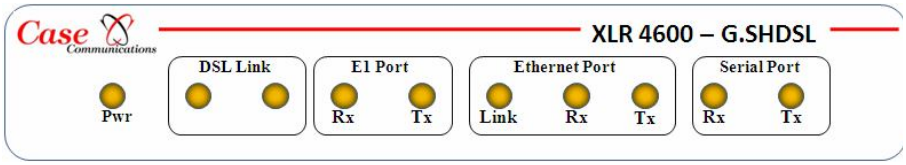
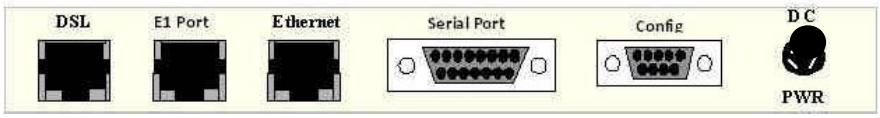
Case Communications Ltd

XLR 4600
Operators Manual





X400 – 460900

XLR 4600

Manual Rev 1.10.4

June 2009

XLR 4600 Software Revisions.

Date	Revision	Changes
Mar 2003	XLR 1.02	Spelling mistakes in MMI corrected. Dual Link mechanism improved If using more than 64 Channels left over channels assigned to Bridge Status screen now shows if line is crossed over in 4 wire mode New FPGA code 01.02 FPGA Code set to display value of S0 FPGA Code can be displayed using 'V' command.
August 2003	XLR 1.03	Ethernet frame increased to 1522 bytes Changes made to menu structure Individual statistics can be reset, from the statistics menu Local and remote menu entry points now the same with single entry point
Sept 2004	XLR 1.04	The typographical errors in the previous version have been fixed
October 2003	XLR 1.05	A new option to allow CRC-4 to be disabled on the E1 link has been added.
Dec 2003	XLR 1.06a	The link establishment mechanism over DSL has been improved. If the link fails to become stable in the first 2 minutes of operation, the next connection attempt occurs 64K slower, down to a minimum of 192K per link. The system will always keep attempting to establish the link, when it fails for any reason The configuration menu has been re-arranged to put E1 options together.
Apr 2004	XLR 1.07a	Further improved buffer handling of the XLR. Increased the number of RX Buffers (24 instead of 16)
Nov 2007	XLR 1.07b	Addition of management Gateway - Allows Management Data to be routed out of XLR's Local 'Gateway' for managing remote XLR's via routers.
Jan 2009	XLR 1.08	Addition of the latest DSL code including the facility to set the Annex type to either Annex A or Annex B
May 2009	XLR 1.10.4	Addition of a telnet timeout for use with the CaseView Management and Monitoring suite.

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Contents **TITLE** **Page**

SECTION 1 INTRODUCTION

1.1 The Case Communications XLR 4600

The Case Communications XLR 4600 is a high performance G.SHDSL (ITU 991.2), transmission device, for use over standard dc copper circuits, as found within the local loop.

The XLR 4600 has the ability to operate at data rates up to 2.3Mbps over 2 wires, or up to 4.6 Mbps over 4 wires by bonding the dual circuits into one high-speed service.

The XLR 4600 provides three services, which may be used concurrently

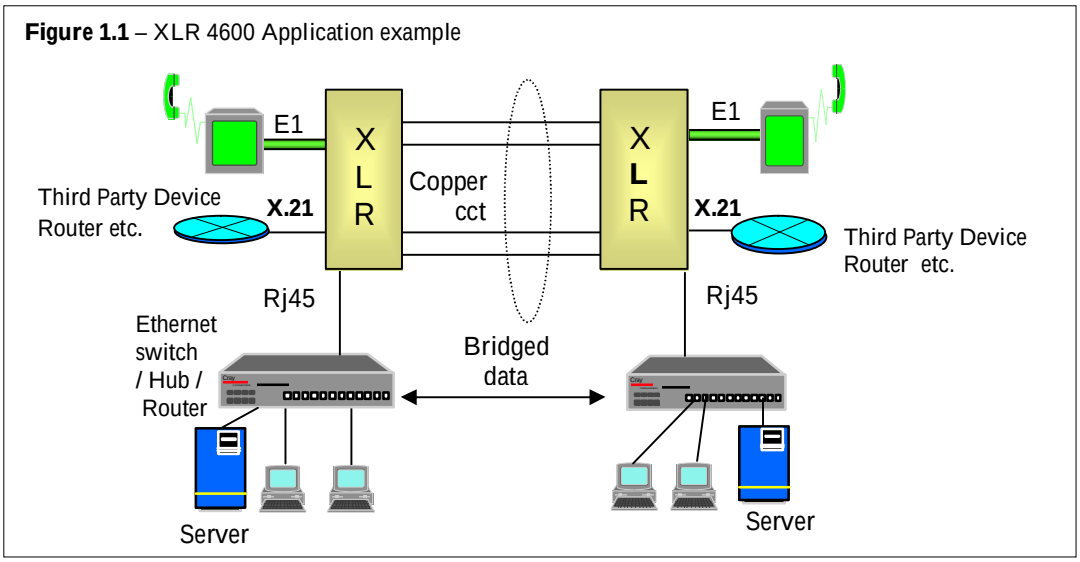
1. Internal Filter Bridge with Spanning .

2. E1 port for PBX to PBX or other devices with E1 connectors

3. X.21 Port for third party devices such as routers etc.

   Figure 1.1 below shows a Typical XLR 4600 application example.

Figure 1.1 – XLR 4600 Application example



The XLR 4600 may also be used in three other modes.

1. E1 Bridge – Allowing the X.21 port and internal Ethernet Bridge to operate over an E1 service.

2. Serial Bridge – Allowing the E1 port and internal Ethernet Bridge to operate over an X.21 service.

3. Conversion from E1 to serial mode

NB. If these modes are required only, the Case Communications DTB is a reduced cost version of the XLR without the DSL technology for use on E1 or X.21 services.

1.2 DSL Modes of Operation.

The XLR 4600 has three modes of operation over DSL copper circuits

3 DSL A only – Up to 2.3Mbps on 2 wires.

4 DSL A and DSL B bonded as below – Provides up to 2.3Mbps across the two pairs of wires.

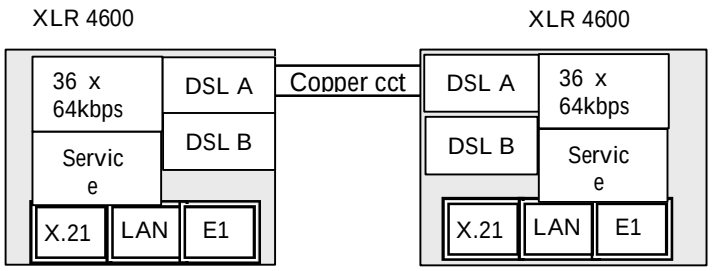
5 DSL A and DSL B bonded. Takes both DSL links and bonds them into single high-speed data path of up to 4.6Mbps NB. 1 x 64Kbps timeslot is utilised to achieve bonding on dual DSL Links.

1.2.1 DSL A 2 Wire Mode.

In DSL A mode the XLR operates over 2 wires to provide up to 2.3 Mbps over the copper pair. If the maximum data rate is achieved 36 timeslots will be available. A poor quality link can fall back to 3 x timeslots or 192kbps.

Figure 1.2.1 is a schematic of the XLR in DSL A mode.

Figure 1.2.1. – XLR 4600 in 2 wire mode

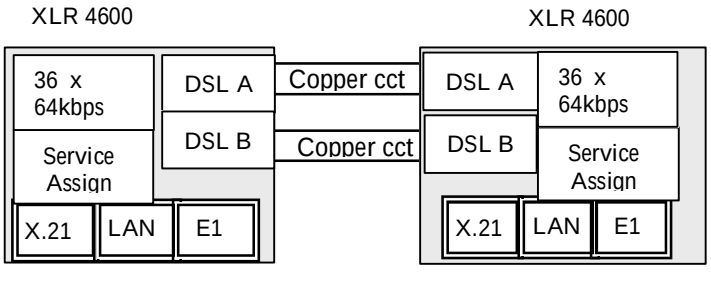


1.2.2 4 –Wire Long Reach

In DSL 4 Wire Long Reach the XLR does not bond the dual circuits into one, but operates over the dual copper circuits at data rates up to 2.3Mbps (36 Timeslots) and does not allocate a 64Kbps timeslot to bonding.

In this mode each DSL link can fall back to 192Kbps (3 x 64Kbps timeslots).

Figure 1.2.2 – XLR 4600 4 Wire Long Reach Mode



Where to use Long Reach.

This mode is ideal where line conditions might be such that the XLR is forced to operate at lower rates. The maximum data rate in Long Reach is 2.048Mbps across the two pairs. This mode is for use on longer circuits or when the circuit quality is less good, or where the loss of a timeslot for bonding is not acceptable. Thus fallback to the lowest rate is 384Kbps (192Kbps x 2=384Kbps)

1.2.3. 4-Wire Short reach

In DSL 4-Wire Short reach mode the DSL links, are bonded into 1 single high-speed pipe providing up to 4.6Mbps, and 72 timeslots.

In order to maintain the bonding, a single 64Kbps timeslot is utilised. Under poor line conditions each link can fall back to 192Kbps, providing 320Kbps (192Kbps x 2=384Kbps, minus 64Kbps=320Kbps)

Where to use Short Reach

Short reach is used where the highest-data rate is required and where the circuits are of sufficient quality to allow the higher rates.

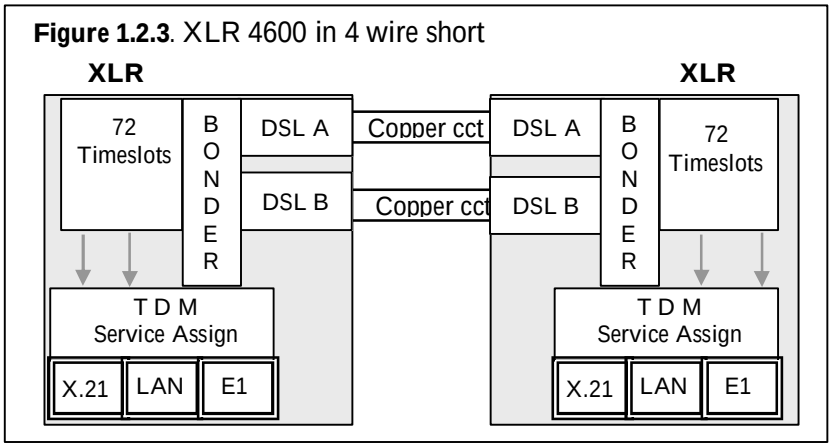


Figure 1.2.3. XLR 4600 in 4 wire short

1.2.4. Extending E1 Services

The XLR 4600 may be used to extend an E1 services over a pair of copper wires, taking its clock from the E1 service or providing a clock to the service. Figure 1.2.4.1 below shows an E1 service going through an E1 network and then extending several 64Kbps timeslots over the local loop.

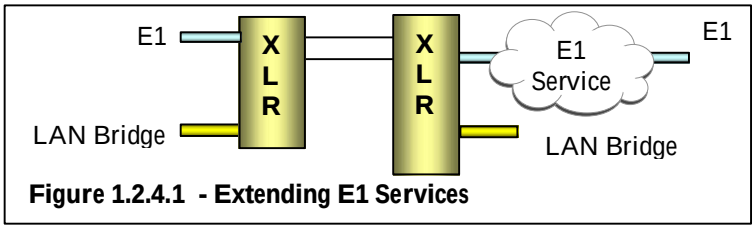


Figure 1.2.4.1 - Extending E1 Services

1.2.5. Extending N x 64Kbps Services

The XLR 4600 may be used to extend an N x 64Kbps service over the local loop, taking its clock from the N x 64Kbps service or providing a clock to the service. Figure 1.2.5.1 below shows a service being provided over a digital unstructured N x 64Kbps network while providing a structured E1 service.

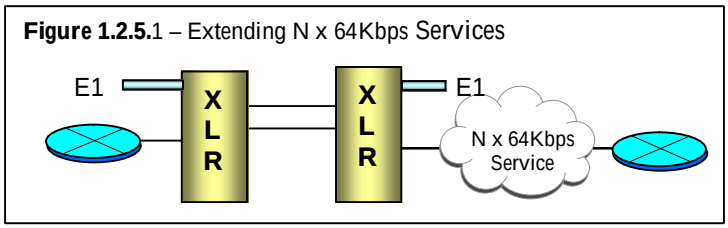


Figure 1.2.5.1 – Extending N x 64Kbps Services

1.3. Digital Bridge Modes

1.3.1 The XLR used as an E1 Bridge

In this mode the XLR is used as a Bridge over an E1 service, using the E1 port on the XLR as a trunk port.

The LAN Bridge provides bridging with the bridge data rate being determined by the number of timeslots allocated to the Bridge.

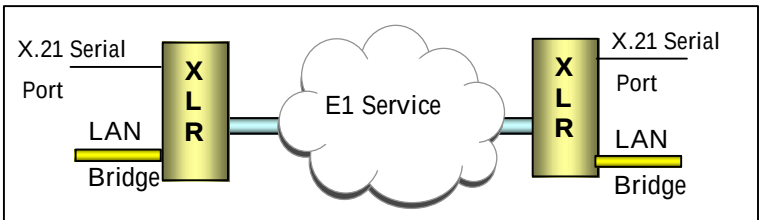


Figure 1.3.1.1 - Overview of XLR Used as an E1 Bridge

In this mode using the e1 port as a trunk the XLR is used as a Bridge over an E1 service.

The bridge data rate is determined by the number of timeslots allocated to the Bridge.

Remaining timeslots can be allocated in 64Kbps segments to the serial port for attaching third party devices.

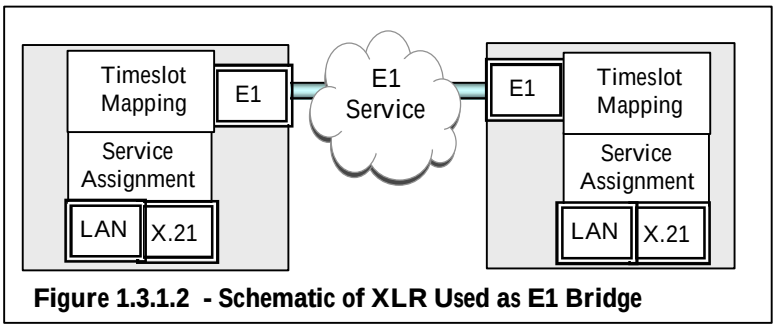


Figure 1.3.1.2 - Schematic of XLR Used as E1 Bridge

1.3.2. The XLR used as a serial bridge.

In this mode the XLR uses an N x 64Kbps service and its X.21 Port as a trunk to provide LAN Bridging over the X.21 Service. Unused timeslots can be used to provide N x 64Kbps on the E1 port.

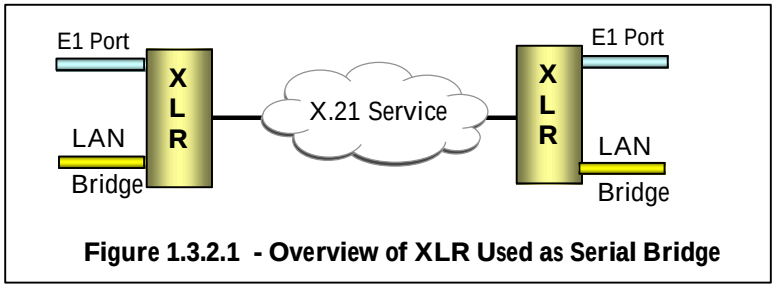


Figure 1.3.2.1 - Overview of XLR Used as Serial Bridge

The E1 port can be set to support G703 / 704 or to operate in an unframed mode, allowing multiple different devices to be used on the E1 service, from PBX's to Stat muxes, Time Division Muxes to Routers.

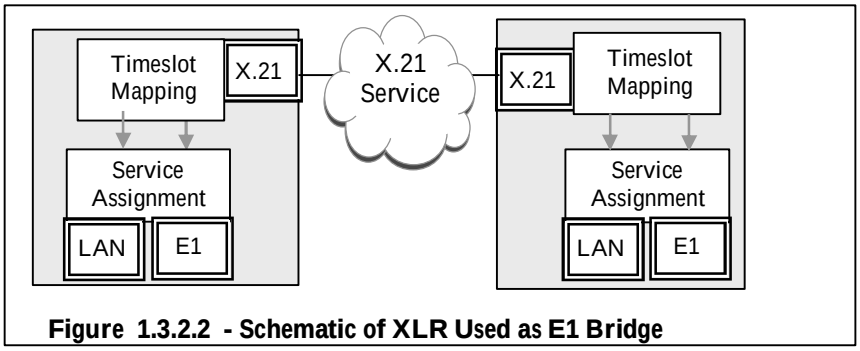


Figure 1.3.2.2 - Schematic of XLR Used as E1 Bridge

1.4 Using the XLR as an Interface Converter.

The XLR may also be used as an interface converter taking an E1 stream and converting it into a serial format as shown in the Figures below.

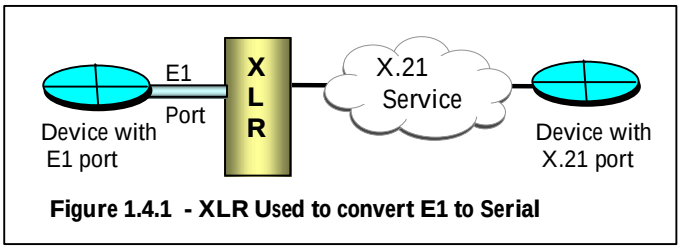


Figure 1.4.1 - XLR Used to convert E1 to Serial

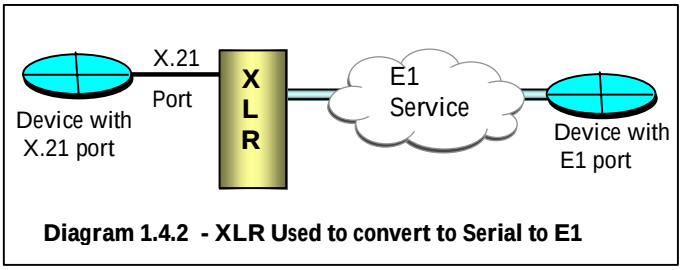


Diagram 1.4.2 - XLR Used to convert to Serial to E1

1.5 Management and configuration

1.5.1 Local and Remote Management.

The XLR 4600 and DTB are configured via a locally connected PC or Async terminal or remotely from similar devices or via a PC and Telnet session. The XLR holds one factory default configuration and 4 user-defined configurations, and is configured using a menu system.

There is a command line Interface user option for some advanced functions such as viewing the XLR traces, and for exporting and importing configuration files

1.5.2. Gateway Address

When managing the XLR 4600 on a remote network, its necessary to configure the XLR 4600 to identify its local gateway, which is generally the router out of the local network. This will allow management from different networks.

1.5.3. Uploading / Downloading configurations

The XLR configuration maps may be uploaded to a PC as text files, for transmission back to the XLR or to another XLR at a later date.

1.5.4. Configuration and Operating System.

The XLR configuration and operating system are held in FLASH memory. As new releases of code are issued it is possible to upload these into the XLR. Please refer to the Advanced User part of the manual for details on how to do this.

