## **Bercut-E1** Universal handheld analyser for the telecommunication networks

Functional reference Version 1.0.9 August 27, 2004

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# **Bercut-E1: overview**

Based on a handheld computer **Bercut-E1** represents the new generation of telecom measurement equipment.

**Bercut-E1** can be used to test telecommunication equipment in accordance with international and national standards, and for operative diagnostic and troubleshooting of the networks elements.

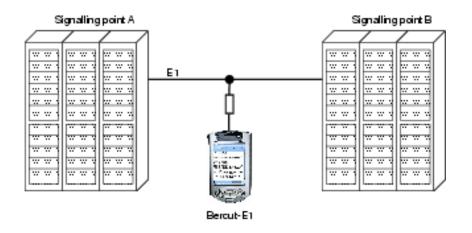
## **1.1 Basic functions**

- Two basic modes protocols analysis and pcm measurements and analysis
- Non-intrusive data stream capture
- Signalling protocols decoding and analysis
- Erroneous signalling messages indication
- Powerful Signalling data filtering system
- Context help for protocol messages (english, russian)
- Saving data for post-processing
- PCM-frame contents monitoring and voice channel control
- ITU-T G.821 and G.826 analysis with posiibility of graphical reports
- Real-time PCM status control
- Data synchronization with desktop PC
- Remote control function
- Desktop PC Software kit (Windows95/98/2000/XP or Linux) intended for the post-processing

**Bercut-E1** is very miniature and easy-to-use device. It uses universal open platform and well-known standard data transfer protocols, so user has no limits for expanding or interconnections with informational systems.

## **1.2 Operation principles**

The basic principle of the **Bercut-E1** operation is the non-intrusive control mode, i.e. analyser connects to tested system in parallel with high-impedance input probe and hereby can not influence on the monitored objects while data gathering.



**Bercut-E1** allows user to display decoded signalling data, control output parameters, filter results by wide range of conditions, save data for futher post-processing etc.

## **1.3** Supply kit

The supply kit of the **Bercut-E1** analyser includes:

- Bercut-E1 analyser:
  - data processing and display module, based on iPAQ Pocket PC H5400, and
  - interface unit (E1-unit) for connection to PCM equipment based on PC Card Expansion Pack.
- Interface cable to connect to PCM equipment.
- AC/DC adapter 110/220V.
- Universal cradle for USB or serial connections.
- Desktop PC Software kit
- User Guide

# **Connection and preliminary settings**

## 2.1 Connection to PCM

Connection to PCM-equipment to be tested is a very easy and short-time process. To get an access to all **Bercut-E1** applications and start an analysis user need to fulfill just 3 steps:

- 1. Connect the E1-module to data processing module.
- 2. Connect anasyser to PCM equipment using the connecting cable.
- 3. Turn on the power and pass authorization procedure.

## 2.2 PCM parameters setup

The first mandatory step after connecting is the PCM parameters setup by means of the "PCM settings" application.

⑦ PCM ports setup	$\otimes \Theta$
Receiver Transmitter	FOD
🗌 Same for all ports	
port O	-
HDB3	~
Doubleframe	-
🗌 CRC4 🛛 CRC4-I	
🗆 CAS	
☑ Error counters	
🗌 Equalizer	
user setting	
()*  ▲ √	••••**

Application "PCM settings" provides the following features:

- Same for all ports This option allows to use same settings for all ports and therefor reduces the time for parameters settings.
- Two types of the frame structure support.
   Bercut-E1 allows to test systems with both doubleframe or multiframe alignment.

- CRC4 control option For the systems with multiframe alignment there are additional options available: CRC4 and CRC4 with bits inversion performance control.
- CAS synchronization Bercut-E1 supports the systems with CAS synchronization.
- Errors counters This option enables continious count of different errors types throughout the operating session.
- Optional long-haul support Special versions of the **Bercut-E1**'s software support the long-haul testing.

