MDS931C-1

MDS931C-2

MDS931AE-2

SUBSCRIBER ACCESS EQUIPMENT

MDSL MODEM

USER MANUAL

Version 1.0

CONTENTS

Version control

Version number	*Date*	*Content of changes*
0.0	01.05.2002	Initial version of the manual corresponding to version 1.31 of the device microprogram
0.1	07.02.2002	Added - telnet - remote statistics via secondary channel - 4.6Mbit operate mode
0.2	09.30.2002	IEEE 802.1Q target packet support
1.0	20.11.2002	The official version

Introduction

The Black Box DSL Discovery device is targeted at the organization of high-rate access to Internet or at the integration of LANs. The 2B1Q line encoding is used to transmit information over a twisted pair. The Black Box DSL Discovery device ensures organization of communication over one or two twisted pairs. The device provides transmission rates in the range from 192 Kbit/s to 4640 Kbit/s. The parameters of the device are stored in the NVRAM with the help of a PC. The *10/100Base-T* interface is used as a user's interface. The device can operate in the transparent bridge mode with the dynamic accumulation of MAC addresses.
The device is designed to organize a digital channel at the central office side and to connect this channel with the Black Box DSL Discovery external unit installed on the customer premises side. It is also possible to interconnect two stand-alone modems, for example, for the organization of communication between LANs.
The modems support uploading of new firmware versions using the Monitor port.

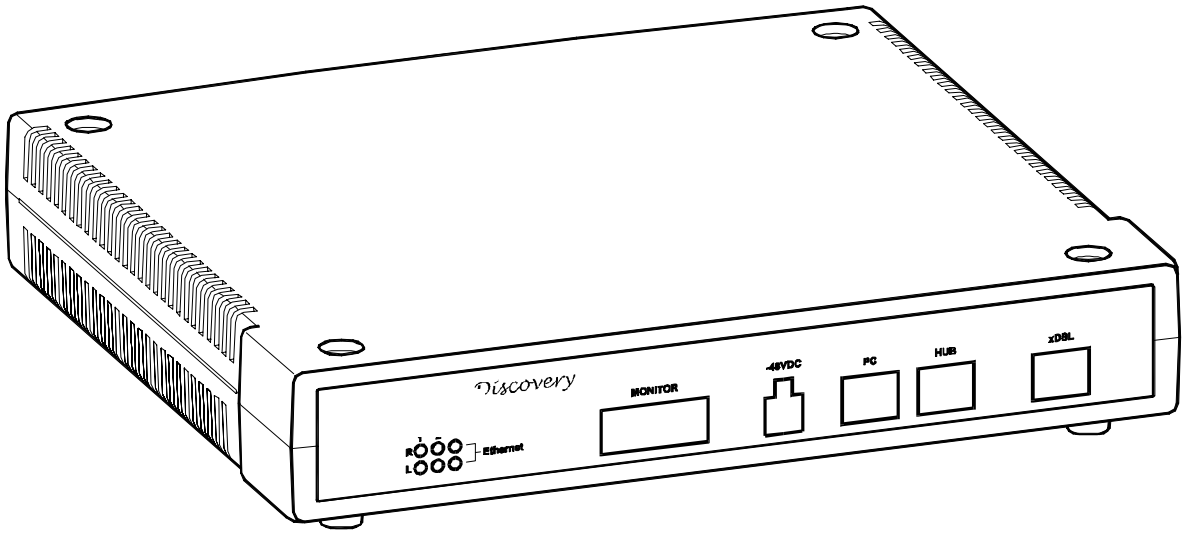
General information

- High-speed symmetrical data transmission over one or two physical copper twisted pairs with the 135 Ohm impedance according to ETSI TS 101 135.
- 2B1Q line encoding.
- Line rate in the range from 192 Kbit/s to 2320 Kbit/s over every pair, up to 4.6M over two pairs.
- Manual or automatic mode of line-speed adjustment.
- Ethernet *10/100Base-T* interface, Full/Half duplex.
- Transmition of VLAN packet (IEEE-802.1q).
- Dynamic table formation of MAC addresses.
- Accumulation of up to 1024 MAC addresses.
- Supported hot reserving DSL function
- Granting of 95% of the digital channel band to the user.
- In-built functions of diagnostics and self-testing.
- Low power consumption, easy-to-use applications.
- Console port for the local management.
- -48V power feeding
- ~220 V power feeding. (only for MDS931AE-2 model)

