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# CMA 3000

### **SPECIFICATIONS**

### **ATM Test Options**

B STM10.E10	Interface Application Result ms and Errors Alarms and Error	Status Misc. Help SDH Alignment CAS	4.2.1
RxA - STM-10 .		Rx8 - STM-10 .61	
C LOF C LOF C OOF MIS-AIS MIS-ROI MIS-ROI C MIS-ROI C MIS-R	Alama         R.A. Current Eners           JTU-LOB         A.IA2         A.MHOF           JTU-LOB         B.1         TU-HOF           LD-TRU         B.2         S.Veto A.PS           LD-RDI         B.8-REI         LD-RDI           LD-RDI         B.8-REI         LD-REI           Pointer information         A.U-POS         D.U-POS           A.U-POS         D.U-POS         D.U-POS	R.B. Current Alama         R.B. Current Inters           G. LOS         G. TU-LON         A.J.A.Z.         A.J.HO           G. LOF         G. TU-LON         B.S.Z.         S.Hoh           G. MS-ASS         L.D-TIKI         B.S.REI         G.MASS           G. AU-LOP         V.S.         G.Ho-FEI         G.Ho-FEI           G. HO-TIM         G. LO-REI         G.Ho-REI         G.Ho-REI           G. HO-TIM         G. LO-REI         G.Ho-REI         G.Ho-REI           G. HO-REI         G. AU-LOS         T.U-REI         G.Ho-REI           G. HO-RIM         G.LO-REI         G.Ho-REI         G.Ho-REI           G. HO-REI         G. AU-ROS         T.U-REI         G.MU-ROS         T.U-REI           G. HO-REI         G. AU-ROS         G.TU-RIS         G.MU-ROS         T.U-REI	APS START STOP ERROR
	Alarm.	Alaski I	104)10

#### Testing ATM connections has never been easier

CMA 3000 is Anritsu's next-generation portable and futureproof field tester for the installation and maintenance of fixed line and mobile access networks. The instrument covers a wide range of applications, from fast first-aid troubleshooting to comprehensive in-depth analysis of transmission problems.

When equipped with the ATM test options, the CMA 3000 is a powerful and easy-to-use tool for testing ATM channels in SDH and PDH systems.

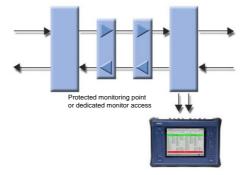


Fig. 1 With the CMA 3000 you're able to perform bi-directional in-service monitoring of ATM traffic.

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Key Features	Key Applications
<ul> <li>Simultaneous bi-directional monitoring of ATM streams</li> <li>Powerful testing of ATM channels through SDH and PDH systems</li> <li>Comprehensive error and alarm statistics</li> </ul>	<ul> <li>Comprehensive out-of-service testing for:</li> <li>Installation</li> <li>Provisioning</li> <li>Performance analysis</li> <li>In-service monitoring for: <ul> <li>Fast troubleshooting</li> <li>Traffic monitoring</li> <li>In-service ATM traffic analysis</li> </ul> </li> </ul>

The ATM option allows both active testing with one transmitter and one or two receivers and simultaneous bi-directional monitoring of ATM traffic with two receivers. This makes CMA 3000 the ideal instrument for both in- and out-of-service transmission-quality measurements.

The intuitive user interface, with a large color LCD display and easy-to-understand graphical symbols allows you to easily read and interpret important information from the ATM traffic.

#### ATM in the access network

ATM is used heavily in the access networks of today. In the mobile environment the 3G (UMTS) access networks (UTRAN) are based on ATM. In the fixed line access networks ATM is used to provide access for ADSL customers. ATM can be carried over SDH lines or in some cases over a set of 2 Mbps lines utilizing the IMA (Inverse Multiplexing for ATM) technique. It is important for field technicians installing and maintaining these types of networks to have an optimal tool to test ATM together with all the other technologies they have to take care of.

#### Speeds ATM troubleshooting

The CMA 3000 status monitor allows you to speed troubleshooting, as the status monitor is always active providing essential information on the monitored transmission system and ATM traffic on top of that. Through bidirectional monitoring the user can quickly verify that both sides of the ATM connection are working properly. The ATM scan facility in the CMA 3000 give a quick overview of the active virtual channels in the monitored ATM traffic. Up to 150 channels can be identified.

