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Ericsson Radio Access AB
8/1551-ZAE 901 17   Rev D
1999-02-23

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TECHNICAL SPECIFICATIONS

8. TECHNICAL SPECIFICATIONS

All CCITT references concern the Blue Book, 1988. When applicable, the references to former CCITT Recommendations have been amended to ITU-T references. These references include the date of the valid ITU-T Recommendation in case these are revised in the future. If a CCITT Recommendation has not been updated as ITU-T by the International Telecommunication Union, CCITT is used in this document.

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RELEVANT RECOMMENDATIONS

8.1 Relevant Recommendations

The ITU-T/CCITT recommendations concerning Ericsson DXX trunk interfaces and user access points are:

Rec.	ITU-T Date (CCITT 1988)	Main Characteristics of the Node and Trunk Interfaces
G.651	March 1993	Characteristics of a 50/125
G.652	March 1993	Characteristics of a single-mode optical fibre cable
G.703	April 1991	Physical/electrical characteristics of hierarchical digital interfaces
G.704	CCITT	Synchronous frame structure used at primary and secondary hierarchical levels
G.706	CCITT	Frame alignment and CRC procedures for G.704 frames
G.707	October 1995	Network node interface for the SDH
G.726	December 1990	40, 32, 24, 16 kbit/s adaptive differential pulse code modulation (ADPCM)
G.732	CCITT	Characteristics of a primary PCM multiplexing equipment operating at 2048 kbit/s
G.736	March 1993	Characteristics of a synchronous digital multiplex equipment operating at 2048 kbit/s
G.744	CCITT	Second order PCM multiplex equipment operating at 8448 kbit/s
G.761	CCITT	General characteristics of a 60-channel transcoder equipment
G.775	November 1994	Loss of signal (LOS) and Alarm Indication Signal (AIS) defect detection and clearance criteria
G.781	January 1994	Structure of recommendations for SDH
G.782	January 1994	Types and general characteristics of SDH equipment
G.783	January 1994	Characteristics of SDH equipment functional blocks
G.803	March 1993	Architectures of transport networks based on the SDH
G.811	CCITT	Timing requirements at the outputs of primary reference clocks suitable for plesichronous operation of international digital links
G.81s (813)	July 1995	Timing requirements at the outputs of slave clocks suitable for SDH operation on international digital links
G.821	CCITT	Error performance of an international digital connection
G.823	March 1993	Control of jitter and wander on the 2048 kbit/s hierarchy
G.825	March 1993	The control of jitter and wander within digital networks which are based on the SDH hierarchy
G.826	November 1993	Error performance parameters and objectives for international constant bit rate digital paths at or above the primary rate
G.832	November 1994	Transport of SDH elements on PDH networks
G.841	May 1995	Types and characteristics of SDH protection architectures
G.957	July 1995	Optical interfaces for equipments and systems relating to the synchronous digital hierarchy
G.960	March 1993	Digital transmission system on metallic local lines for ISDN basic rate access
G.961	March 1993	Access digital section for ISDN primary rate at 2048 kbit/s
Q.921	March 1993	ISDN user-network interface – Data link layer specification

Standard Transmission Network Interfaces (2 Mbit/s and 8 Mbit/s)

2048 kbit/s framed interface	G.704, G.706, G.732, G.736, G.821, G.823

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Standard Transmission Network Interfaces (2 Mbit/s and 8 Mbit/s)

8448 kbit/s framed interface	G.704, G.744, G.821, G.823

User Access Points For Unframed Data Interfaces

Recommendation[a]	Description
V.11 (ITU-T 03/93)	Electrical characteristics for balanced double-current interface circuits
V.13 (ITU-T 03/93)	Simulated carrier control
V.14	Transmission of start-stop characters over synchronous bearer channels
V.22	1200 bits per second duplex modem standardized for use in the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits
V.24	Interface circuits between DCE and DTE
V.27 ter (CCITT 10/84)	4800/2400 bits per second modem standardized for use in the general switched telephone network
V.28	Electrical characteristics for unbalanced double-current interchange circuits
V.29	9600 bits per second modem standardized for use on point-to-point 4-wire leased telephone-type circuits
V.32	A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use on the general switched telephone network and on leased telephone-type circuits
V.35 (CCITT Red Book)	Data transmission at 48 kbit/s using group band modem
V.36	Modems for synchronous data transmission using group band modems
V.54	Loop test devices for modems
V.110 (ITU-T 09/92)	ISDN rate adaption for V-series interfaces
X.21 (ITU-T 09/92)	Synchronous data network interface between DCE and DTE
X.25 (ITU-T 03/93)	Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit
X.27	Same as V.11
X.30	ISDN rate adaption for X.21 interfaces
X.50	Fundamental parameters of a multiplexing scheme for the international interface between synchronous data networks.
X.50bis	Fundamental parameters of a 48-kbit/s user data signalling scheme for the international interface between synchronous data networks.
X.54	Allocation of channels on international multiplex links at 64 kbit/s.

a   All recommendations CCITT except those listed as ITU-T

User Access Points for Voice Frequency Interfaces

G.711 (CCITT)	64 kbit/s PCM encoding
G.712 (CCITT)	4-wire voice frequency interface
G.713 (CCITT)	2-wire voice frequency interface
G.721 (CCITT 1986/88)	32 kbit/s ADPCM

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RELEVANT SDH STANDARDS

8.2 Relevant SDH Standards

ETSI Standards

ETS 300 147	SDH multiplexing structure, Jan 1995
ETS 300 417-1-1	Generic functional requirements for SDH transmission equipment
	Generic processes and performance, Feb. 1995
DE/TM-1015	Generic functional requirements for SDH transmission equipment
	part 2 Physical section layer functions, March 95
	part 3 STM-N regenerator and multiplex section layer functions, May 95
	part 4 SDH path layer functions, June 95
	part 6 Synchronisation distribution layer functions, June 95
DE/TM-3017	Generic requirements for synchronous networks
	Part 1 Definitions of synchronisation terminology, Oct. 94
	Part 2 Synchronisation network architecture, Mar 95
	Part 3 The control of jitter and wander within synchronisation networks, Sep. 95
	Part 5 Timing characteristics of slave clocks suitable for operation in SDH eq., May 95
DE/TM-3042	SDH Network Protection Schemes: APS Protocols and operation, Aug. 95

ETSI Technical Reports

DTR/TM-3025 SDH Network Protection Schemes: Types and characteristics, Sep. 95

T1 Recommendations

— Bellcore TR-TWT-000170 Digital Cross-Connect System (DCS 1/0) Generic Requirements and Objectives; 1993
— ANSI T1.403 - 1989 Carrier to Customer Installation - DS1 Metallic Interface
— TR 54016 - 1989 Requirement for interfacing Digital Terminal Equipment to Services employing the Extended Superframe Format
— ACCUNET T1.5 Service - Description and Interface Specification - 1989 (AT&T)
— FCC-68 Connection of terminal equipment to the telephone network
— ITU Recommendations G.802 Interworking between networks based on different digital hierarchies ans speech encoding laws
— Bellcore TA-TSY-000499 Transport Systems Generic Requirements (TSGR):Common Requirements
— Bellcore TA-TSY-000342 High Capacity Digital AccessService, Transmission Parameter Limits and Interface Combinations - Issue 1 -1990
— TR-NWT-000820 - 1993 Network Maintenance:Transport Surveillance - Generic Digital Transmission Monitoring

