

CMA 3000

SPECIFICATIONS

Basic Instrument



Field testing has never been easier

CMA 3000 is Anritsu's next-generation portable, compact and user-friendly field tester. It's designed specifically for field technicians who install and maintain mobile-access and fixed-access networks, transmission networks and switching.

The CMA 3000 is a powerful tool for a wide range of applications, including fast first-aid troubleshooting to comprehensive, in-depth and all-layer analysis of transmission problems.

The basic CMA 3000 configuration, with its two 2 Mbps receivers and transmitters, supports framed and unframed testing and monitoring of 2 Mbps systems. This makes CMA 3000 the ideal instrument for measuring in- and out-of-service transmission quality.

Futureproof design

The modular design provides you with a clear and cost-effective upgrade path. This allows you to expand the CMA 3000 from a full-featured transmission line quality tester into an advanced signaling analyzer.

By adding options the CMA 3000 becomes a highly flexible field tester with the ability to test a large number of interfaces and technologies, including Ethernet up to 10 Gbps, SDH up to STM-64, ATM, E3, E4, frame relay lines and the Abis interface of GSM and GPRS networks. Other options turn the CMA 3000 into a very powerful signaling analyzer for GSM, GPRS/EDGE, SS7, and ISDN protocols. Finally, options allow the instrument to emulate VoIP or ISDN PRI calls.

Easy-to-use interface

The intuitive user interface, with a large color LCD display and easy-to-understand graphical symbols allows you to easily read and interpret results of measurements.

Key Features	Key Applications
<ul style="list-style-type: none"> • Simultaneous bi-directional monitoring of 2 Mbps lines • Powerful testing of framed Nx64 kbps and unframed 2 Mbps systems • Simultaneous testing of two 2 Mbps lines • Great flexibility through easy-to-install options • LEDs for immediate line state indications • Large color touch-display • Battery-powered, with more than 10 hours operation between recharges 	<ul style="list-style-type: none"> • Comprehensive out-of-service testing for: <ul style="list-style-type: none"> ○ Installation ○ Provisioning ○ Propagation time analysis • Performance analysis • Physical line monitoring • In-service monitoring for: <ul style="list-style-type: none"> ○ Fast troubleshooting ○ Traffic monitoring ○ Identification of synchronization problems ○ In-service error performance measurement • Drop-and-insert for pseudo in-service testing

Using the high-contrast touch-screen display you can easily customize and store both setup and result screens to fit your personal needs and work routines. You may also configure the CMA 3000 to the received signal, eliminating time-consuming instrument setup. And you can store setups for particular applications in the instrument. To allow quick and easy distribution of standardized test setups within the organization it's also possible to transfer setups to a USB memory stick and subsequently load to other CMA 3000 field testers. With the powerful and flexible report generator you can create .pdf files for selected measurement results. With these files you can provide professional documentation of test results to your customers.

The CMA 3000 has USB ports and a LAN interface for data transfer and external communication to give you full flexibility whether in the field or in the workshop. Remote operation is facilitated through an optional MS Windows® program simulating the instrument's front panel. With another option the CMA 3000 can be remotely controlled with command line scripts, whereby the instrument turns into a fast and reliable tool for automated testing in manufacturing environments.

The instrument is powered by rechargeable and replaceable intelligent high-capacity LiIon batteries, providing more than 10 hours of operation between recharges. The CMA 3000 can also be powered via an external mains adapter for long-term measurements.

Speeds troubleshooting

To speed troubleshooting the CMA 3000 displays alarms and transmission link status on LED indicators. The instrument's two inputs allow instant monitoring of both sides of a line and comparison of simultaneously recorded results.

