ETS-1000L
Ethernet/Gigabit Ethernet loopback

Operating manual
Version 1.0.1, 2009

Metrotek

Contents

1. General description

Ethernet/Gigabit Ethernet loopback device **ETS-1000L** (referred to as device, analyser) is intended for performing loopback at the physical, data link, network and transport layers of the OSI model.

The device allows to carry out loopback control via OAM protocol and remote control via TELNET protocol.

2. Supply kit

Table 2.1. Supply kit

Item	**Quantity**
Ethernet/Gigabit Ethernet loopback device **ETS-1000L**	1
Power supply unit GS06E (9 V, 0,3 A)	1
Operating manual	1

3. Overview

3.1 Front panel

Front panel of **ETS-1000L** device is shown on the figure 3.1.

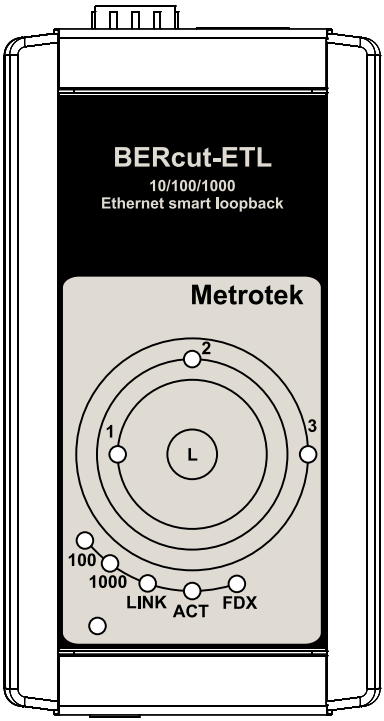

Figure 3.1. Front panel

LEDs
Green color of LEDs corresponds to a loopback layer:

- **1** — physical layer (1);
- **2** — data link layer (2);

- **3** — network layer (3);
- **1+3** — transport layer (4).

L

The button for loopback mode control. To switch between layers 1, 2, 3, 4 or turn loopback off, press this button as many time as needed.

Link speed LED indicators

LED indicators represents link speed.

Table 3.1. Speed LEDs

Speed	**LED**	**LEDs color**
10 Mbit/s	*100* and *1000*	green
100 Mbit/s	*100*	green
1000 Mbit/s	*1000*	green

LINK

LED is used to show link state:

- green — connection is established;
- off — no connection.

ACT

LED shows the data transmission state:

- green — data is being transmitted/received at the moment;
- off — no data is being transmitted or received at the moment.

FDX

LED shows Ethernet interface state:

- green — full-duplex connection;
- off — half-duplex connection.

Power

LED lights up when the power supply unit is plugged in.

3.2 External connectors

Location of external connectors on the top panel is shown on the figure 3.2.

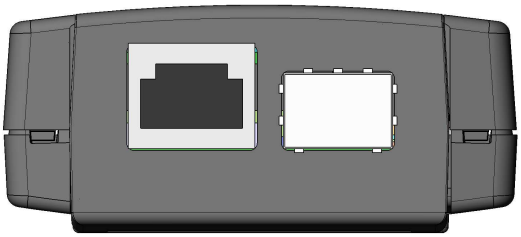

Figure 3.2. Top panel

Tester connectors and equipment to be connected are described in the table 3.2.

Table 3.2. Connectors description

Description	**Connected equipment**
RJ-45 connector to connect to the tested network or equipment	Ethernet cable
SFP-module connectors	SFP-module
External power unit connector	Power supply unit

4. Setting-up procedures

1. Get the tester from the box and make the external inspection. Check the complect according to the table 2.1.
2. Plug in the power supply unit to the electric network (if you use mains voltage 110–240 V with the 50–60 Hz frequency) and to the **ETS-1000L**.
3. The device is ready in 15 second.
4. To turn off the device switch off the power supply unit.

Note: *if you want to restore default settings of the device hold the button of a loop's level choice (**L**) for 5 seconds. Three LEDs will flash once for 1 second to inform you.*

5. Loopback

The Loopback function is necessary for networks testing in compliance with the RFC 2544, as well as for a number of other tasks. This function allows to test the network without changing it's settings.

Network testing with the Loopback function can be performed at the four OSI layers, jumbo frames are supported (up to 9600 byte).

- At the **Physical layer (L1)** all the incoming traffic is being retransmitted backward without changing.

