

MetroRack

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# Metrodata MetroRack User Manual

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## **Preface**

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# 1 INTRODUCTION

## 1.1 The MetroRack

The Metrodata MetroRack is a modular chassis-based product that offers a high I/O module density and efficient use of rack space. The MetroRack is a 19" rack based chassis with integral power supply units occupying 4U of rack space. It provides 12 plug-in slots into which a range of I/O modules may be inserted. All modules and power supplies are "hot-swap" compliant, thus easing maintenance and service provision activity.

A single MetroRack power supply supports a full rack of modules. The AC power supply unit (PSU) may also be used in a 1+1 redundant configuration to provide high reliability. There is an alternative -48 VDC PSU also available with optional redundant capability.

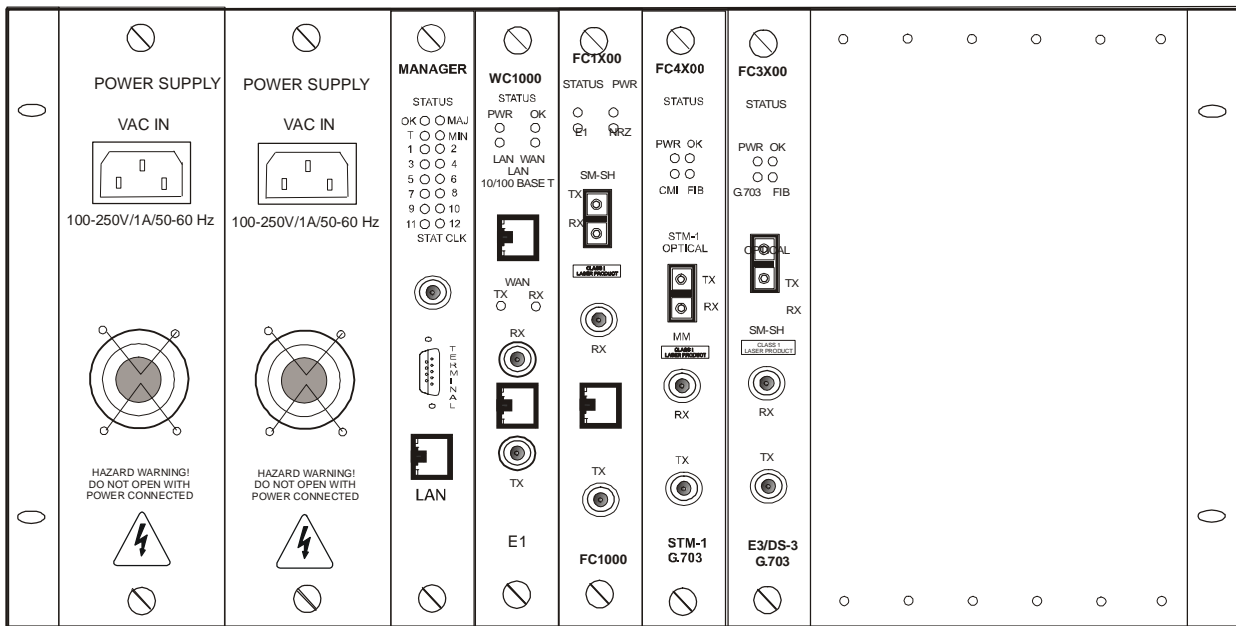


Figure 1.1 MetroRack chassis

The I/O modules for MetroRack support both basic standalone operation or fully managed operation when the optional management module is fitted in the MetroRack.

A pair of changeover relays are fitted to the MetroRack to indicate alarm conditions. The Major alarm relay is energised for normal operation to ensure that a fault is signalled if power fails.

The MetroRack may be managed locally via the terminal port or via the Management Ethernet port using SNMP or Telnet. SNMP Version1 is supported, including MIB-2 and traps. SNMP traps are generated based on configurable alarms generated by any of the I/O modules.

TFTP download of software and configuration parameters is supported. Remote hardware upgrade of CPLD firmware is included for future-proofing the system. Management access is protected by password, both via the console and via Telnet. Performance statistics are available for all ports with data collected over 15 minute intervals for a 24 hour period.

## **1.2 Safety**

Where electrical signal cabling is connected to I/O modules, do not connect to cabling which would be required by BS6701 to be equipped with over-voltage protection. Electrical signal ports should only be connected to SELV ports on other equipment in accordance with EN60950 clause 2.3.

## **1.3 Electromagnetic Compatibility**

In order to ensure EMC compliance all electrical signal and data cables and connectors must use a screened connector shell with a screened cable. The cable screen must be terminated to the screened connector shell and not connected to any pins of the connector. Failure to use the correct connector may compromise EMC compliance. Any unused chassis slots must be fitted with a blanking panel to ensure EMC compliance.

## **1.4 EN55022 Declaration**

MetroRack units are a Class A product. In a domestic environment it may cause radio interference in which case the user may be required to take adequate measures.

## **1.5 FCC Declaration**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at its own expense.

## **1.6 RoHS Compliance**

The MetroRack is compliant with the EU RoHS directive 2002/95/EC. The RoHS directive bans the use of six hazardous materials in products placed on the market after July 1<sup>st</sup> 2006. The six banned materials are Lead, Mercury, Hexavalent Chromium, Polybrominated Biphenyls, Polybrominated Diphenyl Ethers and Cadmium.

The MetroRack product is manufactured using a lead-free soldering process and as such is RoHS 6/6 compliant.

## **1.7 WEEE Directive**

The MetroRack range of products is covered by Directive 2002/96/EC (OJ:L37/24/2003) on waste electrical and electronic equipment (The WEEE Directive). Units must therefore not be disposed of in a standard landfill.

## 2 METRORACK MANAGER MODULE

### 2.1 Manager module

The MetroRack manager module adds a management function to the MetroRack. The module must be inserted in slot 0 of the chassis. When the Manager module is fitted, the user has the option of setting up MetroRack interface cards by means of a menu system, and of viewing status and performance data.

The manager may be accessed using either the local VT100/220 terminal port mounted on the rear fascia panel, or remotely using Telnet or SNMP via the LAN port.

### 2.2 LED indicators

The module has an array of LEDs to indicate its status

LED name	Colour	Meaning
OK	Green	Card status normal
T - Test mode	Yellow	Test running
Maj - Major alarm	Red	Major alarm
Min - Minor alarm	Yellow	Minor alarm
1-12	Green	I/O module present & OK
1-12	Red	I/O module present & alarmed
1-12	Off	I/O module not fitted

Figure 2.1 LED status indicators

The LAN port has two integrated LEDs coloured green and yellow respectively. The green LED shows Link Up when illuminated. The yellow LED shows Tx/Rx activity when illuminated.

### 2.3 Alarm extension port

The alarm extension port is a 9-way D-type female connector mounted on the rear panel of the MetroRack chassis in line with Slot 0.

This port's 9-pin D-type connector allows you to connect the major and minor alarm relay contacts within the Manager to a remote indicator, such as a bell or a lamp. The two types of connectors are described below. The Major alarm relay is energised for normal operation, so that major alarm indication is given if the power supply should fail.

The Alarm Relay port is regarded as a SELV port within the scope of EN41003. The table below shows the layout of the connector:

Pin	Function
1	Shield
2	Major common
3	Minor N/O
4	Minor N/C
5	Not connected
6	Major N/C
7	Major N/O
8	Minor common
9	Not connected

Figure 2.2 Alarm extension connector layout

## 2.4 Logging on to the MetroRack Manager

The initial access to the manager module must use a local terminal connected to the terminal port. The default terminal settings are shown in the table below. The default terminal is a Teletype (*TTY*), but the vast majority of users will employ a *VT100/220* or an *ANSI* terminal either directly or on a PC via a terminal emulator. The TTY output screens do not have graphic capability, and are therefore not so easy to read when setting up the system.

After making changes in the MetroRack's stored terminal set-up (with the terminal on default settings), the physical terminal must then be re-set to correspond to the new values stored in the unit.

V.24 Item	Defaults	Options
Terminal type	TTY	TTY, VT100/220, ANSI
Via Modem	Yes	No
Baud rate	19200	2400, 4800, 9600, 19200
Parity	None	Odd, Even
Data bits	8	7 or 8
Stop bits	1	1 or 2
Flow control	Xon/Xoff	

Figure 2.3 V.24 Terminal set-up defaults and options

The MetroRack has a password protected, menu-driven user interface. When a terminal session is connected to the manager, the welcome banner is displayed:

```
Metrodata MetroRack: Local connection to "[nodename]"
password ('view' to view only):
```

Figure 2.4 Logon screen

At the prompt, enter the password to gain access to the user interface. The default administrator password is *MetroRack*. It is obscured by an asterisk (\*) for each character typed. An incorrect password results in the welcome banner being re-displayed. A correct password leads to the main set-up menu display.

There are two levels of user - Observer, or Operator. If you type *VIEW* as the password, you will only be able to look at the current settings, but will not be able to change any of them. If you enter the correct operator password, you can change any parameters that are not defined as read-only. The default operator password is the same as the model number, i.e. *MetroRack*. When you have entered this once, you will be able to change the password if you wish using the *SYSTEM* menu.

## 2.5 Main menu

When you enter the appropriate password, you will be presented with the *MAIN SET-UP* menu. All of the MetroRack's operating parameters are accessed through this initial menu. The menu options are described in the subsections below.

<b>MAIN SET-UP</b>	
<b>G</b> lobal status	<display>
alarm <b>eX</b> tension	<menu>
<b>D</b> ata port set-up	<menu>
<b>V</b> .24 set-up	<menu>
<b>S</b> ystem	
<b>M</b> anagement	<menu>
<b>T</b> esting	<menu>
<b>P</b> erformance data	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Figure 2.5 Main menu screen

When you press a letter which leads to a further menu, the screen will scroll up and the new menu will be displayed. Pressing a letter corresponding to a menu option will lead to additional prompts at the bottom of the screen:

<space> - change value
<enter> - save new value
<escape> - exit without saving

Figure 2.6 Prompt screen

The current value of that option will then be shown. Each time you press the space bar, the next value will be displayed, cycling through the available values. When the required value is displayed, simply press the <enter> key to accept the value or press <escape> to cancel your choice. This process is known as toggling.

**2.6 Global status**

This display option provides a summary of the operational status of the MetroRack. Each card is identified, together with its Managed/Non-managed status, the port descriptions and the type of alarms that may be present.

Metrodata MetroRack		S/N: 48253				Alarms:		Major	
PSU1 ok PSU2 REMOVED		GLOBAL STATUS						History last cleared	
S1 Card	Managed	Port	Status	Port	Status	Port	Status	Port	Status
0 Manager	Yes								
1 ---									
2 FC9000	Yes	M1.LAN LSF		M1.SFP1	LOS	M2.SFP1	LOS	M2.LAN LSF	
3 WC-Serial	Yes	LAN LKDN		SFP	NF	WAN LKDN			
5 F3X00	Yes	E1	LOS	LAN LKDN					
6 F3X00	No	E1	LOS	LAN	LKDN				
7 FC4000	No	Optical LOS		G.703	LOS				
8 FC4000									
9 ---									
10 ---									
11 ---									
12 ---									
<Escape>-exit, C - clear,		other key -		refresh					

Figure 2.7 Global status screen

Note that even if I/O cards in the MetroRack are set-up for unmanaged use, their Global status is still reported on this screen.

## 2.7 Alarm extension menus

When the Alarm extension menu item is selected from the Main menu screen, the alarm menu screen is presented, as shown in the figure below:

<b>ALARM EXTENSION</b>	
clear Alarm outputs	<display>
<b>S</b> ystem	<menu>
s <b>L</b> ot	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Figure 2.8 Alarm extension screen

### 2.7.1 Clear alarm outputs

The Alarm extension refers to the external alarm relay port. Since this port may control audible warnings, it may be desirable to turn a warning off once it has been acknowledged. The CLEAR ALARM OUTPIUTS menu clears all current alarms and releases the relays.

Alarms cleared:
System: REM2
3. E1 Optical: SD
3. E1 G.703: LOS
6. E1: LOS
6. LAN: LKDN
8.E3/DS-3 Optical: SD
8. E3/DS-3 G.703: LOS
9. STM-1 Optical: LOS,SD
9. STM1- G.703: LOS
press any key to continue

Figure 2.9 Clear alarms screen

The display shows a list of all the alarms cleared as a result of selecting this screen. The individual alarms for cards are listed in the section of this manual describing each I/O card.

## 2.7.2 System alarms

The system alarms are set-up using this screen. The options which are set by toggling each alarm are MAJOR, MINOR or NONE.

SYSTEM	
0 - PSU1	Major
1 - PSU2	Minor
3 - REM1	Major
4 - REM2	Major
5 - FAN1	Major
6 - FAN2	Minor

<space> - change value
<enter> - save new value
<escape> - exit without saving

Figure 2.10 System alarm screen

Note that PSU alarms are power failure of a PSU, REM alarms are for PSU removed (or not connected properly in its slot), the alarms appear on the GLOBAL STATUS screen.

### 2.7.3 Slot alarms

The screen sequence below shows the process of setting-up the alarms for each slot in the MetroRack. Slots are selected by number. Each interface on the slot card may be selected and toggled to MAJOR, MINOR, or NONE. As the interface is selected, the response screen lists the available alarms for that interface. these can be toggled to the desired level.

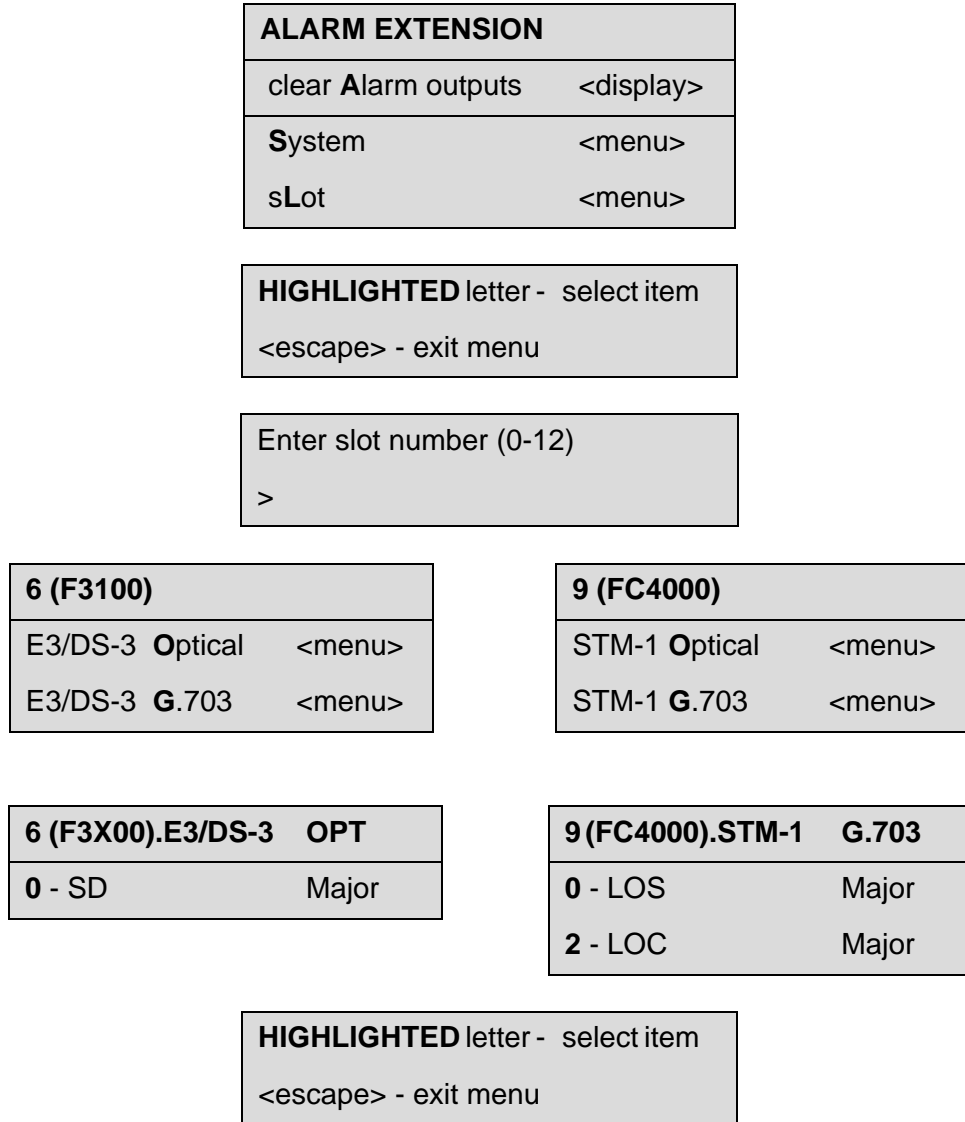


Figure 2.11 Slot alarm selection

The alarm screens for every interface card are shown in the section that describes the card. This section is included to illustrate the set-up sequence.