2.1 Data Modes

DSLA - 2.3Mbps on single copper pair – fallback to 192 Kbps.
DSLB – 2.3 Mbps when used with DSLA – provides 4.6 Mbps.
Short Reach - 4.6Mbps bonded on dual copper pairs - fall back to 320 Kbps (192Kbps per pair minus 1 x 64Kbps for bonding)
(Long reach) 2.048Mbps on dual copper pair with fall back to 384 Kbps (192Kbps per pair)

2.2 Transmission Standards

ETSI TS 101, ITU-T G991.1, ANSI TR-28 for single pair
ITU-T G991.2 for SHDSL Time Division Multiplexing – PCM stream.
PAM Transmit signals

2.3 Circuit type.

Copper DC circuit without amplification or transformers
BT – Baseband Standard – 2 wire (previously EPS 9)
BT –Baseband Premier – 4 wire (previously EPS 8)

2.4 Range and performance.

The range and performance of the XLR 4600 is dependent on the quality of the copper circuits in use, and the noise encountered by those circuits. The table below provide an indication of the sort of ranges that can be expected.

Line Rate Kbps	**No Noise**			
Per Pair	**24 AWG**		**26 AWG**	
	Km	Kft	Kft	Km
144	31.5	9.5	26	7.9
200	25.9	7.9	21.4	6.5
392	25.2	7.7	19.9	6.0
520	24.6	7.5	18.7	5.7
776	21.9	6.7	17.5	5.3
1032	20.3	6.2	16.6.	5.1
1168	18.6	5.7	15.8	4.8
1544	14.7	4.5	14.0	4.2
2056	13.9	4.2	13.0	3.9
2312	12.9	3.9	12.5	3.8

These figures include an 8k overhead per pair

2.5 E1 Port

Physical G.703 - 120 Ohm RJ45
Level 2 Framed G.704 2Mbps for PBX traffic (transparent Timeslot 0)
Framed G.704 2Mbps for PBX traffic (transparent Timeslot 0 and 16)
Framed G.704 N x 64Kbps for fractional service
Unframed 2Mbps for other traffic

2.6 X.21 Serial Port

Physical X.21 V.11 15 Way D type Female
Data rates 64Kbps and Nx64Kbps to 4.096Mbps

2.7 Ethernet

Physical
RJ45 – 10baseT
Spanning Tree 802.1D
Destination filtering on or off

2.8 Management Port

Physical
Serial 9 way female connector
Telnet from LAN port
Remote Access via other XLR 4600 or LAN

2.9 Configuration Options

Factory default configuration
Four user-defined configurations
Up load / down load configuration storage
Easy to use Menu Driven Man Machine Interface

2.10 Diagnostics.

Local Diagnostics	**Remote Diagnostics**
Local Digital loop back	Remote G.SHDSL loop back
Local G.SHDSL loop back	Remote Digital loop back

2.11 Indicators

Power	Green LED	Eth Port	Link up / down LED
DSL Link	Dual tri state LED's	Eth Port	TX / RX LED's
E1 Port	Dual tri state LED's	Serial Port	RX Led and TX LED

2.12 XLR Power Supply - External 2 Pin Socket

Voltage In	230-vac input to Power Supply or 48 Volts DC for DC version
Voltage Out	5Vdc +/5% input to XLR 4600
Phase	50 Hz
Current	Max 2.4A
Watts	Max 12 watts
Connector on XLR:	Binder 99 0072 100 02 *
Connector from PSU:	Binder 09 0073 00 02 *

* From June 2008

2.13 Physical

Size	Width x 210mm, Depth 155mm x Height 350mm
Weight	600 grams

2.14 Environmental

Operating Temp	0 to +50 degrees Centigrade
Storage Temp	-20 degrees Centigrade to +70 degree Centigrade
Humidity	0 to 90% non condensing

2.15 Power Consumption to line.

The Case Communications XLR 4600 draws varying amounts of current depending on the data rate being run and the distance of the circuit. The table below indicates typical current consumption over various ranges and at different data rates. The figures in this table are measured under the following conditions.

- Working in dual-channel mode
- Using a 1:4 Transformer
- Transmit power set to 13.5dbm
- Measured during activation and data mode

	Current Drain (mA)		
Line Rate (Kbps)	**3.3VD DSP & ILD2**	**5VA ILD2**	**Power Port / (mW)**
144	100.0	125.0	955.0
200	105.0	125.0	971.5
208	105.0	125.0	971.5
272	120.0	125.0	1021.0
392	130.0	125.0	1054.0
400	130.0	125.0	1054.0
528	135.0	125.0	1070.5
776	160.0	125.0	1153.0
784	160.0	125.0	1153.0
1040	180.0	125.0	1219.0
1168	185.0	125.0	1235.5
1552	225.0	130.0	1392.5
2056	245.0	130.0	1458.5
2064	245.0	130.0	1458.5
2312	270.0	130.0	1541.0
2320	270.0	130.0	1541.0

SECTION 3 CONFIGURATION

The XLR is capable of working in the following modes, there will be configuration examples given in section five of this manual.

3.1 G.SHDSL Multiplexer

In this mode a pair of units is connected by a 2 or 4-wire DSL link. You can transport across this link any combination of E1 channels, Serial Data, and Bridged Ethernet traffic, up to the limit of the bandwidth available over the DSL link. If using the XLR 4600 over two wires, the maximum bandwidth available is 2.3 Mbps, and over 4 wires 4.6Mbps is available, by bonding the dual circuits into a single high speed pipe.

3.2 E1 Bridge

In this mode a pair of units are connected by an E1 WAN link. Over this can be transported a combination of Serial Data (in multiples of 64K) and Bridged Ethernet traffic.

3.3 Serial Bridge

In this mode a pair of units are connected by an unstructured Serial link. Over this can be transported a combination of E1 Channels and Bridged Ethernet traffic. Where E1 Channels are transported 64k of the Serial link bandwidth is used to provide the necessary framing.

3.4 Configuration Modes

The XLR can be configured via one of three ways.

1. Via locally attached PC running terminal emulator.
   Configured to 19200 bps 8 bits no parity

2. Via a PC or terminal attached to a remote XLR
   There is no preset local password just enter carriage return.
   A remote entry password is required – the factory set default password is case.

3. Via a PC connected to a local area network using Telnet.
   The default IP address is 10.0.0.1
   NB. For security purposes, Telnet access will not function until a password has been set in the unit.

A Menu Tree structure can be found in Appendix 1 at the rear of this manual.

3.4.1. Configuration Screens.

On power up the XLR and connecting a PC to the local configuration port the manager will be given the menu shown below. If connecting via a Local Area Network and Telnet session, the manager will be prompted for a password – the factory default password is case (lower case). If the XLRs have been set up to work as a pair then it will be possible to immediately log on to the remote unit by selecting option 6 – Remote Menu Access. This will allow the configuration of the remote unit.

Main Menu - Node 02

1) Status

(2) Control

(3) Configuration – *applies to this section of the manual*

(4) Active Tables

(5) Statistics

(6) Remote Menu Access

(Q) Disconnect Telnet Session

In order to configure the local XLR select option three, this will bring the manager to the next menu structure shown below.

Configuration Menu (Local) - Node London

(1) Operating Configuration
(2) DSL Link Configuration
(3) Main Configuration
(4) E1 Link Configuration
(5) IP Management Configuration
(6) Bridge Configuration
(7) Reset Configuration being Edited
(8) Save Configuration
(Q) Exit to Previous Menu

3.5 Operating Configuration

```
1 - Operating Configuration - Editing Node London
                                Config 4                    <Live>

 1.  Boot Configuration        : Configuration 4            <Configuration 4>
 2.  Configuration to Edit     : Configuration 4
 3.  Remote Access Password    : case                              <case>
 4.  XLR Operating Mode        : G.SHDSL Multiplexor        <G.SHDSL Multiplexor>
 5.  Telnet timeout (0=none)   : 0    Seconds               <0>
 6.  Remote timeout (0=none)   : 0    Seconds               <0>
 7.  Config port speed         : 19200                      <19200>

Enter Number of Entry to Modify or (Q)uit >
```

This screen allows configuration of the common items between all four configurations allowed on the unit.

3.5.1. Boot Configuration:

Selects the configuration that will be used the next time the unit is reset. Select between the following

1. Configuration 1 G.SHDSL Case House (User defined name of configuration)
2. Configuration 2 G.SHDSL Unit 12
3. Configuration 3 G.SHDSL Weekend Configuration
4. Configuration 4. G.SHDSL Working day config
5. Factory Default

3.5.2. Configuration file to Edit:

Selects the configuration that is currently being edited. Even if this is the same as the 'Live' configuration, you are not changing the currently operating features. The unit is operating on a copy of the selected configuration.

3.5.3. Remote Access Password:

This is used to control access to the unit via Telnet. When there is **no password (default), Telnet access is disabled**. If you enter a password, then a user connecting via Telnet will be asked to provide this password before being allowed access. If you enter a space character as the password, this will disable the password challenge altogether. No Password is required for local access.

3.5.4 XLR Operating Mode:

This selects the mode that the XLR is running. Care should be taken when changing this value as it changes the appearance and available options on some of the other configuration menus. As such it is suggested that when creating a new configuration this value should be set first.

3.5.5 Local Telnet Timeout

The local telnet Timeout logs a manager off of the XLR 4600 after a period of time, defined in seconds via this option.

3.5.6 Remote Telnet Timeout

The telnet timeout options were designed for use with the CaseView Management and Monitoring suite.

The Telnet timeout option configured the number of seconds of no activity before the XLR 4600 closes any telnet session to its management.
The Remote timeout option allows a timeout to be set for the Remote Menu Access on the XLR 4600 that again closes the remote access after the set number of second of inaction has occurred.

The Config port speed option has been added so that the config port can be set to 9600, 19200, 38400 and 115200 bps. The default value is 19200 bps.

3.6 DSL Link Configuration

2 - G.SHDSL Option Configuration - Editing London Node

	Config 1	<Live>
DSL Link Selection	: DSL Link A Only	<DSL Link A Only>
G.SHDSL Annex	: Annex B	<Annex B>
DSL Minimum Channels	: 3	<3>
DSL Maximum Channels	: 36	<36>
DSL Rate Adaptation	: Enabled	<Enabled>
DSL Adaptation Margin (Db)	: 10	<10>
DSL Power BackOff	: Enabled	<Enabled>

This screen only available in DSL Mux mode allows the DSL link itself to be controlled

3.6.1. DSL Link Selection

Changing DSL Link Selection to one of the following:

1 **DSL Link A Only**

This option allows the selection of 2-wire mode for operation over a single wire pair. The maximum data rate that can be used is on 1 pair of wires is 2.3Mbps.

2 **4-Wire Short Reach mode**

Provides the highest possible speed (number of channels) is achieved, but where one channel is used to provide framing. Maximum data rate of 4.6Mbps.

3 **4-Wire Long Reach mode**

Provides a maximum speed of 2048K (32 channels) but does not need to reserve any channels for framing.

3.6.2. Annex Setting

The G.SHDSL Annex is used to set the XLR for the conditions of the copper circuits in use. There are two annexes as show here.

Annex A – for US
Annex B – for Europe

The following options can be set for select installations of the XLR 4600:
Annex B ANFP
Annex A B
Annex A B ANFP

Please note that the Annex type must be identical for both XLR 4600 units to enable them to communicate.

3.6.3. Minimum Channels Per Link

The minimum number of 64K channels, per wire pair, that will be established between this unit and the remote. This can be set to any value from 3 to 36 or 3 to 32 in long reach. Mode.

3.6.4. Maximum Channels Per Link

The maximum number of 64K channels, per wire pair, that will be established between this unit and the remote. In effect this is a way of reducing the data rate on a circuit. In 4 wire Long Reach if the value is set to anything over 16, the XLR will still only allow 16 channels, (2048 Mbps) in 2 wire mode and short reach this can be up to 36, channels per circuit.

3.6.5. DSL Rate Adaptation

This option allows you to enable or disable the mechanism, which probes the line at start up to determine its capacity. With rate adaptation disabled the link will be established at the highest common rate as specified by the DSL Maximum Channels (as described above) With adaptation enabled the Maximum and Minimum values provide a range in which the adaptation will operate.

If Rate Adaptation is disabled and the DSL Maximum Channels is set at too high a level for the quality of the link, then the link can go up and down repeatedly as it is established and then is unable to maintain a viable link.

On any given link you should first establish a link with Rate Adaptation Enabled. Once a reliable link is established, and the number of channels that the link can support established, you may wish to disable adaptation, to speed up the connection process, and ensure that a fixed bandwidth is always achieved.

3.6.6. DSL Adaptation Margin (dB)

This option allows you to specify in Db the noise margin of the link, that you wish to achieve. If you set this for a value of 10 the XLR 4600 will reduce its data rate to obtain at least this value, ensuring a more reliable link but at a possibly reduced rate. If set to ‘disable’ the XLR 4600 will achieve its highest possible rate but with the risk of retraining. For reliable operation over poor quality lines set to 10. For maximum rate set to lower value or disable.

3.6.7. DSL Power Back Off

This option allows you to enable or disable the mechanism whereby the DSL devices will reduce the power they are sending to the line, if the signal being received is too strong. By disabling this option extra performance may be achieved.

3.7 Main Configuration

3 - Main Option Configuration - Editing Node London		
	Config 4	**<Live>**
Configuration Name	: Node 02	<Node 02>
Master Clock Source	: Clock from DSL Link	<Clock from DSL Link>
E1 Framing Mechanism	: Transparent (Ch-0)	<Transparent (Ch-0)>
E1 Active Channels	: 0	<0>
Serial Link Speed x 64K	: 1	<1>
Serial Fallback x 64K	: 0	<0>
Serial Clock Options	: Internal Clock	<Internal Clock>
Minimum Bridge Channels	: 1	<1>

This screen provides the main control options for the unit allowing the selection of ports that will be operating and their speeds. This screen will change depending on the XLR Operating Mode.

3.7.1. Configuration Name:

This option allows you to give this configuration a name. This name will be displayed on the title line of the configuration menus, to help you keep track of which configuration you are editing.

The string of the name may be up to 30 characters long, and may include alpha numeric and characters.

3.7.2. Master Clock Source:

Changing Master Clock Source: Clock from DSL Link

1: Clock from DSL Link
2: Internal Clock
3: Clock from E1 Port
4: Clock from Serial Port

This option selects which clock this unit will synchronise to. The options presented here will depend on the mode you have set the unit to.

NB. By default, the unit will be set to clock from the DSL link. If both ends are left at this setting the DSL Link WILL NOT BE ESTABLISHED. One end must be set to Internal and the other to Clock from DSL Link

The unit at one end of the link must be set to one of the other options. If the units are being used in isolation from any other communications equipment, you can set one end to 'Internal Clock'.

If you are synchronising to other equipment that is connected to a carrier clock or another master clock source, you should use the appropriate setting.

Setting a unit to a value other than clocking from the DSL link, establishes this unit as the 'Master'. This fact is shown on the status screens, and is used to establish a master configuration if both ends are not configured the same.

3.7.3. E1 Active Channels:

This option sets the number of 64K E1 Channels that are being transferred. This can be set to any value from 0 to 32 (up to 2.048MHz)

3.7.4. Serial Link Speed x 64Kbps

This option sets the Serial Clock Speed in multiples of 64K. This can be set to any value from 0 to 64 (up to 4.096Mbps)

Serial Fallback x 64Kbps

This option sets a lower Serial Clock speed that would be acceptable should the link not be fast enough to support the main requested link speed. You should leave this value set to zero if you do not want the speed to fall back and this value must be set below the Serial Link Speed. This can be set from 0 to 64 (Max 4096 Mbps) (If the XLR is set for E1 or Serial Bridge then this option is not displayed)

Serial Clock Options

Changing Serial Clock Options: Internal Clock

1: Internal Clock
2: Clock From Link
3: Inverted Internal Clock
4: Inverted Clock from Link

This value selects the clocking for the Serial Port.

Internal Clock

Internal Clock' selects that the clock derived from internal to the unit either generated locally or synchronized to a remote clock across the WAN link, be driven out onto the Serial Port.

Clock from the Link

'Clock From Link' indicates that the unit should take the clock in from the Serial Link. If you have set the Serial Port to be the 'Master Clock Source' in the option above, this option must be set.

Inverted Clocks

The last 2 items are the same as the first 2 apart from an inverted clock is used. This is useful for operating very high-speed serial links.

3.8 Bridge Channels/Minimum Bridge Channels

In DSL Mux. mode this option selects the minimum number of 64K channels that will be used for Ethernet Bridging. Additional channels will be allocated to bridging if available on the DSL WAN link.

In the other modes this is the fixed number of 64k Channels devoted to Ethernet Bridging. At least 1 channel should be allocated if you with to use the remote configuration screens on the menu system (for a DSL the remote link goes via some spare bits in the DSL frame). Valid Range is 0 to 32.

3.8.1. E1 link Configuration.

This menu option configures the built in E1 port. There are two main options to configure in this section.

E1 Framing mechanism

Changing E1 Framing Mechanism: Transparent (Ch-0)

1: Framed

2: Unframed

3: Framed Voice (Ch-16)

4: Transparent (Ch-0)

5: Trans. Voice (Ch-0, 16)

This option allows you to select the framing, used over the E1 link and, when in framed modes, which channels are transported.

Framed Mode

In the basic 'Framed' mode, Channel 0 is generated locally, and the selected number of channels starting from Channel 1 are transported (or used in E1 Bridge Mode).

Unframed Mode
'Unframed' mode treats the E1 port as a complete block of channels without structure. In this case all 32 channels must be used together.

Framed Mode for voice
'Framed Voice' selects framing over the E1 Link with Channel 0 generated locally, but when allocating channels to transport, it transports Channel 16 first and then the remaining channels are allocated from Channel 1. For this to be useful at least 2 Channels must be being transported, one being for the signalling and the other for the actual call.

Transparent Mode
'Transparent' mode allows you to transport Channel 0 transparently through the pair of units. This is useful when the connected systems are passing information through the signalling bits in Channel 0. For this to be useful at least 2 Channels must be being transported.

Transparent Voice
'Transparent Voice' mode is a combination of the 2 previous modes, transporting both Channel 0 and Channel 16 and then allocating further channels starting from Channel 1. For this to be useful at least 3 Channels must be being transported.

E1 CRC 4 Operation
This option allows the XLR to either use or ignore the E1 CRC4 check sum. In most instances PBX's and other devices will require a CRC 4 checksum, but some PBX's will not work with this enabled and it will be necessary to disable the checksum.
Toggle the Space Bar to enable or disable.

3.9 IP Management Configuration

IP Management Configuration - Editing Node London

		Config 4 (modified)	<Live>
IP Address	:	10.0.0.0.1	192.168.42.150 >
IP Mask	:	255.255.255.0	255.255.255.0 >
IP Gateway		10.254.254.254	192.168.42.10

This screen allows the IP Address and Mask of the unit to be established for managing the device. via a Telnet session. The IP address should be set to an address in keeping with the local area network, to which the XLR is connected, and should not be identical to any existing addresses.

3.9.1. IP Address

This is a freeform text entry where a valid IP Address is entered

3.9.2. Subnet Mask

This is a free form text entry where a valid IP SubNet Mask Should be entered.

3.9.3. Gateway Address

This is used for managing the XLR 4600 when it's on a remote network. The Gateway address is the IP Address should be set to the address of the local router out of the network. This allows the XLR to find its way out of the local subnet.

3.10 Bridge Configuration

```
Bridge Configuration Menu – London Node

1. Bridge Filter Configuration
2. Protocol Filter Configuration
3. Bridge Spanning Tree Configuration
 (Q) Exit to Previous Menu
```

This menu leads to 3 further menus that allow the Bridging software to be configured.

