

Bercut-MMT
Signalling Protocol Analysis

Operation Manual
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Metrotek

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Contents

1	Introduction	5
1.1	General	5
1.2	Documentation Set	6
1.3	Modifications Notice	6
2	General information	7
2.1	Features of the signalling flow analysis card	7
2.2	B4-E1-4: the signalling flow analysis card	7
3	Connection and Start of Operation	9
3.1	Path Connection	9
3.2	Setting E1 Port Parameters	10
3.3	LED Indicator State	11
3.4	Selection of Card Operation Mode	11
4	Signalling Link Settings	13
4.1	Preliminary Settings	13
4.2	Signalling Link Settings	13
4.3	Signalling Links Group	14
4.3.1	Links group creation	15
4.3.2	Link regrouping	16
4.3.3	Groups deleting	16
4.4	Configuration of decoding	16
5	Filter Subsystem	19
5.1	Mandatory parameters	19
5.2	Filter parameters	19
5.2.1	CAS (R1.5) parameters	20
5.2.2	DSS1/PRI, EDSS1/PRI parameters	22
5.2.3	Parameters of the hexadecimal decoder (HEX)	23
5.2.4	SS7/ISUP parameters	24
5.2.5	SS7/TCAP parameters	25
5.2.6	V5 subsystem parameters	26
5.3	Additional filtration criteria	26

5.3.1	Filtering by messages	31
5.4	Parameters operations	33
5.4.1	Configuration file storing	33
5.4.2	Configuration file loading	33
5.4.3	Restoring of the previous configuration	34
6	Protocol Analysis	35
6.1	Graphical interface	35
6.1.1	Toolbar	35
6.1.2	The message list	37
6.1.3	Message list settings	40
6.2	Monitoring mode	44
6.3	Data decoding	46
6.3.1	Message decoding	46
6.3.2	Customizing the grain size	47
6.3.3	Writing decoded messages to a file	49
6.3.4	Viewing of saved messages	49
6.4	Data saving and postprocessing	50
6.4.1	Data saving	50
6.4.2	Viewing of trace files	51
6.4.3	Message filtering	52
7	Technical support	55
7.1	Contact Information	55

1. Introduction

1.1 General

Bercut-MMT Analyzer is a measurement device designed on the basis of a modular platform. It supports measurements in different segments of modern multi-technology telecommunication networks.

The analyzer's modular design provides its user with virtually unlimited testing and measuring capabilities for both traditional interface parameters and for working out long term diagnostics solutions for the communication network.

Figure 1.1 presents an external view of the device.



Figure 1.1. External view

The **Bercut-MMT** device consists of the system unit and two pluggable modules (cards¹), that provide an interface to such testing objects as PCM E1 streams, data transmission interfaces (Datacom) or Gigabit Ethernet.

The System Unit provides for the basic device functionality, i.e.: control of **Bercut-MMT** platform components, an interface to peripheral devices, power supply monitoring, a user interface and specialized computation, states and measurement modes indication.

¹ Terms *Pluggable Cards* and *Pluggable Modules* are convertible terms in the present manual and will be used interchangeably with equal meaning.

The **Bercut-MMT** System Unit consists of the following main components:

- Processor Module with a preinstalled operation system and nonvolatile data storage devices;
- LCD display with a sensor panel;
- number of multipurpose indication LEDs;
- keyboard;
- batteries;
- connectors for peripheral devices (serial port, USB interfaces, 10/100BaseT LAN interfaces, SD/MMC card connectors and connectors for headphones and an external power supply);
- connectors for specialized pluggable cards (modules) installation.

Cards usually contain a powerful processor that performs computations typical for a certain measurements mode. Computation results are transferred to the platform central processor that displays them to a user.

Various pluggable cards have different sets of hardware interfaces and programmable options. Each card has a unique serial number and provides information about a manufacturer, types of interfaces, allowed measurement options, etc.

1.2 Documentation Set

Depending on the ordered options, the following operations guides are delivered with the device:

- **Bercut-MMT**. Telecommunication Networks Analyzer Universal Platform.
- **Bercut-MMT**. E1 Interfaces Analysis.
- **Bercut-MMT**. Signalling Protocol Analysis.
- **Bercut-MMT**. Data transmission Interfaces Testing.
- **Bercut-MMT**. Ethernet 10/100 and Gigabit Ethernet Analysis.
- **Bercut-MMT**. OPIE Graphical Environment.

1.3 Modifications Notice

The manufacturer reserves the right to make any modifications that do not affect operability of the analyzer **Bercut-MMT** to the device hardware and software and to operation manuals without further notice and at its sole discretion.

2. General information

2.1 Features of the signalling flow analysis card

B4-E1-4 card enables to monitor up to eight E1 interfaces (four bi-directional signalling links) simultaneously. The analyzer automatically registers and decodes signalling data in real time, according to international and national signalling protocol standards.

The options delivered with the **Bercut-MMT** device in the *Signalling data flow monitoring and analysis* mode are as follows:

- **B4-SIG1**: the analyzer of signalling protocols including the national SS7, ISDN, V5 signalling protocols:
 - MTP (Russian specifications, ITU-T Q.700-Q.709, White Book);
 - ISUP (Russian specifications, 2001, ITU-T Q.761-Q.764, Blue Book, 1988, White Book, 1993, 1997, ITU-T Q.767, 1991, MoU: ETSI ETS 300 121, 1991);
 - SCCP (Russian specifications 1994, 2001, ITU-T: Q.711-Q.716, White Book, 1996);
 - TCAP (Russian specifications 1994, 2001, ITU-T: Q.711-Q.774, White Book, 1997);
 - ISDN PRI (ETSI: ETS 300 011, ETS 300 125, ETS 300 102, ITU-T I.431, Q.921, Q.931);
 - V.5 (ETSI: ETS 300 324, ETS 300 347).
- **B4-R**: the analyzer of 2BCK (R1.5) signalling protocols.

2.2 B4-E1-4: the signalling flow analysis card

The signalling flow analysis card can work in two modes (for the method of mode changeover, refer to the *Bercut-MMT . The Platform of Universal Telecommunication System Analyzer* operation manual). The card has the following labels:

- the bottom label (**Rx/Tx** and **Sync**) corresponds to the *Measurement and analysis of 2048 kbit/s PCM path parameters* mode;
- the top label (**R0/T0/R1** and **R2/T1/R3**) corresponds to the *Monitoring and analysis of the signalling flow* mode.



Figure 2.1. B4-E1-4 card

3. Connection and Start of Operation

3.1 Path Connection

- Insert the B4-E1-4 plug-in card into the device.
- Using a cable, connect the device to the PCM path to be tested:
 1. insert the connecting cable plug into the Rx0..3 connector on the interface module upper panel until click;
 2. by using an *alligator* clip connect the device to PCM equipment.



To disconnect the analyzer from PCM path, do the following: first, disconnect the cable from PCM path, then unplug the cable from the connector on the interface module.

3.2 Setting E1 Port Parameters

After connecting to PCM equipment, before starting the operation, it is necessary to set E1 port parameters.

E1 port parameters must be set each time you change the connection. When you work with the same signaling line, the set configuration is saved in the device memory and does not require reconfiguration.

To set PCM port parameters, open the application *Port setup* and select the port number (Fig. 3.1):

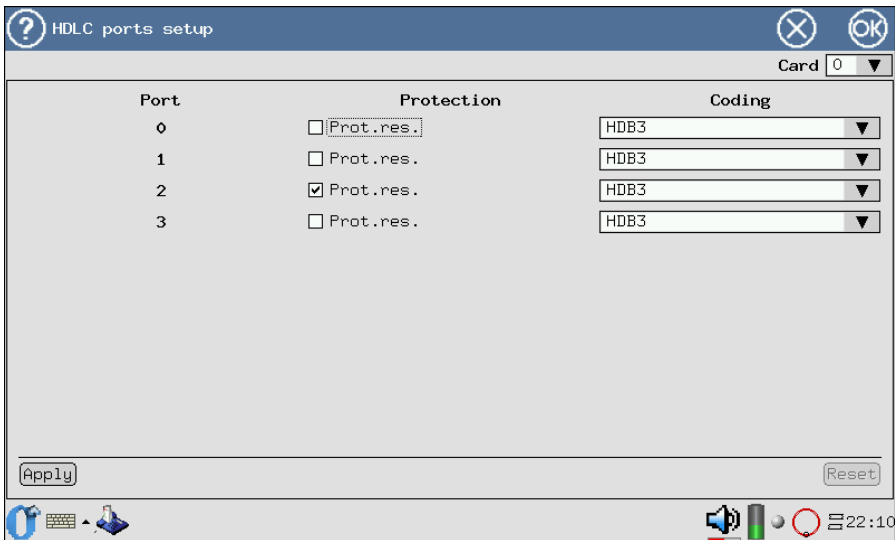


Figure 3.1. HDLC Line Configuration

Select a device operation mode.

- **Protection** — this option allows to control the analyzer built-in protective resistors at Rx0. If the option is on, then Rx0..Rx3 input ports will be connected to the tester scheme through the internal resistance of 470 ohm.
- **HDB3/AMI** — a type of line encoding.

3.3 LED Indicator State

For E1 interface analysis card, there is LED indication ensuring the visual control over conditions of measurements and data receiving.

The LED indicators ensure a sufficient volume of information for analysis and decision making.



Figure 3.2. LED Indicators

The LED indicators values are given for each interface of the **B4-E1-4** card.

LINK — state of connection:

- green — there is a continuous signal as from the moment of discard;
- red — there is no signal at the moment.

ACT — testing state:

- green — data collection in the mode *Protocol Analysis* ;
- no light — there is no data collection.

3.4 Selection of Card Operation Mode

The data transfer interface analysis card may operate in a mode that can be set by using the application **Firmware update utility: O-Menu** ⇒ **Settings** ⇒ **Firmware update utility**. For detailed description of the operation mode setting see the operation manual of *Bercut-MMT. Platform of universal telecommunication system analyzer*.

4. Signalling Link Settings

This chapter describes the *Protocol Analysis* subsystem which enables real-time collection of signalling data, filtering based on message parameters, viewing of detailed signalling packet contents with customizable grain size, saving of received data and processing of previously saved files.

The **Protocol Analysis** subsystem includes the following applications:

Link Setup — allows to set up parameters of connected signalling links;

Filters Setup — allows to set up decoder parameters and specify filtering conditions;

Protocol Analysis — allows to perform the real time monitoring of the signalling flow, its decoding and postprocessing;

Port Setup — allows to trace the current status of of the monitoring process in real time.

Note: the applications of the Protocol Analysis subsystem are run in the HDLC operational mode. For information about operation mode changeover, please refer to section 3.4.

4.1 Preliminary Settings

1. Start the *Firmware update utility* application (**O-menu** ⇒ **Settings** ⇒ **Firmware update utility**) and make sure that the HDLC is selected as the current mode.
2. Set the signalling link parameters.
3. Create the signalling link group(s).
4. Specify the corresponding decoder parameters.

4.2 Signalling Link Settings

Activate the **Link Setup** application and specify the following parameters for each connected link:

Port: the number of the port to which the test link is connected;

Timeslot: the number of the time slot of the PCM path that is used for signalling data transmission;

Ignore FISU: enable/disable filtering of short packets. If this option is enabled (set as *1*), then the analyzer will ignore all packets with a length less than 4 bytes when registering the flow. It is recommended to use this option.