## 2.8 Data port set-up menus

Selecting DATA PORT SET-UP from the MAIN MENU screen leads to a slot-by-slot display of the cards installed in the MetroRack, as shown below:

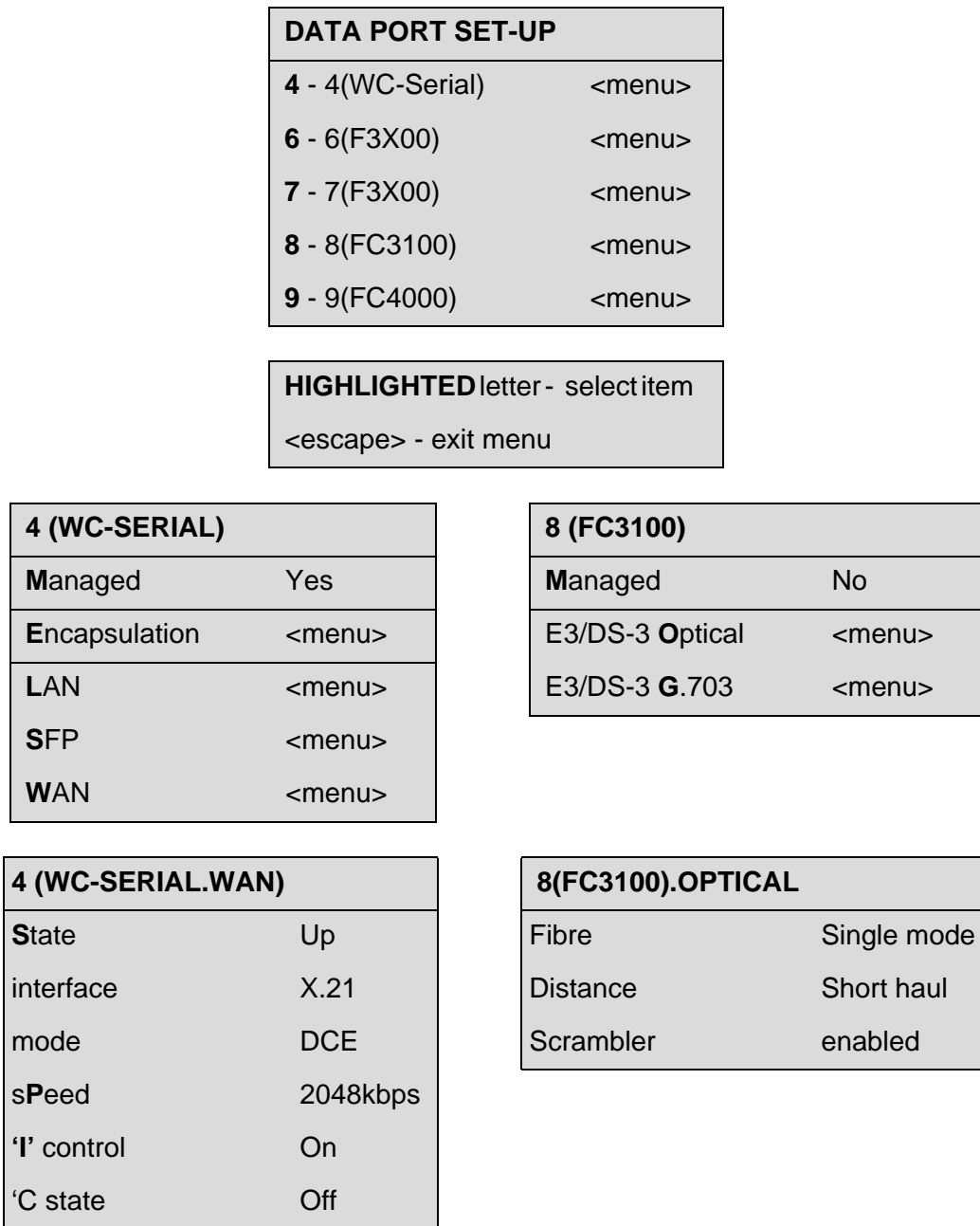


Figure 2.12 Data port set-up screen sequence examples

The card to be set up is selected by its slot number on the first screen. Its MANAGED status can be toggled as YES or NO. The menu set-up options may then be selected and set-up as required. The detail of the DATAPORT SET-UP process is given as a sub-section in the description of each I/O card.

## 2.9 V.24 set-up menu

This menu may be accessed via a preliminary screen to provide for further options.

V.24 SET-UP	
Usage	Console
Console set-up	<menu>

Figure 2.13 V.24 preliminary screen

The USAGE option is toggled between CONSOLE and DISABLED. If DISABLED is selected, the management terminal interface is disabled and management is only available using the LAN port.

The *TERMINAL SET-UP* screen allows you to set up the communications parameters for the terminal attached to the management port.

CONSOLE SET-UP	
Terminal type	VT100/VT220
via Modem	no
Baud rate	19200bps
Parity	None
Data bits	8
Stop bits	2
Load new con fig.	

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Figure 2.14 V.24 Terminal set-up menu

### 2.9.1 Terminal type

The terminal type can be *ANSI*, *VT100/VT220* or *TTY*.

The *ANSI* and *VT100/VT220* options give you a graphical presentation of the menus, whereas *TTY* is used where a dumb terminal device such as a Teletype is used for configuration and data presentation. Note that *ANSI* and *VT100/220* terminals also highlight the menu select letter.

### **2.9.2 Via Modem**

This option specifies whether a modem is to be used or not. This option defaults to *NO* and the option is activated immediately without the need to *LOAD NEW CONFIG*. Modem support causes you to be logged-out if the Ready-To-Send (RTS) signal is dropped on the terminal port.

The menu item *VIA MODEM* is set to *NO* by default, thus enabling local communication only after a cold start. The vast majority of users are expected to carry out set-up procedures on a local basis.

The RTS line needs to be driven for V.24 operation if modem support is on, so we recommend using a fully configured 9-way cable.

### **2.9.3 Baud rate**

The baud rates supported are *2400*, *4800*, *9600* and *19200* baud.

### **2.9.4 Parity**

Parity may be set to *NONE*, *ODD* or *EVEN*.

### **2.9.5 Data bits**

The number of data bits may be *7* or *8*.

### **2.9.6 Stop bits**

The number of stop bits may be *1* or *2*.

### **2.9.7 Load new config**

Except for the terminal type, the changes you make on the V.24 Set-up screen do not take effect until you register the changes in the Manager Card. To do this, select *LOAD NEW CONFIG* after you have made the necessary changes to the other values on this screen. You should then change your terminal settings to match these values.

## 2.10 Management menu

The *MANAGEMENT* menu leads to a series of menus which permit you to configure the various system management protocols and parameters. Only the utility options are described below. Detailed information is given in Section 6 of this manual.

MANAGEMENT	
Ethernet	<menu>
IP	<menu>
UDP	<menu>
tCp	<menu>
sNmp	<menu>
Telnet	<display>
tFtp	<menu>
Ping	<display>

Figure 2.15 Management menu

### 2.10.1 Telnet Option

telnet is only available when logged in using the local terminal port. The Telnet option permits a Telnet session to be established between the local MetroRack and a remote unit:

```
Metrodata MetroRack: Local connection to "[nodename]"
Telnet>
```

Figure 2.16 Telnet screen

Note that the MetroRack Manager does not use DNS facilities and therefore that the IP Address of the device to be called must be used. The following Telnet commands are available on MetroRack and are displayed in response to the <help> command

Command	Action
open	Open a connection to an IP address
close	Close a connection
abort	Abandon a connection without waiting for confirmation from the called service
status	Give a status report of the telnet session
quit	Leave telnet
help	Print help screen.
^]	Escape to command mode

Figure 2.17 Telnet commands

### 2.10.2 TFTP

TFTP is used to upload or download software or config files. In CLIENT mode, the MetroRack connects to an external TFTP server. In SERVER mode, the MetroRack acts as a server and is accessed using an external client.

Server mode should be used when NAT/ Firewalls exists on the network.

The remote server or device is identified by its *REMOTE IP* address, which is typed into a menu box after the menu item is selected.

TFTP		TFTP	
Mode	Server	Mode	Client
remote IP	192.168.1.10	remote IP	192.168.1.10
Software file name	MetroRack.7.0	Get new software	
Config file name	MetroRack.cnf	get Config	
		Put config	

Figure 2.18 TFTP menu screens

The two modes of TFTP operation are as follows:

a) In *SERVER* mode the device awaits *GET* or *PUT* action from other remote devices. The menu items *SOFTWARE FILE NAME* or *CONFIG FILE NAME* specify the files which can be transferred. Note that Software may only be uploaded into the local device, whilst Config files can be transferred in either direction.

Enter file name >
----------------------

b) In *CLIENT* mode, Config files may be downloaded from the server (*GET*), or may be uploaded to the server (*PUT*). Note that Software may only be uploaded (*GET*) into the local device, whilst Config files can be transferred in either direction. The system requests a file name in response to selection of a *GET* or *PUT* action from the menu

Enter file name, then wait >
---------------------------------

### 2.10.3 Ping

*PING* is used to check that a selected device is responding on the network by sending a *PING* packet to its IP address, and receiving an acknowledgement if the connection is successful. When *PING* is selected from the screen, the following dialogue occurs if the connection is successful. If it is not, the screen message is *NO RESPONSE*.

```

Metrodata MetroRack: Local connection to "MetroRack"
Destination: [192.168.1.10]
press any key to stop test
okay
okay
okay
    
```

Figure 2.19 Ping screen

### 2.11 System Menu

<b>SYSTEM</b>	
Time & date	<menu>
Node name	"[nodename]"
Password	*****
'View' user	Enabled
weLcome screen	<menu>
Software version	7.0
<b>O</b> utput config	<display>
Input config	
<b>W</b> arm start	
<b>C</b> old start	
<b>E</b> vent logs	<menu>

**HIGHLIGHTED** letter - select item  
 <escape> - exit menu

Figure 2.20 System set-up menu

## 2.11.1 Time & Date

TIME & DATE	
local Time	12.14.57
Local Date	Mon 12/7/2010
time Zone	+0
NTP server	0.0.0.0
Last sync'd	never
Sync now	

**HIGHLIGHTED** letter - select item  
<escape> - exit menu

Figure 2.21 Time & date menu

### 2.11.1.1 Time

When you select Time, you will be prompted to enter the current time in the format hh:mm:ss. Note that this format uses the 24-hour clock. For example:

```
Enter time (hh:mm:ss)
> 14:30:00
```

Figure 2.22 Time prompt

If NTP is not available, TIME may be entered manually.

### 2.11.1.2 Date

Similarly, enter the current date in the format dd/mm/yyyy. For example, April 4th 2001 would be entered as 4/4/2001. The corresponding day of the week is also displayed when you press <enter>. Leading zeros are suppressed by the date display.

```
Enter date "[dd/mm/yyyy]"
> 4/7/2003
```

Figure 2.23 Date prompt

The year is entered as an explicit 4 digit number (e.g. 2004), and processed as such in the firmware. Dates between 01/01/1980 and 31/12/2047 are valid.

If NTP is not available, DATE may be entered manually.

### 2.11.1.3 Time zone

If NTP is available, enter the number of hours ahead (+) or behind (-) GMT that represent your local time. According to the NTP protocol, the MetroRack will wait for a random period of between 1 and 5 minutes before requesting an NTP update. If NTP is not available, enter the time and date manually. This will be stored in the non-volatile real time clock device.

### 2.11.1.4 NTP server

Enter the IP address of the NTP server

### 2.11.1.5 Last Sync'd /Sync now

These options inform the user when the system was last synchronised with an NTP server, and give the instruction to synchronise now.

### 2.11.1.6 Node name

This is the name of the unit to which you are currently connected. The top of the screen indicates the current node by displaying

```
Local connection to "[nodename]"
```

At the *ENTER NEW NAME* prompt, you can enter the name you wish to give this node. The name may be up to 16 characters.

```
Enter new name
>
```

Figure 2.24 Enter new name

### 2.11.2 Password

This option is used to change the current password. The supervisory password, which allows you to change settings, is initially set to the model number, i.e. *MetroRack*. If you wish to change the password, select this item and then enter the new password.

The password may be up to 16 characters with no spaces permitted. The password is case-sensitive

```
Enter new password
Password> *****
Verify>
```

Figure 2.25 Password prompt

For security, the characters you type are displayed on the screen as asterisks. You will also be asked to re-enter the password as a check.

### 2.11.3 View user

This item is toggled between ENABLED and DISABLED. When ENABLED, the *VIEW* option when logging on to the unit is available. When it is DISABLED, the *VIEW* option does not exist to any user, allowing only authorised users to access the unit.

## 2.11.4 Welcome screen

WELCOME SCREEN	
Welcome screen	Enabled
1st line	
2nd line	
3rd line	
4th line	
5th line	
6th line	
7th line	
8th line	
Clear all text	
Display screen	<display>

Figure 2.26 Welcome screen

This option permits a user to design & specify their own start up welcome screen. The option can be DISABLED or ENABLED by toggling the screen first option above. When enabled, the user is able to input their own welcome text.

## 2.11.5 Output config

This item facilitates the outputting of config information to an intelligent terminal or PC connected to the unit's terminal port and set up with a terminal emulator. When *OUTPUT CONFIG* is selected from the menu screen, the following message appears:

```
Metrodata MetroRack "S/N: 28254"
Start capture then press a key
After transfer, stop capture then press another key.
```

Figure 2.27 Output config screen response

When a key is pressed, transfer of configuration data takes place into a nominated file. Note that the file is a .TXT text file. As soon as the transfer is complete, **[Escape]** should be pressed to terminate the transaction.

A typical config file is shown below:

e.0.t=1	e.0.c=1	e.0.f=1
e.0.o=1	e.0.b=1	e.0.j=1
e.0.xt=58367	e.0.xa=8652	e.0.xi=49715
e.1.l=1	e.0.q=65536	e.1.c=1
e.1.j=1	e.1.f=5	e.1.t=1
e.1.xt=58367	e.1.xa=8652	e.1.xi=49715
a.0.a=1	e.1.q=65536	a.0.m=-1
a.0.p=1	a.0.h=2	a.0.c=1
a.1.a=1	a.0.s=28	a.1.m=-1
a.1.s=28	a.1.h=2	a.1.c=1
v.a=31	v.b=3	v.w=LA1000
g.n=egham3k	v.r=2	v.e=1
p.0.d=1	g.t=60	p.0.e=3
p.1.i=5	p.0.i=5	p.0.v=1
n.0.p=0.192.129.0.1.255	p.2.i=5	n.0.a=1
n.1.n=255.255.255.0	n.0.n=255.255.255.0	n.0.b=1
n.2.b=1	n.1.b=1	n.1.t=1
i.t=32	n.2.t=2	n.2.f=255.255.255.255
s.sc=public	s.up=161	s.ut=162
s.sm=255.255.255.255	s.sw=public	s.st=public
	s.ts=software	s.tc=config

Figure 2.28 Metrorack Configuration dump file

### 2.11.6 Input config

This item facilitates uploading of config information from a stored text file into the MetroRack. It also requires the use of a PC as an intelligent Management terminal connected to the terminal port. When *INPUT CONFIG* is selected from the menu screen, the following message appears:

Send file. Esc to end

Figure 2.29 Input config message screen

When a key is pressed, transfer of configuration data takes place from a nominated file into the Manager's memory.

### 2.11.7 Software version

This option displays the current version of the software on your MetroRack Manager card. This is provided for information only.

### 2.11.8 Warm start

Selecting *WARM START* simulates turning the mains power off then on again. This may be necessary if a network component hangs up. A warm start does not affect the MetroRack's configuration parameters, performance statistics database or event log.

### 2.11.9 Cold start (Caution!)

Selecting *COLD START* returns the MetroRack Manager's software configuration to the default settings. All configuration parameters will be reset to their defaults, and the performance statistics database and event log will be cleared. The "[nodename]" will be erased, but the real-time clock will not be affected.

For security, you will be asked to confirm this request. Pressing *Y* will perform the cold start, pressing any other key will cancel the request.

Note: This option should only be selected when absolutely necessary, since it may cause disruption to the network.

Operational reasons for needing to *COLD START* include real time clock problems when the RTC must be reset; a change of firmware version number in the MetroRack owing to carrying out an upgrade; an invalid configuration, probably caused by corruption of the MetroRack RAM.

The management local terminal may need to be reset to default settings before you can communicate with the MetroRack after a cold start.

Note that if the unit is being managed remotely, a cold start will return it to local control, and the *VIA MODEM* option will have to be re-set on the *V.24 SET-UP* screen

## 2.11.10 Event Logs

Event logs are intended to provide a long-term history of major occurrences on the system. They can be the first port of call for a network manager when investigating a problem, and serve to confirm the status of the MetroRack at any point in time from the last cold start. If a cold start is performed, this log will be cleared and the first entry in the log will be the date and time of that cold start.

The logs are all accessed from the SYSTEM menu. The logs record the most recent events at the top of the screen, with events sorted into backwards order of time. The log is divided into three separate logs on separate screens: SYSTEM EVENT LOG, ALARM EVENT LOG and CONFIG EVENT LOG.

