



DM4100 – Series

DM4100 Metro Ethernet Series

The DM4100 product line is composed by of high-capacity switches at wire-speed to provide DATACOM customer applications with increasingly greater speeds, always with high performance and reliability.

The DM4100 Switches provide layer 2 packet switching. Spanning Tree – Classic, Rapid and Multiple – as well as ERPS and EAPS protocols are available as L2 protection mechanisms. It is also possible to aggregate physical ports, thus forming logical ports static and dynamically (LACP), allowing increase of bandwidth and automatic protection in the event of a failure.

The DM4100 Switches also feature the option of working as a layer 3 Switch Router or a Label Switch Router MPLS⁽¹⁾⁽⁴⁾. It supports dynamic protocols for the establishment of LSPs with the fast convergence mechanism. They also feature VPNs structured on level 2, built on a MPLS infrastructure.

The stacking capability with speeds starting at 40Gbit/s allows the stacking of up to eight pieces of equipment for easy expansion of the applications within the same physical environment, also providing a lower-cost alternative to buying a chassis.

To ease your project, optical ports supporting SFP, SFP+ or XFP transceivers are available, depending on the transmission rate, reach and switch model. Transceivers are available as accessories and in many models.

The DM4100 product line is managed by the DmView application, CLI or HTTP as well as other commercial platforms that use open standards such as SNMP and XML. DmView is the network management platform used to manage of the entire range of DATACOM products, providing an integrated network view and unifying the operations.

The DM4100 features a Command Line Interface (CLI) via SSHv2, Telnet and RS-232. It also has an out-of-band Ethernet port and a USB(1) port. It is possible to have multiple firmware versions and set-up files for an easier upgrade and change control.

This product is homologated by ANATEL in accordance with the procedures regulated by Resolution No. 242/2000 and meets the technical requirements applied, including exposure limits of Specific Absorption Rate related to electric fields, magnetic and electromagnetic radio frequency, according to Resolution No. 303/2002.

For further information, access the website www.anatel.gov.br.

Main Characteristics

Wire Speed L2, L3 & MPLS

The DM4100 line has a commutation matrix of up to 224Gbit/s in the 48 ports model and 152Gbit/s in the 24 ports model. The entire L2, L3 (IPv4/v6) and MPLS packet switching is always performed in hardware and in wire speed, in order to ensure low switch latency. The filter/meter/ACL functions are performed by the ASIC, without impact at the CPU performance or packet forwarding.

Layer 2 and Layer 3 protocols are implemented in software in order to assemble the MAC, IP route and MPLS label push/pop/swap tables.

The DM4100 models provide high capacity of RAM memory in order to allow a high capacity for table storage in software (RIB, MRIB, LRIB, L2RIB, etc.), ensuring more than twice of capacity than the hardware supplies (FIB, MFIB, LFIB, L2FIB, etc.). Besides that, it also provides a high processing performance (CPU), enabling it to support elevated protocol sessions values, route processing and rapid convergence of traffic in hardware.

IP/MPLS Networks⁽¹⁾⁽⁴⁾

The DM4100 line supports IP routing (IPv4/v6) and both static and dynamic routing - RIP, RIPng, OSPF(v3) and BGPv4.

DM4000 may be used in MPLS network as LER (Label Edge Router) or LSR (Label Switch Router).

For the MPLS infrastructure, it is possible the establishment of LSPs or MPLS tunnels through LDP or RSVP-TE protocols, with FRR support, as well as LDP over RSVP-TE tunneling feature support.

LSPs may be assembled over interfaces 1Gbit/s (electrical or optical), 10Gbit/s (XFP) and interfaces 802.3ad (LAG).

Using LDP infrastructure, it is possible to use the VPN services in configuration such as: point-to-point (VPWS), point-multipoint (VPLS) and in hierarchical mode (H-VPLS), named L2VPNolDP.

Using RSVP infrastructure, it is possible to implement the service L2VPN-TE, which use a RSVP tunnel as destination (L2VPNolRSVP). If the infrastructure contains the LSP and RSVP protocols, this service is named L2VPNolDPolRSVP.

Stacking³

It is possible to stack up to eight pieces of equipment so that, from the management point of view, the units behave as a single switch with more ports. The features will become available among different units in a transparent manner, such as VLANs, logic ports, QoS and ports monitoring.

In order to ensure a high availability for the solution, the stacking may be implemented by forming a ring among the elements, providing protection in a failure situation. In this situation, any unit can operate as the master (1:N protection).

Power over Ethernet

The DM4100 PoE models allow passing electric power through its Ethernet Interfaces, according to IEE 802.3at e IEEE802.3af standards, transmitting data and energy along Cat.5e ou Cat.6 cables. Without external power source (RPU), the switches can provide up to 15,4W (IEEE802.3af) on all ports or up to 34,2W (IEEE802.3at) on half of the ports. With the external RPU accessory (RPU), it possible to supply up to 34,2W on all ports of the switch.

Management Facilities

A complete centralized FCAPS management is available through the DATACOM's management software DmView, with sending traps to alarms and events in the system, on a Linux, Windows or Solaris platforms, and with full redundancy. The device has a CLI – Command Line Interface – with automatic assistance in the syntax of commands and parameters, and is accessible through SSHv2, Telnet, and RS-232 Console. A SNMPv1, v2c and v3 over IPv4 and IPv6 using authentication and/or cryptography, and 4 RMON groups are also available.

The DM4100 allows the creation of complex Access Control Lists (ACLs) in hardware, with multiple comparison and action parameters, which enable the modification, routing, discard and/or prioritization of packets. Access and management inband and outband are possible through HTTP and/or HTTPS, via command line interface and console port RJ45.

Besides the protection for the equipment configuration access with passwords, it is also possible the usage of RADIUS or TACACS+ external servers to limit the commands executed by the operator.

