TELCOLINK DESKTOP

SA-DT-TELCOLINK-XXX xDSL TRANSMISSION SYSTEMS

USER MANUAL

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FIGURES

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1 Version Control

User Manual Version	*Date*	*Software Version*	*Major changes to previous version*
2.0	01.02.2006	3.0.V4.N.x	Initial Version
2.1	05.01.2007	3.0.V4.N.5	Modified unit Versions
2.2	21.03.2007	3.0.V4.N.5	Modified Chapter 3.2.6, 3.3.1, 7.2.9.9 Modified commands
2.3	30.07.2007	3.0.V4.N.7	Modified Chapter 7.2.9.24 Pinning Description E1 Connector

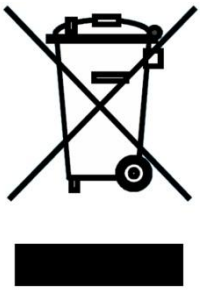
Warnings

INCORRECT USE OF THIS DEVICE, USE IN ANY OTHER ENVIRONMENT AND/OR CHASSIS/HOUSING THAN PROVIDED BY S-ACCESS MIGHT LEAD TO HARMFUL CONDITIONS. FAILURE TO FOLLOW THESE PRECAUTIONS MAY RESULT IN DEATH, SEVERE INJURY OR PROPERTY DAMAGE.

S-ACCESS GmbH REFUSES TO TAKE ANY RESPONSIBILITY, FURTHERMORE, NO WARRANTY IS GRANTED IN SUCH CASE!

Please read this manual carefully before operating the system.
Installation of this equipment has to be done by qualified personnel only.

EU Directive 2002/96/EC and EN50419



This equipment is marked with the above recycling symbol. It means that at the end of the life of the equipment you must dispose of it separately at an appropriate collection point and not place it in the normal domestic unsorted waste stream. (European Union only)

2 Selection Guide

DESKTOP (TELCOLINK), E1 / Nx64

	2 wire (2,3Mb)	4 wire (4,6 Mb)	1 E1	Nx64/RS232	Multi-Service	Point to Point	Point to Multipoint	48V-DC	Remotely powerable	Remote Power source	VT100 Management	Telnet Management
SA-DT-TELCOLINK-E1	■		■			■		■	■		■	■
SA-DT-TELCOLINK-Nx64	■			■		■		■	■		■	■
SA-DT-TELCOLINK-E1/Nx64	■		■	■	■	■		■	■		■	■
SA-DT-TELCOLINK-E1/Nx64-MP	■	■	■	■	■	■	■	■	■		■	■

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3 Panel Description

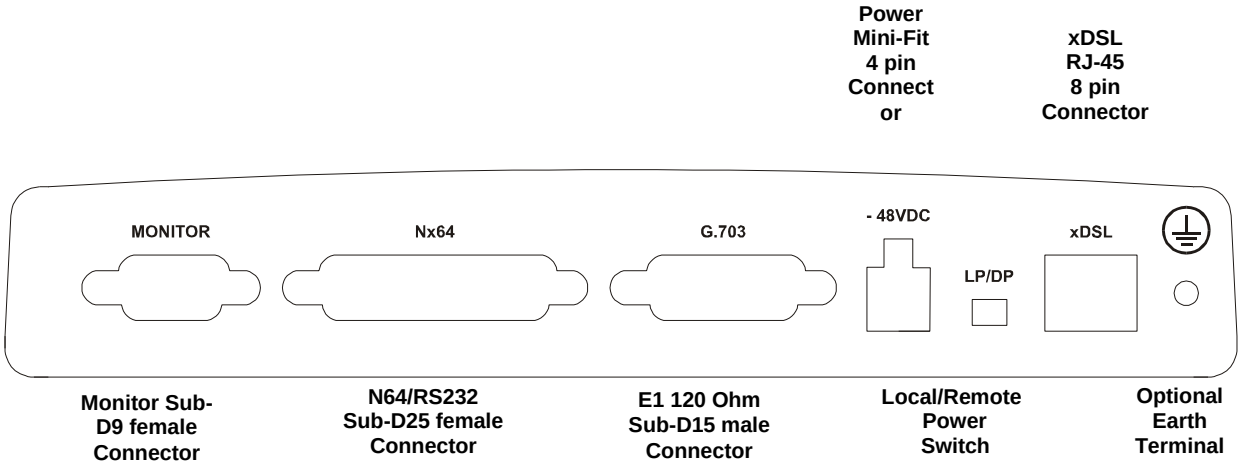

Figure 3-1: Rear Panel

Figure 3-2: Tabletop Front View

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4 Configuration Options

The following sections describe the various configuration options. The operating modes for the NTU are configurable via the V.24 monitor interface on the rear panel as well as from remote LTU (or NTU) via DSL in case of establishing of the link. The unit has to be configured for local or remote power switch, placed on the rear panel.

xDSL

The following two configuration options refer to the xDSL side only and do not affect the E1 and Nx64/RS232 interface operating mode.

4.1 Master / Slave

To start up an xDSL link, one system unit must be configured as master and the other one as slave, as the link start-up procedure is controlled by the slave. If both system units are configured as master or both as slave, no start-up will occur.
Normally, the LTU is configured as master (default setting). In addition, it is also possible to set up an xDSL link with two NTUs, given that one is configured as master and the other one as slave.
The "Master / Slave" option also affects the EOC related functions. Generally, the master-slave rights are:

- The master unit has local access as well as access to the slave unit. The master / slave, G.992.1 Annex, Autorestart configuration and some other settings cannot be altered by the master unit over the xDSL link for safety reasons (thus, default configuration cannot load remotely, see chapter 7 for details).

LTUs are always delivered as *master* (factory setting).
NTUs are always delivered as *slave* (factory setting).

The slave unit has the far end LED always off, whereas the master unit has it always on.

4.2 Normal / Dual pair / Multipoint mode

Units with two xDSL interfaces can operate in 2-wire (Normal) or 4-wire (Dual Pair) mode according to ITU-T G.992.1. To start up an xDSL link, both system units must be set to the same mode. Rate adaptation does not supported in Dual Pair Mode, so in this mode both system units must be set to the same base rate.

In Multipoint mode E1 data is multiplexed to two xDSL interfaces. First n channel time slot is transmitted through xDSL interface A, while other m channel slots – via xDSL interface B. There are two sub-modes: PCM30, when TS16 is processed as signaling slot, and PCM31, when TS16 is considered as channel slot. Multipoint mode is possible for Master only.

4.3 Fixed rate / Adaptive setting

In Normal and Multipoint modes Master can operate either in fixed rate mode (the link will be established according to Baserate setting if xDSL line conditions allow it) or in rate adaptation mode (line rate will be selected automatically due to line conditions). In Normal mode Slave is always in adaptive mode, thus link will be established according to Master settings.
Rate adaptation is not supported in Dual Pair Mode, so in this mode both system units must be set to the same base rate.

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4.4 E1-Interface (2 Mbit/s G.703 / G.704)

The following configuration options refer to the E1 side only and do not affect the xDSL operating mode.

4.5 Framing

Transparent Mode

In the transparent mode, the E1 data will be transmitted without any changes, whereas in the framed mode the frame / multiframe alignment words and eventually the CRC4 bits are searched for by the E1 framer.
The “CRC4” option is not relevant in the transparent mode.
Transparent mode is not supported in Multiservice and Multipoint modes.

Framed Mode ITU-T G.704

In the framed mode (framing according to ITU-T Rec. G.704), the incoming E1 data stream passes through an E1 framer before entering the xDSL section. On the other side, the E1 data stream received from the xDSL section first passes through the E1 framer before being transmitted to the E1 network.
The E1 framer operates in the CCS mode. Time slot 16 is fully transparent (except Multipoint PCM30 mode).
Consider the “CRC4” option when operating in the framed mode.

4.6 CRC4 Option

If operating in the framed mode, the “CRC4” option can be used to adapt the LTU to specific E1 network requirements:

- If enabled:
  - the E1 framer will synchronize on CRC4 multiframes and CRC4 errors (detected in the incoming stream) will be reported;
  - the E1 framer regenerates the CRC4 multiframe alignment and checksum words in the outgoing E1 signal. The A-Bit is set to 0 and the national bits (Sa-Bits) fully transparent (except Multipoint mode).
- If disabled, the E1 framer will synchronize on basic frames only and no CRC4 errors will be reported. Time slot 0 is fully transparent, i.e. the A-Bit and all national bits (Sa-Bits) are fully transparent (except Multipoint mode).

4.7 E-bit Insertion

If operating in the framed mode and “CRC4” option is enabled, the “EBIT” option can be used to adapt the LTU to specific E1 network requirements:

- If the automatic E-Bit generation is enabled, detected CRC4 errors will cause the assertion of the E-bits.
- If disabled, all the E-Bits are set to ‘1’.

The E-bit insertion option is not relevant in transparent mode or if “CRC4” is disabled.

4.8 AIS Generation

If this option is enabled, an unframed AIS (all 1's) will be transmitted on the E1 side, irrespective of whether the system is configured in the transparent or framed mode. AIS generation will be activated on the following conditions:

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- xDSL link to the remote station is not established (loss of signal or loss of frame alignment on xDSL side) or
- remote station is sending AIS or
- AIS-R alarm is active.

If "AIS Generation" is disabled, no signal will be transmitted on the E1 side if any of these three conditions occurs.

4.9 AIS Detection

If "AIS Detection" is enabled, receiving AIS from the E1 side will cause the following actions:

- The Non-Urgent alarm will be set active (AIS-S).
- AIS will be transmitted to the remote station by AIS-R.

4.10 Transmission of TS16

In Normal and Dual Pair Modes E1 data is loaded to xDSL according ITU-T G.991.2. In these modes TS0 of E1 is mapped to TS0 of xDSL, TS1 to TS1 and etc.

To activate the signaling over TS16 the unit has to be set to the PCM 30 mode. If the unit has less TS than 16, the last TS is used for signaling if the PCM 30 mode is activated.

4.11 E1 synchronization modes

Clocking structure

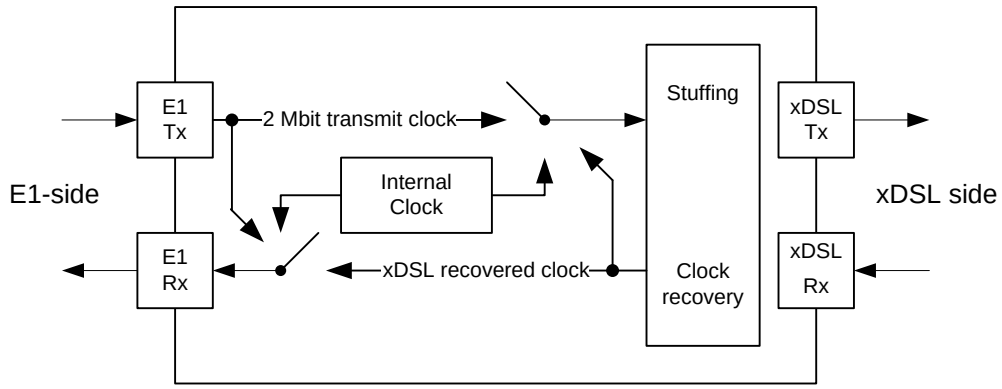

Figure 4-1: Synchronous Operation

The primary TX clock source for module with E1 interface is:

For Master:
E1 2 Mbit transmit clock or internal clock (in case of E1 signal loss).
For Slave:
E1 2 Mbit transmit clock (if plesiochronous mode is used ("PLL" option at slave side is on)) or Internal clock (in case of E1 signal loss);
xDSL recovered clock (if synchronous mode is used ("PLL" option at slave side is off)).

The primary RX clock source for module with E1 interface is:

For Master:
E1 2 Mbit transmit clock (if synchronous mode is used (“PLL” option at master side is off)) or Internal clock (in case of E1 signal loss);
xDSL recovered clock (if plesiochronous mode is used (“PLL” option at master side is on)) or Internal clock (in case of xDSL signal loss).
For Slave:
xDSL recovered clock or internal clock (in case of xDSL signal loss).

The clock sources are automatically switched by the microcontroller, depending on the actual signal and clock status, which is updated every 100 ms.

