

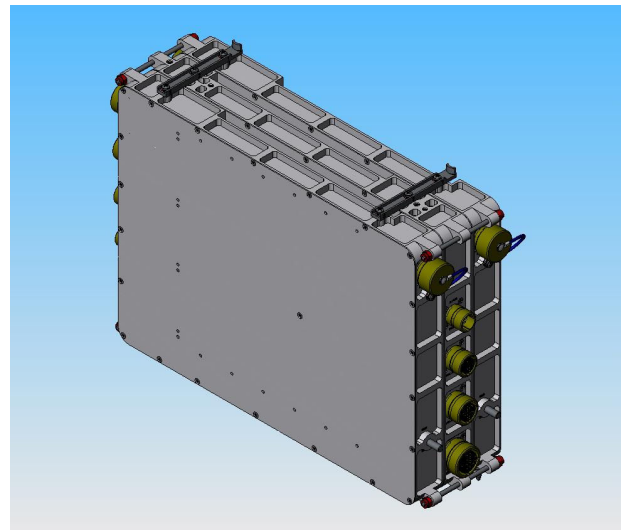
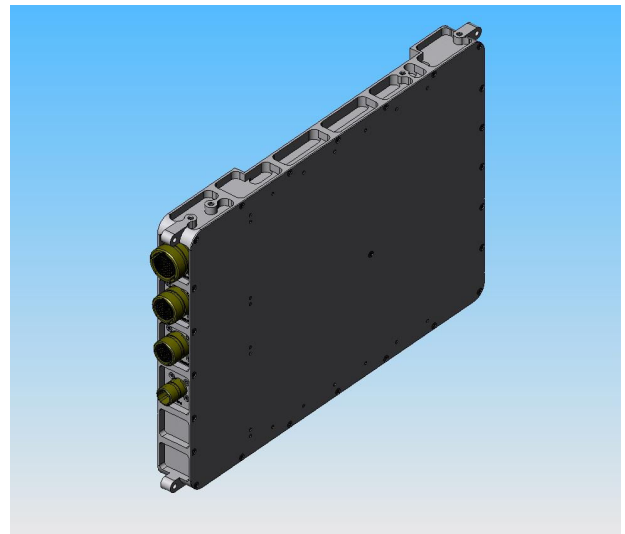
Total Solution for Mil-Spec, Rugged & Industrial Computers and Peripherals

MRRS-262

Rugged Routing Switch

FEATURES

Advanced L3 Routing Switch
48/24 10/100 Ethernet Ports in 1U
4 Gigabit Ethernet uplink ports with various interfaces
CWDM, long-haul optics & Bi-Directional transceivers for single fiber deployments support
Physical Port resiliency for enhanced network survivability
BiNOS on board
Web Enabled Management via Embedded Java™
Non-Blocking Architecture
Cost-Effective Port Trunking Capabilities
Secure Telnet, SSH and RADIUS authentication
Transparent LAN services for end-to-end tunneling services
DHCP Relay with option 82 support
DHCP Server with option 82 support
Access Control Lists for enhanced network security
RMON and Syslog Support
Out-of-Band Management port
IPv6 awareness
IPv4 to IPv6 migration path
Low power consumption



DESCRIPTION

Ultra-Compact High-Density 10/100/1000 Ethernet Routing Switch is 10/100/1000 Ethernet Routing switch provides high performance in a super-compact, super-efficient size. The MRRS-262 small size, only 1.4" in height, combines the capacity of physically larger backbone switches with the economy of workgroup switches.

Very high port density means that a single MRRS-262 Compact Routing can support 2 copper Gigabit Ethernet ports, 2 Gigabit Ethernet fiber plug-in (SFP) ports, 24 auto sensing 10/100BaseT Fast Ethernet ports. The MRRS-262 Compact Routing Switch is the optimal platform for many applications, from the Metro access arena to the Metro edge and enterprise

boundaries. Data centers, server farms, wiring closets and other application users can benefit from its uncompromised standards-compatibility (for flawless interoperability), its modular support of various interfaces that guarantees easy upgradeability and scalability, and its feature-rich routing capabilities make the MRRS-262 a versatile, effective platform for any IP-based service. Copper Gigabit Ethernet provides cost-effective high-speed uplink and cascading capabilities, and pluggable miniGBIC (SFP) optical Gigabit Ethernet interfaces allow network extension over large distances.

