Evolution Series
PD10
IF Satellite Modem

PARADISE DATACOM

OVERVIEW

The Evolution Series PD10 has been designed for cost-critical Modem applications and discerning users who demand quality and reliability at an affordable price. This *10Mbps* capable Modem offers full compliance with IESS-308, 309, 310, 314 & 315, plus a range of data interfaces including Ethernet. The Evolution Series Satellite Modem uses a new design concept whereby core functions are implemented with programmable logic, which allows easy reconfiguration to the needs of the user, and provides future-proof flexibility.

EASE OF OPERATION

The Modem firmware and software is easily upgraded through an Ethernet management port, plus an innovative new menu structure makes configuration a simple procedure. Advanced user interfaces support the display of text in different languages for universal appeal, and a unique Web User Interface offers full remote control and in-depth performance analysis tools using Internet Explorer without special Monitor & Control software.

FEATURES

▶ Field upgradeable feature set
▶ 5Msymbol/s capable
▶ 4.8kbps to 2,048kbps in the base modem; options to 10Mbps
▶ RS422, X.21, V.35, RS232, *G.703 standard* interfaces
▶ Quad E1 and Ethernet Bridge (optional)
▶ IP Acceleration and Brouting (optional)
▶ BPSK, QPSK, OQPSK, 8PSK (option), 8QAM (option) & 16QAM (option)
▶ Multi-rate 2nd Generation Turbo (TPC option), Viterbi, Sequential (option), TCM, LDPC BCH & Reed-Solomon FEC options
▶ 50 - 90MHz & 100 - 180MHz IF in 100Hz steps
▶ Closed Network, Closed Network + ESC, IBS/SMS (option) and IDR (option)
▶ Drop and Insert to E1/T1 (option) with extended functions: RBS, CAS
▶ Built-in 1:1 Redundancy Controller
▶ Embedded web server accessed via standard web browser for management and remote control
▶ 48V dc Primary Power input option

REMOTE CONTROL & WEB INTERFACE

▶ Web User Interface available via embedded web server including (patent pending); Receive Spectrum Analyzer, Receive Constellation Monitor, BER Tester and graphing of Eb/No, Rx Power, BER plus other parameters, using Internet Explorer
▶ Ethernet with embedded web server and SNMP network management support
▶ RS485 multi-drop addressable
▶ M&C via Satellite ESC channel for distant control of Modems and other devices
▶ RS232 for direct PC connection

