



## OVERVIEW

The Quantum Modem Redundancy Switch system offers a revolutionary approach to Modem Redundancy Protection by integrating the Backup Modem and 1:N Redundancy Controller into a single unit. The Backup Modem / Controller becomes a 3RU high 19 inch chassis, which incorporates the traffic and overhead interface connectors necessary to support the online Modem group. This low cost and compact 1:N scheme employs proven integrated 1:1 Redundancy technology pioneered by Paradise Datacom.

## EASE OF OPERATION

An innovative new menu structure makes configuration a simple procedure. Advanced user interfaces support the display of text in different languages. Unique Web User Interface offers full remote control and in-depth performance analysis tools using Internet Explorer without special Monitor & control software.

## FEATURES

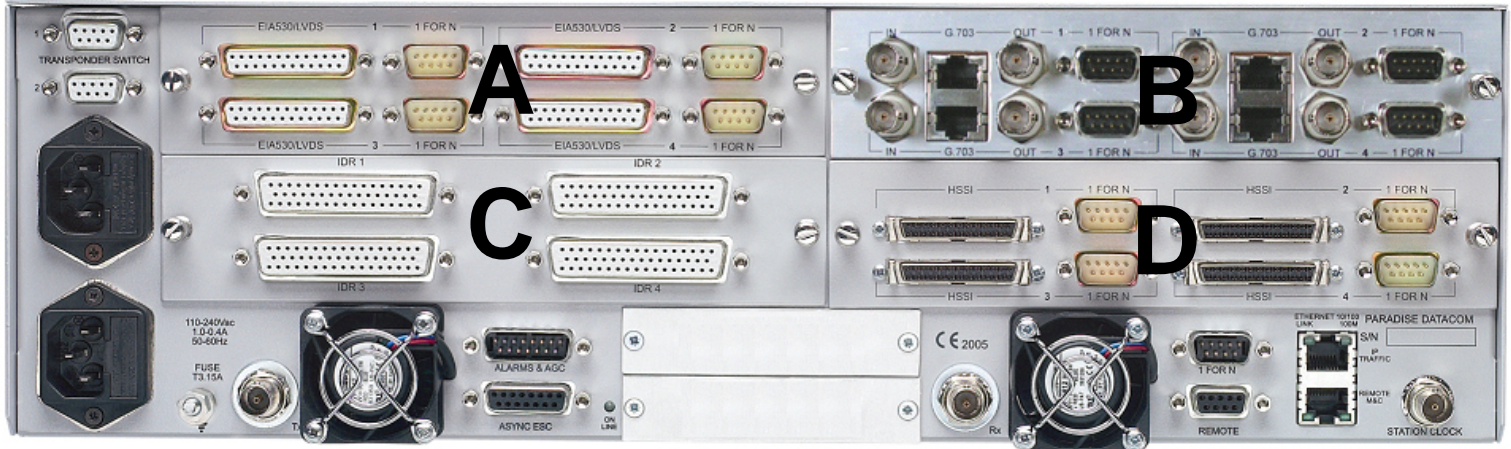
- ▶ Modular design gives maximum flexibility
- ▶ Integrated Backup Modem and Redundancy Controller in 3RU
- ▶ Low Cost
- ▶ Scalable up to 1 for 16 (Traffic protection only)
- ▶ Scalable up to 1 for 8 (Traffic and Overhead protection)
- ▶ Backup Modem / Controller can be replaced without affecting traffic
- ▶ Supports priority traffic channel protection
- ▶ Supports mixed traffic interfaces including Ethernet
- ▶ Supports Manual and Automatic Redundancy Protection
- ▶ Redundant power supplies for maximum reliability
- ▶ Web User Interfaces Remote Control via Ethernet - simple to configure
- ▶ PD60S Supports an IF Modem group with PD20 and/or PD60 Modems and optional Transponder Switching
- ▶ PD60SL supports an L-band Modem group with PD20L and/or PD60L Modems

## PD60S & PD60SL Modem Redundancy Switch

### Instructions for selection of your Quantum Modem Redundancy Switch Options:

- 1 Select the Redundancy Switch interface options for interface positions A, B, C & D in accordance with the traffic interfaces used on the associated Traffic Modems, and overhead protection if required. Each Switch interface panel caters for up to 4 Modems with like physical interfaces.
- 2 Select whether the system is to be IF (PD60S) or L-band (PD60SL).
- 3 Select the features needed within the Backup Modem, ensuring that the Backup Modem includes all the features of every Traffic Modem within the Redundancy Group.

