



IMUX 2000 8-Port T1/E1 DACS



The RFL IMUX 2000 Digital Access Cross-Connect Switch; for the management, protection and routing of critical T1/E1 Traffic

Key Benefits

- Optimizes transmission efficiency
- Drastically reduces overall T1/E1 line costs
- Provides T1/E1 connectivity to several sites
- Ideal for edge access and data back haul
- Groom/Concentrate/Hub multiple T1/E1 links
- Consolidation of Enterprise network traffic
- Enables dual T1/E1 Ring interconnection
- Offers automatic re-routing capabilities

Key Features

- Redundant DACS module and power supply
- Full Time Slot Interchange (TSI) capability
- 1 ms High Speed Intelligent Line Switch
- Rugged design (SWC, EMI, RFI, Temp)
- Intuitive GUI with color coded DACS maps
- Optional SNMP interface compatibility
- Front access T1/E1 maintenance Jack-fields
- Up to 8 T1/E1 ports, fiber optic or electrical
- DACS map and Tri-color port status Displays
- Electrical to fiber optic DS1 migration

The IMUX 2000 8-Port T1/E DACS is designed for stand-alone operation and/or to interface with the IMUX 2000 Multiplexer to support various types of network topologies including "Star", "Hot-Standby" and "Rings."

The IMUX 2000 8-Port T1/E1 DACS, provides full cross-connect capability as well as a reliable level of system restoration. The RFL DACS enables the termination of up to eight [8] T1/E1 ports in a common platform while also providing full DS0 Time Slot Interchange capability. Redundant DACS modules are available for critical applications, which cannot tolerate single point of failure network architectures.

Communications interface options for the DACS include built in T1 CSU, or fiber optic interface adapters, using Code Mark Inversion (CMI) encoding technology. In the event the application is time sensitive in nature the RFL DACS can be configured as an Intelligent Line Switch (ILS) in order to provide ultra high speed path switching.

System restoration is accomplished through the use of alternate DS0, Time Slot Interchanged maps. The alternate maps are pre-determined and pre-programmed through our user friendly Network Management Software. An alternate DS0 map is invoked automatically upon detection of T1/E1 failures (e.g. AIS, Loss of Frame, excessive BER). The time necessary to switch to an alternate map, upon detection of failure, is programmable down to 1 millisecond.



Product Applications

- **Electric Utilities (Investor Owned, Municipal, Cooperatives, Independent Power Producers)**
 - Inter-substation communications
 - System protection control and monitoring
 - Corporate Wide Area Networks
 - Substation automation
 - Remote station data backhaul
 - SONET/ATM backbone access
- **Transportation (Traffic, Intelligent Transportation Systems, Airports, Rail/Transit)**
 - Advanced Transportation Management Systems (ATMS)
 - Traffic operation center data concentration
 - Wayside communications and signaling for metro/rail
 - Airport enterprise solutions
- **Telco (RBOC, CLEC, ILEC, ISP)**
 - Voice, data, video transport
 - DSO grooming
 - DS1 concentration
 - Fractional T1 to subscribers
 - Public and private networks

