

***Emux******Quick Start Guide***

DATE:	1 <sup>st</sup> September 2009
DOCUMENT NO:	76-02-073
REVISION:	C
PREPARED BY:	Ian Banbrook

**Metrodata Ltd**

Fortune House, Crabtree Office Village  
Eversley Way, Egham Surrey, TW20 8RY, UK

Tel +44 1 784 744700  
Fax: +44 1 784 744730  
E-Mail: support@metrodata.co.uk

**METRODATA LTD**

No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, electronic, mechanical, magnetic, optical, chemical, manual or otherwise, without the prior written permission of

**Metrodata Ltd, Fortune House,  
Crabtree Office Village, Eversley Way,  
Egham, Surrey, TW20 8RY, United Kingdom.**

**DISCLAIMER**

Metrodata Ltd makes no representations or warranties with respect to the contents hereof and specifically disclaims any implied warranties or merchantability or fitness for any particular purpose. Further, Metrodata Ltd reserves the right to revise this publication and to make changes from time to time in the content hereof without obligation of Metrodata Ltd to notify any person of such revision or changes.

Copyright © 2009 by Metrodata Ltd,

All Rights Reserved

## Document Revision History

1 <sup>st</sup> July 2009	XA	Document Created
10 <sup>th</sup> August 2009	A	Document Released
13 <sup>th</sup> August 2009	B	Document Updated
1 <sup>st</sup> September	C	Document Updated

---

**TABLE OF CONTENTS**

<b>1</b>	<b>INTRODUCTION</b>	<b>6</b>
1.1	Applications	7
<b>2</b>	<b>QUICK START CONFIGURATION</b>	<b>8</b>
2.1	Connecting to the Emux	8
2.2	Logging in to Emux	8
2.2.1	User Interface Navigation	9
2.3	System Configuration	10
2.3.1	Setting the Unit IP Address	10
2.3.2	Setting a default Route	11
1.1.1	Setting the Time and Date	11
2.3.3	Setting the Node Name	12
2.3.4	Setting the Password	12
2.4	SNMP Configuration	13
2.4.1	Read/Write/Trap Community	13
2.4.2	Contact Person	13
2.4.3	Node Name	13
2.4.4	Location	13
2.4.5	Managers	14
2.5	Configuration of the Data Ports	15
2.5.1	Configuration of the Uplink Port	16
2.5.1.1	Module Type	16
2.5.1.2	SFP1/2 Type	16
2.5.1.3	Active SFP	17
2.5.1.4	auto Fallback	17
2.5.1.5	Switchover Timeout	17
2.5.1.6	Scrambler Mode	17
2.5.1.7	Tx Clock Source	18
2.5.1.8	BERT	18
2.5.2	E1 Port Configuration	19
2.5.2.1	State	19
2.5.2.2	Long Haul / Short Haul	19
2.5.2.3	BERT	20
<b>3</b>	<b>SNMP MANAGEMENT</b>	<b>21</b>
3.1	MIB-2, sysObjectID	21
3.2	Traps	21
3.2.1	Trap Enterprise Field	22
3.2.2	Trap Interface Field	22
3.2.3	Trap Types	23
3.2.3.1	Generic Trap 1, Warm Start	23
3.2.3.2	Generic Trap 2, Link Down	23
3.2.3.3	Generic Trap 3, Link Up	23
3.2.3.4	Generic Trap 6, Enterprise Specific Trap	24
3.2.3.4.1	Enterprise Specific Trap 1	24
3.2.3.4.2	Enterprise Specific Trap 3	24

---

	3.2.3.4.3	Enterprise Specific Trap 2	24
	3.2.3.4.4	Enterprise Specific Trap 4	24
	3.2.3.4.5	Enterprise Specific Trap 13	24
<b>4</b>	<b>FAULT FINDING</b>		<b>25</b>
4.1	Top Level Alarm Summary		25
4.2	Global Status Overview		25
4.3	Performance Data		26
4.4	Loopbacks		26
4.5	BERT Testing		27
4.5.1	Uplink BERT		27
4.5.1.1	Mode Select		27
4.5.1.2	Pattern		27
4.5.1.3	Data Invert		27
4.5.1.4	Start / Stop Test		28
4.5.2	E1 BERT		28
4.5.2.1	Direction		28
4.5.2.2	Pattern		28
4.5.2.3	Data Invert		29
4.5.2.4	Start / Stop Test		29

## 1 INTRODUCTION

The Metrodata Emux is a family of products to provide transport of multiple E1 circuits over a dual, resilient fibre interface.