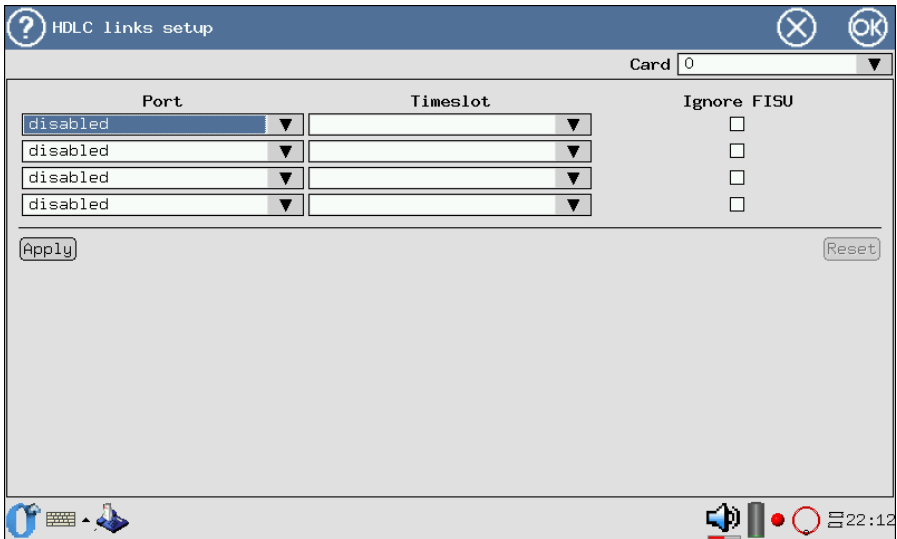


Figure 4.1. Link Settings

Each time the application starts, all parameters are set to *default values*.

To exit the program and save specified parameter values, tap the **Apply** button.

4.3 Signalling Links Group

Creation of signalling links group is the first mandatory step required for correct decoding of the signalling flow. Besides, it allows to trace the signalling exchange relating to the specific call.



The signalling data decoder will not work properly if at least one group is not created!

4.3.1 Links group creation

1. Run the **Filters Setup** application and enter the *Group* section.
2. Tap the **New** button. An empty group with the **group 0** default name will appear in the left part of the window. To specify an more convenient groups name, tap and hold down the groups name, then input a new name.
3. Select the group by marking the relevant string.
4. Select the required link in the list of available links and tap **<<** button to add this link to the selected links. Add other links in the same way (if necessary).
5. When needed, create an other group as described above.

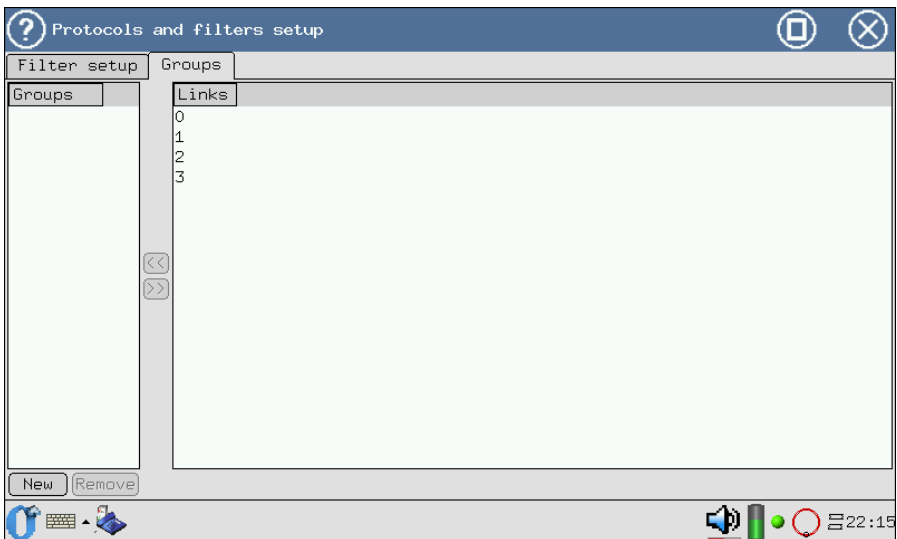


Figure 4.2. Links editing

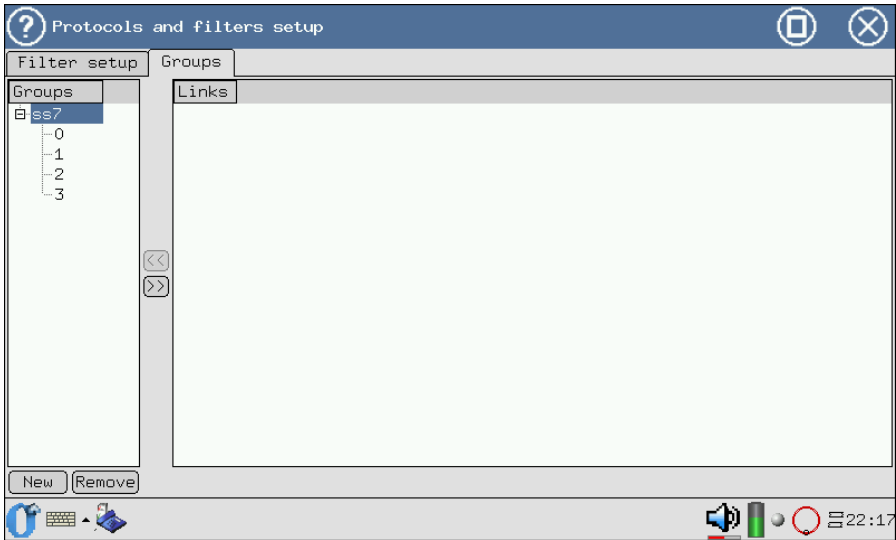


Figure 4.3. Groups content viewing

4.3.2 Link regrouping

1. Expand the groups that includes the particular link.
2. Select the link and tap the \gg button. The link will be moved to the list of available links.
3. Add the released link to an other group.

4.3.3 Groups deleting

1. Select the groups to be deleted.
2. Tap the **Delete** button.
3. Confirm groups deletion in the popped-up dialog box.

The groups will be deleted. All links contained in this groups will be automatically moved to the list of available links.

4.4 Configuration of decoding

Activate the **Filters Setup** application:

1. Ensure that at least one signalling groups is created.
2. Enter the **Filter setup** section.

3. Select the relevant signalling protocol for each groups (you can select a groups in the corresponding drop-down list).

If it is assumed that the same decoder settings shall be used for all links group, check the *same for all* option. This eliminates the need to specify parameters separately for each links group and allows to reduce the time for configuration.

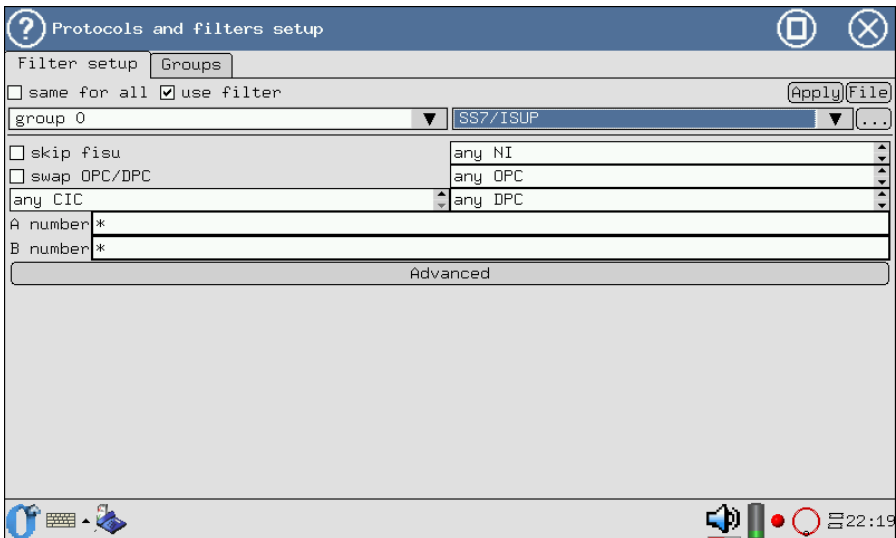



Figure 4.4. Protocol and link settings

4. Tap the button to open the window for protocol standard selection.
5. Select the relevant standard for each protocol subsystem (layer). If you do not want to decode and display messages of a particular subsystem, select **None** .
Tap in the top-right corner to save changes and return to the main window.
Tap in the top-right corner to return to the main window without saving any changes.



Figure 4.5. Decoder selection menu

6. Moreover, you can specify protocol-dependent filtering conditions right now (for detailed description, refer to section 5).
7. Tap the  button to save settings.

5. Filter Subsystem

The Filter Subsystem is a powerful tool that significantly reduces search volume of necessary information in the signalling flow and is used for troubleshooting of possible faults.

This subsystem allows to process signalling data in pre- and post-filtering modes. In the former case, filtering conditions are applied to the data flow being received in real-time, and, in the latter case, to the signalling information that have already been collected and/or stored.

Filtering criteria setup is performed with the **Filters Setup** application (**O-menu** ⇒ **Protocol Analysis** ⇒ **Filters Setup**).

5.1 Mandatory parameters

Mandatory parameters are required for correct decoding of signalling flow. Before starting the real-time data monitoring, the following parameters should be specified:

- signalling links group;
- decoder parameters.

For the detailed description of the parameter setting process, refer to section 4.1, page 13 .

5.2 Filter parameters

The number of available parameters for data filtering depends on the current signalling protocol. The list of filtering criteria for basic protocols see in this section below.

To activate the protocol dependent filters, follow the steps below :

1. Check the **use filter** option to activate the fields of parameter values.
2. Specify the required values. For string-type parameters, you can use wildcard characters * and ?.
3. Specify optional parameters for filtering by tapping the **Advanced** button (see section 5.3, page 26).

4. To save and activate the specified filtering conditions, tap the **Apply** button.

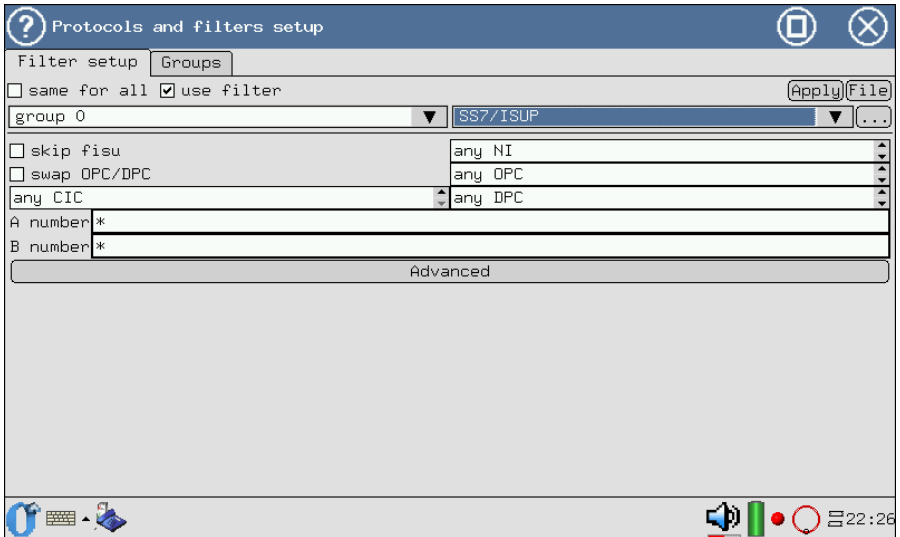
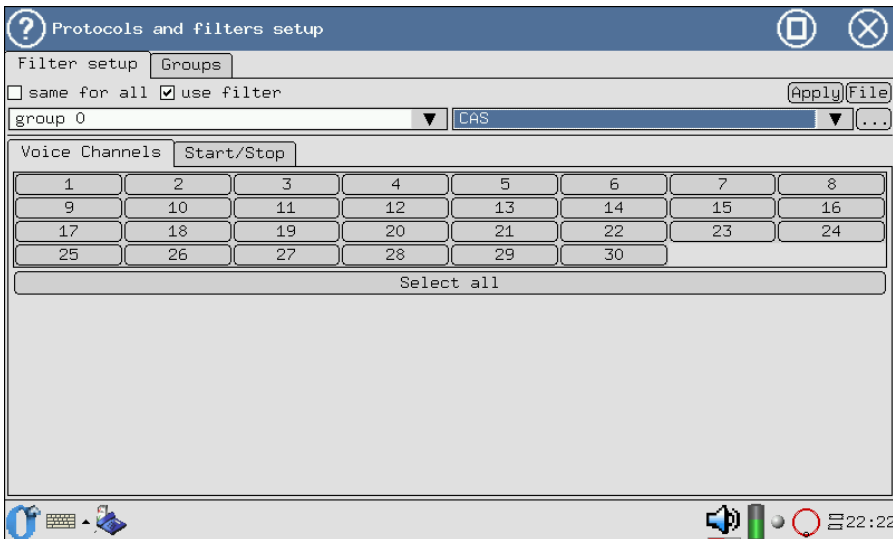


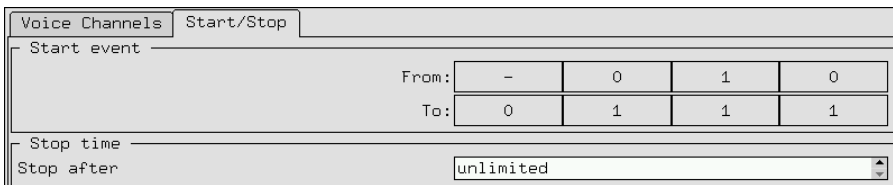
Figure 5.1. Filter parameters

5.2.1 CAS (R1.5) parameters

The CAS subsystem receives data from the R0/R1 ports; among them, the even port corresponds to the forward direction of the E1 flow, and the odd port corresponds to the backward direction (refer to Fig.5.2, page 21).

