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Short Form Catalog

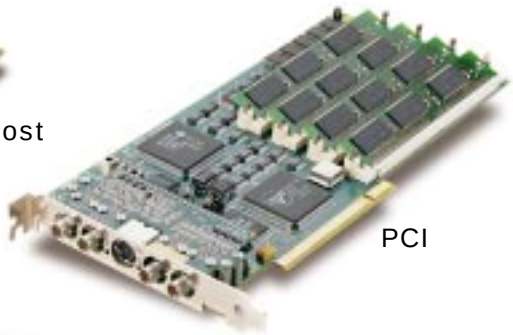
Family of Networking Products

SCRAMNet+ Network

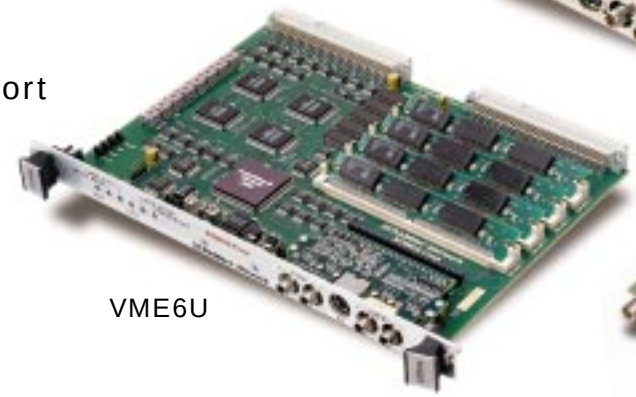
- Shared-Memory Communications
- 250 nSec/node Transport Delay
- 16.7 MB/sec Data Throughput
- Coax or Fiber Optic Media Options
- Up To 8 MB Memory Size Options
- Single-Slot Solution
- Extensive Backplane Support
  - VME
  - PCI
  - PMC
  - SBus
  - GIO-32
  - ISA
  - EISA
  - Rehostable
  - SelBUS™



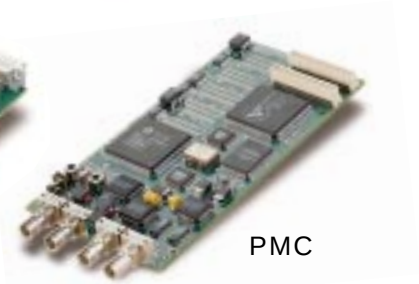
Rehost



PCI



VME6U



PMC

Introduction

The SCRAMNet Network (Shared Common RAM Network) was developed by Systran Corp. to satisfy the demanding real-time requirements of aircraft simulations – but its capabilities extend equally well to virtually all other distributed real-time applications. The SCRAMNet Network is a real-time communications system based upon a replicated shared-memory concept. It is optimized for the high-speed, ultra-low-latency transfer of data among many computing platforms that are all solving portions of the same real-time problem. Its simplicity and speed are ideally suited for distributed real-time systems.

Standard networking systems are designed for file or large-block transfers between computers. They use complex, time-consuming layers of software and hardware protocols. When used in real-time systems, these networks can require many milliseconds to transport data between tasks running on one or more computers in the system. Data communications become non-deterministic, and it is almost impossible to ensure that all tasks are operating simultaneously on the same set of data. Communication drivers absorb large portions of precious backplane and CPU resources. Every increment of system expansion has a large impact on network performance. Standard networking systems are not designed to meet the needs of distributed real-time systems.

Multi-port or shared-memory has been a favored real-time solution and is still a key part of almost every fast multi-processor computer platform. However, when this type of memory is applied externally among platforms, severe limitations arise with the number of connections, types of computers, distance between computers, cable noise, cable size, and memory contention.

The SCRAMNet Network is designed to provide the speed and deterministic performance of shared-memory with the hardware ease and flexibility of a local area network. Using the replicated shared-memory concept, distributed processes map their global data structures into the dual-port memory located on each SCRAMNet node. Any time an application process updates a data structure located in its local SCRAMNet memory, the address and data are immediately (and automatically) broadcast to all other nodes on the SCRAMNet Network.