## 2.3 Signalling links parameters setup

**Bercut-E1** provides following features for setting tested signalling links parameters:

- User-defined links names. User can set convenient symbollic names for tested links.
- Hardware short-packets filter. Hardware filter of short-length signalling usits (packet length is less then 4 bytes; e.g. FISU). If this option enabled then **Bercut-E1** ignores such units and they will never be stored in RAM.
- Links groupping. This option allows to trace signalling data exchange within one call.
- "One-tap" restoration of the preceding configuration.
   Whenever application is loaded all parameters will be set to their default values. User can easily restore preceding parameters values using User Settings button.

## 2.4 Operational modes

Bercut-E1 analyser can operate in two modes:

- monitoring and analysis of signalling protocols data; and
- measurements and analysis of PCM trunks

The operating modes can be easily switched without need to reset the device.

# **Protocols analysis**

## 3.1 Real-time monitoring

**Bercut-E1** analyser provides simultaneous monitoring for up to 4 PCM interfaces and 2 bidirectional signalling links. The device automatically captures data stream and decodes it in a real-time mode in accordance to international or national signalling system standards.

same for all vise filter       Apply File         group 0       SS7/ISUP         viskip fisu       any NI         viskip fisu       any OPC         any CIC       any DPC         A number *       Anumber *         B number *       Blue book 88         Advanced       MTP3: Russian 94         MTP3: Russian 94       MTP3: Russian 94         O Russian 94       ISUP: Russian 94         O Russian 94	$?$ Protocols and filters setup $@\otimes$	🕐 group 0: decoder setu	ip .	$\otimes \Theta$
group 0       SS7/ISUP         Image: SS7/ISUP <td< td=""><td>Filter setup Groups About</td><td>Subsystem</td><td>Variant</td><td>Comment</td></td<>	Filter setup Groups About	Subsystem	Variant	Comment
group 0       SS7/ISUP         Image: SS7/ISUP       Image: SS7/ISUP         Image	□ same for all 🗹 use filter Apply File		Russian 94	
Image: Second state of the second s				
Image: Supple Correction       any OPC       Image: Supple Correction				
any CIC any DPC A number * B number * Advanced Advanced Advanced Bue book 93 MTP3: Q. Blue book 93 MTP3: Q. Blue book 88 MTP3: Q. Blue book 88 MTP3: Q. C Russian 94 ISUP: RU C Russian 94 ISUP: RU C Russian 94 ISUP: Q. C Russian 94 ISUP				MTP2: BI
A number * B number * Advanced	· · · · · · · · · · · · · · · · · · ·			
Advanced  Advanced  Advanced  O Blue book 88  MTP3: Q.  Superational 94  Superational 91  S	any CIC 🔷 any DPC 🔷			
Advanced Advanc	A number *			
Advanced O Russian 94 ISUP: Ru O International 91 ISUP: Q. O White book 97 ISUP: Q. O White book 93 ISUP: Q. O Blue book 88 ISUP: Q. O MoU 92 ISUP: ET O Russian 2001 ISUP-R-2	B number *			
O       Russian 94       ISUP: RU         O       International 91       ISUP: Q.         O       White book 97       ISUP: Q.         O       White book 93       ISUP: Q.         O       White book 93       ISUP: Q.         O       White book 93       ISUP: Q.         O       Blue book 88       ISUP: Q.         O       MoU 92       ISUP-R-2         O       Russian 2001       ISUP-R-2	Advanced		Russian 2001	
O White book 97 ISUP: Q. O White book 93 ISUP: Q. O Blue book 88 ISUP: Q. O MoU 92 ISUP: ET O Russian 2001 ISUP-R-2				
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If **Bercut-E1** is connected to desktop PC then it can operate in probe mode i.e captured stream will be automatically transfered to the PC and stored on its hard disk. In this case real-time monitoring can be performed for 24 hours a day without loss any data.