A monitoring feature in hardware is also available. It can monitor all the switch ports or packet flow, without DM4100 performance impact, redirecting the port or packet flow traffic to a specified port.

In order to facilitate the firmware version and working configuration, it is possible to store simultaneously up to two different firmware versions and ten different configurations in the equipment, allowing to choose which one will be used at equipment startup. All of ten saved configurations can be applied at any time, overwriting the current one instantaneously speeding up the operation.

Supports resolution of IPv4 and IPv6 (DNS IPv4/v6) for equipment names (hostnames), easing management actions via Telnet and SSH, for example.

QoS Implementation Facilities

The DM4100 has eight queues per port, implementing QoS in hardware, without impact in the system performance.

The QoS policies are implemented through many techniques, such as: priority algorithms, which define that a certain data flow will always have a higher priority, assign priority levels to each queue, determine minimum forwarding rates or a combination of these methods.

The traffic classification can be performed via VLANs, input ports, IEEE 802.1p standard, IP Precedence or DSCP fields, TCP and UDP ports, among other.

QoS policies can be applied to physical or logic interfaces.

The filter/meter/ACL functions are performed by the ASIC, without impact in the CPU performance or in the packets forwarding.

The bandwidth control has an 8kbit/s granularity at the CIR (Committed Information Rate) and PIR (Peak Information Rate) and may be applied to the incoming or outgoing traffic of ports or to a certain packet flow by means of filters.

The filters are quite flexible features, allowing multiple matches and actions on the packets. Some of the filter options supported are listed below:

- Match: 802.1p, all, destination-ip, destination-mac, destination-port, dscp, ethertype, protocol, source-ip, source-mac, source-port, tos-bits, tos-precedence, vlan, etc.
- Action: Permit, deny, 802.1p, 802.1p-from-tos, counter, drop-precedence, dscp, egress-block, int-802.1p, pkt-802.1p, pkt-802.1p-from-tos, redirect-port, etc.

Security

The DM4100 line has mechanisms to ensure operation and maintenance security on the installed network. Besides the usage of encryption in the communication protocols, it is possible to specify by means of filters which workstations in the network may access the equipment on an administrative level.

Using local (at least 4000 lines) and remote Syslog, user authentication, authorization and accounting (AAA) via RADIUS and TACACS+, alarm notice by e-mail, single clock via SNTP and protection against Denial of Service attacks (DoS/DDoS). In addition DM4100 implements the port authentication of multiple users via 802.1x, having 1024 users per device and 256 users per port.

For Metro Ethernet applications there are also: limitation of MAC numbers per port and per VLAN, protection mechanisms on L2 and L3 protocols against network attack, bandwidth limitation for broadcast and multicast traffic and Destination Lookup Failure (DLF).

VLANs

Virtual LANs may be built on DM4100 Switches using all of the 4094 VLANs⁽¹⁰⁾ defined in IEEE 802.1q standard simultaneously, offering double tagging (Q-in-Q) functionality as well as define VLAN per protocol, MAC address and IP subnet.

The DM4100 Switch family also provide the feature Private VLAN. The Private VLAN feature enables to define sub-domains where the sub-domain members are able to communicate or not between each other, according the sub-domain type: Isolated or Community. In addition it is possible to define Promiscuous members that can communicate with all members of the Private VLAN.

Access Control Lists (ACLs)

The DM4100 allows the Access Control Lists (ACLs) / Filters creation in hardware, with multiples comparison parameters and action, which enable the modification, forwarding, discard or prioritization of packages in logical and physical interfaces. The product has ingress and egress filters which perform layer 2, 3 and 4 matches, such as: source IPv4/v6, destination IPv4/v6, TCP/UDP source port, TCP/UDP destination port, protocol, source and destination MAC address, DSCP mark, etc. The filters are capable to associate executed actions in hardware. For example: discard of packages, remark of priority 802.1q, bandwidth limitation, etc.

Filters can be associated to the counter resource in order to obtain packets statistics and/or send/received bytes. This information can be viewed through CLI interface, as well as being exported through the management interface SNMP. The many match options make possible a great variety of monitoring modes of data flow, VLAN/VPN traffic, etc.

Protection Mechanisms

In layer 2 are available the Spanning Tree protocols, including Rapid Spanning Tree (RSTP), which has shorter convergence times, Multiple Spanning Tree (MSTP) for better resource allocation and greater scalability, as well as the protocols of Ethernet Automatic Protection Switching (EAPS), Ethernet Ring Protection Switching (ERPS), and ITU-T G.8032 (including Amendment A) protocols, which are specific for sub-50ms protection in Ethernet rings. Using the Link Aggregation (LAG) feature, it is possible to group physical ports to form logical ports, with automatic load balancing and time recovery under 200ms. This way, it is possible to build topologies featuring protection and quick failure recovery for Metro Ethernet applications.

Troubleshooting

The DM4100 Series offers many resources to assist the operator in the monitoring and, problems or abnormalities solution in the network or equipment performance.

The support to SNMP, multiples Syslog Servers and RMON allow that event information, logs and traps are centralized, enabling quick and effective analysis and diagnosis.

Through the Mirroring feature is possible to redirect a copy of traffic of one or more ports which contains "n" VLANs to one specific port (N:1), or even between ports of different equipment in a stacking topology. Mirroring also can be configured in VLAN, DSCP and 802.1p, refining the traffic filtering to be mirrored. In DM4100 Series is possible to use RSPAN, it means, to perform the traffic of many ports into one VLAN. RSPAN permits that the Protocol Analyzer or any other element does not need to be connected in the same equipment of mirrored ports.

DM4100 Series provides some tools for network and cabling infrastructure diagnosis, including Digital Diagnostic (SFF 8472). Cables may be tested for interruptions or cable failures through specific commands for diagnoses.

