

## MetroStar 4000 switch

Layer 2+ switch purpose-built for GTTH access

The MetroStar 4000 (MS4000) is a new generation of Gigabit Ethernet L2+ access switches for enterprise and FTTH networks. Built on a unique network processor and switching silicone solution, the MS4000 delivers a user experience that meets today's challenge from the most demanding FTTH and enterprise networks. Features like ingress and egress traffic shaping, quality measurement and control for SLA fulfillment verification, remote mirroring for easier troubleshooting, and multi-rate support to facilitate network upgrades make the MS4000 the ultimate access switch for Layer 2 networking.

- ☑ Optimal allocation of bandwidth between applications
- ☑ Maximum flexibility for traffic classification and control
- ☑ FTTH Customer and Service VLAN topology ready
- ☑ 10 Gbit/s uplink ports
- ☑ 100Mbit/s and 1Gbit/s for copper and fiber downlink ports
- ☑ Efficient distribution of TV including quality measurement

## Product Overview

The MS4000 is a Layer 2 access switch designed for network edge service control, network aggregation with high-performance switching and traffic classification and prioritization to deliver the ultimate user experience.

The MS4000 provides network operators, service providers, city networks, as well as small and medium sized companies, with a versatile tool for their switching needs. The MS4000 capability to prioritize and allocate bandwidth fairly between applications provide maximum throughput and responsiveness for services even when used by many users at the same time.

The MS4000 is filled with features to deliver voice, video and data services and builds on the experience of over 1,000,000 deployed fiber-to-the-home ports of previous generation switches from PacketFront.

The MS4000 can be used in a variety of network topologies such as

- Customer VLAN topology in combination with a Service Router with efficient multicast distribution and optional RADIUS based control of ingress traffic,
- Service VLAN topology where the MS4000 performs service enforcement and a secure MACFF based network
- TR-101 topologies with VLAN translation.

The MS4000 can even perform PPPoE Intermediate Agent operation to support a mix of DHCP and PPPoE based services on the same infrastructure.

Security features such as IP strict clients can be used with both dynamic and statically assigned addresses to prevent spoofing of IP traffic.

Extendable through the ScriBOS script language, the MS4000 behavior can be easily adapted to fit into a variety of service provisioning solutions using e.g. DHCP or RADIUS to signal service parameters. Industry standard CLI and SNMP support allows easy management and control of MS4000 operation.

The MS4000 is available in two models; either with 24 RJ-45 copper (MS4126) or 24 SFP (MS4026) Gigabit Ethernet ports

## Benefits

### Advanced traffic classification and forwarding

The MS4000 switch silicone has extensive traffic classification support. The network processor architecture of the MS4000 allows further classification and forwarding using advanced algorithms based on Weighted Fair Queuing (WFQ) scheduling and shaping. Traffic in both ingress and egress direction can be handled through the NPU in order to overcome the traditional limitation of hardware queues and switch silicone rate-limiting. The MS4000 performs ingress and egress shaping of traffic resulting in a fair distribution of traffic between applications and flows so that a single session or user cannot monopolize the bandwidth of a service and block all other applications or services.

Fair allocation of traffic is fundamental to a satisfactory end user experience. Even when end users consume all available bandwidth, applications remain responsive.

### Multi-rate support

The SFP ports of the MS4000 support both 100 Mbit/s and 1 Gbit/s speeds, which means that upgrading access to a fiber network is easy. In an existing Fast Ethernet network the Customer gateway (CPE) can continue to operate at 100Mbit/s when the access switches are upgraded to the MS4000. Instead of fork-lift upgrading all CPEs, each customer can obtain higher speed services when needed. A simple reconfiguration in the MS4000 instantly provides 1 Gbit/s link speed if multi-rate SFPs are used.

The 10Gbit/s ports also support 1Gbit/s operation and is fully compatible with both SFP and SFP+ optical modules.

### Customer and Service VLAN topologies

The MS4000 can be used in a wide variety of network topologies and supports:

- Ethernet wholesale with C-VLAN and S-VLAN, supporting double-tagging
- Customer VLAN topologies with a central Service Router
- Service VLAN topologies using DHCP snooping for end-user and network security

- o IP strict clients for anti-spoofing
- o ARP inspection provides increased security
- o MAC Forced Forwarding prevents layer 2 interaction between clients in the VLAN

A major concern in Service Router deployment topologies is how to protect the network from user upstream bandwidth attacks. The natural response is to use ingress rate-limiting on the access switch, but in Service Router topologies this both increases the number of devices that requires configuration and requires advanced rate-limiting functions to avoid a negative impact on traffic flows. The MS4000 can be adapted using ScriBOS to interact with DHCP or RADIUS servers to perform ingress shaping of traffic, thereby contributing to network protection and improved user experience.