Synchronous and plesiochronous operation

Both synchronous and plesiochronous operation modes are possible.
Synchronous operation occurs, when the E1 equipment at one end of the xDSL link uses the receive clock as transmit clock, as shown below. In this case “PLL” option must be switched off on both master and slave sides.

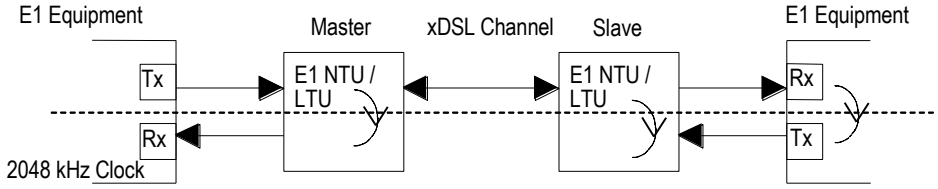

Figure 4-1: Synchronous Operation

Plesiochronous operation occurs, when the E1 equipment at both ends of the xDSL link has its own clock generator, as shown below. In this case “PLL” option must be switched on both master and slave sides.

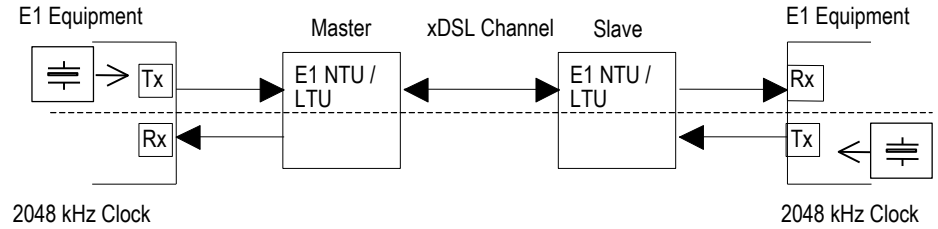

Figure 4-2: Plesiochronous Operation

Warning: Do not configure the E1 interfaces at both ends to use the receive clock as transmit clock except if one xDSL equipment is an LTU using the "External Clock" option. Otherwise there will be no defined clock.

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Nx64/RS232 Interface (DCE)

The following configuration options refer to the Nx64/RS232 (V.35/V.11/V.28/RS232 – SW configurable) side only and do not affect the xDSL operating mode.

4.12 Nx64/RS232 Services

One can choose between three available services:

E1 only: With this service mode, the Nx64 interface is shut down. No payload data is transferred to/from Nx64 transceiver.

Nx64 only: With this service mode, the E1 transceiver is shut down or is sending AIS. No payload data is transferred to/from E1 transceiver.

Multiservice Nx64 & E1: With this service mode, the available xDSL payload is divided into Nx64 (or RS232) payload and E1 payload. The Nx64 payload always starts at timeslot 1 upwards, skipping timeslot 16 up to timeslot 31, then using timeslot 16 and at last timeslot 0. The E1 payload follows after the last used Nx64 timeslot. The RS232 payload starts at timeslot that is defined by "RS232SLOT" command. For data rates from 110 to 38400 kbps RS232 payload occupies one timeslot. For data rates 57600 and 115200 kbps RS232 payload occupies 2 and 3 timeslots accordingly.

4.13 Nx64/RS232 Interface Types

The following interface types/data rates are supported (SW configurable):

- V.35 / 64…2048 kbps;
- V.11 (V.36 or X.21, cable selectable) without termination / 64…2048 kbps;
- V.11 (V.36 or X.21, cable selectable) with termination / 64…2048 kbps;
- V.28 (synchronous) / 64 and128 kbps;
- RS232 (asynchronous) / 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 kbps.

4.14 Nx64 Clock Directions (V.35, V.11 and V.28 only)

There are two options available:

- codirectional: Transmit clock and transmit data have same directions, i.e. both are inputs to the modem at signal number 113 (clock) and 103 (data).
- contradirectional: Transmit clock and transmit data have opposite directions, i.e. transmit clock is output from modem at signal number 114 and transmit data is input to the modem at signal number 103.

4.15 Nx64 Clock Modes (V.35, V.11 and V.28 only)

The following table shows different combinations of clock modes, some of which are invalid. There are three possible DCE clock modes:

- from E1: This clock mode is active when the E1 interface is active.
- external: In this clock mode, the DCE is clock slave and has its PLL on the transmit side (from Nx64 to the xDSL interface) on.
- Internal: In this clock mode, the DCE is clock master and the PLL is off, generating a 2048 kHz clock from the internal oscillator directly.

Service	DTE Clock Mode	DCE Clock Mode	DCE Clock Direction	xDSL Clock Mode
Nx64 only	Slave	internal	don't care	Master
	~~Slave~~	~~external~~	~~don't care~~	~~Slave~~
	Master	external	codirectional	Slave
	~~Master don't care~~	~~external~~	~~contradirectional~~	~~Master don't care~~
	~~Master~~	~~don't care~~	~~don't care~~	~~Master~~
Nx64 & fE1	Slave	from E1	don't care	~~Master~~
	Slave	from E1	don't care	~~Slave~~
	~~Master~~	~~don't care~~	~~don't care~~	~~don't care~~

Note: Invalid clock modes are ruled out.

4.16 Nx64 Block Diagram

The following block diagram shows the receive and transmit path separately. Each direction possesses a FIFO buffer and a PLL.

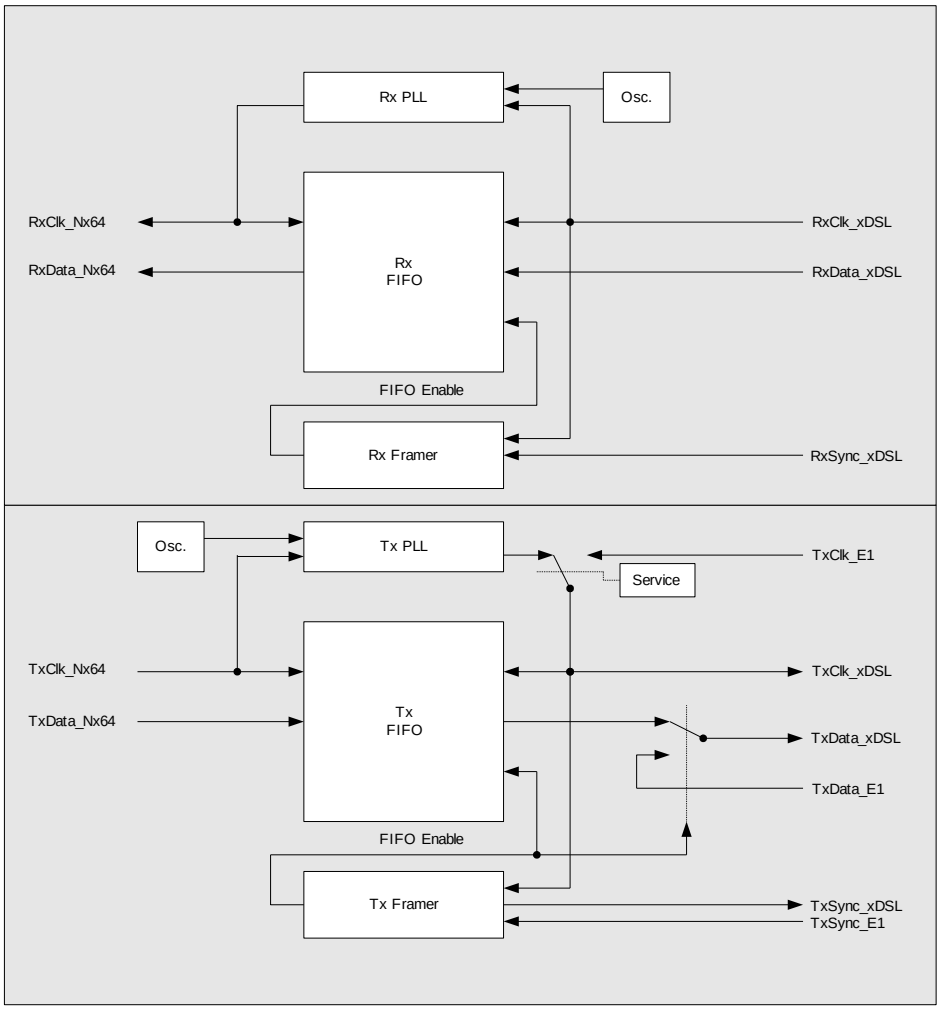
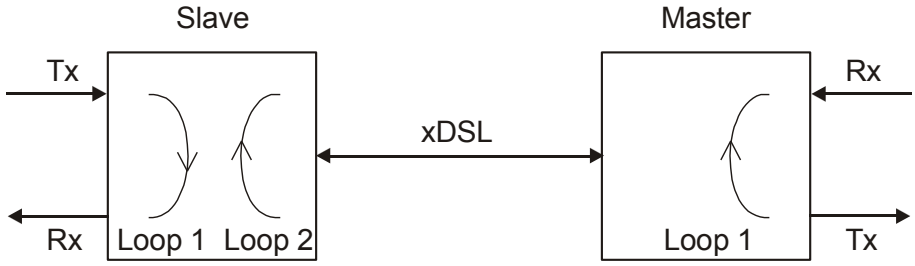


Figure 4-3: Nx64 Block Diagram

4.17 Automatic V.54 loops

System supports V.54 loops, managed by 140-142 lines. Supporting of V.54 loops is SW programmable.



	Master			Slave				
State Name	RL	LL	TI	RL	LL	TI	DSR	State Description
Normal	1	1	1	1	1	1	0	Data Transmission
Loop1 at Master Side (Setting by terminal command)	1	1	0	1	1	1	0	TX Data is looped back to RX at Nx64 Master Network Interface. LOOP1 alarm is active on Master side.
Loop2 (Setting by terminal command)	1	1	0	1	1	0	1	Data from DSL is looped back towards Master side in Slave DSP (Core loopback). LOOP2 alarm is active on Master and Slave sides.
Loop1 at Slave Side (Setting by terminal command)	1	1	1	1	1	0	0	TX Data is looped back to RX at Nx64 Slave Network Interface. LOOP1 alarm is active on Slave side.
Automatic Loop1 setting at Master side (activated by LL line on Master interface)	1	0	0	1	1	1	0	TX Data is looped back to RX at Nx64 Master Network Interface. LOOP1 alarm is active on Master side
Automatic Loop2 (activated by RL line on Master interface)	0	1	0	1	1	0	1	Data from DSL is looped back towards Master side in Slave DSP (Core loopback). LOOP2 alarm is active on Master and Slave sides.
Automatic Loop1 setting at Slave side (activated by LL line on Slave interface)	1	1	1	1	0	0	0	TX Data is looped back to RX at Nx64 Slave Network Interface. LOOP1 alarm is active on Slave side.

4.18 Test Loops

4.19 Standard Test Loops

The test loops can be activated via the monitor interface.

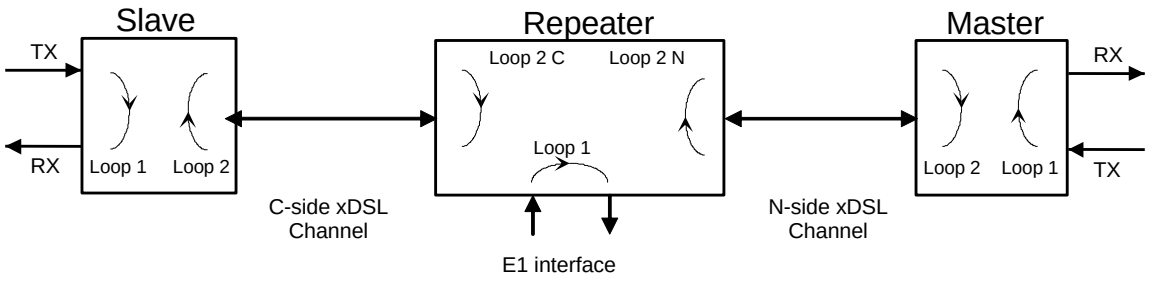


Figure 4-4: standard Test Loops

Note:

On the slave side, Loop 1 can be activated locally, Loop 2 can be activated locally or remotely by the master (LOOP2R command). Loop 1 and Loop 2 on slave can be activated from master via virtual terminal connection (see CONNECT command description).