Figure 5.2. Filter subsystem: settings of **CAS**

Voice Channels — filtering is based on the voice message number.

Figure 5.3. Filter subsystem: settings of **CAS**, **Start/Stop**

Start/Stop — waiting for a CAS-bit state transition. Data collection can be started upon a specified event (CAS-bit changing).

The figure shows an example of data collection upon the CAS-bit state transition from X010 to 0111 (- this value corresponds to any state of CAS-bit).

Stop time — the time of data collection.

5.2.2 DSS1/PRI, EDSS1/PRI parameters

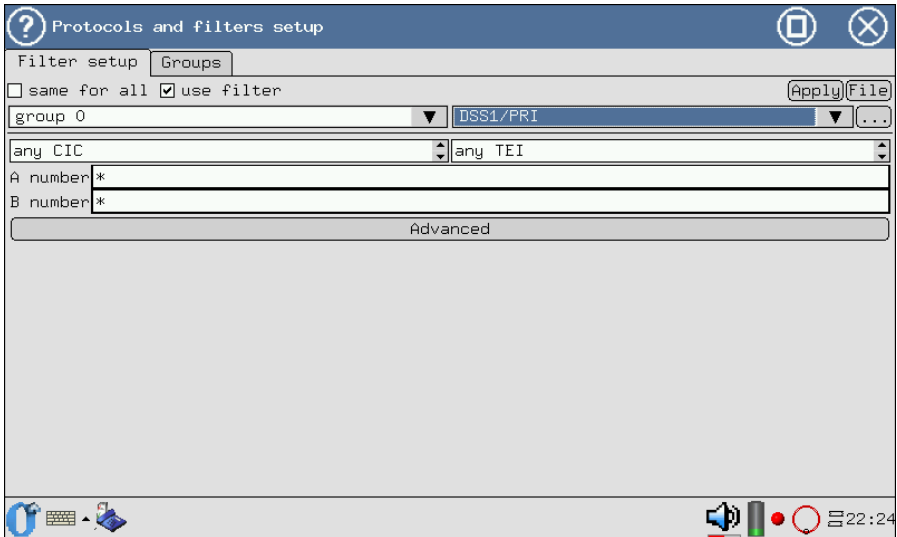


Figure 5.4. Filter subsystem: settings of **DSS1/PRI** protocols

CIC — Channel Identification Code.

TEI — Terminal Endpoint Identifier .

A number/B number — called/calling parties numbers. For specifying the numbers, you can use wildcard characters * and ?. When specifying party numbers (A number or B number parameter), you can use * and ? characters. The * character corresponds to any amount of any digits (e.g. the 7* expression corresponds to any number which starts with the digit 7). The ? corresponds to any single digit (e.g. the 123456? entry corresponds to the following numbers: 1234560 , 1234561 , 1234562 , ... , 1234569).

Advanced — for information about setting up of additional capabilities, refer to section 5.3, page 26.

5.2.3 Parameters of the hexadecimal decoder (HEX)

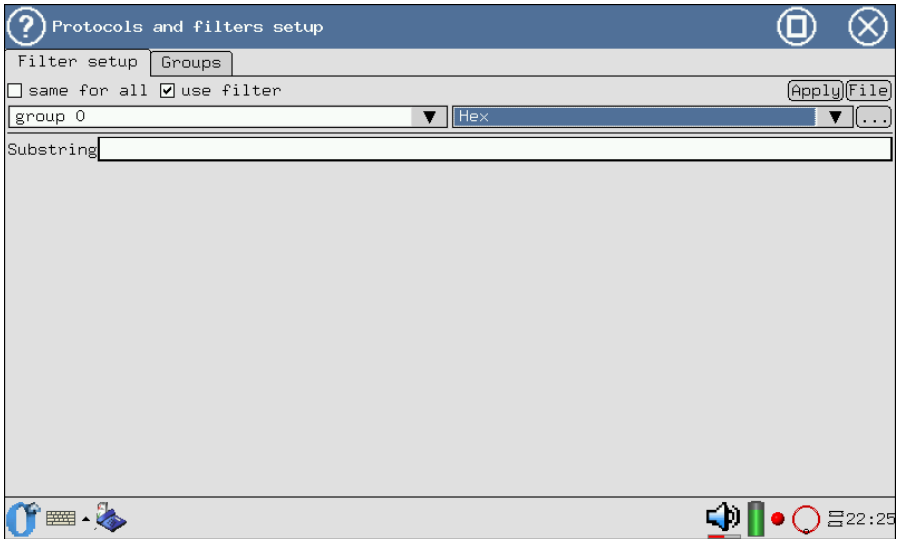


Figure 5.5. Filter subsystem: settings of **HEX** protocols

Substring — specify a substring (a hexadecimal code) for filtering. You can use wildcard characters * and ? (refer to section 5.2.2, page 22).

5.2.4 SS7/ISUP parameters

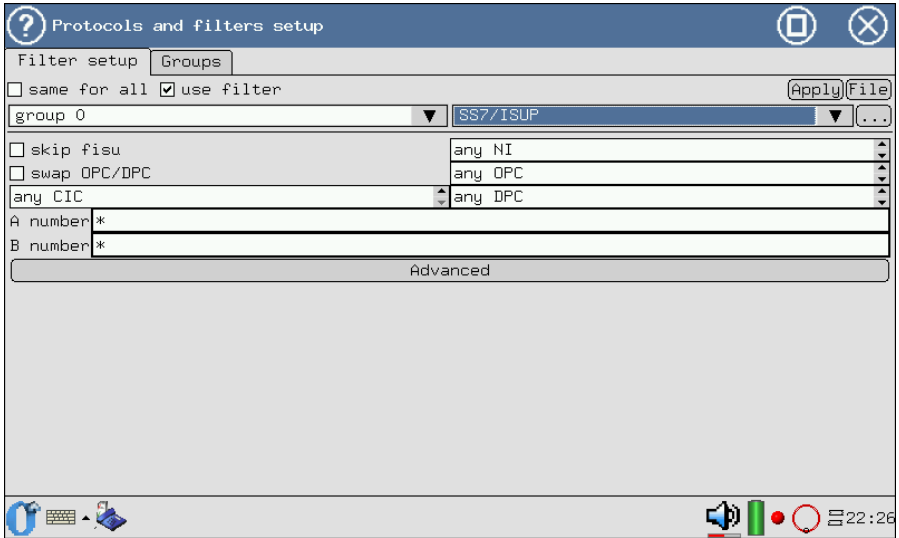


Figure 5.6. Filter subsystem: settings of **SS7/ISUP** protocols

skip fisu — to skip FISU ¹

NI — Network Indicator.

OPC — Originating Point Code.

DPC — Destination Point Code.

CIC — Channel Identification Code.

swap OPC/DPC — this option allows to enable changeover of OPC/DPC, i.e. the messages transmitted in both directions will be displayed.

A number/B number — calling and called parties numbers respectively (refer to section 5.2.2, page 22).

Advanced — for information about setting up of additional capabilities, refer to section 5.3, page 26.

¹ Enable/disable filtering of short packets. If this option is enabled (set as **1**), then the analyzer will ignore all packets with a length less than 4 bytes when registering the flow. It is recommended to use this option.

5.2.5 SS7/TCAP parameters

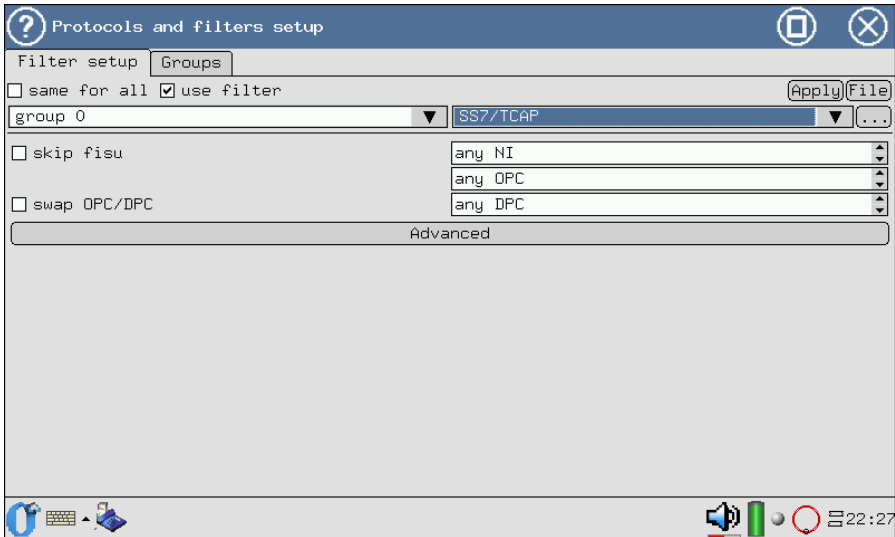


Figure 5.7. Filter subsystem: settings of **SS7/TSAP** protocols

skip fisu — to skip FISU ².

NI — Network Indicator.

OPC — Originating Point Code.

DPC — Destination Point Code.

swap OPC/DPC — this option allows to enable changeover of OPC/DPC (messages transmitted in both directions will be displayed).

Advanced — for information about setting up of additional capabilities, refer to section 5.3, page 26.

²Enable/disable filtering of short packets. If this option is enabled (set as `ij 1ii`), then the analyzer will ignore all packets with a length less than 4 bytes when registering the flow. It is recommended to use this option.