Physical Alarms and Errors SDH Capture	, Ala	ATM irms and Errors			
Manitar A	 	Monitor B			
RxA Current			RxB Currer		
Current Alarms_Errors		Current Alarms			
High Order		High Order			
Loss of Cell		Loss of Cell			
G HEC Single		HEC Single			
HEC Multiple	•	HEC Multiple			
Current Foreground Alarms VPI 24 / VCI 54		Current Foregro	und Alarms VP)	00 / VCI 99	
VP_AIS		VP_AIS			
VP_LOC		VP_LOC			
VP_RDI		VP_RDI			
VC_AIS		VC_AIS			
🕒 vc_Loc		Vc_LOC			
O VC_RDI		VC_RDI			
RxA History No Trouble			RxB Histor No Trouble		

Fig. 2 The CMA 3000 gives you a quick overview of errors and alarms of both sides of the ATM connection.

Transm <sdf< th=""><th></th><th>Receiver «SOH»</th><th>A Received</th><th></th><th>8</th><th>ican</th><th></th><th></th><th></th><th></th><th></th></sdf<>		Receiver «SOH»	A Received		8	ican					
ATH Re VP/VC			V Khan	🔽 Utilae		ATM Re VP/VC			₩ Kbps	🔽 unite	
VPI	vet	Rate(sps)	Rate(Kbps)	Utilize(%)		VPI	VET	Rate(cps)	Rate(Klops)	Unitze(%)	
	1 0	17661	7488.26	5.00		5	8	17661	7488.26	5.00	
5	10	7064	2995.14	2.00							
5	17	3532	1497.57	1.00		5	12	3532	1497.57	1.00	
3	13	1766	748.78	0.50		5	13	1766	748.78	0.50	
5	3.5	3532	1497.57	1.00		5	15	3532	1497.57	1.00	
5	16	1413	599.11	0.40		5	16	1413	599.11	0.40	
7		707	299.77	0.20		7	5	707	299.77	0.20	
7	6	3532	1497.57	1.00		7	6	3532	1497.57	1.00	
7	7	3532	1497.57	1.00		7	7	3532	1497.57	1.00	
7		1766	748.78	0.50		7		1766	748,78	0.50	
7		353	149.67	0.10		7		353	149.67	0.10	
7	11	3885	1647.24	1.10		7	11	3005	1647.24	1.10	
7	17	1060	449.44	9.30		7	12	1060	449.44	0.30	
7	14	3532	1497.57	1.00	*	7	14	3532	1497.57	1.00	
Aş	ply sel	ected to A	TM Receiver /	A foreground		Ap	ply set	ected to A	TM Receiver I	6 foreground	į

Fig. 3 The user can quickly get an overview of the active virtual channels in the monitored ATM traffic through the ATM scan facility in the CMA 3000.

#### In-service ATM statistics

For in -service troubleshooting of ATM channels on SDH links the CMA 3000 provides powerful bidirectional statistical measurements of general ATM alarms and errors and Virtual Path (VP) OAM F4 and Virtual Circuit (VC) OAM F5 alarms for one selected foreground channel.



STM4a, ATM STM4a, ATM	8	Interface	Application	Result	Status	Misc.	Help	3.7.3
Abs-Time	Filter (		SDH	АТМ	ATM	ATM	ATM	
Total	RxAR.st	0.02	9 TCM AI	arms & Errors	Cell Statistics	VPI/VCI	Qos _	_
2007-54-54		Alare	ms	REA( Count	, Ratio )	RaB( Count	L, Ratio )	-
	0 0	Los	s of Cell		6 O		0	
Interval								
2007-04-04		. Lree	•	RxA( Count	, Ratio )	RxB{ Count	t, Ratio )	
2007-04-04	Bern	HEG	Single		0 0		0	
06:58:17	00	HEC	Multiple					
2007-04-04					1	-		
2007-04-04		E.m.	pround Channel	RxA - # / 5		Rx8 - # / 5		
06:58:27	00						5.	
2007-04-04		Fores	provand Alarma	RxA( Count	Batio )	RxB( Count	. Batio 3	
06:50:32		VP						-
2007-04-04		VP					-	
2007-04-04		VP_				-	-	
06:50:42	00				0 0		-	
2007-04-04		VP_			· · · · ·		•	
06:58:47		VP_			0 0		0	
06:58:52	00	VC_	AIS		0 0		9	
2007-04-04		VC_	LOC		ú 0		4	
06:58:57	0 0	vc_	RDI		0 0		0	
1007-04-04		1.000			1000			

