

TaitNet T1541 Radio Network **Operations Manual**

MNA-00007-16 · Issue 16 · November 2019

Contact Information

Tait Communications Corporate Head Office

Tait International Limited
P.O. Box 1645
Christchurch
New Zealand

For the address and telephone number of regional offices, refer to our website: www.taitradio.com

Copyright and Trademarks

All information contained in this document is the property of Tait International Limited. All rights reserved. This document may not, in whole or in part, be copied, photocopied, reproduced, translated, stored, or reduced to any electronic medium or machine-readable form, without prior written permission from Tait International Limited.

The word TAIT and the TAIT logo are trademarks of Tait International Limited.

All trade names referenced are the service mark, trademark or registered trademark of the respective manufacturers.

Disclaimer

There are no warranties extended or granted by this document. Tait International Limited accepts no responsibility for damage arising from use of the information contained in the document or of the equipment and software it describes. It is the responsibility of the user to ensure that use of such information, equipment and software complies with the laws, rules and regulations of the applicable jurisdictions.

Enquiries and Comments

If you have any enquiries regarding this document, or any comments, suggestions and notifications of errors, please contact your regional Tait office.

Updates of Manual and Equipment

In the interests of improving the performance, reliability or servicing of the equipment, Tait International Limited reserves the right to update the equipment or this document or both without prior notice.

Intellectual Property Rights

This product may be protected by one or more patents or designs of Tait International Limited together with their international equivalents, pending patent or design applications, and registered trade marks: NZ 409837, NZ 409838, NZ 415277, NZ 415278, NZ 508806, NZ 530819, NZ 534475, NZ 547713, NZ 577009, NZ 579051, NZ 579364, NZ 586889, NZ 610563, NZ 615954, NZ 700387, NZ 708662, NZ 710766, NZ 711325, NZ 726313, NZ 733434, NZ 593887, AU 2015215962, AU 339127, AU 339391, AU 2016259281, AU 2016902579, AU 2017204526, EU 000915475-0001, EU 000915475-0002, GB 1518031.8, GB 1710543.8, GB 2532863, US 14/834609 Div. no 1, US 15/346518 Div.no 2, US 15/350332, US 15/387026 Div., US 29/614639, US 62/713910, US 62/729478, US 62/730107, US 62/767041, US 62/781642, US 62/778238, US 9794940 Div. no 1, US 20150085799, US 20160044572, US 20160057051, US 20170142646, US 20170055267 Div. no 2, US 20180006844, US 640974, US 640977, US 698339, US 702666, US 7758996, US 8902804, US 9107231, US 9504034, US 9559967.

Environmental Responsibilities



Tait International Limited is an environmentally responsible company which supports waste minimization, material recovery and restrictions in the use of hazardous materials.

The European Union's Waste Electrical and Electronic Equipment (WEEE) Directive requires that this product be disposed of separately from the general waste stream when its service life is over. For more information about how to dispose of your unwanted Tait product, visit the Tait WEEE website at www.taitradio.com/weee. Please be environmentally responsible and dispose through the original supplier, or contact Tait International Limited.

Tait International Limited also complies with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive in the European Union.

In China, we comply with the Measures for Administration of the Pollution Control of Electronic Information Products. We will comply with environmental requirements in other markets as they are introduced.

Contents

Preface	11
About This Manual	11
Typographical Conventions	11
Special Information	11
Associated Documents	12
Publication Record	12
Part A: Using the Network Management Terminal	17
1 Introduction	19
2 Running the NMT	20
2.1 Starting the NMT	20
2.2 Running a Client NMT	21
3 Main Window	22
3.1 Viewing Nodes and Sites	22
3.2 Accessing NMT Menus	23
Node Menu	23
Site Menu	23
3.3 Configuring the Main Window Display	24
3.4 Status Bar	24
Part B: Fleet Management	27
1 Managing Fleets	29
2 Templates	30
Service Area Templates	30
Call Rights Templates	32
3 Choosing a Numbering Scheme	33
3.1 MPT 1327 Addresses	33
3.2 MPT 1343	34
MPT 1343 Group Numbers	35
Range of Available Numbers	36
Number Conversion	37
3.3 CPSx	39
Fleet Size	40
The L, M and S Parameters	40
Fleet Numbers	41
Benefits	41
Configuring the NMT to use CPSx numbering	41
3.4 ANN	42
Fleet Size	42
The FPP and MEP Parameters	42
Prefix	43
Fleet Number	43
ANN Numbers	43
Assigning L to a fleet	43
Assigning R/rr to a fleet	44
MPT 1327 to ANN Conversion	46
ANN to MPT 1327 Conversion	47
Benefits	47
Configuring the NMT to use ANN numbering	47
3.5 Developing an Allocation Policy	48

4	Charging	49
4.1	Charging and Billing Options	49
4.2	Charging Functions	49
5	Storage and Integrity of Fleet Data	50
Part C: Network Management		51
1	Configuring Site Operation	53
1.1	Defining Control Blocks	53
1.2	Defining Control Schedules	53
2	Configuring Radio-to-Telephone Call Routing	54
	Stage 1: Define Port Groups	55
	Stage 2: Assign Each Phone Port to a Port Group	55
	Stage 3: Define Outphone Tables	55
	Stage 4: Repeat the Above for Other Nodes	56
	Stage 5: Assign an Outphone Table to Each Radio	56
3	Configuring Telephone-to-Radio Dialling	57
3.1	Standard Options	57
	MPT 1327	57
	Fleet Dialling	57
3.2	Configurable Options	57
	Incoming Routing	57
	Phone Alias	58
4	Backing Up NMT Files	59
5	Routine Maintenance	60
Part D: File Menu		61
1	Login and Logout	63
1.1	Login	63
1.2	Logout (new in version 4.07.00)	63
2	About	64
3	Network View	65
3.1	Network View Menu	66
3.2	Node Icon Box	67
3.3	Site Icon Box	68
4	System Backup and Restore	69
4.1	Performing a System Backup	69
4.2	Performing a System Restore	70
Part E: Configuration Menu		71
1	Change Password	73
2	Users	74
2.1	Adding a User	75
2.2	Changing Password or Access Rights	76
2.3	Removing a User	77
3	Alarms	78
3.1	Viewing Individual Alarm Configurations	78
3.2	Configuring an Alarm	79
3.3	Storing Alarms in the Alarm Log File	82
3.4	Alarm Log File Format	82
3.5	Sending Alarms by Email	83
3.6	Alarm Email Format	85
	Headers	85

Body	85
3.7 Sending Alarms to a Serial Port	85
3.8 Alarm Serial Port Format	86
3.9 Testing Alarm Destinations	87
3.10 Alarm Types	87
4 Call Records	95
4.1 Viewing Call Record Download Settings	95
Download Settings	96
4.2 Configuring Call Record Downloading	97
4.3 Resetting Call Record Downloading	97
4.4 Call Records File Format	98
Interpreting Call Types	100
Interpreting Call Close Reasons	101
Interpreting Call End Reasons	102
4.5 MPT Special Idents	113
Caller Locations	113
5 Network	114
5.1 Adding a Node and Sites	114
5.2 Editing a Node and Sites	115
6 Properties	116
6.1 General	116
Setting the Server NMT	116
Alert if Connection to Server is Lost	117
Network Integrity Checking	117
Setting the Language	117
Enable Logging	118
Enable Diagnostic Tab	118
6.2 Fleet Addressing Mode	118
Displaying leading zeroes for MPT 1327 addresses	119
Limiting the Prefix Range	119
Specifying a Default Fleet Size	119
Specifying L, M and S	120
Specifying FPP and MEP	120
6.3 Backups	120
Viewing System Backup Configuration	120
6.4 SQL Interface	122
7 Advanced Options	123
7.1 Menu Bar Option for Resolving Time Zone Problems	123
Menubar.TimeZone=true	123
7.2 Menu Bar Option for Translators	123
Menubar.EditTranslations=true	123
7.3 Menubar Option for Customer Specific Import Tools	123
Menubar.ImportTools=true	123

Part F: Fleets Menu 125

1 Working With Templates	127
1.1 Setting Up a Call Rights Template	127
Call Rights	128
1.2 Setting Up a Service Area Template	130
1.3 Modifying Templates	131
2 Adding a New Fleet	132
2.1 Setting Up the Fleet	132
2.2 Adding Radios	135

Adding the First Radio	136
Adding a Block of Radios	139
2.3 Adding a Group	140
Normal Group	140
Registration-Based Group	141
Radio Controlled Group Affiliation (RCGA)	143
Acknowledged Group	143
Local Group	144
Late Entry to Group Calls (Repeat Go-To-Channel Messaging)	145
3 Maintaining Fleets	147
3.1 Viewing Fleet Summary Information	147
3.2 Modifying Fleet Details	148
3.3 Checking for Out of Service Fleets	149
3.4 Barring and Unbarring a Fleet	149
3.5 Removing a Fleet	150
4 Maintaining Radios	151
4.1 Finding a Radio	151
4.2 Modifying a Radio Configuration	151
Configuring Access to the Trunked Network	152
Configuring Telephone Access	153
Mobility	153
Providing a Phone Alias	155
4.3 Changing Service Area	156
4.4 Authenticating Radios	157
Setting Up Authentication	157
Viewing Authentication Results for a Single Radio	158
Viewing Authentication Results for All Radios in a Fleet	159
4.5 Regrouping a Radio	160
4.6 Stunning a Radio	161
Recovering a Radio	162
4.7 Barring a Radio	162
4.8 Editing Multiple Radios	163
5 Maintaining Groups	164
5.1 Modifying a Group Configuration	164
General Options	164
Service Area	167
Tracked Units	168
5.2 Editing Multiple Groups	169
6 Batch Validation	170

Part G: Charging Menu 171

1 Viewing Charge Schemes	173
2 How Call Charges Work	174
2.1 Control Channel Calls	174
Pricing Example for Control Channel Call	174
2.2 Traffic Channel Calls	175
Pro Rata Pricing Example	175
Round Up Pricing Example	175
Round Down Pricing Example	176
3 Creating a Charge Scheme	177
4 Setting the Scale of Charges	179
4.1 Editing the Default Call Type Charge	180
4.2 Creating a Call Type Charge	180

4.3	Creating Call Type Charges for Outgoing Phone Calls	180
4.4	Creating Call Type Charges For Group Calls	181
4.5	Checking a Scheme Using the Test Button	181
5	Viewing Charge Schedules	182
6	Editing a Charge Schedule	183
7	Generating Charge Records	184
7.1	Charge Records File Format	185
8	Producing a Fleet Charges Report	187
9	Producing a Not Chargeable Report	189

Part H: Reports Menu 191

1	Site Summary	193
2	Site Registration Summary	195
3	Fleet Status	197
4	Site Statistics	199
4.1	Obtaining Site Statistics	199
4.2	Viewing Summary Information	199
4.3	Viewing Site Statistics as Graphs	200
	Viewing Site Occupancy	200
	Viewing Control Channel Statistics	201
5	DAS Statistics	203
5.1	Obtaining DAS Statistics	203
5.2	Viewing Summary Information	203
5.3	Viewing DAS Occupancy	204
6	Alarms	206
7	Call Records	208
7.1	Monitoring Call Records	208
7.2	Viewing Call Record Details	211
	Start Time	211
	Call Type	212
	Call Duration	212
	Location of Caller	212
	Subscriber	212
	Miscellaneous	213
	Audio Resources	214

Part I: Node Menu 217

1	Node Status	219
1.1	Node Overview	219
	Primary Node area and Backup Node area	219
	Interpreting the DAS State and In-service/Failed ports fields with Dual DAS (Option 4)	221
	High Availability Nodes	221
	Changing the Node State	222
1.2	Node Database	223
	Primary Node Area and Backup Node Area	223
	Backup/Restore Configuration Area	224
1.3	TCP/IP Connections	225
1.4	Internode Link Status	226
2	DAS Monitor	229
2.1	Monitoring the DAS	229
2.2	Entering the Type and Connection of a Port	231
2.3	Resetting a Port	234
	Disabling a Faulty Port	234

3	Node Configuration	235
	Features Area	235
	Alarm Settings Area	236
	High Availability Node Monitoring Area	237
	DAS Configuration Area	237
4	Control Blocks	239
4.1	Viewing a Control Block	239
4.2	Editing a Control Block	240
4.3	Call Time Limit	240
	Dynamic Call Time Limit (Pre Site 7 Only)	240
	Indefinite Call Time Limit	241
	Call Time Limit for Emergency Calls	241
4.4	Other Timers and General Settings	242
4.5	Enabling Site Features	244
4.6	Configuring Queuing	250
4.7	Setting the FrameLength	253
	Dynamic Framelengths	253
5	Outphone Table	255
5.1	Viewing Routing Information	255
5.2	Defining Call Routes	257
	Defining a Call Route to a PABX at Another Node	257
	Routing PSTN Calls By Area Code	257
5.3	Setting Up Short Form Dialling	257
5.4	Setting Up Network Operator Dialling	258
6	Dialling Rules	260
7	Port Groups	261
7.1	Setting General Options	262
	Incoming Phone Calls	262
	Outgoing Phone Calls	263
7.2	Setting Up Incoming Routing	263
	How Incoming Dialling Works	264
8	Internode Link Configuration	265
8.1	Configuration of Internode Links	265
9	Dispatcher Configuration	268

Part J: Site Menu 271

1	Site Status	273
1.1	General Overview	273
	Active Link Area	273
	Primary Link Area and Backup Link Area	274
1.2	Channel Status	276
1.3	DAS Port Status	277
1.4	SCU/SMM Status	279
	SCU/SMM Status Area	279
	RAM Banks Area	280
	Setting SMM Digital Outputs	284
	Monitoring Digital Inputs	285
1.5	TNDS Status	285
2	Site Configuration	288
2.1	General Site Options	288
	Link Settings Area	288
	Alarm Settings Area	290
	Channel Settings Area	290

2.2	Setting Up Channels	292
2.3	First Aid for Channel Problems	293
	Resetting a Channel	293
	Removing a Channel from Service	293
	Removing the Control Channel from Service	294
2.4	Setting Up Adjacent Sites	294
	Vote Now Area	294
	Pooled Channels Area	296
2.5	Defining a Control Schedule	297
2.6	Setting up TNDS Channels	298
	Auto Extending Frame Size	300
	Time Shared Data Channels	301

Part K: Special Options303

1	Vote Now	305
1.1	Configuration	305
1.2	Forcing Radios onto another Site	306
1.3	Alternate Vote Now Method for Networks with Dual Control Channel Sites	306
2	Alternate Partition Mode	308
2.1	Switching to Alternate Partition Mode	308
2.2	Viewing APM Status	308
3	Pooled Channels	309
3.1	Setting Up Pooled Channels	310
3.2	Pooling Interfering Channels	310
4	Full Duplex Operation	311
4.1	Setting Up Full Duplex Operation	312
5	SQL Interface	313
5.1	Configuration	313
	Using Extended T1541 Call Record Formats with SQL	314
	Disabling Node and Site Status SQL updates every second	315
	Node Configuration for SQL	315
5.2	Remote Access to the NMT Dataset	315
	Remote Control of the NMT Dataset	315
5.3	Access Control	316
5.4	MySQL Data Types	316
	Field encoding	317
5.5	Data Tables	319
	The Fleets table	319
	The Units table	323
	The ESNs table	327
	The Diversions table	328
	The Registrations table	329
	The RCGA (radio controlled group affiliation) table	330
	The Stun table	332
	The Groups table	332
	The Nodes table	334
	The Sites table	336
	The CRTs table	337
	The SATs table	339
	The Dialling Rules table	340
	The Outphone Tables table	340
	The Charge Schedules table	341
	The CallRecords table	342

The Alarms table	346
The Commands table	348
The Audit table	348
The Status table	349
5.6 Description of the Commands	350
ADD_UNIT & MODIFY_UNIT	350
DELETE_UNIT	352
DIVERT_UNIT	353
POLL_UNIT	353
GET_UNIT_RI	353
GET_UNIT_DI	353
STUN_UNIT	354
REGROUP_UNIT	354
GET_UNIT_RCGA	354
MODIFY_UNIT_RCGA	354
MODIFY_UNIT_ESN	355
ADD_GROUP & MODIFY_GROUP	355
DELETE_GROUP	356
MODIFY_FLEET	357
6 Simple Network Management Protocol	358
Traps	358
Management Information Base Files	358
6.1 SNMP Implementation in the Node	358
6.2 Node MIB Files	359
6.3 Starting and Stopping the SNMP Daemon	359
6.4 Using SNMP Command Line Tools	359
6.5 Using snmpget	360
6.6 Using snmptable	360
6.7 Receiving Traps	360
Glossary	363
Index	379

Preface

This issue of the T1541 Operations Manual is written for use with Q1541NC Node Controller and Q1541NMT Network Management Terminal software versions 4.11.xx. Where significant differences from earlier versions of software occur, this is indicated in the text.

It has been updated to include any differences in behaviour by sites running Site 7 software. If the software version of Q1541NC and Q1541NMT is newer than 4.11.00, please consult the relevant software release notes to check whether this manual is still current.

About This Manual

If you are new to the NMT, start with Part A: Using the Network Management Terminal.

If you use the NMT to enter customer data, concentrate on Part B: Fleet Management and Part F: Fleets Menu.

If you maintain and configure the network, use Part C: Network Management to gain an overview, then use the subsequent menu-based parts for more detail.

If your network has non-standard options, look in Part K: Special Options for information about them.

In general, if what you are looking for isn't where you expect it, look it up in the index!

Typographical Conventions

Shift-click means "Hold down the Shift key, move the mouse pointer to the correct place, then click on the left-most mouse button."

Select File > Configuration means "Select the File menu (for example by clicking on the menu name in the menu bar), then select Configuration from the list that appears."

Select Node > Configure means "In the main window, click on the node you want to work with, then click the right-mouse button and select Configure from the pop-up menu that appears." This node is referred to in the documentation as the 'selected node'.

Special Information

In this manual, icons together with special formatting draw attention to special information and indicate its nature and purpose.



Important: Important items need to be carefully read and understood.



Note: Notes give additional related information to broaden your knowledge or make you aware of other possibilities.



Tip

Tips indicate ways to save time or increase your effectiveness.

Associated Documents

The System Manual (MNA-00019-xx) provides system-level descriptions of the network and general information to assist technicians in network installation and configuration.

The T1541 Installation Manual (MNA-00008-xx) describes system installation, and includes installing Solaris, serial ports, the Node controller, the NMT, network time protocols, and the DAS controller. It also describes system features such as NPD's on dispatcher, serial port server pin connections and the T1561-08 conventional gateway.

Technical Notes are published from time to time on the Tait technical support web (password access only) to describe applications for Tait products, to provide technical details not included in manuals, and to offer solutions for any problems that arise.

Publication Record

Part No	Date	Description
M1541-20-805-100	3/2001	First release of the manual. Describes V1.0.0 of the T1541 node and the T1541-20 Network Management Terminal.
M1541-20-805-110	6/2001	Describes V1.1.x of the T1541 node and the T1541-20 Network Management Terminal. Multi-node validation, templates, CPSx numbering, full duplex local calls, service periods, and T1541-25 database server added.
M1541-20-805-200	11/2001	Describes V2.0.x of the T1541 node and the T1541-20 Network Management Terminal. Changes to Main window layout. Configuration menu changes, including additional Features configuration.
M1541-20-805-210	3/2002	New File menu option, System backup. LMS numbering changed to CPSx numbering. New tab under File > Configuration > Auto Backups. Control Block features removed from File > Configuration > Advanced > Features.
M1541-20-805-211	12/2002	New control block parameters, including the transmit inhibit on busy channel feature and pressel messages. New divert on busy radio feature. Valid for versions 2.1.x.
M1541-20-805-300	12/2003	Describes V3.0.x of the T1541 node and the T1541-20 Network Management Terminal.
M1541-20-805-310	03/2004	Separated Part D: Network Configuration into Part D: File Menu and Part E: Configuration menu. All other chapters renumbered accordingly. Describes V3.1.x of the T1541 node and the T1541-20 Network Management Terminal.
M1541-20-805-311	04/2004	Updates to Part I: Node Menu, DAS Monitor section
M1541-20-805-320	06/2004	Updated Part F: Fleets Menu to describe editing and polling multiple radios.
MNA-00007-01	07/2005	Re-released and updated for version 4.00 software.
MNA-00007-02	10/2005	Re-released and updated for version 4.01 software.
MNA-00007-03	05/2006	Updated for version 4.02 software.

Part No	Date	Description
MNA-00007-04	02/2007	Updated to show differences in behaviour between sites running Site 7 software and pre Site 7 software.
MNA-00007-05	06/2007	Updated for version 4.04 software. TNSD and SNMP information added.
MNA-00007-06	12/2007	Updated for version 4.04.02 software. Service area templates can now be created for groups as well as units. Edit multiple units updated. Edit multiple groups added. Control channel statistics can now be displayed in graph form. Call record details window now has Next and Previous buttons.
MNA-00007-07	08/2008	Updated for version 4.05 software. Two TNSD features added: Auto Extended Frame Size and Time Shared Data Channels.
MNA-00007-08	11/2008	Updated for version 4.06 software. <ul style="list-style-type: none"> ■ Table on page 45 updated ■ Table on page 81 updated ■ Call Record Configuration window updated ■ TCP/IP Connections window updated ■ Call end reasons updated
MNA-00007-09	06/2009	Updates for software version 4.07.00 and later: <ul style="list-style-type: none"> ■ Login and Logout added ■ Available Fields updated ■ Alarm Types section: alarms added and updated ■ Call end reason 153 added ■ Advanced Options added ■ Call Rights at Site updated ■ Report Partially Successful Group SDM added ■ Node State updated ■ Control blocks Local Only Group Calls and Other Group Calls updated ■ Enable ALLI Calls updated
MNA-00007-10	12/2009	Updates for software version 4.07.02 and later: <ul style="list-style-type: none"> ■ Backing Up NMT Files updated ■ Network View updated ■ Viewing Call Record Download Settings updated ■ Table in Call Records File Format updated ■ Table in Interpreting Call Close Reasons updated ■ Table in Interpreting Call End Reasons updated ■ Part F: Fleets Menu updated for maximum allowed tracked radios ■ Notes added to "Acknowledged Group" on page 143 ■ Note added to "Acknowledged Group" on page 165 ■ "Warning" on page 171 added ■ Part G: Charging Menu updated ■ Creating Call Type Charges For Group Calls updated ■ Checking a Scheme Using the Test Button added ■ Queue on page 212 updated ■ Audio Resources on page 214 updated ■ Note added on page 215 ■ Tip added to Pressel Message Generates Call Record ■ Note added to "Call Duration" on page 269 ■ Intersite Link Speed on page 288 updated ■ Using Extended T1541 Call Record Formats with SQL added ■ The CallRecords table field descriptions updated ■ Full Off-Air Call Setup (FOACSU) updated

Part No	Date	Description
MNA-00007-11	06/2010	Updates for software version 4.08.00 and later: <ul style="list-style-type: none"> ■ "About" on page 64 added ■ Table in "Interpreting Call End Reasons" on page 102 updated ■ Footnote added on page 217 ■ "Node Status" on page 219 updated ■ "Node Configuration" on page 235 updated ■ "High Availability Node Monitoring Area" on page 237 added ■ Registered Units added to "Site Status" on page 273 ■ "Node Configuration for SQL" on page 315 added
MNA-00007-12	03/2011	Updates for software version 4.08.01 and later: <ul style="list-style-type: none"> ■ New column (Password changed) added to User Configuration window - "Users" on page 74 ■ Note added to "Changing Password or Access Rights" on page 76 ■ New column (Email) added to Alarm Configuration window - "Viewing Individual Alarm Configurations" on page 78 ■ New field (Send email for alarm) added to Edit Alarm window - "Configuring an Alarm" on page 79 ■ New alarms 55 and 56 added to "Alarm Types" on page 87 ■ "Specifying FPP and MEP" on page 120 updated ■ Node State table updated, page 219 ■ DAS State table updated, page 221 ■ "Interpreting the DAS State and In-service/Failed ports fields with Dual DAS (Option 4) High Availability Nodes" on page 221 updated ■ Note added to "DAS Configuration Area" on page 237 ■ Tip added to "Emergency Preemption" on page 246 ■ Tip added to "Queue for Busy Phone Ports" on page 263 ■ "Dispatcher Configuration" on page 268 updated ■ Note added to "Enable Slow Poll Mode" on page 289 ■ "The Nodes table" on page 334 updated ■ "Starting and Stopping the SNMP Daemon" on page 359 updated
MNA-00007-13	10/2011	Updates for software version 4.09.00 and later: <ul style="list-style-type: none"> ■ "Running a Client NMT" on page 21 added ■ "Alarms" on page 78 updated ■ "DAS Configuration Area" on page 237 updated ■ Note added to "Dual DAS (High Availability type: Option 4)" on page 238 ■ "Process All Registration Requests" on page 249 added ■ "General Site Options" on page 288 updated ■ "Setting up TND S Channels" on page 298 updated ■ "Use Alternate Vote Now Method for Dual CC" on page 296 added ■ "Alternate Vote Now Method for Networks with Dual Control Channel Sites" on page 306 added

Part No	Date	Description
MNA-00007-14	09/2013	Updates for software version 4.10.00 and later: <ul style="list-style-type: none"> ■ Screen shots updated for new logo ■ "Network View" on page 65 updated ■ "Available Fields" on page 81 updated ■ "Display Alarm on NMT Window" on page 81 updated ■ DMM alarms (61 to 67) added to "Alarm Types" on page 87 ■ Call end reasons 193 and 194 added to "Interpreting Call End Reasons" on page 102 ■ "Adding a Node and Sites" on page 114 updated ■ Note added to "Site Menu" on page 271 ■ "Queue Depth (0 = use default)" on page 291 updated ■ "Inhibit Control Channel" on page 293 updated ■ "Adjacent Sites" on page 295 updated ■ "Vote Now" on page 305 updated ■ Pooled Channels - definition updated on page 309 and page 369 ■ Pooled Channels - Note added to page 310
MNA-00007-15	11/14	Updates for software version 4.11.00 and later: <ul style="list-style-type: none"> ■ "Status Bar" on page 24 added ■ Screen shot updated and first Note added to "Sending Alarms by Email" on page 83 ■ Alarms 68 to 73 added to "Alarm Types" on page 87 ■ "General" on page 116 screen shot updated, new parameters added ■ Note added to "Viewing Control Channel Statistics" on page 201 ■ "Alarm Priority" on page 269 replaces "Allow Alarm" ■ "Configuration" on page 313 updated

Part A: Using the Network Management Terminal

This part introduces you to the Network Management Terminal (NMT) and to its user interface.

Topics

- Introduction
- Running the NMT
- Main Window

1 Introduction

The T1541-20 NMT is your window into the TaitNet trunked radio network. It lets you manage the network and the fleets of radios that use it. Network management involves monitoring, controlling, configuring, and maintaining the network. Fleet management involves creating fleets and defining their radios' network access.

An NMT can be sited locally or remotely. A local NMT is close to a node and connected to it via a hub. A remote NMT can be sited virtually anywhere. It is connected via a hub and router to a wide area digital data network. Alternatively, NMTs for occasional use can have a dial-up connection through the PSTN to a node's router.

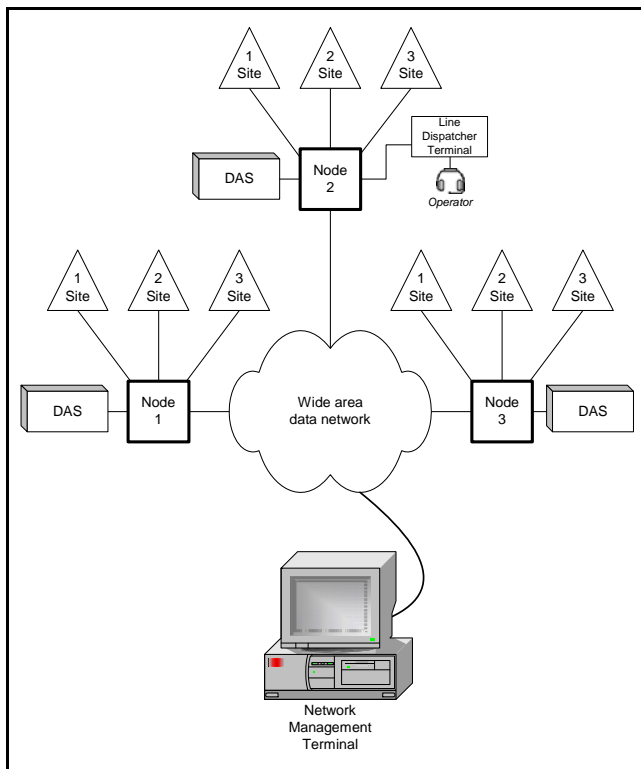


Figure 1: Example Network with Remote NMT

This NMT is for networks with T1541 nodes; it can only be used with T1540 nodes after they have been upgraded with T1541 node software. Networks with T1730 nodes (network management modules) need a T1772 NMT.

2 Running the NMT

2.1 Starting the NMT

To run the NMT program, follow these steps.

1. Select Start > Programs > Tait Applications > TaitNet NMT > TaitNet NMT. Alternatively, double-click the NMT icon on the desktop.



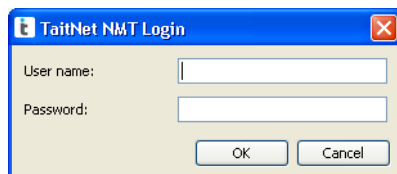
The splash screen will display after a few seconds and informs the user of progress during the startup sequence (note that the software version number is also displayed on your screen).



NMT License

Your computer must have a valid license to run the NMT software. This license is specific to that computer and the computer must have a fixed IP address.

Once the NMT program has started, the TaitNet NMT Login window is displayed. At the same time, if the NMT is a Server NMT connected to an SQL database, in the background you will see the NMT uploading Registration, Diversion and RCGA data from the node¹.



2. Enter your user name and password (the default name is 'admin' and the default password is 'tait'), then press OK to display the main window (see "Main Window" on page 22).



Important: Tait recommends setting NMT users up with their own username and giving them access rights appropriate to their responsibilities. You should also

1. This feature is added in v4.07.02. If using NMT software earlier than this and you need to upload the SQL Registration, Diversion and RCGA databases from the node, select Reports > Fleet Status, click in the 'Name' window, select all fleets using 'Ctrl+A', then click 'Update'.

change default passwords as early as possible, for security reasons. For more information, see “Users” on page 74.

3. To close the NMT software, select File > Exit. You are asked for confirmation. (Generally, the server NMT should be left running. When the NMT that is configured to send Alarm messages (by Email or via the serial port) is down, these messages are lost.)

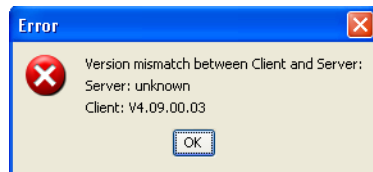
2.2 Running a Client NMT

For details on how to configure the NMT as a Client, refer to “General” on page 116.

It is essential to use the same version of software on both the Server NMT and its Client NMTs .

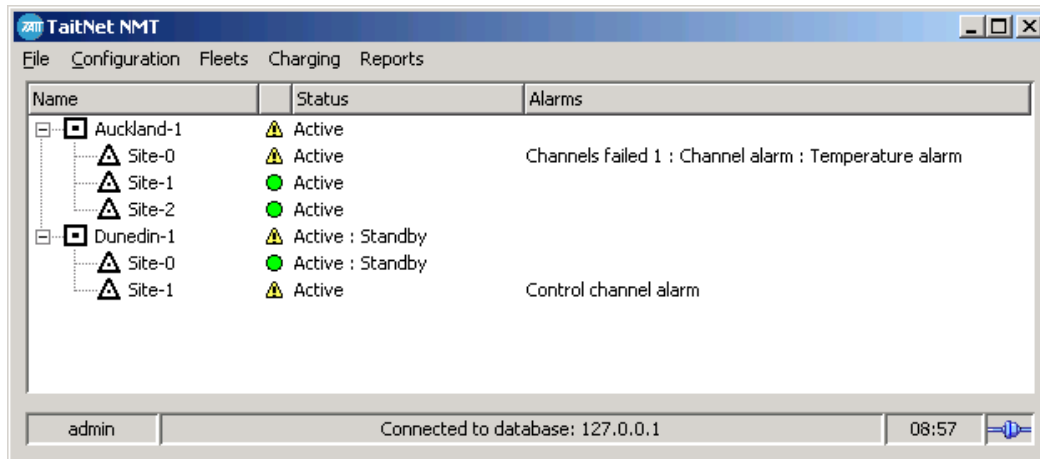
A Client NMT can be considered as a GUI interface to the Server NMT to which it is connected. Most configuration and fleet information is stored on the Server NMT. A Client NMT cannot operate without first connecting to the Server NMT to download the configuration and fleet data it requires. The Client NMT caches this data locally for a limited period of time. Most cached data on the Client NMT is considered stale after 30 seconds, unless it is refreshed.

If your Client NMT software is version 4.09.00 or later and the Server NMT is running a different version of software, then, on launching the Client NMT, once the connection to the Server NMT is established, a dialog box similar to that shown below will display. When the user clicks OK, the Client NMT shuts down.



3 Main Window

The main window provides a graphical view of the nodes and sites in the network and gives you access to all the NMT's menus.



3.1 Viewing Nodes and Sites

- The nodes in the network are displayed as squares.
- If there are no sites shown for a node, double-click on the node. The sites appear as triangles.

Alongside each node or site, a coloured icon indicates its current state. Alongside the icon is a description of that state. The following options can appear.

Icon	State	Description
● (green circle)	Active	The item is functioning. If the item is a node, it is communicating with the NMT, which will receive any alarms that the node sends. If the item is a site, it is communicating with the node.
● (red circle)	Down	The node or site is not functioning or its link is down
⚠ (warning)	DAS down	The DAS connected to the node is down
	<i>n</i> sites down	<i>n</i> sites are not connected to the node or their SMM/SCU is not functioning

3.2 Accessing NMT Menus

The NMT's menu bar gives you access to the File, Configuration, Fleets, Charging, and Reports menus. The commands in these menus affect the NMT or its response to data from the whole network. In addition, there is a Node and a Site menu. The commands in these menus only affect the particular node or site that you selected when accessing the menu.

Node Menu

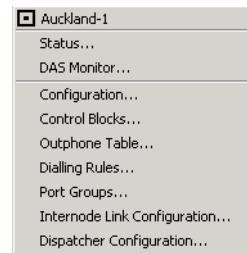
To access the Node menu, follow these steps.

1. In the main window, select a node by positioning the mouse cursor anywhere on the node row, for example over the rectangular node symbol.
2. Press the right-mouse button. The Node menu appears.

The menu heading shows the node symbol and the name of the node.



Note: The manual refers to the procedure of selecting a command from the Node menu as 'Select *Node* > Menu Command'.



Site Menu

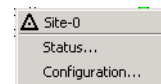
To access the Site menu, follow these steps.

1. In the main window, select a site by positioning the mouse cursor over the triangular site symbol. (You may need to first click on the node symbol to expand it and make its sites visible.)
2. Press the right-mouse button. The Site menu appears.

The menu heading shows the site symbol and the name of the site.



Note: The manual refers to the procedure of selecting a command from the Site menu as 'Select *Site* > Menu Command'.



3.3 Configuring the Main Window Display

You can add nodes and sites to the main window or delete them. Generally, an NMT will be configured to display all the nodes and sites on the network, but it is possible to have an NMT reserved for one part of the network (for example a support technician might have an NMT and only have responsibility for maintaining one or two nodes in the immediate area).

- To add a node and its sites to the main window display, select Configuration > Network and press the Add button. See “Network” on page 114 for more information.
- To remove a node and its sites, select Configuration > Network, then select the node to be deleted and press the Remove button. You are asked for confirmation. This has no direct effect on the node itself.
- To add or remove a site, select Configuration > Network. Select the node you wish to edit and remove the site by deleting the details from the row of the site in question (click on each cell of the table and remove each entry with the delete or backspace keys). See “Editing a Node and Sites” on page 115 for more information.

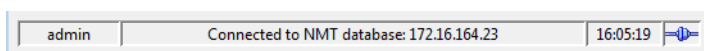


Note: The NMT is automatically connected to all the nodes that appear in the main window and will receive alarms from them. In addition, the nodes and their sites appear in the relevant windows. For example, there is a row in the Call Record Download Configuration window for each node in the main display.



Important: The server NMT that will be used for fleet management must display all nodes in the network, otherwise validation information will be inconsistent between nodes.

3.4 Status Bar



The status bar at the bottom of the main window displays, from left to right:

- The username of the user currently logged in
- A connection status message. The connection monitored depends to the type of NMT:
 - Client NMT: the status of the connection to the Server NMT
 - Server NMT with SQL connection: the status of the SQL connection
 - Server NMT without SQL connection: the status of the loopback connection



Tip

The NMT remembers the size and position of its windows. Re-size and position the main window to suit you. When you close and restart the NMT, it opens the windows at the same position and gives them the same size.

- The current time displayed in 24 hour clock format²
- An icon supplying a visual indication of the connection status

The status message box colour depends on the connection state:

Colour	Connection state
white (background colour)	Connection up and operational
yellow	Connection up but not fully operational
orange-red	Connection down

If the line

```
MainWindow.MemoryUsageBar=true
```

is added to %userprofile%\My Documents\Tait Applications\TaitNet NMT\config\NMT.cfg, and the NMT application restarted, an additional status bar is displayed. This bar is updated every second and displays, from left to right:

- The number of bytes of heap memory currently allocated to the NMT application
- The number of bytes of the currently allocated heap memory that are unused
- The maximum number of bytes of heap memory that can be allocated to the NMT application
- The number of call records downloaded in the previous second
- If the NMT is connected to an SQL Server, the number of transactions queued on the SQL interface

2. This is the same as the time set in the computer on which the NMT is running, unless the NMT has been configured to operate in a different time zone (refer “Menu Bar Option for Resolving Time Zone Problems” on page 123).

Part B: Fleet Management

This part contains introductory and general information on setting up and maintaining fleets.

Topics

- **Managing Fleets**
Introducing fleets, radios, groups, validation and other concepts.
- **Templates**
How a network provider set up templates that reflected the options offered to customers.
- **Choosing a Numbering Scheme**
Different ways of allocating numbers to fleets. Network providers should define a policy *before* going live.
- **Charging**
An overview of charging options and a tutorial showing how to use the NMT to define charge rates and calculate call charges.
- **Storage and Integrity of Fleet Data**
Where fleet management data is stored. How to keep the data consistent.

1 Managing Fleets

NMT operators manage fleets on behalf of the *provider* (often the owner of the TaitNet trunked network). The provider offers network services to *customers*. Generally, there are several options for different sets of call types (local calls, telephone calls, data calls and so on) and different service areas (the whole network, just the main city, just the country, and so on).

When a *customer* contracts for network services, the NMT operator sets up a new fleet for that customer and adds radios and groups to it.

A *fleet* is a named cluster of network numbers, reserved for the customer. Each radio belonging to the customer is programmed with a number from this cluster. Spare numbers are available for the customer's future expansion.

The fleet may for example be a fleet of taxis. Even if the customer does not have a fleet in the ordinary sense of the word (for example if the radios are used by crane operators and freight handlers at a harbour) you still must define a fleet; with the T1541-20 NMT, radios always belong to a fleet.

The fleet can optionally have groups. *Groups* are also network numbers. Radios that belong to a group join in a call made to that group number. A radio has only one individual number but it can belong to many groups.

When you add a radio or a group to a fleet, you configure it in accordance with the option that the provider offered and the customer signed up to. In this way, you control the access that radio has to the network or the way that a group call is set up. Entering the configuration information for a radio or group is known as *validation*. Each node stores a validation record for each radio or group number and sends a subset of that information to its sites.

The service area is part of a radio's validation record. It is that part of the network's coverage area a radio is permitted to operate from. The coverage area is the area where radios can receive signals from the network and the network can receive signals from the radio. This is determined by the number and location of sites in your TaitNet network. The service area is a subset of the network's coverage area. Radios must be within their service area to make or receive calls.

This service area relates only to the location of the radio, it does not limit the area that the radio can make calls to or receive calls from. Service areas can be set up for individual radios and for groups of radios.

What is a Radio?

In this manual, a radio is a mobile or handportable transceiver that is especially equipped to communicate with any trunked radio network based on the open MPT 1327 standard. Equipment such as rural telephones, dispatchers, and lake level monitors that send their results to the network are radios in this sense. Also, Line dispatcher terminals (LDTs) have a radio number. The NMT assigns them call rights and an access level just like any other radio. LDTs are connected by line to the DAS and the node; they do not use the air interface. The network treats them as 'virtual radios'. Radios are also referred to as radio units or units.

Validation

Validation controls user access to the network. The word is used in two ways:

- 1) The process of checking whether a requested call is permitted, and if so allowing it to proceed. The site and the node validate call requests by checking them against their validation record for the calling radio or called group. The site checks all call requests and the node checks intersite call requests.*
- 2) The process of defining the information used in the above checking process. You validate a radio by entering information in the Edit Unit window. See also Batch Validation.*

2 Templates

Call rights templates and service area templates let you combine a set of call rights or a set of sites under a meaningful name and apply them to a radio in a single action. While the trunked network has many features and configuration options, network providers generally market only a few service options, each of which is a combination of network features and configuration options. For each service option, you define a call rights template or service area template to match. This makes defining validation information for the radios and groups in a fleet quicker and less error-prone. Templates also make maintaining validation information easier; you can change the template and globally apply the changes to all radios or groups with that template.

How does a network provider go about deciding on the service options to offer and the templates to define? The following gives a hypothetical example.

A network provides coverage for Metropolis city, Newtown, and the surrounding countryside, see Figure 1. There is a large rural area beyond the town. Highway 1 runs through the city and town. The provider expects business from taxis, courier firms and other mobile organisations, from trucking companies and from rural service industries. Emergency services other than those in the city are likely to become customers of the network.

The network has three nodes; Node 1 is in the city, Node 2 is in the town, and Node 3 is in a small town and serves a large rural area.

The NMT operator set up the following templates. However, the network provider also established a policy that larger customers would be able to negotiate their own variations, should their needs not be covered by the standard service options.

Service Area Templates

Taxi companies in the city would only need city coverage. Those in the town would probably only need town coverage. Long haul truck companies would use the interstate highway. Some customers would be willing to pay extra for full coverage.

The provider set up the following service area templates:

Service Area Template	Coverage
Metropolis City	Node 1, sites 2–8
Newtown	Node 2
Newtown and rural	Node 2 and Node 3
Back country	Node 3
Highway 1	Node 1 and Node 2
All	Node 1, Node 2, and Node 3

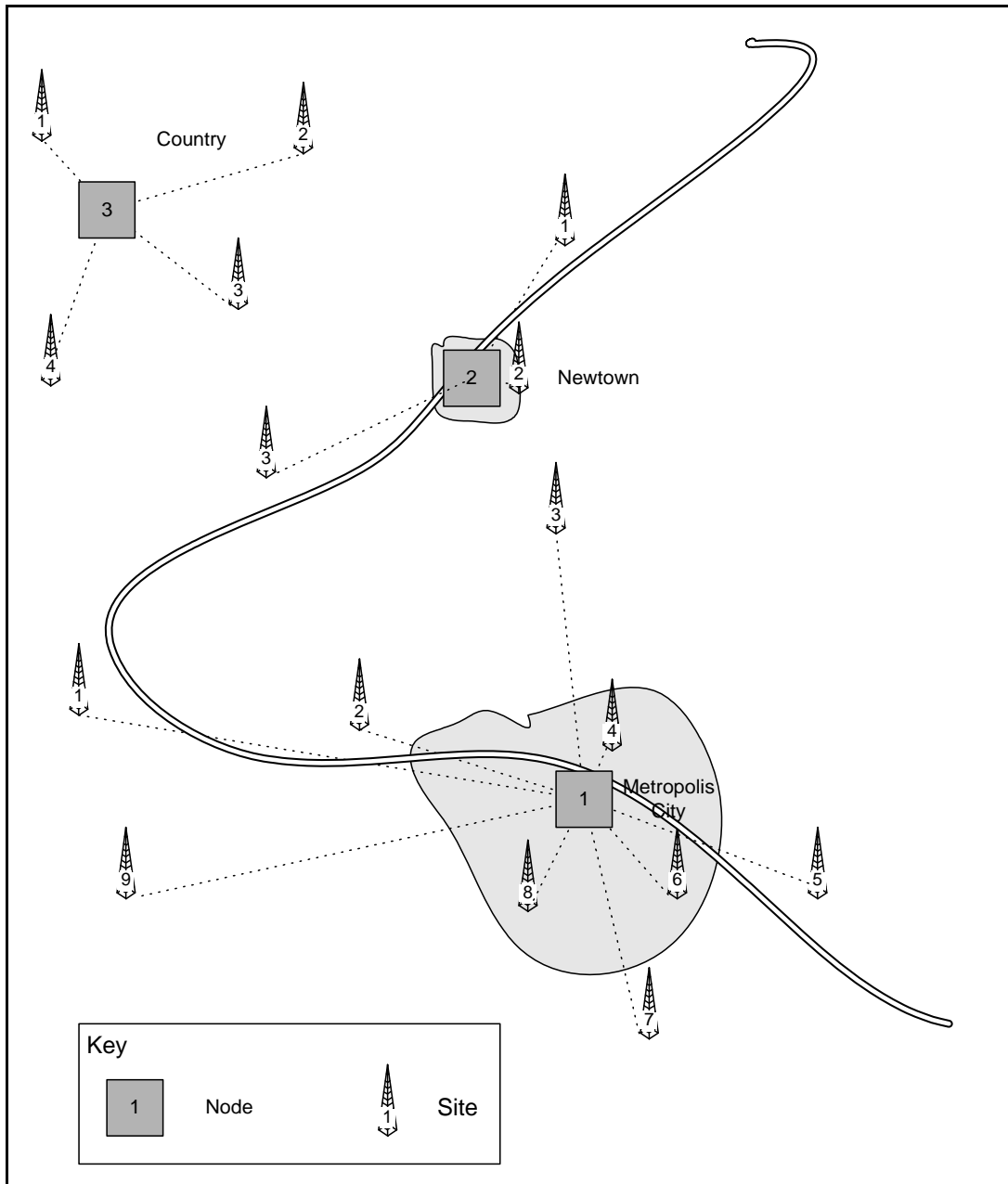


Figure 1: Network Coverage

Call Rights Templates

The provider wanted to provide a basic set of call types, then to define several options for additional types. It was decided to include status calls, call diversion, and intersite individual calls in that basic set. The plan was to include local group calls in the basic set, because they put little burden on network resources, but the call rights template does not distinguish between individual and group calls. To make these distinctions, you need to configure the validation information for each group number. Separate templates were created for PSTN calls only and for PSTN/PABX calls. The provider wanted flexibility in the pricing of connections to an organisation's PABX.

Call Profile	Enabled Call Types
Basic	Status calls, call diversion, intersite calls, group calls, short data messages (single-segment transactions)
PSTN	As for the Basic call profile, plus PSTN calls
PABX	As for the Basic call profile, plus PSTN and PABX calls

3 Choosing a Numbering Scheme

On a TaitNet trunked network, each radio or group is identified in two ways: by an address and a number.

The radio address conforms to the MPT 1327 standard and is used internally by the system, for example:

- The radio transmits the address when requesting a service. This informs the network of the identity of the radio.
- The network checks whether the radio with that address is entitled to use the service.

The radio number is designed to be easier for humans to work with and is used for entry and display, for example:

- A caller dials it to call a radio.
- The network operator selects it to view or edit the service profile for the radio.
- Billing information can be generated against this number

The number that a radio is assigned depends on the numbering scheme that is in use. TaitNet supports three different schemes: MPT 1343, CPSx and ANN.

In each scheme every radio has a unique number which is mapped to a unique MPT 1327 address. Radio and group numbers are grouped into one or more fleets. The schemes are designed to minimize the number of digits that have to be dialled, particularly when the calls are between radios that belong to the same fleet.

The choice of numbering scheme should be made before the initial network installation. All parts of the network, including terminal equipment, must be configured to use the same numbering scheme.

This section explains these numbering schemes.

3.1 MPT 1327 Addresses

MPT 1327 addresses have the format *ppp iiiii* arranged as follows:

Item	Description	Permitted range
ppp	prefix (often referred to as PFX)	000-127
iiii	identity (often referred to as IDENT)	0001-8100

011 0022 is an example of an MPT 1327 address. In the NMT, this address is displayed as 011/0022.

These addresses are designed to minimise number size, so that communications between radios and a control channel on the network require only a small signalling overhead. The binary version of an address only occupies 20 bits (7 for the prefix and 13 for the identity). For more information on MPT 1327 addressing, see Section 4 of the MPT 1327 standard.



Note: A TaitNet trunked network can be set up to use only MPT 1327 addresses rather than a numbering scheme, but this is not normally done and results in limited functionality.

3.2 MPT 1343

MPT 1343 radio numbers have the format **ppp fff uu** or **ppp fff uuu** arranged as follows.

Item	Description	Permitted range
ppp	Number prefix	200 - 327
fff	Fleet individual number (FIN)	2001 - 4999
uu or uuu	Radio unit number	20 - 89 (small fleet) 200 - 899 (large fleet)

201 2001 201 is an example of a number for an individual radio in a large fleet.

MPT 1343 numbering brings the following benefits (see Figure 2):

- To call another member of the same fleet, you simply dial the two-digit or three-digit unit number. For example, to call **211 2222 33**, dial **33**.
- To call a member of a different fleet that has the same prefix, you dial the fleet individual number as well as the radio unit number. For example, to call radio **33** in fleet **2314**, dial **2314 33**.

It is only when you need to call a member of a different fleet with a different prefix, that you need to dial the full MPT 1343 number, for example **207 2001 33**.

For more information on MPT 1343 numbering, see “Section 8.2.1, Network Numbering Structure”, in the MPT 1343 Performance Specification.

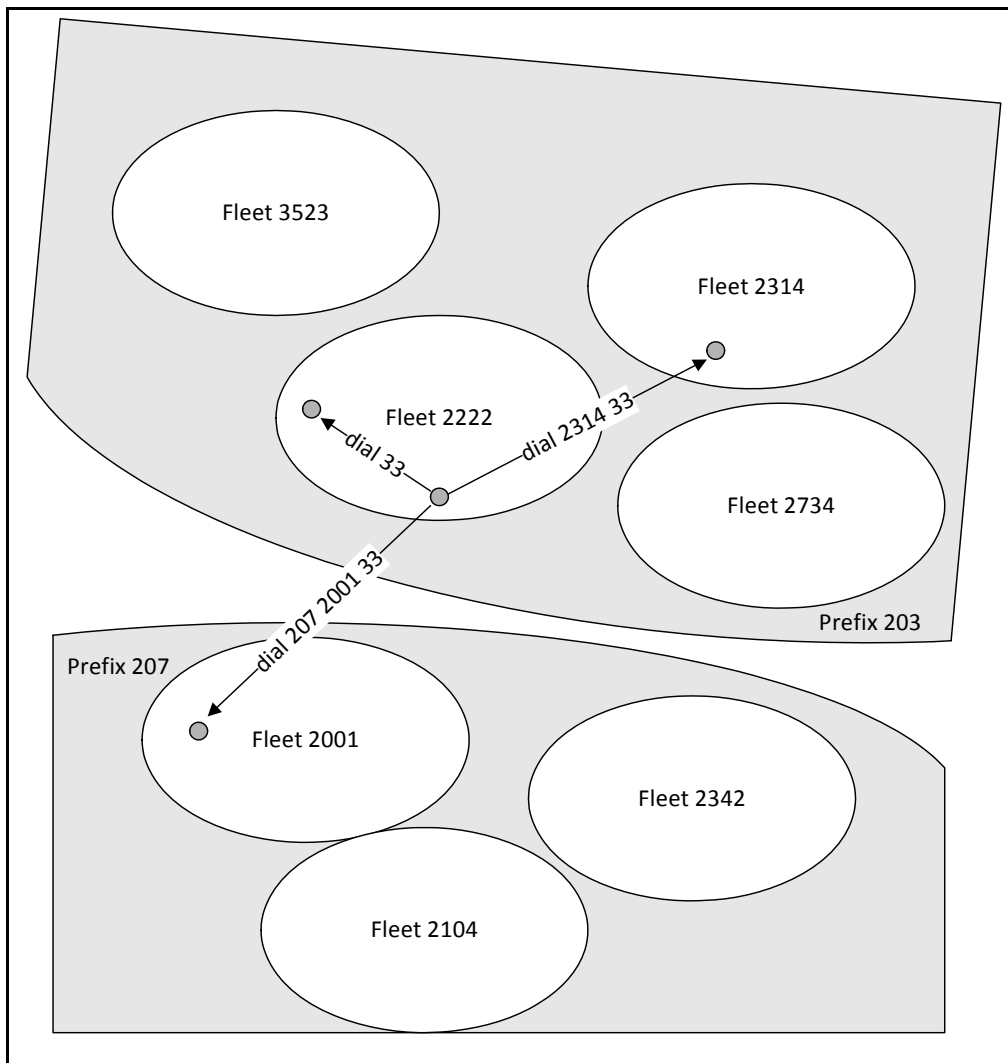


Figure 2: Using MPT 1343 numbers to dial other radios

MPT 1343 Group Numbers

So far, we have only referred to numbers for individual radios. The MPT 1343 standard also specifies number ranges for groups of radios. You dial a group number to make a conference call or a broadcast call.

This means that each fleet has at least two fleet numbers unique to it:

- Fleet Individual Number, used to dial individual radios from outside the fleet
- Fleet Group Number, used to dial groups of radios from outside the fleet.

Numbers for groups are formed in the same way as numbers for individual radios, except for the ranges available for the fleet number and the group numbers:

ppp ffff gg or ggg

Item	Description	Permitted range
ppp	Prefix	200 - 327
ffff	Fleet group number (FGN)	5000 - 6050
gg or ggg	Group number	90 - 99 (small fleet) 900 - 998 (large fleet)

201 5001 91 is an example of a group number for a small fleet.

Range of Available Numbers

A total of 761,746 unique numbers for individual radios are available under the MPT 1343 system. These are divided among 127 prefixes, each with 5,998 individual numbers. Figure 3 shows an example of how the blocks of numbers for a fleet of 700 radios and 100 groups fit into the total range available within one prefix.

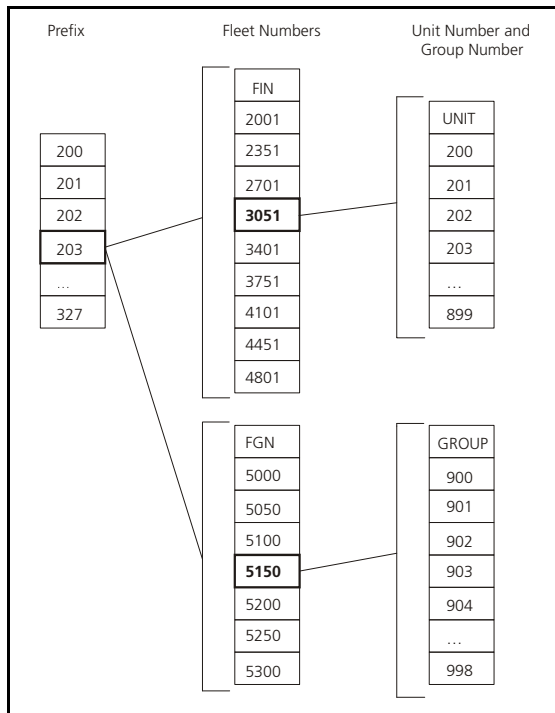


Figure 3: Number Ranges for one Prefix



Note: While all prefixes, unit numbers and group numbers within the defined range are available, only some fleet numbers are. For example, if the fleet for FIN 2001 has 700 units, then the next available FIN is $2001 + 700/2 = 2001 + 350 = 2351$. Every two radios in a fleet use up one fleet number.

Number Conversion

TaitNet networks, like most trunked networks following the MPT standard, need to convert numbers between the systems. Figure 4 gives an overview of this process:

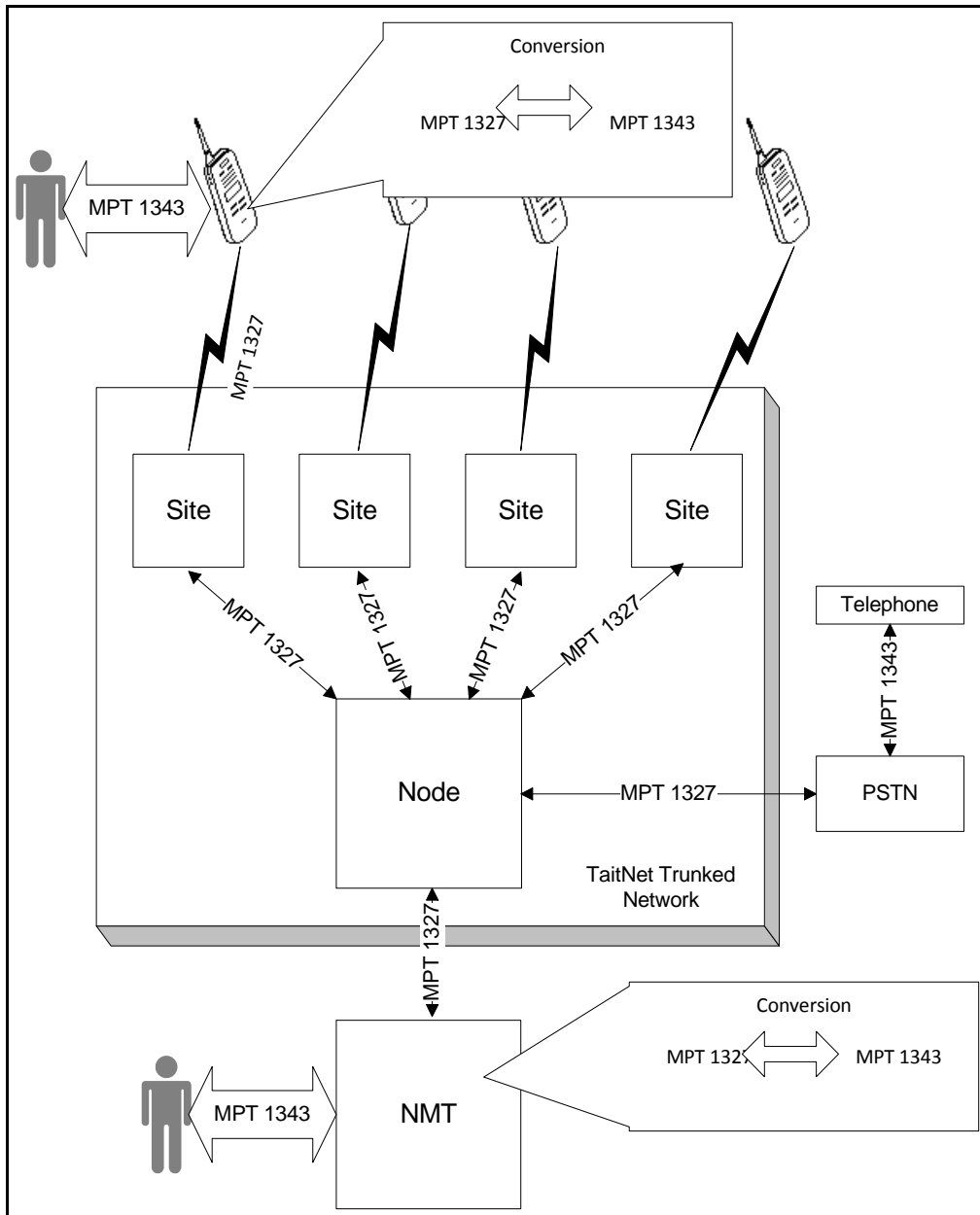


Figure 4: Use of MPT Numbering in the Network

A radio uses the MPT 1327 scheme when it sends a signal to a site. The node uses the same scheme when it identifies the radio to which validation information applies. However, the radio user dials MPT 1343 numbers when making calls, and the network operator uses MPT 1343 numbers when allocating numbers to a fleet.

The radio and the NMT convert numbers between the two schemes whenever this is needed, for example to display the MPT 1343 number of a calling radio or to request a call to the radio that the radio user dialled. This conversion is the same for the numbers of groups as for numbers of individual radios.

A simple formula is used to convert from MPT 1343 to MPT 1327 (Figure 5), but a look-up table is necessary for conversions in the other direction (Figure 6), because the result varies for any particular number, depending on the way the fleets have been set up.

MPT 1343 to MPT 1327 Conversion

For example, the number 201 2495 53 is converted as follows:

ppp: $201 - 200 = 001$

nnnn: $(2495 - 2000) \times 2$
 $= 495 \times 2$
 $= 990.$

nn: $53 - 20 = 33$

iiii = nnnn + nn
 $= 0990 + 33$
 $= 1023$

Result: 001 1023

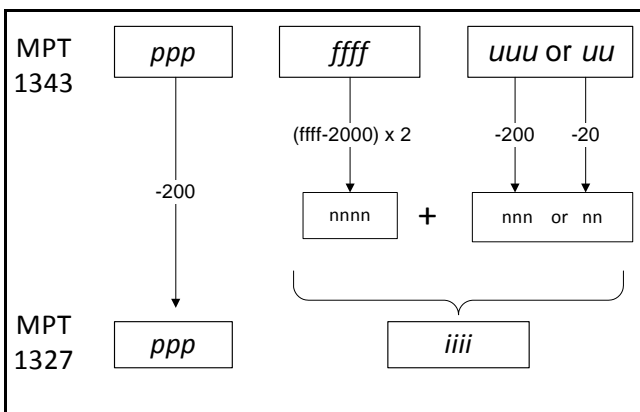


Figure 5: Converting MPT 1343 numbers to MPT 1327

MPT 1327 to MPT 1343 Conversion

Conversion of the number 001 0990 proceeds as follows. 200 is added to the MPT 1327 prefix to obtain the MPT 1343 prefix. The lookup table (stored in a file in the radio or the NMT) for this prefix is consulted, and gives the fleet number 2495 and the unit number 20.

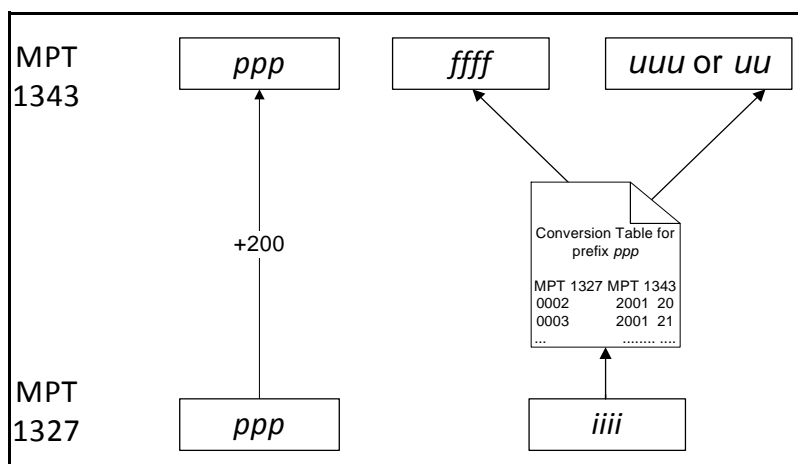


Figure 6: Converting MPT 1327 Numbers to MPT 1343



Note: The NMT has to be able to convert all permitted numbers between the two schemes, but the radio can usually only convert numbers within its fleet. This is why Tait radios display O-FLEET or OFLT (Out of Fleet) for interfleet or interprefix calls instead of the caller ID.

3.3 CPSx

CPSx numbering is sometimes referred to as LMS numbering.

CPSx numbers have the format **ppp ff uuu** for radios and **ppp ff ggg** for groups, arranged as follows.

Item	Description	Range
ppp	Prefix	200-327
ff	Fleet Number	20-79
uuu for units or ggg for groups	Radio Number Group number	200-899 900-999 for groups

Radios and groups within a fleet share the same fleet number.

200 22 201 is an example of a CPSx radio number and 200 22 900 is an example of a group number. In the NMT, they would be displayed as 200-22-201 and 200-22-900.

Fleet Size

Fleet size is restricted to one of five options. Within each fleet there is a range of radio and group addresses. This is outlined below:

Fleet type	Size (radios)	Size (groups)	Radio Number Range	Group Number Range
Large	700	100	200-899	900-999
Interfleet Group Fleet	0	10	N/A	900-909
Medium	354	51	200-553	900-950
Small	236	34	200-435	900-933
Tiny	118	17	200-317	900-916

The L, M and S Parameters

In each prefix, there are 8,100 individual addresses. This is divided into ten blocks numbered from 1 to 10. Each block contains 810 addresses and can accommodate one of the following:

- a single large fleet (plus one interfleet group fleet)
- two medium fleets
- three small fleets
- six tiny fleets

The L, M, and S parameters define how many of each type of fleet can be allocated within a prefix. They can have values in the range 0 - 10. For each set of values the following applies.

- blocks 1 to L are made up of large fleets (and interfleet group fleets)
- blocks (L + 1) to M are made up of medium sized fleets
- blocks (M + 1) to S are made up of small sized fleets
- blocks (S + 1) to 10 are made up of tiny sized fleets

Figure 7 illustrates how the address space in a prefix is divided up for L = 2, M = 4, and S = 8.

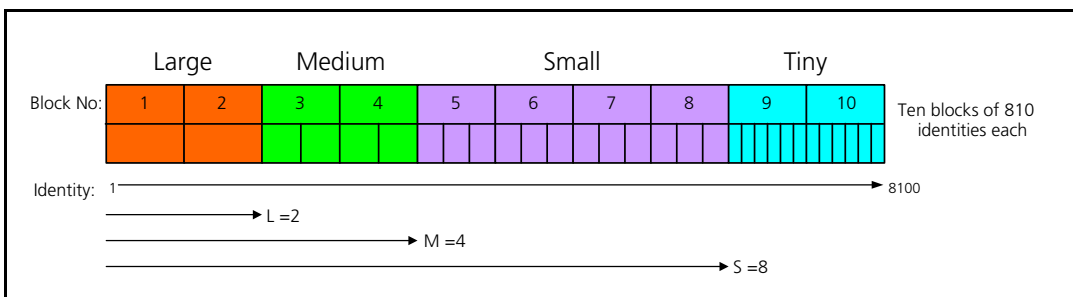


Figure 7: Effect of L, M, and S parameters

Fleet Numbers

Fleet numbers are assigned according to which block the fleet occupies as shown in the following table.

Block	Large Fleets	Interfleet Group Fleets	Medium Fleets	Small Fleets	Tiny Fleets
1	20	21	20, 21	20, 21, 22	20 to 25
2	22	23	22, 23	23, 24, 25	26 to 31
3	24	25	24, 25	26, 27, 28	32 to 37
4	26	27	26, 27	29, 30, 31	38 to 43
5	28	29	28, 29	32, 33, 34	44 to 49
6	30	31	30, 31	35, 36, 37	50 to 55
7	32	33	32, 33	38, 39, 40	56 to 61
8	34	35	34, 35	41, 42, 43	62 to 67
9	36	37	36, 37	44, 45, 46	68 to 73
10	38	39	38, 39	47, 48, 49	74 to 79

Benefits

CPSx numbering has the following benefits:

- Interfleet dialling is accomplished by dialling 5 digits (MPT 1343 requires 6 or 7).
- Interprefix dialling is accomplished by dialling 8 digits (MPT 1343 requires 9 or 10).
- MPT 1327 addresses can be converted to CPSx numbers using a simple algorithm that requires only the values of L, M and S. MPT 1343 requires knowledge of the size and base ident of all the fleets in the prefix.
- Radios can display the caller ID for interfleet and individual interprefix calls.
- Interfleet dialling can be disabled if desired.

Configuring the NMT to use CPSx numbering

See “Fleet Addressing Mode” on page 118 for details on how to configure the NMT to use CPSx numbering.

3.4 ANN

The ANN numbering scheme is similar to CPSx in that the addresses in each prefix are divided up into a number of fleets with predefined sizes.

Fleet Size

Fleet size is restricted to one of three options. Within each fleet there is a range of radio and group addresses. This is outlined below:

Fleet type	Size (radios)	Size (groups)	Radio Number Range	Group Number Range
Large	700	99	200 to 899	900 to 998
Small	70	10	20 to 89	90 to 99
Mini	22	4	20 to 41	90 to 93

The FPP and MEP Parameters

In each prefix, there are 8,100 individual addresses. The first 8,000 of these are divided into ten blocks numbered from 1 to 10. Each block contains 800 addresses and can accommodate one of the following:

- a single large fleet
- ten small fleets
- thirty mini fleets

The number of each type of fleet, that can be allocated within a prefix, is governed by two parameters; the Fleet Partitioning Parameter (FPP) and the Miniaturization Extent Parameter (MEP). FPP and MEP can have values in the range 0 - 10 and the sum of the two values must also lie within this range. For each set of values the following applies.

- blocks 1 to FPP are made up of large fleets
- blocks (11 - MEP) to 10 are made up of mini sized fleets
- all other blocks are used for small fleets
- the number of large fleets = FPP
- the number of small fleets = $(10 - (FPP + MEP)) \times 10$
- the number of mini fleets = $MEP \times 30$

Figure 8 illustrates how the address space in a prefix is divided up when FPP = 2 and MEP = 3

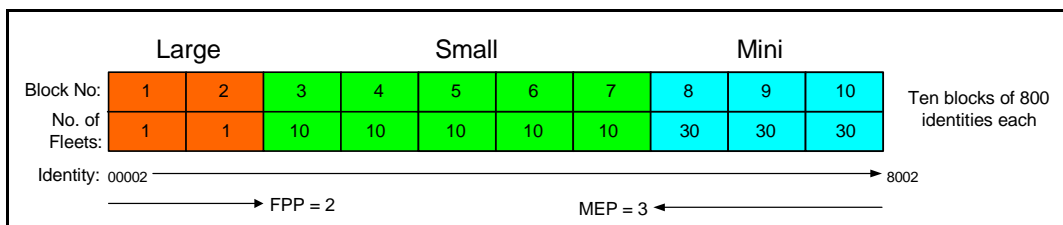


Figure 8: ANN numbering when FPP = 2 and MEP = 3

Prefix

The prefix is identical to that used in the MPT 1327 standard, i.e. it can have a value in the range 0 to 127. It is possible to restrict the number of prefixes available in your system by selecting an appropriate numbering model. The smaller the numbering model, the fewer digits used by the prefix in an ANN number. This is illustrated below:

Numbering model	Prefixes used	Length of prefix
Mini	0	0 digits
Small	0 to 9	1 digits
Large	0 to 99	2 digits
Extra Large	0 to 99 100 to 127	2 digits 3 digits

Fleet Number

Fleet numbers are made up of two components, The first is referred to as L and the second as R/rr.

L

For large and small fleets L is always 7. For mini fleets L can have the value 7, 8 or 9.

R/rr

For large fleets the fleet number is referred to as R and is a single digit in the range 0 to 9.

For small and mini fleets the fleet number is referred to as rr and is a two digit number in the range 00 to 99.

When referring to fleets in general, R/rr is often used.

ANN Numbers

ANN numbers are made up from L, the prefix, R/rr and the radio or group number. L is displayed as a single digit. The prefix is displayed with between 0 and 3 digits according to the numbering model used. For large fleets R is displayed as a single digit and for small and mini fleets rr is displayed as two digits. For large fleets the radio or group number is displayed as 3 digits and for small and mini fleets with 2 digits.

For example the ANN number 7013200 has L = 7, prefix = 01, R = 3 and radio number = 200.

Assigning L to a fleet

To explain how L is assigned we must examine how idents are organised. Within each block of 800, the idents are arranged between radios and groups as follows:

A Large Fleet

0 to 699	Radios
700 to 798	Groups
799	Not used

A Small or Mini Fleet

The block is divided up into ten smaller blocks of 80 idents each. Each of these sub-blocks can hold either one small fleet or three mini fleets. For a small fleet the sub block is divided as follows.

0 to 69	Radios
70 to 79	Groups

For mini fleets the sub block is divided as follows.

0 to 21	Radios (1st mini fleet)
22 to 43	Radios (2nd mini fleet)
44 to 65	Radios (3rd mini fleet)
66 to 67	Not used
68 to 71	Groups (1st mini fleet)
72 to 75	Groups (2nd mini fleet)
76 to 79	Groups (3rd mini fleet)

All the mini fleets within a sub-block have the same value of rr but different values of L .

For the first mini fleet in the block, $L = 7$. For the second, $L = 8$ and for the third $L = 9$.

Assigning R/rr to a fleet

For large fleets R can take values in the range 0 to $(FPP - 1)$.

For small fleets rr can take values in the range $(FPP \times 10)$ to $(99 - (MEP \times 10))$

For mini fleets rr can take values in the range $(100 - (MEP \times 10))$ to 99.

The following table shows valid values for R and rr for different values of FPP and MEP :

	FPP	0	1	2	3	4	5	6	7	8	9	10
	R	N/A	0	0..1	0..2	0..3	0..4	0..5	0..6	0..7	0..8	0..9
MEP												
0	rr small	00..99	10..99	20..99	30..99	40..99	50..99	60..99	70..99	80..99	90..99	N/A
	rr mini	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	rr small	00..89	10..89	20..89	30..89	40..89	50..89	60..89	70..89	80..89	N/A	N/A
	rr mini	90..99	90..99	90..99	90..99	90..99	90..99	90..99	90..99	90..99	90..99	N/A
2	rr small	00..79	10..79	20..79	30..79	40..79	50..79	60..79	70..79	N/A	N/A	N/A
	rr mini	80..99	80..99	80..99	80..99	80..99	80..99	80..99	80..99	80..99	N/A	N/A
3	rr small	00..69	10..69	20..69	30..69	40..69	50..69	60..69	N/A	N/A	N/A	N/A
	rr mini	70..99	70..99	70..99	70..99	70..99	70..99	70..99	70..99	N/A	N/A	N/A
4	rr small	00..59	10..59	20..59	30..59	40..59	50..59	N/A	N/A	N/A	N/A	N/A
	rr mini	60..99	60..99	60..99	60..99	60..99	60..99	60..99	N/A	N/A	N/A	N/A
5	rr small	00..49	10..49	20..49	30..49	40..49	N/A	N/A	N/A	N/A	N/A	N/A
	rr mini	50..99	50..99	50..99	50..99	50..99	50..99	N/A	N/A	N/A	N/A	N/A
6	rr small	00..39	10..39	20..39	30..39	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	rr mini	40..99	40..99	40..99	40..99	40..99	N/A	N/A	N/A	N/A	N/A	N/A
7	rr small	00..29	10..29	20..29	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	rr mini	30..99	30..99	30..99	30..99	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	rr small	00..19	10..19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	rr mini	20..99	20..99	20..99	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	rr small	00..09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	rr mini	10..99	10..99	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	rr small	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	rr mini	0..99	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Cells shaded grey represent combinations of FPP and MEP which allow no fleets of the specified size.
Cells shaded red represent invalid combinations of FPP and MEP.

MPT 1327 to ANN Conversion

To convert an MPT 1327 address of the form prefix/ident to an ANN number we need to calculate L, prefix, R/rr and the unit or group number.

The prefix in ANN is the same as in MPT 1327.

if (ident < (FPP x 800) + 2) then:

L = 7 (the address belongs in a large fleet)

R = (ident - 2) / 800 (rounded down)

unit / group number = ((ident - 2) %¹ 800) + 200

else if (ident < ((10 - MEP) x 800) + 2) then:

L = 7 (the address belongs in a small fleet)

rr = (ident - 2) / 80 (rounded down)

unit / group number = ((ident - 2) % 80) + 20

else

rr = (ident - 2) / 80 (rounded down)

if (((ident - 2) % 80) < 22) then:

L = 7

unit number = ((ident - 2) % 80) + 20

else if (((ident - 2) % 80) < 44) then:

L = 8

unit number = ((ident - 2) % 80) - 2

else if (((ident - 2) % 80) < 66) then:

L = 9

unit number = ((ident - 2) % 80) - 24

else if (((ident - 2) % 80) < 72) then:

L = 7

group number = ((ident - 2) % 80) + 22

else if (((ident - 2) % 80) < 76) then:

L = 8

group number = ((ident - 2) % 80) + 18

else if (((ident - 2) % 80) < 80) then:

L = 9

group number = ((ident - 2) % 80) + 14

1. % is the division remainder operation, e.g. 13 % 4 = 1

ANN to MPT 1327 Conversion

To convert an ANN number to an MPT 1327 address, we need to convert L, prefix, R/rr and the unit or group number to a prefix and ident.

The prefix in MPT 1327 is the same as in ANN.

if (ANN number is member of a large fleet)

$$\text{ident} = (\text{R} \times 800) + \text{unit or group number} - 198$$

else if (ANN number is member of a small fleet)

$$\text{ident} = (\text{rr} \times 80) + \text{unit or group number} - 18$$

else (if ANN number is a radio number)

$$\text{ident} = (\text{L} \times 22) + (\text{rr} \times 80) + \text{unit number} - 172$$

else

$$\text{ident} = (\text{L} \times 4) + (\text{rr} \times 80) + \text{group number} - 48$$

Benefits

ANN numbering has the following benefits:

- Interfleet dialling is accomplished by dialling 5 to 8 digits. MPT 1343 requires 6 or 7 digits.
- Interprefix dialling is accomplished by dialling 5 to 8 digits (MPT 1343 requires 9 or 10).
- MPT 1327 addresses can be converted to ANN numbers using a simple algorithm that requires only the values of FPP and MEP. MPT 1343 requires knowledge of the size and base ident of all the fleets in the prefix.
- Radios can display the caller ID for interfleet and individual interprefix calls.
- Interfleet dialling can be disabled if desired.

Configuring the NMT to use ANN numbering

See “Fleet Addressing Mode” on page 118 for details on how to configure the NMT to use ANN numbering.

On a TaitNet trunked network it is possible to specify up to seven separate sets of values for FPP and MEP. For each set you can specify an individual prefix in which they will apply. It is also possible to define a default set which applies to all other prefixes.

3.5 Developing an Allocation Policy

Once you have decided on a numbering scheme, you will need to develop a policy for allocating fleets, units and groups. This process is important as it will be very difficult to change once your system is up and running. For example, you should consider:

- How many fleets you are likely to need in the long term?
- What size fleets will be required?
- Will your network be set up for alternate partition mode? If so, will the alternate partition be based on prefix? If the answer to both these questions is yes, you will need to assign a group of prefixes to those users who will gain preferential access.
- Does the coverage area divide up into self-contained areas? If so, you may want to divide up prefixes and assign them to regional areas.
- Do you wish to restrict interfleet calls?
- Do you wish to allocate unit numbers that relate to work related numbers. For example a transport company may wish to use radio numbers that reflect bus route numbers.

A Tait representative can discuss your requirements and advise you on your choice of numbering scheme and your allocation policy.

4 Charging

The NMT can calculate charges for calls and generate charge records that detail the cost of each call. It can also provide charge reports for each fleet. These show the total costs incurred by each radio for a charging period (for example one month) and give a grand total for the whole fleet.

If you decide to use the NMT to calculate call charges, you need to set charge rates. To do this, you set up at least one charge schedule and at least two charge schemes, one for peak times and the other for off-peak times. The charge schedule specifies which charge scheme the NMT will apply at each time-slot of each day of the week. Each charge scheme contains a scale of charges that specifies per call charges and call duration charges.

4.1 Charging and Billing Options

There are various options for processing call data to obtain information with which to bill customers. Many network providers already have their own billing system and may prefer to use it to calculate call charges or to generate charging information for each fleet. In addition the NMT can be configured to write call records to a MySQL database. For more information, see “SQL Interface” on page 313.

If you have a billing system you can calculate call charges by having it process the call record files or the entries in the MySQL database periodically.

Alternatively, use the NMT’s Charging menu to define charge schedules and charge schemes. The NMT can then generate charge records for each billing period (for example each month for monthly bills). Your billing system must be configured to process charge records, which contain call costs.

Smaller networks without a billing system can use the NMT to generate charge reports.