3.10.1. Bridge Filter Configuration

```
Filter Configuration - Editing London Node
                              Config 1                  <Live>
 Type of Filtering            : Destination Filtering   <Destination Filtering>
 Filter Sce = Dest            : Disabled                <Disabled>
 Filter Broadcast Frames      : Disabled                <Disabled>
 Filter Multicast Frames      : Disabled                <Disabled>
 Max Filter Entry Age         : 900   Seconds           <900>
```

Type of Filtering
This option allows you to control the type of address filtering performed on frames as they arrive from the LAN.

Filtering Disabled
All frames are forwarded to the remote unit. MAC addresses of locally attached devices are still learnt.

Destination Filtering (default)
The source addresses of received frames are used to build up entries in the filter table. The destination address of each frame is then matched against this table and any frame that matches is discarded.

Block All Frames
For debugging you can set the unit to block all frames. The remote management link will still operate.

Open Source Filtering/Closed Source Filtering
For future development

Protocol Filtering
Enable protocol filtering in addition to the normal Destination Filtering. See later section

Filter Sce = Dest
In normal destination filtering mode frames whose source and destination addresses are the same are filtered out. If however you wish these frames to traverse the whole network to test the network for duplicate addresses, you can disable filtering of this type of frame.

Filter Broadcast Frames
Normally broadcast frames will be forwarded across the bridge. This option allows these frames to be blocked, which may be useful if you do not want broadcast frames from a server to load up the bridge un-necessarily. It may however make some remote resources not appear, which may or may not be useful to you.

Filter Multicast Frames
Normally multi-cast frames will be forwarded across the bridge. This option allows all multi-cast frames to be filtered out. This may cause certain network protocols to fail, and should be used with care.

Max Filter Entry Age
This parameter allows you to select how long an entry will remain in the filter table, after it was last seen on the local LAN segment. Setting this value to zero disables the ageing out process. Spanning Tree can over-ride this setting. (Value 0 to 65535)

Protocol Filter Configuration

Protocol Filter Configuration - Editing London Node

	Config 1	<Live>
Blue Book Filter	: Disabled	<Disabled>
Unrecognised Action	Forward Unmatched	<Forward Unmatched>

	MASK	PATTERN
(1)	Unused	<Unused>
(2)	Unused	<Unused>
(3)	Unused	<Unused>
(4)	Unused	<Unused>

(A)dd (B)lue Book (U)nrecognised (Q)uit >

This screen allows you to set up additional protocol filtering to apply to the LAN frames, before passing them across the link.

3.11 Spanning Tree Configuration

Spanning Tree Configuration - Editing London

	Config	**<Live>**
Spanning Tree	Disabled	<Disabled>
Hello Time :	2 Seconds	<2>
Maximum Age :	20 Seconds	<20>
Forward Delay:	15 Seconds	<15>
Bridge Priority :	32768	<32768>
LAN Port Cost:	100	<100>

Spanning Tree configuration - This either enabled or disabled, use the 'Space Bar' to toggle between selections.

Hello Time – set a value between 1 and 10: (Default 2)

Maximum Age – enter a value between 6 and 40 seconds (Default 20)

Forward Delay – Enter a value between 4 and 30 seconds (Default 15)

Bridge Priority – Enter a value between 0 and 65535 (Default 32768)

LAN Port Cost – Enter a value between 0 and 65535. (Default 100)

This screen lets you specify the Spanning Tree configuration parameters. For details please refer to the appropriate RFC.

3.12 Reset the Configuration being Edited

This option allows you the set the configuration you are working on back to a known state. This can be the factory defaults, or a copy of one of the other configurations currently stored in the unit. The following sub menu structure is displayed when this option is selected.

Changing Stored Configuration to Recall : Factory Defaults

1: Configuration 1
2: Configuration 2
3: Configuration 3
4: Configuration 4
5: Factory Defaults

3.13 Save Configuration

This option saves the configuration changes you have made, both to individual configurations and the common items, into 'Flash' memory.

IF YOU FORGET TO SAVE THE CONFIGURATION INTO 'FLASH MEMORY' ALL CONFIGURATION CHANGES WILL BE LOST

SECTION 4 Cables, Connectors and Indicators

This section outlines the physical connectors on the XLR 4600 rear panel and LEDS on the front panel.

4 The XLR 4600 Rear Connectors

1. DSL – RJ45 Connector for DSL Connection.
2. E1 Port – For direct connection to PBX
3. Ethernet Port – RJ45 for connection to 10Mbps Ethernet
4. Serial Port - X.21 V.11 D Type 15 Way Type Female – for Serial devices
5. Config - 9 Way D Type for Configuration
6. DC – for 5V dc power supply.

Diagram 4.1.1. – XLR 4600 Rear Panel

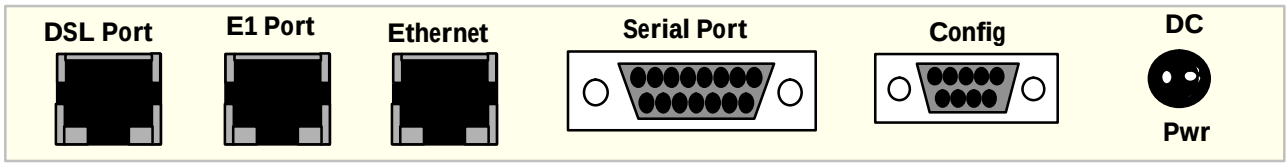
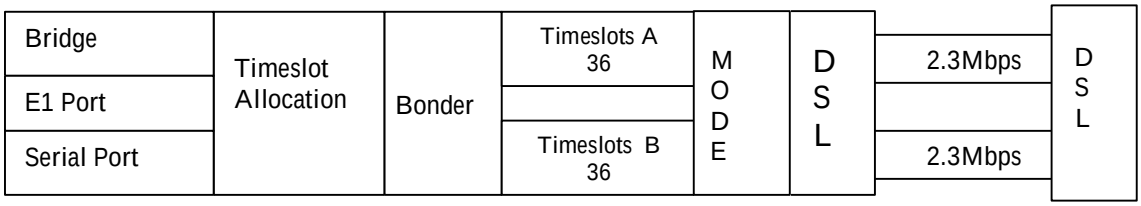


Diagram 4.1.2 Simplified Functional Overview.
The diagram below provides a simplified overview of the architecture of the XLR 4600.



The XLR 4600 uses Time Division Multiplexing to provide up to 72 x 64Kbps timeslots to end user services. The 72 Timeslots are taken as 36 x 64Kbps timeslots from each 2 wire DSL copper circuit. Thus if using one 2 x wire circuit a maximum of 36 timeslots is available for the three services, if using 2 x 2 wire ccts (4 wires in total), then the dual 36 timeslots can be bonded into a single 72 x 64Kbps timeslots service.

When configuring the three integral services, a bandwidth is allocated to those services, which in turn allocated timeslots from the Bonder. Thus if the XLR 4600 is running at 2.3mbps on each link and providing 72 timeslots, in short reach mode, we need to remove one timeslot for bonding and have 71 timeslots left for services. We might allocate the services thus.

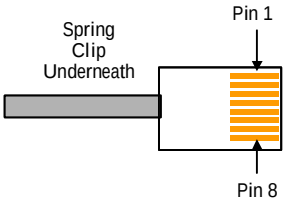
1. E1 port – 25 Timeslots – 24 simultaneous telephone calls (using 1 for signalling)
2. Bridge port – 32 Timeslots – 2048Kbps
3. Serial port 14 timeslots – 896Kbps

4.2 Cable specifications.

4.2.1. DSL Cable Pin Outs

Physical Connector. – RJ45 Female connector.

Rj 45 Orientation



DSL Link A

a. DSL A Leg a -Pin 4
b. DSL A Leg b - Pin 5

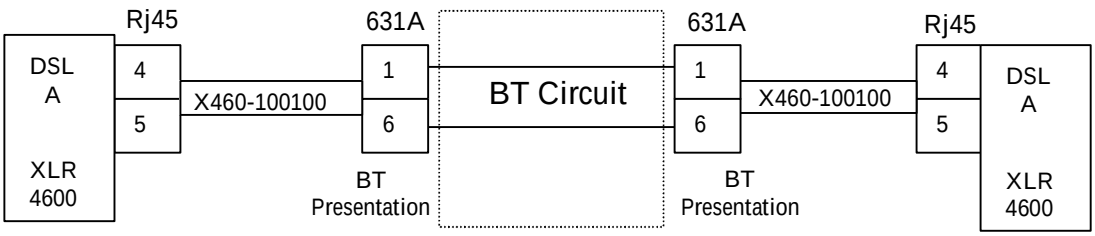
DSL Link B

a. DSL B Leg a - Pin 1
b. DSL B Leg b - Pin 2

4.2.2. Connecting to BT Circuits.

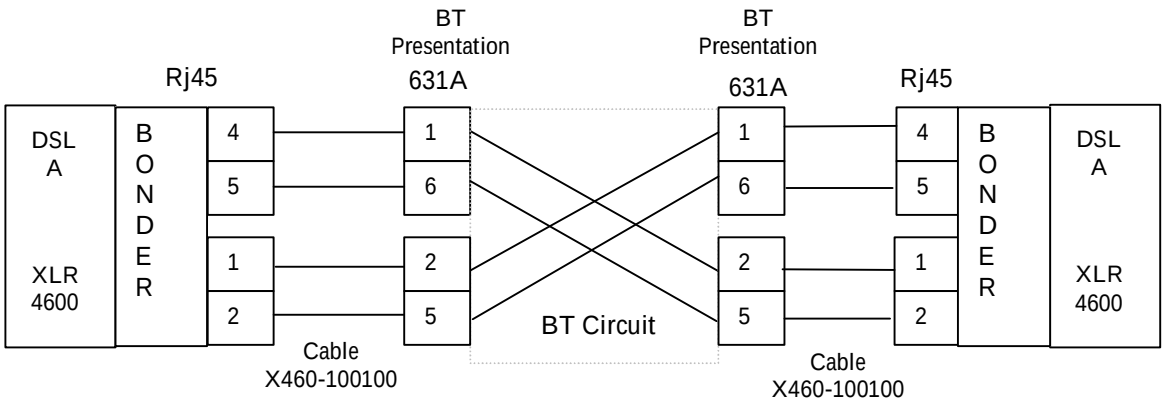
a. DSL A – 2 wire working

When using a single DC pair and DSL A, the connections are as shown below.



b. The XLR Operating in 4 wire long or short reach mode

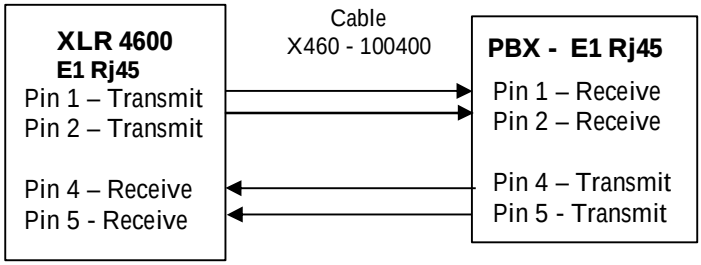
When using two DC pairs and Long or short reach, the connections are as shown below.



NB. The XLR automatically resolves arrival of data on the wires into the correct data buffers.

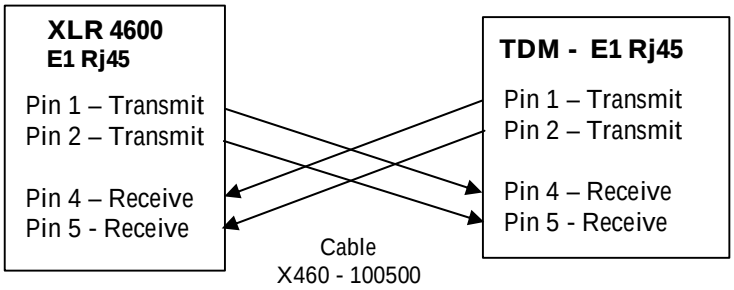
4.2.3. E1 Port Cable Pin Outs.

Connecting the XLR 4600 to a PBX E1 Port.
The XLR 4600 E1 port has been designed to connect directly to a local PBX, and has the following connections.



NB. The XLR looks like a Network (DCE)

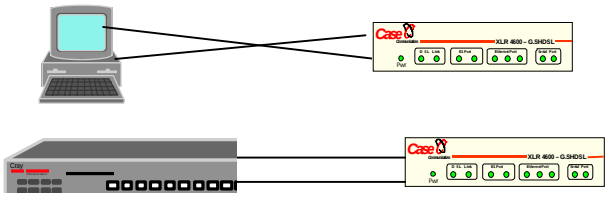
Connecting the XLR 4600 to a Time Division Multiplexer



4.2.4. Ethernet Port – Rj45

Pin w – Transmit
Pin x – Transmit
Pin y – Receive
Pin z – Receive

PC to XLR LAN cable – Cross Over



HUB to XLR LAN cable – Straight

4.2.5. X.21 V.11 Serial Port

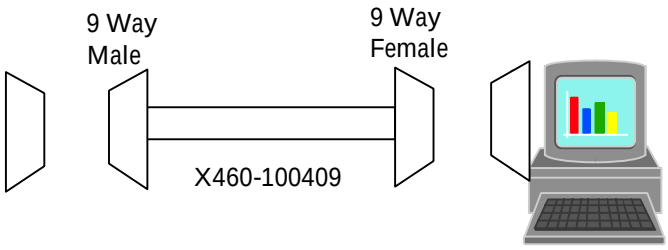
Serial Port X.21 V.11 15 way female 'D' Type

XLR Pin	Pin Ltr	V.11 Description	Direction	DTE Pin
2	Ta	Transmit (A)	←	2
9	Tb	Transmit (B)	←	9
3	Ca	Control (A)	←	3
10	Cb	Control (B)	←	10
4	Ra	Receive (B)	→	4
11	Ra	Receive A)	→	11
5	Ia	Indicate A	→	5
12	Ib	Indicate B	→	12
6	Sa	Signal Timing (A)	→	6
13	Sb	Signal Timing (B)	→	13
7	Ba	Byte Timing (A)	→	7
14	Bb	Byte Timing (B)	→	14
8	G	Signal Ground	↔	8
15		Unassigned		15
Shield		-0v		

4.2.6. XLR 4600 Configuration Port

Configuration port – 9 way female 'D' Type

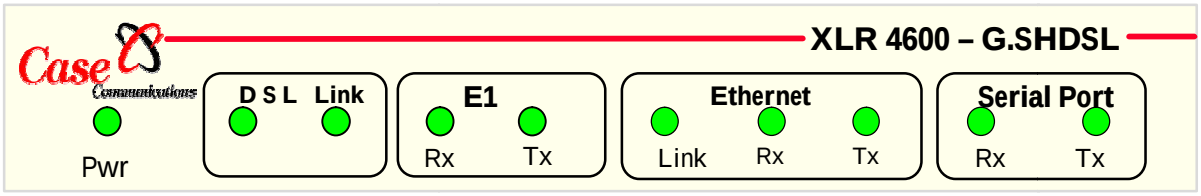
Pin	Description
1	Unused
2	Transmit Data
3	Receive Data
4	Unused
5	Signal Ground
6	Linked to Pin 7
7	Linked to Pin 6
8	Unused
9	Unused
10	Shield –0V



4.3 XLR 4600 Front Panel

The XLR 4600 Front panel has the following indicators.

1. Pwr – Power indicator – shows power applied to the XLR 4600.
2. DSL Link – indicates when the DSL link is initialising and fully operational.
3. E1 Port – Rx and TX – indicates that the E1 port is functional
4. Ethernet Port –
    a. Link – indicates that the Ethernet Link is present.
    b. Ethernet Rx and Tx – indicates Ethernet traffic present
5. Serial Port – Rx and TX – indicates traffic present on the X.21 V.11 Serial port.



4.4 Line Training Sequence.

When the XLR is powered up and connected to its circuit the XLR goes into the following start up sequence.

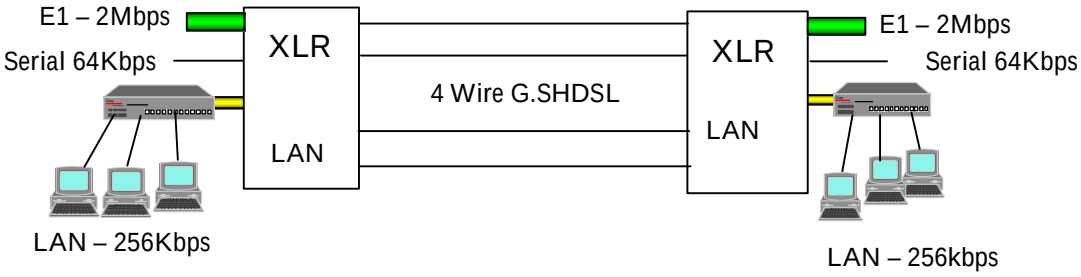
1. Power on – LEDs' illuminate, fan starts
2. XLR – loads on board software from Flash
3. XLR starts connection sequence to remote XLR. If a terminal is connected to the XLR the following sequences can be noted from the statistics page.

    a. Handshaking
    b. Probing
    c. Handshaking
    d. Training
    e. Data – (Up and working)

SECTION 5.0 Application Examples

5.1 Configuration example - 4 Wire Short reach 4.6Mbps

4 wire short reach, 2 Mbps E1, 640 Kbps Bridge and 1 x 1.28Mbps Serial



System Configuration	Unit One	Unit Two
(1) Boot Configuration: Configuration 4	: Configuration 4	Configuration 4
(2) Configuration to Edit	: Configuration 4	Configuration 4
(3) Remote Access Password	: case	: case
(4) XLR Operating Mode	: G.SHDSL Multiplexor	:G.SHDSL Multiplexor

Enter Number of Entry to Modify or (Q)uit >

Main Configuration	Unit One	Unit Two
(1) Configuration Name	: CENTRAL	REMOTE
(2) Master Clock Source	: Clock from E1 Link	Clock from DSL Link
(3) E1 Framing Mechanism	: Transparent (Ch-0)	Transparent (Ch-0)
(4) E1 Active Channels	: 32	32
(5) Serial Link Speed x 64K	: 20	20
(6) Serial Fallback x 64K	: 0	0
(7) Serial Clock Options	: Internal	Internal
(8) Minimum Bridge Channels	: 10	10

Enter Number of Entry to Modify or (Q)uit

DSL Link Configuration	Unit One	Unit Two
(1) DSL Link Selection	DSL 4-Wire Short Reach	DSL 4-Wire Short Reach
(2) DSL Minimum Channels	3	3
(3) DSL Maximum Channels	72	72
(4) DSL Rate Adaptation	Enabled	Enabled
(5) DSL Adaptation Margin (Db)	10	10
(6) DSL Power BackOff	Enabled	Enabled

Enter Number of Entry to Modify or (Q)uit

IP Management Configuration	Unit One	Unit Two
(1) IP Address :	192.168.42.194	192.168.42.184
(2) IP Mask :	255.255.255.0	255.255.255.0

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : Bridge Filter Configuration

	Unit One	Unit Two
(1) Type of Filtering	: Destination Filtering	Destination Filtering
(2) Filter Sce = Dest	: Enabled	Enabled
(3) Filter Broadcast Frames	: Disabled	Disabled
(4) Filter Multicast Frames	: Disabled	Disabled
(5) Max Filter Entry Age	: 900 Seconds	900 Seconds

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : Protocol Filter Configuration