Evolution Series

PD10 IF Satellite Modem

Common Main Specifications

Parameter	Evolution Series Modem
Modulation Scheme	BPSK, QPSK, OQPSK, 8PSK (Option), 16QAM (Option)
IF Frequency Range	50 - 90MHz & 100 - 180MHz
IF Frequency Resolution	100Hz
Traffic Interface - Electrical	Ethernet (10/100 BaseT) IP Traffic on RJ45 with link and traffic indicators. Electronically selectable with other interfaces fitted.
	RS422 including X.21 DCE and DTE emulation, V.35 and RS232 on EIA530 connector 25 pin female D-type (Option), EIA530 maximum 10Mbps, RS232 max 100kbps G.703 balanced on EIA530 G.703 unbalanced on BNC female 75Ω Quad E1 G.703 balanced on RJ45
	MultiMux feature allows a mix of multiple G.703 interfaces plus IP and/or EIA530 traffic with a limit of 2,048kbps per MultiMux traffic port (4 x ports max)
User Traffic Data Rate	4.8kbps – 2,048kbps Extension of base operation to 5Mbps (Option) Extension of 5Mbps to 10Mbps (Option) Extensions are cumulative
User Traffic Data Rate Resolution	1bps
Note: The combination of FEC Rate, Modulation scheme and Satellite Overhead limits the Traffic Data Rate Range in all modes.	
User Data Rate Range – Closed Network	4.8kbps to 10Mbps no Satellite Overhead (with high Data Rate options)
User Data Rate Range – Minimum Overhead (Closed Network plus ESC)	As Closed Network above except limits inclusive of overhead of approximately 1.4 times the ESC baud rate. Resolution of 1bps. Supports ESC rate from 110 baud to >38.4kbaud.
User Data Rate Range – IBS/SMS Option	4.8kbps to 10 Mbps (6.7% Satellite Overhead added). Resolution of 1bps.
User Data Rate Range – IDR Option	4.8kbps to 10 Mbps (96k overhead added) Resolution of 8k (limitation of frame structure)
Audio Channels Option (P1348 emulation mode)	Used with IBS/SMS satellite framing and IDR Options to provide 2 x audio 32kbps ADPCM coded channels within a 64kbps IBS carrier, and 2 x audio 32kbps ADPCM coded channels plus 64kbps data within a 128kbps IBS carrier
Inner Forward Error Correction	Viterbi BPSK/QPSK/OQPSK – Rates 1/2, 3/4, 7/8, k=7 to IESS-308/309 Option: Sequential BPSK/QPSK/OQPSK – Rates 1/2, 3/4, 7/8 up to 2,048kbps maximum Option: TCM 8PSK – Rate 2/3 to IESS-310 Option: TPC BPSK – Rates 5/16, 21/44, 0.493 (Paradise), 2/3, 3/4, 0.789 (Paradise), 7/8 (Paradise), Rate 7/8 de facto Option: TPC QPSK/OQPSK – Rates 5/16, 21/44, 0.493 (Paradise), 2/3, 3/4, 0.789 (Paradise), 7/8 (Paradise), Rate 7/8 de facto, Rate 0.93 (Paradise) Option: TPC 8PSK – Rates 3/4 de facto, 7/8 de facto, Rate 0.93 (Paradise) Option: TPC 16QAM - Rates 3/4 de facto, 7/8 de facto, Rate 0.93 (Paradise) Option: LDPC BCH Short FECFRAME=16,200 BPSK - Rate 1/2, QPSK/OQPSK - Rates 1/2, 2/3, 3/4, 8PSK/8QAM - Rates 2/3, 3/4, 16QAM - Rate 3/4
Outer Forward Error Correction	Concatenated Intelsat Reed-Solomon Outer Codec to IESS308/310 with Custom Option offering variable code rate. Maximum traffic rate 10Mbps.
Scrambling – IBS/SMS Option	Synchronised to framing per IESS-309 up to 10 Mbps
Scrambling – IDR Option and Closed Network	With RS Coding: synchronised to RS overhead. Without RS Coding: synchronised No RS Coding with TPC FEC: V.35 self-synchronising No RS Coding with TPC FEC: 2^12-1 up to 10 Mbps
Scrambling – Closed Network Plus ESC	32kbps or above: synchronised to ESC overhead. Less than 32kbps: as per closed network. V.35 Scrambler has CCITT, Intelsat, "FDC" and "Linkabit" modes up to 10Mbps (with high Data Rate options)
IF Connector type	BNC female
IF Impedance	50Ω & 75Ω, electronically selectable
Return Loss	18dB typical
Internal Frequency Reference - Ageing	<1ppm/yr
External Reference	Clocking Only: 1-10MHz in 1kHz steps. Clocking and RF Frequency: 10MHz, 0dBm±1dB

Modulator Specifications

Parameter	Evolution Series Modem
Output Power Level	0 to –25dBm Continuously Variable in 0.1dB steps
Output Level Stability	±0.5dB, 0ºC to 40ºC
Transmit Filtering	Intelsat IESS compliant α = 0.35
Occupied Bandwidth	1.2 x Symbol Rate
Recommended Channel Spacing	1.4 x Symbol Rate
Phase Accuracy	±2º maximum
Amplitude Accuracy	±0.2dB maximum
Carrier Suppression	-30dBc minimum
Output Phase Noise	As IESS-308, nominally 3dB better.
Output Frequency Stability	<1ppm/yr
Harmonics	Better than –55dBc/ 4kHz in band
Spurious	Better than –55dBc/ 4kHz in band
Transmit On/Off Ratio	55dB minimum
External Transmit Inhibit	By external contact closure or by TTL signal applied to rear panel Alarms & AGC connector

Demodulator Specifications

Parameter	Evolution Series Modem
Input Range	-30 to –60dBm wanted signal
Maximum Composite Signal	30dB above level of desired input up to a maximum of 0dBm
Freq. Acquisition Rng	Selectable from ±1kHz to ±32kHz (1kHz steps)
Acquisition Threshold	<5dB Es/No QPSK
Acquisition Time	At 9.6kbps, less than 1s at 6dB Es/No QPSK At 10 Mbps, less than 100ms at 6dB Es/No QPSK
Clock Tracking Range	±100ppm minimum
Receive Filtering	Intelsat IESS compliant α = 0.35
Performance Monitoring	Measured Eb/No (range 0-15dB, ±0.2dB). Measured Frequency Offset (100Hz resolution). Wanted signal strength indicator centred on middle of Rx Input range.
AGC Output	Buffered direct AGC output for antenna tracking, etc.

