CRONYX

Multiplexing Modem

Qlink-3000

Models /2E1 and /E1-ETV

Installation and Operations Guide

CRONYX

Contents

Section 4. Control via the console port 28

Section 5. Management via SNMP 45

Safety precautions

⚠ An exclamation point enclosed in a triangle warns the user about important operations and maintenance instructions for the device.

It is mandatory to observe the existing safety rules during installation, operations, and technical maintenance of the device. Installation, technical maintenance, and repair operations must be performed only by qualified and certified personnel. Installation, technical maintenance, and repair operations must not be performed by the operator or the user.

The Qlink-3000 multiplexing modem equipment has been tested in the Telecommunications Technical Device and System Testing Center of the "TsNIIS" (Central Research and Development Institute of Telecommunications) of the Ministry of Communications of the Russian Federation and is certified to comply with the following technical requirements:

- RD 45.122-99 "Data transmission equipment designed for use as subscriber sets on public physical communication links. Technical requirements";

- RD 45.176-2001 "Communication equipment implementing frame switching in the local network at the data link layer. Technical requirements"

- GOST R ISO 9001-96.

The Qlink-3000 multiplexing modem equipment is approved for use in the interlinked communication network in Russia as subscriber sets for data transmission over non-superimposed physical communication links.

Section 1. Introduction

1.1. Application

Qlink-3000 **–** is a modem family for physical links, designed to operate over a single twisted pair. Models equipped with two data ports (/2E1 and /E1-ETV) include the multiplexing device and allow transmission of two independent data streams over a single twisted pair. Device structural diagram is presented on the figure:
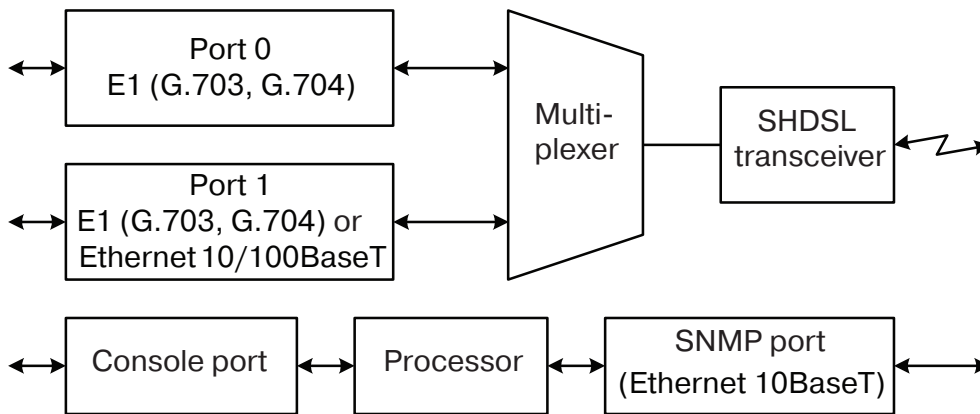
Maximum data transmission rate is 2304 kbit/s (36 x 64 kbit/s). Maximum transmission distance depends on the data transmission rate in the link. The maximum link length for the 26 AWG (0.4 mm) cable is given in the following table:

Physical data rate in the link	Data transmission rate	Maximum cable length
2320 kbit/s	2304 kbit/s	4.0 km
784 kbit/s	768 kbit/s	5.4 km
272 kbit/s	256 kbit/s	7.6 km

The picture shows the diagrams of the item's use:
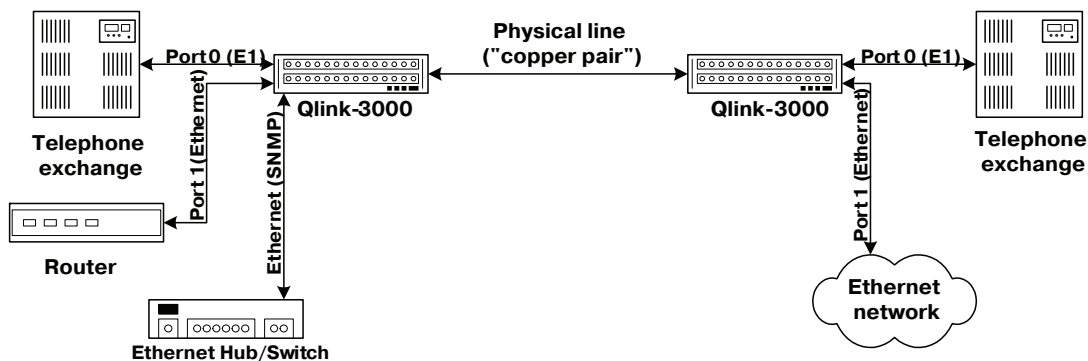
Main Qlink-3000 multiplexing modem characteristics:

- transmission of two data streams over a two-wire physical link for up to 10 km distance;

- compliance with ITU-T standards G.703, G.704, G.706, G.991.2, and IEEE 802.3;

- local and remote loops;

- Built-in Bit Error Rate Tester (BER tester);

- RS-232 console port;

- remote control and monitoring over the SNMP protocol via a separate Ethernet port;

- emergency alarms ("dry" contacts of relay);

- design for mounting in a 19" rack (1U);

- built-in power supply unit for AC (176-264 V, 50 Hz) or DC (36-72 V) power source.

The device may be controlled via the RS-232 interface using an ASCII terminal, or via Ethernet using the SNMP protocol.

Indicators on the device's front panel show link status, enabled loops and enabled testing mode. The built-in BER-tester allows measuring error rate in the link path. The measurements are performed using fixed or pseudo-random code according to the O.151 recommendation (the pattern length is $2^{15}-1=32767$ bits).

In order to test links in case when there are no personnel at the remote end of the link, there is a remote login capability (to control the remote device from the console port of the local device). Commands are transmitted to the remote device via an additional service channel. At user's request remote configuration parameter changes may be prohibited.

The device is equipped with an emergency alarm relay, the "dry" contacts of which may switch on an external device to call the operations personnel.

The multiplexing modem has the capability of firmware upgrades. The instructions for upgrading the firmware may be found at the www.cronyx.ru website.

1.2. Model series

The Qlink-3000 multiplexing modem has two data ports, one of which (Port 0) has an E1 interface (G.703, G.704), and the other may be E1, Ethernet 10/100Base-T, digital V.35 port, or a universal port (V.35, RS-530, RS-232 or X.21).

The multiplexing modem may also be equipped with an additional Ethernet 10Base-T port for control over the SNMP protocol.

Additionally, the Qlink-3000 family includes modems with a single data port with a E1, Ethernet 10/100Base-T, V.35 interface or a universal interface (V.35, RS-530, RS-232, X.21).

All Qlink-3000 family modems are compatible with each other, i.e. there may be a single model on one end of the link, and another model on the other.

1.3. Order code

Qlink-3000 / S - E1/ETV-SNMP-AC

Model:
Qlink-3000

Design:
S - 1U for a 19" rack
B - desktop

Power supply
220VAC
36...72VDC
or 40...60VDC

Control over SNMP

Data port(s):

2E1	- two E1 ports
E1-ETV	- E1 and Ethernet (10/100Base-T)
E1-V	- E1 and V.35
E1-M	- E1 and V.35/RS-530/RS-232/X.21
E1	- single E1 port
ETV	- single Ethernet port (10/100Base-T)
V	- single V.35 port
M	- single V.35/RS-530/RS-232/X.21 port
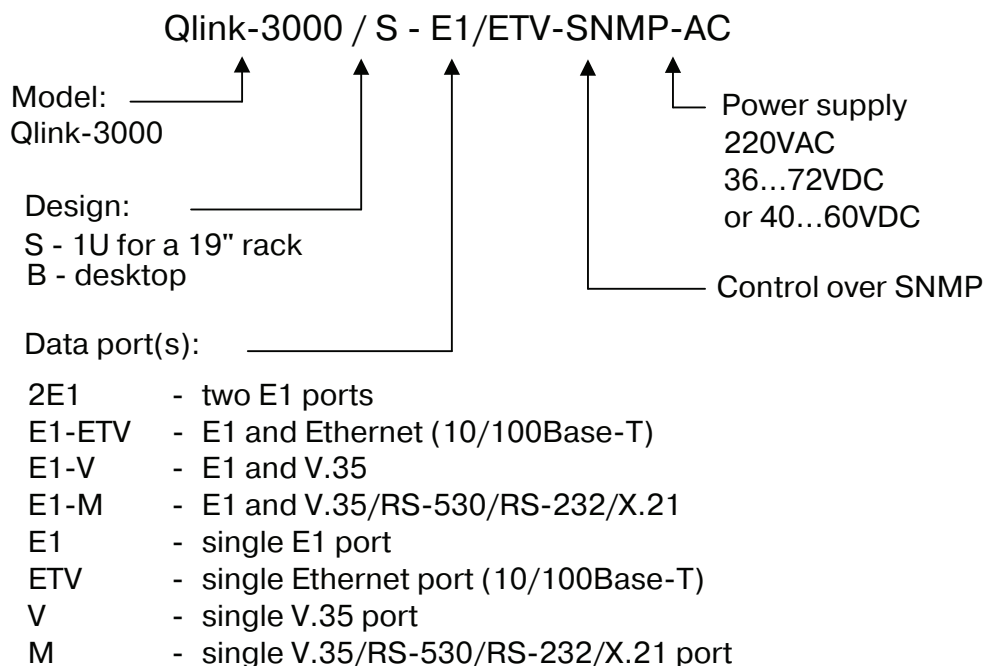
1.4. Technical specifications