The SYSTEM EVENT LOG records system level events

--- System Event Log ---		
16/4/2010	23:27:35	power restored
16/4/2010	23:19:07	power down
15/4/2010	00:09:33	power restored
15/4/2010	00:09:28	power-down
Press any key to continue		

Figure 2.30 System event log

**Note:** If the system event log contains either the message SPURIOUS RESET or ILLEGAL INTERRUPT, please register this occurrence with your Supplier or Distributor of the product.

The ALARM EVENT LOG records alarms that have arisen since the last cold start. They are recorded simply as MAJOR or MINOR alarms with ON or OFF status.

--- Alarm Event Log ---		
17/2/2010	08:20:23	Major ON 4.LAN
16/2/2010	13:21:00	Major OFF 4.LAN
16/2/2010	12:52:38	Minor ON 6.E1
Press any key to continue		

Figure 2.31 Alarm event log

The CONFIG EVENT LOG records any configuration changes on the system. This can be very useful since configuration actions may have been taken remotely, without the knowledge of the local user of a node.

--- Config Event Log ---		
16/7/2010	08:20:23	Config updated
16/5/2010	13:21:00	Config updated
14/5/2010	11:32:38	Config updated
Press any key to continue		

Figure 2.32 Config event log

The FULL EVENT LOG records all events as described above in their chronological order.

--- Full Event Log ---		
16/7/2010	08:20:23	Config updated
16/5/2010	13:21:00	Config updated
14/5/2010	11:32:38	Config updated
Press any key to continue		

Figure 2.33 Full event log

### 3 FIBRE CONVERTER MODULES

#### 3.1 FC1X00 module

The FC1X00 range of converters is used for the transport of E1 traffic over fibre. Different model numbers refer to different fibre capabilities. In this manual the generic term FC1X00 is used to refer to the product range.

The FC1X00 module extends an E1 signal over a pair of single-mode or multi-mode fibres. The E1 line is connected via either a pair of BNC connectors or an RJ45 connector.

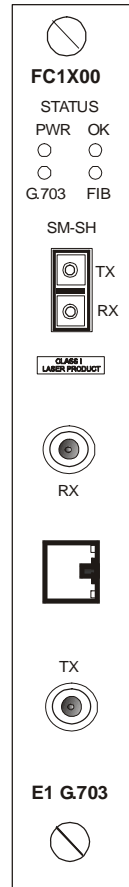
The FC1X00 can operate either in stand-alone mode, where the configuration is set-up using bit-switches mounted on the FC1X00 PCB; or in managed mode, where the Manager card will configure the module via the backplane using the menu system.

The FC1X00 may be hot-swapped: that is, removed or replaced in the chassis with power on and with no adverse effects on any other modules.

There is an array of four status LEDs on the fascia panel of the module. The indications are shown in the tables below.

Power LED state	FC1X00 LED Status
Power (PWR) Off	Module not plugged in or rack not powered up
Power (PWR) Green	Module operating normally in powered up chassis

Figure 3.1 Power LED indications



OK LED state	FC1X00 LED in Unmanaged mode
OK Off	Module not plugged in or rack not powered up
OK Green	Module operating normally in powered up chassis
OK LED state	FC1X00 LED in Managed mode
OK Off	Module not plugged in or rack not powered up
OK Green	Module operating correctly - no alarms
OK Red	Module has at least one port in Alarmed state

Figure 3.2 OK LED indications

G.703 LED state	FC1X00 LED Status
G.703 Off	Module not plugged in or rack not powered up
G.703 Green	Module operating normally in powered up chassis
G.703 Red	G.703 port in LOS or AIS condition

Figure 3.3 G.703 LED indications

FIB LED state	FC1X00 LED Status
FIB Off	Module not plugged in or rack not powered up
FIB Green	Module operating normally in powered up chassis
FIB Red	Fibre port in LOS condition

Figure 3.4 FIB LED indications

**3.1.1 FC1X00 set-up**

The card mounted bit-switches must be set in accordance with the table below to configure the unit. The factory default switch setting is ON, as shown in the table below in bold type.

Bit-switch	ON	OFF
1	750 ohm BNC port	1200 Ohm RJ45 port
2	Normal operation	Loopback enabled
3	Alarm extension disabled	Alarm extension enabled
4	Short haul	Long haul
5	X <sup>3</sup> +1 Scrambler	Scrambler disabled
6	Unused	Unused
7	Unused	Unused
8	Unused	Unused

Figure 3.5 FC1X00 bit-switches

In Managed mode the switch settings are assumed to be the default settings.

**3.1.2 Unbalanced BNC E1 G.703 Network port**

The network is connected to the BNC connectors on the rear fascia panel of the unit

Pin	Function
Tip	Signal
Ring	Shield

Figure 3.6 BNC connection

Cable lengths should be restricted to those defined below:

Cable	Max Length (metres)
UR202	720
RG59U	600
BT2002	650
BT2003	680

Figure 3.7 Cable lengths

**Note:** The total maximum attenuation of each of the cables attached to the BNC (network) port must not exceed 6dB when measured at 1-024 MHz. The frequency/attenuation characteristic of the cables attached to this port shall follow a root frequency law.

**3.1.3 Balanced RJ45 E1 G.703 Network Port**

The RJ45 port is presented as NT for direct connection to a TE device such as a PBX or Router. The layout of the female RJ45 network port mounted on the rear panel is shown below:

Pin	Function
1	Tx tip
2	Tx ring
3	Tx shield
4	Rx tip
5	Rx ring
6	Rx shield
7	Not connected
8	Not connected

Figure 3.8 RJ45 network port layout

**3.1.4 Connecting to an E1 network device**

A connection from the network port to a network device such as an E1 line or an NTU requires a crossover cable. Connections are defined in the table below.

FC1X00 port pin	FC1X00 port function	Network port pin	Network port function
1	Tx tip	4	Rx tip
2	Tx ring	5	Rx ring
3	Tx shield	6	Rx shield
4	Rx tip	1	Tx tip
5	Rx ring	2	Tx ring
6	Rx shield	3	Tx shield
7	Not connected	Not connected	Not connected
8	Not connected	Not connected	Not connected

Figure 3.9 Connection from FC1X00 to network device

### 3.1.5 Crossover dongle

The crossover dongle shown below is supplied with each FC1X00 unit. This dongle should be used for connection to a network port. The part number is 80-40-002.

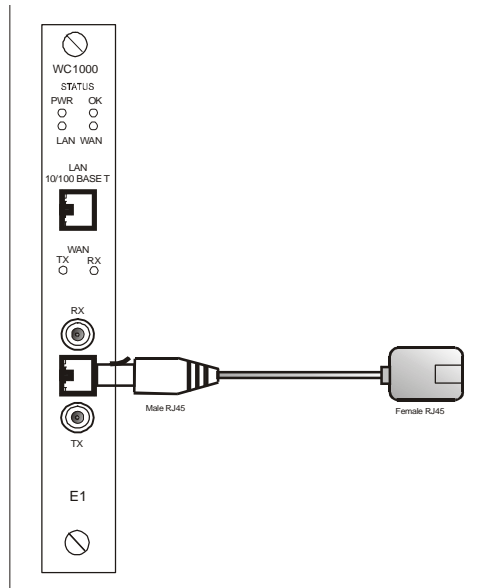
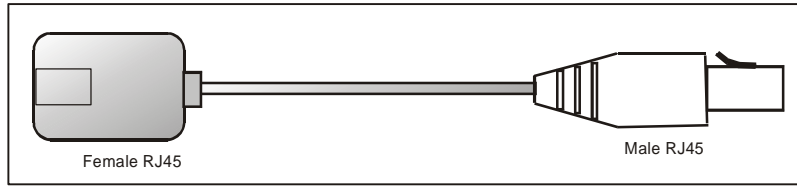


Figure 3.10 FC1X00 Dongle connection

### 3.1.6 RJ45 Connector layout

Figure 2.10 shows both the plug and socket head on so that any connecting wires are behind the connector. The connector numbering is shown:

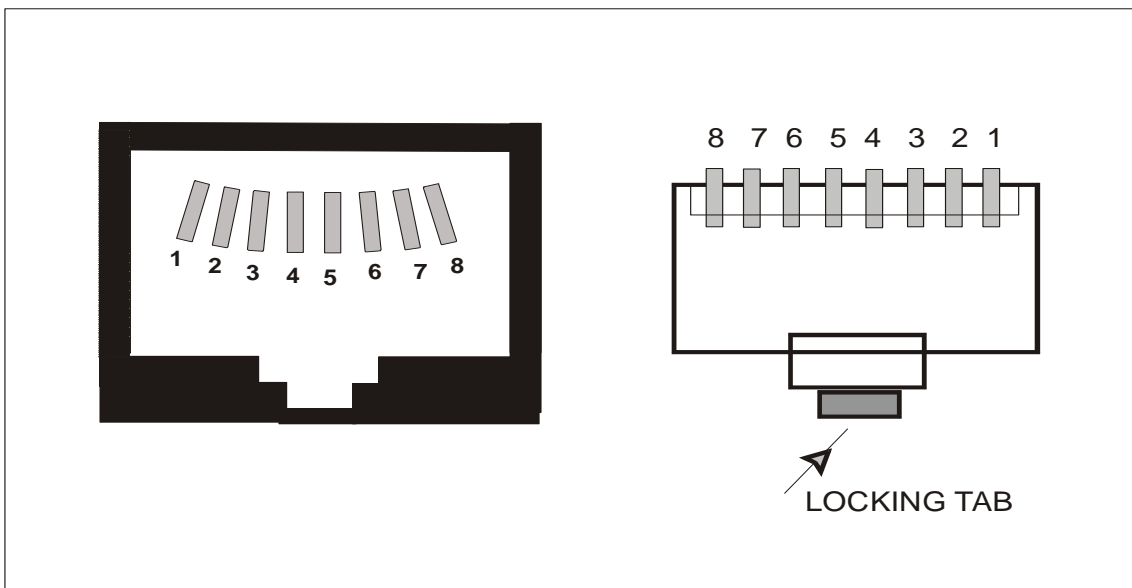


Figure 3.11 RJ45 layout

### 3.1.7 Cable lengths and types

Cable lengths should be restricted to those defined below:

Cable	Max Length (metres)
Belden 8132 (28 AWG)	175
Belden 9841 (24 AWG)	300

Figure 3.12 Cable lengths

**Note:** The total maximum attenuation of the cable attached to the network port must not exceed 6dB when measured at 1.024 MHz. The frequency/attenuation characteristic of the cables attached to the network port shall follow a root frequency law. This port type is approved to CTR12, CTR13.

### 3.1.8 Dataport set-up in Managed mode

In Managed mode the FC1X00 is set-up using the Management terminal connected to the Manager card in the MetroRack. Select the item DATAPORT SET-UP from the Main menu screen that is shown in the figure below. The response is the screen listing all installed I/O cards together with their slot number. The card to be set-up is addressed by selecting its slot number

MAIN SET-UP	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

DATAPORT SET-UP	
3 - 3(FC1000)	<menu>
4 - 4(WC-Serial)	<menu>
6 - 6(WC1000)	<menu>
7 - 7(FC1000)	<menu>
8 - 8(FC3100)	<menu>
9 - 9(FC4000)	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Figure 3.13 Screen sequence to select card

In this example, Slot 7 is selected for setting up the FC1000 installed in that slot. The card set-up options are as follows:

<b>7 (FC1000)</b>	
<b>Managed</b>	Yes
<b>Optical</b>	<menu>
<b>E1 G.703</b>	<menu>

Figure 3.14 FC1X00 set-up

### 3.1.8.1 Managed set-up

The options are YES or NO and they are set-up by the toggling process. Pressing a letter corresponding to a menu option will lead to the prompts shown below

<space> - change value
<enter> - save new value
<escape> - exit without saving

Figure 3.15 Prompt screen

The current value of that option will then be shown. Each time you press the space bar, the next value will be displayed, cycling through the available values. When the required value is displayed, simply press the <enter> key to accept the value or press <escape> to cancel your choice. This process is known as toggling.

### 3.1.8.2 Optical set-up

Selecting O for Optical presents the screens shown below:

<b>7 (FC1000).OPTICAL</b>		<b>7 (FC1000).OPTICAL</b>	
Fibre	Multi-mode	Fibre	Multi-mode
Distance	Short Haul	Distance	Short Haul
<b>Scrambler</b>	Enabled	Scrambler	Enabled
Managed		Unmanaged	

Figure 3.16 Optical screens

The FIBRE and DISTANCE options as installed are displayed on this screen. The displays will correspond to the table below, depending on the actual model installed.

Model	Fibre	Distance
FC1000	Multi mode	Short haul
FC1100	Single mode	Short haul
FC1200	Single mode	Long haul

Figure 3.17 FC1X00 models

The SCRAMBLER option is toggled between Enabled and Disabled in Managed mode. In unmanaged mode it is a display option that may be viewed but not changed. The bit-switches are used instead to set-up the FC1000.

The Scrambler should always be ENABLED for manual operation to break up strings of 0's and 1's. With scrambling DISABLED the module may become sensitive to data patterns and lose data.

**3.1.8.3 E1 G.703 set-up**

Selecting G for E1 G.703 set-up presents the screen shown below:

<b>7 (FC1000).G.703</b>	
Interface	Balanced (RJ45)
Rx sensitivity	Short-haul

Managed

<b>7 (FC1000).G.703</b>	
Interface	Balanced (BNC
Rx sensitivity	Short-haul

Unmanaged

Figure 3.18 E1 G.703 screens

In Managed mode the option INTERFACE can be toggled between Balanced(RJ45) and Unbalanced (BNC). The item Rx sensitivity can be toggled between Long-haul and Short-haul.

In Unmanaged mode, the screen simply displays the installed options and cannot be toggled. The bit-switches are used instead to set-up the FC1000.

### 3.1.9 Alarm set-up in Managed mode

The screens below show the sequence from the Main menu for accessing and setting the alarms for an FC1000 located in slot 3 of the MetroRack. The slot number of a particular card can easily be found by referring to the GLOBAL STATUS display which is accessed from the Main menu.

<b>MAIN SET-UP</b>	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

<b>ALARM EXTENSION</b>	
clear Alarm outputs	<display>
System	<menu>
sLot	<menu>

**HIGHLIGHTED** letter - select item  
 <escape> - exit menu

Enter slot number (0-12)  
 >7

<b>3 (FC1000)</b>	
E1 Optical	<menu>
E1 <b>G.703</b>	<menu>

<b>7 (FC1000).</b>	<b>E1 OPTICAL</b>
<b>0 - SD</b>	Major

<b>7 (FC1000).</b>	<b>G.703</b>
<b>0 - LOS</b>	Minor

Figure 3.19 Alarm set-up sequence

When the alarm has been selected (bottom screen), the setting can be toggled between MAJOR, MINOR and NONE.

Note that the SYSTEM alarms are described in Section 8.8.2 of this manual, but in the examples above, SD is Signal Detect alarm, and LOS is Loss of Signal.

**3.1.10 FC1X00 specifications**

FC1X00	Specification
	G.703 compliant, Sensitivity -10dB. Line coding HDB3. Bit rate: 2.048 Maps +/- 50ppm Interface types: 75 Ohm Unbalanced coax (BNC) or 120 ohm Balanced (RJ45)
Jitter Tolerance	Per G.823.
Barrier	EN 41003 compliant barrier provided on the E1 interface.
Performance	PD7024 (NTR4)
Diagnostics	Bi-directional Loop Test initiated by bit-switch
FC1000 Fibre interface	G.957, Dual SC Multi-mode 62.5/125 um Transmit power: -14 to -19 dBm Max Rx input power: -14 dBm Receive sensitivity: -14 to -30 dBm Optical loss budget: = -19-(-30) = 11dB
FC1100 Fibre interface	G.957, Dual SC SH Single-mode 8/125 um (Short haul) Transmit power: -8 to -15 dBm Max Rx input power:-8 dBm Receive sensitivity: -8 to -31 dBm Optical loss budget: = -15-(-31) = 16dB
FC1200 Fibre interface	G.957, Dual SC LH Single-mode 8/125 um, (Long haul) Transmit power: 0 to -5 dBm Max Rx input power:-8 dBm Receive sensitivity: -8 to -34 dBm Optical loss budget: = -5-(-34) = 29dB
Safety	EN41003, EN50082
EMC	EN55022, EN50082
Ambient Temperature	0degC to +50degC
Storage Temperature	-20degC to +70degC
Relative Humidity	0% - 95% non condensing

### 3.2 FC3X00 Fibre converter

In this manual, the generic name FC3X00 is used for the range of models. The FC3X00 modules extend an E3/DS-3 signal for several kilometres over a pair of single-mode or multi-mode fibres. The three FC3X00 modules provide single-mode short haul, single-mode long haul or multi-mode fibre interfaces using SC connectors.

The E3/DS-3 interface uses a pair of BNC connectors. The FC3X00 provides a clear channel or unchannelised E3/DS-3 path over the fibre. As the interface is clear channel and transparent, the traffic to be transported may be framed or unframed.

#### 3.2.1 LED status alarms

There is an array of status LEDs on the fascia panel of the module. The indications are shown in the figure below.