4.2 Charging Functions

The NMT has various charging functions. These let you charge for calls in a variety of ways. If you restrict yourself to basic charging functions, setting charge rates is easy. The additional charging functions give flexibility, so that you can closely reflect the market value of calls or the network loading that they impose.

See “Charging Menu” on page 171 for details on how to set up and implement NMT charging.

5 Storage and Integrity of Fleet Data

The server NMT stores the fleet table and template definitions. The fleet table contains the names and number ranges of each fleet. In addition, for each fleet the server NMT maintains a list of radio and group numbers that have actually been validated. Roughly speaking, this is the list of radios and groups that actually exist.

The nodes contain validation records for each number in the available MPT number range. If a number has not been validated, the record bars it from using the network. A validation record consists of the number, various flags indicating whether call rights are enabled, and also two fields containing the numbers of the call rights and service area templates assigned to the number.

You should run a batch validation whenever you make changes to the template definitions. The new validation information will be read from the NMT to the nodes.

Validating a Radio or Group

When you validate a radio or group, the NMT sends the configuration you selected to the nodes. Each node in turn passes on the relevant information to the sites that belong to it. The server NMT adds the radio or group to its list for the fleet.

Part C: Network Management

This part contains introductory and general information on how to manage the network. It often deals with topics that span several windows or commands and provides an overview. Later parts of this manual give more detail under the heading of the relevant menu command.

Topics

- Configuring Site Operation
- Configuring Radio-to-Telephone Call Routing
- Configuring Telephone-to-Radio Dialling
- Backing Up NMT Files
- Routine Maintenance

1 Configuring Site Operation

The NMT lets you configure the way a site operates. This is a two-stage process. First you define one or more control blocks for each node, then you define a control schedule for each site by assigning a control block to each time-slot in the week.

A control block specifies maximum call durations, enables or disables site features, and configures queuing. A control schedule specifies which control block is in effect at any particular time. This makes it possible for the site to behave one way during normal business hours, another way on weekends and yet another overnight.



Note: Site operation is also affected by system parameters. These are generally loaded into the flash or EPROM memory of the SCU/SMM or CCM/CMM in the factory. For more information, see the relevant Service or Installation manual.

1.1 Defining Control Blocks

You should define a set of control blocks for each node. The node makes this available to all the sites at the node. Different control blocks can be used for different situations, for example peak times, weekends, nights. If a site has particular characteristics, you may want to define one or more control blocks especially for it.

It is good practice to reserve control block 0 as the default configuration; the default control schedule assigns this block to all time-slots.

Control blocks are defined in the Node menu because this information is node-level (common to all the node's sites). See "Control Blocks" on page 239 for more information.

1.2 Defining Control Schedules

You can define a control schedule for each site. By default, the control schedule specifies control block 0 for each time-slot. You assign a different control block as appropriate to alter the site behaviour from the defaults in control block 0. For example, you may assign a control block to the weekend that lengthens the maximum call times or disables PSTN calls. See "Defining a Control Schedule" on page 297 for more information.

2 Configuring Radio-to-Telephone Call Routing

The TaitNet network needs to route radio-to-telephone calls to the correct destination. This destination can be different for different radios or call types. Figure 9 gives an example of what is involved. When the security officer makes a call (Call 1) to a telephone on the PSTN, that call's audio must be passed through a phone port that is connected to a PSTN line. By default, this is done at the originating node.

However, when the same radio makes a call (Call 2) to an extension on a PABX that is connected to the TaitNet network, that call's audio must be passed to another node and sent through a phone port that is connected to the security company's PABX. When the taxi radio makes a call (Call 3) to the same PABX number, that call's audio must be passed to a third node and sent through a phone port that is connected to the taxi company's PABX.

Routing of Other Calls

Calls other than radio-to-telephone calls do not need their routing to be configured. The node routes intersite calls based on its knowledge of where the destination radio is registered. For internode calls, the originating node routes the audio to the destination node using the route defined in the Internode Audio Routes window (see "Internode Link Configuration" on page 265).

Telephone-to-radio calls are routed just like intersite calls.

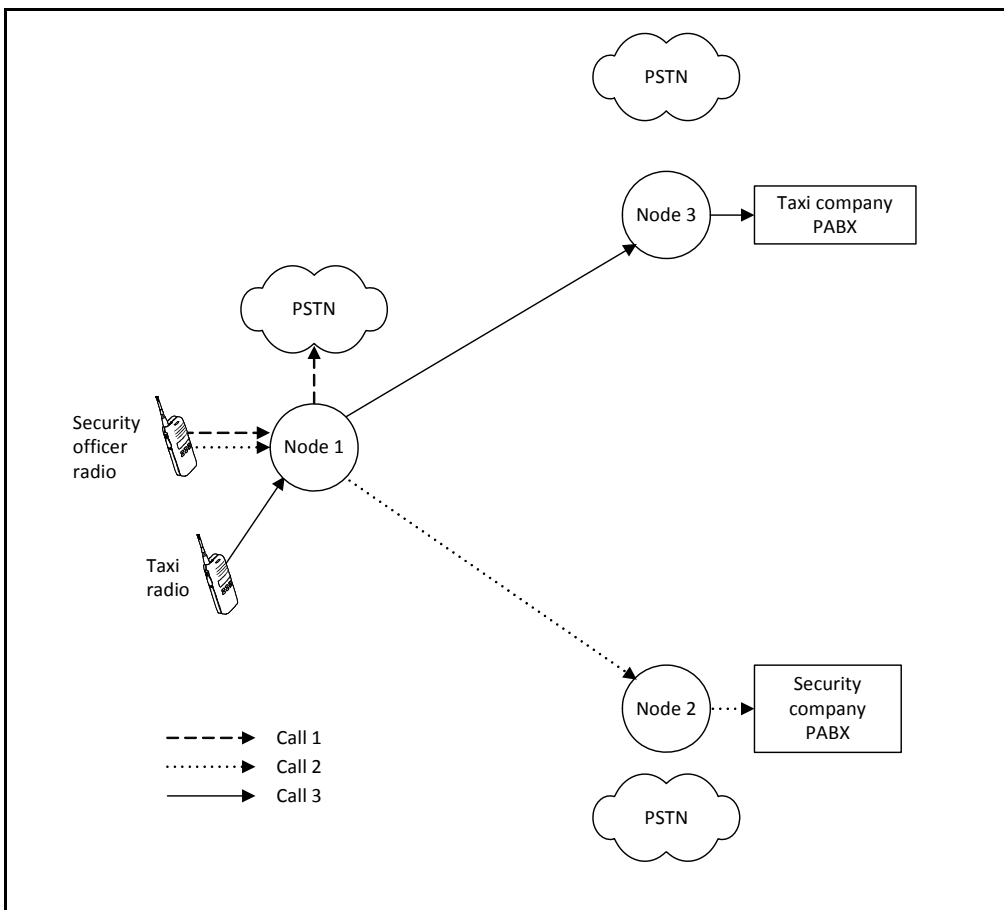


Figure 9: Routing Radio-to-Telephone Calls

You ensure that calls are routed to the correct destination using the NMT. The following stages give an overview of the process of configuring call routing. These stages progressively establish the call routing, but they are often completed in the course of carrying out other tasks.

Stage 1: Define Port Groups

Phone ports must belong to a port group. It is not good practice to put ports that connect to different destinations in the same group. A port can only belong to one group. Tait recommend that you use Port Group 0 for all phone ports that are connected to the PSTN. Each PABX needs to have its own Port Group. Give each port group a suitable name and configure it appropriately. It is good practice to ensure that PABX port groups are unique, that is, if Port Group 3 is defined at Node 1 for one company's PABX, don't define a Port Group 3 at Node 7 for another company's PABX.

You can assign ports with a common destination to different port groups. This would enable you to reserve some ports for those few users who require a high level of service, and assign the other ports to the rest.

To define a port group, select *Node* > Port Groups. For more detail, see "Port Groups" on page 261.

Stage 2: Assign Each Phone Port to a Port Group

At installation, the NMT is used to tell the node about the ports in its DAS. In particular, each phone port must be assigned to a port group.

To assign a phone port to a port group, select *Node* > DAS Monitor, then double-click on the cell for the port. For more information, see "Entering the Type and Connection of a Port" on page 231.

Stage 3: Define Outphone Tables

Outphone tables define (among other things) one or more routes. Each route specifies a port group or another node. A port group tells the node to route calls through a port in that group, a node tells the originating node to route the calls to another node, which then uses its routing information.

If an outphone table has only one route, it probably applies to all calls. If there are several routes, you need to specify which calls each route applies to. You do this by defining one or more digits that the call must match, and if necessary, the total number of dialled digits. In this way, you can distinguish between PSTN calls, which always begin with a 0, and PABX calls, which begin with a 3, 4, 5, or 6.

If a radio needs different routes, you define them in the one table. If different radios need different routes, they are usually defined in a different table. In other words, if a fleet has one or more PABXs that are directly connected to the TaitNet network, define an outphone table especially for that fleet.

For more information, see "Outphone Table" on page 255.

Port Group

A port group is a set of DAS ports that are connected to the same PSTN or PABX. When the node connects a radio-to-telephone call, it must use a phone port that belongs to the port group specified for the calling radio.

Outphone Table

The outphone table specifies how the node handles radio-to-telephone calls. Each outphone table has a number and a name. Each radio is assigned an outphone table.

Call Routing — a Simple Scenario

If your trunked network has no PABXs connected directly to it, call routing is easy to set up.

- 1. You can probably leave all phone ports with port group 0. This is the default.*
- 2. You can probably let all radios on the network use the default outphone table 0. The first route in this table should apply to all calls.*
- 3. Outphone table definitions can probably be the same at all nodes.*

Stage 4: Repeat the Above for Other Nodes

Each node must have its own set of routing information, so you need to repeat the above for the other nodes in the network. All nodes can route PSTN calls to Port Group 0, that is, to a port connected to the PSTN. For PABX calls, all nodes but one will route calls to the node with the PABX. That node must route calls to the port group for that PABX.

Stage 5: Assign an Outphone Table to Each Radio

In the course of configuring radio access to the network, you assign one of the defined outphone tables to the radio number. When the radio requests a radio-to-telephone call, the nodes involved in setting up the call use their outphone tables to route the call to the correct destination.

3 Configuring Telephone-to-Radio Dialling

The NMT lets you configure a range of dialling options for telephone-to-radio calls. To call a radio or group from a telephone, you often dial the number of the trunked network, followed by a number that will connect you to your destination. The first number puts you through to a DAS port. You may need to wait for a second dial tone before dialling the second number. This is referred to as overdialling.

The telephone user can dial:

- the DAS then the full MPT 1327 address
- the DAS then the full fleet address
- the DAS then a number that is translated by an incoming routing table
- a phone alias, which you have previously assigned to the target radio or group

Some dialling options are standard; they are enabled by default and require no special configuration. Others are configurable and only work if you use the NMT to set them up. You select and configure a set of options for each port group and this applies to any telephone-to-radio calls made through that port group.

3.1 Standard Options

The following dialling options are enabled by default. They can be disabled if desired.

MPT 1327

Users dial the full MPT 1327 number of the radio or group. The number is entered in the format pppiiii, where ppp is the prefix and iiii is the ident. For numbers with prefixes between 1 and 99, users can omit the leading 0.

Fleet Dialling

Users dial the full fleet address of the radio or group. The format depends on the numbering scheme in use. For example an MPT 1343 address would be entered in the format pppffffuu, where ppp is the prefix, ffff is the fleet number and uu is the unit number.

3.2 Configurable Options

The following dialling options must be configured from the NMT.

Incoming Routing

Users dial a string of digits. A predefined rule is used to translate the digits into a longer string which represents a radio or group address. To define the rule(s) used in this process see “Setting Up Incoming Routing” on page 263.

Phone Alias

Users dial a number within a range permitted by the PSTN or PABX.

To set this up, you specify the number in the Phone Alias area of the Edit Unit or Edit Group window. When a user dials the number you entered, the node converts it to the corresponding unit or group address and connects the call. For more information, see “Providing a Phone Alias” on page 155.

4 Backing Up NMT Files

The data you work with is stored on the Server NMT and can be backed up by any NMT (Server or Client) either manually or automatically on a daily basis.

A copy should be made of the license file (located in `C:\Program Files\Tait Applications\TaitNet NMT\license.dat`) and stored in case the original file becomes corrupted.

Node configuration data can also be backed up in this way.

In addition some data is stored on the NMT which should be backed up manually on a periodic basis. The following table indicates which files need backing up and what kind of information they contain.

Directory ¹	File	Contents
config	NMT.cfg	Any modifications you have made to the settings of the NMT.
	ETC.cfg	Any modifications you have made to how alarms are handled.
	CR.cfg	Any modifications you have made to the configuration of call record downloading and the current call record sequence numbers.
log	Log files, e.g. log-20050412.txt	Daily files containing a log of the transactions between the NMT, its clients, and the nodes.
	Alarm files, e.g. Alarm-20050412.txt.	Daily files containing alarm messages from the nodes.
	Audit files, e.g. audit-20050412.txt	Daily files tracking changes made by NMT users.
callrecs	Call record files, e.g. CallRecord-20001020	Daily files containing records of each call made on the system and providing the basis for billing network users.

1. The default location of these directories depends on the version of NMT software:

- Earlier than v4.06.00: `C:\Program Files\Tait Applications\TaitNet NMT`
- V4.06.00 and greater: `%userprofile%\My Documents\Tait Applications\TaitNet NMT` where `%userprofile%` is a system defined path, often `C:\Documents and Settings\\`.

5 Routine Maintenance

Tait recommend that you set up a schedule of routine maintenance tasks that are to be carried out daily, weekly, or monthly. Here are some suggested tasks.

- Scroll through the alarms in the Alarm window each day. Look in particular for alarms that occur repeatedly. This can help you detect intermittent faults. Look also for failed ESN checks.
- Enable automatic backups which will back up your data and node configurations on a daily basis. Copy these backups to an off-site location once a week. You should also make a manual backup whenever you add or modify your network.
- Check NMT disk space usage once a week, particularly if you have changed the defaults in the General Configuration window, NMT Log Files tab.
- Use the Reports menu regularly to provide data on the traffic loading at sites and DAS ports. View this data to identify parts of the network that are becoming overloaded, so that channels and DAS ports can be added before the grade of service deteriorates.
- At the end of each billing period, carry out the tasks required for charging customers (for example generating charge reports).

Part D: File Menu

The File menu allows you to see an overview of your network and perform system backup and restore operations.

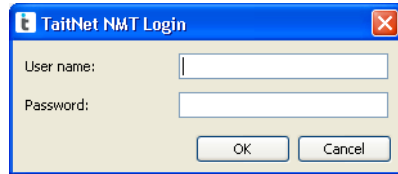
You can also find out version information or exit the NMT from this menu.

- Login and Logout
- About
- Network View
- System Backup and Restore

1 Login and Logout

1.1 Login

Selecting File > Login displays the same Login window that is displayed when the NMT starts up.



This permits another user to log in (for example, with a different access level) without needing to restart the NMT.

1.2 Logout (new in version 4.07.00)

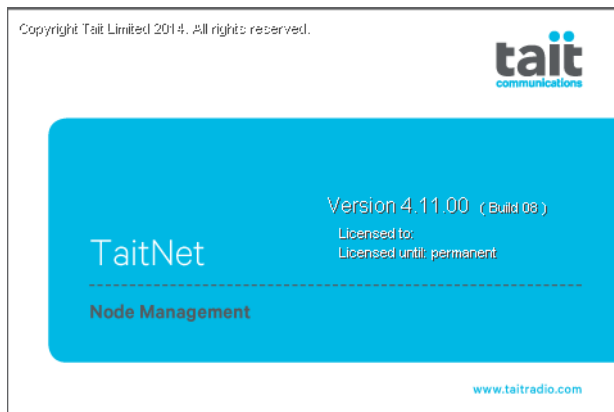
Selecting File > Logout logs out the current user and returns the access permission level to the level available when no-one has logged on (see "Users" on page 74).

2 About

Selecting File > About... displays the Splash screen that is normally displayed when the NMT application software is launched.

The build number displayed on this screen is an internal number used by Tait software developers, and is not part of the formal Tait software release version number.

To close, click anywhere on the screen.



3 Network View

Each node and site is represented in this network overview by a coloured marker and an icon. The marker changes colour to reflect the status of the node or site. The icon displays the node/site name and displays status and load information.

To set up the Network View, first obtain a suitable map of the area your network covers. This map must be in either .gif or .jpg format. Tait recommends that this map is placed in directory `C:\Program Files\Tait Applications\TaitNet NMT\images` but this is not essential¹.

In the NMT Main window, select `File > Network View`. Unless the filename of your map happens to be `Map.gif`, a blank window displays with node icons along the top. Right click anywhere in the blank part of the window and select 'Change background image'. A file chooser window appears. Use the file chooser to navigate to your map. This step only needs to be done once, as the NMT will remember this location.

Each node or site consists of two parts, an icon (rectangle) and a marker (coloured dot). By default, in each 'pile' of icons, the top-most icon is a node, its site icons are underneath. Below, the left-most marker is the node, site markers follow in order. If a node has many sites, there may be more than one row of markers.

To move an icon or marker hold down the `Ctrl` key and drag the object with the right mouse button depressed. Start by dragging a node marker to its location on the map. Then drag the node icon to a nearby location where it will not cover any intended locations for sites or other nodes.

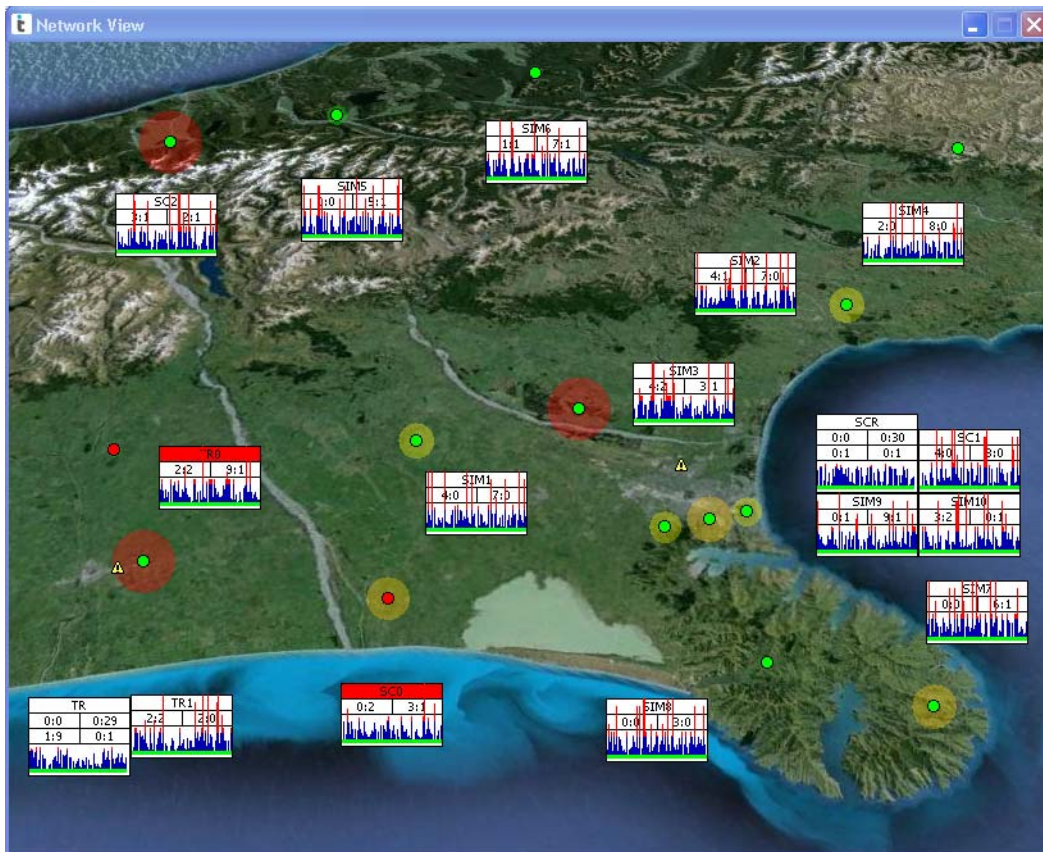
If you hover the mouse over either the icon or the marker, an arrow displays to link them and the marker dot increases its size.

Once the node icon has moved, its first site is on the top of the icon pile. Drag the site marker to its location and the site icon to a suitable location nearby. Continue in this manner until all of the node's sites are located.

If your network has more than one node, move the markers and icons for each node and its sites in turn.

An example of a populated map is shown below:

1. A bug in versions 4.06.00 to 4.07.01 does not enable the default location, and the image must be stored in `%userprofile%\My Documents\Tait Applications\TaitNet NMT` and selected using 'Change background image' (where `%userprofile%` is, for example: `C:\Documents and Settings\<username>`).

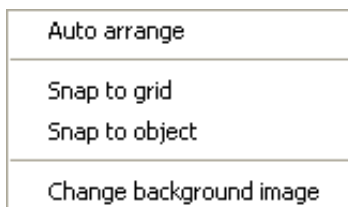


Each marker's shape and colour is the same as its icon in the main window. A right mouse click on either marker or icon displays the same menu as a right mouse click on the node or site icon in the main window, (see "Accessing NMT Menus" on page 23).

Additionally, site markers are surrounded by a halo indicating their current level of activity; the larger the halo, the greater the activity. If site utilization is greater than 80%, the halo changes from green to red.

3.1 Network View Menu

A right mouse-click anywhere on an empty part of the network view map displays this menu:



Auto Arrange

Do not select Auto arrange unless you want to send all your icons and markers back to their starting positions, and undo all the work done

to populate the map. In Q1541NMT version 4.10.xx and later, if you select this item, a dialog will ask you whether you really want to reset all markers and icons.



Note: Earlier versions of Q1541NMT software do not give you a chance to change your mind.

Snap to Grid

If Snap to grid is enabled, when a marker or icon is moved, it will align itself to a 5 pixel by 5 pixel grid.

Snap to Object

If Snap to object is enabled, when an icon is moved, if it is dragged to a location on top of another icon, it aligns itself alongside that icon instead. Whether it aligns above, below, left or right of the icon depends on the shortest distance to resolve the overlap. Snap to object has no effect when a marker is moved.

Change Background Image

Display a file chooser window that allows you to select a different background map file. The map file format must be either `.gif` or `.jpg`.

3.2 Node Icon Box

The first row shows the mnemonic given to the node (see “Network” on page 114).

If the colour is red, the node is in a failed state.

The second row shows:

- on the left, ‘number of connected DAS ports’ : ‘number of reserved DAS ports’
- on the right, ‘number of in-service DAS ports’ : ‘number of failed DAS ports’

The third row shows:

- on the left, ‘number of in-service sites’ : ‘number of failed sites’
- on the right, ‘number of active internode links’ : ‘number of failed internode links’

The larger row at the bottom shows the current DAS port utilization as a bar graph. The graph:

- adds a new bar at the right hand end every 10 seconds
- moves each existing bar 1 pixel to the left every 10 seconds
- accommodates 80 bars of data (800 seconds = 13 minutes + 20 seconds)

In addition:

- a green line at the bottom of the graph shows that the DAS ports are active
- the height of each bar is proportional to the DAS port utilization

- a blue bar shows that the node has less than 80% DAS port utilization
- a red bar shows that the node has greater than 80% DAS port utilization

3.3 Site Icon Box

The first row shows the mnemonic given to the site (see “Network” on page 114).

If the colour is red, the site is in a failed state.

The second row shows:

- on the left, ‘number of active calls’ : ‘number of queued calls’ (for example, 11:2 means there are 11 active calls at the site, and 2 queued calls)
- on the right, ‘number of in-service channels’ : ‘number of failed channels’ (for example, 12:0 means there are 12 active channels, including control channels, and no failed channels)

The larger row at the bottom shows the current channel utilization as a bar graph. The graph:

- adds a new bar at the right hand end every 10 seconds
- moves each existing bar 1 pixel to the left every 10 seconds
- accommodates 80 bars of data (800 seconds = 13 minutes + 20 seconds)

In addition:

- a green line at the bottom of the graph shows that the site is active
- the height of each bar is proportional to the site channel utilization
- a blue bar shows that the site has less than 80% channel utilization
- a red bar shows that the site has greater than 80% channel utilization

4 System Backup and Restore

In addition to automatic backups, the system databases and node data can also be backed up or restored manually as required.

A system backup backs up ALL databases whether the links to the nodes are up or not.

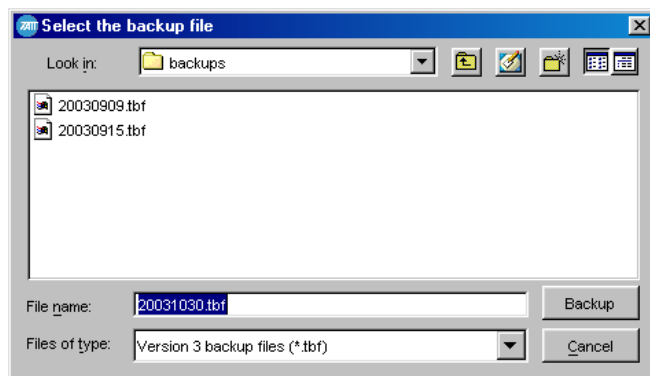
The information held at the NMT that is backed up by a system backup is as follows:

- Fleets
- Units
- Groups
- Network Description
- Service Area Templates
- Call Rights Templates
- Charge Schemes
- Charge Schedules
- Users

All nodes are backed up automatically at the same time as automatic system backups are performed, but the nodes can also be backed up and restored manually on an individual basis. See “Backup Configuration Database” on page 224.

4.1 Performing a System Backup

Select File > System Backup. The System Backup window appears.



1. Use this window to select or create the filename you wish to use for your system backup file.
2. When you have selected or entered the required backup filename, press the Backup button to create the system backup.
3. During the backup procedure a window will appear with a progress bar showing the status of the total backup procedure and the status of the current backup procedure.

If an automatic backup is running when the Backup button is pressed, a message is displayed asking you to try again later.

If the backup failed, you will be informed and no backup file will be created.

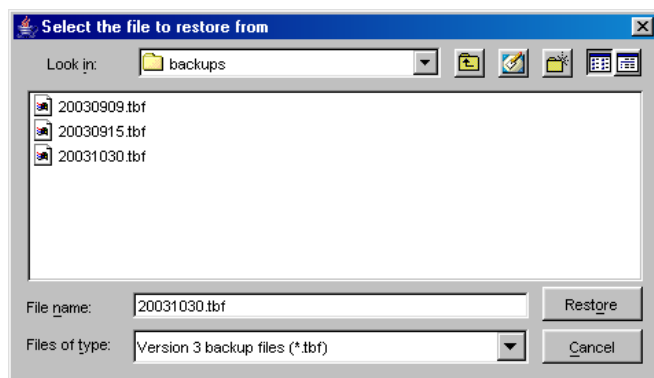
When the backup is complete, a successful backup message is displayed.



Important: Never attempt a system backup whilst the node's status is 'activating', and never change the node's status whilst the backup procedure is under way.

4.2 Performing a System Restore

Select File > System Restore. The System Restore window appears.



1. The name of the last system backup file is shown. Select a different filename to restore if required.
2. When you have selected the backup file to restore from, press the Restore button to restore the selected databases.
3. During the restore procedure a window will appear with a progress bar showing the status of the restore.

If an automatic backup is running when the Restore button is pressed, a message is displayed asking you to try again later.

If one or more nodes are down when you are restoring the units and groups databases, validation inconsistencies may occur. You can cancel the restore at this stage and run it when the nodes are up, or you can continue with the restore. If you continue with the restore, it is recommended that you run a batch validation to fix any validation inconsistencies.

When the restore is complete, a successful restore message is displayed.



Important: Never attempt a system restore whilst the node's status is 'activating', and never change the node's status whilst the restore procedure is under way.

Part E: Configuration Menu

The Configuration menu lets you configure the way the NMT operates and alter your network of nodes and sites.

- Change Password
- Users
- Alarms
- Call Records
- Network
- Properties
- Advanced Options

1 Change Password

Select Configuration > Change Password to change the password of the currently logged on user.

The Change Password window appears:

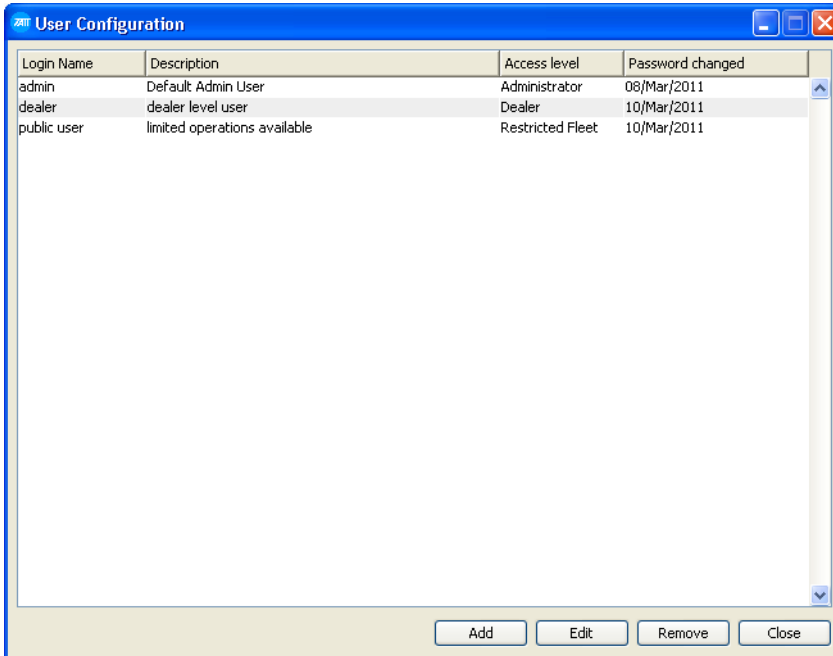


1. Enter your current password in the Old Password box.
2. Enter a new password in the New Password box.
3. Re-enter your new password in the Confirm New Password box.
4. Press OK to store the new password and close the window.

2 Users

Select Configuration > Users to add a new NMT user, change an existing user's access level or password, or remove a user from the list.

The User Configuration window appears.



This window has a row for each user, showing the user's name, description, level of access to the NMT program, and the date when the password was last changed for that user¹. Only users with the Administrator access level can change the information held about other users.



Note: The 'admin' user cannot be deleted, and the access level of the 'admin' user is always Administrator, though the description and password can be altered.

1. Or the date when the Q1541NMT software was first upgraded to v4.08.01 or later versions, whichever is the later.

2.1 Adding a User

1. Press the Add button. The Add User window appears.

2. Enter the login name to be added.
3. Enter, then re-enter a password.
4. Enter a suitable description.
5. Select an access level from the options described below.

With this Access Level...	A User Can...
Admin	Access all functions of the NMT
Engineer	Not access the following menu options: Configuration > Users
Dealer	In addition to the Engineer level restrictions a Dealer cannot access the following options: Configuration > Alarms Configuration > Call Records Configuration > Network Configuration > Properties File > System Backup File > System Restore Fleets > Call Rights Templates Fleets > Service Area Templates Fleets > Batch Validate Charging > Charge Schemes Charging > Charge Schedules Charging > Generate Charge Records Charging > Fleet Charges Report Charging > Cost Code Charges Report Charging > Not Chargeable Report Reports > Site Statistics Reports > DAS Statistics Reports > Alarms Reports > Call Records .../ continued on next page

With this Access Level...	A User Can...
Dealer	<p>/... continued</p> <p>When a Dealer right clicks on a node or a site, they cannot access any of the following options either:</p> <ul style="list-style-type: none"> Node > Configuration Node > DAS Monitor Node > Control Blocks Node > Outphone Table Node > Dialling Rules Node > Port Groups Node > Internode Audio Routes Node > Internode Data Links Node > Connected NMTs Site > Status Site > Configuration Site > Channels Site > Control Schedule Site > Memory Access Site > View Validation
Restricted Fleet	<p>In addition to the Dealer level descriptions, a Restricted Fleet user cannot perform the following operations:</p> <ul style="list-style-type: none"> ■ Add, Remove, Bar/Unbar fleets ■ Add, Remove, Copy units ■ Add, Remove groups ■ Dynamically regroup units ■ Stun or Recover units ■ Add or Remove tracked units to/from a group
Disabled/no one logged on	Cannot run the NMT, but can view the main window and access the options under the File menu.

6. Decide whether the user can change their own password (i.e. have access to Configure > Change Password.
7. Decide whether the user has 'read only' access.
8. Decide whether the user will be asked to supply a comment for the audit trail log when making changes.
9. Press OK to confirm what you have entered and close the window.

2.2 Changing Password or Access Rights

To make any changes to an existing user, follow these steps.

1. Double-click on the user's row. The User Edit window appears.
2. Edit the information in the window as needed.
3. Press OK to confirm your changes and close the window.



Note: Passwords used in Q1541NMT v4.08.01 or later are stored only in an encrypted form. This means that if a user forgets their password, an administrator level user cannot recover it, only issue a new password. If you change the default administrator password, do not forget it. Tait support cannot recover it for you.

Changing Password

Users other than Admin can only change their own password under Configuration > Change Password. See "Change Password" on page 73.

2.3 Removing a User

If you want to take away a user's ability to use the NMT but keep that user on the list of users, assign the access level 'Disabled'. If you want to remove the user from the list of users, follow these steps.

1. In the User Configuration window, click on the row containing information about the user.
2. Press the Remove button. You will be asked to confirm removal of this user.

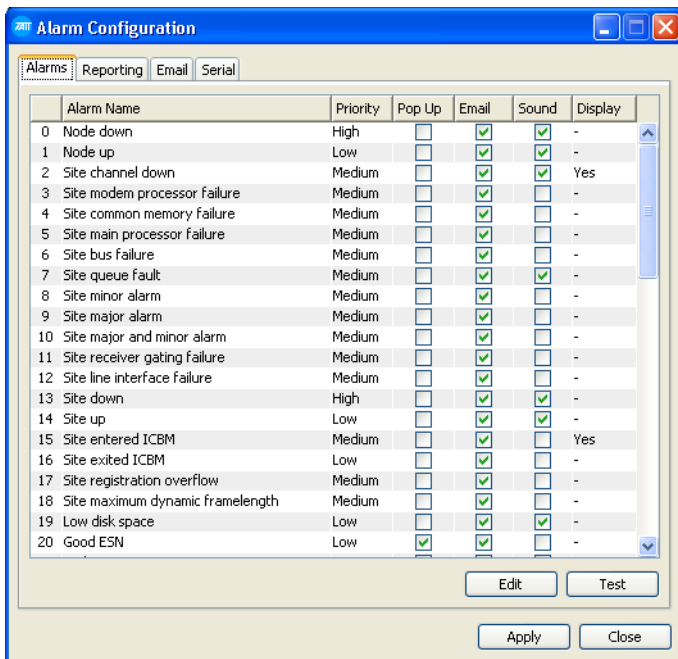
3 Alarms

The NMT receives alarms from the nodes it is connected to. You can configure how the NMT handles these alarms. You can:

- Configure each individual alarm
- Set up a list of Email addresses to which the NMT will send alarms
- Restrict the alarms to be sent to an Email address to those of a particular priority level. For example, the network manager may only wish to receive high priority alarms, but the maintenance technician may wish to receive all alarms.
- Configure the NMT to send alarms to any suitable application via a serial port
- Send a test alarm to check that the destinations you set up will actually receive any alarms

3.1 Viewing Individual Alarm Configurations

Select Configuration > Alarms and the Alarm Configuration window appears.



This window displays the Alarms tab, which contains a row for each alarm that the NMT can receive. You can click on a column name to sort the rows according to that column. (Further clicks toggle the sort order between ascending and descending).

The window has the following columns:

Alarm Name

The internal name of the alarm. This is not the text that the NMT displays when it receives the alarm, although the default text is often

identical to the internal name (except for variables such as the name of the site or channel).

Priority

Indicates the priority level of the alarm (high, medium, or low). This determines which Email addresses are notified when the NMT receives the alarm.

Pop Up

A tick in the Pop Up column indicates that the NMT will display a pop-up window when it receives the alarm.

Email

Unselect this check box if you do not want the NMT to dispatch email(s) for this alarm. Note that ticking this box does not by itself cause emails to be sent, the Configuration > Alarms > Email tab must also be set up. However if this check box is unselected, emails will never be sent for this alarm.

Sound

A tick in the Sound column indicates that the NMT will play a sound when it receives the alarm.

Display

- “Always” in this column indicates that, if activated, the “down” alarm is displayed next to the node or site icon on the NMT main window. Also, the node or site icon itself changes from a good icon to a warning icon or a failed icon. This alarm display remains until the corresponding “up” alarm arrives at the NMT.
- “Yes” is the same as “Always”, but the alarm can be configured not to display.
- “No” indicates that the alarm can be displayed, but is configured not to do so.
- “-” (dash) indicates that either the alarm is an “up” alarm, or that, for technical reasons, it cannot be displayed on the NMT main window.

3.2 Configuring an Alarm

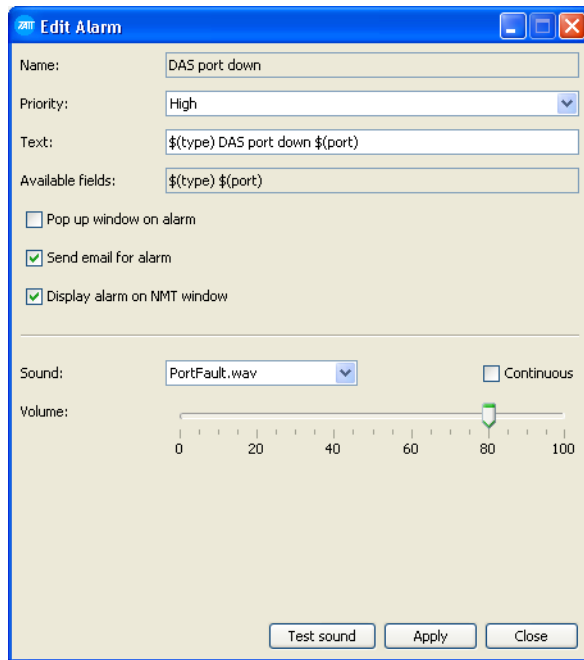
While most NMT users will leave most alarms with their default configuration, you can specify whether the NMT:

- pops up a window
- plays a sound once or continuously

You can also:

- select a different sound
- adjust the volume of the sound
- edit the alarm text

To configure an alarm, double-click on the Alarm row in the Configure Alarms window. The Edit Alarm window appears.



Name

Displays the internal name of the alarm. Not editable.

Priority

Displays the priority level of the alarm.

Text

Displays the text of the alarm that the NMT will use. To change this text, click in the box and edit as desired. This text may include field names such as `$(site)`. Ensure that any changes you make to the text do not interfere with the NMT's ability to display these variables.

Available Fields

Not editable. This box displays the names of any fields that appear in the alarm (see sidebar). For example, \$(site) will display the name of the site that the alarm came from (if no name is entered on the NMT, then the site number is given).

Pop-Up Window on Alarm

Select this check box if you want the NMT to pop up the Alarms window when it receives the alarm.

Send Email for Alarm

Unselect this check box if you do not want the NMT to dispatch email(s) for this alarm. Note that ticking this box does not by itself cause emails to be sent, the Configuration > Alarms > Email tab must also be set up. However if this check box is unselected, emails will never be sent for this alarm.

Display Alarm on NMT Window

This check box is enabled only if the alarm is a “down” alarm and can be displayed next to the node or site icon on the NMT main window and Network View. If the check box is selected, the alarm is configured to display in this manner. When they do display, the icon changes from a green dot to a yellow warning triangle or red dot.

The alarms with “Always” cannot usually be changed. If the alarm has the option yes/no, then they can be altered².

Sound

Specifies which sound file the NMT will play when it receives the alarm. The default is default.wav, but you can choose another file from the drop-down list.

Continuous

When this check box is enabled, the NMT plays a continuous sound when it receives the alarm. As soon the sound file ends, it is started again.

Volume

Lets you individually adjust the volume for different alarms. Set to 0 to turn the sound off for the alarm.

Test Sound

Press the Test Sound button to hear how the alarm sounds.

Field	Description
\$(port)	Port address
\$(type)	Primary or Backup
\$(site)	Site name or number
\$(node)	Node name or number
\$(circuit)	Circuit number
\$(cmm)	CMM number
\$(channel)	Channel number or (TNDS) DMM number
\$(address)	Radio number
\$(code) \$(model) \$(serial)	ESN
\$(freemb)	Free disk space (MB)
\$(raid_status)	None or Optimal or Degraded or Sync
\$(temp)	Temperature in C ¹
\$(channel rf)	(TNDS) DCM channel number

1. The temperature is recorded as an eight bit signed number. This means that a temperature in excess of 127C is displayed as a negative number, starting at -128. For example, a temperature of 128C is displayed as -128, 129C as -127, 130C as -126, and so on.

2. It is possible to override the default behavior of the Alarm.AlarmDisplay parameter by manually editing %userprofile%\My Documents\Tait Applications\TaitNet NMT\config\ETC.cfg. Valid values for this parameter are: 0 = cannot display, 1 = display, 2 = do not display and 3 = always display. Great care must be used when manually updating the ETC.cfg file as changing the settings of some alarms may cause the NMT to crash.

3.3 Storing Alarms in the Alarm Log File

When the NMT displays an alarm message in the Alarm window it also stores the message in its alarm log file. Select the Reporting tab to view the name, path, and maximum size of the log file. You can change the path and the number of days for which records will be kept.



Location of Alarm Log File

The Location of Alarm Log File box displays the full path and name of the alarms log file. Press the Browse button if you want to alter the path. The name of the file cannot be altered.

Days to keep old alarm files before deleting

Alarm log files older than this number of days will be automatically deleted by the NMT. If this parameter is set to zero then old alarm log files will never be deleted.

3.4 Alarm Log File Format

Each alarm message in the alarm log file consists of a string of ASCII characters in the comma-separated fields, terminated by the 'Line Feed' character.

Field	Description
date	alarm date (YYYYMMDD)
time	alarm time (HH:MM:SS)
node number	valid node number on the TaitNet system (1 - 32) or -1 for a test alarm which is generated by T1541 NMT

Field	Description
node name	valid node name on the TaitNet system (or '[test]' if node number is -1)
type	the system-defined alarm type
alarm data	raw alarm data received from node
alarm message	alarm message text specified by the NMT's configuration for the alarm

3.5 Sending Alarms by Email



Note: In Q1541NMT v4.11.00 and later this tab has buttons to permit an operator with Engineer or Administrator privilege to disable and re-enable all email alarms to all destinations with a single button press. A confirmation popup is displayed. If the action is confirmed, an alarm “alarm email facility disabled” or “alarm email facility enabled” is generated and entry is made in the audit log. By default, both alarms have high priority, and, unless specifically configured not to do this (refer “Configuring an Alarm” on page 79), an email message is sent to all addresses informing recipients of the change. The button state is saved in the `NMT.cfg` file, so that if the NMT is shut down, on restart it will enable the correct button.

The NMT can send alarms as Email messages to a maximum of 100 recipients, for example:

```
TaitNet Alarm
Date: Feb 24, 2001 3:02:00 AM
Node: Christchurch
Priority: High
Message: Node Down
```

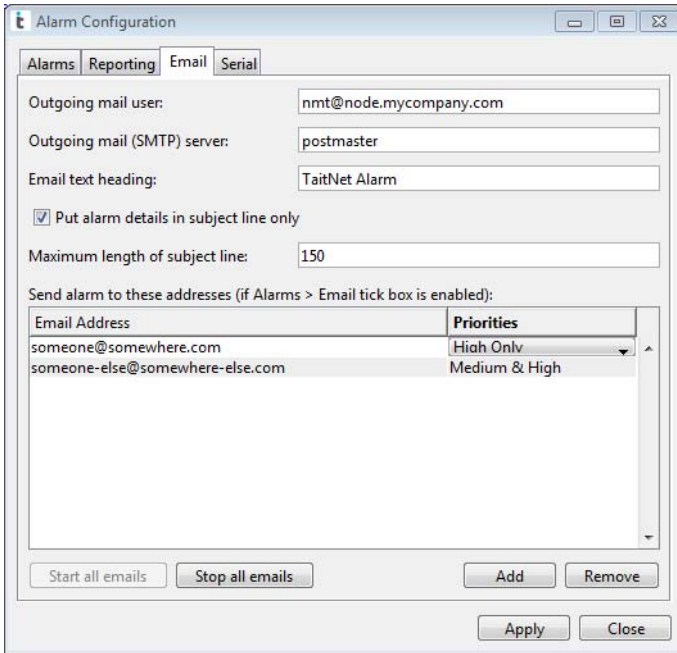
Email alarm messages are only sent if the NMT program is running. For more information about the format of Email alarms, see “Alarm Email Format” on page 85.



Note: For each alarm, no emails are sent unless the Email box is checked in the Alarms tab (see “Email” on page 79).

To configure the NMT for this, follow these steps:

1. In the Alarm Configuration window, select the Email tab.



2. In the Outgoing Mail User box, enter the email address of the person sending the alarm emails. (The sending is done automatically but it is possible to specify who the alarm comes from.)
3. In the Outgoing Mail (SMTP) Server box, enter the IP address or host name of the computer to which the NMT will send Email for distribution to the Email addresses you specify below. This computer should be running an SMTP-compliant mail agent and be networked to the NMT and to the Emailed computers. Tait does not recommend using the node computer or the NMT to run a mail agent.
4. Enter the text that will appear as the first line of the message body in the email (or the first field in the subject line, if “Put alarm details in subject line only” is enabled).
5. If you need to direct alarms to an SMS or paging service that forwards only the subject line of an email, tick the box “Put alarm details in subject line only”. The email will consist of a subject line only, with the comma-separated fields: <Text heading>, <Date>, <Time>, <Location>, <Details>. The subject line will be truncated to the length entered (default 150 characters), if required.
6. Enter an Email address as follows.³
 - a. Press the Add button.
 - b. Click in the Email Address cell in the first row of the table, then enter the Email address.

3. A maximum of 100 email addresses can be entered.

- c. Click in the Priorities column, then choose one of the following options from the list that pops up.

Option	Description
High Only	NMT passes on only high-priority alarms to the Email address
Medium & High	NMT passes on alarms with a medium or high priority to the Email address
All	NMT passes on all alarms to the Email address

7. Repeat step 3 for any other Email addresses you want to add.
8. Press Apply to confirm your changes, then Close to close the window.
9. Test that the Email addresses you set up will actually receive alarms. See “Testing Alarm Destinations” on page 87.

3.6 Alarm Email Format

The alarm log message for the Email notifications is formatted into a MIME style Email message.

Headers

Name	Complete Alarm Description
Subject:	alarm message
Date:	date and time on which the alarm Email was sent
From:	sender’s Email address
To:	recipient’s Email address

Body

The body of the Email consists of the title and the alarm information, for example:

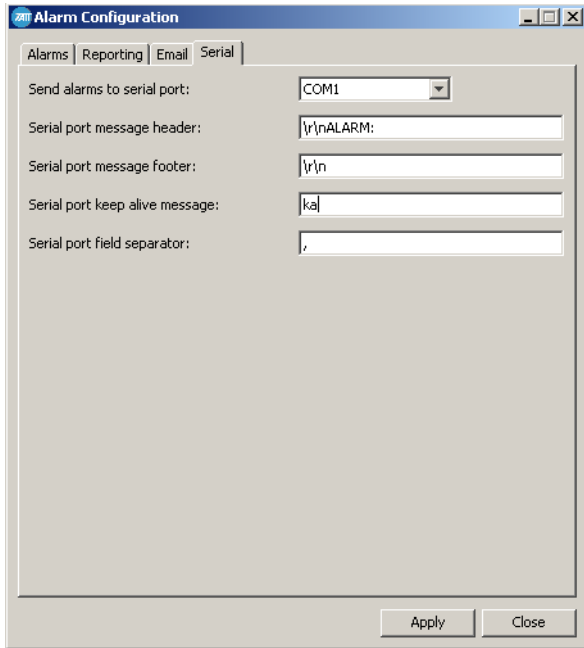
```
TaitNet Alarm
Date: 20050719 10:39:02
Node: Christchurch
Priority: Medium
Message: Site LBX: Channel down 73
```

Where ‘Date’ is the date and time on which the alarm occurred, ‘Node’ is the node name on which the alarm has occurred, ‘Priority’ is the alarm priority specified by the NMT configuration for the alarm, and ‘Message’ is the alarm message text specified by the NMT’s configuration for the alarm.

3.7 Sending Alarms to a Serial Port

You can configure the NMT to send alarms to one of its serial ports.

1. In the Alarm Configuration window, select the Serial tab.



2. In the Send Alarms to Serial Port box, select one of the serial ports.
3. In the Serial Port Message Header and Footer boxes, optionally enter text to appear before and after each alarm message. The footer and or header should include line feed and newline characters. A line feed character is represented as “\n” and a carriage return is represented as “\r”.
4. Set the text to send as a keep alive message. Every minute the NMT will send text to the serial port. If a keep alive message is not defined then it will not be sent.
5. Set the message field separator that is required. The default is “,” (comma).
6. Press Apply to save your changes, then Close to close the window.

Whenever the NMT receives an alarm, it will output an alarm message on the chosen serial port. For information about the format of this message, see “Alarm Serial Port Format” on page 86.



Note: The Serial Port is configured to be 9600,N,8,1. Devices connected to the serial port should be configured the same way.

3.8 Alarm Serial Port Format

Each alarm message sent to a serial port consists of a string of ASCII characters.

The header field is sent immediately before, and the footer field is sent immediately after the fields listed below.

The footer and/or header fields should include line feed and carriage return characters if needed.

The fields are separated by the separator supplied (default is a comma).

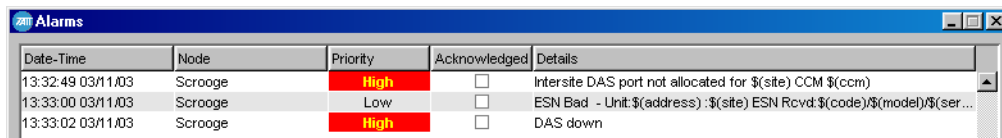
Field	Description
date	alarm date (YYYYMMDD)
time	alarm time (HH:MM:SS)
node name	valid node name on the TaitNet system (or '[test]' if node number is -1)
type	the system-defined alarm type
alarm message	alarm message text specified by the NMT's configuration for the alarm

3.9 Testing Alarm Destinations

To test that network alarms will reach the destinations you have specified, follow these steps.

1. Select the Alarms tab.
2. Click on the alarm message you wish to test and ensure that the Pop Up column for that alarm is enabled.
3. Press the Test button. This sends the alarm to the Email and serial port destinations you specified.

The Alarms window pops up and displays the message you sent. Test alarm messages involving nodes, sites or channels that are set up with variables in the Edit Alarm window will show the variables in the alarm message, as no real node, site or channel is involved.



4. Verify that the alarm was received by the destinations defined in the Email and Serial Port tabs.

3.10 Alarm Types

This section describes the alarm messages that the NMT can display and record in its log file.

0 Primary/Backup Node Down

The indicated node is not operating or its connection to the NMT has been lost.

This message can be caused by a faulty connection, by faulty node controller software, or by faulty hardware.

1 Primary/Backup Node Up

The indicated node has recovered from a fault or the NMT has established a connection to the node.

2 Site NN: Channel down nnn

The SCU/SMM or control channel cannot detect responses from the CCM/CMM of channel *nnn*.

This may be caused by a temporary fault, or the CCM/CMM may be faulty.

3 Site NN: Modem processor failure on channel nnn

This means that a submodule of the CCM/CMM of channel *nnn* is faulty.

4 Site NN: Common memory failure on channel nnn

This means that a submodule of the CCM/CMM of channel *nnn* is faulty.

5 Site NN: Main processor failure on channel nnn

This means that a submodule of the CCM/CMM of channel *nnn* is faulty.

6 Site NN: Site bus failure on channel nnn

An site bus communication error has occurred. Normally no action is required, as the site will automatically recover.

If this alarm occurs frequently then a submodule of the CCM/CMM may be faulty.

7 Site NN: Queue Fault on nnn

The intersite call queue is corrupted. No action is required, as the site will automatically recover.

8 Site NN: Site minor alarm on channel nnn

The channel controller on channel *nnn* has generated a minor alarm. This may mean that the RF power output of channel *nnn*'s transmitter or power amplifier has fallen below an adjustable limit.

9 Site NN: Site major alarm on channel nnn

The channel controller on channel *nnn* has generated a major alarm. This may mean that the power reflected from the antenna subsystem back to the power amplifier or transmitter at channel *nnn* exceeded the safe limit.

10 Site NN: Site major and minor alarm on channel nnn

A major and a minor alarm have been generated. The RF output is probably open circuit; the power amplifier or transmitter has detected high reverse power.

11 Site NN: Receiver failure on channel nnn

The receiver of a traffic channel has been active for longer than the allocated time. This alarm is unlikely to be caused by a channel fault. One of the following causes are more likely:

- intermodulation from other RF signals
- illegal or accidental transmission by unauthorised transmitters
- high RF background noise

If this fault recurs on the same channel, adjust the gate setting as described in the service manual for your receiver. If this does not correct the problem, try to isolate the source of the interference using a spectrum analyser.

12 Site NN: Line interface failure on channel nnn

The intersite line switching functions of the CCM/CMM of channel *nnn* have failed.

13 Site NN: Primary/Backup Down

The node has not received a reply from two successive attempts to poll the site.



Note: If site down messages from all sites are received at the same time, the fault lies at the node.

14 Site NN: Primary/Backup Up

The site has recovered from a fault or the node has established a connection to the site.

15 Site NN: Entered ICBM

Appears only if the site is capable of intersite communications backup mode. Indicates that the site has changed to this mode, probably because the normal node-site link is down.

16 Site NN: Exited ICBM

Appears only if the site is capable of intersite communications backup mode. Indicates that the site has changed from backup mode to normal mode, probably because the normal node-site link has come back up.

17 Site NN: Registration overflow nnn

The registration table at this fill-in site has overflowed because too many radios are registering on it.

18 Site NN: Maximum dynamic framelength nnn

This means that the control channel has increased the framelength to the limit of the dynamic range, in response to an increase in traffic.

Consider increasing the maximum framelength.

19 Low disk space \$(freemb) MB remaining

The node computer is starting to run out of disk space.

20 ESN Good - Unit:ppp iiiii Site:NN

A radio has passed an ESN check. The message indicates the MPT 1327 number of the radio and the site it was registered on.

21 ESN Bad - Unit:ppp iiiii Site:NN ESN Rcvd:mmm/tt/ ssssss

A radio has failed an ESN check. The message indicates the MPT 1327 number of the radio and the site it was registered on and it contains the ESN that the network received.

22 Primary/Backup DAS down

Communications between the node and the DAS controller have failed, or the DAS controller itself has failed.

23 Primary/Backup DAS up

The DAS has recovered from a fault.

24 Primary/Backup DAS port down aaa⁴

The NMT displays this message if the DAS controller does not receive a response from a DAS port. *aaa* is the decimal address of the audio port.

25 Primary/Backup DAS port up aaa³

The DAS port has recovered from a fault or has been detected for the first time by the node.

26 Site NN: Alarm input set aaa

A digital alarm input on the Site Management Module has changed to the asserted state.

27 Site NN: Alarm input clear aaa

A digital alarm input on the Site Management Module has changed to the cleared state.

28 Site NN: Das port fail aaa

The NMT displays this message if the Site Management Module does not receive a response from a DAS port. *aaa* is the decimal address of the audio port.

29 Site NN: Das port good aaa

The DAS port has recovered from a fault or has been detected for the first time by the SMM.

30 Site NN: High/low temperature

The site temperature is outside of the temperature threshold range.

4. The field Primary/Backup is added to these alarms in node version Q1541NC 4.08.00. Earlier versions of node software generate these alarms without the Primary/Backup field.

31 Site NN: Intersite data link overload

The number of messages waiting to be sent from the node to the site has exceeded the threshold.

This may indicate a faulty node to site communication link.

32 Site NN: Channel up nnn

The channel has returned to service or has been detected by the SMM for the first time after a site reset.

33 Primary/Backup Line test fail aaa³

The line test for the specified port failed.

34 Primary/Backup Line test good aaa³

The line test for the specified port passed.



Note: If you double click on the Details cell of a 'Line test good' or 'Line test fail' alarm, a window appears. This displays the results of a line test of the port, performed at the present time, and shows:

- the site name and CCM number for this port
- the line level and the level threshold
- the line noise and the noise threshold

However, details of the test results at the time the alarm was generated are not available.

35 Site NN: Pooled channel request refused

Insufficient pooled channels were available to complete a call setup.

36 Site NN: Link error

A node to site communications error was detected.

37 Internode audio circuit overload to ZZ

Insufficient internode audio circuits to node ZZ were available to complete a call setup.

38 Internode audio circuit numbers have been misconfigured on circuit ccc to ZZ

A call setup to node ZZ was not completed because the internode audio circuits are misconfigured.

Check the internode link configuration and DAS port allocation.

39 Intersite DAS port not allocated for site NN CCM ccm

A call setup was not completed because an active DAS port was not assigned to this CCM/CMM.

Check the DAS port allocation.

40 Internode DAS port not allocated for circuit ccc to ZZ

A call setup to node ZZ was not completed because the internode audio circuits are misconfigured.

Check the internode link configuration and DAS port allocation.

41 Internode DAS port mismatch for circuit ccc

A call setup was not completed because the internode audio circuits are misconfigured.

Check the internode link configuration and DAS port allocation.

42 Dispatcher ddd: link up

A dispatcher has connected, or a faulty link from a dispatcher has recovered.

43 Dispatcher ddd: link down

A link to a dispatcher has failed. Check that the dispatcher is running.

44 Call record limit reached

Clear the call record database from the Node Status window and reset the NMT's call record sequence number to 1.



Note: You will lose any call records that have not yet been downloaded from the node to the NMT.

45 DAS conference overload

The DAS conferencing resource has been exceeded. The audio path of several calls has been interrupted.

46 License error

The node controller license has expired or is invalid.

Contact a Tait representative to get a new license.

47 Site NN: Control channel changed nnn

The control channel has changed to a different RF number than the default.

48 Network Failure

The NMT has lost connection to the network.

49 Network Up

The connection to the network has been restored.

50 Primary/Backup Node activated

This alarm is generated when the indicated node controller changes state from standby to active.

51 Site NN: DMM link up nnn

The site has regained contact with the Data Management Module of channel *nnn*.

52 Site NN: DMM link down nnn

The site has lost contact with the Data Management Module of channel *nnn*.

53 Primary/Backup Node: RAID disk status Optimal

The indicated node controller's RAID disks are in good health.

54 Primary/Backup Node: RAID disk status None/Degraded/Sync

The indicated node controller's RAID disks are non-optimal.

55 Site NN: Channel jammed nnn⁵

The channel status has changed from unjammed to jammed.

56 Site NN: Channel unjammed nnn⁴

The channel status has changed from jammed to unjammed.

57 Site NN: Entered APM

Appears only if the site has changed to using Alternate Partition Mode. For further information on Alternate Partition Mode refer to section 10.15 "Channel Partitioning" in the *TaitNet MPT 1327 Networks System Manual*.

58 Site NN: Exited APM

Appears only if the site was using Alternate Partition Mode, but is no longer using it.

59 Internode link to Node ZZ down

The internode link between this node and node ZZ has stopped transmitting data.

60 Internode link to Node ZZ up

The internode link between this node and node ZZ has recovered.

61 Site NN: DMM bb: nnn down

DMM bb (DCM channel nnn) on Site NN has failed, or the link is faulty.

62 Site NN: DMM bb: nnn up

DMM bb (DCM channel nnn) on Site NN had failed, or lost its link, but has now recovered.

63 Site NN: Major alarm on DMM bb: nnn

DMM bb (DCM channel nnn) on Site NN has triggered a major alarm.

5. New in Q1541NC v4.08.01.

64 Site NN: Minor alarm on DMM bb: nnn

DMM bb (DCM channel nnn) on Site NN has triggered a minor alarm.

65 Site NN: DMM bb: High/low temperature: TT C

DMM bb on Site NN is outside the temperature threshold range with a recorded temperature of TT C.

66 Site NN: Auxiliary input on DMM bb: nnn set

DMM bb (DCM channel nnn) on Site NN has set its auxiliary input.

67 Site NN: Auxiliary input on DMM bb: nnn clear

DMM bb (DCM channel nnn) on Site NN has cleared its auxiliary input.

68 SQL aaaa: queue size greater than 1000

The SQL connection on IP address aaaa has a queue of more than 1000 messages to be processed.

69 SQL aaaa: queue size less than 200

The SQL connection on IP address aaaa previously had a queue of more than 1000 messages to be processed, but the queue has now decreased to less than 200 messages.

70 SQL aaaa: connection failure

The SQL connection on IP address aaaa has failed.

71 SQL aaaa: connection (re)synchronized

The SQL connection on IP address aaaa has either synchronized at startup or resynchronized after connection failure.

72 NMT aaaa: Alarm email facility disabled

The facility that dispatches alarms to email addresses on the NMT with IP address aaaa has been disabled by the NMT operator (refer “Sending Alarms by Email” on page 83).

73 NMT aaaa: Alarm email facility enabled

The facility that dispatches alarms to email addresses on the NMT with IP address aaaa has been re-enabled by the NMT operator (refer “Sending Alarms by Email” on page 83).

4 Call Records

A server NMT can automatically download call records from the nodes it is connected to. Client NMTs cannot do this. You can view information about the way this is done and optionally change the location of call record files, or the length of time for which they are stored. Also, you can specify which nodes the NMT will download call records from and indicate the time of day when this can occur. Downloaded call records are stored in a file, one for each day. Call records for billing purposes should be collected from the server NMT. To monitor call records, select Reports > Call Records. See “Call Records” on page 208 for more information.

4.1 Viewing Call Record Download Settings

Select Configuration > Call Records to see what call record downloading is in place. The following Call Record Configuration window appears.

Node	Download	Sequence Number	Start	End
DONALD	<input type="checkbox"/>	0	00:00	24:00
FISH	<input type="checkbox"/>	0	00:00	24:00
SCROOGE	<input checked="" type="checkbox"/>	1149	00:00	24:00
TRAMP	<input checked="" type="checkbox"/>	7697	00:00	24:00

The window displays information about where the call records are downloaded to. Below this is a Download Settings area that displays a row of information for each node.

Call Record Format

If the T1541 node version software in use is Q1541NC v4.07.02 or later you can select between ‘T1541’ and ‘Extended T1541’ formats.

If ‘Extended T1541’ is selected with node software earlier than v4.07.02 the additional B-site queuing time fields in the call records will be set to -1.

Location of Call Record Files

This box is used to specify the directory where call record files are to be stored. To alter the path, press the Browse button. This box can also be used to specify the filename prefix. Call record filenames consist of a prefix (CallRecords-) and a suffix. The suffix cannot be changed and represents the date on which the calls occurred and is in the format `yyyymmdd`.

Alternative Call Record Format

If you wish to store a second copy of call records in an alternative format you can choose the format to use with this pull down menu. The options are 'None', 'TaitNet T1540' and 'ActionNet'.

Location of Call Record Files (Alternative Format)

Call records are stored by default in the TaitNet-T1541 format. It is possible to save a second copy of the call records in another format as well. This box is used to specify the directory where these files are to be stored. To alter the path, press the Browse button.

Days to Keep Call Record Files Before Deleting

You can specify a number of days that the NMT must store the record files for. If, for example you specify 12 days, the call record file for 1 September will be kept till at least 13 September. Ensure that this time is long enough for the requirements of your billing system.

If you specify 0 days, then call records will be stored indefinitely. You will have to delete them manually at periodic intervals to ensure that you do not run out of disk space.

Maximum Download Rate

Downloading call records generates network traffic that can adversely affect the performance of the network. To prevent this you can set the maximum number of call records to download each second. Valid values are between 1 and 500.



Note: With modern equipment, the slowest maximum download rate is approximately 2 to 3 downloads per second, even when this field is set to a lower value.

Download Settings

The Download Settings area indicates for each node in the network whether call records are downloaded and when that can occur. To alter information for a node, click on the cells you wish to edit.

The columns in the area display the following:

Node

The name of the node that the row applies to.

Download

If this contains a tick, the NMT will download call records from this node.

Sequence Number

Displays the start number of the call records for this node.



Note: This cell does not update on the screen, so the window must be closed and re-opened to obtain the current value. When the Apply button is pressed, the cell value is written to the database only if it has been manually changed to a different value.

Start

Specifies when the NMT is permitted to download call records from this node. It shows the beginning of the permitted time.

End

Specifies when the NMT is permitted to download call records from this node. It shows the end of the permitted time.

4.2 Configuring Call Record Downloading

1. In the Call Record Configuration window, click on the row for the node that you want the NMT to download call records from.
2. To enable call record downloading, select the Download check box.
3. The sequence number column indicates the most recent call record the NMT has downloaded. If you edit this field, the NMT will start downloading records from the number entered.
4. If you want the NMT to download call records during the quiet time of the day, enter the start and end of that quiet time into the Start and End columns.
5. Press Apply to confirm your changes then Close to close the window.

4.3 Resetting Call Record Downloading

If for any reason the call record files in the NMT become corrupted or lost, you may be able to obtain them again by resetting call record downloading.

1. Ensure that there are no old call record files in the directory that the new call records will be downloaded to. You can delete them, remove them, or change the download directory. (Otherwise call records will be appended to existing files.)
2. Select Configuration > Call Records to open the Call Record Configuration window.
3. Click on the sequence number for the node you wish to reset and edit the value to be equal to one. Then press the Apply button. If this is done for all nodes then all nodes will be reset.
4. Press Close to close the Call Record Configuration window.

4.4 Call Records File Format

Call records are separated by the ASCII newline character (\$0A). Fields are comma-delimited and any commas in the original data are replaced by hyphens.

The following table lists the fields in a call record and provides descriptions of them. For general information about the data in these fields, see “Reports Menu” on page 191.

Field No.	Field Name	Format	Comment
1	Date	ISO Date (YYYYMMDD)	The date of the call
2	Time	HH:MM:SS	The time when the call started
3	Cost code	Free-form string	A code that is assigned to the fleet that the radio belongs to. Your billing system can use this code to assign call records from more than one fleet to a single account. Any commas are replaced by hyphens.
4	Called (MPT 1327)	MPT 1327 Number	The called party in the MPT 1327 format prefix/ident
5	Called (Fleet Format)	Number of the called party in the appropriate numbering scheme	Empty if no fleet defined for called party
6	Caller (MPT 1327)	MPT 1327 Number	The calling party in the MPT 1327 format prefix/ident
7	Caller (Fleet Format)	Number of the calling party in the appropriate numbering scheme	Empty if no fleet defined for calling party
8	Dialled digits	Numeric string	Digits as dialled by radio user, including leading 0 for PSTN calls or leading 3, 4, 5, 6 for PABX calls. This field is only used for dialled outgoing phone calls. It is not used for short form, network operator or incoming phone calls.
9	Exchange Digits	Numeric string	Number the network supplied to the PSTN or PABX (outgoing call) or the number the network received from PSTN or PABX (incoming call)
10	A Party ID	Numeric string	This is the calling party identity received from by the PSTN or PABX for incoming phone calls. This is the calling party identity sent to the PSTN or PABX for outgoing phone calls.
11	Call Type	An ASCII character, one of the following: G B S M N X T R P s m n b p ?	See “Interpreting Call Types” on page 100 for a description of this field
12	Coverage	An ASCII character, either L or I	L denotes the call is local and I denotes the call is intersite
13	Priority	An ASCII character, one of the following: N P E	The priority level of the call. This can be normal high emergency

Field No.	Field Name	Format	Comment
14	On Air Duration	Integer	Seconds on air for audio/NPD calls. For Status or SDM calls, indicates the number of control channel slots used by the data call.
15	Queue Duration	Integer	The time in seconds during which the call was queued for busy channel
16	Answer Duration	Integer	Indicates how long the radio or telephone was ringing before the call was answered. This includes time queued because the called party is busy.
17	Node Number	Integer in range 0 to 31	The node number of the calling party
18	Node Name	Free-form string	Any commas replaced with hyphens
19	Calling Party Site Number	Integer	Number representing the calling party's location. See "Caller Locations" on page 113 for details.
20	Calling Party Site Name	Free-form string	A textual representation of the calling party's location. This is usually the site name. Any commas replaced with hyphens.
21	Calling Party Channel	Integer	Calling party's channel number. See "Caller Locations" on page 113 for details.
22	DAS ports used in call	List in the form (integer:integer) (integer:integer)...	This field is only used for calls in which DAS ports were used. The format is (node_number:port).
23	Traffic channels used in call	List in the form (integer:integer:integer) (integer:integer:integer)..	This field is only used for calls in which traffic channels were used. The format is (node_number:site_number:rf). If 'Extended T1541' is selected, a 4th integer is added to each group. This integer is the queued time in seconds for this traffic channel (-1 means the queue time is not available for this channel). This number may be of interest for multi-site group calls, where sites are late being included in the call, or for tracing the reason for slow call set up times with multi-site group calls.
24	Node sequence number	Integer in the range 0 to $2^{32}-1$	A number that the node assigns to the call record. For each new record, the node increments this number by 1. A node sequence number of 0 means that this call was not processed by a node. It was a local, single site call, processed by the site that the call originated from.
25	Site sequence number	Integer in the range 0 to $2^{16}-1$	A number that the originating site assigns to the call record. Registration requests are not assigned a site sequence number, and a value of 0 will be entered in these call records. The same applies to call requests that fail during call setup (for example due to site overload).
26	Call end reason	Integer	This field contains a numeric code giving a detailed reason why the call ended or failed. See "Interpreting Call End Reasons" on page 102 for details.

Field No.	Field Name	Format	Comment
27	Call close reason	Integer	This field contains a numeric code giving the simple reason why the call ended or failed. See "Interpreting Call Close Reasons" on page 101 for details.
28	Meter pulse count	Integer	The number of meter pulses received from the PSTN or PABX for an outgoing phone call

Interpreting Call Types

The following table lists the possible call types and characters representing those call type.

Type	Description
I	Individual speech
B	Broadcast speech
G	Group speech
S	Status
M	Individual short data message
N	Individual non-prescribed data
X	Abort
T	Divert
R	Registration
b	Broadcast non-prescribed data
s	Group status
m	Group SDM
n	Group non-prescribed data
p	Pressel message
P	ESN poll

Interpreting Call Close Reasons

The call close reason contains a numeric code giving the simple reason why the call ended or failed. The following table lists the codes that can appear.

No.	Name	Description
0	TE Busy	The called terminal equipment is already in a call at the time of the call request
1	System Busy	The network is overloaded or has problems
2	No Answer	The called party does not answer
3	Not Found	The ident of the called party is valid but it is either not registered or the node could not route the call
4	Complete	The call was completed
5	Preempted	The call was cleared down to make a channel available for a priority or emergency call
6	Timeout	The call exceeded the current maximum call duration or the maximum allowable call setup time
7	Inactive	One or more of the parties was inactive. The inactivity timer expired.
8	Callback	The call to a line dispatcher terminal was put in the callback queue
9	Unsupported Request	The call could not be processed because the system does not support it, for example, sending a status call to a PSTN port
10	Invalid Call	The call failed the system's validation check, for example, because the caller did not have rights to make the call or because the caller was outside the assigned service area
11	Convert to local	The network could not process the call and sent it back to the originating site to process
12	No route	Internode routing failed
13	Force close	A group call was closed by a party other than the calling party
14	Include complete	The call was successfully amalgamated into another call
15	Unknown	The close reason is not known

Interpreting Call End Reasons

This field contains a numeric code giving a detailed reason why the call ended or failed. It is used to help diagnose configuration and equipment faults.

The following table lists the number and name of each call end reason and provides descriptions of them. There are cases where the call end reason differs or is not used, depending on which version of the site software is running.

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
0	Unknown The network was unable to establish why the call ended or failed	
1	Pending The call was being processed and had not yet ended	
2	Node Node did not accept the call request	
3	Caller not validated The calling radio is not permitted to make the requested call. You can use the NMT to enable it to make the call type involved.	
4	Called barred The called radio is barred from using the network	
5	Caller barred The calling radio is barred from using the network. Use the NMT to allow the radio to operate on the network.	
6	Called busy The called radio is busy	
7		Site bus overload The message queue between the SMM and the channel was full so the SMM was unable to pass on the call request
8	SCU overload Call could not be set up because of SCU overload. The SCU message queue was full so it was unable to pass on the call request.	
9	CC overload Control channel overload. Tables in the CCM were full; the CCM could not process the call.	
10	No called TC There was no traffic channel available for the called radio. Either queuing is not enabled for the call type, or the maximum number of queued calls at the site is exceeded.	
11	No caller TC There was no traffic channel available for the calling radio. Either queuing is not enabled for the call type, or the maximum number of queued calls at the site is exceeded.	
12	Called diverted This call ended because the called party is diverted	
13	Called not home The control channel received no answer from the called radio, even though it is registered at the site. The radio might be switched off.	
14	Caller not home The control channel received no answer from the calling radio. (It sometimes sends an AHOY message to check if the calling radio is still there, for example, when setting up a queued call.)	

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
15	Terminated by site error A site error caused the call termination	Calling IDENT invalid The calling radio supplied an invalid address. This is usually caused by corruption of the radio's transmission.
17	Called ACKV1 Called radio is in 'quiet' mode. The radio user might be unaware of this. If the called radio is a rural phone, the message indicates that it is already off-hook.	
18	Already being diverted A diversion request failed because another diversion request for this radio is being processed	Called ACKX0 The called party refused to accept the call (invalid call type) and responded with a ACKX qual 0
19	Data diversion request A request to divert data calls only was not accepted. The system cannot divert just some types of calls.	Called ACKX1 The called party refused to accept the call and responded with a ACKX qual 1
20	Third party diversion A third party diversion request was not accepted. The system is unable to process third party diversion requests.	Called ACKB1 The called party refused to accept the call and responded with a ACKB qual 1
21	Already diverted A diversion request was not accepted because calls to the radio were already being diverted. The existing diversion must be cancelled before another diversion can be set up.	
22		Called unknown ACK An unknown acknowledgement was received from the called party
23	Data call to self The calling radio attempted a data call to itself	
24	Data call to group The calling radio attempted to make a data call to a group. Either the network cannot make such a call or the call is not allowed.	
25	Data call to phone Data calls to the PSTN or PABX are not allowed	
26	Intersite data call failure An intersite data call failed at the called site	Data call upload failure A data call was unsuccessful while trying to upload data from the calling party
27		Calling party not registered A radio attempted to make a call where it was not registered. If confirmed registrations are enabled, this call attempt will fail.
28	Site not validated The site is not permitted to make this type of call	Called party not registered The call request was aborted because the called party was not registered
29	Site cannot queue this call type The call cannot be set up straight away and the site has been configured by the NMT not to queue the requested call type	
30	Intersite link down An intersite call cannot be connected because the link between the site and the node is down	

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
32	Conflicting call The control channel received a call request from a radio that was already in a call, but could not amalgamate it into the existing call	Called busy diverted The called party was busy and so the call request was diverted
33	Amalgamated The control channel received a call request from a radio that was already in a call and amalgamated it into the existing call	Called not home diverted The called party was not home and so the call request was diverted
34	Invalid IDENT The call request supplied an invalid IDENT for either the calling or called radio	Diversion type prohibited The diversion request type is not supported
35	Invalid field in codeword The calling radio sent inappropriate values in a codeword	
36	Extended address upload failure The control channel failed to upload further information from the calling radio about the call request. This information could be a telephone number or interprefix data.	
37		Site error1 The call failed due to an unspecified site error
38	Interfleet call The calling radio attempted to make an interfleet call but is not permitted to make calls of this type	
39	Site error The call failed due to an unspecified site error	Conflicting call A call request has been received for a radio that is already in a call. The conflicting call was terminated.
40	ACKX The called radio replied to the call request with an ACKX	Cancelled call The call request has been cancelled at the calling party's request
41	SDM in progress The control channel was unable to perform a call diversion because an outgoing SDM from the radio was still queued	
42	Called radio will not be free soon An intersite call was not queued at the called site because the time remaining in the existing call was greater than the called site queuing limit time	
43	Called radio in another call setup An intersite call was not queued at the called site because the called radio was still in the call set-up phase of the previous call	
44		No DAS port allocated The call request failed because a DAS port at site was not allocated to the channel
45		DAS port failed The call failed because the DAS port at site assigned to the call failed.