Fig. 4 The CMA 3000's color indications make it easy to identify alarms or errors in the monitored signal

Abs.Time	Fil	itar i	0#	94 + 0.829	SDH TCM AL	ATM arms & Errors	ATM Cell Statistics		ATM 4	
Total	P.s.	ARA	100			anns a triors	Cell Statistics	mener 1	1603 [	-
2057-54-54 56:58:08	0	0	l.	000000	pration Parameter		• Hamer Te	tal Cells	·	ľ
2007-04-04	0	0	•			VP/VC	Filter off	VP/VC	filter off	
2007-04-04	•			VCI/VP	1	RsA( Count,	Ratio[ 54 ] )	RaB{ Count,	Ratio [ 54 ] )	
2007-04-04				Total		4.47e+11	100.00	1.15e+11	100.00	
06:58:22	•	•		Idle		1.634+11	36.32	7.49++10	65.00	
2007-04-04	0	•		Rest		0	0.00	0	0.00	
2007-04-04				8/35		9.4e+10	21.02	9.85+08	0.86	
06:50:32	•	•		9/77		3.61e+10	0.07	5.78e+09	5.02	
2007-04-04	٩	•		9/78		3.98e+10	8.89	5.5e+09	4.78	
2007-04-04				9/79		3.6e+10	8.05	5.56e+09	4.83	
06:58:42	0	•		9/00		4.23e+10	9.45	1.69e+10	14.67	
2007-04-04	0			9/01		3.67e+10	8.20	5,494+09	4.77	
06:58:47 2007-04-04 06:58:52 2007-04-04 06:58:57 2007-04-04	0	0 0	•							

Fig. 5 Comparing total cell count for the monitored VPI/VCI channels

Statistics are also available for in-service analysis of up to 30 ATM channels, identified by their VP/VC identifiers (VPI/VCI). The user can specify a number of ATM channels to be monitored. The instrument will complete the list by identifying active VPI/VCI pairs in the monitored ATM traffic.

The user can compare one selected parameter for all channels or see all parameters for one channel. The parameters include User cells, User Congestion cells, OAM cells and Resource Management cells. A number of traffic descriptor parameters are also measured. The traffic descriptor parameters describe the behavior of an ATM virtual traffic channel: Peak Cell Rate (PCR), Sustainable Cell Rate (SCR), Minimum Cell Rate (MCR), Maximum Burst Size (MBS) and Cell Delay Variation Tolerance (CDVT).

The instrument can monitor status and synchronization cells for 2 Mbps lines running IMA (Inverse Multiplexing for ATM). Hereby it is easy for the user to check the status of the 2 Mbps lines that are used in the IMA connection.

1, ATM Q	Interfac	e Ap	plication	Resul	R.	Status	Mise.		Help	4.6.
Physical Alarm	is and Erro	ors Ali	gnment	Traffic	Alar	ATM ms and Errors	ATM IMA			
RxA - ICP Grep					Rx	B - ICP Grep				
IMA Version Cell ID	IMA V1.1 1b(ICP)	Link ID		00h		A Version II ID	IMA V1.1 15(ICP)	Link I	_	
Cell ID IMA FSN	1h(ICP) 01b	Link ID		00h 02h		II ID A FSN	15(ICP) 01b	Link I		00h 02h
Status Change	03h	IMA ID	set	0.4h		A FSR Atus Change	03h	IMA I		02h 04h
Link Stuff Indication	07h		Det	ails		nk Stuff wication	07h		Det	ails
Group Status and Control	A2h		Det	ails		roup Status nd Control	A2h		Det	ails
Tx Test Control	00h	To Teni	ng Info.	02h		Test Control	ooh	To To	ning Info. D	02h
Test Link Cmd.	0h(iact)	Tx Clos	k Mode	1h(CTC)	T	est Link Cmd.	0h(iact)	Tx CI	ock Mode	1h(CTC
Tx Test Pattern	00h	Rx Tes	t Pattern	07h	Tx	Test Pattern	ooh	Rx Te	est Pattern	07h
Link Information	FCh		Det	ails		nk formation	FCh		Det	ails
End-to-end ch.	00h				En	d-to-end ch.	ooh			
CRC Error Ctrl.	152h				CR	C Error Ctrl.	152h			
RxA - Cell Statist	tics				Rx	5 - Cell Statist	ics			
Total ICP and fill	ler s		90	1071 Cells	To	tal ICP and fill	er :		3	8071 Cel
Number of filler of	cells :			0 Cells	Nu	mber of filler a	ella :			0 Cel
Number of ICP of	ells i		98	8071 Cells	Bu	mber of ICP o	ells i		9	8071 Ce
						- <b></b>	6		2 🚺	09:00:4

