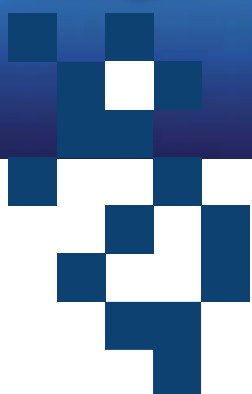


# DATACOM Ethernet Switches DM4000 Family



The DM4000 line of modular switches offers complete solutions for the most diverse Metro Ethernet and high-performance Enterprise network applications.

**DATACOM**

DATAKOM's full line of Ethernet Switches consists of six distinct product families: DM4000, DM4100, DM3000, DM2300, DM2100 and DM1200E. Each providing unique features such as Layer2 and Layer3 with LER/LSR MPLS and physical GigE to 10Gig Electrical and Optical connectivity. The products are suited to provide advanced switching and routing for varying applications ranging from Small Medium Business (SMB) to complex Metro Ethernet Networks.

By offering numerous switch models, in either standalone, stackable or modular platforms, Datacom is able to provide the product that best meets the customer network infrastructure requirement.

## General characteristics of the DM4000 line

### WIRESPEED L2, L3 AND MPLS

- L2, L3 and MPLS packet switching done at the hardware level. Layer 2/3 protocols are implemented in software in order to assemble the MAC address, IPv4/IPv6 route tables and MPLS labels.

### IP/MPLS NETWORKS

- Static and dynamic routing for IPv4 and IPv6, unicast and multicast, by means of RIP, OSPF BGP and PIM protocols, among others.
- The use of LDP, RSVP, LDP over RSVP and extensions of Traffic Engineering in the L3 protocols allow the creation of IP/MPLS networks with support to rapid convergence (Fast Reroute) and traffic engineering.
- The implementation of MPLS VPNs is possible by means of L2 point-to-point (VPWS and Backup-PW) and multipoint (VPLS and H-VPLS).

### MANAGEMENT

- Comprehensive centralized management is available via DmView, DATAKOM's full FCAPS management software. DmView allows for multiple user and segmented network management capability.
- Switch access control with definition of which IP addresses may access the equipment and through which protocols (SNMP, HTTP, Telnet, SSH).
- Easy to use and comprehensive Command Line Interface – CLI, XML interface and SNMP/RMON agent.
- Creation of Access Control Lists (ACLs) in hardware, with multiple comparison and action parameters allowing the changing, forwarding, discarding or prioritizing of packets without penalizing the equipment CPU.

### QoS FACILITIES

- Eight queue per port with priority algorithms, set by either fixed priority, or weight, or minimum rate, or maximum rate or a combination of these methods.
- Classification by the IEEE 802.1p standard, IP precedence or DSCP fields, TCP and UDP ports, among others, are resources that allow the implementation of several QoS models to efficiently transport real time traffic, bandwidth guarantee and the transference of data in high rates.
- Bandwidth control with 64 kbps granularity in the CIR and PIR definition applied to the input or output traffic of the ports or to a certain flow of packets by means of filters and counters implemented in hardware.

### SECURITY

- Encryption is applied within the communication protocols. Managers access control rules allow the implementation of efficient mechanisms against attempts of security and integrity violation of networking operation.

- Local and remote Syslog, user authentication, authorization and accounting RADIUS and TACACS+ (AAA), alarm notification by e-mail, single clock synchronized with SNTP server, protection against Denial of Service attacks and port authentication via 802.1x are some of the available resources for detection and/or protection of the network against attempts of attack.
- Limitation to the quantity of MAC numbers per port and per VLAN, protection mechanisms on L2 and L3 protocols against network attack and bandwidth limitation for broadcast and multicast traffic and destination lookup failure (DLF) are also available options for implementing a network with more sec.

### VLANs

- Up to 4,096 VLANs, outlined by IEEE 802.1Q, provides double tagging functionality (Q-in-Q) allowing the creation of TLS services.
- VLAN definition by protocol, MAC address, IP-Subnet and Port-based.
- Insertion, removal or substitution of the VLAN field in the packets allow for flexibility to the demands of aggregation of other network devices, such as GPON, DSLAM or even CPEs.