Flexible link settings subsystem allows to operate in a multiprotocol monitor mode. For example, user can connect one E1-interface to SS7 signalling link and another one to DSS/PRI link to control protocols interworking. The full list of currently supported signalling systems is available in Specifications at the end of this document.

For the real-time monitoring the Filtering subsystem can be used in pre-filtration mode. This allows to reduce time spent to localize nesessary signalling information.

In the monitoring mode **Bercut-E1** also registers and counts PCM and protocol alarms and errors. Result can be viewed as counters with an apropriate built-in application.

## 3.2 Data decoding

Signalling data decoding from the binary to the human-readable format is one of the main functions of the **Bercut-E1** analyser. Captured data are displayed as a tabbed list, one message per line in order of the capture time.

#### **Message list features**

⊘∕tmp/cath	y/2004	0823-0	0700.0	dat			$\otimes$
$\bigcirc \land \bigcirc \bigcirc$	e,	)[		_			
Time	Link	Туре	NI	OPC	DPC	CIC	
09:36:03	U	THM	3	2048	29	3	
09:36:04	0	ACM	3	2048	28	61	
09:36:04	0	ANM	3	2048	29	122	
09:36:04	0	RLC	3	2048	24	335	
09:36:04	0	INR	3	2048	24	367	
09:36:04	0	RLC	3	2048	24	397	
09:36:04	0	RLC	3	2048	24	379	
09:36:05	0	REL	3	2048	26	21	
09:36:05	0	REL	3	2048	29	62	
09:36:05	0	ACM	3	2048	24	367	
09:36:05	0	CPG	3	2048	24	367	
09:36:05	0	REL	3	2048	25	83	
09:36:05	0	INR	3	2048	24	397	
09:36:05	0	INR	3	2048	24	379	
09:36:05	0	RLC	3	2048	24	279	
09:36:05	0	IAM	3	2048	29	33	
09:36:06	0	ACM	3	2048	24	379	
09:36:06	0	CPG	3	2048	24	379	
09:36:06	0	ANM	3	2048	24	337	
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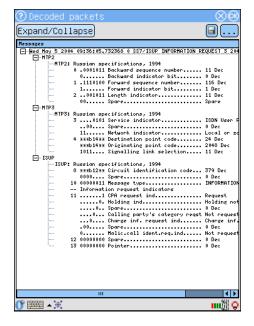
- Wide range of protocol-dependant fields. For example:
  - SS7/ISUP: Message type, Network Indicator, Originating and Destination Point Codes, CIC, Calling and Called partys numbers, Cause Value.
  - DSS1/EDSS: message type, TEI, CIC, Calling and Called Party Number and Cause Value

- Highlighting of erroneous or unknown messages
- The following basic parameters are displayed for all messages:
  - Date message capture date
  - **Time** message capture time
  - Link signalling link and direction
  - Proto signalling protocol name
  - **Info** additional information

⊘∕tmp/cath	y/2004	40820-1100.da	at			8
	e,		-		2	
Time 04:05:02	Link	Type	TEI		Cgl	
04:05:02	0	STATUS	00	512		
04:05:02	0	RR	00	- 11		
04:05:02	0	RELEASE	00	512		
04:05:02	0	RR	00	312	-	
04:05:02	0	RELEASE	00	-	-	
	*				-	
04:05:02	0	DISCONNECT	00	110	-	
04:05:02	0	RR	00	-	-	
04:05:03	0	STATUS	00	110	-	
04:05:03	0	RR	00	-	-	
04:05:03	0	RELEASE	00	110	-	
04:05:03	0	RR	00	-	-	
04:05:03	0	RELEASE	00	110	-	
04:05:03	0	RR	00	-	-	
04:05:04	0	SETUP	00	115		
04:05:04	0	RR	00	-	-	
04:05:04	0	CALL PRO	00	115	-	
04:05:04	0	RR	00	-	-	
04:05:04	0	ALERTING	00	115	-	
	II	1			• •	-
()* 🖼 ► 🤍 💥						Ç

- Easy-to-customize interface. User can easily tune the messages list output to be convenient for current needs.
- Quick substring search of any data in the list.