### Rear view of PD60S IF Redundancy Switch



Please select your Backup Interface Options to include all modem interfaces within the group.

Interface Position A hardware option	1 Option Select	HERE	4 x LVDS / EIA530 on D25 female supports serial LVDS, RS422, X.21, V.35
		HERE	4 x G.703 on BNC and RJ45 supports G.703 unbalanced and balanced
		HERE	4 x HSSI on HD50 50-way SCSI-2 connector
		HERE	4 x Ethernet on RJ45 supports 10/100BaseT Ethernet
Interface Position B hardware option	1 Option Select	OPTIONS	4 x LVDS / EIA530 on D25 female supports serial LVDS, RS422, X.21, V.35
		OPTIONS	4 x G.703 on BNC and RJ45 supports G.703 unbalanced and balanced
		OPTIONS	4 x HSSI on HD50 50-way SCSI-2 connector
		OPTIONS	4 x Ethernet on RJ45 supports 10/100BaseT Ethernet
		OPTIONS	Blanking Plate (position not used)
Interface Position C hardware option	1 Option Select	YOUR	4 x LVDS / EIA530 on D25 female supports serial LVDS, RS422, X.21, V.35
		YOUR	4 x G.703 on BNC and RJ45 supports G.703 unbalanced and balanced
		YOUR	4 x HSSI on HD50 50-way SCSI-2 connector
		YOUR	4 x Ethernet on RJ45 supports 10/100BaseT
		YOUR	4 x overhead protection for Modems connected to Interface Position A
		YOUR	Blanking Plate (position not used)
Interface Position D hardware option	1 Option Select	SELECT	4 x LVDS / EIA530 on D25 female supports serial LVDS, RS422, X.21, V.35
		SELECT	4 x G.703 on BNC and RJ45 supports G.703 unbalanced and balanced
		SELECT	4 x HSSI on HD50 50-way SCSI-2 connector
		SELECT	4 x Ethernet on RJ45 supports 10/100BaseT Ethernet
		SELECT	4 x overhead protection for Modems connected to Interface Position B
		SELECT	Blanking Plate (position not used)

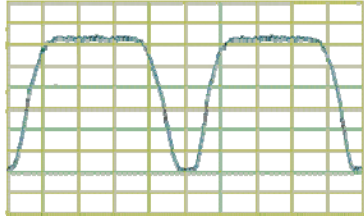
## PD60S & PD60SL Modem Redundancy Switch

Fully configurable - only pay for what you need!