### PROTECTION MECHANISMS

- Spanning Tree protocols, including RSTP and MSTP.
- EAPS and ERPS (ITU G.8032) protocols for L2 networks and RSVP FRR for MPLS networks, allowing for recovery time shorter than 50 milliseconds for the protection of Ethernet rings.
- Backup link for redundancy or double approach applications, allowing choosing to configure the backup interface status either as logic blocking or "link down".

### TDM PSEUDOWIRE

- Clock synchronization protocol for TDM interfaces based on IEEE1588v2 standard allows meeting the synchronization requirements needed to satisfy the legacy services applications.
- CESoP (RFC5086) and SAToP (RFC4553) protocols offer the options for transmitting in a structured or agnostic mode the TDM frames over packet networks.
- With electrical E1 or optical STM-1 port options, the interface cards comply in a flexible way the needs for interconnecting with the legacy traffic networks.

### SDN/OPENFLOW

- Allows the customers higher control and flexibility to configure their network environments, being able to answer expeditiously their needs for innovation in the next generation networks.
- The hardware is controlled by a software layer that allows the equipment initialization, control and monitoring. The OpenFlow 1.0 protocol is implemented over this layer, allowing the provisioning and monitoring of ports and traffic flows.
- Operates with several implementations of Controller (i.e. NOX, POX, Floodlight), allowing the customers to create their own application using high performance resources of any of the DM4000 products.

# DM4000 Family

The DM4000 switch family consists of three distinct chassis for use in 19-inch racks with multiple interface cards, control units and general purpose cards.

The interface cards offer optical Gigabit and 10 Gigabit Ethernet interfaces, electrical Gigabit Ethernet and also E1 and STM-1 interfaces for TDM circuit emulation over IP networks (CESoP/SAToP).

The supervisory and control units are available with varying capacities suited to comply with different requirements.

The DM4000 family provides varying backup options for reliable mission critical applications. Starting with the power supply: dual -48VDC or dual 127/220VAC or in mixed power supply combinations. And also redundant (DUAL) CPU switching/management module options.

## DM4008

Chassis with redundant AC or DC power supplies. Provides eight slots for interface modules, two slots for MPU switching and management modules and one slot for cooling module. The DC chassis has dual direct 48VDC inputs and is 10U high for use in 19-inch racks. The AC chassis has dual slots for AC or DC modules and is 11½U high for use in 19-inch racks.

### MAIN CHARACTERISTICS

- 8 slots chassis
- AC or DC power options
- Redundant control/switching modules
- Passive backplane
- Chassis supports up to 384x GE Ports or 32x 10GE Ports, with oversubscription (32Gbit/s per slot)



## DM4004

Chassis with redundant AC or DC power supplies. Provides four slots for interface modules, two slots for MPU switching and management modules and one slot for cooling module. The DC chassis has dual direct 48VDC inputs and is 6U high for use in 19-inch racks. The AC chassis has dual slots for AC or DC modules and is 7½U high for use in 19-inch racks.

### MAIN CHARACTERISTICS

- 4 slots chassis
- AC or DC power options
- Redundant control/switching modules
- Passive backplane
- Chassis supports up to 192x GE Ports or 16x 10GE Ports



## DM4001

Chassis for a single interface module, in versions for AC power or DC power. 1U high for 19-inch rack.