Communication is achieved through a simple memory map of the global data, broadcast to all nodes with zero software overhead and zero backplane loading.

The SCRAMNet Network derives a remarkable speed advantage from its register insertion network protocol. The register insertion protocol is optimized to provide each node with low overhead, low latency, deterministic performance and guaranteed network access.

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Application Features

Integration of dissimilar computers on a single network; wide variety of host interfaces available

16.7 MB/sec network data throughput in PLATINUM+ mode

System expansion; up to 256 nodes per single network

Inter-processor communications at memory speeds

High-speed, 150 Mbit/sec transmission rate

Ultra-low data latency

Low-overhead, deterministic network protocol

Data filtering feature eliminates unnecessary transmissions

Real-time control via Control and Status Registers

Hardware error detection

Ease of system reconfiguration; all network data are in shared-memory area

High reliability and EMI/RFI protection with fiber optic transmission line options

Separate interrupts for status and memory interrupt events

Network memory paging allows efficient use of memory and subnetting

Status mask register provides status interrupts only on user-selected events

Event counter/timer with global reset provides network performance measurement and global time synchronization

Programmable EEPROM minimizes hardware switch settings and allows custom power-up node configuration

No token passing; all nodes may simultaneously offer traffic on the network with no collisions

No network-dependent application software needed except for initialization

No computer time needed to support network communication

No computer time used for inter-processor synchronization; interrupts occur automatically with user-selected memory writes

The SCRAMNet Network is available with complete hardware and software support to include optional cabinet kits, passive bypass switches, network switches, cabling options, interrupt drivers, and menu-driven diagnostics for a large array of computers and operating systems.

SCRAMNet...The real-time solution for the future!

Operating System Support

VME (VXI Compatible)	PCI	EISA
Concurrent PowerMax OS™	Alpha™ NT[1]	DEC OpenVMS
Digital UNIX®	DEC OpenVMS™[1]	HP 7xx HP-UX
GE Fanuc Logicmaster 90™	Digital UNIX	MS-DOS
HP 7xx HP-UX	MS-DOS®[3]	SGI Indigo2™ IRIX
HP 74x HP-RT	PC LynxOS	Windows 3.x
Harris™ CX-UX	SGI IRIX	Windows 95
MODCOMP® REAL/IX®	Sun Solaris™[2]	GIO-32
Motorola® UNIX	Windows® 3.x	SGI Indy® IRIX
SGI® IRIX™	Windows 95	SGI Indigo® IRIX
VME LynxOS™	Windows NT®	SelBUS/VME Adapter
VxWorks®	ISA	Encore MPX-32™ 3.4
VME/DMA	MS-DOS	Rehostable
SGI IRIX	Windows 3.x	User Defined Interface
VxWorks	Windows 95	
PMC	SBus	
Digital UNIX	Sun Solaris	
VxWorks		

[1] Available third quarter - '98.
[2] Available fourth quarter - '98.
[3] Requires PharLap TnT DOS Extender.