Both the NE LED on the slave and the FE LED on the master will be lit amber when Loop2 is active on slave unit.

At the regenerator point Loop2 on N-side can be activated locally or remotely by the master (LOOP2R command). Loop 2 on C-side and Loop1 can be activated locally or remotely by the master via virtual terminal connection (see CONNECT command description and Repeater Manual).

Both the NE LED on the regenerator and the FE LED on the master will be lit amber when Loop2 is active.

On the master side, Loop 1 and Loop2 can only be activated locally. The NE LED will be lit amber when Loop 1 or 2 is active.

4.20 Analog Loop Back

To test the S-Access equipment itself, the Analog Loop Back can be used. To perform this test, the xDSL - cable has to be disconnected from the unit and the test can be activated with the appropriate monitor command (see chapter 'S-Access Monitor').

During the Analog Test Loop, the xDSL-receiver part receives the transmitted signal of its own transmitter due to the impedance mismatch in the xDSL-line transformer.

All data of the user interface is looped back according to the UIF and its settings.

An Analog Loop Back causes a non-urgent alarm.

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5 Performance Monitoring

The transmission performance of an xDSL link can be monitored in two different ways. The xDSL signal quality is typically used during installation and maintenance procedures, whereas the G.826 error performance parameters are intended to be used for long-term evaluation of operating xDSL links. Refer also to the “SQ” and “G826” monitor commands described in the “S-Access Monitor” section.

5.1 G.826 Performance Monitoring

The G.826 error performance parameters provide *quantitative* performance information of a specific loop. They are intended to be used for long-term evaluation of operating xDSL links.

The evaluation of the G.826 error performance parameters is based on CRC (Cyclic Redundancy Check) error detection:

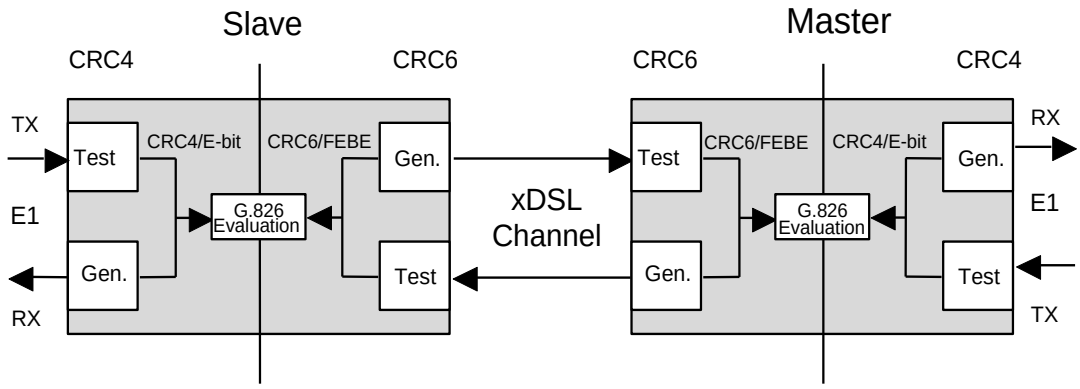

Figure 5-1: G.826 Performance Evaluation

CRC generation and detection on the LTU/NTU are handled separately for the E1 side and the xDSL side, while on the ADD-DROP Repeater CRC generation and detection are handled separately for the E1 side and both xDSL sides.

On the E1 side, four CRC4 check bits are generated per sub-multiframe (SMF) and compared with the corresponding CRC4 bits in the following SMF. If they do not match, the CRC4 error counter is incremented. The opposite station is informed of detected CRC4 errors by setting E-bits in the transmitted frames. At the same time, the E-Bits from the opposite station are counted and can be used for performance monitoring.

Similarly, on the xDSL side, six CRC6 check bits are generated per xDSL frame for each channel and direction. For signaling detected block-errors in the return direction, the FEBE-bits are used. The HDSL G.826 performance of the opposite unit is calculated according to these FEBE-bits.

CRC6 errors are used by software to count the block-errors of the respective xDSL channel and to evaluate its error performance according to ITU-T Rec. G.826.

For the E1 interface, calculations according to G.826 are only possible in the framed mode with CRC4 option enabled. In framed mode with CRC4 option disabled only FAS-errors are detected.

The estimation of a *bit-error rate* is not within the scope of the G.826 calculations.

6 Alarms

6.1 General

This chapter describes a possible implementation for the alarm signalization.

6.2 LEDs

The two NTU LEDs 'far end (FE) status' and 'near end (NE) status' are used to display normal operation condition and alarm condition. Each LED can be green, amber or red when lit according to the following table. The third LED is used for power representation.

NE LED is responsible for local status of N-side and E1 interfaces, while FE LED is responsible for local status of C-side interface.

6.3 Status LEDs (except Multipoint Mode)

Status	Local (NE) LED	Remote (FE) LED
LTU Power failure	Off	off
Hardware - / Software failure	Blinking Red	off
No EOC connection established	On	red
Normal operation local	Green	don't care
Normal operation remote	Don't care	green
xDSL framer synchronizing	Blinking Green/Amber	don't care
xDSL training	Blinking Amber	don't care
Minor alarm local	Amber	don't care
Minor alarm remote	Don't care	amber
Major alarm local	Red	don't care
Major alarm remote	Don't care	red

6.4 Status LEDs Multipoint Mode

Status	Local (NE) LED	Remote (FE) LED
Power failure	Off	off
Hardware - / Software failure	Blinking Red	off
No EOC connection established	On	red
Normal operation local	Green	don't care
Normal operation remote	Don't care	green
Minor alarm local or one channel major alarm local	Amber	don't care
Minor alarm remote or one channel major alarm remote	Don't care	amber
Both channel major alarm local	Red	don't care
Both channel major alarm remote	Don't care	red

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6.5 Local LED - Alarm Conditions

Local (NE) LED

An alarm condition is displayed with the Local LED if one of the following conditions occurs:

Major alarm (red):
- Hardware or software failure (blinking)
- loss of signal / frame alignment on the xDSL side
- xDSL block-error-rate according G.826 ≥ 30% (BER-H)
- E1 block-error-rate according G.826 ≥ 30% (BER-S)

Minor alarm (amber):
- loss of signal on the E1 side (LOS-S)
- loss of frame alignment on the E1 side (LFA-S)
- Segment defect alarm (SEGD)
- receiving AIS on E1 side (AIS-S)
- either Loop 1, Loop 2 is activated
- Analog Loopback is activated
- Spectrum Transmission activated

Displaying a major alarm has a higher priority than displaying a minor one, i.e. an amber alarm will be "overwritten" by a red alarm.

Remote (FE) LED

The remote LED is an image of the local LED of the remote station (see previous LED-table for exceptions).

Alarm Relays NTU

6.6 Implementation

The two alarm relays "Major" and "Minor" are located on the NTU board.

6.7 Relay - Alarm Conditions

Major alarm:
- At least one of the NTU LEDs displays a red alarm
- Power failure of the NTUs

Minor alarm:
- At least one of the NTU LEDs displays an amber alarm and none - a red alarm
- Power failure of the LTUs

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7 NTU Power Concept

Each NTU is fed via the power supply Molex connector on the rear panel with 48 V_{DC}. The NTU converts these voltages to its onboard supply with its DC/DC converter.

In case of a failure of the NTU's onboard power supply, all LEDs on the front-panel will be extinguished.

Units which support remote power can be powered remotely via xDSL. In case of remote powering wetting current acceptance should be switched off (remove jumpers -see figure below).

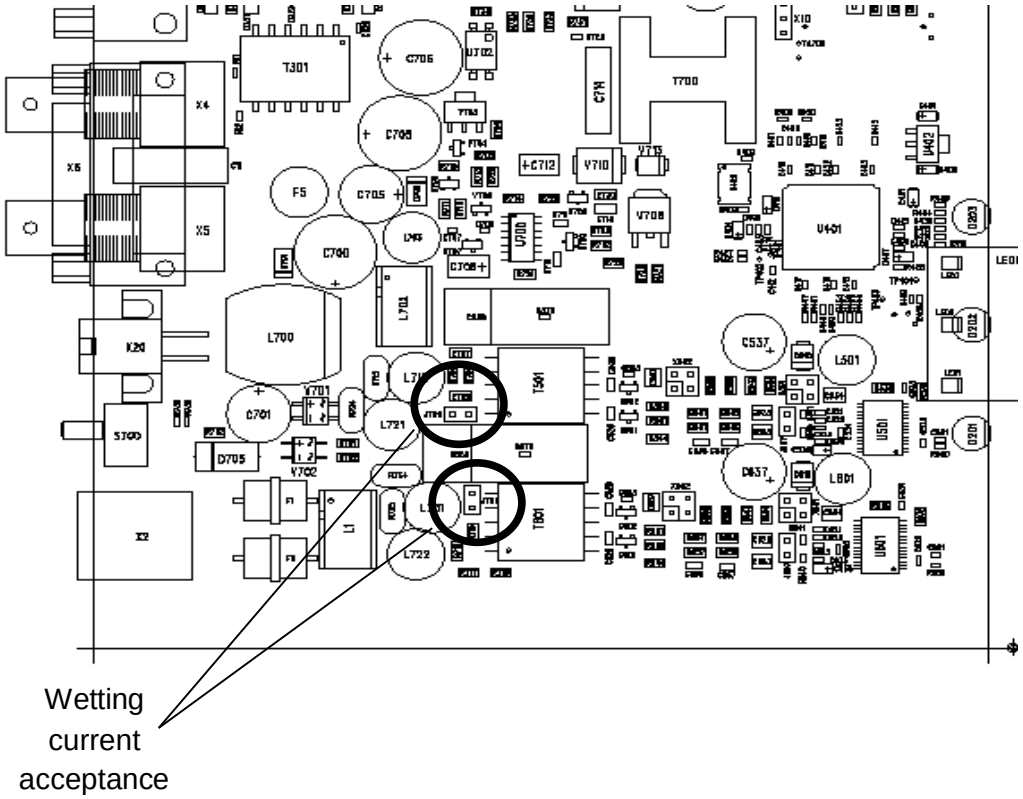

Figure 7-1: NTU Wetting current jumper locations

8 Monitor

8.1 General

The module can be connected to a terminal or a PC (with terminal emulation) in order to monitor relevant events and to display additional information such as the signal quality of the xDSL link or the G.826 error performance parameters. In addition, full system configuration and fault localization can be done over the monitor interface

The terminal for monitoring should be VT100 compatible and configured as follows:

- 9600 baud, asynchronous
- 8 bits, no parity, one stop bit
- no new line on carriage return (i.e. no line feed on carriage return)

8.2 Structure & Organization

The structure and organization of the S-Access monitor is adapted to ITU-T Recommendation M.3400 for TMNs with its five sub-sets.

Sub-set	Short-form
Performance management	PM
Fault and maintenance management	FMM
Configuration management	CM
Accounting management	AM
Security management	SM

As S-Access does not support accounting management AM is not in the monitor's main menu.

At any time, the <H> (“Help”) command shows and explains the available commands and their parameters.

The prompt on the screen consists of:

- a master/slave or repeater (CO - central office, CP - customer premise, RR - repeater) indication
- the slot-number <SN> indication or the repeater address indication
- the shortform of the specified sub-set menu.

For example: “CO_04_FMM>”.
“RR_04_FMM>”.

Note: Repeater address is calculated as repeater position (starting from CO side) in the xDSL chain plus 2. Thus the repeater nearest to CO side has address 03, second one – 04, etc.

8.3 CLI Timeout

If the CLI interface receives no valid character during 5 minutes, the unit will close the active session.

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8.4 Password protection and access rights

There are two access levels to the system: Administrator (username: ADMIN) end User (username: USER).
All the commands are available for Administrator while Configuration commands are not accessible by User.
If the administrator password is not set then entering to main menu happens without password request. In this case Administrator access rights are granted.
If Administrator password is set then system prompts for Username:

```
username :
```

and then

```
password :
```

Username field is fixed (only ADMIN and USER names are permitted).