Blue Book Filter : Disabled
Unrecognised Action : Forward Unmatched

	MASK	PATTERN	MASK	PATTERN
(1)	Unused	<Unused>	Unused	<Unused>
(2)	Unused	<Unused>	Unused	<Unused>
(3)	Unused	<Unused>	Unused	<Unused>
(4)	Unused	<Unused>	Unused	<Unused>

(A)dd (B)lue Book (U)nrecognised (Q)uit >

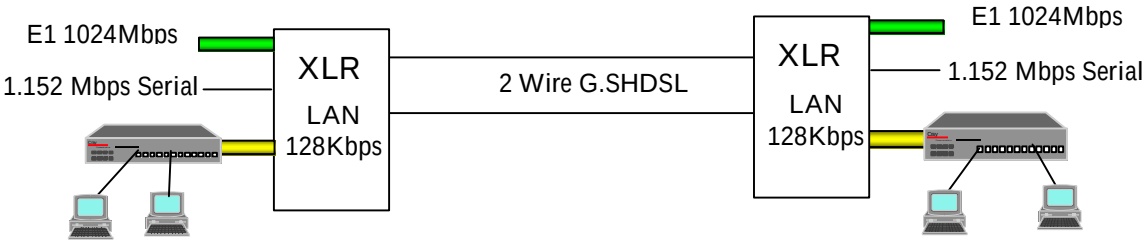
Bridge Configuration : Bridge Spanning Tree Configuration

	Unit one	Unit Two
(1) Spanning Tree	: Disabled	Disabled
(2) Hello Time	: 2 Seconds	2 Seconds
(3) Maximum Age	: 20 Seconds	20 Seconds
(4) Forward Delay	: 15 Seconds	15 Seconds
(5) Bridge Priority	: 32768	32768
(6) LAN Port Cost	: 100	100

Enter Number of Entry to Modify or (Q)uit

5.2 XLR Configuration example - 2 Wire 2.3Mbps

2 wire, 1.024Mbps E1, 128kbps Bridge and 1.152Mbps Serial



System Configuration	Unit One	Unit Two
(1) Boot Configuration	: Configuration 4	Configuration 4
(2) Configuration to Edit	: Configuration 4	Configuration 4
(3) Remote Access Password	: case	: case
(4) XLR Operating Mode	: G.SHDSL Multiplexor	:G.SHDSL Multiplexor

Enter Number of Entry to Modify or (Q)uit >

Main Configuration	Unit One	Unit Two
(1) Configuration Name	: CENTRAL	REMOTE
(2) Master Clock Source	: Clock from E1 Link	Clock from DSL Link
(3) E1 Framing Mechanism	: Transparent (Ch-0)	Transparent (Ch-0)
(4) E1 Active Channels	: 16	16
(5) Serial Link Speed x 64K	: 18	18
(6) Serial Fallback x 64K	: 12	12
(7) Serial Clock Options	: Internal	Internal
(8) Minimum Bridge Channels	: 1	1

Enter Number of Entry to Modify or (Q)uit

DSL Link Configuration	Unit One	Unit Two
(1) DSL Link Selection	DSL Link A Only	DSL Link A Only
(2) DSL Minimum Channels	3	3
(3) DSL Maximum Channels	36	36
(4) DSL Rate Adaptation	Enabled	Enabled
(5) DSL Adaptation Margin (Db)	10	10
(6) DSL Power Back Off	Enabled	Enabled

Enter Number of Entry to Modify or (Q)uit

IP Management Configuration	Unit One	Unit Two
(1) IP Address :	192.168.42.194	192.168.42.184
(2) IP Mask :	255.255.255.0	255.255.255.0

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : **Bridge Filter Configuration**

	Unit One	Unit Two
(1) Type of Filtering	: Destination Filtering	Destination Filtering
(2) Filter Sce = Dest	: Enabled	Enabled
(3) Filter Broadcast Frames	: Disabled	Disabled
(4) Filter Multicast Frames	: Disabled	Disabled
(5) Max Filter Entry Age	: 900 Seconds	900 Seconds

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : **Protocol Filter Configuration**

Blue Book Filter : Disabled
Unrecognised Action : Forward Unmatched

	MASK	PATTERN	MASK	PATTERN
(1)	Unused	<Unused>	Unused	<Unused>
(2)	Unused	<Unused>	Unused	<Unused>
(3)	Unused	<Unused>	Unused	<Unused>
(4)	Unused	<Unused>	Unused	<Unused>

(A)dd (B)lue Book (U)nrecognised (Q)uit >

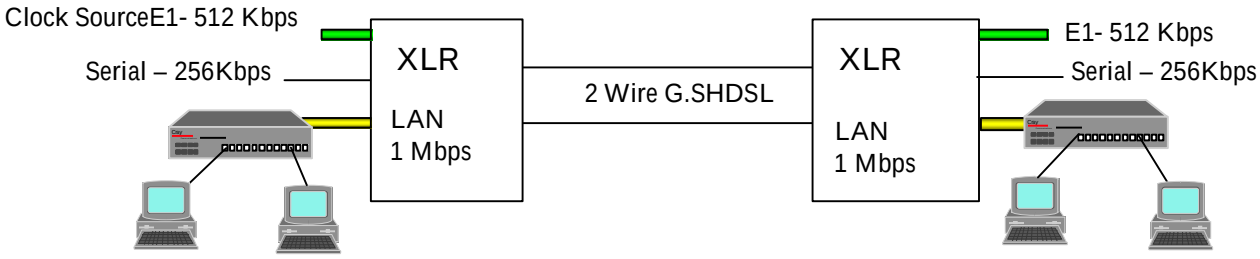
Bridge Configuration : Bridge Spanning Tree Configuration

		Unit one	Unit Two
(1) Spanning Tree	:	Disabled	Disabled
(2) Hello Time	:	2 Seconds	2 Seconds
(3) Maximum Age	:	20 Seconds	20 Seconds
(4) Forward Delay	:	15 Seconds	15 Seconds
(5) Bridge Priority	:	32768	32768
(6) LAN Port Cost	:	100	100

Enter Number of Entry to Modify or (Q)uit

5.3 XLR Configuration example - 2 Wire 2.3Mbps

2 wire, Clocking from E1 link - E1 512Kbps, Serial 256kbps, Bridge 1 Mbps



System Configuration	Unit One	Unit Two
(1) Boot Configuration	: Configuration 4	Configuration 4
(2) Configuration to Edit	: Configuration 4	Configuration 4
(3) Remote Access Password	: case	: case
(4) XLR Operating Mode	: G.SHDSL Multiplexor	:G.SHDSL Multiplexor

Enter Number of Entry to Modify or (Q)uit >

Main Configuration	Unit One	Unit Two
(1) Configuration Name	: CENTRAL	REMOTE
(2) Master Clock Source	: Clock from E1 Link	Clock from DSL Link
(3) E1 Framing Mechanism	: Transparent (Ch-0)	Transparent (Ch-0)
(4) E1 Active Channels	: 8	8
(5) Serial Link Speed x 64K	: 4	4
(6) Serial Fallback x 64K	: 2	2
(7) Serial Clock Options	: Internal	Internal
(8) Minimum Bridge Channels	: 16	16

Enter Number of Entry to Modify or (Q)uit

DSL Link Configuration	Unit One	Unit Two
(1) DSL Link Selection	DSL Link A Only	DSL Link A Only
(2) DSL Minimum Channels	3	3
(3) DSL Maximum Channels	36	36
(4) DSL Rate Adaptation	Enabled	Enabled
(5) DSL Adaptation Margin (Db)	10	10
(6) DSL Power Back Off	Enabled	Enabled

Enter Number of Entry to Modify or (Q)uit

IP Management Configuration	Unit One	Unit Two
(1) IP Address :	192.168.42.194	192.168.42.184
(2) IP Mask :	255.255.255.0	255.255.255.0

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : Bridge Filter Configuration

	Unit One	Unit Two
(1) Type of Filtering	: Destination Filtering	Destination Filtering
(2) Filter Sce = Dest	: Enabled	Enabled
(3) Filter Broadcast Frames	: Disabled	Disabled
(4) Filter Multicast Frames	: Disabled	Disabled
(5) Max Filter Entry Age	: 900 Seconds	900 Seconds

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : Protocol Filter Configuration

Blue Book Filter : Disabled
Unrecognised Action : Forward Unmatched

	MASK	PATTERN	MASK	PATTERN
(1)	Unused	<Unused>	Unused	<Unused>
(2)	Unused	<Unused>	Unused	<Unused>
(3)	Unused	<Unused>	Unused	<Unused>
(4)	Unused	<Unused>	Unused	<Unused>

(A)dd (B)lue Book (U)nrecognised (Q)uit >

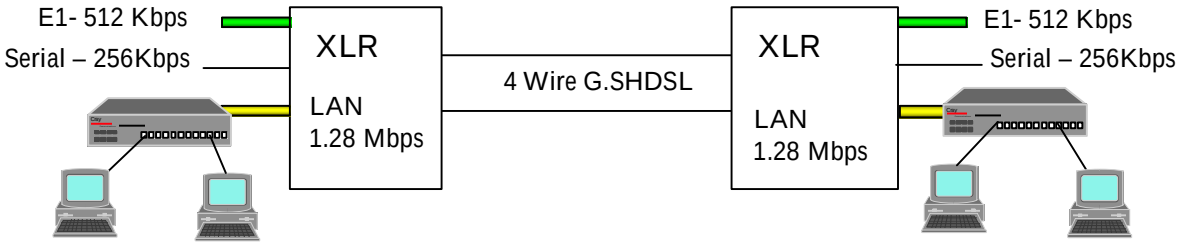
Bridge Configuration : Bridge Spanning Tree Configuration

	Unit one	Unit Two
(1) Spanning Tree	: Disabled	Disabled
(2) Hello Time	: 2 Seconds	2 Seconds
(3) Maximum Age	: 20 Seconds	20 Seconds
(4) Forward Delay	: 15 Seconds	15 Seconds
(5) Bridge Priority	: 32768	32768
(6) LAN Port Cost	: 100	100

Enter Number of Entry to Modify or (Q)uit

5.4 XLR Configuration example - 4 Wire long reach 2.3Mbps

4 wire G.SHDSL, E1 x 512Kbps, X.21 256Kbps, Bridge 1Mbps



System Configuration	**Unit One**	**Unit Two**
(1) Boot Configuration	: Configuration 1	Configuration 1
(2) Configuration to Edit	: Configuration 1	Configuration 1
(3) Remote Access Password	: case	: case
(4) XLR Operating Mode	: G.SHDSL Multiplexor	:G.SHDSL Multiplexor

Enter Number of Entry to Modify or (Q)uit >

Main Configuration	**Unit One**	**Unit Two**
(1) Configuration Name	: CENTRAL	REMOTE
(2) Master Clock Source	: Internal clock	Clock from DSL Link
(3) E1 Framing Mechanism	: Transparent (Ch-0)	Transparent (Ch-0)
(4) E1 Active Channels	: 8	8
(5) Serial Link Speed x 64K	: 4	4
(6) Serial Fallback x 64K	: 2	2
(7) Serial Clock Options	: Internal	Internal
(8) Minimum Bridge Channels	: 16	16

Enter Number of Entry to Modify or (Q)uit

DSL Link Configuration	**Unit One**	**Unit Two**
(1) DSL Link Selection	DSL 4-Wire Long Reach	DSL 4-Wire Long Reach
(2) DSL Minimum Channels	3	3
(3) DSL Maximum Channels	16	16
(4) DSL Rate Adaptation	Enabled	Enabled
(5) DSL Adaptation Margin (Db)	10	10
(6) DSL Power Back Off	Disabled	Disabled

Enter Number of Entry to Modify or (Q)uit

IP Management Configuration	**Unit One**	**Unit Two**
(1) IP Address :	192.168.42.194	192.168.42.184
(2) IP Mask :	255.255.255.0	255.255.255.0

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : Bridge Filter Configuration

	Unit One	Unit Two
(1) Type of Filtering	: Destination Filtering	Destination Filtering
(2) Filter Sce = Dest	: Enabled	Enabled
(3) Filter Broadcast Frames	: Disabled	Disabled
(4) Filter Multicast Frames	: Disabled	Disabled
(5) Max Filter Entry Age	: 900 Seconds	900 Seconds

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : Protocol Filter Configuration

Blue Book Filter : Disabled
Unrecognised Action : Forward Unmatched

	MASK	PATTERN	MASK	PATTERN
(1)	Unused	<Unused>	Unused	<Unused>
(2)	Unused	<Unused>	Unused	<Unused>
(3)	Unused	<Unused>	Unused	<Unused>
(4)	Unused	<Unused>	Unused	<Unused>

(A)dd (B)lue Book (U)nrecognised (Q)uit >

Bridge Configuration : Bridge Spanning Tree Configuration

	Unit One	Unit Two
(1) Spanning Tree	: Disabled	Disabled
(2) Hello Time	: 2 Seconds	2 Seconds
(3) Maximum Age	: 20 Seconds	20 Seconds
(4) Forward Delay	: 15 Seconds	15 Seconds
(5) Bridge Priority	: 32768	32768
(6) LAN Port Cost	: 100	100

Enter Number of Entry to Modify or (Q)uit

5.5 DTB Application Examples

5.5.1. DTB Configuration example - 1

E1 Bridge (1.984Mbps to Bridge and 64Kbps Serial Data)

System Configuration	Unit One	Unit Two
(1) Boot Configuration	: Configuration 2	Configuration 2
(2) Configuration to Edit	: Configuration 2	Configuration 2
(3) Remote Access Password	: case	case
(4) XLR Operating Mode	: E1 Bridge	E1 Bridge

Enter Number of Entry to Modify or (Q)uit >

Main Configuration	Unit One	Unit Two
(1) Configuration Name	: XLR Unit 1	XLR Unit 2
(2) Master Clock Source	: Clock from E1 Link	Clock from E1 Link
(3) E1 Framing Mechanism	: Framed	Framed
(4) E1 Active Channels	: 31	31
(5) Serial Link Speed x 64K	: 1	1
(6) Serial Clock Options	: Internal	Internal
(7) Bridge Channels	: 30	30

Enter Number of Entry to Modify or (Q)uit

DSL Link Configuration	Unit One	Unit Two
(1) DSL Link Selection	DSL 4-Wire Short Reach	DSL 4-wire Short Reach
(2) DSL Minimum Channels	3	3
(3) DSL Maximum Channels	3	3
(4) DSL Rate Adaptation	Enabled	Enabled
(5) DSL Adaptation Margin (Db)	10	10
(6) DSL Power Back Off	Enabled	Enabled

Enter Number of Entry to Modify or (Q)uit

IP Management Configuration	Unit One	Unit Two
(1) IP Address :	192.168.42.194	192.168.42.184
(2) IP Mask :	255.255.255.0	255.255.255.0

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : Bridge Filter Configuration

	Unit One	Unit Two
(1) Type of Filtering	: Destination Filtering	Destination Filtering
(2) Filter Sce = Dest	: Enabled	Enabled
(3) Filter Broadcast Frames	: Disabled	Disabled
(4) Filter Multicast Frames	: Disabled	Disabled
(5) Max Filter Entry Age	: 900 Seconds	900 Seconds

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : Protocol Filter Configuration

Blue Book Filter : Disabled
Unrecognised Action : Forward Unmatched

	MASK	PATTERN	MASK	PATTERN
(1)	Unused	<Unused>	Unused	<Unused>
(2)	Unused	<Unused>	Unused	<Unused>
(3)	Unused	<Unused>	Unused	<Unused>
(4)	Unused	<Unused>	Unused	<Unused>

(A)dd (B)lue Book (U)nrecognised (Q)uit >

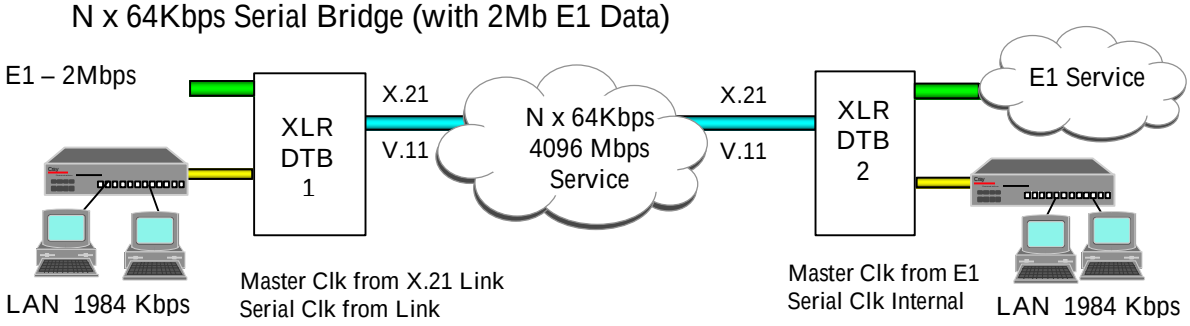
Bridge Configuration : Bridge Spanning Tree Configuration

	Unit one	Unit Two
(1) Spanning Tree	: Disabled	Disabled
(2) Hello Time	: 2 Seconds	2 Seconds
(3) Maximum Age	: 20 Seconds	20 Seconds
(4) Forward Delay	: 15 Seconds	15 Seconds
(5) Bridge Priority	: 32768	32768
(6) LAN Port Cost	: 100	100

Enter Number of Entry to Modify or (Q)uit

5.5.2. DTB Configuration example 2

N x 64Kbps Serial Bridge (with 2Mb E1 Data)



System Configuration	Unit One	Unit Two
(1) Boot Configuration	: Configuration 1	Configuration 1
(2) Configuration to Edit	: Configuration 1	Configuration 1
(3) Remote Access Password	: case	case
(4) XLR Operating Mode	: Serial Bridge	Serial Bridge

Enter Number of Entry to Modify or (Q)uit >

Main Configuration	Unit One	Unit Two
(1) Configuration Name	: XLR Unit 1	XLR Unit 2
(2) Master Clock Source	: Clock from Serial Link	Clock from E1 Link
(3) E1 Framing Mechanism	: Unframed	Unframed
(4) E1 Active Channels	: 32	32
(5) Serial Link Speed x 64K	: 64	64
(6) Serial Clock Options	: Clock From Link	Internal Clock
(7) Bridge Channels	: 31	31

Enter Number of Entry to Modify or (Q)uit

DSL Link Configuration (Not relevant)	Unit One	Unit Two
(1) DSL Link Selection	DSL 4-Wire Short Reach	DSL 4-wire Short Reach
(2) DSL Minimum Channels	3	3
(3) DSL Maximum Channels	3	3
(4) DSL Rate Adaptation	Enabled	Enabled
(5) DSL Adaptation Margin (Db)	10	10
(6) DSL Power Back Off	Enabled	Enabled

Enter Number of Entry to Modify or (Q)uit

IP Management Configuration	Unit One	Unit Two
(1) IP Address :	192.168.42.194	192.168.42.184
(2) IP Mask :	255.255.255.0	255.255.255.0

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : Bridge Filter Configuration

	Unit One	Unit Two
(1) Type of Filtering	: Destination Filtering	Destination Filtering
(2) Filter Sce = Dest	: Enabled	Enabled
(3) Filter Broadcast Frames	: Disabled	Disabled
(4) Filter Multicast Frames	: Disabled	Disabled
(5) Max Filter Entry Age	: 900 Seconds	900 Seconds

Enter Number of Entry to Modify or (Q)uit

Bridge Configuration : Protocol Filter Configuration

Blue Book Filter : Disabled
Unrecognised Action : Forward Unmatched

	MASK	PATTERN	MASK	PATTERN
(1)	Unused	<Unused>	Unused	<Unused>
(2)	Unused	<Unused>	Unused	<Unused>
(3)	Unused	<Unused>	Unused	<Unused>
(4)	Unused	<Unused>	Unused	<Unused>

(A)dd (B)lue Book (U)nrecognised (Q)uit >

Bridge Configuration : Bridge Spanning Tree Configuration

	Unit one	Unit Two
(1) Spanning Tree	: Disabled	Disabled
(2) Hello Time	: 2 Seconds	2 Seconds
(3) Maximum Age	: 20 Seconds	20 Seconds
(4) Forward Delay	: 15 Seconds	15 Seconds
(5) Bridge Priority	: 32768	32768
(6) LAN Port Cost	: 100	100

Enter Number of Entry to Modify or (Q)uit

Time Division Multiplexer Details for N x 64Kbps

Cray Series 3000 Multiplexer

Fitted with System Controller and 2 off Dual LIU cards in slots SYS CON, P1 and P2 respectively

LIU (Line Interface Unit) cards set for terminal, Common Channel Signalling and CRC 4 enabled.