LED name	Green ON	Red ON	Off
Status (OK) Unmanaged mode	Module powered up	N/A	Module absent or power OFF
Status (OK) Managed mode	OK	At least one port in alarmed state	Module absent or power OFF
Power (PWR)	OK	N/A	Power OFF
G.703 (E3/DS-3)	OK	LOS or AIS Alarm	Module absent or power OFF
Fibre (FIB)	OK	Fibre LOS Alarm	Module absent or power OFF

Figure 3.20 LED status indicators

#### 3.2.2 Unbalanced BNC E3/DS-3 G.703 Customer port

The customer equipment is connected to the BNC connectors at the rear of the unit:

Pin	Function
Tip	Signal
Ring	Shield

Figure 3.21 BNC connection

Cable lengths should be restricted to those defined below:

Cable	E3 Max Length (metres)	DS-3 Max Length (metres)
UR202	180	155
RG59U	150	130
BT2002	160	140
BT2003	165	140

Figure 3.22 Cable lengths

**Note:** The total maximum attenuation of each of the cables attached to the BNC (network) port must not exceed 6dB when measured at 1.024 MHz. The frequency/attenuation characteristic of the attached cables shall follow a root frequency law.

### 3.2.3 Bit-switch settings

The FC3X00 has an 8 -position bit-switch mounted on the PCB. The bit-switches are used to configure the module for stand-alone operation in Unmanaged mode, and to select the default settings for the managed mode of operation. The factory default setting is ON for all switches, and is shown below in bold type.

Bit-switch	ON	OFF
1	<b>E3 mode</b>	DS-3 mode
2	<b>Normal mode</b>	Loopback test mode
3	<b>Alarm extension disabled</b>	LOS or AIS Alarm
4	<b>E3 or DS-3 cable &lt; 225 ft</b>	DS-3 cable <225 ft
5	<b>X<sup>3</sup> + 1 Scrambler</b>	X <sup>24-1</sup> Scrambler
6	Unused	
7	Unused	
8	Unused	

Figure 3.23 Bit-switch settings

### 3.2.4 E3/DS-3

This switch is set to specify the Customer side line type. The default setting is E3.

### 3.2.5 Test Loop

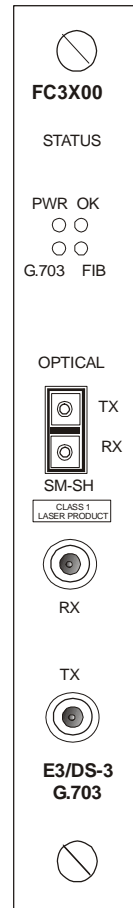
This switch initiates an outside test loop on both ports when set to OFF.

### 3.2.6 Line Build out

This switch boosts the DS-3 signal strength for long lines of over 255ft. The default setting is <255 feet. This switch is not used in E3 mode.

### 3.2.7 Scrambler

The scrambler function modifies the E3/DS-3 line traffic with an algorithm designed to break up long strings of 1's or 0's so that clock synchronisation is not lost or degraded by the long strings. The traffic is unscrambled on arrival at the far end.



### 3.2.8 Dataport set-up in Managed mode

In Managed mode the FC3X00 is set-up using the Management terminal connected to the Manager card in the MetroRack. Select the item DATAPORT SET-UP from the Main menu screen that is shown in the figure below. The response is the screen listing all installed I/O cards together with their slot number. The card to be set-up is addressed by selecting its slot number

MAIN SET-UP	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

DATAPORT SET-UP	
<b>3</b> - 3(FC1000)	<menu>
<b>4</b> - 4(WC-Serial)	<menu>
<b>6</b> - 6(WC1000)	<menu>
<b>7</b> - 7(WC1000)	<menu.
<b>8</b> - 8(FC3100)	<menu>
<b>9</b> - 9(FC4000)	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Figure 3.24 Screen sequence to select card

In this example, Slot 8 is selected for setting up the FC3100 installed in that slot. The card set-up options are as follows:

8 (FC3100)	
Managed	Yes
E3/DS-3 Optical	<menu>
E3/DS-3 G.703	<menu>

Figure 3.25 WC1000 set-up

### 3.2.8.1 Managed set-up

The options are YES or NO and they are set-up by the toggling process. Pressing a letter corresponding to a menu option will lead to the prompts shown below

<space>	- change value
<enter>	- save new value
<escape>	- exit without saving

Figure 3.26 Prompt screen

The current value of that option will then be shown. Each time you press the space bar, the next value will be displayed, cycling through the available values. When the required value is displayed, simply press the <enter> key to accept the value or press <escape> to cancel your choice. This process is known as toggling.

### 3.2.8.2 E3/DS-3 Optical set-up

Selecting O for Optical presents the screens shown below:

8 (FC3100).OPTICAL		8 (FC3100).OPTICAL	
Fibre	Single Mode	Fibre	Single Mode
Distance	Short Haul	Distance	Short Haul
Scrambler	Enabled	Scrambler	Enabled
Managed		Unmanaged	

Figure 3.27 Optical screens

The FIBRE and DISTANCE options as installed are displayed on this screen. The displays will correspond to the table below, depending on the actual model installed.

Model	Fibre	Distance
FC3000	Multi mode	Short haul
FC3100	Single mode	Short haul
FC3200	Single mode	Long haul

Figure 3.28 FC3X00 models

The SCRAMBLER option is toggled between Enabled and Disabled in Managed mode. It is a display option in Unmanaged mode, and cannot be toggled.

### 3.2.8.3 E3/DS-3 G.703 set-up

Selecting G for E3/DS-3 G.703 set-up presents the screen shown below:

8 (FC3100).G.703		8 (FC3100).G.703	
Interface	E3	Interface	E3
Managed		Unmanaged	

Figure 3.29 E3/DS-3 G.703 screens

The option INTERFACE can be toggled between E3 and DS-3 in Managed mode, but simply displays the installed option in Unmanaged mode, and cannot be toggled.

### 3.2.9 Alarm set-up in Managed mode

The screens below show the sequence from the Main menu for accessing and setting the alarms for an FC3100 located in slot 8 of the MetroRack. The slot number of a particular card can easily be found by referring to the GLOBAL STATUS display which is accessed from the Main menu.

MAIN SET-UP	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

ALARM EXTENSION	
clear Alarm outputs	<display>
System	<menu>
sLot	<menu>

**HIGHLIGHTED** letter - select item  
 <escape> - exit menu

Enter slot number (0 -12)  
 >8

8(FC3100)	
E1 Optical	<menu>
E1 G.703	<menu>

8 (FC3100). E1 OPTICAL	
0 - SD	Major

8 (FC3100). G.703	
0 - LOS	Major

Figure 3.30 Alarm set-up sequence

When the alarm has been selected (bottom screen), the setting can be toggled between MAJOR, MINOR and NONE.

Note that the SYSTEM alarms are described in Section 2.7.2 of this manual, but in the examples above, SD is Signal Detect alarm, and LOS is Loss of Signal.

**3.2.10 FC3X00 Specifications**

FC3X00	Specification
E3/DS-3 Interface	<b>Port:</b> G.703 compliant, Sensitivity -10dB. <b>Interface type:</b> BNC 75 Ohm unbalanced coax <b>Line coding:</b> E3: HDB3 DS-3: B3ZS <b>E3 Bit rate:</b> 34.368 Mbps +/- 20ppm <b>DS-3 Bit rate:</b> 44.736 Mbps +/- 20ppm
Jitter Tolerance	Per G.823.
Barrier	EN 41003 compliant barrier provided on the G.703 interface.
Diagnostics	Bi-directional Loop Test initiated by Bit-switch
FC3000 Fibre interface	G.957, Dual SC Multi-mode 62.5/125 um Bit rate: up to 155.52Mbps Transmit power: -14 to -19 dBm Max Rx input power: -14 dBm Receive sensitivity: -14 to -30 dBm Optical loss budget: = -19-(-30) = 11dB
FC3100 Fibre interface	G.957, Dual SC SH Single-mode 8/125 um (Short haul) Bit rate: up to 155.52Mbps Transmit power: -8 to -15 dBm Max Rx input power:-8 dBm Receive sensitivity: -8 to -31 dBm Optical loss budget: = -15-(-31) = 16dB
FC3200 Fibre interface	G.957, Dual SC LH Single-mode 8/125 um, (Long haul) Bit rate: up to 155Mbps Transmit power: 0 to -5 dBm Max Rx input power:-8 dBm Receive sensitivity: -8 to -34 dBm Optical loss budget: = -5-(-34) = 29dB
Safety	EN41003, EN50082
EMC	EN55022, EN50082
Ambient Temperature	0degC to +50degC
Storage Temperature	-20degC to +70degC
Relative Humidity	0% - 95% non condensing

### 3.3 FC4X00 Fibre converter

In this manual, the generic name FC4X00 is used for the range of models, which have different fibre capabilities. The FC4X00 module provides interfacing between an STM-1/OC3 electrical interface and an STM-1/OC3 single-mode or multi-mode fibre interface.

The STM-1 Electrical user port is connected via dual BNC connectors, whilst the fibre traffic is connected via a dual SC connector, as shown in the schematic. The module provides a clear STM-1/OC3 path over the fibre, so that the signal can be either framed or unframed and all protocols are transported transparently.

#### 3.3.1 LED status alarms

There is an array of status LEDs on the fascia panel of the module. The indications are shown in the figure below.

LED name	FC4X00 LED Status	Indication
Status (OK)	Green OK	Red: Alarm
Power (PWR)	Green OK	Off: Power Off
CMI	Green OK	Red: Alarm
Fibre (FIB)	Green OK	Red: Fibre Alarm

Figure 3.31 FC4X00 LED status

#### 3.3.2 Test bit-switches

There are no bit-switch settings to be made for the unit's set-up or normal operation. The switches mounted on the module card are used to set up Outside Loop tests for the unit. The default position is all switches set to ON.

The User port (STM1 BNC) and the Network port (STM 1 Fibre optical) can be selected separately (i.e. not at the same time) for test action.

The Outside loop test loops the incoming signal at the interface and transmits it back upon itself to validate the line that feeds the port.

Bit-switch	ON	OFF
1	Normal operation	Fibre Loopback test
2	Normal operation	G.703 Loopback test
3	Alarm extension disabled	Alarm extension enabled
4	Normal operation	Trim enabled
5	Trim 0	Trim 0
6	Trim 1	Trim 1
7	Trim 2	Trim 2
8	Trim 3	Trim 3

Figure 3.32 FC4X00 bit-switches

The bit-switch settings for adjusting TRIM are shown below, where 0 is switch in the ON position, and 1 is switch in the OFF position.

5	6	7	8	Trim%
0	0	0	0	-21%
1	0	0	0	-18%
0	1	0	0	-15%
1	1	0	0	-12%
0	0	1	0	-9%
1	0	1	0	-6%
0	1	1	0	-3%
1	1	1	0	Normal
0	0	0	1	+3%
1	0	0	1	+6%
0	1	0	1	+9%
1	1	0	1	+12%
0	0	1	1	+15%
1	0	1	1	+18%
0	1	1	1	+21%
1	1	1	1	+24%

Figure 3.33 Bit-switch settings for Trim

The TRIM setting adjusts the line driver output to compensate for the length of the line. In the default position, TRIM is Disabled, but the positions of switches 5-8 is for a TRIM of -21% (0000). So note that if TRIM is Enabled and switches 5-8 are left in the default position, the TRIM is very low.

TRIM should only be adjusted if there are problems with LCV errors as indicated in the Performance statistics for the remote unit.

### 3.3.3 Dataport set-up in Managed mode

In Managed mode the FC4X00 is set-up using the Management terminal connected to the Manager card in the MetroRack. Select the item DATAPORT SET-UP from the Main menu screen that is shown in the figure below. The response is the screen listing all installed I/O cards together with their slot number. The card to be set-up is addressed by selecting its slot number

MAIN SET-UP	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

DATAPORT SET-UP	
<b>3</b> - 3(FC1000)	<menu>
<b>4</b> - 4(WC-Serial)	<menu>
<b>6</b> - 6(WC1000)	<menu>
<b>7</b> - 7(WC1000)	<menu>
<b>8</b> - 8(FC3100)	<menu>
<b>9</b> - 9(FC4000)	<menu>

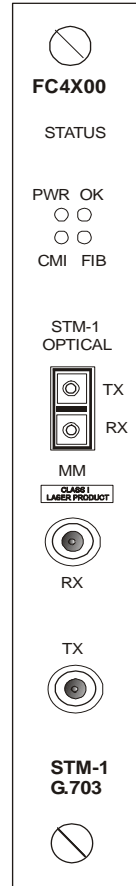


Figure 3.34 Screen sequence to select card

In this example, Slot 9 is selected for setting up the FC4000 installed in that slot. The card set-up options are as follows:

9 (FC4000)	
Managed	Yes
STM-1Optical	<menu>
STM-1 G.703	<menu>

Figure 3.35 WC1000 set-up

### 3.3.3.1 Managed set-up

The options are YES or NO and they are set-up by the toggling process. Pressing a letter corresponding to a menu option will lead to the prompts shown below

<space>	- change value
<enter>	- save new value
<escape>	- exit without saving

Figure 3.36 Prompt screen

The current value of that option will then be shown. Each time you press the space bar, the next value will be displayed, cycling through the available values. When the required value is displayed, simply press the <enter> key to accept the value or press <escape> to cancel your choice. This process is known as toggling.

### 3.3.3.2 E3/DS-3 Optical set-up

Selecting O for Optical presents the screens shown below:

<b>9 (FC4000).OPTICAL</b>		<b>9 (FC4000).OPTICAL</b>	
Fibre	Multi-mode	Fibre	Multi-mode
Distance	Short Haul	Distance	Short Haul
Managed		Unmanaged	

Figure 3.37 Optical screens

The FIBRE and DISTANCE options as installed are displayed on this screen. The displays will correspond to the table below, depending on the actual model installed.

Model	Fibre	Distance
FC4000	Multi mode	Short haul
FC4100	Single mode	Short haul
FC4200	Single mode	Long haul

Figure 3.38 FC4X00 models

### 3.3.3.3 STM 1 G.703 set-up

Selecting G for STM-1 G.703 set-up presents the screen shown below:

<b>9 (FC4000).G.703</b>		<b>9(FC4000).G.703</b>	
Trim	+12%	Trim	Normal
Managed		Unmanaged	

Figure 3.39 STM-1 G.703 screens

In Managed mode the Trim can be selected and toggled between +24% and -21%.

### 3.3.4 Alarm set-up in Managed mode

The screens below show the sequence from the Main menu for accessing and setting the alarms for an FC4000 located in slot 9 of the MetroRack. The slot number of a particular card can easily be found by referring to the GLOBAL STATUS display which is accessed from the Main menu.

<b>MAIN SET-UP</b>	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

<b>ALARM EXTENSION</b>	
clear Alarm outputs	<display>
System	<menu>
sLot	<menu>

**HIGHLIGHTED** letter - select item  
 <escape> - exit menu

Enter slot number (0-12)  
 >9

<b>9 FC4000)</b>	
STM-1 Optical	<menu>
STM-1 G.703	<menu>

<b>9 (FC4000). STM-1 OPTICAL</b>	
0 - LOS	Major
2 - LOC	Major
5 - SD	Minor

<b>9 (FC4000). G.703</b>	
0 - LOS	Minor
2 - LOC	

Figure 3.40 Alarm set-up sequence

When the alarm has been selected (bottom screen), the setting can be toggled between MAJOR, MINOR and NONE.

The alarms that can be signalled for the FC4X00 are shown below:

FC4X00	STM-1 Optical	0 - LOS	Loss of Signal
		2 - LOC	Loss of Clock
		5 - SD	Signal Detect
FC4X00	STM - 1 G.703	0 - LOS	Loss of Signal
		2 - LOC	Loss of Clock

Figure 3.41 FC4X00 LED status alarms

### 3.3.5 FC4X00 Specifications

FC4X00	Specifications
STM-1 Electrical Interface	G.703, 75Ohm BNC, Line coding CMI, Bit rate: 155.52 Mbps +/-15ppm Barrier: Fully barriered per EN41003
FC4000 Multi-mode Line Interface	G.957, Dual SC Multi mode 62.5/125 um Bit rate: up to 155Mbps Transmit power: -14 to -19 dBm Max Rx input power: -14 dBm Receive sensitivity: -14 to -30 dBm Optical loss budget: = -19-(-30) = 11dB
FC4100 Short Haul Line Interface	G.957, Dual SC Single mode 8/125 um Bit rate: up to 155Mbps Transmit power: -8 to -15 dBm Max Rx input power: -8 dBm Receive sensitivity: -8 to -31 dBm Optical loss budget: = -15-(-31) = 16dB
FC4200 Long Haul Line Interface	G.957, Dual SC Single mode 8/125 um Bit rate: up to 155Mbps Transmit power: 0 to -5 dBm Max Rx input power: -8 dBm Receive sensitivity: -5 to -34 dBm Optical loss budget: = -5-(-34) = 29dB
Safety	EN60950
EMC	EN55022, EN50082
Ambient Temperature	0degC to +50degC
Storage Temperature	-20degC to +70degC
Relative Humidity	0% - 95% non condensing
Barometric Pressure	86 kPa - 106 kPa

## 4 WC1000 LAN EXTENDER MODULE

The WC1000 LAN extender card extends a 10/100BaseT LAN service over an E1 WAN. The LAN is connected via an RJ45 socket, whilst the WAN port gives a choice of RJ45 or BNC connectors.