Fig. 6 Presentation of the status of the IMA connection. By clicking "Details" the user gets information bytes presented in decoded format.

#### **Out-of-service ATM tests**

During installation/commissioning and stress testing of network elements you can control the signal transmitted by the CMA 3000. UNI and NNI ATM traffic can be generated from E1 rate up to STM-4 rate (VC4-4c). The instrument can generate ATM cells in one foreground channel for the actual test and add traffic in up to 14 background channels to emulate a realistic signal for testing the ATM network. The instrument offers a selection of traffic profiles in the foreground channel, allowing emulation of different types of traffic.

The instrument can also generate test signals defined in ITU-T rec. O.191 for measurement of Quality of Service (QoS). The QoS parameters include information on lost or misinserted cells, delay and delay variation. The instrument measures the parameters whereby the user can verify that the QoS is in accordance with an ATM Traffic Contract.

For testing of the lower PDH or SDH layer the CMA 3000 provides you with great flexibility for injecting errors and alarms and for SDH making pointer operations and overhead byte changes into the transmitted signal.



<pre>Transmitter <sdh></sdh></pre>	Receiver A «SOH»		VVC Scen				ATM
Interface	SDH	• 🔽 Scrambler	g				
(Ibe	a out	C nut			Total Rate:	1497	60 i bps
Foreground SFC 0	VP/VC E		TI CLP 0 0	HEC	Payload Qoli	Rate 15.0	•
Empty Cells Idle	Туре	-			Ratei	60.	
Background	VP/VC Traf	ffic Profile					
rate				Distribu	tien VIII	del e	•
PCR				PCR		1.0	cell/s
SCR				SCR		2.0	cell/s
	MBS			MBS		-	cell
3220			time				

		1076-177	1222032022	10000		Misz.	Help	3.7.5
Abs.Time	Filter Off	44	SDH	ATM	ATM	ATM	ATM	
Total	RxARxB	- 6.829		larms & Errors	Cell Statistics	VPL/VCI	Qu5	-
007-04-03	0 0		OS Statistics	RxA( Count,	part of the second s	RxB{ Count	l, Ratio )	-
	00	Errorei	d Cells	0	0			
Interval		Lost C	alls	0	0			
2007-04-03		Late C	ells	0	0			
2007-04-03	1.1	Misins	erted Cells	0	D			
16:01:34		Cell Ir	steprity Rate	0	0			
2007-04-03		Ser. E	r. Cell Block	0	0			
2007-04-03		Minim	um Delay	3.198-08				
2007-04-03	00-	- III ( 10000 S	um Delay	3.75+-06				
2007-04-03	00-	Mean		3.25e-06				
16:01:49	00							
2007-04-03			elay Vanation					
16:01:54	1.1.1	R kA C	DV Distributie	n [Scale: 524487	(6)			
16:01:59								
2007-04-03								
16:02:04								
2007-04-03								
Current								-
2007-04-03	00	Rid C	DV Distributio	n :				
16103103	CONSIGNATION OF THE OWNER OWNER OF THE OWNER OWNER OF THE OWNER					the second	and the second of the	

Fig. 7 The intuitive user interface of CMA 3000 facilitates the ATM test setup.

Fig. 8 QoS parameters measured by the CMA 3000.

#### Specifications

The specifications below list the functionality for a basic CMA 3000 with SDH and/or E3 test module installed together with the ATM option.