Multicast VLAN support and ability to create channel packages allows optimal bandwidth utilization in the access at the same time as maximum control of TV distribution is obtained. This effectively prevents card sharing as each downlink port can have its own unique channel package. MS4000 supports simultaneous forwarding of up to 2048 multicast groups.

The MS4000 supports full VLAN range, up to 4,096 vlans, including double-tagging, and 16,000 MAC addresses.

### Automated deployment

The MS4000 can be deployed into the network directly out of the box. There is no need for pre-configuration of the switch before installation. When connected to the network, the switch will BOOTP for its management IP which allows a central auto-configuration server to connect to the switch and configure it.

### Connectors in the front

All connectors for network, administration and power are located in the front of the unit. In addition the MS4000 has a small form factor, only 26cm deep. This simplifies installation and makes the MS4000 fit into narrow spaces in multi-dwelling unit environments as well as dense deployment in central office or wiring-closet sites.

### Support for dual stack services

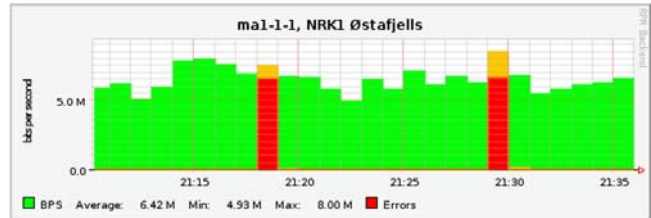
The exhaustion of IPv4 addresses means that IPv6 deployment is now becoming mandatory in many networks. MS4000 also supports

classification on IPv6 including policies for traffic management and QoS.

### Quality inspection of TV

The MS4000 can also inspect multicast MPEG streams using the Realtime Protocol Monitoring (RPM) feature to measure the MPEG quality.

RPM Graph zoom



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The RPM feature supports MPEG over RTP as well as UDP, and collects and analyzes metrics at RTP level, Transport Stream level and Packetized Elementary Stream level. The errors detected include:

- sequence-error per RTP multicast group
- jitter per RTP multicast group
- missing-sync-byte per TS multicast group
- misaligned per TS multicast group

Any detected errors can be logged, read using SNMP, or shown by the ASR CLI. Each ASR that runs RPM becomes a probe, capable of monitoring up to 50 TV channels at the same time. If an end user reports a problem with the TV service, the RPM data provides an immediate notification if a problem is seen in the network, and if it affected the entire network or only a part of the network. The RPM data may even help network engineers to pinpoint the location of the problem in seconds, instead of the usual hours, or even days, of manual troubleshooting.

### Script motor - ScriBOS

The programmable script motor allows customized and autonomous service control. Service conditions and behavior can be adapted to fit any type of existing service deployment structure used by operators. Existing RADIUS based mechanisms, used for xDSL, can be reused by the MS4000 which reduces investment costs in the OSS system for service providers when new services are deployed in the network.

## Order items

The following table describe the main order items in the MetroStar 4000 family.

Order items	
Article	Description
MS4026-AC	MS4026, 2 10GE (SFP+), 20 port 100/1000BASE-X (SFP), 4 GE combo ports, 1 RJ-45 management port, AC power, iBOS Standard
MS4126-AC	MS4126, 2 10GE (SFP+), 20 port 100/1000BASE-T (RJ-45) 4 GE combo ports, 1 RJ-45 management port, AC power, iBOS Standard
SW-IBOS6-MS4K-ADV	Optional iBOS Advanced version 6.x for MS4000

## Accessories

MS4000 accessories include various types of SFP optical modules.



## Features

Performance	
Switch ASIC performance	Forwarding rate: 65 Mpps
	Forwarding bandwidth: 88 Gbps
NPU Performance	NPU with 4 cores, providing up to 10 Gbps throughput
MAC table	16384 MAC addresses
VLAN table	4094 VLANs
Multicast S,G entries	2048 L2 multicast
	4000 IP multicast groups
Jumbo Frames	Up to 12Kbyte
Classification	Layer 2 packet classification with filtering
	Per service packets and bytes accounting
	Access-list entry hit logging and packet counting
Packet queuing	Weighted round robin (WRR)
	Weighted fair queuing (WFQ) (requires iBOS advanced)
Policing ingress/egress	2048 single/dual Token Bucket Policer with packet drop or recolor (64kbps-1000Mbit/s)
Shaping ingress/egress	4095 shapers with packet drop or recolor (64kbps – 1000Mbit/s)