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RELEVANT ATM STANDARDS

8.3 Relevant ATM standards

ITU-T recommendations

I.150	B-ISDN Asynchronous Transfer Mode Functional Characteristics	ITU-T 11/95
I.311	B-ISDN General Network Aspects	ITU-T 08/96
I.321	B-ISDN Protocol Reference Model and Its Application	ITU-T 1991
I.326	Functional Architecture of Transport Networks Based on ATM	ITU-T 11/95
I.327	B-ISDN Functional Architecture	ITU-T 03/93
I.356	B-ISDN ATM Layer Cell Transfer Performance	ITU-T draft 6R/1996
I.361	B-ISDN ATM Layer Specification	ITU-T 11/95
I.371	Traffic Control and Congestion Control in B-ISDN	ITU-T 08/96
I.413	B-ISDN User Network Interface	ITU-T 03/93
I.432.1	B-ISDN User Network Interface Physical Layer Specification - General Characteristics	ITU-T 08/96
I.432.2	B-ISDN User Network Interface Physical Layer Specification for 155 520 kbit/s and 622 080 kbit/s	ITU-T 08/96
I.610	B-ISDN Operation and Maintenance Principles and Functions	ITU-T 11/95.
I.731	Types and General Characteristics of ATM Equipment	ITU-T 03/96.
I.732	Functional Characteristics of ATM Equipment	ITU-T 03/96
G.707	Network node interface for the SDH	ITU-T 03/96
G.803	Architectures of transport networks based on the SDH	ITU-T 03/93
G.804	ATM Cell Mapping into Plesiochronous Digital Hierarchy	ITU-T 11/93
G.805	Generic Functional Architecture of Transport Networks	ITU-T 11/95
G.810	Considerations on Timing and Synchronization Issues	ITU-T 08/96
G.957	Optical interfaces for equipments and systems relating to the SDH	ITU-T 07/95

ATM-Forum implementation agreements

af-phy.	UNI 3.1	ATM-Forum
af-phy.0015.000	ATM Physical Medium Dependent Interface Specification for 155 Mb/s over Twisted Pair Cable	ATM-Forum

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TECHNICAL SPECIFICATIONS
CROSS-CONNECT

8.4 Cross-Connect

Cross-connection method	Synchronous time slot interleaving
Frame frequency	8 kHz

Capacity:

The sum of cross-connected signals	64 Mbit/s (Basic Nodes and Mini Nodes)
	8 x 64 Mbit/s = 512 Mbit/s (Cluster node)
Smallest cross-connect unit	64 kbit/s (Cluster Node)
	8 kbit/s (single and double subrack node)
Signalling cross-connection	n x 500 bit/s (Channel Associated Signalling = CAS)

Delay of cross-connect core:	n x 64 kbit/s	CAS bits (500 bit/s)
single and double subrack	1 frame = 125 μs	2 ms
Cluster node	2 frames = 250 μs	2 ms

Cross-Connect Delay Between Framed Interfaces (GMH):

n x 8 kbit/s, n x 64 kbit/s	< 600 μs (normal 2 frames interface buffer)
500 bit/s CAS	< 7 ms

Time integrity between the time slots in cross-connected signals is maintained.

8.5 Node Timing

Node master clock frequency	16 896 kHz $\pm$ 30 ppm (2 x 8448 kHz)
Master clock functional modes	Locking to the interface Rx clock (n x 64 kbit/s)
	Locking to external clock input (n x 64 kHz)
	Internal mode
	Clock fallback list (5 levels + internal mode)
Locking frequency	n x 64 kHz $\pm$ 50 ppm
External clock input	Frequency n x 64 kHz, n = 1…132
	Electrically G.703
External clock output	Frequency 2048 kHz or 8448 kHz
	Locked to node master clock
	Electrically G.703
Connector type	75 Ω, SMB type connector (not in Mini Nodes)
	120 Ω, D type 9-pin female connector
Jitter transfer function and jitter in the output clock	G.736

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TECHNICAL SPECIFICATIONS
G.704 FRAMED INTERFACE

8.6 G.704 Framed Interface

8.6.1 Frame and Multiframe Buffer

Frame Buffer Mode[a]	Bit Rates	Rx Delay Frames	Tx Delay Frames	Main Usage
2 Fr	2 Mbit/s, 8 Mbit/s	0…2	0	trunk lines
4 Fr	n x 64 k, 2 Mbit/s, 8 Mbit/s	1…3	1	non-trunk lines and n x 64 kbit/s trunks
8 Fr	n x 64 k, 2 Mbit/s	2…6	1	split trunk lines
8 Fr	n x 64 k, 2 Mbit/s, 8 Mbit/s	1…7	1	
64 Fr	n x 64 k, 2 Mbit/s	1…63	1	plesiochronous buffer

a   1 Fr = 125 μs

Slip rate when the incoming signal is plesiochronous:

Buffer Length	Slip Rate n x 64 kbit/s	Slip Rate 2 Mbit/s	Slip Rate 8 Mbit/s
2 Fr	-	240/df	1024/df
4 Fr	n x 8/df[a]	256/df	1056/df
8 Fr (split trunk line)	2 x n x 8/df	512/df	-
8 Fr	4 x n x 8/df	1024/df	4224/df
64 Fr	32 x n x 8/df	8192/df	-

a   df = frequency difference (input x Mbit/s signal frequency - nodes x Mbit/s frequency)

Split trunk line operation (many physical lines combined to one logical trunk):

—   Line bit rates: n x 64 kbit/s ($3 \leq n \leq 32$), 2 Mbit/s

—   All split components must have the same bit rate

—   Tolerated delay difference between lines < 50 μs

Multiframe buffer modes:

When Frame Buffer Is	MFr Buffer[a]	Rx Delay	Tx Delay
2 frames long	2 MFr	0…2 MFr	0 Fr
4…8 frames long	2 MFr	0…2 MFr	1 Fr
64 frames long	4 MFr	1…3 MFr	1 Fr

a   1 MFr = 2 ms

Jitter and wander tolerance: G.823

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G.704 FRAMED INTERFACE

8.6.2 8448 kbit/s Interface (CCITT G.704)

Electrical interface	G.703 Optical line
Multiplexing method	Synchronous time slot interleaving (G.704)
Bits in time slot	8
Time slots in frame	132 numbered 0…131
Frame alignment time slot	TS0/B1…8 + TS66/B1…6
Frame alignment procedure	G.744
Far-end alarm	TS66/B7
CRC error check	CRC-6 in bits TS99/B1…6 (can be disconnected)
CRC error indication to the remote end	TS99/B7
Error performance monitoring	G.821
Signalling multiframe time slots	TS67, 68, 69, 70 (G.704)
Multiframe time slot content	F0/TS sig (0000 xyxx)
Multiframe far-end alarm	F0/TS sig/B6
Multiframe alignment procedure	G.732 (same as in 2 Mbit/s interface) Separate multiframe alignment for each signalling time slot
Frames in multiframe	16
Signalling bits	4 pcs a, b, c, d /64 kbit/s time slot 2 pcs a, b / c, d /32 kbit/s 1 pc a/b/c/d /16 kbit/s
Control channel datalink	n x 8 kbit/s (n = 1…8) Any time slot except TS0 and TS66 DXX trunk lines preferable TS01/B1…B8 (64 kbit/s) TS33/B1…B8

Time slot usage in trunks

cross-connectable time slots with signalling bits (CAS)	120 time slots TS5…TS32, TS34…TS65 TS71…TS98, TS100…TS131
cross-connectable time slots without signalling bits	5 time slots TS1…TS4, TS33
free bits	TS66/B8 TS99/B8

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8.6.3 2048 kbit/s Interface (CCITT G.704/706)

Electrical interfaces	G.703 (see Data Interface Modules)
	Line terminal
	Optical line
	V.35
	V.36/V.11
Multiplexing method	Synchronous time slot interleaving
Bits in time slot	8
Time slots in frame	32 numbered 0…31
Frame alignment time slot	TS0
Frame alignment method	G.706
Far-end alarm	TS0/B3
CRC error check	CRC-4 in CRC multiframe of TS0/B1
	(G.704/706, CRC can be disconnected)
CRC block error indication to the remote end	CRC multiframe E bit
Error performance monitoring	G.821
Signalling multiframe time slot	TS16 (G.704)
Multiframe alignment time slot content	F0/TS16 (0000 xyxx)
Multiframe far-end alarm	F0/TS16/B6-
Multiframe alignment method	G.732
Frames in multiframe	16
Signalling bits	4 pcs a, b, c, d /64 kbit/s time slots
	2 pcs a, b / c, d /32 kbit/s
	1 pc a/b/c/d /16 kbit/s

Time slot usage in trunks:

cross-connectable time slots with signalling bits (CAS)	30 time slots, TS1…TS15, TS17…TS31
free bits	TS0/B4…8 (see control channel datalink)
Control channel datalink	n x 8 kbit/s (n = 1…8)
	Any time slot except TS0 frame alignment bits
	Ericsson DXX trunk lines preferable TS0/B5(8…16 kbit/s)