Link interface

Link requirements	Unloaded twisted pair
Link data rate	208 kbit/s to 2320 kbit/s
Link length	Up to 10 km with a 0.6 mm wire strand diameter, up to 7.6 km with a 0.4 mm wire strand diameter
Connector	RJ type (female, 8 pins)
Encoding...	TC-PAM
Transmission path synchronization................	Internal (from an internal clock-pulse oscillator) From Port (from the receiving path of the E1 port)
Overvoltage protection	SIDACtor
Overcurrent protection	Fuse

E1 interface (2048 kbit/s)

Connector	RJ-48 (female)
Link impedance	120 Ohms, balanced (twisted pair)
Cycle structure..	according to G.704, or transparent stream transmission (Unframed G.703)
Signal level at the receiver input...................	0 to -43dB, up to 2 km over 22AWG (0.6 mm) twisted pairs
Jitter attenuator	in the receiver path
Data encoding..	HDB3
Error detection	Bipolar violation
Overvoltage protection	TVS
Overcurrent protection	Fuse

Ethernet interface

Interface type	Ethernet 100Base-T
Connector type	RJ-45 (female)
Bandwidth	64 to 2304 kbit/s
Operating mode	100 Mbps Full-duplex, 100 Mbps Half-duplex, 10 Mbps Full-duplex, 10 Mbps Half-duplex, or Autonegotiation (automatic selection)
LAN table size	15000 MAC-addresses
Maximum frame size	4224 bytes, including MAC-layer header
Protocols	Transparent or Cisco-HDLC bridging IEEE protocol, set automatically

Emergency alarm interface

Connector type	DB-9 (female)
Relay contact current	Up to 600 mA
Relay contact voltage	Up to 110 VDC or 125 VAC

Console port

Interface type,	RS-232 DCE connector, DB-9 (female)
Data transfer protocol	Asynchronous, 9600 bit/s, 8 bits/character, 1 stop bit, no parity
Modem signals	DTR, DSR, CTS, RTS, CD

Control port SNMP

Interface type	Ethernet 10Base-T
Connector	RJ-45

Diagnostic modes

Loops .... Local, remote

Error rate control .... Built-in

Control .... Via the RS-232 control port,
via the SNMP interface, or from a
remote device

Dimensions and weight

Design .... For mounting in a 19" rack, height 1U

Size .... 444 mm x 262 mm x 44 mm

Weight.. 3.4 kg

Electric power supply

176–264 VAC, 50 Hz

36–72 VDC

Power consumption .... Not more than 12.5 W

Operating conditions

Temperature .... 0 to 50 °C

Relative humidity .... Up to 80%, no condensation

Section 2. Installation

2.1. Installation place requirements

The device must be grounded before switching on, there is a ground terminal screw on the front panel provided for this purpose.

When installing the multiplexing modem, allow for at least 10 cm of free space next to the front panel for interface cable connections.

The ambient temperature must be 0 to +50 °C at 80% humidity, no condensation.

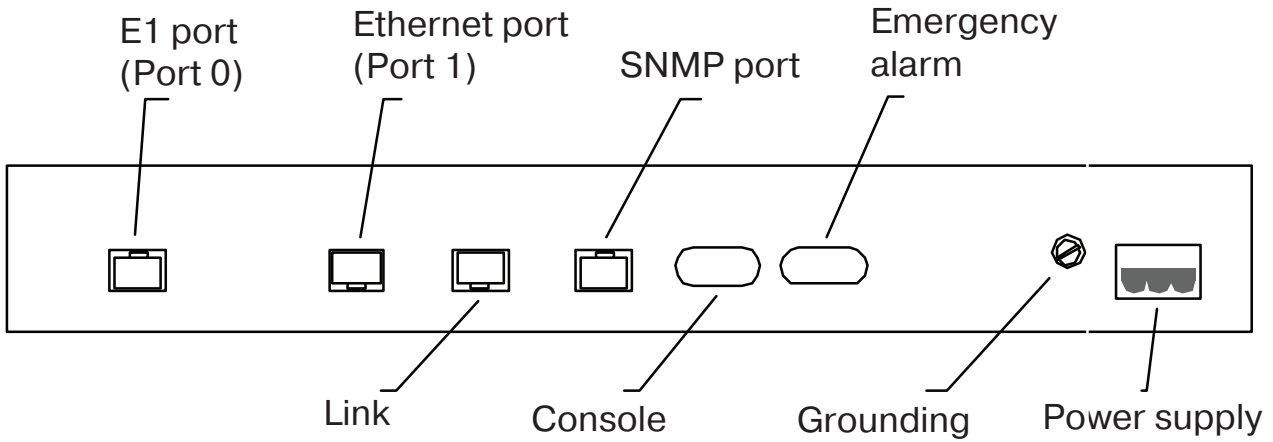## 2.2. Delivered items

Delivered items include:

- Qlink-3000 unit   – 1 pc.;
- bracket for mounting the Qlink-3000 unit in a 19" rack   – 2 pcs.;
- self-adhesive stand for the Qlink-3000 unit   – 4 pcs.;
- power supply cable (for the AC model)   – 1 pc;
- removable part of the power supply connector terminal unit
  (for the DC model)   – 1 pc.;
- user's guide   –1 pc.

2.4. Cable connections

The front panel of the multiplexing modem contains connectors for connecting physical links, E1 link(s), Ethernet link, SNMP control link, console, emergency alarm and power supply.

E1 port
(Port 0)   Ethernet port
(Port 1)   SNMP port   Emergency
alarm

Link   Console   Grounding   Power supply

Front panel connector locations for Qlink-3000/S-E1/ETV-SNMP model

E1 port
(Port 0)   E1 port
(Port 1)   SNMP port   Emergency
alarm

Link   Console   Grounding   Power supply
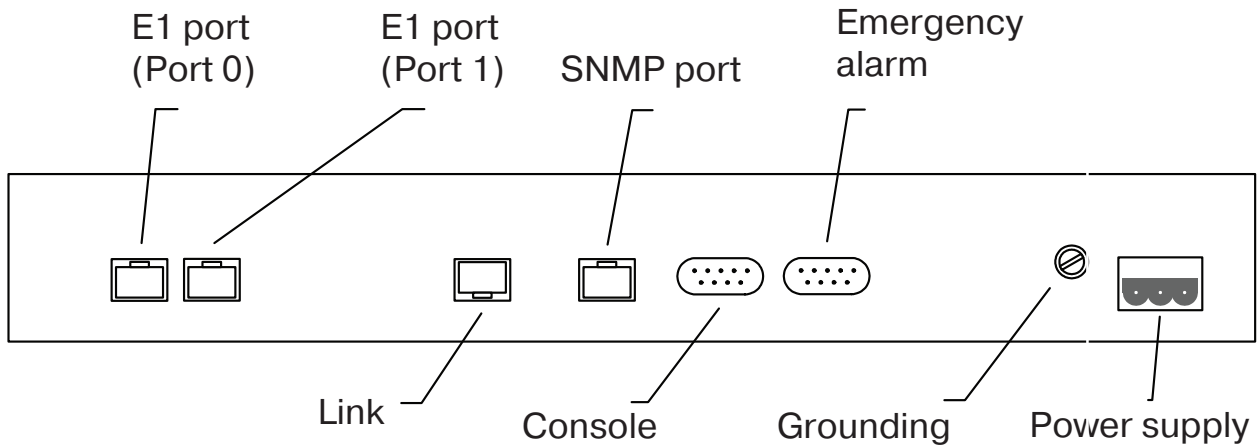
Front panel connector locations for Qlink-3000/S-2E1-SNMP model

Power supply connector

A standard mains connector is used to connect the AC power supply cable (for the "AC" model). The power supply cable is supplied with the device.

To connect the DC power supply cable (for the "DC" model), the power supply connector is used, shown below (view from multiplexer's front panel side):

- 48 VDC   + 48 VDC

Connected to the chassis
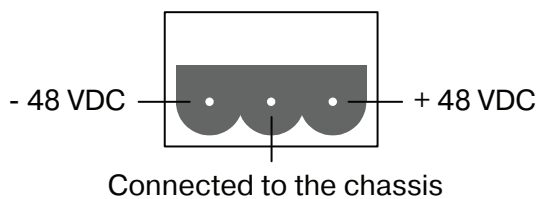
The corresponding removable part of the terminal unit of the power supply connector is supplied with the device.

Ground terminal

There is a M4 screw on the front panel for device grounding.

⚠ Before switching the device on, and before connecting other cables, the multiplexer unit must be grounded properly.

Link connector

The RJ type connector (8 pins) is used for link connection:

```
1   8
```
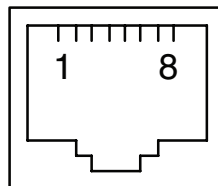
1-not used
2-not used
3-not used
4- Line A
5- Line B
6-not used
7-not used
8-not used

E1 port connectors

The RJ-48 connector is used for E1 link connections:

```
1   8
```

1 - Input A
2 - Input B
3 - not used
4 - Output A
5 - Output B
6 - not used
7 - not used
8 - not used

Ethernet port connector

The RJ-45 female socket is used to connect the Ethernet port (10/100Base-T, IEEE 802.3) when operating using the remote bridge protocol:

```
1 - TX+ (output)
2 - TX- (output)
3 - RX+ (input)
4 - not used
5 - not used
6 - RX- (input)
7 - not used
8 - not used
```
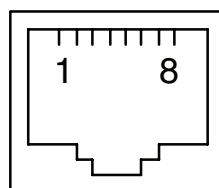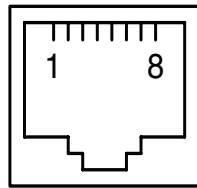
Use direct cable for connection to the Ethernet switch.