5.2.6 V5 subsystem parameters

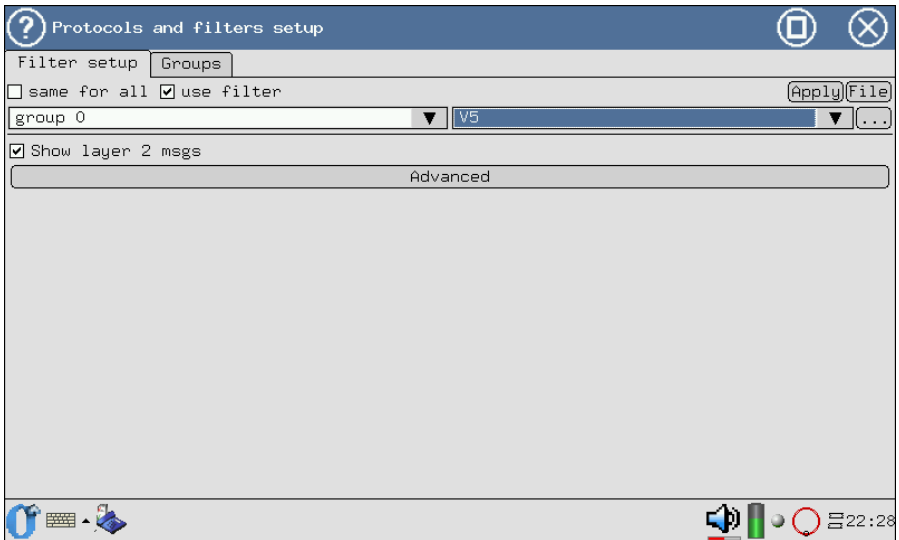



Figure 5.8. Filter subsystem: settings of **V5** protocols

Show layer 2 msgs — enable/disable filtering by 2nd layer messages.
Advanced — for information about setting up of additional capabilities, refer to section 5.3, page 26.

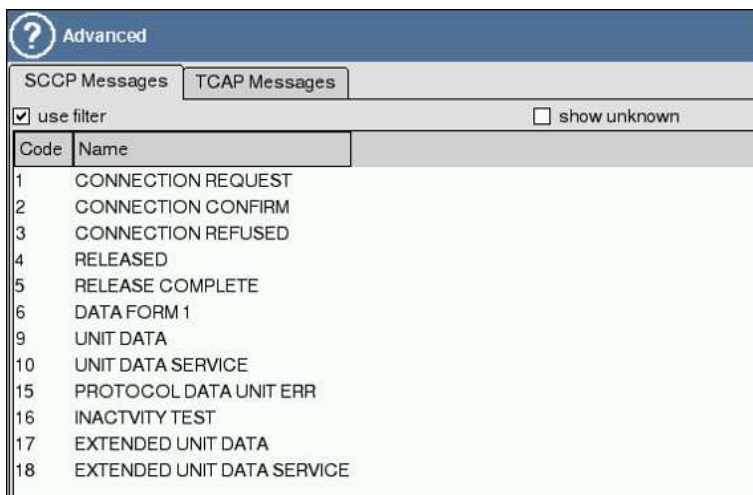
5.3 Additional filtration criteria

Additional filtering criteria are available for the following protocols ³

- **SS7/ISUP, EDSS1/PRI, DSS1/PRI** , see Fig.5.18, page 32:
 - **Messages** — filtering by message type;
 - **Cause Values** — filtering by cause of disconnection value;
 - the **show unknown** option allows to display messages that are unknown for the selected protocol.
- **SS7/TCAP** :
 - **SCCP Messages** — message filtering by SCCP type (see Fig.5.9, page 27);

³ Additional settings are activated if at least one decoder for a given protocol is selected (the  button at the right side of the protocol name).

- **TCAP Messages** — message filtering by TCAP type (see Fig.5.10, page 28).
- **V5:**
 - **Subsystems** — filtering by V5 subsystems (see Fig.5.11, page 28);
 - **PSTN** — filtering by Public Switched Telephone Network (PSTN) messages (see Fig.5.12, page 29);
 - **Control** — filtering by messages of a control protocol (see Fig.5.13, page 29);
 - **Protection** — filtering by messages of a protection protocol (see Fig.5.14, page 30);
 - **BCC** — filtering by messages of the Bearer Channel Connection protocol (see Fig.5.15, page 30);
 - **Link Control** — filtering by messages of the path control protocol (see Fig.5.16, page 31).



Code	Name
1	CONNECTION REQUEST
2	CONNECTION CONFIRM
3	CONNECTION REFUSED
4	RELEASED
5	RELEASE COMPLETE
6	DATA FORM 1
9	UNIT DATA
10	UNIT DATA SERVICE
15	PROTOCOL DATA UNIT ERR
16	INACTIVITY TEST
17	EXTENDED UNIT DATA
18	EXTENDED UNIT DATA SERVICE

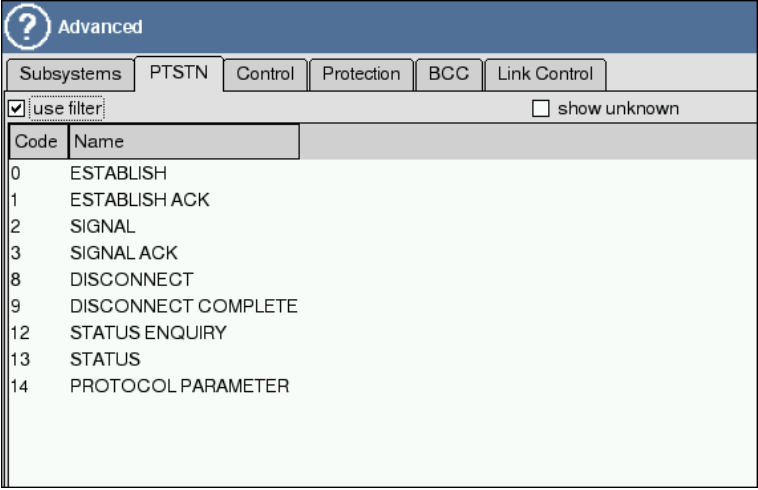
Figure 5.9. Additional settings of SS7/TCAP: **SCCP**

Code	Name
0	Begin
1	End
2	Continue
3	Abort
4	Unidirectional

Figure 5.10. Additional settings of SS7/TCAP: **TCAP**

Code	Name
0	V5 PSTN
1	V5 Control
2	V5 Protection
3	V5 BCC
4	V5 LinkControl

Figure 5.11. Filtering by subsystems of **V5**



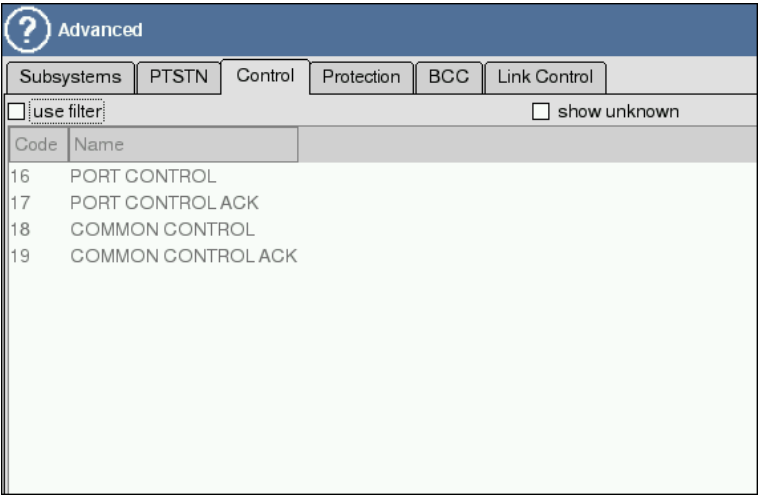
Advanced

Subsystems PTSTN Control Protection BCC Link Control

use filter show unknown

Code	Name
0	ESTABLISH
1	ESTABLISHACK
2	SIGNAL
3	SIGNALACK
8	DISCONNECT
9	DISCONNECT COMPLETE
12	STATUS ENQUIRY
13	STATUS
14	PROTOCOL PARAMETER

Figure 5.12. Additional filter settings for V5: PSTN



Advanced

Subsystems PTSTN Control Protection BCC Link Control

use filter show unknown

Code	Name
16	PORT CONTROL
17	PORT CONTROLACK
18	COMMON CONTROL
19	COMMON CONTROLACK

Figure 5.13. Additional filter settings for V5: Control

Advanced

Subsystems PTSTN Control Protection BCC Link Control

use filter show unknown

Code	Name
24	SWITCH-OVER REQ
25	SWITCH-OVER COM
26	OS-SWITCH-OVER COM
27	SWITCH-OVER ACK
28	SWITCH-OVER REJECT
29	PROTOCOL ERROR
30	RESET SN COM
31	RESET SNACK

Figure 5.14. Additional filter settings for V5: Protection

Advanced

Subsystems PTSTN Control Protection BCC Link Control

use filter show unknown

Code	Name
32	ALLOCATION
33	ALLOCATION COMPLETE
34	ALLOCATION REJECT
35	DE-ALLOCATION
36	DE-ALLOCATION COMPLETE
37	DE-ALLOCATION REJECT
38	AUDIT
39	AUDIT COMPLETE
40	AN FAULT
41	AN FAULT ACKNOWLEDGE
42	PROTOCOL ERROR

Figure 5.15. Additional filter settings for V5: BCC

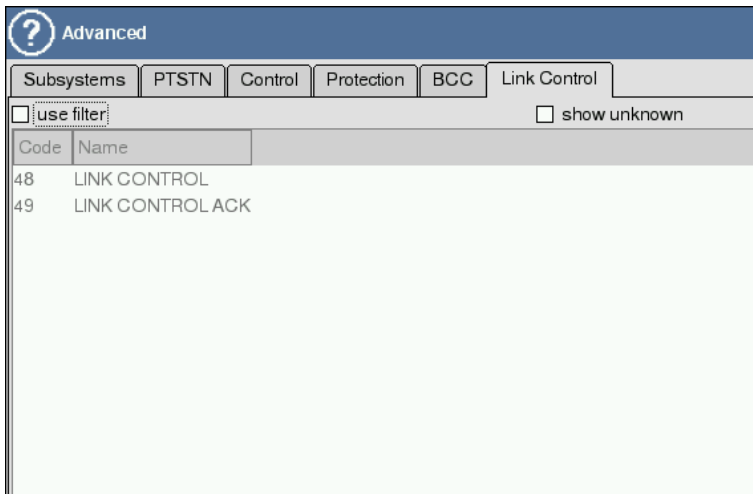


Figure 5.16. Additional filter settings for **V5: Link Control**

5.3.1 Filtering by messages

1. Tap the **Advanced** button to open the **Additional settings** window.
2. There is the **use filter** option on each tab, which activates the list of message types (see Fig.5.18, page 32). Available message types are determined by the standard selected for compliance analysis.
3. Check the **show unknown** option (if necessary).
4. Check required message types. To unmark all selected list items, tap the **Clear** button in the lower part of the window.
5. To return to the **Filter settings** window and save the parameters, tap the **OK** button.