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G.704 FRAMED INTERFACE

8.6.4 N x 64 kbit/s Interface with G.704 Type Frame

Electrical interface

n x 64 kbit/s baseband interface	see "Data Interface Modules" on page 19
1088 kbit/s Line terminal	
V.35 n x 64 kbit/s	signals 103, 104, 113, 115 (V.35 electrical specs.)
V.36 n x 64 kbit/s	signals 103, 104, 113, 115 (V.11 electrical specs.) for V.35 and V.36 $n = 2…32$, with $n = 32$
Multiplexing method	Synchronous time slot interleaving
Bits in time slot	8
Time slots in frame	n numbered $0…n-1$
Frame alignment time slot	TS0
Frame alignment method	G.706
Far-end alarm	TS0/B3
CRC error check	CRC-4 in CRC multiframe of TS0/B1 (G.704/706, CRC can be disconnected)
CRC block error indication to the remote end	CRC multiframe E bit
Error performance monitoring	G.821
Signalling multiframe time slot (TS sig.)	Last time slot in frame (TSn-1) except with $n \geq 17$ TS sig. = 16
Multiframe alignment time slot content	F0/TS sig. (0000 xyxx)
Multiframe far-end alarm	F0/TS sig./B6
Multiframe alignment method	G.732
Frames in multiframe	16
Signalling bits	4 pcs a, b, c, d /64 kbit/s 2 pcs a, b / c, d /32 kbit/s 1 pc a/b/c/d /16 kbit/s

Time slot usage in trunk lines:

cross-connectable time slots with signalling bits (CAS)	n-2 pcs
free bits	TS0/B4…8 (see control channel datalink)
Control channel datalink	n x 8 kbit/s (n = 1…8) Any time slot except TS0 frame alignment bits Ericsson DXX trunk lines preferable TS0/B5(8 …16 kbit/s)

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TECHNICAL SPECIFICATIONS
1544 KBIT/S INTERFACE

8.7 1544 kbit/s Interface

Electrical	G.703/ACCUNET T1.5
Bits in Timeslot	8 bits clear channel, 7 bits with signalling enabled
Time Slots in frame	24
Frame Alignment Method	TR-NWT-000170/G.706 Superframe and Extended Superframe
Yellow alarm	Superframe- Bit 2 all channels set to 0 or last Fs bit set to '1' Extended Superframe- Repetative 8 '0's, '1's in datalink
CRC error check	CRC-6 as per TR-NWT-000499
Error performance monitoring	TR-NWT-000820
Frames in Multiframe	Superframe -12 Extended Superframe -24
Control Channel datalink	a n*8bits (n=1...8) in any channel time slots b ESF Datalink (4kbit/s)

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TECHNICAL SPECIFICATIONS
UNFRAMED DATA INTERFACES

8.8 Unframed Data Interfaces

8.8.1 V.24/V.28, V.35, V.36/V.11 - 1.2(19.2 kbit/s, 48,5 6, n x 64 kbit/s

Interface type	V.24/V.28	V.35, V.36/V.11 V.24/V.28	V.35, V.36 V.24 (n = 1)
Data bit rate	1.2, 2.4, 4.8 7.2, 9.6 14.4, 19.2, 38.4 kbit/s	48, 56 kbit/s	n x 64 kbit/s n = 1, 2…32
Framing inside Ericsson DXX net-work	V.110	V.110	-
Interface functions	V.24	V.24	V.24
Handshake signal transmission[a]:			
105/109	SB	SB	V.13
106	X	X	-
108/107	SA	SA	-
140/142	V.54	V.54	V.54

a   SA, SB, X are bits in a V.110 frame

Electrical interface

V.24	V.28 for all signals
V.35	V.35 for signals 103, 104, 113, 114, 115, V.28 for other signals
V.36	V.28 for signals 140, 141 and 142, V.11 for other signals
Interface signals:	102, 103, 104, 105, 106, 107, 108, 109, 113, 114, 115, 140, 141, 142
Connector type:	
V.24	ISO 2110, D type 25-pin female connector
V.35	ISO 2593, D type 34-pin female connector
V.36	ISO 4902, D type 37-pin female connector
Test loops via data interface	RL, V.54 remote loop, (loop 2) LL, V.54 local loop, (loop 3)

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UNFRAMED DATA INTERFACES

8.8.2 X.21 - 1.2(19.2 kbit/s, 48, 56, n x 64 kbit/s

Data bit rate	1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 48 kbit/s	56 kbit/s	n x 64 kbit/s n = 1, 2,…32
Framing inside DXX network	X.30 (V.110)	V.110	-
Interface functions	V.24	V.24	-
Control signal transmission[a]			
C/I	S1 + S3 + S4	S3 + S4	-

a S1, S3, S4 are bits in a V.110 frame

Interface signals:

bit rates 1.2…48 kbit/s	G, T, R, S, C, I
bit rates 56…n x 64 kbit/s	G, T, R, S
Electrical interface	X.27 (V.11)
Connector type:	ISO 4903, D type 15-pin female connector

8.8.3 Transparent 2 Mbit/s, n x 64 kbit/s

Interface Type	G.703 2 Mbit/s	G.703 64 kbit/s	Opt. Line	Line Terminal	Baseband Line
Data bit rate, n x 64 kbit/s	n = 32	n = 1	n = 32	n = 17, 32	n x 64 kbit/s n = 1…12

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GMU SDH INTERFACE UNIT

8.9 GMU SDH Interface unit

GMU has three operating modes:

— terminal multiplexer (TM)
— terminal multiplexer with MS 1+1 protection (TM1+1)
— add-drop-multiplexer (ADM)

Trunk Interfaces

— STM-1 electrical, G.703
— STM-1 optical short-haul, G.957 (S-1.1)
— STM-1 optical long-haul, G.957 (L-1.1)
— 34 Mbit/s electrical, G.703

STM-1 electrical interface

Bit rate	155.52 Mbit/s
Input tolerance	±20ppm
Code	CMI
Nominal impedance	75 Ω
Pulse shape	G.703 figures 24 and 25
Maximum input attenuation	12.7 dB at 77.76 MHz ($\sqrt{f}$)
Jitter tolerance	G.825 § 4.1
Connector type	SMB (unbalanced 75 Ω)

STM-1 optical interface short-haul (S-1.1)

Bit rate	155.52 Mbit/s
Input tolerance	±20 ppm
Code	NRZ
Pulse shape	G. 957 fig. 2
Transmission path	Standard single-mode fibre (G.652 , G.957)
Optical transmitter	LASER multi-longitudinal mode transmitter
Operating wavelength range	1261 -- 1360 nm
Maximum spectral RMS width	7.7 nm
Mean launched power	
-minimum	-15 dBm
-maximum	-8 dBm
Minimum extinction ratio	8.2 dB
Optical receiver	PIN-diode
Receiver sensitivity (BER 1E-10)	-28 dBm
Receiver overload	-8 dBm
Connector type	SC or FC

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GMU SDH INTERFACE UNIT

STM-1 optical interface long-haul (L-1.1)

Bit rate	155.52 Mbit/s
Input tolerance	±20ppm
Code	NRZ
Pulse shape	G. 957 fig. 2
Transmission path	Standard single-mode fibre (G.652,G.957)
Optical transmitter	LASER multi-longitudinal mode transmitter
Operating wavelength range	1280…1335 nm
Maximum spectral RMS width	4 nm
Mean launched power	
-minimum	-5 dBm
-maximum	0 dBm
Minimum extinction ratio	10 dB
Optical receiver	PIN-diode
Receiver sensitivity (BER 1E-10)	-34 dBm
Receiver overload	-10 dBm
Connector type	SC or FC

S34M electrical interface

Bit rate	34.368 Mbit/s
Input tolerance	±20ppm
Code	HDB3
Nominal impedance	75 Ω
Pulse shape	G.703 figure 17
Jitter tolerance	G.823 § 3.1.1
Connector type	SMB (unbalanced 75 Ω)
Frame structure	G.832

Matrix 4/1

Matrix type	4-port T-S, strictly non blocking
Cross connection level	VC-2, VC-12
Connection types	unidirectional bi-directional loop
Connection capacity	4 x STM-1 port equivalent (two trunk ports, a tributary port and a monitoring port)
Delay	VC-12 from STM1 port to STM1 port less than 50 μs