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
46		<p>DAS port unavailable This indicates that a DAS port was not available to process a call request. All appropriate DAS ports are in use.</p>
47		<p>Routing failed This indicates either that an outgoing phone call was aborted because a routing ID was not found in the user group table for the calling prefix and ident, or that the incoming dialled digits could not be converted into a valid MPT1327, MPT1343, CPSx or ANN address</p>
51		<p>Outgoing phone call failed or data call upload failed Phone call: reason not known Data call: the calling radio lost contact with the site during the transmission of an SDM</p>
52		<p>Outgoing phone call failed or data call upload failed Phone call: no dial tone Data call: the calling radio lost contact with the site during the transmission of an SDM</p>
53		<p>Outgoing phone call failed or data call upload failed Phone call: timeout during call setup MFC timeout Data call: the calling radio lost contact with the site during the transmission of an SDM</p>
54		<p>Outgoing phone call failed or data call upload failed Phone call: engaged Data call: the calling radio lost contact with the site during the transmission of an SDM</p>
55		<p>Outgoing phone call failed or data call upload failed Phone call: number unobtainable Data call: the calling radio lost contact with the site during the transmission of an SDM</p>
56		<p>Outgoing phone call failed or data call upload failed Phone call: exchange overloaded Data call: the calling radio lost contact with the site during the transmission of an SDM</p>
57		<p>Outgoing phone call failed or data call upload failed Phone call: called party did not answer or call timed out Data call: the calling radio lost contact with the site during the transmission of an SDM</p>
58		<p>Data call upload failed Data call: the calling radio lost contact with the site during the transmission of an SDM</p>

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
64		Diversion requests disabled Diversion requests are not permitted at this site
65		Intersite calls disabled Intersite calls are not permitted at this site
66		Intersite group calls disabled Intersite group calls are not permitted at this site
67		Local group calls disabled Local group calls are not permitted at this site
68		Data calls disabled NDP calls, short data and status messages are not permitted at this site
69		PSTN calls disabled This indicates that a call request was rejected because the control parameter "PSTN Calls" was set to not-allowed
70		PABX calls disabled This indicates that a call request was rejected because the control parameter "PABX Calls" was set to not-allowed
71		Phone to group calls disabled This indicates that a call request was rejected because the control parameter "Phone To Group" was set to not-allowed
72		Called not validated This indicates that an incoming local phone call or incoming intersite phone call was aborted because the called party was not validated for phone calls and the configuration parameter "Check if radio validated for incoming phone calls" was set to enabled
73		ALLI calls disabled ALLI calls are not permitted at this site
74		Dispatcher include call - party not ready A dispatcher include call failed
80		Unknown traffic channel number The gateway received a GTC for an unknown traffic channel
81		No reply from gateway A call request has been sent from the gateway to the external network, but the external network has ignored this request
82		Gateway allocated new call The external network has set up a second call on a traffic channel, even though the gateway still believes that the channel is already carrying a valid call
83		Invalid interprefix call The gateway has cancelled the call as it does not support interprefix calls

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
96		DIP: Overloaded The call was terminated because there was a problem with the dispatcher interface
97		DIP: Message parse error The call was terminated because a message received on the dispatcher interface had a field containing an illegal value. The node log will contain details of the error and the illegal value received.
98		Internode link failed The call terminated because the internode data link failed
99		Internode link overload The call terminated because the internode interface was overloaded
100		No internode link The call request terminated because the internode data link failed
101		No internode circuit The call request failed because no internode audio circuits were available
102		No internode route The call request failed because a route to the destination node could not be found
103		Unsupported request The call was terminated because the node does not support this request type
104		Essential site not available The group call setup failed because an essential site was not available
105		Call timeout error The call was terminated because the node's call timeout expired
106		Unsupported diversion request The diversion request type is not supported by the node
107		DAS port failed The call terminated because the DAS port assigned to the call failed
108		Called not registered The called party was not registered at any site
109		Group not available The called group does not have a 'Home Node' on the system
111		Intersite link down The call failed because the intersite data link was down

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
112		<p>Phone maximum calls exceeded The call request failed because the maximum number of calls supported by the phone port group has been exceeded</p>
113		<p>No route to phone port The call request failed because the node was unable to find a route to the phone port</p>
114		<p>DAS/node sync error The node controller and DAS have lost synchronisation with each other. The node's model of the DAS port state differs from the commands the DAS is sending to the node. This fault can be caused by a faulty serial connection between the node and the DAS.</p>
115		<p>Phone port failed The call terminated because the phone port assigned to the call failed</p>
116		<p>Phone no ports available The call request failed because no phone ports were available</p>
117		<p>Outgoing phone call prohibited The call request failed because outgoing phone calls were prohibited on the port group assigned to the call</p>
118		<p>Site maximum calls exceeded The maximum number of calls the site can process simultaneously has been exceeded</p>
119		<p>Convert to local The called party is registered at the same location as the originating party. No intersite link is required.</p>
120		<p>Site no DAS port allocated The call request failed because a DAS port at site was not allocated to the channel</p>
121		<p>Site conflicting call The call request was rejected because it conflicts with a call already on channel</p>
122		<p>Site corrupt diversion record The call request to a diverted party was rejected because the diversion record is corrupt.</p>
123		<p>Site invalid party The call request was rejected because it contains invalid calling or called parties</p>
124		<p>Site diversion request not supported The diversion request was rejected because the diversion type is not supported</p>
125		<p>Site unsupported call type The call request was rejected because the call request type is not supported</p>

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
126		Conventional line interface port failed The call failed because the DAS port assigned to the conventional line interface failed
127		Conventional line interface overload The call request failed because the maximum number of calls supported by the conventional line interface has been exceeded
128	End reason unknown	Site call already closed
129	Pending (call not yet ended)	Site no reason available
130	Node - unspecified	Site conflicting registration Can only occur where two control channels, at distant sites, share the same frequency. Both have received either a registration request or a call request from the same radio. The node has established which site the radio thinks it is registered on, actioned the request at this site, and has terminated the request at the other site.
131		DAS: call answered
132		Bad RCGA request A radio controlled group affiliation request was received from a radio, but could not be processed due to an error
133		Partially successful group data call¹ A multi-site Group Status Call or Group SDM was successfully sent to only some of the sites at which radios in the Group were registered
134		Including call invalid An Include Call request has failed because one of the parties in the including call is invalid, likely it was not an individual radio or dispatcher
135		Include call invalid An Include Call request has failed because it is not from one of the including call parties
136		Including call not found An Include Call request has been made to include to a call that cannot be found
137		Called group busy A Group Status call or Group SDM was aborted because the group was already in a call
138		DIP: Reason 'Complete'
139		DIP: Reason 'Failed'
140		DIP: Reason 'Unknown'
144	Not answered The radio(s) involved in the call were sent to a traffic channel, but the channel did not detect any transmissions	

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
145	Failed control channel The control channel failed. The traffic channel that took over as control channel cleared down all current calls.	
146	Failed traffic channel The traffic channel failed in the middle of the call, for example because of transmitter low forward power	
147	Called ACKB The called radio sent an ACKB message, refusing to accept the call. Tait radios can be configured to refuse to accept a call when there is a callback request to the calling radio.	
148	Diverted When a call is made to a diverted radio, an initial call record (this record) details the original call. A second call record is for the call that is made to the new location.	
149	Called radio rejected call An incoming FOACSU call was declined by the called party	
150	Successful diversion request A radio has successfully requested that calls to it be diverted. No actual call is made.	
151	Call start without call end The SMM detected a call start request that was sent to the traffic channel but did not receive a call end report from the traffic channel	
152	Queued radio busy timeout A call was queued because the radio was busy. The call was removed from the queue after the timeout period without being connected.	
153	Queued called channel busy timeout The call was queued because all channels at the called radio's site were busy. The call timed out and was removed from the queue without being connected.	
154	Queued intersite call timeout The call timed out during the setup of an intersite call. The call was removed from the queue after the timeout period without being connected.	
155	Queued calling channel busy timeout The call was queued because all channels at the calling radio's site were busy. The call was removed from the queue after the timeout period without being connected.	
156	Queued data call timeout A data call that was queued for reasons other than 'busy radio' timed out without being connected	
157	Unknown cancel request A call was queued then cleared at the B-site. When the A-site tried to cancel the call, the B-site could not find the queued call.	Site in standby mode A call request is rejected because it has come from a site in standby mode. This could happen when a site fails and is then put in standby mode.
158	Queued cancelled radio busy The call was queued because the called radio was busy, then cancelled by the caller before it could be connected	
159	Queued cancelled calling channel busy The call was queued because the calling channel was busy, then cancelled by the caller before it could be connected	

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
160	Queued cancelled B site queued The intersite call was queued at the B-site, then cancelled by the caller before it could be connected	
161	Queued cancelled radio and channel busy The call was queued because both the calling channel and the called radio were busy, then cancelled by the caller before it could be connected	
162	Queued cancelled data call A queued data call was cancelled	
164	Queued calling preempt The call was queued, then cancelled because of an emergency call to the calling radio	
165	Queued called preempt The call was queued, then cancelled because of an emergency call to the called radio	
166	Queued calling channel preempt The call was queued, then cancelled because the calling channel that was reserved was wanted for an emergency call (not yet implemented)	
192	End reason unknown	Successful registration The registration request was accepted
193	Pending Call setup is not yet ended	Implicit registration An unregistered radio has made a call, and the system registered it
194	Node Node did not accept the call request	ESN received A radio (registered or unregistered) has responded to a request to supply its Electronic Serial Number
195	Called closed The called party cleared down the call	
196	Caller closed The calling party cleared down the call	
197	Traffic channel timeout The radio(s) involved in the call did not clear it down. A backup timer on the traffic channel CCM cleared the call down.	
198	Control channel timeout The radio(s) involved in the call did not clear it down. A backup timer on the control channel CCM cleared the call down.	
199	Inactive timeout Neither party to the call spoke for a time. The channel registered no activity, so the call inactivity timeout was activated.	
200	Closed by called user or calling user The call was ended by one of the call parties before it was answered. This is on a non FOACS call.	
203	Caller preempt The call was cleared down because the calling radio had an emergency call, and emergency preempt is enabled	

No.	Pre Site 7 Reason and Description	Site 7 Reason and Description
204	Called preempt The call was cleared down because the called radio had an emergency call, and emergency preempt is enabled	
205	Called channel preempt The call was cleared down because the channel was required for an emergency call and emergency pre-empt is enabled	
206	Calling channel preempt The calling channel was wanted for an emergency call and emergency pre-empt is enabled	
207	Successful data call A data call on the control channel was successfully completed	
208	Swapped During the call, the control channel moved the radios to another traffic channel. This is the call record for the channel the call was moved from.	Successful group call amalgamation The calling radio has been amalgamated into an existing group call
209	Logically inactive but physically active The traffic channel was involved in a call, but the control channel had no record of sending radios to channel	
210		Successful dispatcher include call amalgamation A dispatch terminal has requested that this call is amalgamated with an existing call
211		Calling party amalgamated A call request has been received that has the same calling and called parties as a call already in progress

1. Used in Q1541NC v4.04.05 and in v4.07.xx and later.

4.5 MPT Special Idents

The MPT standards specify some special idents that are used for the air interface and that appear in call records. For detailed information see the MPT documentation. Special idents you may see in call records include the following:

Ident	Description
8101	Call to PSTN
8102	Call to PABX
8121–8135	Short form PSTN call
8170–8180	Network operator call
8185	Registration request
8187	Diversion request
8189	Interprefix request
8190	ESN poll
8191	System wide call

Caller Locations

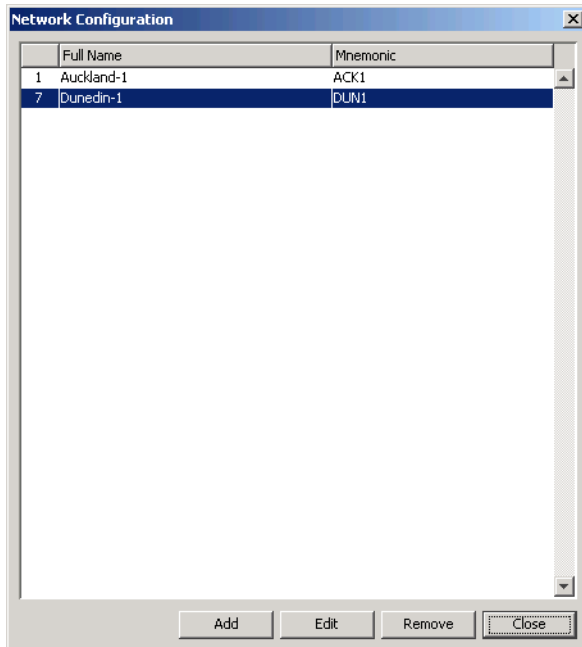
Calls may originate from sites, phone ports, line dispatchers and the conventional line interface. The calling party's site number and channel number fields have different values depending on the interface the call originates from.

Calling party's Site Number	Calling party's Channel Number	Description
0 to 29	The site channel number of the channel used for the call	The call originates from the specified site number
2000 to 2031	If the port group is configured as PABX then the channel number is set to 1, otherwise the channel is set to 2	The call originates from a phone port. Note that the port group number is the originating site number minus 2000.
3000 to 3299	The dispatcher number as specified in the DAS port configuration	The call originates from a line dispatcher
4000 to 4299	The DAS port number	The call originates from a conventional line interface

5 Network

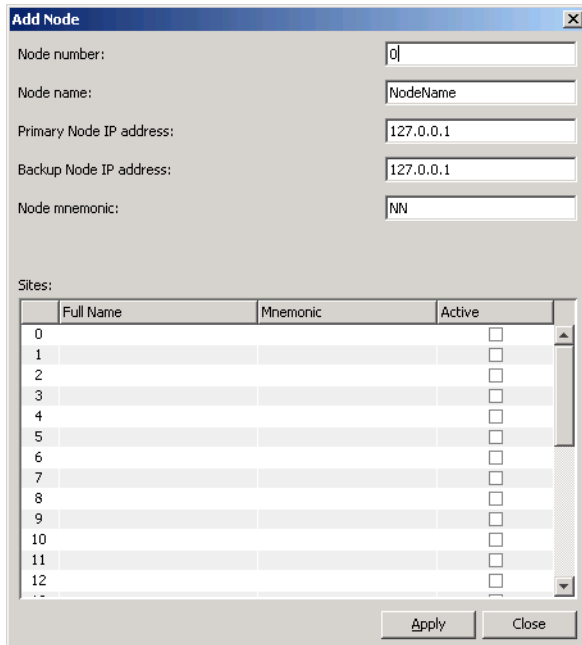
When a node is added to the network, you need to tell the NMT about it and the sites that belong to it.

Select Configuration > Network. The Network Configuration window appears.



5.1 Adding a Node and Sites

1. Press the Add button to display the Add Node window.



2. In the Node Number box, enter the number of the node. This is the number you chose when you installed the node software. It must be a number between 0 and 31. You cannot have two nodes in a network with the same node number.
3. In the Node Name box, enter a suitable name for the node.
4. In the Primary Node IP Address box, enter the IP address of the primary node controller computer.
If a backup node controller computer is available, enter the IP address of the backup node controller in the Backup Node IP Address box.
5. In the Node Mnemonic box, optionally enter a short version of the node name, this will be displayed on various windows (for example, the DAS Monitor window), instead of the node's full name.
6. To enter the sites, click on the cells in the Sites table and enter the name and mnemonic (if required) for each site connected to the node. Site 0 is the site connected to Port 1 on the Etherlite port server, Site 1 is connected to Port 2, and so on.



Important: If you don't enter a name for an existing site, it will not be displayed in the main window. All *active* sites **must** have a name, so that site status and configuration parameters are visible to the NMT.

7. Click on the Active column for each site on this node. If Active is not selected, the Site icon in the Main Window will be displayed with a diagonal red line through it.
8. Press Apply to save your changes then Close to close the window.

The node you added now appears in the Network Configuration window, and the main window.

5.2 Editing a Node and Sites

Details about the nodes in the network are displayed in the main NMT window and in various other windows.

Select Configuration > Network to rename the node or add, rename, or remove any of its sites as follows:

1. Select Configuration > Network to display the Network Configuration window.
2. Double-click on the node you wish to edit to display the Edit Node window.
3. Edit the node and site details as required.
4. Press Apply to save your changes, then Close to close the window.

6 Properties

Select Configuration > Properties to display the Properties window. This window contains the following tabs:

- General
- Fleet Addressing
- Backup
- SQL Interface

which are described below.

6.1 General

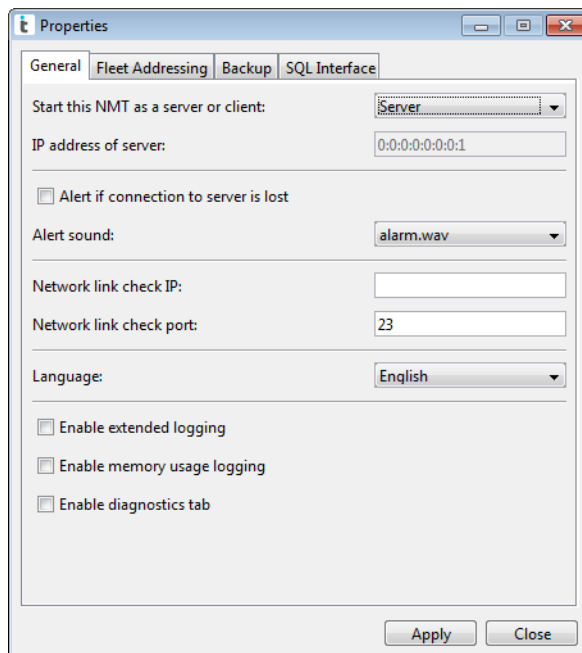
Setting the Server NMT

It is recommended that each network has one server NMT, and that any other NMTs on the network be configured as clients. This ensures that all the data and configuration files on the network are synchronised. In a network with only one NMT, that NMT must be the server. By default, an NMT is a server NMT. In particular circumstances, it may be appropriate for there to be several server NMTs, for example if some fleets only operate on part of the network. However care must be taken to ensure that there are no inconsistencies in fleet information and charge rates.

Select the General tab to configure your NMT as a server or a client NMT.

Server NMT

The Server NMT maintains the fleet, unit, group and charging information for itself and for any client NMTs. This ensures that the NMTs work with the same information. The Server NMT communicates with the node controllers on behalf of the client NMTs.



Only users with Administrator access rights can make changes to this screen.

If your NMT is to be the server NMT:

1. Ensure that the Start This NMT as a Server or Client box is set to Server.
2. The IP Address of Server box will not let you enter anything.

If your NMT is **not** the server NMT, follow these steps.

1. Ensure that the Start This NMT as a Server or Client box is set to Client.
2. Enter the IP Address of Server.
3. Press Apply to save your changes.



Important: If you make an NMT the server NMT, or make the server NMT a client NMT, you must restart the NMT.

Alert if Connection to Server is Lost

The NMT client can be configured to sound an alarm if communications with the NMT server fails. The alarm sounds every second whilst the communications link is down.

To enable this feature, open the Properties window from the Configuration menu and select the General tab. There are two options that must be configured:

1. Alert if connection to server is lost: Tick the checkbox to enable the feature.
2. Alert sound: Use the drop down menu to select an appropriate alert sound.

Network Integrity Checking

When the NMT loses contact with a node, a 'node down' alarm is raised. However, the node may be functioning properly. The real problem may be an error on the computer network linking the NMT to the node.

The NMT can be configured to test the integrity of the network whenever it loses contact with a node. The NMT attempts to connect to a remote device. If the connection cannot be established, the network is judged to be faulty and a 'network link' alarm is raised. Otherwise a 'node down' alarm is generated.

To enable this feature, open the Properties window from the Configuration menu and select the General tab. There are two options that must be configured:

1. Network link check IP: Enter the IP address of a remote device on your network. This device should be the one which is used to test the computer network. This could be a hub, for example, but should not be a node.
2. Network link check port: Enter the port number of the device on which connection attempts should be made.

Setting the Language

The NMT windows can be displayed in English or Chinese:

Fleet Table

A set of fleet definitions stored in the Server NMT. This enables the server and any clients to display fleet information and to convert MPT 1327 addresses to fleet numbers and display them.

- In the Language box, select the required language.

Enable Logging

The two logging checkboxes are independent of each other and enable different types of logging. Either one or both may be enabled, but be aware that the volume of data logged may swamp a PC with limited storage.

Enabling extended logging is not recommended unless a specific issue exists. It greatly increases the size of each daily log file. If enabled, it is important that the size of the %userprofile%\My Documents\Tait Applications\TaitNet NMT\logs directory is monitored regularly. Daily log files greater than 1 GB are possible on busy networks with this option enabled.

Enabling memory usage logging is recommended if there is concern about possible memory leaks. It prints an analysis of NMT memory usage to the log file every minute and this increases the size of each daily log file by about 2 MB.

Enable Diagnostic Tab

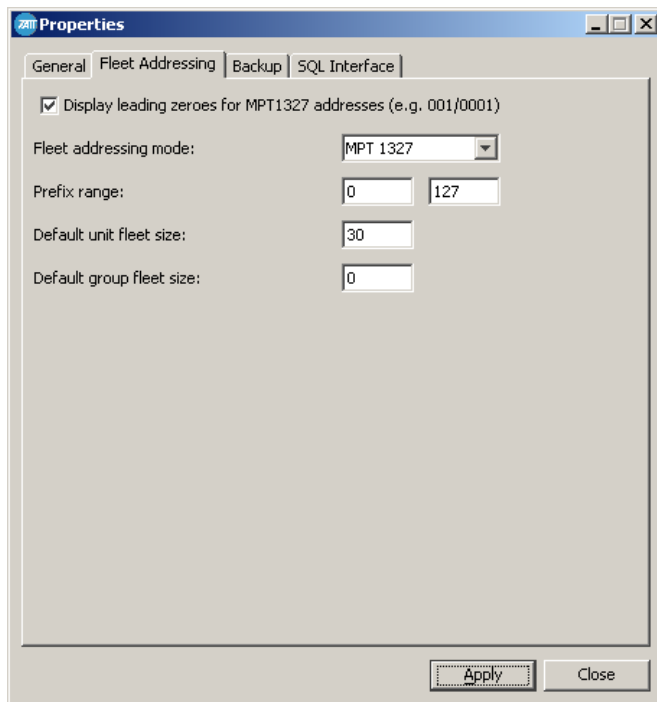
Administrator privilege and a password are required to enable the Diagnostic tab. If the well-known password is entered, a Diagnostics tab is added to the Properties window. It allows access to some diagnostic functions without a need to restart the NMT. Documentation of this tab is outside the scope of this manual.

6.2 Fleet Addressing Mode

From the Fleet Addressing tab you can specify the numbering scheme that the NMT uses. You must select the same numbering scheme as used by the radios on your network. The options are MPT 1327, MPT 1343, CPSx and ANN. Your choice affects the display of radio numbers and the way fleets are created and displayed.



Important: Once a fleet has been defined (Fleet > Summary), it is no longer possible to change the Fleet Addressing Mode. This is because fleets with different addressing modes cannot co-exist on the same network.



Displaying leading zeroes for MPT 1327 addresses

Whichever numbering scheme you use, MPT 1327 addresses are sometimes displayed in the NMT, for example in call records. Select this option if you wish to see leading zeroes displayed in such circumstances. An address such as 1/12 will appear as 001/0012.

Limiting the Prefix Range

In all numbering schemes the available address space is divided into 128 separate prefixes. In the MPT 1327 and ANN numbering schemes, the prefix range is 0 to 127. In MPT 1343 and CPSx the range is 200 to 327. You may wish to reduce this range. For example you may wish to divide the available prefixes among different NMT servers or agencies. In addition, the number of prefixes that a site can support depends on the amount of memory they are fitted with. The NMT lets you specify the range of prefix numbers.

Enter the lowest and the highest prefix number into the Prefix Range boxes.

The NMT will not let you specify prefixes outside this range when you are defining fleets. However it will still display MPT numbers outside the range, if they exist.

Specifying a Default Fleet Size

If the MPT 1327 or MPT 1343 numbering scheme is selected, you can alter the default fleet size. Enter suitable values in the Default Unit Fleet Size and Default Group Fleet Size boxes. The NMT provides these values as defaults when you create a new fleet.

Specifying L, M and S

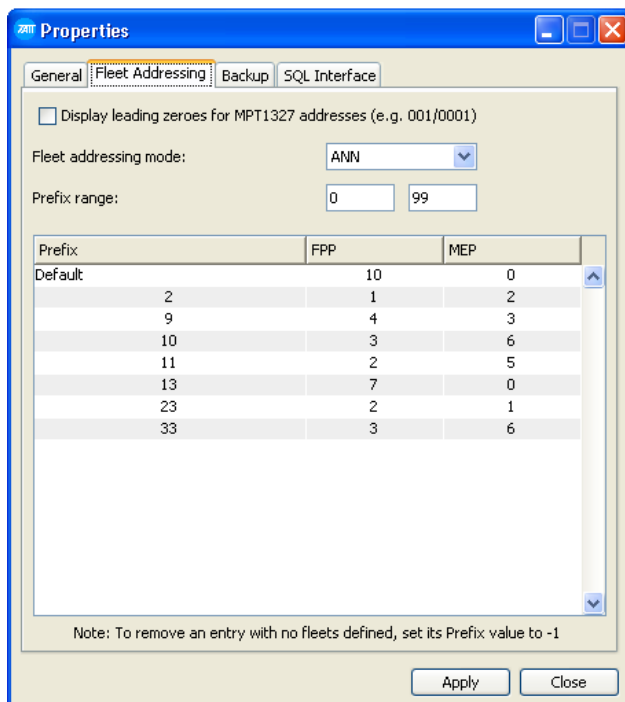
If the CPSx numbering scheme is selected you can specify the values of L, M and S that are to be used to divide up the address space.

Specifying FPP and MEP

If the ANN numbering format is selected you can specify the values of FPP and MEP that are to be used to divide up the address space in each prefix. You can specify sets of values (a maximum of 7 sets in Q1541NMT v4.08.01 and earlier) and the prefix to which each applies. In addition, you can specify a set of default values that will be used for all other prefixes, as displayed in the following diagram.



Note: Once a fleet is defined in a particular prefix, you can no longer edit the FPP and MEP values for that prefix.

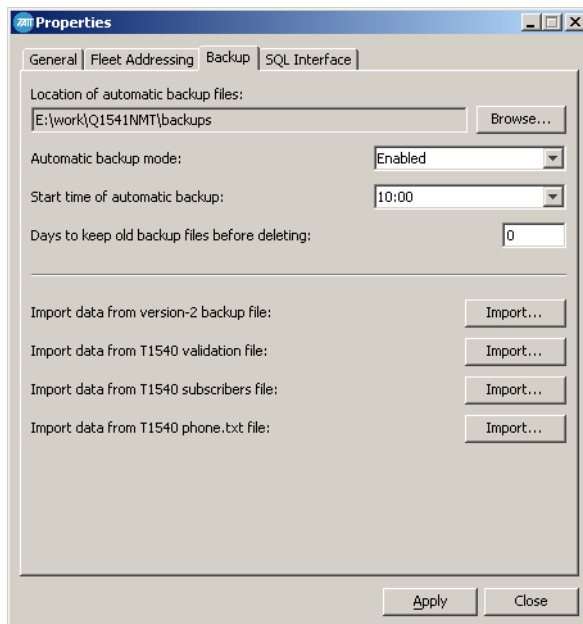


6.3 Backups

The NMT can automatically back up system databases as well as data from the nodes displayed in the main window. You can view the current backup configuration and optionally alter the length of time that backup files are stored for. Also you can specify when the automatic backup can start. Automatically backed up data is stored in files on the NMT computer, one per day for each node.

Viewing System Backup Configuration

Select Configuration > Properties > Backup to view the NMT's automatic backup settings for backing up database data. The Properties window Backup tab appears.



Location of Automatic Backup Files

The Location of Automatic Backup Files box specifies the path and the first part of the name of the system backup files. The automatic system backup filename consists of a prefix (AutoBackup-) and a suffix that is the date in *yyyymmdd* format.

Automatic Backup Mode

To turn automatic system backups on, select Enabled. To turn automatic backups off, select Disabled.

Start Time of Automatic Backup

Enter the time that you want the automatic system backup to start.

If a manual backup or restore is in process at this time, the NMT will wait until it has finished before starting the automatic backup.

Days to Keep Old Backup Files Before Deleting

You can specify a minimum number of days that the NMT must store the backup files for. If you specify 2 days, the backup file for 1 September will be kept at least until 3 September. If you specify 0 days, then backup files will be kept indefinitely. You should delete older files manually at periodic intervals to ensure that you do not run out of disk space.

Import Data from Version-2 Backup File

This button is to allow the user to import data (network description, radio units etc) from a version 2 backup file.

Import Data from T1540 Validation File

This button is to allow the user to import validation data from T1540 backup files.

Import Data from T1540 Subscribers File

This button is to allow the user to import subscriber data from T1540 backup files.

Import Data from T1540 Phone.txt File

This button is to allow the user to import radio data from T1540 backup files.

6.4 SQL Interface

The NMT can be configured to write a copy of its data (fleets, units, groups etc) and all call records to a MySQL database. This feature allows for remote provisioning and billing access through a third party application such as a web based interface. The NMT server must be configured to allow this and must be licensed for this additional function. If this special configuration option is required, refer to “SQL Interface” on page 313.

7 Advanced Options

These options are not available by default. The appropriate line must first be added to file `NMT.cfg`, using a text editor, for example Notepad. The NMT must be restarted to re-read the configuration file. The option is then available in the Configuration menu. If the menu item is absent or is set `=false`, the menu item is not displayed.

7.1 Menu Bar Option for Resolving Time Zone Problems

Under normal circumstances NMT application software should derive its time zone from the host PC. In the unlikely event of a problem, the time zone used by NMT application software can be set independently of the host PC. If set `=true`, the following menu bar parameter adds a Configuration option for a user with Administrator level privileges to set the time zone from a drop down menu of available time zone IDs.

Menubar.TimeZone=true



Note: The time zone selected is stored in the file

`%userprofile%\My Documents\Tait Applications\TaitNet NMT\config\timezone.txt`. If this file is empty, or if the file does not exist, then the NMT application software should derive its time zone from the host PC.

7.2 Menu Bar Option for Translators

The following menu bar parameter is for use by translators only, and must be deleted from `NMT.cfg` (or set `=false`) at all other times.

Menubar.EditTranslations=true



Important: The Edit Translations window is not compatible with the Windows Vista operating system.

7.3 Menubar Option for Customer Specific Import Tools

The following menu bar parameter adds three import tools to the Configuration menu:

Import SDO Report, Import SSO Report and Import SGO Report. These are used to import data from a Nokia ActionNet system to a TaitNet system.

Menubar.ImportTools=true

6. Where `%userprofile%` is a system-defined path, often `C:\Documents and Settings\.`

Part F: Fleets Menu

This part describes how to use the NMT to create and maintain fleets and to give their radios and groups the appropriate call rights and other network features.

Topics

- Working With Templates
- Adding a New Fleet
- Maintaining Fleets
- Maintaining Radios
- Maintaining Groups
- Batch Validation

1 Working With Templates

Using templates simplifies fleet management. You need to set up call rights templates for each call plan that the network provider offers customers. Similarly, you need a service area template for each coverage plan offered. When the definition of a plan changes, you modify the corresponding template.

1.1 Setting Up a Call Rights Template

1. Select Fleets > Call Rights Template. The Call Rights Templates window appears.
2. Press the Add button. The Add Call Rights Template window appears.



Note: The At Node: options are not available until the related At Site: options have been enabled.

Number: 46 Name: All rights

Description: All call types accepted

At site

- Intersite calls
- Phone calls
- Use second control channel
- Data calls
- Interfleet calls
- Interprefix calls

At node

- Speech to radio calls
- Speech to group calls
- PSTN calls
- PABX calls
- Status messaging
- Short data messaging
- Non-prescribed data calls
- Self diversion requests

Apply Close

3. Choose a template number. This is a unique number that identifies the template. When the window opens the NMT will insert a valid number in this box. You may change it if you wish but the number you choose must be unique and greater than 0.
4. Enter a name and optionally a description for the template.
5. In the At Site: and At Node: areas, select or clear the check boxes to enable or disable the call rights you want (see “Call Rights” on page 128 for more information).
6. Press Apply to save the template, then the Close button. The new template appears in the Call Rights Templates window.

Call Rights

When your template is assigned to a radio, it gives or takes away that radio's right to make a particular call type, depending on whether the appropriate check box is enabled or disabled. It is important to understand that both sites and nodes check whether a radio has the right to make the call. The originating site checks all calls, and the node checks all intersite calls. The check at the node is more differentiated. If either check fails, the call cannot go ahead.

Call Rights at Site

The At Site: and At Node: areas in the Call Rights Template window reflect the two different validation checks; the first at the site and the second at the node. If a call right is disabled at the site, the corresponding call rights at the node are disabled.

Select This Check Box...	To Enable... ¹
Intersite calls	Intersite calls of any kind (calls between sites, calls between nodes, telephone calls that use the DAS at the node). Only clear this check box if you want to limit radios to local calls.
Data calls	Data calls of any kind (status messages, short data messages, or non-prescribed data). This check box will only enable local data calls, unless you also select data options in the Call Rights - at Node area.
Phone calls	Calls to any telephone network (PSTN or PABX). The Intersite check box must also be selected, unless the calling site has its own DAS.
Interfleet calls ²	Calls from a radio in one fleet to radios or groups in another fleet. This feature is principally for networks using the CPSx or ANN numbering formats. Disabling this option has a limited effect in MPT 1343.
Use second control channel	Radios will be asked to move to the second control channel. Applies only to sites operating with dual control channels.
Interprefix calls	Calls from a radio in one prefix to radios or groups in another prefix

1. To enable intersite calls, you also need to select the appropriate check box(es) in the At Node: area.

2. Restricting MPT 1343 Interfleet Calls

With MPT 1343 fleets, it is impossible to entirely ban interfleet calls between fleets that use the same prefix. If Call Rights > Interfleet calls is disabled, radios can still make interfleet calls under the following circumstances:

- Radio to radio calls: a radio can call any other radio that has the same prefix and has an MPT 1327 ident that is within +/- 700 of the calling radio's MPT 1327 ident.
- Radio to Group calls: a radio can call any group with the same prefix as the calling radio.

Intersite Call

1. A call between users at different sites at the same node. 2. Any call that involves an intersite line. This can be an intersite call, a telephone call, or an internode call.

Call Rights at Node

The At Node: area tells nodes how to validate call requests. Only intersite call requests reach the node, and only if the site has approved them.

Validation at the node is more differentiated; for example you can allow PABX but not PSTN calls.

Select This Check Box...	To Enable...
Speech to Radio calls	Intersite and internode calls to another radio (speech only: to enable data calls, you need to select the appropriate data options below)
Speech to Group calls	Intersite and internode calls to a group (speech only: to enable data calls, you need to select the appropriate data options below)
PSTN calls	Calls to the public telephone network (speech only: you cannot make data calls to telephone subscribers)
PABX calls	Calls to any private branch exchange (speech only: you cannot make data calls to telephone subscribers)
Status Messaging	Intersite and internode status calls
Short Data Messaging	Intersite and internode short data messages (single-segment or multi-segment transactions)
Non-Prescribed Data calls	Intersite and internode data calls using a traffic channel
Self-Diversion Requests	The radio to send a message telling the node to divert any future calls to it, so that they are made to another radio or telephone

1.2 Setting Up a Service Area Template

1. Select Fleets > Service Area Template. The Service Area Templates window appears.
2. Press the Add button. The Add Service Area Template window appears.

Node	Site	Status
TRAMP	Site-0	Essential
TRAMP	Site-1	Essential
DONALD	SMM-0	Allowed
DONALD	SMM-1/SCU-1	Originate Only
DONALD	SIM 1	Not Allowed
DONALD	SIM 2	Not Allowed
DONALD	SIM 3	Not Allowed
DONALD	SIM 4	Not Allowed
DONALD	SIM 5	Not Allowed
DONALD	SIM 6	Not Allowed
DONALD	SIM 7	Not Allowed
DONALD	SIM 8	Not Allowed
DONALD	SIM 9	Not Allowed
DONALD	SIM 10	Not Allowed
DONALD	SIM 11	Not Allowed
DONALD	SIM 12	Not Allowed
DONALD	SIM 13	Not Allowed
DONALD	SIM 14	Not Allowed
DONALD	SIM15	Not Allowed
DONALD	SIM 16	Not Allowed

3. The window displays all sites in the network.
4. Choose a template number. This is a unique number that identifies the template. When the window opens the NMT will insert a valid number in this box. You may change it if you wish but the number you choose must be unique and greater than 0.
5. Enter a name and optionally a description for the template.
6. Select the service area template type from the drop-down menu. Valid types are Unit or Group, depending on whether this service area template is to be applied to individual radio units or to radio groups.
7. Select one or more sites that you want to be included in the service area. (You can use Shift+Click to select a block of sites, or Ctrl+Click to add a site to the selection.)
8. Click on the right-mouse button, then select a status type from the pop-up menu. If this is a Unit type service area, the status of the sites can be either 'Allowed' or 'Not Allowed'. If this is a Group type service area, the additional status types of 'Essential', 'Local only' and 'Originate only' are also available. (Refer to "Service Area Table" on page 167 for information on group status types.)
9. Press Apply to save your changes then Close to close the window. The new template appears in the Service Area Templates window.

1.3 Modifying Templates

You need to modify templates if the network provider changes an existing plan, for example by including additional sites in a service area, or by adding data calls to a call plan. Because template information is stored in the server NMT, modifying templates does not alter the validation information stored in the nodes. You must carry out a batch validation.

To modify a template, follow these steps.

1. Select Fleets > Call Rights Template or Fleets > Service Area Template to view the list of current templates.
2. Double-click the template you want to modify.
3. In the editing window, make the changes you want, then press OK to save your changes and close the window.
4. Carry out a batch validation for any fleets that will be affected by the changes. See “Batch Validation” on page 170. If the template change is the addition of a site, only batch validate the node that the site belongs to.



Tip

When a service option changes, you can create a new template instead of modifying the existing one.

Then you assign the new template to the radios that have purchased the service option.

This method keeps a record of the changes made to service options. Assigning a new template to the radios updates their validation information at the nodes, so a batch validation is not needed.

2 Adding a New Fleet

When a customer contracts network services for a set of radios, you need to:

- Set up a fleet for the customer
- Configure network access for the radios in the fleet
- Configure any groups in the fleet
- Set up radio authentication, if you want to check for unauthorised use of the network

2.1 Setting Up the Fleet

To set up a fleet, you enter a name and contact information, and you specify the fleet parameters in the chosen numbering scheme. These parameters define a block of idents within a prefix that will be reserved for the fleet. You can manually choose the fleet parameters or you can ask the NMT to find the first available space within a prefix.

To set up a fleet, follow these steps.

1. Select Fleets > Summary to display the Fleet Summary window and press the Add button. The Add Fleet window appears.

The screenshot shows the 'Add Fleet' window with the following fields and values:

- Description:**
 - Fleet name: [Empty text box]
 - Cost code: [Empty text box]
 - Charge schedule: Default (dropdown)
 - Contact details: [Empty text box]
 - Address: [Empty text box]
- Service period:**
 - Start date: 26 Nov 2003 (dropdowns)
 - End date: 26 Nov 2004 (dropdowns)
- Allocation: MPT 1343:**
 - Prefix: 200 (text box)
 - Individual number: 2001 (text box)
 - Group number: 5000 (text box)
 - Number of radios: 30 (text box)
 - Number of groups: 0 (text box)

Buttons at the bottom: Find Space, Apply, Close.

The bottom panel in the Add Fleet window indicates the blocks of numbers that will be allocated to the fleet.

The appearance of the allocation panel changes according to the numbering system you have selected. See “Fleet Addressing Mode” on page 118 for more information.

2. In the Fleet Name box, enter a suitable name for the fleet.

3. If you need to charge several fleets to one customer, enter an alphanumeric code into the Cost Code box. This code will appear in charge records and tells your billing system which account to charge the fleet's calls to.
4. If you use the NMT to specify call charges, select a charge schedule. The available schedules are the ones set up in the NMT's Charging menu.
5. In the Contact Details box, enter suitable contact information, for example the name of the organisation that the fleet belongs to or a responsible person within it.
6. In the Address box, enter the postal address of the organisation. You might also want to add other details such as a phone number or Email address.
7. In the Service Period area, enter the start date and end date of the contract that the fleet owner has contracted with you.



Tip

If you do not work with cost codes, use the Cost Code box for other information, for example the NMT operator responsible for maintaining the fleet.



Note: The service period you specify has no effect on the network. You can leave the default service period unchanged.

8. Next you must define the block of addresses that the fleet will use. This step is dependent on the Numbering scheme you have selected.



Important: Once you have defined a fleet, you cannot increase its size. Ensure that you make the fleet large enough to cater for future growth.

- a. MPT 1327

You must specify the following:

- Prefix: This should be a value in the range 0 to 127.
- Start Unit: This is the lowest unit ident in the fleet.
- Number of radios: Pick a number that can accommodate future growth.
- Start Group: This is the lowest group ident in the fleet.
- Number of Groups: Pick a number that can accommodate future growth.

Allocation: MPT 1327			
Prefix:	<input type="text" value="0"/>		
Start unit:	<input type="text" value="1"/>	Number of radios:	<input type="text" value="30"/>
Start group:	<input type="text" value="6000"/>	Number of groups:	<input type="text" value="0"/>

b. MPT 1343

You must specify the following:

- Prefix: This should be a value in the range 200 to 327.
- Individual Number: Enter the Fleet Individual Number (FIN).
- Number of Radios: The maximum you may specify is 700.
- Group Number: Enter the Fleet Group Number (FGN).
- Number of Groups: The maximum you may specify is 99.

Allocation: MPT 1343			
Prefix:	200		
Individual number:	2001	Number of radios:	30
Group number:	5000	Number of groups:	0

Multi-Fleet Groups

You can have groups containing radios from more than one fleet. Arbitrarily assign the groups to a particular fleet (making sure that the number of groups is large enough), then program radios from the different fleets with the full MPT 1343 group number.

Alternatively, create a fleet specifically for multi-fleet groups. This fleet must have a minimum of one radio number.

c. CPSx

You must specify the following:

- Prefix: This should be a value in the range 200 to 327.
- Fleet Size: There are five options: large, medium, small, tiny and interfleet.
- Fleet number: This must be a valid CPSx fleet number for the selected size.

Allocation: CPSx			
Prefix:	200	Fleet size:	Large
Fleet number:	20	Number of radios:	700
		Number of groups:	100

d. ANN

You must specify the following:

- Prefix: This should be a value in the range 0 to 127.
- Fleet Size: There are three options: large small and mini.
- L: This defaults to 7 for large and small fleets and cannot be changed. For mini fleets you may specify a value in the range 7 to 9.
- R: For small and mini fleets this parameter has the name rr. You should choose a valid value for the selected fleet size.

Allocation: ANN			
Prefix:	0	Fleet size:	Large
L:	7	Number of radios:	700
R:	1	Number of groups:	99

Whichever numbering scheme you use, the values entered define the block of address space that is reserved for the fleet. You may choose the values yourself but they must specify an address block that is not in use by any other fleets. Alternatively, if you select a prefix and click the Find Space button, the NMT will find the next available block of idents and provide suitable values for you.

9. Press Apply to define the fleet, then Close to close the window. The new fleet should appear in the Fleet Summary window. The information you have created is stored in the server NMT.

You can now proceed to configure the fleet's radios and groups.

2.2 Adding Radios

When you create a fleet, you reserve blocks of numbers so that they cannot be used by other fleets, but the fleet is empty. The fleet's Radio Units tab contains no radios and the network will not give access to any of the customer's radios, even if they have been programmed with numbers from the block you reserved. You need to add radios to the fleet, giving them the desired validation information. Adding a radio tells the server NMT that the radio actually exists. The Radio Units tab for the fleet shows the radios that have been added; it does not have entries for all the numbers that have been reserved.

The quickest way to add radios to the fleet is to add the first radio, giving it a standard set of validation information, then to copy that radio to all the other radios you want to add. You can subsequently modify the validation information of an individual radio if necessary, for example to give a supervisor additional call rights.

When you add a radio or copy a radio's validation information to a set of radios, you also:

- assign a call rights template or individually enable or disable each call right
- give an access level (normal, priority, or emergency) to the trunked network
- configure access to the telephone network by assigning an outphone table and a number bar
- assign a service area template or individually add or take away sites from the radio's service area

The server NMT sends the validation information to all the nodes in the network, which in turn pass on a subset of that information to their sites.



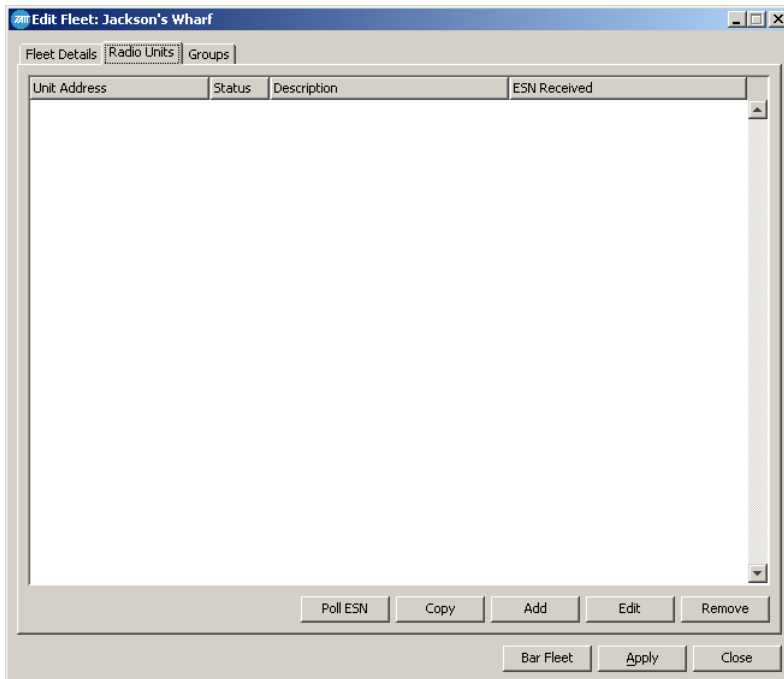
Tip

It is recommended that call rights and service area templates are assigned to radio units in preference to the custom option.

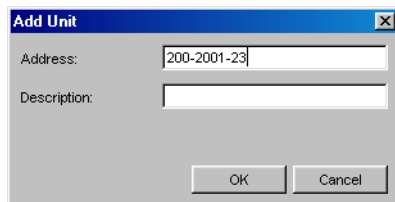
This is because batch validation can automatically update the nodes and sites with new or updated template validation information, whilst radios and group using custom validation information must be individually updated.

Adding the First Radio

1. In the Fleet Summary window, double-click on the fleet to add radios to. In Edit Fleet window click on the Radio Units tab. This is empty, indicating that there are as yet no radios in the fleet.

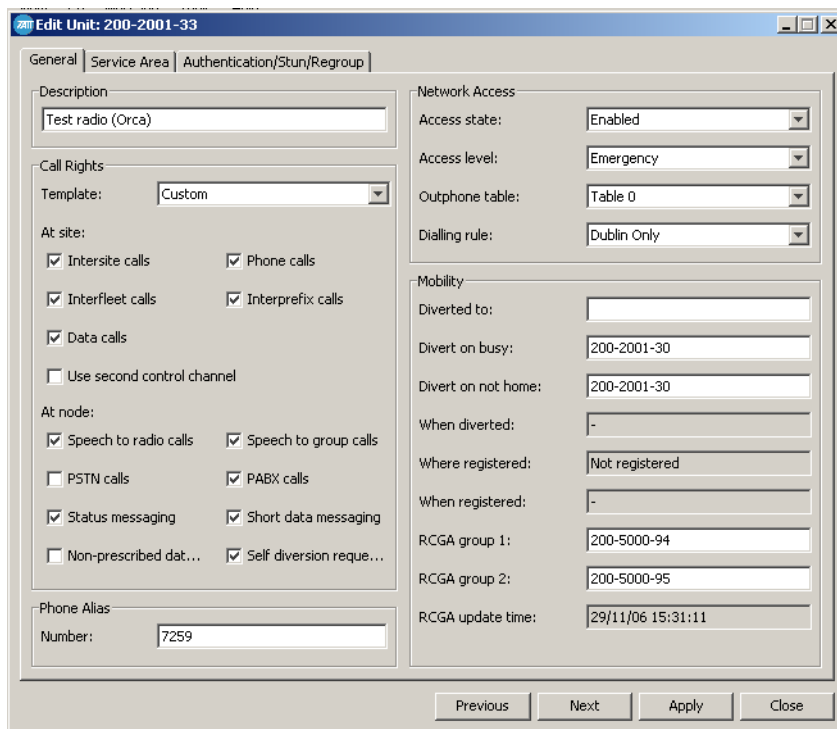


2. Press the Add button. The Add Unit window appears.



In this window, the Address box displays the first unused number in the fleet. The radio you add will have this number.

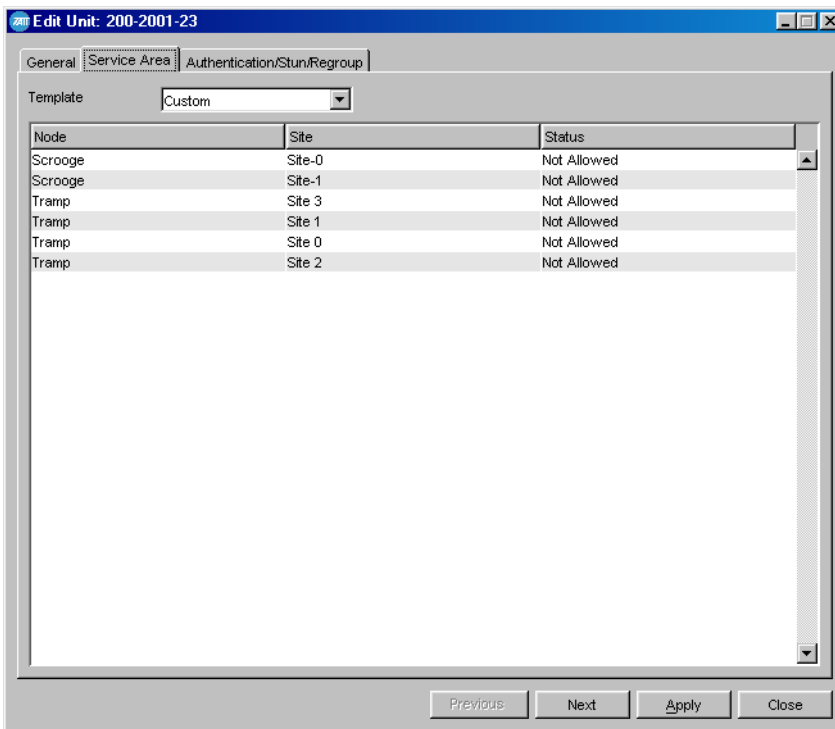
3. Enter a description if required, and press OK. The Edit Unit window is displayed.



4. In the Call Rights area, select a call rights template from the drop-down list. Alternatively, leave the Call Rights Template box displaying 'Custom', and give or take away call rights to each call type individually. For information about call rights, see "Call Rights" on page 128.
5. In the Description area, the description given to the radio unit can be altered.
6. In the Network Access area, ensure that the radio's access state is 'Enabled'.
7. If desired, select a different access level. You have the following options.

Choose This...	If You Want to...
Barred	Prevent the radio from using the network
Normal	Allow the radio to make normal calls (default setting)
Priority	Allow the radio to make normal and priority calls
Emergency	Allow the radio to make normal, priority, and emergency calls

8. If desired, alter the default outphone table and dialling rule to configure the radio's telephone access. See "Configuring Telephone Access" on page 153.
9. Click on the Service Area tab.



10. From the Template drop-down list, select a template. The table now indicates which sites are allowed (which sites the radio can operate from). Alternatively, give the radio a custom service area as follows:
 - a. Leave the Template box displaying 'Custom'.
 - b. Select the sites you want in the service area, press the right-mouse button and select 'Allowed' from the pop-up menu.
 - c. Select any sites that show 'Allowed' but that you don't want in the service area, press the right-mouse button and select 'Not Allowed' from the pop-up menu.
11. Press Apply to save your changes, sending them to the nodes in the network.



Note: You can also set up authentication for the radio. See "Authenticating Radios" on page 157 for more information.

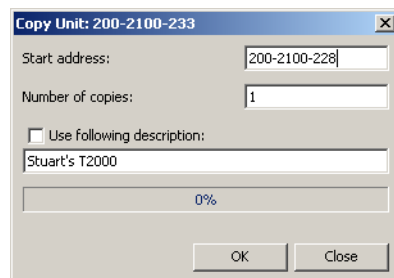
Adding a Block of Radios

Once you have added a radio to the fleet, you can easily add a whole block of them. You can use this method to configure the rest of the radios in the fleet.



Important: Only add radios to the fleet if there are actual physical radios. Do not add radios for all the reserved numbers. This ensures that the NMT only displays radios that actually exist.

1. In the Edit Fleet window, select the Radio Units tab.
2. Select the radio you want to copy and press the Copy button. The Copy Unit window appears.



Tip

The Copy function is only available when you are adding radios. You cannot use it to copy validation information to a set of existing radios.

3. The Start Address box will display the next available radio address to use for the copy function. Edit it if required.
4. In the Number of Copies box, enter the number of radios you want to create.
5. If you want to use the description from the radio you are copying, check the Use Following Description check box and leave the description as it is. You can also choose not to copy the description, by leaving the check box blank; or you can edit the description and tick the check box to change the description.
6. Press OK. The status bar along the bottom of the window displays progress creating the radios and a message indicates that the copy was successful.
7. Use the Edit Unit window to edit/add descriptions for the copied radio units, and make any changes necessary.



Note: If you used a Custom template for call rights or service area, the radios will have the same individual call rights or access to the same sites as the radio they were copied from.

2.3 Adding a Group

The NMT lets you configure the way the network handles group calls. For each group number, you define the way the group call is set up and configure how each site will handle calls to the group.

It is important to choose a configuration that is suited to the way the members of the group work. You want to provide them with the service they need without adding unnecessarily to the loading on network resources. The way network users are charged for different types of group call will affect this choice.

- If the group is large, configure it as a normal group. In this case, it is important to minimise wastage of network resources by carefully defining the group's service area to exclude nodes and sites that group members will not roam to. For instructions on how to set up this group type, see "Normal Group" on page 140.
- If the group is highly mobile, configure it as a registration-based group, particularly if it is small in number or likely to be concentrated within one or two sites at a given time. Registration-based groups would suit a forestry work team or a small travelling sales team. For instructions on how to set up this group type, see "Registration-Based Group" on page 141.
- If the group works within the coverage area of a site, and calls to it will also come from the same site, you can configure the group as a local group. This type only involves the site; it uses a minimum of network resources, but telephone and line dispatcher users cannot access it. For instructions on how to set up this group type, see "Local Group" on page 144.

Normal Group

A normal group uses a channel at each site within the service area. Figure 1 shows an example call; a radio at Site 1 on Node 3 makes the call. Node 3 and Site 3 at Node 1 can only be used to originate a call to the group. Site 2 at both Node 1 and Node 2 uses a channel even though there are no radios at the site.

To add a normal group to the fleet, follow these steps (for additional detail, see "Maintaining Groups" on page 164).

1. Open the Edit Fleet window for the fleet that the group belongs to (or continue in the Add Fleet window).
2. Select the Groups tab, then press the Add button. The Add Group window appears.
3. Enter the address and description for the group and press OK to display the Edit Group window.
4. In the Group Type box, select Normal, and enter a phone alias if required.
5. Select the Service Area tab.
6. In the Template box, select Custom.
7. Using multi-select and the right-mouse button menu, assign the type 'Allowed' to each site that group members will be at and the type 'Originate Only' to the remaining sites.

Group Call

A call from a radio or telephone to a group number. Only radios programmed with that group number respond to the call.

There are two kinds of group call:

- *Conference calls where group members can listen and reply.*
- *Broadcast calls where the members of the group can only listen.*

The group configuration discussed in this chapter applies to both kinds of group call.

Group Call Configuration

While the configuration of a radio number affects calls that it makes, the configuration of a group number applies to calls made to that number.

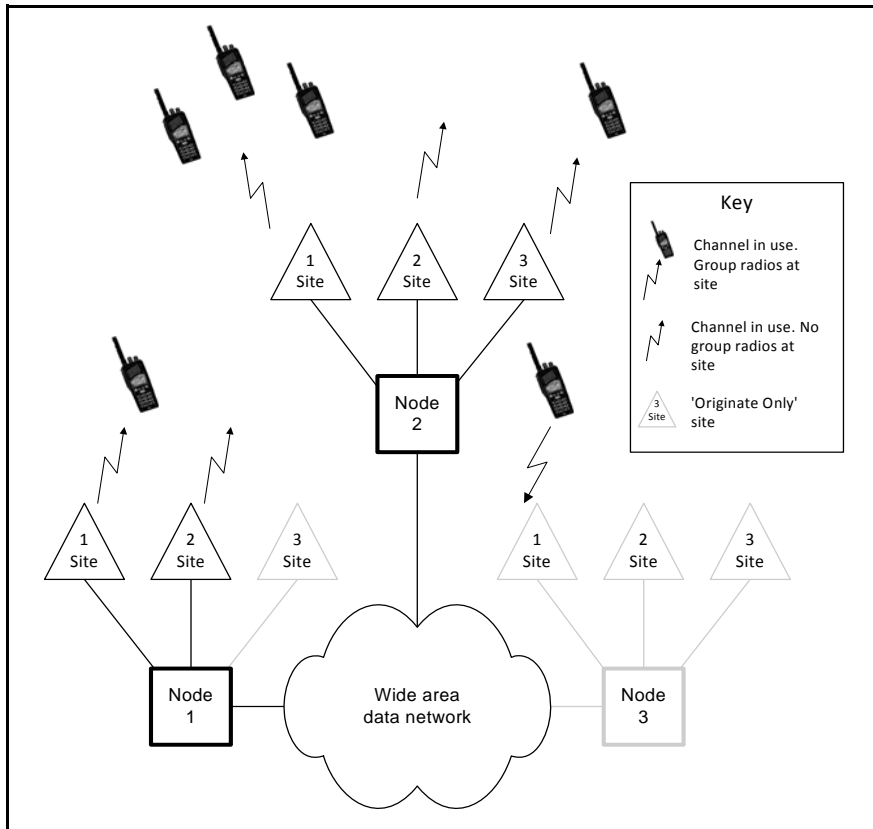


Figure 1: Normal Group Call

Radios will be able to call the group from anywhere in the network, but network resources will only be used at the allowed sites.

8. Press Apply to confirm your changes and send them to the nodes, then Close to close the window.

Registration-Based Group

A registration-based group only uses a channel at a site if a radio in the group is registered at that site. Figure 2 shows an example call; a radio at Site 1 on Node 1 makes the call and only sites with radios are involved. Registration-based groups are generally assigned a service area template. All sites shown are in the service area; any other sites are not allowed to participate in the group call.



Note: A registration-based group can have a maximum of 200 tracked radio units (with Q1541NC software v4.07.01 or earlier), or 500 tracked radio units (Q1541NC v4.07.02 or later).

To add a registration-based group to the fleet, follow these steps (for additional detail, see “Maintaining Groups” on page 164).

1. Open the Edit Fleet window for the fleet that the group belongs to (or continue in the Add Fleet window).
2. Select the Groups tab, then press the Add button. The Add Group window appears.

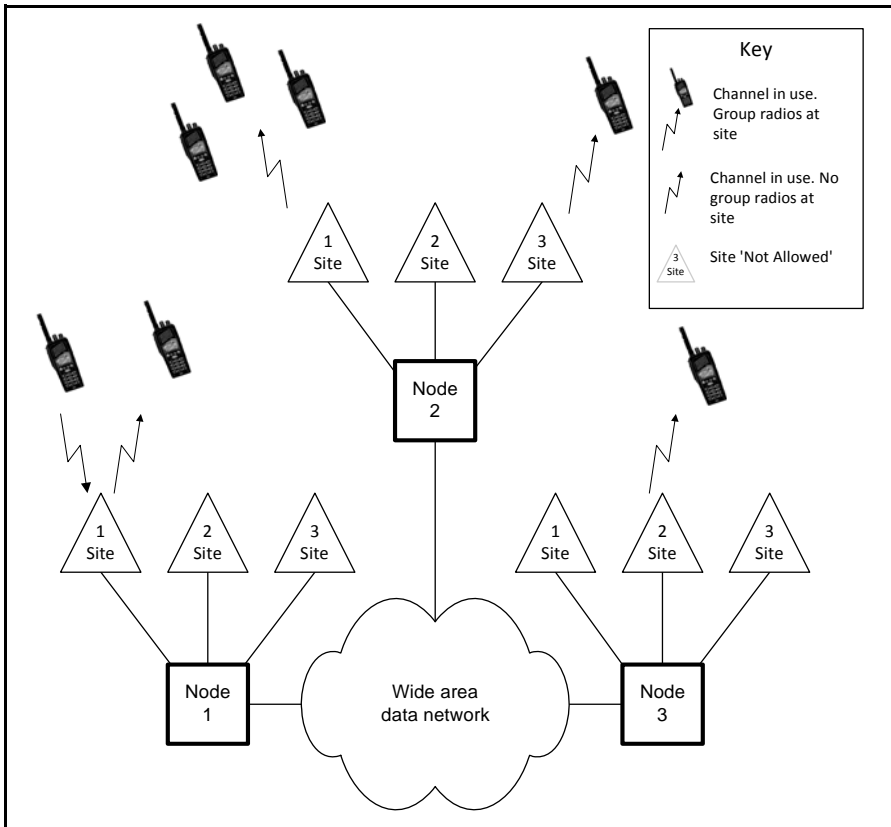


Figure 2: Registration-Based Group Call

3. Enter the address and description for the group and press OK to display the Edit Group window.
4. Enable the “Registration based” feature.
5. Select the Service Area tab.
6. In the Template box, select the template assigned to the radios in the fleet.
This allows radios to call the group or participate in a call to the group from anywhere in their service area.
7. Select the Tracked Units tab.
8. To add a radio, type its address into the box marked Unit Address to Add: and click the Add button. If the text you entered represents a valid radio address then the radio will be added to the group and will appear in the table. You can continue this process to add more radios. Group calls will only be set up on those sites on which at least one tracked unit is registered.
9. Press Apply to confirm your changes and send them to the nodes (note that the window now displays the full MPT 1343 number), then Close to close the window.

Radio Controlled Group Affiliation (RCGA)

Registration-based groups work well where units are members of only one group, and the group membership changes rarely. But when the operation of an organisation requires talk-group membership to be dynamic (for example by incident, or geographic area), the registration based group call feature does not offer the same efficiency benefits.

Radio controlled group affiliation extends registration-based groups by allowing a radio user to update their group affiliation over the air. It is implemented by having a unit 'sign on' to a group to indicate that it should now be included as a member of the group's tracked units. The functionality can be characterised as: When a call request is made to the group, the call will be set up at only those sites where at least one signed-on radio unit member of the group's tracked units had its last registration recorded.

The 'sign-on' message may be implemented as a 'canned' Short Data Message, but is also designed to allow a sign-on using manual entry of the SDM from a radio with a full keypad.



Note: A maximum of 200 radios can be affiliated to any one group at a time with Q1541NC software v4.07.01 or earlier, or 500 radios with Q1541NC v4.07.02 or later.

To enable RCGA in a group, follow these steps:

1. Open the Edit Fleet window for the fleet that the group belongs to (or continue in the Add Fleet window).
2. Select the Groups tab, then either double click on the group, or single click on the group and then click the Edit button. The Edit Group window appears.
3. Enable the Radio controlled group affiliation feature.
4. Press Apply to confirm your changes and send them to the nodes, then Close to close the window.



Note: Radios may need to be specially configured to enable this feature, and it may not be available on all radios.



Note: A group can be "registration based" and also have "radio controlled group affiliation" enabled. The node will check for both kinds of tracked units when setting up the multi-site group call. The total number of tracked units is restricted to 200 or 500, depending on the node software version installed.

Acknowledged Group

During an intersite group call, a traffic channel may be reserved at a site at which no group members are present. If the Acknowledged Groups feature is enabled, all sites in the group call (except the originating site) check to see if any group members are present and clear the channel if none are found.



Important: Radios must be configured to support Acknowledged Groups. This feature is not supported by all versions of site software.



Note: The Acknowledged Group feature can be combined with any type of group except a local group.



Note: The Acknowledged Group feature relies on the system receiving an acknowledgement from one or more radios on each site. If many radios on one site acknowledge simultaneously, the data may be corrupted, so the system uses receiver gating to determine if an acknowledgement was sent.

Receiver gating on such a short burst of a data can be unreliable if the base stations are configured with SINAD gating (with or without PL/CTCSS). A symptom of this problem is radios on a site joining a group call, then immediately dropping out and returning to the control channel.

It is therefore recommended that RSSI gating without PL/CTCSS is used when the Acknowledged Group feature is enabled.



Note: If Late Entry to Group Calls (refer to page 145) is enabled with Acknowledged Groups, GTC messages sent while the call is in progress are sent only on those sites where one or more radios acknowledged the group call request. The effect is that radios are able to join the group call after it has started only at those sites where another radio, not involved in another call, was present and was able to acknowledge the group call request.

Local Group

A call to a local group only involves one site. The site sets up the call; the node is not involved. Telephone users and radios at other sites cannot call the group. Figure 3 shows an example call; a radio at Site 1 on Node 1 makes the call and only radios at that site are involved.

If you set up a local group at many sites, the network will set up the group call at whichever site the calling radio is at. This can be useful if the group of radios roams but is always within coverage of the one site, and the caller is usually part of the group.

To set up a local group, you define the group type as Normal, then configure one or more sites as 'Local Only'.

To add a local group to the fleet, follow these steps (for additional detail, see "Maintaining Groups" on page 164).

1. Open the Edit Fleet window for the fleet that the group belongs to (or continue in the Add Fleet window).
2. Select the Groups tab, then press the Add button. The Add Group window appears.
3. Enter the address and description for the group and press OK to display the Edit Group window.
4. In the Group Type box, select Normal.

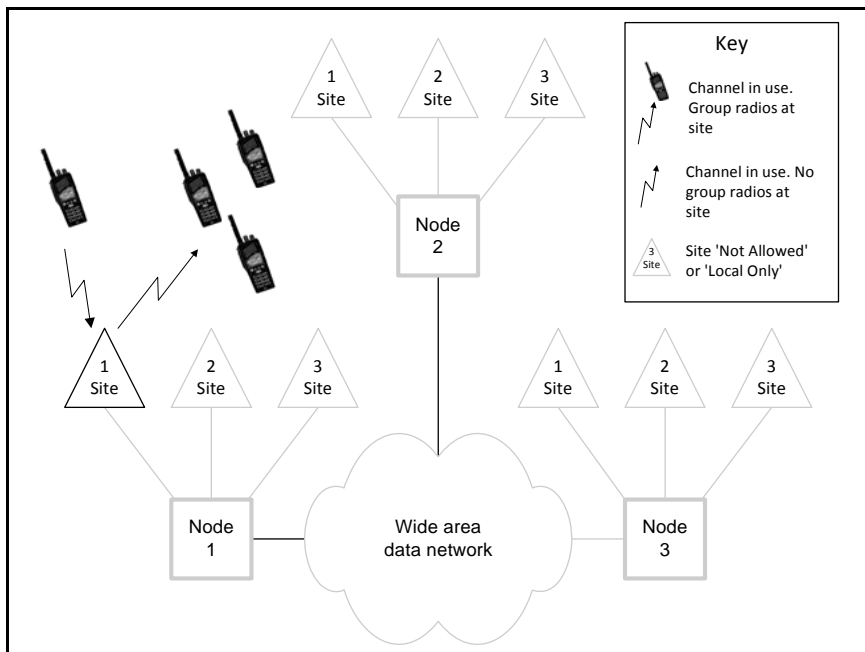


Figure 3: Local Group Call

5. Select the Service Area tab.
6. In the Template box, select 'Custom'.
7. Using multi-select and the right-mouse button menu, assign the type 'Local Only' to one or more sites that are used by the group and the type 'Not Allowed' to all other sites.
8. Press Apply to confirm your changes and send them to the nodes, then Close to close the window.

Late Entry to Group Calls (Repeat Go-To-Channel Messaging)

Late entry enables radios to join a group call after it has started. The control channel sends GTC messages at intervals, inviting radios in the group to join the call. Radios that are busy in another call, out of range, or turned off will miss the group call. Late entry makes it possible for them to join in later.

The late entry feature is enabled (or disabled) individually for each group on the system. This means that within a system, some groups can be late entry groups, while other groups are not.



Note: In a broadcast call to a late entry enabled group, transmit inhibit messages are sent at intervals on the traffic channel, to ensure that radios entering the group call know not to transmit. This transmit inhibit message will be heard by users as a short burst of interference about 200ms duration.



Note: If the group is an acknowledged group, then once a site has been removed from a group call because no radios at the site have acknowledged the group call when it was first set up, late entry at that site is no longer possible.

To enable late entry to group calls, the following steps need to be taken.

1. Open the Edit Fleet window for the fleet that the group belongs to (or continue in the Add Fleet window).
2. Create a new group, or double-click the group to edit, then select the General tab.
3. Tick the Enable Repeat Go-To-Channel Messaging (late entry group call) box. By default, this feature is not enabled.
4. Press Apply to confirm your changes and send them to the nodes, then Close to close the window.

GTC repeat interval

This parameter defines the frequency with which GTC (Go to Channel) messages are sent on the control channel during group calls. It also defines the frequency with which repeat transmit inhibit messages are sent on the traffic channel during broadcast calls.

The GTC Repeat Interval parameter is not used with groups that do not have late entry enabled. It is set on a system wide basis, in the node control blocks.



Note: The smaller the value chosen for this parameter, the more difficult it is for radios to leave a group call and call anyone else.

To change the GTC repeat interval, the following steps need to be taken for each node and control block.

1. Select *Node* > Control Blocks.
2. Select the Features tab, then GTC repeat interval.
3. Enter the repeat interval required, in seconds. The default value is 10 seconds.
4. Press Apply to confirm your changes and send them to the node, then Close to close the window.

3 Maintaining Fleets

Once fleets have been set up, you may need to view information about them, modify their details, or bar them from the network. When they no longer use the network, you can remove them.

3.1 Viewing Fleet Summary Information

The Fleet Summary window displays information about all the fleets on the network. Select Fleets > Summary to open it.

Cost Code	Name	Status	Start Service	End Service	Unit Details	Group Details
	Prefix 200 - Main Fleet	✓	24/Mar/2004	24/Mar/2005	200-2001-20 [70]	200-5000-90 [10]
	A fleet	✓	28/Feb/2001	30/Nov/2006	250-2001-20 [30]	250-5000-90 [0]
1	Air Interface Test Fleet	✓	11/Mar/2004	11/Mar/2005	201-2001-20 [70]	201-5000-90 [10]
1	Big Fleet 2	✓	28/Oct/2005	28/Oct/2006	200-2386-200 [700]	200-5055-900 [99]
1A	Dublin	✓	30/Aug/2004	30/Aug/2007	300-2001-200 [700]	300-5000-900 [99]
2	T3000s	✓	03/Aug/2004	03/Aug/2005	209-2001-20 [60]	209-5000-90 [10]
2	Interprefix test	✓	17/Aug/2006	17/Aug/2007	327-4999-20 [2]	327-5000-90 [10]
2A	Bus simulator fleet	✓	29/Aug/2006	29/Aug/2007	202-2001-200 [700]	202-5000-900 [70]
5	Dublin LDT	✓	30/Aug/2004	30/Aug/2005	300-3500-20 [30]	300-5000-90 [0]
5B	Simulator Fleet	✓	31/May/2005	31/May/2006	210-2001-200 [700]	210-5000-900 [90]

Each row displays information for a fleet.

Cost Code

A code that your billing system can use to assign call records from more than one fleet to a single account.

Name

The name of the fleet.

Status

The current status of the fleet.

Status	Description
✓	The fleet is in service; it can use the network ¹
✗	The fleet has been barred. Its radios have all been given the access state 'Barred'. They cannot make or receive calls.

- The fleet will stay in service after its service period expires. You must manually bar an expired fleet to take it out of service; see page 149.

Fleet Information

The information in the Fleet Summary window is stored in the fleet table, which is stored in the server NMT. Usually, a network only has one server NMT. This ensures that fleet information is the same for all NMTs.

Start Service

The start of the service period assigned to the fleet. By default, when a fleet is created, the NMT assigns it a service period of one year. This service period starts immediately; that is, the start date is the creation date of the fleet.

End Service

The end of the service period assigned to the fleet. The NMT does nothing if a fleet's service period ends, but the NMT operator can for example bar the fleet.

Unit Details

The number (including the prefix) of the first radio in the fleet. This is the Prefix, Fleet Individual Number (FIN) and the lowest Unit Number followed by the maximum number of radios that the fleet can have in brackets. This is the number of radios specified when the fleet was created.

Group Details

The number (including the prefix) of the first group in the fleet. This is the Prefix, Fleet Group Number (FGN) and the lowest Unit Number followed by the maximum number of groups that the fleet can have in brackets. This is the number of groups specified when the fleet was created.

Filter

This is a case-sensitive filter on the "Name" column. Type the first few letters of the fleet name and press Enter. Only fleets with names beginning with these letters will be displayed. To display all fleets, delete all characters in the filter and press Enter.

Add

Press the Add button to define a new fleet, see "Adding a New Fleet" on page 132 for details.

Edit

Select a fleet in the Fleet Summary window and press the Edit button to change the fleet's name or contact information. You cannot alter the MPT numbering of the fleet. See "Modifying Fleet Details" on page 148.

Remove

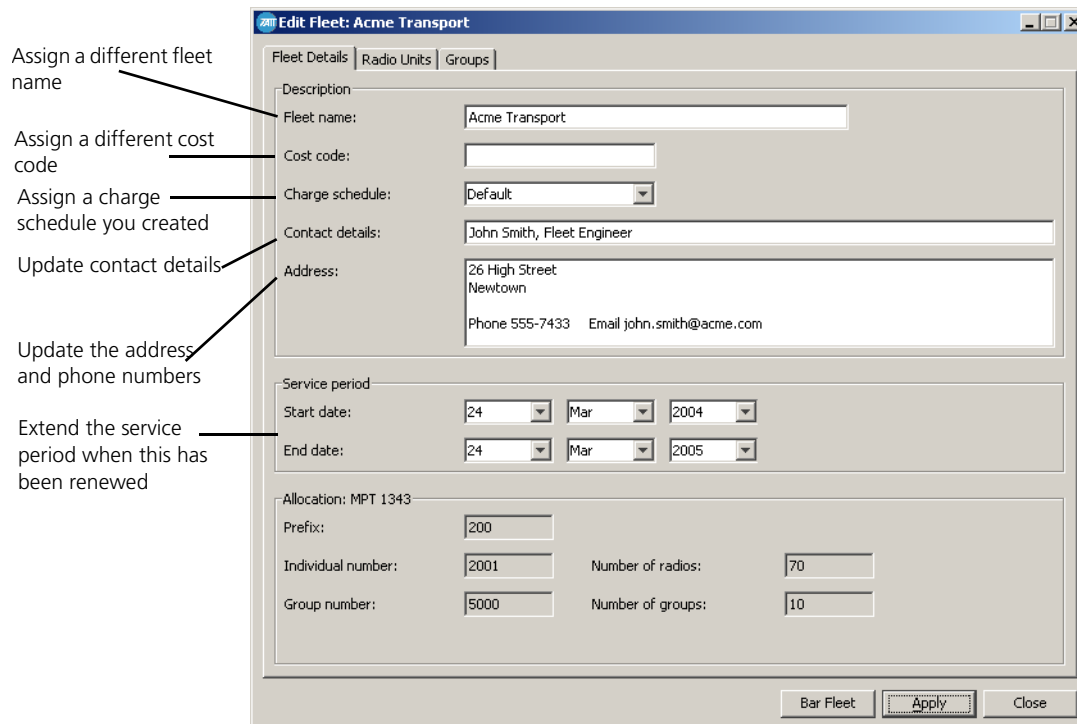
Select a fleet in the Fleet Summary window and press the Remove button to delete that fleet from the fleet table.

3.2 Modifying Fleet Details

Once you have set up a fleet, you can make changes to any of its details. You cannot change the number allocation. In the Fleet Summary window, double-click on the fleet. The Edit Fleet window appears.

Date Format

The date format that the NMT displays is defined by your computer's operating system settings. The screens shown in this manual use the format dd/mm/yy.



3.3 Checking for Out of Service Fleets

When a fleet's service period expires, the NMT takes no action. However, you can use the Fleet Summary window to check whether there are any such fleets, so that they can be encouraged to renew their service contract.

- In the Fleet Summary window, click on the End Service column to order the fleets by their end service dates. Check the dates against today's date to see if any are out of date.

3.4 Barring and Unbarring a Fleet

If for any reason you want to stop a fleet from using the network, you can bar it. This step is easily reversed.

To bar a fleet, follow these steps:

1. In the Fleet Summary window, double-click on the fleet. The Edit Fleet window appears.
2. Press the Bar Fleet button. You are asked for confirmation. When barring the fleet is successfully completed, the Bar Fleet button changes to Unbar and the Status column in the Fleet Summary window shows 'Barred'. In addition, the Access Status box of the Edit Unit window shows 'Barred' for all radios belonging to the fleet.

To unbar a fleet, follow these steps:

1. In the Fleet Summary window, double-click on the fleet. The Edit Fleet window appears.
2. Press the Unbar button.

3.5 Removing a Fleet

If a customer no longer wishes to use the services of the network, you can simply bar the customer's fleet. This leaves you with a record of the fleet and its radios and makes reinstating service to that customer easy. Eventually, however, you may want to completely remove the fleet and its radios.

To remove a fleet and its radios, follow these steps.

1. Bar the fleet. This ensures that the fleet's radios cannot use the network. (Simply deleting the fleet leaves nodes and sites with the radios' current validations, allowing radios from the deleted fleet to continue making calls.)
2. In the Fleet Summary window, select the fleet. Press the Remove button. You are asked for confirmation.

4 Maintaining Radios

After you have added a radio, you can check on the way it is configured, set up a call diversion for it, configure its telephone access, provide it with a caller ID, and assign it to a group. If it fails an authentication check, the NMT can automatically bar it or you can manually stun or bar it.

4.1 Finding a Radio

To find the network's configuration information for a radio number, follow these steps.

1. In the Fleet Summary window, find the fleet that the radio belongs to, then double-click on it.
2. In the Edit Fleet window, select the Radio Units tab.
3. Find the radio in the list of radios belonging to the fleet, then double-click on it. The Edit Unit window appears. It displays all the configuration information for the radio's number.

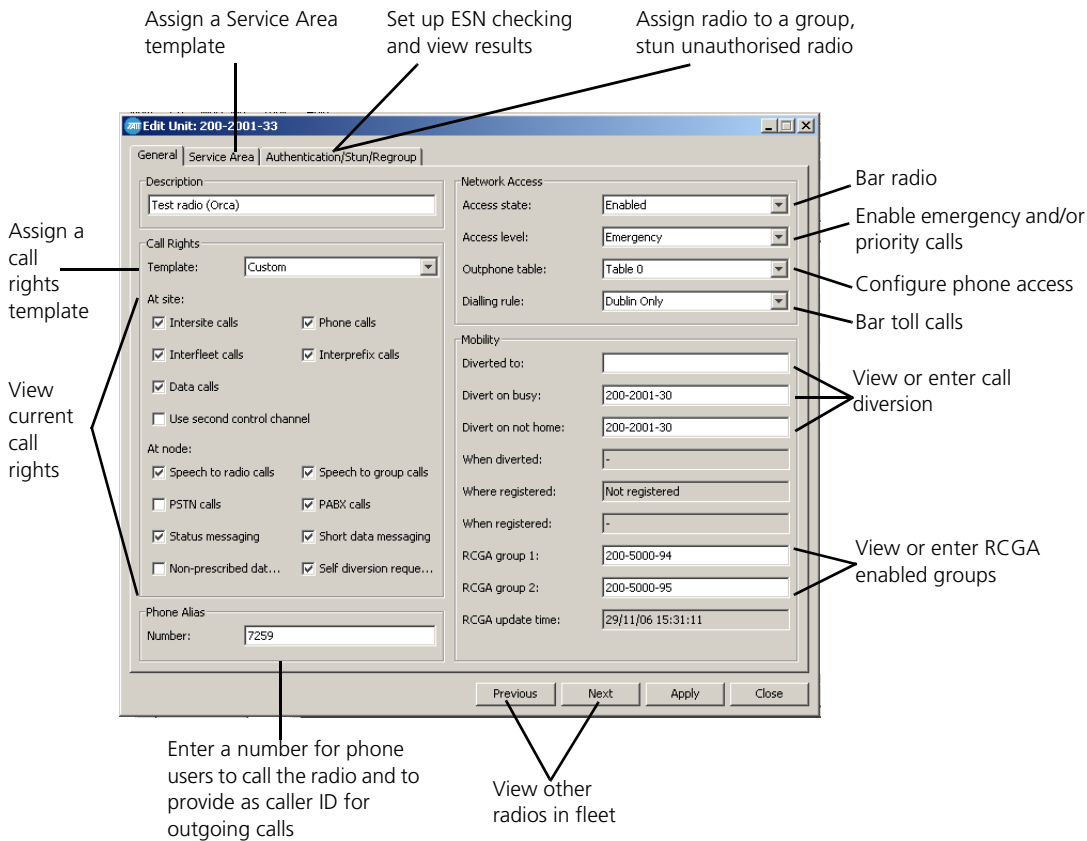
Finding a radio is easy on a small network, but if there are many fleets and radios and you don't have the full radio number, it helps to use some of the NMT's features to narrow the search down.

- Table sorting lets you list fleets in an order that makes it easier to find the fleet the radio belongs to.

4.2 Modifying a Radio Configuration

To modify a radio's current configuration, follow these steps.

1. In the Fleet Summary window, double-click on the radio's fleet. The Edit Fleet window appears.
2. Click on the Radio Units tab. This displays a list of radio numbers belonging to the fleet.
3. Double-click on the number of the radio. The Edit Unit window appears, displaying validation information that the NMT has obtained from the nodes.



Make changes as required to the information in any of the tabs in this window (the sections below describe the Edit Unit window in detail). When you have made the changes, press Apply to send them to the nodes, then press Close to close the window.

Configuring Access to the Trunked Network

The Network Access Area lets you configure the radio's access to the trunked network.

Access State

The Access Level box defines whether the radio can or cannot use the network.

Option	Description
Enabled	The radio can use the network, provided that the Access Level (see "Access Level" below) is not barred
Barred	The radio has been barred, or the fleet that the radio belongs to has been barred

Access level

The Access Level box defines the radio's level of access to the trunked network.

Choose This...	If You Want to...
Barred	Prevent the radio from using the network
Normal	Allow the radio to make normal calls (default setting)
Priority	Allow the radio to make normal and priority calls
Emergency	Allow the radio to make normal, priority, and emergency calls

Configuring Telephone Access

The Edit Unit window also lets you configure a radio's access to the PSTN or to one or more PABXs.

Follow these steps:

1. Ensure that the call rights template used gives the radio the right to make telephone calls.
2. In the Network Access area, assign a suitable outphone table to define (among other things) the way radio-to-telephone calls will be routed. If there is no suitable outphone table, you may need to define one, see "Outphone Table" on page 255 for more information. See also "Configuring Radio-to-Telephone Call Routing" on page 54.
3. In the Network Access area, assign a Dialling Rule to allow calls to some telephone numbers and bar access to others. If there is no suitable number bar, you may need to define one, see "Dialling Rules" on page 260 for more information.
4. If desired, set up a phone alias. This can be provided to called telephones as the caller ID. See "Providing a Phone Alias" on page 155. (It can also be used to call the radio.)
5. Press Apply to save your changes to the nodes.