### 4.1 Setting-up the bit-switches

There is an array of 8 bit switches mounted on the WC1000 motherboard. The WC1000 bit switches will be in the default condition shown in Figure 4.1 below when shipped from the factory.

This may not be so if the unit has been used previously. To return a unit to its default state requires a power cycle and re-setting the bit-switches to default setting.

#### 4.1.1 Bit-switch definitions

The default settings of the bit-switches are shown bold and asterisked:

Bit-switch	Control	On	Off
1	Timing mode	Internal*	Loop
2	Port select	BNC*	RJ45
3	Loopback	None*	Remote Loop
4	Managed Mode	Disabled	Enabled*
5			
6	Duplex	Full duplex*	Half Duplex
7	Speed	100M*	10M
8	Auto Negotiation	Enabled*	Disabled

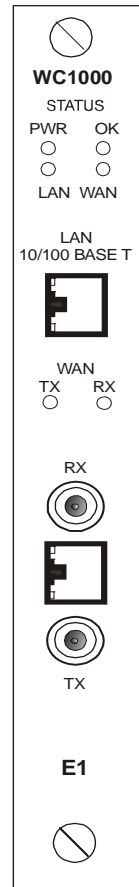


Figure 4.1 Bit-switch definitions

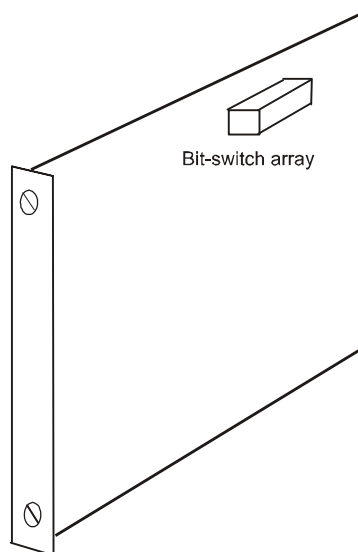


Figure 4.2 Bit-switch array on PCB

### 4.1.2 Cold Starting the unit

To cold start the unit, first set bit-switch no 4 (Managed Mode) to the ON (Disabled) state. Power up the WCM1000 and wait for the status LED on the rear panel to come on in any state, then power down. To ENABLE Managed Mode, re-set Bit-switch 4 to the OFF (Enabled) state with the power still off. Ensure that all other bit-switches are in their default positions as shown on the base panel label. Then power up the unit which will now be in the factory default state.

### 4.2 Alarms

The Status LED on the WC1000 fascia panel shows alarm conditions as shown in the table:

LED name	Green ON	Red ON	Off
Status (OK)	OK	LAN or WAN fault	Module absent or power OFF
Power (PWR)	OK	N/A	Power OFF
LAN	OK	Link Down	Module absent or power OFF
WAN	OK	LOS Alarm	Module absent or power OFF

Figure 4.3 Rear panel LED alarms

### 4.3 LED Indicators

There are LED indicators for LAN and WAN activity on the rear panel.

#### 4.3.1 LAN port

There are two miniature LEDs mounted at two corners of the RJ45 socket.

The upper (green) LED shows link activity, and the lower (yellow) LED shows operation at 100Mbps when it is illuminated.

#### 4.3.2 WAN port

One of the two WAN LEDs labelled Tx illuminates when the WAN port is transmitting data, and the other LED labelled Rx illuminates when the WAN port is receiving data.

### 4.4 E1 Crossover dongle

The crossover dongle shown below is supplied with each FC1X00 unit. The part number is 80-40-002.

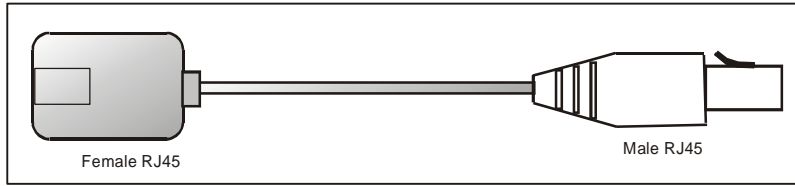


Figure 4.4 E1 Crossover dongle

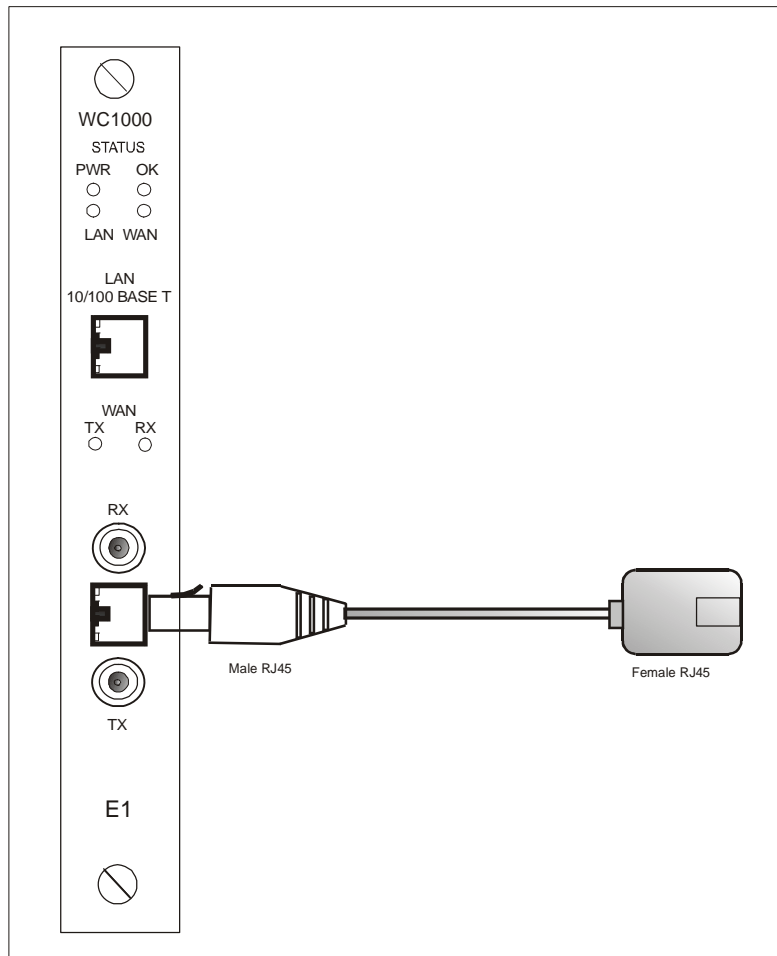


Figure 4.5 Dongle connection

### 4.4.1 RJ45 Connector layout

Figure 2.10 shows both the plug and socket head on so that any connecting wires are behind the connector. The connector numbering is shown.

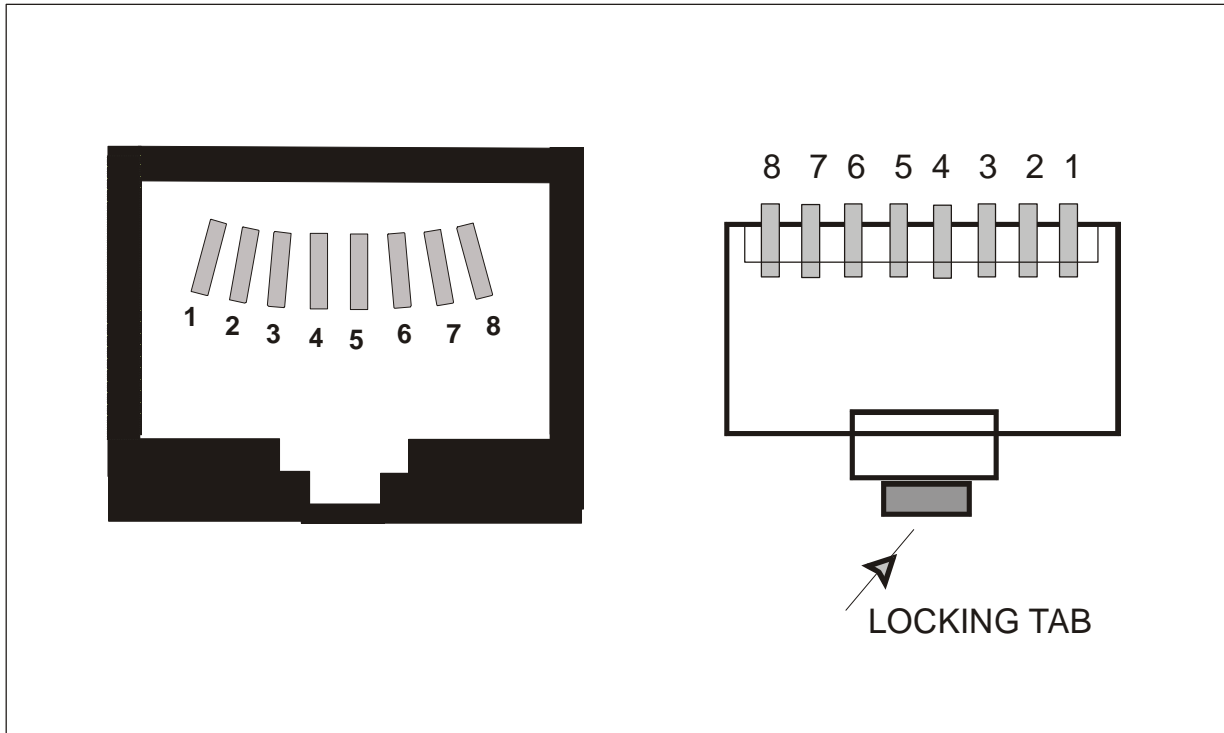


Figure 4.6 RJ45 layout

### 4.4.2 Cable lengths and types

Cable lengths should be restricted to those defined below:

Cable	Max Length (metres)
Belden 8132 (28 AWG)	175
Belden 9841 (24 AWG)	300

Figure 4.7 Cable lengths

**Note:** The total maximum attenuation of the cable attached to the network port must not exceed 6dB when measured at 1.024 MHz. The frequency/attenuation characteristic of the cables attached to the network port shall follow a root frequency law. This port type is approved to CTR12, CTR13.

#### 4.5 Dataport set-up in Managed mode

In Managed mode the WC1000 is set-up using the Management terminal connected to the Manager card in the MetroRack. Select the item DATAPORT SET-UP from the Main menu screen that is shown in the figure below. The response is the screen listing all installed I/O cards together with their slot number. The card to be set-up is addressed by selecting its slot number

MAIN SET-UP	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

DATAPORT SET-UP	
<b>3</b> - 3(FC1000)	<menu>
<b>4</b> - 4(WC-Serial)	<menu>
<b>6</b> - 6(WC1000)	<menu>
<b>7</b> - 7(FC1000)	<menu.
<b>8</b> - 8(FC3100)	<menu>
<b>9</b> - 9(FC4000)	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Figure 4.8 Screen sequence to select card

In this example, Slot 6 is selected for setting up the WC1000 installed in that slot. The card set-up options are as follows:

:

<b>6 (WC1000)</b>	
<b>Managed</b>	Yes
<b>E1</b>	<menu>
<b>LAN</b>	<menu>

Figure 4.9 WC1000 set-up

#### 4.5.1 Managed mode

This option is toggled between YES and NO to select Managed mode operation by the toggling process. Pressing a letter corresponding to a menu option will lead to the prompts shown below

<space> - change value <enter> - save new value <escape> - exit without saving
--

Figure 4.10 Prompt screen

The current value of that option will then be shown. Each time you press the space bar, the next value will be displayed, cycling through the available values. When the required value is displayed, simply press the <enter> key to accept the value or press <escape> to cancel your choice. This process is known as toggling.

#### 4.5.2 E1 set-up

Selecting E1 presents the screen shown below:

<b>6 (WC1000).E1</b>	
<b>Timing</b>	Loop
<b>Interface</b>	Unbalanced (BNC)
<b>Counters</b>	<display>

Figure 4.11 E1 screen

The TIMING options are toggled between Loop and Internal. The INTERFACE option is toggled between Unbalanced (BNC) and Balanced (RJ45).

Selecting the COUNTERS display presents the screen below:

Interface Statistics	
ifInOctets	0
ifInUcastPkts	0
ifInNUcastPkts	0
ifInDiscards	0
ifInErrors	0
ifInUnknownProtos	0
ifOutOctets	0
ifOutUcastPkts	0
ifOutNUcastPkts	0
ifOutDiscards	0
ifOutErrors	0

Figure 4.12 Counters display

A detailed description of the Counters items is given in the Metrodata LM1100 E1 User Manual, part number 76-02-042.

### 4.5.3 LAN set-up

Selecting LAN set-up presents the screen shown below:

6 (WC1000).LAN		6 (WC1000).LAN	
Auto-negotiation	Enabled	Auto-negotiation	Disabled
Speed		Speed	100Mbit/s
Duplex		Duplex	Half
Flow control	Enabled	Counters	<display>
Counters	<display>		

Figure 4.13 LAN screen

The AUTONEGOTIATION option is toggled between Enabled and Disabled. SPEED and DUPLEX are automatic options when Auto-negotiation is Enabled.

When the AUTONEGOTIATION option is toggled to Disabled, SPEED can be toggled between 100Mbit/s and 10Mbit/s, and DUPLEX can be toggled between Half and Full. This amounts to providing a manual set-up option sequence.

Selecting the COUNTERS display presents the screen below:

<b>Interface Statistics</b>	
ifInOctets	0
ifInUcastPkts	0
ifInNUcastPkts	0
ifInDiscards	0
ifInErrors	0
ifInUnknownProtos	0
ifOutOctets	0
ifOutUcastPkts	0
ifOutNUcastPkts	0
ifOutDiscards	0
ifOutErrors	0

Figure 4.14 Counters display

A detailed description of the Counters items is given in the Metrodata LM1100 E1 User Manual, part number 76-02-042.

#### 4.5.4 Alarm set-up in Managed mode

The screens below show the sequence from the Main menu for accessing and setting the alarms for a WC1000 located in slot 6 of the MetroRack. The slot number of a particular card can easily be found by referring to the GLOBAL STATUS display which is accessed from the Main menu.

MAIN SET-UP	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

ALARM EXTENSION	
clear Alarm outputs	<display>
System	<menu>
sLot	<menu>

**HIGHLIGHTED** letter - select item  
 <escape> - exit menu

Enter slot number (0-12)  
 >6

6(WC1000)	
E1	<menu>
LAN	<menu>

6 (WC1000).E1	
0 - LOS	Major
3 - AIS	Minor

6 (WC4000).LAN	
0 - LKDN	Major

Figure 4.15 Alarm set-up sequence

When the alarm has been selected (bottom screen), the setting can be toggled between MAJOR, MINOR and NONE.

Note that the SYSTEM alarms are described in Section 2.7.2 of this manual.

## 4.6 WC1000 Specifications

<b>Subscriber (LAN) Ports</b>	<b>Definition</b>
LAN Interface	RJ45, Auto switched MDI or MDI-X, or fixed MDI selected by bit-switch
Operating mode	Auto-negotiated 10/100 Mbps, Full / Half Duplex, or 100Mbps FD Fixed
Port filtering rate	148810 pps (packet per sec)
Port switching rate	148810 pps (packet per sec)
Switch mode	Any to Any
MAC address table	4096 entries
Min/Max Packet size	64 bytes / 1522 bytes
<b>E1 LINE (WAN) port</b>	<b>Definition</b>
E1 LINE Interface	G.703 compliant, Sensitivity -10dB. Line coding HDB3. Interface types: 75 ohm unbalanced coax (BNC) or 120 ohm balanced RJ45. Interface selected by bit-switch
Jitter Tolerance	Per G.823.
Barrier	EN 41003 compliant barrier provided on the E1 interface
Framing	Unframed
Encapsulation	HDLC
Clocking options	E1 Line: Internal or Loop: E1 line receive clock
Line Rate	2.048 Mbps
Maximum packet rate	4064 pps (packet per sec)
LED Indicators	Tx/Rx Packet, Alarm
Alarms	E1 LOS
Diagnostics	External Loop Test initiated by bit-switch
<b>Environmental</b>	<b>Range</b>
Ambient Temperature	0degC to +50degC
Storage Temperature	-20degC to +70degC
Relative Humidity	0% - 95% non condensing
Barometric Pressure	86 KPa - 106 KPa

## 5 WC-SERIAL LAN EXTENDER MODULE

The WC-Serial LAN extender card extends a 10/100/1000BaseT LAN service over a Serial WAN interface. The LAN is connected via an RJ45 socket, whilst the WAN port is connected via a 60-way Multi-serial interface connector.