Any registered message can be decoded at full length. Utterly decoded messages can be displayed with customizable detailes class, i.e. user can view only one protocol layer without expanding others (for example, view only ISUP part data without MTP2 and MTP3)



## 3.3 Data storage and post-processing

Any collected signalling data can be stored for futher processing in the **Bercut-E1** RAM or on external memory cards. Also any data can be synchronized with desktop PC.

Signalling data can be stored in two formats:

- 1. Captured data stream can be saved as a binary trace-file and can be lately displayed and processed with an internal protocol analysis aplication or with special desktop PC software included in **Bercut-E1** Supply kit.
- 2. Utterly decoded messages can be saved as a text file for further processing with any text editor.

## 3.4 Filtering and search

Filtering subsystem is a powerful tool allows to essentially reduce time searching for the necessary information through the signalling data stream. Filters are useful for possible malfunction localization and troubleshooting.

Filters are available in both pre- and post-filtration mode. In the first case filters applies to the captured stream and all data that do not match to defined conditions will be ignored. In case of post-filtration all filter parameters apply to an already collected and stored signalling information.

Defined filter parameters can be saved as a configuration file. This option is useful for frequently used parameters combinations. Besides, preceeding filter settings can be easily restored with only one stylus tap.

Number of filters parameters depends on currently selected signalling protocol. The list of filter settings for basic supported protocols is shown below. For several parameters (subscribers numbers and the substring) the wildcards "\*" and "?" are allowed.

### Bercut-E1: Functional reference

#### **SS7** Parameters

Protocols and filte	rs setup 🔲 🔘 🔘
Filter setup Groups	About
🗆 same for all 🗹 use	filter Apply File
group 0 🔽 SS7/IS	GUP
🗹 skip fisu	any NI 🔷
☑ swap OPC/DPC	any OPC 🄶
any CIC 🗧	any DPC 🄶
A number *	
B number *	
Adva	anced
<b>() Ⅲ →</b> ₩	

#### **DSS1/EDSS** Parameters

⑦Protocols and filters setup
Filter setup Groups About
□ same for all ☑ use filter Apply File
group 0 V DSS1/PRI
any TEI
A number *
B number *
Advanced
() () () () () () () () () () () () () (

- **TEI** Terminal Endpoint Identifier
- A number/B number Calling/Called subscriber numbers.

- **skip fisu** software filter for FISUs.
- NI Network Indicator
- **OPC and DPC** Originating and Destination Point Codes
- swap OPC/DPC this option enables to show messages transmitted in both directions
- A number/B number Calling/Called subscriber numbers.

Filter setup Groups About ☐ same for all I use filter App group 0  Hex Substring	ly) File ▼
group 0 🔽 Hex	ly File •
group 0 🔽 Hex	<b></b>
Substring	
Image: A market and a marke	

### Hexadecimal decoder settings

• **Substring** — set substring as filter.

For some signalling protocols such as SS7 or DSS/PRI there are advanced filter conditions available:

1. Message type filter

🕐 Adv	anced						$\otimes \Theta$
Messa	ages Ca	use Val	ues.				
🗹 use	filter			] show	unkr	iown	
Code	Name						
1	IAM						
2	SAM						≡
3	INR						
4	INF						
5	СОТ						
6	ACM						
7	CON						
9	ANM						
10	Reserved	l (used	in	1984	Ver)		
11	Reserved	l (used	in	1984	Ver)		
12	REL						
13	SUS						
14	RES						
15	Reserved	l (used	in	1984	Ver)		
16	RLC						
17	CCR						<b></b>
48	920						
			lea	r			
0° 🕮	<b>▲</b> ₩						•••• <sup>66</sup>