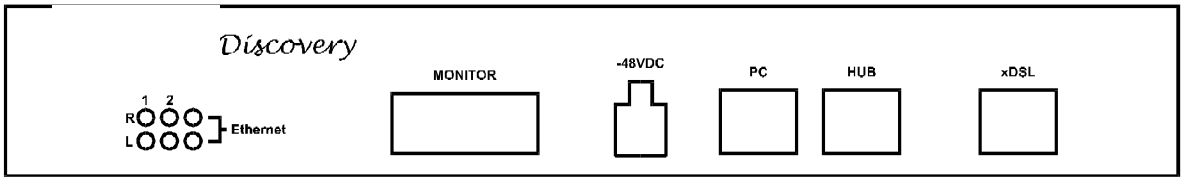
Description of the device

Exterior design

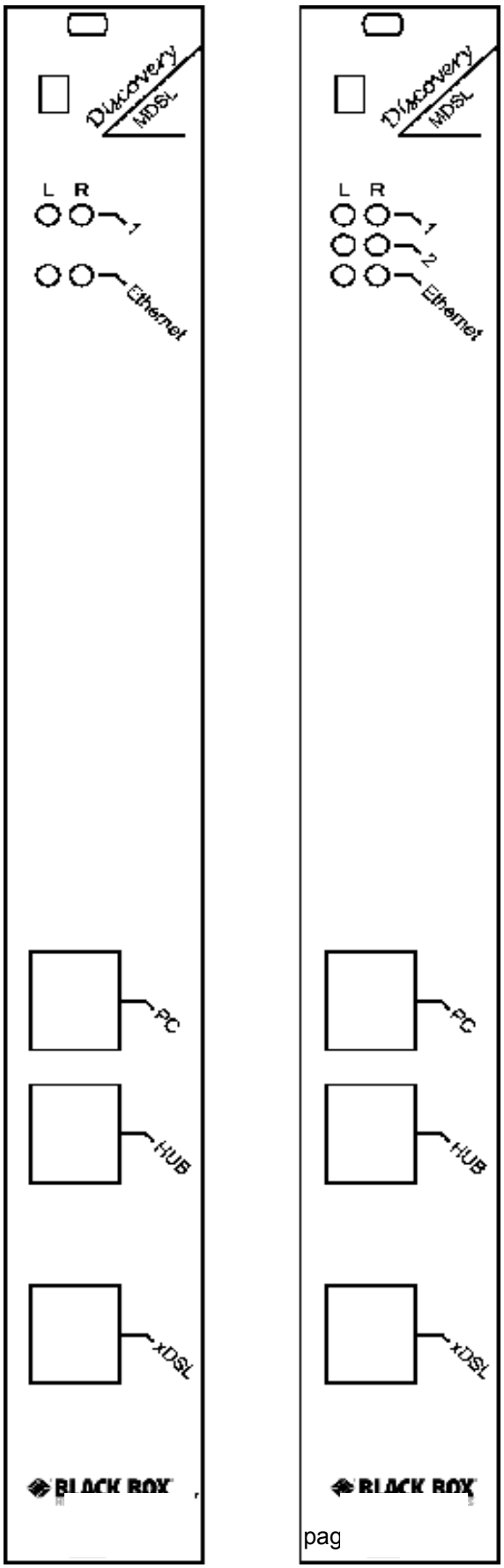
Exterior design of external model (MDS931AE-2) is introduced at the picture



The front panel of the device has six LEDs:



Exterior design of Rack Mount models MDS931C-1, MDS931C-2 is introduced at the picture



LOCAL(L)		informs the user about the status of the local device. The following four statuses are possible
	«blinking red»	informs the user about malfunctioning of the modem's hardware and software. In this case, the modem is out of order and should be submitted to the service center for being repaired.
	«red»	informs the user about an urgent alarm. An abruption of the connection, the correspondence of the signal-to-noise ratio which does not allow transmitting information and a great number of errored blocks can cause an urgent alarm. See the "Command menu" chapter for detail.
	«amber»	informs the user about non-urgent alarms. An abruption of connection over the user's interface can cause non-urgent alarms.
	«green»	absence of alarms. Normal functioning of the device.
REMOTE(R)		informs the user about the status of the remote device. At the time being the remote configuring of modems is not provided.
Ethernet		The LED is lit upon an incorrect connection to the LAN, blink when it is active
		The LED is lit upon the connection to the LAN at 100 Mbit/s.

The front panel of the external modem has:

- The "-48VDC" power connector. The connection of the modem to the 220 V power supply is implemented using an external power supply unit;
- the "Monitor" connector to control the modem and store statistics;
- "PC" and "HUB" connectors to connect the modem to the LAN using a straight Patch Cord (to the PC or HUB, respectively);
- the "DSL" connector to connect the modem to the leased physical line.