Data Rate Specifications

Modulation/FEC	FEC Rate de facto	Min Data Rate (kbps)	Max Data Rate (Mbps)
BPSK VIT / SEQ	1/2	4.8	2.5 / 2
BPSK VIT / SEQ	3/4	7.2	3.75 / 2
BPSK VIT / SEQ	7/8	8.4	4.375 / 2
BPSK VIT RS	1/2	4.8	2.2
BPSK VIT RS	3/4	6.4	3.3
BPSK VIT RS	7/8	7.5	3.8
BPSK LDPC BCH	1/2	4.8	2.1
O/QPSK VIT / SEQ	1/2	9.6	5 / 2
O/QPSK VIT / SEQ	3/4	14.4	7.5 / 2
O/QPSK VIT / SEQ	7/8	16.8	8.7 / 2
O/QPSK VIT RS	1/2	8.6	4.4
O/QPSK VIT RS	3/4	12.8	6.6
O/QPSK VIT RS	7/8	15	7.7
O/QPSK TPC	3/4	14.4	7.5
O/QPSK TPC	7/8	16.8	8.7
O/QPSK TPC	0.93	17.9	9.2
O/QPSK LDPC BCH	1/2	8.4	4.3
O/QPSK LDPC BCH	2/3	12.7	6.5
O/QPSK LDPC BCH	3/4	13.9	7.2
8PSK TCM	2/3	19.2	10
8PSK TCM RS	2/3	17.7	8.8
8PSK TPC	3/4	21.6	10
8PSK TPC	7/8	25.2	10
8PSK TPC	0.93	26.8	10
8PSK/8QAM LDPC BCH	2/3	19	9.8
8PSK/8QAM LDPC BCH	3/4	21	10.8
16QAM TPC	3/4	28.8	10
16QAM TPC	7/8	33.6	10
16QAM TPC	0.93	35.8	10
16QAM	3/4	28.8	14.4

BER Performance - Guaranteed dB (Typical)

		Rate 1/2	Rate 3/4	Rate 7/8	Rate 2/3	Rate 0.93
Viterbi QPSK	1E-4	4.7 (4.4)	6.1 (5.8)	7.1 (6.8)		
	1E-8	7.2 (6.9)	8.8 (8.5)	9.5 (9.2)		
Sequential (64kbps)	1E-4	4.3 (4.0)	5.4 (5.1)	6.4 (6.1)		
	1E-8	6.4 (6.1)	7.3 (7.0)	8.6 (8.3)		
Sequential (2048kbps)	1E-4	5.6 (5.3)	6.1 (5.8)	6.9 (6.6)		
	1E-8	7.5 (7.2)	8.1 (7.8)	8.4 (8.1)		
Turbo (TPC) QPSK	1E-4	2.7 (2.4)	3.5 (3.2)	4.1 (3.8)		
	1E-6					6.3 (6.0)
	1E-8	3.3 (3.0)	4.5 (4.2)	4.5 (4.2)		6.8 (6.5)
Turbo (TPC) 8PSK	1E-4		5.6 (5.3)	6.8 (6.5)		
	1E-6					9.2 (8.9)
	1E-8		6.8 (6.3)	7.2 (6.8)		9.9 (9.6)
Turbo (TPC) 16QAM	1E-3		6.5 (6.2)	7.7 (7.4)		
	1E-6					10.0 (9.7)
	1E-7		7.8 (7.5)	8.2 (7.8)		
	1E-8					10.7 (10.4)
8PSK/TCM	1E-3				6.3 (6.0)	
	1E-8				10.4 (10.1)	
8PSK/TCM + Reed-Solomon (all rates)	1E-4				6.1 (5.8)	
	1E-10				7.3 (7.0)	
LDPC B*/Q/OQPSK	1E-5	2.0 (1.7)*	3.0 (2.6)		2.3 (2.0)	
	1E-9	2.3 (2.0)*	3.3 (3.0)		2.7 (2.3)	
LDPC 8PSK	1E-5		5.7 (5.3)		-	
	1E-9		6.0 (5.6)		5.7 (5.2)	
LDPC 8QAM	1E-5		5.2 (4.7)		4.6 (4.2)	
	1E-9		5.7 (5.3)		5.0 (4.6)	
LDPC 16QAM	1E-5		6.8 (6.2)			
	1E-9		7.1 (6.8)			

Framing and Deframing Specifications

Parameter	Evolution Series Modem
Closed Network Format	Unframed, no overhead.
IBS/SMS Option Format	Intelsat IBS to IESS-309 and IESS-310, and Eutelsat SMS to EESS-501.
IDR Option Format	Intelsat IDR to IESS-308 and IESS-310
Closed Network plus ESC Format	Provides variable rate asynchronous ESC, optional synchronous scrambler above 32kbps to replace error multiplying V.35 scrambler, optional backward alarm facility and optional timeslot ID maintenance when used with Drop/Insert, all in minimum possible overhead down to <0.5%
Format of Other Modes	For custom options, see handbook.
Poor BER Performance	Deframer includes extended threshold operation that improves performance when used with Ree d-Solomon in very poor BER conditions (where a single uncorrectable RS codeword can contain enough corrupt frame alignment words to knock an Intelsat specified deframer out of frame sync).