Multicast L2 e L3

Designed to multicast applications, the DM4100 forward the multicast packages of L2 and L3 in hardware. It supports the protocols IGMP v1/v2/v3, MLD v1/v2, PIM-SM with support in hardware for PIM-Register messages encapsulation, in accordance with RFC4601 and the PIM-SSM function, according RFC4607. It also supports Designated Router (DR) election and Rendezvous Point (RP) configuration by static mode or via BootStrap.

L2 and L3 multicast applications are supported through 4,096 L2/L3 IP groups. Are also implemented the IGMP multicast protocol (snooping and query functions), MLDv1/v2, MVR feature and PIM protocol.

OAM Ethernet

DM4100 Series support End-to-End OAM (CFM) according IEEE 802.1ag and ITU-T Y.1731. Thus, it is possible to perform a proactive monitoring of connectivity (Continuity Check) and failure isolation by Loopback Messages (L2 ping) and Linktrace Message (L2 traceroute).

The equipment provides support Point-to-Point OAM (EFM), according IEEE 802.3ah standard. It enables the failure indication, including Dying Gasp, Unidirectional Link and Critical Event. The EFM works with configurable PDU gaps, ensuring interoperability with other trademarks.

FTTx Applications

The DM4100 Series feature the provision of Fiber-to-the-Wherever services, since the equipment ports have SFP interfaces, allowing the use of different types of optical modules accordingly to the fiber type, speed and distance chosen.

The DATACOM SFP, SFP+ and XFP modules are tested to fulfill the INF-8074i and IEC60825-1 Specification. Non-approved modules do not guarantee the correct operation of the equipment and can damage the interface cards. From Firmware version 12,4 onwards, DATACOM equipment family will allow the usage of non-homologated SFPs. However, in previous firmware versions the DATACOM equipment will check if the SFP is homologated and if not, it will perform the lockout of the module. Contact the technical support of DATACOM to further information about the risks of usage of non-homologated SFP and the possibility of unlock them.