### MAIN CHARACTERISTICS

- AC or DC power source
- Compatible with any of the DM4000 family interface modules
- Does not require MPU module



## DM4000 interface modules



Hardware	ETH24GT H Series	ETH48GT H Series	ETH24GX H Series	ETH48GX H Series	ETH24GX+2x10GX H Series
100/1000BASE-X Ports (SFP)	—	—	24	48	24
100/1000BASE-T Ports (RJ45)	24	48	—	—	—
10GbE (XFP) Ports	—	—	—	—	2
MPLS	LER/LSR	LER/LSR	LER/LSR	LER/LSR	LER/LSR
QoS	L2-L4	L2-L4	L2-L4	L2-L4	L2-L4
MAC address table	512k <sup>(1)</sup>	512k <sup>(1)</sup>	512k <sup>(1)</sup>	512k <sup>(1)</sup>	512k <sup>(1)</sup>
Filter Rules	8k	8k	8k	8k	8k
TDM Ports	—	—	—	—	—
CES Protocols	—	—	—	—	—
IEEE1588-2008	—	—	—	—	—
SDN/Openflow	Yes	Yes	Yes	Yes	Yes

(1) Indicates the maximum value. The size of the tables is configurable for distributing the entrances among MAC, IPv4 and IPv6.

## Chassis technical specifications

Environmental conditions and dimensions	DM4001	DM4004	DM4008
Operation Temperature	-5 to +55 °C	-5 to +55 °C	-5 to +55 °C
Storage temperature	-20 to +65 °C	-20 to +65 °C	-20 to +65 °C
Humidity	10 to 90% non condensing	10 to 90% non condensing	10 to 90% non condensing
Height	44mm (DC Chassis)	277mm (DC Chassis)	442mm (DC Chassis)
	44mm (AC Chassis)	344mm (AC Chassis)	509mm (AC Chassis)
Depth	280mm (DC Chassis)	280mm (DC Chassis)	280mm (DC Chassis)
	500mm (AC Chassis)	350mm (AC Chassis)	350mm (AC Chassis)
Width	440mm for 19" racks	440mm for 19" racks	440mm for 19" racks



ETH4x10GX H Series	PWE3 ETH20GX+ 32E1 H Series	PWE3 ETH20GX+ 2x10GX+32E1 H Series	PWE3 ETH16x1GX+ 4STM1 H Series	PWE3 ETH16x1GX+ 2x10GX+4STM1 H Series
—	20	20	16	16
—	—	—	—	—
4	—	2	—	2
LER/LSR	LER/LSR	LER/LSR	LER/LSR	LER/LSR
L2-L4	L2-L4	L2-L4	L2-L4	L2-L4
512k <sup>(1)</sup>	512k <sup>(1)</sup>	512k <sup>(1)</sup>	512k <sup>(1)</sup>	512k <sup>(1)</sup>
8k	8k	8k	8k	8k
—	32 E1 (G703)	32 E1 (G703)	4 STM1 (SFP)	4 STM1 (SFP)
—	SAToP / CESoPSN	SAToP / CESoPSN	SAToP / CESoPSN	SAToP / CESoPSN
—	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes

## DM4000 control modules

The DM4000 control modules, also known as Main Processing Units, provide the DM4000 platform all the management functions, data plane switching and protocols control plane functionalities. The MPUs can also operate on a redundant work/standby mode for high availability services.



### MPU 512

- 512 Gbit/s forwarding capacity
- Up to 48 Gbit/s full duplex bandwidth per slot on DM4004
- Up to 32 Gbit/s full duplex bandwidth per slot on DM4008

### MPU 384

- 384 Gbit/s forwarding capacity
- Up to 48 Gbit/s full duplex bandwidth per slot on DM4004
- Up to 26 Gbit/s full duplex bandwidth per slot on DM4008