Rules of connection settings

It is necessary to stick to the following rules while configuring the modems:

- One modem should be set in the “MASTER” mode and the other should have this mode disabled. Usually the “MASTER” mode is enabled on the provider or central office side because in this mode the modem can affect the connection parameters.
- The value of “ADAPTIVE” parameters should be equal on both modems.
- For 4,6M connection, the value of “OPERATE” parameters must be set to “Transparent” on both modems.

The time of connections in ADAPTIVE mode depends on the current line conditional and can be up to 5 minutes.

Examples of the modem configuration (for every line).

Parameters	*Modem 1*	*Modem 2*
MASTER	ON	OFF
ADAPTIVE	OFF	OFF
LINERATE	2320	2320

The connection is established at a speed of 2320 Kbit/s.

Parameters	*Modem 1*	*Modem 2*
MASTER	ON	OFF
ADAPTIVE	OFF	OFF
LINERATE	192	192

The connection is established at a speed of 192 Kbit/s.

Rules of switching

Open the package and make sure that the delivery set is complete.

The delivery set

The delivery set includes:

- the subscriber access device (a modem);
- the power supply source (an AC adapter); (for MDS931AE-2)
- the cable for the connection to the line;
- Patch Cord UTP5
- User manual.

If any problems occur, address to the vendor.

Connection rules

During the connection of the modem stick to the following rules:
For external models

- connect the modem using the “straight” Patch Cord cable to the hub through the HUB connector or to the PC through the PC connector. Only one device can be connected to modem jack at same time.
- connect the modem, if necessary, to the serial port of the PC through the “MONITOR” connector using the “straight” modem cable;
- connect the modem to the line using the “DSL” connector;
- connect the power supply unit to the AC power system;
- connect the modem to the power adapter using the “-48VDC” connector;

- launch the hyper-terminal operation program on the PC.

For Rack Mount models

- insert modem card to shelf
- connect the modem using the “straight” Patch Cord cable to the hub through the HUB connector or to the PC through the PC connector. Only one device can be connected to modem jack at same time.
- connect the modem, if necessary, to the serial port of the PC through the “MONITOR” shelf connector using the “straight” modem cable;
- connect the modem to the line using the “DSL” connector;

Communication parameters of the terminal configuration

Management of devices of Rack Mount type

The device rear panel contains the TTL management bus, organized according to the “point/multipoint” scheme. The TTL-RS232 layer translator is on the rear panel of the device. The socket for the connection to the terminal is on the rear panel as well. If ACU and CMU are installed in Sub-Rack, the management socket is on the front panel.

To connect the terminal, it is necessary to use RS232 cable. While attaching the cable to the computer COM-port, make sure the port is not occupied by the other device drivers (for example, mouse).

The terminal must be configured in the following way:

• Transmission rate: 9600 kbit/s;
• Transmission format: 8-N-1;
• Flow management: XON/XOFF;
• Terminal type: VT100.

At any one time only one device in the shelf can be logically connected to the management interface. The device is chosen in accordance with the slot number, in which it is mounted. To choose the necessary device, type <%SN□>, where SN is the slot number.

Example: to select the modem, mounted in slot 3, type:
%03□
The unit in the shelf displays %SN after the ECHO command is entered, where SN is the slot number.
After typing “ECHO”, the operator will receive a response from LTU devices, as it is shown below:
ECHO
%01 %02 %08 %10 %11 %12

Management of devices of Stand Alone type

The management terminal is connected to the MONITOR socket (DB9 type), which is on rear panels. The requirements to the terminal configuration are analogous to those of Rack Mount devices. After the power is on, the computer displays information about the device firmware loading. It is necessary to set the following parameters to monitor the modem:

- transmission rate – 9600;
- data bits – 8;
- parity – none;
- number of stop bits – 1;
- flow control – XON/XOFF.

To update the information on the screen use the “Enter” key. The following menu will appear on the screen.

```
                    Black Box MDSL
                 Ethernet Monitor V1.41

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

NTU> Select [1..4]:
```

The modem is ready to be configured.

The command system

Basic rules

After the command is typed, press <enter>.
The <Backspace> key is used to edit commands.
Some commands have the parameter <C> to update the information on the screen. This mode starts acting after the command is entered. To exit from the mode press any key.
Each command has the (H)elp command to help the user and the (M)ain command to return to the main menu.

The main menu

The main menu is the following:

```
                    Black Box MDSL
                 Ethernet Monitor V1.21

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

NTU> Select [1..4]:
```

The menu consists of four submenus. To choose the needed submenu, it is necessary to type its number and press “Enter”. The main menu also contains information about the current version of the firmware. It is important that you inform the service center about it when being consulted.