SECTION 6 STATUS SCREEN

6.1 Status Screen – Main Menu Option (1)

The Status Screen accessed from the Main Menu, via Option 1 and provides a complete summary of the unit operation. The information presented will vary, depending on the current mode of operation of the unit.
This page is designed to provide a quick overview of the status of the XLR, for more comprehensive statistics please refer to the statistics section of this manual.

Case XLR 4600 G.SHDSL Bridge/Mux. System Status Ver 0.10 1 May 16:53

Configuration 3 <DSL Mux> ""
MAC Address:00-00-6d-01-00-23 IP Address/Mask:10.0.0.1 /255.0.0.0
Uptime: 4:29:22 CPU Free: 69% Buffers Free: 83%

Channels (M) DSLA: 36 DSLB: 36 E1: 0 Serial: 1 Bridge: 64 Framing:1

Ethernet Bridge Stats

Bridge Mode:	Dest. Filter
State:	Active
Filtered:	35077
Forwarded:	35077
Received:	52606
Span:	Block Block

E1 Port Stats

	E1.
Mode:	Framed
State:	Disconnected
CRC Errs:	0
Frm Errs:	0
Code Errs:	0
E Bit Errs:	0

DSL Stats

	DSL A	DSL B
Mode:	Enabled	Enabled
State:	SyncData	SyncData
Mean Sq:	72	68
CRC Errs:	0	0
SEGA Err:	0	0
LOSW Err:	0	0

Port	Tx. Bytes	Tx. Frames Good / Bad		Rx. Bytes	Rx. Frames Good / Bad / Busy		
Ethernet:	4608	57	0	12122	180	0	0
MMI Port:	361	24	0	0	0	0	0
PPP Link:	2928	122	0	0	0	0	0

RETURN to Re-display Any Character to Exit >

6.2 Explanation of the top line of the Status Screen

The title line indicates the unit type and version of software running.

Configuration 1 <DSL Mux> "London"

This line indicates which of the 4 possible configurations that the unit can hold is currently in use, and what mode of operation the unit is in. The name at the end of the line is a name given by the user to ‘Configuration 1’.

MAC Address:00-00-6d-01-00-03 IP Address / Mask:10.0.0.1 / 255.0.0.0

This line indicates the MAC address of the unit, which is fixed when the unit is shipped, together with the IP Address and Mask, which are configured by the user and are only required if you wish to control the unit using Telnet.
The MAC address can be obtained by looking at the serial number of the unit.

Uptime: 0:05:45 CPU Free: 70% Buffers Free: 84%

This line indicates the amount of time that the unit has been operating since it was last reset or powered on. The CPU and Buffers Free values provide an indication of how hard the Processor and Ethernet Bridging software is working.

Channels(M) DSLA: 36 DSLB: 0 E1: 20 Serial: 3 Bridge: 13

This line indicates the distribution of the available 64k Channels to the various services the unit can provide. These numbers are not necessarily the same as those configured in the unit, since if the available link is slower that expected the available channels are distributed among the requested services as best it can.

If the remote unit is Master (indicated by the 'M' next to the word channels), and the two ends of the link are configured differently, the slave end will adapt to the configuration of the Master unit. This will be indicated in this line of the status display.

6.3 DSL Link Statistics

DSL A Enabled – this refers to the fact that the configuration has enabled DSL link A

DSL B enabled – This refers to the fact that the configuration has also enabled, and is operating in 4-wire mode. If the unit was configured for 2 - wire mode DSL B would be shown as disabled.

DSL State
The XLR Transceiver can be in any of the following states.

Idle Mode – The transceiver is not attempting to start up or pass data or perform tests.

Test Mode – The transceiver is either in local analogue loop back, local digital loop back and is not passing data.

Start-up mode where the transceiver is attempting a start-up of the DSL connection prior to entering DATA mode

Handshake - mode where a link is being established between the two XLRs.

Training mode - where the transceiver is attempting a start-up, prior to entering DATA mode

Sync Data mode - where the transceiver has started up and trained and is ready to pass user data

Mean Square – This is an indication of the quality of the Copper Circuits / Line between the units. The higher the operational speed of the XLRs the more critical the quality of the circuit becomes.
The higher this number is, the lower the quality of the circuit.
If operating in a laboratory or on a bench back to back we might expect to see a reading of 100 – 120 at 4.6Mbps, which indicates good signal quality. If the line quality of poor a certain

point the XLRs will re-train. The relationship between these figures and the threshold at which the XLR will retrain is explained in the next paragraph.

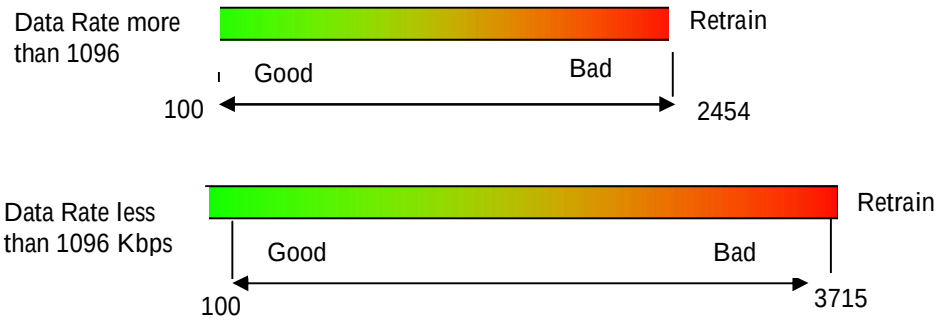
Conditions which will cause the XLRs to retrain.
Conditions, which will cause the XLRs to retrain, can be determined by viewing the 'Mean Square' statistics described above. A retrain should be performed for any of the following three conditions.

1- Perform a retrain if the average return value from the 'Mean Square' is greater than 2454 for data rates of 1096Kbps and over, or if the 'Mean Square' is greater than 3715 for data rates of less than 1096Kbps.

2- Performa a retrain if the return value from the CRC errors is greater than zero for more than 3 seconds. This is CRC Errors occur for more than 3 consecutive seconds.

3- Perform a retrain if the return value from the Framer Synch Status is out of sync for 2seconds. This means that if the frame is out of sync for more than 2 consecutive frames.

Each second during DATA mode, the number of CRC errors, FEBE errors and LOSW defect errors are summed to separate counters in the DSP/Framer.



Equating the Mean Square Value to Signal To Noise Ratio.
For data rates of 1096 kb/s and over, if the average value of the mean square is greater than 2454, a retrain should be performed to maintain a minimum SNR of 24.5dB. For data rates of less than 1096 kb/s, if the average value of the 'mean square' is greater than 3715,a retrain should be performed to maintain a minimum SNR of 22.7 dB

CRC Errors – These are the number of Cyclic Checksum errors received on the link. Under normal conditions line errors will be received, especially after initial power up.

SEGA Errors – The number of SEGA errors received in the last second are shown in this statistic. These are Segment Anomalies in the Received Frame.

LOSW Errors – The number of LOSW (Errors in the Receive Frame) errors that occur in one second during data mode. An LOSW defect is declared when at least 3 consecutive received frames contain one or more bit errors in the frame sync word. A LOSW defect is cleared when at least 2 consecutive received frames contain no errors in the frame sync word.

6.4 Ethernet Bridge Statistics.

Bridge Mode Destination Filter indicates that Ethernet Bridge is filtering the frames that it is forwarding to the remote end of the link.

State – Indicates that the Bridge is active and has not been disabled.

Filtered – The number of frames filtered by the bridge.

Forwarded – The number of frames forwarded by the bridge to the remote XLR.

Received – The number of frames received by the XLR

Span – This indicates Spanning tree is operating and that duplicated frames will be blocked.

6.5 E1 Port Statistics.

Mode Framed – This indicates that the E1 port is operating in a framed (G.703/704) mode. It is also possible to operate this port in an unframed mode for transparent operation.

State Disconnected, - this parameter indicates that the E1 port is not currently connected to a device.

CRC Errs – The number of CRC 4 errors detected on the E1 port. NB. The XLR has the ability to enable or disable the CRC checking on the E1 port

Frm Errors – This counter indicates the number of E1 frames that have been received that are in error. If this statistic is showing errors, it indicates corruption of data between the E1 device (such as a PBX) and the XLR. Check clock sources and cabling.

Code Errs – Indicates data received with E1 code errors. These are errors, which do not conform to the expected E1 HDB3 code format.

E bit Errors – Due to signalling requirements the E-Bits of frame 13 and frame 15 of the CRC multiframe, can be used to indicate received sub-multiframes with errors. In the multiframe synchronous state the E-bits are processed according to ITU-T G.704. The E bit counter (EBC) counter counts zeros in the E-bit position of frame 13. and 15 of every received CRC multiframe. This counter option gives information about the outgoing transmit PCM line if the E-bits are used by the remote end for sub-multiframe error indication. Incrementing is only possible in the multiframe synchronous state.

6.6 Port Statistics

Ethernet Port

Tx Bytes	The number of bytes transmitted from the Ethernet port to line.
Tx Frames Good	The number of good frames transmitted from the Ethernet port to line
Tx Frames Bad	The number of bad frames transmitted from the Ethernet port to line
Rx Bytes	The total number of bytes received on the Ethernet port from line
Rx Frames Good	The total number of good frames received from line
Rx Frames Bad	The number of bad Ethernet frames received from the line
Rx Frames Busy	The number of Ethernet frames received from the line, which could not be delivered due to the local host being busy.

MMI Port	**Man Machine Interface Statistics**
Tx Bytes	The number of bytes from the Manager Port to the XLR
Tx Frames Good	The number of good frames from the MMI Port to the XLR
Tx Frames Bad	The number of bad frames from the MMI Port to the XLR
Rx Bytes	The number of bytes from the XLR to the MMI Port
Rx Frames Good	The total number of good frames from XLR to the MMI Port
Rx Frames Bad	The number of bad Ethernet frames from XLR to the MMI Port
Rx Frames Busy	The number of Ethernet frames received from the XLR management port, which cannot be delivered due to the MMI port being busy.

PPP Link	**(NB This refer to the WAN link)**
Tx Bytes	The number of bytes transmitted over the WAN Link
Tx Frames Good	The number of good frames transmitted over the WAN Link
Tx Frames Bad	The number of bad frames transmitted over the WAN Link
Rx Bytes	The number of bytes received from the WAN Link
Rx Frames Good	The total number of good frames received from the WAN Link
Rx Frames Bad	The number of bad Ethernet frames received from the WAN Link
Rx Frames Busy	The number of Ethernet frames received from the WAN Link which cannot be delivered.

6.7 Operational Information

6.7.1. Rate Adaptation

Introduction.

Rate adaptation is a process where the transceiver probes the line at start-up to find the best line rate possible based on the capabilities of the circuit and Case Communication XLR 4600's. During handshake, the modems will exchange their capabilities, such as the maximum and minimum sub rates and base rates.

How Rate Adaptation Works.

During a cold start, each Case Communications XLR4600 unit needs to find out the capabilities of the G.SHDSL unit at the other end of the loop. This is accomplished by exchanging messages, according to the G.994.1 bis standard.
There are three phases to a rate adaptation activation, (rate-adapted start-up).

Phase 1

The G.SHDSL unit determines if the other end is capable of performing rate adaptation. If one unit is not capable, they will perform a fixed rate start-up. If both units are capable of rate adaptation, they will exchange their capabilities. Once that is done the units will proceed to stage 2.

Phase 2.

The master unit (or central site / central office) and the remote unit both probe the line to find the best rate possible under the current line conditions. Probing is done in half duplex and not simultaneously. The rates do not have to be the same for both units. The G.994.1.bis requirements are a maximum of 3 seconds line probing per rate, with a maximum of 10 seconds from the end of the first handshake session to the start of the second handshake session.

Phase 3.

The line rate is decided, based on the exchange of information of the minimum and maximum line rates. Based on the line rate of both units, the maximum rate compatible with both sides is used.

6.7.2 Decreasing training time by fixing the data rate.

If the XLRs are to be used at a known and fixed data rate, fixing the data rate and not going through the Rate Adaptation process can reduce the training time of the XLRs.

6.8 E1 Bridge Mode Status Screen

Case XLR 4600 G.SHDSL Bridge / Mux. System Status Ver 0.10 1 May 16:53

Configuration 2 <E1 Bridge> ""
MAC Address:00-00-6d-01-00-00 IP Address/Mask:10.0.0.1 / 255.0.0.0
Uptime: 0:00:27 CPU Free: 71% Buffers Free: 84%

Channels(S) E1: 31 Serial: 2 Bridge: 29

Bridge	
Mode:	Dest. Filter
State:	Active
Filtered:	0
Forwarded:	0
Received:	0
Span:	Block Block

	E1.
Mode:	Framed
State:	Framed Link
CRC Errs:	0
Frm Errs:	0
Code Errs:	0
EBit Errs:	0

Port	Tx. Bytes	Tx. Frames Good / Bad		Rx. Bytes	Rx. Frames Good / Bad / Busy		
Ethernet:	0	0	0	0	0	0	0
MMI Port:	1554	64	0	2	2	0	0
PPP Link:	432	33	0	408	32	0	0

6.9 Ethernet Bridge Mode

In this mode the XLR is operating as a Bridge operating over an E1 network.

Configuration – The mode that the unit is working in – E1 Bridge Mode

MAC Address - This is the MAC address of the XLR / DTB 00-00-6d-01-00-00

The IP Address & subnet mask of the management port IP :10.0.0.1 /255.0.0.0

Uptime - The time the XLR/DTB has been in operation since it was powered on 0:00:27

CPU Free: 71% The percentage free time available on the CPU

Buffers Free: The percentage of the buffers that are free 84%

The X21 Port is used to pass transparent data over the E1 link. In this example the following bandwidth is allocated.

1. Trunk 31 x 64Kbps = 1984 Kbps
2. Serial port 2 x 64Kbps timeslots = 128Kbps
3. Ethernet Bridge 29 x 64Kbps timeslots – 1856 Kbps

The Bridge statistics are the same as previously described, but in this instance the E1 port is being used as the main network trunk. The Ethernet port statistics are as previously described.

6.10 Serial Bridge Mode - Status Screen

Case XLR 4600 G.SHDSL Bridge/Mux. System Status Ver 1.10.4 1 May 16:53

Configuration 3 <Serial Bridge> ""
MAC Address:00-00-6d-01-00-03 IP Address/Mask:10.0.0.1 /255.0.0.0
Uptime: 0:00:53 CPU Free: 71% Buffers Free: 84%

Channels(S) Serial: 10 E1: 4 Bridge: 5 Framing: 1

Bridge			E1.
Mode:	Dest. Filter	Mode:	Framed
State: Active		State:	Framed Link
Filtered:	0	CRC Errs:	0
Forwarded:	0	Frm Errs:	0
Received:	0	Code Errs:	0
Span:	Block Block	EBit Errs:	0

Port	Tx. Bytes	Tx. Frames Good / Bad		Rx. Bytes	Rx. Frames Good / Bad / Busy		
Ethernet:	0	0	0	0	0	0	0
MMI Port:	10632	294	0	11	11	0	0
PPP Link:	1080	87	0	1056	86	27	0

6.10.1. X.21 Serial Port Bridge Mode

In this mode the XLR is operating as a Bridge operating over serial data stream network.

Configuration – The mode that the unit is working in – Serial Bridge Mode

MAC Address - This is the MAC address of the XLR / DTB 00-00-6d-01-00-00

The IP Address & subnet mask of the management port IP:10.0.0.1 /255.0.0.0

Uptime - The time the XLR/DTB has been in operation since it was powered on 0:00:27

CPU Free: 71% The percentage free time available on the CPU

Buffers Free: The percentage of the buffers that are free 84%

The Bridge statistics are the same as previously described, but in this instance the X.21 serial port is being used as the main network trunk.

The E1 Port is used to pass framed data over the serial link. In this example the following bandwidth is allocated.

4. Trunk 10 x 64Kbps = 640 Kbps
5. E1 port 4 x 64Kbps timeslots = 256Kbps
6. Ethernet Bridge 5 x 64Kbps timeslots – 320 Kbps

The Ethernet port statistics are as previously described.

SECTION 7 SYSTEM CONTROL

7.1 The System Control Menu.

7.1.1 System Control Menu

The above menu allows you to access actions that control the immediate operation of the unit. Reset Statistics and Restart Unit provide the expected functions. 'Enter Debug Monitor' provides access to a lower level command line interface to the unit. It is from here that you can look at the error log provided by the unit and do software upgrades. The 'H' command in this monitor will provide a list of the functions available. 'Loopback Control' provides access to a further menu shown below

This menu is shown below.

System Control Menu - London

(1) Reset Statistics

(2) Loopback Control

(3) Enter Debug Monitor

(4) Restart Unit

(Q) Exit to Previous Menu

7.1.2. Reset Statistics

This option resets the statistics within the unit. The options are either

1. Yes - Reset the statistics
2. No – Do not reset the statistics.

7.2 Loop Back Control Menu

Entering option 2 from the System Control Menu takes the manager to the Loopback control menu, this is shown below.

Loopback Control Menu (Local) – Node London

Loop back Serial Link

Loopback E1 Link

Remove Loop backs

(Q) Exit to Previous Menu

7.2.1 Loopback serial Link

This option applies a loop back the X.21 V.11 serial port. If the unit is off line then the loop back is a local digital loop back only. The following diagrams indicate how the loops are applied.

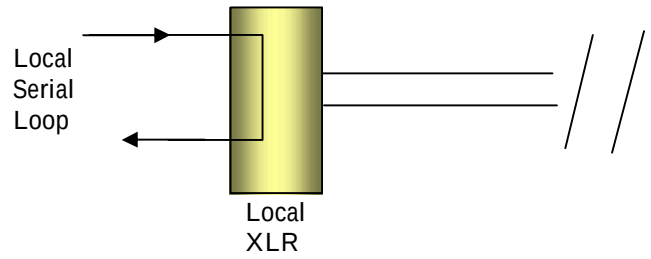


Diagram - Serial Loop back on standalone XLR not connected to remote unit

If the unit is online to a remote XLR then the loop back is applied in two directions.