Figure 1: Emux Front and Rear Panels

The Emux is available in many different configurations designed to provide the right level of cost/performance for customer applications.

Emux-4	4 Port E1 with Dual Fibre Interface
Emux-8	8 Port E1 with Dual Fibre Interface
Emux-16	16 Port E1 with Dual Fibre Interface

The fibre interfaces are offered using SFP modules and therefore support many different options:

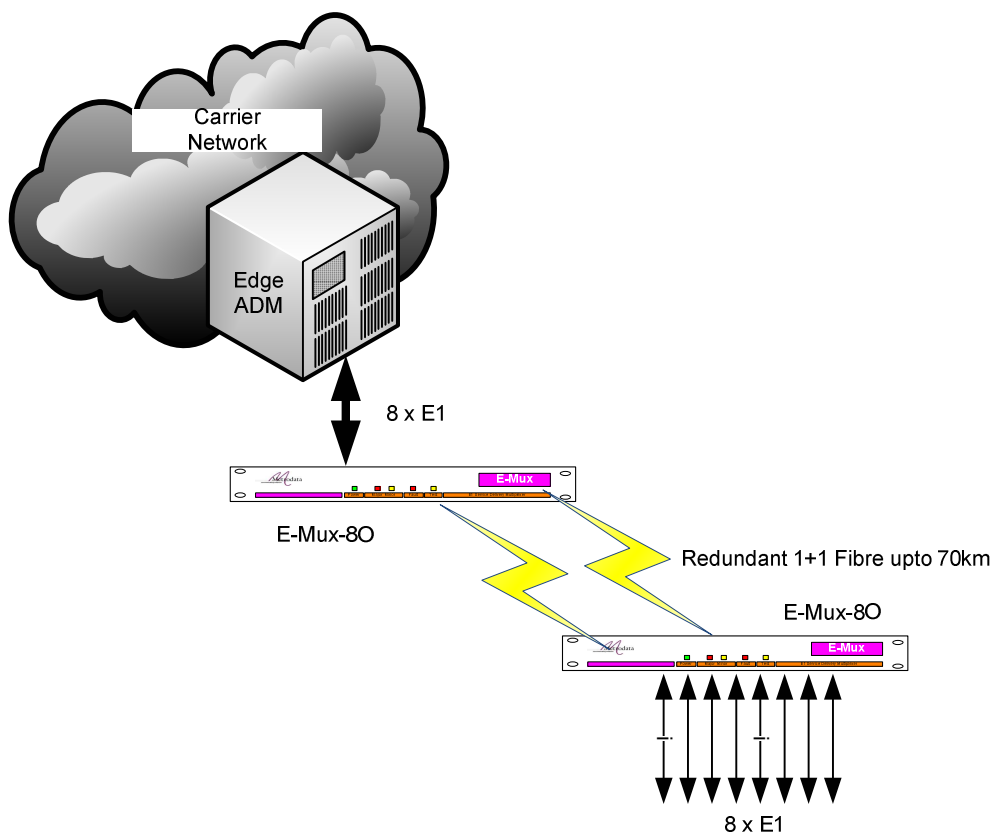
- OC-3 1310 MM SR-1 (2km)
- OC-3 1310 SM IR-1 (10km)
- OC-3 1310 SM LR-1 (40km)
- OC-3 1550 SM LR-2 (80km)

For increased resilience, when dual diverse fibres are deployed, a fault occurring on one fibre will force the Emux to automatically switch over to use the alternate fibre link thereby minimising the service outage. Port switchover is completed within 50mS of the fault being detected. A configurable timeout is used to prevent port flapping between fibre ports.