Clocking and Buffering Specifications

Parameter	Evolution Series Modem	
Clock Integrity	Frequency Locked Loops give phase-hit immune operation even with poor clock sources such as routers etc.	
Tx Clocking	Internal	Standard (±1ppm)
	External	Tracking range ±100ppm/min
	Rx Clock	Slaves Tx timing from Rx clock. (Includes full asymmetric operation)
Rx Clocking	Buffer Disable	Clock from Satellite
	Tx Input clock	Plesiochronous. (Includes full asymmetric operation)
	Internal	Standard ±1ppm
	External timing clock (DTE interface only)	
	Station Reference (see below)	
Station Reference Inputs	75Ω BNC female Station Clock Connector, transformer isolated. 1MHz to 10MHz in 1kHz steps (accepts sinusoidal >0dBm or square-wave e.g. G.703 para 10)	
	120Ω RS422 compatible input, 1MHz to 10MHz in 1kHz steps via Async ESC connector	
	NB: When set to 10MHz, the station reference may replace internal reference to all internal circuitry. The unit automatically switches back to internal reference if the station reference fails.	
Buffer Size	Selectable in 1ms increments from 0ms to 99ms. Automatically adjusted to slip an integer number of terrestrial multi-frame lengths for framed rates. Buffer storage: Maximum buffer size – 256kbytes.	

Intelsat Reed--Solomon Codec & Custom Option Specifications

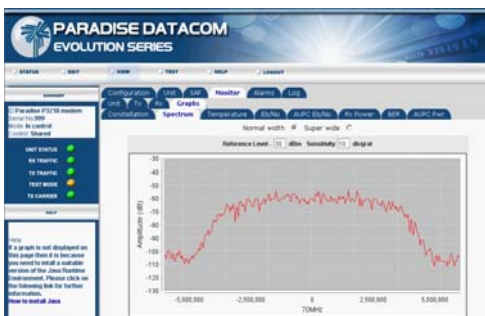| Parameter	Evolution Series Modem
Maximum traffic rate	10Mbps
Format	Concatenated Reed--Solomon outer codec to IESS-308/310.
Code Rate	Default n, k, t = (126, 112, 7) depth 4. Automatically switches to: (225, 205, 10) depth 4 for 1544kbps IDR mode or (219, 201, 9) depth 4 for 2048kbps IDR mode and TCM<=1544kbps or (219, 201, 9) depth 8 for TCM >1544kbps.
Processing Delay (bits)	Combined encoder and decoder: 8 x (2n-k+60) Combined Interleaver/De-Interleaver: 8 x n x Depth (Calculate delay time using data rate including RS overhead).
Custom Option	When fitted allows arbitrary selection of n and k to provide fully variable code rate. 60<=n<=255, (n-20)<=k<=(n-2) in steps of 2. Interleaver depth of 4 or 8. The custom option allows use of shorter code words to reduce interleaver/de-interleaver delay on low data rate circuits.

Drop & Insert Option Specifications

Parameter	Evolution Series Modem
Bearer Types	T1-D4, T1-ESF and E1-G.732
Timeslot Selection	Independent selection of arbitrary timeslots for both drop and insert.
Bearer Generation	The terrestrial bearer may be looped through the Drop Mux then Insert Mux, or terminated after the drop Mux and a new blank bearer generated by the insert Mux. The bearer generated within the Insert Mux provides full multiframe and CRC support and may be generated from the Tx clock, station reference, satellite clock or internal reference.
Bearer Backup	In the event that the Insert Mux bearer clock is lost, or AIS is supplied, then the Insert Mux will switch temporarily to bearer generation mode in order to preserve the receive traffic. The backup bearer may be generated from the station reference, satellite clock or internal reference.
Terrestrial CRC	Fully supported, with front panel display of terrestrial error rate based on CRC (T1-ESF and G.732) or Frame Alignment Word errors (all bearer types).
Timeslot ID	The IBS/SMS or Closed Net Plus ESC overhead maintains the identity of individual Drop/Insert timeslots for N=1,2,3,4,5,6,8,10,12, 15,16, 20, 24 and 30. (See extended option below).