For more information on the functionality of the basic configuration please refer to the CMA 3000 basic instrument specifications sheet. For more information on the functionality of the SDH and E3 test modules please refer to the SDH, E3 and E4 test options specifications sheet.

Specifications	
ATM over SDH option	ATM over STM-1: requires that an SDH test option is installed in the instrument
	<ul> <li>ATM over STM-4 VC4-4c or in one VC4: requires that an SDH test option and at least one STM-1/-4 optical module is installed in the instrument</li> </ul>
	<ul> <li>ATM over STM-16 in one VC4-4c or in one VC4: requires that the enhanced SDH test option and at least one STM-1/-4/-16 optical module is installed in the instrument</li> </ul>
ATM over E1/E3 option	• ATM over E1 and E3. ATM is mapped to E3 in accordance with ITU-T recommendation G.832. ATM over E3 requires that the E3 test option is installed in the instrument

Traffic generation				
No. of transmitters	One transmitter can be activated for generating ATM traffic			
Channels	1 foreground channel, 14 background channels			
Interface	UNI/NNI			
Traffic profiles	Constant, Variable, Burst, Poisson, Binominal, 2 state Markovian			
Cell scrambler	User selectable: On/Off			
Cell header editing	VPI, VCI, GFC, PTI, CLP			
Payload contents	<ul> <li>Foreground channel:</li> <li>PRBS9, PRBS11, PRBS 15, PRBS 20, PRBS 23, PRBS 29, PRBS 31, Normal/inverted,</li> <li>User defined cell</li> <li>User defined 8 bit word</li> <li>ITU-T rec. 0.191 test cells</li> <li>Background channels:</li> <li>A fixed 8 bit value selectable for each channel</li> <li>Payload programmable as kbps, cps and %</li> </ul>			
Error generation	HEC single, HEC multiple, PRBS error insertion, 0.191 cell late, 0.191 cell loss, 0.191 CRC16, 0.191 cell out-of sequence.			
Alarm generation	Loss of Cell Delineation VP-AIS, VP-LOC, VP-RDI, VP-CC, VP-LB VC-AIS, VC-LOC, VC-RDI VC-CC, VC-LB			

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ATM Layer Traffic Ana	alysis
No. of receivers	One or two receivers can be activated for receiving ATM traffic
Auto-detect active VCI/VPIs	Up to 30 VCI/VPI pairs
No. of channels monitored	Up to 30 VCI/VPI pairs + total ATM stream
Channel definition	VCI/VPI
Statistics	Total ATM stream:
	Idle, Unassigned, HEC correctable, HEC uncorrectable.
	Total ATM stream and selected VCI/VPI pairs:
	User, User Congestion, Segmented OAM F5, End-to-end OAM F5, Resource Management, Reserved, Cells with CLP = 1.
	Selected VCI/VPI pairs:
	Traffic descriptor parameters: Peak Cell Rate (PCR), Sustainable Cell Rate (SCR) , Minimum Cell Rate (MCR), Maximum Burst Size (MBS), Cell Delay Variation Tolerance (CDVT)
Error detection/statistics	Total ATM stream: HEC correctable, HEC uncorrectable
Alarm detection	Loss of Cell Delineation, VP-AIS, VP-LOC, VP-RDI, VC-AIS, VC-LOC, VC-RDI
O.191 QoS measurements	CER, CLR, CMR, SECBR, CTD max/mean/min, CDVpp, 1-point CDV, 2-point CDV estimated as described in ITU-T rec. 0.191 section 7.1.4.
Cell BER tests	Detection of errors in user defined payload in the foreground channel
	G.826/M.2100 parameters
OAM functionality	Generation of AIS and RDI OAM F4 and F5 frames. Monitoring of AIS and RDI for F4 and F5 level.
ATM Channel Scan	Identification of currently active virtual (VCI/VPI pair ) channels. Up to 150 channels can be identified.
IMA Support (E1 only)	IMA versions supported: v1.0 and v1.1
	IMA Status monitor: Readout of ICP cell information, including:
	IMA version
	Cell and Link ID
	Link stuff indication
	Group status and control
	Tx Test control and Timing information
	Link information for the up to 32 lines that can be included in an IMA system
	IMA statistics:
	Total cells count
	Filler cell count
	ICP cell count

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