The E1 ports are presented on RJ-45 connectors, and offer an NT configuration for direct connection to TE equipment such as Routers or PBXs. Connection of the Emux to an E1 NT port, such as a DSU/NTU will require the use of a cross-over connection.

The Emux provides extensive configuration options to ensure interoperability with other vendor equipment, and through comprehensive alarm reporting and performance monitoring enables quick and easy diagnosis of network problems. Management of the Emux may be either local using a VT100 terminal or remotely over the LAN Management port using either Telnet or SNMP.

## 1.1 Applications



The Emux may be used by Managed Network Operators to fan out E1 services from their main POP sites. Using a national carrier network the Emux is attached to the local ADM and then distributed over fibre. At the remote site, the individual E1 services may then be fanned out using the Emux.

## 2 QUICK START CONFIGURATION

The purpose of this document is to give a user new to Emux, a simple overview of how to configure the various options to give a basic level of operation. This document should be used in conjunction with the User Manual.

### 2.1 *Connecting to the Emux*

When an Emux is first powered up the Terminal port will have the factory default configuration. The default parameters are as below:

Baud Rate: 19200

Parity: None

Character: 8 bits

Stop Bits: 2

Flow Control: XON/XOFF

The Terminal port is presented as a 9 way D-Type Female connector with the standard PC pin configuration as shown below:

PIN	SIGNAL
1	DCD
2	Receive Data
3	Transmit Data
4	
5	Signal Ground
6	DSR
7	RTS
8	CTS
9	

### 2.2 Logging in to Emux

The Emux has a password protected, menu driven user interface. When a terminal is connected to the Emux, hit <ENTER> and the welcome banner will be displayed as shown:

```
Metrodata Emux: Local connection to ""
Password ( 'view' to view only) :
```

At the prompt, enter the password to gain access to the Emux. The default password is "emux". For security, the password is obscured with \* being displayed for each character typed. An incorrect password will lead to the welcome banner being redisplayed. A correct password will lead onto the main set up menu as shown below:

---

Metrodata Emux: Local connection to "" Alarms: None

#### MAIN SET-UP

Global status <display>  
alarm eXtension <menu>

Data port set-up <menu>  
V.24 set-up <menu>  
Management <menu>  
System <menu>

Testing <menu>

Performance data <menu>

First CAPITAL – select item  
<escape> - exit menu

### 2.2.1 User Interface Navigation

The Emux user interface is a simple menu based interface. Each selectable item may be selected by typing the first capital of the option, e.g. for “Global status” type <G><sup>1</sup> or <g>. Sometimes, where multiple items have the same starting letter the selection capital will not be the first letter, e.g. “alarm eXtension” which is selected with <x>.

On the right side of the display is a list of what is below each item. This could be:

<menu>	This indicates a sub-menu will be entered
<display>	This indicates an information screen will be displayed. This may be status or statistics.

Additional keys may be used to navigate the menu system:

<ESC>	This will exit the current menu, or log out from the main set up menu.
<SPACE>	This will toggle through a list of selectable options
<ENTER>	This will select an item

---

<sup>1</sup> Encapsulating an item within < > indicates a key press is required, for example <G> means type G.

## 2.3 System Configuration

The system menu provides the basic administrative configuration items for the Emux and should be configured first:

### 2.3.1 Setting the Unit IP Address

From the Main Setup Menu, select the Management Menu and then select the Ethernet Menu.

#### Ethernet

State	UP
Phys . Address	00:C0:81:xx:yy:zz
dHcp	On
IP Address	0.0.0.0
Net Mask	0.0.0.0
Broadcast Address	From bit 1
AT Table	<display>
sTats	<display>

To change the IP settings for installation:

dHcp	For operation in a DHCP enabled network and automatic IP address allocation leave this parameter enabled.
IP Address	Assign the required IP address for correct installation into the network.
Net mask	Assign the required network mask for correct installation into the network.