The CMA 3000 status monitor is always active, providing essential information on the monitored transmission system, including:

- Line alarms on LED indicators with a trap facility
- Display of current input frequency and deviation
- Indication of input level
- Traffic channel usage
- Audio level in a traffic channel
- Propagation time monitor
- Listen-in on a traffic channel

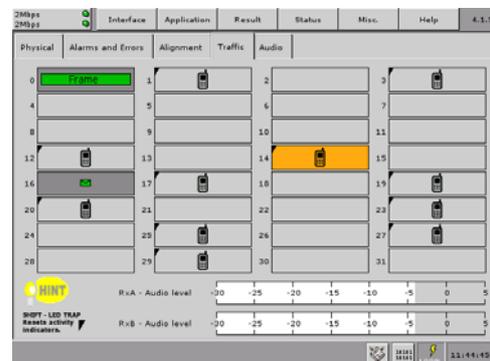


Figure 1 Fast overview of traffic channel time slots.

Fault location is greatly facilitated by the high degree of portability of the robust CMA 3000. This allows you take measurements at any suitable measuring point.

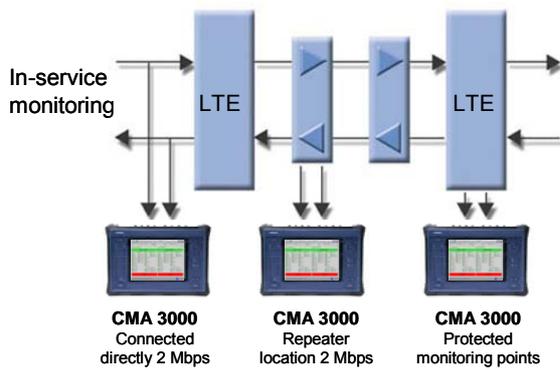


Figure 2 CMA 3000 allows you to perform in-service monitoring of 2 Mbps lines.

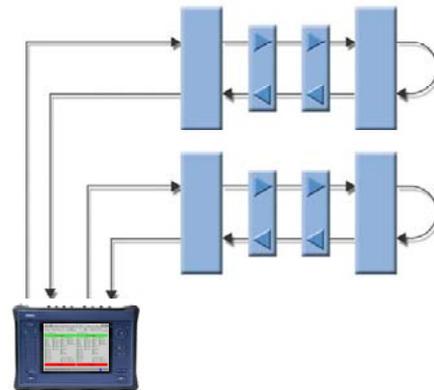


Figure 3 Simultaneous out-of-service testing of up to two 2 Mbps lines.

Out-of-service or in-service statistics

For installation/commissioning and troubleshooting of out-of-service lines the CMA 3000 provides powerful statistical measurements for Bit Error Rate (BER) testing. Statistics are also available for in-service analysis of the transmission-error performance of a line. Information on errors and alarms is collected in time-intervals as defined by you, and error-performance parameters (G.821/G.826/M.2100) are calculated.

The Measurement Summary function gives you a rapid overview of a measurement via an 'OK/Questionable/not-OK' indication with user defined threshold levels. Histogram presentations facilitate the tracing of errors over time.



Figure 4 The Measurement Summary function gives you an OK/Questionable/not-OK indication.

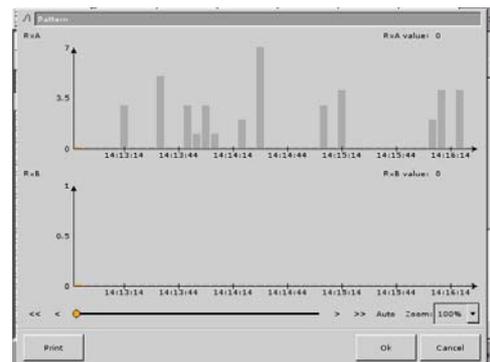


Figure 5 The CMA 3000 histograms facilitate the overview of a statistical measurement.

Out-of-service tests

During installation/commissioning and stress testing of network elements it's possible to control the signal transmitted by the CMA 3000. When generating a 2Mbps signal, the instrument allows you to inject errors and alarms into the transmitted signal. In addition, you may diverge the frequency of the transmitted signal from nominal to test a receiver's ability to handle signals that are out of specifications. For 2 Mbps lines carried through SDH systems you can analyse the APS (Automatic Protection Switching) function of the SDH system with the CMA 3000's APS test and analysis application.