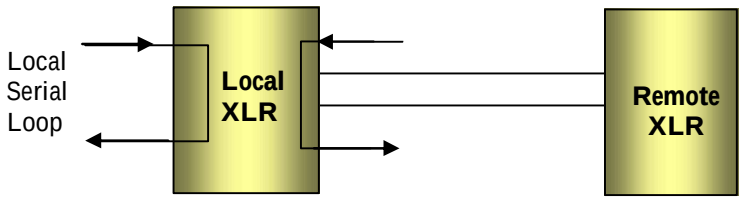


Diagram – Applying a remote Serial Loopback on an XLR link

The wide area link from the remote unit is looped back to the remote unit. By using Remote Menus, it is possible to therefore apply a remote loop-back.

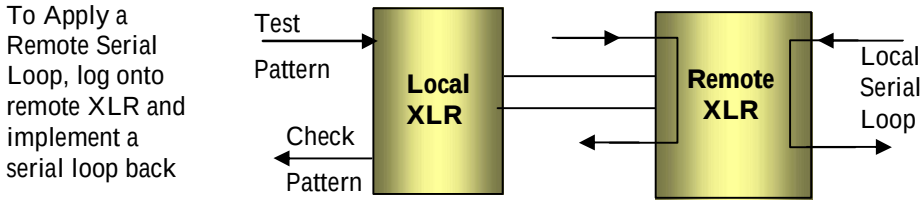


Diagram – Applying a remote serial loop back to an XLR Link

7.2.2 Loop back E1 Port

This option applies a loop back the E1 port If the unit is off line then the loop back is a local digital loop back only. The following

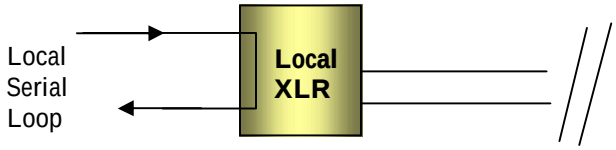


Diagram – E1 Loopback on standalone XLR

If the unit is online to a remote XLR then the loop back is applied in two directions.

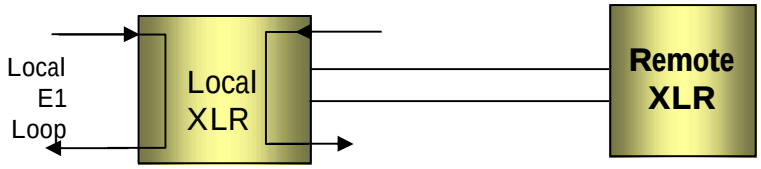


Diagram – Applying an E1 loop back to an XLR Link

The wide area link from the remote unit is looped back to the remote unit. By using Remote Menus, it is possible to therefore apply a remote loop-back.

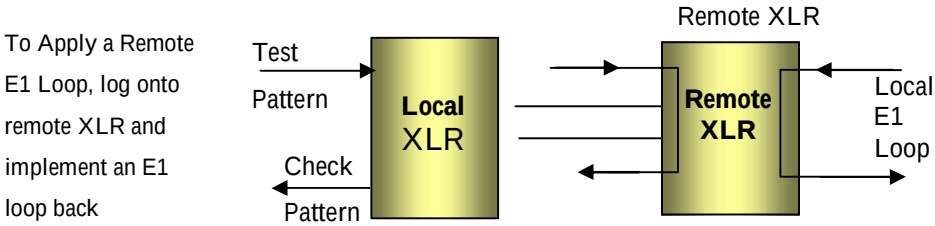


Diagram – Applying a remote E1 loop back to an XLR Link

7.2.3 Remove an E1 Loopback.

The Remove Loop back option removes all loop-backs applied within this unit, on both the E1 and Serial ports.

7.2.4 Entering Debug Mode.

'Enter Debug Monitor' provides access to a lower level command line interface to the unit. It is from here that you can look at the error log provided by the unit and do software upgrades. Trace facilities are available in debug mode Please refer to the advanced user section of this manual for more details.

7.2.5 Restarting the XLR 4600

This menu option allows you to restart the XLR and to load in a configuration map.

SECTION 8 STATISTICS

Main Menu – (5) Statistics

```
        Statistics Menu - London

    (1)  G.SHDSL Link

    (2)  E1 Link

    (3)  Ethernet

    (4)  Management

    (5)  PPP / WAN Link

    (Q)  Exit to Previous Menu
```

This menu allows you to access the various Statistical display screens shown below. Some of the information also appears on the Status Screen

8.1 DSL Statistics Display.

DSL Statistics Display - London

	DSL A	**DSL B**
Link:	Enabled	Disabled
State:	Data	Idle
Channels:	36	0
Framer:	Synchronised	No Sync.
Mean Square:	76	0
CRC Errors:	0 (0)	0 (0)
SEGA Errors:	0 (0)	0 (0)
LOSW Errors:	0 (0)	0 (0)

Link Enabled – Indicates the configuration has been set the link to be enabled.

Link Disabled – Indicates that the configuration has not enabled this link. In this example the XLR is operating in 2 wire mode.

DSL A – Enabled – means that the XLR is enabled to run on DSL A link only.

DSL B – If set to enabled the XLR is set to work over 4 wires, in either short reach or long reach mode. If set to disabled as shown in example above the XLR is set to work in 2 wire mode

Channels – The maximum number of channels (64Kbps) expected over the link, in this example as the XLR is operating in 2 wire mode we expect a maximum of 36 x 64Kbps timeslots, per link. Framer – Indicates that the XLR are synchronised over this link.

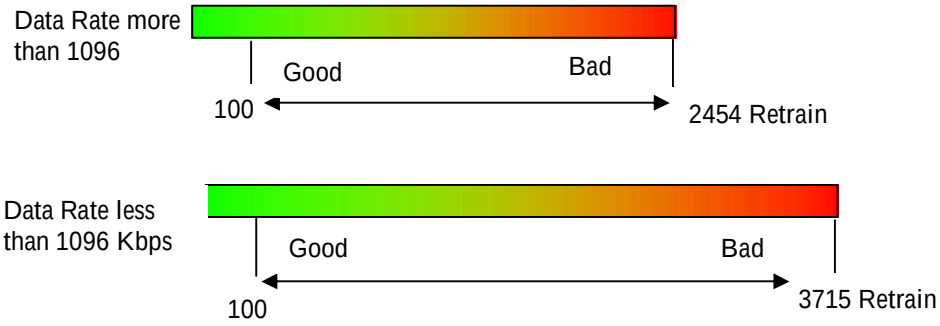
Mean Square – This is an indication of the quality of the Copper Circuits / Line between the units. The higher the operational speed of the XLRs the more critical the quality of the circuit becomes. The rule for this parameter is;

- The lower the number the higher the quality of the circuit.
- The higher the number the worse the quality of the line.

If operating in a laboratory or on a bench back to back we might expect to see a reading of 100 – 120, which indicates good signal quality. If the line quality of poor a certain point the XLRs will re-train.

Equating the Mean Square Value to Signal To Noise Ratio.
For data rates of 1096 kb/s and over, if the average value of the mean square is greater than 2454, a retrain should be performed to maintain a minimum SNR of 24.5dB. For data rates of less than 1096 kb/s, if the average value of the 'mean square' is greater than 3715,a retrain should be performed to maintain a minimum SNR of 22.7 dB.

The diagram shows the principles of how this works.



Equating the Mean Square to the XLR retraining.
Conditions, which will cause the XLRs to retrain, can be determined by viewing the 'Mean Square' statistics described above. A retrain should be performed for any of the following three conditions.

1.Performs a retrain if the average return value from the 'Mean Square' is greater than 2454 for data rates of 1096Kbps and over, or if the 'Mean Square' is greater than 3715 for data rates of less than 1096Kbps.

2.Performs a retrain if the return value from the CRC errors is greater than zero for more than 3 seconds. This is CRC Errors occur for more than 3 consecutive seconds.

3.Perform a retrain if the return value from the Framer Synch Status is out of sync for 2seconds. This means that if the frame is out of sync for more than 2 consecutive frames.

How does Mean square value work – The Case Communications XLR 4600 uses an internal value (GTI_Mean_SQ_Error) to determine the received signal-to-noise ration. To determine the received signal-to-noise ration, it takes the low and high bytes to form a 16-bit integer, 1. Using this information it applies the following formula.

Received S/N (dB) = 58.4- 10 Log 10 (1)
Check the signal quality by monitoring it for 1 or 2 seconds, averaging over 5 samples.

To assure 10^{-7}, BER performance, the received SNR should not be less than 24.5dB for data rates of 1096Kbps and over, and should not be less than 22.7dB for data rates of less than 1096Kbps.

24.5dB = Received S/N (dB)= 58.4- 10 log10 (1), data rates over 1096 Kbps and over for a SNR of 24.5dB, N=2454 (0x996)

22.7dB = Received S/N (dB)= 58.4- 10 log10 (1), data rates of less than 1096 Kbps and over for a SNR of 22.7dB, N=3715 (0x996)

Data Mode Errors
Each second during data mode the number of CRC errors, SEGA errors, and LOSW errors are added to the statistics page.

CRC Errors – These are the number of checksum errors receive don the link. Under normal conditions line errors will be received, especially after initial power up.

SEGA Errors – The number of SEGA errors received in the last second are shown in this statistic. These are Segment Anomalies in the Received Frame, as seen between the DSP and processor.

LOSW Errors – The number of LOSW (Errors in the Receive Frame) errors that occur in one second during data mode. An LOSW defect is declared when at least 3 consecutive received frames contain one or more bit errors in the frame sync word. A LOSW defect is cleared when at least 2 consecutive received frames contain no errors in the frame sync word.

8.2 E1 Statistics

E1 Statistics Display - London

Mode:	Framed						
Link	LOS	ALRM	LFA	RRA	NMF	LMFA	
	0	0	0	0	0	0	
Status	CRC4	LFA	RS-	RS+	XS-	XS+	
	0	0	0	0	0	0	
Channel 16	EXZD	RA	LOS	AIS	LFA	XLS	XLO
	0	1	0	0	0	0	0

CRC Errors:	0 (0)
Framing Errors:	0 (0)
E-Bit Errors:	0 (0)
Code Errors:	0 (0)

E1 Alarms

These alarms relate to the E1 port on the XLR / DTB.

E1 Frame Receive Status Register

Bit 7 Bit 0

LOS	ALRM	LFA	RRA	FRS0	NMF	LMFA	4C

8.2.1. E1 Link Alarms – Real time Status

LOS – Loss of signal on the E1 port

This alarm is raised when the incoming signal has 'no transition' (analogue interface) or logical zeros (digital interface) in a time interval of T consecutive pulses, where T is between 16 and 4096

AIrm – Alarm on the E1 Port

An alarm interrupt status has been detected on the E1 port.
The alarm is also generated when the incoming signal has two or less Zeros in each of two consecutive double frame period (512bits). The alarm is cleared when each of two consecutive double frame periods contain three or more zeros or when the frame alignment signal has been found (ITU-T G.775)

LFA – Loss of Frame Alignment

This indicates 3 or 4 incorrect Frame Alignment Sequences. After the loss of synchronisation the XLR will attempt to resynchronise automatically. The following conditions have to be detected to regain synchronisation.

- The presence of the correct Frame Alignment Sequence frame n
- The presence of the correct service word (bit 2+1) in frame n+1.
- For a second time the presence of a correct Frame Alignment Sequence word in frame N+2.

This counter is incremented every time the frame has been detected as lost.

RRA – Receive Remote Alarm

This alarm is generated if an alarm condition has been detected from the remote XLR. The alarm is cleared if no alarm condition is detected. At the same time a remote alarm recovery interrupt status ISR2.RAR is generated.

NMF – No Multiframe Alignment Found

This bit is only valid if the XLR is set to use CRC4. The alarm is triggered if the multiframe pattern is not detected in a time interval of 400ms after the framer has reached the double frame synchronous state. The receiver is then automatically switched to double frame format

LMFA – Loss of Multiframe Alignment

This is not used in double frame format. In CRC Multi-Frame mode this alarm is generated if

- If force re-synchronisation is initiated.
- If multi-frame force resynchronisation is initiated.
- If pulse frame alignment has been lost

This alarm is reset and the counter incremented if two CRC-Multiframes have been received at an interval of n x 2ms(n=1, 2, 3 and so forth) without a framing error.

8.2.2 E1 Status Counts – Real Time

CRC4 – Cyclic redundancy Check 4

This alarm indicates the number of CRC 4 errors counted on the E1 port, and can indicate problems between the locally attached device on the E1 port and the XLR / DTB. Possible causes could be clocking, or cable faults.

NB ITU-T specifications G.704 and G.706 define the CRC4 cyclic redundancy check for enhanced error monitoring on the E1 line. Note that the current 4-bit CRC is calculated from the previous semi-multiframe. The XLR / DTB have the ability to turn the CRC 4 to an ignored state, to accommodate some PBX's which do not support this function.

LFA – Loss of Frame Alignment

This indicates 3 or 4 incorrect Frame Alignment Sequences. After the loss of synchronisation the XLR will attempt to resynchronise automatically. The following conditions have to be detected to regain synchronisation.

- The presence of the correct Frame Alignment Sequence frame n
- The presence of the correct service word (bit 2+1) in frame n+1.
- For a second time the presence of a correct Frame Alignment Sequence word in frame N+2.

RS- Receive Slip Negative

The frequency of the receive route clock is greater than the frequency of the receive system interface working clock based on 2.048 MHz. A frame is skipped. It is set during alarm simulation.

RS+ Receive Slip Positive

The frequency of the receive route clock is less than the frequency of the receive system interface working clock based on 2.048 MHz. A frame is repeated. It is set during alarm simulation.

XS- Transmit Slip Negative

The frequency of the transmit clock is greater than the frequency of the transmit system interface working clock based on 2.048 MHz. A frame is skipped. After a slip has performed writing of register XC1 is not necessary.

XS+ Transmit Slip Positive
The frequency of the transmit clock is less than the frequency of the transmit system interface working clock based on 2.048 MHz. A frame is repeated. After a slip has performed writing of register XC1 is not necessary.

8.2.3 E1 Port Channel 16 Alarms - Real Time Status

These alarms only refer to traffic transported within timeslot 16 of the E1 frame. Timeslot 16's Frame is depicted below

Bit 7 **Timeslot 16 Alarms** Bit 0

EXZD	RA	LOS	AIS	LFA	FRS1	XLS	XL0

EXZD Excessive Zeros Detected
This alarm is triggered after detection of more than 3 (HDB3 code) or 15 (AMI Code) contiguous zeros in the received data stream. This alarm is cleared when the data stream returns to normal.

TS16RA Receive Time Slot 16 Remote Alarm.
This alarm is triggered by information from the remote XLR device, sending a message indicating it has an alarm. Setting and resetting of this bit causes an interrupt status change.

TS16LOS Receive Time Slot 16- Loss of Signal
This alarm is generated if the incoming Timeslot 16 data stream contains all zeros for at least 16 contiguously received timeslots. One in timeslot 16 resets this Alarm.

TS16AIS Receive Time Slot 16 Alarm Indication Signal
The detection of the alarm indication signal in timeslot 16 is in accordance to ITU-T G.775 This bit is set if the incoming timeslot 16 contains less than 4 zeros in each of two consecutive Timeslot 16 multiframe periods. This Alarm is cleared if two consecutive CAS multiframe periods contains more than 3 zeros or the multiframe pattern was found in each of the periods. This bit is cleared if Timeslot 0 Synchronisation is lost.

TS16LFA Receive Timeslot 16 Loss of Multiframe Alignment.
0= The CAS controller is in synchronisation state after frame alignment is accomplished.
1= This bit is set if the framing pattern '0000' in 2 consecutive CAS multiframes were not found or in all TS16 of the preceding multiframes were not found or in all Timeslot 16 of the preceding multiframe all bits were reset.

XLS Transmit Line Short
This alarm is set if XL1and XL2 are shortened for at least 3 pulses. As a reaction of the short the pins XL1 and XL2 are automatically forced into a high-impedance state if bit XPM2.DAXLT is reset.

XLO Transmit Line Open
This alarm is set if at least 32 consecutive zeros were sent on pins XL1/XL2 or XDOP/XDON. This bit is reset with the first transmitted pulse. With the rising edge of this bit an interrupt ISR1.XLSC is set. In case of XPM2.XLT is set this bit is frozen.

8.2.4. Total Count of Errors – At the Bottom of screen

CRC4 – Cyclic Redundancy Check 4

This alarm indicates the number of CRC 4 errors counted on the E1 port, and can indicate problems between the locally attached device on the E1 port and the XLR / DTB. Possible causes could be clocking, or cable faults.

Framing Errors

This counter indicates the number of E1 frames that have been received that are in error. If this statistic is showing errors, it indicates corruption of data between the E1 device (such as a PBX) and the XLR. Check clock sources and cabling.

E-Bit Errors

Due to signalling requirements the E-Bits of frame 13 and frame 15 of the CRC multiframe, can be used to indicate received sub-multiframes with errors. In the multiframe synchronous state the E-bits are processed according to ITU-T G.704. The E bit counter (EBC) counter counts zeros in the E-bit position of frame 13. and 15 of every received CRC multiframe. This counter option gives information about the outgoing transmit PCM line if the E-bits are used by the remote end for sub-multiframe error indication. Incrementing is only possible in the multiframe synchronous state.
If double-frame format is selected, FEBEH/L has no function.

Code Errors

Indicates data received with E1 code errors. These are errors, which do not conform to the expected E1 HDB3 code format.

8.3 Statistics Display

LAN Statistics Display - London

Transmitted Bytes:	0
Correctly Transmitted Frames:	0
Failed Frame Transmissions:	0
Received Bytes:	0
Correctly Received Frames:	0
Corrupt Received Frames:	0
Receive Frames lost Local Busy:	0

These statistics relate to the Local Area Network port on the XLR / DTB

Transmitted Bytes – The total number of bytes transmitted.
Correctly Transmitted Frames – The number of frames transmitted correctly.
Failed Frame Transmissions – The number of frames received by the local XLR / DTB but which were unable to reach the local host due to the LAN being congested.

Received Bytes – The total number of bytes received
Correctly received Frames – The number of frames received correctly.
Corrupt received frames – The number of corrupt frames received
Receive Frames lost local busy – The number of frames received by the local XLR / DTB but which were unable to reach the local host due to the LAN being congested.

8.4 Management Statistics

MMI Statistics Display - London

Transmitted Bytes:	16886
Correctly Transmitted Frames:	952
Failed Frame Transmissions:	0
Received Bytes:	35
Correctly Received Frames:	35
Corrupt Received Frames:	0
Receive Frames lost Local Busy:	0

Management Information Display

These statistics relate only to traffic to and form the management ports on the XLR / DTB.

Transmitted bytes – The total number of bytes transmitted by the manger port
Correctly transmitted frames – The number of correctly transmitted manager frames.
Failed Frame Transmissions – The number of frames received by the local XLR / DTB but which were unable to reach the local host due to the LAN being congested.

Received Bytes – The number of manager bytes received
Correctly received frames – The number of manager frames correctly received.
Corrupt received frames – The number of frames that have been received that are corrupt.
Received frames lost local busy – The number of frames received by the local XLR / DTB but which were unable to reach the local host due to the LAN being congested.

8.5 WAN / PPP Statistics Display

WAN/PPP Statistics Display - London

Transmitted Bytes:	1584
Correctly Transmitted Frames:	132
Failed Frame Transmissions:	0
Received Bytes:	1584
Correctly Received Frames:	132
Corrupt Received Frames:	0
Receive Frames lost Local Busy:	0

WAN / PPP Statistics Display

These statistics refer to the frames received by the DSL port on the XLR.

Transmitted Bytes – The total number of bytes transmitted
Correctly transmitted frames – The total number of correctly transmitted frames
Failed Frame Transmissions – The number of frames received by the local XLR / DTB but which were unable to reach the local host due to the LAN being congested.