SNMP port connector

An RJ-45 female socket is used for Ethernet port connection (10Base-T, IEEE 802.3 standard) for control over the SNMP protocol, shown above (see "Ethernet" port connector").

Use direct cable for connection to the switch.

Console port connector

A DB-9 (female) connector is used for console connection. The console port has a standard RS-232 DCE interface, and utilizes the following settings: asynchronous mode, 9600 baud speed, 8 bits/symbol, 1 stop bit, no parity. Use a direct cable for connection to a PC COM port.

An RTS signal from the controlling terminal to the device port must be provided when connecting the console.

It is recommended to use the following cable diagrams:

Emergency alarm connector

to Qlink-3000 console (DB-9 male)

GND 5 ←→ GND
TXD 3 ← TXD
RXD 2 → RXD
RTS 7 ← RTS
CTS 8 ← CTS
DTR 4 ← DTR
CD 1 → DSR
→ CD

to Control terminal

Cable without modem control

to Qlink-3000 console (DB-9 male)

GND 5 ←→ GND
TXD 3 ← TXD
RXD 2 → RXD
RTS 7 ← RTS
CTS 8 → CTS
DTR 4 ← DTR
DSR 6 → DSR
CD 1 → CD

to Control terminal

Cable with modem control
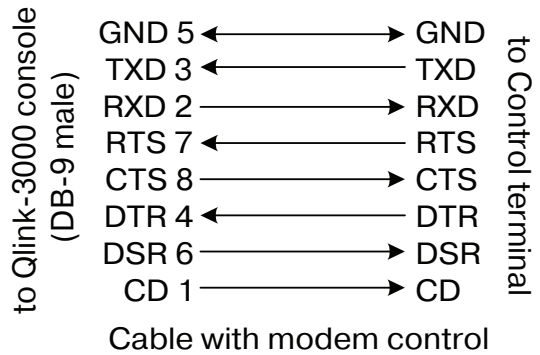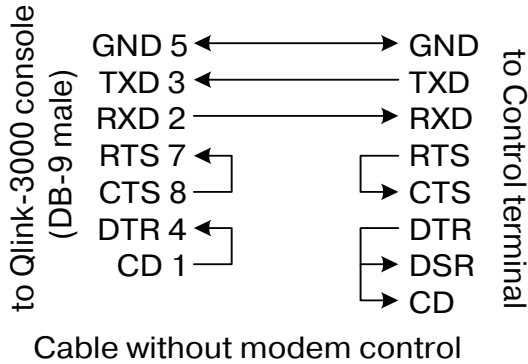
A DB-9 (female) connector is used for emergency alarm connection. The external input sensor (pins 3 and 7) must be isolated from other electrical circuits. Pins 1, 2 and 6 are reserved and must not be used.

Emergency alarm circuits

Normal state shown

+5 V

⑤ ④ ③ ② ①
⑨ ⑧ ⑦ ⑥

External input sensor
(user-supplied equipment)
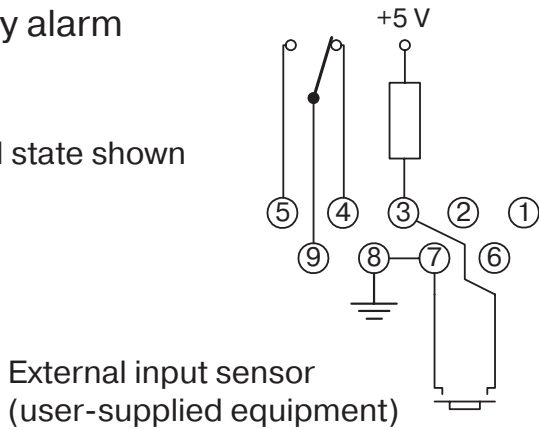
3 - input contact
4 - connected to the middle contact (9) during normal operation, open during errors
5 - open during normal operations, connected to the middle contact (9) during errors
7 - common wire (GND)
8 - common wire (GND)
9 - middle contact

Section 3. Operations

3.1. Indicators

The front panel contains indicators, showing the status of the device. The list of indicators and their functions are specified below in the text.

Qlink-3000/S-2E1-SNMP front panel

Qlink-3000/S-E1/ETV-SNMP front panel
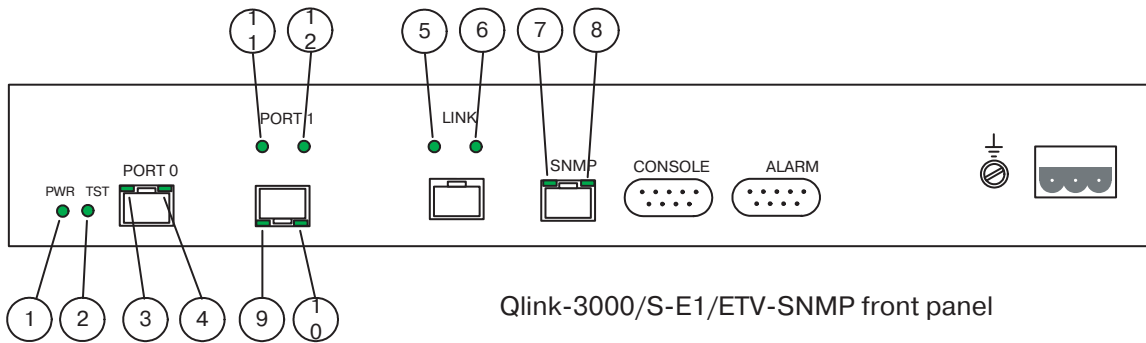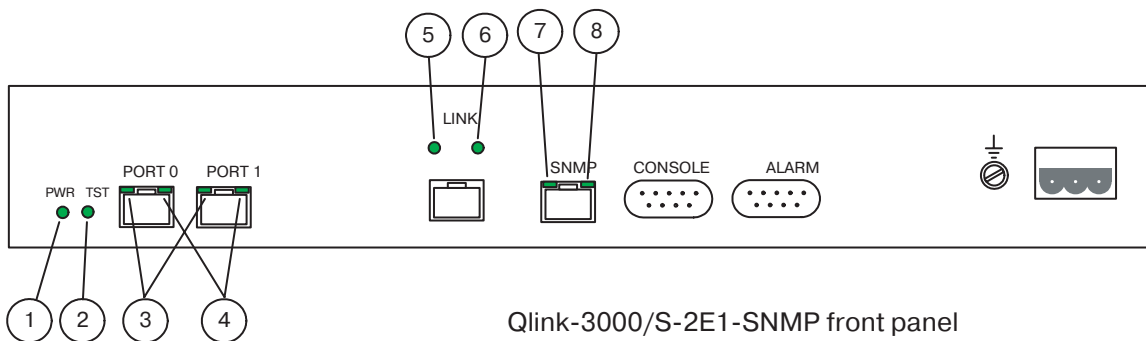
1 Power indicator (PWR)

The power indicator lights green when power supply is on.

2 BER tester indicator (TST)

The indicator lights if the BER tester is switched on. The color determines the testing results: green - testing is performed without errors, red - test pattern not detected, or errors detected during testing. When the BER tester is switched off, the TST indicator does not light.

3 E1 port status and mode indicator (E1-LOC)

This indicator shows the status and the mode of the E1 port. The color shows the port status: green - no errors (OK), red - no link signal (LOS) or error (AIS, LOF, LOMF). The E1 port operating mode is shown by blinking: no blinking - normal operation, blinks (single flashes) - the BER tester is enabled on the port tributary or loop is enabled for the port, blinks (continuously) - loop is enabled on the port tributary. If the port is disabled, then the corresponding E1-LOC indicator is extinguished. The table contains the possible states of the E1-LOC indicator:

Color	Blinking	Description
Does not light		Port disabled.
Green	No	Normal operation (status = OK, local loop and port tributary loop disabled, BER tester on the port tributary disabled).
Green	Single flashes	Port status = OK, BER tester enabled on port tributary tester, or the local loop is enabled towards the G.703 link.
Red	No	No link signal G.703 (LOS). Local loop and port tributary loop disabled, BER tester on port tributary disabled.
Red	Single blinks	No link signal G.703 (LOS). BER tester enabled on port tributary BER or local loop enabled towards G.703 link.
Red	Flashes	If the E1-REM indicator flashes red, the port tributary loop is enabled. If the E1-REM indicator does not blink, then there is signal in the link, but either the AIS alarm indication signal is received, or Loss Of Frame (LOF) or Loss of MultiFrame synchronization (LOMF) found.

④ Remote E1 port status and mode indicator (E1-REM)

This indicator shows the status and the mode of the remote E1 port. If the indicator is green, then there are no errors on the remote side, and red indicates error (FARLOF - the remote side transmits the alarm indication signal (bit A of the zero timeslot). The E1-REM flashes red, if the tributary loop is enabled on the port tributary. If the port disabled or there is no information from the remote device (for example, when operating in the unframed mode), then the corresponding E1-REM indicator does not light. The table contains the possible states of the E1-REM indicator:

Color	Blinking	Description
Does not light		Port disabled or no information from the remote device.