When the IP address is changed, the menu changes to show the current or active IP address as well as the address that will be stored and assumed following a restart.

#### Ethernet

State	UP
Phys . Address	00:C0:81:xx:yy:zz
dHcp	Off
IP Addr	192.168.0.1
Net mask	255.255.255.0
Broadcast Address	From bit 1
AT Table	<display>
sTats	<display>

### 2.3.2 *Setting a default Route*

From the Main Setup Menu, select the Management Menu and then select the IP Menu, from this menu select the Routing Table.

Add a new entry as the default route as follows:

Destination	0.0.0.0
Mask	0.0.0.0
Next Hop	IP Address of Next Hop Router

### 1.1.1 *Setting the Time and Date*

The Emux optionally supports the use of NTP to provide an accurate real time clock function. In applications where NTP is not available, the Emux may be configured manually with the current time and data settings.

To configure the NTP parameters, select the "Time and date" menu from the "System" menu. The menu is as below:

#### TIME & DATE

Local Time	01:00:46
Local Date	Sat 1/1/2000
time Zone	+0
NTP Server	0.0.0.0
Last sync'd	Never
Sync now	

If NTP is available, then the following parameters need to be set,

Time Zone +/-12	Since NTP uses GMT, time zone adjustment allows the correct time to be configured wherever the units are deployed globally.
NTP Server	Enter the IP address of the network NTP server.

According to the NTP protocol, the Emux will wait for a random period of between 1 and 5 minutes before requesting an NTP update.

If NTP is not available, then the user can manually enter the time and date which will be stored in the non volatile real time clock device.

### 2.3.3 *Setting the Node Name*

To enable identification of the Emux unit it is useful to enter a meaningful name for the unit. The node name is entered as a string of up to 16 alpha numeric characters, including spaces.

### 2.3.4 *Setting the Password*

The password for the Emux may be changed from the system menu. The default password is “Emux”, however in actual deployment a more secure password may be preferred by the user.

To change the unit password, select “Password” from the system menu. The user interface will display the following:

```
Enter new password
```

```
Password >
```

Enter the new password, up to 16 alphanumeric characters. For security, each character is shown on the screen as an asterisk “\*”. Once the new password is entered, the display changes to

```
Enter new password
```

```
Password >      *****
```

```
Verify>
```

Re-enter the new password. If the password is correctly verified the unit will assume the new password for the next logon.

---

## 2.4 SNMP Configuration

The Emux needs to be configured with the details of the SNMP Network Management Station before the unit will generate traps, or respond to SNMP polls.

The SNMP parameters are configured using the SNMP menu found under the Management menu

### SNMP

Read community	public
Write community	public
Trap community	public
Managers	<menu>
Contact Person	Metrodata Limited, Fortune House ..
Node Name	
Location	
Stats	<display>
trap Alarms	<menu>

### 2.4.1 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.

### 2.4.2 Contact Person

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

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

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

### 2.4.3 Node Name

The node name is the SNMP MIB-2 system SysName parameter. By default this entry is blank. The parameter may be up to 255 characters and should be configured to reflect the actual installation requirements.

### 2.4.4 Location

The location is the SNMP MIB-2 system SysLocation parameter. By default this entry is blank. The parameter may be up to 255 characters and should be configured to reflect the actual installation requirements.

### 2.4.5 Managers

To enable access to the Emux using SNMP, specific manager addresses must be configured. Once a Manager is assigned the Emux will respond to polls and generate traps for that manager. The Emux supports up to 10 configured Network Management Stations.

The Add Manager Menu is as below:

Add Manager

IP Address	0.0.0.0
Access Rights	None
Receive Traps	No
Remove Manager	

The IP address is the IP address of the assigned Network Management Station.

The Access Rights supported are:

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

The Receive Traps parameter determines whether, under alarm conditions, Traps should be sent to this Network Manager.

## **2.5 Configuration of the Data Ports**

This section deals with the configuration of each of the user data port types including E1 and Uplink. A simple configuration will be shown for each type of port.

