

Technical Specifications

Traffic Handling Characteristics

Payload Handling

Voice Processing	<ul style="list-style-type: none">▪ G.711 PCM @ 64Kbps (A-law and μ-law)▪ G.729A (+B), CS-ACELP @ 8Kbps▪ G.723.1, ACELP / MPMLQ @ 5.3, 6.3 Kbps
Packetization Period	<ul style="list-style-type: none">▪ For G.711: 10, 20, 30 and 40 msec.▪ For G.729A: 10, 20, 30 and 40 msec▪ For G.723.1: 30, 60, and 90 msec
Silence Suppression	<ul style="list-style-type: none">▪ G.711, Ap.2▪ G.729A, Annex B▪ G.729A, Ap2 (G.711)▪ G.723.1, Annex A
Echo Cancellation	<ul style="list-style-type: none">▪ ITU-T G.168 & G.165 compliant▪ Up to 128 msec Echo Tail Length▪ Dynamic EC enabling controlled by signaling▪ ERL: 6dB▪ NLP: Non-Linear Processor Enable/Disable
Fax support	<ul style="list-style-type: none">▪ Group 3 fax calls▪ ITU-T T.38 fax relay or pass through to G.711, according to a configuration parameter▪ V.27, V.29 and V.17 (up to 14.4 kbps)▪ Packetization Period: 40 msec.▪ Fax redundancy: 1+1, 1+2 and 1+3 -- Operator configurable▪ Supports voice to fax switchover and fax to voice switchback▪ V.34 Fax (V.Fax): Pass through to G.711 or T.38 (V.17) - operator configurable
Voice Band Data (modem) support	<ul style="list-style-type: none">▪ Pass through to G.711▪ Redundancy: 1+1, 1+2 and 1+3 (operator configurable)▪ V.22, V.23, V.32, V.34 V.90, and V.92 modems▪ Packetization period: 20 msec.▪ Operator configurable maximum number of VBD/modem calls (and Transparent Channel and Clear Mode Channels).
DTMF Support	<ul style="list-style-type: none">▪ In-Band, DTMF Relay (detection and generation according to RFC 2833)▪ Out-of-Band - INFO Method (RFC 2976)

Transparent (Clear) Channel	<ul style="list-style-type: none"> ▪ 64 kbps (G.711), VAD OFF, EC OFF ▪ Redundancy: 1+1, 1+2 or 1+3 -- Operator configurable ▪ Packetization Period: 10 msec ▪ Operator configurable maximum number of Transparent Channels, Clear Mode Channels and VBD/modem calls ▪ Supports Clear Mode (RFC 4040)
Payload Aggregation	<ul style="list-style-type: none"> ▪ RTP Multiplexing based ▪ Enabled/Disabled per destination -- Operator configurable ▪ Configurable size -- 100 to 1500 bytes ▪ Configurable duration: 1 to 9 msec ▪ Static RTP Multiplexing ▪ Automatic RTP Multiplexing
Jitter Buffer	<ul style="list-style-type: none"> ▪ Absorbs up to 300 msec network jitter ▪ Minimum jitter buffer size: <ul style="list-style-type: none"> • Operator configurable separately for voice, fax, modem and transparent channel • Voice, Modem and Transparent Channel: 10 to 150 msec • Fax: 10 to 300 msec ▪ Adaptive jitter buffer for voice ▪ Fixed jitter buffer for fax, modem and transparent channel
Bearer	<ul style="list-style-type: none"> ▪ Over IP network (using Fast Ethernet ports) ▪ Over TDM network (using E1 or T1 TDM ports) ▪ Combined IP and TDM networks ▪ Supports terrestrial, microwave and satellite links
Typical Gain (voice traffic between I-Gate terminals)	<ul style="list-style-type: none"> ▪ G.729A -- 12:1 ▪ G.723.1 -- 16:1
Traffic Congestion Control	<ul style="list-style-type: none"> ▪ Packet Priority Selection mechanism ▪ For G.723.1 and G.729
Embedded Cross-Connect	<ul style="list-style-type: none"> ▪ Any-to-any trunk DS0 channel ▪ For all configured DS0s
Output Signal Gain	<ul style="list-style-type: none"> ▪ Operator configurable
QoS Framework	<ul style="list-style-type: none"> ▪ Multiple queue management ▪ IP packet classification and marking ▪ Multiple congestion avoidance mechanisms (including Smart Packet Priority Selection) ▪ Scheduling and Shaping ▪ Policing

Call Handling

Digit Manipulation (DM)	<ul style="list-style-type: none">▪ SIP-Originated Pre-Routing DM▪ SIP-Terminated Post-Routing DM▪ PRI-Originated Pre-Routing DM▪ PRI-Terminated Post-Routing DM
Call Routing	<ul style="list-style-type: none">▪ SIP-Originated Routing▪ PRI-Originated Routing▪ Load Balancing for PRI-to-SIP