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GMU SDH INTERFACE UNIT

Termination and mapping

Frame structures	STM-1, G.707
	34 Mbit/s, G.832
Trail termination	VC-4 (east and west)
	P31s (G.832) (east and west)
	VC-2 x 10
	VC-2-mc (m = 2 to 10)
	VC-12 x 32
	VC-12-mc (m = 2 to 32)
Mapping	n x 64 kbit/s byte synchronous floating
SOH access	most SOH channels can be cross connected and accessed from other Ericsson DXX interface units.
Concatenation	virtual concatenation of VC-2 and VC-12

Other characteristics

Clock generator	accuracy + 4.6 ppm
	holdover as in G.813
Clock source	STM-1, 2048 kbit/s, 2048 kHz
Line protection	Linear Multiplex Section 1+1
	Subnetwork Connection Non-intrusive 1+1 for VC-2, VC-12
Power supply	48 V DC
Power consumption	25 W
Unit size	76 x 160 x 233 mm (w x d x h)
Unit width	15 T

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TECHNICAL SPECIFICATIONS
AIU ATM INTERFACE UNIT

8.10 AIU ATM INTERFACE UNIT

8.10.1 ATM Access Interfaces

—   STM-1 single mode fiber optical intraoffice, G.957
—   STM-1 multimode fiber optical intraoffice, ATMF UNI3.1
—   STM-1 UTP-5 cable electrical, ATMF af-phy.0015.000

STM-1 MMF Optical Interface Intraoffice

Bit Rate	155.52 Mbit/s
Input tolerance	±20 ppm
Code	NRZ
Pulse shape	ITU-T G.957 (fig.2)
Transmission media	multimode fiber
Optical transmitter	LED
Operating wavelength range	1261…1360 nm
Typical spectral RMS width	58 nm
Mean launched power: - minimum - maximum	 - 20 dBm - 14 dBm
Minimum extinction ratio	8.2 dB
Optical receiver	PIN diode
Receiver minimum sensitivity (BER 1E-10)	- 29 dBm
Receiver minimum overload	- 14 dBm
Connector type	SC

STM-1 SMF Optical Interface Intraoffice

Bit Rate	155.52 Mbit/s
Input tolerance	± 20 ppm
Code	NRZ
Pulse shape	ITU-T G.957
Transmission media	Singlemode fiber
Optical transmitter	Class-1 Laser (IEC825)
Operating wavelength range	1260…1360 nm
Typical spectral RMS width	7.7 nm
Mean launched power: - minimum - maximum	 -15 dBm -8 dBm
Minimum extinction ratio	8.2 dB
Optical receiver	
Receiver minimum sensitivity (BER 1E-10)	- 28 dBm
Receiver minimum overload	- 8dBm
Connector type	SC

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AIU ATM INTERFACE UNIT

STM-1 UTP-5 Interface

Bit Rate	155.52 Mbit/s
Input tolerance	±20 ppm
Code	NRZ
Transmission media	UTP-5
Nominal impedance	100 Ω
Pulse shape	af-phy.0015.000
Jitter/Jitter tolerance	1.5ns peak-to-peak / af-phy.0015.000
Connector type	RJ-45/ISO/IEC 8877

ATM Cross Connect

Matrix type[a]	1:N
Cross-connection level	Virtual Path
Connection types	bi-directional
Connection capacity	16-32 Mbit/s
Maximum number of VPCs	256-1024
Buffering	Output buffered per ATM virtual trunk

a Cross-connection between ATM Access Interface (1) and ATM virtual trunks (N). VP Cross-connection between ATM virtual trunks is not supported.

ATM Access Interface Termination and Mapping

Frame structures	STM-1, G.707
ATM cell mapping	VC4, I.432.2 and G.707
SOH access	Limited

ATM Virtual Trunk Termination and Mapping

Frame structures	Ericsson DXX interface unit framings
ATM cell mapping	Byte synchronous nx64k to X-bus

Other characteristics

Power supply	48 V DC
Power consumption	17 W
Unit size w x d x h (mm)	50x160x233
Unit width (T)	10

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8.11 Data Interface Modules

8448 kbit/s, G.703 Interface (G703 module)

Bit rate	8448 kbit/s ±30 ppm
Coding	HDB3
Nominal peak voltage	2.37 V/75 Ω unbalanced
Pulse width	59 ns ±10 ns
Attenuation margin	0…6 dB/4 MHz
Jitter tolerance	G.823
Connector type	75 Ω, SMB connector

2048 kbit/s, G.703 Interface (G703 module)

Bit rate	2048 kbit/s ±50 ppm
Coding	HDB3
Nominal peak voltage	2.37 V/75 Ω unbalanced 3.0 V/120 Ω balanced
Pulse width	244 ns ±20 ns
Attenuation margin	0…8 dB / 1 MHz
Jitter tolerance	G.823
Connector type	75 Ω, SMB type connector 120 Ω, D-type 9-pin female connector

64 kbit/s, G.703 Interface (G703-64 module)

Bit rate	64 kbit/s ±50 ppm
Type	co- or contradirectional
Impedance	120 Ω balanced
Nominal peak voltage	1.0 V
Pulse width	244 ns ±20 ns
Attenuation margin	0…3 dB
Jitter tolerance	G.823
Connector type	D-type 15-pin female connector

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DATA INTERFACE MODULES

2048 kbit/s, G.703 Interface (G703-75 module)

Bit rate	2048 kbit/s ±50 ppm
Code	HDB3 (G.703 Annex A)
Nominal impedance	75 Ω unbalanced
Pulse shape	G703 Figure 15
Nominal peak voltage	2.37 V (75 Ω)
Nominal pulse width	244 ±25 ns
Attenuation margin	6 dB at 1024 kHz
Input return loss	G.703 § 6.3.3
Output return loss	ETS 300 166 § 5.3
Jitter tolerance	G.823 § 3.1.1
Output jitter when transmit signal timing is supplied by the SXU operating in the internal mode	< 0.05 UI (20 Hz…100 kHz)
Output jitter when the node is synchronized from an G703-75 interface or SXU external clock input interface	TBR 12 § 5.2.1.4
Output short circuit current	< 50mA RMS
Connector type	SMB

2048 kbit/s, G.703 Interface (G703-120 module)

Bit rate	2048 kbit/s ±50 ppm
Code	HDB3 (G.703 Annex A)
Nominal impedance	120 Ω balanced
Pulse shape	G703 figure 15
Nominal peak voltage	3.0 V (120 Ω)
Nominal pulse width	244 ±25 ns
Attenuation margin	6 dB at 1024 kHz
Input return loss	G.703 § 6.3.3
Output return loss	ETS 300 166 § 5.3
Jitter tolerance	G.823 § 3.1.1
Output jitter when transmit signal timing is supplied by the SXU operating in the internal mode	< 0.05 UI (20 Hz…100 kHz)
Output jitter when node is synchronized from an G703-120 interface or SXU external clock input interface	TBR 12 § 5.2.1.4
Connector type	D-type 9-pin female connector

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TECHNICAL SPECIFICATIONS
DATA INTERFACE MODULES

8448 kbit/s, G.703 Interface (G703-8M module)

Bit rate	8448 kbit/s ±30 ppm
Code	HDB3 (G.703 Annex A)
Nominal impedance	75 Ω unbalanced
Pulse shape	G.703 figure 16
Nominal peak voltage	2.37 V (75 Ω)
Nominal pulse width	59 ± 10 ns
Attenuation margin	6 dB at 4224 kHz
Input return loss	G.703 § 7.3.3
Jitter tolerance	G.823 § 3.1.1
Output jitter when transmit signal timing is supplied by the SXU operating in the internal mode	< 0.05 UI (20 Hz…400 kHz)
Connector type	SMB (unbalanced 75 Ω)

2048 kbit/s,G.703 Interface (G703-75-4CH module)