### 5.1 Alarms

The Status LEDs on the WC-Serial fascia panel show alarm conditions as shown in the table

LED name	Green ON	Red ON	Green flashing
Status (OK)	Normal Operation	Alarm	
Power (PWR)	OK		
WAN	OK	WAN Link DOWN	
LAN	LAN Link UP	LAN Link DOWN	If SFP is fitted, one of the SFP or Copper ports has Link DOWN

Figure 5.1 Rear panel LED alarms

### 5.2 LED RJ45 Indicators

There are two miniature LEDs mounted at two corners of the RJ45 socket. The upper (green) LED shows link activity, and the lower tri-colour LED shows the speed of operation when it is illuminated:

Green	Yellow	Red
1000Mbps	100Mbps	10Mbps

Figure 5.2 Speed (lower) LED states

### 5.3 Setting-up the bit-switches

There is an array of 8 bit switches mounted on the WC-Serial motherboard, They are numbered 1 to 8 reading from left to right..

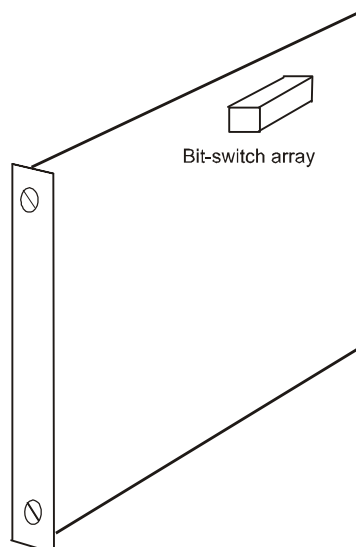
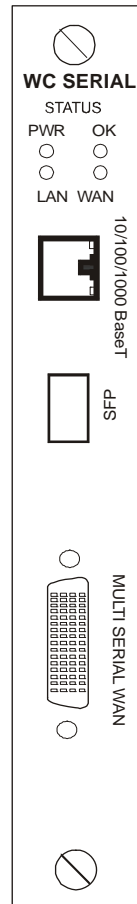


Figure 5.3 WC-Serial card showing bit-switch position



## 5.4 Bit-switch definitions

The default settings of the bit-switches are shown in bold. The WC-Serial bit switches will be in the default condition shown in Figure 5.2 below when shipped from the factory.

This may not be so if the unit has been used previously. To return a unit to its default state requires a power cycle and re-setting the bit-switches to the default settings.

Bit-switch	Control	On	Off
1	Module Operating mode	Managed mode	Stand alone mode
2	QOS control	Traffic Priority mode Enabled	Flow control Enabled
3	Alarm control	Alarm relay driver Disabled	Alarm relay driver Enabled
4	Max Frame size	MTU =1522 bytes	MTU=2048 bytes
5	Copper operating mode	Switch 5 & 6 combination ON	See section below
6	Copper operating mode	Switch 5 & 6 combination ON	See section below
7	SFP operating mode	SFP mode, 1000Base-X*	SFP mode, 100Base-FX
8	QOS mode select	Priority mode DSCP	Priority mode 802.1p

Figure 5.4 WC-Serial bit-switch options

### 5.4.1 Switch 1 - Module operating mode

When operated in a chassis with no Manager card fitted, Setting this switch to the OFF position enables the stand-alone mode. In this mode, the on-board micro-controller sets the configuration as defined by the remaining bit-switches.

### 5.4.2 Switch 2 - QOS control

The WC-Serial may operate with traffic prioritised over 4 queues, or may be operated with Pause Frame based flow control. When Priority mode is ENABLED, bit-switch 7 is used to determine the source of Priority control information.

### 5.4.3 Switch 3 - Alarm control

The chassis has a single alarm relay that can be linked to external alarm equipment. When the alarm relay driver is ENABLED, an alarm arising on the WC-Serial will drive the external alarm.

### 5.4.4 Switch 4 - Maximum Frame size

For standard LAN settings the maximum frame size is 1518 or 1522 for VLAN tagged frames. For protocols such as MPLS or QinQ the MTU should be set to 2048 bytes.

### 5.4.5 Switches 5 & 6 - Copper port operating mode

Switches 5 & 6 select the operating mode of the 10/100/1000BaseT port. With both switches in the ON position, the interface negotiates for speed, duplex and (if enabled) flow control. The other settings of these switches force a fixed speed and full duplex mode.

Switch 5	Switch 6	Control
ON	ON	Auto-negotiate, 10/100/1000 BaseT (Default)
OFF	ON	10M, Full duplex
ON	OFF	100M, Full duplex
OFF	OFF	1000M, Full duplex

Figure 5.5 Copper port mode settings

Note that Auto-negotiate mode should be used for operation with fixed half duplex ports.

### 5.4.6 Switch 7 - SFP port operating mode

This switch controls the mode of the SFP port which may operate as either 1000BaseX or 100BaseFX depending upon the type of SFP module inserted.

### 5.4.7 Switch 8 - Traffic prioritisation mode

When the Traffic priority mode is enabled by Switch2, then Switch7 selects between the IP based DSCP (Differentiated Services Code Point) or 802.1p priority schemes. Any frames received that do not have any priority defined will be assigned to the lowest priority queue.

## 5.5 Multi-Serial interface

The serial interface is presented on a high density 60-way connector. It supports X.21, EIA-530, V.35, V.36/RS-422 standards at speeds of up to 20Mbps.

The port uses the cable identifier to determine the type of interface to be serviced. It uses CISCO compatible cables as listed below:

Standard	CISCO cablepart no
X.21 DTE	CAB - X21-MT
X.21 DCE	CAB - X21-FC
EIA-530 DTE	CAB - 530-MT
V.35 DTE	CAB -V35-MT
V.35 DCE	CAB - V35-FC
V.36/RS-422 DTE	CAB - V36-MT
V.36/RS-422 DCE	CAB - V36-FC

Figure 5.6 CISCO serial interface cables

## 5.6 RJ45 Connector layout

Figure 2.10 shows both the plug and socket head on so that any connecting wires are behind the connector. The connector numbering is shown.

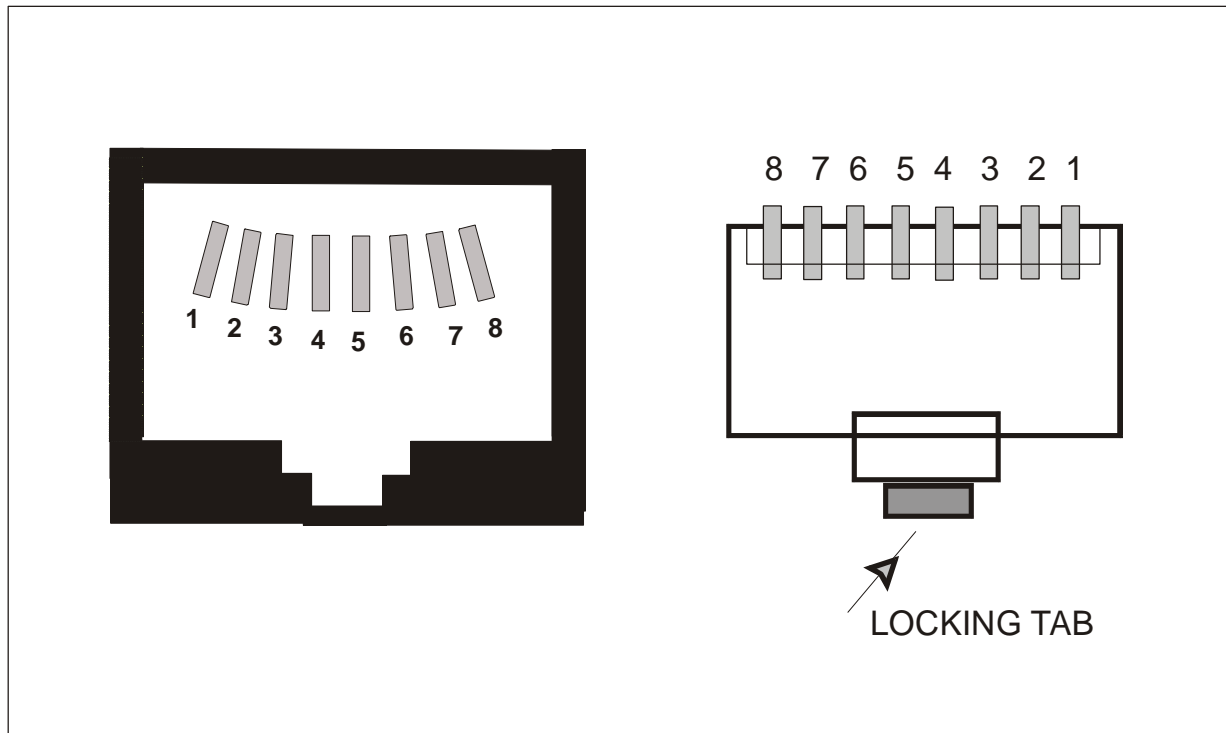


Figure 5.7 RJ45 layout

### 5.6.1 Cable lengths and types

Good quality Cat5 or Cat6 cable should be used with a maximum length of 100 metres port to port.

## 5.6.2 Alarm set-up in Managed mode

The screens below show the sequence from the Main menu for accessing and setting the alarms for a WC-Serial located in slot 4 of the MetroRack. The slot number of a particular card can easily be found by referring to the GLOBAL STATUS display which is accessed from the Main menu. Section 5.7.1 describes how to set up Managed mode.

MAIN SET-UP	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

ALARM EXTENSION	
clear Alarm outputs	<display>
System	<menu>
sLot	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Enter slot number (0-12)
>6

4(WC-SERIAL)	
LAN	<menu>
SFP	<menu>
WAN	<menu>

6 (WC-SERIAL).LAN		6 (WC-SERIAL).SFP	
0 - LOS	Major	0 - LOS	Major
1 - LKDN	Major	1 - LKDN	Major
2 - NF	None	2 - NF	None
3 - LSF	Minor	3 - LSF	Minor
4 - FEFI	Minor	4 - FEFI	Minor

4 (WC-SERIAL.WAN)	
0 - LKDN	<menu>
3 - LSF	<menu>

Figure 5.8 Alarm set-up sequence

When the alarm has been selected (bottom screen), the setting can be toggled between MAJOR, MINOR and NONE.

Note that the SYSTEM alarms are described in Section 2.7.2 of this manual.

Alarm	Meaning
AIS	Alarm Indication Signal
FEFI	Far End Failure Indication
LKDN	Link Down
LOS	Loss of Signal
LSF	Link State Forwarding Alarm
NF	Not Fitted

Figure 5.9 Alarm definitions

## 5.7 Dataport set-up in Managed mode

In Managed mode the WC-Serial is set-up using the Management terminal connected to the Manager card in the MetroRack. Select the item DATAPORT SET-UP from the Main menu screen that is shown in the figure below. The response is the screen listing all installed I/O cards together with their slot number. The card to be set-up is addressed by selecting its slot number

MAIN SET-UP	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

DATAPORT SET-UP	
<b>3</b> - 3(FC1000)	<menu>
<b>4</b> - 4(WC-Serial)	<menu>
<b>6</b> - 6(WC 1000)	<menu>
<b>7</b> - 7(FC1000)	<menu.
<b>8</b> - 8(FC3100)	<menu>
<b>9</b> - 9(FC4000)	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Figure 5.10 Screen sequence to select card

In this example, Slot 4 is selected for setting up the WC-Serial installed in that slot.

The card set-up options are as follows:

<b>4 (WC-SERIAL)</b>	
<b>Managed</b>	Yes
<b>Encapsulation</b>	<menu>
<b>LAN</b>	<menu>
<b>SFP</b>	<menu>
<b>WAN</b>	<menu>

Figure 5.11 WC-Serial set-up

**5.7.1 Managed mode**

This option is toggled between YES and NO to select Managed mode operation by the toggling process.

**5.7.2 Encapsulation menu**

Selecting Encapsulation presents the screens shown below, depending upon whether Flow Control is Enabled or Disabled:

4 (WC-Serial)	ENCAPSULATION	4 (WC-Serial)	ENCAPSULATION
Encapsulation	HDLC	Encapsulation	HDLC
HDLC FCS	16-bit	HDLC FCS	16-bit
MAC FCS	Strip	MAC FCS	Strip
<b>Flow control</b>	Enabled	<b>Flow control</b>	Disabled
maX frame size	1522	maX frame size	1522
		<b>Priority table</b>	<menu>

<p><b>HIGHLIGHTED</b> letter - select item</p> <p>&lt;escape&gt; - exit menu</p>
--

Figure 5.12 Encapsulation screen

**5.7.2.1 Encapsulation**

The LAN frames are transported across the WAN interface with HDLC encapsulation, in which flags are used to delimit frames and bit-stuffing is used to ensure that the flags are unique bit sequences.

**5.7.2.2 HDLC FCS**

To ensure that bit errors are detected, the HDLC frames are transmitted with a 16-bit frame check sequence added to the frame.

### 5.7.2.3 MAC FCS

The 32-bit Ethernet MAC Frame Check sequence is removed from the frame before transmission to improve efficiency. The FCS is recalculated and added to the frame after transmission.

### 5.7.2.4 Flow Control

The FLOW CONTROL option is toggled between Enabled and Disabled. The two traffic management options are 802.3x pause frame based control; or priority based queuing.

If Flow Control is Disabled, the priority mode is enabled and queued according to the option selected under the PRIORITY TABLE menu.

If Flow Control is Enabled, then all traffic flows through a single queue that will force the generation of pause frames as it reaches 3/4 full, and will cease issuing pause frames when the queue returns to 1/4 full.

### 5.7.2.5 Max frame size

The LAN port supports three settings for the Max Frame Size:

1522	This format supports 1518 bytes for non-VLAN tagged frames or 1522 bytes for tagged frames
2048	This format supports frame sizes up to 2048 bytes to allow support for protocols such as QinQ, MPLS etc
10k	This selection allows for support of jumbo frames. In practice, this mode is not advisable owing to the low speed of the WAN serial link

Figure 5.13 Max frame size options

### 5.7.2.6 Priority Table

When Flow Control is Disabled, the incoming LAN traffic is queued according to the Priority mode selected. The options are:

- a) IP based Differential Services Code Point (DSCP). This uses a 6-bit control as part of the IP header
- b) 802.1q VLAN tag based priority using the 802.1 priority code point

In each case the multiple levels of 64 for DSCP and 8 for 802.1q are mapped to 4 priority queues which operate in a strict priority mode:

Queue 1	Highest Priority
Queue 2	Medium Priority
Queue 3	Low Priority
Queue 4	Best Effort/ Lowest Priority

Figure 5.14 priority definitions

PRIORITY TABLE	
Priority Scheme	802.1p
<b>1</b> High	6,7
<b>2</b> Medium	4,5
<b>3</b> Low	2,3
<b>4</b> Best Effort	0,1
Restore Defaults	

PRIORITY TABLE	
Priority Scheme	DSCP
<b>1</b> High	40-63
<b>2</b> Medium	24-39
<b>3</b> Low	8-23
<b>4</b> Best Effort	0-7
Restore Defaults	

Enter list and /or range  
>

Figure 5.15 Priority scheme screens

The Priority Scheme may be either IP based, using the DSCP flag within the IP header, or it may use the 3 bit 802.1q VLAN tag.

The DSCP scheme uses 6 bits, giving 64 levels of priority. These 64 levels must be mapped to 4 priority queues. The mapping is entirely for user preference, but the Default scheme is shown in the screen above. Typing **[R]** restores the Default scheme.

The 802.1p scheme uses 3 bits giving 8 priority levels which must be mapped to 4 priority queues.

To set the Priority scheme, the user must select the level, and enter the list or range options.

Assignments of priority may be made in many ways, such as:

Range	1 to 7 selects range
Individual	1,2,3 selects 1, 2 and 3
Add	+7 adds level 7 to current setting
Remove	-2 removes level 2 from current setting

Figure 5.16 Setting priorities

Any unassigned levels are automatically assigned to level 4, the lowest priority.

### 5.7.3 LAN set-up

Selecting LAN set-up with State either UP (Enabled) or DOWN (Disabled) presents the screens shown below:

4 (WC-Serial).LAN		4 (WC-Serial).LAN	
State	Up	State	Down
link status	Down	spEed	1000M
spEed	1000M	Duplex	Half
Duplex	Full	Auto-negotiation	Enabled
Auto-negotiation	Disabled	negotiated	10M/HD
negotiated	1000HD	MDI/MDIX	Auto
MDI/MDIX	Auto	counTers	<display>
counTers	<display>		

Figure 5.17 LAN screen

#### 5.7.3.1 State

The STATE option controls the administrative state of the LAN port. When State is UP, the port operates in accordance with its configuration, and alarm conditions are reported. When the State is DOWN, the port is disabled and alarms, including LINK DOWN will not be reported or signalled on alarm displays.

#### 5.7.3.2 Link status

This is the operational state of the LAN port - options are UP or DOWN.

### 5.7.3.3 Speed & Duplex

These options behave differently according to the state of the AUTO-NEGOTIATION option.

If Auto-negotiation is ENABLED, these two options control the maximum operational mode as shown in the table below:

Speed Mbps	Duplex	Advertised mode
1000	Full	1000FD, 1000HD, 100FD, 100HD, 10FD, 10HD
1000	Half	1000HD, 100FD, 100HD, 10FD, 10HD
100	Full	100FD, 100HD, 10FD, 10HD
100	Half	100HD, 10FD, 10HD
10	Full	10FD, 10HD
10	Half	10HD

Figure 5.18 Auto-negotiation Enabled speeds

In these circumstances the port automatically negotiates with the far end to determine and select the highest common operating mode. The port advertises the speed and duplex negotiated on the menu screen.