Green	No	Normal operation (no alarm indication signal from the remote).
Red	No	Alarm indication signal received from the remote (bit A of the zero timeslot).
Red	Single	Loss of the G.703 signal in the link (LOS), alarm indication signal (AIS) received, no frame (LOF) or multiframe (LOMF) synchronization. BER tester is enabled on port tributary or local loop enabled towards the G.703 link.
Red	Blinks	Port tributary loop enabled (in this case the E1-LOC indicator continuously flashes red).

⑤ SHDSL link status and mode indicator (LINK-LOC)

This indicator shows the status and the mode of the SHDSL link. The color shows the port status: green - connection established, no errors (OK), red - no connection or error present (CRC anomaly, LOSW defect, Loop attenuation defect, SNR margin defect, LOSW failure). The SHDSL port operating mode is indicated by blinking: does not blink - normal operation, blinks (single flashes) - local loop or BER tester is enabled. The table contains possible LINK-LOC indicator states:

Color	Blinking	Description
Green	No	Normal operation (connection established, no errors, local loop and testing mode disabled).
Green	Single flashes	Port status = OK, BER tester or local loop enabled on the link.
Red	No	Connection not established (connection activation) Local loop and testing disabled.
Red	Single flashes	Connection not established or errors in the link (CRC anomaly, LOSW defect, Loop attenuation defect, SNR margin defect, LOSW failure), the built-in BER tester or local loop enabled on the link.
Red	Blinks continuously	Connection established, but there are errors in the link (CRC anomaly, LOSW defect, Loop attenuation defect, SNR margin defect, LOSW failure). Local loop and link testing disabled.

⑥ Remote SHDSL port status and mode indicator (LINK-REM)

This indicator shows the remote SHDSL port status and mode. If information about the remote side is unavailable (connection not established, or service link does not operate due to errors), then the LINK-REM indicator does not light. Color shows the port status: green - connection established, no errors (OK), red - error (CRC anomaly, LOSW defect, Loop attenuation defect, SNR margin defect, LOSW failure). The remote loop enabled status is indicated by flashing: does not flash - normal operation, flashes (single flashes) - remote loop enabled. The table contains possible LINK-REM indicator states:

Color	Blinking	Description
Does not light		Remote device state unavailable (no connection or errors in the link).
Green	No	Normal operation (connection established, no-errors, remote loop disabled).
Green	Single flashes	Connection activated, local loop enabled.
Red	No	Different link transmission rates set on local and remote devices, or error on the remote side (CRC anomaly, LOSW defect, Loop attenuation defect, SNR margin defect, LOSW failure). Remote loop disabled.
Red	Single flashes	Error on the remote side (CRC anomaly, LOSW defect, Loop attenuation defect, SNR margin defect, LOSW failure). Remote loop enabled.

⑦ SNMP port activity indicator (SNMP-ACT)

The SNMP-ACT lights green during data reception/transmission over the SNMP port.

⑧ SNMP port state indicator (SNMP-LINK)

The SNMP-LINK indicator does not light if the Ethernet cable is not connected to it. If the cable is connected, then it lights green.

⑨ Ethernet port mode indicator (ETH-FAST)

The indicator lights green, if the cable is connected to the Ethernet port, and the 100BaseT mode is used. If the Ethernet cable is not connected to the port, or the 10BaseT mode is used, then the ETH-FAST indicator does not light.

(10) Ethernet port state indicator (ETH-LINK)

The ETH-LINK indicator does not light, if the Ethernet cable is not connected to the port, and lights green if the cable is connected to the Ethernet port (the indicator flashes during data reception and transmission).

(11) Ethernet port error indicator (ETH-LOS)

The ETH-LOS indicator lights red, if the Ethernet cable is not connected to the port, and flashes red during Ethernet bridge errors.

(12) Ethernet port status indicator (ETH-STATUS)

The ETH-STATUS indicator does not light, if the port is disabled, lights green during normal operation, flashes green if the BER tester is enabled on the port tributary.

3.2. Emergency alarms

The Qlink-3000 multiplexing modem is equipped with an emergency alarm interface. The emergency alarm interface is used for turning on an external executive unit (ringer, buzzer, console indicator, etc.) during emergency situation, for example, loss of carrier, loss of synchronization, power failure. It is switched on by "dry" (i.e. not connected to any multiplexer electrical circuits) relay contacts.

Additionally, the interface has a pair of input contacts, the state of which (closed/open) is transmitted to the remote device and leads to relay activation at the remote. If the multiplexer is installed in an unserviced room, then the input contacts may be used, for example, for remote climate sensors, door opening signals, etc.

⚠ The input contacts must be closed by a switch, which is isolated from electrical circuits! Non-compliance with this requirement may lead to device malfunction.

Contact 9 closes to contact 4 during normal operating mode. During the "alarm" state contact 9 disconnects from contact 4 and connects to contact 5.

The external sensor has two operating modes: closing-sensitive and opening-sensitive. The mode is set to closing-sensitive by default. When contact 3 connects to contact 7, the remote device switches to alarm state.

The console may be used to set the mode to opening-sensitive, in this case the sensor must be normally closed, and alarm is raised on the remote device, when the sensor opens.

The relay switches to the "alarm" state (contact 9 disconnected from contact 4 and connected to contact 5) under the following conditions:

- power failure;
- contact 3 is connected to contact 7 at the remote device (or it is disconnected, if the opening-sensitive mode is selected);
- connection over the physical pair is not activated;
- loss of signal (LOS) or loss of cycle structure at one of the (used) E1 ports.

3.3. Device responses to emergencies

Local device			Remote device	
State	Indicators and relays	AIS output to E1 ports	Indicators and relays	AIS output to E1 ports
Loss of electric ower supply	All indicators do not light, Relay - ALARM		LINK-LOC - red, LINK-REM - does not light, Relay - ALARM	To all E1 ports
No SHDSL link connection	LINK-LOC - red, LINK-REM - does not light, Relay - ALARM	To all E1 ports	LINK-LOC - red, LINK-REM - does not light, Relay - ALARM	To all E1 ports
High error rate in the SHDSL link	LINK-LOC - blinks red, LINK-REM -do not light		LINK-LOC - blinks red, LINK-REM - does not light	
Ethernet port disabled	ETH-LOS and ETH-STATUS do not light			
No Ethernet cable plugged and port enabled	ETH-STATUS - green, ETH-LOS - red, Relay - ALARM			
E1 port disabled	E1-LOC and E1-REM of the corresponding port do not light			
Loss of E1 port signal or frame synchronization	E1-LOC - red, E1-REM - does not light, Relay - ALARM	To the E1 port, if the 'AIS on LOS' parameter is specified		
Link local loop enabled	LINK-LOC blinks (single flashes)	To all E1 ports		
Link remote loop enabled	LINK-REM blinks (single flashes)		LINK-LOC blinks green (single flashes)	To all E1 ports
E1 port loop enabled	E1-LOC blinks (single flashes)			
E1 port tributary loop enabled	E1-LOC and E1-REM blink red	E1 port disabled		
BER tester enabled on the line	LINK-LOC blinks (single flashes)			To all E1 ports

3.4. Loops

Normal mode

Local device: normal operation   Remote device: normal operation
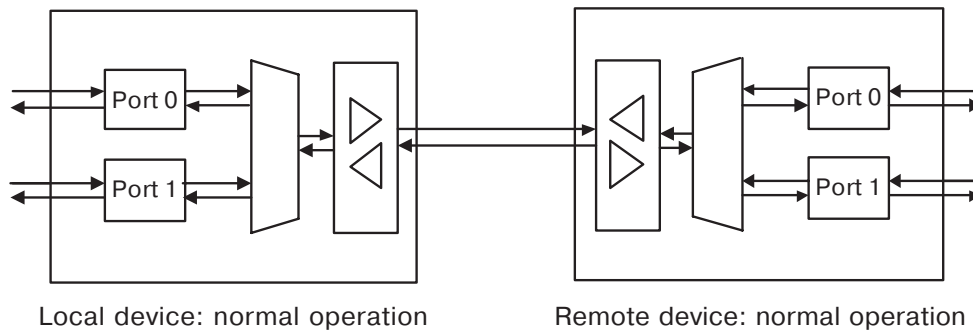
The indicators must me in the following states during normal operation mode (all ports used):

Indicator	Color	State
PWR	Green	On
TST	-	Does not light
E1-LOC	Green	Lights
E1-REM	Green	Lights[*)]
LINK-LOC	Green	Lights
LINK-REM	Green	Lights
ETH-LOS	-	Does not light
ETH-STATUS	Green	Lights
ETH-FAST	Green	Lights if 100Base-T mode is selected
ETH-LINK	Green	Lights (blinks during data transmission)
SNMP-LINK	Green	Lights if the Ethernet cable is connected to the SNMP port
SNMP-ACT	Green	Blinks during data transmission over the SNMP port

[*)] The E1-REM indicator does not light in the unframed mode (the mode without frame structure).