Performance management submenu

Upon activation of the performance management submenu the following message will be displayed.
00:28:10 Performance management activated
Enter <M> to return to MAIN, or <H> for HELP information

```
NTU_PM_S09_P1>
```

Press <H> to see all available commands with their brief description.

00:28:10 Performance management activated
Enter <M> to return to MAIN, or <H> for HELP information

```
NTU_PM>H

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
LINE                    Display Line statistic
LINE C                  Display Line statistic continuously
ETH                     Display Ethernet statistic
ETH C                   Display Ethernet statistic continuously
MAC                     Display MAC table
RESET A                 Reset All statistics
RESET L                 Reset Line statistics
RESET E                 Reset Ethernet statistics
RESET M                 Reset MAC table statistics
TRACETIME [5..20]       Change trace time (5..20 seconds)
M(AIN)                  Return to main menu
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_PM_S09_P1>
```

TRACETIME command

The TRACETIME command allows the user to change the time interval of updating the information on the screen (5…20 seconds):

```
NTU_PM>TRACETIME 10
NTU_PM_S09_P1>
```

LINE command

The LINE command informs the user about the status of the connection over the physical line. Upon entering the <C> parameter, the updating of the information on the screen will occur automatically with the interval of 5…20 seconds according to the parameter set by the TRACETIME command:

Line Port Statistics

```
                                LOCAL                        REMOTE
-------------------------------------------------------------------------
                        5  sec        Total           5  sec        Total
Transmit Packets        0             0               0             0
Receive Packets         0             0               0             0
Receive Error Packets   0             0               0             0
Error Packet Rate, %    0.00          0.00            0.00          0.00

Receive Bytes           0             0               0             0
Transmit Bytes          0             0               0             0
Average Speed, kBps     0             0               0             0
-------------------------------------------------------------------------
Software Version        1.2
Link                    Down          Down
Line Speed, kBps         272           272
Signal Level, dBm        0.0           0.0            0.0
Far-End Level, dBm      63.0          63.0            0.0
Noise Level, dBm       -16.0         -16.0            0.0

NTU_PM_S09_P1>
```

ETH command

The ETH command informs the user about the status of the connection over the Ethernet port. Upon entering the <C> parameter, the updating of the information on the screen will occur automatically with the interval of 5…20 seconds according to the parameter set by the TRACETIME command:

Ethernet Port Statistics

```
        Speed           100M            Duplex Mode Full
        Link State      Link Up
                        Input                           Output
                5  sec          Total           5  sec          Total
Octets          180             3810            0               0
Ucast Packets   0               0               0               0
NUcast Packets  2               33              0               0
Discards Pckts  1               6               0               0
Errors          0               0               0               0

NTU_PM_S09_P1>
```


onesource for worldwide networksolutions

BLACK BOX Network Services AG
Zürcherstrasse 102 - CH-8852 Altendorf
Tel. +41(0)55 451 70 70 - Fax +41(0)55 451 70 75
e-Mail: blackbox@black-box.ch

for active and passive network components
www.black-box.ch

MAC command

The MAC command displays the table of MAC addresses on the screen

```
                                   LOCAL

00:48:54:6c:5e:08 2 00:90:27:1c:78:70 2 00:09:b7:02:66:91 2 00:c0:df:06:03:4d 2
00:60:08:76:61:c2 2 00:c0:26:31:66:c0 2 00:60:08:76:62:08 2 00:c0:26:a3:8c:df 2
00:60:52:0b:f8:01 2 00:30:48:10:7f:46 2 00:c0:26:aa:a7:1a 2 XX:XX:XX:XX:XX:XX
XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX
XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX
XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX
XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX
XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX
XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX
XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX   XX:XX:XX:XX:XX:XX

NTU_PM_S09_P1>
```

RESET command

The modem continuously stores statistics about its operation. The RESET command is used to reset all the statistics. The following parameters are available:

- “A” to reset all the statistics;
- “L” to reset the line statistics;
- “E” to reset the Ethernet port statistics;
- “M” to reset the MAC table statistics.

```
NTU_PM_S09_P1>RESET A
01:23:57 All modem statistics cleared

NTU_PM_S09_P1>RESET L
01:24:07 Line statistics cleared

NTU_PM_S09_P1>RESET E
01:24:15 Ethernet port statistics cleared

NTU_PM_S09_P1>RESET M
01:24:22 MAC table statistics cleared

NTU_PM_S09_P1>
```


one source for worldwide networksolutions

BLACK BOX Network Services AG
Zürcherstrasse 102 - CH-8852 Altendorf
Tel. +41(0)55 451 70 70 - Fax +41(0)55 451 70 75
e-Mail: blackbox@black-box.ch