Extended Drop & Insert Option Specifications

Parameter	Evolution Series Modem
Timeslot Re-Ordering	Selected timeslots may be independently re-ordered on both Tx and Rx paths.
Multi-Destinational Working	All or only a subset of the received data may be inserted into the terrestrial bearer on the receive path for multi-destinational working.
Timeslot ID Maintenance	The IBS/SMS or Closed Net Plus ESC is extended to maintain the identity of individual timeslots for all values of N from 1 to 31.
Signalling	Both Channel Associated Signalling (CAS) and Robbed Bit Signalling (RBS) are fully supported. For G.732 Drop/Insert, CAS signalling is extracted from terrestrial TS16 and carried over the satellite in IBS/SMS TS16 and TS48 before re-inserting into the distant terrestrial TS16. For RBS, the IBS or Closed Net Plus ESC overheads maintain the identity of the in-band signalling and it is re-inserted into the terrestrial multi-frame in the correct positions to maintain the RBS.

Advanced ESC and Advanced Aux Option Specifications

Parameter	Evolution Series Modem	
ESC/Aux Port	A single port provides the interface for optional high rate async ESC (IBS/SMS option or Closed Net Plus ESC) or the Intelsat low rate async IBS ESC channel.	
Electrical Interface	RS232, RS422 or RS485 external interfaces or internal link to remote M&C port (software selected). Other devices externally wired in parallel with M&C port can also be accessed remotely.	
Async ESC Option	Closed Net Plus ESC	Overhead scales to provide any user specified async ESC baud rate whatever the satellite data rate. ESC limit is approximately 70% of main channel rate, overhead varies from <0.5% to >70%.
	IBS Option	High rate async data using from 1/32nd to 22/32nd of the IBS overhead, providing async baud rates from 0.2% to 5.1% of the terrestrial rate (e.g., up to >2400 baud at 64kbps). Includes modes compatible with the P300 and P400 Series, P230 & P1300/P1361 (using 20/32nd of the overhead).
IBS Aux Data Channel	With IBS option and Advanced Aux option: Intelsat low rate async ESC definition carried in bit 1 of TS32 providing a synchronous channel at 1/480th of the data rate, allowing up to one quarter of this rate for over-sampled async data. Compliant with Intelsat IESS-403 low rate ESC definition.	

Ethernet Traffic

Parameter	Evolution Series Modem
Ethernet Optional (unaccelerated)	Throughput depends on traffic format – formats such as UDP that do not require acknowledgements run at up to the maximum data rate of the modem – unaccelerated TCP (which requires acknowledgements) will typically run at up to 128kbps per connection, 80 Connections/Sec
PEP (TCP/IP acceleration) Option	Performance Enhancing Protocol (acceleration) for TCP/IP traffic - overcomes performance problems associated with TCP over satellite . Maximum throughput 10Mbps
Traffic mode	Bridging (Option) for point-to-point operation Brouting (Option) for point-to-multipoint and satellite outbound plus non--satellite return. Mesh network support. User selectable bridge between Ethernet traffic and Ethernet M&C port.
DHCP	Dynamic Host Control Protocol allows modem IP address to be allocated dynamically from an external DHCP network server.
Ethernet Header Compression	Compression of Ethernet frame headers at data rates up to 2Mbps. Typically reduces 14 byte Ethernet header to 1 byte.
IEEE 802.1p/q	IEEE 802.1p Quality of Service supporting the choice of strict priority queuing or fair weighting queuing.
	IEEE 802.1q VLAN support

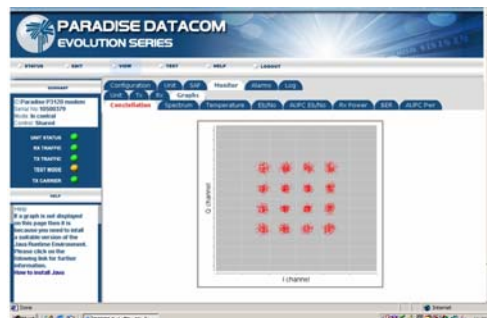*Built-in Spectrum Analyser for Receive Carrier, Adjacent Carrier and Super-Wide Monitoring (3 bandwidth settings).*