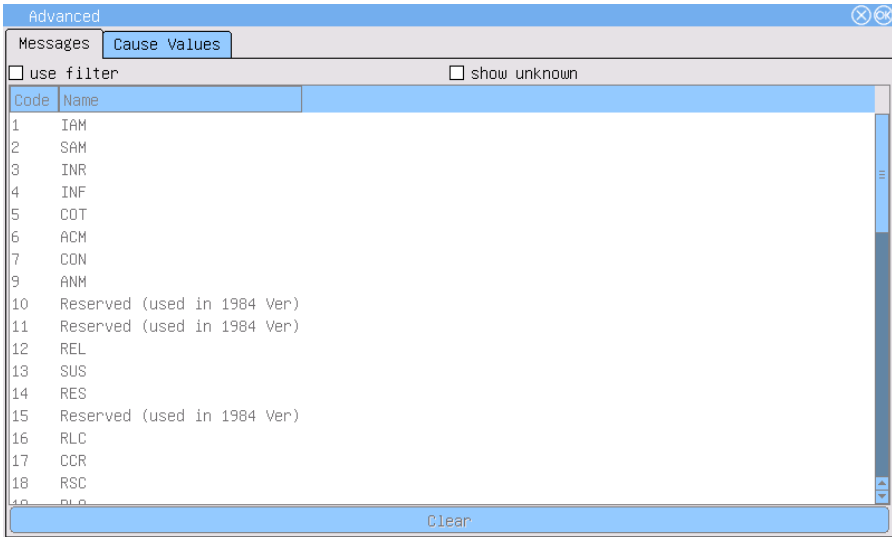


Figure 5.17. Additional filter settings

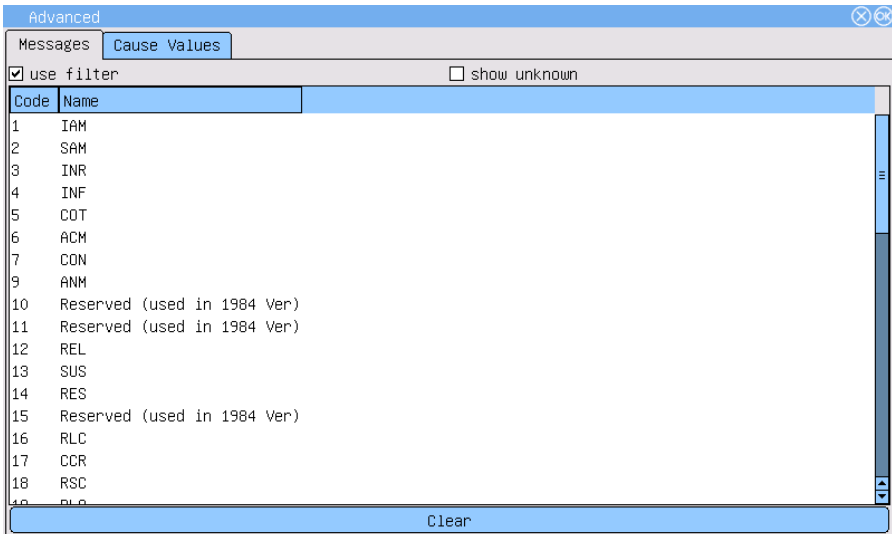


Figure 5.18. SS7/ISUP, EDSS1/PRI, DSS1/PRI: filtering by message type

5.4 Parameters operations

5.4.1 Configuration file storing

This function is suitable for saving of frequently used patterns of filtering criteria.

1. Specify all required filter parameter values.
2. Tap the **File** button and, in the popped-up menu, select the **Save** item.
3. Input the file name in the popped-up window. The file name format is `[date]-[time].cfg` according to the date and time of file creation. The date format is `yyyymmdd`, the time format is `hhmm`.
4. Tap the **OK** button. The file with the specified name will be created in the `/tmp/[user]/` directory.

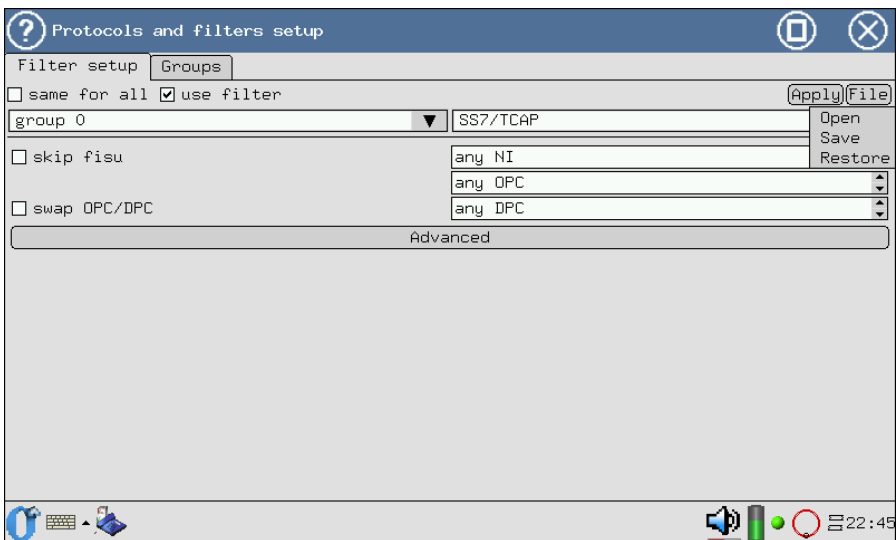


Figure 5.19. Parameters operations: file saving

5. To cancel the saving operation and return to the main window, tap the **Cancel** button.

5.4.2 Configuration file loading

1. Tap the **File** button. Select the **Open** item in the list.
2. In the popped-up window, select the name of the file to be opened.

3. To cancel the operation, tap the \otimes button.

5.4.3 Restoring of the previous configuration

To restore previously saved settings corresponding to each tapping on the **Apply** button for specified values, open the **File** menu and select the **Restore** item.

6. Protocol Analysis





The **Protocol Analysis** application (**O-menu** ⇒ **Protocol Analysis** ⇒ **Protocol Analysis**) allows to process signalling data in two modes.

Data collection or monitoring mode — the device is connected to the data transmission system and performs data collection from the specified channel in real time.

Postprocessing mode — viewing and processing of data collected in real time (both newly collected data and previously saved data in the form of a trace file). In this mode, you can view decoded messages (with different grain sizes of output), filter data by selected parameters using the **Filters Setup** application, save data for further processing etc.

6.1 Graphical interface

6.1.1 Toolbar

-  — start/stop data collection.
-  — decoding.
-  — filtering.
-  — file operations menu:
 - **Open** - opening of a previously saved file;
 - **Save** - saving of a trace file;
 - the list of five last opened files.

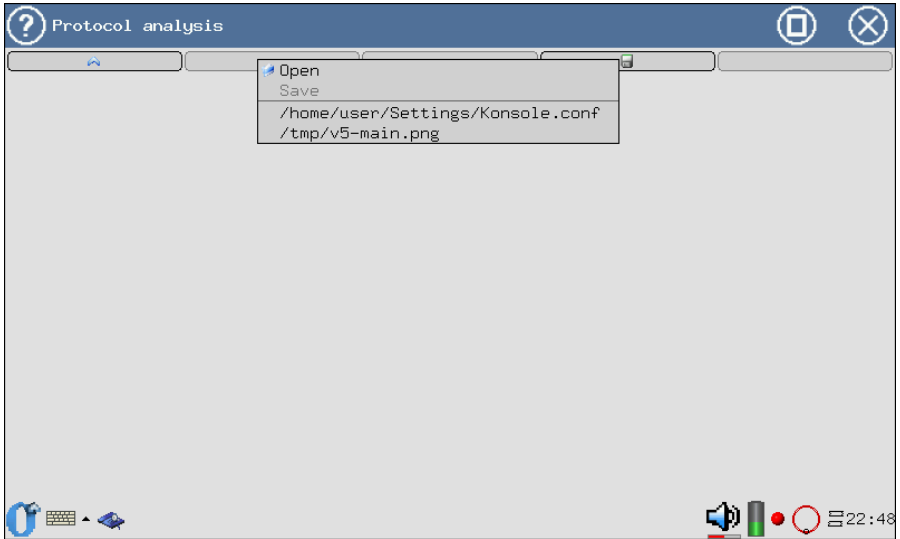
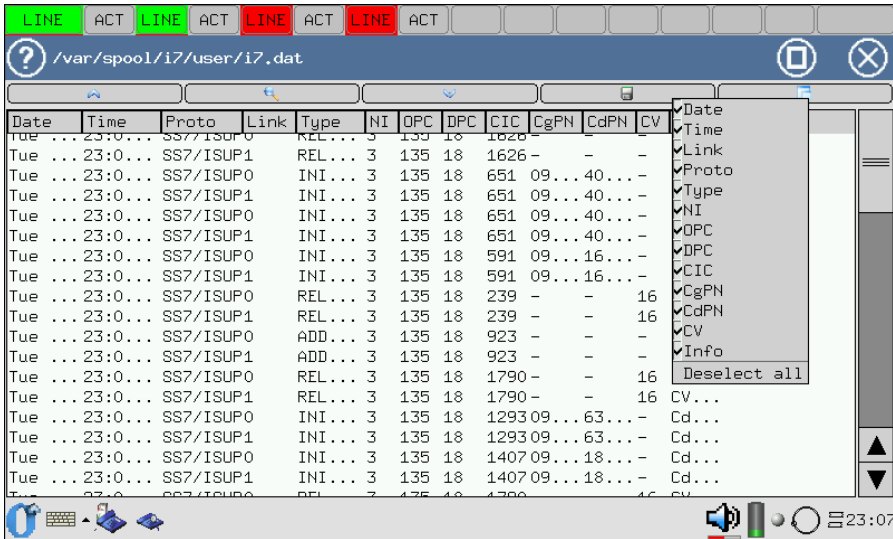


Figure 6.1. Protocol Analysis: file operations menu

 — the **View** menu:

- listing of message parameters displayed in the list (the number of available parameters depends on the selected protocol);
- **Deselect All** — deselecting all messages in the list.

Figure 6.2. Protocol Analysis: menu *View*

6.1.2 The message list

The main part of the **Protocol Analysis** application window is the message list as a table representing signalling packets registered by the device. Each message corresponds to one row in the list. Wrong or unknown messages are highlighted in red colour in the list¹.

The following basic parameters are displayed for all messages, regardless of the protocol:

- Date** — the date of message registration in the device;
- Time** — the time of message registration in the device;
- Link** — the signalling link;
- Proto** — the signalling protocol;
- Info** — the information.

For hexadecimal data representation (**HEX**), only the basic parameters are outputted.

Remaining available message parameters are determined by the protocol type.

¹ Message highlighting is applied only in the data view mode.

CAS (R1.5)

Date	Time	Proto	Link	Info	V/C	CAS	500	F0	F1	F2	F4	F7	F11	2600
Tue	.. 23:0...	CAS	2	-	16	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	1	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	16	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	2	-	2	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	2	-	17	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	2	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	17	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	1	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	16	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	2	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	17	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	3	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	18	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	4	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	19	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	2	0...0	0	0	0	0	0	0	0	0
Tue	.. 23:0...	CAS	3	-	17	0...0	0	0	0	0	0	0	0	0

Figure 6.3. Protocol Analysis: CAS

- **V/C** (Voice Channel) — the number of the voice channel (1...30) in which a change has occurred;
- **CAS** — CAS-bits specified by the user for one voice channel in both directions (in the *forward:backward* format);

Table 6.1: Signalling frequency description

Designation	Signalling frequency value (Hz)
500	500
F0	700
F1	900
F2	1100
F4	1300
F7	1500
F11	1700
2600	2600

- **State** — the information about frequency combination.

DSS1/PRI, EDSS1/PRI

Date	Time	Proto	Link	Type	TEI	CIC	CgPN	CdPN	CV	Info
Tue ...	23:0...	DSS1/PRI0		DM	4D	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI1		DM	4D	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI0		-	4F	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI1		-	4F	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI0		SREJ	4B	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI1		SREJ	4B	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI0		UI	4C	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI1		UI	4C	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI0		-	4C	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI1		-	4C	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI0		SREJ	4D	-	-	-	-	-
Tue ...	23:0...	DSS1/PRI1		SREJ	4D	-	-	-	-	-

Figure 6.4. Protocol Analysis: DSS1/PRI

- **Type** — the message type;
- **TEI** — Terminal Endpoint Identifier;
- **CIC** — Channel Identification Code;
- **CgPN** — Calling Party Number;
- **CdPN** — Called Party Number;
- **CV** — Cause Value (the reason of disconnection).