for active and passive network components
www.black-box.ch

Fault and maintenance management submenu

Upon activation of the fault and maintenance management submenu the following message will be displayed.

```
01:37:30  Fault and maintenance management activated
          Enter <M> to return to MAIN, or <H> for HELP information


NTU_FMM_S09_P1>
Press <H> to see all available commands with their brief description.
01:37:30  Fault and maintenance management activated
          Enter <M> to return to MAIN, or <H> for HELP information


NTU_FMM_S09_P1>H

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
SQ                      Display Signal Quality
SQ C                    Display Signal Quality continuously
STATUS                  Display System Status
STATUS C                Display System Status continuously
ALARM                   Display Alarm
ALARM C                 Display Alarm continuously
TRACETIME [5..20]       Change trace time (5..20 seconds)
M(AIN)                  Return to main menu
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_FMM_S09_P1>
```

TRACETIME command

The TRACETIME command allows the user to change the time interval of updating the information on the screen (5…20 seconds):

```
NTU_PM_S09_P1>TRACETIME 10
NTU_PM_S09_P1>
```

SQ command

The SQ command informs the user about the status of the connection over the physical line. Upon entering the <C> parameter, the updating of the information on the screen will occur automatically with the interval of 5…20 seconds according to the parameter set by the TRACETIME command. It is very convenient to create a text file about the connection status for further analysis.

```
NTU_FMM_S09_P1>SQ

-----Levels, dBm ----------------------------------------------------------
Time            Signal  FarEnd  Noise          R.Pckts T.Pckts E.Pckts EPR%
-------------------------------------------------------------------------
01:39:13        49.0    50.0    -16.0          0       0       0       0.00

NTU_FMM_S09_P1>
```

Use this command to store the information about the quality of the connection in log files.

```
NTU_FMM_S09_P1>SQ C

-----Levels, dBm ----------------------------------------------------------
Time            Signal  FarEnd  Noise          R.Pckts T.Pckts E.Pckts EPR%
-------------------------------------------------------------------------
01:40:43        48.0    50.0    -16.0          0       0       0       0.00
01:40:53        49.0    50.0    -16.0          0       0       0       0.00
01:41:03        49.0    49.0    -16.0          0       0       0       0.00
01:41:13        49.0    50.0    -16.0          0       0       0       0.00
01:41:23        49.0    50.0    -16.0          0       0       0       0.00

NTU_FMM_S09_P1>
```

STATUS command

The STATUS command informs the user about the modem status. Upon entering the <C> parameter, the updating of the information on the screen will occur automatically with the interval of 5…20 seconds according to the parameter set by the TRACETIME command:

Modem Status

```
        Startup time          6332 sec (   0 days 01:44:32)

                Line                            Ethernet
        Link              Down          Link              Down
        Master            ON            Duplex            Half
        Speed, kBps       272           Speed, Mbps       10
        Unavailable time  1225          Unavailable time  1217
        Available time    0             Available time    0
        Statistic time    1225          Statistic time    1217
        Link Loss         0

NTU_FMM>
```

ALARM command

The ALARM command informs the user about urgent and non-urgent alarms. Upon entering the <C> parameter, the updating of the information on the screen will occur automatically with the interval of 5…20 seconds according to the parameter set by the TRACETIME command:
Alarm Status

```
 Urgent:         LossSync - ON    HiEPR - OFF
 Not-urgent:     Link -  OFF      LoEPR - OFF      SQ - OFF

NTU_FMM_S09_P1>
```

Configuration management submenu

Upon activation of the configuration management submenu the following message will be displayed.
01:47:50 Configuration management activated

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


NTU_CM_S09_P1>
Press <H> to see all available commands with their brief description.
NTU_CM_S09_P1>H

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
CONFIG                   Display local configuration
RESET                    System Reset
TELNET ON|OFF            Set telnet mode to ON/OFF
IP XXX.XXX.XXX.XXX       Set IP Address for this card (where XXX = 0..255)
NETMASK XXX.XXX.XXX.XXX  Set Network Mask for this card (where XXX = 0..255)
GATEWAY XXX.XXX.XXX.XXX  Set Default Gateway for this card (where XXX = 0..255)
MASTER ON|OFF            Set xDSL master/slave mode (similar to CO/RT)
LINERATE [1..16]         Select line rate
ADAPTIVE ON|OFF          Set adaptive mode to ON/OFF ( only for slave mode)
DEFAULT [0..1]           Set default configuration
ESPEED [AUTO|10|100]     Set speed of Ethernet port
EMODE [AUTO|HALF|FULL]   Set Duplex mode of Ethernet port
TRACETIME [5..20]        Change trace time (5..20 seconds)
PORT      [1..2]         Change port number (1..2)
OPERATE   [1..2]         Change operation mode (1..2)
M(AIN)                   Return to main menu
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_CM_S09_P1>
```

TRACETIME command

The TRACETIME command allows the user to change the time interval of updating the information on the screen (5…20 seconds):

```
NTU_CM_S09_P1>TRACETIME 10
```

```
NTU_CM_S09_P1>
```

CONFIG command

The CONFIG command informs the user about the configured parameters.