Available Models

| Available Models | 1000Base-X Ports | 10/100/1000 Base-T Ports | Combo 1000Base-X 10/100/1000 Base-T Ports | 10GbE Ports | Ports with PoE+ support | Stackable | Switch Fabric (Gbps) | Packet Processing (Mpps) | MPLS Support | Power Supply | Equipm. Power | Max PoE Power | Max PoE Power (w/ RPU) |
|------------------------------------|------------------|--------------------------|---|-------------|-------------------------|------------------|----------------------|--------------------------|--------------|----------------------------|---------------|---------------|------------------------|
| DM4100 ETH24GX+2XX+S+MPLS | 24 | - | - | 2 XFP | - | yes ⁹ | 140 | 104,2 | licensable | Redundant, Hotswap AC/DC | 80W | - | - |
| DM4100 ETH24GX+2XX+S+L3 | 24 | - | - | 2 XFP | - | yes ⁹ | 140 | 104,2 | - | Redundant, Hotswap AC/DC | 80W | - | - |
| DM4100 ETH24GX+4GX+L3 | 28 | - | - | - | - | - | 56 | 41,7 | - | Redundant, Hotswap AC/DC | 80W | - | - |
| DM4100 ETH24GX+4XX+L3 | 24 | - | - | 4 XFP | - | - | 128 | 95,2 | - | Redundant, Hotswap AC/DC | 85W | - | - |
| DM4100 ETH24GX+4GX+MPLS | 28 | - | - | - | - | - | 56 | 41,7 | licensable | Redundant, Hotswap AC/DC | 80W | - | - |
| DM4100 ETH24GX+4XX+MPLS | 24 | - | - | 4 XFP | - | - | 128 | 95,2 | licensable | Redundant, Hotswap AC/DC | 85W | - | - |
| DM4100 ETH24GX+4XS+MPLS | 24 | - | - | 4 SFP+ | - | - | 128 | 95,2 | licensable | Redundant, Hotswap AC/DC | 85W | - | - |
| DM4100 ETH20GT+4GC+S+MPLS | - | 20 | 4 | - | - | yes ⁹ | 100 | 74,4 | licensable | Redundant, Hotswap AC/DC | 75W | - | - |
| DM4100 ETH20GT+4GC+2XX+S+MPLS | - | 20 | 4 | 2 XFP | - | yes ⁹ | 140 | 104,2 | licensable | Redundant, Hotswap AC/DC | 80W | - | - |
| DM4100 ETH20GT+4GC+S+L3 | - | 20 | 4 | - | - | yes ⁹ | 100 | 74,4 | - | Redundant, Hotswap AC/DC | 75W | - | - |
| DM4100 ETH20GT+4GC+2XX+S+L3 | - | 20 | 4 | 2 XFP | - | yes ⁹ | 140 | 104,2 | - | Redundant, Hotswap AC/DC | 80W | - | - |
| DM4100 ETH20GT+4GC+2XS+S+L3 | - | 20 | 4 | 2 SFP+ | - | yes ⁹ | 140 | 104,2 | - | Redundant, Hotswap AC/DC | 80W | - | - |
| DM4100 ETH20GT+4GC+L3 | - | 20 | 4 | - | - | - | 48 | 35,7 | - | Redundant, Hotswap AC/DC | 75W | - | - |
| DM4100 ETH20GT+4GC+4XX+L3 | - | 20 | 4 | 4 XFP | - | - | 128 | 95,2 | - | Redundant, Hotswap AC/DC | 85W | - | - |
| DM4100 ETH20GT+4GC+4XS+L3 | - | 20 | 4 | 4 SFP+ | - | - | 128 | 95,2 | - | Redundant, Hotswap AC/DC | 85W | - | - |
| DM4100 ETH20GT+4GC+4XX+MPLS | - | 20 | 4 | 4 XFP | - | - | 128 | 95,2 | licensable | Redundant, Hotswap AC/DC | 85W | - | - |
| DM4100 ETH20GP+4GC+S+L3 | - | 20 | 4 | - | 24 | yes ⁹ | 100 | 74,4 | - | Internal AC + Optional RPU | 80W | 411W | 912W |
| DM4100 ETH20GP+4GC+2XX+S+L3 | - | 20 | 4 | 2 XFP | 24 | yes ⁹ | 140 | 104,2 | - | Internal AC + Optional RPU | 85W | 411W | 912W |
| DM4100 ETH20GP+4GC+2XS+S+L3 | - | 20 | 4 | 2 SFP+ | 24 | yes ⁹ | 140 | 104,2 | - | Internal AC + Optional RPU | 85W | 411W | 912W |
| DM4100 ETH20GP+4GC+4XX+L3 | - | 20 | 4 | 4 XFP | 24 | - | 128 | 95,2 | - | Internal AC + Optional RPU | 90W | 411W | 912W |
| DM4100 ETH20GP+4GC+4XS+L3 | - | 20 | 4 | 4 SFP+ | 24 | - | 128 | 95,2 | - | Internal AC + Optional RPU | 90W | 411W | 912W |
| DM4100 ETH44GT+4GC+S+L3 | - | 44 | 4 | - | - | yes ⁹ | 160 | 119,0 | - | Internal AC + Optional RPU | 160W | - | - |
| DM4100 ETH44GT+4GC+2XX+S+L3 | - | 44 | 4 | 2 XFP | - | yes ⁹ | 200 | 148,8 | - | Internal AC + Optional RPU | 165W | - | - |
| DM4100 ETH44GT+4GC+2XS+S+L3 | - | 44 | 4 | 2 SFP+ | - | yes ⁹ | 200 | 148,8 | - | Internal AC + Optional RPU | 165W | - | - |
| DM4100 ETH44GT+4GC+S+MPLS | - | 44 | 4 | - | - | yes ⁹ | 160 | 119,0 | licensable | Internal AC + Optional RPU | 160W | - | - |
| DM4100 ETH44GT+4GC+S+MPLS (DC) | - | 44 | 4 | - | - | yes ⁹ | 160 | 119,0 | licensable | Redundant DC | 120W | - | - |
| DM4100 ETH44GT+4GC+2XX+S+MPLS | - | 44 | 4 | 2 XFP | - | yes ⁹ | 200 | 148,8 | licensable | Internal AC + Optional RPU | 165W | - | - |
| DM4100 ETH44GT+4GC+2XX+S+MPLS (DC) | - | 44 | 4 | 2 XFP | - | yes ⁹ | 200 | 148,8 | licensable | Redundant DC | 125W | - | - |
| DM4100 ETH44GT+4GC+4XX+L3 | - | 44 | 4 | 4 XFP | - | - | 176 | 131,0 | - | Internal AC + Optional RPU | 170W | - | - |
| DM4100 ETH44GT+4GC+4XS+L3 | - | 44 | 4 | 4 SFP+ | - | - | 176 | 131,0 | - | Internal AC + Optional RPU | 170W | - | - |
| DM4100 ETH44GT+4GC+4XX+MPLS | - | 44 | 4 | 4 XFP | - | - | 176 | 131,0 | licensable | Internal AC + Optional RPU | 170W | - | - |
| DM4100 ETH44GT+4GC+4XX+MPLS (DC) | - | 44 | 4 | 4 XFP | - | - | 176 | 131,0 | licensable | Redundant DC | 130W | - | - |
| DM4100 ETH44GP+4GC+S+L3 | - | 44 | 4 | - | 48 | yes ⁹ | 160 | 119,0 | - | Internal AC + Optional RPU | 160W | 822W | 1824W |
| DM4100 ETH44GP+4GC+2XX+S+L3 | - | 44 | 4 | 2 XFP | 48 | yes ⁹ | 200 | 148,8 | - | Internal AC + Optional RPU | 165W | 822W | 1824W |
| DM4100 ETH44GP+4GC+2XS+S+L3 | - | 44 | 4 | 2 SFP+ | 48 | yes ⁹ | 200 | 148,8 | - | Internal AC + Optional RPU | 165W | 822W | 1824W |
| DM4100 ETH44GP+4GC+4XX+L3 | - | 44 | 4 | 4 XFP | 48 | - | 176 | 131,0 | - | Internal AC + Optional RPU | 170W | 822W | 1824W |
| DM4100 ETH44GP+4GC+4XS+L3 | - | 44 | 4 | 4 SFP+ | 48 | - | 176 | 131,0 | - | Internal AC + Optional RPU | 170W | 822W | 1824W |

Hardware Characteristics

All DM4100 models are 1U height and ready for standard 19 inches racks.

The power sources for the have the following characteristics (according to above table):

- Redundant AC/DC Hotswap: removable power source unit, with AC 100V ~240V 50Hz/60Hz or DC 48V/60V +-20% input;
- Internal AC + Optional RPU: internal fixed power source unit with AC 100V~240V 50Hz/60Hz input;
- Redundant DC: two DC inputs for 48V/60V +-20%.

The following table shows the internal tables and interfaces capacities of the DM4100 products:

| DM4100 Models | MAC Address Table | L3 Hosts (IPv4) | L3 Hosts (IPv6) | L3 Routes (IPv4) | L3 Routes (IPv6) | L2 Multicast Groups | L3 (IPv4) Multicast Groups | L3 (IPv6) Multicast Groups | Stacking (models with +S in the name only) | Access Control Lists (ACLs) | Alarms |
|-------------------------------------|-------------------|-----------------|-----------------|------------------|------------------|---------------------|----------------------------|----------------------------|---|-----------------------------|-------------------|
| ETH24GX, ETH20GT and ETH20GP Models | 32k | 4k | 4k | 12k | 6k | 1k | 4k | 2k | 2 dedicated ports - 52Gbit/s ⁹ total | 2k | 3 inputs 1 output |
| ETH44GT and ETH44GP Models | 32k | 4k | 4k | 12k | 6k | 1k | 4k | 2k | 2 dedicated ports - 64Gbit/s ⁹ total | 2k | 2 inputs 1 output |