Mobility

The Mobility area lets you view a radio's self-diversion or divert the radio yourself. It also indicates where and when the radio was registered, and its current radio controlled group affiliation membership.

Mobility	
Diverted to:	<input type="text"/>
Divert on busy:	<input type="text" value="200-2001-30"/>
Divert on not home:	<input type="text" value="200-2001-30"/>
When diverted:	<input type="text" value="-"/>
Where registered:	<input type="text" value="Not registered"/>
When registered:	<input type="text" value="-"/>
RCGA group 1:	<input type="text" value="200-5000-94"/>
RCGA group 2:	<input type="text" value="200-5000-95"/>
RCGA update time:	<input type="text" value="29/11/06 15:31:11"/>

Diverted To

The Diverted To box displays the number that calls to the radio will be diverted to. To divert calls yourself, enter the required number, then press the Apply button. This number can be a radio or a telephone number. Radio numbers must be entered in the correct format for the chosen numbering scheme or as the full MPT 1327 address. To clear the diversion, delete the number, then press Apply.

Divert on Busy

If this feature is enabled (see “Call Diversion on Busy Party” on page 248), a call made to a radio that is currently involved in a call will be diverted to the number entered here, instead of being queued or failing with the reason “engaged”. The diversion does not have to be to another radio, it can be to any valid unit in the system, for example, a line dispatcher or a phone.

To clear the diversion, delete the number in the Divert on Busy box, then press the Apply or OK button.

Divert on Not Home

If this feature is enabled (see “Call Diversion on Not Home Party” on page 249), a call made to a radio that is switched off or out of contact will be diverted to the number entered here. The diversion does not have to be to another radio, it can be to any valid unit in the system, for example, a line dispatcher or a phone.

To clear the diversion, delete the number in the Divert on Not Home box, then press the Apply or OK button.

When Diverted

Displays the date and time when calls to the radio were diverted. If the Diverted To box is empty, it indicates when the last diversion was cleared.

To clear the diversion, view the radio’s current configuration, delete the number in the Diverted To box, then press the Apply or OK button.

RCGA group 1

RCGA group 2

RCGA enabled groups that this unit has registered with. If both fields are blank, then the unit has not registered with any RCGA enabled groups.



Note: The RCGA group fields are editable, and therefore the NMT operator can force the unit to be a tracked member of an RCGA enabled group (or cancel that membership). However, RCGA is designed primarily to allow radio users to control their own group affiliation, and it is intended that NMT operator control of RCGA will be used in unusual circumstances only.

RCGA update time

Displays the date and time when the RCGA membership of this unit last changed.

Providing a Phone Alias

Any radio (or group) can have a phone alias. When telephone users dial a radio's phone alias, they are connected to the radio, provided the port group used is configured to accept numbers as radio aliases (see "Allow Incoming Phone Alias Dialling" on page 262).

For example, the PSTN makes available a set of numbers beginning with 026. One of these numbers is 026 1231. You enter 1231 into the Number box. To call the radio, the telephone subscriber dials 026 1231.

The phone alias can also be used in radio-to-telephone calls. The node provides it to the PSTN or PABX, so that it can appear on telephones with caller ID.

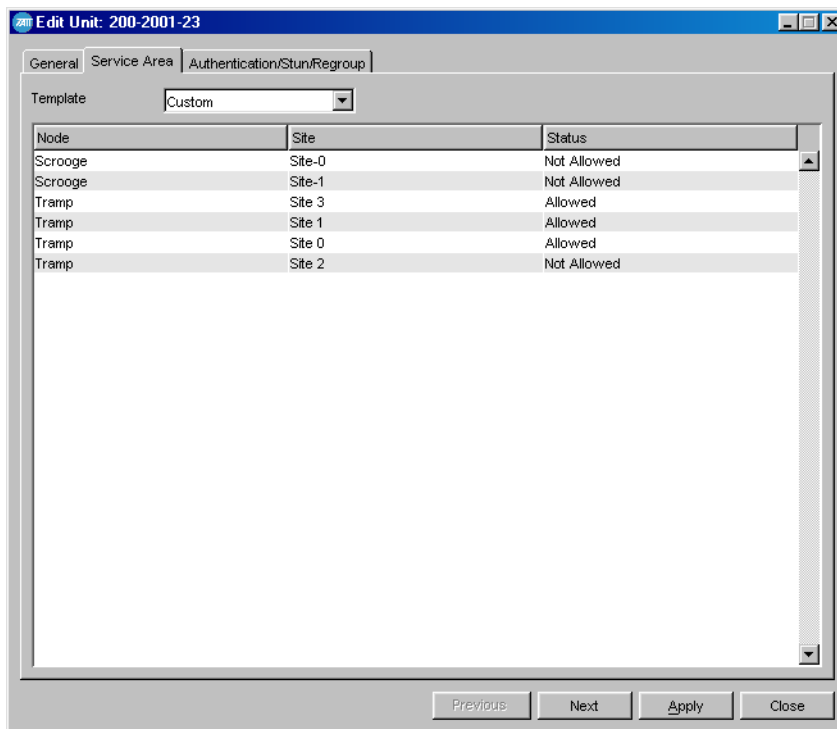
- In the Phone Alias area, enter the full number that telephone users will dial into the Number box.

Making Telephone-to-Radio Calls Easier

Providing a phone alias is one way of making telephone-to-radio calls easier to dial. See "Configuring Telephone-to-Radio Dialling" on page 57 for other options.

4.3 Changing Service Area

The Service Area tab in the Edit Unit window defines where a radio can make calls from.



Service Area Template

The Service Area Template box defines a service area template for the radio that specifies whether a site is allowed or not allowed. The options available have been created for your network, see “Setting Up a Service Area Template” on page 130. The option ‘Custom’ enables you to individually specify the service area for the radio.

Service Area

The Service Area table is read-only, unless you selected the template ‘Custom’. For each site in the network, it indicates ‘Allowed’ (part of the radio’s service area) or ‘Not Allowed’ (not part of the service area).

4.4 Authenticating Radios

A trunked network automatically checks any call requests and only allows them if they pass the validation process. This built-in security ensures that radios can only use the network if they have been programmed with the unique identity of your network and with a radio number that has been given access and call rights.

In certain circumstances, for example if it is suspected that more than one radio is using the same radio number, you can configure the network so that it asks radios to authenticate themselves.

Authentication is based on the fact that each trunked radio has a unique electronic security number (ESN) that was programmed in at manufacture.

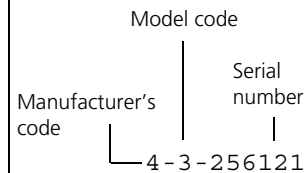
Authentication is carried out as follows. Sites ask a radio to provide its ESN. When a response is received, the node checks it against the ESN that you entered into the Authentication tab of the Add Unit or Edit Unit window.

Authentication places an additional load on the site's control channel. For this reason the way you configure authentication needs to find a balance between security and network loading. You could for example, only set up authentication on radios that you have reason to suspect.

Electronic Security Number (ESN)

A unique number assigned to each radio by its manufacturer, and held in its permanent memory. The network can check the ESN of radios using its services, to ensure that they are properly authorised.

An ESN (Electronic Security Number) has three parts:



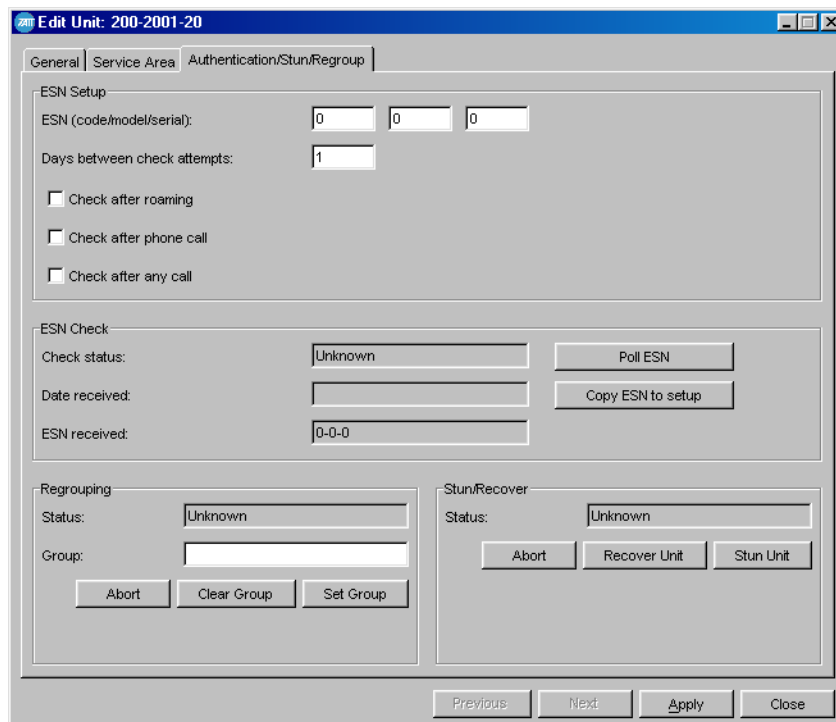
Setting Up Authentication

To set up the authentication of a radio, follow these steps:

1. Open the Edit Unit window for the radio.
2. Click on the Authentication/Stun/Regroup tab. The following screen appears.

Tip

You can use ESN checking to monitor the radio inventory. This indicates whether a radio is being used in the field, what number it has and where it is located.



3. Enter the three parts of the ESN into the first three boxes.



Important: The serial number on the radio chassis is not necessarily the same as the internal electronic serial number.

4. In the Days Between Check Attempts box, enter a number of days. This specifies the minimum interval between authentication checks. For example, if you enter '3', the nodes will carry out a check for example after a phone call, but will not carry out another until three days have elapsed, no matter what calls the radio makes and what checking options are selected.

If you enter '0', the nodes will not apply a minimum duration and if for example you selected ESN Check After Phone Call, the node will check the radio's ESN after every phone call it makes.

5. Choose one or more of the following options to specify when the node checks the radio's ESN.

Select This Check Box...	And the Node Checks the Radio...
Check after Roaming	Immediately after the site informs the node of a change in registration information ¹
Check after Phone Call	Immediately after the radio makes a telephone call
Check after Any Call	Immediately after the radio makes a call

1. Switching a radio on at its usual site or doing a forced registration doesn't change the site's registration information, but moving to another site's coverage area does.

6. Press Apply to send your changes to the nodes.

Viewing Authentication Results for a Single Radio

You can see the results of the last authentication check that the network carried out on the radio.

1. Open the Edit Unit window for the radio.
2. Click on the Authentication/Stun/Regroup tab.
3. View the ESN Check area.

ESN Check	
Check status:	No response
Date received:	3/11/03 10:06
ESN received:	0-0-0
	Poll ESN
	Copy ESN to setup

This displays the following information:

Obtaining the ESN

You can use the NMT to obtain a radio's ESN and enter it.

1. Press the Poll ESN button.
2. Wait until the ESN check is completed and the ESN appears in the ESN Received box, then press the Copy ESN to Setup button.

Alternatively, you can obtain the full ESN of any Tait radio through its radio programming software.

Check Status

Displays the result of the last check on the radio. The following can appear.

Result	Explanation
Good ESN Received	The ESN that the node received from the radio was the same as the ESN entered in the NMT ¹
Bad ESN Received	The ESN that the node received from the radio was different from the ESN entered in the NMT. The radio is probably operating illegitimately on the network. Alternatively, if the ESN was entered from an inventory list, the inventory is incorrect.
No Response	The ESN was not checked, probably because the radio was turned off
Unknown	The ESN was not checked, because no radio with the number entered was found on the network

1. There still could be a second radio with the same radio number but a different ESN. In a future ESN check, this radio might be the first to respond, failing the check.

Date Received

The date and time of the last attempt that the node made to check the radio's ESN.

ESN Received

Displays the ESN that the node received from the radio.

Poll ESN

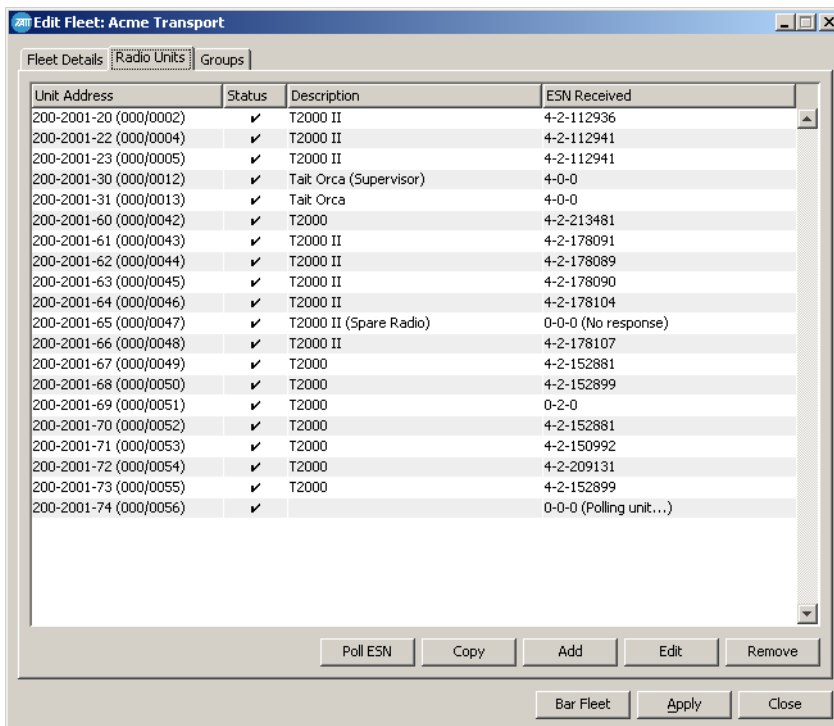
Performs an immediate ESN poll on the current radio.

Copy ESN to Setup

Copies the ESN number downloaded from the current radio to the ESN boxes in the ESN Setup area.

Viewing Authentication Results for All Radios in a Fleet

It is possible to check the authentication status for all radios in a fleet by selecting the Radio Units tab on the Edit Fleet window. The ESN Received column shows the last ESN received from each radio. If no ESN has been received from a radio then the entry will be blank. If polling is in progress or an incorrect ESN was received then this information will be included in the table.



From this window, it is possible to perform an ESN poll on a radio by selecting it, then pressing the Poll ESN button. It is also possible to perform ESN polls on multiple units simultaneously by selecting more than one unit, then pressing the Poll ESN button.

4.5 Regrouping a Radio

The NMT can dynamically assign a Tait radio to a group. This is useful when the composition of a work team changes frequently; network users can call the group and reach the members of the team, even though they change. A radio can only be a member of one such group at a time. The radio's membership of other groups is largely unaffected. These groups are programmed into the radio or selected by the user from a pre-programmed list. The regrouping feature is only available for Tait radios with the correct firmware. The radio programming must also enable the feature.



Note: The Tait Line Dispatcher Terminal can also regroup radios. This is a different type of regrouping and can involve up to six groups for any particular radio, provided the radio firmware supports this.

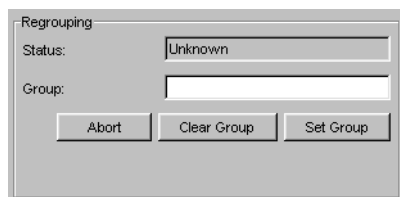
To regroup a Tait radio, follow these steps:

1. In the Fleet Summary window, double-click on the fleet that the radio belongs to.
2. Click on the Radio Units tab, then double-click on the row for the radio. The Edit Unit window appears.

Radios You Can Regroup

Regrouping from the NMT is a proprietary feature not covered by the MPT standards.

3. Select the Authentication/Stun/Regroup tab. You will use the Regrouping area.



4. In the Group box, enter the number of the group you want the radio to belong to.
5. Press the Set Group button. The Status box should display 'Attempting to regroup unit' then 'Regrouped' when the regrouping is successfully completed. If the display does not change, you have entered an invalid group number. If the radio does not respond, for example because it is turned off, the Status box continues to display 'Attempting to regroup unit' and the network repeats the attempt up to 5 times at intervals of 30 seconds. The Abort button can be used to end the regroup attempt.



Note: To remove the radio from the group, press the Clear Group button.

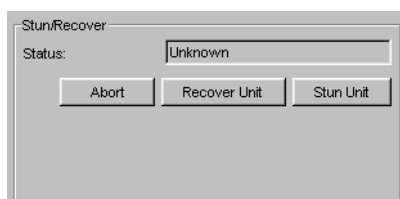
Status	Description
Unknown	The Regrouping area has not yet been used for this radio
Attempting to regroup unit	The network is trying to regroup the radio
Regrouped	The regroup message has been sent and acknowledged

4.6 Stunning a Radio

The NMT can stun a Tait radio. This is useful if the radio has been stolen. A radio that is stunned cannot make or receive calls. The keyboard is locked. Its display indicates that it is stunned. The radio cannot be used, even in conventional (non-trunked) mode, but it will still register so that the NMT can tell you roughly where it is. You can recover a stunned radio, returning it to normal functioning. This feature is only available for Tait radios with the correct firmware. The radio programming must also enable the feature.

To stun a Tait radio, follow these steps:

1. In the Fleet Summary window, double-click on the fleet that the radio belongs to.
2. Click on the Radio Units tab, then double-click on the row for the radio. The Edit Unit window appears.
3. Select the Authentication/Stun/Regroup tab. You will use the Stun/Recover area.



Radios You Can Stun/Recover

Stunning or recovering a radio from the NMT is a proprietary feature not covered by the MPT standards.

4. Press the Stun Unit button. The Status box displays 'Attempting to stun unit', then 'Stunned' when the stun message has successfully been sent to the radio. If the radio does not respond, for example because it is turned off, the network repeats the attempt every 30 seconds until it is successful. The Abort button can be used to end the stun/recover attempt.

Recovering a Radio

To recover a stunned radio, do this:

- In the Stun/Recover area, press the Recover Unit button. The Status box displays 'Reviving', then 'Recovered' when the recover message has successfully been sent to the radio. The radio should now function normally.

Status	Description
<i>Unknown</i>	<i>The Stun/Recover area has not yet been used for this radio</i>
<i>Attempting to stun unit</i>	<i>The network is trying to stun the radio</i>
<i>Stunned</i>	<i>The stun message has been sent and acknowledged</i>
<i>Attempting to recover unit</i>	<i>The network is trying to recover the radio</i>
<i>Recovered</i>	<i>The recover message has been sent and acknowledged</i>

4.7 Barring a Radio

The NMT lets you bar radios so that they cannot use the network. You may want to do this if a customer reduces the number of radios in the fleet or if a radio fails an authorisation check and its node is not configured to automatically bar failed radios.

1. Open the radio's Edit Unit window.
2. In the Network Access area on the General tab, set the Access State to 'Barred'. (If the fleet is barred, the Access State will already be 'Barred'.)
3. Press Apply.

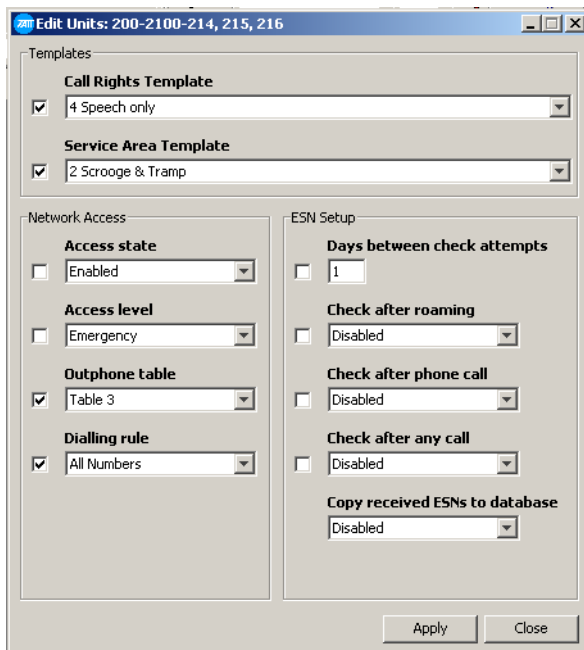
If there are two radios programmed with this radio number, one authorised and the other unauthorised, neither can now use the network.



Note: It is better to use the Access State box rather than the Access Level box to bar the radio because that way the NMT still knows the access level that was assigned to the radio.

4.8 Editing Multiple Radios

To simplify fleet management, it is possible to edit more than one radio at the same time. Click the Radio Units tab on the Edit Fleet window and select more than one radio. Now click the Edit button. The following window appears.



The screenshot shows a window titled "Edit Units: 200-2100-214, 215, 216". The window is divided into several sections:

- Templates:**
 - Call Rights Template:** A checked checkbox followed by a dropdown menu showing "4 Speech only".
 - Service Area Template:** A checked checkbox followed by a dropdown menu showing "2 Scrooge & Tramp".
- Network Access:**
 - Access state:** An unchecked checkbox followed by a dropdown menu showing "Enabled".
 - Access level:** An unchecked checkbox followed by a dropdown menu showing "Emergency".
 - Outphone table:** A checked checkbox followed by a dropdown menu showing "Table 3".
 - Dialling rule:** A checked checkbox followed by a dropdown menu showing "All Numbers".
- ESN Setup:**
 - Days between check attempts:** An unchecked checkbox followed by a text input field containing "1".
 - Check after roaming:** An unchecked checkbox followed by a dropdown menu showing "Disabled".
 - Check after phone call:** An unchecked checkbox followed by a dropdown menu showing "Disabled".
 - Check after any call:** An unchecked checkbox followed by a dropdown menu showing "Disabled".
 - Copy received ESNs to database:** A dropdown menu showing "Disabled".

At the bottom of the window are two buttons: "Apply" and "Close".

From this window you can edit several of the attributes of the selected radios. For example, you can specify a call rights template or a service area template. For more information on the settings in this window, see “Modifying a Radio Configuration” on page 151, but this time any changes that you make will apply to all the selected radios.

If you tick the box marked ‘Copy received ESN to database’, then the ESN numbers that were received by the last ESN polls on the selected radios will become the actual ESN numbers stored in the database.

The tick box at the start of each line shows whether the particular field has been edited. Only edited fields are actioned when the operator clicks ‘Apply’. If a field is edited by mistake, the tick box that shows whether a field has been modified can be unticked.

When the Edit Units window is opened, if all units in the selection currently have the same value for a field, the relevant field displays this value as the initial value, otherwise the field displays as an empty box. If units use a ‘Custom’ service area or ‘Custom’ call rights, the relevant field displays as an empty box, as ‘Custom’ service areas or ‘Custom’ call rights are not appropriate when editing multiple units.

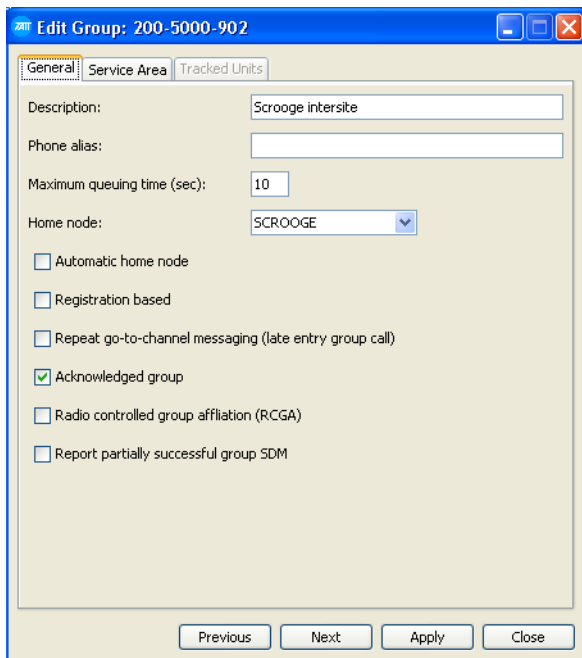
5 Maintaining Groups

After you have set up and configured a group, you might need to check on those configurations or to make further changes to better reflect the way the fleet is using its groups. This section also gives full details on group configuration options.

5.1 Modifying a Group Configuration

To view and make changes to the current settings for a group number, follow these steps:

1. In the Fleet Summary window, double-click on the fleet that the group belongs to. The Edit Fleet window appears.
2. Click on the Groups tab. This displays a list of the groups in the fleet.
3. Double-click on the group you want. The Edit Group window appears.



For details about the information in this window, see below:

General Options

The General tab defines the general behaviour of calls to the group number.

Phone Alias

Specifies the number for telephone subscribers to dial when they want to make a call to the group. See “Providing a Phone Alias” on page 155 for more information.

Group Call Setup Process

To set up a group call, the originating node does the following:

1. It accesses the list of essential nodes and sites and the list of normal nodes and sites. If the group call is registration-based and/or RCGA enabled, it must first take its registration records and build these lists.

2. It forwards call requests to each of the local sites and remote nodes.

3. It starts the Maximum Queuing Time timer and waits for responses from the sites and nodes.

4. If all the essential nodes and sites are available, it starts the call. Any normal nodes and sites that are still busy will join the call as soon as they become free. If an essential node or site is not available and the timer expires, the call fails.

Remote nodes receive the call request from the originating node and follow a similar procedure to the above.

Maximum Queuing Time

Specifies the length of time in seconds that the node will wait while setting up a call to the group. If an essential site or node is still busy (or if all sites are busy) when the timer expires, the call fails.

Home Node

Specifies the home node of the group. When a call to the group is made the call is first routed to the 'Home Node', which then proceeds to set up the call.



Note: Extended T1541 Call Records (see "Call Record Format" on page 95) report called site queue times only at sites connected to the Home Node.

Automatic Home Node

If this feature is enabled you need not specify a home node for the group. The node will automatically assign it to be the lowest numbered active node within the service area.

Registration Based

If this feature is enabled then the group is 'Registration based'. This feature can greatly reduce the number of sites that need to be involved in the group call, conserving network resources.

Registration-Based	Description
Disabled	Each site in the group's service area uses a channel, even if there are no radios belonging to the group at the site
Enabled	Calls to the group will only use sites that have one or more radios belonging to the group. You enter a list of radios in the group into the Group window's Tracked Units tab. The node then tracks those radios and maintains a list of sites at which the radios are registered.

Enable Repeat Go-To-Channel Messaging (late entry group call)

Enables radios to join a group call after it has started. The control channel sends repeated GTC messages inviting radios in the group to join the call. Radios that are busy in another call, out of range, or turned off will miss the group call. Late entry makes it possible for them to join in later.

Acknowledged Group

During an intersite group call, a traffic channel may be reserved at a site at which no group members are present. If this feature is enabled, all sites in the group call (except the originating site) check to see if any group members are present and clear the channel if none are found.



Important: Radios must be configured to support this option. This feature is not supported by all versions of site software.



Note: The Acknowledged Group feature can be combined with any type of group except a local group.



Note: The Acknowledged Group feature relies on the system receiving an acknowledgement from one or more radios on each site. If many radios on one site acknowledge simultaneously, the data may be corrupted, so the system uses receiver gating to determine if an acknowledgement was sent.

Receiver gating on such a short burst of a data can be unreliable if the base stations are configured with SINAD gating (with or without PL/CTCSS). A symptom of this problem is radios on a site joining a group call, then immediately dropping out and returning to the control channel.

It is therefore recommended that RSSI gating without PL/CTCSS is used when the Acknowledged Group feature is enabled.



Note: If Late Entry to Group Calls (refer to page 145) is enabled with Acknowledged Groups, GTC messages sent while the call is in progress are sent only on those sites where one or more radios acknowledged the group call request. The effect is that radios are able to join the group call after it has started only at those sites where another radio, not involved in another call, was present and was able to acknowledge the group call request.

Radio Controlled Group Affiliation (RCGA)

This feature is similar to “registration based” groups, and is another method for reducing the number of sites that need to be involved in a multi-site group call.

Unlike the case with “registration based” groups, there is no requirement for tracked units to be set up in the NMT. With RCGA, radio users themselves decide which groups they want to be tracked members of. This is done by sending a coded SDM to a special address reserved for this purpose. A radio can be a member of none, one or two RCGA enabled groups at a time.



Note: Radios may need to be specially configured to enable this feature, and it may not be available on all radios.



Note: A group can be “registration based” and also have “radio controlled group affiliation” enabled. The node will check for both kinds of tracked units when setting up the multi-site group call.



Note: A maximum of 200 radios with Q1541NC software v 4.07.01 or earlier, or 480 radios with Q1541NC v4.07.02 or later, can be affiliated to any one group at a time.

Report Partially Successful Group SDM

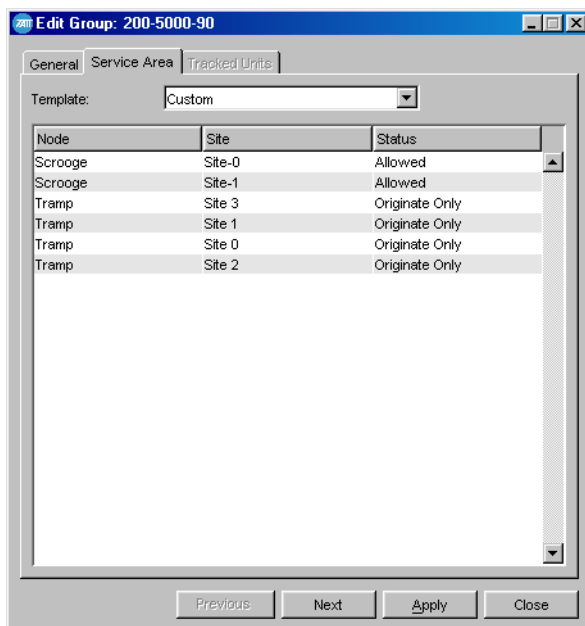
If enabled, a multi-site Group SDM or multi-site Group Status call that is successfully sent to only some of the sites at which radios in the Group are registered will generate a Call Record with Call End Reason 133 (partially successful group data call).

Previous/Next

The Previous and Next buttons let you step through the groups in the fleet, so that you can view and if necessary change their configurations.

Service Area

The Service Area tab specifies which sites are in the service area of the group call. This can be done by selecting a service area template or by using the 'Custom' template and individually configuring sites.



Template

The Template box specifies which template is used to define the group's service area. The options that appear in the drop-down list are the service area templates that have been created for your network, see "Setting Up a Service Area Template" on page 130.

Service Area Table

Below the Service Area Template box is a table that shows the way each site will behave for calls to this group number. If 'Custom' is selected, items in the Status column can be individually selected from a drop down menu, otherwise the Status of each site is specified by the particular template chosen.

The following table lists the available site Status options:

Site Service Areas and Registration-Based Group Calls

If a group is registration-based and/or RCGA enabled, normal or essential sites are only involved in the call if a radio in the group is registered at the site.

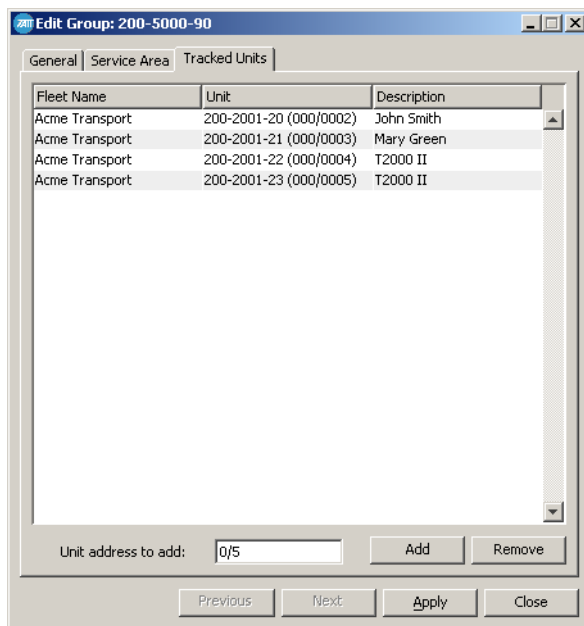
Option	Description
Not Allowed	Group calls cannot occur at the site. A radio cannot make a group call and group members cannot receive a group call.
Allowed	When a group call is made, the site uses a channel for the call. If the site is busy, the call goes ahead and the site joins the call when a channel comes free.
Essential	The group call must include the site. If the site is busy for more than the maximum queuing time, the call fails.
Local Only	The group call only uses this site. The calling party must be at the site. Only radios registered at the site can participate. The node is not involved in call setup. If the group call originates from another site, this site is not included.
Originate Only	The group call can only be originated from the site. Radios can call the group from the site, but only group members at the originating site and at 'Allowed' and 'Essential' sites can participate.

Tracked Units

If the group is registration-based, the Tracked Units tab contains the tracking status of the radios in the fleet.



Note: A registration-based group can have a maximum of 200 tracked radio units (with Q1541NC software v4.07.01 or earlier) or 500 tracked radio units (v4.07.02 or later).



Fleet Name

The Fleet Name column lists the names of the fleets to which the tracked units belong.

Unit

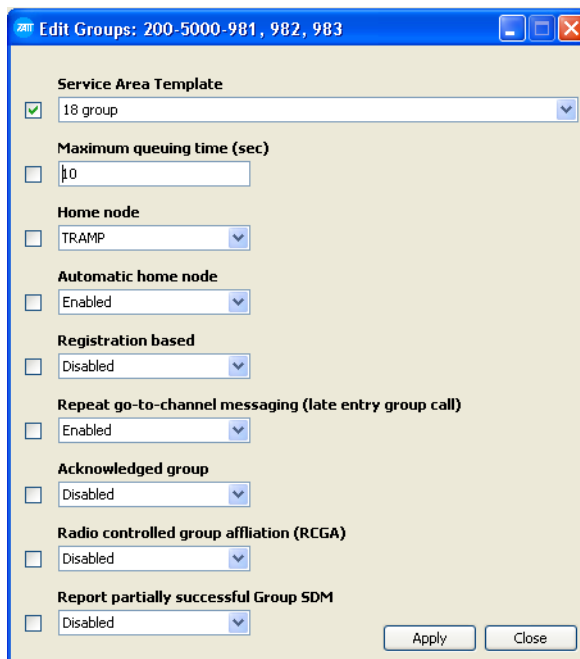
The Unit column lists radios belonging to the registration-based group. For instructions on adding radios, see “Registration-Based Group” on page 141. The nodes keep track of which sites these radios are registered and only include those sites in the call.

Description

The description column lists the description of each tracked unit.

5.2 Editing Multiple Groups

To simplify fleet management, it is possible to edit more than one group at the same time. Click the Groups tab on the Edit Fleet window and select more than one group. Now click the Edit button. The following window appears.



The screenshot shows a dialog box titled "Edit Groups: 200-5000-981, 982, 983". The dialog contains several configuration sections, each with a checkbox and a dropdown menu:

- Service Area Template:** Checked, dropdown set to "18 group".
- Maximum queuing time (sec):** Unchecked, input field contains "10".
- Home node:** Unchecked, dropdown set to "TRAMP".
- Automatic home node:** Unchecked, dropdown set to "Enabled".
- Registration based:** Unchecked, dropdown set to "Disabled".
- Repeat go-to-channel messaging (late entry group call):** Unchecked, dropdown set to "Enabled".
- Acknowledged group:** Unchecked, dropdown set to "Disabled".
- Radio controlled group affiliation (RCGA):** Unchecked, dropdown set to "Disabled".
- Report partially successful Group SDM:** Unchecked, dropdown set to "Disabled".

At the bottom right, there are "Apply" and "Close" buttons.

From this window you can edit several of the attributes of the selected groups. For example, you can specify a service area template or a maximum queuing time. For more information on the settings in this window, see “Modifying a Group Configuration” on page 164, but this time any changes that you make will apply to all the selected groups.

The tick box at the start of each line shows whether the particular field has been edited. Only edited fields are actioned when the operator clicks ‘Apply’. If a field is edited by mistake, the tick box that shows whether a field has been modified can be unticked.

When the Edit Groups window is opened, if all groups in the selection currently have the same value for a field, the relevant field displays this value as the initial value, otherwise the field displays as an empty box. If groups use a ‘Custom’ service area, the relevant field displays as an empty box, as ‘Custom’ service areas are not appropriate when editing multiple groups.

6 Batch Validation

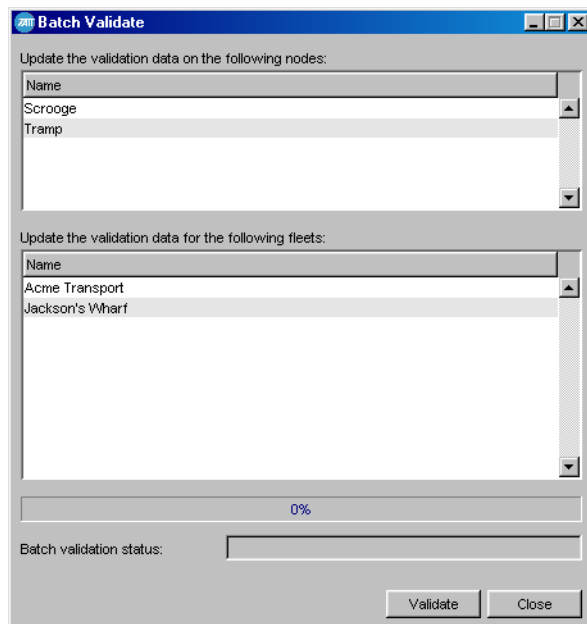
A batch validation updates the validation information held at the node in the light of any changes to call rights or service area templates, which are stored in the server NMT. It then uses the node's validation information to update the validation information held at the sites. You can limit the scope of a batch validation to particular nodes and fleets. This means you can avoid updating validation information for fleets or nodes that are unaffected by the changes. You can also make the most important updates first.

You may need to carry out a batch validation in the following circumstances.

- A call rights template has been changed. You only need to batch validate fleets that use the template.
- A service area template has been changed. You only need to batch validate nodes which have sites that have been added to or removed from the service area.
- A node has been added to the network.
- A site has been added to the network. It needs to be provided with the node's validation information.
- You added or modified validation information while one or more nodes or sites were down.

To carry out a batch validation, follow these steps:

1. Select Fleets > Batch Validate. The Batch Validate window appears.



2. Select the fleets and nodes you want to batch validate. Do not select a fleet or node if it is not affected by the changes.
3. Press the Validate button. The NMT sends validation data concerning the selected fleets to each of the selected nodes in turn.



Tip

Carry out the batch validation in stages, to avoid overloading the network. For example, select the most important nodes or fleets first.

Part G: Charging Menu

The Charging menu lets you set up and maintain charge rates for the trunked network. It also lets you generate charge records and compile reports for billing purposes.

For an introduction to charging, see “Charging” on page 49.

Topics

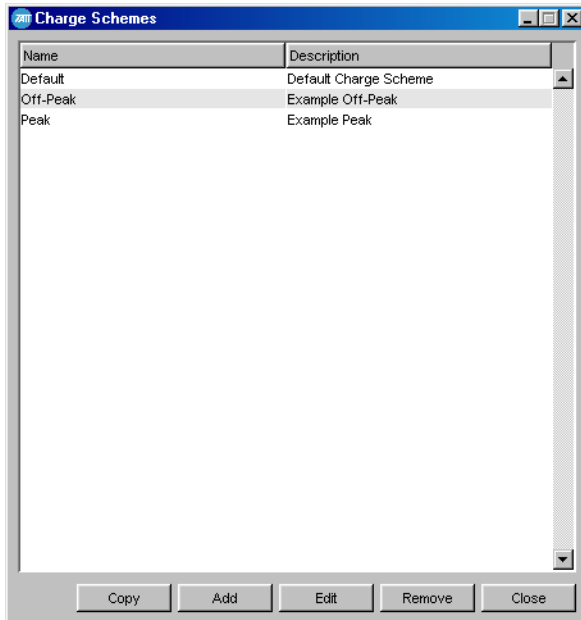
- Viewing Charge Schemes
- How Call Charges Work
- Creating a Charge Scheme
- Setting the Scale of Charges
- Viewing Charge Schedules
- Editing a Charge Schedule
- Generating Charge Records
- Producing a Fleet Charges Report
- Producing a Not Chargeable Report

Warning

Customers intending to use the Charging Menu feature must upgrade their NMT software to version 4.07.01 or higher.

1 Viewing Charge Schemes

Select Charging > Charge Schemes to view charge schemes. The Charge Schemes window appears.



This window shows the name and description of each charge scheme.

Charge Scheme

A charge scheme defines how the NMT will charge for calls. It contains one or more Call Type Charges. A fleet is charged for calls according to the charge scheme that the Charge Schedule assigned to the fleet specifies for the time of the calls.

2 How Call Charges Work

A charge scheme is defined by:

- The 'Rounding' type. This can be one of the following:
 - a. 'Round up'. Call duration is rounded **up** to the nearest minute.
 - b. 'Round down'. Call duration is rounded **down** to the nearest minute.
 - c. 'Pro rata'. Call duration is calculated to the nearest second.
- The 'Minimum chargeable duration' (in seconds)
- The call type, each of which has the following parameters:
 - a. The 'Cost per call'
 - b. The number of 'Free seconds'
 - c. The 'Cost per time unit'

Call costs are dependant on whether the call was a control channel call or not.

2.1 Control Channel Calls

The cost of control channel calls is equal to the 'Cost per call' plus the duration based cost. The duration based cost is calculated by charging for the entire duration of the call (in seconds) at the 'Cost per time unit' rate.



Note: A control channel call includes status messages or short data messages.

Pricing Example for Control Channel Call

In this example, a control channel call lasting 2 seconds is made on the following charge scheme:

Parameter	Value
Rounding type*	Pro rata
Minimum chargeable duration*	20 seconds
Cost per call	\$0.25
Free seconds*	10 seconds
Cost per second	\$0.10

* For control channel calls, the 'Rounding' type, 'Minimum chargeable duration' and the number of 'Free seconds' have no bearing on the call cost.

The call cost is calculated as:

$$\begin{aligned} &\text{Fixed cost} + \text{Duration based cost} \\ &\$0.25 + (2 \times \$0.10) = \$0.45 \end{aligned}$$

2.2 Traffic Channel Calls

If the call duration is less than the 'Minimum chargeable duration', then the call attracts no charge. Otherwise the charge depends upon one of the following three 'Rounding' type examples.



Note: A traffic channel call includes speech calls and non-prescribed data calls.

Pro Rata Pricing Example

If the 'Rounding' type is 'Pro rata' then the call cost is equal to the 'Fixed cost per call' plus the duration based cost. The duration based cost is calculated by first deducting the number of 'Free seconds' from the call duration and then charging the resulting time (in seconds) at the 'Cost per minute' rate.

In this example, a call lasting 12 seconds is made on the following charge scheme:

Parameter	Value
Rounding type	Pro rata
Minimum chargeable duration	10 seconds
Cost per call	\$0.25
Free seconds	6 seconds
Cost per minute	\$0.40

The 6 'Free seconds' are deducted from the call duration and the call cost is given as:

$$\begin{aligned} &\text{Fixed cost} + \text{Duration based cost} \\ &\$0.25 + (((12 - 6) / 60) \times \$0.40) = \$0.29 \end{aligned}$$

Round Up Pricing Example

If the 'Rounding' type is 'Round up' then the call cost is equal to the 'Fixed cost per call' plus the duration based cost. The duration based cost is calculated by rounding the call duration, less the free seconds, up to the next minute and charging at the 'Cost per minute' rate.

In this example, a call lasting 67 seconds is made on the following charge scheme:

The call duration is rounded up to 2 minutes and the call cost is calculated as:

$$\begin{aligned} &\text{Fixed cost} + \text{Duration based cost} \\ &\$0.25 + (2 \times \$0.40) = \$1.05 \end{aligned}$$

Parameter	Value
Rounding type	Round up
Minimum chargeable duration	10 seconds
Cost per call	\$0.25
Free seconds	5 seconds
Cost per minute	\$0.40

Round Down Pricing Example

If the 'Rounding' type is 'Round down' then the call cost is equal to the 'Fixed cost per call' plus the duration based cost. The duration based cost is calculated by rounding the call duration, less the free seconds, down to the last minute and charging at the 'Cost per minute' rate.

In this example, a call lasting 59 seconds is made on the following charge scheme:

Parameter	Value
Rounding type	Round down
Minimum chargeable duration	10 seconds
Cost per call	\$0.25
Free seconds	5 seconds
Cost per minute	\$0.40

The call duration is rounded down to 0 minutes and the call cost is calculated as:

$$\begin{aligned} \text{Fixed cost} + \text{Duration based cost} \\ \$0.25 + (0 \times \$0.40) &= \$0.25 \end{aligned}$$

3 Creating a Charge Scheme

You may want to add a charge scheme to the Peak and Off-Peak schemes already there, for example to define charges over the weekend, or during the middle of the night, or to provide a different set of charge schemes for an additional charge schedule.

If you increase your charges, you can simply edit existing charge schemes, but if you change the basis on which customers are charged (for example by introducing special charges for data), it is good practice to create a new set of charge schemes rather than editing existing ones. This makes it clear that charging has changed, and it enables you to re-process old call records with the old charge schemes to check that charging was correct.

The best way to create a new charge scheme is to copy an existing one and edit it.

1. Select Charging > Charge Schemes to open the Charge Schemes window.
2. Click on the charge scheme to be copied and press the Copy button. (Alternatively, double-click on a row to edit an existing charge scheme or press the Add button to create a new scheme from scratch.) The Copy Charge Scheme window appears, containing values from the copied charge scheme.

Call Type	Cost per Call	Free Seconds	Cost per Time unit	Time unit	Phone Prefix	Group Sites
Default	0.20	0	0.20	per minute	N/A	N/A
Group	0.05	3	0.10	per minute	N/A	1
Group	0.05	3	0.20	per minute	N/A	3
Group	0.05	3	0.30	per minute	N/A	2
Group NPD	0.05	0	0.10	per minute	N/A	1
Group NPD	0.10	0	0.20	per minute	N/A	2
Group SDM	0.03	N/A	0.03	per second	N/A	N/A
Group Status	0.02	N/A	0.00	per second	N/A	N/A
Incoming PABX	0.00	6	0.10	per minute	N/A	N/A
Incoming PSTN	0.00	6	0.10	per minute	N/A	N/A
Individual	0.05	3	0.10	per minute	N/A	N/A
NPD	0.05	0	0.10	per minute	N/A	N/A
Outgoing PSTN/PABX	0.05	6	0.00	per minute	012	N/A
Outgoing PSTN/PABX	0.05	6	0.15	per minute	0	N/A
Outgoing PSTN/PABX	0.00	0	0.00	per minute	3	N/A
Outgoing PSTN/PABX	0.00	0	0.00	per minute	34	N/A
SDM	0.03	N/A	0.03	per second	N/A	N/A
Status	0.01	N/A	0.00	per second	N/A	N/A

1. In the Name box, enter a suitable name for the charge scheme.
2. In the Description box, provide a longer description of the scheme. This will appear in the Charge Schemes window.

3. In the Rounding box, define how the NMT will round call times for charging purposes. Select a value from the drop down list. Options are Round Up, Round Down, or Pro Rata (see “How Call Charges Work” on page 174 for more information).
4. In the Minimum Chargeable Duration box, specify how long a call must last before it attracts any charge. For example, if you enter 10, calls that last less than 10 seconds will be free. Do not enter a value less than 5, so that users will not be charged for failed calls.
5. In the table, set the charges for calls. See “Setting the Scale of Charges” on page 179 for more information.
6. Press Apply to save your changes, then Close to close the window. The new or edited charge scheme appears in the Charge Schemes window.

4 Setting the Scale of Charges

The Add Charge Scheme and Edit Charge Scheme windows have a table, which define call charge rates.

Scale of Charges

Each Charge Schedule has a scale of charges, which consists of a set of Call Type Charges.

Call Type	Cost per Call	Free Seconds	Cost per Time unit	Time unit	Phone Prefix	Group Sites
Default	0.20	0	0.20	per minute	N/A	N/A
Group	0.05	3	0.10	per minute	N/A	1
Group	0.05	3	0.20	per minute	N/A	3
Group	0.05	3	0.30	per minute	N/A	2
Group NPD	0.05	0	0.10	per minute	N/A	1
Group NPD	0.10	0	0.20	per minute	N/A	2
Group SDM	0.03	N/A	0.03	per second	N/A	N/A
Group Status	0.02	N/A	0.00	per second	N/A	N/A
Incoming PABX	0.00	6	0.10	per minute	N/A	N/A
Incoming PSTN	0.00	6	0.10	per minute	N/A	N/A
Individual	0.05	3	0.10	per minute	N/A	N/A
NPD	0.05	0	0.10	per minute	N/A	N/A
Outgoing PSTN/PABX	0.05	6	0.00	per minute	012	N/A
Outgoing PSTN/PABX	0.05	6	0.15	per minute	0	N/A
Outgoing PSTN/PABX	0.00	0	0.00	per minute	3	N/A
Outgoing PSTN/PABX	0.00	0	0.00	per minute	34	N/A
SDM	0.03	N/A	0.03	per second	N/A	N/A
Status	0.01	N/A	0.00	per second	N/A	N/A

Each row in the table defines a call type charge. The top row defines the charge for the call type 'Default'. This will be applied to any calls not covered by other rows in the table. For example, if you define call charge types for individual and telephone calls, group calls will be charged at the rate defined by the Default call type charge.

In general, you can only have one call type charge for each call type. However, phone calls and group calls are exceptions.

Call Type Charge

A call type charge specifies the charge for calls of a particular type. This can consist of a cost per call as well as a duration-based cost per unit of time.

Cost per Call

Specifies a cost for the call. Both this cost and the cost per minute are applied to a call. The call must last longer than the minimum call length for this cost to be applied.

Free Seconds

Specifies how long the call can last before the duration-based cost specified in the Cost per Time Unit box begins to accumulate.

Cost per Time Unit

Specifies the amount of money that will be charged per minute or per second.

Time Unit

Either 'per second' (control channel calls) or 'per minute' (all other calls).

Phone Prefix

Specifies the prefix that will be dialled for this phone call type charge. Use this to differentiate between different phone call type charges, for example local calls, national calls, international calls.

Group Sites

Specifies the number of sites that are involved in a group call. Use this to create different call type charges for group calls depending on how many sites are involved in the call.

4.1 Editing the Default Call Type Charge

You need to edit the Default call type charge to set appropriate charges for call types that do not have their own charge. In a simple charging setup, you may not need any other call charge.

4.2 Creating a Call Type Charge

In general, you can create one call type charge for each type of call. However, group calls and telephone calls can each have multiple call type charges.

Follow these steps to create a call type charge (but for group calls, see also “Creating Call Type Charges For Group Calls” on page 181 and for radio-to-telephone calls, see also “Creating Call Type Charges for Outgoing Phone Calls” on page 180).

1. In the Edit Charge Scheme window, press the Add button. A new line appears in the table. If the call type in the new line is not the call type you wanted, select the call type cell, then right click to get a drop down menu of available call types.
2. In the Cost per Call box, specify an amount of money that will be charged for making a call.
3. Specify a number of free seconds that the call must proceed for, before there is a charge for the duration of the call.
4. In the Cost per Time Unit box, specify the amount of money that will be charged for each minute or second of call duration.
5. Press the Apply button to create the call charge type.

4.3 Creating Call Type Charges for Outgoing Phone Calls

You can create more than one call type charge for outgoing radio-to-telephone calls. This makes it possible to charge network users differently for local calls, toll calls, calls to the home office, calls to 0800 numbers and so on.

When you have several phone charges, the most exact match in the Phone Prefix column is applied. For example, if a user telephones an 0800 number, the ‘0800’ call charge will be applied, not the ‘0’ call charge. A call charge with nothing entered into the Phone Prefix box will be applied to phone calls not otherwise matched.

To create an outgoing radio-to-telephone call charge, generally follow the instructions in “Creating a Call Type Charge” on page 180, but do this before you press Apply:

- In the table, select Outgoing PSTN/PABX.

- Enter the charges as required, then in the Phone Prefix box, enter the first one or more digits, to specify a group of telephone calls. For example 0 for toll calls, 3 252 141 to specify the home office, 0800 for free toll calls. Alternatively, leave the box empty and the call type charge will apply to all outgoing telephone calls.
- To create another outgoing radio-to-telephone call charge, press the Add button to add another row to the table for Outgoing PSTN/PABX calls.

4.4 Creating Call Type Charges For Group Calls

You can create up to four call types charge for group calls. These are 'Group', 'Group NPD', 'Group SDM' and 'Group Status'. With Group and Group NPD calls, you can also charge network users based on the number of sites used.

To create a group call charge, generally follow the instructions above, but do the following before you press Apply:

- In the table, select the required group call type.
- In the case of Group and Group NPD call types, in the Group Sites box enter the number of sites involved in the call, or keep the default value (1). Multiple lines for these call types can be created, providing the number of Group Sites is different in each line. The call type charge will apply to group calls that use that number of sites. If there is no call type charge for group calls that use more than this number of sites, this call type charge will also apply to them.



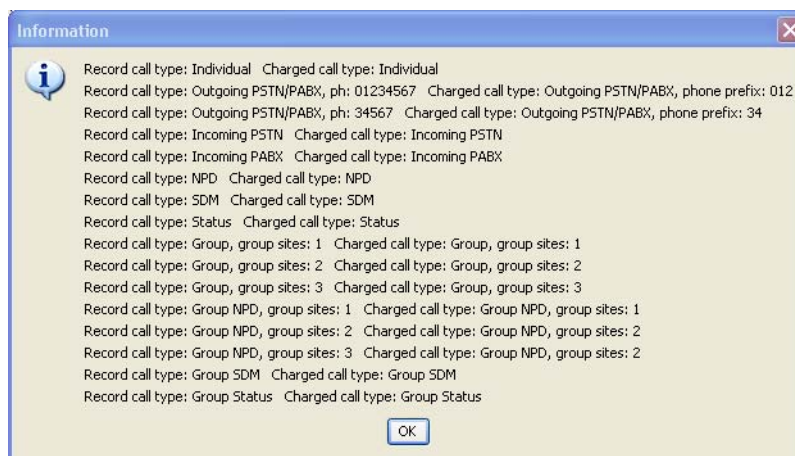
Note: With both Group and Group NPD call types you should always have one call type charge row that uses the default Group Sites value of 1.

4.5 Checking a Scheme Using the Test Button

Once a scheme has been defined, the charge type that is assigned to each call type can be checked by clicking the Test button. Use this facility to check that the charge scheme will operate as expected.

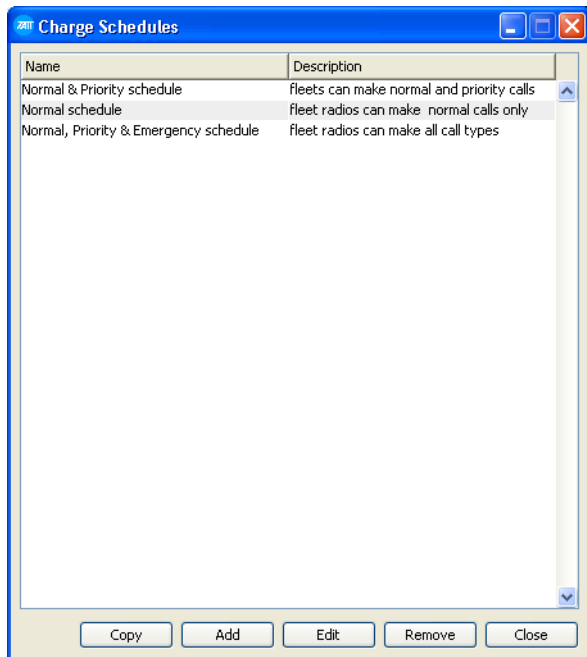


Note: To use the Test button, at least one fleet must be defined in the Fleets menu.



5 Viewing Charge Schedules

Select Charging > Charge Schedules to display the Charge Schedules window.



This window displays a row for each available Charge Schedule.

Charge Schedule

A charge schedule specifies which Charge Scheme the NMT will apply at each time-slot of each day of the week. Each fleet has a charge schedule assigned to it.

6 Editing a Charge Schedule

You can create, edit, and remove charge schedules. Many networks will only need one charge schedule.

Select Charging > Charge Schedules to display the Charge Schedules window.

To edit a charge schedule, double-click on its row. To create a new charge schedule, press the Add button. The Edit Charge Schedule or Add Charge Schedule window appears.

Charge Schedule

A charge schedule specifies which Charge Scheme the NMT will apply at each time-slot of each day of the week. Each fleet has a charge schedule assigned to it.

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
00:00-01:00							
01:00-02:00							
02:00-03:00							
03:00-04:00							
04:00-05:00							
05:00-06:00							
06:00-07:00							
07:00-08:00							
08:00-09:00							
09:00-10:00							
10:00-11:00							
11:00-12:00							
12:00-13:00							
13:00-14:00							
14:00-15:00							
15:00-16:00							
16:00-17:00							
17:00-18:00							
18:00-19:00							
19:00-20:00							
20:00-21:00							
21:00-22:00							
22:00-23:00							
23:00-24:00							

To make your changes, follow these steps:

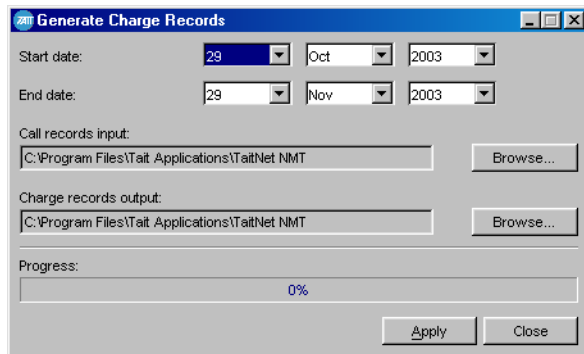
1. Enter or edit the name and optionally, enter a description of the schedule.
2. Assign charge schemes to the time-slots in the schedule as follows.
 - a. Select one or more time-slots. To do this, click and drag or click on the upper left corner, then shift-click on the lower right corner of the area you want to select.
 - b. With the time-slots still selected, click the right button of the mouse. A menu of available charge schemes pops up.
 - c. Select the charge scheme you want. Its name appears in the selected time-slots.

Press Apply to save your changes, then Close.

7 Generating Charge Records

To generate charge records from the call records that the NMT has retrieved from nodes and stored on its hard disk, follow these steps:

1. Select Charging > Generate Charge Records. The Generate Charge Record window appears.



Charge Record

A charge record gives details of a call, the charge for the call itself and for the duration of the call. Charge records are generated from call records at your request.

2. Select a start date and end date. This should correspond to the period that you want to bill customers for. The start and end date specify that call records from 00:00 on the start date to 24:00 on the day **before** the end date will be used to generate charge records.

So to generate charge records for the whole of February, for example, you should set the start date to 1 Feb 2003 and the end date to 1 Mar 2003. This should be done on 1 Mar 2003 at the earliest, to ensure that all records for the period are downloaded.

3. If you changed the default path for call record files, tell the NMT the current path in the Call Records Input box.
4. If desired, modify the path in the Charge Records Output box. By default, the NMT will store charge record files in its %userprofile%\My Documents\Tait Applications\TaitNet NMT\chargerecs directory. You may for example want to store charge record files on another computer on the network. Tait recommend that you store charge record files in a separate folder for each billing period.
5. Press Apply to generate the charge record file, then Close to close the window.

7.1 Charge Records File Format

Field No.	Field Name	Format	Comment
1	Date	ISO Date (YYYYMMDD)	
2	Time	HH:MM:SS	
3	Cost Code	Free-form string	Any commas are replaced by hyphens
4	Charged Unit	Radio number in the appropriate numbering scheme	The radio that is charged for the call. This is the caller, except for incoming telephone calls, when it is the called number.
5	Fixed Cost	Integer > 0	The cost charged for the call independently of its duration. This is the cost per call according to the scale of charges. Expressed in hundredths of the currency unit (for example hundredths of a dollar, i.e. cents).
6	Duration-based Cost	Integer > 0	The amount added to the cost for the call based on its duration. This is based on the scale of charges applied to the call. Expressed in hundredths of the currency unit.
7	Units	String	Number of units charged for the call
8	Schedule	String	Name of the schedule used to calculate the charge for the call
9	Charge Scheme	String	Name of the charge scheme applied to calculate the charge for the call
10	Applied Charge	String	Name of the item in the scale of charges
11	Called (MPT 1327)	MPT 1327 Number	
12	Called (Fleet Format)	Number of the called party in the appropriate numbering scheme	Empty if no fleet defined for caller
13	Caller (MPT 1327)	MPT 1327 Number	
14	Caller (Fleet Format)	Number of the calling party in the appropriate numbering scheme	Empty if no fleet defined for called
15	Dialled Digits	Numeric string	Digits as dialled by radio user, including leading 0 for PSTN calls or leading 3, 4, 5, 6 for PABX calls. This field is only used for dialled outgoing phone calls (not used for short form or network operator, not used for incoming phone calls).
16	Exchange Digits	Numeric string	Number the network supplied to PSTN or PABX (outgoing call) or number the network received from PSTN or PABX (incoming call)

Field No.	Field Name	Format	Comment
17	A Party ID	Numeric string	Calling party identity if supplied by PSTN or PABX (incoming phone calls)
18	Call Type	Exactly one ASCII character I G B S M N X T R P s m n b t ?	individual group broadcast status SDM NPD abort divert registration poll group status group sdm group npd broadcast data divert on busy unknown
19	Coverage	Exactly one ASCII character L I	local intersite
20	Priority	Exactly one ASCII character N P E	normal high emergency
21	On Air Duration	Integer > 0	Seconds on air for audio/NPD calls. For Status or SDM calls, indicates the number of control channel slots used by the data call.
22	Queue Duration	Integer > 0	Always 0 for calls not using audio resource
23	Answer Duration	Integer > 0	Always 0 for calls not using audio resource
24	Number of DAS ports	Integer > 0	Number of DAS ports used in the call
25	Number of channels	Integer > 0	Number of RF channels used. This is also the number of sites involved.

8 Producing a Fleet Charges Report

Before you produce a fleet charges report, ensure that the NMT has downloaded all call records.

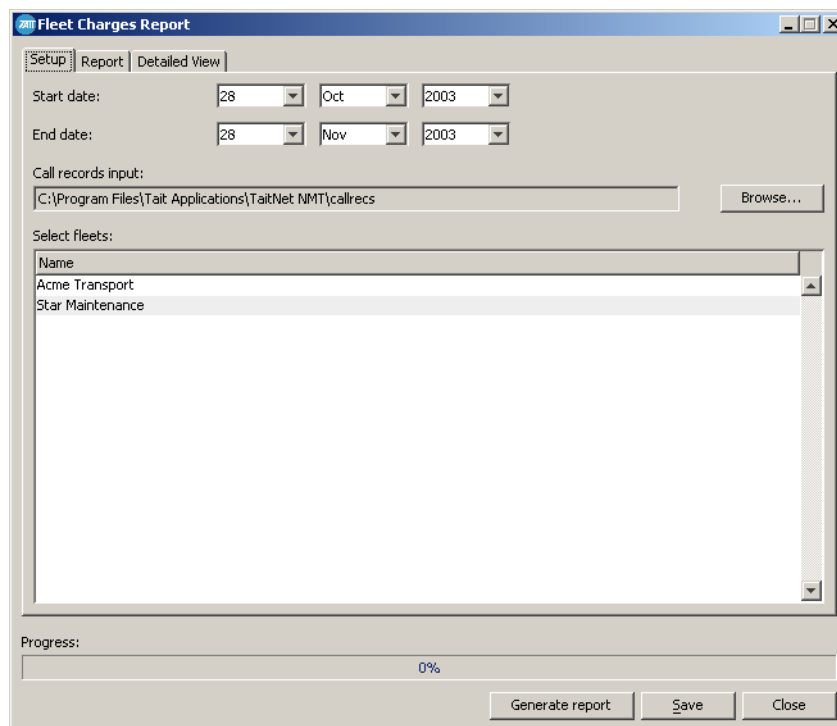
You can also use Charging > Not Chargeable Report to ensure that there are no radios using the network that do not belong to a fleet (see “Producing a Not Chargeable Report” on page 189).

Then follow these steps.

1. Select Charging > Fleet Charges Report. The Fleet Charges Report window appears, displaying the Setup tab.

Cost Code Charges Report

If you want to bill an organisation for more than one fleet, set up each fleet with a cost code. Then you can use Charging > Cost Code Charge Report to generate a report which contains charging information for several fleets and a combined grand total. The procedure is similar to that described here for a Fleet Charges Report.

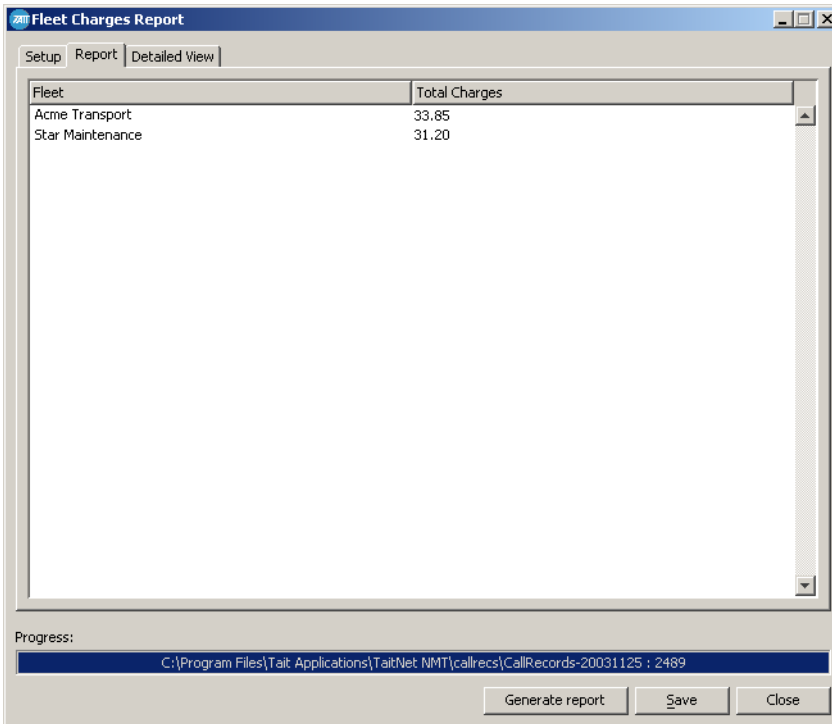


2. Select a start and end date. The start and end date specify that call records from 00:00 on the start date to 24:00 on the day **before** the end date will be used to generate charge records.

So to generate a report for the whole of February, for example, you should set the start date to 1 Feb 2003 and the end date to 1 Mar 2003. This should be done on 1 Mar 2003 at the earliest, to ensure that all records for the period are downloaded.

3. Check that the Call Records Input box displays the correct path to the charge records. If not, press the Browse button and navigate to the correct path.
4. In the Select Fleet(s) box, select the fleet or fleets that you want fleet charges reports for.
5. Press the Generate Report button. A progress bar shows the status of the report creation.

- Select the Report tab to view a Summary report of the charges per fleet, or the Detailed View tab to show a report of charges per radio unit per fleet.



- Optionally press the Save button to save the charge report to a file (the default location is the NMT's %userprofile%\My Documents\Tait Applications\TaitNet NMT\reports subdirectory). The report looks something like this:

```
#Charging Report
Fleet,Ident,Total Charges
Acme Transport,200-2001-20,13.25
Acme Transport,200-2001-21,4.15
Acme Transport,200-2001-22,13.55
Acme Transport,200-2001-23,0.20
Acme Transport,200-5000-90,1.35
Acme Transport,200-5000-91,1.35
Acme Transport,Total,33.85
Star Maintenance,201-3000-200,0.40
Star Maintenance,201-3000-201,0.60
Star Maintenance,201-3000-202,3.00
Star Maintenance,201-3000-203,10.50
Star Maintenance,201-3000-204,12.40
Star Maintenance,201-3000-205,0.00
Star Maintenance,201-3000-206,4.30
Star Maintenance,Total,31.20
```

- Press the Close button to close the window.

9 Producing a Not Chargeable Report

The Fleet Charges Report indicates the charges for radios that belong to a fleet; radios that are not part of a fleet are not chargeable. You can produce a Not Chargeable report to see whether there are any such radios.

Radios can be on the network without being part of a fleet:

- if a fleet is deleted without being barred beforehand
- if the network has more than one server NMT and the other server NMT has set up a fleet and validated radios for it

To produce a Not Chargeable report, follow these steps:

1. Select Charging > Not Chargeable Report.
2. Calculate charges in the same way as you would for a Fleet Charges report.

Part H: Reports Menu

The Reports menu can produce a variety of different reports about the network. Sometimes you need to specifically select a day and press an Update button to obtain the data. Generally, you can sort the display by any column by clicking on that column's header.

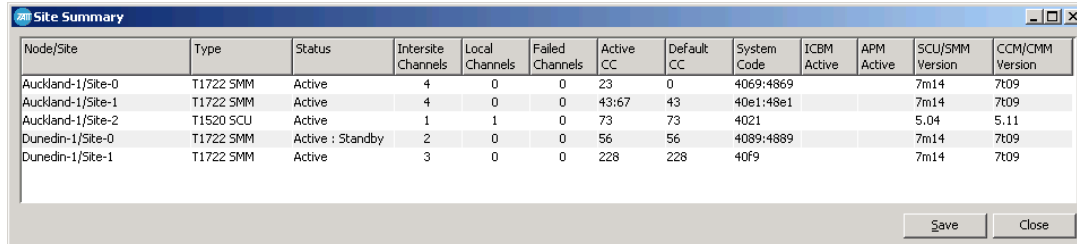
Reports

- Site Summary
- Fleet Status
- Site Registration Summary
- Site Statistics
- DAS Statistics
- Alarms
- Call Records

The data in some reports is automatically saved to a file. The other reports have a Save to File button that lets you manually save them to a file, for example so that you can look back to see how a site's traffic loading has changed over the past few months. These files contain comma-delimited text and are easily imported into spreadsheet programs for further manipulation.

1 Site Summary

The NMT can provide summary information on all the sites in the network. Select Reports > Site Summary and the Site Summary window appears.



Node/Site	Type	Status	Intersite Channels	Local Channels	Failed Channels	Active CC	Default CC	System Code	ICBM Active	APM Active	SCU/SMM Version	CCM/CMM Version
Auckland-1/Site-0	T1722 SMM	Active	4	0	0	23	0	4069:4869			7m14	7t09
Auckland-1/Site-1	T1722 SMM	Active	4	0	0	43:67	43	40e1:48e1			7m14	7t09
Auckland-1/Site-2	T1520 SCU	Active	1	1	0	73	73	4021			5.04	5.11
Dunedin-1/Site-0	T1722 SMM	Active : Standby	2	0	0	56	56	4089:4889			7m14	7t09
Dunedin-1/Site-1	T1722 SMM	Active	3	0	0	228	228	40f9			7m14	7t09

There is a table row for each site. The following columns display information on a site:

Node/Site

The name of the site and the node that it is connected to.

Type

Whether the site has a T1520 (SCU) or a T1722 (SMM).

Status

The site's current status. This can be Active or Inactive.

Intersite Channels

The number of channels at the site that are configured to handle intersite calls.

Local Channels

The number of channels at the site that can only handle local calls. (This number includes the control channel.)

Failed Channels

The number of channels at the site that are failed.

Active CC

The channel number (RF number) of the control channel. If this is set to zero then no channel is operating at this site. If this site has two control channels then both control channel numbers will be displayed separated by a comma.

Default CC

The expected channel number (RF number) of the control channel. If this site has two default control channels then both numbers will be displayed separated by a comma.

System Code

The System Code of the site.

If the site has dual control channels, both syscodes are displayed, separated by a colon.

ICBM Active

If Intersite Communications Backup Mode is active, this check box will be ticked.

APM Active

If Alternate Partition Mode is active, this check box will be ticked.

SCU/SMM Version

The software version number of the Site Control Unit or Site Management Module for this site.

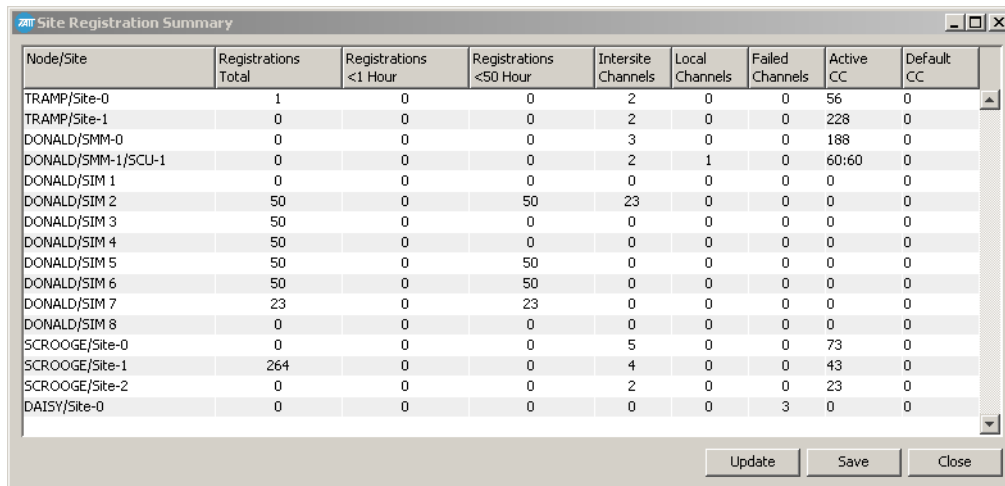
CCM/CMM Version

The software version number of the Channel Control Module or Channel Management Module for this site.

2 Site Registration Summary

The NMT can tell you the sites radios are registered on and how long the radios have been registered. This summary report is used to obtain a overview of site utilisation.

1. Select Reports > Site Registration Summary. The Site Registration Summary window appears.



Node/Site	Registrations Total	Registrations <1 Hour	Registrations <50 Hour	Intersite Channels	Local Channels	Failed Channels	Active CC	Default CC
TRAMP/Site-0	1	0	0	2	0	0	56	0
TRAMP/Site-1	0	0	0	2	0	0	228	0
DONALD/SMM-0	0	0	0	3	0	0	188	0
DONALD/SMM-1/SCU-1	0	0	0	2	1	0	60:60	0
DONALD/SIM 1	0	0	0	0	0	0	0	0
DONALD/SIM 2	50	0	50	23	0	0	0	0
DONALD/SIM 3	50	0	0	0	0	0	0	0
DONALD/SIM 4	50	0	0	0	0	0	0	0
DONALD/SIM 5	50	0	50	0	0	0	0	0
DONALD/SIM 6	50	0	50	0	0	0	0	0
DONALD/SIM 7	23	0	23	0	0	0	0	0
DONALD/SIM 8	0	0	0	0	0	0	0	0
SCROOGE/Site-0	0	0	0	5	0	0	73	0
SCROOGE/Site-1	264	0	0	4	0	0	43	0
SCROOGE/Site-2	0	0	0	2	0	0	23	0
DAISY/Site-0	0	0	0	0	0	3	0	0

2. Press the Update button.

The NMT gets registration information from the nodes, collates this with site status information and displays it in the window.

There is a table row for each site. The following columns display information on a site:

Node/Site

The name of the site and the node that it is connected to.

Registrations Total

The number of radios registered on this site.

Registrations <1 Hour

The number of radios that have registered on this site in the last hour and still registered on this site.

Registrations <50 Hours

The number of radios that have registered in the last 50 hours and still registered on this site.

Intersite Channels

The number of channels at the site that are configured to handle intersite calls.

Local Channels

The number of channels at the site that can only handle local calls.
(This number includes the control channel.)

Failed Channels

The number of channels at the site that are failed.

Active CC

The channel number (RF number) of the control channel. If this is set to zero then no channel is operating at this site. If this site has two control channels then both control channel numbers will be displayed separated by a colon.

Default CC

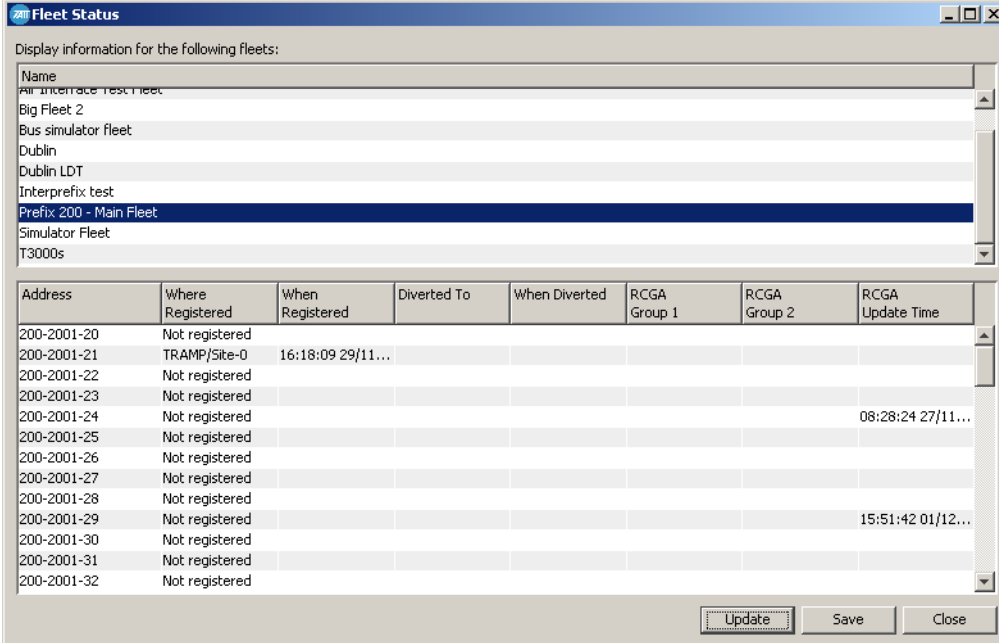
The expected channel number (RF number) of the control channel. If this site has two default control channels then both numbers will be displayed separated by a colon.

3 Fleet Status

The NMT can tell you where a fleet's radios are and whether calls to them are being diverted.

1. Select Reports > Fleet Status. The Fleet Status window appears.
2. In the upper panel, select one or more fleets.
3. Press the Update button.

The NMT gets status information from the nodes, and displays it in the window.



The screenshot shows the 'Fleet Status' window. At the top, it says 'Display information for the following fleets:'. Below this is a list of fleet names: Air interface test fleet, Big Fleet 2, Bus simulator fleet, Dublin, Dublin LDT, Interprefix test, Prefix 200 - Main Fleet (highlighted), Simulator Fleet, and T3000s. Below the list is a table with the following columns: Address, Where Registered, When Registered, Diverted To, When Diverted, RCGA Group 1, RCGA Group 2, and RCGA Update Time. The table contains 12 rows of data for addresses 200-2001-20 through 200-2001-32. At the bottom of the window are three buttons: Update, Save, and Close.

Address	Where Registered	When Registered	Diverted To	When Diverted	RCGA Group 1	RCGA Group 2	RCGA Update Time
200-2001-20	Not registered						
200-2001-21	TRAMP/Site-0	16:18:09 29/11...					
200-2001-22	Not registered						
200-2001-23	Not registered						
200-2001-24	Not registered						08:28:24 27/11...
200-2001-25	Not registered						
200-2001-26	Not registered						
200-2001-27	Not registered						
200-2001-28	Not registered						
200-2001-29	Not registered						15:51:42 01/12...
200-2001-30	Not registered						
200-2001-31	Not registered						
200-2001-32	Not registered						

Address

The MPT number of the radio.

Where Registered

The node of the site that the radio is registered on.

When Registered

The date and time that the radio was registered. This tells you when the radio last roamed onto the site. If the radio hasn't moved, this box tells you when the radio was first switched on.

Diverted To

The radio or telephone number to which calls to the radio will be diverted.

When Diverted

The date and time when the radio user or NMT operator set up the call diversion for the radio. If the radio is now no longer diverted, the column indicates when the last diversion was cleared.