IDR Option Specifications

Parameter	Evolution Series Modem	
IDR ESC Audio	Two 32kbps ADPCM channels	
Interface	4-wire 600Ω, +7dBm to –16dBm (programmable in 0.1dB steps).	
Backward Alarms	Outputs: Four "form C" relays. Inputs: Four protected inputs, short to 0V to send alarm with matching summary Rx fail output. Alarm inputs software configurable for: a) All external patch, b) 1=Rx fail and 2–4 =external patch, c) 1=Rx fail and 2–4=OK, d) 1--4=Rx fail	
ESC/Aux Ports	When the IDR option is fitted, independent ESC & Aux ports on the IDR option replace the single shared ESC/Aux port on the base unit.	
ESC Port	RS232, RS422 or RS485 external interfaces or internal link to remote M&C port (software selected). No external cabling required between the ESC and M&C ports for M&C via ESC channel within the overhead. Other devices externally wired in parallel with M&C port can also be accessed remotely. Provides clock, data and sync (octet timing) lines.	
	IDR	Synchronous access to 8kbps IDR ESC. With the Async ESC option, async ESC access to the 8kbps IDR ESC is provided giving up to a 9600 baud async channel
	Others	IBS and Closed Net Plus ESC facilities as before installation of IDR option, but now on ESC port on IDR card not shared ESC/Aux port of base unit.
Aux Port	RS232 or RS422 (user selectable). Provides clock and data lines.	
	IDR	Provides 32 or 64kbps access in place of one or both audio ESC channels.
	IBS	Intelsat low rate ESC mode as previously but now via Aux port on IDR card not shared ESC Aux port of base unit. IDR option also adds sync IBS mode, configurable to use between 1/32nd and 21/32nd of the IBS overhead providing a full sync Aux port at between 0.2% and 4.3% of the main data rate. Aux port provides satellite timing information for P1500 slave Frequency Standard when not configured for Aux data access.

Traffic Log Specifications

Parameter	Evolution Series Modem
Capacity	Over 6000 entries
Entry Format	Fault message with time and date stamp. Separate entry when fault clears/changes.

AUPC Specifications

| Parameter	Evolution Series Modem
Modes of Operation	Monitor of distant Eb/No and BER only, full distant Eb/No maintenance. Unidirectional or Bi-directional operation.
Communication Link	Utilises asynchronous ESC channel on IBS/SMS, IDR and Closed Network plus ESC carriers (ESC from 300 baud, i.e., overheads down to less than 1%). Maximum data rate 10 Mbps
User Parameters	Target Eb/No, positive power offset, negative power offset

EZ BERT Specifications

Parameter	Evolution Series Modem
BER Channel	The BERT may operate through main traffic, ESC or Aux data channels, or outputted via the terrestrial interface. Use of ESC & Aux data channels allows continuous real traffic BER performance monitoring whilst the modem carries traffic.
Test Patterns	PRBS 2^N-1: N=6, 7, 9, 11, 15, 19, 20, 23. All 1s, All 0s, Alternate Patterns, Sparce Patterns, QRSS, User. Compatible with common stand-alone BER testers.
Results	Display of error count and average BER.
Autolog	Automatic logging of average BER and other parameters at regular intervals.

Built-in Receive Constellation Display for channel diagnostics.

Common Specifications

Parameter	Evolution Series Modem
Loop-backs	Interface Loop (Local and Remote) Framer Loop (Local) RS Loop (Local) FEC Loop (Local) Deframer/Framer Loop (Remote) Internal IF loopback (local, automatically matching Rx IF frequency to Tx)
Test Modes	Transmit CW (Pure Carrier) Transmit Alternate 1-0 Pattern Wideband spectrum analyzer display EZ Audio: 1kHz test tone on audio channels in IDR and P1348 emulation modes
Alarm Relays	4 Independent Change-Over Contacts: Unit Fault, Rx Traffic Fault Tx Traffic Fault, Deferred Alarm (backward alarm, BER or Eb/No below user set threshold)
Controller	Motorola PowerPC
Embedded Software	Revised embedded software may be downloaded into FLASH memory via Ethernet port with modem remaining in equipment rack.
Configuration Memories	>20 configurations can be stored and recalled from the front panel or remote M&C. Memories can be labelled with text string to aid identification.
User Interface	Clear and intuitive operator interface with plain English dialogue (other languages supported). Graphic display, backlit, high contrast, wide angle LCD. 17 key tactile full keyboard.
Remote Monitor And Control	For multi-drop applications, RS485 interface. For direct to PC applications, RS232 interface (front panel selectable). M&C port may be directly internally linked to ESC port for "over-the-satellite" M&C without cabling. Ethernet (10/100 BaseT) via RJ45, embedded Web server, SNMP agent V1, V2c
Redundancy Features	1:1 redundancy controller built in. "Y" cables passively split data maintaining impedances. IF inputs/outputs are passively split/ combined outside the units. Off-line unit tri-states data outputs and mutes Tx carrier.
Monitor	0-10V analogue output (Signal level, Eb/No, or Rx offset frequency) on Alarms & AGC connector.
Mechanical	1U chassis – 410mm deep, excluding front panel handles and rear panel connectors and fans.
Weight	3.5 kg
Power Supply	100-240VAC, +6%, -10%, 1A @100V, 0.5A @ 240V, 47-63Hz. Fused IEC connector (live and neutral fused). 48 Volts DC option
Safety	EN60950-1
EMC	EN55022 Class B (Emissions) EN55082 Part 1 (Immunity)
Environmental	Operating Temperature Range 0-50ºC