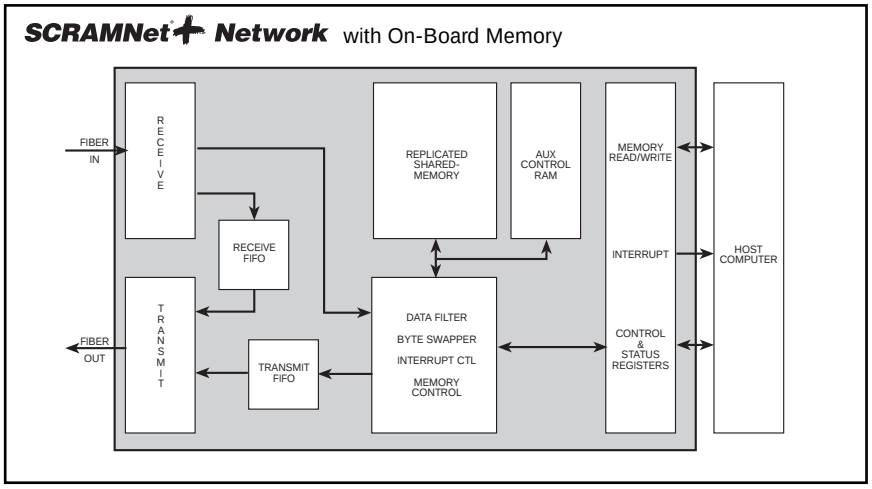
Applications

The SCRAMNet Network is ideally suited for applications with critical control loop timing requirements. It is optimized for the high-speed transfer of data between many dissimilar computers that are all solving portions of the same real-time problem. Typical applications include:

- Aircraft Simulators
- Missile Simulators
- Virtual Reality
- Power Generation Plant Simulators
- Ship Simulators
- Land Vehicle Simulators
- Mission Planning Simulators
- Force-Level Training Simulators
- Range and Telemetry Systems
- Flight Test
- Wind Tunnels
- Test Stands
- Power Generation Plants
- Robotics
- Particle Accelerators
- Industrial Control

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Functional Block Diagram

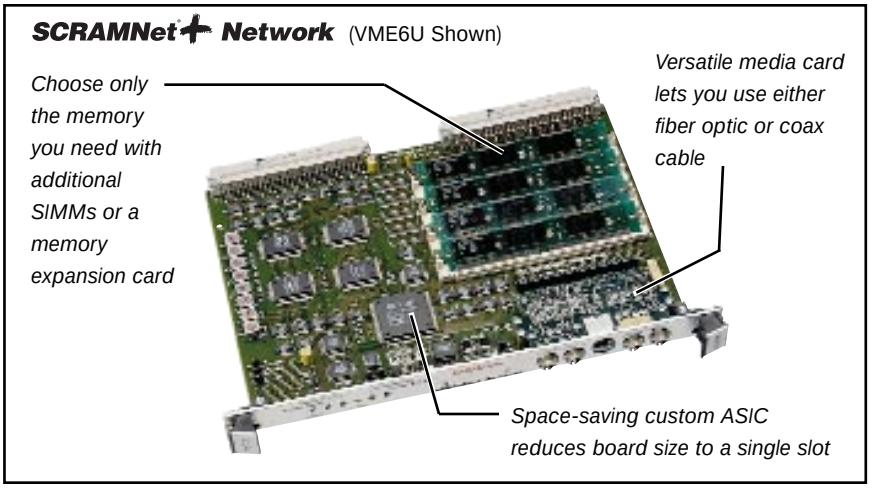


SCRAMNet Network Replicated Shared-Memory Concept

SCRAMNet nodes have on-board, dual-port memory. The SCRAMNet memory appears on the host bus as additional host bus memory.

The host reads and writes data through one port while the network writes data to memory through a second port. Data written to memory by the host is automatically transmitted by the hardware to all nodes on the network.

Modular Design



SCRAMNet+ Node

Custom ASIC, single-slot design

Host boards with 4 KB or 128 KB memory

Memory expansion options – 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

Media card options – coax, standard fiber, long-link fiber

Cabinet kit options – relocate media cards to the optimum location for fiber connection and LED status observation

Specifications

Electrical Requirements:
+5 VDC, 3 Amps

Operating Temperature:
0° to 40° C (32° to 104° F)

Operating Humidity:
10% to 90% (noncondensing)

Replicated Shared-Memory Sizes:
4 KB, 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

Maximum Number of Nodes:
256

Transmission Medium:
Coax – paired conductor cable
Standard fiber – paired 62.5 micron core multi-mode fiber cable
Long-link fiber – paired 62.5 micron core multi-mode fiber cable

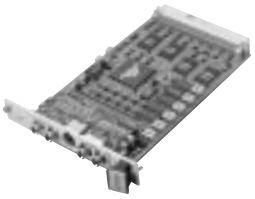
Maximum Node Separation:
Coax – 30 meters
Standard fiber – 300 meters
Long-link fiber – 3,500 meters