If Auto-negotiation is Disabled, the SPEED can be toggled between 10, 100 and 1000Mbps, and DUPLEX can be toggled between Half and Full. To set-up the port manually. Note that FLOW CONTROL is not supported with Auto-Negotiation Disabled.

### 5.7.3.4 MDI/MDIX

The MDI/MDIX option can be toggled between MDI and MDI-X and AUTO. The standards define the pin-out of the RJ45 port in terms of MDI (DTE) or MDI-X (DCE). Operation with a straight through patch cable requires an MDI at one end and an MDI-X at the other end. The menu option permits the port to be fixed as either MDI or MDI-X, or alternatively to detect the required interface type automatically.

### 5.7.3.5 Counters

Selecting the COUNTERS display presents the screen below:

Interface Statistics	
ifInOctets	0
ifInUcastPkts	0
ifInNUcastPkts	0
ifInDiscards	0
ifInErrors	0
ifInUnknownProtos	0
ifOutOctets	0
ifOutUcastPkts	0
ifOutNUcastPkts	0
ifOutDiscards	0
ifOutErrors	0

Figure 5.19 Counters display

The statistics are collected and updated approximately every 5 seconds. These counters are the MIB-2 I/F table statistics for this port.

### 5.7.4 SFP set-up

SFP is selected from the WC-Serial menu and response is as follows:

4 (WC- SERIAL)	
Managed	Yes
Encapsulation	<menu>
LAN	<menu>
SFP	<menu>
WAN	<menu>

4 (WC-Serial).SFP	
sfp type	1000 Base-SX
State	Up
spEed	1000M
Auto-negotiation	Enabled
sfp Info	<display>
counTers	<display>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Figure 5.20 SFP set-up

#### 5.7.4.1 SFP type

This item displays the type of SFP fitted to the unit, and is read from the device itself. If no SFP is present, the type is shown as NOT FITTED.

**Note:** When an SFP is not fitted, it is up to the user to set the admin STATE to DOWN if it is expected not to be fitted, otherwise alarms will be raised.

#### 5.7.4.2 State

The STATE option controls the administrative state of the SFP port. When State is UP, the port operates in accordance with its configuration, and alarm conditions are reported.

When the State is DOWN, the port is disabled and alarms, including LINK DOWN will not be reported or signalled on alarm displays.

#### 5.7.4.3 Link status

This is the operational state of the SFP port - options are UP or DOWN.

#### 5.7.4.4 Speed

The menu option can be toggled between 1000 Base-X, 100BaseFX or AUTO. AUTO permits the software to establish the type of SFP fitted and to set-up the interface accordingly. If a 155Mbps SFP is fitted, the 100BaseFX mode will be selected.

#### 5.7.4.5 Auto-negotiation

These options behave differently according to the state of the AUTO-NEGOTIATION option. If Auto-negotiation is ENABLED, the port automatically negotiates with the far end to determine and select the highest common operating mode. The port advertises the speed and duplex negotiated on the SFP menu screen. If Auto-negotiation is DISABLED, the SPEED can be toggled between 100 and 1000Mbit/s and AUTO, to set-up the port manually.

#### 5.7.4.6 SFP Info

This item displays the manufacturer information read from the SFP module, comprising its type, manufacturer and device part number. This information may be requested by Metrodata Technical Support if problems are reported by the user.

		EoPDH SFP Info	Slot: 4
Status	Type	Vendor	Part No
good	1000 Base-SX	Stratos Lightwave	SLPC -20-4-1-B-R6
<Escape> - exit	other key-refresh		

Figure 5.21 SFP Info screen

#### 5.7.4.7 Counters

Selecting the COUNTERS display presents the screen below:

Interface Statistics	
ifInOctets	0
ifInUcastPkts	0
ifInNUcastPkts	0
ifInDiscards	0
ifInErrors	0
ifInUnknownProtos	0
ifOutOctets	0
ifOutUcastPkts	0
ifOutNUcastPkts	0
ifOutDiscards	0
ifOutErrors	0

Figure 5.22 Counters display

The statistics are collected and updated approximately every 5 seconds.

**5.7.5 WAN set-up**

The WC-Serial uses a 60-way connector with auto-sense to detect the cable type, so that when a cable is plugged into the unit, it automatically presents the correct interface. Interface options supported are X.21, V.35, EIA-530 and V.36. The cable also determines the operating mode as either DTE or DCE. The screens below show the set-ups for X.21 and V.35 interfaces.

4 (WC- SERIAL)	
Managed	Yes
Encapsulation	<menu>
LAN	<menu>
SFP	<menu>
WAN	<menu>

4 (WC-Serial).WAN	
State	Up
interface	X.21
mode	DTE
“C” control	On
“I” state	On

4 (WC-Serial).WAN	
State	Up
interface	X.21
mode	DCE
sPeed	2048 kbps
“I” control	On
“C” state	Off

4 (WC-Serial).WAN	
State	Up
interface	V.35
mode	DTE
RTS control	On
DTR control	On
CTS state	Off
CD state	Off
DSR state	Off

4 (WC-Serial).WAN	
State	Up
interface	V.35
mode	DCE
sPeed	2048kbps
cTs control	On
CD control	On
DSR control	On
RTS state	On
DTR state	On

Figure 5.23 X.21 and V.35 DTE & DCE set-up screens

### 5.7.5.1 State

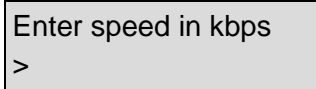
All interface options have the state parameter, which is toggled to either UP or DOWN. In the UP state the port operates normally. In the DOWN state, it is disabled and alarms will not be generated.

### 5.7.5.2 Mode & Speed in DCE mode

The operating mode (DTE or DCE) is shown on every screen.

When the port is in DCE mode, It generates the Transmit and Receive clocks as required by the interface type. The clock speed can be configured in steps of 8kbps to a maximum of 8192kbps.

When the menu item SPEED is selected, the system requests the user to enter the required speed, as shown below:

A screenshot of a terminal window showing a prompt for speed configuration. The text "Enter speed in kbps" is displayed on the first line, and a greater-than sign ">" is on the second line, indicating the user's input position.

```
Enter speed in kbps
>
```

### 5.7.5.3 X.21 set-up options

In DTE mode, the following controls may be set by toggling the screen item:

C Control: This may be toggled to ON or OFF

In DCE mode, the following controls may be set by toggling the screen item:

I Control: This may be toggled to ON, OFF or LOOPED

### 5.7.5.4 V.35 set-up options

In DTE mode, the following controls may be set by toggling the screen item:

RTS Control: This may be toggled to ON or OFF

DTR Control: This may be toggled to ON or OFF

In DCE mode, the following controls may be set by toggling the screen item:

CTS Control: This may be toggled to ON, OFF or LOOPED

CD Control: This may be toggled to ON, OFF or THROUGH

DSR Control: This may be toggled to ON, OFF or LOOPED

## 5.8 WC-Serial Specifications

Subscriber (LAN) Port 1	Specification
LAN Interface	RJ45, 10/100/1000BaseT, Autoswitch MDI/MDIX
Operating mode	Auto-negotiation, Manual 10/100/1000Mbps, Full / Half Duplex
Port filtering rate	Wire speed 10M:14881Mbps, 100M:148810Mbps, 1000M: 1488095Mbps
MAC address table	4096 entries
Min/Max Packet size	64 bytes / 10K bytes
LEDs	Link, Activity, Speed
Subscriber (LAN) Port 2	Specification
LAN Interface	SFP, 1000Base-X, 100Base-FX
Operating mode	1000Base-X Full Duplex, Auto-negotiate 100Base-FX Full Duplex
Port filtering rate	Wire speed 100M:148810Mbps, 1000M: 1488095Mbps
MAC address table	4096 entries
Min/Max Packet size	64 bytes / 10K bytes
LEDs	Link, Activity, Signal Detect
WAN Serial port	Specification
Presentation	HD 60-way connector (Cisco compatible)
Standards	EIA-530, V.35, X.21, V.36/RS-422, RS-232 (Cable select)
Mode	DTE, DCE
Signal support	<b>X.21:</b> TxD, RxD, Control, Indicate, SET <b>EIA-530:</b> TxD, RxD, TxC, RxC, ETxC, RTS, CTS, DCD, DTR, DSR <b>V.35:</b> TxD, RxD, TxC, RxC, ETxC, RTS, CTS, DCD, DTR, DSR <b>V.36:</b> TxD, RxD, TxC, RxC, ETxC, RTS, CTS, DCD, DTR, DSR <b>RS-232:</b> TxD, RxD, TxC, RxC, ETxC, RTS, CTS, DCD, DTR, DSR
DCE Clock	Configurable up to 8.192 Mbps (Nx64k)
Max data rate	DTE mode: 20Mbps, DCE mode: 8.192Mbps
Encapsulation	HDLC, 16-bit FCS, MAC CRC Strip, 1 Flag between frames
Prioritisation	4 Priority Queues, DSCP or 802.1q

---

<b>Environmental</b>	<b>Range</b>
Ambient Temperature	0degC to +50degC
Storage Temperature	-20degC to +70degC
Relative Humidity	0% - 95% non condensing
Barometric Pressure	86 KPa - 106 KPa

## 6 SETTING-UP SNMP FOR METRORACK

### 6.1 Management

The MetroRack supports SNMP V1 for both read and write access. It will also generate unsolicited traps. The MetroRack must be configured with the IP address of an NMS before it will generate traps or respond to SNMP polls.

The operating parameters, event log, performance statistics database and diagnostics functions are known collectively as the Management Information Base (MIB). The MetroRack MIB can be accessed remotely by using a Network Management System (NMS) connected to the LAN. The NMS should use SNMP (Simple Network Management Protocol), and could be located on the local LAN or on a remote LAN connected to the local LAN via a LAN bridge or IP router.

#### 6.1.1 MIB definitions

The MIB definitions supported have been placed in the public domain by Metrodata and can be parsed in to any NMS supporting an ASN.1 MIB parser. For further information on the management interface and the MIB definition, please refer to the LM1100 SNMP Enabler user manual, part number 70-02-003B.

The MetroRack requires the following MIBs

RFC-1213	MIB-2
METROHDR.MIB	Metrodata Enterprise Definitions
METROMSC.MIB	Metrodata Enterprise Miscellaneous Definitions
METRTRP.MIB	Metrodata Enterprise Trap Definitions

Figure 6.1 Metrodata MIBs

#### 6.1.2 MIB-2 Object definitions

The MetroRack uses the following Object ID:

Enterprises.503.1.49

Where:

503	=Metrodata Enterprise MIB (METROHDR)
1	=MetroSysObjectID
49	= MetroRack

Figure 6.2 Object definitions

## 6.2 SNMP configuration

From the MAIN SET-UP menu, select the **Management** menu item and then select the **SNMP** menu.

MAIN SET-UP		MANAGEMENT	
Global status	<display>	Ethernet	<menu>
alarm eXtension	<menu>	IP	<menu>
Data port set-up	<menu>	UDP	<menu>
V.24 set-up	<menu>	tCp	<menu>
<b>Management</b>	<menu>	sNmp	<menu>
System	<menu>	Telnet	<display>
Testing	<menu>	tFtp	<menu>
Performance data	<menu>		

Figure 6.3 Main set-up & Management screen menu

I

SNMP	
Read community	public
Write community	public
Trap community	public
Managers	<menu>
contact Person	0.0.0.0.
Node name	
Location	
sTats	<display>
trap Alarms	<menu>

Figure 6.4 SNMP screen menu

The SNMP parameters are configured using the SNMP menu shown above.

### 6.2.1 Read/Write trap community

To provide a level of security, communities are used to control access to the unit via SNMP. Separate communities may be configured for Read/Write or Trap access.

### 6.2.2 Contact person

The contact person is the SNMP MIB-2 system *SysContact* parameter, and the default setting is:

*Metrodata Limited, Fortune House, Eversley Way, Egham, Surrey, TW20 8RY*

The parameter may be up to 255 characters long and should be configured to reflect the actual installation needs.

### 6.2.3 Node name

The Node name is the SNMP MIB-2 system *SysName* parameter. By default, the entry is blank.

The parameter may be up to 255 characters long and should be configured to reflect the actual installation needs.

### 6.2.4 Location

The Location is the SNMP MIB-2 system *SysLocation* parameter. By default, the entry is blank.

The parameter may be up to 255 characters long and should be configured to reflect the actual installation needs.

### 6.2.5 Managers

To enable access to the MetroRack using SNMP, specific manager address must be configured. Once the manager has been assigned, the card will respond to polls and generate traps for that manager. The MetroRack supports up to 10 configured Network Management Stations (NMS). The ADD MANAGER menu sequence is shown below

<b>MANAGERS</b>	
Add Manager	<menu>

<b>ADD MANAGER</b>	
IP address	0.0.0.0
Access rights	Read-Write
receives Traps	Yes
Remove manager	

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Figure 6.5 Main set-up menu

#### 6.2.5.1 Add manager menu

The *IP address* is the IP address of the NMS assigned. The access rights are toggled between:

None	No access
Read Only	Only SNMP GET access allowed
Read-Write	SNMP GET/SET access allowed

Figure 6.6 Access rights

The *Receive Traps* parameter determines whether Traps should be sent to this Network Manager in alarm conditions. It is toggled between *Yes* and *No*.

## 6.2.6 Trap alarms

The MetroRack allows the used to disable or enable traps for each interface. This permits traps to be limited to specific events to highlight operational problems.

SNMP	
Read community	public
Write community	public
Trap community	public
Managers	<menu>
contact Person	0.0.0.0.
Node name	
Location	
sTats	<display>
trap Alarms	<menu>

TRAP ALARMS	
sLot	<menu>

Enter slot number (0-12)
>

4(WC-SERIAL).LAN	
1 - LKDN	Trap
3 - LSF	Trap

<space> - change value
<enter> - save new value
<escape> exit without saving

Figure 6.7 Set-up sequence for trap alarms

A Trapped Alarm generates a trap on entry to Alarmed state or Exit from Alarmed state. No trap means that Traps are not generated for this alarm.

## 6.3 Traps

Traps are unsolicited messages issued when a given condition arises in the product and it has to be signalled to the management system without waiting for the device to be polled.

The MetroRack generates standard traps as per RFC-1215 as well as the Enterprise specific traps as defined in METROTR.MIB. Traps on MetroRack are all generated using the TRAP-V1 PDU. The METROTR2.MIB uses the TRAP-TYPE macro as defined in RFC-1215. The MetroRack will issue traps when physical faults occur on the interfaces assigned.

Note that METROTR2 is a generic trap database and therefore the interface generating the trap is included in the definition.

### 6.3.1 Trap Enterprise field

The MetroRack will issue traps with the *Enterprise* field set to:

Enterprises.503.3 Enterprises.metro.metroTraps

### 6.3.2 Trap Interfaces field

The MetroRack allocates the interface *IfIndex* values tabled below:

IfIndex=1	Internal Management LAN port		
IfIndex=75	Slot1, Port1	IfIndex=459	Slot7, Port1
IfIndex=76	Slot1, Port2	IfIndex=460	Slot7, Port2
IfIndex=77	Slot1, Port3	IfIndex=461	Slot7, Port3
IfIndex=139	Slot2, Port1	IfIndex=523	Slot8, Port1
IfIndex=140	Slot2, Port2	IfIndex=524	Slot8, Port2
IfIndex=141	Slot2, Port3	IfIndex=525	Slot8, Port3
IfIndex=203	Slot3, Port1	IfIndex=587	Slot9, Port1
IfIndex=204	Slot3, Port2	IfIndex=588	Slot9, Port2
IfIndex=205	Slot3, Port3	IfIndex=589	Slot9, Port3
IfIndex=267	Slot4, Port1	IfIndex=651	Slot10, Port1
IfIndex=268	Slot4, Port2	IfIndex=652	Slot10, Port2
IfIndex=2699	Slot4, Port3	IfIndex=653	Slot10, Port3
IfIndex=331	Slot5, Port1	IfIndex=715	Slot11, Port1
IfIndex=332	Slot5, Port2	IfIndex=716	Slot11, Port2
IfIndex=333	Slot5, Port3	IfIndex=717	Slot11, Port3
IfIndex=395	Slot6, Port1	IfIndex=779	Slot12, Port1
IfIndex=396	Slot6, Port2	IfIndex=780	Slot12, Port2
IfIndex=397	Slot6, Port3	IfIndex=781	Slot12, Port3

Figure 6.8 MetroRack IfIndex values

Product	Port1	Port2	Port 3
FC1000	Fibre interface	G.703 interface (E1)	
FC3000	Fibre interface	G.703 interface (E3/DS-3)	
FC4000	Fibre interface	G.703 interface (STM-1/OC-3)	
WC1000	LAN interface	G.703 interface (E1)	
WC-Serial	LAN interface	WAN interface	SFP Fibre interface

Figure 6.9 Interface port numbers

### 6.3.3 Trap types

The MetroRack supports the generic trap types listed below:

Trap	Action
Type 1	Warm start
Type 2	Link Down
Type 3	Link Up
Type 6	Enterprise specific trap

Figure 6.10 MetroRack Trap types

other trap types are not supported or generated by MetroRack.