Software

| Characteristics | Details |
|---|--|
| Flow Control | Backpressure in half duplex; PAUSE (IEEE 802.3x) in full duplex |
| Interface Basic Parameters | Description, MDI/MDIX, Speed Mode and Duplex Mode, Flow Control, |
| | Port MTU Size, GARP, Link-Flap detection, Port-Channel, switchport |
| Auto-negotiation | Speed, duplex mode, flow control and MDI/MDIX |
| Management | HTTP/HTTPs Access with more than one simultaneous access |
| | Remote Management of Network Devices through the protocol RDM |
| | SNMP v1/v2c/v3 over IPv4 and IPv6 |
| | Command Line Interface (CLI) via SSHv2 (IPv4/IPv6), Telnet (IPv4/IPv6) and Console (RJ45, USB ⁽¹⁾ or RS232) |
| | RMON groups 1 (statistics), 2 (historic), 3 (alarms) and 9 (events) |
| | ACL configuration with multiple comparisons and actions |
| | Network Diagnostic Tools (telnet, traceroute, ping) IPv4 and IPv6 |
| | Cabling Diagnostic Tool |
| | Up to 2 firmwares in flash, with upgrade via SCP, TFTP or HTTP/HTTPS |
| | Up to 10 configurations in flash, with upload or download via SCP, TFTP or HTTP/HTTPS |
| | Actions Scheduling through commands script |
| | XML Management Interface supporting cryptography |
| | OAM (EFM – IEEE 802.3ah, CFM – IEEE 802.1ag, Y.1731 and E-LMI) |
| | Link Layer Discovery Protocol (LLDP – IEEE 802.1ab) |
| | Traffic Monitoring via SNMP to interface traffic and CPU usage and processor memory |
| | Remote equipment management “ IP less ” IEEE 802.3ah extension |
| SNMP access to QoS Counter | |
| Static or dynamic IP address through DHCP Client | |
| DHCP relay (RFC 2131) with option 82 | |

| Characteristics | Details |
|-------------------|---|
| Management | DHCP for IPv6 |
| | CPU Protection system against IPv4 or IPv6 packet flood |
| | Switch interface port identification through text names up to 64 characters |
| | NTP / SNTP |
| Security | IEEE 802.1x with guest vlan, restricted vlan and vlan assignment |
| | Filters in HW to access control SNMP, Telnet and SSH |
| | MAC Address Limit configurable per port and per VLAN |
| | Allow only Authorized DHCP Servers |
| | Syslog Local and Remote with support to Multiples Syslog Servers |
| | Mutual Authentication (two-way-party authentication), authorization and accounting (AAA) RADIUS and TACACS+ |
| | E-mail notification (SMTP) |
| | Protection Mechanisms against Denial of Service attacks (DoS/DDoS), MAC Move |
| VLAN | VLAN Tagging with 4094 VIDs in simultaneous usage (IEEE 802.1q) |
| | Port-based , with ports overlap possibility |
| | Protocol-based (IEEE 802.1v), MAC-based, IP-Subnet based ⁽¹⁾ |
| | Q-in-Q double tagging, Selective Q-in-Q |
| | Communication Separation between interfaces of the same VLAN or broadcast domain |
| | VLAN Translate allowing insertion, removal or swap |
| | Inter-VLAN Routing (IPv4/v6) |
| | Voice VLAN |
| | Link Layer Discovery Protocol for Media Endpoint Devices (LLDP-MED) |
| Protection | Classic Spanning Tree (IEEE 802.1d) up to 16 instances |
| | Rapid Spanning Tree (IEEE 802.1w) up to 16 instances |
| | Per-VLAN Rapid Spanning Tree up to 16 instances |
| | Multiple Spanning Tree (IEEE 802.1s) up to 16 instances |

| Characteristics | Details |
|--|---|
| | Backup-Link |
| | Monitoring of network link status through Link State Tracking |
| Protection | Logs of violation attempts |
| | Loopback Detection |
| | BPDU Guard |
| | Protection Against DOS in IP and ARP Spoofing |
| | Link flap |
| | Ethernet Automatic Protection Switching (EAPS) |
| | Ethernet Ring Protection Switching (ERPS) |
| QoS: Marking Classifying Priorization | 8 queues per port in hardware |
| | Packet classification through layers 2, 3 and 4 |
| | TCI tagging (IEEE 802.1p), IP Precedence/TOS or DSCP/TOS |
| | Source/Destination IP and/or MAC and/or TCP/UDP ports |
| | Packet classification and marking based on MPLS-EXP field |
| | Filter rules |
| | Rate Shaping (Ingress e Egress) in hardware, with granularity of 64 kbit/s per port and per traffic flow in CIR and PIR definition |
| | Weighted Round Robin, Weighted Fair Queuing, Strict Priority or a combination of these techniques as queue scheduling algorithm |
| | Hierarchical QoS (HQoS) ⁽³⁾ |
| Weighted Random Early Detection (WRED) support | |
| Link Aggregation | Dynamic or static configuration via LACP (IEEE 802.3ad) |
| | Up to 128 logical groups , with 8 active ports in each group |
| | Equivalent use to non-aggregated links for L2, L3, MPLS and QoS functions |
| | Configurable Load Balance Criteria (i.e MAC, IP, etc.) |
| | Allow Link Aggregation groups with ports from different switches in a stacked configuration |
| L2 Functionalities | Maximum Broadcast, Multicast and DLF rate, controlled by port |