Network Data Bandwidth:
6.5 MB/sec (4 bytes/packet)
12 MB/sec (16 bytes/packet)
15.2 MB/sec (64 bytes/packet)
16.2 MB/sec (256 bytes/packet)
16.7 MB/sec (1 KB/packet)

Node Latency:
250 nSec – 800 nSec (4 bytes/packet)
250 nSec – 1.5 µSec (16 bytes/packet)
250 nSec – 4.2 µSec (64 bytes/packet)
250 nSec – 16 µSec (256 bytes/packet)
250 nSec – 61.8 µSec (1 KB/packet)

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VME3U

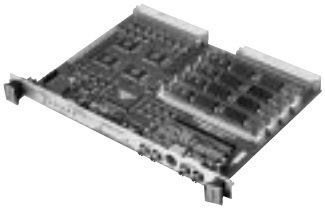


Hardware Compatibility:
VMEbus Rev. C.3, ANSI/IEEE Standard 1014-1987

Physical Dimensions:
3.937″ x 6.299″
(100.000 mm x 160.000 mm)

Memory Sizes:
128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

VME6U



Hardware Compatibility:
VMEbus Rev. C.3, ANSI/IEEE Standard 1014-1987

Physical Dimensions:
6.299″ x 9.173″
(160.000 mm x 233.000 mm)

Memory Sizes:
4 KB, 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB
(Note: Also available with DMA transfer capability.)

VME9U

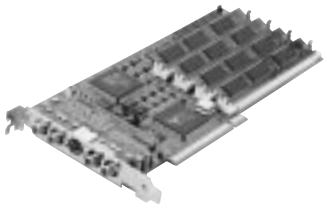


Hardware Compatibility:
VMEbus Rev. C.3, ANSI/IEEE Standard 1014-1987

Physical Dimensions:
14.449″ x 15.748″
(367.000 mm x 400.000 mm)

Memory Sizes:
4 KB, 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

PCI

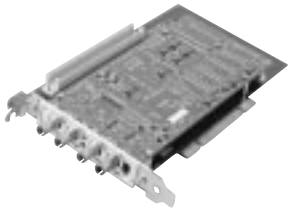


Hardware Compatibility:
PCI Specification Version 2.0

Physical Dimensions:
4.200″ x 9.500″
(106.680 mm x 241.300 mm)

Memory Sizes:
4 KB, 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

1/2 Length PCI

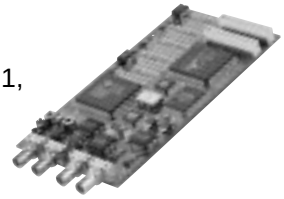


Hardware Compatibility:
PCI Specification Version 2.0

Physical Dimensions:
4.200″ x 6.900″
(106.680 mm x 174.670 mm)

Memory Sizes:
4 KB, 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

PMC (PCI Mezzanine Card)

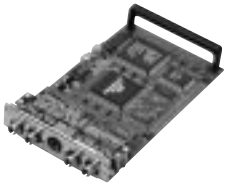


Hardware Compatibility:
PCI Local Bus Specification, Rev. 2.1,
CMC IEEE P1386/Draft 2.0
PMC IEEE P1386.1/Draft 2.0

Physical Dimensions:
2.913″ x 5.866″
(74.000 mm x 149.000 mm)

Memory Sizes:
4 KB, 128 KB, 512 KB, 1 MB, 2 MB, 4 MB

SBus

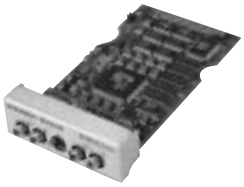


Hardware Compatibility:
SBus Specification IEEE Standard 1496-1993

Physical Dimensions:
3.299″ x 5.760″
(83.800 mm x 146.700 mm)

Memory Sizes:
128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

GIO-32

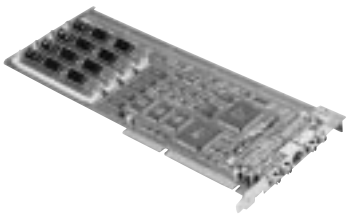


Hardware Compatibility:
GIO-32 Bus Specification Version 2.0

Physical Dimensions:
3.374″ x 6.437″
(85.700 mm x 163.500 mm)