Registration

The process by which a Radio informs a Site that it has acquired that Site. When a radio acquires a site's control channel (the first time it is switched on or whenever it roams to a different site) it sends a registration message. Switching a radio on and off or even making it do a forced registration does not alter the site or node's registration information. Registration enables the network to keep track of the radio so that it can connect its incoming calls.

RCGA Group1
RCGA Group 2

If the radio is a tracked unit of a radio controlled group affiliation (RCGA) enabled group, the group ident is displayed.

RCGA Update Time

The date and time when the radio last changed its RCGA group membership.

4 Site Statistics

The NMT can provide you with daily information about the traffic load on each site. You need to monitor this information so that you know when to add channels or shift them from a quiet to a busy site.

You can view the following:

- a summary, which displays key information on the busy hour (all sites all nodes). Each day's summary can be saved to a file to provide a traffic loading history.
- a graph of the traffic channel occupancy (one site at a time)
- a graph of the control channel usage

4.1 Obtaining Site Statistics

To obtain statistical information from the sites on the network, follow these steps.

1. Select Reports > Site Statistics. An empty Site Statistics window appears, showing the Summary tab with today's date selected.
2. If you want to view site statistics for a different date, select it from the drop-down lists. (It is best not to look at today's statistics because the data is still being gathered.)
3. Press the Update button.

The NMT gets statistical information from all the sites on the network, and displays it in the window.

4.2 Viewing Summary Information

The Summary tab displays a summary of site statistics.

Node/Site Details	Channels	Total Calls	Total Call Time	Average Occupancy	Busy Hour Start Time	Busy Hour Calls	Busy Hour Call Time	Busy Hour Occupancy	Average Call Duration
Tramp/Site 0	22	0	0	0	00:00	0	0	0	0
Tramp/Site 1	23	64623	223227	11	20:15	2697	9395	11	3
Tramp/Site 2	23	64624	208848	11	02:30	2692	8957	11	3
Tramp/Site 3	1	0	0	0	00:00	0	0	0	0

Node/Site Details

The name of the node and site.

Channels

The number of traffic channels on the site. (If a channel was taken out of service for the whole day, it is not included. If it was taken out of service for part of the day, it is included.)

Total Calls

The total number of calls for the selected day.

Total Call Time

The total call times of all the calls for the day.

Average Occupancy

The mean occupancy rate of the site. An occupancy of 50% means that on average, the channels were handling calls for half the time.

Busy Hour Start Time

The start time of the continuous one-hour period with the highest average traffic intensity.

Busy Hour Calls

The number of audio calls that the site handled during the busy hour. (This number does not include status messages, SST, or MST data calls.)

Busy Hour Call Time

The duration in seconds of calls in the busy hour.

Busy Hour Occupancy

The mean occupancy rate of the site during the busy hour. An occupancy of 50% means that on average, the channels were handling calls for half the time.

Average Call Duration

The average length of each call in seconds.

4.3 Viewing Site Statistics as Graphs

Viewing Site Occupancy

The Graph tab lets you see how the occupancy of a site changes over a day.

1. In the Site Statistics Summary tab window, obtain site statistics as described above.
2. Select the node/site required, then select the Graph tab.
3. Select the Traffic Channels button to display the graph showing how the occupancy rate varied during the whole day.

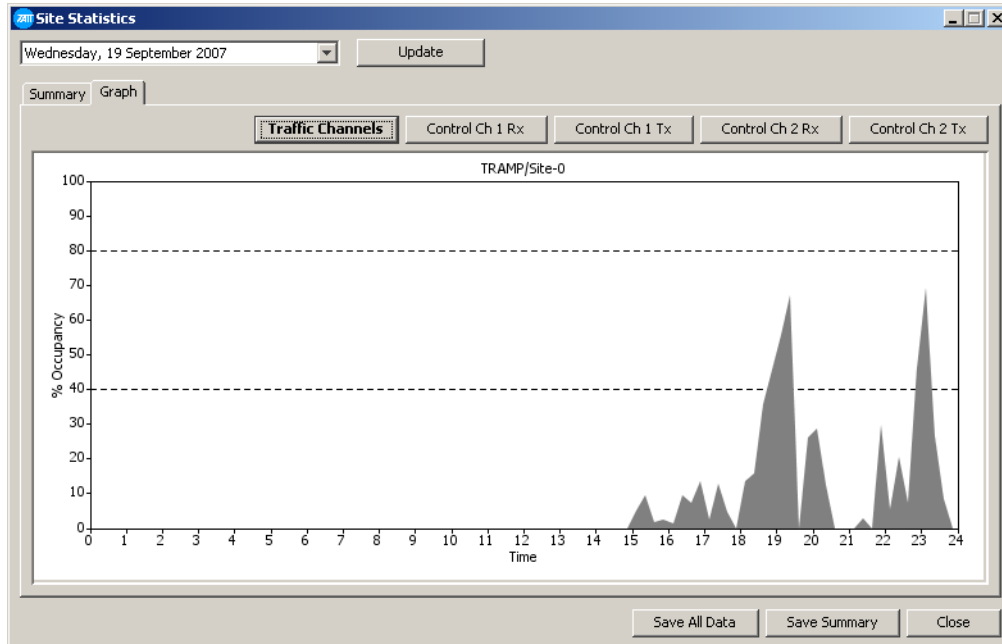
Grade of Service

The grade of service is a measure of the quality of service to the user of the trunked network. The better the grade of service, the less likely it is that a user will need to wait for a call to be set up. MPT 1318 defines grade of service as the probability that a user has to wait for more than 20 s for their call to be set up.

To obtain the grade of service for a site, first multiply the busy hour occupancy by the number of channels to obtain the traffic intensity in erlangs, then use the tables in Appendix E of MPT 1318 to obtain a value based on the Erlang C formula.



Note: Due to the way the site collects the traffic channel statistics, the graph will always show a slight underestimation of actual traffic channel occupancy.



Note: The data from the Summary and Graph windows can be saved, in full or summary form, using the Save All Data and Save Summary buttons.

Viewing Control Channel Statistics

Control channel statistics can only be viewed in graph form.

1. In the Site Statistics Summary tab window, obtain site statistics as described above.
2. Select the node/site required, then select the Graph tab.
3. Select from the Control Channel buttons to display the required statistics. Graphs can be displayed for the following options:
 - a. Control Channel 1 Rx
 - b. Control Channel 1 Tx
 - c. Control Channel 2 Rx
 - d. Control Channel 2 Tx



Note: Control channel statistics graphs have a factor applied to recognise that a loading factor of 35% effectively represents 100% channel usage with MPT Random Access Protocol. While this works well for most networks, those with most traffic due to TNDS can utilize the control channel rather more efficiently and may display control channel utilization of over 100% on Tx graphs.

In Q15451NMT v4.10.05 and later, loading factors are configurable and set by the parameters `ControlChannel.RxLoadFactor` and `ControlChannel.TxLoadFactor` in `%userprofile%My Documents\Tait Applications\TaitNet NMT\config\NMT.cfg`. The parameters are not accessible from within the application, so if non-default values are required, the parameters and values must be added manually to `NMT.cfg` and the NMT must then be restarted.

For networks with most traffic due to TNDS, Tait recommends using the following setting:

```
ControlChannel.TxLoadFactor=70
```

5 DAS Statistics

The NMT can provide you with daily information about the traffic load on the DAS. You need to monitor this information so that you can identify when to increase the number of intersite links, internode links, PSTN connections, or PABX connections. You can view the information and save it to a file.

5.1 Obtaining DAS Statistics

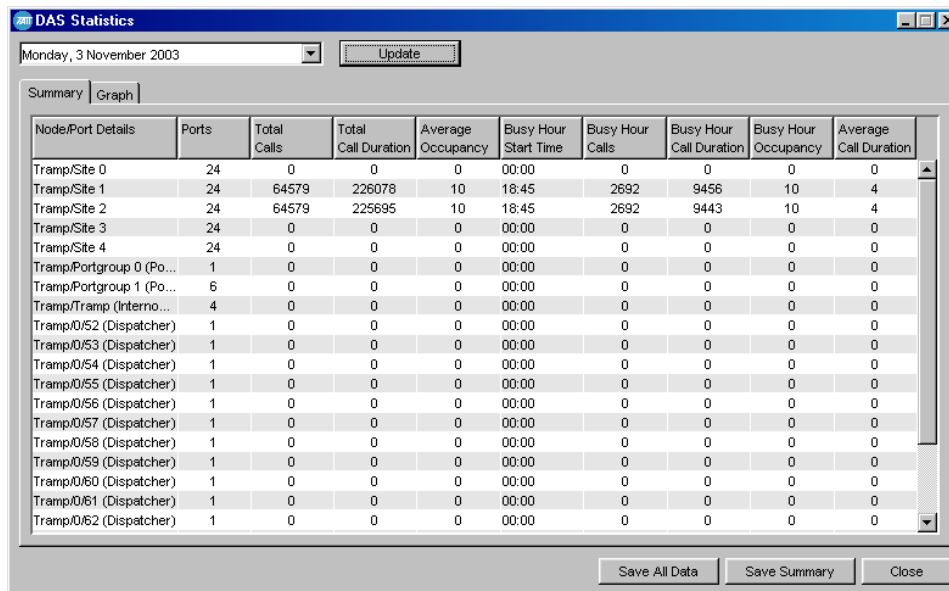
To obtain DAS statistics, follow these steps.

1. Select Reports > DAS Statistics. An empty DAS Statistics window appears, showing the Summary tab with today's date selected.
2. If you want to view DAS statistics for a different date, select it from the drop-down lists. (It is best not to look at today's statistics because the data is still being gathered.)
3. Press the Update button.

The NMT gets statistical information about the DAS from all the nodes on the network, and displays it in the window.

5.2 Viewing Summary Information

The Summary tab groups information about the ports in the DAS according to what they are connected to. For example, all intersite ports going to a site, all internode ports connecting two particular nodes, and all PSTN ports in one port group are grouped.



The screenshot shows the 'DAS Statistics' window with the 'Summary' tab selected. The window title is 'Monday, 3 November 2003' and there is an 'Update' button. The table below shows the data for various port groups.

Node/Port Details	Ports	Total Calls	Total Call Duration	Average Occupancy	Busy Hour Start Time	Busy Hour Calls	Busy Hour Call Duration	Busy Hour Occupancy	Average Call Duration
Tramp/Site 0	24	0	0	0	00:00	0	0	0	0
Tramp/Site 1	24	64579	226078	10	18:45	2692	9456	10	4
Tramp/Site 2	24	64579	225695	10	18:45	2692	9443	10	4
Tramp/Site 3	24	0	0	0	00:00	0	0	0	0
Tramp/Site 4	24	0	0	0	00:00	0	0	0	0
Tramp/Portgroup 0 (Po...	1	0	0	0	00:00	0	0	0	0
Tramp/Portgroup 1 (Po...	6	0	0	0	00:00	0	0	0	0
Tramp/Tramp (Interno...	4	0	0	0	00:00	0	0	0	0
Tramp/O/52 (Dispatcher)	1	0	0	0	00:00	0	0	0	0
Tramp/O/53 (Dispatcher)	1	0	0	0	00:00	0	0	0	0
Tramp/O/54 (Dispatcher)	1	0	0	0	00:00	0	0	0	0
Tramp/O/55 (Dispatcher)	1	0	0	0	00:00	0	0	0	0
Tramp/O/56 (Dispatcher)	1	0	0	0	00:00	0	0	0	0
Tramp/O/57 (Dispatcher)	1	0	0	0	00:00	0	0	0	0
Tramp/O/58 (Dispatcher)	1	0	0	0	00:00	0	0	0	0
Tramp/O/59 (Dispatcher)	1	0	0	0	00:00	0	0	0	0
Tramp/O/60 (Dispatcher)	1	0	0	0	00:00	0	0	0	0
Tramp/O/61 (Dispatcher)	1	0	0	0	00:00	0	0	0	0
Tramp/O/62 (Dispatcher)	1	0	0	0	00:00	0	0	0	0

Node/Port Details

The name of the node that the DAS belongs to, and the port type for this port grouping.

Further information about the port groupings is displayed in the following table.

For This Port Type...	The Info Column Displays...
Site	Site name
Phone	Port group
Internode	Node name
Dispatcher	Dispatcher ident

Ports

The number of ports that the table row provides information on.

Total Calls

The total number of calls for the selected day for the port group.

Total Call Time

The total call times of all the calls for the day for the port group.

Average Occupancy

The mean occupancy rate of the port group. An occupancy of 50% means that on average, the ports were handling calls for half the time.

Busy Hour Start Time

The start time of the continuous one-hour period with the highest average traffic intensity for the port group.

Busy Hour Calls

The number of audio calls that the port group handled during the busy hour. (This number does not include status messages, SST, or MST data calls.)

Busy Hour Call Duration

The duration in seconds of calls in the busy hour for the port group.

Busy Hour Occupancy

The mean occupancy rate of the port group during the busy hour. An occupancy of 50% means that on average, the ports were handling calls for half the time.

Average Call Duration

The average length of each call in seconds.

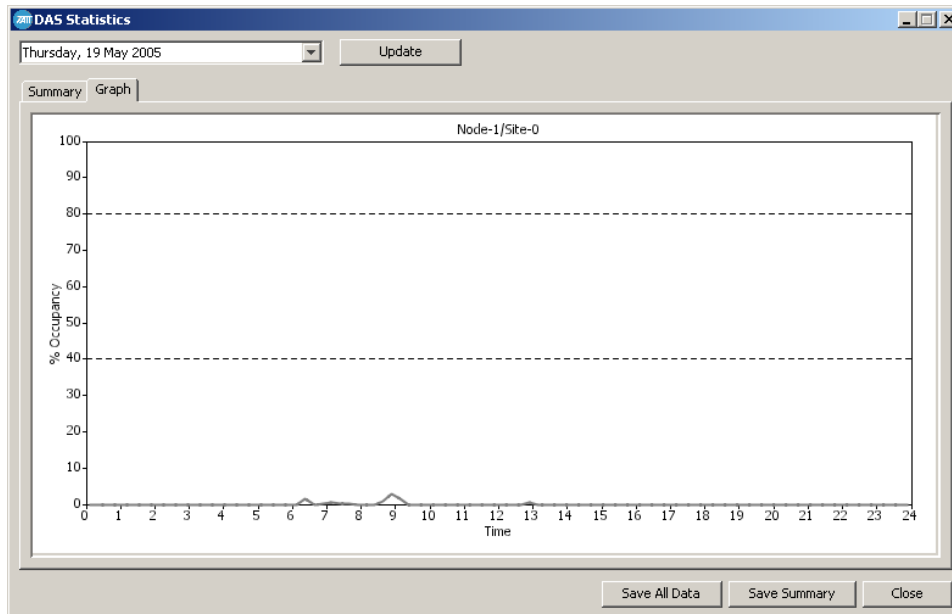
5.3 Viewing DAS Occupancy

The Graph tab lets you see how the occupancy of a port group changes over a day.

1. In the DAS Statistics Summary tab window, obtain summary statistics as described above.

2. Select the node/port required, then select the Graph tab.

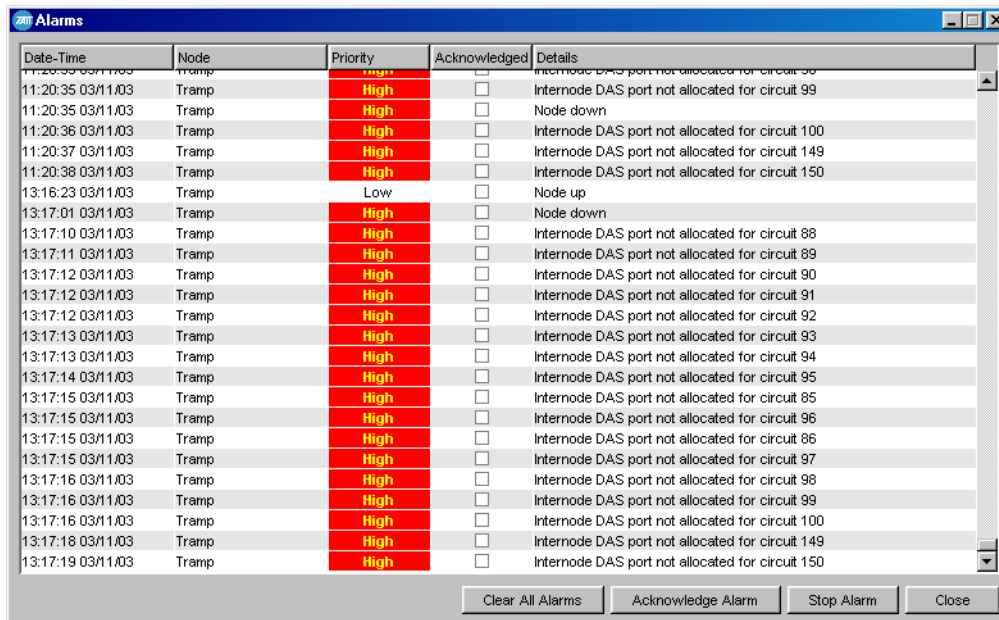
The tab displays a graph showing how the occupancy rate varied during the whole day.



Note: The data from the Summary and Graph windows can be saved, in full or summary form, using the Save All Data and Save Summary buttons.

6 Alarms

Select Reports > Alarms to manually open the Alarms window, so that you can view recent alarms.



Date-Time	Node	Priority	Acknowledged	Details
11:20:35 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 98
11:20:35 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 99
11:20:36 03/11/03	Tramp	High	<input type="checkbox"/>	Node down
11:20:36 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 100
11:20:37 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 149
11:20:38 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 150
13:16:23 03/11/03	Tramp	Low	<input type="checkbox"/>	Node up
13:17:01 03/11/03	Tramp	High	<input type="checkbox"/>	Node down
13:17:10 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 88
13:17:11 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 89
13:17:12 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 90
13:17:12 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 91
13:17:12 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 92
13:17:13 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 93
13:17:13 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 94
13:17:14 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 95
13:17:15 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 85
13:17:15 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 96
13:17:15 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 86
13:17:15 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 97
13:17:16 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 98
13:17:16 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 99
13:17:16 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 100
13:17:18 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 149
13:17:19 03/11/03	Tramp	High	<input type="checkbox"/>	Internode DAS port not allocated for circuit 150

Alarms are not restricted to fault conditions; they are used to indicate important network events of any kind.

The window displays the current alarm at the bottom of the list of recent alarms. It displays the date and time of the alarm, the node that sent it to the NMT, the priority level of the alarm, whether the alarm message has been acknowledged, and the text of the alarm message.

Priority

The Priority column uses colour to indicate the priority level: red for high priority and yellow for medium priority.

Clear All Alarms

The Clear All Alarms button removes all alarm messages from the Alarm window and deletes them from the alarm log file. You are asked for confirmation.

Acknowledge Alarm

The Acknowledge Alarm button sets the acknowledged tick in the table. This can be used by network operators as a way to keep track of alarms, and to be sure they have read the alarm.

Stop Alarm

The Stop Alarm button will turn the alarm sound off. This can be used by network operators once they have acknowledged an alarm (especially if it has been configured with a continuous alarm sound).

Alarm Log File

The NMT stores alarms in a log file. If an alarm is no longer visible on screen, it will still be in the log file, unless that file has reached its permitted maximum size or you pressed Clear All. See “Storing Alarms in the Alarm Log File” on page 82 for more information.

Viewing Emailed Alarms

For an example of an alarm that has been sent by Email, see “Sending Alarms by Email” on page 83.



Note: If you double click on the Details cell of a 'Line test good' or 'Line test fail' alarm, a window appears. This displays the results of a line test of the port, performed at the present time, and shows:

- the site name and CCM number for this port
- the line level and the level threshold
- the line noise and the noise threshold

However, details of the test results at the time the alarm was generated are not available.

7 Call Records

Using the NMT, you can monitor recent call records in real time, and view full details of a single call record.

7.1 Monitoring Call Records

The NMT allows you to monitor the download of call records, in real time. Select Reports > Call Records and the Call Records Summary window appears. Click Monitor On/Monitor Off to start/stop call record monitoring.

Start Time	Node	Site	Caller	Called	Priority	Type	Duration	End Reason
09:04:44 09/01/07	DONALD	SIM 2	210-2001-386	210-2001-436	N	S	1	207
18:14:48 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	3	207
09:04:43 09/01/07	DONALD	SIM 2	210-2001-367	210-2001-417	N	S	1	207
18:14:45 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	3	207
18:14:42 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	3	207
09:04:43 09/01/07	DONALD	SIM 2	210-2001-364	210-2001-414	N	S	1	207
09:04:42 09/01/07	DONALD	SIM 2	210-2001-381	210-2001-431	N	S	1	207
18:14:39 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	2	207
09:04:42 09/01/07	DONALD	SIM 2	210-2001-366	210-2001-416	N	p	1	1
18:14:36 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	2	207
09:04:41 09/01/07	DONALD	SIM 2	210-2001-363	210-2001-413	N	S	1	207
18:14:30 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	2	207
09:04:40 09/01/07	DONALD	SIM 2	210-2001-380	210-2001-430	N	S	1	207
18:14:27 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	2	207
09:04:40 09/01/07	DONALD	SIM 2	210-2001-365	210-2001-415	N	S	1	207
18:14:22 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	2	207
09:04:38 09/01/07	DONALD	SIM 2	210-2001-382	210-2001-432	N	S	1	207
18:14:19 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	2	207
09:04:38 09/01/07	DONALD	SIM 2	210-2001-397	210-2001-447	N	S	1	207
18:14:17 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	1	207
09:04:37 09/01/07	DONALD	SIM 2	210-2001-362	210-2001-412	N	S	1	207
18:14:14 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	1	207
09:04:37 09/01/07	DONALD	SIM 2	210-2001-379	210-2001-429	N	S	1	105
18:14:11 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	1	207
09:04:37 09/01/07	DONALD	SIM 2	210-2001-396	210-2001-446	N	S	1	207
18:14:08 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	1	207
09:04:36 09/01/07	DONALD	SIM 2	210-2001-378	210-2001-428	N	S	1	207
18:14:06 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	1	207
09:04:35 09/01/07	DONALD	SIM 2	210-2001-394	210-2001-444	N	S	1	207
18:13:45 27/12/06	TRAMP	Site-0	0/301	0/304	N	M	0	26

If the monitor is on and no call records are downloading, select Configuration > Call Records and turn on the downloading of call records. See “Configuring Call Record Downloading” on page 97, for details of how to do this.

Start Time

The date and time when the call started. The SCU or node clock provides this data.

Node

The name of the node originating the call.

Site

The name of the site originating the call.

Caller

The number of the calling party.

Called

The number of the called party.

Priority

The priority level of the call.

Level	Description
N	Normal
P	Priority
E	Emergency

Type

The type of call.

Type	Description
I	Individual speech
B	Broadcast speech
G	Group speech
S	Status
M	Individual short data message
N	Individual non-prescribed data
X	Abort
T	Divert
R	Registration
b	Broadcast non-prescribed data
s	Group status
m	Group SDM
n	Group non-prescribed data
p	Pressel message
P	ESN poll

Duration

The time in seconds that the call was on air.

Call Record Files

The NMT stores call records in files, one for each day.

By default, call record files are stored indefinitely, see “Days to Keep Call Record Files Before Deleting” on page 96 for information on how to alter the default storage time.

For more information on call record files, see “Call Records” on page 95.

End/Reason

This column displays a numeric code giving the reason why the call ended or failed.

Code	Call End Reason
6	The called number was busy
9	The control channel was overloaded and couldn't accept the call
13	The called number did not respond, perhaps because it was out of range

These are only a few of the many call end reasons. For a full list of call end reasons, see “Interpreting Call End Reasons” on page 102.

Clear Button

Clears displayed call records from the screen.

Monitor On/Off Buttons

When the Monitor On button is toggled on, the window is continually updated with the most recent call records downloaded by the server NMT. If lots of call records are being downloaded, it can be difficult to read the information on the window. Turning the Monitor Off button on stops the window from being updated, so that it can be read more easily.

Previous/Next Buttons

When the Call Records Summary window is in the Monitor Off state and a new Call Record Details window is opened, Next and Previous buttons are displayed that can be used to move forwards or backwards through the call records on the screen. These buttons use the same table as the Summary window (i.e. if the filter was applied when this table was created, the filter applies to the behaviour of these buttons too).

When the Call Records Summary window is in the Monitor On state, and a new Call Record Details window is opened, Next and Previous buttons are not present. Next and Previous buttons do not work in the Monitor On state, as the table changes with each new incoming Call Record.

Changing the Call Records Summary window from the Monitor Off to the Monitor On state causes Next and Previous buttons in any open Call Record Details windows to disappear.

Filter

It is possible to filter the displayed call records by typing text in the Filter box at the bottom of the window and pressing the enter key to activate the filter. The filter is applied to the Node, Site, Caller and Called columns in the table.



Note: The filter applies only to new call records being added to the Call Record Summary window. It does not filter call records already on view.

Using the example pictured above, if we were to enter the text 'Tr' or 'Tramp' into the Filter box, the window would only display call records for calls originating on the Node 'Tramp'.



Note: Text entered must be case sensitive.

If we entered '200-2001' then we would see all records for those calls in which the calling or called party address began with '200-2001'.

To see only calls involving radio '200-2001-206' we could enter that address into the filter.

7.2 Viewing Call Record Details

If you need more information about a recent call than is provided in the Call Records window, you can view its full call record.

In the Call Records window, double-click on a call record. The Full Call Record window appears.

Call Record Details

Start Time
 Date: 20/10/09
 Time: 09:37:28

Call Type
 Type: Group Speech
 Coverage: Intersite
 Priority: Normal

Call Duration
 On air: 31
 Queue: 0
 Answer: 0
 Meterpulses: 0

Location of Caller
 Node: TRAMP
 Site: LI
 Channel: 18

Subscriber
 Cost code:
 Caller (MPT1327): 0/310
 Caller (MPT1343): 200-2100-310
 Called (MPT1327): 0/6000
 Called (MPT1343): 200-5000-900
 Dialed digits:
 Exchange digits:
 A party ID:

Miscellaneous
 Node sequence number: 7654
 Site sequence number: 0
 End reason: 199
 Close reason: 7

Audio Resources

Node	Port
SCROOGE	4
SCROOGE	6
SCROOGE	482
SCROOGE	482
TRAMP	66
TRAMP	66
TRAMP	17
TRAMP	18

Node	Site	Channel	Q time
SCROOGE	Site-0	156	0
SCROOGE	Site-1	108	0

Close

Start Time

The Start Time area specifies when the call started.

Date

The date of the call.

Time

The time when the call started.

Call Type

The Call Type area gives information about the type of call.

Type

The type of call. This box can contain names of the different call types defined in the MPT standards.

Coverage

Whether the call is local (involves only the site) or intersite (involves a site and one or more nodes).

Priority

The priority level of the call. This can be Normal, Priority, or Emergency.

Call Duration

The Call Duration area provides information about how long the call and its setting up lasted.

On Air

The time in seconds during which the call was on air. For status or SDM messages, the box contains the number of control channel slots used.

Queue

The time in seconds during which the call was queued for busy channel. In the case of a group call, this is the time queued for a busy channel at the calling site, not the total time the call was queued for.

Answer

Indicates how long the radio or telephone rang before the call was answered. This includes time queued because the called party is busy.

Meter pulses

The number of meter pulses received from the PSTN or PABX for an outgoing phone call.

Location of Caller

The Location of Caller area displays the number/name of the node and site from which the call originated. It also displays the number of the channel at the site that carried the call.

Subscriber

The Subscriber area provides information relevant for charging.

Cost Code

A code that is assigned to the fleet that the radio belongs to. Your billing system can use this code to assign call records from more than one fleet to a single account.

Caller (MPT1327)

The number of the calling party in MPT 1327 format prefix/ident.

Caller¹

The number of the calling party in the format of the chosen numbering scheme.

Called (MPT1327)

The number of the called party in MPT 1327 format.

Called¹

The number of the called party in the format of the chosen numbering scheme.

Dialled Digits

Contains the digits dialled by the radio user. This box is only used for dialled outgoing phone calls. It is not used for short form dialling or for network operator dialling.

Exchange Digits

For a radio-to-telephone call, displays the digits that the node sent to the PSTN or PABX. These are the dialled digits as modified by the matching entry in the outphone table for the calling radio.

For a telephone-to-radio call, displays the digits that the node received from the PSTN or PABX. (Generally, the number that the caller dialled after dialling the trunked network.)

A Party ID

For a radio-to-telephone call, displays the digits that were sent to the PSTN or PABX as the caller ID. This is the MPT number or the phone alias of the radio. The phone alias is used if a number is entered in the Phone Alias area of the radio's Edit Unit window and if the port group is configured to transmit phone aliases as caller IDs.

For a telephone-to-radio call, displays the caller ID if the node received it from the PSTN or PABX.

Miscellaneous

The miscellaneous area contains information that can be used when diagnosing call problems.

Node Sequence Number

A number that the node assigns to the call record. For each new record, the node increments this number by 1.

Site Sequence Number

A number that the originating site assigns to the call record.

MPT Special Idents

The MPT standards specify some special idents that are used for the air interface and that appear in call records. For detailed information see the MPT documentation. Special idents you may see in call records include the following.

Ident	Description
8101	Call to PSTN
8102	Call to PABX
8121–8135	Short form PSTN call
8170–8180	Network operator call
8185	Registration request
8187	Diversion request
8189	Interprefix request
8190	ESN poll
8191	System wide call

1. This will be displayed in brackets: either MPT 1343, CPSx or ANN depending on your configured numbering scheme.

End Reason

This column displays a numeric code giving the detailed reason why the call ended or failed. For a full list of call end reasons, see “Interpreting Call End Reasons” on page 102.

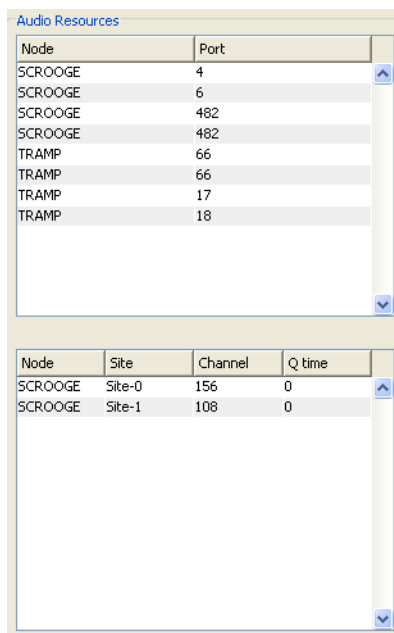
Close Reason

This column displays a numeric code giving the simple reason why the call ended or failed. For a full list of call close reasons, see “Interpreting Call Close Reasons” on page 101.

Audio Resources

The Audio Resources area shows what DAS ports and RF channels were used for the audio path of the call (intersite calls only).

The first table lists DAS ports and the node they belong to (internode and telephone calls), the second table lists RF channel numbers and the site and node they belong to.



The screenshot shows a window titled "Audio Resources" containing two tables. The top table has two columns: "Node" and "Port". The bottom table has four columns: "Node", "Site", "Channel", and "Q time".

Node	Port
SCROOGE	4
SCROOGE	6
SCROOGE	482
SCROOGE	482
TRAMP	66
TRAMP	66
TRAMP	17
TRAMP	18

Node	Site	Channel	Q time
SCROOGE	Site-0	156	0
SCROOGE	Site-1	108	0

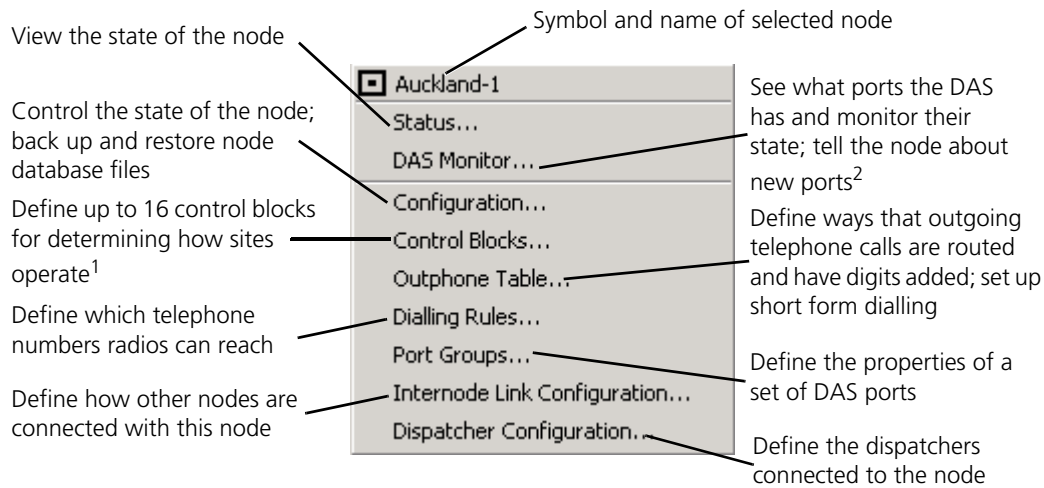
If 'Extended T1541' call records is selected (refer “Viewing Call Record Download Settings” on page 95), a 4th column is added to the Site table; Q time. If the Home Node of the group call is running Q1541NC v4.07.02 or later, this lists the channel queue time for the connection to this site, or N/A if this queue time is not available.



Note: For multi-site group calls, the time queued for a busy channel at the calling site is reported in the 'Queue' field (page 212). A group call will, by default, wait for up to 10 seconds for a channel at a called site to become available. After 10 seconds, the call will go ahead at available sites only, unless an unavailable site is 'Essential' (refer to "Service Area Table" on page 167), in which case the call will fail 'System busy'. The queuing time is set in the Edit Group window (refer to "Modifying a Group Configuration" on page 164).

Part I: Node Menu

The Node menu contains commands that let you monitor and configure the way the node and its DAS behave. In the main window, position the mouse cursor over the node and press the right-mouse button. The Node menu appears.

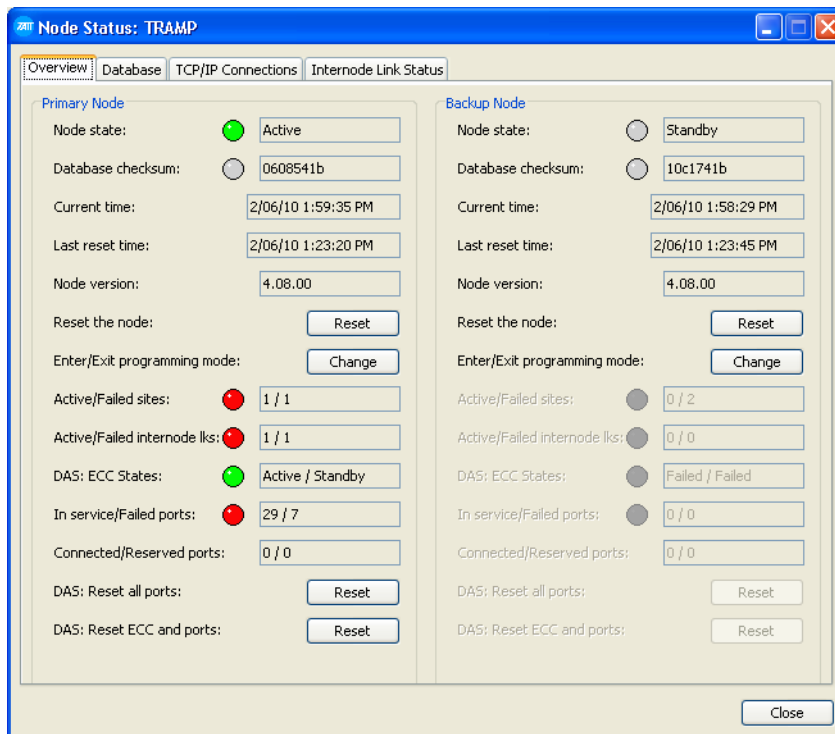


1. Control blocks affect site operation but are stored primarily at the node.
2. If Option 4 is selected as the High Availability type in the Node Configuration window (see "Node Configuration" on page 235), the 'DAS Monitor...' entry is replaced by two entries: 'Primary Node DAS Monitor...' and 'Backup Node DAS Monitor...'.

1 Node Status

1.1 Node Overview

Select *Node* > Status to display the Node Status (Overview tab) window. The display changes depending on the setting of Node Configuration parameters High Availability Type and Has Backup ECC in DAS Bin (see page 237).



Primary Node area and Backup Node area

Node State

Displays the current state of the node. One of the following states will be displayed:

State	Description
Active	The node is operating normally
Program	The node is in 'program' mode; which is used to restore the node database
Failed	The node has failed
Activating	The node is preparing to go Active
Link Failed	The link to the node is down
Network Failed	
License Failed	The node license is missing or has expired

State	Description
Disabled	The node is switched off
Unknown	The operating state of the node cannot be determined
Standby	Where two nodes are present, the standby node is ready to switch to Active mode if the other node goes into Program mode or shows a failed state
DAS failed	The node is not operational because it is unable to connect to an operational DAS
Link up	The link from the node to the NMT has just been established, and the status of the node yet to be determined

Database Checksum

Displays the checksum of the node's database.

Current time

Displays the date and time of the node's system clock.

Last Reset Time

Displays the date and time the node was last reset.

Node Version

Displays the version number of the software that the node is running.

Reset the Node

This Reset button allows you to reset the node.

Enter/Exit Programming Mode

This Change button allows you to change the state of the node. If you want to do work on the node that cannot be carried out while the node is fully operational, for example restoring node data from backup, you need to put the node in the Program state. You can change the node's state from Active to Program and back again using the Change button.

Active/Failed Sites

Displays the number of sites that are connected to this node and are in the active/failed state.

Active/Failed Internode Lks

Displays the number of active/failed internode links.

DAS: ECC States/DAS State

Displays the current state of the DAS ECC. One of the following states will be displayed:

State	Description
Active	The ECC is operating normally
Standby	The ECC is operating in Standby mode
Disabled	The ECC has not been fitted
Failed	The link to the ECC is down or the ECC has failed
Monitor	The ECC is operating in standby mode and actively monitoring all DAS ports under its control. (Used only in Option 4 High Availability nodes, where the entire DAS is duplicated.)

In Service/Failed Ports

Displays the number DAS ports that are in service/failed.

Connected/Reserved Ports

Displays the number of DAS ports that are currently on air/ allocated to calls which have not yet connected.

DAS: Reset all ports

This reset button allows you to reset all ports in the DAS. It does not reset the DAS Controller (ECC).

DAS: Reset ECC and ports

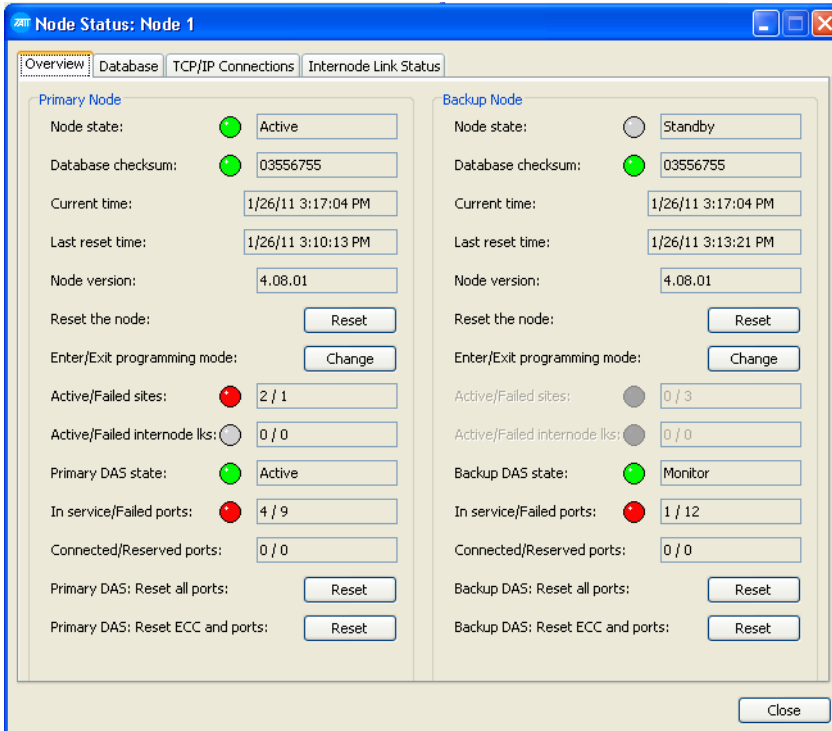
This reset button allows you to reset all DAS ports and the active DAS Controller (ECC) as well.



Note: This button will not reset the ECC unless the Node Controller uses version Q1541NC v4.08.00 or later and the ECC uses version Q1561ECC v4.03 or later.

Interpreting the DAS State and In-service/Failed ports fields with Dual DAS (Option 4) High Availability Nodes

If Option 4 is selected as the High Availability type and both nodes are operational, the DAS State on the 'Active' node should be 'Active' and the DAS state on the 'Standby' node should be 'Monitor'.



The DAS connected to the Standby node is not performing any call functions, but it is actively monitoring its DAS ports. Therefore, in the monitoring DAS, ports that have fully separate links should be reported as 'In-service', while those that share links with the DAS connected to the Active node should be reported as 'Failed'. Also in the monitoring DAS there should be no Connected or Reserved ports so this field should display '0/0'.

Changing the Node State

If you want to do work on the node that cannot be carried out while the node is fully operational, for example restoring node data from backup, you need to put the node in the Program state.

- To put the node into the Program state, press the Change button in the Primary Node area (or Backup Node area, if this is the node you wish to work on).

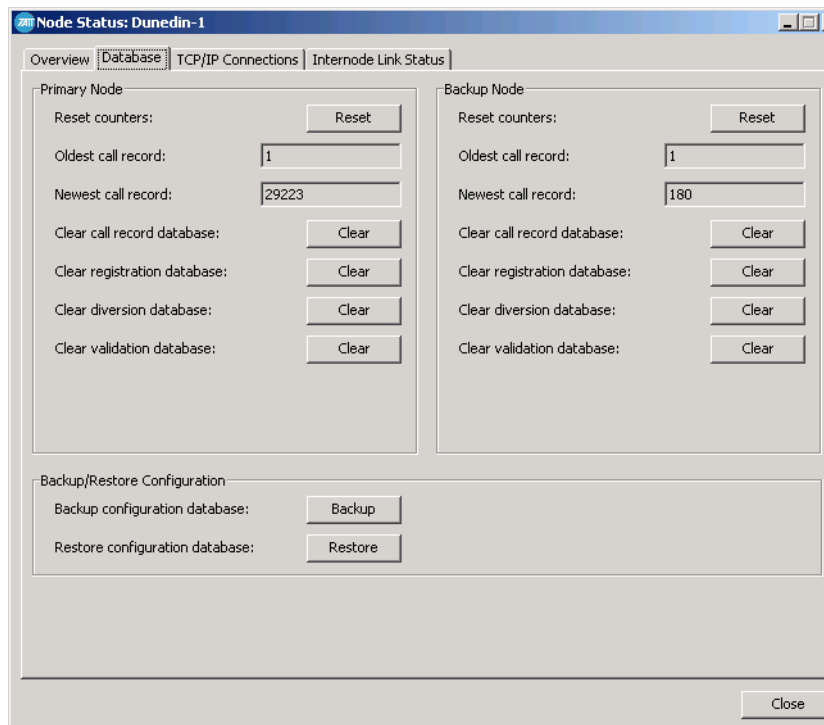


Important: Before you change the node's state from Program back to Active, close all NMT windows other than the main window and Node Status window. Otherwise the NMT is unable to display changes.

- To put the node back from a Program state into a normal operational state (Active), press the Change button in the Primary Node area (or Backup Node area, if this is the node you have been working on).

1.2 Node Database

Select *Node* > Status to display the Node Status window, and select the Database tab.



Primary Node Area and Backup Node Area

Reset Counters

This Reset button allows you to reset the site link and internode link status counters. The number of bytes received and transmitted and the number of link errors are set to 0.

Oldest Call Record

Displays the node sequence number of the oldest call record stored on the node.

Newest Call Record

Displays the node sequence number of the next call record to be stored on the node.

Clear Call Record Database

This Clear button allows you to clear the node's call record data.

Clear Registration Database

This Clear button allows you to clear the node's registration data.

Clear Diversion Database

This Clear button allows you to clear the node's diversion data.

Clear Validation Database

This Clear button allows you to clear the node's validation data.

Backup/Restore Configuration Area



Important: A node backup or restore should only be attempted when the node state is either:

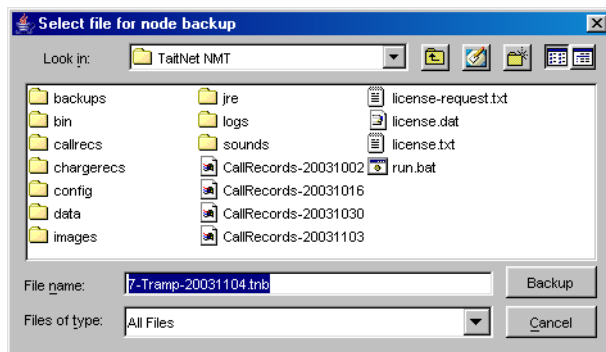
- active
- program
- standby (when it is one node of a high availability pair and the other node's state is active)

A node backup or restore when the node is not in one of these states is likely to fail, and may generate corrupted files.

Backup Configuration Database

This button allows you to backup the node configuration to a file.

1. Click the Backup button. The following window appears.

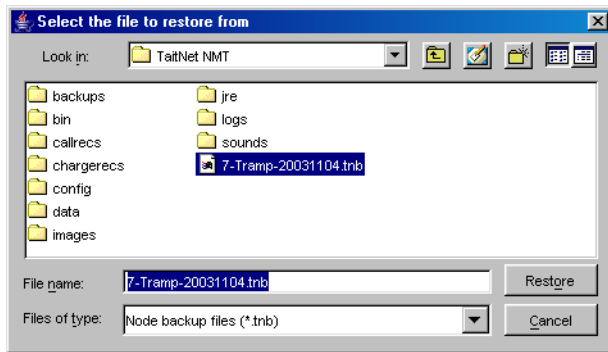


2. Use this window to select or create the filename you wish to use for your node data backup file.
3. When you have selected or entered the required backup filename, press the Backup button to create the node data backup.
4. During the backup procedure a window will appear with a progress bar showing the status of the total backup procedure and the status of the current backup procedure.
If the backup procedure fails, an error message will be displayed.
No backup file will be created.
5. When the backup is complete, a successful backup message is displayed. Press Close to end the backup procedure.

Restore Configuration Database

This button allows you to restore the node configuration from a file.

1. Click the Restore button. The following window appears:



2. The name of the last system backup file is shown. Select a different filename to restore if required.
3. When you have selected the backup file to restore from, press the Restore button to restore the selected database.
4. During the restore procedure a window will appear with a progress bar showing the status of the restore.
If the restore procedure fails, a warning will be displayed.
5. When the restore is complete, a successful restore message is displayed. Press Close to end the restore procedure.
6. On the Network Configuration window, press the Change State button to put the node back into service.

1.3 TCP/IP Connections

Select *Node* > Status to display the Node Status window, and select the TCP/IP Connections tab. This window displays which NMTs and LDTs are connected to the node and how long they have been connected for.

Connection Type	IP Address / Port Number	Connected Since	Details
LDT	172.25.140.18.2032	19/11/08 7:13:05 PM	200-2100-314
LDT	172.25.140.18.2033	19/11/08 7:13:15 PM	200-2100-313
LDT	172.25.140.17.2812	20/11/08 12:07:48 PM	200-2100-351
NMT	172.25.140.2.3965	19/11/08 7:12:48 PM	



Note: All LDTs able to make and receive calls, and that are connected to this node, should be visible in this window. Only one NMT (the server NMT) should be connected. Client NMTs are not directly connected to the node, so will not appear in this window.

Connection Type

Displays the connection type, either LDT or NMT.

IP Address/Port Number

Displays the IP address of each connected LDT and NMT.

Connected Since

Displays the date and time that the LDT or NMT connected to the node for the current session.

Details

Displays the address of any connected LDT.

1.4 Internode Link Status

A node can only set up an internode call when there is a functioning link to the other node or nodes.

Select *Node* > Status to display the Node Status window, and select the Internode Link Status tab.

	Remote Node	Link Status	Tx Queue Size	Tx Bytes	Rx Bytes	Link Errors
0	Node 0	-	0	0	0	0
1	Auckland-1	Up	0	1915506	1611381	33
2	Node 2	Up	0	1847937	1267067	30
3	Node 3	-	0	0	0	0
4	Node 4	-	0	0	0	0
5	Node 5	-	0	0	0	0
6	Node 6	-	0	0	0	0
7	Dunedin-1	-	0	0	0	0
8	Node 8	-	0	0	0	0
9	Node 9	-	0	0	0	0
10	Node 10	-	0	0	0	0
11	Node 11	-	0	0	0	0
12	Node 12	-	0	0	0	0
13	Node 13	-	0	0	0	0
14	Node 14	-	0	0	0	0
15	Node 15	-	0	0	0	0
16	Node 16	-	0	0	0	0
17	Node 17	-	0	0	0	0
18	Node 18	-	0	0	0	0
19	Node 19	-	0	0	0	0
20	Node 20	-	0	0	0	0
21	Node 21	-	0	0	0	0
22	Node 22	-	0	0	0	0
23	Node 23	-	0	0	0	0
24	Node 24	-	0	0	0	0
25	Node 25	-	0	0	0	0
26	Node 26	-	0	0	0	0

The window displays a row for each possible node in the network.

Remote Node

The Remote Node column specifies the number and name of the destination node.

Link Status

Displays the state of the link between the selected node and the remote node.

Status	Description
Up	Link is functioning
Down	Link is not functioning or the linked node is not active
Synchronising	Link has just been re-established. The nodes are updating their registration information.
-	No link has been defined to the remote node

Tx Queue Size

Displays the number of messages queued for transmission.

Tx Bytes

Displays the number of bytes transmitted over the link. This counter can be reset from the Node Status window Database tab by clicking the Reset Counters button.

Rx Bytes

Displays the number of bytes received over the link. This counter can be reset from the Node Status window Database tab by clicking the Reset Counters button.

Link Errors

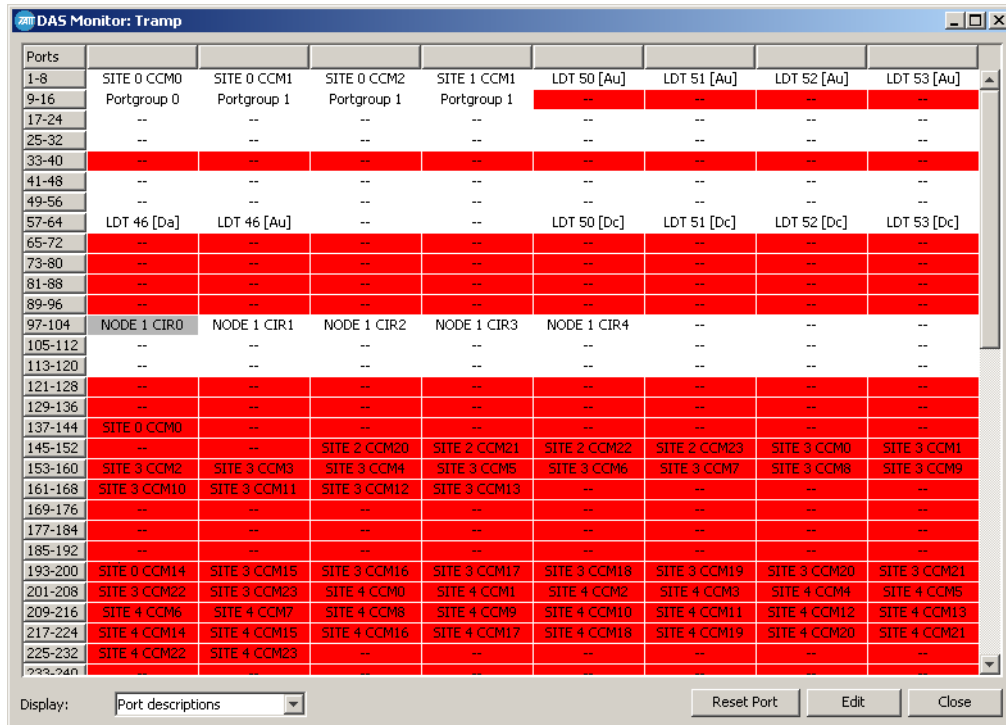
Displays the number of communication errors detected on this link. This counter can be reset from the Node Status window Database tab by clicking the Reset Counters button.

2 DAS Monitor

The NMT lets you monitor the ports at a DAS. When new port cards are installed, you need to tell the node about them, so that it can use them when setting up calls.

2.1 Monitoring the DAS

Select *Node* > DAS Monitor to see the type of ports in the DAS or to monitor their use. The DAS Monitor window appears.



This window contains user-entered information about the type of each port and what it is connected to. The window also displays real-time information about the state of the port, provided by the DAS controller. Greyed-out ports have been disabled from an NMT; red indicates a faulty port or failed line test result.¹

The window has a cell for each of the 512 possible DAS ports.

Display

Select the DAS monitor display type you would like to see. There are four different options:

1. Port Descriptions displays specific information about what the DAS port is connected to.

1. If there is no connection to the DAS bin, or if the DAS controller (ECC) has failed, no ports will be displayed in this window (ie. the body of the window will be white). However, it is still possible to configure a port (refer "Entering the Type and Connection of a Port" on page 231) by double clicking in the location where the port cell would be.

2. Port States displays the current state of the port. This information is displayed in two parts, consisting of port type and port state, for example [Bs - Co]. The following tables list the port types and port states:

Port Type	Description
Bs	Base station
Ph	Phone
Lc	Line controlled repeater
Er	Error
Au	Audio (speech) calls only
Da	Data (NPD) calls only
Dc	Dispatcher DCP connection
*	This is a backup port, and will only be used if the primary port has failed

Port State	Description
Er	Error
Lk	Link error
Id	Idle
Wc	Waiting for line or blocked
Di	Dialling
Wo	Ringing
Co	Connected
Bu	Busy
Nu	Invalid number
Sv	Out of service
DI	Dialled digits received

- Line Test Results displays the most recent results from line testing. The value displayed is in units of -dBm with the threshold in parentheses.
- Line Noise Results displays the most recent results from noise testing. The value displayed is in units of -dBm with the threshold in parentheses.

Line Test and Line Noise Results

Displayed Line Test Results and Line Noise Results are relevant only for 'Intersite' ports with Line Testing Enabled. With all other ports, displayed numbers are meaningless and should be ignored. See Step 3 'Intersite', on page 232 for details.

2.2 Entering the Type and Connection of a Port²

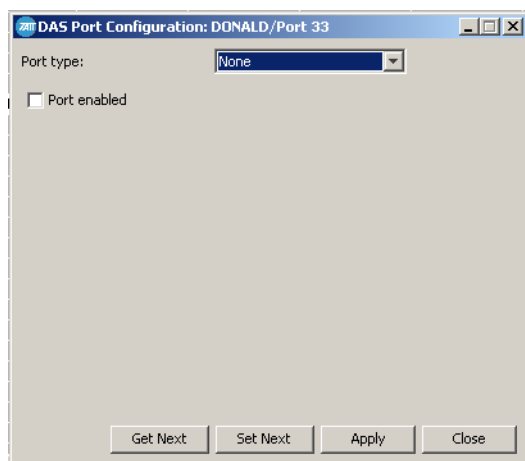
When DAS cards are installed, you need to tell the node what type each port is and what it is connected to. The node uses this information when setting up calls.



Important: If you enter incorrect information or provide it to the wrong port, the network will not be able to set up intersite calls properly.

To tell the node about a newly installed DAS port, follow these steps.

- In the DAS Monitor window, double-click on the cell for the port. The Port Configuration window appears.



The title bar of the window specifies the decimal address of the port. The bottom half of the window is initially empty. When you select a Port Type, it will contain the right box or boxes for that type.

- If Option 4 is selected as the High Availability type in the Node Configuration window (see page 235), the Primary Node DAS Monitor and the Backup Node DAS Monitor are selected separately. But individually numbered ports in each DAS have identical configuration, because same Port Configuration entry is used for each. This means that when you modify the type and connection for a port using either the Primary Node DAS Monitor or the Backup Node DAS Monitor, you automatically modify the type and connection for the same port in the other DAS as well.

2. In the Port Type box, select the correct type.

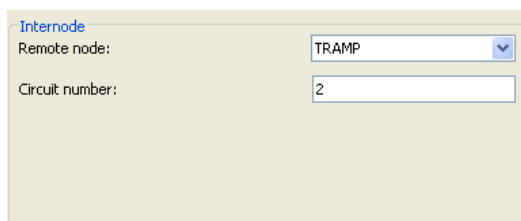
Select This Type	For This Card Type...	And Connection...
Intersite	T1561-02 or T1561-30 or T1561-35	Channel at a site
Phone Interface	T1561-03 or T1561-08 ¹	PSTN or PABX
Internode	T1561-02 or T1561-30 or T1561-35	T1561-02 at another node's DAS
Dispatcher Interface	T1561-02 or T1561-35	Line Dispatcher Terminal
Line Interface	T1561-08 ²	e.g. Conventional Dispatcher, Dispatcher Console etc.

- 1. For a phone interface, a T1561-08 must have Q1561AP4 software installed.
- 2. For a line interface, a T1561-08 must have Q1561MUT software installed.

3. If you selected the type 'Intersite', the Intersite area is displayed. Select the site and enter the number of the CCM that the port is connected to, together with the required dbm levels for Line Test Threshold and Line Test Noise Threshold. You should also select from the drop-down list whether the port is to be used for audio, data or both, and whether the port is for a primary or backup DAS.

4. If you selected the type 'Phone Interface', select the number of the port group that you want the port to belong to. The port group must suit the port's actual connection. For an overview, see "Stage 2: Assign Each Phone Port to a Port Group" on page 55.

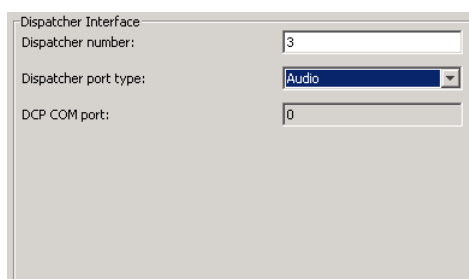
5. If you selected the type 'Internode', select the number of the node and enter the number of the circuit used to connect this port to a port in that node's DAS. You can enter any number between 1 and 100 that is unique to the node pair. The port at the other node must be given the same circuit number.



Circuit Numbers

When you physically connect up audio between the DASs of different nodes, give each audio circuit a unique number. Enter the circuit number into the Port Configuration windows of each port using the circuit.

6. If you selected the type 'Dispatcher Interface', enter the number for the dispatcher in the Dispatcher Number box. This number refers to the entry in the Dispatcher Configuration window for this dispatcher. Each dispatcher at a node must have a unique number assigned to it. The node uses this number when setting up calls.



7. Select the correct port type from the following:

- Audio - for a T1561-02 card
- Data - for a T1561-35 card

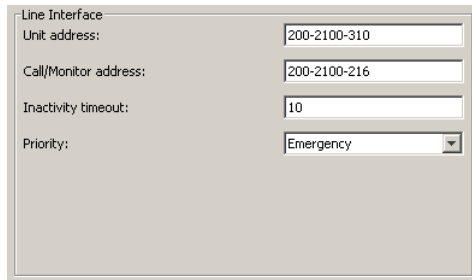
Configure this port for generic non-prescribed data. All NPD calls to this dispatcher address will be connected to this port. It is the responsibility of the dispatcher application to decode this data.

- DCP - for a T1561-35 card

Configure this port for DAS Card Protocol. All NPD calls to this dispatcher address will be connected to this port. The node will decode the received data.

If this option is selected you must enter a DCP COM port. This is the serial device that the port on the T1561-35 Asynchronous Interface card is connected to.

8. If you selected the type 'Line Interface', the following will appear:



Line Interface	
Unit address:	200-2100-310
Call/Monitor address:	200-2100-216
Inactivity timeout:	10
Priority:	Emergency

The line interface is associated with a unit address and can make calls from that address. The line interface is associated with a call/monitor address and all calls from the line connector are connected to that address. If the call monitor address is a group address, any calls made to that group can be monitored via the connected speaker. If a call from the line interface is inactive for more than the specified number of seconds, the call is automatically cleared. The priority that is assigned to any incoming call from the line interface is set using the Priority drop down menu. This can be set to Normal, High or Emergency.

9. At the top of the window, ensure that the Port Enabled check box is selected.
10. Press the Apply button to save your changes and the Close button to close the window.

2.3 Resetting a Port

If you have identified a particular port as the cause of call problems, resetting it may solve them.

1. In the DAS Monitor window, click on the cell for that port.
2. Press the Reset Port button.

Disabling a Faulty Port³

If resetting a port does not solve the problem, you can quickly disable a port until a technician is able to replace the DAS card.

1. In the DAS Monitor window, double-click on the cell for that port.
2. Clear the Port Enabled check box.
3. Press the Apply button, then the Close button.

3. If a High Availability node has a separate DAS for each node (for example, in High Availability type Option 4), be aware that this will disable the selected port on both DAS. When High Availability nodes have separate DAS bins, there is no way to disable a single DAS port from the NMT.

3 Node Configuration

Select *Node* > Configuration to display the Node Configuration window.

Node Configuration: TRAMP

Features

- Amalgamate group calls at node
- Dispatcher can force clear group calls
- Bar units failing ESN check
- Send all registration/diversion/RCSGA updates to NMT
- Forward not home calls to default location
- Default location node number:
- Default location site number:
- ESN check not-home radios

Alarm Settings

Node diagnostics and fault logging:

- Alarm for good ESN check
- Alarm for bad ESN check
- Failed DAS ports limit:
- Failed sites limit:

High Availability Node Monitoring

High Availability type:

DAS Configuration

- Has backup ECC in DAS bin
- Primary ECC COM port:
- Backup ECC COM port:

Apply Close

Features Area

Amalgamate group calls at node

If this feature is enabled, the node will allow multiple contemporaneous calls to the same group by amalgamating subsequent calls into the initiating call.



Note: If this feature is enabled, the way that call queuing operates may be affected. See “Configuring Queuing” on page 250.

Dispatcher Can Force Clear Group Calls

Enable this feature to allow dispatcher operators to forcibly clear down a group call.

Bar Units Failing ESN Check

If this feature is enabled, the node will automatically bar radios that fail an ESN check. For this feature to work, radios must be configured so that the network can authenticate them by checking their ESN.



Important: The node bars by radio number, not by ESN. If an unauthorised radio fails an ESN check, any authorised radios using the same radio number will also be barred.

If this feature is disabled, you will need to manually bar unauthorised radios. For more information, see “Barring a Radio” on page 162.

Send all Registration/Diversions/RCGA Updates to NMT

If this feature is enabled, the node will notify the NMT of all registrations, diversions and RCGA updates as they happen.

Enabling this feature at all nodes is essential when an SQL database is attached to the Server NMT. (See “Configuration” on page 305.)

If this feature is not enabled, the NMT will only receive this data for specified units and only if particular windows are open. For example, if the Edit Unit window is open, the node will send all registration and diversion data for the unit being edited.

Forward Not Home Calls to Default Location

If this feature is enabled, calls to a unit which is ‘not home’, are forwarded to a default location. The default location is specified by a node and site number and is set as follows:

Default Location Node Number

Enter the node number of the default location.

Default Location Site Number

Enter the site number of the default location.

ESN Check Not Home Radios

Use this check box if you want radios that are ‘not home’ to have an ESN check made on them.

Alarm Settings Area

Node Diagnostics and Fault Logging

If you are experiencing problems with the network, Tait engineers may request that you turn on node debugging. Follow these steps:

1. From the Node Configuration window, select the requested option for Node Diagnostics and Fault Logging (Disable, Error only, Normal, Extended, or Extended+I/O).
2. Press the Apply button to confirm your changes.
3. Press the Close button to close the Node Configuration window.

Alarm for Good ESN Check

An alarm will be generated when the node receives an ESN report that matches the ESN number stored in the node’s database.

Alarm for Bad ESN Check

An alarm will be generated when the node receives an ESN report that does not match the ESN number stored in the node’s database.

Failed DAS Ports Limit

If the number of failed DAS ports on this node exceeds the figure entered in this box, the node will consider itself to be in the 'failed' state.

Failed Sites Limit

If the number of failed sites on this node exceeds the figure entered in this box, the node will consider itself to be in the 'failed' state.



Note: The Failed DAS Ports Limit and Failed Sites Limit parameters are not used when High Availability type Option 2 or Option 3 is selected.

High Availability Node Monitoring Area

High Availability Type

Select the High Availability type installed at this node (or None if High Availability is not installed). Refer to the *T1541 Installation Manual*, Section 1.2, for information on High Availability types.



Note: If Option 4 is selected, the node `.cfg` configuration parameter `HA.SeparateDasBins` (see *T1541 Installation Manual*) **must** also be enabled. It is accessed by typing `config` at the node controller prompt in v4.08.00 or later. This parameter is not available in earlier versions of the node controller software so Option 4 **must not** be selected unless the node controller software is v4.08.00 or later.

DAS Configuration Area

Connection Type

This controls the way the node communicates with the serial port server. Options are either 'serial port' (default) or 'socket'. The socket setting is appropriate only if you are using a Digi TS series serial port server and are using Node Controller software Q1541NC v4.09.00 or later.



Note: Older models of serial port server, for example the Digi EL series, and older Node Controller software, support only the serial port setting. Using the socket setting with these older serial port servers will cause undesirable behaviour.

Has Backup ECC in DAS Bin

Select this check box if you have both a primary ECC and a backup ECC in the DAS bin. This will enable the Backup ECC field.

DAS / Primary ECC

If 'serial port' is selected for the Connection type, enter the COM port address for the DAS or primary ECC. If 'socket' is selected for the Connection Type, enter the IP address of the Digi TS serial port server in dotted quad format, followed by a colon (:) and the socket port number, as shown in the diagram below. Alternatively, if

'socket' is selected, your serial port server has a name, and the NMT can access the Domain name server, you may enter the device name, followed by a colon (:) and the socket port number. The socket port number is the port number on the device + 2100. If the colon and port are omitted, :2101 is added automatically when you Apply the change. This port number is appropriate only if you are using the first port on the TS device.

Backup ECC (if required)

If 'serial port' is selected for the Connection type, enter the COM port address for the backup ECC. If 'socket' is selected for the Connection Type, enter the IP address of the Digi TS serial port server in dotted quad format, followed by a colon (:) and the socket port number. Alternatively, if 'socket' is selected, your serial port server has a name, and the NMT can access the Domain name server, you may enter the device name, followed by a colon (:) and the socket port number. The socket port number is the port number on the device + 2100. If the colon and port are omitted, :2101 is added automatically when you Apply the change. This port number is appropriate only if you are using the first port on the TS device.

Dual DAS (High Availability type: Option 4)

If High Availability type: Option 4 is selected, a second set of DAS configuration fields is enabled. These are for the DAS at the backup (b) node. If 'serial port' is selected for the Connection type, Tait strongly recommends that the same DAS COM port numbers are used for both nodes (and, if there are two ECC cards in each DAS, the same Backup ECC COM port numbers). However, if 'socket' is selected for the Connection Type, the two Digi TS serial port servers will have different IP addresses. Again, Tait strongly recommends that the same IP port numbers are used for equivalent connections in both nodes.



Note: If the data in the DAS a and DAS b configuration fields is not the same, the two nodes will have different information and the node database checksums (see "Database Checksum" on page 220) will not match. This means it is not possible to check for successful node alignment by comparing node database checksums (refer to Section 12 of the T1541 Installation Manual).

4 Control Blocks

A control block determines how a site operates. For example, it defines the way calls are queued and prioritised, and specifies time limits for calls of different types. For each node, you define a set of control blocks, for example, one for busy periods, another for normal business activity, yet another for the evening. A node can have up to 16 control blocks. For each site, you create a control parameter schedule by assigning a control block to each time-slot in the week. At any particular time in the week, a site belonging to this node will operate according to the control block specified by the site's control schedule for that time-slot.

4.1 Viewing a Control Block

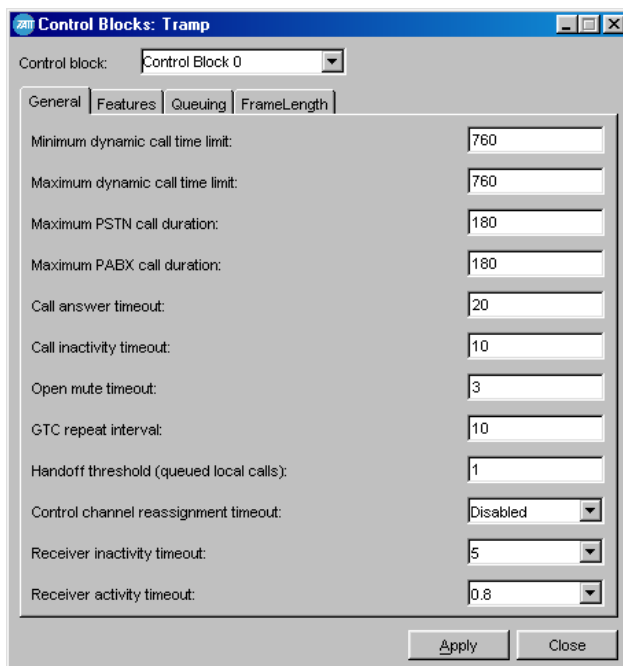
To see the different settings in a particular control block, follow these steps:

1. Select *Node* > Control Blocks. The Control Blocks window appears.
2. Select the control block from the drop-down list.

The window displays the name and the parameter values for that control block.

Viewing a Site's Current Configuration

To see how a site is currently configured, select Site > Control Schedule to find out which control block is in effect, then view that site's control block.



3. Click on each of the four tabs in turn to view the different groups of settings.

4.2 Editing a Control Block

1. Select *Node* > Control Blocks. The Control Blocks window appears.
2. Select from the Control Block drop-down list the number of a control block.
3. Configure the site control parameters in each of the four tabs as desired (see below). After configuring a tab, press Apply before moving to the next tab, to ensure that you do not lose your changes.
4. Press Close to close the window.



Note: When editing control blocks, please allow two minutes for the changes to be received and updated by the site.



Tip

Use Control Block 0 as your default control block. This makes creating a Site Control Schedule easier, because this control block is assigned to site Control Schedules by default. Only change the settings in Control Block 0 if you are sure they are more suited to the usual operation of your network.

4.3 Call Time Limit

Minimum Dynamic Call Time Limit

This parameter in the General tab defines the minimum allowable dynamic call time limit, that is, the lower limit of the dynamic range. This lower limit is applied to calls when three or more calls are queued at the site, waiting for a free traffic channel⁴. Tait recommends a value of about half the maximum dynamic duration. To have a fixed call time limit (that is, to disable the dynamic call time limit feature, set the minimum dynamic call time limit to the same value as the maximum dynamic call time limit.

Maximum Dynamic Call Time Limit

This parameter defines the maximum allowable dynamic call time limit, that is, the upper limit of the dynamic range. This upper limit is applied to calls when two or fewer calls are queued at the site, waiting for a free traffic channel⁵.

Maximum PSTN Call Duration

Defines the call time limit for radio-to-PSTN calls.

Maximum PABX Call Duration

Defines the call time limit for radio-to-PABX calls.

Dynamic Call Time Limit (Pre Site 7 Only)

The call time limit varies depending on the size of the call queue. If there is no queue, the call time limit is the Maximum Dynamic Call Time Limit. If the site call queue is full (one queued call for each traffic channel), the call time limit is the Minimum Dynamic Call Time Limit. In between, the call time limit varies between the upper and lower limits and is linearly scaled by the ratio of currently queued calls to maximum queued calls, as shown in Figure 4.

-
4. In Pre Site 7 networks, this lower limit is applied to calls when the site call queue has reached the maximum queue depth of one queued call per traffic channel.
 5. In Pre Site 7 networks, this upper limit is applied to calls when the site call queue is empty.

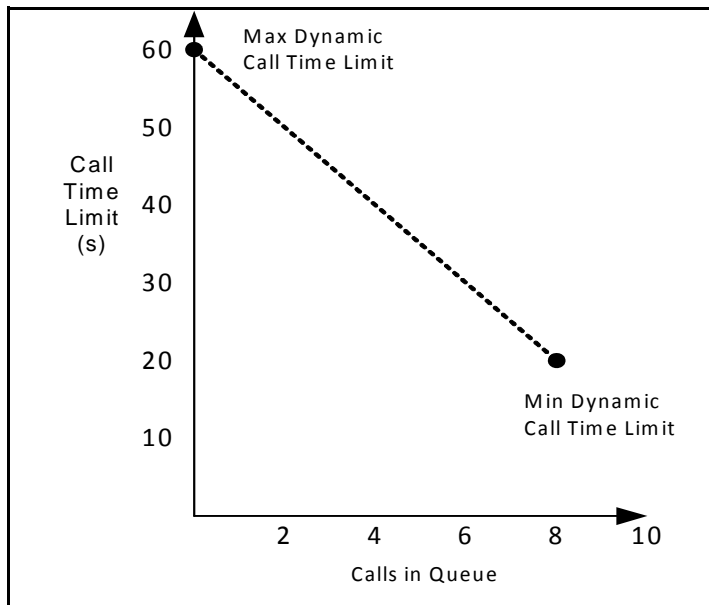


Figure 4: Default Dynamic Call Time Limit for an 8-Channel Site

Indefinite Call Time Limit

If you want radio-to-radio or radio-to-group calls to have no time limit, enter 0 into the dynamic call time limit boxes. If you want radio-to-radio or radio-to-group calls to use the radio's TSCLIM call time limit then enter 1 into the dynamic call time limit boxes.

Call Time Limit for Emergency Calls

The call time limit for emergency calls is not configurable through the node or NMT.

Pre Site 7

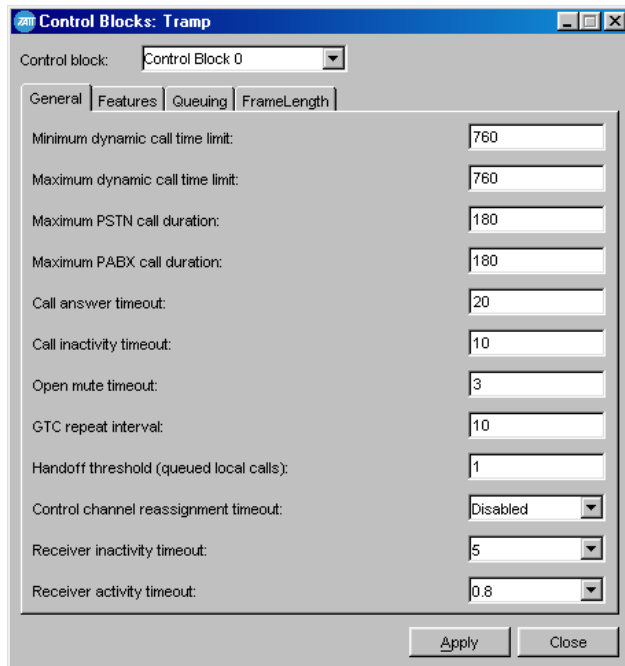
It is regulated by the CLIME configuration parameter in the traffic channel's CMM.

Site 7

It is regulated by the CLIME configuration parameter in the site's SMM.

4.4 Other Timers and General Settings

The General tab in the Control Blocks window also lets you specify timer values and configure other parameters. All timer values are in seconds, unless stated otherwise.



Call Answer Timeout

Defines how long the network waits for an answer to the call. After setting up the call, it starts the timer and waits for a radio to transmit on a traffic channel. If a radio doesn't transmit, the timer expires and the network clears the call down.

Call Inactivity Timeout

Defines how long the network waits for signs of activity on the channel. Once a call is in progress, the site starts the timer each time the carrier signal on the traffic channel ceases. If a radio doesn't transmit, the timer expires and the network clears the call down.

Open Mute Timeout

If a channel's receiver has its mute circuits open (for example because it is receiving noise) even though the call has ended or the call time limit has been reached, the site waits for the number of seconds defined by this parameter before it clears the channel down. If this timeout occurs, a Receiver Failure alarm is raised, but the channel remains in service.

If this parameter is set to 0, the channel will not be cleared down because of an open receiver mute.

GTC Repeat Interval

Applies to group calls. Defines the interval between GTC (Go to Channel) messages. The control channel can repeatedly send GTC messages during group calls to enable radios to join the call if they were busy when the group call was set up. It will only do this if the group number is configured to enable late entry to the call. See “Enable Repeat Go-To-Channel Messaging (late entry group call)” on page 165 for more information.

Very low values make it impossible for radios to leave a group call and call anyone else.

Handoff Threshold (queued local calls)

Defines how many calls must be queued before the site uses free intersite channels for local calls. The default is 0, which means that a call is never queued if there is a channel available to take the call.



Note: A local call is never assigned to an intersite channel if there is a local channel available for the call.

Control Channel Reassignment Timeout

Select a value from the drop down options. This specifies the time, in minutes, that a current control channel remains as the control channel before the site attempts to hand control channel responsibility to another channel. Control channel reassignment should be used only when there is a compelling (i.e. regulatory) reason to move the control channel at intervals.

It is possible to inhibit specific channels so they can never be the control channel. It is also possible (and recommended if control channel reassignment is used) to enable ‘Inhibit if jammed’ on channels to prevent selection when they are in a “jammed” state (see “Setting Up Channels” on page 292).

If ‘Disabled’ is selected (the default), the lowest numbered, uninhibited channel becomes the control channel and remains the control channel unless it fails for some reason (at which time the site assigns the next lowest numbered, uninhibited channel to the role).

If a numerical value is selected, then, after this number of minutes has elapsed, the site attempts to move the control channel to the next lowest numbered, uninhibited, free traffic channel. If all uninhibited traffic channels are in use, the control channel will not move.

Immediately before the change occurs, the control channel issues a MOVE command to all radios listening on the control channel to shift them to the new control channel frequency.

Reassignment is circular, i.e. starting at the lowest numbered channel, moving through to the highest numbered channel, and then starting at the lowest numbered channel again. If dual control channels are enabled, the control channels still only change by one control channel each time, i.e. if CC1 = channel 0 and CC2 = channel 1, then after the reassignment, CC1 = channel 1 and CC2 = channel 2, etc.

Pre Site 7

Reassignment can occur only when the site is idle; that is, with no calls in progress and no calls queued. If the site is not idle, the current control channel checks, at one minute intervals, to see if the site is idle, and attempts the reassignment only when the idle condition is met.

Site 7

Reassignment can occur providing there is one uninhibited traffic channel available to become the new control channel. Radios in a call when the control channel moves will not know that it has moved. The radio that clears the call down will return to the previous control channel, find it is no longer there, and commence a hunt sequence to locate another control channel. Other radios in the call are cleared down by a CLEAR message sent on the traffic channel, and this message tells radios the new control channel frequency to return to.



Note: A side effect of reassignment with calls in progress is that if there is another call queued, waiting for the radio that clears down the call, then this queued call fails “Not

Home” because the called radio has lost the control channel. This is an unavoidable feature of reassignment under these circumstances.

Receiver Activity Timeout

Channel interference is detected by measuring activity on the receiver gate. Persistent activity for longer than a set timeout is considered to be interference and the channel is said to be ‘jammed’. This timeout is specified in seconds by selecting a value from the drop down options.

Activity of lesser duration is not considered interference. To ensure that ordinary noise and static are not confused with interference, set the timeout to a value greater than 1 second.

Jammed channels can be inhibited from the Channel Configuration window. See “Inhibit If Jammed” on page 293.