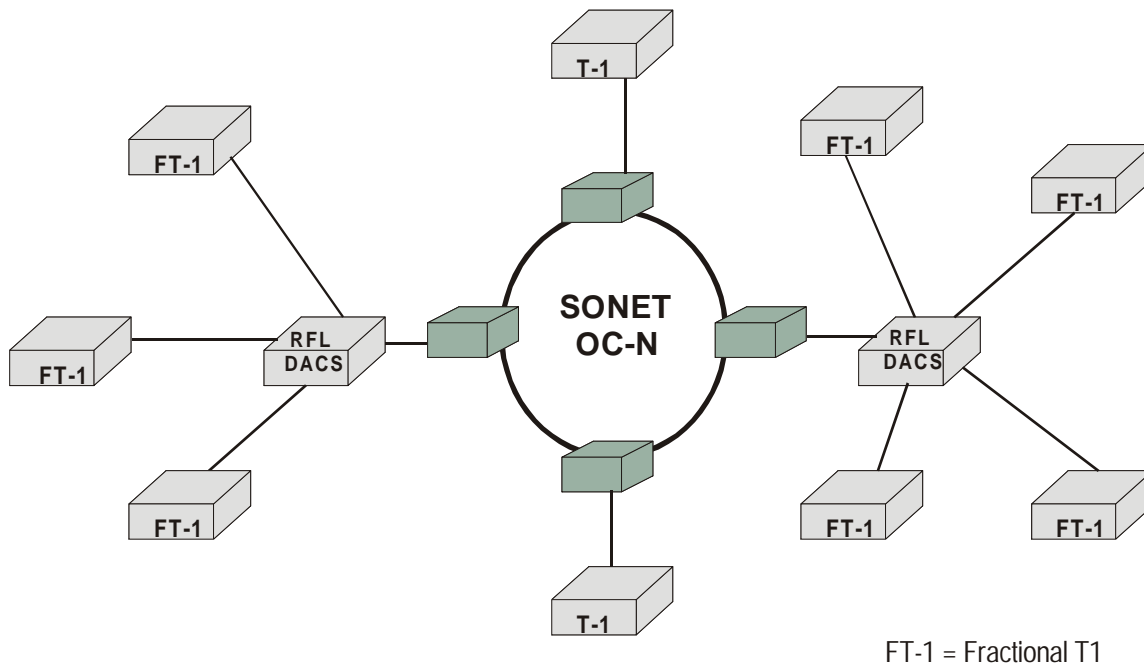


Figure 1. RFL DACS application DSO grooming of fractional T1

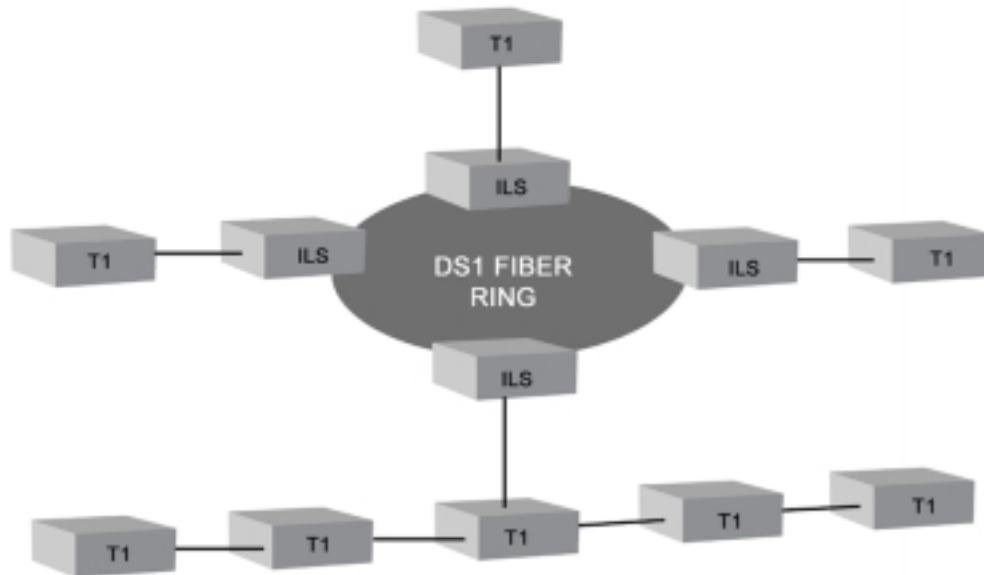


Figure 2. RFL DACS configured as an Intelligent Line Switch for time sensitive high speed switching applications