TDM Network Interface Characteristics

E1 Interfaces

Electrical characteristics	▪ Complies with ITU-T Recommendation G.703
Impedance	▪ 120Ω balanced
Frame structure	▪ Complies with ITU-T Recommendation G.704
Line code	▪ HDB3
CRC-4 and E bit use	▪ Configurable
Return loss	▪ Complies with ITU-T Recommendation G.703 paragraph 6.3.3 and with ETSI ETS 300166

T1 Interfaces

Electrical characteristics	▪ Complies with ITU-T Recommendation G.703, ANSI T1.102
Impedance	▪ 100Ω balanced
Frame structure	▪ Complies with ITU-T Recommendation G.704, ANSI T1.107
Multi frame	▪ SF (12 frames) / ESF (24 frames), configurable
Line code	▪ AMI/ B8ZS (Configurable)
Return loss	▪ Complies with ITU-T Recommendation G.703 paragraph 6.3.3 and with ETSI ETS 300166

TDM Network Connectivity

E1	▪ up to 20 E1 links (comprising up to 16 fully populated E1 trunks (spans) and up to 4 E1 bearers); or ▪ up to 20 E1 links (some or all of them partially populated E1 trunks (spans) or comprising up to 4 E1 bearers)
T1	▪ up to 20 T1 links (all T1 trunks (spans) or comprising up to 4 T1 bearers)

TDM Bearer Characteristics

WAN Protocol	▪ Standard PPP (RFC 1661) ▪ Standard MLPPP (RFC 1990)
TDM Interfaces	▪ E1, T1
Delay	▪ Max. supported delay between Channel Groups of an MLPPP link: 10 msec. ▪ Max. bearer delay: 270 msec. (end-to-end)

Packet Network Interface Characteristics

Ethernet Ports

Interface	<ul style="list-style-type: none"> Fast Ethernet (100 BaseT) IEEE 802.3u Auto-negotiation Full Duplex
Capacity	<ul style="list-style-type: none"> 3 Fast Ethernet ports (on BPSM-R1 or XPSM-R1 Main Module)
Redundancy	<ul style="list-style-type: none"> 3 Fast Ethernet ports (on redundant BPSM-R1 or XPSM-R1 Main Module)
Connector	<ul style="list-style-type: none"> RJ45
VLAN Tag	<ul style="list-style-type: none"> IEEE 802.1q Up to 16 configurable VLANs

IP Protocols

Packetized Traffic	<ul style="list-style-type: none"> All media traffic (except fax): RTP/UDP/IP Fax: T.38/UDP/IP or RTP/UDP/IP (fax throughput) RTP (RFC 3550) RTCP (RFC 3551) RFC 4040 - RTP Payload Format for 64 kbps Transparent call
SIP and Call Handling Signaling (partial list)	<ul style="list-style-type: none"> RFC 2976 - The SIP INFO Method RFC 3261 - Session Initiation Protocol RFC 3262 - Reliability of Provisional Responses in the Session Initiation Protocol (SIP PRACK) RFC 3264 - An Offer/Answer Model with SDP RFC 3323 - A Privacy Mechanism for the Session Initiation Protocol (SIP) RFC 3325 - Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks RFC 3326 - The Reason Header Field for the Session Initiation Protocol (SIP) RFC 3398 - Integrated Services Digital Network (ISDN) User Part (ISUP) to Session Initiation Protocol (SIP) Mapping RFC 4028 - Session Timers in the Session Initiation Protocol RFC 4497 - Interworking Between the Session Initiation Protocol (SIP) and QSIG RFC 4566 - Session Description Protocol (SDP) draft-ietf-sipping-realtimefax-01
Management	<ul style="list-style-type: none"> SNMP V2 (RFC 1907) (for runtime configuration, status, alarm notifications and operator actions) FTP (RFC 959) (for SW and map download/upload)
IP version	<ul style="list-style-type: none"> IPv4

Others	<ul style="list-style-type: none"> ▪ IP (RFC 791) ▪ UDP (RFC 768) ▪ IP over Ethernet (RFC 1042) ▪ ICMP (RFC 792) ▪ ARP (RFC 826) ▪ Syslog (RFC 3164)
QoS	<ul style="list-style-type: none"> ▪ RFC 2474 ▪ RFC 2475 ▪ RFC 2597 ▪ RFC 2598