Received bytes – The number of bytes received by the XLR
Correctly received frames – The total number of correctly received frames.
Corrupt received frames – The total number of corrupt received frames.
Receive Frames Lost local host busy – The number of frames received by the local XLR / DTB but which were unable to reach the local host due to the LAN being congested.

SECTION 9 ACTIVE TABLES

9.1 Active Tables

The active tables menu provides access to the two further screens (shown below). These allow you to look at the dynamic tables created as part of the ARP and Bridge Source Filtering process.

Active Tables Menu - London

(1) Local Filter Table
(2) Local ARP Table
(Q) Exit to Previous Menu

This menu provides access to the two further screens (shown below). These allow you to look at the dynamic tables created as part of the ARP and Bridge Source Filtering process.

Dynamic Filter Table Display - London

Entry	Address	Location	Type		
1	00-00-6d-01-00-06		Management		
2	01-80-c2-00-00-00		Management		
3	00-e0-07-00-1b-55	L	Dynamic	Age	7 seconds
4	00-c0-9f-1b-40-13	L	Dynamic	Age	7 seconds
5	00-06-5b-03-d3-0e	L	Dynamic	Age	0 seconds
6	00-40-8c-59-32-93	L	Dynamic	Age	20 seconds
7	00-90-27-5c-88-1b	L	Dynamic	Age	418 seconds
8	00-c0-a8-7c-51-ad	L	Dynamic	Age	110 seconds
9	00-01-69-00-16-a4	L	Dynamic	Age	478 seconds
10	Unused				
11	Unused				
12	Unused				
13	Unused				

This table shows the MAC addresses that the unit has recognized at being on the locally attached LAN segment.

ARP Table Display - London

Entry	IP Address	MAC Address	Age
1	Unused		
2	Unused		
3	Unused		
4	Unused		
5	Unused		
6	Unused		
7	Unused		
8	Unused		
9	Unused		
10	Unused		
11	Unused		
12	Unused		
13	Unused		
14	Unused		
15	Unused		

This table shows the MAC addresses and the time since they were last seen in an ARP message.

SECTION 10 ADVANCED USER

10.1 Introduction

This part of the XLR manual cover a Command Line Interface monitoring and configuration section, which allows the more advanced user to run facilities such as 'Trace' and to load new code into the XLR.

To enter this part of the XLR management from the main menu, enter option 2, (Control) and then option 3 (enter Debug)

10.2 Access to the Advanced Options

Main Menu
2 – Control
3 – Enter Debug Mode

The following prompt should be displayed.

```
Select Option>
  XLR 4600  G.SHDSL Bridge / Mux Monitor Ver x.xx
```

This display indicates the following

1. XLR 4600 – Operating mode of the unit – this could also be displayed at DTB 2300 if DTB (Digital TDM Bridge) mode is in operation

2. Version – This is the version of operating system loaded into the unit and currently running

3. Date – The date this code was released by Case Communications.

10.3 Using 'Help' to display advanced options

Enter 'Help' or 'H' followed by carriage return to display the complete list of commands available. To go straight to any command merely enter the letter.
This displays a list of the commands available from the XLR Command Line Interface (CLI).

A	Display FPGA Registers	N	
B		O	
C		P	
D	Display Memory	Q	Return to menu system
E	Display FALC	R	Reset unit
F	Programme FPGA	S	Programme Sector FPGA
G	Run DSL Tests	T	Display Log
H	Display this message	U	Clear Log
I	Import configuration	V	Display FPGA Version
J	Reset Factory Defaults	W	
K		X	
L		Y	
M	Modify Memory	Z	Test Byte Access
!	Enter Debugger		

Display FPGA Registers. – Option A

This option provides a display of the sectors written in the Field Programmable Gate Array. Typically there will be 16 FPGA segments, which have been written.

To return to the list of options re-enter 'h' or 'Help

D – Display Contents of Memory
This option provides a hex dump of the contents of the unit's memory.

E – Display FALC Status
This displays the status of the FALC and will return a line such as
Framer RX Status (1..2) a2 28
ISR Status (0..5) 00.08.00.40.00.00

F – Programme FPGA. (Only used to load new code)
This is only used to load a new version of code into the Field Programmable Gate Array, and it takes code stored in the unit and programme sit into the FPGA.
Please read the later part of this section for detailed instructions on how to load the FPGA.

G – Run DSL Tests
This option not functional.

H – Display this message
This brings up the 'Help' facility which displays the list of commands.

I – Import configuration.
Its possible to export and import XLR configuration data into and out of the unit. The XLR configuration data is saved in the form of a text file.
Entering 'i' provides the following response.
'Send configuration now – should end with line 'main'

Using a terminal emulator transmit the file which will be stored as a notepad or simple text file. The file end is indicated with the word 'main'

J – Reset To Factory Default.
This option resets the factory default stored within the unit. If the XLR configuration is corrupted or if there has been a problem, which results in the unit appearing to be non-functional, this option usually resolves the problem, by erasing any corrupt configuration data from the unit, and restoring it to a default configuration.

M – Modify Memory
This option is for development use only.
If this mode is accidentally entered escape by entering 'Q' and carriage return.

! – Enter Debugger
This option is used to load new operating software into the XLR. As soon as the option is entered the user is requested to set their terminal emulator to a speed to 115,000 bps.
The new code should be loaded into the unit as a file.

Q – Return to menu system
This option returns the operator back to the unit's configuration menus.

R – Reset Unit
Resets the unit.

S – Program Sector (FPGA)
This loads the unit with new code for the FPGA (Field Programmable gate Array) This operation is not normally carried out in the field and will only be required if the operating system is not capable of running on the FPGA code. The FPGA code is rarely changed and its unlikely this will require changing. However please refer to software modules later in this section if this is required.

T – Display Log
This command provides a trace log of the unit's activities, powering up and in operation.
A typical example in 4 wire short reach mode with some misconfiguration would provide the following trace.

Time (in seconds first eg is 1.19th of a second) Activity

0: Log Started – Ver x.xx - *Software release date*
0: Facilities: 90000000 Variant No1 *operating as a DSL unit*
0: Loaded Primary config No.1 *Operating configuration*
0: Telnet MMI Access Disabled - *Telnet access not set*
119 : JBI; Configure – *code has been loaded into a device*
130: JBI: Device#1 IDCODE is 010200DD – *code loaded.*
132: JBI: configuring Flex device (s)…. *preparing to load the FPGA*
833: JBI: Done – *The FPGA has been loaded*
11.44: DSL channel 0 OK – *DSL channel 0 is working*
14.41: DSL Channel 1 OK – *DSL Channel 1 is working*
4937: DSL Link 0 up speed 2248 E1:32 Br 16 Ser 0. Fall back 0 – *Link and mode*
4937: Probed link quality 0: 100 *Higher number equates to better quality*
4943: DSL Link 1 up speed 2248 E1:32 Br 16 Ser 0. Fall back 0 – *Link and mode*
4943: Probed link quality 1: 112 *Higher number equates to better quality*
4943: Remote Master Config different – Complying. *The local unit is adapting to meet the configuration of the remote unit.*
4944: Cutting eth channels back from 37 to 32 – *An indication that the link speed is not at maximum and the Ethernet link is going into fall back mode*
4944:E1 Mis-Configuration Framed 32 channels - *In this example the two XLR units have been mis-set with different numbers of E1 channels.*

5131; LCP 0 Link up

During normal operation events will be displayed via the trace, for example if bad frames are received the trace will show the following

36686: Log started – Ver x.xx *Sw release date*
77707:Dsl_rx bad checksum - discarding

U – Clear Log
This clears the Trace Log described above.

V – Display FPGA Version
This displays the level of code loaded into the FPGA. Typically it will be shown as

FPGA Code: xlr 0102.jbc :20207/20/03 16.41:16

X – Export Configuration.
The unit will respond with the following
'Set up Capture system now – then press Return'

Set up your file capture from your terminal emulator to receive a text file, and press return.

For example if using Hype-term
1. Transfer – Capture Text
2. Set location
3. Press Return.

Z – Test Byte Access
This option is used to load software

10.4 Loading new code into the XLR

The Case Communications XLR 4600 and DTB 2300 have three sets of software loaded into the product.

1. Boot Code – Installed at time of manufacture and should not need any changes
2. FPGA – Programmed at time of manufacture and should not need changing
3. Operating system – Programmed at time of manufacture but may be upgraded in the field.

To upgrades the operating system code follow these instructions

1. From the main menu select Option 2'Control'
2. Enter Option 3 'Debug Monitor '
3. Response will show XLR4600 G.SHDSL Bridge / Mux monitor ver 1.xx date
4. Enter Debugger '!' (exclamation)

Action
Enter Debug Mode !

Path
Control / Debug / Monitor

Response
debug>

WARNING Possible Problem

NB. Spurious characters.
If you enter any numeric or alpha numeric keys you may get extra spurious characters appear on the screen so you would see something like this

Incorrect Response

0000Debug>

Action
To clear these characters enter semi-colon'

Correct Response
debug>

Action - Upload operating system
Go to Terminal emulator and transmit new operating system. Some terminal emulators will show progress others will display a blank screen, the time taken to load the code is approximately 3 mins.

Action
When upload has completed press 'carriage return' / 'Enter'

The only valid Response is
00810000 debug>

New code in RAM now install it into FLASH.

At this point the upload has been stored in the units RAM and its necessary to load it onto FLASH/

Loading code into FLASH

Enter	**Response**
'Z'	'New code do you wish to overwrite'
'Y'	…..please wait erasing 6 sectors.

When complete the XLR reports **done**.

If the uploaded code is the same as the existing code the XLR will go though what appears to be the loading process but will not actually load the new code.

Once the code has been loaded – restart the unit.

Abbreviated load sequence

Enter	**Response**
Debug mode	**debug>**
Upload operating system	**00810000 debug>**

To Load into FLASH

Enter	**Response**
'Z'	'New code do you wish to overwrite'
'Y'	…..please wait erasing 6 sectors.

When complete the XLR reports **done**.

Programming the FPGA

To upgrades the Field programmable Gate Array code follow these instructions

1.From the main menu select Option 2'Control'
2.Enter Option 3 'Debug Monitor '
3.Response will show XLR4600 G.SHDSL Bridge / Mux monitor ver 1.xx date
4.Enter 'S' for transmit S record

Enter	**Response**
'S'	
	Transmit 'S' record now 1 sector only

Set your terminal emulator to 19, 200 bps 8 bits no parity
Transmit the FPGA code
(eg xlr0102.sr (s record) for XLR
or (dtb0102.sr (s record) for DTB

Once the upload has taken place the unit should respond with

Received xlr0102.jbc :0207/20/03 16:41:16 len 41990

The XLR will then invite you to programme the code into FLASH by responding with

Response
CRC OK programme sector 14

If the upload has become corrupt the message will indicate this fact and show

Response
CRC Bad, do you wish to continue?

Do not continue at this point but enter 'N' for no and re-load the code from your PC.

The XLR will then invite you to programme the code into FLASH by responding with

Response
'programme?'

If the code has been loaded correctly and has NO CRC errors enter 'Y'

Response
Erased……programmed

BOOT CODE

To upgrades the Units Boot Code follow these instructions

1.From the main menu select Option 2'Control'
2.Enter Option 3 'Debug Monitor '
3.Reset terminal to 115,200 bps
4.Response will show XLR4600 G.SHDSL Bridge / Mux monitor ver 1.xx date
5.Enter ''V' (capital V) to see the existing version of Boot Code

SECTION 11 PROBLEM SOLVING

11.1 Introduction

While it is hoped that you simply connect your XLR 4600 to a copper circuit and it functions without any problem, there are times when problems will arise which will require rectification. This section outlines some of the problems that may arise with recommended actions to resolve the issue.

11.2 Line Problems.

11.2.1 British Telecomm DC Circuits.

By enlarge the vast majority of problems that are likely to occur are with the Copper circuit and associated wiring. You should be using DC circuit without amplifiers or transformers, and if your circuit is purchased from BT the two types of circuit are.

a. 2 Wire Circuit – BT Name - Baseband Standard (was EPS 9).
b. 4 Wire Circuit – BT Name – Baseband Premier (was EPS 8)

11.2.2. Specifications.

While BT might tell you there are no Service Level Agreements associated with these circuits, there are in fact a set of parameters, outlying the specifications of the circuit and these are detailed in a BT document called 'SIN 355'. This document relates to multiple circuits but there is a section called 'Baseband Standard & Baseband Premier' which details the key parameters.
The key parts of SIN 355 for a Baseband circuit are;

1. **Nominal Insertion** - Loss at 10,000 Hz and at 140 Ohms should not exceed 40dB

2. **Loss frequency** - response at 1000 Hz should not exceed 20dB

3. **Loss frequency** - response at 100,000 Hz should not exceed 75dB

4. **Random Noise** - level between 0Hz to 30,000 Hz will not exceed –60dBm un-weighted at the customer's premises.

5. **Impulse Noise -** maybe expected at thresholds as high as 20dB below the received level of 1000Hz test signal applied at 0Hz. This should not result in a count greater than 18 in any period of 15 minutes when measured across 140 Ohm resistive termination with an instrument operated in 'flat mode'

6. Input Impedance - nominal value- 140 Ohm. The input impedance will depend on the construction and length of the circuit and, on the shortest connections, may be significantly affected by the terminating impedance at the remote end.

11.2.3. Circuit Orientation.

One of the key considerations is how the physical copper media is connected to the XLR 4600's. The following scenarios give some details on how the lines can be connected. Some basic test equipment will be required to test the circuits. The list below might be considered adequate to carry out basic testing.

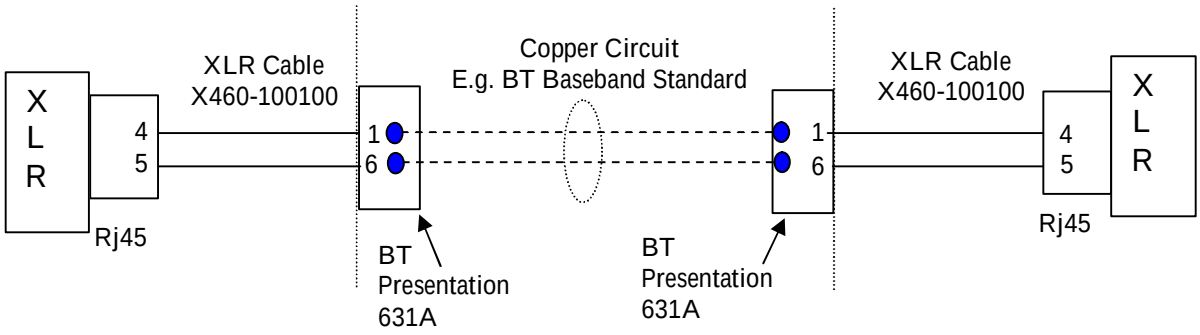
11.2.4. Basic Test Equipment

a. Audio test set with the ability to measure incoming audio signals.
b. Telephone ear piece with cable to listen to the line
c. Signal Generator ideally with the ability to go from 0Hz to 100,000 Hz
d. A cable with one end open and BT 631 connector at the other end. (Standard BT telephone line connector with open ends)

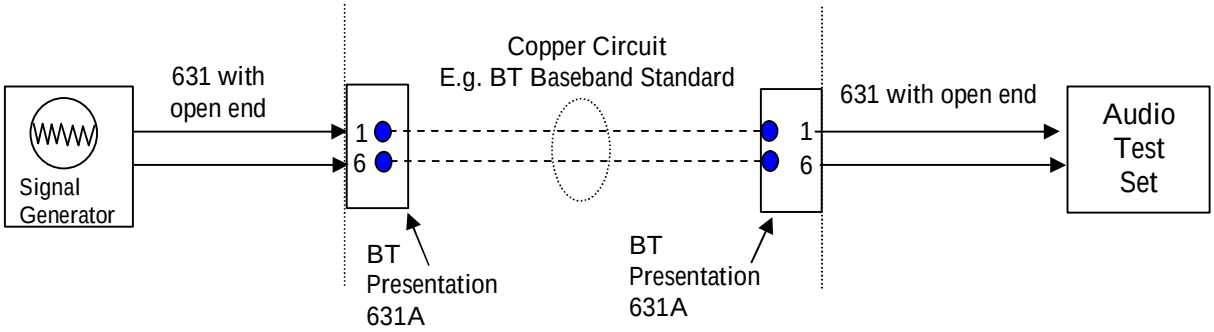
11.2.5. 2-Wire Operation.

2 Wire operation is relatively simple but its still possible the circuit provider can miss wire the circuit and it might be necessary to determine the correct pair by carrying out some basic tests.

An XLR Connection over a 2-wire circuit should look like this



If you're operating in 2 wire mode and the XLRs fail to synchronise check the pairs are correct by injecting a signal at one end and measuring or listening for it at the other end.

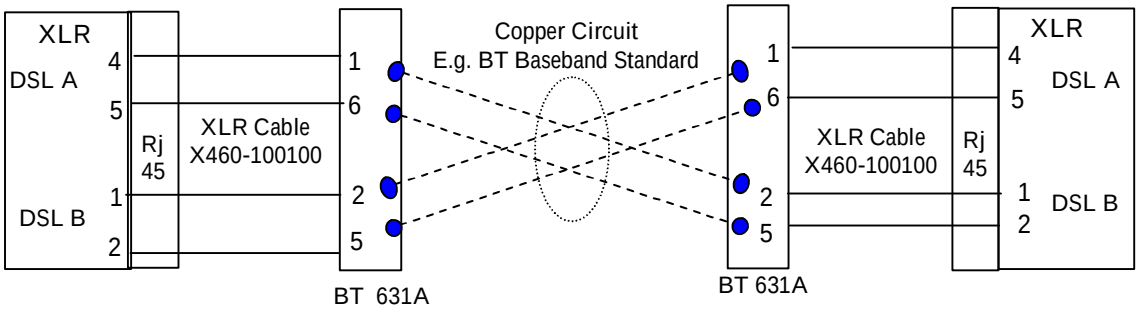


11.2.6. 4-Wire Operation.

Short Haul Working

There are two modes of 4-Wire Operation, 'Long Haul' and 'Short Haul'. In Short haul the DSL A and DSL B circuits are bonded to form a single 4.6Mbps stream. The XLR will switch the data into the correct order regardless of which DSL leg (DSL A or DSL B) is connected to which remote DSL Leg, so for example DSL A can quite legitimately connect to DSL A or DSL B, and vice versa. The provider is likely to switch the lines between the two locations, making the Transmit pair from Site A, the receive pair at Site B. The XLR bonder takes care of this and re-orders the data automatically.

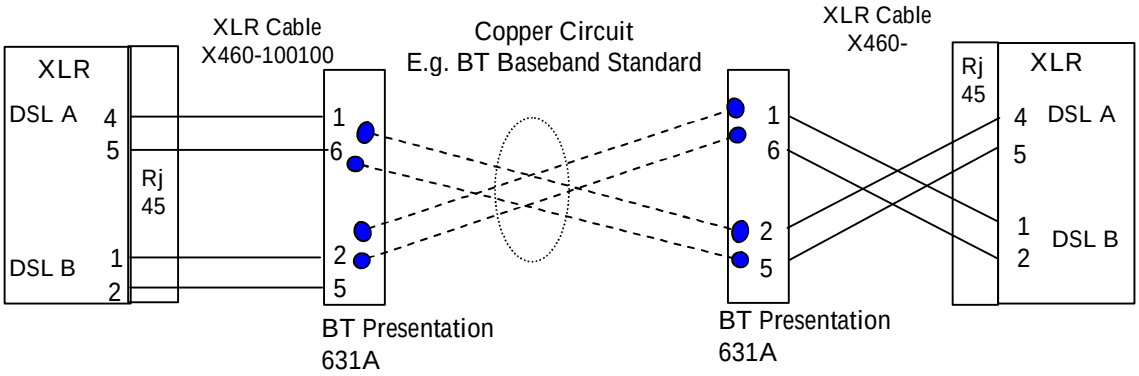
The diagram below depicts the data path for a 4-wire short haul connection.