Physical Characteristics

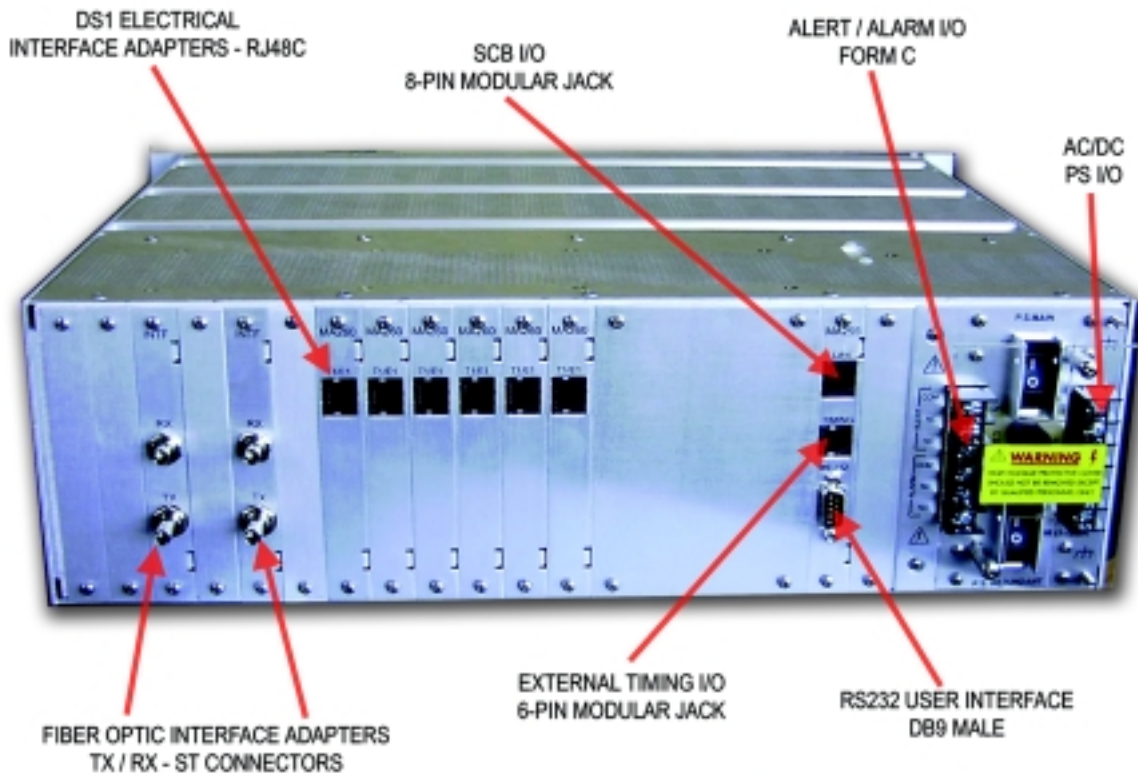


Figure 3. IMUX DACS Back - plane connections. (T1 Configuration)



Product Specifications

DS1 Inputs/Outputs Interface	DSX-1 interface per ANSI T1.403-1995. T1 CSU line build outs of -7.5dB, -15dB, and -22.5dB.
Rate	Input: 1.544 Mbps \pm 30 PPM, using internal timing. Output: 1.544 Mbps \pm 30 PPM.
Pulse Amplitude	Per ANSI T1.403-1995.
Formats	Extended Superframe (ESF) per AT&T 62411. D4/Superframe (SF) per AT&T 43801.
Line Codes	Bipolar with 8 Zero Substitution (B8ZS). Alternate Mark Inversion (AMI).
Line Impedance	100 ohms resistive (nominal).
Avg. Reframe Time	<25 milliseconds or <1 millisecond with Fast Reframing channel (FRC) enabled (FRC reframe for single frame data payload only).
E1 Inputs/Outputs Interface	Conforms to CCITT G.703.
Rate	Input: 2.048 Mbps \pm 50 ppm, using internal timing. Output: 2.048 Mbps \pm 200 ppm, when not loop or through timed. 2.048 Mbps \pm 130 ppm, when loop or through timed.
Pulse Shape	Per CCITT G.703.
Formats	Frame Format CCS or CAS as per CCITT G.704 in 30 channel and 31channel modes.
Line Codes	High Density Bipolar; Order 3 (HDB3) per CCITT G.703 or Alternate Mark Inversion (AMI).
Line Impedance	Selectable 75 or 120 ohm resistive (nominal).
Avg. Reframe Time	<25 milliseconds or <1 millisecond with Fast Reframing channel (FRC) enabled (FRC reframe for single frame data payload only).
Propagation Delay	
DS1/E1 through Delay	DACS: 1 to 3 frames, 2 frames average (250 μ sec) for each pass through. ILS: 25 μ sec for each signal pass through the ILS.
Switch Time	DACS DS0/T1, DS0/E1 Alternate Maps: Programmable down to 1ms ILS DS1 switch time: Programmable down to 1ms