8.5 Command set tree for Normal and Dual modes (* - Administrator access only)

Main Menu			
Performance	**Fault and Maintenance**	**Configuration**	**Security**
G826	SQ	CONFIG	PSW ADMIN*
G826 C	STARTUP*	HW	PSW USER*
G826 E1	STATUS	TSSHOW	
G826 E1 C	ALARM	G704*	
RESETG826*	ALARM T	CRC4*	
HIST*	TLM	EBIT*	
RESETHIST*	RESETTLM*	AISGEN*	
DATE*	TLMCONF*	AISDET*	
TIME*	TLMSET*	PCM*	
	LOOP1*	IDLECAS*	
	LOOP2*	IDLEPAT*	
	STARTAL*	SIGSLOT*	
	RESTART*	SERVICE*	
	SPECTRUM*	TYPE*	
	ACO*	BITRATE*	
	RESET*	CLOCKDIR*	
		AUTOLOOP*	
		SLOTUSAGE*	
		MODE*	
		MASTER*	
		PLL*	
		RS232SLOT*	
		RS232BITS*	
		RS232RATE*	
		RS232ERATE*	
		AUTORST*	
		BASERATE*	
		ADAPT*	
		SETADDR*	
		SCALE*	
		DEFAULT*	
		ANNEX*	
		ID*	
		SOM*	

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Figure 8-1: Command Set Tree (Normal/Dual Pair Modes)

8.6 Command set tree for Multipoint mode (* - Administrator access only)

Main Menu			
Performance	**Fault and Maintenance**	**Configuration**	**Security**
G826	SQ	CONFIG	PSW ADMIN*
G826 C	STARTUP*	HW	PSW USER*
G826 E1	STATUS	TSSHOW	
G826 E1 C	ALARM	CRC4*	
RESETG826*	ALARM T	EBIT*	
HIST*	TLM	AISGEN*	
RESETHIST*	RESETTLM*	AISDET*	
DATE*	TLMCONF*	PCM*	
TIME*	TLMSET*	PAYLOAD*	
	LOOP1*	IDLECAS*	
	LOOP2*	IDLEPAT*	
	STARTAL*	SIGSLOT*	
	RESTART*	MODE*	
	SPECTRUM*	PLL*	
	ACO*	AUTORST*	
	RESET*	BASERATE*	
		ADAPT*	
		SETADDR*	
		SCALE*	
		DEFAULT*	
		ANNEX*	
		ID*	
		SOM*	

Figure 8-2: Command Set Tree Multipoint Mode

8.7 Main Menu

```
MODEL          SA-PAM-SAN-E1B/N64-MP,V34
HW             D0
SW             3.0.V4.N.5 / R308_2
SW-DATE        Nov 09 2006
ID
RUNS           0000d 00:01:03
ALARM          URGENT
STATUS         LINK DOWN
MODEL-DESC.    S-Access Tabletop Dual E1 / Nx64 120 Ohm

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------------- Main Menu -----------------
1. Performance management (PM)
2. Fault and maintenance management (FMM)
3. Configuration management (CM)
4. Security management (SM)

6. Exit
-----------------------------------------

CP_MM>Select [1..6]:
```

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To select the sub-menus type 1 to 6.

Note: Each command must be terminated by a carriage return.

Dual Channel SYNTAX

If a Dual channel unit works in multipoint mode and the parameter can be entered for channel A or B the command syntax can vary. Please use the H command to check the right syntax.

Example:
Normal mode: BASERATE 31
Multipoint mode: BASERATE A 12

8.8 Common Commands

Common commands are available in every sub menu.

HELP Command

By typing the letter "H" followed by [ENTER], all available commands of the actual sub menu are displayed.

MAIN Command

By typing the letter "M" followed by [ENTER], you return to the Main Menu Screen.

CONNECT Command

SYNTAX: CONNECT [n] or CO [n]

The CONNECT command opens a virtual terminal connection to the remote unit, i.e. characters received at the local unit's V.24 interface are sent to the remote unit, and characters (screen messages) sent from the remote unit are transmitted back to the local unit's V.24 interface.
During a virtual terminal session, the local unit is not available any more, unless you close your virtual terminal connection by typing the DISCONNECT command or by selecting "Exit" on the Main Menu Screen (of the remote unit).
Some commands will be unavailable from a virtual terminal connection for safety reasons.
Add the parameter “R” to connect to the remote unit (i.e. LTU or NTU) or type the repeater number (1 to 14) instead of “R” to connect to the selected repeater (this is only possible from master side).

DISCONNECT Command

SYNTAX: DISCONNECT or DIS

The DISCONNECT command closes the virtual terminal connection to the remote unit.

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8.9 Performance management PM

```
Performance management activated
Enter <M> to return to MAIN, or <H> for HELP information
```

Type <***H***> and the monitor lists all available commands in the performance sub-menu.

G826 Command

SYNTAX: G826 or G

The G826 command displays the ITU-T G.826 error performance on xDSL line side:

```
CO_01_PM> G826
G.826 Error Performance  :   CRC6-A    CRC6-B
Errored blocks           :  00000000  00000000
Errored seconds          :  00000000  00000000
Severely errored seconds :  00000000  00000000
Background block errors  :  00000000  00000000
Available time           :  00624483  00624483
Unavailable time         :  00000024  00000024
CP_PM>
```

Option:

C Updates the G.826 parameters continuously

Definitions:

1. CRC6-A: Cyclic redundancy check indicating errored blocks received on the local xDSL side.
2. CRC6-B: Far end block error indicating errored blocks received on the remote xDSL side.
3. Errored block (EB): A block in which one or more bits are in error.
4. Errored seconds (ES): A one second period with one or more errored blocks. SES defined below is a subset of ES.
5. Severely errored second (SES): A one second period which contains >=30% errored blocks.
6. Background block error (BBE): An errored block not occurring as part of an SES.

Note: In Multipoint and Dual Pair modes represent data for both xDSL interfaces.

G826 E1 Command

SYNTAX: G826 E1 or G E1

The G826 E1 command displays the ITU-T G.826 error performance parameters on the E1 2Mbit/s side. This command is only available if framed mode is enabled.
If CRC4 mode is on, the following parameters are displayed:

```
CP_PM>G826 E1
-------------------------------------------------------------------
G.826 Error Performance  :    CRC4      E-Bit
-------------------------------------------------------------------
Errored blocks           :  00000000  00000000
Errored seconds          :  00000000  00000000
Severely errored seconds :  00000000  00000000
Background block errors  :  00000000  00000000
Available time           :  00000000  00000000
Unavailable time         :  00000135  00000135
-------------------------------------------------------------------
```

```
CP_PM>
```

If CRC4 detection mode is off, the following parameters are displayed:

```
CP_PM>G826 E1
------------------------------------------------------------------------
G.826 Error Performance  :    FAS
------------------------------------------------------------------------
Errored blocks           :  00000000
Errored seconds          :  00000000
Severely errored seconds :  00000000
Background block errors  :  00000000
Available time           :  00000000
Unavailable time         :  00000051
------------------------------------------------------------------------
CP_PM>
```

Option:

C Updates the G.826 E1 parameters continuously

Definitions:

1. CRC4: Cyclic redundancy check indicating errored sub-multiframes received on the local 2Mbit/s E1 side.
2. E-bit: CRC-4 indication bit indicating received errored sub-multiframes on the 2Mbit/s E1 remote side.
3. FAS: Errored Frame Alignment Signal received on the 2Mbit/s E1 side. The criterion for severely errored seconds (SES) is 28 FAS-Errors per second. (In accordance to G.821)

RESETG826 Command

SYNTAX: RESETG826 or RG

The RESETG826 command sets the G.826 error performance parameters back to zero.

```
CO_PM>RESETG826
G.826 error performance parameter reset
CO_PM>
```

HIST Command

SYNTAX: HIST [i] [t] or HI [i] [t]

This command displays the history data.

Parameters:
i: D for DSL interface
E for E1 interface
N for Nx64 interface
ETH for Ethernet interface
t: A for
7 for the last 7 days
24 for the last 24 hours

For the Nx64 interface only the alarm history is available.

RESETHIST Command

SYNTAX: RESETHIST or RH

This command clears the history data.

DATE Command

SYNTAX: DATE [date] or DA [date]

Without parameters this command displays current date.
With parameters this command sets the date.

FORMAT: DD/MM/YYYY

TIME Command

SYNTAX: TIME [time] or TI [time]

Without parameters this command displays the current time.
With parameters this command sets the running time.

FORMAT: HH:MM:SS

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8.10 Fault and maintenance management FMM

Fault and maintenance management activated
Enter <M> to return to MAIN, or <H> for HELP information

Type <H>and the monitor lists all available commands in the fault and maintenance sub-menu.

SQ Command

The SQ command allows the user to toggle the signal quality trace on and off:

CO_01_FMM> SQ
signal quality trace on
xDSL SNR: local 38.8 dB, remote 39.0 dB
xDSL SNR: local 41.3 dB, remote 38.8 dB
xDSL SNR: local 38.6 dB, remote 39.0 dB

CO_01_FMM> SQ
signal quality trace off
CO_01_FMM>
Note: Units in Multipoint and Dual Pair modes represent data for both xDSL interfaces.

STARTUP Command

SYNTAX: STARTUP or SUP

The STARTUP command allows the user to toggle the startup trace on and off, in order to observe the LTU / NTU activation state diagram transitions conforming to ITU-T G.991.2.

CO_FMM> STARTUP
xDSL transceiver startup trace on
CO_FMM>
CO_FMM> STARTUP
xDSL transceiver startup trace off
CO_FMM>

Note: Units in Multipoint and Dual Pair modes represent data for both xDSL interfaces.

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STATUS Command

SYNTAX: STATUS or ST

The STATUS command displays the actual system status:

```
CO_FMM>STATUS
---------------------------------------------------------------------
Local System Status
---------------------------------------------------------------------
LOSD     :    1
SEGA     :    1
PS       :    1
SEGD     :    1
Tx power  :  07.5 dBm
Rx gain   :  07.3 dB
Loop attn.:  00.2 dB
SNR       :  35.8 dB
Bitrate   :  0648 kbit/s
SRU #     :    1
ANNEX     :    A
---------------------------------------------------------------------
CO_FMM>
```

Definitions:

LOSD:	(Loss of Signal) Indicates the loss of signal from the application interface. Loss of Signal = 0, Normal = 1.
SEGA:	(Segment Anomaly) Indicates a CRC error on the incoming xDSL frame. A segment anomaly indicates that a regenerator operating on a segment has received corrupted data and therefore the regenerated data is unreliable. CRC Error =0, Normal = 1.
PS:	(Power Status)
SEGD:	(Segment Defect)
Tx power:	Local transmit power in dBm
Rx gain:	Local receiver gain in dB
Loop attn.:	Estimate of the loop attenuation in dB of the actual connection
SNR:	SNR is the ratio of constellation power to equalizer error power
Bitrate:	Bitrate of the actual connection
SRU #:	Number of detected repeater in loop
ANNEX	ITU-T Rec. G.991.2 ANNEX

Note: Units in Multipoint and Dual Pair modes represent data for both xDSL interfaces.

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ALARM Command

SYNTAX: ALARM or AL

The ALARM command displays the actual alarm status:

```
CO_01_FMM> ALARM
------------------------------------------------------------------------
Local Alarm Status
------------------------------------------------------------------------
LOS-S     : off
LFA-S     : off
AIS-S     : off
AIS-R     : off
BER-S     : off
DTR-OFF   : off
LOS/LFA-H : off
SEGD      : off
BER-H     : off
LOOP1_E1  : off
LOOP1_Nx64: off
LOOP2     : off
ALB       : off
TEST      : off
------------------------------------------------------------------------
CO_01_FMM>
```

Options:

T Turns alarm trace on / off

Definitions:

LOS-S:	Loss of signal at subscriber (E1) side
LFA-S:	Loss of frame alignment at subscriber (E1) side
AIS-S:	AIS (Alarm Indication Signal) detected at subscriber (E1) side
AIS-R:	AIS (Alarm Indication Signal) detected at subscriber (E1) side of remote unit
BER-S:	Excessive Block Error Rate on subscriber side If CRC4 enabled : BER-S = on if more than 805 CRC4 Errors per second. If CRC4 disabled : BER-S = on if more than 28 FAS Errors per second.
DTR-OFF:	V.35/V.36: DTR input is off X.21: RTS input is off
LOS/LFA-H:	Loss of signal or frame alignment at xDSL loop
SEGD:	Segment Defect indication
BER-H:	xDSL block-error-rate according G.826 ≥ 30%
LOOP1_E1:	xDSL test loop 1 active (see section)
LOOP1_Nx64:	xDSL test loop 1 active (see section)
LOOP2:	xDSL test loop 2 active
ALB:	Analog loopback
TEST:	At least one test function is active

Note: Units in Multipoint and Dual Pair modes represent data for both xDSL interfaces.