E1 port loop (Port 0 loop)

Local device: E1 port loop
(Port 0 loop)

Remote device: normal operation
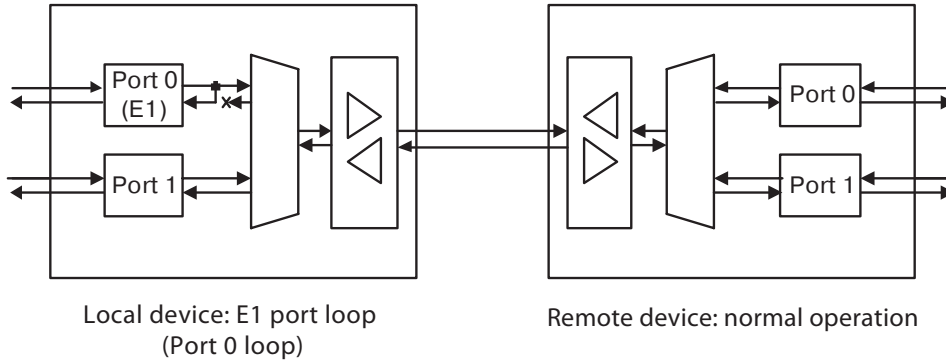
When loop is enabled on the E1 port, the data received from the E1 port are turned back. The E1-LOC indicator blinks (single flashes); its color depends on the status: red - loss of signal (LOS) on the E1 receiver input, alarm indication signal (AIS) is received, loss of frame (LOF) of multiframe (LOMF) synchronization, green - no errors.

E1 port tributary loop (Port 0 tributary loop)

Local device: E1 port tributary
loop (Port 0 tributary loop)

Remote device: normal operation
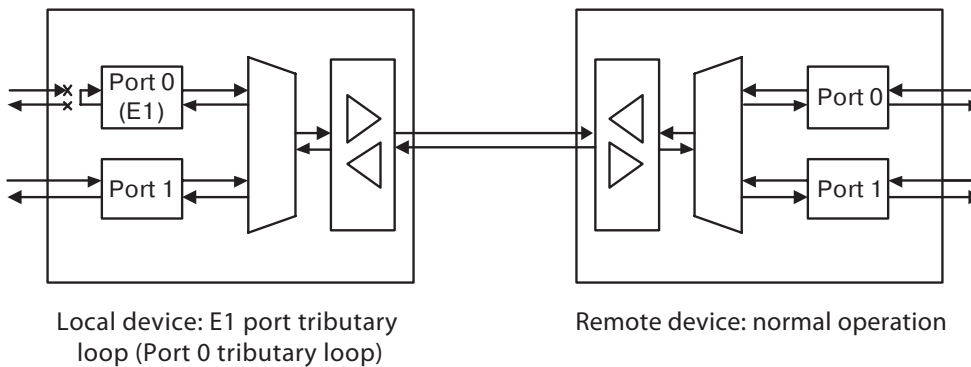
The loop towards the SHDSL link may be enabled either on the full payload (see Local loop on the link), or over the E1 port tributary (tributary loop).

When the loop is enabled on the E1 port tributary, the data corresponding to the E1 port received from the SHDSL link, are turned back. In this mode E1 port receiver and transmitter are disconnected from the link.E1-LOC and E1-REM indicators simultaneously blink red.

Local loop on the link

Local device: link loop   Remote device: normal operation
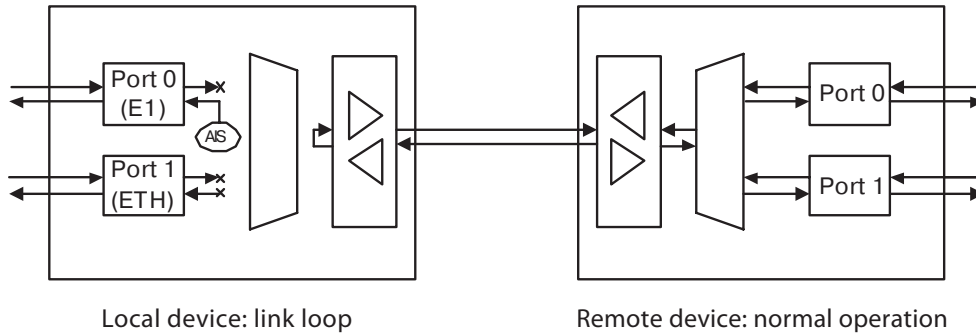
When the loop is enabled on the SHDSL link, the data received from the link are turned back. In this case, local and remote Ethernet ports are disconnected from the link, and the AIS signal is output to local E1 port(s). The LINK-LOC indicator blinks (single flashes), its color depends on the SHDSL port status: red - connection not established, or errors in the link (CRC anomaly, LOSW defect, Loop attenuation defect, SNR margin defect, LOSW failure), green - no errors.

Link remote loop

Local device: link remote loop   Remote device: Link loop enabled
                                                              after remote request
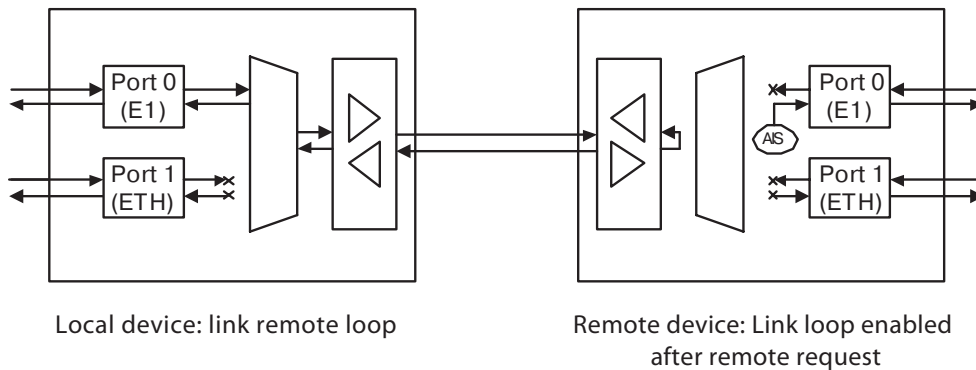
The remote device after request may enable the loop on the SHDSL link. In this case, the data received by the remote device are turned back to the link. Then local and remote Ethernet ports are disconnected from the link, and the AIS signal applied to the remote E1 port(s). The LINK-REM indicator on the local device and the LINK-LOC indicator on the remote device blink (single flashes).

3.5. Built-in BER tester

The Qlink-3000 multiplexing modem has a built-in BER tester, which allows to perform error rate measurements in the SHDSL link. The measurements are performed using fixed or pseudo-random code according to the O.151 recommendation (the pattern length is 2^{15}-1=32767 bits). The BER tester is controlled from the console (see the "Test" menu" section) or via an additional Ethernet port using the SNMP protocol. If remote control is allowed, then the BER tester may be controlled from a terminal connected to the console port of the remote device.

The BER tester may be enabled on the full useful bandwidth, or on the tributary of each port.

In order to test the link, it is recommended to enable loop on the remote device before enabling the BER tester. This may be performed using the "Link Remote Loop" command on the console of the local device or using the "Link Loop" on the console of the remote device.

Example of enabling the BER tester on the full bandwidth on the local device:

Local device: link remote loop,
BER-tester enabled over
full payload

Remote device: local loop enabled
after remote request
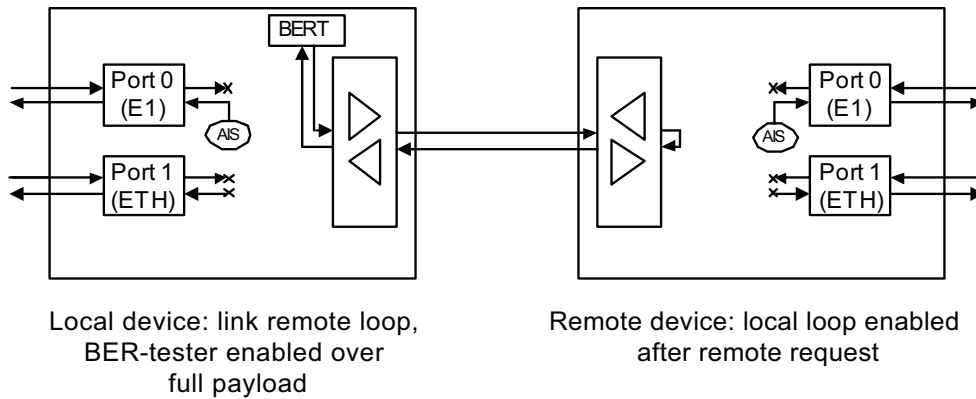
In order to measure error rate separately in "outgoing" and "incoming" directions, it is recommended to enable BER testers on both devices (in opposite directions).