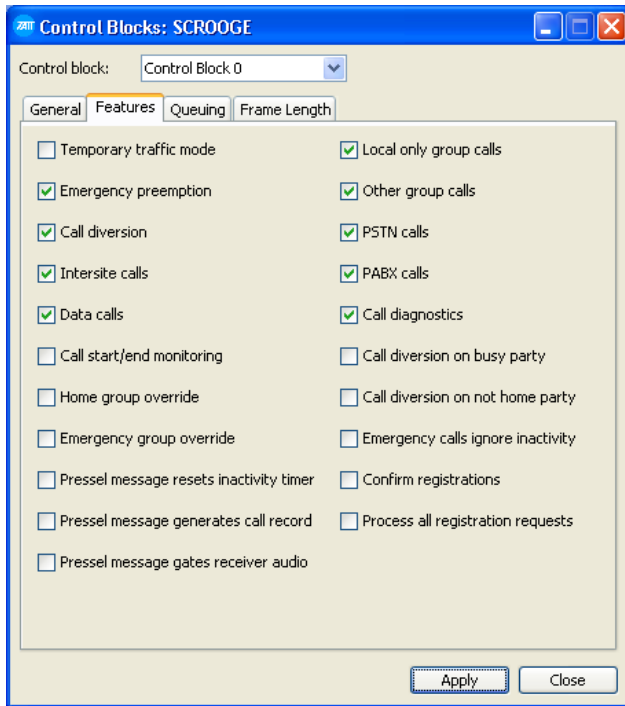
Jammed channels do not generate an alarm but they are displayed on the Site Status window. See “Channel Status” on page 276.

Receiver Inactivity Timeout

If a jammed channel remains interference free for longer than a set time, it is considered to be un-jammed. This timeout is specified in seconds by selecting a value from the drop down options.

4.5 Enabling Site Features

The Features tab in the Control Blocks window has a set of check boxes that let you enable or disable site features. Some features enable radio functions; whether a particular radio can use those functions depends also on that radio’s call rights (see “Call Rights” on page 128).



Temporary Traffic Mode



Important: If the site must be available at all times to handle emergency calls, do not enable temporary traffic mode on the site.

If temporary traffic mode is enabled, the control channel is able to become a traffic channel and handle a call itself. It resumes its former function as the control channel when the call finishes. Other radio units listening on the control channel lose service during this time.

If another channel becomes available before the call on the former control channel finishes, this former traffic channel becomes the control channel on a temporary basis until the 'usual' control channel becomes available.

Temporary traffic mode should be enabled only on sites with one, two or perhaps three channels.

Pre Site 7

Temporary traffic mode, if enabled, is not activated until the number of calls queued at the site reaches the value set by the 'Queue depth' parameter in the Site Configuration (see "General Site Options" on page 288).

When this limit is reached, the control channel selects a call from the call queue, and handles the call itself. Some call types are ineligible for selection. These are:

- all intersite calls
- non-prescribed data calls
- calls from radio units restricted to a channel partition

The 'Queue depth' parameter selection is important:

- 0 - do not select this value if temporary traffic mode is enabled in a pre Site 7 site. The resulting behaviour is undefined.
- 1 - no calls will be queued. When a call eligible for temporary traffic use is received and all traffic channels are in use, temporary traffic mode will be invoked.
- 2 - one call will be queued. If a second call is received, if either call is eligible for temporary traffic use, temporary traffic mode is invoked.
- 3 - two calls will be queued. Temporary traffic mode is invoked when the third call is received.

Site 7

Temporary traffic mode, if enabled, is activated if no traffic channels are available to take the call (no call queuing is involved). All call types are eligible to be handled on the control channel, providing it is able to handle that call type (e.g. if the control channel has no intersite link, it will not be assigned an intersite call).



Note: Temporary traffic mode can be very unfriendly to other radios using the site. The control channel has simply gone away. No communication with the site is now possible, even for emergency calls.



Note: A site with just a single channel needs to have temporary traffic mode enabled, as there is no dedicated traffic channel. A possible exception might be a data only system where all messages are transmitted on the control channel (i.e. as SDMs and Status messages).

Emergency Preemption

Emergency preemption enables sites to clear down any non-emergency call to make a channel available for an emergency call if there are no free channels available at the site.

If the called radio is in a call, unless that call is itself an emergency call, the call will be cleared down so that the called radio can receive the emergency call.



Note: For Emergency Preemption to work correctly, it is important that, if enabled, it is enabled at every node in the network.

Call Diversion

Enables radio users to divert calls for their radio to another address. Does not affect the ability of NMT operators to set up or change call diversions.

Intersite Calls

Allows calls to destinations beyond the local site. Applies to calls to other sites as well as calls from other sites to this one. Must be enabled to permit any call type that is set up by the node: call diversions, PSTN calls, and PABX calls.



Tip

An emergency call may be queued for a short period while an existing call is selected and cleared down. Therefore for call preemption to work correctly, queuing for emergency calls must be enabled. Refer to “Configuring Queuing” on page 250 and to “Queue for Busy Phone Ports” on page 263 to set this up correctly.

Data Calls

Allows users at the site to send data (Status, SSTs, MSTs and non-prescribed data) to users on other sites and nodes.

Call Start/End Monitoring

Call start/end monitoring enables the NMT to display **all** calls that use a traffic channel on the Channel Status window (see “Channel Status” on page 276). If this feature is not enabled, only calls on the first five channels (CMM 0 to CMM 4) are displayed.

When a new speech or NPD call starts, the call information appears against the allocated traffic channel in the window. This includes the call type (incoming, outgoing or local), along with the called and calling parties.

This feature is disabled by default, and will increase the system load marginally if enabled.

For the LDT ‘Talking Party ID’ feature to work, this parameter should be enabled.

Home Group Override

If this feature is enabled, any group call interrupts all calls currently in progress at a site (including emergency calls). It does this by transmitting a GTC (go to channel) command on all active channels, directing any radios on that channel to move to the channel where the group call is taking place.

Enabling this feature also inhibits the transmission of the clear-down command at the start of all group calls.

For this feature to be useful in a situation where more than one organisation is using the site, additional software needs to be installed in each radio, allowing the radio to filter out GTC commands for group calls that are not its ‘priority’ groups.

Emergency Group Override

If this feature is enabled, an emergency group call interrupts all calls currently in progress at a site *with the exception of emergency calls*. It does this by transmitting a GTC (go to channel) command on all active channels not involved in emergency calls, directing any radios on that channel to move to the channel where the emergency group call is taking place.

Enabling this feature also inhibits the transmission of the clear-down command at the start of an emergency group call (otherwise sent at the start of a call to clear down from the channel any radios not participating in the call).

Pressel Message Resets Activity Timer

A call will normally timeout and clear down if no activity is detected on the channel audio line for a specified period. The pressel message resets inactivity timer can be used if a channel is often subject to interference that would otherwise prevent a channel from timing out due to inactivity. With this feature enabled, PTT on/off messages and MAINT messages are used to detect activity.



Tip

This feature is available on Tait radios, but special radio firmware may be required.



Tip

This feature is available on Tait radios, but special radio firmware may be required.



Tip

Some Non-MPT compliant radios may not send periodic MAINT messages while transmitting, causing a call to timeout prematurely.

Pressel Message Generates Call Record

With this feature enabled the site will send a call record to the node when each 'over' occurs during a group call. These call records are in addition to the normal call record. This feature will permit call record logs to be examined to trace malicious callers participating in a group call. However, in a system that has a high percentage of group calls, this feature will generate a large number of additional call records, and this may overload a system that is already under heavy load.



Tip

If call records are not required for each 'over' and the LDT 'Talking Party ID' feature is sufficient for caller identification, consider enabling Call Start/End Monitoring instead. It uses less resources than the Pressel Message Generates Call Record feature and is therefore less likely to overload a network.

Pressel Message Gates Receiver Audio

With this feature enabled the base station talk-through path is controlled by PTT on/off messages from the radio. This means that the system audio path is muted between 'overs'. Enabling this feature prevents channel interference from being heard between 'overs'. This can be useful on channels with heavy interference.



Tip

The CMM or LTU hardware may need to be modified to use this feature.

Local Only Group Calls

Allows users at the site to make group calls to 'local only' groups at this site. See Note below.

Other Group Calls

Allows users to make all types of group call (including intersite group calls), except for 'local only' group calls.



Note: The distinction between intersite and local group call in the control blocks is by group call type, not by call area. In control blocks, a group is always an intersite group unless the group's service area Status field for the site is set to 'local only'. Refer to the table entry 'Local Only' on page 168.

PSTN Calls

Allows users at the site to make calls to telephone subscribers, provided their validations permit this.

PABX Calls

Allows users at the site to make calls to PABX telephones, provided their validations permit this.

Call Diagnostics

Turns on the collection of call records for failed calls and provides all call records with a call end reason that can be used in diagnosing call problems.

Call Diversion on Busy Party

If this feature is enabled, a call made to a radio that is currently involved in a call will be diverted to another unit, instead of being queued or failing with the reason 'engaged'. The diversion does not

have to be to another radio, it can be to any valid unit in the system, for example, a line dispatcher or a phone. See “Divert on Busy” on page 154 for where to enter the required diversion number.

Call Diversion on Not Home Party

If this feature is enabled, a call made to a radio that is currently switched off or cannot be found will be diverted to another unit, instead of being queued or failing. The diversion does not have to be to another radio, it can be to any valid unit in the system, for example, a line dispatcher or a phone.

The address that a unit is diverted to can be specified from the Edit Unit window. See “Divert on Not Home” on page 154 for details.

Emergency Calls Ignore Inactivity

If this feature is enabled, emergency calls will not timeout due to inactivity.

Confirm Registrations

If this feature is enabled, all registration requests will be sent to the node for confirmation before sending an acknowledgement to the radio.

Process All Registration Requests

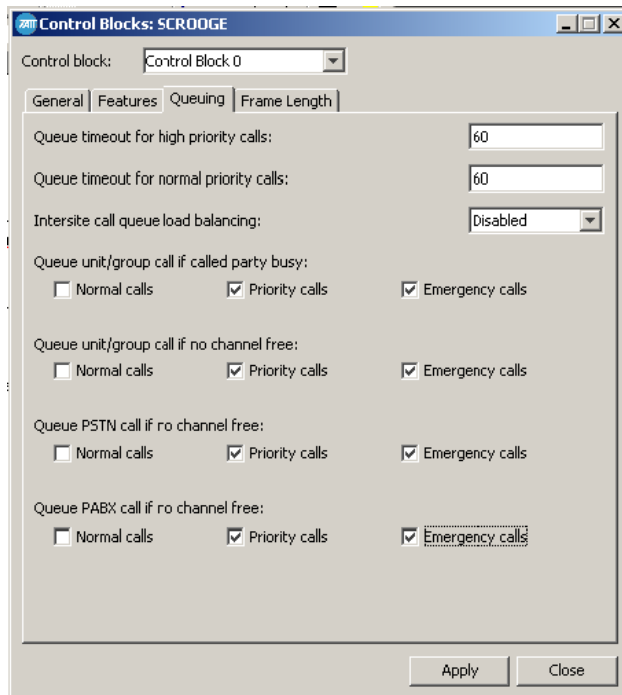
By default, a site does not process a registration request (RQR) from a radio if that radio is already registered on the site. If this feature is enabled, the site will always process a registration request (RQR), regardless of whether the radio is already registered. If radios on the site are continually re-registering, enabling this feature generates significant additional traffic load on the link between the site and the node.



Note: To process all registration requests requires both NMT and Node Controller software to be v4.09.00 or later, and Site Controller software Q1722SMX v7.43 or later. If the node or site software is older, the check box setting is ignored and the default setting is always used.

4.6 Configuring Queuing

The Queuing tab in the Control Blocks window lets you configure the queuing behaviour of the node and its sites.



Tait recommends queuing for channels, but not for busy radios or for calls to the PABX or PSTN. For general information about the way TaitNet networks handle queuing, refer to the Support manual.

Queue Timeout for High Priority Calls

Pre Site 7

Specifies a value in seconds that sites on this node will use when they are the B-site in an intersite call and the called radio is busy or there are no free B-site channels. This parameter determines whether an intersite priority call will be queued at the B-site.

The timeout does not apply to local calls, which have a fixed 60 second timeout when queuing is enabled.

Site 7

The timeout applies to **all** queuing in Site 7, not just B-site queuing.



Note: With intersite calls in site 7, queuing at the called and calling sites occurs independently. It is therefore possible for an intersite call to be queued for almost twice this length of time, as follows:

1. No intersite channel is available at the calling site, so the call is queued at the calling site.
2. One second before the queue timeout elapses, an intersite channel becomes available at the calling site.
3. No intersite channel is available at the called site, so the call is queued at the called site.

B-Party Queuing (Pre Site 7 only)

B-party queuing is queuing of intersite calls at the site of the called radio. It can occur when there are no free channels at the B-site or when the called radio is busy.

During intersite call setup, the A-site reserves one of its free intersite channels, then sends a message to the node to find the other radio.

If the B-site has no free channels, it applies the B-Party Queue Limit. If it estimates that it is likely to take fewer seconds than this parameter before a channel comes free, it queues the call and the A-site keeps its channel reserved until a B-site channel comes free.

Otherwise it tells the node to clear down the call.

If the called radio is already in a call, the B-site applies the B-Party Queue Limit, but in a different way. If the time remaining for the current call is less than the value of this parameter, the B-site queues the call.

4. One second before the queue timeout elapses, an intersite channel becomes available at the called site.
5. The call goes to channel.

Queue Timeout for Normal Priority Calls

Pre Site 7

Specifies a value in seconds that sites on this node will use when they are the B-site in an intersite call and the called radio is busy or there are no free B-site channels. This parameter determines whether an intersite *normal* call will be queued at the B-site.

The timeout does not apply to local calls, which have a fixed 60 second timeout when queuing is enabled.

Site 7

The timeout applies to **all** queuing in Site 7, not just B-site queuing.



Note: With intersite calls in site 7, queuing at the called and calling sites occurs independently. It is therefore possible for an intersite call to be queued for almost twice this length of time, as follows:

1. No intersite channel is available at the calling site, so the call is queued at the calling site.
2. One second before the queue timeout elapses, an intersite channel becomes available at the calling site.
3. No intersite channel is available at the called site, so the call is queued at the called site.
4. One second before the queue timeout elapses, an intersite channel becomes available at the called site.
5. The call goes to channel.

Intersite Call Queue Load Balancing

Pre Site 7

If this feature is enabled, new incoming intersite calls will be aborted when an incoming call has to be queued and the average intersite call queue time exceeds the queue timeout parameters.

If this feature is not enabled then incoming intersite calls will always be queued. The queued call will then terminate if it is queued for longer than the queue timeout parameter. The ability to disable this feature is only available with site firmware version 6.00. In previous versions it is always enabled.

To enable this feature, select Enable from the drop down menu.

Site 7

This feature is not supported in Site 7 at all. Behaviour is as though it is permanently disabled.

For the following fields, queuing is enabled when there is a tick in the relevant box. Clicking in a box will insert a tick if it is not present, or remove a tick if it is. Queuing can be enabled separately for normal priority, high priority and emergency calls.



Important: Emergency call queuing: In versions of node software prior to 4.03.02 and NMT software prior to version 4.03.01 call queuing for emergency calls is always enabled. In later version of software it is enabled by default, but can be disabled. However, sites using SMM software prior to version 7.20 ignore emergency call queuing parameter settings and allow emergency calls to be queued always.

Queue Unit/Group Call if Called Party Busy

This allows the following types of calls to be queued when the called party is busy:

- radio-to-radio calls
- radio-to-group calls
- radio to short form (pre-nominated) PSTN calls (e.g. **06)
- pre-Site 7 only: radio to short form (4 or 5 digit) PABX calls



Note: If “Amalgamate group calls at node” is enabled (*Node > Configuration > Features* tab), then, if a group call is in progress, incoming call requests to the group or to units currently involved in the group call are never queued at the B-site, but are automatically amalgamated into the existing call.

Queue Unit/Group Call if No Channel Free

This allows the following types of calls to be queued when no suitable channel is available at the site:

- radio-to-radio calls
- radio-to-group calls
- radio to short form (pre-nominated) PSTN calls (e.g. **06)
- pre-Site 7 only: radio to short form (4 or 5 digit) PABX calls

Queue PSTN Call if No Channel Free

This allows radio to PSTN calls to be queued when no suitable channel is available at the site.



Note: This does not apply to radio to short form (pre-nominated) PSTN calls (e.g. **06). These are treated as radio-to-radio calls.

Queue PABX Call if No Channel Free

This allows radio to PABX calls to be queued when no suitable channel is available at the site.



Note: Pre Site 7 only: This does not apply to radio to short form (4 or 5 digit) PABX calls These are treated as radio-to-radio calls.

All phone calls (PABX and PSTN)

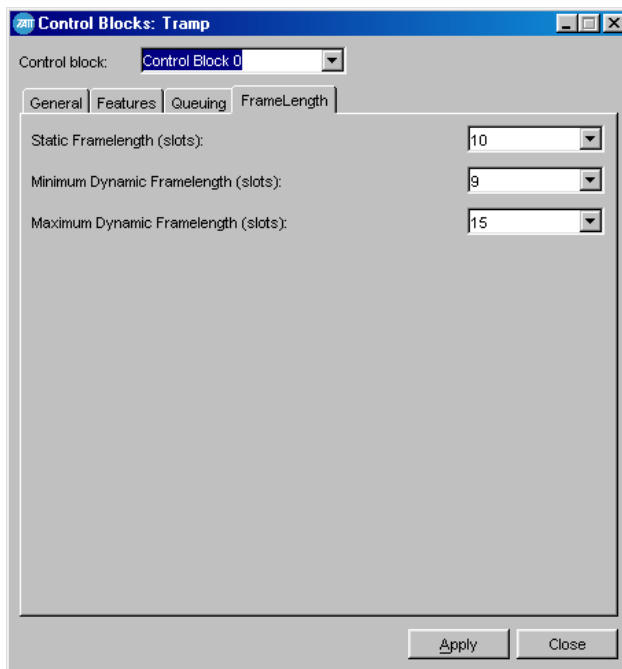
In the Node > Port Groups > General tab there is an option to enable ‘Queue for busy phone ports’. This parameter is set separately for each port group.

4.7 Setting the FrameLength

The FrameLength tab lets you specify whether the framelength is fixed or dynamic. If the framelength is fixed, you specify the number of frames. Most users will not need to alter the defaults in this tab.

Dynamic framelength can optimise the way the control channel processes radios' call requests. However, the efficiency gains are not large and sites will function adequately with a fixed framelength. It is probably better for newcomers to MPT trunking to leave the framelength fixed.

If you decide to use dynamic framelength, Tait recommends that you experiment with different values to find suitable ones for your network.



Dynamic Framelengths

To use dynamic framelengths, first select 'dynamic' from the Static Framelength drop-down menu, and then set the minimum and maximum dynamic framelengths to the values required.

Static Framelength

Specifies the length of the frame when dynamic framelength is disabled. The default is 10 slots. Tait recommends a value between 8 and 10. If the value is too high, call setup is too long. If the value is too low, the likelihood of clashes increase, which makes the setup time for some calls too long.

FrameLength

The control channel sends data in frames. The framelength is the number of slots in the frame.

Dynamic Framelength

If you enable dynamic framelength, the control channel CCM varies the length of the frames it transmits. When the site is busier, it lengthens the frames, making more time-slots available per frame. This reduces the chances of clashes (two radios responding in the same slot).

When the framelength needs to be increased, the CCM changes to the maximum framelength, then reduces the length step-by-step until it corresponds to the level of activity on the site. This enables the CCM to respond quickly to a sudden increase in traffic.

Minimum Dynamic Framelength

Specifies the shortest framelength when dynamic framelength is enabled. Tait suggests that you try 9.

Maximum Dynamic Framelength

Specifies the longest framelength when dynamic framelength is enabled. Tait suggest that you try 15. If the traffic on a site is heavy enough for it to set the framelength to the maximum value, the node generates an alarm. If you see this message, consider increasing the maximum framelength.

5 Outphone Table

Outphone tables specify how the node handles outgoing telephone (radio-to-telephone) calls. All radios are assigned an outphone table.

When a Radio...	The Outphone Table Tells the Node...
Makes a PSTN or PABX call	Which port group or which other node to route the call through
Dials a short form number	The full destination number
Dials an operator service	

Viewing a Radio's Routing Information

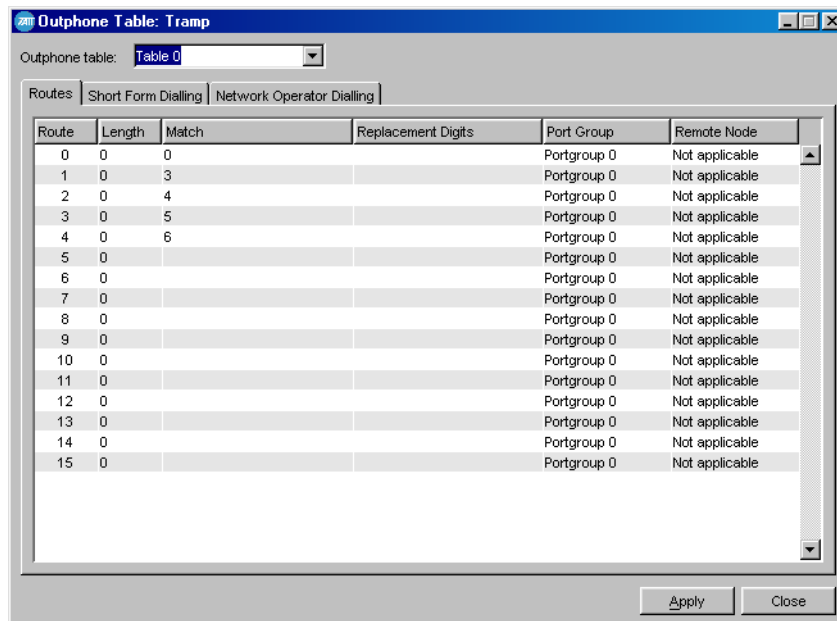
To see how a node will route outgoing telephone calls from a radio, open its Edit Unit window to find out which outphone table is assigned to the radio, then view that outphone table's routing information.

This section describes how to view the way calls are currently routed, then gives guidance on defining call routes for common scenarios. It also describes how to set up short form dialling and network operator dialling.

5.1 Viewing Routing Information

To see the routing information in an outphone table, follow these steps.

1. Select *Node > Outphone Table*. The Outphone Table window appears.
2. In the Outphone Table box, select the outphone table.



The window shows the Routes tab, which displays a table. Each row of the table defines a route.

Route

An identifying number for the route.

Length

The number of digits in the string received from the calling radio. Generally, this column is not changed from the default '0', which specifies any length.



Note: In the case of 4 digit PABX numbers, Length = 5 (not 4) because radios always prepend a '3' to all 4 digit PABX numbers.

Match

Can contain one or more digits. The node must match these digits with the incoming call string before applying the call routing defined by the row. Any matched digits are removed from the string. The node also tries to find the most exact match. For example, if Route 1 specifies 3 in the Match column, and Route 4 specifies 34, a call string beginning with 34 will be routed using Route 4. 0 matches any PSTN call.



Note: In the case of 4 digit PABX numbers, prepend a '3' to the Match because radios always prepend a '3' to all 4 digit PABX numbers (e.g. to match 7xxx, enter 37 in the Match column).

Replacement Digits

If necessary, this column specifies replacement digits. These digits are added to the *front* of the digit string after the 'match' digits have been removed. These digits can replace those removed, or they can add different ones. If the route specifies a Remote Node rather than a port group, the Replacement Digits column needs to replace any matched digits so that they can be matched at that node.



Note: Don't forget to replace the '3' when forwarding a 4 digit PABX number to another node.

Port Group

Use the drop down menu to specify which DAS port group is used to route the call to the PSTN or PABX. Select 'Remote Node' if the call is to be routed first to another node and then to a port group at that node, as defined in that node's outphone table.

Other other drop down menu choices are 'Not Available' and 'Full Duplex Loopback' (for more information on this, see "Full Duplex Operation" on page 311).

Remote Node

Only used if the Port Group column specifies 'Remote Node'. Use the drop down menu to specify the node that matching calls will be routed to.

Route

A route is an audio path from the trunked network to the PSTN or PABX. It is defined by a row in an outphone table. For dialled digits of a defined length and match, it specifies a port group or another node. If another node is specified, its outphone table has a row that specifies how the audio path continues.

Matching PSTN Calls

To make a PSTN call, radio users dial 0 followed by the PSTN number. Routes that have a 0 in the Match column apply to PSTN calls.

Matching PABX Calls

To make a short-form PABX call to their default PABX, radio users dial four digits. The radio prefaces the number with a 3. Routes that have a 3 in the Match column apply to these calls.

Alternatively, radio users can preface the four-digit PABX extension number with a number between 3 and 6. (This means that the node can support up to four different PABX destinations for any set of radios.) Routes with the corresponding digit in the Match column apply to these PABX calls.

5.2 Defining Call Routes

This section gives guidance on how to define call routes for some common scenarios.

- Use Route 0 for PSTN calls. Generally, you can leave Length and Match at 0. This matches all calls, but lets you define additional routes with a more precise matching (for PABX calls, for example). The node will always use the more precise match. The matched digit 0 will be removed from the front of the dialled string.
- If the radios that use this outphone table will access a PABX at the selected node, create a route to that PABX. Set Match to 3 (this will match PABX calls to the default PABX) and select the port group containing the ports connected to the PABX.
- Remember that you will need to define routes in outphone tables at any other nodes that the radios can operate from.

Defining a Call Route to a PABX at Another Node

If a fleet has its PABX at one node, but can roam to other nodes, those other nodes need call routes to the node with the PABX. This section gives guidance on how to define such routes.

- In the Port Group column, select 'Remote Node', then use the Remote Node column to select the node with the DAS that the calls will be routed through.
- Replace any matched digits, so that the remote node can also match them.

Routing PSTN Calls By Area Code

You can route PSTN calls to a node that lies within an area code. To do this, you create different routes within the outphone table, one for each area code. These routes:

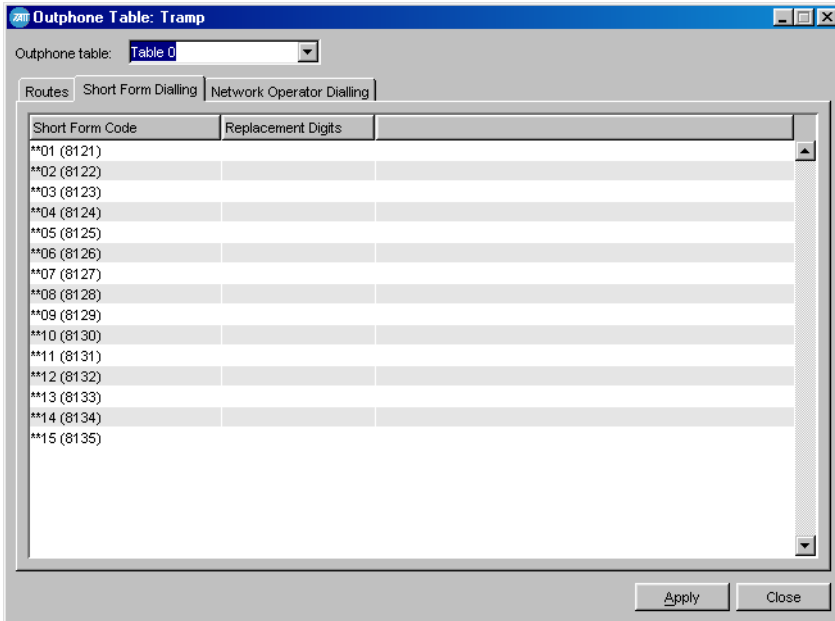
- Have the area code in the Match column.
- If the node lies within the PSTN area code, the Port Group column specifies the port group of the ports with lines to the PSTN. The 0 is not replaced.
- If the node is outside the area code, the Port Group column specifies 'Remote Node', and the Remote Node column specifies the node within the PSTN area code. The 0 is replaced, so that the remote node can match it.

5.3 Setting Up Short Form Dialling

Short form dialling allows radio users to access telephone numbers without having to enter the whole number. Instead, they dial two asterisks (**) followed by a two-digit code.

To set up short form dialling, follow these steps:

1. Select *Node* > Outphone Table, then the Short Form Dialling tab.



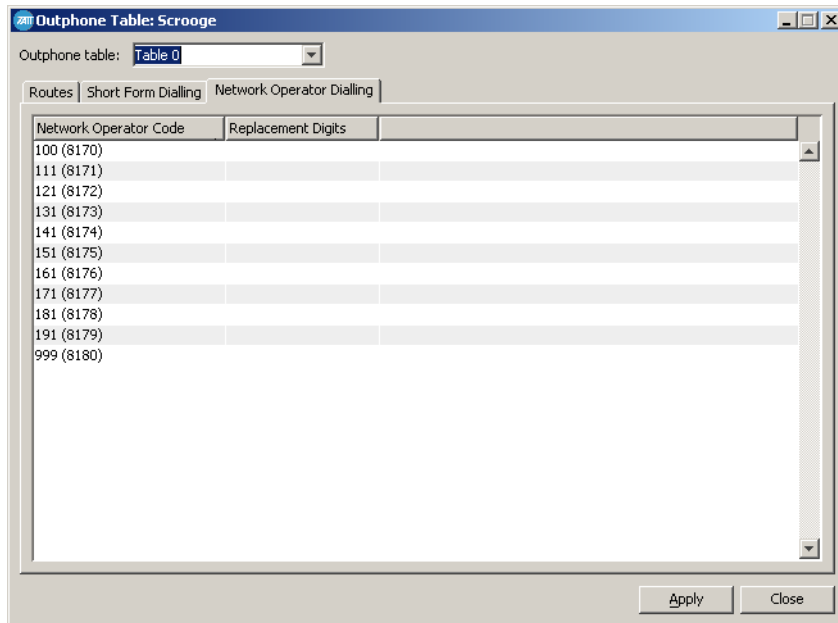
The window has a row for each of the 15 available short form dialling numbers. (The four-digit numbers in brackets are the equivalent special idents that the radio sends. These idents do not need a prefix to form an address.)

2. Select the Outphone Table number that is assigned to the radios you want to provide with short form dialling.
3. For each short form dialling code, enter a full PSTN or PABX number.
4. Press Apply.

5.4 Setting Up Network Operator Dialling

The MPT 1343 standard specifies a set of three-digit numbers that radio users can dial to access operator services such as faults, complaints, accounts, and sales. To enable this feature, you need to provide the full radio or telephone number for each service.

1. Select *Node* > Outphone Table, then the Network Operator Dialling tab.
2. Select the Outphone Table number that is assigned to the radios you want to provide with operator services.



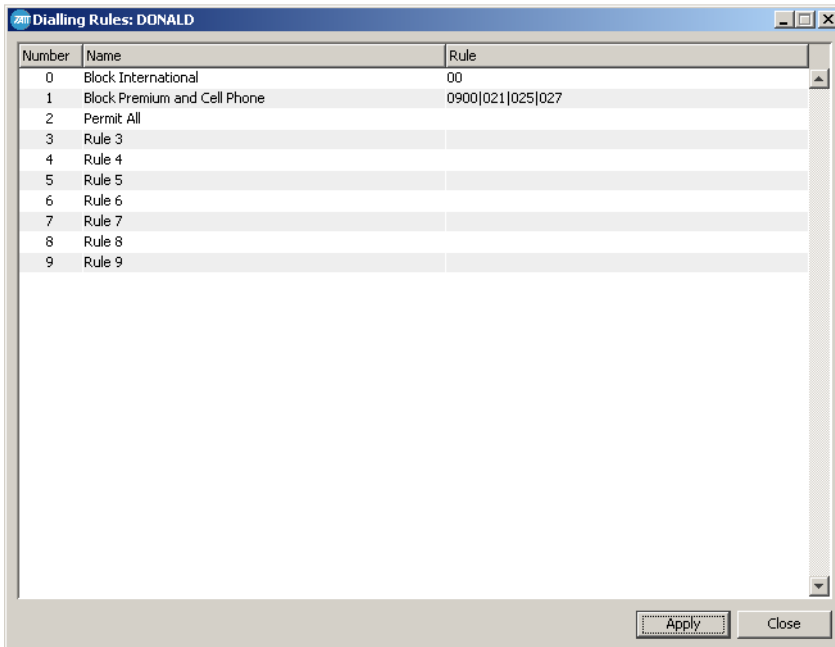
The window has a row for each available three-digit number. (The four-digit numbers in brackets are the equivalent special idents that the radio sends. These idents do not need a prefix to form an address.)

3. For each operator service you want to provide, enter the full radio or telephone number in the appropriate cell in the Replacement Digits column.
4. Press Apply.

6 Dialling Rules

The NMT lets you limit a radio's access to the PSTN. You can, for example, prevent a radio from making toll calls.

Select *Node* > Dialling Rules to view or change a node's options for barring calls to PSTN numbers. The Dialling Rules window appears.



The window contains a table with a Number, Name and Rule column for entering the patterns that the node can use to check whether a PSTN number that a radio has dialled is allowed.

To define a dialling rule, follow these steps.

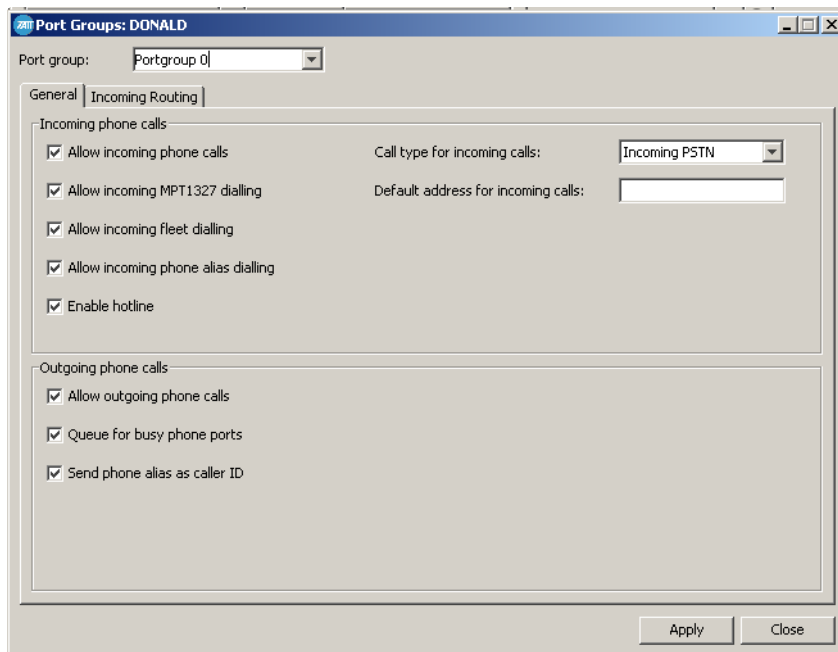
1. In the Name column, enter a suitable name for the option.
2. In the Rule column, enter the numbers that you wish to bar. For example, if you enter 00, all numbers beginning with 00 are barred. You can enter more than one set of numbers in each rule, just separate them by the | character. For example, the rule 021|025 bars all numbers that start with 021 or 025.
3. Press Apply.



Note: These dialling rules apply to all outgoing phone calls at the node, they cannot be applied to just one fleet or port group.

7 Port Groups

Select *Node* > Port Groups to configure one or more port groups. The Port Groups window appears.



The window has two tabs. The General tab sets general options. The Incoming Routing tab lets you specify up to 64 rules that describe how the numbers dialled by telephone subscribers are translated into radio or group addresses.

Port Group

Use the Port Group box to select one of the available port group numbers for defining or editing.

Port Group

A port group is a set of DAS ports that are connected to the same PSTN or PABX. When the node connects a radio-to-telephone call, it must use a phone port that belongs to the port group specified for the calling radio.

When you use the DAS Monitor window to tell the node about the phone ports in its DAS, you assign them to a port group.

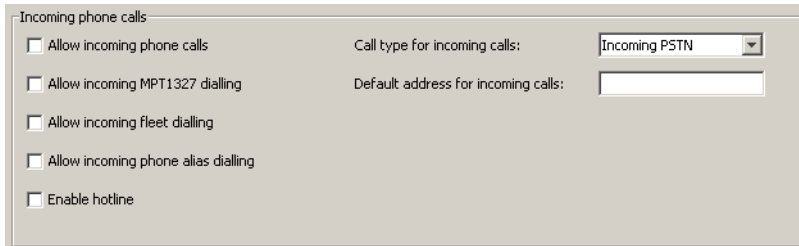
The outphone table assigned to the radio in the Edit Unit window specifies which port group is to be used for the requested call type.

7.1 Setting General Options

The General tab lets you specify the capabilities of the port group and configure the use of phone aliases.

Incoming Phone Calls

The Incoming Phone Calls area lets you turn various functions on or off.



The screenshot shows a configuration window titled "Incoming phone calls". It contains several options:

- Allow incoming phone calls
- Allow incoming MPT1327 dialling
- Allow incoming fleet dialling
- Allow incoming phone alias dialling
- Enable hotline

On the right side, there are two fields:

- Call type for incoming calls: A dropdown menu currently showing "Incoming PSTN".
- Default address for incoming calls: An empty text input box.

Incoming Phone Calls

Specifies whether the ports in the group will handle calls coming into the DAS from the PSTN or PABX.

Allow Incoming MPT 1327 Dialling

Specifies whether telephone subscribers can over dial with MPT 1327 numbers to call radios or groups.

Allow Incoming Fleet Dialling

Specifies whether telephone subscribers can over dial in the chosen numbering scheme to call radios or groups. See "Fleet Addressing Mode" on page 118 for details on changing the numbering scheme.

Allow Incoming Phone Alias Dialling

Specifies whether the port group can treat the dialled number as an alias. When a telephone calls the number specified in the Phone Alias area of a radio's Edit Unit window, the trunked network connects the call to that radio.

Call Type for Incoming Calls

Tells the node whether the ports are connected to the PSTN or to a PABX. To change the setting, click on the arrow to the right of the box and select the other option.

Default Address for Incoming Calls

If you enter the MPT number of a radio or group into this box, incoming calls to the port group will be connected to that number, if no other number is over dialled or if an invalid number is over dialled.

Enable Hotline

If this feature is enabled, all calls from telephone subscribers are connected to the default address irrespective of which number was dialled.

Phone Alias

A phone alias is a telephone number that can be used as the alias of a radio or group number. If a telephone dials a phone alias, the node can convert it into the corresponding radio number. It can also convert the number of a calling radio into the phone alias, which the telephone of the called party can display as the caller ID.



Note: The DAS port must be configured to have a maximum dial string length of zero.

Outgoing Phone Calls

The Outgoing Phone Calls area lets you turn various functions on or off.

Outgoing phone calls

- Allow outgoing phone calls
- Queue for busy phone ports
- Send phone alias as caller ID

Allow Outgoing Phone Calls

Specifies whether the ports in the group will handle calls going out from the DAS to the PSTN or PABX.

Queue for Busy Phone Ports

Specifies whether the node will queue calls when all the ports in the group are busy.

Send Phone Alias as Caller ID

Enables the ports in the group to provide the PSTN or PABX with a caller ID that is the number in the Phone Alias area of the calling radio's Edit Unit window.



Tip

If you require emergency radio-to-phone calls to preempt phone ports in use by other radio to phone calls, Queue for Busy Phone Ports must be enabled. Refer to "Emergency Preemption" on page 246.

7.2 Setting Up Incoming Routing

The Incoming Routing tab lets you specify up to 64 rules that describe how the numbers dialled by telephone subscribers are translated into radio or group addresses.

Port Groups: Node-2

Port group: Portgroup 0

General Incoming Routing

	Length	Match	Replacement
0	3	1	1000
1	0		
2	0		
3	0		
4	0		
5	0		
6	0		
7	0		
8	0		
9	0		
10	0		
11	0		
12	0		
13	0		
14	0		
15	0		
16	0		
17	0		
18	0		
19	0		
∞	∞		

Apply Close

Each line in the table represents one rule. Each rule is defined by the following three fields:

Length

The rule only applies when the number of dialled digits is equal to the value specified in this field.

Match

The rule only applies when the first n dialled digits match those in this field.

Replacement

If the rule is deemed to apply, then the matching digits are replaced by the digits in this field.

If more than one rule is defined in the table, then each rule is tried in turn until a successful match is found.

For example, consider a rule defined by length = 3, match = 1 and replacement = 120000.

A telephone subscriber dials 143. This has the correct length and starts with 1. The matching digit is replaced with 120000 giving a translated number of 12000043.

Another subscriber dials 243. This has the correct length but does not start with the matching digits. The rule does not apply and the number is untranslated by this rule.

How Incoming Dialling Works

The following procedure describes how a call is routed when an incoming number is received:

1. If the hotline is enabled, the call is routed to the default address.
2. The number is checked against each of the rules defined in the incoming routing table until a successful match is found. The rules are checked in the order in which they appear in the table. If a match is found the number is translated. If no match is found the number is unchanged. The process now proceeds to the next step.
3. If fleet dialling is enabled and the number represents a valid address in the current numbering scheme, the call is routed to the address.
4. Otherwise, if MPT 1327 dialling is enabled and the number is a valid address of the form pppiiii (ppp is the prefix, iiii is the ident) the call is routed to the MPT 1327 address.
5. Otherwise the call is routed to the default address.

8 Internode Link Configuration

When setting up an internode call, a node needs to know the internode routes it can use to pass audio between the nodes of the called and the calling parties.

You can view the internode routes that were defined when the network was initially set up. You can also make changes if needed, for example, when the addition of a node means that you need to define new routes, or an increase in the number of audio lines between two nodes makes a different route more desirable.

Figure 5 shows the available internode audio routes for an example network. In this network, Node 0 needs to know the audio routes to the other nodes. There are direct audio routes to each of the other nodes, except Node 1. These direct routes should be specified as the primary route. In addition, one or more alternative routes should be specified, so that audio can be routed if the direct audio route is blocked. For example, an alternative route from Node 0 to Node 2 would be to go to Node 5 and then to Node 2.

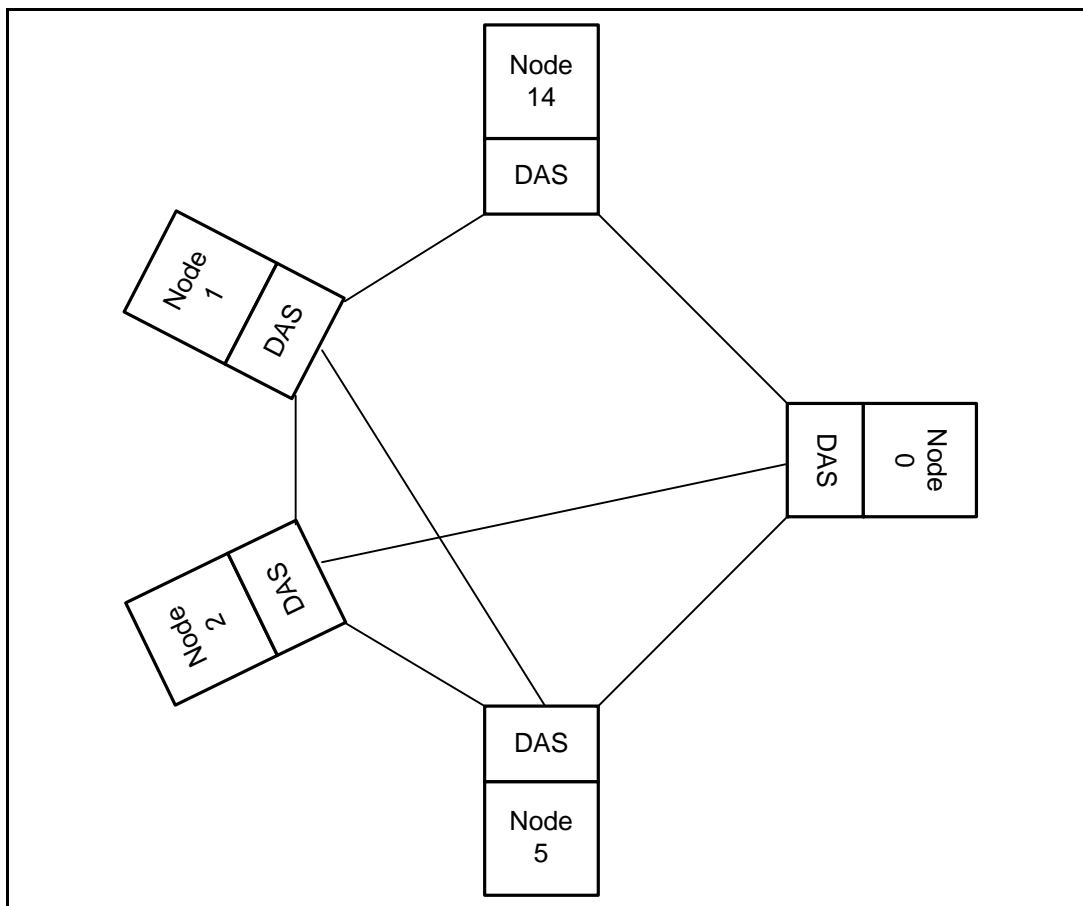


Figure 5: Internode Links

8.1 Configuration of Internode Links

Select a node on the main NMT screen and choose Internode Link Configuration from the node menu. The following window appears:

	Remote Node	IP Address	Max tx-bps	Route 1	Route 2	Route 3
0	Node 0	172.27.1.39	0	2,0		
1	Node-1	172.27.1.40	0	1		
2	Node-2	172.27.1.37	0	2		
3	Node 3		0			
4	Node 4		0			
5	Node 5		0			
6	Node 6		0			
7	Node-7	172.27.1.48	0	7		
8	Node 8		0			
9	Node 9		0			
10	Node 10		0			
11	Node-11		0			
12	Node 12		0			
13	Node 13		0			
14	Node 14		0			
15	Node 15		0			
16	Node 16		0			
17	Node 17		0			
18	Node 18		0			
19	Node 19		0			
20	Node 20		0			
21	Node 21		0			
22	Node 22		0			
23	Node 23		0			
24	Node 24		0			
25	Node 25		0			

From this window you can see the existing links between the selected node and the other nodes on the network. You can change these links and define new ones.

The window contains a table and every possible node on the network is represented by one row. There is a row for the node that you selected but entering information in this row is optional and has no effect.

Remote Node

The Remote Node column specifies the number and name of the destination node.

IP Address

This column contains the IP address of the remote node.

Max tx-bps

This column specifies the maximum transmission rate to use across this link. The rate is defined in units of bits per second. A value of zero means that the transmission rate limit is ignored.

Route 1

This column defines the primary route to the remote node. This is the route that will normally be used when the selected node is setting up a call to the remote node.

Routes are represented as a series of up to three numbers separated by commas. Each number represents a node and the final number must be that of the remote node.

In the simplest case: a *direct* connection to Node 3 is represented by the number 3.

In a more complex example: a route to Node 3 that goes via Node 5 and then Node 1, is represented as 5,1,3.

Route 2

This column defines an optional secondary route to the remote node. If the node cannot be reached via route 1, an attempt to reach it via route 2 will be made.

Route 3

This column defines an optional third route to the remote node. If the node cannot be reached via routes 1 or 2, an attempt to reach it via route 3 will be made.

Example

Consider the example network shown in Figure 5. We wish to specify the routing between Node 0 and Node 2. The primary route should be the direct link between them. For route 2 we could go via Node 5 and for route 3 we could go via Node 14 and Node 1. To define this routing strategy, do the following:

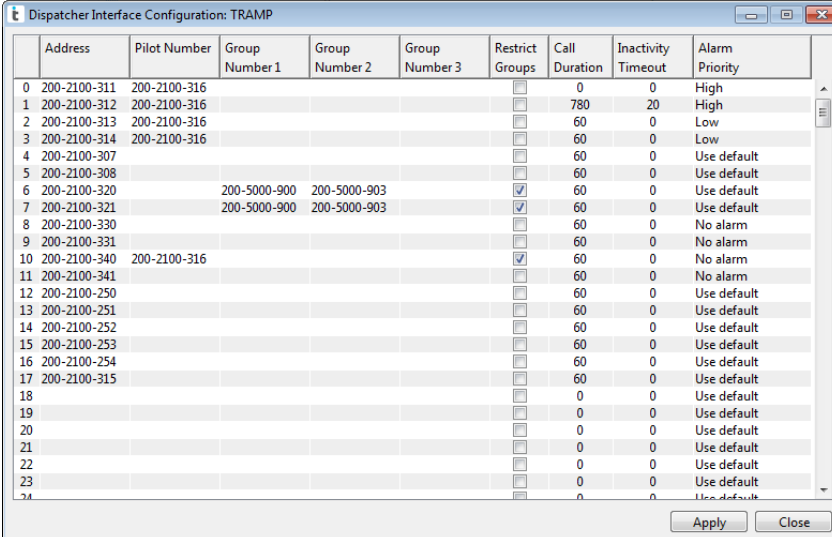
1. Open the Internode Link Configuration window for Node 0.
2. Select the row that represents Node 2.
3. Enter the IP address of Node 2 in the IP Address column.
4. Enter the maximum transmission rate to use (in bits per second) in the TX-bps column.
5. Enter '2' in the Route 1 column.
6. Enter '5,2' in the Route 2 column.
7. Enter '14,1,2' in the Route 3 column.
8. Click Apply.



Note: The above example defines the audio route from Node 0 to Node 2. You will need to specify the route from Node 2 to Node 0 as well.

9 Dispatcher Configuration

Select *Node* > Dispatcher Configuration to configure one or more dispatcher interfaces. The Dispatcher Interface Configuration window appears:



	Address	Pilot Number	Group Number 1	Group Number 2	Group Number 3	Restrict Groups	Call Duration	Inactivity Timeout	Alarm Priority
0	200-2100-311	200-2100-316				<input type="checkbox"/>	0	0	High
1	200-2100-312	200-2100-316				<input type="checkbox"/>	780	20	High
2	200-2100-313	200-2100-316				<input type="checkbox"/>	60	0	Low
3	200-2100-314	200-2100-316				<input type="checkbox"/>	60	0	Low
4	200-2100-307					<input type="checkbox"/>	60	0	Use default
5	200-2100-308					<input type="checkbox"/>	60	0	Use default
6	200-2100-320		200-5000-900	200-5000-903		<input type="checkbox"/>	60	0	Use default
7	200-2100-321		200-5000-900	200-5000-903		<input checked="" type="checkbox"/>	60	0	Use default
8	200-2100-330					<input type="checkbox"/>	60	0	No alarm
9	200-2100-331					<input type="checkbox"/>	60	0	No alarm
10	200-2100-340	200-2100-316				<input checked="" type="checkbox"/>	60	0	No alarm
11	200-2100-341					<input type="checkbox"/>	60	0	No alarm
12	200-2100-250					<input type="checkbox"/>	60	0	Use default
13	200-2100-251					<input type="checkbox"/>	60	0	Use default
14	200-2100-252					<input type="checkbox"/>	60	0	Use default
15	200-2100-253					<input type="checkbox"/>	60	0	Use default
16	200-2100-254					<input type="checkbox"/>	60	0	Use default
17	200-2100-315					<input type="checkbox"/>	60	0	Use default
18						<input type="checkbox"/>	0	0	Use default
19						<input type="checkbox"/>	0	0	Use default
20						<input type="checkbox"/>	0	0	Use default
21						<input type="checkbox"/>	0	0	Use default
22						<input type="checkbox"/>	0	0	Use default
23						<input type="checkbox"/>	0	0	Use default
24						<input type="checkbox"/>	0	0	Use default

Each row contains the information for one dispatcher interface.

Address

Enter the address of the dispatcher.

Pilot Number

When a call is made to the pilot number, all dispatchers that are monitoring the pilot number will receive the call request. The call will be allocated to the first dispatcher to answer the call. The call will be cleared on all other dispatchers. The pilot number must be a unit address which has been validated on the system.

Group Number 1 Group Number 2 Group Number 3

Use these fields to enter up to three group numbers for the dispatcher to monitor if you wish to restrict this dispatcher from monitoring all group calls (see Restrict Groups below).

Restrict Groups

If the restrict groups option is enabled, this dispatcher will only be included in group calls for the group addresses specified by the Group Number 1, 2, and 3 fields. The dispatcher is not able to monitor any other groups. If this option is not ticked then the dispatcher may monitor any group.

Call Duration

If set to a non-zero value then this field specifies the maximum call time for calls originating from the dispatcher.



Note: If a shorter maximum call time is set elsewhere in the network, for example in the node's Control Blocks, the maximum call time set here is overridden.

Inactivity Timeout

If set to a non-zero value then this field specifies the call inactivity timeout for this dispatcher. This defines how long the node waits for signs of activity from the dispatcher. If all radios and dispatchers in a call are inactive then the system will automatically clear the call down.



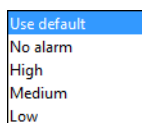
Note: To use this feature, the dispatcher must be connected to a T1561-08-01xx Conventional Line Interface card that has the VOX detection parameters enabled.

Alarm Priority⁶

This sets the priority assigned to Dispatcher link up/down alarms (Alarm Types, numbers 42 and 43). The choices available in the drop-down menu depend on the version of Q1541NC software used in the node:

- With Q1541NC v4.08.00 or earlier, only one option is available “Use default”. Dispatcher link alarms use the priority assigned to them in the Configuration > Alarms window (refer “Alarms” on page 78).
- With Q1541NC v4.08.01 or later but earlier than v4.11.00, the option “No alarm” is added. This allows the operator to disable link alarms for the dispatcher.

With Q1541NC v4.11.00 or later, the operator has full control over the link alarms priority for each individual dispatcher. The default value uses the priority assigned in the Configuration > Alarms window (refer “Alarms” on page 78).



Tip

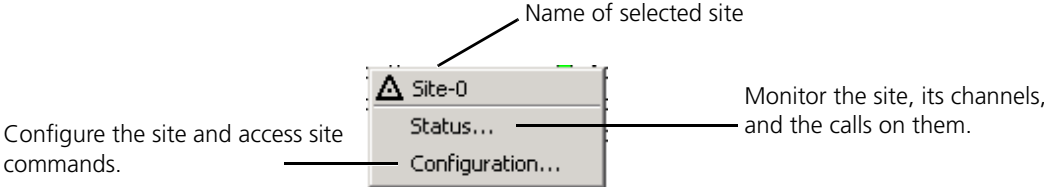
TaitNet networks **never** forget where a radio was last registered, even when the radio is switched off for an extended period, or is decommissioned. This can be a problem if the address assigned to a dispatcher in a network was previously assigned to a radio, as calls to the dispatcher will be directed to the site where the radio was last registered.

The only solution is to modify the registration database in the registration manager (the lowest numbered active node). Refer to Section 8.7 Advanced Node Commands in the T1541 Installation Manual for instructions.

6. In software earlier than Q1541NMT v4.11.00, this column is a checkbox “Allow Alarm” that is enabled by default, and allows the operator only to disable link alarms for individual dispatchers.

Part J: Site Menu

The Site menu lets you monitor and configure a site and its channels.



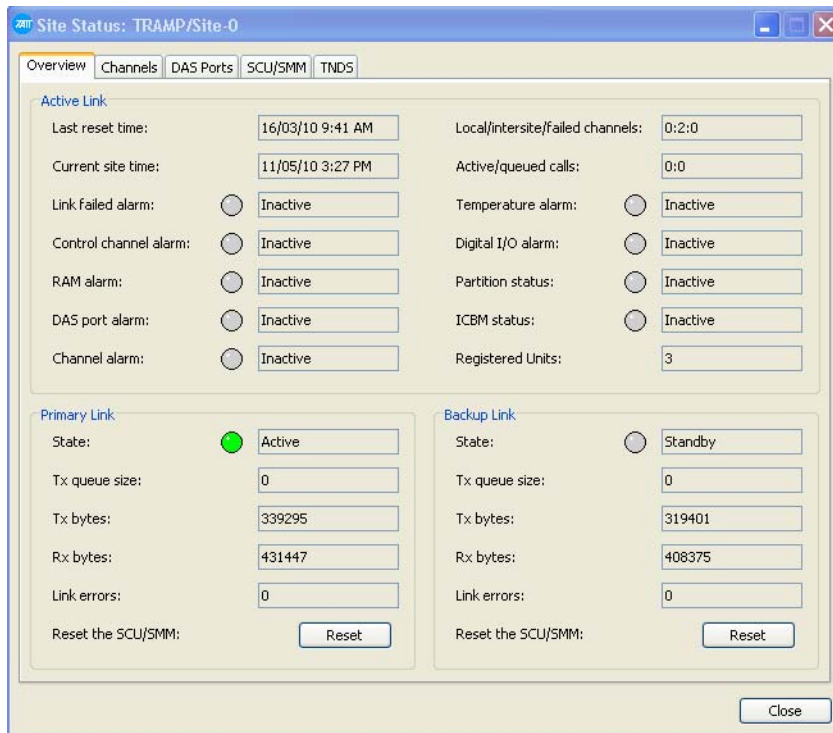
Note: If a site icon has a diagonal red line through it, this means that the site is not activated in Configuration > Network > Edit Node window. Refer to "Adding a Node and Sites" on page 114.

1 Site Status

Select *Site* > Status to monitor a site. The Site Status window appears.

1.1 General Overview

The Overview tab lets you view general information about the site's current status.



Active Link Area

Last Reset Time

Shows when the control channel CCM was last reset.

Current Site Time

Displays the date and time provided by the SCU clock. This is used to time-stamp call records. The display is updated approximately every 5 seconds.

Link Failed Alarm

If the link has failed, this box displays 'Active', otherwise it shows 'Inactive'.

RAM Alarm

If there is a problem with the RAM banks, this box displays 'Active', otherwise it shows 'Inactive'.

DAS Port Alarm

If there is a problem with the DAS port link, this box displays 'Active', otherwise it shows 'Inactive'.

Channel Alarm

If there is a problem with a channel, this box displays 'Active', otherwise it shows 'Inactive'.

Local/Intersite/Failed Channels

Displays three numbers separated by a /. The first number is the number of local channels that are in service. The second number is the number of intersite channels that are in service. The third number is the number of failed channels.

Active/Queued Calls

Displays two numbers separated by a /. The first number represents the number of active calls that the site's traffic channels are handling. The second number represents the number of local calls that are queued.

Temperature Alarm

If there is a problem with temperature, this box displays 'Active', otherwise it shows 'Inactive'.

Digital I/O Alarm

If there is a problem with the digital input/output lines, this box displays 'Active', otherwise it shows 'Inactive'.

Partition Status

Indicates whether the site is configured for alternate partition mode and whether that mode is active. See "Alternate Partition Mode" on page 308 for more information.

ICBM Status

Indicates whether the site is configured for intersite communications backup mode and whether that mode is active. ICBM uses the Alternate Partition Table in the SMM to restrict access to certain channels to privileged users. For more information, see the T1722 SMM Installation Manual (MNA-00004-xx).

Registered Units

The number of units currently registered on this site.

If this site is connected to a node using software earlier than Q1541NC v4.07.04, this number may be incorrect.

Primary Link Area and Backup Link Area

State

If the node is receiving communications from the SMM or SCU, this box displays Active, otherwise it shows Not Active or Standby.

Tx Queue Size

Displays the number of messages queued for transmission.

Tx Bytes

Displays the number of bytes transmitted over the link. This counter can be reset from the Node Status window by clicking the Reset Counters button.

Rx Bytes

Displays the number of bytes received over the link. This counter can be reset from the Node Status window by clicking the Reset Counters button.

Link Errors

Displays the number of communication errors detected on this link. This counter can be reset from the Node Status window by clicking the Reset Counters button.

Reset the SCU/SMM

If the site is exhibiting problems on more than one channel, you may wish to reset the SCU/SMM and see if this resolves the problem.



Important: Resetting the SCU/SMM results in the termination of all calls in which the site is currently involved. Service will not return for about one minute.



Tip

If resetting the SCU/SMM doesn't work.

Try resetting the control channel. See "Resetting a Channel" on page 293.

1.2 Channel Status

The Channel tab displays hardware information on each of the channels on the site. If a channel is currently handling a call, the area also displays the call type and the number of the calling and the called parties.

CCM	RF	Hardware Type	Call Type	Jammed Channel	Control Channel	Pooled Channel	Major Alarm	Minor Alarm
0	56	Intersite			✓			
1	108	Intersite						
2	0	Not Fitted						
3	0	Not Fitted						
4	0	Not Fitted						
5	0	Not Fitted						
6	0	Not Fitted						
7	0	Not Fitted						
8	0	Not Fitted						
9	0	Not Fitted						
10	0	Not Fitted						
11	0	Not Fitted						
12	0	Not Fitted						
13	0	Not Fitted						
14	0	Not Fitted						
15	0	Not Fitted						
16	0	Not Fitted						
17	0	Not Fitted						
18	0	Not Fitted						
19	0	Not Fitted						
20	0	Not Fitted						
21	0	Not Fitted						
22	0	Not Fitted						
23	0	Not Fitted						

CCM

The number of the channel's CCM. This is the number set by a BCD switch inside the channel's CCM.

RF

The RF number of the channel.

Hardware Type

The hardware setting of the channel.

If the Channel is...	It can handle...
Local	Local calls only
Intersite	Local or Intersite calls
Not Fitted	No calls. The channel equipment is not installed, or it is unavailable, out of service, or (pre-Site 7) is being used as the control channel.

CCM 0 (pre-Site 7 only)

The channel acting as the control channel has a CCM number like any other channel. With site firmware versions 5 or 6, when a channel becomes the control channel, it is assigned the 'logical' number 0. If you want to monitor the control channel, look in the row for CCM 0. The row for its 'physical' number is also there, but the RF column shows 0 and the HW column usually shows Not Fitted, to indicate that there is no active channel with that CCM number.

Call Type

If Call Start/End Monitoring is enabled (see page 247), when a new speech or NPD call starts, the call information appears against the allocated traffic channel in this column. This includes the call type (incoming, outgoing or local), along with the called and calling parties.

If Call Start/End Monitoring is not enabled, call information is displayed only for the first five channels (CMM 0 to CMM 4) at the site.

Jammed Channel

If interference is detected on this channel, indicating that it is currently in use by another radio network, a tick will be displayed in this column.

To enable this feature, see “Receiver Activity Timeout” on page 244 and “Inhibit If Jammed” on page 293.

Control Channel

A tick will be displayed in this column to indicate the current control channel.

Pooled Channel

A tick will be displayed in this column to indicate if the channel is pooled. See “Pooled Channels” on page 309 for more information.

Major Alarm

A tick will be displayed if the major alarm input is asserted on the CCM/CMM by the attached base station. On older equipment the major alarm input is identified as the ‘high reverse power’ alarm signal.

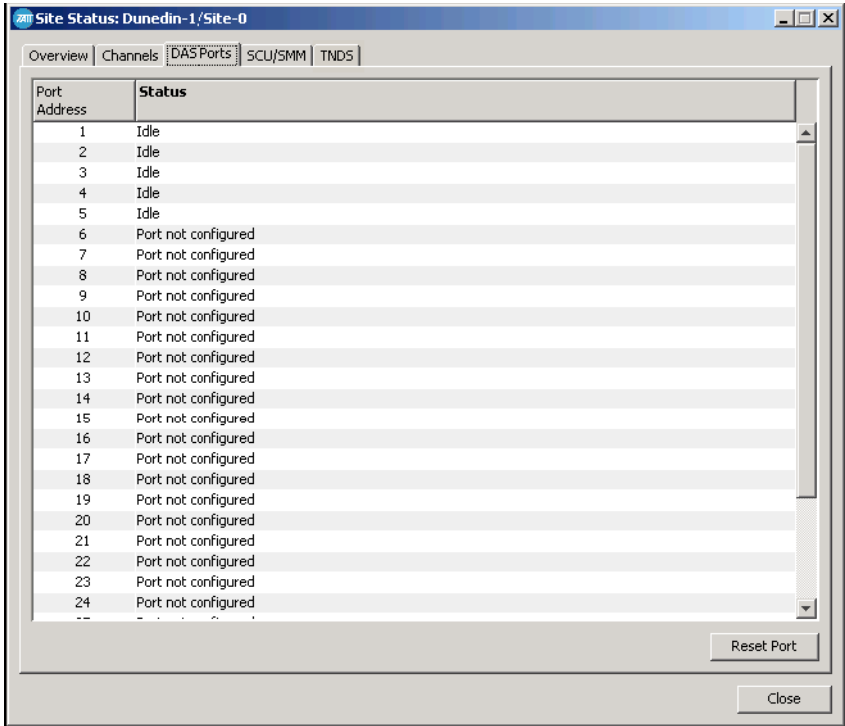
Minor Alarm

A tick will be displayed if the minor alarm input is asserted on the CCM/CMM by the attached base station. On older equipment the minor alarm input is identified as the ‘low forward power’ alarm signal.

1.3 DAS Port Status

If the site has a Digital Audio Switch (DAS), the Site Status window lets you remotely monitor the status of DAS ports and reset any that are having problems.

Select *Site* > Status, then select the DAS Ports tab.



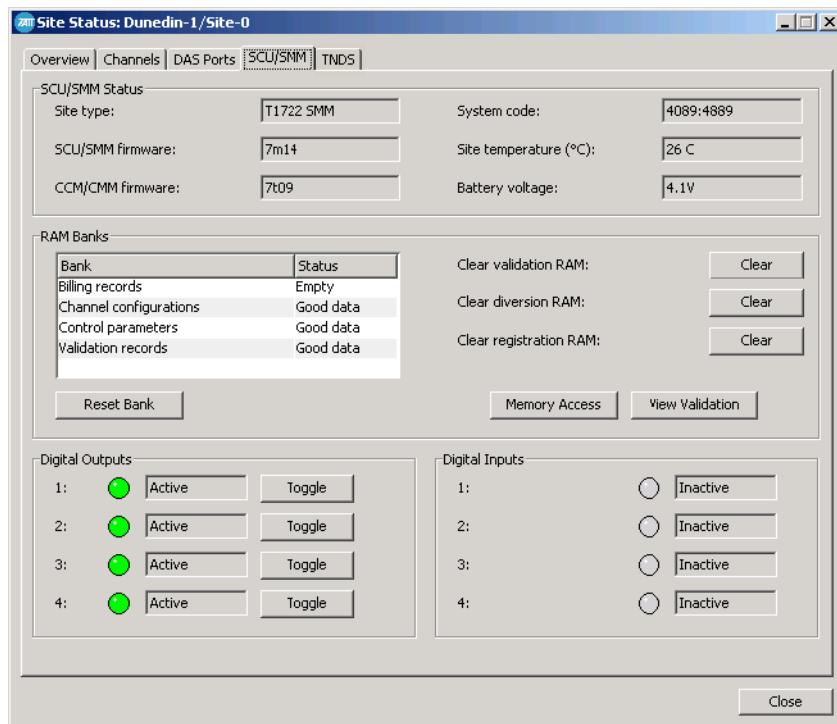
The window shows the total number of ports at the site and the address and status of each of them.

Ports in the DAS should display changes in status as they are used for a call, returning to the 'Idle' status after the call ends. If a port gets stuck at a particular status, it may be locked up. Select the relevant row in the table, then press the Reset Port button to reset the port.

1.4 SCU/SMM Status

The Site Status window lets you remotely monitor the status of the connected SCUs and SMMs and reset any that are having problems.

Select *Site* > Status, then select the SCU/SMM tab.



SCU/SMM Status Area

Site Type

Indicates whether the site uses a T1520 SCU or a T1722 SMM.

SCU/SMM Firmware

Shows the version number of the SCU/SMM software.

CCM/CMM Firmware

Shows the version number of the CCM/CMM software.

System Code

Indicates the SysCode that the control channel CCM broadcasts to indicate the network and site identity. The value is in hexadecimal.

Site Temperature

Displays the output of the SMM's built-in temperature sensor in degrees Celsius. If the temperature is outside the range, the NMT displays an alarm. A raised temperature can indicate that the air conditioning has failed.

Battery Voltage

The voltage of the battery in the SMM. This battery is used to back up the RAM banks in the SMM, so that their data is not lost if there is a power cut.

Voltage	Meaning
≥ 3.6	The battery is connected and provides a normal voltage
≤ 2.0	The battery is dead or not connected

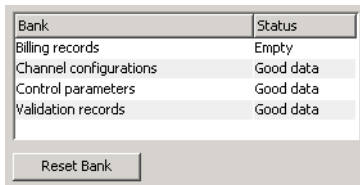


Note: If the maintenance of site data is important, you should replace the battery after about four years. You are unlikely to detect a failing battery unless there has recently been significant current draw. If power fails and the battery dies, call records are lost, but channel configurations and control parameters will be automatically downloaded from the node when power returns to the site. You need to re-send validation records to the site as a batch validation.

RAM Banks Area

RAM Bank Status

The RAM Banks area shows the current status of the battery-backed RAM banks.

A screenshot of a software window titled 'RAM Bank Status'. It contains a table with two columns: 'Bank' and 'Status'. The table has four rows: 'Billing records' with status 'Empty', 'Channel configurations' with status 'Good data', 'Control parameters' with status 'Good data', and 'Validation records' with status 'Good data'. Below the table is a button labeled 'Reset Bank'.

Bank	Status
Billing records	Empty
Channel configurations	Good data
Control parameters	Good data
Validation records	Good data

Reset Bank

The SCU has numbered RAM banks. Bank 1 stores control blocks and Bank 3 stores call records. The other banks are generally not fitted.

The SMM has named RAM banks. The 'Channel configurations' bank contains various settings that have been set using the NMT. The 'Control parameters' bank contains the control blocks and control schedule for the site.

The status of the RAM bank can be one of the following:

Status	Description
Checksum Error	Data in the RAM bank is corrupt. This can happen if there has been a power cut and the battery providing backup power is dead. You should clear the bank (see Clearing RAM Banks, below) and restore the data, if possible. If the bank that stores call records is corrupt, you will have lost any call records that have not yet been downloaded to the node.
Empty	RAM bank contains no data. This should occur after you clear the bank.
Full	This situation is rare and should only occur for the bank that stores call records. This can happen if the node link to a busy site fails. New call records will be discarded while the bank is full and cannot be retrieved.
Good Data	RAM bank contains good data
Not Fitted	RAM bank is not present

Clearing RAM Banks

If a RAM bank exhibits a ‘Checksum error’, you need to clear it.

1. For an SMM: Select the RAM bank you wish to reset and click the Reset Bank button.
2. For an SCU: You can clear the RAM banks by clicking the ‘Clear Validations RAM’, ‘Clear Diversions RAM’ and ‘Clear Registrations RAM’ buttons.



Note: These features are not available on an SCU running older versions of software.

3. If the RAM bank contained validation records, carry out a batch validation to replace the lost data.
4. If the RAM bank contained control blocks or channel configurations, reset the SMM or SCU. On start-up, the node will re-send this information.
5. Call records from a cleared RAM bank cannot be recovered.

Clear Validation RAM

The site stores the validation settings for radios and groups in RAM. If this area of RAM is cleared, the site will set all radios and groups to the default validation settings. This generally results in radios being barred from using the site.



Important: After clearing the validation RAM you can restore new validation data to the site by performing a batch validation (see “Batch Validation” on page 170).



Note: This feature is not available on an SCU running software older than v5.04.

Clear Diversion RAM

The site stores the diversion settings in RAM. Clearing this area of RAM will delete all diversion information from the site.



Note: This feature is not available on an SCU running software older than v5.06.

Clear Registration RAM

The site maintains a record of which radios are currently registered on it. Clearing this area of RAM will delete this data.



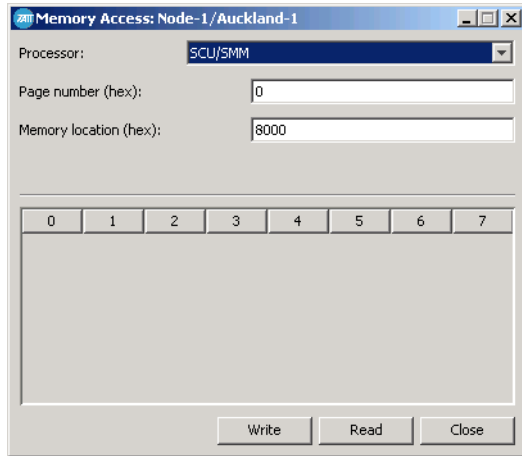
Note: This feature is not available on an SCU running software older than v5.04.

Memory Access

The NMT can read data from any specified RAM location in the SCU or any CCM at a site, and write new data to that location. You may be asked to use the NMT to read or write data to RAM at a site if the site has problems you are unable to resolve. The data you view can contain useful diagnostic information, and the data you write can issue commands, for example to tell the SCU to clear its registration records or reset its validation information to the defaults.

Reading Data from a Memory Location

1. Select the Memory Access button and the Memory Access window appears.
2. In the Processor box, select the processor whose memory you want to access. (each CCM/CMM has a main and a modem processor).
3. If you selected the SCU/SMM, enter into the Page Number box a hexadecimal number between 0 and FF.
4. In the Memory Location box, enter the lowest hexadecimal address of the memory location.
5. Press the Read button. The NMT obtains the data from the site and displays it in the bottom half of the window.



The table displays the address location in its header row and the hexadecimal data in the rows remaining.

Writing Data to a Memory Location



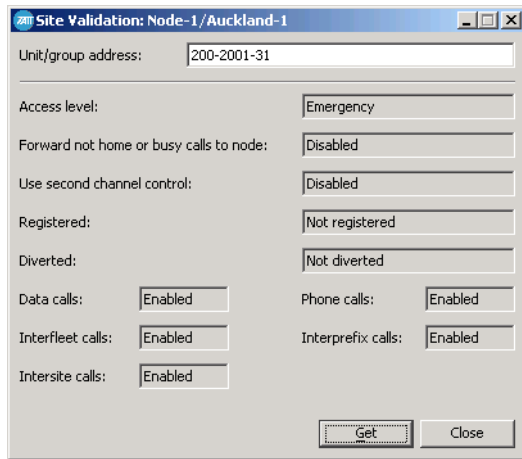
Important: Only modify site memory if a Tait engineer asks you to. Ensure that you select the correct memory location; changing data in the wrong place could create additional problems.

1. Display the data at the memory location as described in the previous section.
2. Carefully check the display to ensure that the location and page number are correct.
3. Edit the byte(s) you wish to change. You must enter a valid two-digit hexadecimal value.
4. Press the Write button to write the data back to the site, then press Close to close the window.

View Validation

If you suspect that validation information at a site differs from the information entered in the NMT and sent to the node, you can view that information for a radio or group number.

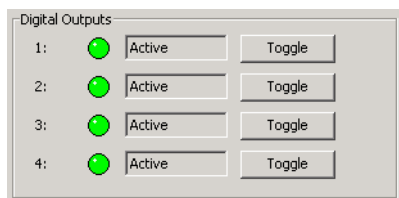
1. Select the View Validation button.
2. Enter a radio or group number and press the Get button. The site's validation information for that number appears in the Site Validation window.



3. Check that the information displayed is the same as the information in the number's Edit Unit or Edit Group window for the node that the site belongs to.
4. Check that the site specifies the same access level as the node.
5. Confirm that the radio is registered at the site.
6. If the validation information at the site is not consistent with the information at the node, carry out a batch validation, see "Batch Validation" on page 170.

Setting SMM Digital Outputs

If the site has a T1722 SMM, the Digital Outputs area of the SCU/SMM tab lets you control its output ports by setting these outputs high or low. The output ports are active low.



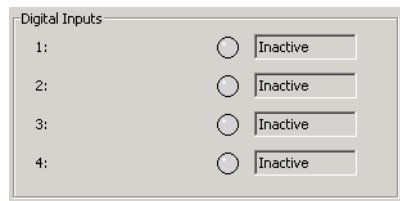
The Digital Outputs area contains a Toggle button for each of the ports (labelled 1 to 4). Pressing the Toggle button alternates between making the port 'Active' (this will initiate the action that the port is set up for) and returning the port to its 'Inactive' state.

SMM Digital Outputs

The SMM has four output ports that can be used to control equipment at the site facility. A port could for example disable a security alarm or test a backup power generator. For more information, see the SMM documentation.

Monitoring Digital Inputs

If the site has an SMM, the Digital Inputs area of the SCU/SMM tab lets you monitor any alarm sensors that are connected to the SMM. When the sensor sets the line high, the SMM sends a message to the node and the NMT displays 'Active'.



This lets you remotely monitor the security of your site facility.

The Digital Inputs area shows information for each of the alarm ports, labelled 1 to 4. The text box can display the following:

When This Appears...	The Port is...
Unknown	Not connected to any external equipment
Inactive	Set low
Active	Set high

SMM Alarm Control

The SMM has four alarm ports. These are general-purpose input ports that can be connected to equipment such as a fire alarm, door alarm, or mains power failure alarm. For more information, see the SMM documentation.



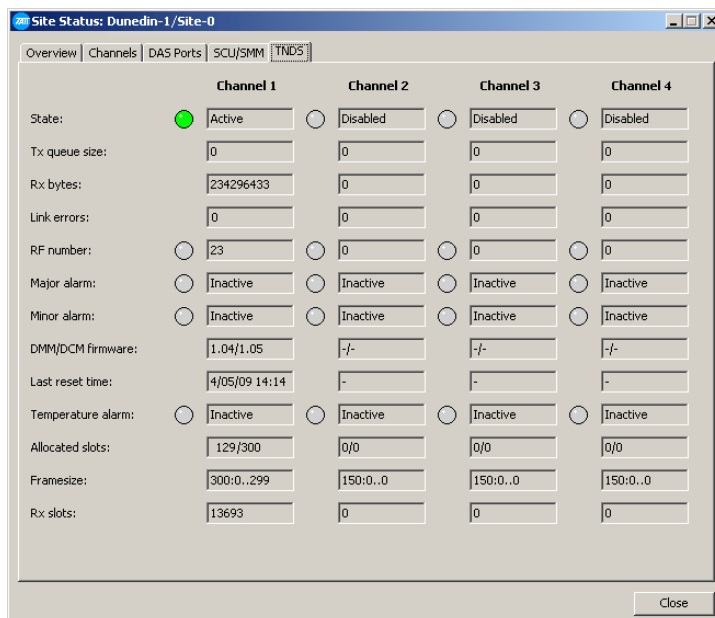
Tip

If you have more than one alarm input to the SMM, provide a clear notice near the NMT computer that tells users what the ports are connected to. This will help them quickly interpret an alarm status.

1.5 TNDS Status

The TNDS tab displays the status of all the data channels associated with a site.

In the following window, a sample site with one active data channel is displayed:



TNDS Channels

The TaitNet Data System provides a PMR solution for gathering vehicle locations from a large fleet of mobile radios. It has been designed for AVL applications, and is also suitable for a variety of other mobile applications, including Real Time Passenger Information.

State

The current state of the data channel, as follows:

State	Description
Active	The node has established end-to-end communications with the DMM
Standby	The node has established end-to-end communications with the DMM but as another DMM is already Active in the Standby Group, the node has placed this data channel in Standby. The data channel transmitter will not be active.
Link Failed	The node has not established end-to-end communications with the DMM
Disabled	The channel is not in use

DMM

The T1432 Data Management Module is a component of a TNDS channel. It is a T1722 SMM loaded with the DMM firmware Q1432DMMx.xx.

Tx Queue Size

The number of messages waiting to be sent from the node to the DMM. This number provides an indication of the intersite link loading and quality. If this number is greater than 20 for longer than one minute, then the intersite link may have an unacceptably high latency or BER.

Rx Bytes

The number of bytes received by the node from the DMM.

Link Errors

The number of link errors detected on the intersite link between the node and DMM. If this number increases by more than 10 in one minute, then the intersite link may have an unacceptably high latency or BER.

RF Number

The RF channel number of the data channel's base station as set by the rotary switches in the DCM. If this number does not match the expected number, then multiple DCMs may be connected to a DMM. Only one DCM should be connected to a DMM. If this number is 0, then the DMM is not communicating correctly with the DCM.

Major Alarm Minor Alarm

Sets to Active from Inactive if the major/minor digital alarm signals on the DCM are asserted by the base station.

DMM/DCM Firmware

The firmware version of the DMM and DCM respectively. If the DCM firmware version is '-', then the DMM is not communicating correctly with the DCM.

DCM

The T1433 Data Channel Module is a component of a TNDS channel. It is a T1711 CMM that has been modified to operate as a DCM. See TN-1268-AN for modification details.

Last Reset Time

The power-up time of the DMM. If this date/time changes then the DMM has power cycled, due to either power failure or a serious software fault.

Temperature Alarm

Sets to Active from Inactive if the DMM temperature exceeds 50°C or falls below 0°C.