In Short Haul mode the links are bonded and, it does not matter which way round the pairs are oriented.

Long Haul Working

In Long Haul the DSL A and DSL B circuits work at a lower rate to provide a maximum of 2.3Mbps across the dual links, without the loss of s timeslot for bonding.
Here the orientation of the pairs is important to make sure DSL A goes to DSL A and DSL B only goes to DSL B. The provider is likely to cross the lines between the two locations, making the transmit pair from site A, the receive pair at site B. Therefore a cross over line cord is likely to be required to re-reverse the line connections as shown below. The diagram below depicts the data path for a 4-wire long haul connection.



11.3 Basic Configuration Checks

If the incoming signal is being received but the units still don't synchronise then check the following.

1. Both ends are set to the same mode ie:
    a. Both set to 2 Wire mode
    b. Or both set to 4 Wire Long Reach
    c. Or both set to 4 Wire Short Reach.
    d. Your using the correct line cords.
    e. Both ends are set to the same Annex ie. Both Annex A or both Annex B

2. It's also necessary to ensure one end is set to 'Internal Clock' and the other end set to 'Clock from the DSL Link'

If your still experiencing difficulties then it will be necessary to send tones down each pair of the circuit and to measure the results at the other end of the link. The diagram below shows how the test should be set up (if using one Signal Generator and one Audio Test Set, then measure each circuit one at a time.)

11.3 .2. DSL Adaption Margin.

If the lines are noisy you might find that the SNR margin is stopping the units from synchronising. The default setting of 10 instructs the XLR 4600 not to allow synchronisation which results in a worse SNR of 10. Try setting this to 0 and seeing if the units sync up. The lower the value the higher the data rate that's achieved but the less reliable the link will be. In effect this value sets the Signal to Noise Margin that the XLR will try to achieve. If the Margin is below the required value the XLR will reduce its data rate until it meets the required value.

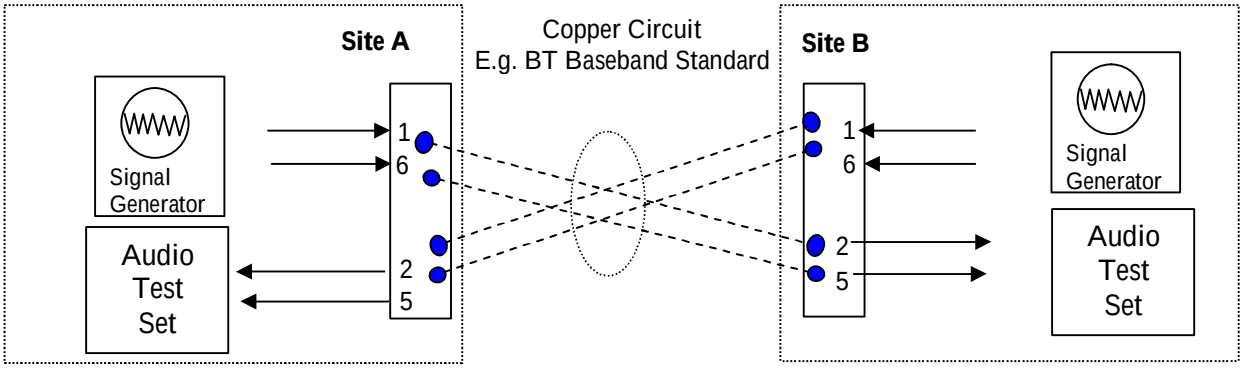
11.3.3. DSL Power-back-off

By disabling power back off we allow the XLR 4600's to transmit at a greater power, try disabling this in case of difficulty in establishing a link or to get higher rates.

11.4 Circuit Testing

11.4.1 Loss / Frequency and Noise

Diagram – 4 Wire Line Test



Now measure each pair for the following results from Site A to Site B

Signal Generator Set to 0dBm Frequency	Transmit Pair Site A	Receive Pair Site B	Receive Level Site B	Notes .
1000 Hz	1 & 6			If less than -40dB call circuit provider
100,000 Hz	1 & 6			If less than -75 dB call circuit provider

Now measure each pair for the following results from Site B to Site A

Signal Generator Set to 0dBm Frequency	Transmit Pair Site B	Receive Pair Site A	Receive Level Site A	Notes
1000 Hz	1 & 6			If greater than -40dB call circuit provider
100,000 Hz	1 & 6			If greater than -75 dB call circuit provider

Now remove the Signal Generator and measure background noise.

Signal Generator Disconnected	Receive Pair Site A	Receive Level Site A	Notes
			If greater than –60dBm un-weighted call circuit provider
Signal Generator Disconnected	Receive Pair Site B	Receive Level Site B	
			If greater than –60dBm un-weighted call circuit provider

Note if your unable to obtain a signal generator the XLR should transmit at +13db therefore just measure the incoming signal and if it's below approximately –30dB call your provider to test the circuit.

11.4.2.1. DC Path Testing

Its feasible the circuit might have an amplifier or line transformers, which will stop DSL from working. Your provider should provide a DC path.

11.4.2.2. Aluminium Circuits

Occasionally circuit providers implement circuits using Aluminium wire. These provide very poor quality circuits and ideally should be avoided if possible.

11.5 Other Problems

11.5.1 CRC Errors on the X.21 Port

The X.21 port on the XLR 4600 does not check for CRC errors, as the switching is carried out by hardware. All clocks are frequency locked to the internal clock, but this internal clock source can also be locked to an external source, such as a Kilostream etc. If it's assumed the link is relatively clean (check the link stats for a mean sq value) then try different X.21 clock modes, such as setting one end of the link to 'clock from link' or try inverted clocks.

11.6 PBX Problems

11.6.1 Timeslot Mapping

If you're experiencing problems getting the PBX's to work, firstly ensure the timeslot mapping is correct. For example if your transporting timeslots 1 to 20 across the link then ensure the XLR is set to support timeslots 1 to 20.

11.6.2.1. CRC 4 on E1 Link

Some PBX's don't support CRC checking on the E1 link, which prevent them from communicating with each other. The XLR has the option of turning the CRC 4 checking to 'off' on the E1 port.

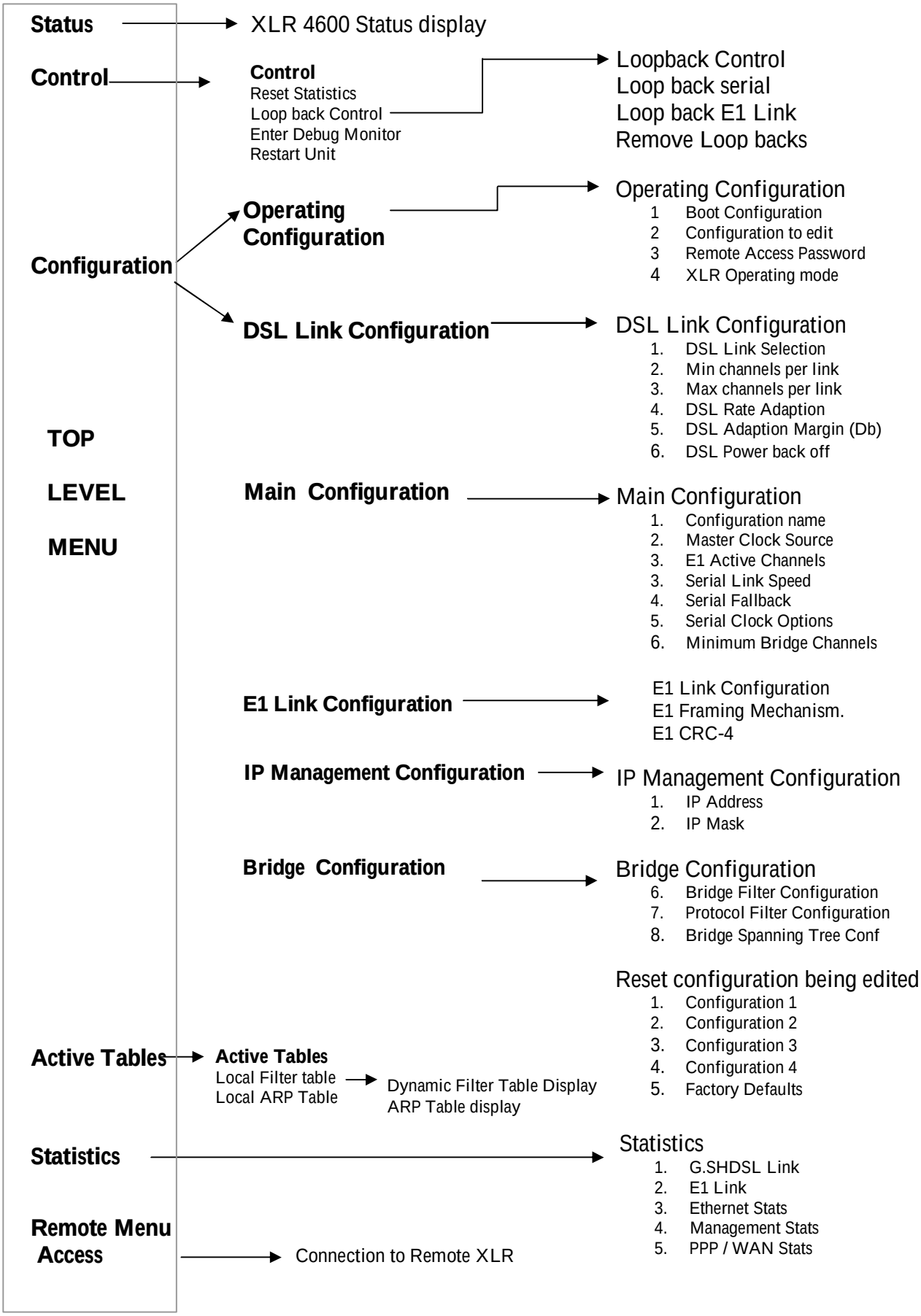
11.6.2.2. Hardware Problems

If the XLR continually power re-cycles the possible causes of this are

1. **The Power Supply** - not providing the correct current due to a faulty Power Supply or bad connector. At power up the XLR probes the line and draws a higher current than once it's equalised and operational.

2. **Faulty Hardware** – return the XLR to place of purchase for testing. Running XLRs back to back will determine if the hardware is functional or not

Appendix A
XLR Menu Map



APPENDIX B
DSL Start Up Sequence

Transceiver Status

IDLE Mode – Where the transceiver is not attempting to start up, pass data or perform tests.

TEST MODE – Where the transceiver is either in local analogue loopback or local digital loopback and is not passing user data.

START-UP MODE – Where the transceiver is attempting to start up the DSL connection, prior to entering data mode.

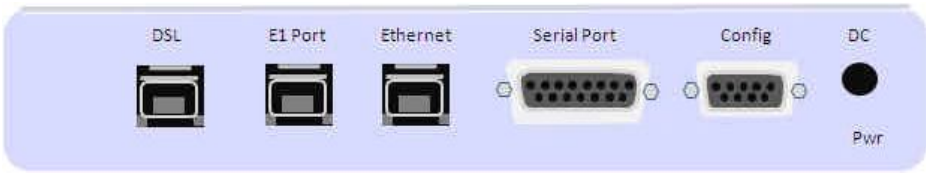
HANDSHAKE MODE – Where a link is established between the two XLR 4600's.

TRAINING MODE – Where the transceiver is attempting a start-up prior to entering data mode.

SYNC MODE – Where the DSL link is synchronised and in data mode

APPENDIX C
Physical Attributes

XLR 4600 Front View



XLR 4600 Rear View

Power input

The XLR 4600 has two styles of DC power input. The mains powered unit uses an external power adapter and a low voltage DC input as shown above. The connector used on the PSU is made by Binder, part number 99 0072 100 02

There is also a 48 Volt DC Version of the XLR 4600 and this uses a similar 3 pin power adapter which connects directly to the –48 Volt DC Source.

APPENDIX D
SubNetwork Masks

Sub Networking concept

IPv4 addresses are broken down into three parts: the network part, the subnet part (now often considered part of the network part, although originally it was part of the rest part), and the host part. There are three classes of IP address, which determine how much is which.

Class	Leading bits	Start	End	Default Subnet Mask in dotted decimal	CIDR notation
A	0	1.0.0.0	126.0.0.0	255.0.0.0	/8
B	10	128.0.0.0	191.255.0.0	255.255.0.0	/16
C	110	192.0.0.0	223.255.255.0	255.255.255.0	/24
D	1110	224.0.0.0	239.255.255.0		
E	1111	240.0.0.0	255.255.255.0		

The 127.0.0.1 Network ID is left out because it is designated for loopback and cannot be assigned to a network

Class D multicasting Class E reserved

Subnetting is the process of allocating bits from the host portion as a network portion. For example, giving the class A network 10.0.0.0 a subnet mask of 255.255.0.0 would break it down into 256 sub-networks (10.0.0.0 to 10.255.0.0), and indicates that the first octet of the IP address shows the network address, the second one shows the subnet number and the last two show the host part.
Subnet masks are not limited to whole octets, either. For example 255.254.0.0 (or /15) is also a valid mask. Applied to a class A address this would create 128 sub networks in intervals of two (1.2.0.1 - 1.3.255.254, 1.4.0.1 - 1.5.255.254, etc).

IPv4 subnetting reference

Certain chunks of IPv4 address space are specially allocated by RFCs for special uses such as loopback (RFC 1643), Private networks (RFC 1918), and Zero conf (RFC 3927) usage, and are not available for allocation by Regional Internet Registries (RIRs).
The netmask is a bitmask that can be used to separate the bits of the network identifier from the bits of the host identifier. It is often written in the same notation used to denote IP addresses.

Subnetwork sizing

There is a play off between the number of subnetworks you create and 'wasted' IP numbers. Every individual IP network has two addresses unusable as interface (host) addresses - the network IP number itself and the broadcast address. When you sub-network, each subnetwork requires its own, unique IP network number and broadcast address - and these have to be valid addresses from within the range provided by the IP network that you are sub-networking.
So, by sub-networking an IP network into two separate subnetworks, there are now **two** network addresses and **two** broadcast addresses - increasing the 'unusable' interface (host) addresses; creating 4 subnetworks creates **eight** unusable interface (host) addresses and so on. In fact the smallest usable subnetwork consists of 4 IP numbers:-

- Two usable IP interface numbers - one for the router interface on that network and one for the single host on that network.
- One network number.
- One broadcast address.

Quite why one would want to create such a small network is another question! With only a single host on the network, any network communication must go out to another network. However, the example does serve to show the law of diminishing returns that applies to sub-networking.

Calculating the subnetwork mask and network numbers

The network mask is what performs all the **local** magic of dividing an IP network into subnetworks.
The network mask for an un-sub-networked IP network number is simply a dotted quad which has all the 'network bits' of the network number set to '1' and all the host bits set to '0'.
So, for the three classes of IP networks, the standard network masks are:-

- Class A (8 network bits) : 255.0.0.0
- Class B (16 network bits): 255.255.0.0
- Class C (24 network bits): 255.255.255.0

The way sub-networking operates is to *borrow* one or more of the available host bits and make then make interfaces **locally** interpret these borrowed bits as part of the network bits. So to divide a network number into two subnetworks, we would borrow one host bit by setting the appropriate bit in the network mask of the first (normal) host bit to '1'.
For a C Class address, this would result in a netmask of
11111111.11111111.11111111.10000000

Not all sizes of prefix announcement may be routable on the public Internet: see routing, peering.

The table below provides typical mask examples for a quick reference.

Note that in common usage, the "host all zeroes" address is reserved for referring to the whole network, while the "host all ones" address is reserved as a broadcast address; this reduces the number of hosts available by 2, explaining the reference to /31 as "Useless Network".

Sub Network Masks Quick reference Table

CLASS 'A' Networks (address range 0 – 126) EG Subnet ID 10.0.0.0					
CIDR	Net Mask	Sub Net	Hosts	Range	Broadcast
/8	255.0.0.0	16777216	16777214	10.0.0.0 - 10.255.255.255	10..255.255.255
/9	255.128.0.0	838608	838606	10.0.0.0 - 10.127.255.255	10.127.255.255
/10	255.192.0.0	4194304	4194302	10.0.0.0 - 10.63.255.255	10.63.255.255
/11	255.224.0.0.	2097152	2097150	10.0.0.0 - 10.31.255.255	10.31.255.255
/12	255.240.0.0.	1048576	1048574	10.0.0.0 - 10.15.255.255	10.15.255.255
/13	255.248.0.0.	524288	524286	10.0.0.0 - 10.7.255.255	10.7.255.255
/14	255.252.0.0.	262144	262142	10.0.0.0 - 10.3.255.255	10.3.255.255
/15	255.254.0.0.	131072	131070	10.0.0.0 - 10.1.255.255	10.1.255.255

CLASS 'B' Networks (address range 128 – 191) E.g Subnet ID 128.16.0.0					
CIDR	Net Mask	Sub Net	Hosts	Range	Broadcast
/16	255.255.0.0.	1	65534	128.16.0.1 - 128.16.255.254	128.16.255.255
/17	255.255.128.0.	2	32766	128.16.0.1 - 128.16.127.254	128.16.127.255
/18	255.255.192.0	4	16382	128.16.0.1 - 128.16.63.254	128.16.63.255
/19	255.255.224.0	8	8190	128.16.0.1 - 128.16.31.254	128.16.31.255
/20	255.255.240.0	16	4094	128.16.0.1 - 128.16.15.254	128.16.15.255
/21	255.255.248.0	32	2046	128.16.0.1 - 128.16.7.254	128.16.7.255
/22	255.255.252.0	64	1022	128.16.0.1 - 128.16.3.254	128.16.3.255
/23	255.255.254.0	128	510	128.16.0.1 - 128.16.1.254	128.16.1.255

CLASS 'C' Networks (address range 192 – 223) E.g Subnet ID 192.168.0.0					
CIDR	Net Mask	Sub Net	Hosts	Range	Broadcast
/24	255.255.255.0	256	254	192.168.0.1 - 192.168.0.254	192.168.0.255
/25	255.255.255.128	128	126	192.168.0.1 - 192.168.0.126	192.168.0.127
/26	255.255.255.192	64	62	192.168.0.1 - 192.168.0.62	192.168.0.63
/27	255.255.255.224	32	30	192.168.0.1 - 192.168.0.30	192.168.0.31
/28	255.255.255.240	1**6**	14	192.168.0.1 - 192.168.0.14	192.168.0.15
/29	255.255.255.248	8	6	192.168.0.1 - 192.168.0.6	192.168.0.7
/30	255.255.255.252	4	2	192.168.0.1 - 192.168.0.2	192.168.0.3
/31	255.255.255.254	2	2	192.168.0.0 - 192.168.0.1	NB
/32	255.255.255.255	1	1	192.168.0.0 - 192.168.0.0	NB

/30 and /31 are known as Glue Networks' (Point to point links) 'Useless Network proposed for point to point links RFC 3021