Memory Sizes:
128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

ISA

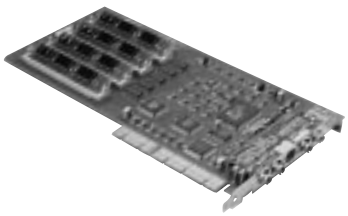


Hardware Compatibility:
16-bit ISA Compliant
IEEE-P996

Physical Dimensions:
4.800″ x 13.000″
(121.920 mm x 330.200 mm)

Memory Sizes:
4 KB, 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

EISA



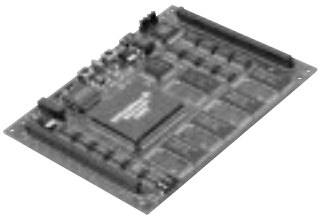
Hardware Compatibility:
EISA Specification Version 3.12

Physical Dimensions:
5.000″ x 13.000″
(127.00 mm x 330.200 mm)

Memory Sizes:
4 KB, 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

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Rehostable

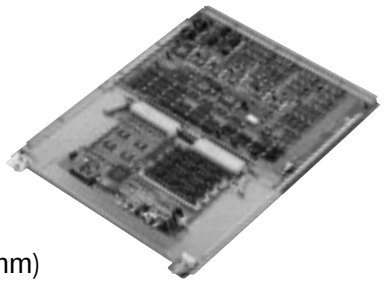


Hardware Compatibility:
Register/Memory Bus

Physical Dimensions:
3.300″ x 4.000″
(83.820 mm x 101.600 mm)

Memory Sizes:
0 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

SelBUS

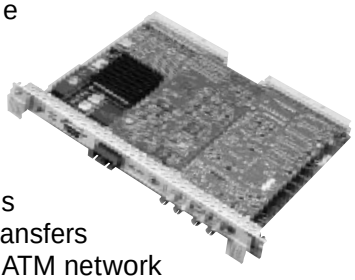


Hardware Compatibility:
VMEbus Rev. C.3
ANSI/IEEE Standard
1014-1987

Physical Dimensions:
5.000″ x 18.700″
(381.000 mm x 474.980 mm)

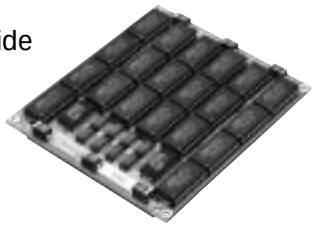
Memory Sizes:
4 KB, 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB

SCRAMNet-to-ATM Bridge



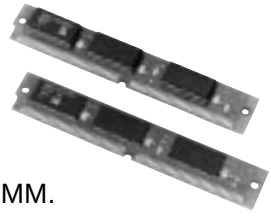
The SCRAMNet-to-ATM Bridge is a gateway that provides an interface between a SCRAMNet ring and an industry-standard ATM (Asynchronous Transfer Mode) network. It transfers SCRAMNet data across the ATM network to a partner SCRAMNet-to-ATM Bridge, while minimumizing the latency to complete the transfer of data from one SCRAMNet ring to another.

Memory Expansion Card



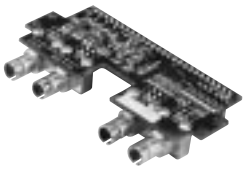
Memory expansion cards provide memory options from 512 KB to 8 MB on host boards too small to support the memory SIMM.

Memory SIMM



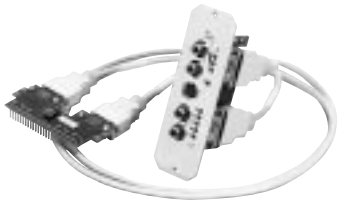
There are four memory SIMM connectors on SCRAMNet+ nodes which can accommodate either the low-density SIMM (512 KB) or high-density (2 MB) SIMM.