SS7/ISUP, SS7/TCAP

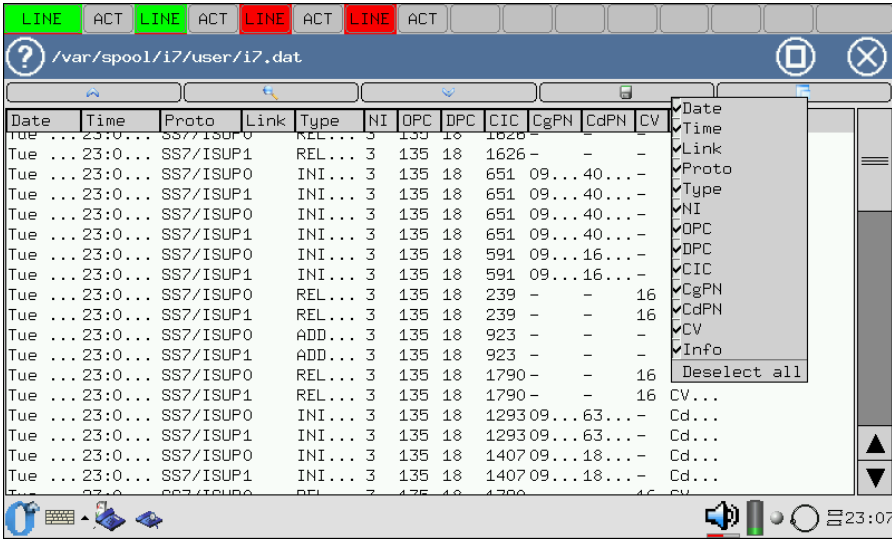



Figure 6.5. Protocol Analysis: SS7/ISUP, SS7/TCAP

- **Type** — the message type;
- **NI** — Network Indicator;
- **OPC** — Originating Point Code;
- **DPC** — Destination Point Code;
- **CIC** — Channel Identification Code;
- **CgPN** — Calling Party Number;
- **CdPN** — Called Party Number;
- **CV** — Cause Value (the reason of disconnection).

6.1.3 Message list settings

6.1.3.1 Parameter output settings

1. Tap the  icon. The list will appear in which the names of displayed columns are marked with the ✓ symbol.
2. In this list, select the columns to be displayed in the message list: just tap the name of the required column with the stylus.
3. To disable display of the column in the output, just tap its name again.

Date	Proto	Link	Type	NI	OPC	DPC	CIC	CgPN	CdPN	CV	Info
Tue ...	SS7/ISUP0		REL...	3	135	18	1626	-	-	-	
Tue ...	SS7/ISUP1		REL...	3	135	18	1626	-	-	-	
Tue ...	SS7/ISUP0		INI...	3	135	18	651	09...	40...	-	Cd...
Tue ...	SS7/ISUP1		INI...	3	135	18	651	09...	40...	-	Cd...
Tue ...	SS7/ISUP0		INI...	3	135	18	651	09...	40...	-	Cd...
Tue ...	SS7/ISUP1		INI...	3	135	18	651	09...	40...	-	Cd...
Tue ...	SS7/ISUP0		INI...	3	135	18	591	09...	16...	-	Cd...
Tue ...	SS7/ISUP1		INI...	3	135	18	591	09...	16...	-	Cd...
Tue ...	SS7/ISUP0		REL...	3	135	18	239	-	-	16	CV...
Tue ...	SS7/ISUP1		REL...	3	135	18	239	-	-	16	CV...
Tue ...	SS7/ISUP0		ADD...	3	135	18	923	-	-	-	BC...
Tue ...	SS7/ISUP1		ADD...	3	135	18	923	-	-	-	BC...
Tue ...	SS7/ISUP0		REL...	3	135	18	1790	-	-	16	CV...
Tue ...	SS7/ISUP1		REL...	3	135	18	1790	-	-	16	CV...
Tue ...	SS7/ISUP0		INI...	3	135	18	1293	09...	63...	-	Cd...
Tue ...	SS7/ISUP1		INI...	3	135	18	1293	09...	63...	-	Cd...
Tue ...	SS7/ISUP0		INI...	3	135	18	1407	09...	18...	-	Cd...
Tue ...	SS7/ISUP1		INI...	3	135	18	1407	09...	18...	-	Cd...
Tue ...	SS7/ISUP0		REL...	3	135	18	1790	-	-	16	CV...
Tue ...	SS7/ISUP1		REL...	3	135	18	1790	-	-	16	CV...

Figure 6.6. Protocol Analysis: the message list

Fig.6.2, page 37, and Fig.6.6 show the ordinary message list and the list in which the **Time** column is not displayed.

6.1.3.1.1 Changing the column width

1. Select a column to change its width.
2. Tap the right border of the column in the list header.
3. Holding down the stylus on the device screen, drag the border until you reach the desired column width.

The example shows the ordinary message list and the list in which the width of the **Time** column is changed.

Figure 6.7 shows the original view of the Protocol Analysis software. The window title is "/var/spool/i7/user/i7.dat". The table displays network events with the following columns: Date, Time, Proto, Link, Type, NI, OPC, DPC, CIC, CgPN, CdPN, CV, and Info. The 'Time' column is narrow, showing only the date and time in HH:MM:SS format.

Date	Time	Proto	Link	Type	NI	OPC	DPC	CIC	CgPN	CdPN	CV	Info
Tue ...	23:00:00	SS7/ISUP0	REL...	3	135	18	1626	-	-	-	-	-
Tue ...	23:00:00	SS7/ISUP1	REL...	3	135	18	1626	-	-	-	-	-
Tue ...	23:00:00	SS7/ISUP0	INI...	3	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:00:00	SS7/ISUP1	INI...	3	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:00:00	SS7/ISUP0	INI...	3	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:00:00	SS7/ISUP1	INI...	3	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:00:00	SS7/ISUP0	INI...	3	135	18	591	09...	16...	-	-	Cd...
Tue ...	23:00:00	SS7/ISUP1	INI...	3	135	18	591	09...	16...	-	-	Cd...
Tue ...	23:00:00	SS7/ISUP0	REL...	3	135	18	239	-	-	-	16	CV...
Tue ...	23:00:00	SS7/ISUP1	REL...	3	135	18	239	-	-	-	16	CV...
Tue ...	23:00:00	SS7/ISUP0	ADD...	3	135	18	923	-	-	-	-	BC...
Tue ...	23:00:00	SS7/ISUP1	ADD...	3	135	18	923	-	-	-	-	BC...
Tue ...	23:00:00	SS7/ISUP0	REL...	3	135	18	1790	-	-	-	16	CV...
Tue ...	23:00:00	SS7/ISUP1	REL...	3	135	18	1790	-	-	-	16	CV...
Tue ...	23:00:00	SS7/ISUP0	INI...	3	135	18	1293	09...	63...	-	-	Cd...
Tue ...	23:00:00	SS7/ISUP1	INI...	3	135	18	1293	09...	63...	-	-	Cd...
Tue ...	23:00:00	SS7/ISUP0	INI...	3	135	18	1407	09...	18...	-	-	Cd...
Tue ...	23:00:00	SS7/ISUP1	INI...	3	135	18	1407	09...	18...	-	-	Cd...
Tue ...	23:00:00	SS7/ISUP0	REL...	3	135	18	1790	-	-	-	16	CV...
Tue ...	23:00:00	SS7/ISUP1	REL...	3	135	18	1790	-	-	-	16	CV...

Figure 6.7. Protocol Analysis: the original view

Figure 6.8 shows the Protocol Analysis software with the 'Time' column width changed. The window title is "/var/spool/i7/user/i7.dat". The table displays network events with the following columns: Date, Time, Proto, Link, Type, NI, OPC, DPC, CIC, CgPN, CdPN, CV, and Info. The 'Time' column is wider, showing the date, time, and a unique identifier.

Date	Time	Proto	Link	Type	NI	OPC	DPC	CIC	CgPN	CdPN	CV	Info
Tue ...	23:06:01.713028	SS7/ISUP0	REL...	3	135	18	1626	-	-	-	-	-
Tue ...	23:06:01.713153	SS7/ISUP1	REL...	3	135	18	1626	-	-	-	-	-
Tue ...	23:06:02.054528	SS7/ISUP0	INI...	3	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:06:02.054653	SS7/ISUP1	INI...	3	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:06:03.078528	SS7/ISUP0	INI...	3	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:06:03.078653	SS7/ISUP1	INI...	3	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:06:03.092153	SS7/ISUP0	INI...	3	135	18	591	09...	16...	-	-	Cd...
Tue ...	23:06:03.092278	SS7/ISUP1	INI...	3	135	18	591	09...	16...	-	-	Cd...
Tue ...	23:06:03.538653	SS7/ISUP0	REL...	3	135	18	239	-	-	-	16	CV...
Tue ...	23:06:03.538778	SS7/ISUP1	REL...	3	135	18	239	-	-	-	16	CV...
Tue ...	23:06:03.562028	SS7/ISUP0	ADD...	3	135	18	923	-	-	-	-	BC...
Tue ...	23:06:03.562153	SS7/ISUP1	ADD...	3	135	18	923	-	-	-	-	BC...
Tue ...	23:06:03.585403	SS7/ISUP0	REL...	3	135	18	1790	-	-	-	16	CV...
Tue ...	23:06:03.585528	SS7/ISUP1	REL...	3	135	18	1790	-	-	-	16	CV...
Tue ...	23:06:04.849778	SS7/ISUP0	INI...	3	135	18	1293	09...	63...	-	-	Cd...
Tue ...	23:06:04.849903	SS7/ISUP1	INI...	3	135	18	1293	09...	63...	-	-	Cd...
Tue ...	23:06:05.074403	SS7/ISUP0	INI...	3	135	18	1407	09...	18...	-	-	Cd...
Tue ...	23:06:05.074528	SS7/ISUP1	INI...	3	135	18	1407	09...	18...	-	-	Cd...
Tue ...	23:06:05.633403	SS7/ISUP0	REL...	3	135	18	1790	-	-	-	16	CV...
Tue ...	23:06:05.633528	SS7/ISUP1	REL...	3	135	18	1790	-	-	-	16	CV...

Figure 6.8. Protocol Analysis: the width of the *Time* column is changed

6.1.3.1.2 Moving the columns

1. Select a column that have to be moved.
2. Tap the column name and, holding down the stylus on the screen, drag the column to the desired position. When you drag the column, its future location is schematically shown by a dotted line.



Date	Time	Proto	Link	Type	NI	OPC	DPC	CIC	CgPN	CdPN	CV	Info
Tue ...	23:0...	SS7//ISUP0		REL...	3	135	18	1626	-	-	-	-
Tue ...	23:0...	SS7//ISUP0		INI...	3	135	18	651	09...	40...	-	Cd...
Tue ...	23:0...	SS7//ISUP1		INI...	3	135	18	651	09...	40...	-	Cd...
Tue ...	23:0...	SS7//ISUP0		INI...	3	135	18	651	09...	40...	-	Cd...
Tue ...	23:0...	SS7//ISUP1		INI...	3	135	18	651	09...	40...	-	Cd...
Tue ...	23:0...	SS7//ISUP0		INI...	3	135	18	591	09...	16...	-	Cd...
Tue ...	23:0...	SS7//ISUP1		INI...	3	135	18	591	09...	16...	-	Cd...
Tue ...	23:0...	SS7//ISUP0		REL...	3	135	18	239	-	-	16	CV...
Tue ...	23:0...	SS7//ISUP1		REL...	3	135	18	239	-	-	16	CV...
Tue ...	23:0...	SS7//ISUP0		ADD...	3	135	18	923	-	-	-	BC...
Tue ...	23:0...	SS7//ISUP1		ADD...	3	135	18	923	-	-	-	BC...
Tue ...	23:0...	SS7//ISUP0		REL...	3	135	18	1790	-	-	16	CV...
Tue ...	23:0...	SS7//ISUP1		REL...	3	135	18	1790	-	-	16	CV...
Tue ...	23:0...	SS7//ISUP0		INI...	3	135	18	1293	09...	63...	-	Cd...
Tue ...	23:0...	SS7//ISUP1		INI...	3	135	18	1293	09...	63...	-	Cd...
Tue ...	23:0...	SS7//ISUP0		INI...	3	135	18	1407	09...	18...	-	Cd...
Tue ...	23:0...	SS7//ISUP1		INI...	3	135	18	1407	09...	18...	-	Cd...
Tue ...	23:0...	SS7//ISUP0		REL...	3	135	18	1790	-	-	16	CV...
Tue ...	23:0...	SS7//ISUP1		REL...	3	135	18	1790	-	-	16	CV...