The port configuration is accessed from the main setup menu by selecting the data port menu. The data port menu gives the following options

### DATA PORT SET-UP

Uplink	<menu>
E1 port	<menu>

### 2.5.1 Configuration of the Uplink Port

The Uplink port configuration menu is accessed from the data port menu. For basic operation only three parameters must be set, the remaining parameters are optional and in many cases may be left in the default state.

The Uplink Port configuration menu is as below:

#### UPLINK

Module Type	Dual 1+ 1 Fibre
SFP 1 Type	OC-3 Single Mode IR-1
SFP 2 Type	OC-3 Single Mode IR-1
Active SFP	SFP1
Auto Fallback	Enabled
sWitchover timeout	5
sCramble mode	X^43-1
Tx clock source	Internal Osc
BERT	<menu>

#### 2.5.1.1 Module Type

This display item shows which type of uplink module is fitted to the Emux. Available options are:

Dual 1+1 Fibre

Note that SFP1 is designated the Primary link, and SFP2 is designated the secondary or fallback link. When, due to a fault, the fibre switches to use the fallback link, the Emux will generate a Fallback alarm to indicate there is an issue.

#### 2.5.1.2 SFP1/2 Type

This display item shows the type of SFP module fitted to each port of the Fibre Module. Metrodata supply a range of SFP devices which have been tested for operation with the Emux and the options are as below:

OC-3 MM 1310 SR-1	1310nm, Multimode, Short Range (2km)
OC-3 SM 1310 IR-1	1310nm, Single-Mode, Intermediate Range (10km)
OC-3 SM 1310 LR-1	1310nm, Single-Mode, Long Range (40km)
OC-3 SM 1550 LR-2	1550nm, Single-Mode, Long Range (80km)

Alternatively, if no SFP is fitted in either port then it will show:

Not Fitted

### **2.5.1.3 Active SFP**

The active SFP displays which port is currently active. The options are

SFP1	Primary Link, Selected
SFP2	Fallback Link, Selected

In normal operation, the SFP1 should be displayed. Following a fault on the fibre interface which causes a switch to the fallback link, a Fall Back Alarm is raised. To clear this alarm once the primary link is restored, the Active SFP should be set to SFP1.

### **2.5.1.4 auto Fallback**

The Emux designates SFP1 as the primary link, and should a fault occur the Emux may fallback to use the SFP2 link. Following the switch, the Emux raises a FALLBACK minor alarm.

The automatic switching circuit only functions when a fault is detected, it will not automatically restore the primary link, this must be a manual operation when the primary link fault has been cleared.

When Fallback is disabled, the link is selected manually.

### **2.5.1.5 Switchover Timeout**

In order to prevent link flapping whilst the new link tries to synchronize after a switchover a timeout is configurable. The timeout period is the length of time following a switchover before switching can occur again.

The timeout is configurable in seconds, in the range 1 to 31 seconds.

The default setting is 5 seconds which will ensure that on start up, the primary link will be selected.

### **2.5.1.6 Scrambler Mode**

To ensure enough transitions are present on the fibre interface the data is scrambled before transmission to ensure that long sequences of '1' or '0' are prevented. The scrambling options are

X <sup>43</sup> -1	43 bit scrambler
X <sup>3</sup> -1	3 bit scrambler, (Metrodata FC3000 compatible)

Unless the Emux is connected to a Metrodata FC3000 device, the X43 scrambler should be selected.

### **2.5.1.7 Tx Clock Source**

To ensure correct operation, the correct timing mode must be configured for the Uplink port. The options are:

- Internal Osc: Transmit timing derived from the local oscillator and will be accurate to +/-15ppm
- Uplink: Transmit timing is derived from the receive signal
- E1 Port xx: Transmit Timing is derived from a selected E1 port.

In virtually all applications where the fibre interface is used, the timing mode should be configured to INTERNAL.