2. Cause value filter

🕐 Adv	anced 🛛 🖉 🖉	R
Messa	ages Cause Values	
🗹 use	filter 🗌 show unknown	
Code	Name	
1	Unassigned number	
2	No route to specified transit netw	=
з	No route to destination	
4	Send special information tone	
5	Misdialled trunk prefix	
8	Preemption	
9	Preemption: circuit reserved for reu	
16	Normal call clearing	
17	User busy	
18	No user responding	
19	No answer (user alerted)	
20	Subscriber absent	
21	Call rejected	
22	Number changed	
27	Destination out of order	
28	Invalid number format	-
<u> </u>		۲
	Clear	J
0° 🚃	<b>▲</b> ♥ <b>Ⅲ</b>	Q

3. "Show unknown" option which allows to display messages that are unknown for selected protocol

# **Performance Control**

## 4.1 PCM status monitor

Bercut-E1 allows to control PCM line alarms and errors in in-service mode.

The group of four indicators (according to the device's interface ports) is allways available in a task-bar and user can immediatly react to the changing of a connected PCM-line status.

With only one tap at the indicators area user will get the detailed status information about following states:

- LOS Loss Of Signal
- AIS Alarm Indication Signal
- LFA Loss Frame Alignment
- LMFA Loss MultiFrame Alignment
- RRA Receive Remote Alarm
- OK connected PCM line operates in a normal mode

Indicators color differs according to the status:

- Red alarm detected
- Green no alarms, normal ststus
- Gray unknown state (no line connected to the port)

() PC	M status			$\otimes$
PCM	status	Abou <sup>-</sup>	t	
	0	1	2	3
LOS	•	۲	٢	۲
AIS	٢	٢	٢	۲
LFA	٢	۲	٢	۲
LMFA	٢	۲	٢	۲
RRA	۲	٢	٢	۲
ок	٢	•	٩	•
<b>℃</b> ⊞	≣ - ¥			

## 4.2 PCM errors

**Bercut-E1** collects information about registered PCM alarms and errors within operating session and allows to view these data as accumulative counters.

(?) Err	ons	mor	nitor		$\otimes$
Erro	rs	Ab	out		
	(	C	1	2	3
LOS	361	690	27	17	17
CVC	5	8	7676	،00 261	41 10763
AIS	(	C	0	0	0
LFA	(	С	10	2	2
LMFA	(	0	0	0	0
RRA	(	С	1	0	0
FEC	(	0	339	95	0
MFEC	(	С	0	0	0
CRCE	(	0	0	0	0
REBE	(	0	0	0	0
00:00	:10				Clear
() E	<b>▲</b>	E.			

Besides counters of registered alarms listed above, **Bercut-E1** provides information for the following errors counters:

- CVC Code Violation Counter
- FEC Frame Error Counter
- MFEC MultiFrame Error Counter
- CRCE CRC Error counter
- REBE Remote E-Bit errors counter

## 4.3 HDLC errors

**Bercut-E1** allows to control HDLC-channel performance by means of accumulated errors counters.

⑦ Erro	irs mo s Ab	nitor out		$\otimes$	
	0	1	2	3	
CRC	10	1100	0	0	
ZI	0	18	0	0	
sus	0	0	0	0	
00:00:22					
	▲ III				

For each connected channel user can get information for the following HDLC errors:

- CRC Cyclic Redundant Code errors
- ZI Zero Insertion errors
- SUS Signal Unit Size errors

## 4.4 Frame monitor

Bercut-E1 can monitor the binary content of a PCM-frames data in 3 modes:

- reading data from a selected timeslot for 32 multiframes at once<sup>1</sup>
- continious reading data from a selected timeslot for 32 multiframes <sup>2</sup>
- real-time timeslot monitoring. This mode is also used to listen audio channels.

	lata monit viewer	tor About	$\otimes$
PCM 0			
0	-	1	-
2	-	3	-
4	-	5	-
6	-	7	-
8	-	9	-
10	-	11	-
12	-	13	-
14	-	15	-
	mframe	e O 🔻	
)	<b>▲ !!!!</b>		