Bit rate	2048 kbit/s ±50 ppm
Code	HDB3 (G.703 Annex A)
Nominal impedance	75 Ω unbalanced
Pulse shape	G703 Figure 15
Nominal peak voltage	2.37 V (75 Ω)
Nominal pulse width	244 ±25 ns
Attenuation margin	6 dB at 1024 kHz
Input return loss	G.703 § 6.3.3
Output return loss	ETS 300 166 § 5.3
Jitter tolerance	G.823 § 3.1.1
Output jitter when transmit signal timing is supplied by the XCG operating in the internal mode	< 0.05 UI (20 Hz…100 kHz)
Output jitter when the node is synchronized from an G703-75-4CH interface or XCG external clock input interface	TBR 12 § 5.2.1.4 TBR 13 § 5.2.1.4
Output short circuit current	< 50mA RMS
Connector type	SMB (unbalanced 75 Ω)
Overvoltage Protection	G.703 Annex B

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TECHNICAL SPECIFICATIONS
DATA INTERFACE MODULES

2048 kbit/s, G.703 Interface (G703-120-4CH module)

Bit rate	2048 kbit/s ±50 ppm
Code	HDB3 (G.703 Annex A)
Nominal impedance	120 Ω balanced
Pulse shape	G703 figure 15
Nominal peak voltage	3.0 V (120 Ω)
Nominal pulse width	244 ±25 ns
Attenuation margin	6 dB at 1024 kHz
Input return loss	G.703 § 6.3.3
Output return loss	ETS 300 166 § 5.3
Jitter tolerance	G.823 § 3.1.1
Output jitter when transmit signal timing is supplied by the XCG operating in the internal mode	< 0.05 UI (20 Hz…100 kHz)
Output jitter when node is synchronized from an G703-120-4CH interface or XCG external clock input interface	TBR 12 § 5.2.1.4 TBR 13 § 5.2.1.4
Connector type	D-type 9-pin female connector
Overvoltage Protection	G.703 Annex B

2048 kbit/s, G.703 Interface (G703-75-Q and G703-120-Q module)

	75 Ω unbalanced/G703-75-Q	120 Ω unbalanced/G703-120-Q
Nominal impedance		
Bit rate	2048 kbit/s ± 50 ppm	2048 kbit/s ± 50 ppm
Code	HDB3 (G.703 Annex A)	HDB3 (G.703 Annex A)
Pulse shape	G.703 figure 15	G.703 figure 15
Nominal peak voltage	2.37 V	3.0 V
Nominal pulse width	244 ± 25 ns	244 ± 25 ns
Attenuation margin	6 dB at 1024 kHz	6 dB at 1024 kHz
Input return loss	G.703 § 6.3.3	G.703 § 6.3.3
Output return loss	ETS 300 166 § 5.3	ETS 300 166 § 5.3
Jitter tolerance	G.823 § 3.1.1	G.823 § 3.1.1
Output jitter when transmit signal timing is supplied by the SXU/XCG operating in the internal mode	<0.05 UI (20 Hz…100 kHz)	<0.05 UI (20 Hz…100 kHz)
Output jitter when the node is synchronized from any 2048 Mbit/s G.703 interface or SXU/XCG external clock input interface	TBR 12 § 5.2.1.4 TBR 13 § 4.2.1.4	TBR 12 § 5.2.1.4 TBR 13 § 4.2.1.4
Output short circuit current	<50mA RMS	
Connector type	SMB	D-type 9-pin female connector

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8.12 2048 kbit/s and 1088 kbit/s Line Terminal Interface (LTE Module)

Bit rate	2048 kbit/s $\pm$ 50 ppm	1088 kbit/s $\pm$50 ppm
Coding	HDB3	HDB3
Nominal peak voltage	3.0V / 120 Ω symmetrical	
Pulse width	244 ns $\pm$25 ns	460 ns $\pm$40 ns
Attenuation margin	0…36 dB at 1024 kHz	0…36 dB at 544kHz
Jitter tolerance	G.823	Mask like G.823 for 2048 kbit/s with the following exceptions: A019.6 (18 μs) A10.75 A20.10 f450 kHz
Input impedance	120 Ω symmetrical	
Return loss	G.703	
Connector type	D type 9-pin female connector	
Overvoltage protection	Gas discharge tubes, diodes	

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2048 KBIT/S AND 1088 KBIT/S LINE TERMINAL INTER-

8.12.1 Optical Line Interface 2048 kbit/s/8448 kbit/s, LED and Laser (OTE-LED and OTE-LP Modules)

Bit rate		2048 kbit/s ±50 ppm 8448 kbit/s ±30 ppm	
Transmission path		Standard multi mode fiber (G.651) Standard single mode fiber (G.652)	
Optical transmitter		Semiconductor LED or Laser	
Nominal wave length		1300 nm	
Functional Mode		Minimum Output Power	Attenuation Margin
OTE-LED:			
multi mode	LED 2 M	-20 dBm	30 dB
single mode	LED 2 M	-30 dBm	20 dB
multi mode	LED 8 M	-20 dBm	22 dB
single mode	LED 8 M	-30 dBm	12 dB
OTE-LP:			
multi mode	Laser LP 2 M	-2 dBm	48 dB
single mode	Laser LP 2 M	-4 dBm	46 dB
multi mode	Laser LP 8 M	-2 dBm	40 dB
single mode	Laser LP 8 M	-4 dBm	38 dB
Optical line code		CMI	
Symbol rate		4096 kBaud (2 Mbit/s) 16896 kBaud (8 Mbit/s)	
Optical receiver		PIN diode	
Min. sensitivity (BER 10 -9)		-50 dBm (2 M) -42 dBm (8 M)	
Optical connector		FC-type with a receptacle	

8.12.2 Baseband Line Interface 2.4…19.2 kbit/s, 48, 56…384 kbit/s (BTE-64 and BTE-384 Modules)

Bit rate	2.4, 4.8, 7.2, 9.6, 14.4, 19.2, 8, 16, 32, 48, 56, 80, n x 64 kbit/s (n = 1…6)
Line interface	2/4 W full-duplex
Line code	biphase space
Interface impedance	150 Ω symmetrical (BTE-384) 820 Ω parallel with 180 Ω + 82 nF (BTE-64)
Output level/150 Ω	0/-6 dBm
Return loss	> 12 dB
Maximum input level/150 Ω	0 dBm
Minimum input level/150 Ω	BTE-64: -30 - -38 dBm (varies according to bit rate) BTE-384: -33 - -38 dBm (varies according to bit rate)
Equalizer	adaptive
Connector type	D type 9-pin female connector

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2048 KBIT/S AND 1088 KBIT/S LINE TERMINAL INTER-

8.12.3 Baseband Line Interface 256…768 kbit/s (BTE-768 Module)

Bit rate	n x 64 kbit/s, n = 4…12
Line interface	4 W full-duplex
Line code	Partial response, class 4, seven levels
Interface impedance	150 Ω symmetrical
Output level/150 Ω	+6 dBm/0 dBm
Return loss	> 12 dB
Maximum input level/150 Ω	+6 dBm
Minimum input level/150 Ω	-25 dBm
Equalizer	adaptive
Connector type	D type 9-pin female connector

8.12.4 Baseband Line Interfaces 320…4224 kbit/s (BTE-1088, 2048, 2048-2W and 4096 Modules)

Bit rate	n x 64 kbit/s, n = 5, 9,17 (BTE-1088) n=16,17, 32,33 (BTE-2048) n=16,17,32,33,64,66(BTE-4096)
Line interface	4 W full-duplex (BTE-2048-2W also 2W full-duplex)
Line code	2B1Q
Interface impedance	135 Ω symmetrical
Output level/135 Ω	+13.5 /+6 dBm/0 dBm
Return loss	> 12 dB
Maximum input level/135 Ω	+ 15 dBm
Minimum input level/135 Ω	- 30 dBm
Equalizer	adaptive
Connector type	D type 9-pin female connector

8.12.5 Baseband Line Interfaces 320…2304 kbit/s (BTE-320, 576, 1088-2W and 2304 Modules)

Bit rate	n x 64 kbit/s	n = 5 (BTE-320) n=5, 9 (BTE-576) n=5, 9, 16, 17 (BTE-1088-2W) n=16, 17, 32, 33, 34, 36 (BTE-2304)
Line interface	2W full-duplex (BTE-1088-2W and BTE-2304 also 4W full-duplex)	
Line code	2B1Q	
Interface impedance	135 Ω symmetrical	
Output level/135 Ω	+13.5 /+6 dBm/0 dBm	
Return loss	> 12 dB	
Maximum input level/135 Ω	+ 15 dBm	
Minimum input level/135 Ω	- 30 dBm	
Equalizer	adaptive	
Connector type	D type 9-pin female connector	