### **2.5.1.8 BERT**

For validation of the uplink the Emux offers extensive BERT testing capabilities which enables the transmission and reception of a range of BERT patterns. The BERT test functions will be described in detail in the testing section of this manual.

**2.5.2 E1 Port Configuration**

The Emux supports either 4, 8 or 16 E1 ports operating simultaneously. Each E1 port is configured independently. The E1 ports are presented as RJ-45 connectors on the rear panel of the Emux and the port assignment is as follows:

4	3	2	1
---	---	---	---

Emux-4 Port Configuration

8	7	6	5
4	3	2	1

Emux-8 Port Configuration

16	15	14	13
12	11	10	9

8	7	6	5
4	3	2	1

Emux-16 Port Configuration

There are two parameters available for each port, however these may normally be left in the default state for normal operation.

**2.5.2.1 State**

The State parameter controls the state of the E1 port. The port must be in the UP state for normal operation. When a port is not used it should be placed in the DOWN state which will force the transmission of an AIS (all 1's) signal both Upstream and Downstream. When a port is in the down state, alarm processing is disabled.

**2.5.2.2 Long Haul / Short Haul**

The E1 interface may be set for short or long haul operation. For connection to other equipment within the building, the interface should be set for short haul operation.

### **2.5.2.3 BERT**

For validation of the E1 the Emux offers extensive BERT testing capabilities which enables the transmission and reception of a range of BER patterns. The BERT test functions will be described in detail in the testing section of this manual.

### 3 SNMP MANAGEMENT

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

The Emux requires the following MIBs

RFC-1213	MIB-2
METROHDR.MIB	Metrodata Enterprise Definitions
METROMSC.MIB	Metrodata Enterprise Miscellaneous Definitions
METROTRP2.MIB	Metrodata Enterprise Trap Definitions

#### 3.1 MIB-2, sysObjectID

The Emux uses the following OID

Enterprises.503.1.51

Where

503	=	Metrodata Enterprise MIB ( METROHDR )
1	=	MetroSysObjectID
51	=	Emux

#### 3.2 Traps

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

The Emux generates standard traps as per RFC-1215 as well as enterprise specific traps as defined in METROTR2.MIB.

Traps on the Emux are all generated using the TRAP-V1 PDU. The METROTR2 MIB utilises the TRAP-TYPE macro as defined in RFC-1215. The Emux will issue traps on the occurrence of physical faults on the interfaces.

METROTR2 is a generic trap database, and as such the interface generating the trap is included in the definition.

### **3.2.1 Trap Enterprise Field**

The Emux will issue traps with the ENTERPRISE field set to

Enterprises.503.3    Enterprises.metro.metroTraps

### **3.2.2 Trap Interface Field**

The Emux allocates the following interface ifIndex values

ifIndex = 1	Internal Management LAN port
ifIndex = 4	Uplink
IfIndex = 5	E1 Port 1
IfIndex = 6	E1 Port 2
IfIndex = 7	E1 Port 3
IfIndex = 8	E1 Port 4
IfIndex = 9	E1 Port 5
IfIndex = 10	E1 Port 6
IfIndex = 11	E1 Port 7
IfIndex = 12	E1 Port 8
IfIndex = 13	E1 Port 9
IfIndex = 14	E1 Port 10
IfIndex = 15	E1 Port 11
IfIndex = 16	E1 Port 12
IfIndex = 17	E1 Port 13
IfIndex = 18	E1 Port 14
IfIndex = 19	E1 Port 15
IfIndex = 20	E1 Port 16

### **3.2.3 Trap Types**

The Emux supports the following generic trap types

Trap Type 1	Warm Start
Trap Type 2	Link Down
Trap Type 3	Link Up
Trap Type 6	Enterprise Specific Trap

Other trap types are not supported, or generated by the Emux.

#### **3.2.3.1 Generic Trap 1, Warm Start**

When the unit powers up and initialises, it will issue a single warm start trap to indicate that the Emux has warm started.

Note, cold start is not issued, since the cold start returns the Emux to the factory default condition with no SNMP managers configured.