Allocated Slots

Two numbers are displayed: aaa/ttt

Where:

aaa = the number of slots allocated to mobiles on this data channel

ttt = the total number of slots available at the site. The total number of slots available at the site may vary if the framesize is automatically extended (see page 300). It may also be less than the frame length if this data channel is being shared with another channel.

The total number of slots free is ttt - aaa.

Framesize

Three numbers are displayed: fff : lll .. hhh

Where:

fff - is the current framesize being used by the data channel. Either 150, 300, 450, or 900 slots, which is equivalent to 10s, 20s, 30s or 60s polling rates respectively. On an “auto extending frame size” channel, the frame size may change during run time and this parameter will display the current size being used at the site.

lll .. hhh - is the range of slots that can be allocated to radios on this data channel. For an “auto extending frame size” channel this will always be the complete frame size. On a “time shared data” channel (see page 301), it will display the partition of the frame (lowest to highest slot) which is allocated to the data channel to use.

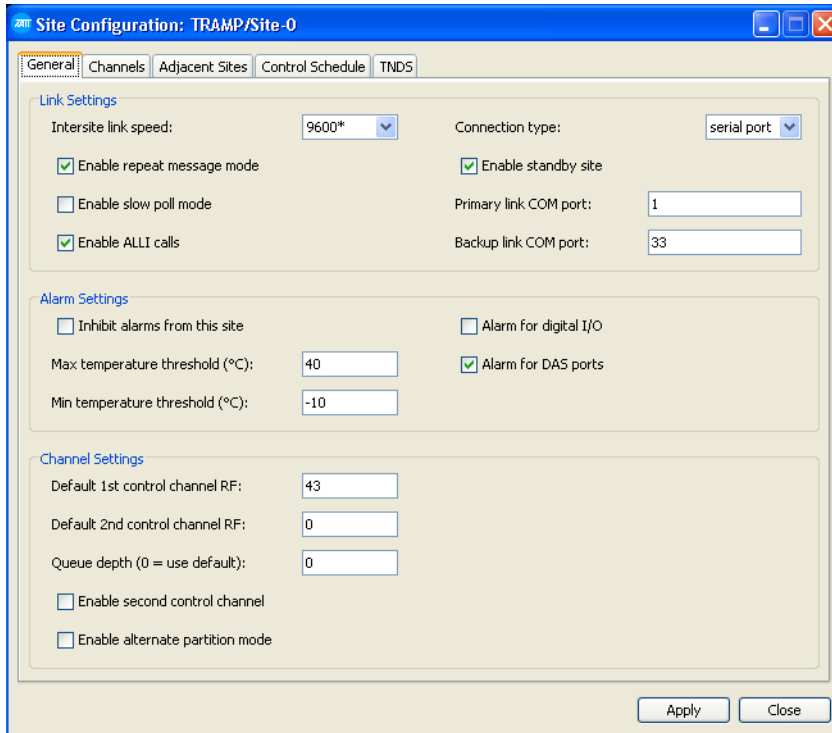
Rx Slots

This number increases by 1 when the data channel receives a TNDS report from a mobile. This field is used in determining whether the data channel receiver is functioning correctly.

2 Site Configuration

2.1 General Site Options

To configure general options for a site, select *Site > Configuration* and select the General tab. The following window appears:



Link Settings Area

Intersite Link Speed

In the Intersite Link Speed box, tell the node the baud rate to use for its communications with the site. This needs to be done when the site and node are first installed. This setting is generally 2400 bps. It must be the same as the setting in the SCU or SMM. You can check this in the SCU by looking at the DIP switch settings on the SCU board. For a T1722 SMM, the baud rate is defined by the software and is configurable.

The available intersite link speeds in the drop-down menu are displayed as 1200, 2400 or 9600 bps, and as 1200*, 2400* or 9600* bps.

If the SMM is operating with Q1722SMX firmware v7.30 or greater, then the intersite link speed you select **must** be one of those displayed with an asterisk (*). For earlier firmware versions you should select an intersite link speed with no asterisk.

Enable Repeat Message Mode

Enabling this feature provides more robust node-site communications. Messages that are not received are re-sent.

Enable Slow Poll Mode

You should enable this feature on high latency node-site links.



Note: This feature operates on node-site links where the SMM is operating with software earlier than Q1722SMX v7.3x. When the SMM is operating with newer software, this feature is not used, and this tick box setting is ignored.

Enable ALLI Calls

The Enable ALLI Calls check box allows you to enable or disable ALLI (all-ident) calls at this site.



Important: If this feature is enabled in the SMM, it overrides the ALLI call validation setting from the NMT. If this feature is disabled in the SMM, the ALLI call validation setting from the NMT is used to determine if ALLI calls are permitted.

Connection Type

This controls the way the node communicates with the serial port server. Options are either 'serial port' (default) or 'socket'. The socket setting is appropriate only if you are using a Digi TS series serial port server and are using Node Controller software Q1541NC v4.09.00 or later.



Note: Older models of serial port server, for example the Digi EL series, and older Node Controller software, support only the serial port setting. Using the socket setting with these older serial port servers will cause undesirable behaviour.

Enable Standby Site

Tick this checkbox if you are running both a primary and backup site. This will enable the Backup Link field.

Primary Link COM Port

If 'serial port' is selected for the Connection type, enter the COM port address for the primary site. If 'socket' is selected for the Connection Type, enter the IP address of the Digi TS serial port server in dotted quad format, followed by a colon (:) and the socket port number, as shown in the diagram below. Alternatively, if 'socket' is selected, your serial port server has a name, and the NMT can access the domain name server, you may enter the device name, followed by a colon (:) and the socket port number. The socket port number is the port number on the device + 2100. If the colon and port are omitted, :2101 is added automatically when you Apply the change. This port number is appropriate only if you are using the first port on the TS device.

Connection type: socket

Enable standby site

Primary link IPaddr:port: 172.27.2.200:2101

Backup link IPaddr:port: 0.0.0.0:2101

ALLI Calls

ALLI calls are broadcast calls to all radios on a site. They are designed for single site, single fleet networks. On multi-site networks, ALLI calls can create problems. For example, if a radio at the site is participating in an intersite call when the ALLI occurs, the radio at the remote site simply loses the call. No 'clear down' command is issued. Home Group Override (page 247) and Emergency Group Override (page 247) are better solutions for multi-site networks.

Backup Link COM Port (if required)

If 'serial port' is selected for the Connection type, enter the COM port address for the backup site. If 'socket' is selected for the Connection Type, enter the IP address of the Digi TS serial port server in dotted quad format, followed by a colon (:) and the socket port number. Alternatively, if 'socket' is selected, your serial port server has a name, and the NMT can access the domain name server, you may enter the device name, followed by a colon (:) and the socket port number. The socket port number is the port number on the device + 2100. If the colon and port are omitted, :2101 is added automatically when you Apply the change. This port number is appropriate only if you are using the first port on the TS device.

Alarm Settings Area

Inhibit Alarms from this Site

If this option is enabled, the Node will not report any alarms related to this site.

Max Temperature Threshold (°C)

Min Temperature Threshold (°C)

The SMM has a built-in temperature sensor (see "Site Temperature" on page 279).

If the temperature is above the value in the Max Temperature Threshold box or below the value in the Min Temperature Threshold box, an alarm is triggered. To alter a threshold, simply enter a new value into one of these boxes, then press the Apply button.

Alarm for Digital I/O

If this checkbox is enabled, alarms will be recorded if there are problems with the digital input/output lines.

Alarm for DAS Ports

If this checkbox is enabled, alarms will be recorded as site DAS ports failed or returning to service.

Channel Settings Area

Default 1st Control Channel RF

Enter the RF of the default first control channel. If the control channel changes to one other than the default, an alarm will be generated. If you enter 0 then an alarm will not be generated when the control channel changes.

The default control channel RF number is displayed in the site summary window and can be compared with the active control channel RF.

Default 2nd Control Channel RF

Enter the RF of the default first control channel. If the control channel changes to one other than the default, an alarm will be generated. If you enter 0 then an alarm will not be generated when the control channel changes.

The default control channel RF number is displayed in the site summary window and can be compared with the active control channel RF.

This parameter applies only to sites with a control channel enabled.

Queue Depth (0 = use default)

This allows you to specify the maximum number of calls that the site will queue before dropping calls. If set to 0, the queue depth is set to the number of channels at the site plus 2, with a minimum value of 3 and a maximum value of 20.

Enable second control channel

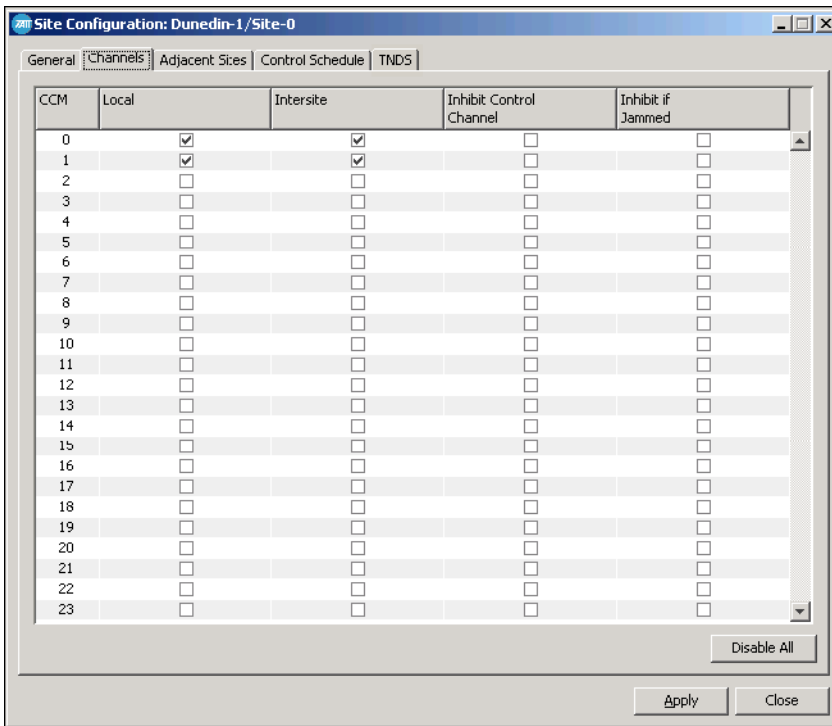
Enables a second control channel on this site. Applies only to sites with dual control channel firmware.

Enable Alternate Partition Mode

The Enable Alternate Partition Mode check box lets you switch the site to alternate partition mode. See “Alternate Partition Mode” on page 308.

2.2 Setting Up Channels

Select *Site* > Configuration then the Channels tab to set up channels for local or intersite use. The Channel Configuration window appears.



- Generally, you will select the Local check box for channels with a 'Local' hardware status, and both the Intersite check and Local check boxes for channels with an 'Intersite' hardware status
- If you want a channel to **never** be used for local calls, select the Intersite check box and clear the Local check box
- A local call is always assigned to a local channel if one is available to take the call. If you want intersite channels to be reserved for intersite calls unless the local channels become overloaded, select both the Intersite check box and the Local check box, and use the Handoff Threshold (queued local calls) feature (see page 243).
- If a channel seems to be causing problems on intersite calls but not on local calls, you can clear the Intersite check box to take the channel out of service for intersite calls



Note: When editing channel settings, please allow two minutes for the changes to be received and updated by the site.

The following table shows the effect of the Local and Intersite check box settings for different Hardware Type options:



Note: Pre Site 7 only: The Control channel (CCM 0) is a special case; it cannot be configured for intersite calls. If you de-select the Local check-box, the control channel cannot change to temporary traffic mode.

Settings Made in the Channel Setup Window			
Hardware Settings	Local Only	Intersite Only	Local and Intersite
Local	Channel is only available for local calls	Channel is disabled	Channel is only available for local calls
Intersite		Channel is only available for intersite calls	Channel is available for all calls. Local calls are allocated to a local channel if one is available.
Not Fitted	Channel not available		

Inhibit Control Channel

If you want to ensure that a channel never becomes a control channel, then select this check box.

This setting is strongly recommended for channels that are pooled between sites. If a pooled channel is selected as a control channel this can have unintended consequences. Refer to “Pooled Channels” on page 309.

Inhibit If Jammed

If you want to ensure that calls will not be allocated to a channel if interference is detected, then select this check box. For more details, see “Receiver Activity Timeout” on page 244.

2.3 First Aid for Channel Problems

You can use the Site Status window Channels tab and Site Configuration window Channels tab to quickly respond to problems.

Resetting a Channel

If a particular channel appears to not be functioning correctly, you can reset it remotely from the NMT.

1. In the Site Status window, select the Channels tab and click on the channel you want to reset.
2. Press the Reset CCM button.

Removing a Channel from Service

If resetting a channel doesn't solve the problems, you can remove it from service. This reduces the site's traffic capacity until you are able to trace the fault and fix it, but it quickly stops the problems from occurring.

1. In the Site Configuration window, select the Channels tab and clear the Local and the Intersite check boxes for the channel.
2. Press Apply.

Removing the Control Channel from Service

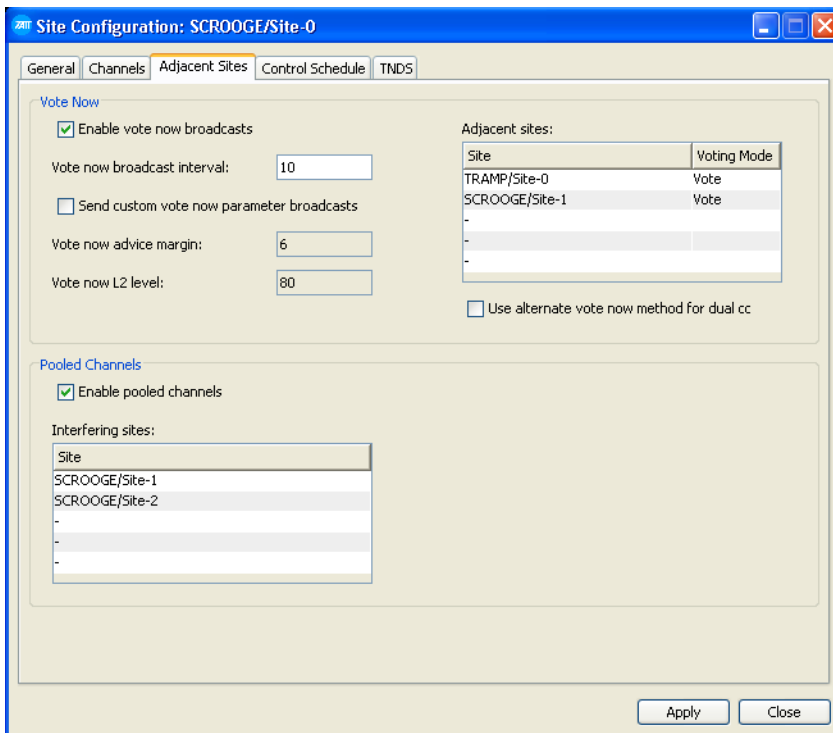
The following procedure applies to sites using firmware versions 5 and 6.

If the control channel is causing problems and resetting it has not fixed them, you can remove that channel from service. Another channel automatically takes over as the control channel. The procedure for the control channel is different from that for traffic channels.

1. Establish the CCM number of the current control channel. This can be found from the Channels tab of the Site Status Window. It is usually (but not always) CCM 1. It is not CCM 0.
2. In the Site Configuration window, select the Channels tab and clear the Local and Intersite check boxes for that channel.
3. Press Apply to save your change and close the window. Because the previous control channel is taken out of service, another channel takes over as the control channel.

2.4 Setting Up Adjacent Sites

Select *Site* > Configuration then the Adjacent Sites tab to set up channels for local or intersite use. The Adjacent Sites window appears.



Vote Now Area

Enable Vote Now Broadcasts

This Enable Vote Now Broadcasts check box allows you to enable or disable the Vote Now feature. See “Vote Now” on page 305.

Vote Now Broadcast Interval

Specifies the interval between Vote Now messages being transmitted.

Send Custom Vote Now Parameter Broadcasts

If this feature is enabled, the system will broadcast voting parameters to override the default vote now settings of radios. Two broadcast messages are sent, one specifies the vote now advice margin, the other the vote now L2 level threshold. The broadcast messages are sent with the same period as the vote now broadcasts.

This feature is a Tait proprietary enhancement to the MPT 1327 specification and requires special radio firmware.

Vote Now Advice Margin

This parameter sets the signal strength margin that the new channel must exceed the current control channel by for the radio to switch to the new control channel it has been directed to by a vote now BCAST codeword.

Vote Now L2 Level

This parameter defines the signal strength level that a new channel must exceed for the radio to switch to the new control channel it has been directed to by a vote now BCAST codeword.

Adjacent Sites

In the Adjacent Sites table, click in the Site area and select adjacent sites from the pop-up node/site menu that appears. For each entry, select either 'Vote' or 'Move' as the Voting Mode. 'Move' is recommended only for fill-in sites with a small number of channels. The maximum number of adjacent sites available for any one site depends on the version of software installed in the NMT, the Node controller and the Site controller (SMM).

- For site controller software earlier than version 7.43 or NMT and Node controller software earlier than version 4.09.00, the maximum number of adjacent sites is 5, but, for each adjacent site that has dual control channels, this maximum number of adjacent sites is reduced by one.

For example, if one of the first four sites listed in the table has dual control channels and there is a fifth adjacent site in the table, this fifth site is ignored.

- For site controller software version 7.43 with NMT and Node controller software version 4.09.xx or later, the maximum number of adjacent sites is 5, and there is no restriction on this number due to sites with dual control channels.
- For site controller software version 7.44 and later with NMT and Node controller software version 4.10.00 and later:
 - If 'Use alternate vote now method for dual cc' is enabled, the maximum number of adjacent sites is 10, and there is no restriction on this number due to sites with dual control channels.

- If 'Use alternate vote now method for dual cc' is not enabled, the maximum number of adjacent sites is 20, but, for each adjacent site that has dual control channels, this maximum number of adjacent sites is reduced by one.

For example, if two of the first 18 sites listed in the table have dual control channels and there is a 19th and/or 20th adjacent site in the table, these are ignored.

Use Alternate Vote Now Method for Dual CC

This check box allows you to select an alternate method for apportioning radios to control channels at sites with dual control channels. For further information, refer to "Alternate Vote Now Method for Networks with Dual Control Channel Sites" on page 306.



Note: The alternate method requires both NMT and Node Controller software to be v4.09.00 or later, and Site Controller software Q1722SMX v7.43 or later. If the node or site software is older, the check box setting is ignored and the normal method is always used.



Note: The same Vote Now method should be used on every site on the network, irrespective of whether the site has single or dual control channels. Mixing Vote Now methods is likely to cause impaired performance.

Pooled Channels Area

Enable Pooled Channels

The Enable Pooled Channels check box allows you to enable or disable the Pooled Channels feature. See "Pooled Channels" on page 309.

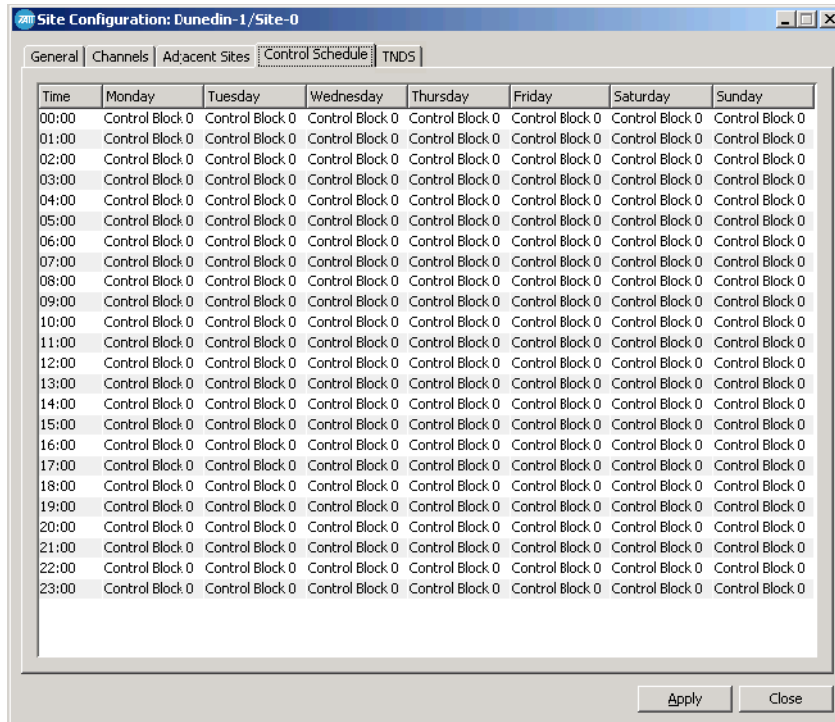
Interfering Sites

In the Interfering Sites box, enter up to five other sites whose coverage overlaps the selected site.

2.5 Defining a Control Schedule

Once you have defined a set of control blocks for a node (see “Control Blocks” on page 239), you can define a control schedule for each of the sites belonging to that node.

Select *Site* > Configuration, then the Control Schedule tab, and the Control Schedule window appears.



This window displays the current control schedule for the site. It contains 24 time-slots for each of the seven days in the week. A control block (by default Control Block 0) is assigned to each time-slot.

To edit the site’s control schedule, follow these steps:

1. Select one or more time-slots. To do this, click and drag the mouse. Alternatively, click on the upper left corner, then shift-click on the lower right corner of the area you want to select.
2. With the time-slots still selected, click the right button of the mouse. A menu of control blocks pops up.
3. Select the control block you want. Its name appears in the selected time-slots.
4. Press Apply to save your changes then Close to close the window.

2.6 Setting up TND5 Channels

To configure TND5 channels for a site, select *Site > Configuration* and select the TND5 tab. The following window appears:

	Channel 1	Channel 2	Channel 3	Channel 4
Connection type	serial port			
Frame size	300	150	150	150
Extended frame size	900	150	150	150
Lowest Slot	0	0	0	0
Highest Slot	599	0	0	0
Intersite link speed	9600	Disabled	Disabled	Disabled
COM port	8	0	0	0
Standby channel	No	No	No	No

Connection Type

This controls the way the node communicates with the serial port server. Options are either 'serial port' (default) or 'socket'. The socket setting is appropriate only if you are using a Digi TS series serial port server and are using Node Controller software Q1541NC v4.09.00 or later.



Note: Older models of serial port server, for example the Digi EL series, and older Node Controller software, support only the serial port setting. Using the socket setting with these older serial port servers will cause undesirable behaviour.

Frame Size

Select the frame size from the pop-down options. Values are 150, 300, 450, or 900. These frame sizes correspond to poll rates for radios on the data channel of 10, 20, 30 and 60 seconds respectively.

This is the desired frame size at the site, and the fastest polling rate that the site will use.

Extended Frame Size

If auto extending frame sizes are required at the site, then this parameter selects the largest frame size that it can be extended to.

Select the frame size from the pop-down options. Values are 150, 300, 450, or 900. These frame sizes correspond to poll rates for radios on the data channel of 10, 20, 30 and 60 seconds respectively. This value must be larger than the Frame Size parameter (above) for the auto extending frame size feature to be enabled.

For further information, see “Auto Extending Frame Size” on page 300.

Lowest Slot Highest Slot

The lowest slot and highest slot allows the setting of a time shared data channel partition, which includes all slots from the lowest slot to the highest slot.

Select the lowest slot from the pop-down options. Values are 0, 75, 150, 225, 300, 375, 450, 525, 600, 675, 750, and 825.

Select the highest slot from the pop-down options. Values are 0, 74, 149, 224, 299, 374, 459, 524, 599, 674, 749, 824 and 899. If this value is higher than the Frame Size parameter (see above), the data channel will use the Frame Size parameter setting instead.

Partitions can be allocated in 75 slot blocks. Each block accounts for 5 seconds of polling time. This means that a 10 second polling data channel can have at most 2 shared data channels.

Each time shared data channel can have one time shared data channel partition, which is made up of between 1 and 11 consecutive blocks. Fifty slots of each partition will be used for guard times, transmitter ramping, and synchronisation; and will not be available for slot allocation to radio units. For a 5 second partition, this means only 25 slots will be available for allocation.

The Lowest Slot and Highest Slot parameters will be ignored by a data channel if the Auto Extending Framesize feature has been enabled (i.e. Time Shared Data Channels will only come into effect if the frame size is the same as the extended frame size).

The highest slot size must always be greater than the lowest slot size.

The NMT does not check to see that the partition selected does not overlap a shared channel partition on another data channel. If the partitions do overlap, it will cause RF interference in overlapping coverage areas, as both data channels will end up transmitting at the same time.

If you do not want an auto extending frame size data channel, or a time shared data channel, then you must assign all slots to the channel. Do this by setting the lowest slot to 0, and the highest slot to 899.

For further information, see “Time Shared Data Channels” on page 301.

Intersite Link Speed

The recommended link speed is 9600 bps. It is possible to use 1200 or 2400 bps, but this is not recommended for systems with more than 20 radios per data channel. If this data channel is not used, then set the link speed to disabled.

COM Port / IPAddr:Port

Depending on the value selected for the Connection Type this will be either the COM port number of the node's serial port that the data channel is connected to, or the IP address of the Digi TS serial port server. If a COM port is required, the valid range is 0-199, where 0 indicates that this data channel is disabled. On most systems, COM port numbers 1 to 32 refer to the first EL-32 serial port server, and ports 33 to 64 refer to the second EL-32 serial port server. If an IP address and port are required, enter this in dotted quad format, followed by a colon (:) and the socket port number. Alternatively, if 'socket' is selected, your serial port server has a name, and the NMT can access the domain name server, you may enter the device name, followed by a colon (:) and the socket port number. The socket port number is the port number on the device + 2100. If the colon and port are omitted, :2101 is added automatically when you Apply the change. This port number is appropriate only if you are using the first port on the TS device. Either IP address 0.0.0.0 or an empty field can be used to indicate that this connection is disabled

Standby Channel

If set to no, then this data channel is not a standby channel. If set to 1 or 2, then this data channel is a standby channel for data channels 1 or 2.

If a data channel fails and a standby channel is available to replace it, the node will activate the standby channel and use the standby channel to provide the TNDS service in place of the failed channel. Standby channels must have the same RF channel number as the channel they are replacing.

The channel is considered to be failed, if any of the following is true:

- The intersite link to the data channel is failed
- The DCM is failed (Reported RF channel number is 0)
- The major alarm signal on the DCM is asserted

Auto Extending Frame Size

The purpose of this feature is to manage the TNDS slot resource based on demand. The situation could arise where a TNDS channel will need to double the frame length to allow an extraordinary number of radios on the channel. This could be the result of a co-located TNDS channel, or a mass migration due to a site failure. Conversely, once the demand reduces below a defined threshold point of the original frame length, the TNDS channel will need to halve the frame length.

An auto extending frame size data channel will automatically detect if the data channel has run out of free slots, and will then extend the frame size to allow more slot allocations. However, this extension will cause a decrease in the polling rate on the channel. The frame size can be extended more than once; for example it might extend from 150 to 300, and then from 300 to 450 slots, and even then to 900 slots at a later stage.

The data channel will also automatically reduce the frame size. Detecting when to reduce in size is slightly more complicated, as a reduction in frame size will cause a number of radios to re-register for slots if they have previously been allocated slots in the higher range of the frame size. The data channel will only reduce the frame size if:

1. It will cause less than 50 radios to re-register for slots (this will take approximately 30 seconds).
2. It will leave at least 50 spare slots at the new frame size (assuming that all radios that re-register will be allocated slots first).

If a site has multiple data channels, auto extending may be enabled on any number of the channels. Each may extend independently of the others. This means that there may be different polling rates occurring for radios on the same site, but which are allocated slots on different data channels.

Time Shared Data Channels

The purpose of this feature is to allow several data channels to use the same RF frequency. Each data channel will be allocated slots from a small subset of the frame that is different to the other channels.

When comparing the update rate of a TNDS channel to implementing a similar scheme using control channel data, the difference is well in excess of a factor of 10. This is spectacular for larger sites, which can support hundreds of radios on a single data channel. However, the trigger point to change from using control channel data to using a TNDS channel is about 15-20 radios at best. Using a dedicated TNDS channel for a small number of radios may be inefficient in terms of frequency utilisation. For example, if 50 radios are polled on a TNDS channel with a 30 second frame length, the channel is only operating at 11% utilisation. The 89% free could easily be used at another site.

Part K: Special Options

The NMT can be used to enable and configure various special options for the TaitNet trunked network. Sometimes an option is only available if additional hardware is installed or the existing hardware is configured in a particular way.

Topics

- Vote Now
- Alternate Partition Mode
- Pooled Channels
- Full Duplex Operation
- SQL Interface
- Simple Network Management Protocol

1 Vote Now

TaitNet networks and the radios that use them can optionally be configured to use Vote Now messages. This can improve the efficiency with which roaming radios acquire a new control channel. Radios must otherwise scan channels looking for a control channel when the signal strength of the current control channel is too low. Vote Now messages do add a small load to the control channel; every message effectively removes a slot that would otherwise be available for setting up calls.

Generally, network providers decide at network installation whether they want this feature, as all radios must be programmed to take advantage of it.

Radios must have the Vote Now function enabled before they can use it. Background hunt should be disabled. The Vote Now Advice Margin should be set to 6 or 10 dB

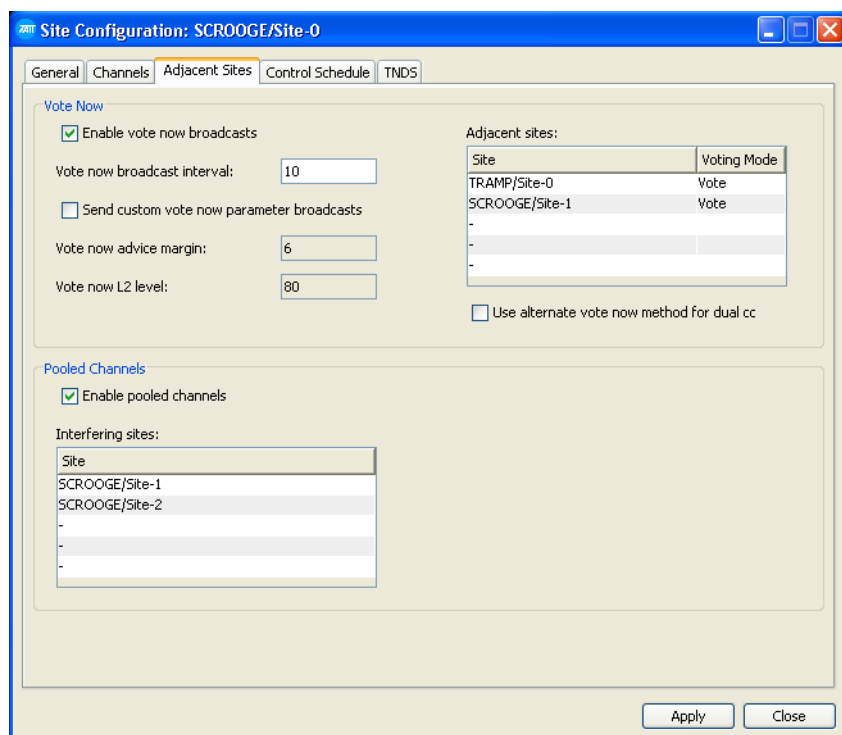
Vote Now

Vote Now messages instruct radios to vote on which channel has the greater signal strength: the current control channel or the control channel specified in the message. If the other control channel is significantly stronger, Tait radios will attempt to register with it.

1.1 Configuration

To configure a site for Vote Now, follow these steps.

1. Select *Site* > Configuration, then the Adjacent Sites tab.



2. Select the Enable Vote Now Broadcasts check box.
3. If desired, alter the Vote Now Broadcast Interval from the default of 10 seconds.
4. If a customised vote now parameter broadcast is required, enable this check box and specify the Vote Now Advice Margin and the Vote Now L2 Level values.

5. In the Adjacent Sites area, specify the Site and the Voting Mode of the control channel for adjacent sites. The maximum number of adjacent sites that can be entered depends on the versions of software installed in the Site Controller, Node Controller and NMT. Refer to “Adjacent Sites” on page 295. The voting modes can be Vote or Move (see Forcing Radios onto another Site below).
6. Press Apply.

1.2 Forcing Radios onto another Site

If required, the site can send a Move rather than a Vote Now message. The Move message instructs radios to use another control channel regardless of the signal strength.

This applies only to sites using firmware version 7.

1.3 Alternate Vote Now Method for Networks with Dual Control Channel Sites



Note: This alternate method requires both NMT and Node Controller software to be v4.09.00 or later and Site Controller software Q1722SMX v7.43 or later. If the node or site software is older, the check box setting is ignored and the normal method is always used.

With the alternate method enabled, two site features are modified:

- **Vote Now sequence**

This is best explained with the following example:

There are three adjacent sites A, B, C, and site B has dual control channels.

Using the normal method (check box not selected), sends Vote Now commands to radios in the repeating sequence A, B1, B2, C...

Using the alternate method (check box selected), sends Vote Now commands to radios in the repeating sequence A, B1, C, A, B2, C...

- **Call Rights - Use second control channel**

If the alternate method is selected at a dual control channel site, the call right that specifies on which control channel the radio must register is ignored, so radios can register on either control channel at the site.

Using the alternate method may result in more efficient use of channel resource, but only if these statements regarding your network are all true:

- The radios on the network are all part of the same fleet.
- Radios usually call the dispatcher, and only rarely call another radio.
- Radios are very mobile, that is, on average, radios move sites at least as frequently as they make calls.

With the alternate method there is no re-registration due to radios being forced to move between the control channels at the site when they register. This reduces control channel loads. Statistical chance should distribute radios equally between the two control channels.



Note: The same Vote Now method should be used on every site on the network, irrespective of whether the site has single or dual control channels. Mixing Vote Now methods is likely to cause impaired performance.

2 Alternate Partition Mode

Partition tables are used to assign different channel allocation strategies to different users or call types. For example, some users can be given access to all channels whilst other users may be able to use a limited number only.

When a call is attempted, the site scans the appropriate partition table and uses the first entry that matches the call attempt to determine which channel(s) can be used for this call. If no matching entry is found, the call will be aborted.

When using sites with firmware version 7, the partition tables are defined in the Site Management Module. See the Site Management Module installation manual for details.

When using sites with firmware version 5 or 6, the partition tables are set up in the CCM/CMM. See the CCM/CMM Service Manual for details.

Two sets of tables can be defined: an ordinary one and an alternate one, which can for example be configured for use in an emergency situation. You can switch a site between normal and alternate partition mode from the NMT.

2.1 Switching to Alternate Partition Mode

To switch a site to alternate partition mode, follow these steps.

1. Select *Site* > Configuration to display the Site Configuration window.
2. In the General area, click on the Enable Partition Mode box to put a tick in the box.
3. Click Apply then Close.

2.2 Viewing APM Status

The NMT can indicate whether a site is currently in normal or alternate partition mode. The Site Summary window displays the APM status of all sites and the Site Status window displays the APM status of an individual site.

Select Reports > Site Summary. The following column appears within the Site Status window.

If Alternate Partition Mode is active, a tick will appear in this column. If APM is not configured or inactive, this column will be blank.

3 Pooled Channels

If your network provider only has permission to operate with a limited number of channel frequencies, you can pool channels. This enables you to reduce the total number of frequency pairs that the TaitNet network needs. Also, if you discover unexpected frequency interference between sites, you can easily solve the problem by pooling any common channels.

Normally, sites with overlapping coverage must use different channel frequencies, because signals on the same frequency would interfere with each other. Pooled channels allow overlapping sites to use the same frequency pair. Any traffic channel can be pooled. The node prevents the sites from using the same frequency pair at the same time.

In the example shown in Figure 6, three sites with overlapping coverage each have 10 channels; five unique and five pooled. Pooling channels reduced the total number of frequency pairs used from 30 to 20.

Pooled Channels

Pooled channels are frequency pairs that are shared among channels at different but overlapping sites. The node ensures that a pooled channel is inactive if another channel is using the frequency pair. You can only pool channels that are on sites connected to the same node. Pooling channels between nodes is not supported.

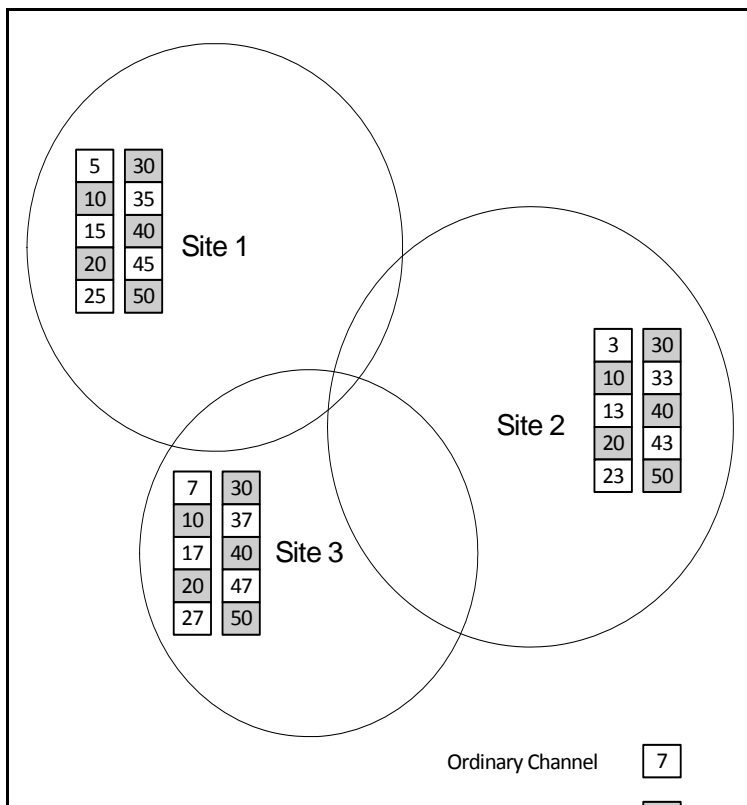
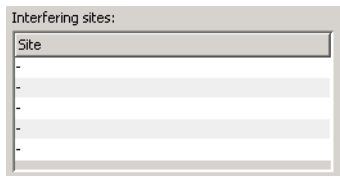


Figure 6: Pooled Channels

3.1 Setting Up Pooled Channels

To pool channels when the network is first installed, follow these steps.

1. Decide which channel frequencies and which channel equipment will be pooled.
2. Configure that equipment to use pooled channel frequencies.
3. Use the NMT to specify which sites with pooled channel frequencies have overlapping coverage. For each of these sites, follow these steps.
 - a. Select *Site* > Configuration, then the Adjacent Sites tab.
 - b. Select the Enable Pooled Channels check box.
 - c. In the Interfering Sites box, enter up to five other sites whose coverage overlaps the selected site.



- d. Press Apply.

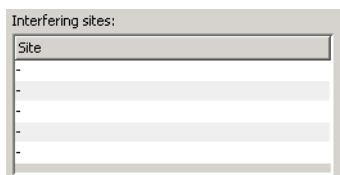
The node now automatically pools any channels common to the selected site and one or more of the interfering sites.

3.2 Pooling Interfering Channels

If, once the network is up and running, you discover that two or more channels with the same RF frequency pair are interfering with each other, you can pool them to eliminate this interference.

For each of the sites with interfering channels, follow these steps.

1. Select *Site* > Configuration tab, then the Adjacent Sites tab.
2. Select the Enable Pooled Channels check box.
3. In the Interfering Sites box, enter the other interfering sites from the drop-down lists, then press Apply.



Note: A pooled channel must always be a traffic channel, never a control channel. It is a good idea to tick the Inhibit Control Channel box in the *site* > Configuration > Channels tab for channels that are pooled, so that this restriction is enforced. Refer to “Inhibit Control Channel” on page 293.

Pooled Channels–Network Operation

When you set up pooled channels, the node provides the sites with information about which channels are pooled. When a site receives a call request and all its non-pooled channels are busy, it asks the node to specify a free pooled channel. The node checks its information about which pooled channels are in use, and supplies the site with a channel number, which the site uses to set up the call.

Interfering Site

An interfering site is a site that can cause RF interference with the selected site. Its coverage must overlap with the selected site’s coverage and it must have at least one frequency pair in common.

4 Full Duplex Operation

You can use the NMT to configure the trunked network for full duplex operation. A standard TaitNet network provides full duplex for telephone calls and intersite calls but not for local calls. Enabling full duplex operation therefore only need involve changes to local calls.



Important

Call Records for full duplex operation are not supported.

Full duplex operation requires the following:

- Users have an MPT-compliant full duplex radio (for example, the Tait full duplex T700 mobile radio; third party radios should be able to work with this TaitNet feature but have not been explicitly tested on it)
- Users dial a valid MPT phone number (for example the number of the called radio with a 3, 4, 5, or 6 in front). The first digit causes the site to treat the call as an outgoing telephone call.
- At the NMT an outphone table entry is created that will match the dialled number and replace it to form a valid MPT number that will be passed to the site

Full duplex operation uses a workaround that causes the network to process local calls as intersite calls. The node effectively asks the originating site to set up a second call. This provides a second frequency pair which makes full duplex possible.

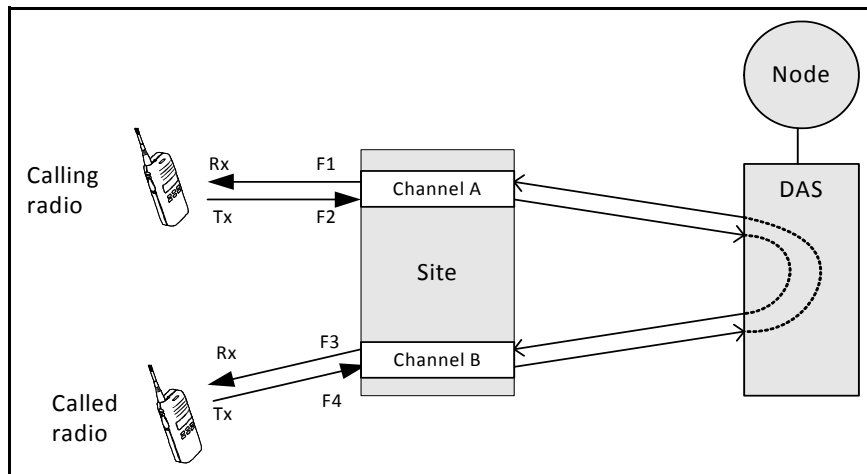


Figure 7: Site Operation During a Full Duplex Call

From the site's point of view, the calling radio requests an outgoing phone call. The entry in the outphone table causes the node to loop the call back to the originating site, using another DAS analogue I/O port, instead of connecting the call to the PSTN or PABX using a phone port. The outphone table also replaces the matched digits, which are passed back to the site. The site receives these digits as if they were from an incoming intersite call and sets up a second call that involves the called party.

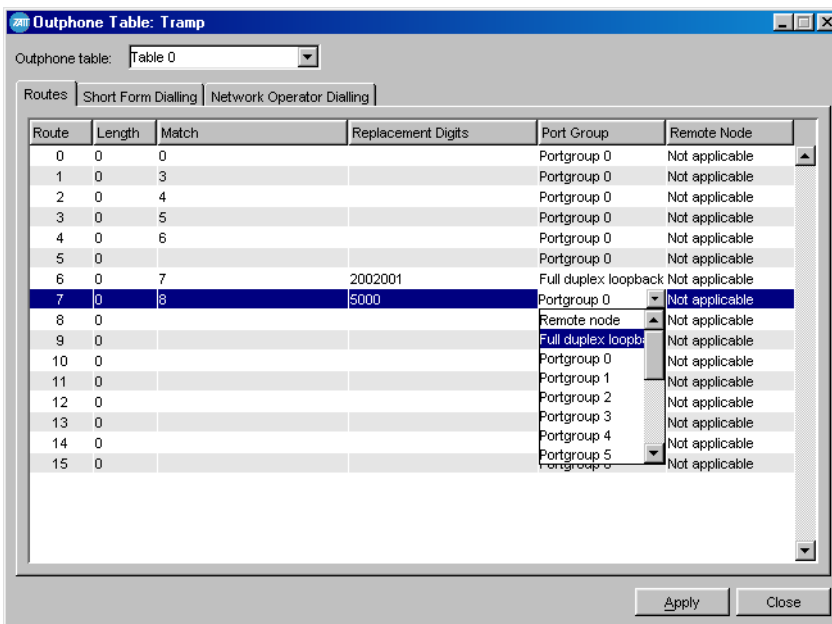


Note: The call setup process is essentially the same for an intersite or internode call, except that the second DAS port connects to a different site, or to another node. However, if callers know that the called party is at another site or node, they do not need to use the prefix: calling any MPT 1327 or 1343 number will give full duplex operation.

4.1 Setting Up Full Duplex Operation

To set up full duplex operation at a node, you need to define a suitable entry in the outphone table assigned to the full duplex radios. Follow these steps:

1. Select *Node* > Outphone Table.
2. Select the outphone table that is assigned to the radios.
3. In the Match column, enter digits to match the numbers that the full duplex radios will use.
4. In the Replacement Digits column, enter values that will result in MPT 1327 numbers (prefaced by a '1') or full-form MPT 1343 numbers.
5. In the Port Group column, select 'Full Duplex Loopback' from the top of the drop-down list.



In this example, radios use 7 as a prefix to dial other radios in their fleet or 8 to dial groups. The Replacement Digit column replaces these prefixes with the MPT 1343 prefix and fleet individual number or fleet group number for that radio's fleet.

6. Press Apply.

5 SQL Interface¹

The NMT can be configured to communicate with a MySQL database. The operation of this feature is outlined below. It is assumed the reader is familiar with the administration and use of MySQL.

The following definitions will be used in a discussion of this feature.

Definitions

NMT dataset	The NMTs' internal data: describes the network, fleets, units etc.
SQL	Structured Query Language. An ANSI standard computer language for accessing and manipulating databases.
MySQL	A popular open-source database suite (Server / Client software)
MySQL server	A MySQL database server
MySQL database	A MySQL database, running on a MySQL server; contains one or more tables of data
Table	A table within a MySQL database; contains rows of data
Column	A column of data within an SQL table
Row	A row of data within an SQL table
Data Table	A table containing NMT data
Commands Table	A table containing requests to add, modify or delete an item (fleet, unit, group for example) of NMT data
Audit Table	A table containing an audit trail of all requests to add, modify or delete an item (fleet, unit, group for example) of NMT data

5.1 Configuration

You must first create a database on your MySQL server. The NMT will write data to this database. You should also create a user that has read-write access to the database and protect that user name with a password. The NMT will log on to the MySQL server using this user name and password.

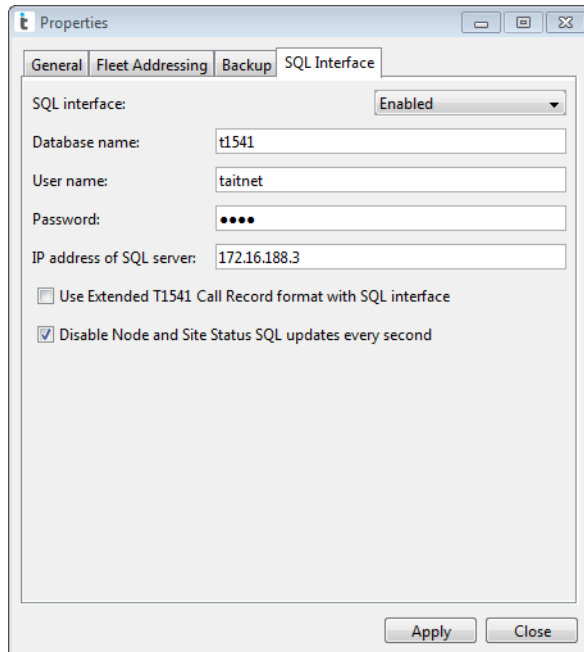
For the purposes of this document we will assume that the database was called *T1541* and that a user was created with the name *TaitNet* and the password *tait*.

1. If using NMT software earlier than v4.07.02 and you need to upload the SQL Registration, Diversion and RCGA databases from the node, select Reports > Fleet Status, click in the 'Name' window, select all fleets using 'Ctrl+A', then click 'Update'.



Note: If the SQL Configuration is changed and the ‘Apply’ button pressed, changes made do not take effect until the NMT application is restarted. This restriction does not apply to the checkboxes “Use Extended T1541 Call Record format with SQL interface” and “Disable Node and Site status SQL updates every second”. Changes in these checkboxes take effect when the ‘Apply’ button is pressed.

Only the NMT server can be configured to use this feature. Open the Properties window from the Configuration menu and select the SQL interface tab. The following window appears.



Select Enabled from the SQL interface drop down box to use this feature.

Enter the database name, user name and password in the relevant boxes. You must also enter the IP address of the MySQL server.

Using Extended T1541 Call Record Formats with SQL

If enabled, the ‘Extended T1541’ format will be used when call records are downloaded to the SQL server.

If enabled, and ‘Extended T1541’ format is not available (for example, because node software is earlier than v4.07.02, or the site in question is not connected to the Home Node for the group), B-site queuing times will be reported as -1.

For correct operation, when this feature is selected, ‘Extended T1541’ must also be selected as the call record format in the Configuration > Call Records window.

Disabling Node and Site Status SQL updates every second

By default, both the Node and Site SQL tables are updated, not by update commands received from the Node Controllers, but by an internal 1 second timer. This means that it does not matter how frequently the NMT is supplied with updated information; these tables are updated every second. If this checkbox is enabled, the internal 1 second timer is disabled, and updates are sent only when they are received from a Node Controller. In a large network with many sites, the number of updates sent by the 1 second timer may cause problems for some SQL servers.



Warning: Changing the frequency of Node and Site status updates may have unintended side effects. But this feature can be turned on or off without a requirement to restart the NMT, so it can be trialed to see whether the change is effective.

Node Configuration for SQL

For correct operation, the feature *Node > Configuration > Send All Registration/Diversion/RCGA Updates to NMT* must be enabled for every node in the network (see “Node Configuration” on page 235). This feature is not enabled by default.

5.2 Remote Access to the NMT Dataset

The NMT communicates with a MySQL server to which it sends a copy of the NMT dataset. The MySQL server stores this data in a MySQL database as a set of data tables.

See “Data Tables” on page 319 for the definition of the data tables.

Remote users are able to connect to and query the MySQL server. In this way they have remote access to the NMT dataset.

For example: login to the MySQLserver, connect to the database and type the following:

```
SELECT name, fleetID FROM FLEETS;
```

This should elicit a response in the following format (dependent on the actual data stored in the database).

name	fleetID
Rapid Taxis	10000002

Remote Control of the NMT Dataset

In addition to tables containing NMT data, the MySQL server hosts two other tables. These have the names *Commands* and *Audit*. The *Commands* table is initially empty and is provided to allow remote users to place commands to add, modify or remove units etc. This table is referred to as the ‘commands table’ and should be made available to remote users with read-write access.

The NMT periodically connects to the MySQL server and scans the commands table. If a command is found, the NMT makes the necessary changes and instructs the MySQL server to update the data tables accordingly and to remove the command from the Commands table.

Each time the NMT processes a command it creates a new entry in the Audit table. This entry describes the command and whether it was carried out successfully or not.

In this way remote users have the ability to control the NMT server.

See “Description of the Commands” on page 350 for the definition of the various commands that can be used.

For example, to delete unit 1/12, login to the MySQLserver, connect to the database and type the following:

```
INSERT INTO commands SET Cmd=DELETE_UNIT:10010012
```

The unit address is encoded in the format 1pppiiii, see “1pppiiii encoding” on page 318.

This instruction should be processed by the NMT, which will delete the relevant unit from the NMT dataset and instruct the MySQL server to delete the entry from the Units table in the MySQL database.

5.3 Access Control

The MySQL server administrator can specify which users can access which tables and from which network addresses. It is therefore a simple matter to specify which data tables can be read by an individual user and whether they can place requests in the Commands table.

5.4 MySQL Data Types

The following MySQL data types are used in the Data Tables:

Type	Storage (bytes)	Range / Format
<i>TINYINT</i>	1	-128 to 127, or 0 to 255 if unsigned
<i>SMALLINT</i>	2	-32,768 to 32,767, or 0 to 65,535 if unsigned
<i>MEDIUMINT</i>	3	-8,388,608 to 8,388,607 or 0 to 16,777,215 if unsigned
<i>INT</i>	4	Range -2,147,483,648 to 2,147,483,647 or 0 to 4,294,967,295 if unsigned
<i>CHAR(M)</i>	M	String of exactly M one-byte characters; M can be 0 to 255
<i>TEXT</i>	Length + 2	String of characters, with a maximum length of 65535
<i>DATE</i>	3	Date in the format YYYY-MM-DD
<i>DATETIME</i>	8	Date/time in the format YYYY-MM-DD hh:mm:ss
<i>TIMESTAMP</i>	4	A timestamp in the format YYYYMMDDhhmmss

Field encoding

Various items of data have to be encoded before they can be stored in the available MySQL data types. Some of the common encoding methods used are presented below:

URL encoding

Some strings may contain non-ASCII characters; in fleet names for example. To accommodate these, some TEXT fields in the database are encoded to the *x-www-form-urlencoded* form², enhanced with the UTF-8-in-URL proposal³.

In this standard each character is encoded as follows:

- The letters a-z (upper and lower case) and the numbers 0 to 9 remain unchanged
- The unreserved characters: - _ ! ~ * . ' () (minus, underscore, exclamation, tilde, asterisk, period, single quote and left and right parentheses) remain unchanged
- The space character is converted into a plus sign(+)
- All other ASCII characters are converted into the 3-character string “%xy”, where xy is the two-digit hexadecimal representation of the character code.
e.g. “Hello World?” is encoded as “Hello+World%3f”.
- All non-ASCII characters are encoded in two steps: first to a sequence of 2 or 3 bytes, using the UTF-8 algorithm; secondly each of these bytes is encoded as %xy
e.g. “Hello Français” is encoded as “Hello+Fran%c3%a7ais”

Service area encoding

Service areas are encoded as strings. Within each string are a set of substrings separated from each other by the space character. Each substring represents the service area on a particular node. The first two characters in each substring is the node number; a leading zero is used if the node number is less than 10. The third character is a space. The next 30 characters are a string of digits, with each one representing the service at each potential site on the node. The first digit represents the first site, the second digit represents the second site and so on. Each digit can have one of the following values:

0	Not Allowed
1	Allowed
2	Essential
3	Local only
4	Originate only

2. <http://www.w3.org/TR/html4/>

3. <http://www.w3.org/International/O-URL-and-ident>

Those nodes for which all sites are ‘Not Allowed’ are not displayed in the service area.

For example, consider a network with two nodes, numbered 0 and 3. The service area has been defined such that sites 0, 2, 3, 4, and 5 are available on node-0. In addition site 0 on node-3 is available and site 1 on node-3 is essential. This would be encoded as follows:

```
00 10111100000000000000000000000000 03
12000000000000000000000000000000
```

Tracked units encoding

Tracked units are encoded as strings. Within each string are a set of substrings separated from each other by the space character. Each substring represents one unit and is encoded in the format 1pppiiii, see “1pppiiii encoding” on page 318.

For example, the units 0/12 0/13 and 1/2 would be encoded as:

```
10000012 10000013 10010002
```

1pppiiii encoding

Whatever numbering scheme is in use, unit and group addresses are stored as 8 digit integers with the form 1pppiiii. The first digit is always a 1. the next three digits are the prefix and the last four are the index in the MPT1327 numbering scheme.

For example the unit 3/12 would be encoded as10030012.

MPT address display formats

MPT addresses are always stored in the 1pppiiii format described above, but sometimes a copy of the address is stored in an additional format.

If an MPT address belongs to a known fleet then it is displayed according to the format used by that fleet in one of the ways described in the following table.:

MPT1327	Addresses in this format are displayed as a prefix and an ident separated by a forward slash character. For example: 1/4415
MPT1343	Addresses in this format are displayed as three numbers separated by the minus character. The first number is the fleet prefix (FP). The second number is the fleet individual number (FIN) for units or the fleet group number (FGN) for groups. The third number is the unit number or the group number. For example: 200-2001-35

CPSx	Addresses in this format are displayed as three numbers separated by the minus character. The first number is the fleet prefix (FP). The second number is the fleet individual number (FIN). The third number is the unit number or the group number. For example: 200-25-20
ANN	Addresses in this format are displayed as a set of four numbers with no separating character. The first number is L. The second number is the prefix. The prefix can be between 0 and 3 digits long depending on the numbering model used. The third number is R for large fleets or rr for small and mini fleets. The fourth number is the unit or group number. For example: 70002200

If the address does not belong to any known fleet then it is displayed in the MPT1327 format.

Addresses in the above formats are stored as TEXT. They are not URL encoded as outlined in “URL encoding” on page 317.

5.5 Data Tables

Within the MySQL database, data is stored in a set of tables. There is one table for fleets, one for units and one for groups... etc. Within a table, an entry is represented as a row of fields. For example a single fleet occupies one row within the ‘Fleets’ table. The name of the fleet is one of the fields within that row.

In this section we present a description of all of the tables used to store data from the NMT. We also explain the types of data used and how the fields are encoded.

The structure of each table is presented in the same format as that used to display table descriptions in MySQL. These descriptions are laid out as follows:

Field	Type	Null	Key	Default
-------	------	------	-----	---------

Under Field is a list of all the column names in the table. Below Type is a list of the data types stored in each column of the table. Under Null the word YES appears if the variable can have the value Null. Under Key is information as to whether each variable is used as a key for indexing. For example the word PRI indicates that the variable is a primary index. Under Default is a list of the values to which each variable in the table defaults.

The data tables should be set to have read-only permission for all users except for the NMT.

The Fleets table

Name: Fleets

Purpose: Contains fleet definitions

Structure:

Field Descriptions:

Field	Type	Null	Key	Default
fleetID	mediumint(8) unsigned		PRI	0
name	text	YES		NULL
type	text			
p	tinyint(3) unsigned			0
bui	smallint(5) unsigned			0
bgi	smallint(5) unsigned			0
nU	smallint(6)			0
nG	smallint(6)			0
FP	smallint(5) unsigned			0
FIN	smallint(5) unsigned			0
FGN	smallint(5) unsigned			0
FBU	smallint(5) unsigned			0
FBG	smallint(5) unsigned			0
start	date	YES		NULL
end	date	YES		NULL
bar	char(1)			
CC	text	YES		NULL
CS	smallint(5) unsigned	YES		NULL
contact	text	YES		NULL
address	text	YES		NULL

fleetID

The unique ID of this fleet. The ID is the lowest possible address in the fleet (the base address) and is stored in the 1ppiiii format.

name

Name of the fleet. URL encoded.

type

Defines the numbering format used by the fleet. Can have one of the following values: 1327, 1343, CPSx or ANN.

p

Prefix of the fleet in the MPT1327 numbering scheme. Valid range 0-127.

bui

Base Unit Ident: the lowest possible unit ident for this fleet in the MPT1327 numbering scheme. Valid range 1-8100.

bgi

Base Group Ident: the lowest possible group ident for this fleet in the MPT1327 numbering scheme. Valid range 1-8100.

nU

Number of Units: maximum number of units that can fit within this fleet.

nG

Number of Groups: maximum number of groups that can fit within this fleet.

FP

Fleet Prefix. Value depends on the fleet type.

For MPT1327 and ANN, equals p. Valid range 0-127.

For MPT1343 and CPSx, equals p+200. Valid range 200-327.

FIN

Fleet Individual Number: Every unit within a fleet has the same FP and FIN. Value depends on the fleet type.

For MPT1327 fleets, this field is equal to bui.

For MPT1343 fleets, valid range is 2000-4999.

For CPSx fleets, valid range is 20-79.

For ANN fleets this number is a combination of the parameters L and R/rr and has the value $(L \times 100) + R/rr$. L can have the value 7, 8 or 9.

FGN

Fleet Group Number. Every group within a fleet has the same FP and FIN. Value depends on the fleet type.

For MPT1327 fleets, this field is equal to bgi.

For MPT1343 fleets, valid range is 5000-6050.

For CPSx and ANN fleets this field has the same value as the FIN.

FBU

Fleet Base Unit: The lowest possible unit number for this fleet stored as an integer.

For MPT1327 fleets, this field is equal to bui.

For MPT1343, CPSx or ANN fleets, this field is 20 or 200.

FBG

Fleet Base Group: The lowest possible group number for this fleet stored as an integer.

For MPT1327 fleets, this field is equal to bgi.

For MPT1343, CPSx or ANN fleets, this field is 90 or 900.

Start

Start Date: Service period start-date.

End

End Date: Service period end-date.

bar

Can have one of two values:

t - The fleet is barred

f - The fleet is not barred

CC

Cost Code. URL encoded.

CS

Charge Schedule

contact

Name of the contact person for this fleet. URL encoded.

address

Physical address of the contact person. URL encoded.

The Units table

Name: Units

Purpose: Contains unit definitions

Structure:

Field	Type	Null	Key	Default
address	mediumint(8) unsigned		PRI	0
sAddress	text	YES		NULL
fleetID	mediumint(8) unsigned	YES		NULL
info	text	YES		NULL
bar	char(1)	YES		NULL
access	char(1)	YES		NULL
OT	smallint(5) unsigned	YES		NULL
DR	smallint(5) unsigned	YES		NULL
CRT	tinyint(3) unsigned	YES		NULL
SAT	tinyint(3) unsigned	YES		NULL
SA	text	YES		NULL
blntersite	char(1)	YES		NULL
bPhone	char(1)	YES		NULL
bData	char(1)	YES		NULL
bRadio	char(1)	YES		NULL
bGroup	char(1)	YES		NULL
bPSTN	char(1)	YES		NULL
bPABX	char(1)	YES		NULL
bStatus	char(1)	YES		NULL
bSDM	char(1)	YES		NULL
bNPD	char(1)	YES		NULL
bSelfDvrt	char(1)	YES		NULL
blnterFleet	char(1)	YES		NULL
blnterPrefix	char(1)	YES		NULL
bSecondCC	char(1)	YES		NULL
dvrtBusy	mediumint(8) unsigned	YES		NULL
dvrtNotHome	mediumint(8) unsigned	YES		NULL

Field	Type	Null	Key	Default
sDvrtBusy	text	YES		NULL
sDvrtNotHome	text	YES		NULL
phone	text	YES		NULL

Field descriptions:

address

Unit address in the 1ppiiii format.

sAddress

Unit address in the numbering format used by the NMT.

fleetID

The ID of the fleet to which this unit belongs. The ID is the lowest possible address in the fleet (the base address) and is stored in the 1ppiiii format.

info

An optional string. Stored as a URL encoded TEXT string.

bar

Can have one of the following values:

- t** - The unit is barred from the network
- f** - The unit is not barred from the network

access

Access level of the unit. Can have one of the following values:

- B** - Barred
- N** - Normal
- P** - Priority
- E** - Emergency

OT

Outphone table number. Valid range is 0-31.

DR

Dialling rule number. Valid range is 0-9.

CRT

Call Rights Template number. A value of zero indicates this unit has custom call rights and does not use a template.

SAT

Service Area Template number. A value of zero indicates this unit has a custom service area and does not use a template.

SA

Service Area encoded as described in section 6.5.3. If SAT is non-zero this field is empty.

bInterSite

Can have one of two values:

- t** - Intersite calls are allowed
- f** - Intersite calls are not allowed

bPhone

Can have one of two values:

- t** - Local phone calls are allowed
- f** - Local phone calls are not allowed

bData

Can have one of two values:

- t** - Local data calls are allowed
- f** - Local data calls are not allowed

bRadio

Can have one of two values:

- t** - Speech calls to radios are allowed
- f** - Speech calls to radios are not allowed

bGroup

Can have one of two values:

- t** - Speech calls to groups are allowed
- f** - Speech calls to groups are not allowed

bPSTN

Can have one of two values:

- t** - PSTN calls are allowed
- f** - PSTN calls are not allowed

bPABX

Can have one of two values:

- t** - PABX calls are allowed
- f** - PABX calls are not allowed

bStatus

Can have one of two values:

- t** - Status message calls are allowed
- f** - Status message calls are not allowed

bSDM

Can have one of two values:

- t** - SDM calls are allowed
- f** - SDM calls are not allowed

bNPD

Can have one of two values:

- t** - NPD calls are allowed
- f** - NPD calls are not allowed

bSelfDvrt

Can have one of two values:

- t** - Self diversions are allowed
- f** - Self diversions are not allowed

bInterFleet

Can have one of two values:

- t** - Inter-fleet calls are allowed
- f** - Inter-fleet calls are not allowed

bInterPrefix

Can have one of two values:

- t** - Inter-prefix calls are allowed
- f** - Inter-prefix calls are not allowed

bSecondCC

Can have one of two values:

- t** - Radio is allowed on 2nd control channel (if available)
- f** - Radio not allowed on 2nd control channel (if available)

dvrtBusy

Address that this unit is diverted to when busy. Stored in the 1ppiiii format. NULL if the unit is not diverted when busy.

dvrtNotHome

Address that this unit is diverted to when not home. Stored in the 1ppiiii format. NULL if the unit is not diverted when not home.

sDvrtBusy

The address that this unit is diverted to when busy, if any. Stored in the numbering format used by the NMT. NULL if the unit is not diverted when busy.

sDvrtNotHome

The address that this unit is diverted to when not home, if any. Stored in the numbering format used by the NMT. NULL if the unit is not diverted when not home.

phone

The phone number alias (if any).

The ESNs table

Name: esns

Purpose: Contains unit electronic serial number information

Structure:

Field	Type	Null	Key	Default
address	mediumint(8) unsigned		PRI	0
sAddress	text	YES		NULL
code	tinyint(3) unsigned	YES		NULL
model	tinyint(3) unsigned	YES		NULL
serial	mediumint(8) unsigned	YES		NULL
pCode	tinyint(3) unsigned	YES		NULL
pModel	tinyint(3) unsigned	YES		NULL
pSerial	mediumint(8) unsigned	YES		NULL
pDate	datetime	YES		NULL
pStatus	char(1)	YES		NULL
pDays	smallint(5) unsigned	YES		NULL
bPReg	char(1)	YES		NULL
bPPhone	char(1)	YES		NULL
bPCall	char(1)	YES		NULL

Field descriptions:

address

Unit address in the 1ppiiii format.

sAddress

Unit address in the numbering format used by the NMT.

code

The manufacturers code. Valid range 0-255.

model

Model number. Valid range 0-15.

serial

Serial number. Valid range 0-262,143.

pCode

The manufacturers code that was received after the last ESN poll of this unit.

pModel

The model number that was received after the last ESN poll of this unit.

pSerial

The serial number that was received after the last ESN poll of this unit.

pDate

The date and time of the last ESN poll on this unit.

pStatus

Result of the last ESN poll on this unit. Can be one of the following:

- U** - Unknown
- X** - No Response
- P** - Polling
- B** - Bad ESN received
- G** - Good ESN received

pDays

Number of days that must elapse between automatic ESN polls.

bPReg

Can have one of two values:

- t** - Automatic polls occur after the unit registers
- f** - Automatic polls do not occur after the unit registers

bPPhone

Can have one of two values:

- t** - Automatic polls occur after the unit makes a phone call
- f** - Automatic polls do not occur after unit makes a phone call

bPCall

Can have one of two values:

- t** - Automatic polls occur after the unit makes a call
- f** - Automatic polls do not occur after the unit makes a call

The Diversions table

Name: Diversions

Purpose: Contains unit diversion information

Structure:

Field	Type	Null	Key	Default
address	mediumint(8) unsigned		PRI	0
sAddress	text	YES		NULL

Field	Type	Null	Key	Default
dvrt	mediumint(8) unsigned	YES		NULL
sDvrt	text	YES		NULL
whenDvrt	datetime	YES		NULL

Field descriptions:

address

Unit address in the 1pppiiii format.

sAddress

Unit address in the numbering format used by the NMT.

dvrt

The address that this unit is diverted to, if any. Stored in the 1pppiiii format. This information can be out of date and should be updated by issuing a GET_UNIT_DI command.

sDvrt

The address that this unit is diverted to, if any. Stored in the numbering format used by the NMT. To ensure this data is up-to-date, issue a GET_UNIT_DI command.

whenDvrt

The date and time when this unit was diverted. To ensure this data is up-to-date, issue a GET_UNIT_DI command.

The Registrations table

Name: Registrations

Purpose: Contains unit registration information

Structure:

Field	Type	Null	Key	Default
address	mediumint(8) unsigned		PRI	0
sAddress	text	YES		NULL
regd	text	YES		NULL
regdDate	datetime	YES		NULL
state	tinyint(3) unsigned	YES		NUL

Field descriptions:

address

Unit address in the 1pppiiii format.

sAddress

Unit address in the numbering format used by the NMT.

regd

Site on which unit is registered. URL encoded. To ensure this data is up-to-date, issue a GET_UNIT_RI command.

whenRegd

Date and time when the unit last registered. To ensure this data is up-to-date, issue a GET_UNIT_RI command.

state

Registration Status. Can be one of the following:

0 - Not Registered

2 - Registered

The RCGA (radio controlled group affiliation) table

Name: RCGA

Purpose: Contains information on RCGA enabled units

Structure:

Field	Type	Null	Key	Default
address	mediumint(8) unsigned		PRI	
sAddress	text	YES		NULL
group1	mediumint(8) unsigned	YES		NULL
sGroup1	text	YES		NULL
group2	mediumint(8) unsigned	YES		NULL
sGroup2	text	YES		NULL
whenChanged	datetime	YES		NULL

Field descriptions:

address

Unit address in 1ppiiii format.

sAddress

Unit address in the numbering format used by the NMT.

group1

Address of first group this unit is registered as a tracked member of (in 1ppiiii format).

sGroup1

Address of first group this unit is registered as a tracked member of (in the numbering format used by the NMT).

group2

Address of second group this unit is registered as a tracked member of (in 1pppiiii format).

sGroup2

Address of second group this unit is registered as a tracked member of (in the numbering format used by the NMT).

whenChanged

Date and time when the RCGA membership of this unit last changed.

The Dynamic Groups table

Name: Dynamic Groups

Purpose: Contains information about dynamic groups

Structure:

Field	Type	Null	Key	Default
address	mediumint(8) unsigned		PRI	0
sAddress	text	YES		NULL
DG	mediumint(8) unsigned	YES		NULL
sDG	text	YES		NULL
state	char(1)	YES		NULL

Field descriptions:

address

Unit address in the 1pppiiii format.

sAddress

Unit address in the numbering format used by the NMT.

DG

Address of the dynamic group this unit belongs to. Stored in the 1pppiiii format.

sDG

Address of the dynamic group this unit belongs to. Stored in the numbering format used by the NMT.

state

Status of the dynamic regrouping. Can be one of the following:

U - Unknown

R - Regrouped

P - Pending regroup

A - Attempting regroup

The Stun table

Name: Stun

Purpose: Contains information about stunned units

Structure:

Field	Type	Null	Key	Default
address	mediumint(8) unsigned		PRI	0
sAddress	text	YES		NULL
state	text	YES		NULL

Field descriptions:

address

Unit address in the 1ppiiii format.

sAddress

Unit address in the numbering format used by the NMT.

state

The stun status of the unit. Can be one of the following:

U - Unknown

S - Stunned

R - Revived

PS - Pending stun

PR - Pending revive

AS - Polling after stun

AR - Polling after revive

The Groups table

Name: Groups

Purpose: Contains group definitions

Structure:

Field	Type	Null	Key	Default
address	mediumint(8) unsigned		PRI	0
sAddress	text	YES		NULL
fleetID	mediumint(8) unsigned	YES		NULL
info	text	YES		NULL
SAT	smallint(5) unsigned	YES		NULL
SA	text	YES		NULL
maxQ	tinyint(3) unsigned	YES		NULL

Field	Type	Null	Key	Default
bLE	char(1)	YES		NULL
TU	text	YES		NULL
phone	text	YES		NULL
homeNode	tinyint(3) unsigned	YES		NULL
bAutoHome	char(1)	YES		NULL
bReg	char(1)	YES		NULL
bAck	char(1)	YES		NULL
bRCGA	char(1)	YES		NULL

Field descriptions:

address

Address of the group in the 1pppiiii format.

sAddress

Address of the group in the numbering format used by the NMT.

fleetID

The ID of the fleet to which this group belongs. The ID is the lowest possible address in the fleet (the base address) and is stored in the 1pppiiii format.

info

An optional string. URL encoded.

SAT

Service Area Template number. A value of zero indicates this group has a custom service area and does not use a template.

SA

Service Area. Encoded as described in section “Service area encoding” on page 317.

maxQ

Maximum queuing time in seconds. Valid range 0-50.

bLE

Can have one of two values:

- t** - Late entry is enabled
- f** - Late entry is disabled

TU

A list of tracked units. This parameter has no meaning unless the group is registration based. The tracked units are encoded as described in section “Tracked units encoding” on page 318.

phone

The phone number alias (if any).

homeNode

The home node. Valid range is 0-31.

bAutoHome

Can have one of two values:

- t** - Auto home node is enabled
- f** - Auto home node is disabled

bReg

Can have one of two values:

- t** - The group is registration based
- f** - The group is not registration based

bAck

Can have one of two values:

- t** - The group is acknowledged
- f** - The group is not acknowledged

bRCGA

Can have one of two values:

- t** - Radio controlled group affiliation is enabled for this group
- f** - Radio controlled group affiliation is disabled for this group

The Nodes table

Name: Nodes

Purpose: Contains information about the nodes

Structure:

Field	Type	Null	Key	Default
n	tinyint(3) unsigned		PRI	0
name	text	YES		NULL
state	char(1)	YES		NULL
dasState	char(1)	YES		NULL
nCP	smallint(5) unsigned	YES		NULL
nRP	smallint(5) unsigned	YES		NULL
nSP	smallint(5) unsigned	YES		NULL

Field	Type	Null	Key	Default
nFP	smallint(5) unsigned	YES		NULL
stateB	char(1)	YES		NULL
dasStateB	char(1)	YES		NULL

Field descriptions:

n

Node number

name

Node name. URL encoded.

state

Primary node status. Can be one of the following:

- X** - Node not available
- U** - Node up (active)
- D** - Node down (activating or failed)
- S** - Node in standby mode
- P** - Node in programming mode

dasState

Primary DAS status. Can be one of the following:

- X** - DAS not available (not present)
- U** - DAS up (active)
- D** - DAS down (failed)
- S** - DAS in standby mode
- M** - DAS in monitor mode⁴

nCP

Number of connected DAS ports.

nRP

Number of reserved DAS ports.

nSP

Number of in-service DAS ports.

nFP

Number of failed DAS ports.

4. Used only in Option 4 High Availability nodes, where the entire DAS is duplicated ("High Availability Type" on page 237). Indicates that the DAS is in standby mode and actively monitoring all DAS ports under its control.

stateB

Backup node status. Can be one of the following:

- X** - Node not available
- U** - Node up (active)
- D** - Node down (activating or failed)
- S** - Node in standby mode
- P** - Node in programming mode

dasStateB

Backup DAS status. Can be one of the following:

- X** - DAS not available (not present)
- U** - DAS up (active)
- D** - DAS down (failed)
- S** - DAS in standby mode
- M** - DAS in monitor mode⁵

The Sites table

Name: Sites

Purpose: Contains information about the sites

Structure:

Field	Type	Null	Key	Default
n	tinyint(3) unsigned		PRI	0
s	tinyint(3) unsigned		PRI	0
name	text	YES		NULL
state	char(1)	YES		NULL
nAC	smallint(5) unsigned	YES		NULL
nQC	smallint(5) unsigned	YES		NULL
nSC	smallint(5) unsigned	YES		NULL
nFC	smallint(5) unsigned	YES		NULL

Field descriptions:

n

Node number

s

Site number

5. Used only in Option 4 High Availability nodes, where the entire DAS is duplicated ("High Availability Type" on page 237). Indicates that the DAS is in standby mode and actively monitoring all DAS ports under its control.

name

Site name. URL encoded.

state

Site status. Can have one of two values:

U - Site up

D - Site down

nAC

Number of active calls.

nQC

Number of queued calls.

nSC

Number of in-service channels.

nFP

Number of failed channels.

The CRTs table

Name: CRTs

Purpose: Contains call rights template definitions

Structure:

Field	Type	Null	Key	Default
n	smallint(5) unsigned		PRI	0
name	text	YES		NULL
info	text	YES		NULL
bIntersite	char(1)	YES		NULL
bPhone	char(1)	YES		NULL
bData	char(1)	YES		NULL
bRadio	char(1)	YES		NULL
bGroup	char(1)	YES		NULL
bPSTN	char(1)	YES		NULL
bPABX	char(1)	YES		NULL
bStatus	char(1)	YES		NULL
bSDM	char(1)	YES		NULL
bNPD	char(1)	YES		NULL
bSelfDvrt	char(1)	YES		NULL

Field	Type	Null	Key	Default
bInterFleet	char(1)	YES		NULL
bInterPrefix	char(1)	YES		NULL
bSecondCC	char(1)	YES		NULL

Field descriptions:

n

A unique ID number for the template.

name

Name of the template. URL encoded.

info

Optional description of the template. URL encoded.

bInterSite

Can have one of two values:

- t** - Intersite calls are allowed
- f** - Intersite calls are not allowed

bPhone

Can have one of two values:

- t** - Local phone calls are allowed
- f** - Local phone calls are not allowed

bData

Can have one of two values:

- t** - Local data calls are allowed
- f** - Local data calls are not allowed

bRadio

Can have one of two values:

- t** - Speech calls to radios are allowed
- f** - Speech calls to radios are not allowed

bGroup

Can have one of two values:

- t** - Speech calls to groups are allowed
- f** - Speech calls to groups are not allowed

bPSTN

Can have one of two values:

- t** - PSTN calls are allowed
- f** - PSTN calls are not allowed

bPABX

Can have one of two values:

- t** - PABX calls are allowed
- f** - PABX calls are not allowed

bStatus

Can have one of two values:

- t** - Status message calls are allowed
- f** - status message calls are not allowed

bSDM

Can have one of two values:

- t** - SDM calls are allowed
- f** - SDM calls are not allowed

bNPD

Can have one of two values:

- t** - NPD calls are allowed
- f** - NPD calls are not allowed

bSelfDvrt

Can have one of two values:

- t** - Self diversions are allowed
- f** - Self diversions are not allowed

bInterfleet

Can have one of two values:

- t** - Inter-fleet calls are allowed
- f** - Inter-fleet calls are not allowed

bInterPrefix

Can have one of two values:

- t** - Inter-prefix calls are allowed
- f** - Inter-prefix calls are not allowed

bSecondCC

Can have one of two values:

- t** - Radio can use 2nd control channel (if available)
- f** - Radio cannot use 2nd control channel (if available)

The SATs table

Name: SATs

Purpose: Contains Service Area Template definitions

Structure:

Field descriptions:

Field	Type	Null	Key	Default
n	smallint(5) unsigned		PRI	0
name	text	YES		NULL
info	text	YES		NULL
SA	text	YES		NULL

n

A unique ID number for the template.

name

Name of the template. URL encoded.

info

Optional description of the template. Stored as a URL encoded TEXT string.

SA

The 'Service Area' for this unit. This is encoded as described in "Service area encoding" on page 317.

The Dialling Rules table

Name: DiallingRules

Purpose: Contains the names of the dialling rules

Structure:

Field	Type	Null	Key	Default
n	tinyint(4)		PRI	0
Name	text	YES		NULL

Field descriptions:

n

A unique ID number for the dialling rule.

name

Name of the rule. URL encoded.

The Outphone Tables table

Name: OutphoneTables

Purpose: Contains the names of the outphone tables

Structure:

Field descriptions:

n

A unique ID number for the outphone table.

Field	Type	Null	Key	Default
n	tinyint(4)		PRI	0
Name	text	YES		NULL

name

Name of the outphone table. URL encoded.