Example: BER testers are enabled on local and remote devices:

Local device: BER tester enabled
over full useful bandwidth (link test)

Remote device: BER tester enabled
over full useful bandwidth (link test)
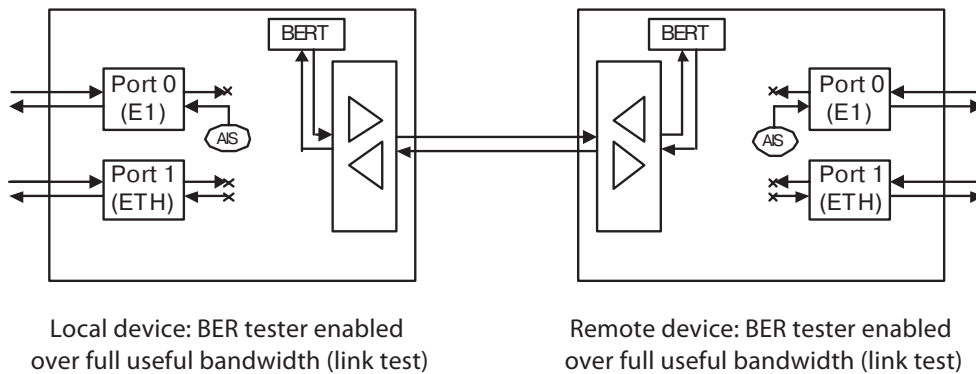
The BER tester may be enabled on one of the port tributaries, in this case the operation of the second port is not affected. Example: the BER tester is enabled on the port 0 tributary on the local device, loop is enabled on the port 0 tributary on the remote device:

Local device: BER tester on E1 port
tributary (Port 0 tributary test)

Remote device:
port 0 tributary loop
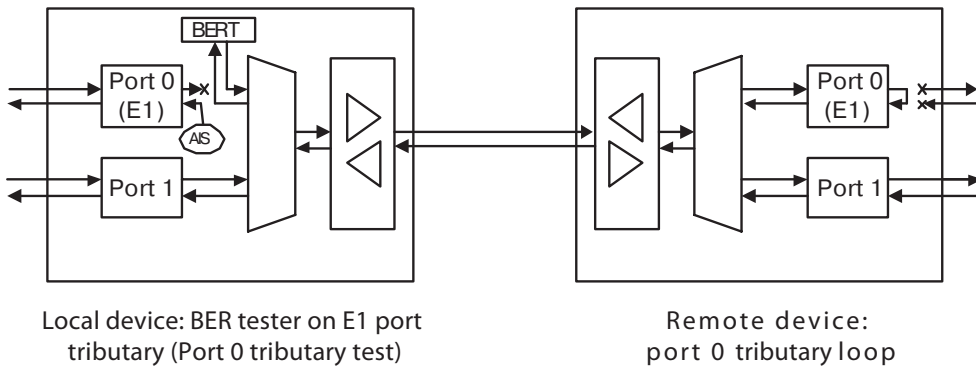
Section 4. Control via the console port

The front panel of the multiplexing modem is equipped with a DB9 (female) connector with an RS-232 interface for connecting the control terminal (console). The console may be used to view current device modes, port states, local and remote error statistics, to select device modes and save them in non-volatile memory. For the console data rate is equal to 9600 bits/s, 8 bits per character, no parity, 1 stop bit.

⚠ When the terminal is connected, the RTS signal (for flow control) must be provided.

4.1. Upper level menu

The console interface is designed as a simple hierarchical menu. To select a command, you must enter its number. To return to the upper-level menu, you must press <Enter> (or <Return>). An example of the main menu is given in the picture:

```
Cronyx Qlink-3000 E1/ETV revision A, 15/06/2004

Link: CO, 2320 kbps, SNR=23 dB (23 dB), PCLK=Port 0
Port 0: E1 (18x64=1152 kbps), Low gain, Use16, no CRC4, Idle=0xd5
Port 1: 18x64=1152 kbps, 100Base-T, Full Duplex
                1 3 5 7 9 1 3 5 7 9 1 3 5 7 9 1
Port 0 timeslots: #################............


  1. Statistics
  2. Event counters
  3. Loopback...
  4. Test...
  5. Configure...
  6. Link remote login
  0. Reset

Command: _
```

The upper line contains device model name, revision code and firmware date.

Then configuration parameters and modes for the SHDSL port (Link) and data ports (Port 0 and Port 1) are displayed.

The following parameters are displayed for the SHDSL port (Link):

- Mode: CO (Central Office) or RT (Remote terminal);
- Link transmission data rate (this parameter is not displayed if connection is not established);
- Signal/noise ratio on the local and the remote (in parentheses) devices (these parameters are not displayed if connection is not established);
- PCLK source;
- Link testing mode: Loop - loop is enabled on the link, Remote loop- remote loop request enabled, Test - BER tester enabled. When the BER tester is enabled, the measurement results are displayed:
  - Current Test error rate;
  - Time passed;
  - Total errors detected during testing time;

The following parameters are displayed for the E1 port (Port 0, Port 1):

- Mode (E1, Unframed) and useful bandwidth (Nx64 kbps, n=1..32);
- Maximum receiver gain (Low Gain - 12 dB, High gain - 43 dB);
- 16-th timeslot mode (Use16 - timeslot 16 may be used for data, Skip16 - CAS signaling is transmitted in the 16-th timeslot);
- CRC4 multiframe generation and check need indicator (CRC4, no CRC4);
- Idle code
- Testing mode: Loop - loop enabled on the port, Tloop - port tributary loop enabled - port disabled, TTest - BER tester enabled on port tributary. When the BER tester is enabled, the measurement results are displayed:
  - Current Test error rate;
  - Time passed;
  - Total errors detected during testing time;

The following parameters are displayed for the Ethernet port (Port 1):

- Useful bandwidth (Nx64 kbps, n=1..36);
- Port mode (100Base-T or 10Base-T);
- Duplex type (Half Duplex or Full Duplex);
- Ethernet frame filtering disable indicator (No filtering);

If E1 port(s) operates in the framed mode, then the timeslots transmitted over the SHDSL link are displayed for them.

4.2. Menu structure

```
1. Statistics              1. Link loop: enabled/disabled          1. Error insertion rate

2. Event counters          2. Port 0 loop - enabled/disabled       2. Insert single error

                           5. Port 0 tributary loop - enabled/     3. Test pattern: pseudorandom/fixed
3. Loopback ...                disabled                                code

                           7. Link remote loop - enabled/          4. Test code value
                               disabled

4. Test ...                1. Link test - run/stopped              1. Framing: E1/Unframed

                           2. Port 0 tributary test - run/stopped  2. Timeslots...

                           3. Port 1 tributary test - run/stopped  3. Timeslot 16: Use/Skip

                           4. Test Results...                      4. CRC4: No/Yes

                                                                   5. Idle Code

5. Configure ...           1. PCLK source: Port 0/Int              6. Receiver Gain: Low/High

                           2. Mode: CO/RT                          7. Loss of sync action: Ignore/
                                                                      Remote Alarm/AIS
                           3. Port 0 ...

                           4. Port 1...                            1. Payload Rate

                           5. Alarm input: Normal/Inverted         4. Negotiation: Automatic/manual

                           6. SNMP...                              5. Media Type: 100Base-T/10Base-T

                           7. Remote control: Enabled/Disabled     6. Duplex: Half/Full

                           8. Factory settings...                  7. Filtering: Enabled/Disabled

                           9. Save parameters

                           0. Restore parameters                   1. IP address/netmask

                                                                   2. Gateway IP address

6. Link remote login                                               3. Get community

0. Reset                                                           4. Get IP address/netmask

                                                                   5. Set community

                                                                   6. Set IP address/netmask

      Menu structure for models:                                  7. Traps: Enabled / Disabled
    Qlink-3000/S-E1/ETV-SNMP-AC
    Qlink-3000/S-E1/ETV-SNMP-DC                                    8. Authentication traps: Enabled /
                                                                      Disabled

                                                                   9. Trap community

                                                                   0. Trap destination IP address
```

1. Statistics		1. Link loop: enabled/disabled		1. Error insertion rate
2. Event counters		2. Port 0 loop - enabled/disabled		2. Insert single error
3. Loopback ...	→	3. Port 1 loop - enabled/disabled		3. Test pattern: pseudorandom/fixed code
		5. Port 0 tributary loop - enabled/disabled		4. Test code value
		6. Port 0 tributary loop - enabled/disabled		
		7. Link remote loop - enabled/disabled		1. Framing: E1/Unframed
4. Test ...	→	1. Link test - run/stopped		2. Timeslots...
		2. Port 0 tributary test - run/stopped		3. Timeslot 16: Use/Skip
		3. Port 1 tributary test - run/stopped		4. CRC4: No/Yes
		4. Test Results...		5. Idle Code
5. Configure ...	→	1. PCLK source: Port 0/Port 1/Int		6. Receiver Gain: Low/High
		2. Mode: CO/RT		7. Loss of sync action: Ignore/Remote Alarm/AIS
		3. Port 0 ...		1. Framing: E1/Unframed
		4. Port 1...		2. Timeslots...
6. Link remote login		5. Alarm input: Normal/Inverted		3. Timeslot 16: Use/Skip
0. Reset				4. CRC4: No/Yes
				5. Idle Code
				6. Receiver Gain: Low/High
				7. Loss of sync action: Ignore/Remote Alarm/AIS
		6. SNMP...		1. IP address/netmask
		7. Remote control: Enabled/Disabled		2. Gateway IP address
		8. Factory settings...		3. Get community
		9. Save parameters		4. Get IP address/netmask
		0. Restore parameters		5. Set community
				6. Set IP address/netmask
				7. Traps: Enabled / Disabled
				8. Authentication traps: Enabled / Disabled
				9. Trap community
				0. Trap destination IP address

**Menu structure for models:
Qlink-3000/S-2E1-SNMP-AC
Qlink-3000/S-2E1-SNMP-DC**

4.3. "Statistics" menu

The "*Statistics*" mode is designed for viewing link operating modes and statistics counters.

```
Statistics: Session #1, 1 days, 21:06:47

Link: CO, 2320 kbps, SNR=23 dB (23 dB), PCLK=Port 0
Port 0: E1 (18x64=1152 kbps), Low gain, Use16, no CRC4, Idle=0xd5
Port 1: 18x64=1152 kbps, 100Base-T, Full Duplex
                  1 3 5 7 9 1 3 5 7 9 1 3 5 7 9 1
Port 0 timeslots: #################............


                BPV      OOS      Err     Event    Status
Link:           0        21       13      7        Ok
 far end:       0        22       13      1        Ok
Port 0:         0        3        0       0        Ok
 far end:       0        27       0       0        Ok
Port 1:         -        -        15      0        Ok
 far end:       -        -        14      0        No cable

C - clear counters, R - refresh mode, any key to break...
```

The information on the screen is updated once per two seconds. To return to the upper-level menu, you must press <Enter> (or <Return>). Press "R" to turn imposition mode on/off. In the imposition mode, the screen will not be cleared when information is updated. To clear the statistics counters, press "C". To clear counters on the remote device, press "Z".