PSTN/PBX Signaling Support

PRI	<ul style="list-style-type: none"> ▪ E1 and T1 (FAS) links ▪ ETSI-ETS 300 125 ISDN User Network Interface Data Link Layer specification ▪ ETSI-ETS 300 102-1/2 ISDN User Network Interface Layer 3 specification for basic call control ▪ ETSI-ETS 300 402-2 ISDN; DSS1 protocol; Data link layer; Part 2: General protocol specification ▪ ITU-T Q.920 (I.440) DSS1 - ISDN User Network Interface data link layer - General Aspects ▪ ITU-T Q.921 ISDN User Network Interface data link layer specification ▪ ITU-T Q.931 ISDN User Network Interface Layer 3 specification for basic call control ▪ ITU-T Q.850 Usage of cause and location in the DSS1 ▪ ECMA-339 Signaling interworking between QSIG and SIP ▪ TR-NWT-001268 - ISDN Primary Rate Interface - Call Control Switching and Signaling ▪ TR-NWT-002120 - National ISDN-2 ▪ TR-TSY-000793-ISDN D-channel exchange Access Signaling and Switching Requirements (Layer 2) ▪ NI2, ANSI T-607-2000, DMS100, DMS250, 4 ESS, 5 ESS
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System Capacity

E1 Trunks	<ul style="list-style-type: none"> ▪ Using BPSM-R1 Main Module: up to 120 (4 x 30) simultaneous calls ▪ Using XPSM-R1 Main Module: up to 480 (16 x 30) simultaneous calls
T1 Trunks	<ul style="list-style-type: none"> ▪ Using BPSM-R1 Main Module: up to 96 (4 x 24) simultaneous calls and signaling channels ▪ Using XPSM-R1 Main Module: up to 480 (20 x 24) simultaneous calls and signaling channels
Cross-Connect	<ul style="list-style-type: none"> ▪ Embedded (Any-to-Any DS0)

Redundancy and High Availability

Main Module (includes TDM interface, Fast Ethernet interface, switch, DSP and CPU elements)	<ul style="list-style-type: none"> ▪ 1:1 BPSM-R1 redundancy ▪ 1:1 XPSM-R1 redundancy
Power Supply	<ul style="list-style-type: none"> ▪ 1:1 EDCM redundancy ▪ 1:1 EACM redundancy ▪ Load sharing
Power Feed	<ul style="list-style-type: none"> ▪ 2 independent power feed connections through main and redundant EDCM or EACM
Fan Tray	<ul style="list-style-type: none"> ▪ 4 fans ▪ Support for Fan Turbo mode
Failover Time	<ul style="list-style-type: none"> ▪ Less than 1 sec.
Fast Ethernet Link Protection	<ul style="list-style-type: none"> ▪ 1:1 (based on BPSM-R1/XPSM-R1 redundancy and external LAN switch)
Availability	<ul style="list-style-type: none"> ▪ 99.99995 % (six 9's)
Additional High Availability Features	<ul style="list-style-type: none"> ▪ Hitless Hot-module swapping -- Hot extractions/insertions of modules ▪ Hitless Hot SW Upgrade -- Non traffic affecting ▪ Runtime configuration ▪ PSTN Fallback ▪ Busy Out indication
Temperature Control	<ul style="list-style-type: none"> ▪ Built-in temperature sensors ▪ Fan Turbo mode ▪ Alarms: High & Extreme High Temperature

System Synchronization

Clock Source	<ul style="list-style-type: none"> ▪ Primary Clock Source (E1 or T1 bit stream) ▪ Secondary Clock Source (E1 or T1 bit stream) ▪ Internal Clock Source
Internal Timing Module	<ul style="list-style-type: none"> ▪ Operation modes: Complies with ITU-T recommendations G.812 and G.813 ▪ Jitter/Wander tolerance/transfer complies with AT&T TR-62411 and Telcordia GR-1244 Stratum 3 specifications ▪ Jitter specifications comply with ITU-T G.823, G.824, and ANSI T1.101

Power

DC power input	<ul style="list-style-type: none">▪ -48 VDC / -60 VDC (nominal)▪ -36 VDC / -75 VDC
AC power input	<ul style="list-style-type: none">▪ 220 VAC / 110 VAC (nominal)▪ 90 VAC / 265 VAC
Max DC Power Consumption per terminal	<ul style="list-style-type: none">▪ 76 Watts
Max AC Power Consumption per terminal	<ul style="list-style-type: none">▪ 105 Watts

Physical Characteristics

Dimensions	<ul style="list-style-type: none">▪ Width: 435mm (17.1") -- not incl. mounting brackets▪ Height: 44.45mm (1.75" -- 1U)▪ Depth: 350mm (13.8")
Weight	<ul style="list-style-type: none">▪ 3.98 Kg
Cabinet	<ul style="list-style-type: none">▪ Can be installed in 19" or 23" cabinets