Figure 6 CMA 3000 gives comprehensive statistics on alarms and errors.

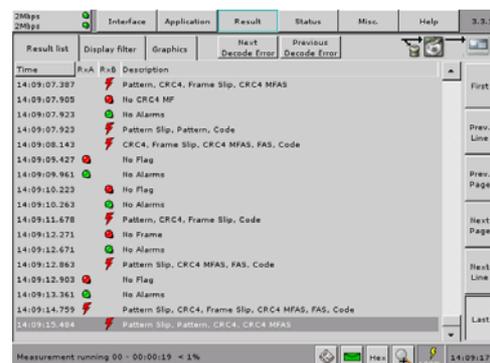


Figure 7 CMA 3000 logs errors and alarms with high-resolution time stamps.

Advanced in-service troubleshooting

Troubleshooting transmission errors may require analysis of timing between events that occur within a few milliseconds. The CMA 3000's high-resolution log makes it easier to analyze timing between errors or alarms. Other events logged are CAS bit changes, Sa bit changes and, depending on the options added, a number of other event types such as GSM, GPRS/EDGE, SS7, and ISDN signaling. This allows you to correlate and observe the different event types. Using filters you may disable the logging and display of individual events, allowing you to view only the most essential information.

Specifications

The specifications table on the following pages covers the functionality of the CMA 3000 basic instrument.

2 Mbps interfaces	
General	The interfaces comply with ITU-T recommendation G.703 for 2 Mbps
Connectors	Unbalanced connector: BNC or Siemens 1.6/5.6 (as specified by the user) Balanced connector: BNO
Port number	Number of transmitters: 2 Number of receivers: 2

Transmitter	
Impedance	Input impedances supported: <ul style="list-style-type: none"> 75 Ohms (unbalanced), 120 Ohms (balanced)
Clocks	<ul style="list-style-type: none"> Internal 2.048 Mbps clock. Accuracy: 4.6 ppm. Clock may be deviated +/- 125 ppm in 1 ppm steps Recovered from a receiver TTL level external 2.048 MHz clock in a D-Sub 15 male connector
Line code	HDB3 or AMI (user-selectable)
Framing	Unframed or framed FAS/nFAS. Sa-bits (non-FAS) are user-programmable
Drop and insert	Supports drop & insert of one or multiple 64 kbps timeslots (TS) within E1
Alarms	Alarm may be generated: <ul style="list-style-type: none"> No Signal, AIS, No Frame, CRC4 MF loss, Distant Alarm, CAS MF Loss, Distant MF Alarm
Errors	Errors may be generated: <ul style="list-style-type: none"> Bit, code, FAS bit, FAS word, CRC-4, E-bit Manual: 1-255 consecutive errors (1-16 consecutive FAS word errors) Continuous 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7} Provoking of G.821, G.826 or M.2100 events (ES, SES etc.) (Bit, FAS, CRC-4, E-bit) Manual slip insertion: frame slip, pattern slip
BER test patterns	Pattern generation: <ul style="list-style-type: none"> Unframed or framed n* 64 kbps in contiguous or non-contiguous channel access Test patterns supported: <ul style="list-style-type: none"> PRBS 6, PRBS 7, PRBS 9, PRBS 11, PRBS 12, PRBS 15, PRBS 20, PRBS 23, QRSS 11, QRSS 20 All 0s, All 1s, Alternating (1:1), (1:3), (1:7), (3:1), (7:1), (3:24), Quick brown fox. User-defined up to 16 bits. Length in steps of 1 bit User-defined up to 2048 bits. Length in steps of 8 bits All patterns, except 'All 0', 'All 1' and 'Fox', can be inverted
Tone and speech signal insertion	Tone in one speech channel on one of the transmitters: <ul style="list-style-type: none"> Frequency: 1 Hz to 4 kHz in 1 Hz steps Level: +3 dBm to -70 dBm in 1 dBm steps Artificial speech signal in one speech channel on one of the transmitters
CAS	CAS signaling bits may be generated