TLM Command

SYNTAX: TLM or T

This command displays table of repeaters' external alarm inputs.

```
CO_FMM>TLM
Distance Ext. Alarm Status
---------------------------
REPTR | ALM1 | ALM2 | ALM3 |
---------------------------
REPT 1| off  | det  |  on  |
REPT 2|  -   |  -   |  -   |
REPT 3|  -   |  -   |  -   |
REPT 4|  -   |  -   |  -   |
REPT 5|  -   |  -   |  -   |
REPT 6|  -   |  -   |  -   |
REPT 7|  -   |  -   |  -   |
REPT 8|  -   |  -   |  -   |
REPT 9|  -   |  -   |  -   |
REPT10|  -   |  -   |  -   |
REPT11|  -   |  -   |  -   |
REPT12|  -   |  -   |  -   |
REPT13|  -   |  -   |  -   |
REPT14|  -   |  -   |  -   |
---------------------------
CO_FMM>
```

Definitions:
Off – no external alarm detected
On – external alarm is active
Det – external alarm have been detected since last clearing of external alarm table

RESETTLM Command
SYNTAX: RESETTLM or RT

This command clears the external alarm table.
TLMCONF Command
SYNTAX: TLMCONF or TC
This command displays the external alarm config table.

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TLMSET Command

SYNTAX: TLMSET [Rn-k] [abc] or TS [Rn-k] [abc]

This command sets the external alarm configuration.

Definitions:

- ignore
RES represents external alarm status in the external alarm table
MIN represents external alarm status in the external alarm table and consider as Minor alarm
MAJ represents external alarm status in the external alarm table and consider as Major alarm

```
CO_FMM>TLMSET R02-R03 321
Reactions table for distance ext. alarms
----------------------------
REPTR | ALM1 | ALM2 | ALM3 |
----------------------------
REPT 1| RES  | MIN  | MAJ  |
REPT 2| MAJ  | MIN  | RES  |
REPT 3| MAJ  | MIN  | RES  |
REPT 4|  -   |  -   |  -   |
REPT 5|  -   |  -   |  -   |
REPT 6|  -   |  -   |  -   |
REPT 7|  -   |  -   |  -   |
REPT 8|  -   |  -   |  -   |
REPT 9|  -   |  -   |  -   |
REPT10|  -   |  -   |  -   |
REPT11|  -   |  -   |  -   |
REPT12|  -   |  -   |  -   |
REPT13|  -   |  -   |  -   |
REPT14|  -   |  -   |  -   |
----------------------------
CO_FMM>
```

Definitions:

Rnn exact repeater position (adjust configuration for one repeater) or
Rnn-Rkk repeaters position range (adjust configuration for some repeaters)

Last 3 symbols define configuration of 3 alarm inputs of the repeater(-s):
0 ignore
1 represents external alarm status in the external alarm table
2 represents external alarm status in the external alarm table and consider as Minor alarm
3 represents external alarm status in the external alarm table and consider as Major alarm

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LOOP1 Command

SYNTAX: LOOP1 [E/N] [ON/OFF] or L1 [E/N] [ON/OFF]

The LOOP1 command starts the local loopback (see section 4.19: Standard Test Loops):

CO_FMM>LOOP1 E ON
Loop 1 on E1 interface on
CO_FMM>

CO_01_FMM> LOOP1 OFF
Loop 1 off
CO_01_FMM>

LOOP2 Command

SYNTAX: LOOP2 [n] [ON/OFF] or L2 [n] [ON/OFF]

The LOOP2 command starts the local loopback toward xDSL (see section 4.19: Standard Test Loops):

CO_FMM>LOOP2 R ON
Remote loop activation started
Remote loop on
CO_FMM>

Parameters:
n: L local unit
1..14 repeater number
R remote unit

Note: In Multipoint mode LOOP2 command has additional parameter which assign necessary xDSL interface.

STARTAL Command

SYNTAX: STARTAL or SAL

The STARTAL command starts the analog loopback:

CO_FMM>STARTAL
Analog loopback started
CO_FMM>
CO_FMM>STARTAL
Analog loopback stopped
CO_FMM>

Notes:
Detach the xDSL line before starting the analog loopback. If the analog loopback is started while a remote station is attached to the xDSL line, the remote station signal will interfere with the loopback signal, causing bit errors on the network interface.
Note: In Multipoint mode and for Repeater STARTAL command has a parameter which assign necessary xDSL interface.

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RESTART Command

SYNTAX: RESTART or RE

By typing RESTART, the actual channel will be restarted.

CO_01_FMM> RESTART
Restarting channel
CO_01_FMM>
Note: In Multipoint mode and for Repeater RESTART command has a parameter which assign necessary xDSL interface.

SPECTRUM Command

SYNTAX: SPECTRUM or SP

The SPECTRUM command initializes the xDSL analog output for power measurements.

CO_FMM>SPECTRUM
Analog spectrum started
CO_FMM>SPECTRUM
Analog spectrum stopped
CO_FMM>
Note: In Multipoint mode and for Repeater SPECTRUM command has a parameter which assign necessary xDSL interface.
ACO command
SYNTAX: ACO [ON/OFF]

This command blocks/unblocks alarm relays.

CO_FMM>ACO ON
ACO is ON
CO_FMM>ACO OFF
ACO is OFF

RESET Command

SYNTAX: RESET or RST

By typing RESET, the system unit will be restarted.

CO_01_FMM> RESET
System reset

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8.11 Configuration management CM

Configuration management activated
Enter <M> to return to MAIN, or <H> for HELP information

Type <***H***> and the monitor lists all available commands in the configuration sub-menu.

CONFIG Command

SYNTAX: CONFIG or C

The CONFIG command displays the configuration of the unit.
Note: After each configuration change, the new configuration is automatically displayed.

HW Command

SYNTAX: HW

Displays actual hardware configuration.

TSSHOW Command

SYNTAX: TSSHOW [A/E/N] or TSS [A/E/N]

This command displays the actual time slots relation for the selected interface.

Parameters:
A relation for DSL A interface;
E relation for E1 interface;
N relation for Nx64 interface.
G704 Command
SYNTAX: G704 [ON/OFF]

Set framed mode / transparent mode.
Note: This command is not supported in Multipoint mode.

CRC4 Command

SYNTAX: CRC4 [ON/OFF] or C4 [ON/OFF]

Set CRC4 processing on / off

EBIT Command

SYNTAX: EBIT [ON/OFF] or E [ON/OFF]

Set automatic E-Bit insertion on / off

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AISGEN Command

SYNTAX: AISGEN [ON/OFF] or AG [ON/OFF]

Set AIS generation on / off

AISDET Command

SYNTAX: AISDET [ON/OFF] or AD [ON/OFF]

Set AIS detection on / off

PCM Command

SYNTAX: PCM [30/31]

This command enables/disables signaling timeslot processing:

Parameters:
30 Set signaling timeslot processing on. Signaling slot is transmitted transparently
31 Set signaling timeslot processing off

PAYLOAD Command

SYNTAX: PAYLOAD [a] [b] or PL [a] [b]

This command sets the numbers of channel TS to be transmitted to xDSL interfaces A and B.

IDLECAS Command

SYNTAX: IDLECAS [hex] or IC [hex]

This command sets the idle pattern (1..F) for the signaling TS.
IDLEPAT Command
SYNTAX: IDLEPAT [hex] or IDP [hex]

This command sets the idle pattern (0..FF) for unused data slot(s).

SIGSLOTS Command

SYNTAX: SIGSLOTS [AUTO/a,e] or SS [AUTO/a,e]]

This command sets the signaling slot number of the DSL A and E1 interface.
Valid only for the PCM 30 mode.

Parameters:
AUTO: standard config (TS16 or last TS if baserate < 16)
a: 1 – 31 for DSL A
e: 1 – 31 for E1/G703

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SERVICE Command

SYNTAX: SERVICE [E/N/M] or SRV [E/N/M]

Select one of four available services:
E E1 only
N Nx64 only
M Multiservice Nx64 & fE1 (fractional E1)

TYPE Command

SYNTAX: TYPE [n] or TP [n]

This command sets the Nx64 interface type.

Parameters:
0 V.35
1 V.11 (V.36/X.21) without termination
2 V.11 (V.36/X.21) with termination
3 V.28 synchronous
4 RS232 asynchronous

BITRATE Command

SYNTAX: BITRATE [n] or BTR [n]

This command sets the Nx64 payload bit rate to [1..32] x 64 kbit/s for V.35 and V.11 or [1..2] x 64 kbit/s for V.28.

Parameters:
n: 1-31 depending on the Nx64 interface type

CLOCKDIR Command

SYNTAX: CLOCKDIR [CO/CONTRA] or CD [CO/CONTRA]

This command sets the Nx64 port clock direction to co- or contradirectional.

Parameters:

CO Codirectional uses input line 113 for input data (103) sampling
CONTRA Contradirectional uses output line 114 for input data (103) sampling

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AUTOLOOP Command

SYNTAX: AUTOLOOP [ON/OFF] or AUL [ON/OFF]

This command enables/disables the usage of lines 140/141 for the automatic V.54 loop control.

SLOTUSAGE Command

SYNTAX: SLOTUSAGE [ON/OFF] or SU [ON/OFF]

This command enables/disables the usage of timeslot 0 for the Nx64 payload when service Nx64 only is selected.

MODE Command

SYNTAX: MODE [N/D/M] or MO [N/D/M]

This command sets the operation mode.

Parameters:
N Normal mode
D Dual pair mode
M Multipoint mode
MASTER Command
SYNTAX: MASTER [ON/OFF] or MA [ON/OFF]

Set xDSL master/slave mode. One unit must be configured as master, the other as slave.

PLL Command

SYNTAX: PLL [ON/OFF

This command enables/disables the PLL on channel A of xDSL port (see section 3.2.7).

RS232SLOT Command

SYNTAX: RS232SLOT [n] or RSS [n]

This command assigns the slot [1..31] for RS232 data transmission.

RS232BITS Command

SYNTAX: RS232BITS [n] or RSB [n]

This command sets the RS232 data bits [7..10].

RS232RATE Command

SYNTAX: RS232RATE [n] or RSR [n]

This command sets the RS232 rate.

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Parameters:
N 110, 150, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600,115200

RS232ERATE Command

SYNTAX: RS232ERATE [n] or RSR [n]

This command sets the excess rate of the RS232 interface.

Parameters:
1 0 percent
2 0.5 percent
3 1 percent
4 2 percent

Note: for correct data transmission on rate 115200 via RS232 interface two stop bits must be used
AUTORST Command
SYNTAX: AUTORST [ON/OFF] or AR [ON/OFF]

This command enables/disables the restarting of the xDSL channel.

BASERATE Command

SYNTAX: BASERATE [n] or BR [n]

This command sets the base xDSL payload rate. This value must be between 3 and 32 and defines the available 64 kbit/s channels.

ADAPT Command

SYNTAX: ADAPT [ON/OFF] or ADP [ON/OFF]

This command enables/disables rate adoption during startup.

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SETADDR Command

SYNTAX: SETADDR [n] or SA [n]

This command sets the virtual modem address.

Parameters:
00 Disable "%xx" command for entering NTU (Normal Mode!!!).
01 – 99 Address 1-99
A0-A9 Address 100 -109
B0-B9 Address 110 -119
C0-C7 Address 120 -127

Note: Type ECHO and the unit will respond with the programmed address.

SCALE Command

SYNTAX: SCALE [A/B] [n] or SC [A/B] [n]

This command sets output TX power offset from ITU-T value in dBm.

Parameters:
0.0 highly recommended standard operation
-16.0..2.0 with 0.5 increment steps

ANNEX Command

SYNTAX: ANNEX [A/B] [A/B/AB] or AN [A/B] [A/B/AB]

Set desired ITU-T Rec. G.991.2 Annex type
Parameters:
A Annex A
B Annex B
AB Annex A_B (auto detect annex type).
ID Command
SYNTAX: ID [text]

This command sets a unique identification string printed on the main screen.