The "Statistics" line contains the current session number and time passed from powerup or restarting the multiplexer ("Reset" command). The session number is incremented after each restart of the device.

Then device configuration parameters are displayed (for more details see "Main menu" section).

Then counters (local and remote (far end)) and port states are displayed. If connection with the remote side is not established, then remote port counters and states are not displayed.

Statistics counters:

- BPV – for the SHDSL link and E1 ports - the number of code violations detected; this counter if not displayed for the Ethernet port;
- OOS – for the SHDSL link - the number of seconds, during which the connection with the remote device was lost; for the E1 port - the number of seconds, during which

signal, frame or multiframe synchronization was lost; this counter is not displayed for the Ethernet port;

- Err – for the SHDSL link - the number of seconds, during which the blocks with wrong CRC or BER tester errors were detected; for the E1 port - the number of seconds, during which CRC4 errors or BER tester errors were detected; for the Ethernet port - the number of seconds, during which Ethernet bridge module errors were present;
- Event – for the SHDSL link - the number of seconds, during which slip events or jitter attenuator errors were found; for the E1 port - the number of seconds, during which slip events were present; for the Ethernet port - the number of seconds, during which collisions were observed in the network segment;

SHDSL "Link Status":

- Initialization – port initialization;
- Activating – connect activation;
- OK – normal mode (connection with the remote device established, there are no errors);
- CRC anomaly – connection with the remote device established, but wrong CRC blocks are received;
- LOSW defect – connection with the remote device established, but there is wrong synchronization word in the received block;
- Loop attenuation defect – connection with the remote device established, but signal attenuation in the link exceeds the acceptable threshold;
- SNR margin defect – connection with the remote device established, but the signal-to-noise ratio is below the acceptable threshold;
- LOSW failure – connection with the remote device established, but wrong synchronization word blocks are received;

The state of the E1 port is shows as a set of flags:

- Unused – port not used;
- LOS – loss of signal in the link;
- AIS – link Alarm Indication Signal received (the "Blue Alarm");
- LOF – loss of frame synchronization;
- LOMF – loss of multiframe synchronization;
- FARLOF – fault signal received (bit A of the zero timeslot);
- CRCE – CRC4 error;
- SLIP – controlled slip event;
- OK – normal mode (link signal, frame and multiframe synchronization are present);

4.5. "Event counters" command

Use "*Event counters*" command to get more detailed information about counters.

```
Alive: 0 days, 18:04:39 since last counter clear

Link counters

CV = 0   - coding violations
     0           - total code violations

OOS = 52  - seconds without carrier

Err = 0  - seconds with CRC error(s), LOSW defect(s) or BERT errors
     0           - total CRC errors

Event = 1  - seconds with jitter attenuator error(s) or S(H)DSL slip(s)
     0           - total jitter attenuator errors
     0           - seconds with jitter attenuator error(s)
     0           - jitter attenuator FIFO overflow errors
     2           - jitter attenuator FIFO underflow errors
     1           - seconds with jitter attenuator FIFO error(s)
     0           - TFSC jerks
     0           - seconds with TFSC jerk(s)
     0           - receive slip events
     0           - transmit slip events
     0           - seconds with slip event(s)

Press any key to continue...
```

SHDSL link counters:

- total code violations – total number of encoding errors;
- total CRC errors – total number of received blocks with wrong CRC;
- total jitter attenuator errors – total number of jitter attenuator errors;
- seconds with jitter attenuator error(s) – seconds, during which jitter attenuator errors were present;
- jitter attenuator FIFO overflow errors – the number of jitter attenuator FIFO buffer overflows;
- jitter attenuator FIFO underflow errors – the number of jitter attenuator FIFO buffer underflows;
- seconds with jitter attenuator FIFO error(s) – seconds, during which jitter attenuator FIFO buffer errors (overflows or underflows) were present;
- TFSC jerks – the number of TFSC errors (this error appears when the PCLK synchronization source is unstable);

- seconds with TFSC jerk(s) – seconds, during which transmission synchronization pulse errors were present;
- receive slip events – the number of slip events in the receiving path;
- transmit slip events – the number of slip events in the transmitting path;
- seconds with slip event(s) – seconds, during which slip events in the receiving or transmitting path were present;

```
Port 0 counters

BPV = 0  - HDB3 encoding violations
     0          - total HDB3 encoding violations

OOS = 1 - out of service seconds
     3          (0%) - frame alignment signal errors

Err = 0 - seconds with CRC4 or BERT errors
     0          (0%) - total CRC4 errors

Event = 0  - seconds with slip events
     0          (0%) - total slip full events
     0          (0%) - total slip empty events

Port 1 counters

0 - seconds with errors
0 - counter of Ethernet errors
0 - seconds with collisions
0 - counter of collisions

Press any key to continue...
```

E1 port counters:
- total HDB3 encoding violations — total number of HDB3 encoding errors;
- frame alignment signal errors — number of FAS errors;
- total CRC4 errors — total number of CRC4 errors;
- total slip full events — total number of slip buffer overflow errors;
- total slip empty events — total number of slip buffer underflow errors;

Ethernet port counters:
- seconds with receive errors – time, in seconds, during which data reception errors were observed;
- counter of Ethernet errors — Ethernet error counter;
- seconds with collisions — time, in seconds, during which collisions were observed;
- counter of collisions — Ethernet collision counter.

4.6. "Loopback" menu

The "*Loopback*" menu is designed for loop management:

```
Loopback


  1. Link loop - disabled
  2. Port 0 loop - disabled
  5. Port 0 tributary loop - disabled
  7. Link remote loop - disabled

Command: _
```

The following loops are implemented:
- Link loop – local loop on the link. The data received from the link are turned back;
- Port loop – local loop on the port (for E1 ports only). The data received from the port are turned back;
- Port tributary loop – loop on the port tributary (for E1 ports only). The data received from the SHDSL link, and corresponding to the port, are turned back. The other port continues to operate normally.
- Link remote loop – remote loop on the link. Request to enable loop on the remote device is transmitted towards the link;

4.7. "Test" menu

The "*Test*" menu is designed to control the BER-tester.

```
BER Test


  1. Link test - stopped
  2. Port 0 tributary test - run
  3. Port 1 tributary test - stopped
  4. Test results...

Command: _
```

The BER tester may be enabled towards the SHDSL link only:
- Link test – over full payload;
- Port 0 tributary test – over port 0 tributary;
- Port 1 tributary test – over port 1 tributary;

In order to view test results, select the "Test results..." item:

```
Port 0 Tributary Bit Error Test


Bit error rate: 0.0

Total errors:              87
Elapsed seconds:           75   (00:01:15)
Seconds with no sync:       4   (00:00:04)
Seconds with errors:       18   (00:00:18)

  1. Error insertion rate: no errors inserted
  2. Insert single error
  3. Test pattern: pseudorandom

<C> - clear errors counter, <R> - refresh mode, <Enter> - exit
```

The information on the screen is updated once per two seconds. To return to the upper-level menu, you must press <Enter> (or <Return>). Press "R" to turn the imposition mode on/off. In the imposition mode the screen will not be cleared when information is updated. To reset BER-tester counters, press "C".

Command "1" selects the error insertion rate, 10^{-7} to 10^{-1} errors/bit. Command "2" inserts a single error. Command "3" switches the test data pattern to fixed 8-bit code.

Test results information is displayed in the following lines:
- Bit error rate – error rate in the received data. If not test pattern was detected during reception, then the "Test pattern not detected" string is displayed instead of the error rate;
- Total errors – data error counter;
- Elapsed seconds – total testing time;
- Seconds with no sync – the number of seconds, during which test pattern synchronization was absent;
- Seconds with errors – the number of seconds, during which errors were detected.

BER tester modes are not saved in the non-volatile memory.

4.8. "Configure" menu

The "*Configure*" menu allows to select multiplexing modem operating modes:

```
Configure


  1. PCLK source: Port 0
  2. Mode: CO (Central Office)
  3. Port 0...
  4. Port 1...
  5. Alarm input: Normal
  6. SNMP...
  7. Remote control: Enabled
  8. Factory settings...
  9. Save parameters
  0. Restore parameters

Command: _
```

If the current parameters have been set unsuccessfully, the saved configuration may be restored using the "*Restore parameters*" command. After setting the parameters, you should save them in the non-volatile memory (NVRAM) using the "*Save parameters*" command. If required, all settings may be restored to a known initial state using the "*Factory settings*" menu item.

"PCLK source" parameter

In order to specify the synchronization source for the transmitting path of the SHDSL port, select the "PCLK Source" item. The synchronization source may be one of the following:

* Internal generator of the device – "Int";
* E1 port receiving path – "Port 0" or "Port 1" (for the model equipped with two E1 ports).

In the majority of cases the synchronization source for the SHDSL transmitting path must be set E1 port receiver (for example, "Port 0").

"Mode" item

To set the operating "Mode" for the device. When two devices are operating in a pair, one of them must be set as "CO (Central Office)", and the other - as "RT (Remote Terminal)".