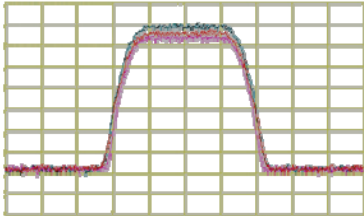
	Possible modes		Description
	SCPC	DVB-S2	
<b>PD60 Base Switch</b>	•	•	BPSK/QPSK/OQPSK, 4.8kbps to 10Mbps, 1bps variable rate, closed network modem. Ethernet 10/100BaseT on RJ45 for M&C, unaccelerated Ethernet 10/100BaseT on RJ45 via traffic or overhead (Ethernet Bridging) Includes: Viterbi FEC, Rates 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. AUPC: Automatic Uplink Power Control (operates through ESC channel) Remote Web Browser based monitoring tools (Spectrum Display, Constellation Monitor and link performance versus time) plus SMTP email client for status notification. DHCP allowing IP address to be allocated dynamically via external DHCP network server Ethernet header compression of data rates up to 2Mbps IEEE 802.1p QoS supporting choice of strict priority queuing or fair weighting queuing, IEEE 802.1q VLAN support.
		•	50kbps to 10Mbps, 1bps variable rate in DVB-S2 mode, requires a DVB-S2 option
<b>Either IF PD60S</b>	•	•	IF Frequency 50-90 MHz & 100-180MHz in 100Hz steps, Closed Network modem, Closed Network plus ESC modem. <b>(hardware option)</b>
<b>or L-band PD60SL</b>	•	•	L-band: 950- 1950MHz with 100Hz resolution, includes 4E-8 internal reference <b>(hardware option)</b>
<b>Wideband L-band</b>	•	•	Extends L-band coverage to 950-2050MHz in 100Hz steps - L-band option only
<b>Adds Data Rates to 16,896kbps</b>	•	•	Extends base operation to 16,896kbps
<b>Adds Data Rates to 25Mbps</b>	•	•	Extends 16,896kbps operation to 25Mbps - requires 16,896kbps option
<b>Adds Data Rates to 60Mbps</b>	•	•	Extends 25Mbps operation to 60Mbps - requires 16,896kbps & 25Mbps options
<b>IP Acceleration</b>	•	•	TCP/IP Acceleration to 10Mbps on base Ethernet port, subject to prevailing data rate limits - overcomes performance problems associated with TCP over satellite
<b>Ethernet Bridging</b>	•	•	Ethernet Bridging for Point-to-Multipoint operation when there is a non-satellite return path - can be used with base Ethernet port or IP Traffic card
<b>IP Traffic Shaping</b>	•	•	Supports allocation of CIR and BIR plus priority for IP Streams identified by IP Address, Diffserv Class, IEEE 802.1p priority tag or MPLS EXP field. Available as an option on the base IP port and the IP Traffic card.
<b>Position 2 (must choose 1 option) hardware option</b>	•	•	Blank Panel
	•	•	IP Traffic card providing TCP acceleration to 16,896kbps, subject to prevailing data rate limits, also provides HTTP Acceleration by prefetching webpage inline objects to reduce webpage download time
<b>Position 2 IP Traffic card options</b>	•	•	Adds TCP acceleration up to 25Mbps on IP Traffic card, subject to prevailing data rate limits - requires IP Traffic card
	•	•	Adds TCP acceleration up to 60Mbps on IP Traffic card, subject to prevailing data rate limits - requires IP Traffic card and requires 25Mbps Acceleration option
	•	•	Adds Robust Header Compression to RFC 3059 (IP/UDP) at throughput rates to 29kpkts/s (1-way), 22kpkts/s (2-way), subject to prevailing data rate limits - requires IP Traffic card
	•	•	Encapsulation of IP packets and Ethernet frames over DVB uses MPE or ULE protocols
	•	•	Adds Dynamic Routing: supports RIP, OSPF and BGP, plus 64 static routes - requires IP Traffic card
<b>DVB-S2 Modulation &amp; Coding hardware options</b>		•	DVB-S2 CCM Tx - includes QPSK, 8PSK & 16APSK for DVB-S2 use only, includes also DVB-S2 LDPC Error Correction for DVB-S2 only. Must specify IP Traffic card if IP Traffic required Includes SmartLink allowing SCPC features to be overlaid on DVB-S2 space segment.
		•	DVB-S2 CCM Rx - includes QPSK, 8PSK & 16APSK for DVB-S2 use only includes also DVB-S2 LDPC Error Correction for DVB-S2 only. Must specify IP Traffic card if IP Traffic required Includes SmartLink allowing SCPC features to be overlaid on DVB-S2 space segment.
<b>Low Rate TPC 2nd Generation Turbo 10Mbps maximum subject to prevailing data rate limits</b>	•		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
<b>High Rate TPC 2nd Generation Turbo All data rates to 20Mbps subject to prevailing data rate limits</b>	•		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
<b>Sequential FEC Limited to 2,048kbps maximum</b>	•		Rates 1/2, 3/4, 7/8 in BPSK, QPSK, OQPSK
<b>FastLink Low Latency LDPC</b>	•		FastLink LDPC up to 1Mbps, supports BPSK and QPSK, also supports 8PSK - requires 8PSK option, FastLink 8QAM - requires FastLink 8QAM option, and 16QAM - requires 16QAM option <b>(hardware option)</b>
	•		FastLink LDPC extension to 2.5Mbps - requires FastLink LDPC to 1Mbps
	•		FastLink LDPC extension to 5Mbps - requires FastLink LDPC to 1Mbps and extension to 2.5Mbps
	•		FastLink LDPC extension to 10Mbps - requires FastLink LDPC to 1Mbps plus extension to 2.5Mbps and extension to 5Mbps
	•		FastLink LDPC extension to 25Mbps - requires FastLink LDPC to 1Mbps plus extension to 2.5Mbps, extension to 5Mbps and extension to 10Mbps
	•		FastLink LDPC extension to 60Mbps - requires FastLink LDPC to 1Mbps plus extension to 2.5Mbps, extension to 5Mbps, extension to 10Mbps and extension to 25Mbps

Configuration options continue on next page.