#### **3.2.3.2 Generic Trap 2, Link Down**

When any of the external ports are in an alarmed state, a Link Down Trap will be issued on entry into the alarmed condition.

For an E1 port, a Link Down Trap is issued on detection of either Loss of Signal, or AIS conditions.

For a Fibre port, a Link Down Trap is issued on detection of LOS, LOF or AIS.

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

#### **3.2.3.3 Generic Trap 3, Link Up**

When any of the external ports are not in an alarmed state, a Link Up Trap will be issued on exit from the alarmed condition.

For an E1 port, a Link Up Trap is issued when the Loss of Signal, or AIS condition is no longer present.

For a Fibre Port, a Link Up trap is issued when the LOS, LOF or AIS condition is no longer present.

The generic link up trap contains the IfIndex value to indicate which port has returned to the link up state.

### **3.2.3.4 Generic Trap 6, Enterprise Specific Trap**

#### *3.2.3.4.1 Enterprise Specific Trap 1*

When a port enters the alarmed state, i.e. Link Down, the Emux will issue this trap to give more detailed information than the simple link down trap.

Trap 1    MetroOtherMajorStart

The MetroOtherMajorStart trap also includes the IfIndex value to indicate which port has entered the Major Alarm state.

#### *3.2.3.4.2 Enterprise Specific Trap 3*

When a port exits the alarmed state, i.e. Link Up, the Emux will issue this trap to give more detailed information than the simple link up trap.

Trap 3    MetroOtherMajorEnd

The MetroOtherMajorEnd trap also includes the IfIndex value to indicate which port has exited the Major Alarm state.

#### *3.2.3.4.3 Enterprise Specific Trap 2*

When a port enters the alarmed state, i.e. Link Down, the Emux will issue this trap to give more detailed information than the simple link down trap.

Trap 2    MetroOtherMinorStart

The MetroOtherMinorStart trap also includes the IfIndex value to indicate which port has entered the Minor Alarm state.

#### *3.2.3.4.4 Enterprise Specific Trap 4*

When a port exits the alarmed state, i.e. Link Up, the Emux will issue this trap to give more detailed information than the simple link up trap.

Trap 4    MetroOtherMinorEnd

The MetroOtherMinorEnd trap also includes the IfIndex value to indicate which port has exited the Minor Alarm state.

#### *3.2.3.4.5 Enterprise Specific Trap 13*

When the Emux powers up, or warm starts, it will issue this trap to augment the generic “warm start” trap..

Trap 13    metroPowerUp

## 4 FAULT FINDING

Following initial configuration all may be well and all traffic is passing error free. However, in many cases it is possible that there may be problems. This section gives a quick overview of how to go about diagnosing where the problem may lie.

### 4.1 Top Level Alarm Summary

To give an immediate indication of the current operational state of the Emux a summary alarm indication is shown in the top right corner of every menu in the user interface.

The top line of the display shows:

Metrodata Emux: Local connection to "*nodename*" Alarms: none

If any alarms exist in the system the display will change to show either:

Alarms : Minor

Alarms : Major

If there are either major or minor alarms present, then further investigation is required using either the global status overview, or the performance monitoring screens.

### 4.2 Global Status Overview

When the Emux is experiencing problems the first place to look to get an overview of where the problems are is the Global Status Display. This is accessed from the Main Set up menu and gives an overview of every port and tributary on a single screen.

Metrodata Emux "*node-name*"

#### GLOBAL STATUS

-----

Alarms: Major

History last Cleared:

1/7/2009 13:02:14

Port	State	Diag	Alarms	Errors
Uplink	Up		-	
E1 1	Up	LL	-	
E1 2	Up		LOS	
E1 3	UP		los	
E1 4	UP		-	

Uplink Module : Dual 1+1 Fibre

\*SFP1: Single Mode OC-3

SFP2: Single Mode OC-3

<escape> - exit, C – clear, other key - refresh

The Global Status shows both current alarms and historical alarms. Current alarms are shown in capitals, e.g. LOS and this means that the alarm is currently active. Historical alarms are shown in lower case, e.g. los, and means that some time in the past an alarm occurred. Historical alarms may be cleared by typing <C> to clear the history.