Environmental

Operating Temperature	-20° to +55°C operating.
Humidity	0 - 95% Non-condensing.
SWC & Fast Transient	ANSI C.37.90-1989 & ANSI C.37-90.1.
EMI	ANSI C.37.90.2.
FCC Compliance	BCC Part 15 Class A.
CE/EMC	BS EN 5502:1995, BS EN 61000-4-2:1995, BS EN 61000-4-3:1997, BS EN 61000-4-4:1995, BS EN 6100-4-6:1996, BS EN 61000-4-8:1994, DD ENV 50204:1996.

Physical

Dimensions	19in (483mm) Width X 5.25in (134mm) Height X 15in (370mm) Depth Depth varies depending on I/O in rear of chassis. Available in 23" width mounting.
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Power Supply

The RFL DACS has the capability to be equipped with a secondary plug-in power supply for redundancy. The secondary power supply operates on a hot-standby concept versus a load sharing technique:

Input Voltage	Range
24 VDC	19.0 to 29.0 VDC
48/125 VDC	38.0 to 150.0 VDC
220 VAC	180.0 to 265.0 VDC
120 VAC	90.0 to 130.0 VAC
Power Supply Capacity: Typically 50 Watts	

Optical Interface Adapters

Wavelength	Emitter Type	Fiber Type	System Gain
850	LED	Multimode	25 dB
1300	LED	Multimode	25 dB
1300	LED	Singlemode	19 dB
1300	Laser	Singlemode	36 dB
1550	Laser	Singlemode	30 dB

Alarms

Alarm Types :	Alert, Cautionary conditions that do not prevent multiplexer operation Alarm, Conditions that directly affect multiplexer operation.
Interface:	Front Panel indicators and a RS-232 port for remote access and interrogation. Shelf, Form C alarm relays rated for 100 mA at 250 Vdc

Test and Diagnostics

Loopbacks:	Remote, Local and Analog DS0 & DS1/E1
Test pattern:	PRBS pattern generation/detection 16-bit loop-up and loop-down code generation and detection.

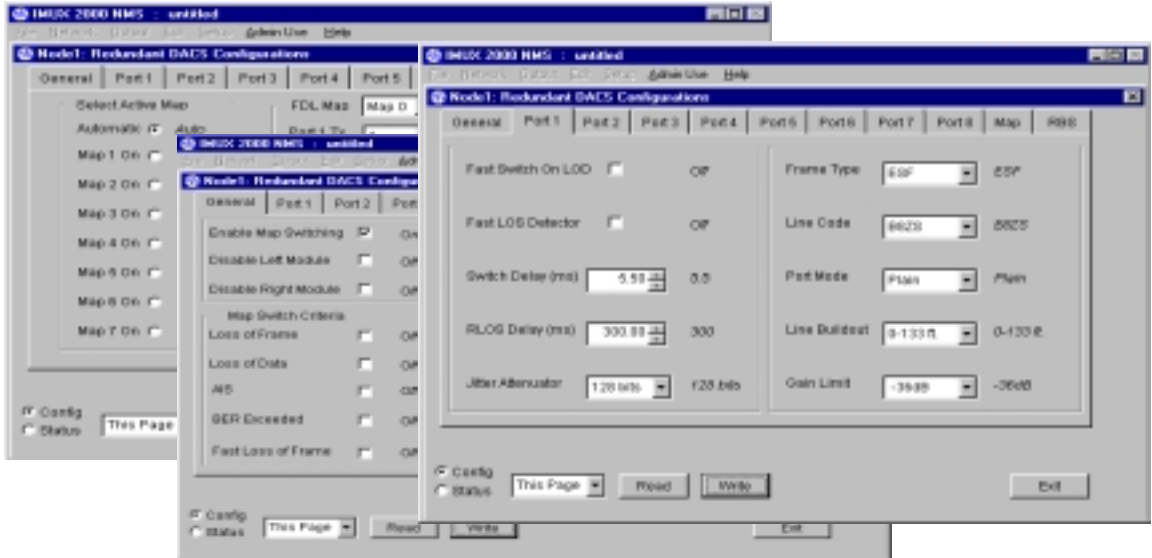
Specifications compliance:

ANSI T1.403-1995; ANSI T1.231-1993; ANSI T1.408; AT&T TR54016; AT&T TR62411; ITU G.703;G.704; G.706; G.736; G.775; G.823; G.932; I.431; O.151; O.161; ETSI ETS 300 011; ETS 300 166;ETS 300 233; CTR4; CTR12; IEC 255-5 & IEC 801-4.



Network Management Software (NMS)

- The RFL DACS comes factory installed with a user friendly Windows based graphical user interface. This enables the administrator a large amount of flexibility in configuring which DACS map will be utilized and under which pre-determined criteria.
- The on board craft interface provides the path to access the NMS either locally or remotely. One will have the ability to provision the system, program the DACS maps, interrogate for alarms, and allow for operation and maintenance.



- The NMS offers intuitive color-coded DS0 cross-connect maps to facilitate system programming and to reduce the possibility of human error.
- Optional SNMP access gateway modules are available to interface the network management system in stand-alone system applications.





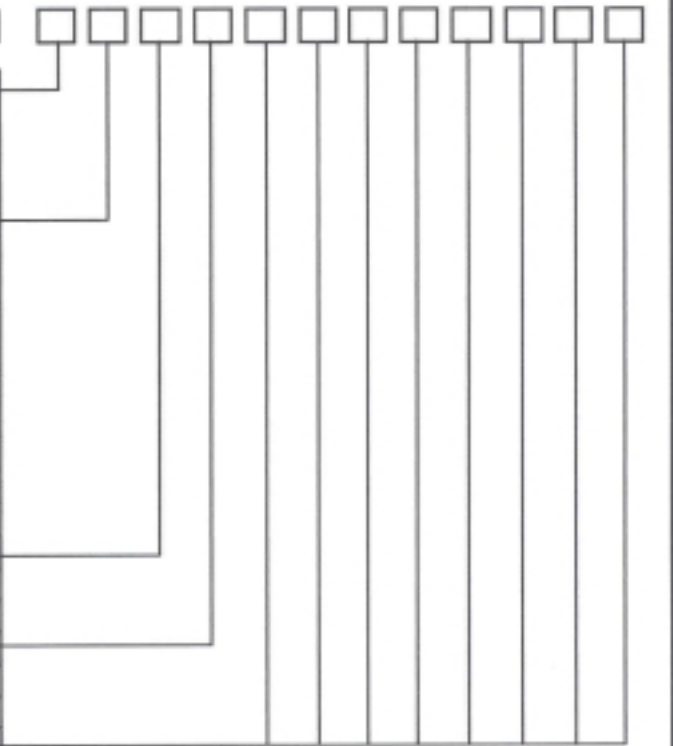
NOTES

**IMUX 2000 8-Port DACS-R T1/E1 Equipment List
Ordering Information**

RFL Part Number (fill in blanks):

D

MODULE ARRANGEMENT		
Single DACS Without Redundancy		A
Single DACS Redundant Ready		B
Dual DACS with Redundancy		C
POWER SUPPLIES		
Single 24 Vdc		A
Redundant 24 Vdc		B
Single 48/125 Vdc		C
Dual 48/125 Vdc		D
Single 115 Vac		E
Dual 115 Vac		F
Single 220 Vac		G
Dual 220 Vac		H
Special		#
JACKFIELD AND DISPLAY		
With Display, no Jackfield		1
With Display and Jackfield		2
SAG MODULE		
No SAG Module or I/O		0
SAG Module and I/O		1
PORT (1-8) INTERFACE		
No Interface		0
T1/E1 RJ48C		1
T1/E1 DB9		2
E1 BNC		3
850 Fiber		4
1300 mm LED Fiber		5
1300 sm LED Fiber		6
1300 sm Laser Fiber		7
1550 sm Laser Fiber		8



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