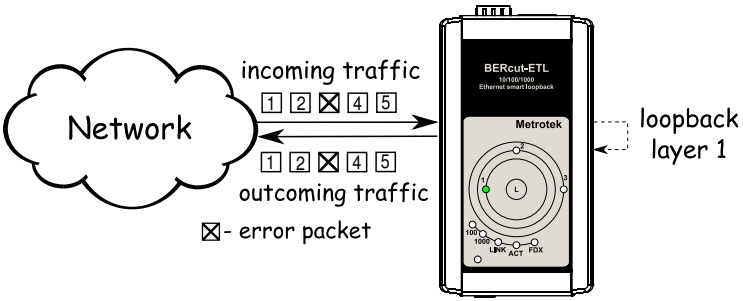

Figure 5.1. Loopback at the physical layer

All the connection schemes use the following notation:

  - MAC Src — source MAC address;
  - MAC Dst — destination MAC address;
  - IP Src — source IP address;
  - IP Dst — destination IP address.
  - TCP/UDP Dst — destination TCP/UDP port number;
  - TCP/UDP Src — source TCP/UDP port number.

- At the **Data link layer (L2)**, the incoming traffic (without error frames) is being retransmitted backward with swapping destination and source MAC addresses.

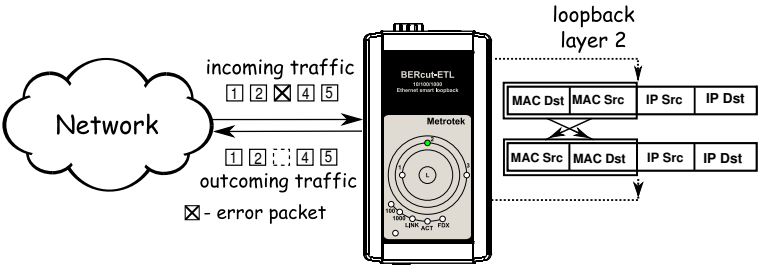

Figure 5.2. Loopback at the data link layer

Note: *if a frames destination MAC address is not equal to the MAC address of* ***ETS-1000L****, the frame will not be retransmitted.*

Note: *frames with equal destination and source MAC address are not retransmitted at the data link, network and transport layers.*

- At the **Network layer (L3)** the incoming traffic (without error packets) is being retransmitted backward with source and destination IP and MAC addresses swapping.

  Note: *the frame will be retransmitted only if a frames destination MAC address and destination IP address are equal to the MAC and IP address of* ***ETS-1000L****.*

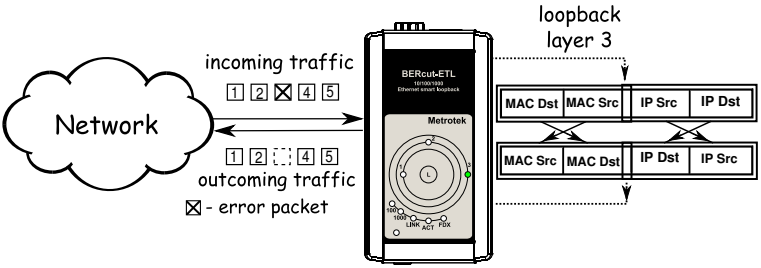

Figure 5.3. Loopback at the network layer

- At the **Transport layer (L4)** the incoming traffic (without error packets) is being retransmitted backward with source and destination IP and MAC addresses swapping and source and destination TCP/UDP addresses swapping.

Note: *the frame will be retransmitted only if a frames destination MAC address and destination IP address are equal to the MAC and IP address of* ***ETS-1000L****.*

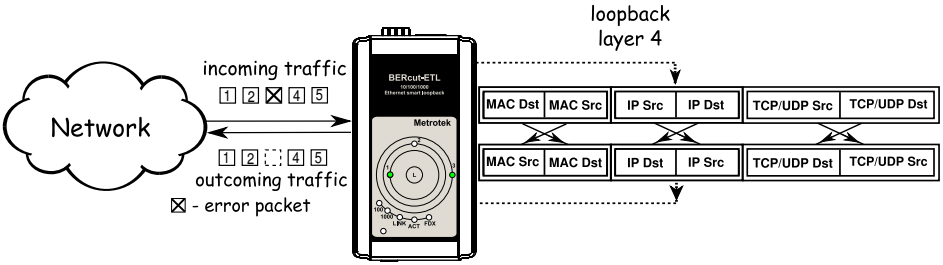

Figure 5.4. Loopback at the transport layer

5.1 Loopback adjustment

Connect **ETS-1000L** to the Ethernet network and select Loopback layer by pressing **L** button. Additional parameters (IP address, MAC address, etc.) are being adjusted in the remote management mode (see section 6).

6. Remote management

Telnet (Telecommunication Network) is a network protocol used for access to the remote network device. This network protocol allows the user of the personal computer to cooperate with the device on the other end of connection. By means of the commands presented in the table 6.1 and 6.2, it is possible to configure device and view current settings.

To manage device over Telnet protocol connect **ETS-1000L** to personal computer through the Ethernet interface. Loopback must be switched off.

Default IP address of the loopback device is 192.168.1.1.

Username — *admin*, default password — *admin*.