```
NTU_CM_S09_P1>CONFIG
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s       : 2320
 Master/Slave           : Slave
 Adaptive mode          : ON
 Operation mode         : Transparent
Ethernet
 Speed                  : AUTO
 Duplex mode            : AUTO
 Telnet mode            : ON
 IP Address             : 10.7.1.1
 Subnet mask            : 255.0.0.0
 Default gateway        : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_CM_S09_P1>
```

RESET command

The RESET command restarts the modem.

```
NTU_CM_S09_P1>RESET
01:55:02 system reset
```

MASTER command

```
The MASTER command sets the modem either in the maser or slave modes.
NTU_CM_S09_P1>MASTER ON
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s       : 2320
 Master/Slave           : Master
 Adaptive mode          : ON
 Operation mode         : Transparent
Ethernet
 Speed                  : AUTO
 Duplex mode            : AUTO
 Telnet mode            : ON
 IP Address             : 10.7.1.1
 Subnet mask            : 255.0.0.0
 Default gateway        : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_CM_S09_P1>
```

LINERATE command

The LINERATE command determines the modem connection rate over the line. The number parameters from 1 to 16 determine the connection rate.

```
NTU_CM_S09_P1>LINERATE 12
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s       : 1296
 Master/Slave           : Master
 Adaptive mode          : ON
 Operation mode         : Transparent
Ethernet
 Speed                  : AUTO
 Duplex mode            : AUTO
 Telnet mode            : ON
 IP Address             : 10.7.1.1
 Subnet mask            : 255.0.0.0
 Default gateway        : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_CM_S09_P1>
```

ADAPTIVE command

The ADAPTIVE command adjusts the line rate of the slave modem to the line rate of the master modem. The line rates should be set equal on both modems.

```
NTU_CM_S09_P1>ADAPTIVE ON
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s       : 1296
 Master/Slave           : Master
 Adaptive mode          : ON
 Operation mode         : Transparent
Ethernet
 Speed                  : AUTO
 Duplex mode            : AUTO
 Telnet mode            : ON
 IP Address             : 10.7.1.1
 Subnet mask            : 255.0.0.0
 Default gateway        : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_CM_S09_P1>
```

ESPEED command

The ESPEED command determines the operating speed over the Ethernet port.

```
NTU_CM_S09_P1>ESPEED AUTO
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s       : 1296
 Master/Slave           : Master
 Adaptive mode          : ON
 Operation mode         : Transparent
Ethernet
 Speed                  : AUTO
 Duplex mode            : AUTO
 Telnet mode            : ON
 IP Address             : 10.7.1.1
 Subnet mask            : 255.0.0.0
 Default gateway        : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_CM_S09_P1>
```

EMODE command

The EMODE command sets the operation mode over the Ethernet port.

```
NTU_CM_S09_P1>EMODE AUTO
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s      : 1296
 Master/Slave          : Master
 Adaptive mode         : ON
 Operation mode        : Transparent
Ethernet
 Speed                 : AUTO
 Duplex mode           : AUTO
 Telnet mode           : ON
 IP Address            : 10.7.1.1
 Subnet mask           : 255.0.0.0
 Default gateway       : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_CM_S09_P1>EMODE HALF
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s      : 1296
 Master/Slave          : Master
 Adaptive mode         : ON
 Operation mode        : Transparent
Ethernet
 Speed                 : 100
 Duplex mode           : HALF
 Telnet mode           : ON
 IP Address            : 10.7.1.1
 Subnet mask           : 255.0.0.0
 Default gateway       : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_CM_S09_P1>EMODE FULL
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s      : 1296
 Master/Slave          : Master
 Adaptive mode         : ON
 Operation mode        : Transparent
Ethernet
 Speed                 : 100
 Duplex mode           : FULL
 Telnet mode           : ON
 IP Address            : 10.7.1.1
 Subnet mask           : 255.0.0.0
 Default gateway       : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTU_CM_S09_P1>
```

PORT command

The PORT command sets the current port for management or configuration. Information about current active port is display in prompt.