| Characteristics | Details |
|--|--|
| | Support to Jumbo Frame of up to 9KB |
| | IGMP (v1/v2/v3) fore Snooping, Query and SSM Mapping functions |
| | Aging L2 |
| | Tunneling of protocols L2 (TLS) |
| | MAC Learning Disabling per port or per VLAN. |
| | Multicast VLAN Registration (MVR) |
| L2 Functionalities | Captive Portal |
| | Port Authentication IEEE 802.1x via MAC in Radius Server (RADA) |
| | Statics MAC Addresses attribution per interface, broadcast and multicast |
| | Traffic Monitor for ports (4 MTP simultaneous sessions) and/or packets flow IPFIX rate 1:1000⁽³⁾ |
| | RSPAN Remote Switched Port Analyzer |
| L3 Functionalities | Static Routing (IPv4/v6 ⁽³⁾) |
| | RIPv2, OSPF v2/v3⁽³⁾ and BGP v4 |
| | Support for up to 128 OSPFv2 adjacencies and up to 128 OSPFv2 areas |
| | Dual-stack Layer IPv4/IPv6⁽³⁾ (RFC 4213) |
| | Packets Tunneling IPv6 in IPv4 (6over4) |
| | VRRP Redundancy (including <i>dual stack</i> IPv4/IPv6) |
| | PIM Protocol IPv4/IPv6⁽³⁾ |
| | IP Local Proxy ARP |
| | Policy Based Routing (PBR) in hardware |
| | Equal-Cost Multi-Path (ECMP) |
| | Route Redistribution among protocols (static, RIPv2, OSPF, BGP) |
| | Non Stop Routing for OSPF, BGP and LDP |
| | MD5 Authentication for OSPFv2/v3 ⁽³⁾ and BGP protocols |
| | route-map and prefix-list to filtering and conditional announcement of routes |
| Jumbo Frame Supporting of up to 9KB | |

| Characteristics | Details |
|-----------------|---|
| | Support for up to 512 L3 interfaces (VLAN with configured IP) |
| MPLS | VPWS - L2 VPN over MPLS (Draft Martini) and Backup PW |
| | VPLS – Virtual LAN Services and H-VPLS – Hierarchical VPLS |
| | Support for up to 1024 pseudowires and up to 256 VPNs |
| | Label Distribution Protocol (LDP), with up to 128 sessions and up to 256 LDP target sessions |
| | Resource Reservation Port-Traffic Engineering (RSVP-TE) with Fast Reroute (FRR) |
| | Resource Reservation Protocol (RSVP) |
| | Time to Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks |
| | LDP Tunneling over RSVP-TE |
| MPLS | The USE of RSVP with IETF Integrated Service (INTERSERV) |

Compliance with Main Standards

For a complete list of Standards, which DATACOM complian with, get contact with DATACOM Technical Support.

IEEE

| | |
|-------------|--------------------------------------|
| 802.1ab | Link Layer Discovery Protocol (LLDP) |
| 802.1ad | Provider Bridges |
| 802.1ag | Connectivity Fault Management (CFM) |
| 802.1d | Media Access Control (MAC) Bridge |
| 802.1p | Priority Support |
| 802.1q | Virtual LAN |
| 802.1q-in-q | VLAN Stacking |
| 802.1s | Multiple Spanning Tree (MSTP) |
| 802.1x | Port Security |
| 802.1w | Rapid Spanning Tree |
| 802.3 | 10 BASE T |
| 802.3ab | 1000 BASE T |
| 802.3ac | Extension for VLAN Tagging |
| 802.3ad | Link Aggregation (LAG) |
| 802.3ah | Ethernet First Mile (EFM) |
| 802.3ae | 10G BASE-SR/LR/ER/SW/LW/EW |
| 802.3af | Power Over Ethernet |
| 802.3at | Power Over Ethernet + |
| 802.3i | 10BASE-T 10 Mbit/s (1.25 MB/s) |
| 802.3u | 100 BASE TX |
| 802.3x | Flow Control |
| 802.3z | 1000 BASE SX/LX |

ITU-T

Y.1731 OAM functions and mechanisms for Ethernet based networks

MEF

9 MEF 9 - Abstract Test Suite for Ethernet Services at the UNI
14 MEF 14 - Abstract Test Suite for Traffic Management Phase 1
24 MEF 24 - Abstract Test Suite for UNI Type 2 Part 2 E-LMI

IETF

RFC854 Telnet Protocol Specification
RFC1027 Using ARP to Implement Transparent Subnet Gateways
RFC1492 An Access Control Protocol, Sometimes Called TACACS
RFC1812 Requirements for IP Version 4 Routers (Ipv4)
RFC1981 Path MTU Discovery for IP version 6
RFC2030 Simple Network Time Protocol (SNTP)
RFC2104 HMAC: Keyed-Hashing for Message Authentication
RFC2131 DHCP/BOOTP Relay
RFC2138 Remote Authentication Dial In User Service (RADIUS)
RFC2139 RADIUS Accounting
RFC2460 IPv6 Specification
RFC2461 IPv6 Neighbor Discovery
RFC2462 IPv6 Stateless Address Auto-Configuration
RFC2464 Transmission of IPv6 over Ethernet Networks
RFC2544 Benchmarking Methodology for Network Interconnect Devices
RFC2865 Remote Authentication Dial In User Server (RADIUS)
RFC3021 Using 31-Bit Prefixes on IPv4 Point-to-Point Links
RFC3164 The BSD Syslog Protocol
RFC3176 sFlow: A Method for Monitoring Traffic in Switched and Routed Networks
RFC3272 Overview and Principles of Internet Traffic Engineering
RFC3484 Default Address Selection for Internet Protocol version 6 (IPv6)
RFC3513 IPv6 Addressing Architecture

| | |
|---------|---|
| RFC3579 | RADIUS Support for EAP |
| RFC3587 | IPv6 Global Unicast Address Format |
| RFC3619 | Ethernet Automatic Protection Switching (EAPS) version 1 |
| RFC4213 | Transmission Mechanisms for IPv6 Hosts/Routers – Dual Layer |
| RFC4250 | The Secure Shell (SSH) Protocol Assigned Numbers |
| RFC4251 | The Secure Shell (SSH) Protocol Architecture |
| RFC4252 | The Secure Shell (SSH) Authentication Protocol |
| RFC4253 | The Secure Shell (SSH) Transport Layer Protocol |
| RFC4254 | The Secure Shell (SSH) Connection Protocol |
| RFC4291 | IPv6 Addressing Architecture |
| RFC4443 | ICMPv6 |
| RFC4861 | Neighbor Discovery for IP version 6 (IPv6) |
| RFC4862 | IPv6 Stateless Address Autoconfiguration |
| RFC5517 | Private VLANs: Scalable Security in a Multi-Client Environment |
| RFC5942 | IPv6 Subnet Model: The Relationship between Links and Subnet Prefixes |