<sup>&</sup>lt;sup>1</sup>If connected system does not use Multiframe synchronization, then **Bercut-E1** reads data from 16 frames

 $<sup>^2 {\</sup>rm If}$  connected system does not use Multiframe synchronization, then Bercut-E1 reads data from 16 frames

# **PCM Measurements**

## 5.1 "PCM measurements" subsystem

This **Bercut-E1** subsystem allows to measure and analyse different PCM parameters to control tested trunk performance.

The analyser carries out two types of PCM measurements:

- 1. In-Service monitoring (ISM) for maintance and performance monitoring.
- 2. Out-of-Service (OSM) for installation, provisioning and bringing-into-service tasks.

All measurement results can be saved as file for futher review at any moment during measurement session without process interraption.

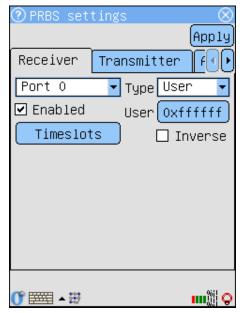
### 5.1.1 Test Pattern Generator/Receiver

Test Pattern Generator/Receiver generates test pattern or PRBS in either the transmit or receive direction. The pattern can be generated in any selected timeslot(s) of connected PCM trunk.

#### **Pattern generator**

The following patterns can be generated:

- $2^6 1$
- $2^9 1$
- $2^{11} 1$
- $2^{15} 1$
- $2^{23} 1$
- Fixed patterns (all 1, all 0, alternative, user defined)



#### 5.1.2 PRBS Status

Test pattern receiver status is displayed with an taskbar applet. This applet shows if there is synchronization of locally generated pattern with received pattern.

This data is dislayed as a table of indicators which colors differs as follows:

- Red alarm status
- Green normal status, no alarm
- Gray status is not available. Such situation appears in the following cases:
  - 1. Pattern receiver is not enabled for current port
  - 2. There were LOS or AIS alarm detected for current port

PCM n	neas	urem	ents	mo	nit	or (	$\otimes$
Port O	-	Sa	ave		Sta	art	
Aları	ns	G.82	21	G.8	26	]	Þ
Param	Abs	%					
ES		ο ο.	000				
SES		ο ο.	000				
AS		0 0.	000				
US		0 0.	000				
			PRE	BS S	tati	us	
	Bit	ts:	L	SS 🎱	00	))	0
	BEF	२:	A11	0 🔾	00	))	)0
	Ela	apsec	A11	10	00	))	)0
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Each E1 interface (numbered from 0 to 3) fits column in the table. Status parameters are displyed in table rows as followed:

• LSS – Loss of sequence synchronization. Shows status of synchronization with the received pattern.

Status can be estimated as alarm if:

- 1. wrong type of pattern or it's inversion were selected
- 2. timeslots for the patterm receiving have been selected incorrectly
- 3. received pattern has more than 10% of bit errors
- All 0 additional parameter which shows that in timeslots intended for test pattern there were only 0 received (for 255 received 0 there are no 1 detected)
- All 1 additional parameter which shows that in timeslots intended for test pattern there were only 1 received (for 255 received 1 there are no 0 detected)

### 5.1.3 PCM Errors and Alarms

"PCM measurements" subsystem counts and displays errors and alarms detected for E1 interfaces during the measurement session.