```
NTU_CM_S09_P1>PORT 1
NTU_CM_S09_P1>PORT 2
NTU_CM_S09_P2>
```

OPERATE command (only for MDS931C-2, MDS931AE-2 models)

The OPERATE command depend the 2 Mbits (Bridge) or 4 Mbits (Transparent) operation mode. When the value will be changed, it is necessary to sets MASTER, ADAPTIVE LINERATE parameters every ports.

```
NTU_CM_S09_P2>OPERATE 1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s       : 1296
 Master/Slave           : Master
 Adaptive mode          : ON
 Operation mode         : Transparent
Ethernet
 Speed                  : 100
 Duplex mode            : FULL
 Telnet mode            : ON
 IP Address             : 10.7.1.1
 Subnet mask            : 255.0.0.0
 Default gateway        : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

01:05:06 system reset
```

TELNET command

The TELNET command enables or disables of TCP/IP packets. You can manage only local modem via telnet session.

```
NTU_CM_S09_P1>TELNET OFF
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s       : 1296
 Master/Slave           : Master
 Adaptive mode          : ON
 Operation mode         : Transparent
Ethernet
 Speed                  : 100
 Duplex mode            : FULL
 Telnet mode            : OFF
 IP Address             : 10.7.1.1
 Subnet mask            : 255.0.0.0
 Default gateway        : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

00:11:43 system reset
```

IP, NETMASK, GATEWAY commands

The IP, NETMASK, GATEWAY commands set the TCP/IP parameters for telnet management.

```
NTU_CM_S09_P1>IP 10.0.0.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s      : 1296
 Master/Slave          : Master
 Adaptive mode         : ON
 Operation mode        : Transparent
Ethernet
 Speed                 : 100
 Duplex mode           : FULL
 Telnet mode           : OFF
 IP Address            : 10.0.0.1
 Subnet mask           : 255.0.0.0
 Default gateway       : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Please reset the system, and the change will be take effect

NTU_CM_S09_P1>NETMASK 255.0.0.0
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s      : 1296
 Master/Slave          : Master
 Adaptive mode         : ON
 Operation mode        : Transparent
Ethernet
 Speed                 : 100
 Duplex mode           : FULL
 Telnet mode           : OFF
 IP Address            : 10.0.0.1
 IP Address            : 255.0.0.0
 Default gateway       : 10.27.66.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Please reset the system, and the change will be take effect

NTU_CM_S09_P1>GATEWAY 10.0.1.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
xDSL
 Line Rate,kbit/s      : 1296
 Master/Slave          : Master
 Adaptive mode         : ON
 Operation mode        : Transparent
Ethernet
 Speed                 : 100
 Duplex mode           : FULL
 Telnet mode           : OFF
 IP Address            : 10.0.0.1
 Subnet mask           : 255.0.0.0
 Default gateway       : 10.0.1.1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Please reset the system, and the change will be take effect
```

Security management submenu

Upon activation of the security management submenu the following message will be displayed.
00:18:02 Security management activated

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

NTU_SM_S09_P1>
```

It is reserved for further developments.

Technical specifications

The main technical specifications of modems of the Black Box DSL family are presented below in the table.

Line interface.		
Standard	ETSI 101 135	
Number of pairs	1 or 2	
Line rate (every pais)	192 – 2320 Kbit/s	
Communication range for cables with the wire diameter of 144 Kbit/s 2320 Kbit/s	0.5 mm: 7.7 km 3.4 km	1.2 mm: 31 km 13.7 km
Line code	2B1Q	
Input impedance of the physical line	135 Ohm	
Output signal level	7.8 – 14.8 dBm	
Transmission spectrum	from 0…96 kHz to 0…1160 kHz	
User's interface		
Standard:	IEEE-802.3 IEE-802.1Q	
Interface type:	Ethernet 10/100Base-T, Full/Half Duplex	
Connector:	RJ-45	
Management		
Monitoring	VT100 Telnet	
Power supply		
Supply voltage:	~220 V ± 10%; 50 Hz -48VDC	
Power consumption:	No more than 5 W for Mds931C-1 No more than 5 W for MDS931C-2 / MDS931AE-2	
Grounding resistance	No more than 10 Ohm	
Protection	Conforms to the requirements of the GOST (State Standard) 12.2 85, GOST 7153-85, GOST P.50033-92 and Norm 9-93	
Climatic conditions		
Temperature range	-5° C ….+45° C	
Relative humidity of air	5%…85%	

Storage conditions

The equipment of the Black Box DSL family while being packed should withstand all means of transport at a temperature in the range form -50° C to +50° C and the relative humidity of air up to 100% at 25° C. The equipment can also withstand air-transport at a low air pressure of 12 kPa (90 Torr) at -50° C.
The packed equipment of the Black Box DSL family can be stored within 12 months (from the date of transshipment including transporting time) in storage rooms without heating at -50° C - +50° C and the mean monthly value of the air humidity of 80% at 20° C; short-term increases of air humidity up to 98% (no more than a month a year) at a temperature not exceeding 25° C without moisture condensation is admissible.
The equipment should be stored in storage buildings, which protect the devices from atmospheric precipitations. The equipment should be kept on shelves or in factory packages in the absence of vapors of acids, alkali and other atmospheric impurities.