Routing

| | |
|---------|---|
| RFC1058 | RIP Version 1 - Routing Information Protocol |
| RFC1723 | RIP Version 2 - Carrying Additional Information |
| RFC1997 | BGP Communities Attribute |
| RFC1998 | BGP Community Attribute in Multi-Home Routing |
| RFC2080 | RIPng ⁽¹⁾ |
| RFC2082 | RIP Version 2 MD5 Authentication |
| RFC2154 | OSPF with Digital Signatures |
| RFC2328 | OSPF Version 2 |
| RFC2329 | OSPF Standardization Report |
| RFC2338 | Virtual Router Redundancy Protocol |
| RFC2370 | The OSPF Opaque LSA Option |
| RFC2385 | Protection of BGP Sessions via the TCP MD5 Signature Option |

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|---------|---|
| RFC2439 | BGP Route Flap Damping |
| RFC2453 | RIP Version 2 |
| RFC2545 | Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing |
| RFC2740 | OSPF for IPv6 (OSPFv3) |
| RFC2796 | BGP Route Reflector An Alternative to Full Mesh BGP |
| RFC2842 | Capabilities Advertisement with BGP-4 |
| RFC2858 | Multiprotocol Extensions for BGP-4 |
| RFC2918 | Route Refresh Capability for BGP-4 |
| RFC3021 | Using 31-Bit Prefixes on IPv4 Point-to-Point Links |
| RFC3065 | Autonomous System Confederations for BGP |
| RFC3101 | The OSPF NSSA Option |
| RFC3137 | OSPF Stub Router Advertisement |
| RFC3315 | Dynamic Host Configuration Protocol for IPv6 |
| RFC3392 | Capabilities Advertisement with BGP-4 |
| RFC3623 | Graceful OSPF Restart |
| RFC3630 | Traffic Engineering (TE) Extensions to OSPF Version 2 |
| RFC3768 | Virtual Router Redundancy Protocol (VRRP) |
| RFC4271 | A Border Gateway Protocol 4 (BGP-4) |
| RFC4360 | BGP Extended Communities Attribute |
| RFC4724 | Graceful Restart Mechanism for BGP |
| RFC4760 | Multiprotocol Extensions for BGP-4 |
| RFC4893 | BGP Support for Four-octet AS Number Space |
| RFC5065 | Autonomous System Confederations for BGP |
| RFC5250 | The OSPF Opaque LSA Option |
| RFC5291 | Outbound Route Filtering Capability for BGP-47 |
| RFC5396 | Textual Representation of Autonomous System (AS) Numbers |
| RFC5492 | Capabilities Advertisement with BGP-4 |

Multicast

| | |
|---------|--|
| RFC1112 | Host extensions for IP multicasting |
| RFC2236 | Internet Group Management Protocol, Version 2 |
| RFC2710 | Multicast Listener Discovery (MLD) for IPv6 |
| RFC3376 | Internet Group Management Protocol, Version 3 |
| RFC3569 | An Overview of Source-Specific Multicast (SSM) |
| RFC3810 | Multicast Listener Discovery Version 2 (MLDv2) for IPv6 |
| RFC4541 | Considerations for Internet Group Management Protocol (IGMP) and Multicast |
| RFC4601 | Protocol Independent Multicast – Sparse Mode (PIM-SM) |
| RFC4604 | Using IGMP Version 3 for Source Specific Multicast |
| RFC4607 | Source-Specific Multicast for IP |
| RFC4608 | Source-Specific Protocol Independent Multicast in 232/8 |

MPLS

| | |
|---------|---|
| RFC2205 | RSVP v1 Functional Specification |
| RFC2209 | Resource ReSerVation Protocol (RSVP) - Version 1 Message Processing Rules |
| RFC2210 | The USE of RSVP with IETF Integrated Service |
| RFC2702 | Requirements for traffic engineering over MPLS |
| RFC2961 | RSVP Refresh Overhead Reduction Extensions |
| RFC3031 | MPLS architecture |
| RFC3032 | MPLS label stack encoding |
| RFC3036 | LDP specification |
| RFC3037 | LDP applicability |
| RFC3209 | Extensions to RSVP for LSP tunnels |
| RFC3210 | Applicability statement for extensions to RSVP for LSP Tunnels |
| RFC3215 | LDP state machine |
| RFC3270 | Multi-protocol label switching (MPLS) support of differentiated services |
| RFC3346 | Applicability Statement for Traffic Engineering with MPLS |
| RFC3443 | TTL Processing in Multiprotocol Label Switching (MPLS) Networks |
| RFC3469 | Framework for MPLS-based recovery |

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|---------|---|
| RFC3916 | Requirements for Pseudo-Wire Emulation Edge-to-Edge (PWE3) |
| RFC3985 | Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture |
| RFC4090 | Fast reroute extensions to RSVP-TE for LSP tunnels |
| RFC4182 | Removing a restriction on the use of MPLS explicit NULL |
| RFC4221 | MPLS management overview |
| RFC4377 | OAM Requirements for MPLS Networks |
| RFC4378 | A framework for MPLS Operation and Management |
| RFC4446 | IANA Allocations for Pseudowire Edge to Edge Emulation (PWE3) |
| RFC4447 | Pseudowire Setup and Maintenance Using the LDP |
| RFC4448 | Encapsulation methods for transport of Ethernet over MPLS |
| RFC4664 | Framework for L2VPNs |
| RFC4665 | Service Requirements for Layer 2 Provider-Provisioned VPN |
| RFC4762 | Virtual Private LAN Service (VPLS) Using LDP Signaling |
| RFC4905 | Encapsulation Methods for Transport of Layer 2 Frames Over MPLS |
| RFC4906 | Transport of Layer 2 Frames Over MPLS |
| RFC5036 | LDP Specification |