Table 6.1. Remote management commands; show mode

Command	**Information shown in the console or action performed**
show version	software versions
show link	the state of the interface
show ip address	interface IP address
show ip netmask	interface subnet mask
show ip gateway	gateway IP address
show mac	interface MAC address
show gbe speed	interface speed
show gbe autonegotiation	interface autonegotiation state
show gbe mac	interface MAC address
show oam mode	OAM mode: off/active/passive
show oam discovery	state of OAM discovery process
show tftp	state of a TFTP server: on/off
show vlan mode	vlan state: on/off
show vlan id	vlan identifier
show vlan priority	vlan priority
reboot	reboot device
configure	switch to configuration mode
exit	finish session
help	list of available commands

Table 6.2. Remote management commands (Telnet); configuration mode

Command	Operation
ip address	set interface IP address
ip netmask	set interface subnet mask
ip gateway	set gateway IP address
gbe mac	set interface MAC address
gbe speed	set interface speed: 10/100/1000/automatic
gbe autonegotiation	set autonegotiation mode: on/off
oam	set OAM mode: off/active/passive
vlan mode	set vlan mode: on/off
vlan id	set vlan identifier (a number in the 0–4095 range)
vlan priority	set vlan priority (a number in the 0–7 range)
tftp	enable or disable TFTP server: on/off
password	change admin's password
save	save settings; settings will be applied after device reboot
reboot	reboot device
exit	leave configuration mode
help	list of accessible commands

Note: *configuration mode commands become effective after* ***save*** *and* ***reboot*** *commands.*

6.1 OAM

OAM (Operations, Administration, and Maintenance) is a protocol of the link state monitoring. The protocol operates at the Data Link Layer of OSI model. To transmit data between two Ethernet-devices, OAM protocol data units (OAMPDU) are used.

An important feature of the OAM protocol is providing the ability to use Loopback mode for the remote end. Both devices should support the IEEE 802.3ah standard.

ETS-1000L and remote device should be connected directly.

Possible OAM states are described below.

- **Passive** — passive mode. In passive mode, the port can only response to Ethernet OAM commands from the remote device, but cannot initiate the Loopback mode.
- **Off** — OAM is disabled.

6.2 ET discovery

ET discovery function allows to switch off loopback mode or to change loopback level on **ETS-1000L** using ETS-1000.

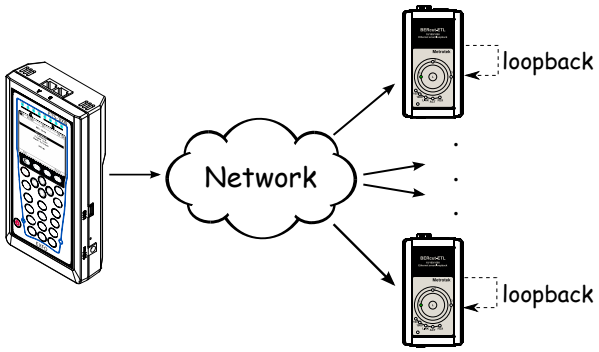

Figure 6.1. Connection diagram

In accordance with connection diagram it is possible to switch loopback mode on for several devices **ETS-1000L** in series. The devices may be in the same or in the different subnets.

> ***Note:*** *the loopback mode on the* ***ETS-1000L*** *devices may be switched off or switched on.*

6.3 Upgrading versions of the software

The last versions of the software for the **ETS-1000L** are accessible on the Internet (`http://www.metrotek.spb.ru/files/b3etl/release`). To upgrade to the latest versions of software it is necessary to execute sequence of actions.

1. Establish connection with the device over Telnet protocol, enter user name and password.
2. Enable TFTP server (*tftp on* command in **configure mode**).

If you use Linux operating system:

1. Configure TFTP client for a work in binary mode (*mode binary* command).
2. Connect to the device by means of TFTP client (*connect IP-address_of_device* command).

3. Upload software package file with the new version of software (*put path-to-file/image_X.X.X.fs*).

If you use Windows operating system:

1. Install **tftp client** on yor PC (WinAgents TFTP Client for example).
2. Enter in console terminal:

```
tftp.exe -i 192.168.1.1 put C:\work\image_X.X.X.fs
```

When the software package file is uploaded **ETS-1000L** will automatically reboot.

Notes

- *If current and new versions of the software are very much different, settings are restored to default.*
- *In case of unsuccessful upgrade device work still may be restored. Just hold the button of a loop's level choice for 5 seconds while turning on power supply.*
  Device will restore normal operation within 1 minute.

7. Troubleshooting

Table 7.1. Troubleshooting

Failure symptom	Possible reason	Repair method
Connection is lost	Incorrect cable connection	Check cable connection state
	Two active connections at the same time	Use only one active connection
No connection	Incorrect connection settings	Check autonegotiation mode state and interface settings
No telnet connection	Loopback mode is on, incorrect cable connection	Switch off Loopback mode and check cable connection state