Figure 6.9. Protocol Analysis: the original list view

Date	Time	Proto	Type	NI	Link	OPC	DPC	CIC	CgPN	CdPN	CV	Info
Tue ...	23:0...	SS7/ISUPREL	...	3	0	135	18	1626	-	-	-	-
Tue ...	23:0...	SS7/ISUPINI	...	3	0	135	18	651	09...40...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI	...	3	1	135	18	651	09...40...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI	...	3	0	135	18	651	09...40...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI	...	3	1	135	18	651	09...40...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI	...	3	0	135	18	591	09...16...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI	...	3	1	135	18	591	09...16...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPREL	...	3	0	135	18	239	-	-	16	CV...
Tue ...	23:0...	SS7/ISUPREL	...	3	1	135	18	239	-	-	16	CV...
Tue ...	23:0...	SS7/ISUPADD	...	3	0	135	18	923	-	-	-	BC...
Tue ...	23:0...	SS7/ISUPADD	...	3	1	135	18	923	-	-	-	BC...
Tue ...	23:0...	SS7/ISUPREL	...	3	0	135	18	1790	-	-	16	CV...
Tue ...	23:0...	SS7/ISUPREL	...	3	1	135	18	1790	-	-	16	CV...
Tue ...	23:0...	SS7/ISUPINI	...	3	0	135	18	1293	09...63...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI	...	3	1	135	18	1293	09...63...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI	...	3	0	135	18	1407	09...18...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI	...	3	1	135	18	1407	09...18...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPREL	...	3	0	135	18	1790	-	-	16	CV...
Tue ...	23:0...	SS7/ISUPREL	...	3	1	135	18	1790	-	-	16	CV...

Figure 6.10. Protocol Analysis: the *Link* column is moved

6.2 Monitoring mode

1. Activate the **Protocol Analysis** application by making the required preliminary settings (refer to the description above).
2. To enter the monitoring mode, tap the  icon on the toolbar. The device starts data collection and display in real time.
3. To stop data collection and enter the postprocessing mode, just tap the  button again.



When you return to the monitoring mode next time, the message list will be cleared and all previously registered data will be lost! Save the required information beforehand!

6.2.0.1 Monitoring status applet

You can visually check the current status of the signalling data collection process in real time using the monitoring status applet.

The applet is represented by the indicator that looks like a circle with a

moving dot 

- The indicator is in green, the dot is moving — the signalling data collection process is going on.
- The indicator is in red, the dot is not moving — the real-time monitoring is not running.

6.2.0.2 Quick search

The analyzer supports the quick search capability that allows to find the required information in the message list by the substring.

1. Stop the data collection.
2. Double tap (like a mouse double clicking on a PC) any string in the list.
3. Input a search substring in the popped-up dialog box. You can use wildcard characters.
4. Tap the **Find next** button. If the requested data are found, then the search will be stopped and the cursor will indicate the found message string.
5. To find a next string satisfying the request, tap the **Find next** button again.
6. To exit the search dialog box, tap **OK** .

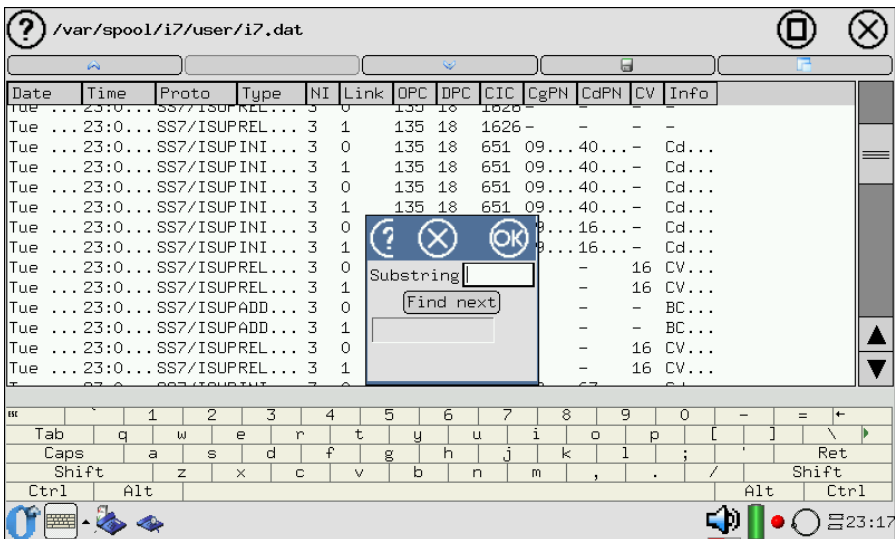


Figure 6.11. Protocol Analysis: quick search

6.3 Data decoding

Any registered signalling message can be fully decoded. Fully decoded messages are displayed with the customized grain size, i.e. you can view the data of selected protocol subsystems only (e.g. only the ISUP data are displayed, and the MTP2/MTP3 data are ignored).

6.3.1 Message decoding

To fully decode one or several messages, do the following operations.

1. Stop the data collection.
2. Select the messages to be decoded: tap the string of the required message.

To unselect the message, tap again its string in the list. Besides, you can use the additional function **Deselect All** in the **View** menu. In this case, all previously selected messages will be deselected.

Date	Time	Proto	Type	NI	Link	OPC	DPC	CIC	CgPN	CdPN	CV	Info
Tue ...	23:0...	SS7/ISUPREL...	3	0	135	18	1626	-	-	-	-	-
Tue ...	23:0...	SS7/ISUPREL...	3	1	135	18	1626	-	-	-	-	-
Tue ...	23:0...	SS7/ISUPINI...	3	0	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI...	3	1	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI...	3	0	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI...	3	1	135	18	651	09...	40...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI...	3	0	135	18	591	09...	16...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI...	3	1	135	18	591	09...	16...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPREL...	3	0	135	18	239	-	-	-	16	CV...
Tue ...	23:0...	SS7/ISUPREL...	3	1	135	18	239	-	-	-	16	CV...
Tue ...	23:0...	SS7/ISUPADD...	3	0	135	18	923	-	-	-	-	BC...
Tue ...	23:0...	SS7/ISUPADD...	3	1	135	18	923	-	-	-	-	BC...
Tue ...	23:0...	SS7/ISUPREL...	3	0	135	18	1790	-	-	-	16	CV...
Tue ...	23:0...	SS7/ISUPREL...	3	1	135	18	1790	-	-	-	16	CV...
Tue ...	23:0...	SS7/ISUPINI...	3	0	135	18	1293	09...	63...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI...	3	1	135	18	1293	09...	63...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI...	3	0	135	18	1407	09...	18...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPINI...	3	1	135	18	1407	09...	18...	-	-	Cd...
Tue ...	23:0...	SS7/ISUPREL...	3	0	135	18	1790	-	-	-	16	CV...
Tue ...	23:0...	SS7/ISUPREL...	3	1	135	18	1790	-	-	-	16	CV...

Figure 6.12. Data decoding: message selection

3. When the required messages are selected, tap the (🔍) button. The detailed decoded data window will appear on the screen.

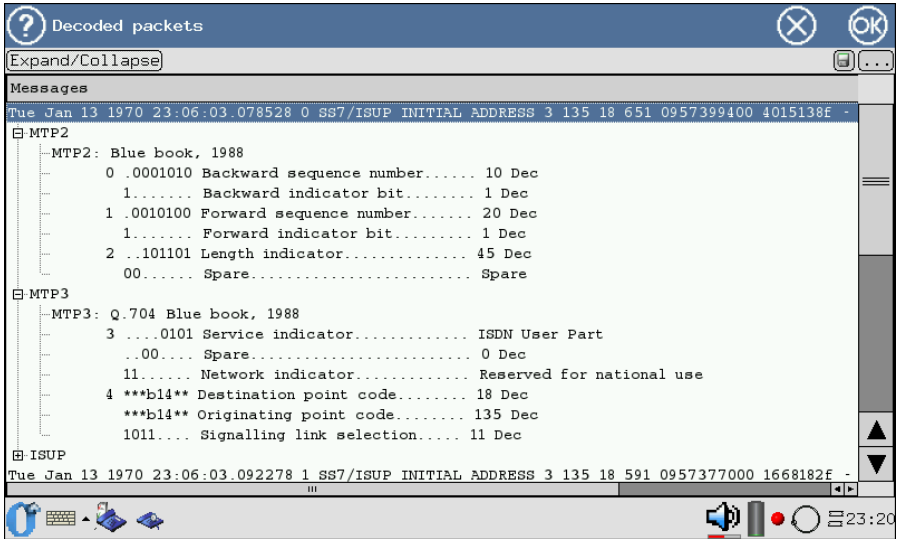


Figure 6.13. Data decoding: detailed decoded data

6.3.2 Customizing the grain size

1. Tap the button in the right corner of the toolbar.
2. In the list appeared on the screen, mark the required subsystems of the signalling protocol. The data of the marked subsystems will be displayed automatically when using the **Expand/Collapse** option.

6.3.2.1 Messages expanding/collapsing

When you open the detailed decoded data window, collapsed messages are displayed, i.e. only the message header is shown. To expand messages, tap the **Expand/Collapse** button on the toolbar. Messages are displayed in a tree view, different signalling protocol subsystems are represented in a hierarchical structure. Data relating to unmarked subsystems (see the description in the above subsection) remain collapsed. To collapse all messages, tap the button again.

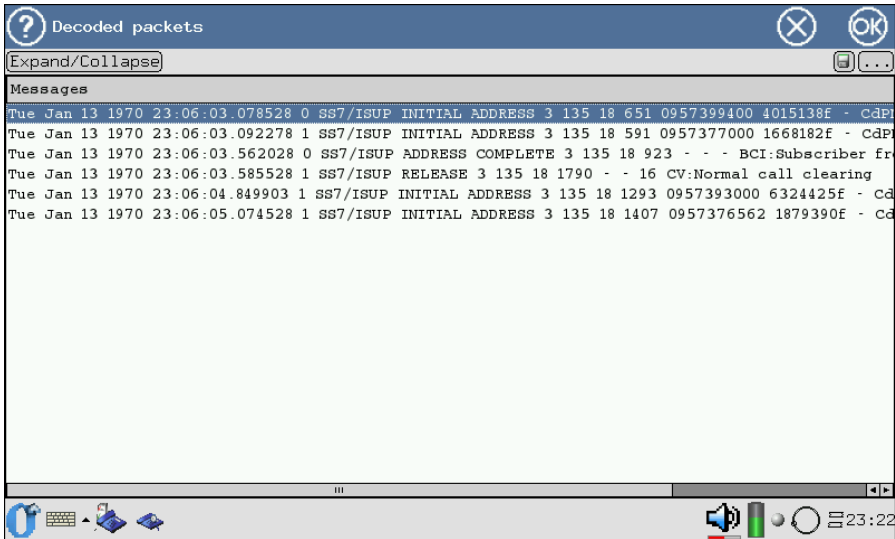


Figure 6.14. Decoded packets: the original view

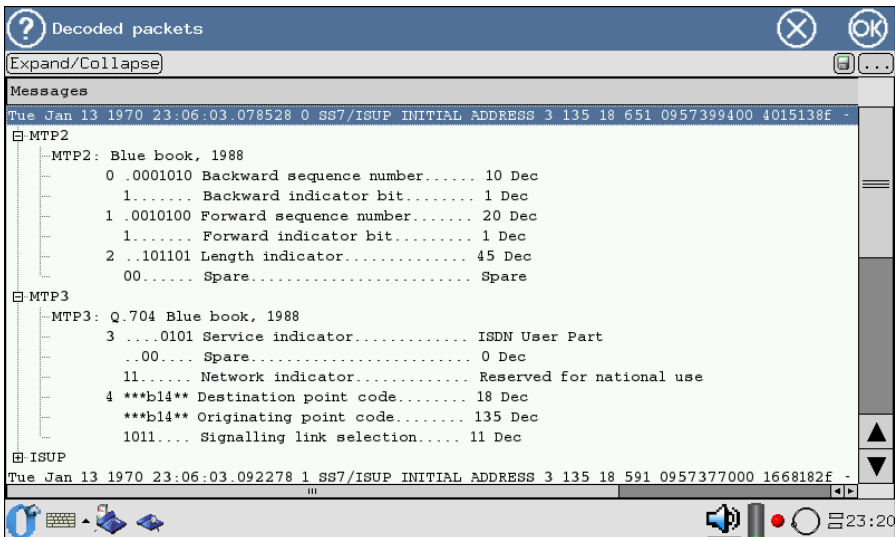





Figure 6.15. Decoded packets: the expanded messages view

You can also expand/collapse messages manually, without using the automatic function.