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TECHNICAL SPECIFICATIONS
2048 KBIT/S AND 1088 KBIT/S LINE TERMINAL INTER-

8.12.6 Baseband Line Interfaces 160 kbit/s (IUM-5T and IUM-10T)

Line rate	160 kbit/s (2B+D)
Symbol rate	80 kbaud
Line interface	2 W full-duplex
Line code	2B1Q
Interface impedance	135 Ω symmetrical
Output level/135 Ω	+13.5 dBm
Return loss	Defined in ANSI T1.601-1992
	1 ... 10 kHz:> 0 ... 20dB
	10 ... 25 kHz:> 20dB
	25 ... 250 kHz:> 20 ... 0 dB
Connector type	Modular 8-pin RJ-45 jack connector

8.12.7 1544 kbit/s (T1) Interface

Bit Rate	1.544MBits/S +/- 50 ppm
Coding	AMI
	AMI with zero code suppression
	B8ZS
Nominal Peak Voltage	3V
Nominal Pulse Width	323nS
Attenuation	20dB
Line Buildouts	0dB
	-7.5dB
	-15dB
	-22.5dB
Jitter	AT&T TR62411 (ACCUNET T1.5 Service). Jitter tolerance and transfer function also depend on the node main PLL. Currently max jitter amplitude in frequency range 1-120Hz is 24 UI.
Connector type	D-type 15 pin female
Termination	100 Ω

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TECHNICAL SPECIFICATIONS
2048 KBIT/S AND 1088 KBIT/S LINE TERMINAL INTER-

8.12.8 ISDN U-Interface Unit (ISD-LT/NT)

General features:

Number of channels	4
Channel capacity available to NTU user	2B+D + overhead, 160kbit/s, "semitransparently through Ericsson DXX Network"

Line interface:

Line rate	160 kbit/s (2B + D)
Symbol rate	80 kBaud
Signal encoding	2B1Q
Impedance	135 Ohm
Line connection	2-wire full duplex
Frame structure	ETR 080
Line monitoring in Ericsson DXX mode	1. Dying gasp monitoring 2. Carrier detection 3. Bit error rate (calculated from CRC)
Line power feeding	Five voltage levels: OFF, 60V, 68V, 95V, 100V, 110V Max. feeding current is 25 mA

Performance:

Exceeds ETSI ISDN U-interface (ETR 080 1993) performance requirements for 2-pair 2B1Q-systems line rate 160 kbit/s.

Max. cable attenuation	better than 40 dB at 40 kHz
Max cable length	about 8 km (0.5 mm/40 nF/km cable , no noise) about 5 km (0.4 mm/46 nF cable, no noise) (guidelines only: actual length depends on cable characteristics)

Diagnostics:

Loops	Interface-loop, data is looped back to XBUS on interface module Equipment loop, data is looped back to XBUS on base unit Line loop, data is looped back to line on base unit The use of loops are is relevant generallybasically in ISD-LT Ericsson DXX mode only
Operation	ETR080, G.960, G.961
Statistics	G.821

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TECHNICAL SPECIFICATIONS
2048 KBIT/S AND 1088 KBIT/S LINE TERMINAL INTER-

8.12.9 ECS X.50 Server

Customer Data Rates Supported

V.110	600,1200,2400,4800,9600,14400,19200,48000 bits/s
V.110M	600,1200,2400,4800,9600,14400,19200,48000 bits/s
X.50 Division 201.11.96	600,1200,2400,4800,9600,14400,19200,48000 bits/s
X.50 Division 3	1200,2400,4800,9600,14400,19200,48000 bits/s
X.50bis	48000 bits/s

ECS Capacity

Number of X.50 bearer channels per unit:8 for 10T, 4 for 5T

Number of V.110 channels per unit:60 for 10T, 30 for 5T

X.50 Capacity

Number of X.50 channels per bearer for customer data rate

600 bits/s	80 (not available in X.50 Division 3)
1200 bits/s	40 (if X.50 Division 3 this is allocated as 2400 bits/s and only 20 channels are available)
2400 bits/s	20
4800 bits/s	10
9600 bits/s	5
14400 bits/s	2
19200 bits/s	2
48000 bits/s	1

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2048 KBIT/S AND 1088 KBIT/S LINE TERMINAL INTER-

Octet Assignments

Valid X.50 octet assignments for customer data rate.

600 bits/s	1 through 80
1200 bits/s	1 & 41, or 2 & 40, or 3 & 43, or ... 40 & 80
2400 bits/s	1 through 20 (see note)
4800 bits/s	1 & 11, or 2 & 12, or ... 40 & 80 (see note)
9600 bits/s	1 & 6 & 11 & 16, or 2 & 7 & 12 &, or ... 5 & 10 & 15 & 20 (see note)
14400 bits/s	1 & 2 & 6 & 11 & 12 & 16 or 3 & 4 & 8 & 13 & 14 & 18 (see note)
19200 bits/s	1 & 2 & 6 & 7 & 11 & 12 & 16 & 17, or 3 & 4 & 8 & 9 & 13 & 14 & 18 & 19, or 1 & 3 & 6 & 8 & 11 & 13 & 16 & 18, or 2 & 4 & 7 & 9 & 12 & 14 & 17 & 19, or 3 & 5 & 8 & 10 & 13 & 15 & 18 & 20 (see note)
48000 bits/s	All

NOTE!

Octet assignments reflect ITU-T Recommendation X.50 Division 3 (20 octets). If an X.50 bearer has been configured as X.50 Division 2 (80 octets), the listed subrate channels octets shall be continued throughout the 80 octet frame. For example a 9600 bits/s channels shall reside in the following octets: 1 & 6 & 11 & 16 & 21 & 26 & 31 & 36 & 41 & 46 & 51 & 56 & 61 & 66 & 71 & 76.

X.50 Interface Requirements

The X.50 bearer channel may connected to any Nx64kbit/s data interface. Byte alignment is not required except for 48kbit/s X.50 bis channels.

Faults detected and reported

X.50 AIS

X.50 Loss of Frame Alignment

X.50 Frame Far-End Alarm (RAI)

X.50 Unavailable state in terms of G.821

X.50 Performance Event

X.50 Excessive error ratio 10^{-4}, 10^{-5}, and 10^{-6}

X.50 Bearer in Loopback

V.110 Frame Far-End Alarm (RAI)

V.110 AIS

V.110 Loss of Frame Alignment

V.110 Unavailable state in terms of G.821

V.110 Channel in Loopback

V.110 Performance Event

Note: Faults may be masked on X.50 bearers and V.110 channels.

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2048 KBIT/S AND 1088 KBIT/S LINE TERMINAL INTER-

V.110 Line conditioning options available for X.50 faults

—   AIS (all 1's, no framing) shall be sent on all V.110 channels associated with the X.50 channel.

—   IDLE (all 1's, valid framing) shall be sent on all V.110 channels associated with the X.50 channel.

—   IDLE (all 1's, valid framing) followed by Network Out of Service (NOS - SB=1 data = 0) shall be sent on all V.110 channels associated with the X.50 channel.

X.50 Line conditioning options available for V.110 faults

—   Network Out Of Service (NOS - S=OFF, DATA=0) shall be sent on the X.50 octet(s) associated with the V.110 channel.

—   IDLE (S=OFF, DATA=1) followed by NOS (S=OFF, DATA=0) shall be sent on the X.50 octet(s) associated with the V.110 channel.