Receivers	
Impedance	Input impedances supported: <ul style="list-style-type: none"> 75 Ohms (unbalanced), 120 Ohms (balanced), High (> 10 * nominal)
Jitter tolerance:	In accordance with ITU-T G.823 section 3.1.1
Return loss	Complies with the ITU-T Rec. G.703
Receiver attenuation and impedance modes	<p><u>TERMINATE:</u></p> <ul style="list-style-type: none"> Up to 40 dB cable attenuation, nominal impedance <p><u>MONITOR:</u></p> <ul style="list-style-type: none"> Up to 6 dB cable attenuation + 20 dB to 30 dB linear attenuation, nominal impedance <p><u>BRIDGED:</u></p> <ul style="list-style-type: none"> Up to 40 dB cable attenuation, high impedance
Receiver sensitivity	As stated above. Inputs will tolerate levels up to 3 dB above nominal value
Input level indication	Range: +3 to -42 dB (normal) or - 20 to -32 dB (monitor)
Receive signal rate	<ul style="list-style-type: none"> 2048 kbps ± 100 ppm Frequency deviation indication accuracy: ± 1 ppm
Line Code	HDB3 or AMI (user-selectable)
Framing	Unframed or framed FAS/nFAS
Detectors	<ul style="list-style-type: none"> Each input has a no signal detector with levels -20dB, -33dB and full sensitivity Each input has a signal level detector Each input has signal frequency detector
Auto configuration	Framing and pattern are automatically determined. Signaling channels are identified if signaling options are installed
Alarms	Alarm detected: <ul style="list-style-type: none"> No Signal, AIS, No Frame, CRC4 MF loss, Distant Alarm, CAS MF loss, BERT Pattern Sync Loss, Distant MF Alarm
Errors	Errors detected: <ul style="list-style-type: none"> FAS/nFAS errors, Pattern Errors, CRC4 errors, E-bit (FEBE) errors, Code errors, Pattern Slips, Frame Slips
CAS	CAS channel contents (TS16) can be supervised. Whenever a CAS channel contents change, an event is logged and time-stamped
BER test patterns	Same as transmitter. Test patterns are detected in nx64 kbps contiguous or non-contiguous channels (framed) or as an unframed signal
Error performance	<p>G.821, G.826 or M.2100 analysis of a PRBS in the received signal, or based on CRC-4, E-bit or FAS. ES, SES, DM (G.821), BBE (G.826), UAT, EFS, AT % or count.</p> <p>Error performance evaluation for the total measurement:</p> <ul style="list-style-type: none"> HR% for a user- defined error performance parameter or programmable OK and not-OK limits for Bit, FAS, CRC-4 or E-bit count or ratio
Round trip delay (propagation time) measurement	<ul style="list-style-type: none"> Resolution: 1 µsec (unframed), 0.1 msec framed Range: 0 - 4 sec
Time-slot monitoring	<p>FAS, NONFAS, CAS signaling, Contents of single time slot incl. positive/negative peak values and coder offset. Level and frequency for encoded tone:</p> <ul style="list-style-type: none"> Frequency: 1 Hz to 4 kHz with 1 Hz resolution Level: +3 dBm to -66 dBm with 1 dBm resolution
Speech decode	64 kbps (ITU-T Rec. G.703): A-law according to ITU-T Rec. G.711

Results	
Status	Current information on: <ul style="list-style-type: none"> Alarms and errors on the monitored line Input level indication Frequency deviation Round trip delay Contents of one time slot FAS/non-FAS and CAS bits Traffic overview: Busy/idle indication from all 31 channels
Statistics	User-defined resolution: 1, 2, 5, 10, 15, 30s, 1, 5, 10, 15, 30 min, 1, 2, 4, 6, 12 hours Information logged: <ul style="list-style-type: none"> Alarms Code error count/ratio Pattern bit, FAS, CRC-4 and E-bit error count/ratio and G.821, G.826 or M.2100 parameters Frequency deviation information
Event Log	<ul style="list-style-type: none"> Events are logged with 1 msec resolution time stamps Logged events: Detected alarms and errors. Changes in CAS and Sa bits Filters enable/disable the logging of individual events
APS	APS (Automatic Protection Switching) test and analysis: <ul style="list-style-type: none"> APS switching time is measured. Switching time above a user defined threshold is highlighted <ul style="list-style-type: none"> Trigger events (user selectable): 2 Mbps alarms (LOS, No Frame or AIS). Number of switchovers Resolution of APS switching time measurement: <ul style="list-style-type: none"> No Frame, AIS : 1 msec LOS: Undefined