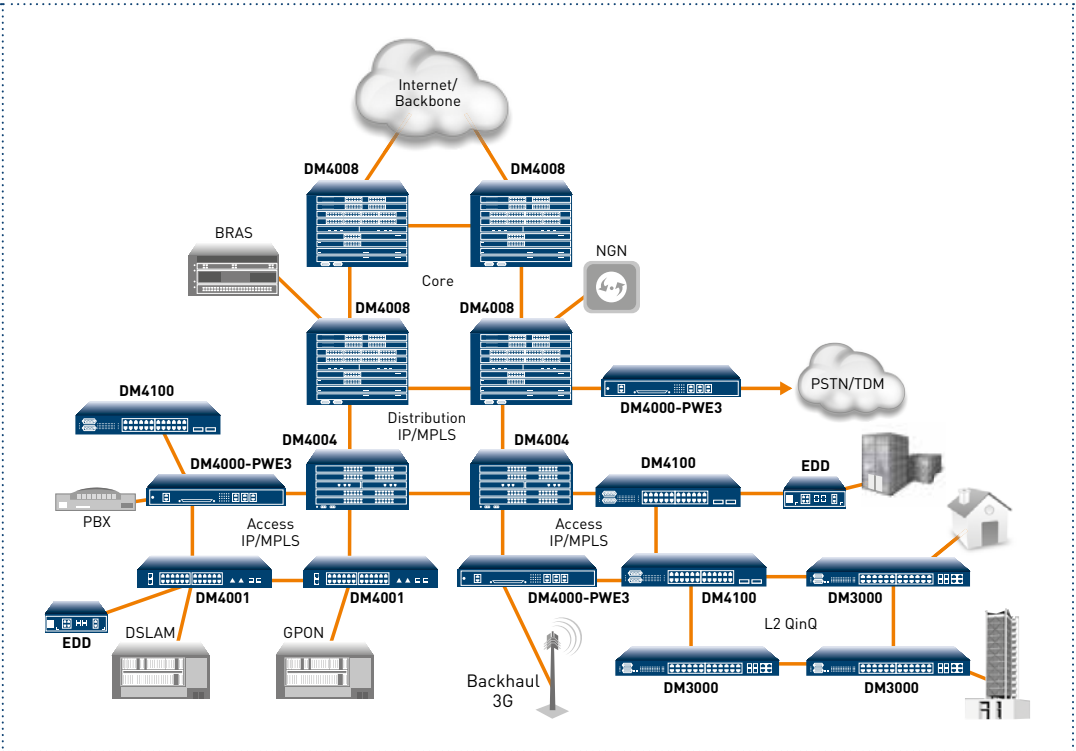


# SOLUTIONS FOR ETHERNET NETWORKS

The DM4000 product line is ideal for the deployment of Ethernet networks, either by applying Layer 2, Layer 3 or IP/MPLS technology. All of the DM4000 family switches are Metro Ethernet Forum (MEF) certified, providing a great variety of standardized services with high aggregated value. The layers from Access to Concentration are capable of offer transport to the Next Generation Networks (NGN) and also to the TDM legacy , providing the users with high scalability, port density and fast convergence. A wide range of layer 2 (i.e. xSTP, EAPS, ERPS) and layer 3 (i.e. OSPF, BGP, LDP, RSVP) protocols allows for the deployment of different network solutions suitable to the most diverse customers' demands. DM4000 is able to support several OAM resources to reduce the OPEX in the networks managed by means of the DmView (DATACOM's NMS) or third-party platforms.