#### Errors

PCM	mea	suren	nent:	s mo	nit	or 🚫
Port	0	][s	ave		Sta	art )
Error	٦S	Aları	ns	G.8	21	
Name	Va.	lue				
FEC	0.0	00e+0	0			
MFEC	0.0	00e+0	0			
CRCE	0.0	00e+0	0			
REBE	0.0	00e+0	0			
CVC	0.0	00e+0	0			
EBIT	0.0	00e+0	0			
	-	1			~~~	
	E	lapse	a ti	me:	00:0	10:00
0° 🕮	-				1	

- CVC Code Violation Counter
- FEC Frame Error Counter
- MFEC MultiFrame Error Counter
- CRCE CRC Error counter
- REBE Remote E-Bit errors counter

#### Alarms

PCM	meas	ureme	nts i	monit	or 🛞
Port	0 🗸	Sav	'e	( St	art )
Error	s f	Alarms	G	.821	
Name	Abs	%			
LOS	0	0.000			
AIS	0	0.000			
LFA	0	0.000			
RRA	0	0.000			
LMFA	0	0.000			
LSS	0	0.000			
	- 1	I			
	Eli	apsed	τıme	::00:	00:00
0° 🚟	▲ Щ				<b>₩</b> ₩

Following alarms can be detected:

- LOS Loss Of Signal
- AIS Alarm Indication Signal
- LFA Loss Frame Alignment
- LMFA Loss MultiFrame Alignment
- RRA Receive Remote Alarm
- LSS Loss of Sequence Synchronization

Besides the absolute values for alarm counters error ratio is also displayed.

### 5.1.4 G.821 measurements

Measurements and analysis for following parameters are carried out:

- **ES** Errored Seconds
- SES Severely Errored Seconds
- AS Available Seconds
- US Unavailable Seconds

PCM mea	asuremen	ts monitor 🛇			
Port 0	C Save	e 🛛 Start			
Errors	Alarms	G.821			
Param Ab	is %				
ES	0 0.00	o 🛛			
SES	0 0.00	o 🛛			
AS	0 0.00	o 🛛			
US	0 0.00	0			
B	its:	0.000e+00			
B	ER:	0.000e+00			
Elapsed time:00:00:00					
0 🕅 📲		••••****			

### 5.1.5 G.826 measurements

PCM performance analysis according to ITU-T G.826 recomendation provides possibility to measure parameters in the In-Service mode. All measurements are carried out for near and far ends.

- **ES** Errored Seconds
- SES Severely Errored Seconds
- AS Available Seconds
- US Unavailable Seconds
- **BBE** Background Block Errors

PCM mea	asun	ement	s mo	onit	or 🛞
Port 0		Save		Sta	art )
Alarms	G.	821	G.8	326	
Param	Abs	%			
Near end					
ES	0	0.00	0		=
SES	0	0.00	0		-
BBE	0	0.00	0		
US	0	0.00	00		
-AS	0	0.00	0		
Far end					
ES	0	0.00	0		-
SES	0	0.00	<u>۱</u>		-
E	laps	ed ti	.me:	00:0	00:00
0 🚟 🔺					

### 5.1.6 PCM measurements settings

For each measurement parameter the tresholds can be set. If these values have been achieved during the measurement session then the measured parameter is highlighted as alarm.

#### G.821 settings

- **SEST** Severely Errored Seconds Treshold. The value from 0 to 1, default value 1e10-3.
- **ESTR** ES ratio treshold (errored seconds), in %
- SESRT SES ratio treshold (severely errored seconds), in %
- USRT US ratio treshold (unavailable seconds), in %

⊘ Measur Port O	rement setup ▼	⊗ Apply
G.821	G.826	
SEST	1.000e-03	
ESRT, %	8	_
SESRT, 🤊	٤0.2	
USRT, %	ò .	
() ₩ 4	<b>i</b> /	

#### G.826 settings

Following values can be set as G.826 analysis parameters:

🕐 Measurement setup	) 🛇
Port 0 🔽	(Apply)
G.821 G.826	
Near end	Far end
SEST 805	805
ESRT, % 4	4
SESRT, %0.2	0.2
USRT, % O	0
BBERT, %0.02	0.02

- 1. Quality Threshold:
  - SEST SES counter treshold
- 2. Preformance Objectives:
  - (a) ESRT
  - (b) SESRT
  - (c) USRT
  - (d) BBERT

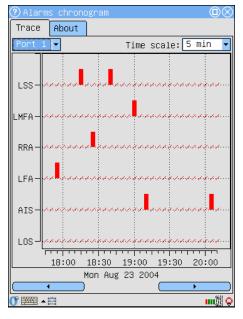
These parameters are the tresholds for ESR,SESR,USR, BBE correspondingly.