Media Card



Media cards are available to support coax, standard fiber and long-link fiber media options on the SCRAMNet+ node or Quad Switch.

Cabinet Kits



Cabinet kits are available for most computer systems where the card cage is embedded in the chassis. With cabinet kits, the media card is mounted on the I/O plate of the chassis and the cables connect outside the chassis.

Fiber Optic Cables



A SCRAMNet+ fiber optic cable is composed of paired 62.5/125 micron, multi-mode fibers terminated with ST connectors. Standard and custom lengths are available.

Coax Cables



A SCRAMNet+ coax cable is composed of paired, shielded conductors terminated with SMA connectors. Standard and custom lengths are available.

Core Software Package



The Core Software Package, with memory/register mapping routines and an interrupt driver, provides a common application software interface across many different host computers and operating systems. The package also includes an EEPROM initialization program and a complete menu-driven diagnostic program for initialization and test.

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Network Transparent Switch

Patent Pending



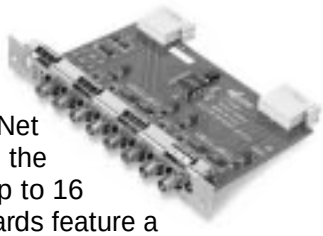
- Non-blocking, 32 x 32 crossbar matrix switch
- Switches any digital signal up to 1.5 GHz
- External control via RS232 or modem
- Point-to-point, loop, or broadcast connections are easy to establish and control
- Port cards allow signal conversion and customization of the NTS to any type of network or digital signal up to 1.5 GHz
- Standard port cards available for SCRAMNet, Fibre Channel, and SMPTE video

The rack-mounted SCRAMNet Network Transparent Switch (NTS) base unit is a full 32x32 crossbar switch, designed to support up to 32 I/O ports connected to digital signals with baud rates up to 1.5 GB/sec. The switch is called “transparent” because it does not engage in any protocol disassembly or any encoding or decoding of input data streams. Therefore, the NTS is transparent to the network protocol whose data streams are being directed, routed, or channeled by the switch.

The NTS base unit is designed to accept up to eight “port cards” with two I/O port cards per card. Different types of port cards provide the specific media connectors, signal conversion, and conditioning required for a specific type of network or digital signal to be switched. The NTS can be populated with multiple port card types.

In addition to the high-speed data lines, a SCRAMNet node may be connected to an NTS port by the associated Auxiliary Connector. If the node is connected but it is not powered up, or it is in loopback mode, the Auxiliary Connector forces the NTS port into the inactive state. If the port is not forced inactive by the Auxiliary Connector and both of that port’s receivers are detecting a signal, the NTS considers that port to be active. The NTS can be programmed to automatically switch a port (for example, into or out of a ring) depending on its active or inactive status. If nothing is attached to the Auxiliary Connector, the associated port is not forced inactive, and its active/inactive status depends on the presence of signals at its two receivers.

Optical Port Cards



The SCRAMNet Optical Port Cards interface two SCRAMNet ports to the NTS. Each SCRAMNet port uses two NTS channels, so the 32x32 channel NTS can route up to 16 SCRAMNet ports. These port cards feature a standard SCRAMNet bit rate of 150 Mb/sec and fit in one Systran NTS port slot. They are available in standard and long-link varieties and are compatible with SCRAMNet+ or SCRAMNet Classic nodes.

Interface Description:

Optical Connector:

ST (bayonet)

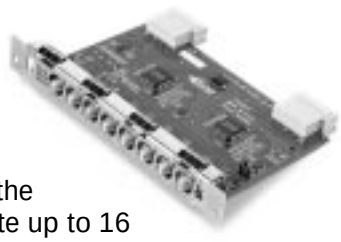
Auxiliary Connector:

3-pin header, .025 in. square posts

Media:

62.5/125 µm multimode fiber
(two pairs per port)

Coax Port Cards



The SCRAMNet Coax Port Card interfaces two SCRAMNet ports to the NTS. Each SCRAMNet port uses two NTS channels, so the 32x32-channel NTS can route up to 16 SCRAMNet ports. They feature a standard SCRAMNet bit rate of 150 Mb/sec and are compatible with SCRAMNet+ or SCRAMNet Classic nodes.