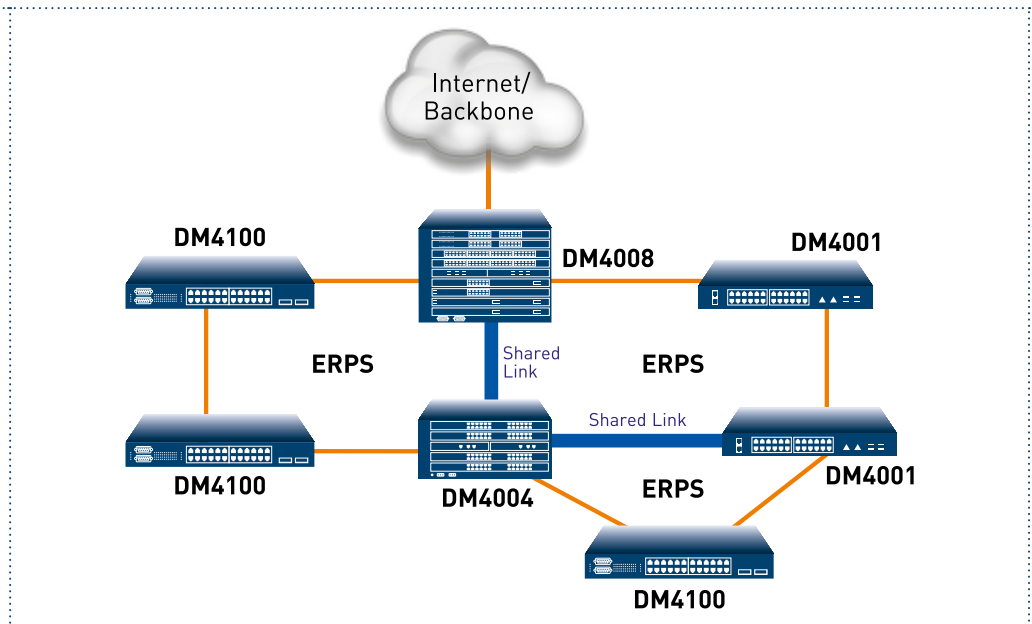
## MPLS

DATACOM MPLS compatible switches allow the construction of MPLS protocol-based networks, providing great scalability and security. The switches are capable of operating either as LSR (Label Switch Routers) or LER (Label Edge Routers), implementing P2P L2VPNs like (VPWS and Backup-PW) or multipoint (VPLS and H-VPLS) topologies.



## L2 SOLUTION

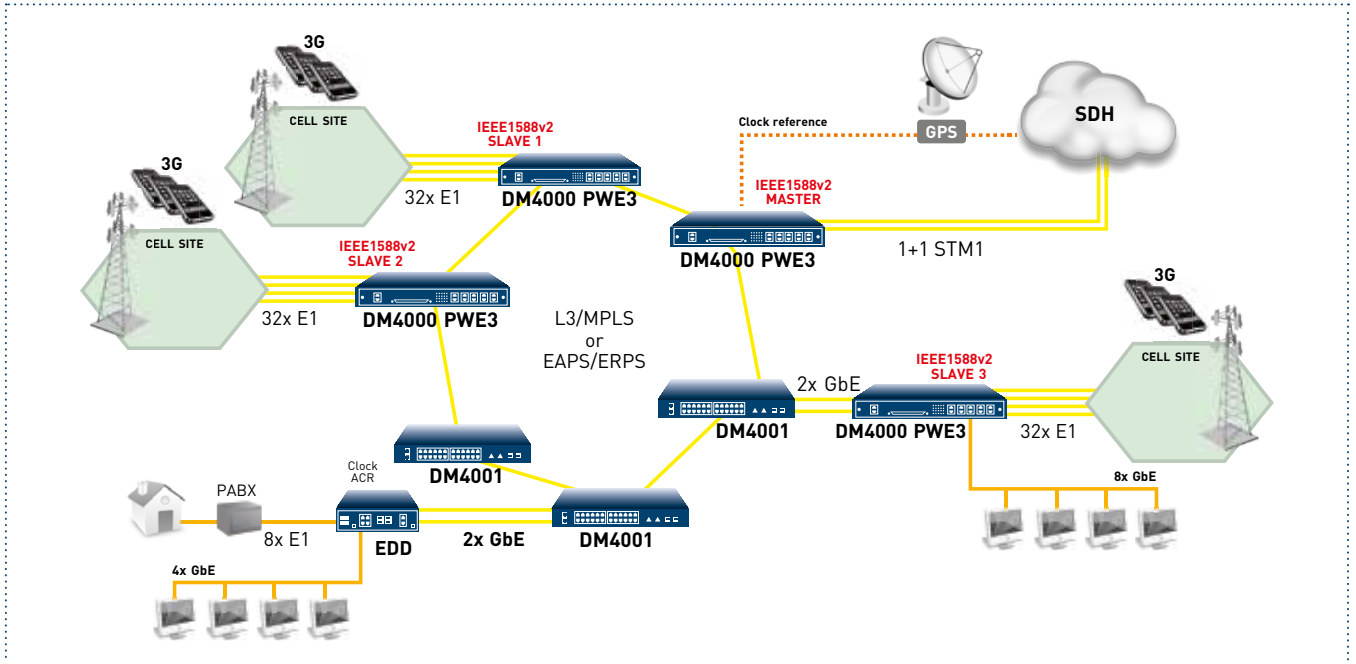
A great part of the Layer 2 packet networks are built in ring topology, providing cost-effective resiliency. With the EAPS and ERPS protocols it is possible to achieve recovery times of less than 50ms. The ERPS protocol also supports protection in adjoining rings with link intersection. This way, the network is protected even in topologies where such connections are required, making it easier to expand the network with no need for major changes in its architecture.