User Interface	
Display	8 ¼ " active TFT display with VGA resolution (640x480 pixels) and touch screen
LEDs	34 bi-color LEDs (with text on display)

Service interfaces	
USB data Interface	Two USB 1.1 ports. Connector type A. CMA 3000 will operate as host
Ethernet Interface	Ethernet 10/100. One RJ45 connector
V.24 data Interface	DTE. Connector: 9 pin, D-sub, Male

Other interfaces	
Phone Interface	<ul style="list-style-type: none"> For connection of an optional telephone set; to insert human voice into a traffic channel and to listen-in using the loud speaker in the telephone set Connector: <ul style="list-style-type: none"> RJ11 (1x6) Female
Built-in loudspeaker	<ul style="list-style-type: none"> The built-in loudspeaker monitors speech in both directions of a voice channel Output level: user-controlled from front panel A 3.5 mm diameter jack provides ear phone access to the audio signal. The built-in loudspeaker is disconnected when a headset is plugged in
Compact Flash	The instrument is equipped with one Compact Flash socket

Miscellaneous	
Battery	10.8 V rechargeable and replaceable intelligent Lilon battery Operating time (basic instrument): <ul style="list-style-type: none"> • With PowerSave; more than 10 hours • Without PowerSave; more than 6 hours Charging time: Typically 3 to 6 hours Indicator for remaining capacity: % and hours/minutes
Mains adapter	Input: 100-240 V AC, 50-60 Hz Output: 18 V DC, max. 3.4 A
Mechanical	Basic instrument: <ul style="list-style-type: none"> • Dimensions: Approx. 23 x 33 x 7.5 cm (HxWxD) • Weight: Approx. 3.3 kg
Environmental	Operating temperature: 0°C to +40°C Storage temperature: -25°C to +60°C The CMA 3000 is CE-marked and complies with EN 300 386, EN 61326-1 and EN 61010-1
Standard accessories	Standard accessories, included with the basic CMA 3000 <ul style="list-style-type: none"> • User's Guide, • Lilon battery • Mains adapter with mains cable • Stylus
Additional accessories	Additional accessories, not included with the basic CMA 3000 <ul style="list-style-type: none"> • Carrying case • Carrying soft bag • Instrument carrying strap • Extra Lilon battery • Stand-alone battery charger • Ear phones • Telephone set • Measurement cables
Service products	Factory calibration