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SOME Command

SYNTAX: SOM [type]

Parameters:
<no> Show available Operation & Monitoring System
type: Monitoring System type 0-none
1-M2M

DEFAULT Command
SYNTAX: DEFAULT [n] or DF [n]

This command sets default configuration. There are two default configurations for multipoint mode (n=0..1) and six for all other modes (n=0..5).

8.11.1.1.1 Factory Default command

```
CO_CM>DEFAULT F
------------------------------------------------------------------------
Local Configuration
------------------------------------------------------------------------
2 Mbit/s
  Framing        :  Transparent        CRC4           :  --
  E-Bit Insertion :  --                AIS Detection   :  on
  AIS Generation  :  on
xDSL
  Mode           :  Normal             Service        :  E1 only
  Master/Slave    :  Slave             PLL            :  off
  Autorestart     :  on                Base Rate      :  03-32
  Rate Adaption   :  on                Annex          :  A_B
  Power Offset    :  +00.0 dBm
------------------------------------------------------------------------
```

8.11.1.1.2 E1 only Normal or Dual Pair mode

DEFAULT	0	1	2	3	4	5
Framing	Transparent	ITU-T G.704	ITU-T G.704	Transparent	ITU-T G.704	ITU-T G.704
CRC4	--	off	on	--	off	on
E-Bit Insertion	--	--	on	--	--	on
AIS Detection	on	on	on	on	on	on
AIS Generation	on	on	on	on	on	on
Mode	*	*	*	*	*	*
Master/Slave	Master	Master	Master	Slave	Slave	Slave
PLL	off	off	off	off	off	off
Autorestart	on	on	on	on	on	on
Base Rate	32	32	32	Mrz 32	Mrz 32	Mrz 32
Rate Adaption	off	off	off	on	on	on
Annex	A_B	A_B	A_B	A_B	A_B	A_B
Power Scale Offset	0	0	0	0	0	0

* not changed

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8.11.1.1.3 Nx64 only Normal or Dual Pair mode

DEFAULT	0	1	2	3	4	5
Interface Type	V.35	V.35	V.35	V.35	V.35	V.35
Bitrate	512 kbit/s	1024 kbit/s	2048 kbit/s	512 kbit/s	1024 kbit/s	2048 kbit/s
Clock Edge	inverted	inverted	inverted	inverted	inverted	Inverted
V.54 Loops	disabled	disabled	disabled	disabled	disabled	Disabled
Clock Mode	internal	internal	internal	remote	remote	Remote
Clock Direction	contradirectional	contradirectional	contradirectional	contradirectional	contradirectional	Contradirectional
Use Timeslot 0	no	no	yes	no	no	Yes
Mode	*	*	*	*	*	*
Master/Slave	Master	Master	Master	Slave	Slave	Slave
PLL	off	off	off	off	off	Off
Autorestart	on	on	on	on	on	On
Base Rate	9	17	32	Mrz 32	Mrz 32	Mrz 32
Rate Adaption	off	off	off	on	on	On
Annex	A_B	A_B	A_B	A_B	A_B	A_B
Power Scale Offset	0	0	0	0	0	0

* not changed

Default values for RS232:
- bits: 8
- rate: 0 (RS232 disabled)
- excess rate transmitter over receiver: 0.0 %
- slot: 31

8.11.1.1.4 fE1 &Nx64 Normal or Dual Pair mode

DEFAULT	0	1	2	3	4	5
Framing	ITU-T G.704	ITU-T G.704	ITU-T G.704	ITU-T G.704	ITU-T G.704	ITU-T G.704
CRC4	on	on	on	on	on	on
E-Bit Insertion	on	on	on	on	on	on
AIS Detection	on	on	on	on	on	on
AIS Generation	on	on	on	on	on	on
Mode	*	*	*	*	*	*
Interface Type	V.35	V.35	V.35	V.35	V.35	V.35
Bitrate	256 kbit/s	512 kbit/s	1024 kbit/s	256 kbit/s	512 kbit/s	1024 kbit/s
Clock Edge	inverted	inverted	inverted	inverted	inverted	inverted
V.54 Loops	disabled	disabled	disabled	disabled	disabled	disabled
Clock Mode	from E1	from E1	from E1	remote	remote	remote
Clock Direction	contradirectional	contradirectional	contradirectional	contradirectional	contradirectional	contradirectional
Use Timeslot 0	--	--	--	--	--	--
Mode	*	*	*	*	*	*
Master/Slave	Master	Master	Master	Slave	Slave	Slave
PLL	off	off	off	off	off	off
Autorestart	on	on	on	on	on	on
Base Rate	32	32	32	Mrz 32	Mrz 32	Mrz 32
Rate Adaption	off	off	off	on	on	on
Annex	A_B	A_B	A_B	A_B	A_B	A_B
Power Scale Offset	0	0	0	0	0	0

* not changed

Default values for RS232:
- bits: 8
- rate: 0 (RS232 disabled)
- excess rate transmitter over receiver: 0.0 %
- slot: 31

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8.11.1.1.5 Multipoint Mode

DEFAULT	0	1
Framing	ITU-T G.704	ITU-T G.704
CRC4	on	on
E-Bit Insertion	on	on
AIS Detection	on	on
AIS Generation	on	on
PCM Mode	PCM31	PCM30
Payload	16 15	15 15
Idle pattern	--	0xD
Mode	*	*
Master/Slave	Master	Master
PLL	off	off
Autorestart	on on	on on
Base Rate	17 16	17 17
Rate Adaption	off off	off off
Annex	A_B A_B	A_B A_B
Power Scale Offset	0	0

* not changed

Security management SM
Security management activated
Enter <M> to return to MAIN, or <H> for HELP information

Type <***H***> and the monitor lists all available commands in the configuration sub-menu.
PSW Command
SYNTAX: PSW [USER/ADMIN]

This command sets the user/admin password (4-8 characters).

CO_SM>PSW ADMIN
Enter password: ******
Confirm new password: ******
New password was fixed

9 Software update

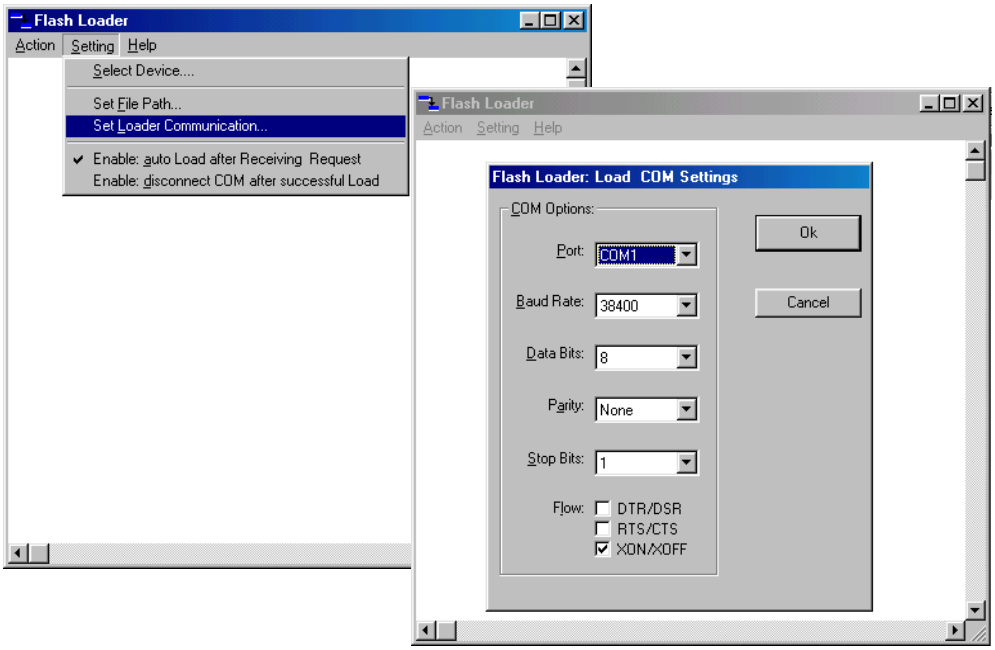
General

The software of the S-Access boards has the possibility for field updates. To do a field update, you need only a Windows 95/98/NT computer, the *Flash Loader* program installed, a connection between the Windows computer and the LTU/NTU Monitor connector and the newest release of the S-Access software.

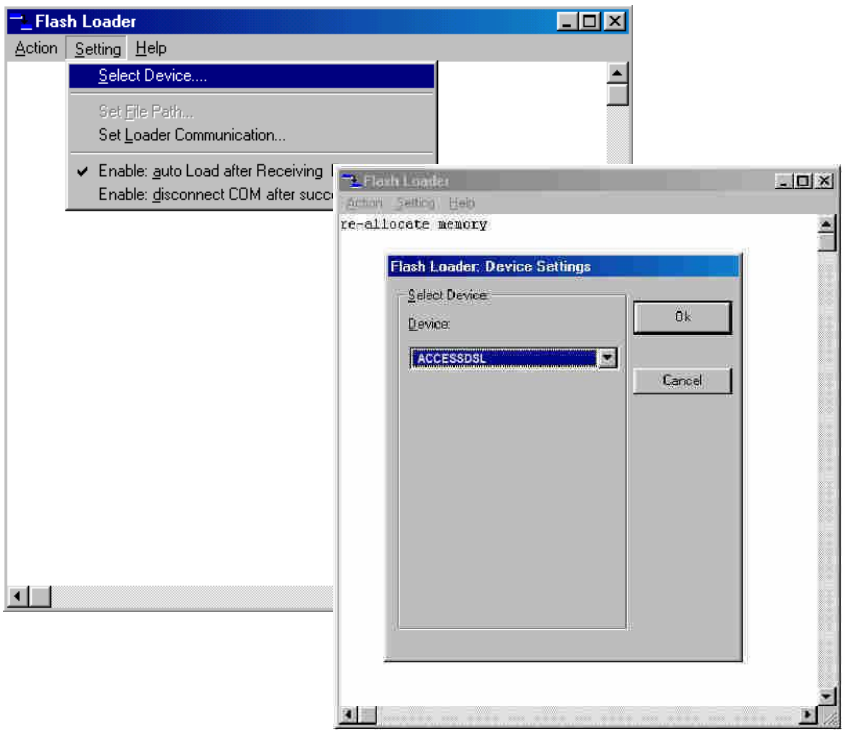
Software download

To update the software on your LTU/NTU you have to run through the following steps:

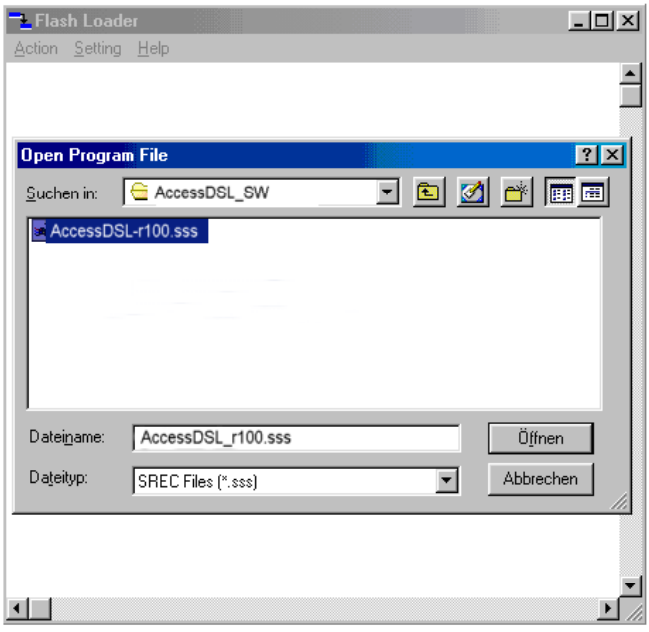
- Switch off the power of your LTU/NTU.
- Connect the LTU/NTU monitor connector with your Windows computer's RS232 interface.
- Start the *Flash Loader* software on your Windows computer
- Choose *Set Loader Communication* in the menu *setting*. Select the right communication port, the communication information and press *Ok*.