Various fiber interfaces for both MM (SX) and SM long-haul Optics, Bi-directional (single fiber usage) and CWDM modules are supported. The resident BiNOS (BATM Inter Networking Operating System) software anticipates the administration, management, QoS, and security performance requirements of enterprise networks by supporting a breadth of IEEE standards and industry conventions, such as Access Control Lists. Hardware based implementation of BiNOS mandated policies enables the T5 Routing Switch to perform Layer 2 switching and Layer 3 routing at wire speed. Field upgrades of BiNOS software from Layer 2 to Layer 3 use a patented procedure that incurs no downtime. MRRS-262 switches are fully manageable using leading In-band (IB) or Out-of-Band (OOB) management tools.

Administrators can use industry-standard SNMP-based network management systems, or BiNOSCenter, BATM EMS/NMS Element/Network Management System. BiNOSCenter provides the network operator a powerful, state-of-the-art tool for SNMP-based configuration, monitoring and maintenance.

To directly access units, BATM switches support a robust Command Line Interface that complies with the de facto industry standard. Web-based management is possible using an embedded Java™ based management technology.

Description of Product Technology

Performance

Wire speed Layer 2 switching, Layer 3 routing, and Layer 4 networking are made possible by use of advanced ASICs to perform all switching, routing, and policy enforcement in hardware. Concentration of services in hardware allows the MRRS-262 routing to attain a significant performance advantage over traditional routers at a fraction of the cost. The non-blocking architecture of the MRRS-262 Compact Routing switch ensures that no packets are lost - even under one hundred percent traffic load with full policy enforcement.

Cascadable Routing Switches

Network topologies must be easily scaled up to support high bandwidth applications and additional network services. Cascading is an economical solution, because routing switches are added only when required, in a "pay-as-you-grow" philosophy. Gigabit Ethernet ports can be trunked to provide redundant cascading configurations. In addition, the MRRS-262 can be configured with a mixture of cascading and long reach connections. The MRRS-262 has a designated 10Gbps port that can be used for non-blocking cascading, freeing Gigabit Ethernet ports for other connections.

Flexibility

Switches must conform to the needs of the network, and not vice versa. To allow flexibility in choosing various optical transceivers, the MRRS-262 has two Small Form Pluggable modules (SFPs), and supports CWDM, long-haul and Bi-directional (single fiber usage) transceivers. In addition 2 10/100/1000 Ethernet fixed ports are available for flexibility enhancement. The MRRS-262 is supplied in with 24 FE auto-sensing ports. This versatility enables the customer to choose the most suitable configuration while using a uniform platform and feature set. This versatility enables use of a single MRRS-262 to "close" rings and ears topologies.

Features

The T5 Compact Routing, with BiNOS on board, incorporates a large number of features, such as IEEE 802.3ad link aggregation, IEEE 802.1Q VLAN, IEEE 802.1d Spanning Tree Algorithm, 802.1w Rapid Spanning Tree Algorithm, 802.1s Multiple Spanning Tree Algorithm,

IEEE 802.3x Flow Control and Backpressure, Resilient Ports, IGMP, Access Control Lists, bandwidth reservation, DiffServ and IEEE 802.1p

based Quality of Service with four priority queues.

• Link Aggregation (802.3ad & LACP)

Link Aggregation helps broaden the bandwidth between different switches dynamically. This helps circumvent possible network bottlenecks by aggregating bandwidth on crucial network connections. Link Aggregation also serves as a form of redundancy by ensuring that even if one link fails, all network traffic will still be propagated over the remaining links in the aggregation group.

• Virtual LANs

Virtual LANs let network administrators improve bandwidth usage and reduce administrative overhead by segmenting users into logical groups. The MRRS-262 supports the up to 4K VLANs according to the IEEE 802.1q standard, and auto-VLAN detection capabilities.

• IGMP Multicast Support

Network multicasts reduce the amount of bandwidth needed for applications like video-conferencing and online learning. Hardware support for IGMP allows the MRRS-262 to forward only single copies of a transmission to destination ports. The MRRS-262 has the unique ability to automatically recognize IGMP join and leave messages, freeing network administrators from the strain of multicast management.

• Security and Policy Enforcement

RADIUS technology and Secure Telnet protect access, with port-based MAC security and user-defined rules that determine how, where, and when various network functions are performed. While many early implementations focused on QoS across a number of network

devices, the goal of policy-based networking is to allow the management of any type and number of policies across a network. BiNOS SSH server provides a more secure connection by providing authenticated services.

- **Access Control Lists**

The MRRS-262 Pro's wire speed Access Control Lists (ACLs) enable the implementation of QoS, security, and marking for Differentiated Services at DiffServ Code Points upon entry to the switch. ACLs ensure that only authorized users have access to specific resources, and block any unwarranted attempts to reach network resources. The policies implemented in the ACLs are used to provision bit rates by IP or application.