QoS

| | |
|---------|--|
| RFC2309 | Queue Management and Congestion Avoidance in the Internet |
| RFC2474 | Definition of the differentiated services field (DS) in Ipv4 |
| RFC2475 | An architecture for differentiated services |
| RFC2597 | Assured Forwarding PHB Group |
| RFC2598 | An Expedited Forwarding PHB |
| RFC2697 | A single rate three color marker |
| RFC2698 | A two rate three color marker |
| RFC3140 | Per hop behavior identification codes |
| RFC3246 | An expedited forwarding PHB |
| RFC3644 | Policy quality of service (QoS) Information model |
| RFC3670 | Information model for describing network device QoS datapath mechanism |

MIB e SNMP

| | |
|---------|---|
| RFC1157 | Simple Network Management Protocol (SNMP) |
| RFC1212 | Concise MIB Definitions |
| RFC1213 | MIB for Network Management of TCP/IP-based internets:MIB-II |
| RFC1215 | A Convention for Defining Traps for use with the SNMP |
| RFC1229 | Extensions to the generic-interface MIB |
| RFC1441 | SNMPv2 Protocol Framework |
| RFC1493 | Definitions of Managed Objects for Bridges |
| RFC1573 | Evolution of the Interfaces Group of MIB-II |
| RFC1643 | Definitions of Managed Objects for the Ethernet-like InterfaceTypes |
| RFC1650 | Definitions of Managed Objects for the Ethernet-like IF Types using SMIV2 |
| RFC1724 | RIP Version 2 MIB Extension |
| RFC1757 | Remote Network Monitoring Management Information Base |
| RFC1850 | OSPF Version 2 Management Information Base |
| RFC1901 | Introduction to Community-based SNMPv2 |
| RFC1902 | Structure of Management Information for Version 2 of SNMPv2 |
| RFC1903 | Textual Conventions for Version 2 of SNMPv2 |
| RFC1904 | Conformance Statements for Version 2 of SNMPv2 |
| RFC1905 | Protocol Operations for Version 2 of SNMPv2 |
| RFC1906 | Transport Mappings for SNMPv2 |
| RFC1907 | Management Information Base (MIB) for SNMPv2 |
| RFC1908 | Coexistence between V1 and V2 of the Internet-standard NMF |
| RFC2021 | Remote Network Monitoring MIBv2 using SMIV2 |
| RFC2037 | Entity MIB using SMIV2 |
| RFC2233 | The Interfaces Group MIB using SMIV2 |
| RFC2570 | Introduction to V3 of the Internet-standard NMF |
| RFC2571 | An Architecture for Describing SNMP Management Framework |
| RFC2572 | Message Processing and Dispatching for SNMP |

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| RFC2573 | SNMP Applications |
| RFC2574 | USM for version 3 of SNMPv3 |
| RFC2575 | VACM for SNMP |
| RFC2576 | Coexistence between SNMP v1,v2,v3 |
| RFC2578 | Structure of Management Information for SNMPv2 |
| RFC2579 | Textual Conventions for SNMPv2 |
| RFC2580 | Conformance Statements for SMIv2 |
| RFC2665 | Definitions of Managed Objects for the Ethernet-like Interface Types |
| RFC2674 | Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions |
| RFC2819 | Remote Network Monitoring MIB |
| RFC2863 | The Interfaces Group MIB |
| RFC3411 | An Architecture for Describing SNMP Management Framework |
| RFC3412 | Message Processing and Dispatching for SNMP |
| RFC3413 | SNMP Application |
| RFC3414 | User-based Security Model for SNMPv3 |
| RFC3415 | View-based Access Control Model for SNMP |
| RFC3416 | Protocol Operations for SNMPv2 |
| RFC3812 | MPLS Traffic Engineering Management Information Base7 |
| RFC3813 | MPLS LSR Management Information Base |
| RFC3814 | MPLS FEC-To-NHLFE Management Information Base |
| RFC3815 | Definitions of Managed Objects for the MPLS, LDP |
| RFC4188 | Definitions of Managed Objects for Bridges |
| RFC4273 | Definitions of Managed Objects for BGP-4 using SMIv27 |
| RFC4292 | IP Forwarding Table MIB |
| RFC4293 | MIB for the Internet Protocol |
| RFC4363 | Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions |

Accessories

- PSU 85 100-250 VAC/48-60 VDC modular supply, full range, hot-swappable, redundant
- DM4100 RPU 300W: External 100-240VAC power supply
- DM4100 RPU 500W: External 100-240VAC power supply
- DM4100 RPU 1000W: External 100-240VAC power supply
- Stacking Cable: length 0,50m
- Stacking Cable: length 1,00m
- DM4100 RPU Cable – Power Blade – 1m
- DM4100 RPU Cable – Power Blade – 3m

1 Check for availability according purchased hardware and software versions

2 Check equipment manual or tables for the switch fabric capacity per HW model

3 Dependent on hardware model

4 Dependent on software license

5 Class 3 devices

6 Class 4 devices

7 Using external RPU

8 For maximum reach, check attenuation

9 Stacking functionalities available for L2 and L3 applications. For MPLS applications, get contact with DATACOM's Technical Support

10 Some VLANs can be required for internal use, remaining 4094 VLANs for effective usage

11 When assembled in a stacking topology, the maximum value will be the lower of the available for each model

Specifications and product availability presented may change without notice.