- Choose *Select Device* in the *Setting* menu, select the device *S-Access* and press *Ok*.



- Choose the newest software version and press *Öffnen*.



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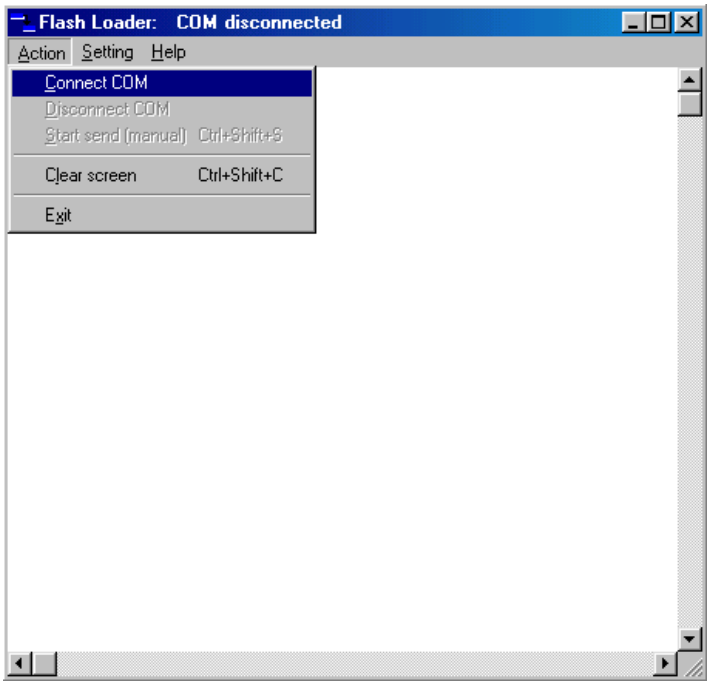
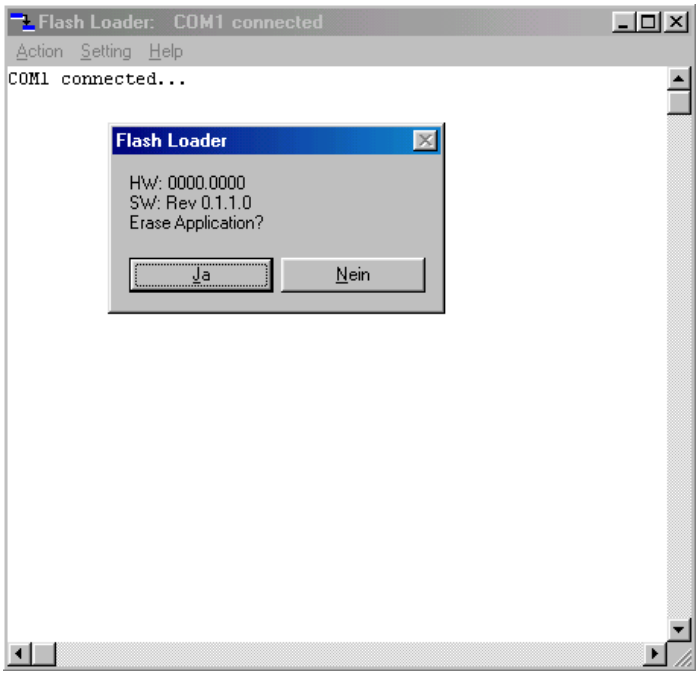
- Execute the command *Connect COM* in the menu *Action*.



- Switch on the power of your LTU/NTU.
- The following message appears on the screen, then press *Ja*.



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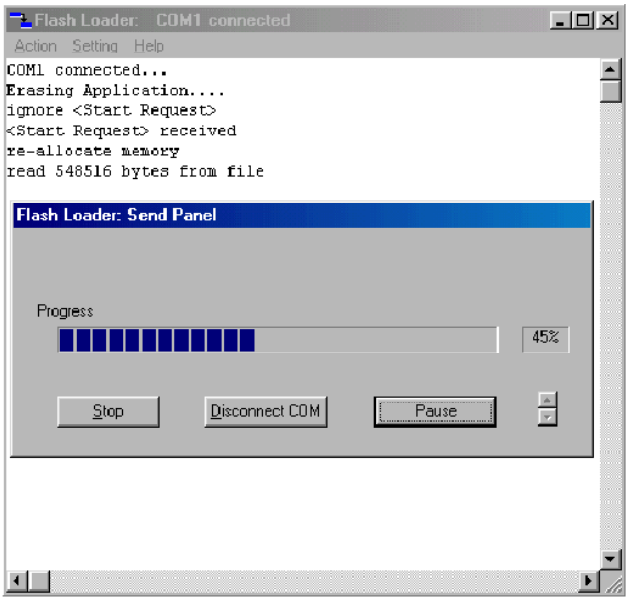
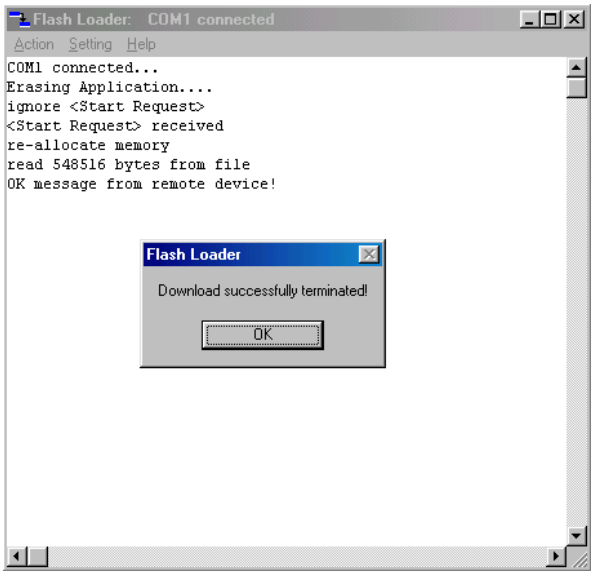
- During the download the FE-LED is green blinking and the NE-LED is amber. On the Windows screen you see the ongoing download.





- If the download is successfully finished the *Flash Loader* program sends the following message:

- If the download was successful, the LTU/NTU restarts automatically.

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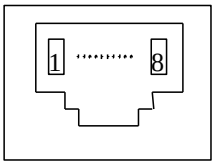
10 Connectors' Description

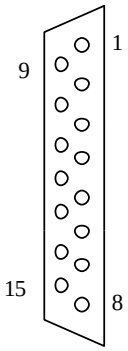
xDSL Connector



Front View
RJ45-8

Pin	Signal	Description
1	NC	Not used
2	Shield	DSL cable shield
3	TXA.a	Loop B, Tip (C-side) (four-wire unit only)
4	LA.a	Loop A, Tip (N-side)
5	LA.b	Loop A, Ring (N-side)
6	TXA.b	Loop B, Ring (C-side) (four-wire unit only)
7	Shield	DSL cable shield
8	NC	Not used

E1 120 Ohm Connector



Pin	Signal	Description
1	Out_Ch1,A	E1 Output → Ch 1 (wire A sym)
2	FPE	Functional Protective Earth (cable shield Out Ch 1)
3	Inp_Ch1,A	E1 Input→ Ch 1 (wire A sym)
4	FPE	Functional Protective Earth (cable shield Inp Ch 1)
5	FPE	-
6	NC	-
7	FPE	
8	NC	
9	Out_Ch1,B	E1 Output → Ch 1 (wire B sym)
10	NC	
11	Inp_Ch1,B	E1Input → Ch1 (wire B sym)
12	NC	-
13	NC	-
15	NC	-

E1 75 Ohm In / Out Connectors
Type: BNC 75 Ω
Optionally equipped for E1 interface with 75 Ω

Nx64/RS232 DCE Connector

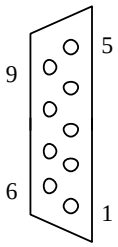
Pin	V.24 (V.35/V.36)			X.21		Direction
	ITU-T #	Description	Name	Description	Name	
1	-	Shield	-	Shield	-	-

7	102	Signal Gnd	SG	Signal Gnd	G	-
2	103a	Transmit Data (A)	TD(A)	Transmit (A)	Ta	TO DCE
14	103b	Transmit Data (B)	TD(B)	Transmit (B)	Tb	TO DCE
3	104a	Receive Data (A)	RD(A)	Receive (A)	Ra	TO DTE
16	104b	Receive Data (B)	RD(B)	Receive (B)	Rb	TO DTE
4	105a	Request To Send (A)	RTS(A)	Control (A)	Ca	TO DCE
19	105b	Request To Send (B)	RTS(B)	Control (B)	Cb	TO DCE
5	106a	Clear To Send (A)	CTS(A)	Indication (A)	Ia	TO DTE
13	106b	Clear To Send (B)	CTS(B)	Indication (B)	Ib	TO DTE
6	107a	Data Set Ready (A)	DSR(A)			TO DTE
22	107b	Data Set Ready (B)	DSR(B)			TO DTE
20	108a	Data Terminal Ready (A)	DTR(A)			TO DCE
23	108b	Data Terminal Ready (B)	DTR(B)			TO DCE
8	109a	Data Carrier Detect (A)	DCD(A)			TO DTE
10	109b	Data Carrier Detect (B)	DCD(B)			TO DTE
24	113a	Terminal Transmit Clock (A)	TTC(A)	DTE Signal Element Timing (A)	Xa	TO DCE
11	113b	Terminal Transmit Clock (B)	TTC(B)	DTE Signal Element Timing (B)	Xb	TO DCE
15	114a	Transmit Clock (A)	TC(A)			TO DTE
12	114b	Transmit Clock (B)	TC(B)			TO DTE
17	115a	Receive Clock (A)	RC(A)	Signal Element Timing (A)	Sa	TO DTE
9	115b	Receive Clock (B)	RC(B)	Signal Element Timing (B)	Sb	TO DTE
21	140	Remote Loopback	RLB			TO DCE
18	141	Local Loopback	LLB			TO DCE
25	142	Test Mode	TM			TO DTE

Continue:

Pin	V.24 (V.28) synchronous			RS232 asynchronous		Direction
	ITU-T #	Description	Name	Description	Name	
1	-	Shield				
7	102	Signal Gnd	SG	Signal Gnd	SGND	
21	103	Transmit Data	TD	Transmit Data	TXD	TO DCE
5	104	Receive Data	RD	Clear To Send	CTS	TO DTE
4	105	Request To Send	RTS	Request To Send	RTS	TO DCE
6	107	Data Set Ready	DSR	Data Set Ready	DSR	TO DTE
20	108	Data Terminal Ready	DTR	Data Terminal Ready	DTR	TO DCE
18	113	Terminal Transmit Clock	TTC			TO DCE
25	114	Transmit Clock	TC	Receive Data	RXD	TO DTE
8	115	Receive Clock	RC	Data Carrier Detect	DCD	TO DTE

Monitor Interface



Pin	**Signal**	Description
1	FPE	Functional Protective Earth
2	TXD	EIA-232 Transmit Data
3	RXD	EIA-232 Receive Data
4	ALACOM	Common Contact*
5	SGND	EIA-232 Signal Ground
6	ALMAJ_NC	Major Alarm Contact, normally closed*
7	ALMAJ_NO	Major Alarm Contact, normally open*
8	ALMIN_NC	Minor Alarm Contact, normally closed*
9	ALMIN_NO	Minor Alarm Contact, normally open*

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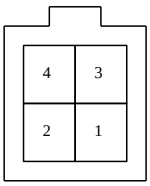
Power Interface



Pin	Signal	Description
1	-MainsPWR	Negative power supply terminal for mains adapter
2	FPE	Functional Protective Earth
3	NC	-
4	+PWR	Positive power supply terminal

Molex Mini-Fit, 4-pin

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11 Technical Specification

Interfaces

11.1 xDSL Line Interface

Specification	ITU-T G.SHDSL, Rec G.991.2
Option	4-wire Interface (separate Tx and Rx Pairs)
Line Code	TC-PAM
Impedance	135Ω
Transmit Power	13.5 (Annex A) or 14.5 (Annex B) dBm @ 135 Ω
Number of Pairs	1 or 2 (option: 2 or 4)
Bit Rate	192 to 2064 kbps
Connector Type	RJ-45, 8 pin
Overvoltage Protection	ITU-T Rec. K.20/K.21
Specification	ITU-T G.SHDSL, Rec G.991.2
Wetting Current	2-4 mA @ 60 V