Unframed T1 option	
General	Unframed T1 is an add-on option to the basic CMA 3000. When Unframed T1 is enabled, 2 Mbps testing is disabled and vice versa.
T1 Unframed interface, Transmitters	The interface complies with ANSI T1 recommendations for 1544 kbps. Connector is of BNO type. The T1 interface contains two identical transmitters
Impedance	100 Ohms
Clocks	<ul style="list-style-type: none"> Internal 1.544 Mbps clock. Accuracy: 4.6 ppm. Clock may be deviated +/- 125 ppm in 1 ppm steps Recovered from a receiver
Line Code	B8ZS or AMI (user selectable). Each Rx-Tx pair must use same line code.
Line Build Out	0-133 ft, 133-266 ft, 266-399 ft, 399-533 ft, 533-655 ft
Alarms	The following alarms may be generated: No Signal (LOS), AIS, No Sync (LSS)
Errors	<p>The following errors may be generated:</p> <ul style="list-style-type: none"> Pattern: <ul style="list-style-type: none"> Manual: 1-255 consecutive errors Continuous: 10-2, 10-3, 10-4, 10-5, 10-6, 10-7 Pattern slip: Manual, single Code (BPV): Manual, single
BER test patterns	<p>Test patterns supported:</p> <ul style="list-style-type: none"> PRBS 6, PRBS 7, PRBS 9, PRBS 11, PRBS 12, PRBS 15, PRBS 20, PRBS 23, QRBS 11, QRBS 20 All 0s, All 1s, Alternating (1:1), (1:3), (1:7), (3:1), (7:1), (3:24), Quick brown fox. User-defined up to 16 bits. Length in steps of 1 bit. User-defined up to 2048 bits. Length in steps of 8 bits. <p>All patterns, except "All 0", "All 1" and "Fox", can be inverted.</p>
T1 Unframed interface, Receivers	The interface complies with ANSI T1 recommendations for 1544 kbps. Connector is of BNO type. The T1 interface contains two identical receivers.
Impedance	100 Ohms
Receiver sensitivity	T1 Short Haul: -15 dB
Receive signal rate	1544 kbps ± 100 ppm. Frequency deviation indication resolution: ± 1 ppm.
Line Code	B8ZS or AMI (user selectable). Each Rx-Tx pair must use same line code.
Alarms	Alarms detected: No Signal, AIS, BERT Pattern Sync Loss (LSS)
Errors	Errors detected: Pattern Errors, Pattern Slips, Code (BPV) errors
BER test patterns	Same as transmitter
Round trip delay (propagation time) measurement	Resolution: 1 µsec Range: 0 - 5 sec., depending on selected pattern
T1 Unframed Results - Status	<p>Current information on:</p> <ul style="list-style-type: none"> Alarms and errors on the monitored line Frequency deviation Round trip delay
T1 Unframed Results - Statistics	<p>User-defined resolution: 1, 2, 5, 10, 15, 30s, 1, 5, 15, 30 min., 1, 2, 4, 6, 12 hour</p> <p>Information logged:</p> <ul style="list-style-type: none"> Alarms Code error count/ratio Pattern bit error count/ratio Pattern slip count Frequency deviation information

Options	
Add-on Options (not included in the basic CMA 3000)	<ul style="list-style-type: none"> • Ethernet 10/100 Mbps interface measurement option • Ethernet 10/100/1000 Mbps interface measurement option • Ethernet 10 Mbps / 100 Mbps / 1 Gbps /10 Gbps interface measurement option <ul style="list-style-type: none"> ○ Two versions: Single or dual port at 10 Gbps level ○ 10G LAN PHY and 10G WAN PHY options ○ STM-64 option • IP over Ethernet measurement option (requires an Ethernet option) • Ethernet Service Activation Test option (requires an Ethernet option) • Synchronous Ethernet Test option (requires Ethernet 10/100/1000 Mbps interface measurement option or Ethernet 10 Mbps / 100 Mbps / 1 Gbps /10 Gbps interface measurement option) • Ethernet multistream option (requires an Ethernet option) • Ethernet stacked VLAN option (requires an Ethernet option) • Ethernet MPLS option (requires an Ethernet option) • VoIP Call emulation options (requires an Ethernet option)¹ • SDH STM-1/-4/-16 test options • Unframed T1 testing • E3 interface testing • E4 interface testing (requires SDH STM-1/-4/-16 test option) • ATM-over-SDH measurement option (requires SDH STM-1/-4/-16 test option) • ATM- over-E1/E3 measurement option (E3 requires E3 test option) • V-series interface measurement option • Frame relay test option • Abis protocols – ETSI and vendor specific¹ • Vendor specific GPRS Abis PCU protocols¹ • GPRS Gb interface protocol decode (requires Frame relay test option) • SS7 protocols¹ • ISDN protocols¹ • ISDN PRI call emulators¹ • FrontSim (remote operation) option • Remote Control – Scripting option

Note

¹ Please contact your local Anritsu representative for details on available protocols

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