All parameters can be set for near and far ends separately. By default their values are equal.

### Bercut-E1: Functional reference

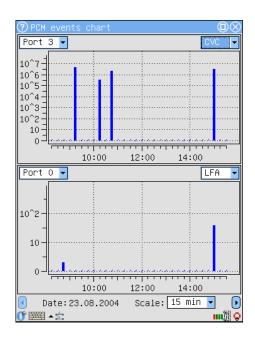
### 5.1.7 Graphic reports

"PCM measurements" subsystem allows to display analysis results in graphic format.



#### Chronogram

The chronogram traces the alarms detection during measure session for each E1 interface. Time scale can be set to 1, 5, 15, 30 minuts or an 1 hour.



#### Chart

**Bercut-E1** allows to generate charts that show values of measured parameters during the session. An application displays two charts simultaniously. Time scale is the same to the chronogram time scale.

# Appendix A

# Specifications

# A.1 Technical specifications

E1 interface	duplex, symmetrical, 2x430 Ohm
Input resistance	not less than 4 kOhm
User interface	graphical
Display	Transflective color TFT, 240-320 pixels,
	64535 colors support
Input methods	Touch-screen input with stylus, virtual
	keyboard
Memory	RAM 32M / ROM 32M
Possibility to extend memory	up to 512 Mb
External interfaces	Serial, USB, IrDA, Bluetooth
Remote access via	ssh, telnet, http, ftp, NetBIOS
Data sync with PC	Windows 95/98/XP/2000, Linux
Autonomic operational time (w/o	up to 10h
battery recharge)	
Power	1400 mAh Li-Polymer built-in battery,
	AC/DC adapter
Size	133 x 88 x 36 mm
Weight	250 g (including battery)

## A.2 Supported Signalling protocols

#### A.2.1 SS-7

- MTP ITU-T Q.700-Q.709, Blue Book, 1988
   ITU-T Q.700-Q.709, White Book, 1993
   Russian (national), 1994, 2001
- ISUP ITU-T Q.761-Q.764, Blue Book, 1988
  ITU-T Q.767, 1991
  ISUP MoU: ETSI ETS 300 121, 1991
  ITU-T Q.761-Q.764, White Book, 1993, 1997
  Russian (national), 1994, 2001
- SCCP ITU-T: Q.711-Q.716, White Book, 1996 ANSI T1.112 Russian (national), 1994, 2001
- TCAP ITU-T: Q.711-Q.774, White Book, 1997 ANSI T1.114-1996 Russian (national), 1994, 2001
- **INAP** ITU-T: Q.1218, 1995 ETSI: CS-1 Core INAP, ETS 300 374-1, 1994 Russian (national), 1994

### A.2.2 DSS1/PRI

• EURO-ISDN ETSI: ETS 300 011, ETS 300 125, ETS 300 102

• **DSS1/PRI** ITU-T: I.431, Q.921, Q.931

### A.2.3 GSM, GPRS

- MAP GSM 09.02 Release 1996
- MAP GPRS GSM 09.02 Release 1997
- Abis GSM 08.56, 08.58, 04.08
- **BSSMAP** GSM 08.08
- **DTAP** GSM 04.08
- SS GSM 04.80
- CAMEL GSM 09.78 Release 1997
- **SMS** GSM 04.11

#### A.2.4 V5

- V5.1 ETSI: ETS 300 324
- **V5.2** ETSI: ETS 300 347

#### A.2.5 QSIG

• **QSIG** ETSI: ETS 300 172, 1995