To expand the message or the data of the subsystem, tap the + sign at the beginning of the message header string or the subsystem string. Then the sign at the beginning of the string will change to -. Tap the sign again to collapse the data.

6.3.3 Writing decoded messages to a file

You can save decoded messages as a text file.

1. Tap the  button.
2. Input the file name in the popped-up dialog box. By default, the name includes the date and time of file saving in the `yyymmdd-hhmm.txt` format.
3. Tap  to create the file with the specified name in the `/tmp/[username]` directory (if no other directory was created when specifying the file name).
4. To cancel the saving operation, tap .

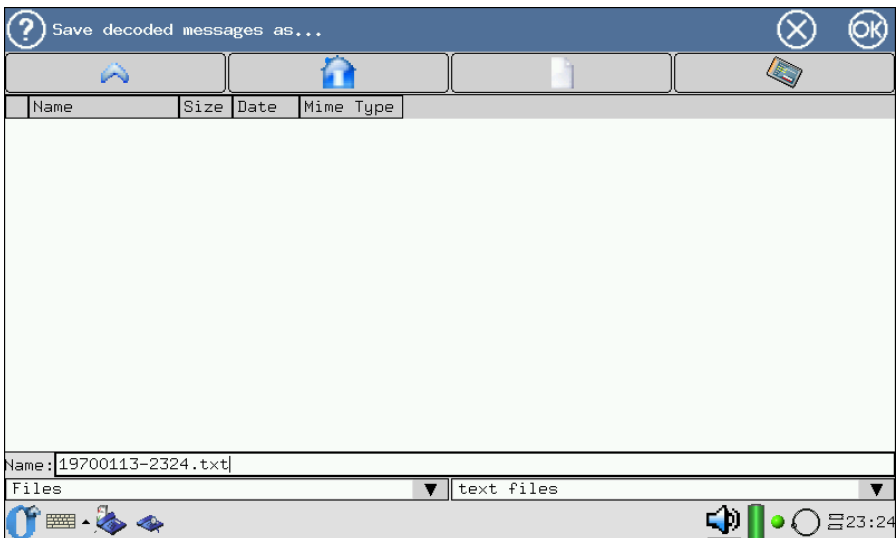


Figure 6.16. Data decoding: writing to the file

6.3.4 Viewing of saved messages

Since decoded messages are saved in an ordinary text file, you can use any available text editor for viewing saved messages.

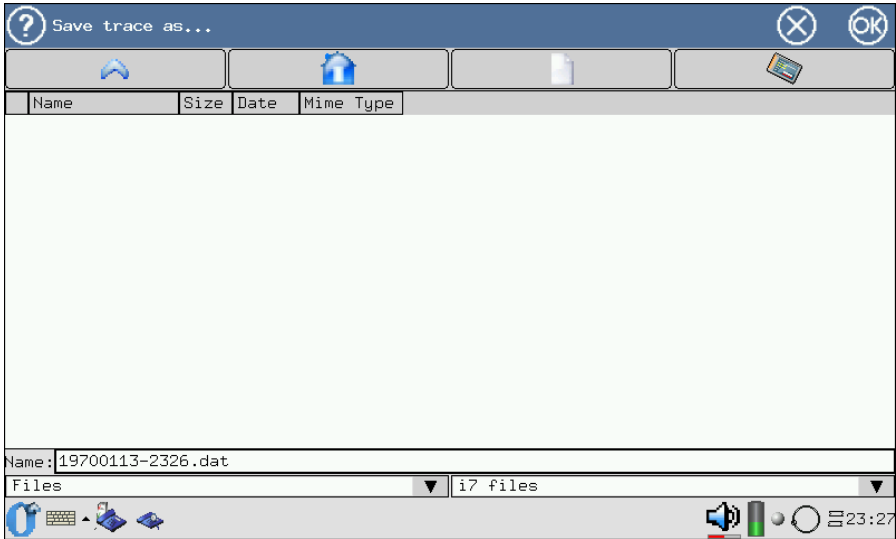



Figure 6.18. File saving

6.4.2 Viewing of trace files



When you open the file, all data currently displayed in the list will be lost! Save the required information beforehand!

1. Stop the data collection.
2. Tap the  button, and then select the **Open** item in the popped up list.
3. In the popped up window, tap the name of a previously saved trace file that you need to view.
Besides, the **File** menu contains the list of five last viewed files, where you can also select the required file.

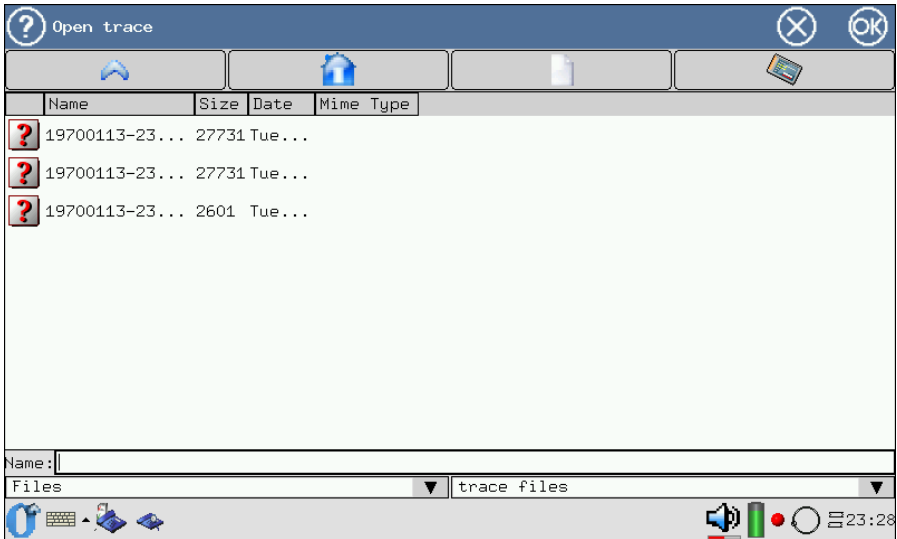



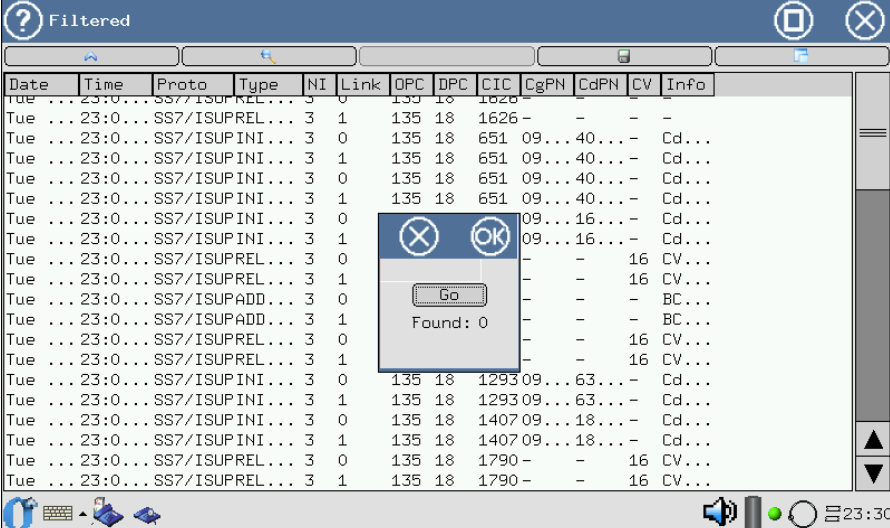


Figure 6.19. Trace file opening

6.4.3 Message filtering

1. Stop the real-time data collection.
2. Open the **Filters Setup** application and specify required filtering conditions. For detailed description of the application, refer to section 5, page 19.
3. You can resume the data collection. In this case, all registered data will be filtered before displaying in accordance with specified rules. Note that in this case, the device will ignore all data which do not match the filtering conditions, and these data will be unavailable for viewing and restoring.
4. If you need to filter out previously collected data, tap the  button, and then — the **Start** button in the popped up dialog box. You can abort the filtering process before its completion, by tapping the  button. In this case, all messages matching the filtering conditions and found on the moment of process stopping will be displayed. To cancel the filtering process and return to the view of the message list without any changes, tap the  button.



Date	Time	Proto	Type	NI	Link	OPC	DPC	CIC	CgPN	CdPN	CV	Info
Tue	.. 23:0..	SS7//ISUPREL	...	3	0	135	18	1626	-	-	-	-
Tue	.. 23:0..	SS7//ISUPINI	...	3	0	135	18	651	09...40...	-	-	Cd...
Tue	.. 23:0..	SS7//ISUPINI	...	3	1	135	18	651	09...40...	-	-	Cd...
Tue	.. 23:0..	SS7//ISUPINI	...	3	0	135	18	651	09...40...	-	-	Cd...
Tue	.. 23:0..	SS7//ISUPINI	...	3	1	135	18	651	09...40...	-	-	Cd...
Tue	.. 23:0..	SS7//ISUPINI	...	3	0	135	18	651	09...16...	-	-	Cd...
Tue	.. 23:0..	SS7//ISUPINI	...	3	1	135	18	651	09...16...	-	-	Cd...
Tue	.. 23:0..	SS7//ISUPREL	...	3	0	-	-	-	-	-	16	CV...
Tue	.. 23:0..	SS7//ISUPREL	...	3	1	-	-	-	-	-	16	CV...
Tue	.. 23:0..	SS7//ISUPADD	...	3	0	-	-	-	-	-	-	BC...
Tue	.. 23:0..	SS7//ISUPADD	...	3	1	-	-	-	-	-	16	CV...
Tue	.. 23:0..	SS7//ISUPREL	...	3	0	-	-	-	-	-	16	CV...
Tue	.. 23:0..	SS7//ISUPREL	...	3	1	-	-	-	-	-	16	CV...
Tue	.. 23:0..	SS7//ISUPINI	...	3	0	135	18	1293	09...63...	-	-	Cd...
Tue	.. 23:0..	SS7//ISUPINI	...	3	1	135	18	1293	09...63...	-	-	Cd...
Tue	.. 23:0..	SS7//ISUPINI	...	3	0	135	18	1407	09...18...	-	-	Cd...
Tue	.. 23:0..	SS7//ISUPINI	...	3	1	135	18	1407	09...18...	-	-	Cd...
Tue	.. 23:0..	SS7//ISUPREL	...	3	0	135	18	1790	-	-	16	CV...
Tue	.. 23:0..	SS7//ISUPREL	...	3	1	135	18	1790	-	-	16	CV...

Figure 6.20. Message filtering: settings



Remember that the message list filtering involves a list re-reading which leads to loss of all unsaved data! Do not forget to save the required data beforehand!

7. Technical support

Additional information on the **Bercut-MMT** device and new software can be found at the company site www.metrotek.ru. You also can send an email or call Technical Support Service (refer to **Contact Information**). Please provide problem description and device data that can be found in the device's menu item: *Bercut-MMT Device Information* (**O-menu** ⇒ **Configuring** ⇒ **Bercut-MMT Information**), and consist of the following information:

- device serial number (also present on the rear panel);
- version;
- pluggable modules information.

***Note:** prior to application to the technical support service it is recommended to update the firmware version of the device and to check its operability again.*

7.1 Contact Information

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