Guarantee

The mean time before failure is no less 30000 hours.
The manufacturer guarantees that the equipment are in all respects in accordance with the requirements of technical conditions when the customer follows the rules and conditions of storage, transporting and maintenance.
The guarantee period (no less than 12 months after putting the equipment into operation) is specified upon drawing the Contract for the sale of the equipment.
Should the equipment prove defective during the guarantee period, the manufacturer undertakes to remedy the defects or replace the faulty equipment. If the defects appear due to incompetent storage, maintenance and transporting, the guarantee does not cover such defects.
After the guarantee period expires, the manufacture provides paid delivery of spare parts. The list of spare parts and terms of their delivery during the operating lifetime of the equipment should be specified in the Contract.

Terms to transport

The equipment of the Black Box DSL family should be packed and transported by:

- motor transport with an enclosed truck body;
- enclosed railroad cars;
- unpressurized airplanes and helicopters (up to 10000 m at an air pressure of 170 Torr);
- river transport (in holds).

The equipment of the Black Box DSL family should withstand transportation when being packed under the following conditions:

- temperature from -50° C to +50° C;
- relative air humidity up to 100% at 25° C (within 10 days).

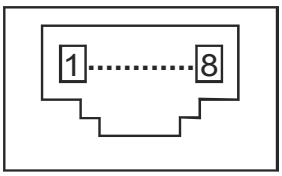
The equipment of the Black Box DSL family should be packed and withstand transportation by:

- motor transport with the number of transshipments no more than four:
  - along the asphalt-concrete and cement-concrete roads at a distance of 200 – 1000 km;
  - earth roads at a distance of 50 – 250 km at a speed of 40 km/hour;
- different means of transport (airplanes, railway transport in combination with motor transport along the asphalt-concrete and cement-concrete roads at a distance of 200 km) with the number of transshipments from three to four;
- water transport (excluding sea transport) in combination with motor transport along the asphalt-concrete and cement-concrete roads at a distance of 200 km with the number of transshipments no more than four.

During transportation the packages with the equipment should be fixed so that to exclude their moving, collision and collision against the transport bodies.

Connector's description

DSL connector



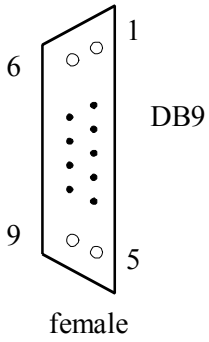
RJ45

Type: RJ-45, 8 pin

Number	*Signal*	*Assignment*
1	Line 2,a	tip
2	Line 2,b	ring
3	Ground	-
4	NC	
5	Ground	-
6	NC	
7	Line 1,a	tip
8	Line 1,b	ring

Monitor connector

(MDS931AE-2)

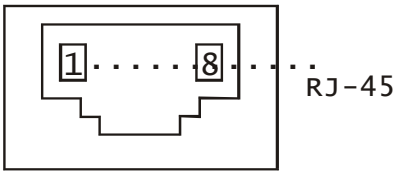


Type: Sub-D9, female

Number	*Signal*	*Assignment*
	NC	-
2	TXD	Transmit data
3	RXD	Receive data
4	DTR	Data terminal ready
5	SGND	Signal ground
6	NC	-
7	NC	-
8	NC	-
9	NC	-

PC and Hub connectors

Type: RJ-45



Number	*PC assignment*	*HUB assignment*
1	Tx+	Rx+
2	Tx-	Rx-
3	Rx+	Tx+
4	NC	NC
5	NC	NC
6	Rx-	Tx-
7	NC	NC
8	NC	NC

Description of interface cables

«Straight» Ethernet cable

Side A	*Color of wire*	*Side B*
1	white/green	1
2	green/white	2
3	white/orange	3
4	blue/white	4
5	white/blue	5
6	orange/white	6
7	white/brown.	7
8	brown/white	8

«Straight» modem cable

The device side	*The PC side*	
DB9M	DB9F	DB25F
2	2	3
3	3	2
5	5	7
4	4	20