- **Quality of Service**

Quality of Service is vital to ensure proper flow control and bandwidth management in a network. Four priority queues allow the MRRS-262 routing to differentiate between time sensitive VoIP applications and other network data transmissions. In addition to IEEE 802.1p and Type of Service (ToS) support, the MRRS-262 also supports Differentiated Services (DiffServ). DiffServ is used to specify and control network traffic by class, so that certain types of traffic get precedence. DiffServ avoids simple priority tagging and depends on a policy to determine how to forward a given network transmission. One of the MRRS-262 Routing's more unique qualities is its ability to provide adaptive bandwidth control. Thresholds can be set by using Weighted Random Early Detection (WRED) to start segregating TCP traffic when it surpasses a given threshold. This allows networks a great amount of flexibility and the ability to avoid unnecessary static bandwidth provisioning.

Routing and Multicast Routing

To improve network utilization, Layer 3 routers forward packets toward their destination via adjacent networks. The information used to forward packets is gathered by using special protocols, such as Routing Information Protocol (RIP), Open Shortest Path First (OSPF) and Border Gateway Protocol 4 (BGP4). Special network routing hardware enables the MRRS-262 to perform MAC resolution, CRC checks, and TTL updates at wire speed. When routing between VLANs, the MRRS-262 can replace 802.1q VLAN tags at wire speed. VRRP eliminates the single point of failure inherent in static default routed environments. The MRRS-262 supports Routing Multicasts features such as PIM (Protocol Independent Multicast)

Standards

IEEE 802.3 CSMA/CD method and physical layer specifications
IEEE 802.1d Spanning Tree Algorithm
IEEE 802.1p Priority Queuing
IEEE 802.1q VLAN tagging
IEEE 802.1w Rapid Spanning Tree
IEEE 802.1s Multiple Spanning Tree
IEEE 802.3ac VLAN Tagging
IEEE 802.3ad Link Aggregation
IEEE 802.3x Flow Control
IEEE 802.3 Ethernet
IEEE 802.3u Fast Ethernet
IEEE 802.3z Gigabit Ethernet
RFC 768 UDP
RFC 783 TFTP
RFC 791 IP
RFC 792 ICMP
RFC 793 TCP
RFC 826 ARP
RFC 854 Telnet Client & Server
RFC 951 BootP
RFC 862 Echo Protocol
RFC 863 Discard Protocol
RFC 919 Broadcasting Internet Datagrams
RFC 922 Broadcasting Internet Datagrams in the Presence of Subnets
RFC 1027 Using ARP to Implement Transparent Subnet Gateways
RFC 1042 Standard for the Transmission of IP Datagrams over IEEE 802 Networks
RFC 1058 RIP
RFC 1112 IGMP
RFC 1122 Host Requirements
RFC 1166 Internet Numbers
RFC 1256 Router discovery protocol
RFC 1305 Network Time Protocol
RFC 1519 CIDR (Classless Interdomain Routing)
RFC 1542 Bootstrap Extensions
RFC 1587 OSPF NSSA
RFC 1661 PPP
RFC 1701 Generic Routing Encapsulation*
RFC 1702 Generic Routing Encapsulation over IPv4 Networks*
RFC 1723 RIP V2
RFC 1771 BGP4*
RFC 1745 BGP4/OSPF*
RFC 1812 Requirements for IP Version 4 Routers
RFC 1866 HTML
RFC 1965 Autonomous system configuration for BGP*
RFC 1966 BGP Route Reflection*
RFC 1967 BGP Communities Attribute*
RFC 2131 DHCP Server
RFC 2132 DHCP Options and BOOTP Vendor Extensions
RFC 2138 RADIUS
RFC 2139 RADIUS Accounting*
RFC 2178 OSPF
RFC 2236 IGMPv2
RFC 2328 OSPF V2

RFC 2338 VRRP
RFC 2362 PIM-SM*/DM
RFC 2370 The OSPF Opaque LSA Option
RFC 2439 Route Flap Damping
RFC 2453 RIPv2
RFC 2474 DiffServ Precedence
RFC 2475 DiffServ Core and Edge Router Functions*
RFC 2597 DiffServ Assured Forwarding*
RFC 2598 DiffServ Expedited Forwarding
RFC 2697 A Single Rate Three Color Marker
RFC 2698 A Two Rate Three Color Marker*
RFC 3084 COPS-PR*
RFC 3140 PHB Identification Codes
DVMRP v3*
GMRP, GVRP
RSVP*
SSH2
PVST
IGMP snooping
BiNOS enabled
* - future implementation