Diagnostics available on ECS Module

X.50 External Line Loopback

V.110 External Line Loopback

X.50 Internal Line Loopback

V.110 Internal Line Loopback

Patterned Local Loopback (module self test)

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8.13 VF & EM Interface 64 kbit/s PCM and 32 kbit/s ADPCM

Voice Frequency Interface

Number of VF channels per unit	5, 10, 20	
Type of encoding	64 kbit/s PCM CCITT G.711 A-law 32 kbit/s ADPCM CCITT G.721 24 kbit/s ADPCM ANSI T1.303 16 kbit/s ADPCM by Dallas Semiconductor	
Type of VF interface	2- or 4-wire	
4-wire VF characteristics	G.712/G.714	
2-wire VF characteristics	G.713/G.715	
Nominal impedance	600 Ω	
Return loss 300-3400 Hz	> 20 dB	
Terminal balance return loss	> 18 dB	
Relative levels	4-wire	2-wire
input	-16 dBr…0 dBr	-10 dBr…0 dBr
output	-16 dBr…+6 dBr	-16 dBr…-2 dBr
adjustability	0.1 dB steps	
Longitudinal balance	> 60 dB	
Out-of-band signals at channel output	< -30 dB	
Discrimination against out-of-band input signals	> 30 dB	
Absolute channel delay @ 1 kHz		
VF to PCM	< 600 μs	
PCM to ADPCM	< 375 μs	
ADPCM to PCM	< 375 μs	
PCM to VF	< 500 μs	
Total distortion (CCITT G.712/G.713 method 1)		
64 kbit/s PCM	G.712/G.713	
32 kbit/s ADPCM	G.712/G.713	
24 kbit/s ADPCM	G.712/G.713 - 5 dB	
16 kbit/s ADPCM	G.712/G.713 - 13 dB	
Idle channel noise		
-64 kbit/s PCM	< 75 dBm0p	

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TECHNICAL SPECIFICATIONS
VF & EM INTERFACE 64 KBIT/S PCM AND 32 KBIT/S AD-

EM Signalling Interface

Polarity	negative
Input/output state	
closed	binary 0
open	binary 1
Signalling distortion	< 3 ms
ADPCM processing	G.761
Earth potential offset	< + 2 V
Test point	uP interface to each signalling bit
Output	
closed state resistance	< 50 Ω
open state resistance	> 200 kΩ
closed state voltage (I < 75 mA)	< 2 V
voltage transients (< 5ms)	< 180 V
open state current	< 50 μA
closed state current	< 75 mA
current transients (< 10 ms)	< 100 mA
digital noise filtering	RC = 10 ms
Input	
closed state current	< 10 mA
open state voltage	-10 V
noise filtering	RC = 40 μs
Cable characteristics	
series resistance	< 350 Ω
resistance to earth	> 20 kΩ
capacitance to earth	< 0.3 μF

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8.14 Telephone Interfaces (CCO and CCS)

Transmission Characteristics

Number of channels per unit	10
Type of encoding	64 kbit/s PCM (CCITT G.711 A-law)
	16, 32 kbit/s ADPCM (ITU-T G.726)
VF characteristics	G.712
Nominal impedance	$275\Omega + 850\ \Omega//150$ nF
Return loss 300Hz…600Hz	>15 dB
Return loss 600Hz…3400Hz	> 20 dB
Terminal balance return loss (TBRL)	> 20 dB
Relative levels	
input	-12 dBr…+1 dBr
output	-16 dBr…+1 dBr
adjustability	0.1 dB/steps
Longitudinal balance	
CCO	> 50 dB
CCS	> 40 dB
Out-of-band signals at channel output	< -30 dB
Absolute channel delay @ 1 kHz	
VF to PCM	< 700 μs
PCM to VF	< 700 μs
PCM to ADPCM	< 400 μs
ADPCM to PCM	< 400 μs
Total distortion (CCITT G.712/G.713 method 1)	
64 kbit/s PCM	G.712
Idle channel noise	
64 kbit/s PCM	< -75 dBmOp

Noise in conversation state	CCO	CCS
input	< -66 dBmOp	< -64 dBmOp
output	< -75 dBmOp	< -67 dBmOp

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DXX NODE TECHNICAL DESCRIPTION

TECHNICAL SPECIFICATIONS
TELEPHONE INTERFACES (CCO AND CCS)

DC Characteristics For Extension Unit, CCS

Voltage feed

quiescent condition	48 Vdc + 20 %/-15 %

Current feed

off-hook condition	48/(1650 + R) A min. 52/(1550 + R) A max. (R = 0…1800)
short circuit between a, b and earth, any combination	150 mA max.

Extension line resistance

loop resistance including a telephone set in off-hook condition	1800 Ω max.

Signalling Characteristics For Extension Unit, CCS

Signalling states detection

on-hook condition loop current	3 mA max.
off-hook condition loop current	10 mA min.
multifrequency signalling	transparently to PBX
loop disconnect signalling	supported

Ringing signal

frequency	25 Hz +/- 4 %
distortion	10 % THD

voltage:

no load	75 V rms. max.
at terminals across 5.2 kΩ	52 Vrms. min.

Loop Termination for PBX Unit, CCO

PBX line interface

high-ohmic condition	1 MΩ min.
low-ohmic condition	350 Ω max.
ringing signal detector impedance at 25 Hz	8 kΩ min
loop DC current	13 mA min. 40 mA max.

Signalling Characteristics for PBX Unit, CCO

ringing signal to be detected	30 V rms. min.
ringing signal frequency	25 Hz +/-12%
50 Hz ringing signal detection	supported
ringing signal not to be detected	10 V rms. max.

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8.15 Voice/Fax Compression

Voice coder specifications

Type of encoding	16 kbit/s ATC	
	8 kbit/s CELP	
Signal/noise ratio	> 30 dB	
(1004 Hz @ 0 dBm0 single tandem, single tone)		
Magnitude transfer response		
(1004 Hz @ 0 dBm0)	600 - 3500 Hz	+/- 0.5 dB
	300 - 3500 Hz	+/- 1.5 dB
	100 - 3900 Hz	+/- 15 dB

Fax rates supported

16 kbits/s	V.21 300 bit/s
	V.27 ter 2400 bit/s
	V.27 ter 4800 bit/s
	V.29 7200 bit/s
	V.29 9600 bit/s
8 kbit/s	V.21 300 bit/s
	V.27 ter 2400 bit/s
	V.27 ter 4800 bit/s
	V.29 7200 bit/s

Data modem rates supported

16 kbit/s	V.22 1200 bit/s
	V.22bis 2400bit/s
	bell 103 300 bit/s
8 kbit/s	none

End-to-end delay

16 kbit/s	less than 80 ms
8 kbit/s	less than 150 ms (excluding delays of transmission links)

Echo canceller

End path cancellation	32 mS

DTMF detection

frequency deviation	+/- 1.4 % max. of nominal
level range	0 to - 25 dBm
pulse duration	40 mSec minimum
interdigit duration	40 mSec minimum
pulse interval (pulse on+pulse off)	93 mSec minimum

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TECHNICAL SPECIFICATIONS
VOICE/FAX COMPRESSION

DTMF regeneration

frequency deviation   +/- 0.5 % of nominal

level range   +/- 3 dB (of detected valid level)

Tone generation

frequency accuracy   1020/1000 Hz   +/- 0.5%

level accuracy   1020/1000Hz   +/- 0.5 dB

Tone detection

frequency accuracy   +/- 0.5%

frequency resolution   1 Hz

level range   0 to - 45 dBm

level accuracy   +/- 0.5 dB

level resolution   0.1 dB

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8.16 Management and Alarm Interfaces

Service Computer (SC) Interface

Interface type	V.24
Electrical interface	V.28
Data bit rate	9.6 kbit/s asynchronous
Character format	8 bit, no parity, 1 stop bit
Connector type	ISO 2110, D type 25-pin female connector
Interface signals	102, 103, 104, 105, 106, 107, 108, 109
Protocol	Layers 2…7 proprietary

Management Computer (SCC) Interface)

Interface type	X.21	
Electrical interface	X.27 (V.11)	
Data bit rate	64 kbit/s synchronous	
Connector type	ISO 4903, D type 15-pin male connector	
Interface signals	G, T, R, S, C, I	
Protocol	Layer 2	X.25 LABP
		X.25 PLP
	Layer 3…7	proprietary

Equipment Alarm Outputs PMA, DMA, MEI

Three alarm outputs:

PMA	Nodes prompt maintenance alarm (ITU-T)
DMA	Nodes deferred maintenance alarm (ITU-T)
MEI	Nodes maintenance event information (ITU-T)

No alarm state:

Contact resistance	$> 100 \ k\Omega$
Voltage	-100…+100 V

Alarm state:

Contact resistance	$< 50 \ \Omega$
Current	-100…+100 mA
Connector type	D type 9-pin male connector

Output contacts are floating and the other end can be tied to the equipment earth.