## PSEUDO WIRE EMULATION EDGE TO EDGE (PWE3)

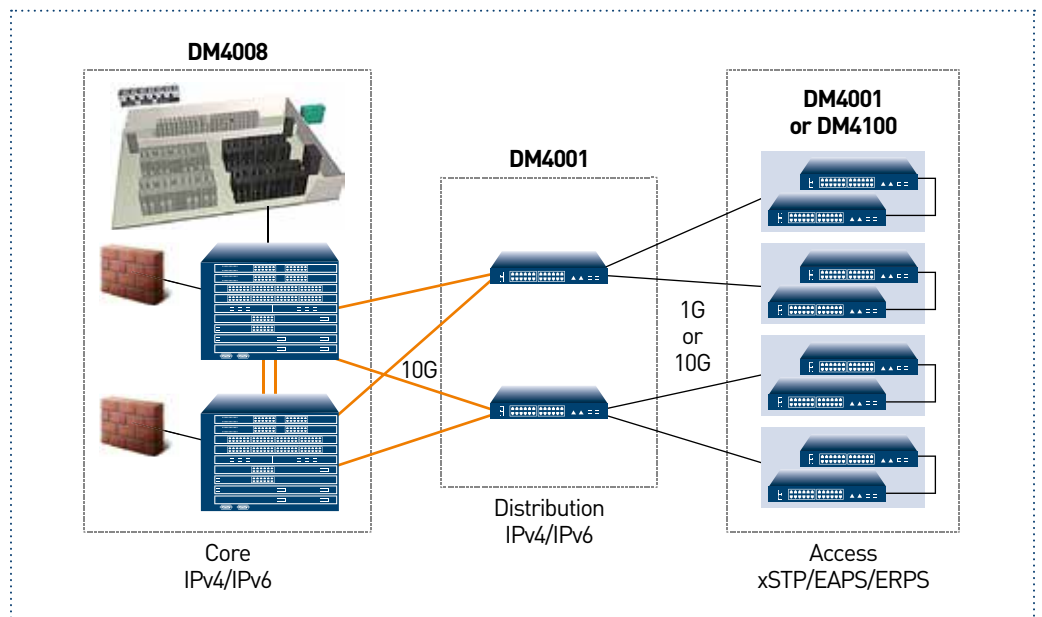
The current migration from existing TDM systems to PSN (Packet Switched Networks) paves the way for the utilization of communication services that may emulate the essential properties of the traditional connections. A pseudowire emulates a point-to-point or a point-to-multipoint connection in an existing network.

DATAKOM offers a complete PWE3 solution for the transport of TDM traffic over the Metro Ethernet network through DM4000 PWE3 interface cards and DM2100-EDD switches.



## ENTERPRISE NETWORK

The DM4000 family of modular switches is capable of meeting the security and scalability requirements for the operation of large enterprises or campus deployment. DM4000 scalability and functional resources allows for an investment in infrastructure that is "future proof". The modularity and wide range of interface options makes it possible to fulfill the most diverse demands for connecting the Access, Distribution and Core layers. In terms of solution, it is possible to design an access network based on layer 2 or 3, as well as comply with requirements for routing in the distribution connected either at 1Gbps or at 10Gbps. In the core of the network the DM4008 offers several options of scalability to interconnect servers at 1Gbps or 10Gbps, as well as to do the intersection with the WAN networks that connects the Corporation.



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