Interfaces

10/100/1000BaseT/TX:
Connectors: D38999 Ser III
Transmission: Full/Half-Duplex
Range: 100m
Option: 1000BaseSX/1000BaseLX:
Connectors: D38999 Ser III
Transmission: Full/Half-Duplex
Optical Budget: 9db
Fiber: 62.5/125 or 50/125 micron, 850nm, 9/125 micron, 1310nm
Range: 220m (62.5/125), 550m (50/125), 10 km (9/125)

Switching Characteristics

Technology: ASIC based parallel Store-and-Forward
Bridging: IEEE 802.1d Spanning Tree Algorithm
Address Table: 64K MAC addresses
Forwarding Rate: Up to 148,800 pps / 100 Mbps ports, Up to 1,488,000 pps / 1 Gbps ports
Flow Control: 802.3x for full duplex. and back-pressure for half duplex transmission

Routing Characteristics

Technology: ASIC based IP routing
Address Table: 64K IP Addresses, 17 default gateways
Forwarding Rate: Up to 148,800 pps / 100 Mbps ports, Up to 1,488,000 pps / 1 Gbps ports

Management:

SNMP Client
RFC959 File Transfer Protocol, RFC1350 TFTP Protocol, RFC1905
SNMPv2, SNMPv3*, RFC2068 HTTP., SYSLOG, RFC1902 SMIv2
MIBs: RFC 1157 SNMP, RFC 1213 MIB II, RFC 1493, Bridge MIB,
RFC 1591 DNS, RFC 1643 EtherLike MIB, RFC 1724 RIPv2 MIB, RFC
1757 RMON, RFC 2239 MAU, IETF Dot1p Dot1q MIB, BATM
Enterprise MIB
Telnet: CLI
Internet: Java based Web management
Interface: In-Band/Out-of-Band



Local Interface: D38999 Ser III
SW Download: via TFTP

Management Features:

VLANs: Up to 4k VLANs per 802.1q

Bridging: Spanning Tree, Aging
Class of Service: 4 queues per port
Monitoring: Single/Multi port mirroring

ENVIRONMENTAL CHARACTERISTICS

TEMPERATURE

Operating: -20 - +55 °C
Option -40 - +55 °C
Intermittent: -30 - +60 °C
Non Operating: -40 - +85 °C

ALTITUDE

From S.L. to 45,000 FT
operation & non-operation

HUMIDITY

Operating/Storage 95% at 35°C

VIBRATION

Transportation Loss Cargo per MIL-STD-810F, Method 514.4. fig 514.5C-1
Functional Aircraft vibration per MIL-STD-810F, Method 514.4. based on fig 514.4C-8 and 514.5C-9
Endurance Aircraft vibration per MIL-STD-810F, Method 514.4. based on fig 514.4C-8 and 514.5C-9

SHOCK

Operating: MIL-STD-810E Method 516.4 Procedure I. (20g for 11msec)

EXPLOSIVE

MIL-STD-810F, Method 511.4. Porc. I

EMI/RFI

MIL-STD-461E

DRIP

MIL-STD-810F Method 506.4 Proc. III

DUST

MIL-STD-810F, Method 510.4, Proc. I

PHYSICAL CHARACTERISTICS

SIZE 1.4" H x 10" W x 14.25" D
WEIGHT 2.5 Kg.
POWER 20 - 30 VDC
MIL-STD-704E

ORDER INFORMATION:

Model #	Part #	Description
MRRS-262	24-355	Rugged Routing Switch - Basic Configuration - 22 Ports 10/100BT & 2 Ports 10/100/1000
	24-355-FO	Rugged Routing Switch - Basic Configuration - 22 Ports 10/100BT , 2 Ports 10/100/1000 & 2 1GB FO Ports
	48-355	Rugged Routing Switch - Basic Configuration - 44 Ports 10/100BT & 4 Ports 10/100/1000
	48-355-FO	Rugged Routing Switch - Basic Configuration - 44 Ports 10/100BT , 4 Ports 10/100/1000 & 2 FO Ports
	72-355	Rugged Routing Switch – Basic Configuration - 66 Ports 10/100BT & 6 Ports 10/100/1000
	72-355-FO	Rugged Routing Switch – Basic Configuration - 66 Ports 10/100BT , 6 Ports 10/100/1000 & 2 FO Ports
Options:		
Extended Temp	EXT	Extended Operating Temperature to -40 - +55 °C
RS-422	RS422	RS-422 Control in place of RS-232. one is required per 24 ports.

These specifications are subject to change without notice