"Port 0..." and "Port 1..." menus

These two menus are designed to specify configuration parameters for the corresponding ports.

Port E1 configuration

```
Port 0


  1. Framing: E1
  2. Timeslots...
  3. Timeslot 16: Use
  4. Crc4: No
  5. Idle code: 0xd5
  6. Receiver gain: Low
  7. Loss of sync action: Remote Alarm


Command: _
```

The following parameters are specified for E1 ports:

* Operating mode (Framing): with the G.704 cycle structure (E1) or transparent G.703 stream translation (Unframed). This menu item is not displayed, if a bandwidth of other port exceed 256 kbit/sec (4 x 64 kbit/sec);
* Timeslots, which are transmitted over the SHDSL line. This menu item is not displayed, if the port operates in transparent G.703 stream translation mode;

- Use of Timeslot 16 (Timeslot 16): Use - the timeslot may be used for data transmission, Skip - the 16-th timeslot is used to transmit CAS multiframes generated by the multiplexing modem. This menu item is not displayed, if the port operates in transparent G.703 stream translation mode;
- CRC4 supercycle generation and control (CRC4): Yes - CRC4 multiframe generation and checking enabled, No - disabled. This menu item is not displayed, if the port operates in transparent G.703 stream translation mode;
- Idle code (Idle code): an eight-bit code (0x00 - 0xff), which is transmitted in unused timeslots. In the majority of cases, this parameter must be set to the 0xd5 value. This menu item is not displayed, if the port operates in transparent G.703 stream translation mode;
- Maximum receiver gain (Receiver gain): Low - low gain (12 dB), High - high gain (43 dB);
- Reaction to the loss of synchronization (Loss of sync action): AIS - the AIS alarm indication signal AIS ("Blue Code") is output to the port during signal of frame synchronization loss, Remote Alarm – bit A of the zero timeslot is set.

In order to disable the E1 port, it is required to set the framed mode (Framing: E1) and not to assign and timeslots (from the "Timeslots" item).

Ethernet port configuration

```
Port 1


  1. Payload Rate: 256 kbps (4x64 kbps)
  4. Negotiation: Manual
  5. Media Type: 100Base-T
  6. Duplex: Half
  7. Filtering: Enabled

Command: _
```

The following parameters should be set for the operation of the Ethernet port:
- Payload Rate – Ethernet port bandwidth (64 - 2304 kbit/s, N x 64 kbit/s, N = 1...36). In order to disable the Ethernet port, it is required to specify a 0 kbit/s bandwidth;
- Negotiation – Rate and Duplex parameter setting mode: Automatic or Manual;
- Media Type – Ethernet port mode: 100Base-T or 10Base-T (when Negotiation=Manual);
- Duplex – duplex mode: Full or Half (when Negotiation=Manual);
- Filtering – packet filtering: Enabled or Disabled.

"Alarm input" command

The "*Alarm input*" toggles the input emergency alarm contacts mode. The external sensor has two operating modes: "Normal" – closing-sensitive (default), and "Inverted" – opening-sensitive. In the "Normal" mode, when contact 3 connects to contact 7, the remote device goes into the emergency alarm status. (See section "Emergency alarm" for more details).

"SNMP" menu

The "*SNMP*" menu is designed for setting network IP addresses and SMTP protocol parameters:

```
SNMP

MAC address: 00-09-94-00-1a-49

  1. IP address/netmask: 131.201.94.11 / 24
  2. Gateway IP address: 131.201.94.254
  3. Get community: public
  4. Get IP address/netmask: 131.201.94.0 / 24
  5. Set community: private
  6. Set IP address/netmask: 131.201.94.55 / 32
  7. Traps: Enabled
  8. Authentication traps: Enabled
  9. Trap community: alert
  0. Trap destination IP address: 131.201.94.55

Command: _
```

The following parameters should be set for the operation of the SNMP port:

• IP address/subnet mask – the IP-address of the Ethernet port, and the length of the subnet mask;

- Gateway IP address – the IP-address of the routing gateway.

The following parameters must be set for control over the SNMP protocol:
- Get community – information query access password;
- Get IP address/subnet mask – the IP-address and the subnet mask length for the restriction of information query access;
- Set community – access password for parameter settings;
- Set IP address/subnet mask – the IP-address and the subnet mask length for the restriction of access to parameter settings;
- Traps – allow sending messages about emergency situations;
- Authentication traps – allow sending messaged about unauthorized access attempts;
- Trap community – password for sending messaged about emergency situations;
- Trap destination IP address – the IP-address for sending messages about emergency.

"Remote control" parameter

If remote control is enabled (Remote control: Enabled), then the remote device may be used to change any device configuration parameters, and to enable diagnostic modes (loops, BER-tester).
The main menu during remote log in to the device with remote control enabled:

```
Cronyx Qlink-3000 E1/ETV revision A, 15/06/2004


  1. Statistics
  2. Event counters
  3. Loopback...
  4. Test...
  5. Configure...
  0. Reset

Remote (^X to exit): _
```

When remote control is disabled (Remote control: Disabled) only statistics counters may be viewed during remote log in.
The main menu during remote log in to the device with remote control disabled:

```
Cronyx Qlink-3000 E1/ETV revision A, 15/06/2004


  1. Statistics
  2. Event counters

Remote (^X to exit): _
```

"Factory settings" menu

The "*Factory settings*" menu may be used to reset device parameters to one of the initial states:

```
  Factory settings


    1. CO, 2048 kbps to Port 0, 256 kbps to Port 1
    2. CO, 2304 kbps to Port 1
    3. CO, 1152 kbps to Port 0, 1152 kbps to Port 1
    4. RT, 2048 kbps to Port 0, 256 kbps to Port 1
    5. RT, 2304 kbps to Port 1
    6. RT, 1152 kbps to Port 0, 1152 kbps to Port 1

  Command: _
```

Selection of one of the configuration parameters options from the "*Factory settings*" menu does not affect network IP addresses settings and SNMP protocol settings (see the "SNMP" menu).

4.9. "Link remote login" command

The "*Link remote login*" command gives the opportunity to connect to the remote device menu. An example of the remote menu is given below. To disconnect from the remote menu, type ^X (Ctrl-X).

```
  RCronyx Qlink-3000 E1/ETV revision A, 15/06/2004

  Link: RT, 2320 kbps, SNR=23 dB (23 dB), PCLK=Port 0
  Port 0: E1 (18x64=1152 kbps), Low gain, Use16, no CRC4, Idle=0xd5
  Port 1: 18x64=1152 kbps, No cable
                  1 3 5 7 9 1 3 5 7 9 1 3 5 7 9 1
  Port 0 timeslots: #################.............


    1. Statistics
    2. Event counters
    3. Loopback...
    4. Test...
    5. Configure...
    0. Reset

  Remote (^X to exit): _
```

In the remote login mode, it is possible to view device modes, link state and statistics. If remote control is enabled, (see the "Remote control" item), then it is possible to change device operating modes and to enable/disable loops and the BER-tester.

4.10. "Reset" command

The "*Reset*" command causes the multiplexing modem to restart. The configuration parameters stored in the non-volatile memory (NVRAM) are restored after this.

Section 5. Management via SNMP

The Qlink-3000 multiplexing modem may be equipped with a SNMP control port. The SNMP control port is located on the front panel, and has a standard Ethernet 10Base-T interface (RJ-45). The SNMP protocol allows to view current device modes, link states, local and remote error statistics, to change configuration parameters, and to enable diagnostic modes.

5.1. SNMP parameter settings

The following parameters must be set from the console to access the device over the SNMP protocol:

- IP address/netmask – the IP-address of the Ethernet port, and the length of the subnet mask;
- Gateway IP address – the IP-address of the routing gateway.
- Get community – information query access password;
- Get IP address/netmask – the IP-address and the subnet mask length to restrict information query access;

Information query access is permitted only for the hosts, whose IP-addresses are equal to the one specified by the "Get IP address" parameter. The higher-order bits are used for IP-address comparison, the number of which is specified by the "Netmask" parameter.

Additional parameters must be specified for access to parameter settings:

- Set community – access password for parameter settings;
- Set IP address/netmask – the IP-address and the subnet mask length for the restriction of access to parameter settings.

⚠ Access rights to parameter settings must be granted to authorized hosts only.

In case of emergencies, the device is able to send SNMP messages (traps). The following parameters must be specified to enable this:

- Traps – allow sending messages about emergency situations;
- Authentication traps – allow sending messaged about unauthorized access attempts;
- Trap community – password for sending messaged about emergency situations;
- Trap destination IP address – the IP-address for sending messages about emergency situations.

SNMP-messages (traps) are sent when the following events occur:

- Multiplexer power-up or reload – the COLD START message;
- Unauthorized access attempt over the SNMP protocol – the AUTHENTICATION FAILURE message;
- Connection establishment/loss over the SHDSL link – the LINK UP/LINK DOWN messages;
- Connection establishment/loss over the port – the PORT UP/PORT DOWN messages;

5.2. Management information blocks (MIBs)

The following management information blocks (MIBs) are implemented in the multiplexer:

- RFC 1213 (MIB-II) – standard management information block, including general system parameters (system) and SNMP protocol statistics (snmp);
- CRONYX-QLINK3000-MIB – a specialized management information block, containing the states of E1 ports and of the SHDSL link.

The CRONYX-QLINK3000-MIB management information block specification files are available from the www.cronyx.ru website.