#### 6.3.3.1 Warm start

Generic trap 1: when the unit powers up and initialises, it will issue a single *Warm start* trap to indicate that the MetroRack has warm-started.

Note: *Cold start* is not issued since the Cold Start returns the MetroRack to the factory default state with no SNMP managers configured.

#### 6.3.3.2 Link down

Generic trap 2: when any of the external ports are in an alarmed state, a *Link Down* Trap is issued on entry to the alarmed condition.

For a G.703 port, a *Link Down* trap is issued on detection of either Loss of Signal (LOS) or AIS alarm conditions.

For a Fibre port, a *Link Down* trap is issued on detection of Loss of Signal (LOS).

for LAN ports, a *Link Down* trap is issued when the port is in the Link Down state. The Link Down may be caused by a cable disconnection or a mismatch between link partners.

The generic *Link Down* trap contains the IfIndex value to indicate which port has entered the Link Down state.

### 6.3.3.3 Link Up

Generic trap 3: when any of the external ports are not in an alarmed state, a *Link Up* Trap is issued on exit from the alarmed condition.

For a G.703 port, a *Link Up* trap is issued on detection of either Loss of Signal (LOS) or AIS alarm condition is no longer present.

For a Fibre port, a *Link Up* trap is issued when the Loss of Signal (LOS) condition is no longer present.

for LAN ports, a *Link Up* trap is issued when the port is in the Link Up state. The Link Up indicates completion of auto-negotiation, or compatible link partners.

The generic *Link Up* trap contains the IfIndex value to indicate which port has returned to the Link Up state.

### 6.3.4 Enterprise Specific Traps

Enterprise Specific Trap no	Explanation
Trap1 MetroOther MajorStart	If a port enters alarmed state e.g. <i>Link Down</i> , this trap is issued to give more information than a simple Link Down trap. The trap also includes the IfIndex value to indicate which port has entered the alarmed state
Trap 3 MetroOtherMajorEnd	When a port exits alarmed state e.g. <i>Link Up</i> , this trap is issued to give more information than a simple Link Up trap. The trap also includes the IfIndex value to indicate which port has exited the alarmed state
Trap 13 MetroPowerUp	When the MetroRack warm starts it will issue this trap to augment the generic <i>Warm Start</i> trap.

## 7 TESTING

The TESTING menu is accessed from the main menu, as shown below. The TESTING screen lists all the cards installed in the MetroRack. The card to be tested is accessed by typing its slot number.

<b>MAIN SET-UP</b>	
Global status	<display>
alarm eXtension	<menu>
Data port set-up	<menu>
V.24 set-up	<menu>
System	
Management	<menu>
Testing	<menu>
Performance data	<menu>

<b>TESTING</b>	
3 - 3(FC1000)	<menu>
4 - 4(WC-Serial)	<menu>
6 - 6(WC 1000)	<menu>
7 - 7(FC1000)	<menu.
8 - 8(FC3100)	<menu>
9 - 9(FC4000)	<menu>

<b>HIGHLIGHTED</b> letter - select item
<escape> - exit menu

Figure 7.1 Testing menu sequence

The individual card testing options are shown by a response screen. If the test listed has no highlighted letter, then no tests exist for that interface. Typing the bold highlighted letter permits the test field to be toggled to initiate or terminate a test on the card.

4 (WC-Serial)		9 (FC4000)	
LAN	None	STM-1 Optical	Local loop
SFP	Local loop	STM-1 G.703	Local loop
WAN	Outside loop		

7 (WC1000)		8 (FC3100)	
E1	Local loop	E3/DS-3 G.703	None
SFP	Local loop		

Figure 7.2 Testing response screen examples

The array of tests (and possible responses) that can be toggled is shown in the table below

Card	Interface	Toggle1	Toggle 2	Toggle 3
FC1X00	E1 G.703	None		
FC3X00	E3/DS-3 G.703	None		
FC4X00	STM-1 Optical	None	Local loop	
	STM - 1 G.703	None	Local loop	
WC1000	E1	None	Local loop	
WC Serial	LAN	None	Local loop	Outside loop
	SFP	None	Local loop	Outside loop
	WAN	None	Local loop	Outside loop

Figure 7.3 Tests available

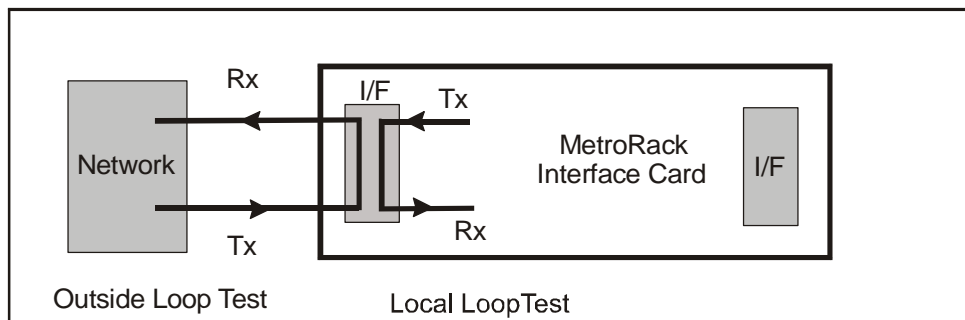


Figure 7.4 Loop tests

---

In a Local loop test, a signal for transmission is passed directly back to the receiving port for comparison.

In an Outside loop test, a signal received by the unit's interface is returned to the device transmitting it.

Figure 7.4 shows these tests diagrammatically.

## 8 ANALYSING PERFORMANCE

### 8.1 Introduction

The MetroRack provides you with extensive performance analysis functions, which allow you to monitor and record service information about the various links. The first part of this section describes the Errors and Alarms that are valid for the modes of operation of the MetroRack. Performance data is displayed in the form of an on-screen report or summary. Information is grouped into periods of 15 minutes. Examples of the screens are shown in later subsections.

### 8.2 Alarms and Errors

The following alarms may be monitored. The alarm extension menu can be used to set the status of any alarm to the required level e.g. MAJOR, MINOR or NONE.

Card	Interface	Alarm	Alarm definition
FC1X00	E1 Optical	0 - SD	Signal Detect
	E1 G.703	0 - LOS	Loss of Signal
FC3X00	E3/DS-3 Optical	0 - SD	Signal Detect
	E3/DS-3 G.703	0 - LOS	Loss of Signal
FC4X00	STM-1 Optical	0 - LOS	Loss of Signal
		2 - LOC	Loss of Clock
		5 - SD	Signal Detect
FC4X00	STM - 1 G.703	0 - LOS	Loss of Signal
		2 - LOC	Loss of Clock
WC1000	E1	0 - LOS	Loss of Signal
		3 - AIS	Alarm Indication Signal
WC1000	LAN	0 - LKDN	Link Down
WC Serial	LAN	1 - LKDN	Link Down
		3 - LSF	Link State Forwarding
WC Serial	SFP	0 - LOS	Loss of Signal
		1 - LKDN	Link Down
		2 - NF	Not Fitted
		3 - LSF	Link State Forwarding
WC Serial	WAN	0 - LKDN	Link Down
		3 - LSF	Link State Forwarding

Figure 8.1 MetroRack Alarm types

The following error types are reported if they are activated using the Performance data menu:

FC1X00, WC1000	E1 BPV Errors
FC3X00, FC4X00	G.703 LCV Errors

Figure 8.2 MetroRack Error types

### 8.3 Performance menu

PERFORMANCE	DATA
Interface	3.E1 Optical
Display mode	Static summary
Summary style	G.821
Phys layer stats	<display>
Error type	None
Clear all data	

**HIGHLIGHTED** letter – select item  
<escape> - exit menu

Figure 8.3 Performance data menu

#### 8.3.1 Interface

This field is for the selection of the interface for which statistics are to be displayed. Options are toggled using the space bar. The interface is displayed by slot number and then type, so that toggling displays the slot number in ascending order, followed by listing the interfaces applicable to each slot. Thus, slot 3 might toggle through *3.E1 Optical* followed by *3.E1 G.703* for an FC100 installed in slot 3.

#### 8.3.2 Display mode

This sets the type of display and the options are:

Full report and Rolling report

Static summary, Updated summary and 15 minute summaries

These modes are described in the subsections below describing reports and summaries. Reports and summaries are dealt with separately since they have different characteristics.

#### 8.3.3 Summary style

The *SUMMARY STYLE* menu option only appears when a Summary has been selected (as opposed to a Report) from the Display mode menu item, and this is therefore described in section 8.5.3 below.

#### 8.3.4 Physical layer statistics

This item leads to the physical layer statistics display screen described later in this section.

### 8.3.5 Error type

The Error type to be reported is selected by toggling the options presented on the menu screen.

Note that if the Error type has no bold selection character and displays NONE, there are no errors defined that can be activated.

## 8.4 Physical layer stats – Reports

### 8.4.1 Full Report

This presentation gives six sequential screens of information extending over the previous 24 hours for each type of error. The entries show the performance statistics for each 15-minute interval, referenced from the current real-time clock time.

**Note:** If the real-time clock is altered then the relative times of this database are also modified.

Metrodata MetroRack: "S/N:48254"							Alarms: Major		
6.E1							1 of 2		
(no error selected)							Alarmed seconds:		
Period Starting	Count	Valid	EF	ES	SES	UAS	Valid	LOS	AIS
	0	900	0	0	0	0	900	0	0
14:24:23	0	900	0	0	0	0	900	0	0
14:39:23	0	900	0	0	0	0	900	0	0
14:54:23	0	900	0	0	0	0	900	0	0
15:09:23	0	900	0	0	0	0	900	0	0
15:24:23	0	900	0	0	0	0	900	0	0
15:39:23	0	900	0	0	0	0	900	0	0
15:54:23	0	900	0	0	0	0	900	0	0
16:09:23	0	900	0	0	0	0	900	0	0
16:24:23	0	900	0	0	0	0	900	0	0
16:39:23	0	900	0	0	0	0	900	0	0
16:54:23	0	900	0	0	0	0	900	0	0

<Escape> to exit, any other key to continue

Figure 8.4 Full report screen

### 8.4.2 Rolling report

The Rolling report option gives a single line summary of the statistics at the end of each 15-minute period. This option is a more economic version of the 15-minute summaries option where a line printer is used, since only one report line is added to the printout every 15 minutes.

Metrodata MetroRack: "S/N:48254"							Alarms: Major		
6.E1							1 of 2		
I (no error selected)							I Alarmed seconds:		
Period Starting	Count	Valid	EF	ES	SES	UAS	Valid	LOS	AIS
	0	900	0	0	0	0	900	0	0
14:24:23	0	900	0	0	0	0	900	0	0
14:39:23	0	900	0	0	0	0	900	0	0
14:54:23	0	900	0	0	0	0	900	0	0
15:09:23	0	900	0	0	0	0	900	0	0
15:24:23	0	900	0	0	0	0	900	0	0
<Escape> to exit, any other key to continue									

Figure 8.5 Rolling report screen

## 8.5 Physical layer stats - Summaries

### 8.5.1 Screen presentation

The summary report screens are designed to give a view of the alarm and error status on a single screen. There is a choice of update frequencies of the data so that the user can choose the optimum presentation at any time.

The type of Alarm or Error being monitored is shown in the left hand column of the screen. Always check this when viewing a screen for the first time. If a diagnostic test is being run, its name appears at the top right of the screen entitled DIAGS.

The Temporary counts column is used to obtain error counts over a user definable test period, the duration of which need not be time related to anything else, without erasing the entire statistics database. You can reset the Temporary counts by pressing C. This means that a measurement may be started after a 15 minute interval has partly elapsed. The counts are displayed for the temporary measurement period from its start until you clear it down by pressing C.

Pressing any key other than C or <esc> will instantly refresh the display. This applies to each of the display styles - Static, Updated and 15 minute displays.

The Current 15-mins column gives the error counts for the current partial 15 minute period. Therefore the duration of statistics within this column varies between 0 and 15 minutes in a cyclical fashion as time passes.

The Previous 15-mins column gives the error counts for the previous complete 15 minute period, assuming that there has been one.

The Last 24 hours column gives the error counts for the previous 24-hour period, as an accumulation of the last 96 complete Previous 15-mins periods.

### 8.5.2 Presentation display modes

The three *DISPLAY MODES* for summaries define the frequency with which the display data is updated.

#### Static summary

This option presents the data as a single screen display, giving a snapshot of the current status. The information in the display may be updated by pressing any key except <escape>.

#### Updated summary

This is similar to a static summary except that the screen is refreshed approximately every 5 seconds, and provides a dynamic display of events.

#### 15 minute summary

This updates the information in a summary at the end of each 15 minute period. This mode is useful where a printer is connected to the terminal port and a detailed log is required.

Once one of these summary types has been selected for display, three styles of display are available for selection, as described below.

### 8.5.3 Summary style

This option determines the method of presenting the error information in the summaries. These options are not available for the full or rolling reports, which have a fixed style. The *SUMMARY STYLE* option only shows on the menu when a *SUMMARY* has been selected in the *DISPLAY MODE*. The styles available are:

Counts	Errors and alarms accumulate and are quoted as an absolute count.
G.821	Errors and alarms are expressed as G.821 parameters per second.
%G.821	Errors and alarms are shown in terms of normalised percentage G.821 parameters.

Figure 8.6 Summary styles

#### Notes:

- a) If an alarm appears in G.821 style, it is updated incrementally in the Temporary Counts and other columns as appropriate for its duration.
- b) The definition of G.821 as parameters per second gives a different summary layout than that for Counts style.
- c) In Counts style, an event is recorded once only.

### 8.5.4 Summary display - COUNTS style

Metrodata MetroRack: "S/N:48254"		Alarms: Major		
13:32:54 Mon 13/09/2010		PERFORMANCE SUMMARY		
Current Alarms: LOS -----		Diag: None		
	Temporary	Current	Previous	Last
	Counts	15 mins	15 mins	24 hours
Alarmed secs				
Total Secs	856	510	900	86400
LOS	0	0	0	0
AIS	1	0	0	0
<Escape> - exit, N - next interface, C - clear temp, other key - refresh				

Figure 8.7 Performance summary screen - COUNTS style

**Note:**

If an alarm appears in Counts style, it appears only once as a single event, and is recorded in the Temporary Counts column only. It may be best to confirm an alarm situation by setting the summary screen to G.821 style when an alarm is present.

### 8.5.5 G.821 Error and Alarm definitions

The G.821 definitions corresponding to Performance reporting shown below are used in the summary display screens in the following sub-sections:

G.821 Errors	Definition
Err. Count	The number of errors in the interval
Total secs	Valid number of seconds in the interval (less than 900 means that the 15 minute period was incomplete)
EFS	Error-free seconds
ES	Errored seconds: seconds with an error
BES	Bursty errored seconds: seconds $\geq 2$ errors, $< 1$ in $10^3$ errors
SES	Severely errored seconds: seconds $> 1$ in $10^3$ errors
UAS	Unavailable seconds: declared after SES for 10 consecutive secs
DM	Degraded minutes: $> 1$ in $10^6$ errors/minute

Figure 8.8 Performance data definitions

**8.5.6 Summary display - G.821 style**

Metrodata MetroRack: "S/N:48254"		Alarms: Major		
13:32:54 Mon 13/09/2010		PERFORMANCE SUMMARY		8.E3/DS-3 G.703
Current Alarms: LOS -----		Diag: None		
	Temporary	Current	Previous	Last
	Counts	15 mins	15 mins	24 hours
Alarmed secs				
Total Secs	856	510	900	86400
LOS	500	500	0	0
LCV Errors:	0	0	0	0
Total secs	856	510	900	86400
ES	500	500	0	0
SES	500	500	0	0
UAS	0	0	0	0
<Escape> - exit, N - next interface, C - clear temp, other key - refresh				

Figure 8.9 Performance summary screen - G.821 style

**8.5.7 Summary display - Percent G.821 style**

Metrodata MetroRack: "S/N:48254"		Alarms: Major		
13:32:54 Mon 13/09/2010		PERFORMANCE SUMMARY		8.E3/DS-3 G.703
Current Alarms: LOS -----		Diag: None		
	Temporary	Current	Previous	Last
	Counts	15 mins	15 mins	24 hours
Alarmed time:				
Total secs	856	510	900	86400
%LOS	00.0000%	00.0000%	00.0000%	00.0000%
LCV Errors	100.0000%	100.0000%	100.0000%	100.0000%
%EFS	0.0000%	0.0000%	0.0000%	0.0000%
%ES	0.0000%	0.0000%	0.0000%	0.0000%
%SES	0.0000%	0.0000%	0.0000%	0.0000%
%UAS	0.0000%	0.0000%	0.0000%	0.0000%
<Escape> - exit, N - next interface, C - clear temp, other key - refresh				

Figure 8.10 Performance summary screen - Percent G.821 style