11.2 E1 Line Interface

Specification	ETS 300 166, ITU-T Rec G.703, G.704
Number of Interfaces	1 or 2
Line Code	HDB3
Impedance	either 120Ω or 75Ω
Jitter	ITU-T Rec G.823, ETSI TS 101 135
Bit Rate	2048 kbit/s ± 50 ppm
Connector Type	either DB15 male (120Ω) or two BNC 75Ω
ESD Protection	8 kV (Air discharge)

11.3 V.35 DCE User Interface

Specification	ITU-T Rec V.35/V.36/X.21/V.24/V.28/EIA-232
Number of Interfaces	1
Connector Type	DB25 female
Bitrate	1…32 x 64 kbps (synchronous); 4800…115200 bps (asynchronous)

11.4 Monitor Interface

Specification	EIA-232 / V.28
Data Rate	9600 baud, asynchronous
Protocol	8 bit, no parity, 1 stop bit no linefeed with carriage return XON/XOFF enabled
Signal Level	V.28 on DB9 female connector
Connector Type	DB9 female connector

Power Supply

Specification	ETSI ETS 300 132-2	
Voltage	1 x 40V/60V_{DC} over Molex type safety approved connector 38..200Vdc over xDSL	
Power Consumption	Typ. 2.30W	SA-PAM-SAN-E1B, V2
	Typ. 2.85W	SA-PAM-SAN-N64, V2
	Typ. 3.00W	SA-PAM-SAN- E1B/N64, V2
	Typ. 4.80W	SA-PAM-SAN E1B/N64-MP, V2

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Environmental

11.5 Climatic Conditions

Storage:	ETS 300 019-1-1 Class 1.2	(-25°C … +55°C)
Transportation:	ETS 300 019-1-2 Class 2.3	(-40°C … +70°C)
Operation:	ETS 300 019-1-3 Class 3.2	(-5°C … +45°C)

Higher Operation Temperature range available on request.

11.6 Safety / EMC

According to EN60950 / EN 55022 , Class B

Physical Dimensions and Weight

Dimensions: 230(W)x160(D)x46(H) mm
Weight: 0.7 kg

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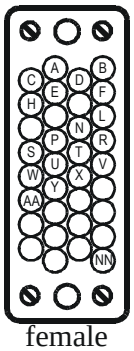
12 Nx64 cables

V.35 DTE

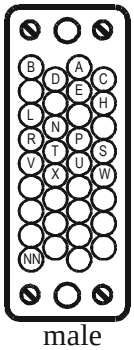


V.35/ISO 2593
34 Pin Connector

female

#	MRAC-34, female (a/b)	DB25, male (a/b)
SAND	A	1
SGND	B	7
103	P/S	2/14
104	R/T	3/16
105	C	4
106	D	5
107	E	6
108	H	20
109	F	8
113	U/W	24/11
114	Y/AA	15/12
115	V/X	17/9
140	N	21
141	L	18
142	NN	25

V.35 DCE



V.35/ISO 2593
34 Pin Connector

male

#	MRAC-34, male (a/b)	DB25, male (a/b)
SAND	A	1
SGND	B	7
103	P/S	3/16
104	R/T	2/14
105	C	5
106	D	4
107	E	20
108	H	6
109	-	-
113	U/W	17/9
114	-	-
115	V/X	24/11

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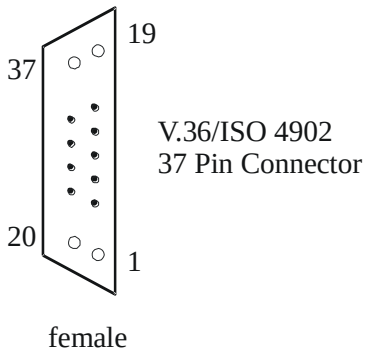
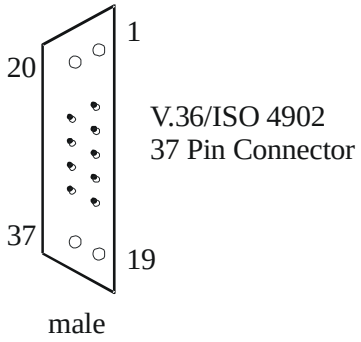
V.36/RS449 DTE



#	DB37, female (a/b)	DB25, male (a/b)
SAND	1	1
SGND	19	7
SGND(a)	37	7
SGND(b)	20	7
103	4/22	2/14
104	6/24	3/16
105	7/25	4/19
106	9/27	5/13
107	11/29	6/22
108	12/30	20/23
109	13/31	8/10
113	17/35	24/11
114	5/23	15/12
115	8/26	17/9
140	14	21
141	10	18
142	18	25

V.36/RS449 DCE



#	DB37, male (a/b)	DB25, male (a/b)
SAND	1	1
SGND	19	7
SGND(a)	37	7
SGND(b)	20	7
103	4/22	3/16
104	6/24	2/14
105	7/25	5/13
106	9/27	4/19
107	11/29	20/23
108	12/30	6/22
113	17/35	17/9
115	8/26	24/11

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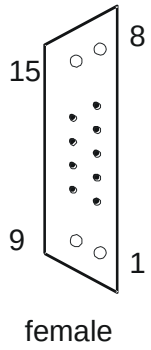
X.21 DTE

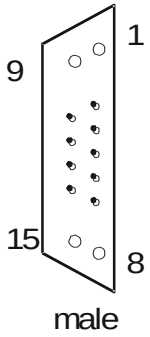


X.21/ISO 4903
15 Pin Connectors

#	DB15, female (a/b)	DB25, male (a/b)
SAND	1	1
G	8	7
S	6/13	17/9
R	4/11	3/16
T	2/9	2/14
C	3/10	4/19
I	5/12	5/13
X	7/14	24/11

Note: join together pins 22&23 and 6&20 at DB-25 side

X.21 DCE



X.21/ISO 4903
15 Pin Connector

#	DB15, male (a/b)	DB25, male (a/b)
SAND	1	1
G	8	7
S	6/13	24/11
R	4/11	2/14
T	2/9	3/16
C	3/10	5/13
I	5/12	4/19
X	7/14	17/9

Note: join together pins 22&23 and 6&20 at DB-25 side

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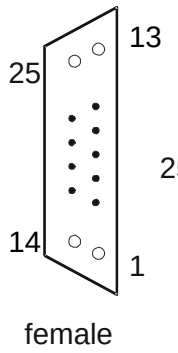
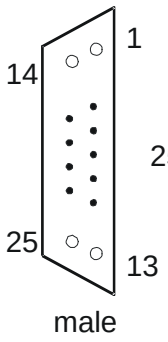
V.28 DTE synchronous



#	DB25, female	DB25, male
SGND	7	7
103	2	21
104	3	5
105/10	4/5	4
6	6	6
107	20	20
108	24	18
113	15	25
114	17	8
115		

Note: join together pins 4&5 at DB-25 female side (DTE equipment side)

V.28 DCE synchronous



#	DB25, male	DB25, male
SGND	7	7
103	2	5
104	3	21
105/106	4/5	-
107	6	20
108	20	6
113	24	8
114	-	-
115	17	18

Note: join together pins 4&5 at DCE equipment side

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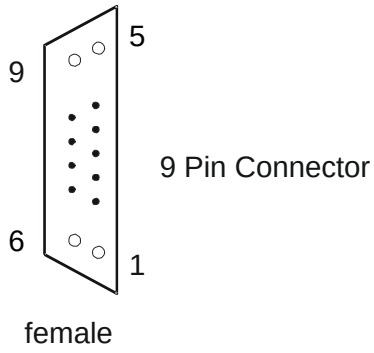
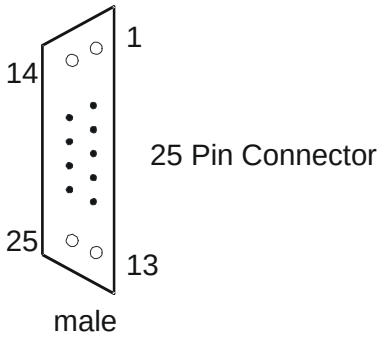
RS232 DTE asynchronous



#	DB9, female	DB25, male
SGND	5	7
TXD	3	21
RXD	2	25
RTS	7	4
CTS	8	5
DSR	6	6
DTR	4	20
DCD	1	8

RS232 DCE asynchronous



#	DB25, male	DB25, male
SGND	7	7
TXD	2	25
RXD	3	21
RTS	4	5
CTS	5	4
DSR	6	20
DTR	20	6

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13 Appendices

Initialization Errors

At system startup, various hardware self tests are performed. If any initialization error occurs, the startup procedure will be aborted and the monitor will display an initialization error code in hexadecimal representation. Each bit of the word value corresponds to a specific initialization error and is set to one if the corresponding hardware is faulty. The table below lists the possible initialization errors and their corresponding bit position in the error code word.

Bit Nr	Initialization Error
0	Microcontroller RAM test failure
1	
2	

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Abbreviations

2B1Q	2 Binary - 1 Quaternary
ACO	Alarm Cut Off
AIS	Alarm Indication Signal
AIS-R	Alarm Indication Signal (Alarm bit in xDSL frame)
AIS-S	Alarm Indication Signal Subscriber
BER-H	Block Error Rate High (> 30 % according G.826)
BER-L	Block Error Rate Low (> 15 % & < 30% according G.826)
BER-S	Excessive Block Error Rate (CRC-4 Errors > 805) on Subscriber
CCITT	International Telegraph and Telephone Consultative Committee
CCS	Common Channel Signaling
CMU	Control and Management Unit
CRC	Cyclic Redundancy Check
E1	ITU-T G.703 User Interface at 2048 kbit/s
ET	Exchange Termination
EOC	Embedded Operations Channel
FAS	Frame Alignment Signal
FC	Failure Condition
FEBE	Far End Block Error
HDSL	High Bit Rate Digital Subscriber Loop
HRP	HDSL Regenerator Present
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union
LFA	Loss of Frame Alignment
LFA-L	Loss of Frame Alignment xDSL
LFA-S	Loss of Frame Alignment Subscriber
LOS-L	Loss of Signal
LOS-S	Loss of Signal Subscriber side
LT	Line Termination
LTU	Line Termination Unit
NC	Not Connected
NEXT	Near End Cross Talk
NM	Noise Margin
NT	Network Termination
NTU	Network Termination Unit
PDH	Plesiochronous Digital Hierarchy
PRA	Primary Rate Access
RX	Receive
SDH	Synchronous Digital Hierarchy
SMF	Sub-Multiframe
SQ	Signal Quality
TE	Terminal Equipment
TMN	Telecommunication Management Network
TX	Transmit
UIF	User Interface
UTP	Unshielded Twisted Pair
XVR	Transceiver

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References

13.1 Standards

ETSI ETR 152, “Transmission and Multiplexing (TM); High Bit Rate Digital Subscriber Line (xDSL) Transmission System on Metallic Local Lines; xDSL Core Specification and Applications for 2048 kbit/s Based Access Digital Sections”
ITU-T G.821, “Error Performance of an International Digital Connection Forming Part of an Integrated Services Digital Network”
ITU-T G.826, “Error Performance Parameters and Objectives for International, Constant Bit Rate Digital Paths at or above the Primary Rate”
ITU-T G.823, “The Control of Jitter and Wander within Digital Networks Which Are Based on the 2048 kbit/s Hierarchy”
ITU-T G.703, “Physical/Electrical Characteristics of Hierarchical Digital Interfaces”
ITU-T G.704, “Synchronous Frame Structures Used at Primary and Secondary Hierarchical Levels”
ITU-T M.3400, “TMN Management Functions”
ITU-T K.20, “Resistibility of Telecommunication Switching Equipment to Overvoltages and Overcurrents”
ITU-T K.21, “Resistibility of Subscribers’ Terminals to Overvoltages and Overcurrents”
EN 60950, “Safety of Information Technology Equipment Including Electrical Business Equipment”
EN 55022, “Grenzwerte und Messverfahren für Funkstörungen von informationstech-nischen Einrichtungen”
ETS 300 019, “Equipment Engineering; Environmental Conditions and Environmental Tests for Telecommunications Equipment”

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