Interface Description:

Optical Connector:

SMA

Auxiliary Connector:

3-pin header, .025 in. square posts

Media:

50 Ω coax cable
(two pairs per port)

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Quad Switch

The SCRAMNet Quad Switch is available for real-time systems that require a powerful and flexible way of controlling SCRAMNet ring configurations. The Quad Switch can combine or isolate the various SCRAMNet node or sub-ring components within a real-time facility.

The Quad Switch was originally conceived to allow local clusters of up to four SCRAMNet nodes to be switched in or out of a primary SCRAMNet ring independently and dynamically - thus the name “Quad Switch." It is equally useful when a critical real-time resource must be shared and easily re-allocated between many independent real-time systems.

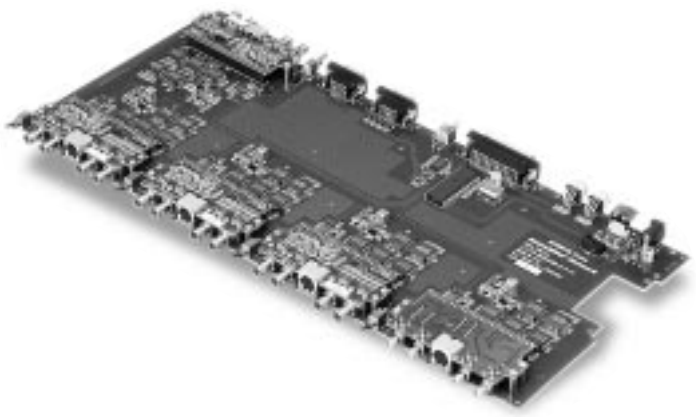
When designed into real-time facilities, the Quad Switch can perform many useful functions. It combines and extends the functions of the SCRAMNet passive optical bypass switch, fiber optic repeater, and link converter.

As a bypass switch, the five ports that are also in the INCLUDE state are combined on the ring with other ports that are also in the INCLUDE state. When a port is switched out, it is in the ISOLATE state and its transmissions are looped back out of the same port, bypassing the internal ring and, thus, all other ports of the Quad Switch.

The electronic switching action is very fast, introducing a total network disruption of about one microsecond. This is over 10,000 times faster than mechanical, optical bypass switches and allows ring re-configuration to be performed in real-time with minimal impact on the system.

As a repeater, each Quad Switch port converts optical signals to electrical signals. The phase lock loop (PLL) of each port re-synchronizes then re-transmits the pair of transmission signals. This allows each connection to the Quad Switch to be the maximum length for the type of media selected.

The Quad Switch can also perform media conversion. Each port uses a media card with transmitters and receivers on board. Different types of media cards are available: coax for links up to 30 meters, standard fiber for links up to 300 meters, and long-link fiber for links of up to 3,500 meters.



Each Quad Switch port can be configured with a different type of media card to perform media conversion between ports. For example, a cluster of four coax cards installed on ports 1 through 4, while a long-link fiber media card on port 5 could be used for the main ring connection to other Quad Switches separated by long distances.

Quad Switch Specifications

Electrical Requirements:
+5 VDC, 5 Amps

Environmental Requirements:
0° to 50° C (32° to 122° F)

Operating Humidity:
10% to 90% (noncondensing)

Physical Dimensions:
19.000″ (482.600 mm) Rack mountable chassis
1.750″ x 17.000″ x 7.000″
(44.450 mm x 431.800 mm x 177.800 mm)

Fiber Optic Bypass Switch



Bypass switches are devices cabled into a SCRAMNet+ ring that cause operations to automatically bypass (or go around) an unpowered node. These switches provide automatic network reconfiguration with only a 15-to-22 millisecond disruption in operations. In addition, they provide higher system fault tolerance and are also an excellent way of redistributing network resources according to the needs of different real-time applications. There is software control to disable the bypass mode which is enabled by default on power-up.

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