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DXX NODE TECHNICAL DESCRIPTION

TECHNICAL SPECIFICATIONS
POWER SUPPLY

8.17 Power Supply

DC Power Supply

Input voltage	30…60V Positive pole earthed, can be duplicated /protected
Battery interface	CEPT Rec. T/TR 02-02
Connector type	D type 3W3 male connector

AC Power Supply

Input voltage (DXX and NTUs)	230 VAC +6/-15 % 47…63 Hz
Input voltage (SBM 2048M)	110…240 VAC +10/-10 % 47…63 Hz

Power Consumption of Nodes

Basic and Cluster node	< 100 W / one shelf (2 Mbit/s G.703 interfaces)

Power Consumption of Network Elements

Module/Unit	Description	Power Consumption (max)
ADPCM-10VF	Voice frequency interface module for CAE	3.0W
AIU 1:1	ATM Interface Unit	17W
AIU 1:4	ATM Interface Unit	17W
ALARM-IF	Alarm interface module	0.1W
BBU	Battery backup unit	0.5W
BCU	Battery charger unit	2.5W
BOU	Battery output unit	1.0W
BTE-64	Baseband interface module	3.3W
BTE-384	Baseband interface module	3.3W
BTE-768	Baseband interface module	4.3W
BTE-1088	Baseband interface module	4.3W
BTE-2048	Baseband interface module	5.0W
BTE-2048-2W	Baseband interface module	4.5W
BTE-4096	Baseband interface module	5.0W
CAE	Voice frequency interface unit	5.0W
CCU	Cluster node control unit	5.0W
CCO	PBX interface unit	10W
CCS	Extension interface unit	50W
CXU-A	Cluster node cross-connect unit / Slave	14W
CXU-M	Cluster node cross-connect unit / Master	8.0W
CXU-S	Cluster node signalling cross connect unit	14W

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Module/Unit	Description	Power Consumption (max)
EAE	PCM/ADPCM server	7.0W
EM-2*10	E&M signalling module for CAE	2.0W
ECS-5T	V.110 to X.50 conversion server unit	6.5W
ECS-10T	V.110 to X.50 conversion server unit	10.5W
EPS-10T	Fax/Voice compression unit	17W
EPS-5T	Fax/Voice compression unit	9.0W
G703	G.703 interface module for GMH	1.7W
G703-8M	G.703 8448kbit/s interface module	1.0W
G703-64	G.703 64 kbit/s interface module	1.5W
G703-75	G703 75 Ω interface module	1.0W
G703-120	G.703 120 Ω interface module	1.0W
G703-75-4CH	G.703 75 Ω 4 Channel Interface module	3.5W
G703-120-4CH	G.703 120 Ω 4 Channel Interface module	3.5W
G703-75-Q	G.703 75 Ω 4 Channel Interface module	3.0W
G703-120-Q	G.703 120 Ω 4 Channel Interface module	3.0W
G703-PDA	PDA interface module	1.5W
GCH-A	Unframed data interface unit	3.0W
GMH	Framed interface unit	4.0W
GMM+T1	T1 interface unit	5.0W
GMU	SDH interface unit	17W
GMU-M	SDH interface unit	17W
HDLC-4CH	Control channel expansion module	1.0W
ISD-LT	ISDN U-Interface Unit	11W (without line load)
ISD-NT	ISDN U-Interface Unit	5.6W
IUM-5T	Baseband interface unit	5.5W
IUM-10T	Baseband interface unit	7.0W
LTE	Line terminal 1/2 Mbit/s	1.1W
OTE-LED	Optical line interface module 2/8 Mbit/s	3.7W
OTE-LP	Optical line interface module 2/8 Mbit/s	5.4W
PAU	Power Supply Unit	65W
PAU-5T	Power Supply Unit	24W
PCM-10VF	PCM interface module	3.0W
PCU	Power control unit	1.0W
PFU	Fuse Unit (-48V, old type)	5.0W
PFU-A	Fuse Unit (-48V)	5.0W
PFU-A-24V	Fuse Unit (+24V)	7.0W
PFU-B	Fuse Unit (-48V, protected use)	5.0W
PFU-B-24V	Fuse Unit (+24V, protected use)	7.0W

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Module/Unit	Description	Power Consumption (max)
PMP-Server	PMP Server unit	3.5W
QMH	Framed interface unit, 4 channels	4.5W
SCC-IF	Control interface module	0.3W
SCU	Node control unit	5.0W
STM-1-E	Electrical interface module	4.1W
STM-1-LH-13	Optical short-haul module	2.6W
STM-1-SH-13	Optical long-haul module	2.6W
SXU-A	Cross-connect unit / small	8.0W
SXU-B	Cross connect unit / large	17W
SXU-C	Cluster slave subrack cross-connect unit	8.0W
SYN-34-E	Synchronous electrical interface module	1.7W
V24-DCE	V.24 interface module for VCM-5T-A	1.5W
V24-DTE	V.24/V.28 DTE interface module	1.5W
V24-PMP	V.24/V.28 PMP interface module for VCM-5T-A	1.5W
V35	V.35 interface module for VCM-10T-A	1.5W
V35-G704	V.35 interface module for GMH	1.5W
V35-G704-B	V.35 interface module for GMH	2.0W
V35-G704-BS	V.35 interface module for GMH	2.0W
V35-IEC	V.35 interface module for VCM-5T-A	1.5W
V36	V.36 interface module for VCM-10T-A	1.5W
V36-G704	V.36 interface module for GMH	1.5W
V36-IEC	V.36 interface module for VCM-5T-A	1.5W
VCM-10T-A	Unframed interface unit	3.5W
VCM-5T-A	Unframed interface unit	3.5W
VMM	Low overhead framed interface unit	4.5W
X21	X.21 interface module for VCM-5T-A	1.5W
X21-G704	X.21 interface module for GMH	1.5W
XCG	Cross-connect and control unit	12W

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TECHNICAL SPECIFICATIONS
MECHANICS

8.18 Mechanics

Basic and Cluster Node Dimensions and Weight

Basic node consists of one single or double subrack.

Cluster node consists of one double subrack and 1…8 single or double subracks.

Subrack/single	Wx D x H	451 x 255 x 310 mm	(19"/7 U subrack)
Subrack/double	W x D x H	451 x 255 x 620 mm	(19"/14 U subrack)
Air deflector plate	W x D x H	451 x 255 x 44 mm	(19"/1 U)
Unit	W x D x H	25 x 160 x 233 mm 50 x 160 x 233 mm 75 x 160 x 233 mm	(E2, 6 U/5 T) (E2, 6 U/10 T) (E2, 6 U/15 T)

An air deflector plate is recommended below each single/double subrack.

Subrack/single	< 15 kg	(19"/7 U subrack incl. units)
Subrack/double	< 30 kg	(19"/14 U subrack incl. units)

Midi Subrack Dimensions and Weight

2 x Midi Subrack	W x D x H	451 x 255 x 310 mm	(19"/7 U subrack)
Midi Subrack (single)	weight	< 10 kg	(incl. units)

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DXX NODE TECHNICAL DESCRIPTION

TECHNICAL SPECIFICATIONS
ERICSSON DXX PRODUCTS USAGE LIMITATIONS

8.19 Ericsson DXX Products Usage Limitations

—   GDH 230, G703 Interface Module (G.703 2Mbit/s, 8Mbit/s) should always be installed in EMC cabinet when 8Mbit/s is used.

—   BTE-64 nor BTE-384 (version 2.0 or earlier) does not fulfill the test level 1 of ENV 50141 (1993), Conducted Disturbances Induced by Radio Frequency Fields; Immunity Test.

Digital interface modules GDH 507 (G703-8M) and GDH 476 (G703-75) are approved only for use with the following BABT certified models of Ericsson DXX. Use of the product with a system not listed here may result in a hazard and will invalidate the BABT certification.

—   Ericsson DXX Basic Node

—   Ericsson DXX Cluster Node

—   Ericsson DXX Midi Node

The cards must be installed in accordance with the installation instructions provided.

Digital interface modules GDH 508 (G703-8M-M) and GDH 477 (G703-75M) are approved only for use with the following BABT certified models of Ericsson DXX. Use of the product with a system not listed here may result in a hazard and will invalidate the BABT certification.

—   Ericsson DXX Mini Node

—   Ericsson DXX Micro Node

The cards must be installed in accordance with the installation instructions provided.