The Charge Schedules table

Name: ChargeSchedules

Purpose: Contains the charging schedules

Structure:

Field	Type	Null	Key	Default
n	tinyint(4)		PRI	0
name	text	YES		NULL
info	text	YES		NULL
mon	text	YES		NULL
tue	text	YES		NULL
wed	text	YES		NULL
thu	text	YES		NULL
fri	text	YES		NULL
sat	text	YES		NULL
sun	text	YES		NULL

Field descriptions:

n

A unique ID number for the charge schedule.

name

Name of the charge schedule. Stored as a URL encoded TEXT string.

info

Optional description of the template. Stored as a URL encoded TEXT string.

mon

24 numbers separated by the space character. Each number represents the charge scheme to be used during that hour of Monday. If no charge scheme is to be used the number is set to -99.

tue

As for mon (above) but applies to Tuesday.

wed

As for mon (above) but applies to Wednesday.

thu

As for mon (above) but applies to Thursday.

fri

As for mon (above) but applies to Friday.

sat

As for mon (above) but applies to Saturday.

sun

As for mon (above) but applies to Sunday.

The CallRecords table

Name: CallRecords

Purpose: This table contains call records downloaded from the node(s)

Structure:

Field	Type	Null	Key	Default
date	datetime		PRI	0000-00-00 00:00:00
node	tinyint(3) unsigned			0
nodeName	text	YES		NULL
nodeSeq	int(10) unsigned		PRI	0
site	tinyint(3) unsigned			0
siteName	text	YES		NULL
siteSeq	int(10) unsigned		PRI	0
ch	tinyint(3) unsigned	YES		NULL
caller	mediumint(8) unsigned	YES		NULL
called	mediumint(8) unsigned	YES		NULL
sCaller	text			
sCalled	text			
charged	tinyint(4)	YES		NULL
chargedFleetID	mediumint(8) unsigned	YES		NULL
chargedCC	text	YES		NULL

Field	Type	Null	Key	Default
type	char(1)			
priority	char(1)			
interSite	char(1)			
onAir	smallint(5) unsigned			0
queue	smallint(5) unsigned			0
answer	smallint(5) unsigned			0
mps	smallint(5) unsigned			0
dialled	text	YES		NULL
exchange	text	YES		NULL
aParty	text	YES		NULL
end	tinyint(3) unsigned			0
close	tinyint(3) unsigned			0
nPorts	smallint(5) unsigned			0
DAS	text	YES		NULL
nCh	tinyint(3) unsigned			0
chs	text	YES		NULL

Field descriptions:

date

Time and date of the call.

node

Number of the node from which the call originated.

nodeName

Name of the node from which the call originated. URL encoded.

nodeSeq

Number assigned to the call record by the node. In each subsequent record, the value increases by one.

site

Number of the site from which the call originated. See “Caller Locations” on page 113 for details.

siteName

Name of the site from which the call originated. URL encoded.

siteSeq

A number assigned to the call record by the originating site.

ch

Number of the channel that carried the call on the originating site.
See “Caller Locations” on page 113 for details.

caller

The address of the calling party in the format 1pppiiii. Note if the calling party did not have an MPT1327 address (for example it may have been an incoming phone call) then this field is NULL.

called

The address of the called party in the format 1pppiiii. Note if the called party did not have an MPT1327 address (for example it may have been an outgoing phone call) then this field is NULL.

sCaller

The address of the calling party in the numbering format used by the NMT.

sCalled

The address of the called party in the numbering format used by the NMT.

charged

Can have one of three values:

- 0** - The calling party pays for the call
- 1** - The called party pays for the call
- 100** - The NMT could not decide who pays for the call

chargedFleetID

The fleet to which the unit paying for the call belongs.

chargedCC

The cost code assigned to the fleet to which the unit paying for the call belongs.

type

Call Type: Can have one of the following values:

- I** - Individual speech
- B** - Broadcast speech
- G** - Group speech
- S** - Status
- M** - Individual SDM
- N** - Individual NPD
- X** - Abort
- T** - Divert

- R** - Registration
- b** - Broadcast NPD
- s** - Group status
- m** - Group SDM
- n** - Group NPD
- p** - Pressel message
- P** - ESN poll

priority

Can have one of the following values:

- N** - Normal
- P** - Priority
- E** - Emergency

interSite

Can have one of the following values:

- t** - The call was intersite
- f** - The call was local

onAir

Time in seconds that the call was on-air. For SDM or status messages this field contains the number of control channel slots used.

queue

Time in seconds that the call was queued for a busy channel. In the case of a group call, this is the time queued for a busy channel at the calling site, not the total time the call was queued for.

answer

Indicates how long the radio or telephone was ringing before the call was answered. This includes time queued because the called party is busy.

mps

The number of meter pulses recorded during the call.

dialled

The digits dialled by the user making the call.

exchange

For a radio-to-telephone call, this field contains the digits that the node sent to the PSTN/PABX. These are the dialled digits as modified by the matching entry in the outphone table for the calling radio.

For a telephone-to-radio call, this field contains the digits that the node received from the PSTN/PABX (generally the number that the caller dialled after connecting to the trunked network).

aParty

For a radio-to-telephone call, this field contains the digits that were sent to the PSTN/PABX as the caller ID. This is the MPT number of the radio. If the radio has a phone alias and the port group is configured to transmit phone aliases as caller IDs then this field will contain the radios phone alias instead.

For a telephone-to-radio call, this field contains the caller ID if the node received it from the PSTN/PABX.

end

This field contains a numeric code giving a detailed reason why the call ended or failed. See “Interpreting Call End Reasons” on page 102 for more details.

close

This field contains a numeric code giving a simple reason why the call ended or failed. See “Interpreting Call Close Reasons” on page 101 for more details.

nPorts

The number of DAS ports involved in the call.

DAS

The DAS ports used during the call. They are displayed in the following format:

nodeN^o-PortN^o:nodeN^o-PortN^o...etc.

nCh

The number of RF channels involved in the call.

chs

The RF channels used during the call. They are displayed in the following format if ‘Using Extended T1541 Call Record Format with SQL’ is enabled:

nodeN^o-siteN^o- channelN^o- channelQueueTime: ... etc.

otherwise they are displayed as follows:

nodeN^o-siteN^o- channelN^o:nodeN^o-siteN^o-channelN^o:...etc.

The Alarms table

Name: Alarms

Purpose: Contains alarms generated by the node

Structure:

Field	Type	Null	Key	Default
seq	int(10) unsigned		PRI	0
node	tinyint(4)		PRI	0
aDate	datetime			0000-00-00 00:00:00

Field	Type	Null	Key	Default
type	smallint			0
details	text	YES		NULL
bAck	char(1)			
bTest	char(1)			

Field descriptions:

seq

A unique number assigned to the Alarm by the NMT.

node

Number of the node from which the alarm originated. A negative value indicates that this was a test alarm.

aDate

Time and date on which the alarm was generated.

type

This field contains a numeric code provided by the node that indicates the type of alarm that occurred.

details

A string of text describing the incident which caused the alarm to be generated. URL encoded.

bAck

Can have one of the following values:

- t** - Alarm has been acknowledged by an NMT operator
- f** - Alarm has not been acknowledged by an NMT operator

bTest

Can have one of the following values:

- t** - The alarm was a test
- f** - The alarm was not a test

The Commands table

Name: Commands

Purpose: This table allows users to request actions by the NMT

Structure:

Field	Type	Null	Key	Default
ID	int(11)		PRI	NULL
TS	timestamp	YES		CURRENT_TIMESTAMP
arb	text	YES		NULL
cmd	text	YES		

Field descriptions:

ID

A unique ID number for the command. You should not specify this parameter when you insert a command. It is generated automatically for you.

TS

The time at which the command was inserted. You should not specify this parameter when you insert a command. It is generated automatically for you.

arb

Can contain any arbitrary text.

cmd

The command.

The Audit table

Name: Audit

Purpose: This table displays an audit trail of commands that were processed by the NMT

Structure:

Field	Type	Null	Key	Default
ID	int(11)		PRI	NULL
TS	timestamp	YES		CURRENT_TIMESTAMP
arb	text	YES		NULL
cmd	text			
result	tinyint(4)			0
outcome	text	YES		NULL

Field descriptions:

ID

A unique ID number for the comand.

TS

A copy of the arbitrary timestamp from the commands table.

arb

A copy of the arbitrary text from the commands table. URL encoded.

cmd

The command.

result

The result of the command. Can have one of the following values:

- 1 - Success
- 1 - Failure
- 2 - Failure, client not ready
- 3 - Failure, incorrect message type
- 4 - Failure, invalid message
- 5 - Failure, address in use
- 6 - Failure, no such address
- 7 - Failure, no fleet

outcome

The result of the command in a human readable form.

The Status table

Name: Status

Purpose: This table reflects the status of the NMT-MySQL database

Structure:

Field	Type	Null	Key	Default
Var	int(11)		PRI	0
State	int(11)			0
TS	timestamp	YES		CURRENT_TIMESTAMP

Field descriptions:

Var

Currently has the value 0.

State

The state of the NMT-MySQL database, can have one of two values:

- 0 - The MySQL database is in the process of synching with the NMT
- 1 - The MySQL database is ready

TS

The time at which this entry was inserted.

5.6 Description of the Commands

Users make requests to the NMT by adding commands to the commands table in the MySQL database. This is done with by typing the following at the MySQL prompt:

```
INSERT INTO commands SET Cmd=<command>
```

Commands are encoded as a string of parameters separated by the colon character. The first parameter is the command type and is a string of upper case characters. Subsequent parameters follow and are separated from each other by the colon character.

For example to stun the unit 1/12 you would issue the STUN_UNIT command with the stun parameter set to 't'. To do this you would type the following at the MySQL prompt:

```
INSERT INTO commands SET Cmd=STUN_UNIT:10010012:t
```

The commands table should now contain the following entry:

TS	arb	cmd
2005-05-13 10:14:48	NULL	STUN_UNIT:10000012:t

If the command is processed correctly, the following will appear in the audit table:

TS	arb	cmd	result	outcome
2005-05-13 10:14:48	NULL	STUN_UNIT:10000012:t	1	Success

The arbitrary string and the timestamp are copied from the commands table into the audit table.

ADD_UNIT & MODIFY_UNIT

Purpose: The ADD_UNIT command requests that a unit is added.

The MODIFY_UNIT command requests that a unit is modified.

Number of Parameters: 25

Parameter number	Parameter	Description
0	command	Can have one of two values: ADD_UNIT MODIFY_UNIT
1	address	Unit address in the 1ppiiii format

Parameter number	Parameter	Description
2	info	A description of the unit formatted as a URL encoded string. This can contain any information that the user may wish to associate with the unit. This parameter is optional and can be left blank.
3	barred	Can have one of two values: t - the unit is barred from the network f - the unit is not barred from the network
4	accessLevel	The access level of the unit. Can have one of four values: B - Barred N - Normal P - Priority E - Emergency
5	SAT	Number of the service area template to be used by the unit. Valid range is 0-65535. If set to 0 a custom service area should be supplied in parameter 7.
6	CRT	Number of the call rights template to be used by the unit. Valid range is 0-65535. If set to 0, custom call rights should be supplied in parameters 8-19.
7	serviceArea	The custom service area to be used by the unit. This must be encoded as described in section 6.5.3.
8	bIntersite	Can have one of two values: t - Intersite calls are allowed f - Intersite calls are not allowed
9	bPhone	Can have one of two values: t - Local phone calls are allowed f - Local phone calls are not allowed
10	bData	Can have one of two values: t - Local data calls are allowed f - Local data calls are not allowed
11	bRadio	Can have one of two values: t - Speech calls to radios are allowed f - Speech calls to radios are not allowed
12	bGroup	Can have one of two values: t - Speech calls to groups are allowed f - Speech calls to groups are not allowed
13	bPSTN	Can have one of two values: t - PSTN calls are allowed f - PSTN calls are not allowed
14	bPABX	Can have one of two values: t - PABX calls are allowed f - PABX calls are not allowed
15	bStatus	Can have one of two values: t - Status message calls are allowed f - Status message calls are not allowed

Parameter number	Parameter	Description
16	bSDM	Can have one of two values: t - SDM calls are allowed f - SDM calls are not allowed
17	bNPD	Can have one of two values: t - NPD calls are allowed f - NPD calls are not allowed
18	bSelfDvrt	Can have one of two values: t - Self diversions are allowed f - Self diversions are not allowed
19	bInterFleet	Can have one of two values: t - Inter-fleet calls are allowed f - Inter-fleet calls are not allowed
20	bInterPrefix	Can have one of two values: t - Inter-prefix calls are allowed f - Inter-prefix calls are not allowed
21	bSecondCC	Can have one of two values: t - Unit is allowed to use 2nd control channel (if available) f - Unit is not allowed to use 2nd control channel (if available)
22	outphoneTable	The outphone table to be used by the unit. Valid range is 0-31.
23	diallingRule	The dialling rule to be used by the unit. Valid range is 0-9.
24	divertBusy	The address to which the unit should be diverted when it is busy
25	divertNotHome	The address to which the unit should be diverted when it is not home
26	phoneAlias	The phone alias of the unit

DELETE_UNIT

Purpose: Requests that a unit is removed

Number of Parameters: 2

Parameter number	Parameter	Description
0	command	DELETE_UNIT
1	address	Unit address in the 1pppiiii format

DIVERT_UNIT

Purpose: Requests that a unit be diverted

Number of Parameters: 3

Parameter number	Parameter	Description
0	command	DIVERT_UNIT
1	address	Unit address in the 1ppiiii format
2	to	Address to which unit should be diverted. Can be a radio address or telephone number. Leave empty to cancel a diversion.

POLL_UNIT

Purpose: Requests that an ESN poll is performed on a unit

Number of Parameters: 2

Parameter number	Parameter	Description
0	command	POLL_UNIT
1	address	Unit address in the 1ppiiii format

GET_UNIT_RI

Purpose: Request the unit registration details be updated in the database

Number of Parameters: 2

Parameter number	Parameter	Description
0	command	GET_UNIT_RI
1	address	Unit address in the 1ppiiii format

GET_UNIT_DI

Purpose: Request the unit diversion information be updated in the database

Number of Parameters: 2

Parameter number	Parameter	Description
0	command	GET_UNIT_DI
1	address	Unit address in the 1ppiiii format

STUN_UNIT

Purpose: Requests that a unit be stunned / recovered

Number of Parameters: 3

Parameter number	Parameter	Description
0	command	STUN_UNIT
1	address	Unit address in the 1pppiiii format
2	bStun	Can have one of two values: t - Stun the unit f - Recover (un-stun) the unit

REGROUP_UNIT

Purpose: Requests that a group be dynamically regrouped

Number of Parameters: 3

Parameter number	Parameter	Description
0	command	REGROUP_UNIT
1	address	Unit address in the 1pppiiii format
2	groupAddress	Dynamic group address in the 1pppiiii format

GET_UNIT_RCGA

Purpose: Request the unit's radio controlled group affiliations be updated in the database

Number of Parameters: 2

Parameter number	Parameter	Description
0	command	GET_UNIT_RCGA
1	address	Unit address in the 1pppiiii format

MODIFY_UNIT_RCGA

Purpose: Modify or remove the unit's radio controlled group affiliations in the database

Number of Parameters: 4

Parameter number	Parameter	Description
0	command	MODIFY_UNIT_RCGA
1	address	Unit address in the 1pppiiii format

Parameter number	Parameter	Description
2	group1	New address of first group (in 1ppiiii format). Set to '0' to remove first group.
3	group2	New address of second group (in 1ppiiii format). Set to '0' to remove second group.

MODIFY_UNIT_ESN

Purpose: Requests that the electronic serial number (ESN) settings of a unit are modified

Number of Parameters: 9

Parameter number	Parameter	Description
0	command	MODIFY_UNIT_ESN
1	address	Unit address in the 1ppiiii format
2	code	The manufacturers code. Part of the ESN. Valid range is 0-255.
3	model	The model number. Part of the ESN. Valid range is 0-15.
4	serial	The serial number. Part of the ESN. Valid range is 0-262,143.
5	pollRoaming	Can have one of two values: t - Automatically poll ESN when the unit registers on a site f - Do not automatically poll ESN when the unit registers on a site
6	pollAnyCall	Can have one of two values: t - Automatically poll ESN poll when the unit makes a call f - Do not automatically poll ESN when the unit makes a call
7	pollPhone	Can have one of two values: t - Automatically poll ESN poll when the unit makes a phone call f - Do not automatically poll ESN when the unit makes a phone call
8	minPollDays	Number of days that must pass between automatic ESN polls

ADD_GROUP & MODIFY_GROUP

Purpose: The ADD_GROUP command requests that a group is added.

The MODIFY_GROUP command requests that a group is modified.

Number of Parameters: 14

Parameter number	Parameter	Description
0	command	Can have one of two values: ADD_GROUP MODIFY_GROUP
1	address	Group address in the 1ppiiii format

Parameter number	Parameter	Description
2	info	A description of the group formatted as a URL encoded string. This can contain any information that the user may wish to associate with the group. This parameter is optional and can be left blank.
3	bAutoHome	Can have one of two values: t - The group uses an automatic home node f - The group does not use an automatic home node
4	homeNode	An integer in the range 0-31. Specifies the home node for the group, ignored and can be left empty if bAutoHome is set to 't'.
5	bAck	Can have one of two values: t - The group is acknowledged f - The group is not acknowledged
6	bLateEntry	Can have one of two values: t - Late entry (go-to-channel) is enabled f - Late entry (go-to-channel) is disabled
7	phoneAlias	The phone alias for the group
8	maxQ	An integer in the range 0-50. Specifies the maximum queuing time for the group.
9	SAT	Service area template to be used by the group. Valid range is 0-65535. If set to 0 a custom service area should be supplied in parameter 10.
10	serviceArea	The custom service area to be used by the group. This must be encoded as described in section 6.5.3. This parameter is ignored and can be left blank if SAT is none zero.
11	bRegBased	Can have one of two values: t - The group is registration based f - The group is not registration based
12	trackedUnits	A list of tracked units. This parameter has no meaning unless the group is registration based. The tracked units are encoded as described in "Tracked units encoding" on page 318.
13	bRCGA	Can have one of two values: t - Radio controlled group affiliation is enabled for this group f - Radio controlled group affiliation is disabled for this group

DELETE_GROUP

Purpose: Requests that a group is removed

Number of Parameters: 2

Parameter number	Parameter	Description
0	command	DELETE_GROUP
1	address	Group address in the 1ppiiii format

MODIFY_FLEET

Purpose: Requests that a fleet is modified

Number of Parameters: 14

Parameter number	Parameter	Description
0	command	MODIFY_FLEET
1	fleetID	The unique ID of the fleet. The ID is the lowest possible address in the fleet (the base address) and is stored in the 1ppiiii format..
2	name	Name of the fleet. Formatted as a URL encoded TEXT string.
3	contact	Name of the contact person for this fleet. Formatted as a URL encoded TEXT string.
4	address	Physical address of the contact person for this fleet. Formatted as a URL encoded TEXT string.
5	costCode	Cost Code to be used. Formatted as a URL encoded TEXT string.
6	chargeSchedule	Charging schedule to be used. Valid range is 0-23.
7	sDay	Day of month on which the service period starts. Valid range is 1-31.
8	sMonth	Month on which the service period starts. Valid range is 1-12.
9	sYear	Year on which the service period starts
10	eDay	Day of month on which the service period ends. Valid range is 1-31.
11	eMonth	Month on which the service period ends. Valid range is 1-12.
12	eYear	Year on which the service period ends
13	barred	Can have one of two values: t - The fleet is barred f - The fleet is not barred

6 Simple Network Management Protocol

Simple Network Management Protocol (SNMP) is a set of standards for network management, including a communication protocol. It is commonly used by network administrators, allowing them to communicate with network devices such as hubs, switches and routers. Two software components are involved in the communication: SNMP management software and SNMP agent software.

SNMP management software is used to monitor and/or manage a network device. This is only possible if the network device is running SNMP agent software. The device that runs the management software is a manager and the device running the agent software is an agent.

Managers can monitor an agent by requesting the state of one or more parameters. This is achieved by issuing an SNMP get command. SNMP can also be used to manage an agent by changing the state of one or more parameters. This is achieved by issuing an SNMP set command.

Traps

In addition to responding to set and get requests, agents can generate traps. These are notifications that an unusual or interesting event has occurred. Some managers can be configured to detect and log traps.

Management Information Base Files

Devices that run SNMP agent software are defined in Management Information Base (MIB) files. The MIB files contain definitions for every parameter and trap that can be monitored and/or managed on the device. Each parameter and trap is identified by a unique object identifier (OID).

MIB files are used by managers to issue set and get commands by referring to the relevant OID. Information received from an agent is translated according to the definition in the MIB.

6.1 SNMP Implementation in the Node

Starting with version 4.04.00, the T1541 node controller software supports SNMP version 2. The implementation procedure is as follows:

1. net-snmp version 5.1.1 is installed on the node computer.
2. SNMP agent software runs on the node computer at startup. The agent software is a unix daemon called snmpd.
3. The node software operates as an SNMP sub-agent. Specifically it runs as an agent-x sub-agent.
4. The node software communicates with snmpd using the unix domain socket: `/user/taitnet/agentx`

5. The node software supports SNMP get requests but not SNMP set commands. This allows the node software to be monitored, but not managed, by an SNMP manager.

6.2 Node MIB Files

The specification for the node SNMP module is contained in three MIB files. These are:

TAIT-COMMON-MIB.txt	Defines data common to all SNMP capable equipment produced by Tait Electronics Ltd
TAIT-T1541-MIB.txt	Defines data specific to the T1541 node controller
TAIT-T1541-TC.txt	Defines textual conventions used in TAIT-T1541-MIB.txt

These files are located on the node computer in the following directory:

```
/usr/local/share/snmp/mibs
```

6.3 Starting and Stopping the SNMP Daemon

The SNMP daemon (snmpd) begins running when the node computer boots up.

Should you wish to stop it running, login as **root** and type the following:

```
/etc/rc3.d/s76netsnmp stop
```

To start the daemon, login as **root** and type the following:

```
/etc/rc3.d/s76netsnmp start
```



Note: A full reboot of the node processor is also required to successfully restart SNMP

6.4 Using SNMP Command Line Tools

To access information from the node, you can use the SNMP command line tools. These are installed on the node computer. Log onto the node computer as the user **taitnet** (using telnet, for example) and type the appropriate command.

You may also install the tools on a separate machine, this will allow you to monitor the node without logging onto the node computer. You will need to download and install the appropriate tools for the software/hardware platform you are using. You will also need to install the three MIB files mentioned above and configure the SNMP tools so that it can find them. On a Unix system this is achieved by modifying environment variables. From a bash prompt type:

```
export MIBDIR=<path>
```

```
export MIBS=ALL
```

Detailed instructions on installing and running the SNMP command line tools on a remote machine are outside the scope of this document. In the following discussion it is assumed that you are logged onto the node computer as the user **taitnet**.

6.5 Using snmpget

The command line tool `snmpget` can be used to view the status of parameters defined within the MIB file.

For example to view the node status, enter the following command:

```
snmpget -v 2c -c public localhost taitT1541NodeStatus.0
```

You should see something like the following:

```
TAIT-T1541-MIB::taitT1541NodeStatus.0 = INTEGER: active(4)
```

There are many more status parameters that can be retrieved by `snmpget`. Study the MIB file for more details.

6.6 Using snmptable

Much of the data that are available through `snmp` are stored in the form of tables. You can use the `snmptable` command to retrieve all the information within a table.

For example, information about the sites connected to a node are contained in the site table. To retrieve the site table type the following:

```
snmptable -Ci -Cb -Cw 80 -v 2c -c public localhost taitT1541SiteTable
```

You should see something similar to the following:

```
SNMP table: TAIT-T1541-MIB::taitT1541SiteTable
```

index	AState	AQ	ATx	ARx	AErr	BState	BQ	BTx	BRx	BErr	Enabled
0	active	0	297257	321333	0	standby	0	305307	321975	0	true
1	active	0	296852	320861	0	disabled	0	0	0	0	true

```
SNMP table TAIT-T1541-MIB::taitT1541SiteTable, part 2
```

index	Type	Smm	Cmm	Time	StartTime	Sys1
0	t1722SMM	7t21	7.11	2007-5-7,3:52:0.0,+0:0	2007-4-5,0:50:0.0,+0:0	4089
1	t1722SMM	7.20	7.11	2007-5-7,3:52:0.0,+0:0	2007-2-25,20:8:0.0,+0:0	40F9

```
SNMP table TAIT-T1541-MIB::taitT1541SiteTable, part 3
```

index	Sys2	LocalCh	IsiteCh	FailedCh	Calls	Queued	Units	CC1	CC1Exp	CC2	CC2Exp
0	4889	0	2	0	0	0	0	56	56	0	0
1	0000	0	2	0	0	0	0	228	228	0	0

```
SNMP table TAIT-T1541-MIB::taitT1541SiteTable, part 4
```

index	Apm	Icbm	Temperature	Battery	Das
0	false	false	29C	4.1V	32
1	false	false	29C	4.1V	32

6.7 Receiving Traps

To receive traps you must run a daemon called `snmptrapd`. This can be run on the node computer but only by the root user. To start `snmptrapd`, log onto the node computer as `root` and type the following:

```
/usr/local/sbin/snmptrapd -f -Le -F "TRAP from %B on %m/%l/%y at %h:%j:%k \nEnterprise=%N Type=%w SubType=%q \nwith Varbinds: %v \n\n" localhost:162
```


As the node starts, you should see output of the following form:

```
2007-05-07 02:55:28 NET-SNMP version 5.1.1 Started.
TRAP from localhost on 5/7/2007 at 2:56:10 Enterprise=TAIT-T1541-
MIB::taitT1541Events
Type=6 SubType=TAIT-T1541-MIB::taitT1541NodeActivatedEvent
with Varbinds: TAIT-T1541-MIB::taitT1541NodeStatus.0 = INTEGER: active(4)
TAIT-T1541-MIB::taitT1541EventSeverity.0 = INTEGER: alarm(2)

TRAP from localhost on 5/7/2007 at 2:56:19 Enterprise=TAIT-T1541-
MIB::taitT1541Events
Type=6 SubType=TAIT-T1541-MIB::taitT1541NodeDasEvent
with Varbinds: TAIT-T1541-MIB::taitT1541PrimaryDasStatus.0 = INTEGER:
standby(2)
TAIT-T1541-MIB::taitT1541BackupDasStatus.0 = INTEGER: disabled(3)
TAIT-T1541-MIB::taitT1541EventSeverity.0 = INTEGER: notificatation(0)

TRAP from localhost on 5/7/2007 at 2:56:19 Enterprise=TAIT-T1541-
MIB::taitT1541Events
Type=6 SubType=TAIT-T1541-MIB::taitT1541SiteUpEvent
with Varbinds: TAIT-T1541-MIB::taitT1541SiteAState.0 = INTEGER: linkFailed(3)
TAIT-T1541-MIB::taitT1541SiteAState.0 = INTEGER: linkFailed(3)
TAIT-T1541-MIB::taitT1541EventSeverity.0 = INTEGER: alarm(2)

TRAP from localhost on 5/7/2007 at 2:56:19 Enterprise=TAIT-T1541-
MIB::taitT1541Events
Type=6 SubType=TAIT-T1541-MIB::taitT1541SiteUpEvent
with Varbinds: TAIT-T1541-MIB::taitT1541SiteAState.1 = INTEGER: linkFailed(3)
TAIT-T1541-MIB::taitT1541SiteAState.1 = INTEGER: disabled(0)
TAIT-T1541-MIB::taitT1541EventSeverity.0 = INTEGER: alarm(2)
```


Glossary

This glossary contains an alphabetical list of terms and abbreviations used in the NMT and this manual.

Access Level	The caller's allocated access type and priority level. The four possible access levels (in order of increasing priority) are Barred, Normal, Priority, and Emergency. See also <i>Priority</i> .
Alarms	Notifications to an NMT operator signifying events that may affect service to users.
Alias	See <i>Phone Alias</i> .
ALLI Call	An ALLI (all idents) call is a system-wide call to all radio units on a <i>trunking</i> system.
Alternate Partition Mode	A mode of site operation in which the channels are divided up among users in a different way from normal partition mode. The NMT can switch to or from alternate partition mode.
A-Site	The calling party's Site. Contrast with <i>B-Site</i> .
Barred	An access level. When a radio has this access level, it is not able to make or receive calls using the trunked network.
Batch Validation	The manually initiated process of transferring information extracted from the Validation Database to one or more specified <i>Sites</i> , usually done to ensure that the Sites have the correct information (for example, following Site outage or memory clearance). See also <i>Validation</i> .
Broadcast Call	A <i>Group Call</i> where group members can only listen.
B-Site	The called party's Site. Contrast with <i>A-Site</i> .
Busy Hour	The continuous one-hour period with the highest average traffic intensity.
Call Diversion	A procedure that diverts incoming radio calls for a specific radio to another radio or to a PSTN or PABX number. Diversion details are stored at Nodes. See also <i>Diversion calls</i> .
Call Diagnostics	A feature of Tait site equipment. When it is enabled, sites generate call records for calls that fail and all call records contain a call end reason.
Call Record	A set of information about a call made on the trunked radio network. This information includes the date and start time of the call, the numbers of the calling and the called parties, and the duration of the call.

CCM	An abbreviation of <i>Channel Control Module</i> .
CCM Number	A number between 1 and 23 that is set using DIP switches in the CCM. The number must be unique for each CCM in a site. One CCM takes over as the control channel. It operates with the CCM number 0. CCM numbers are used in communications on the site bus. CCM number is not to be confused with <i>Channel Number</i> .
Channel	1) A particular pair of communications frequencies. 2) The equipment at a Site that routes and queues communications on a particular frequency pair.
Channel Control Module (CCM)	The channel equipment that controls a particular channel and the processing of calls. It supervises calls on a particular <i>Traffic Channel</i> .
Channel Number	The channel number is shorthand for the frequency pair that a channel operates on. Radios using the network are programmed with the available channel numbers and the corresponding frequency pairs and the site's CCMs have DIP switches whose settings tell each CCM its channel number (and <i>CCM Number</i>). During call setup, the control channel CCM assigns a traffic channel to the call and tells the radio that channel's channel number. The channel number is specific to trunked networks and is not related to the channel number in the T800 Programming Software and in the backplane DIP switch settings. Also, do not confuse Channel Number with <i>CCM Number</i> .
Charge Record	A charge record gives details of a call, the charge for the call itself and for the duration of the call. Charge records are generated from call records at your request.
Charge Schedule	A charge schedule specifies which <i>Charge Scheme</i> the NMT will apply at each time-slot of each day of the week. Each fleet has a charge schedule assigned to it.
Charge Scheme	A charge scheme defines how the NMT will charge for calls. It contains one or more <i>Call Type Charges</i> . A fleet is charged for calls according to the charge scheme that the <i>Charge Schedule</i> assigned to the fleet specifies for the time of the calls.
Call Type Charge	A call type charge specifies the charge for calls of a particular type. This can consist of a cost per call as well as a duration-based cost per unit of time.
Co-Located Site	A site located in close proximity to its node.
Conference Call	A <i>Group Call</i> where group members can listen and reply.
Control Block	A table of data that determines how a Site operates. For example, it defines the way calls are queued and prioritised, and the duration of different call types.
Control Channel	One particular channel at a site that controls radio access to the network. Call setup is done through the control channel.

Control Channel Reversion	An alternative term for <i>Temporary Traffic Mode</i> .
Control Schedule	Data that determines which Control Parameter Table a Site will use at any particular time period on any day of the week.
Coverage Area	A geographical area where radios can hear and be heard by a specified <i>Site</i> . Coverage areas may overlap to minimise <i>dead spots</i> .
DAS	An abbreviation of <i>Digital Audio Switch</i> .
DAS Port	An interface for handling voice and <i>NPD</i> calls at a Node. It connects calls to a Site channel, PABX, PSTN, or another audio port at a different node, so that voice and <i>NPD</i> communication can take place. Each <i>Digital Audio Switch</i> has a set of audio ports. Also referred to as a <i>DAS Port</i> .
Data Call	A call or part of a call between two <i>Mobiles</i> that carries data rather than speech communications. A data call can be a <i>status message</i> , a <i>single-segment transaction</i> , a <i>multi-segment transaction</i> or <i>Non-Prescribed Data (NPD) call</i> . Compare with <i>speech calls</i> .
DCM	The T1433 Data Channel Module is a component of a TNDS channel. It is a T1711 CMM that has been modified to operate as a DCM. See TN-1268-AN for modification details.
Dead Spot	An area where a mobile cannot communicate with any <i>Site</i> .
Destination Node	The node where the called party is.
Digital Audio Switch (DAS)	Equipment that provides switching between <i>Audio Ports</i> .
Dispatcher	An abbreviated term for a <i>Line Dispatcher</i> or <i>Text Dispatcher</i> .
DMM	The T1432 Data Management Module is a component of a TNDS channel. It is a T1722 SMM loaded with the DMM firmware Q1432DMMx.xx.
Dynamic Call Time Limit	A maximum call duration that varies depending on network loading. When the queue at a site becomes longer, the call time limit becomes shorter.
Dynamic Framelength	Dynamic framelength is an optional site feature. The control channel CCM lengthens the frames it transmits when the site is busy.
ECC	An abbreviation of <i>Embedded Controller Card</i> .
Electronic Security Number (ESN)	A unique number assigned to each radio by its manufacturer, and held in its permanent memory. The network can check the ESN of radios using its services, to ensure that they are properly authorised.

Enhanced Call Records	The collection of call records for calls that failed as well as calls that succeeded. Enhanced call records are enabled when you check Call Diagnostics in a control block.
Embedded Controller Card	Card that provides the centralised functions and overall control of a DAS Series II.
Emergency Call	A <i>Speech call</i> that may override another call to obtain a <i>channel</i> for its use. See also <i>Priority Level</i> .
ESN	An abbreviated term for a <i>Electronic Security Number</i> .
Essential Site	A site that must be involved in a group call. If this site is busy, the call cannot proceed.
Fleet	1) A group (of taxis or trucks, for example) that operates under unified control. 2) In the <i>MPT 1343 standard</i> , a named set of two blocks of MPT 1343 network numbers. One block is for <i>radios</i> , the other for groups of radios. A fleet can be made up of any set of radios that belong to the same subscriber. Radios that use the MPT 1343 numbering scheme must belong to a fleet.
Fleet Individual Number (FIN)	The middle part of the three-part MPT 1343 radio number.
Fleet Group Number (FGN)	The middle part of the three-part MPT 1343 group number.
Fleet Table	A set of fleet definitions stored in the Server NMT. This enables the server and any clients to display fleet information and to convert MPT 1327 addresses to fleet numbers and display them.
Framelength	The control channel sends data in frames. The framelength is the number of slots in the frame.
Full Off-Air Call Setup (FOACSU)	A way of setting up telephone-to-radio calls in which a traffic channel is reserved for the call during call set up, so that the call is ready to proceed once the radio operator has responded to the call alert. The called radio is only sent to channel once the radio user answers the call.
Gateway Node	The Node a PABX or PSTN outward call is placed on. Also referred to as the call's <i>Home Node</i> .
Grade of Service	The grade of service is a measure of the quality of service to the user of the trunked network. The better the grade of service, the less likely it is that a user will need to wait for a call to be set up. MPT 1318 defines grade of service as the probability that a user has to wait for more than 20 s for their call to be set up.
Group Call	A call from a radio or telephone to a group number. Only radios programmed with that group number are called.

Half-duplex	A system in which communication can go in both directions, but not at the same time. TaitNet trunked networks are duplex, but the mobiles that operate on it are half-duplex. Also referred to as Semi-duplex.
High Availability Equipment	Optional equipment installed in parallel with identical equipment in a TaitNet wide-area network to provide redundancy.
Ident	<ol style="list-style-type: none"> 1. A four-digit number used in the MPT 1327 numbering scheme for identification purposes. Each radio has a unique MPT 1327 address, consisting of a three-digit <i>Prefix (PFIX)</i> and the four-digit Ident. 2. The MPT 1343 or MPT 1327 number of any terminal equipment using the network.
Interfering Site	A site that can cause RF interference with the selected site. Its coverage must overlap with the selected site's coverage and there must be at least one common channel frequency pair.
Internode Call	A call between users at different <i>Sites</i> in different <i>Nodes</i> .
Intersite Call	<ol style="list-style-type: none"> 1. A call between users at different <i>sites</i> at the same node. 2. Any call that involves an <i>intersite line</i>. This can be an intersite call, a telephone call, or an internode call.
Intersite Channel	A <i>Traffic Channel</i> that is capable of handling <i>Intersite Calls</i> .
Intersite Line	A line connecting a Site with a Node. Also known as an intersite link, as the line can be a leased line, a microwave link, or an RF link.
LDT	An abbreviation of <i>Line Dispatcher Terminal</i> .
Line Dispatcher Terminal	Optional equipment used by a centrally located operator to connect calls between telephone users and radios or groups and to pass messages on to radio users. Also referred to as a Line-Connected Dispatcher.
Local Call	A call between users that is controlled by the same <i>Site</i> . Compare with <i>Intersite Call</i> and <i>Internode Call</i> .
Local Node	The <i>Node</i> that coordinates and controls communications for a particular <i>Site</i> and <i>coverage area</i> . Compare with <i>Remote Node</i> .
Mobile	A <i>Radio</i> that is vehicle-mounted.
Modified Off-Air Call Setup (MOACSU)	A way of setting up telephone to radio calls; similar to <i>Full Off-Air Call Setup</i> , except that the radio is sent to channel before the radio user accepts the call.

MPT 1318 Standard	A standard published by the United Kingdom Department of Trade and Industry that describes statistical data for Sites. The NMT outputs statistics compatible with this standard.
MPT 1327 Standard	A radio signalling standard published by the United Kingdom Department of Trade and Industry that describes the air interface between the <i>Site</i> and a <i>Radio</i> . This standard has been adopted in Tait trunked systems.
MPT 1343 Standard	A radio signalling standard published by the United Kingdom Department of Trade and Industry that extends MPT 1327 and specifies the performance of radios. This standard has been adopted in Tait trunked systems.
Multi-Channel Recorder (MCR)	Equipment that can record and play back voice calls on channels it is connected to.
Multiple Segment Transaction (MST)	A method of sending data over the control channel that is defined by the MPT 1343 standard. Up to 100 characters can be sent in one message.
Network Management Terminal (NMT)	1) A computer that lets you configure, monitor, and control a Tait trunked network. Each network can have one or more NMTs. 2)The Tait software that runs on an NMT computer.
Node	The equipment coordinating and controlling a group of <i>Sites</i> . It handles <i>Intersite calls</i> , <i>Internode calls</i> , and connections to PABX and PSTN lines. Each node has an associated DAS.
Node Controller	The computer controlling the communications equipment at a <i>Node</i> .
Non-Prescribed Data (NPD) call	A <i>Data call</i> that uses the audio path provided by a traffic channel for modem communications.
Number Bar	A method to prevent users making PSTN calls to certain telephone numbers (usually those involving toll call charges).
Outphone Table	The outphone table specifies how the node handles radio-to-telephone calls. Each outphone table has a number and a name. Each radio is assigned an outphone table.
Overlapping Coverage Areas	Two or more <i>coverage areas</i> that overlap geographically. A radio in an area of overlap can be instructed to choose the strongest signal. See <i>Vote Now Message</i> .
Originating Node	The node that a call originates from.
PABX	An abbreviation of Private Automatic Branch Exchange.

Phone Alias	A phone alias is a telephone number that can be used as the alias of a radio or group number. If a telephone dials a phone alias, the node can convert it into the corresponding radio number. It can also convert the number of a calling radio into the phone alias, which the telephone of the called party can display as the caller ID.
Pooled Channels	Pooled channels are frequency pairs that are shared among channels at different but overlapping sites. The node ensures that a pooled channel is inactive if another channel is using the frequency pair. You can only pool channels that are on sites connected to the same node. Pooling channels between nodes is not supported.
Port Address	A decimal or hexadecimal number that specifies a DAS port's address on the DAS bus. The node and the DAS controller use this address when communicating with the port. The port address is defined by the DAS card's switch setting (Series I) or bin number and position in the bin (Series II).
Port Group	A port group is a set of DAS ports that are connected to the same PSTN or PABX. When the node connects a radio-to-telephone call, it must use a phone port that belongs to the port group specified for the calling radio.
Prefix (PFIK)	<ol style="list-style-type: none"> 1) The first three digits of an MPT 1327 address. This value must be within the range 0 through 127. (Each MPT 1327 address consists of the PFIK and a four-digit <i>IDENT</i>.) 2) The first three digits of an MPT 1343 number. This value must be within the range 200 through 327.
Priority (of a call)	The caller's requested priority level for a call. The three possible levels (in order of increasing priority) are Normal, Priority, and Emergency. System resources are allocated on a first-come-first-served basis, <i>unless</i> a higher priority call is competing for the same resource. See also <i>Access Level</i> .
PSTN	An abbreviation of <i>Public Switched Telephone Network</i> .
Public Switched Telephone Network (PSTN)	The public telephone network whose subscribers own or rent fixed communications devices (telephones, faxes, and modems), compared to mobile communications devices (radio telephones).
Push To Talk (PTT) Key	A key on a radio that makes the radio transmit. The user presses the PTT key each time before talking.
Queue	A logical storage area containing information about calls waiting to be connected. In Tait trunked radio systems, if a call cannot be connected, it is put in a queue and automatically connected later. This happens when there is no free traffic channel, when the PSTN or PABX lines are busy, or when the called radio is busy. The NMT operator can configure the way the network queues calls. Calls can also be queued at the radio.
Radio Unit (RU)	The MPT standard's term for a <i>mobile</i> , fixed location, or <i>handportable</i> two-way radio. Terminal equipment used by users of a trunked network.

Registration	The process by which a <i>Radio</i> informs a <i>Site</i> that it has acquired that Site. When a radio acquires a site's control channel (the first time it is switched on or whenever it roams to a different site) it sends a registration message. Switching a radio on and off or even making it do a forced registration does not alter the site or node's registration information. Registration enables the network to keep track of the radio so that it can connect its incoming calls.
Registration-Based Group Call	A type of <i>Group Call</i> that only uses a channel at a site if a <i>Tracked Radio</i> belonging to the group is registered at that site.
Remote Node	A <i>Node</i> that is not the <i>Local Node</i> for a particular <i>Site</i> and <i>Coverage Area</i> . Compare with <i>Local Node</i> .
RF Channel Number	See <i>Channel Number</i>
Roaming	A term used to describe the movement of mobile <i>Radios</i> across <i>Coverage Areas</i> for <i>Sites</i> .
Route	In <i>Outphone Tables</i> , a route is an audio path from the trunked network to the PSTN or to a PABX. A route specifies a port group or another node.
Route Code	A code that a telephone user dials before dialling a unit or group number. This code 'routes' the call to a particular fleet. The user does not need to dial the full number.
RU	An abbreviation for <i>Radio Unit</i> .
Scale of Charges	Each <i>Charge Schedule</i> has a scale of charges, which consists of a set of <i>Call Type Charges</i> .
Selected Site or Node	The site or node that the NMT window you are working in applies to. The site or node that you selected when you chose a command in the site or node menu.
Server NMT	The Server NMT maintains the fleet, unit, group and charging information for itself and for any client NMTs. This ensures that the NMTs work with the same information. The Server NMT communicates with the node controllers on behalf of the client NMTs.
Service Area	The area within the total coverage area of the trunked network within which a radio or group can obtain service (register, make calls, receive calls.)
SCD	An abbreviation for <i>System Configuration Dossier</i> .
SCU	An abbreviation for <i>Site Control Unit</i> .

Short Data Message (SDM)	A <i>Data call</i> between two <i>Mobiles</i> which contains more data than a <i>status message</i> but less than a <i>Non-Prescribed Data call</i> , and that does not require an audio channel to convey the data. The user data is contained in the control channel signalling between the Site and the radio.
Short-Form Number	A two-digit number that a radio user can dial after two asterisks (**). The outphone table assigned to the radio number tells the node the full-length PSTN number of the party to be called.
Single-Segment Transmission (SST)	A method of sending data over the <i>Control Channel</i> . Up to 25 characters can be sent in a single message. In the MPT 1327 standard, SSTs are referred to as <i>Short Data Messages</i> .
Site	A multi-channel repeater station with trunking intelligence.
Site Control Unit (SCU)	Equipment at a Site that handles communications with the Node. It also holds registration, validation, and call record data. The NMT and this manual sometimes use the term ‘SCU’ broadly to include the SCU and the SMM. For example, the SCU Version column will contain the version number of the SMM, if that is what the site has.
Site Number	A number between 0 and 29 that the node uses to identify its sites. The number corresponds to port numbers on the node’s Etherlite port server (Site 0 is connected to Port 1, Site 1 is connected to Port 2, and so on).
SNMP	Simple Network Management Protocol is a set of standards for network management, including a communication protocol. It is commonly used by network administrators, allowing them to communicate with network devices such as hubs, switches and routers. Two software components are involved in the communication: SNMP management software and SNMP agent software.
Speech Calls	Calls carrying voice communications. Compare with <i>Data Calls</i> .
Status Message	A message between two <i>Radios</i> that contains only a status number (between 1 and 30). The data is conveyed on the <i>Control Channel</i> in the signalling between the <i>Site</i> and the radio. Radios or other terminal equipment can be programmed to interpret status numbers as alphanumeric labels.
System Configuration Dossier	Collection of documents that record the configuration of a TaitNet trunked network.
System Identity Code	A code transmitted by the <i>Control Channel</i> at a <i>Site</i> in order to uniquely identify the Site to <i>Radios</i> registered on the system. This code also indicates whether the network is a single-Node (T1530) or wide-area (T1540) system.
T1541	The Tait part number for the <i>Node Controller</i> of a wide-area system. The term used to designate a system containing one or more Node Controllers with this part number.

TaitNet Network	An MPT 1327 trunked mobile radio network manufactured by Tait Electronics Limited.
Temporary Traffic Mode	An optional Site mode where the <i>Control Channel</i> can be used as a <i>Traffic Channel</i> to increase traffic capacity.
Traffic Channel	A channel, not currently assigned as the <i>Control Channel</i> , used to handle <i>Speech calls</i> and <i>Non-Prescribed Data calls</i> . Some traffic channels will also be assigned as <i>Intersite channels</i> .
TNDS	<p>The TaitNet Data System provides a PMR solution for gathering vehicle locations from a large fleet of mobile radios. It has been designed for AVL applications, and is also suitable for a variety of other mobile applications, including Real Time Passenger Information.</p> <p>By adding one or more dedicated data channels to MPT 1327 TaitNet systems, custom TM8200 radios can send and receive data in an unobtrusive and bandwidth efficient manner, while retaining full MPT services.</p>
Tracked Radio	Radio belonging to a registration-based group number, which the node keeps track of, knowing which site it is registered on.
Trunking	The concept of sharing channel resources in a communications network so that the most efficient use can be made of those resources.
Unit	A <i>Call Type Charge</i> defines a duration-based cost for the call as a cost per unit of time. You can define how long that unit is.
Validation	<p>Validation controls user access to the network. The word is used in two ways:</p> <ol style="list-style-type: none"> 1) The process of checking whether a requested call is permitted, and if so allowing it to proceed. The site and the node validate call requests by checking them against their <i>validation record</i> for the calling radio or called group. The site checks all call requests and the node checks intersite call requests. 2) The process of defining the information used in the above checking process. You validate a radio by entering information in the Edit Unit window. See also <i>Batch Validation</i>.
Validation Record	Data that indicates the types of calls that can be made by a <i>Radio</i> , the <i>number bars</i> that apply, and so on.
Vote Now	Vote Now messages instruct radios to vote on which channel has the greater signal strength: the current control channel or the control channel specified in the message. If the other control channel is significantly stronger, Tait radios will attempt to register with it.

Tait General Software Licence Agreement

This Software License Agreement ("Agreement") is between you ("Licensee") and Tait International Limited ("Tait").

By using any of the Software items embedded and pre-loaded in the related Tait Designated Product, included on CD, downloaded from the Tait website, or provided in any other form, you agree to be bound by the terms of this Agreement. If you do not agree to the terms of this Agreement, do not install or use any of the Software. If you install or use any of the Software, that will be deemed to be acceptance of the terms of this Agreement.

For good and valuable consideration, the parties agree as follows:

Section 1 DEFINITIONS

“Confidential Information” means all or any information supplied to or received by Licensee from Tait, whether before or after installation or use and whether directly or indirectly pertaining to the Software and Documentation supplied by Tait, including without limitation all information relating to the Designated Products, hardware, software; copyright, design registrations, trademarks; operations, processes, and related business affairs of Tait; and including any other goods or property supplied by Tait to Licensee pursuant to the terms of this Agreement.

“Designated Products” means products provided by Tait to Licensee with which or for which the Software and Documentation is licensed for use.

“Documentation” means product and software documentation that specifies technical and performance features and capabilities; user, operation, and training manuals for the Software; and all physical or electronic media upon which such information is provided.

“Executable Code” means Software in a form that can be run in a computer and typically refers to machine language, which is comprised of native instructions the computer carries out in hardware. Executable code may also refer to programs written in interpreted languages that require additional software to actually execute.

“Intellectual Property Rights” and **“Intellectual Property”** mean the following or their substantial equivalents or counterparts, recognized by or through action before any governmental authority in any jurisdiction throughout the world and including, but not limited to all rights in patents, patent applications, inventions, copyrights, trademarks, trade secrets, trade names, and other proprietary rights in or relating to the Software and Documentation; including any adaptations, corrections, de-compilations, disassemblies, emulations, enhancements fixes, modifications, translations and updates to or derivative works from, the Software or Documentation, whether made by Tait or another party, or any improvements that result from Tait processes or, provision of information services.

“Licensee” means any individual or entity that has accepted the terms of this License.

“Open Source Software” means software with freely obtainable source code and license for modification, or permission for free distribution.

“Open Source Software License” means the terms or conditions under which the Open Source Software is licensed.

“Person” means any individual, partnership, corporation, association, joint stock company, trust, joint venture, limited liability company, governmental authority, sole proprietorship, or other form of legal entity recognized by a governmental authority.

“Security Vulnerability” means any flaw or weakness in system security procedures, design, implementation, or internal controls that if exercised (accidentally triggered or intentionally exploited) could result in a security breach such that data is compromised, manipulated, or stolen, or a system is damaged.

“Software” (i) means proprietary software in executable code format, and adaptations, translations, de-compilations, disassemblies, emulations, or derivative works of such software; (ii) means any modifications, new versions and new releases of the software provided by Tait; (iii) means any upgrades, enhancements or other functions or features to the Software provided by Tait; and (iv) may contain one or more items of software owned by a third-party supplier. The term "Software" includes the applicable “Software Key” and does not include any third-party software provided under separate license or not licensable under the terms of this Agreement.

“Source Code” means software expressed in human readable language necessary for understanding, maintaining, modifying, correcting, and enhancing any software referred to in this Agreement and includes all states of that software prior to its compilation into an executable programme.

“Software Key” means a code or key that is supplied by Tait to access, enable and use the Software or certain functions or features of the Software.

“Tait” means Tait International Limited and includes its Affiliates.

Section 2 SCOPE

This Agreement contains the terms and conditions of the license Tait is providing to Licensee, and of Licensee’s use of the Software and Documentation. Tait and Licensee enter into this Agreement in connection with Tait delivery of certain proprietary Software and/or products containing embedded or pre-loaded proprietary Software.

Section 3 GRANT OF LICENSE

3.1. Subject to the provisions of this Agreement and the payment of applicable license fees, Tait grants to Licensee a personal, limited, non-transferable (except as permitted in Section 7), and non-exclusive license to use the Software in executable code form, and the Documentation, solely in connection with Licensee’s use of the Designated Products for the useful life of the Designated Products. This Agreement does not grant any rights to source code.

3.2. The Licensee acknowledges that one or more Software Keys may be required from Tait for the Software or certain functions or features of the Software. The Licensee may only access, enable and use such Software or functions or features of the Software with Software Keys issued by Tait. Tait may provide the Licensee with a Software Key for the Software or certain functions or features of the Software agreed to by the parties as part of this Agreement. The Software Key may control the functions or features of the Software licensed in accordance with this Agreement. The Licensee’s license to the Software Key is limited to a license to use the Software Key only to access, enable and use the Software or certain functions or features of the Software that Tait has agreed to provide to the Licensee and only in accordance with the Documentation.

3.3. If the Software licensed under this Agreement contains or is derived from Open Source Software, the terms and conditions governing the use of such Open Source Software are in the Open Source Software Licenses of the copyright owner and not in this Agreement. If there is a conflict between the terms and conditions of this Agreement and the terms and conditions of the any applicable Open Source Software Licenses, the terms and conditions of the Open Source Software Licenses will take precedence. For information about Open Source Components contained in Tait products and the related Open Source licenses, see:
<https://www.taitradio.com/opensource>

Section 4 LIMITATIONS ON USE

4.1. Licensee may use the Software only for Licensee's internal business purposes and only in accordance with the Documentation. Any other use of the Software is strictly prohibited. Without limiting the general nature of these restrictions, Licensee will not make the Software available for use by third parties on a "time sharing," "application service provider," "service bureau" basis, or for any other similar commercial rental or sharing arrangement.

4.2. Licensee will not, and will not directly or indirectly allow or enable any third party to: (i) reverse engineer, disassemble, extract components, decompile, reprogram, or otherwise reduce the Software or any portion thereof to a human perceptible form or otherwise attempt to recreate the source code; (ii) modify, adapt, create derivative works of, or merge the Software; (iii) copy, reproduce, distribute, lend, or lease the Software or Documentation to any third party; (iv) grant any sublicense or other rights in the Software or Documentation to any third party; (v) take any action that would cause the Software or Documentation to be placed in the public domain; (vi) remove, or in any way alter or obscure any copyright notice or other notice of Tait or third-party licensor's proprietary rights; (vii) provide, copy, transmit, disclose, divulge or make the Software or Documentation available to, or permit the use of the Software by, any third party or on any machine except as expressly authorized by this Agreement; or (viii) use, or permit the use of, the Software in a manner that would result in the production of a copy of the Software by any means whatsoever other than what is permitted in this Agreement. Licensee may make one copy of the Software to be used solely for archival, back-up, or disaster recovery purposes; provided that Licensee may not operate that copy of the Software at the same time as the original Software is being operated. Licensee may make as many copies of the Documentation as it may reasonably require for the internal use of the Software.

4.3. Unless otherwise authorized by Tait in writing, Licensee will not, and will not enable or allow any third party to: (i) install a copy of the Software on more than one unit of a Designated Product; or (ii) copy or transfer Software installed on one unit of a Designated Product to any other device. Licensee may temporarily transfer Software installed on a Designated Product to another device if the Designated Product is inoperable or malfunctioning. Temporary transfer of the Software to another device must be discontinued when the original Designated Product is returned to operation and the Software must be removed from the other device.

4.4. Licensee will maintain, during the term of this Agreement and for a period of two years thereafter, accurate records relating to this license grant to verify compliance with this Agreement. Tait, or a third party nominated by Tait, may inspect Licensee's premises, books and records, upon reasonable prior notice to Licensee, during Licensee's normal business hours and subject to Licensee's facility and security regulations. Tait is responsible for the payment of all expenses and costs of the inspection, provided that Licensee shall indemnify Tait for all costs (including audit costs and legal costs on a solicitor client basis) if Licensee has breached the terms of this Agreement. Any information obtained by Tait during the course of the inspection will be kept in strict confidence by Tait and used solely for the purpose of verifying Licensee's compliance with the terms of this Agreement.

Section 5 OWNERSHIP AND TITLE

Tait, its licensors, and its suppliers retain all of their Intellectual Property Rights in and to the Software and Documentation, in any form. No rights are granted to Licensee under this Agreement by implication, estoppel or otherwise, except for those rights which are expressly granted to Licensee in this Agreement. All Intellectual Property developed, originated, or prepared by Tait in connection with providing the Software, Designated Products, Documentation, or related services, remains vested exclusively in Tait, and Licensee will not have any shared development or other Intellectual Property Rights.

Section 6 LIMITED WARRANTY; DISCLAIMER OF WARRANTY

6.1. The commencement date and the term of the Software warranty will be a period of one (1) year from Tait shipment of the Software. If Licensee is not in breach of any obligations under this Agreement, Tait warrants that the unmodified Software, when used properly and in accordance with the Documentation and this Agreement, will be free from a reproducible defect that eliminates the functionality or successful operation of a feature critical to the primary functionality or successful operation of the Software. Whether a defect has occurred will be determined solely by Tait. Tait does not warrant that Licensee's use of the Software or the Designated Products will be uninterrupted, error-free, completely free of Security Vulnerabilities, or that the Software or the Designated Products will meet Licensee's particular requirements. Tait makes no representations or warranties with respect to any third-party software included in the Software.

6.2 Tait sole obligation to Licensee, and Licensee's exclusive remedy under this warranty, is to use reasonable efforts to remedy any material Software defect covered by this warranty. These efforts will involve either replacing the media or attempting to correct significant, demonstrable program or documentation errors or Security Vulnerabilities. If Tait cannot correct the defect within a reasonable time, then at Tait option, Tait will replace the defective Software with functionally equivalent Software, license to Licensee substitute Software which will accomplish the same objective, or terminate the license and refund Licensee's paid license fee. If Tait investigation of the perceived defect reveals that no such defect in fact exists, Tait may recover its costs in respect of such investigation from Licensee.

6.3. Tait disclaims any and all other warranties relating to the Software or Documentation other than the express warranties set forth in this Section 6. Warranties in Section 6 are in lieu of all other warranties whether express or implied, oral or written, and including without limitation any and all implied warranties of condition, title, non-infringement, merchantability, or fitness for a particular purpose or use by Licensee (whether Tait knows, has reason to know, has been advised of, or is otherwise aware of any such purpose or use), whether arising by law, by reason of custom or usage of trade, or by course of dealing. In addition, Tait disclaims any warranty to any person other than Licensee with respect to the Software or Documentation.

Section 7 TRANSFERS

7.1. Licensee will not transfer the Software or Documentation to any third party without specific prior written consent from Tait. Tait may withhold such consent or at its own discretion make the consent conditional upon the transferee paying applicable license fees and agreeing to be bound by this Agreement.

7.2. In the case of a value-added reseller or distributor of Tait Designated Products, the consent referred to in Section 7.1 may be contained in a Tait Reseller or Tait Distributor Agreement.

7.3. If the Designated Products are Tait vehicle-mounted mobile products or hand-carried portable radio products and Licensee transfers ownership of the Tait mobile or portable radio products to a third party, Licensee may assign its right to use the Software which is embedded in or furnished for use with the radio products and the related Documentation; provided that Licensee transfers all copies of the Software and Documentation to the transferee.

7.4. For the avoidance of any doubt, Section 7.3 excludes TaitNet Infrastructure, or the products listed at any time under network products at: <http://www.taitradio.com>.

7.5. If Licensee, as a contractor or subcontractor (integrator), is purchasing Tait Designated Products and licensing Software not for its own internal use but for end use only by a Customer, the Licensee may transfer such Software, but only if a) Licensee transfers all copies of such Software and the related Documentation to the transferee and b) Licensee has first obtained from its Customer (and, if Licensee is acting as a subcontractor, from the interim transferee(s) and from the ultimate end user sub license) an enforceable sublicense agreement that prohibits any other transfer and that contains restrictions substantially identical to the terms set forth in this Software License Agreement. Except as stated in the foregoing, Licensee and any transferee(s) authorised by this Section may not otherwise transfer or make available any Tait Software to any third party nor permit any party to do so. Licensee will, on request, make available evidence reasonably satisfactory to Tait demonstrating compliance with all the foregoing.

Section 8 TERM AND TERMINATION

8.1. Licensee's right to use the Software and Documentation will commence when the Designated Products are supplied by Tait to Licensee and will continue for the life of the Designated Products with which or for which the Software and Documentation are supplied, unless Licensee breaches this Agreement, in which case this Agreement and Licensee's right to use the Software and Documentation may be terminated immediately upon notice by Tait.

8.2. Within thirty (30) days after termination of this Agreement, Licensee must certify in writing to Tait that all copies of the Software have been removed or deleted from the Designated Products and that all copies of the Software and Documentation have been returned to Tait or destroyed by Licensee and are no longer in use by Licensee.

8.3. Licensee acknowledges that Tait made a considerable investment of resources in the development, marketing, and distribution of the Software and Documentation and that Licensee's breach of this Agreement will result in irreparable harm to Tait for which monetary damages would be inadequate. If Licensee breaches this Agreement, Tait may terminate this Agreement and be entitled to all available remedies at law or in equity including immediate injunctive relief and repossession of all non-embedded Software and associated Documentation. Licensee shall pay all Tait costs (on an indemnity basis) for the enforcement of the terms of this Agreement.

Section 9 CONFIDENTIALITY

Licensee acknowledges that the Software and Documentation contain proprietary and Confidential Information valuable to Tait and are Tait trade secrets, and Licensee agrees to respect the confidentiality of the information contained in the Software and Documentation.

Section 10 LIMITATION OF LIABILITY

10.1. In no circumstances shall Tait be under any liability to Licensee, or any other person whatsoever, whether in Tort (including negligence), Contract (except as expressly provided in this Agreement), Equity, under any Statute, or otherwise at law for any losses or damages whether general, special, exemplary, punitive, direct, indirect, or consequential arising out of or in connection with any use or inability of using the Software.

10.2. Licensee's sole remedy against Tait will be limited to breach of contract and Tait sole and total liability for any such claim shall be limited at the option of Tait to the repair or replacement of the Software or the refund of the purchase price of the Software.

Section 11 GENERAL

11.1. COPYRIGHT NOTICES. The existence of a copyright notice on the Software will not be construed as an admission or presumption of publication of the Software or public disclosure of any trade secrets associated with the Software.

11.2. COMPLIANCE WITH LAWS.

Licensee acknowledges that the Software may be subject to the laws and regulations of the jurisdiction covering the supply of the Designated Products and will comply with all applicable laws and regulations, including export laws and regulations, of that country.

11.3. ASSIGNMENTS AND

SUBCONTRACTING. Tait may assign its rights or subcontract its obligations under this Agreement, or encumber or sell its rights in any Software, without prior notice to, or consent of, Licensee.

11.4. GOVERNING LAW. This Agreement shall be subject to and construed in accordance with New Zealand law and disputes between the parties concerning the provisions hereof shall be determined by the New Zealand Courts of Law. Provided however Tait may at its election bring proceedings for breach of the terms hereof or for the enforcement of any judgment in relation to a breach of the terms hereof in any jurisdiction Tait considers fit for the purpose of ensuring compliance with the terms hereof or obtaining relief for breach of the terms hereof.

11.5. THIRD-PARTY BENEFICIARIES.

This Agreement is entered into solely for the benefit of Tait and Licensee. No third party has the right to make any claim or assert any right under this Agreement, and no third party is deemed a beneficiary of this Agreement. Notwithstanding the foregoing, any licensor or supplier of third-party software included in the Software will be a direct and intended third-party beneficiary of this Agreement.

11.6. SURVIVAL. Sections 4, 5, 6.3, 7, 8, 9, 10, and 11 survive the termination of this Agreement.

11.7. ORDER OF PRECEDENCE. In the event of inconsistencies between this Agreement and any other Agreement between the parties, the parties agree that, with respect to the specific subject matter of this Agreement, this Agreement prevails.

11.8 SECURITY. Tait uses reasonable means in the design and writing of its own Software and the acquisition of third-party Software in order to limit Security Vulnerabilities. While no software can be guaranteed to be free from Security Vulnerabilities, if a Security Vulnerability is discovered, Tait will take the steps specified in Section 6 of this Agreement.

11.9 EXPORT. Licensee will not transfer, directly or indirectly, any Designated Product, Documentation or Software furnished hereunder or the direct product of such Documentation or Software to any country for which New Zealand or any other applicable country requires an export license or other governmental approval without first obtaining such license or approval.

11.10 SEVERABILITY. In the event that any part or parts of this Agreement shall be held illegal or null and void by any court or administrative body of competent jurisdiction, such determination shall not affect the remaining terms which shall remain in full force and effect as if such part or parts held to be illegal or void had not been included in this Agreement. Tait may replace the invalid or unenforceable provision with a valid and enforceable provision that achieves the original intent and economic effect of this Agreement.

11.11 CONSUMER GUARANTEES.

Licensee acknowledges that the licenses supplied in terms of this agreement are supplied to Licensee in business, and that the guarantees and other provisions of prevailing consumer protection legislation shall not apply.

11.12 WHOLE AGREEMENT. Licensee acknowledges that it has read this Agreement, understands it and agrees to be bound by its terms and conditions. Licensee also agrees that, subject only to the express terms of any other agreement between Tait and Licensee to the contrary, this is the complete and exclusive statement of the Agreement between it and Tait in relation to the Software. This Agreement supersedes any proposal or prior agreement, oral or written, and any other communications between Licensee and Tait relating to the Software and the Designated Products.

Index

A

- A Party ID box 213
- access level 74, 137, 153
- Acknowledge Alarm button 206
- Acknowledged Group 143, 165
- Add Call Rights Template window 127
- Add Charge Schedule window 183
- Add Charge Scheme window
 - Scale of Charges area 179
- Add Fleet window 132
- Add Node window 114
- Add Service Area Template window 130
- Add Unit window 136
- Add User window 75
- adjacent sites
 - setting up 294
- Adjacent Sites window 294
- Admin user 75
- Advanced options
 - customer specific import tools 123
 - resolving time zone problems 123
 - translators 123
- alarm
 - adjusting volume 81
 - choosing a sound for 79
 - configuring 78, 79
 - editing text 80
 - pop up 79
 - priority level of 79
 - sending by Email 83
 - sending to serial port 85
 - stored in file 206
 - storing in file 82
 - testing destination of 87, 87
 - testing sound of 81
 - viewing recent 206
- Alarm Configuration window 78
- alarm log file 59, 82
- Alarm.log file 206
- alarms
 - email format 85
 - serial port format 86
- Alarms window 87
 - opening 206
- alternate partition mode 308
- ANN numbering 42
- Audio Resources area 214
- audit log file 59

- authentication 157
 - setting up 157
 - using for inventory monitoring 157
 - viewing results 158
- Auto Extending Frame Size 300
 - configuring with Extended Frame Size parameter 298
- Automatic System Backup Configuration window 120
- AutoSystem-*. * file 121

B

- backing up
 - NMT files 59
- backing up system
 - automatic 120
 - date of last 120
- Bad ESN Received 159
- Barred access level 153
- Barred access state 152
- barring a radio 162
- Batch Validate window 170
- batch validation 170
- battery voltage 280
- Baud rate 288
- busy hour 200, 204
 - for DAS ports 203

C

- call
 - channels used by 214
 - charging 171
 - charging options 49
 - cost of 179
 - DAS ports used by 214
 - end reason 214
 - number handled by site 200, 204
 - queuing 250
 - setting charges for 49
- Call Answer Timeout box 242
- call charge
 - control channel calls 174
 - traffic channel calls 175
- call diagnostics
 - turning on 248
- call diversion
 - clearing 153
 - enabling by radio 246

- enabling radio to make 129
- setting up 153
- viewing 197
- when set up or cleared 197
- Call Inactivity Timeout box 242
- call record 95, 208
 - downloading 95
 - monitoring recent 208
 - replacing corrupted 97
 - special idents in 213
 - viewing full 211
- Call Record Configuration window 95
- call record file 59, 209
 - format options 96
- call records
 - call close reasons 101
 - call end reasons 102
 - call types 100
 - caller locations 113
 - file format 98
 - MPT special idents 113
- Call Records Summary window 208
- call rights 128
 - validation check at node 129
 - validation check at site 128
- Call Rights - at Node area 129
- Call Rights - at Site area 128
- call rights template 127
 - applying 137
- call route 54, 256
 - examples 54
 - for PSTN calls 257
 - how to define 257
 - simple scenario 55
 - to node within area code 257
 - to PABX at another node 257
- call start/end
 - monitoring 247
- call time limit 240
 - indefinite 241
- call timers 242
- call type charge 180
 - Default 179, 180
 - defining 180
 - for group calls 181
 - for phone calls 180
- caller ID 155
- CCM 0 276
- CCM number 276
- Change Password window 73
- Change State button 222
- channel
 - pooling because of interference 310
 - removing from service 293
 - resetting 293
 - setting up 292
 - viewing current call 276
 - viewing status of 276
- Channel Configuration window 292
- channel pooling 309
- charge record 184
 - file format 185
 - generating 184
 - location of 184
- charge report 187
- charge schedule 182
 - assigning to fleet 133
 - Default 183
 - editing 183
 - viewing 182
- Charge Schedules window 182
- charge scheme 173
 - creating 177
 - viewing 173
- Charge Schemes window 173
- charging 49, 171
 - available functions 49
 - options 49
- circuit number 233
- Clear All Alarms button 206
- Clear Group button 161
- client NMT 117
- Close Reason box 214
- Configuration menu 61, 71
- Configure Alarms window
 - Email tab 84
 - Serial tab 86
- control block 53, 239
 - default 240
 - editing 240
 - viewing 239
- Control Block 0 240
- Control Blocks window 239
- control channel
 - CCM number of 276
 - removing from service 294
 - setting up 292
- Control Channel Reassignment Timeout box 243
- control schedule 53, 297
- Control Schedule window 297
- Copy button 139
- Copy Charge Scheme window 177
- Copy ESN to Setup button 158
- Copy Unit window 139
- cost code 147, 187
 - assigning to fleet 133
 - report on charges for 187

Cost Code Charges Report 187
Cost per Call box 179
Cost per Minute box 179
CPSx numbering 39
customer 29

D

DAS 229, 277
 busy hour 203
 occupancy 204
 occupancy rate 203
 resetting port 278
 statistics 203
 traffic load on 203
 viewing port status 278
DAS Down message 90
DAS Monitor window 229
DAS Port Down message 90
DAS Statistics window 203
data call 128
 disabling at a site 247
 radio right to make 128
date format 148
Days Between Check Attempts box 158
Dealer user 75
desktop 22
Dialled Digits box 213
Dialling Rules window 260
Digital Audio Switch 277
Disabled access level 76
Dispatcher Interface Configuration window 268
diversion
 clearing 153
 date set up or cleared 197
 setting up 153
 viewing 197
Divert on Busy
 enable feature 248
 entering diversion number 154
Download column 96
Download Settings area 95
dynamic call time limit 240
dynamic framelength 253

E

Edit Alarm window 79
Edit Charge Schedule window 183
Edit Charge Scheme window
 Scale of Charges area 179
Edit Fleet window 148
Edit Group window 164

Edit Unit window 137, 151
 providing telephone access 153
 viewing ESN check results 158
editing multiple radios 163
electronic security number 157
 obtaining 158
Email tab 83
Emergency access level 153
emergency call
 enabling 137
 ensuring channel availability 246
Emergency Group Override box 247
emergency preempt 246
End Reason box 214
Engineer user 75
ESN checking 157
 interval between 158
 options 158
 setting up 157
 viewing results for a fleet 159
 viewing results for one radio 158
ESN polling
 multiple radios 160
essential site 168
Exchange Digits box 213
Exit NMT 21

F

FGN 36
FIN 34
fleet 29
 assigning charge schedule to 133
 assigning cost code to 133
 barring 149
 maintaining 147
 out of service 149
 removing 150
 setting up 132
 unbarring 149
 viewing summary information 147
fleet addressing mode 118
Fleet Charges Report window 187
fleet group number 36
fleet individual number 34
fleet management 19, 27, 125
Fleet Status window 197
Fleet Summary window 147
fleet table 59, 117, 147
fleets.cfg file 59
framelength 253
Free Seconds box 179
Full Call Record window 211

full duplex 311
 setting up 312
Full Duplex Loopback option 312

G

Generate Charge Record window 184
grade of service 200
group 29
 adding to fleet 140
 configuration options 140
 configuring as local 144
 configuring as normal 140
 configuring as registration-based 141
 for multiple fleets 134
 modifying configuration 164
 numbering scheme for 35
 radios belonging to 168
 service area of 167
group call 140
 at one site 168
 defining charge for 181
 disabling at a site 248
 interval between GTC messages 243
 setup process 164
GTC Repeat Interval box 243

H

Handoff Threshold box 243
High Availability
 node monitoring area 237
High Availability Option 4
 interpreting DAS state 221
Home Group Override box 247

I

Incoming Phone Calls area 262
incoming routing 263
indefinite call time limit 241
Inhibit Control Channel box 293
Inhibit If Jammed box 293
interfering site 310
internode link configuration 265
intersite call 128
 disabling at a site 246
 radio right to make 128

L

Late Entry to Group Calls (Repeat Go-To-Channel Messaging) feature 145
LDT 29

Length column 256
license 20
local group 144
local only site 168
log files 59
logging in 20
Login menu option 63
Logout menu option 63
Low Disk Space message 89

M

main window 22
 adding node to 74
 configuring 24
Match column 256
matching rule 260
Maximum Dynamic Call Time Limit box 240
Maximum PABX Duration box 240
Maximum PSTN Duration box 240
Memory Access window 282
menu 23
 selecting command from 11
Minimum Chargeable Duration box 178
Minimum Dynamic Call Time Limit box 240
Mobility area 153
monitoring calls in progress 247
MPT 1327 address
 converting to MPT 1343 number 37
MPT 1327 numbering 33
MPT 1343 number
 converting to MPT 1327 address 37
 for group 35
 range available 36
MPT 1343 numbering 34
multiple radios
 edit 163
 poll 160
MySQL
 commands 350
 data tables 319
 data types 316

N

network 19
 viewing 22
Network Configuration window 114
network management 19, 51
network operator dialling 258
network view
 menu 66
 window 66

- NMT 19
 - access level 74
 - backing up data from 59
 - charging functions 49
 - client 117
 - configuring 61, 71
 - connection to node 24
 - exit program 21
 - introduction 19
 - license for 20
 - local 19
 - logging in 20
 - menus 23
 - remote 19
 - running 20
 - server 147
 - starting 20
 - users 74
 - using 17
- NMT user 20
 - access level 74
 - adding 75
- NMT . cfg file 59
- node 19
 - adding 74
 - adding site to 115
 - automatically connected to NMT 24
 - changing state 222
 - checking 87
 - current state 22
 - deleting from main window 24
 - link to other nodes 265
 - setting speed of intersite link 288
- Node Configuration window 235
- Node Down message 87
- Node menu 217
 - accessing 23
- node number 115
- node sequence number 213
- Node Status window
 - Database tab 223
 - Internode Link Status tab 226
 - Overview tab 219
 - TCP/IP Connections tab 225
- Normal access level 153
- normal group
 - configuring 140
- Not Chargeable report 189
- NPD, enabling radio to make 129
- number conversion
 - ANN to MPT 1327 47
 - MPT 1327 to ANN 46
 - MPT 1327 to MPT 1343 38
 - MPT 1343 to MPT 1327 38
- numbering schemes

- ANN 42
- CPSx 39
- MPT 1327 33
- MPT 1343 34

O

- occupancy rate 200, 204
 - graph of 200, 205
 - of port group 203
- Open Mute Timeout box 242
- operator services 258
- Originate Only site 168
- Outgoing Mail (SMTP) Server box 84
- Outgoing Phone Calls area 263
- outphone table 55, 255
 - assigning to radio 56
 - configuring for full duplex operation 312

P

- PABX call
 - enabling radio to make 129
 - routing 257
- PABX call, disabling at a site 248
- Partition Mode box 308
- password 20
 - changing 73, 76
 - removing 77
- phone alias 155
- phone call 128
 - defining charge for 180
 - radio right to make 128
- Poll for ESN Now button 158
- polling multiple radios 160
- pooled channels 309
- port 229
 - assigning to port group 55
 - disabling 234
 - entering connection information for 231
 - entering type of 231
 - monitoring 229
 - resetting 234
- Port Configuration window 231
- port group 55
 - allowing incoming or outgoing calls 262
 - report on 203
- Port Groups window 261
- Pressel messages
 - control calls using 247
- Priority access level 153
- priority call
 - enabling 137
- provider 29

PSTN call
 disabling at a site 248
 enabling radio to make 129
 routing 257

Q

queue 250
 B-party 250
queue timeouts 250

R

radio 29
 acquiring control channel 305
 adding to fleet 135
 allowing emergency calls 137
 allowing priority calls 137
 assigning call routing information to 56
 assigning outphone table to 56
 authenticating 157
 barred 152
 barring 162
 call rights 128
 configuring access to trunked network 152
 copying validation to many radios 139
 diverting incoming calls 154
 edit multiple 163
 enabling diversion of incoming calls 129
 enabling intersite and internode calls 129
 enabling intersite and internode group calls 129
 finding 151
 modifying configuration 151
 monitoring inventory of 157
 phone alias 155
 poll multiple 160
 providing telephone access 153
 regrouping 160
 serial number of 157
 setting access level 137
 stunning 161
 viewing routing information for 255
 where registered 197
Radio Controlled Group Affiliation feature 143
Radio Units tab 135
radio-to-telephone call
 limiting access 260
 routing of 55
RAM bank 281
Receiver Activity Timeout box 244
Receiver Inactivity Timeout box 244
registration
 viewing 197
registration-based group 168
 configuring 141

Remove command 24
Replacement Digits column 256
report 191
 on all sites 193
 on call charges 187
 on radio diversions 197
 on radio registrations 197
 saving to file 191
Reports menu 191
Reset All button 97
Reset Port button 234, 278
Restore Database window 225
Restricted Fleet user 76
RF interference 310
 pooling channel to remove 310
Rounding box 178
route 54, 256

S

Save button 191
scale of charges 179
SCU
 status of RAM banks 280
selected node 11
selected site 11
selecting menu commands 23
server NMT 116, 147
service area 156
 of group 167
Service Area tab 167
service area template 156
 applying 138
service period 148
shift-click 11
short data message
 enabling radio to make 129
short form dialling 258
Simple Network Management Protocol 358
site
 adding 24
 adding to node 115
 busy hour 200, 204
 call diagnostics 248
 can only originate group call 168
 configuring (control blocks) 239
 configuring operation of 53
 current state 22
 disabling call types at 247
 enabling features 244
 essential for group call 168
 local only for group call 168
 monitoring 273
 number of calls 200, 204

- occupancy rate 200, 204
- reading data from memory 282
- registration summary 195
- removing 24, 115
- renaming 115
- replacing battery 280
- SMM or SCU 279
- state of link to node 274
- statistics 199
- summary information 193
- temporary traffic mode 245
- timers 242
- traffic loading on 199
- type of 279
- viewing current calls 276
- viewing current configuration (control block) 239
- viewing SysCode of 279
- viewing validation information at 283
- writing data to memory 283
- Site Configuration window
 - Pooled Channels area 310
 - Vote Now area 305
- Site menu 271
 - accessing 23
- site number 115
- Site Registration Summary window 195
- site sequence number 213
- Site Statistics window 199
- Site Status window 273
- Site Summary window 193
- Site Validation window 283
- SMM 279
 - battery voltage 280
 - controlling output ports 284
 - monitoring alarm sensors 285
 - status of RAM banks 280
 - temperature of 279
- SNMP 358
- Special checkbox 142
- Speech to Group check box 129
- Speech to Radio check box 129
- SQL interface 122, 313
- SST, enabling radio to make 129
- status call
 - enabling radio to make 129
- Status Messaging check box 129
- system
 - backing up data from 120
- system backup
 - manual 69
- System Code 279
- system restore
 - manual 70

system.properties file 59

T

- T1520 SCU **See** SCU
- T1721 SMM **See** SMM
- telephone access 153
- telephone call
 - radio right to make 128
- telephone-to-radio call
 - configuring dialling 57
 - default address for 262
 - using phone alias 155
- template 127
- temporary traffic mode 245
- Time Shared Data Channels 301
 - configuring with Lowest Slot and Highest Slot parameters 299
- timers 242
- TNDS
 - configuring 298
 - monitoring 285
- TNDS configuration window 298
- TNDS status window 285
- toll bar 260
- tracked units 168
- Tracked Units tab 142
- transaction.log file 59
- Transmit inhibit on busy channel parameters
 - Control Channel Reassignment Timeout 243
 - Inhibit Control Channel 293
 - Inhibit If Jammed 293
 - Jammed Channel 277
 - Receiver Activity Timeout 244
 - Receiver Inactivity Timeout 244
- trunked network 12, 19

U

- user 20, 74
 - adding 75
- user access level 74
- User Configuration window 74

V

- validation 29
 - check at node 129
 - check at site 128
 - viewing at site 283
- volume of alarm 81
- Vote Now messages 305