Layer2 and Forwarding

IEEE standards	IEEE 802.3u – Fast Ethernet IEEE 802.3z – Gigabit Ethernet IEEE 802.1p and 802.1Q with full VLAN range including Q-in-Q IEEE 802.1 D Spanning-tree IEEE 802.1w Rapid spanning-tree IEEE 802.1x Port authentication with RADIUS VLAN/Service template assignment
Link aggregation	Up to 16 groups, 4 interfaces per group
Double tagging	Direct tagging of two tags (requires iBOS Advanced)

Other features

Management	Industry standard CLI with debugging, configuration and management RS232 serial console to access the CLI Telnet SNMP PFDP – PacketFront Device Protocol SNMP v1, v2c and v3 Syslog NTP
System boot	BOOTP client for address assignment
Flow export	Netflow version 9 (requires iBOS Advanced)
Security	IP spoofing protection Up to 10 Gbps bandwidth IP fragment inspection in NPU Restricted multicast access with IGMP join-filter UNI isolated ports MAC Forced Forwarding DHCPv4 snooping for anti-spoofing
Mirroring	Interface mirroring to local interface Interface mirroring over GRE to remote Wireshark or other packet capture tool (requires iBOS Advanced)
Programmable extension	ScriBOS script language for programmable extension (requires iBOS Advanced)

Security

Command Line Interface	Industry standard CLI with debugging, configuration and management Telnet
Serial interface	RS232 console serial port to access CLI
SNMP	SNMPv1, v2c and v3
PFDP	PacketFront Device protocol exchange system information with other

## MetroStar 4000 - Datasheet

	iBOS devices and selected PacketFront customer premise equipment
System boot	BOOTP client for address assignment
Time	NTP
Remote logging	Syslog

Physical		
	MS4026	MS4126
Uplink ports	2 10000baseX (SFP) with diagnostics (DDM)	2 10000baseX (SFP) with diagnostics (DDM)
GE ports	24 100/1000baseX (SFP) with diagnostics (DDM)	24 10/100/1000baseT with MDI/MDCX and polarity autosense
Combo ports	4 10/100/1000baseT with MDI/MDCX and polarity autosense	4 100/1000baseX (SFP) with diagnostics DDM
Management port	1 RJ-45	1 RJ-45
Dimensions	43x441x240 mm (H x W x D)	43x441x240 mm (H x W x D)
Weight	4 kg	4 kg
Indicators	Interface LED indicator for link and speed Power LED indicator System LED indicator Managed LED indicator	
Acoustic	Max 50dBA noise level	
Cooling	Redundant fan. The MS4000 has sufficient cooling capacity when two of the three fans are working.	

Environmental	
Operating temperature	0 to 45°C
Operating humidity	10% to 90%, non-condensing
Storage temperature	-10 to 70°C
Storage humidity	5% to 95%, non-condensing
Rack mounting	Standard 19" rack mountable
Heat dissipation	See power consumption

## MetroStar 4000 - Datasheet

Power and Safety	
Power connector	One IEC 60320-1 C14, located on the front panel
Power	Single power input 100-240V, 50-60 Hz
Power consumption	MS 4026 AC: 50 W MS 4126 AC: 50 W
Regulatory compliance	EN 55022 Class A, EN 55024, EN 300386 IEC/EN 60950-1, IEC/EN 60825-1 CE mark CB RoHS directive 2002/95/EC WEEE directive 2002/96/EC

## Service and support

PacketFront provides several different support packages with a clearly defined Service Level Agreement (SLA) to give you the mix of technical support and hardware replacement services that best suits your needs.

PacketFront is committed to help you protect your investment and our Technical Assistance Center team, or approved Partners, are ready to handle all your support issues.

Through our support web site, PacketFront provides software updates and upgrades, and has an extensive Knowledge Base for both general network topics and product specific questions. You will also find documentation, release notes, product specifications and other useful information to help you achieve the best results with your PacketFront products.



## Purchase your MS4000

With over 10 years' experience in the FTTH industry, PacketFront offers individual pricing and purchasing terms. Our experienced sales team will assist you in making the best buy possible, based on your specific needs and current situation. To find out how you can join the growing number of Gigabit To The Home networks using the MS4000, contact [sales@packetfront.net](mailto:sales@packetfront.net).