### Paired Carrier Operation

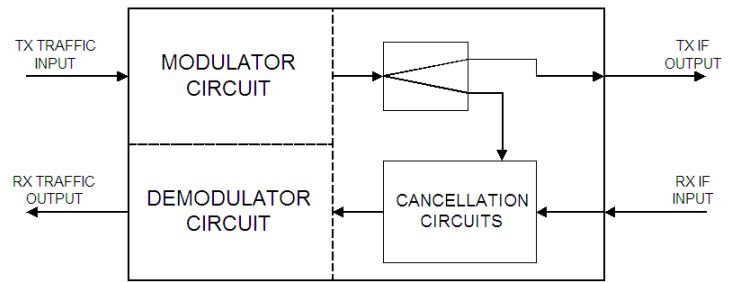


Paired Carrier Disabled



Paired Carrier Enabled  
Can save 50% on space segment

### PAIRED CARRIER MODEM SCHEMATIC



**Paired Carrier** technology allows both the uplink and downlink signals to occupy the same space segment. An adaptive self-interference cancellation technique removes the uplink signal components generated by the local terminal from the received signal off satellite, allowing demodulation of the far end signal.

Paired Carrier	
Parameter	QUANTUM Series Switch
Paired Carrier	Transmit and receive carriers are overlaid on top of each other in the same space segment. Echo cancellation techniques are used in the demodulator to cancel the transmit carrier and extract the wanted receive carrier signal.
Paired Carrier data rate options	512kbps, 1024kbps, 2.5Mbps, 5Mbps, 10Mbps, 15Mbps, 20Mbps, 25Mbps, 40Mbps, 50Mbps and 60Mbps traffic rate

	Possible modes		Description
	SCPC	DVB-S2	
FastLink 8QAM	•		FastLink 8QAM requires FastLink LDPC
8PSK Including TCM	•		Rate 2/3 8PSK Pragmatic TCM to IESS 310 8PSK Turbo available - requires 2nd Generation Turbo FEC option
16QAM	•		16QAM - requires either 2nd Generation Turbo FEC option or LDPC option
IBS / SMS	•	•	Satellite Framing to IESS 309 with low rate Intelsat ESC (to IESS 403) & High Rate IBS/SMS ESC
Audio Channels	•	•	P1348 Emulation mode for IBS 64kbps carrier (2xaudio) or 128kbps (2xaudio + 64kbps data) - requires IBS / SMS & IDR options
Drop / Insert including Extended D/I	•	•	T1/E1 linear order Drop/Insert, plus independent timeslot re-ordering on Tx & Rx. Signalling (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. Drop/Insert can operate with any interface, although G.703 is typically used (requires G.703 option if used in G.703 mode)
G.703 Clock Extension	•	•	Provides a stable G.703 E1 or T1 reference clock over satellite when traffic is NOT E1 or T1
Advanced AUX	•	•	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	•	•	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.
EZ BERT - PRBS Tester	•	•	Internal Bit Error Rate Tester (BERT) can run through main data channel, or ESC/Aux channels, or output/input via the terrestrial interface
OM-73	•		OM-73 Scrambling, symbol mapping and Viterbi compatibility
48V DC Input	•	•	48V DC Primary power input in place of 100-240V AC input ( <b>hardware option</b> )
Adaptive Signal Predistorter	•		Use with 16QAM to relax HPA backoff by up to 1.6dB. Compensates for HPA non-linearities in ground segment and/or transponder. Requires 16QAM option.
Tx Only operation	•	•	Transmit functions only
Rx Only operation	•	•	Receive functions only
Paired Carrier (carrier re-use) subject to prevailing modem data rate limits. Minimum occupied bandwidth limit of 150kHz, and maximum occupied bandwidth limit of 36MHz	•	•	Paired Carrier Ready, allows carriers to be overlapped thereby reducing the required satellite bandwidth. ( <b>hardware option</b> ) - requires additional cumulative software options below depending upon data rate required
	•	•	Paired Carrier up to 512kbps traffic rate - requires Paired Carrier Ready option
	•	•	Extends Paired Carrier up to 1024kbps traffic rate - requires 512kbps option
	•	•	Extends Paired Carrier up to 2.5Mbps traffic rate - requires 1024kbps option
	•	•	Extends Paired Carrier up to 5Mbps traffic rate - requires 2.5Mbps option
	•	•	Extends Paired Carrier up to 10Mbps traffic rate - requires 5Mbps option
	•	•	Extends Paired Carrier up to 15Mbps traffic rate - requires 10Mbps option
	•	•	Extends Paired Carrier up to 20Mbps traffic rate - requires 15Mbps option
	•	•	Extends Paired Carrier up to 25Mbps traffic rate - requires 20Mbps option
	•	•	Extends Paired Carrier up to 40Mbps traffic rate - requires 25Mbps option
•	•	Extends Paired Carrier up to 50Mbps traffic rate - requires 40Mbps option	
•	•	Extends Paired Carrier up to 60Mbps traffic rate - requires 50Mbps option	

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