Simple to use BER Tester allows real time bit error measurements through traffic or ESC channel.
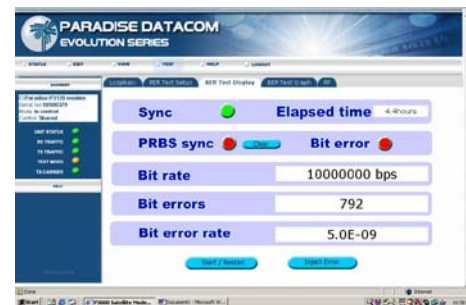
Unique Web User Interface provides full Monitor & Control plus graphing of Eb/No, BER, Receive Power and other operating parameters, plus a Receive Spectrum Analyser, Receive Constellation Monitor and BER Tester for detailed signal analysis and performance validation via Internet Explorer. Logged graph data can be sent via email to any email address.

Evolution Series
PD10 IF Satellite Modem

Fully configurable - only pay for what you need!

	Options	Description
PD10 IF Base Modem	✓	BPSK/QPSK/OQPSK 4.8kbps to 2,048kbps, 1bps variable rate, closed network modem. Includes: Viterbi FEC, Rates 1/2, 3/4 & 7/8 with k=7 Intelsat Reed-Solomon Outer Codec to IESS 308 Advanced ESC: Variable rate Async channel for Closed Net plus ESC operation, High Rate IBS/SMS ESC - requires IBS option, Async ESC access to IDR 8k sync ESC channel - requires IDR option. AUPC: Automatic Uplink Power Control (operates through ESC channel) Wideband IF: 50-90 MHz & 100-180MHz in 100Hz steps Ethernet 10/100 BaseT Monitor & Control Port: Internal web server or SNMP with user selectable DHCP allowing IP Address to be allocated dynamically via external network server Remote Web Browser based monitoring tools (Spectrum Display, Constellation Monitor and link performance versus time) plus SMTP email client for status notification G.703 E1 via BNC interface - requires EIA 530 for E1 120 ohm balanced or T1 operation EZ BERT Internal Bit Error Rate Tester can run through main data channel, or ESC/Aux channels, or output/input via the terrestrial interface
Adds Data Rates to 5Mbps	W	Extends base operation to 5Mbps
Adds Data Rates to 10Mbps	E	Extends 5Mbps operation to 10Mbps - requires 5Mbps option Also enables G.703 E2 & T2
IP Traffic Interface	R	Unaccelerated Ethernet 10/100 Base T on RJ45 via traffic or overhead (Ethernet Bridging). IEEE 802.1p QoS supporting choice of strict priority queuing or fair weighting queuing, IEEE 802.1q VLAN support. Ethernet Header Compression at data rates up to 2Mbps
IP Acceleration	E	TCP/IP Acceleration to 10Mbps on Ethernet port, subject to prevailing data rate limits - overcomes performance problems associated with TCP over satellite - requires IP Traffic Interface to be activated
Ethernet Brouting	H	Ethernet Brouting for Point-to-Multipoint operation when there is a non-satellite return path - requires IP Traffic Interface to be activated
Position 1 (must choose 1 option) **hardware option**		EIA 530 D25 DCE providing selectable RS422 / X.21 / V.35 / RS232, also balanced G.703
	S	IDR operation to IESS 308. Two audio ESC channels, synchronous 8kbps ESC, four from 'C' backward alarms & Async access to 8k sync channel - includes EZ Audio test tone generator
		Blank Panel
Position 2 (must choose 1 option) **hardware option**	N	EIA 530 D25 DCE providing selectable RS422 / X.21 / V.35 / RS232, also balanced G.703
	O	Quad E1 Multiplexer with 1 x RJ45 port enabled plus integral G.703 and Drop & Insert included - requires IBS/SMS satellite framing
		Blank Panel
Position 2 Quad E1 Mux options - can only be used with Quad E1 Mux card	I	Adds Port 2 with Drop & Insert to Quad E1 card - requires Quad E1 Mux in Position 2 plus data rate option to 5Mbps
	T	Adds Port 3 with Drop & Insert to Quad E1 card - requires Quad E1 Mux in Position 2 and Port 2 option plus 5Mbps and 10Mbps data rate options