For each E1 port or uplink a single alarm will be displayed and in most cases this is the highest priority alarm for that layer. Often multiple alarms will be active and it is necessary to view the physical layer statistics for that particular port or tributary to identify all active alarms.

For the Uplink, the type of SFP fitted to each port is displayed, and the current active interface is indicated with the “\*”.

### **4.3 Performance Data**

The performance data screens provide complete status for each physical port or tributary within the system. The display will maintain a count of errored seconds for each alarm and also provides a display of all currently active alarms.

The temporary count column may be cleared without affecting the main 24 hour performance statistics to make the current network state clearer.

### **4.4 Loopbacks**

The Emux can apply a wide range of diagnostic loopbacks.

For the Uplink port the loops available are:

None	Normal Operation
Local Loop	Fibre Transmit looped back to Fibre Receiver
Outside Loop	Fibre Receive looped back to Fibre Transmit.

For the E1 ports the loops available are

None	Normal Operation
Local Loop	E1 Transmit looped back to E1 Receiver
Outside Loop	E1 Receive looped back to E1 Transmit.

## 4.5 BERT Testing

The EMUX offers extensive BERT testing capabilities for testing of the E1 or Uplink circuits. The BERT test options are available under the Uplink or E1 Data port configuration menus.

### 4.5.1 Uplink BERT

The Uplink BERT test menu is as follows:

BERT	
Start	<Display>
Mode Select	E3 / E3 Payload
pAttern	2 <sup>15</sup> -1
Invert Data	Disable

#### 4.5.1.1 Mode Select

This option determines whether the BERT pattern is transmitted as the payload only leaving the framing information intact, or is sent as the entire signal.

#### 4.5.1.2 Pattern

The test pattern is selectable with the full range of 0.151 test patterns available. Patterns available include

2<sup>7</sup>-1

2<sup>9</sup>-1

2<sup>11</sup>-1

2<sup>15</sup>-1

2<sup>20</sup>-1

2<sup>23</sup>-1

QRSS

#### 4.5.1.3 Data Invert

To ensure compatibility with external test equipment the data pattern may be sent normally or with inverted data. Select as required.

#### 4.5.1.4 Start / Stop Test

When the Start Menu is entered the BERT test is started and the results are displayed as shown:

Status	In-Sync / Out of Sync
Bit Count	1.2512e+08
Error Count	3.86302e+07
BER	3.0 x 10 <sup>-1</sup>

To refresh the screen and update the counts press <SPACE>.

To restart the test, type <C> to clear the counts.

To force an error, type <F> to insert a single error.

#### 4.5.2 E1 BERT

The E1 BERT test menu is found under the E1 configuration Menu in the data port setup section, as follows:

BERT	
Start	<Display>
Direction	Upstream / Downstream
pAttern	2 <sup>15</sup> -1
Invert Data	Disable

##### 4.5.2.1 Direction

This option determines whether the BERT pattern is transmitted downstream (over the uplink) to replace the received E1 data, or upstream as the E1 transmit data..

##### 4.5.2.2 Pattern

The test pattern is selectable with the full range of 0.151 test patterns available. Patterns available include

2<sup>7</sup>-1

2<sup>9</sup>-1

2<sup>11</sup>-1

2^15-1

2^20-1

2^23-1

QRSS

#### **4.5.2.3 Data Invert**

To ensure compatibility with external test equipment the data pattern may be sent normally or with inverted data. Select as required.

#### **4.5.2.4 Start / Stop Test**

When the Start Menu is entered the BERT test is started and the results are displayed as shown:

Status	In-Sync / Out of Sync
Bit Count	1.2512e+08
Error Count	3.86302e+07
BER	3.0 x 10 <sup>-1</sup>

To refresh the screen and update the counts press <SPACE>.

To restart the test, type <C> to clear the counts.

To force an error, type <F> to insert a single error.