	P	Adds Port 4 with Drop & Insert to Quad E1 card - requires Quad E1 Mux in Position 2 with Port 2 option & Port 3 option plus 5Mbps and 10Mbps data rate options
	O	MultiMux - Allows base IP traffic and/or EIA530 traffic, if EIA530 interface fitted, to be used in place of 1 or 2 Quad E1 ports, each MultiMux port limited to 2,048kbps traffic rate, and aggregate traffic rate limited to prevailing data rate limit
2nd Generation Turbo 10Mbps *maximum subject to prevailing data rate limits*		Rates 5/16, 21/44, 0.493, 2/3, 3/4, 0.789, 7/8 Paradise (low latency) in BPSK, QPSK, OQPSK Rate 7/8 in QPSK, OQPSK Rate 0.93 Paradise in QPSK, OQPSK Rates 3/4, 7/8, 0.93 Paradise in 8PSK - requires 8PSK option Rates 3/4, 7/8, 0.93 Paradise in 16QAM - requires 16QAM option
LDPC / BCH including 8QAM 5Mbps *maximum subject to prevailing data rate limits*	R	Low Density Parity Code (LDPC) plus Bose-Chaudhuri-Hocquenghem (BCH) error correction up to 5Mbps, short FECFRAME=16,200 **(hardware option)**: BPSK Rate 1/2, QPSK/OQPSK Rates 1/2, 2/3 & 3/4, 8PSK Rates 2/3 & 3/4 – requires 8PSK option, 8QAM Rates 2/3 & 3/4 - includes 8QAM modulation, 16QAM Rate 3/4 - requires 16QAM option
LDPC / BCH including 8QAM Extension to 10Mbps *maximum subject to prevailing data rate limits*	U	Low Density Parity Code (LDPC) plus Bose-Chaudhuri-Hocquenghem (BCH) error correction extension to 10Mbps, short FECFRAME=16,200 **(hardware option)**: BPSK Rate 1/2, QPSK/OQPSK Rates 1/2, 2/3 & 3/4, 8PSK Rates 2/3 & 3/4 – requires 8PSK option, 8QAM Rates 2/3 & 3/4 - includes 8QAM modulation, 16QAM Rate 3/4 - requires 16QAM option Requires LDPC / BCH to 5Mbps
Sequential FEC *limited to 2,048kbps maximum*	O	Rates 1/2, 3/4 & 7/8 in BPSK, QPSK, OQPSK
8PSK		Rate 2/3 8PSK Pragmatic TCM to IESS 310 8PSK Turbo available - requires 2nd Generation Turbo FEC option
16QAM	Y	16QAM - requires 2nd Generation Turbo FEC option
IBS / SMS	T	Satellite Framing to IESS 309 with low rate Intelsat ESC (to IESS 403) & High Rate IBS/SMS ESC
Audio Channels	C	P1348 Emulation mode for IBS 64kbps carrier (2xaudio) or 128kbps (2xaudio + 64kbps data) - requires IBS / SMS & IDR options
Drop / Insert		T1/E1 linear order Drop/Insert. Drop/Insert can operate with any interface, although G.703 is typically used
Extended D/I	E	Independent timeslot re-ordering on Tx & Rx. Signaling (E1 CAS & T1 RBS). Rx Partial Insert for multi-destinational working, Timeslot ID maintenance for N=1 to 31 with IBS / SMS or Closed Net plus ESC - requires Drop / Insert option
Advanced AUX	L	Variable rate synchronous Aux channel for IBS / SMS - requires IBS / SMS option IDR 32/64kbps in place of one/both audio ADPCM ESC channels - requires IDR option
Custom	E	Custom RS Outer Codec values of n, k and interleaver depth. Custom IBS / SMS modes, allocation of overhead between ESC and Aux channels in IBS / SMS, custom backward alarms in IBS / SMS, and Closed Net plus ESC - requires IBS/SMS option. Custom IDR mode - requires IDR option.
48V DC Input		K3002 48V DC Primary power input in place of 100-240V AC input **(hardware option)**
Tx Only operation	S	Transmit functions only
Rx Only operation		Receive functions only

Paradise Datacom reserves the right to change specifications of products described in this document at any time without notice and without obligation to notify any person of such changes. Refer to the website or contact Sales or Customer Service for the latest product information.

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