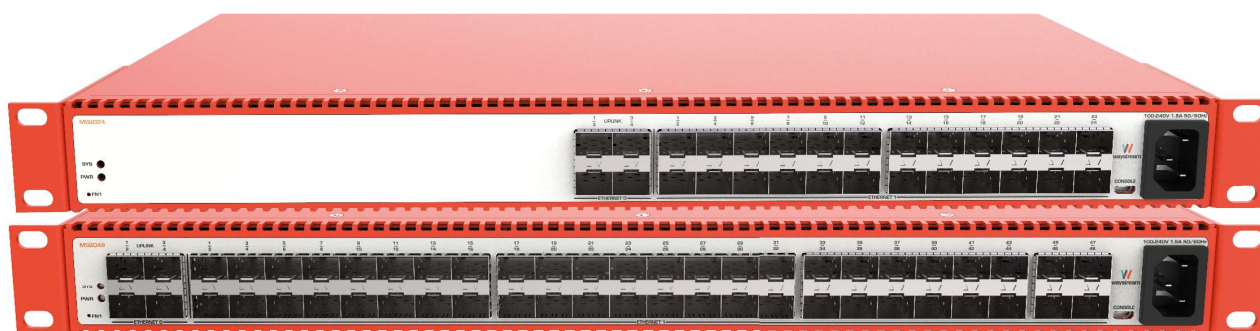


MS8000 Switch

10Gbit/s access switch for FTTH/FTTB



All ports are 10Gbit/s Ethernet

The MS8000 Ethernet switch is purpose built for FTTH/FTTB access to enable easy operation and deployment of services.

The MS8000 provides you with a feature set to support demanding business and residential services such as Internet, TV, wholesale capacity services and private networks at the same time as simplified and automated control of the network lets you reduce operational cost and save time when dealing with network issues.

The MS8000 meet network operator needs for long deployment cycles and reliable network operation and it is purpose built with fiber networks in mind to support a wide variety of network architectures and service models.

Using extended temperature in MS8000 models you can deploy the switches in outdoor enclosures such as street cabinets.

BENEFITS

- FTTH Customer and Service VLAN topology support with advanced QoS
- 28 or 52 SFP+-based downlink ports supporting 1/10Gbit/s speed, with extended -20 to +70C temperature models
- Front-to-side airflow for optimal cooling
- Telemetry and service assurance of multicast TV

Product overview

The MS8000 is a Layer 2 access switch designed for FTTx access networks, network aggregation and traffic classification and prioritization to deliver the ultimate user experience.

The MS8000 is built with modern technology and has support for 1 Gbit/s and 10Gbit/s over fiber using a variety of SFP modules as well as 2.5 Gbit/s 2500BASE-T using copper-SFPs for example to connect wireless access-points.

The MS8000 is filled with features to deliver voice, video and data services and to support your network team in daily troubleshooting and network operations, including streaming telemetry.

The MS8000 can be used in a variety of network topologies such as

- Customer VLAN topology in combination with a Service Router/BNG with efficient multicast distribution and optional RADIUS based control of ingress traffic,
- Service VLAN topology where the MS8000 performs service enforcement and isolates end-users securely using MAC Forced Forwarding.
- TR-101 topologies with VLAN translation.
- PPPoE topologies with intermediate agent features for customer identification

The MS8000 can mix these features to support transitions from PPPoE to Service VLAN or Customer VLAN topologies. 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 MS8000 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 MS8000 operation.

The MS8000 is available with either with 28 SFP+ (MS8024) or 52 SFP+ (MS8048) Ethernet downlink ports.

The models are available as commercial or extended temperature range versions with AC or DC power options. This creates a versatile model programme that can be used in remote deployed street cabinets, building installations or central office sites for access and aggregation of traffic.

Benefits

Faster services and advanced traffic classification/forwarding

The MS8000 can deliver faster services. Using the onboard network processor (NPU) gives the MS8000 extensive traffic classification and service oriented bandwidth control and scheduling using advanced algorithms such as Weighted Fair Queuing (WFQ). 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 rate-limiting. In ASIC-accelerated mode the MS8000 supports policing and shaping on port queue level.

Extended temperature range and front to side-back cooling

The MS8000 extended temperature range versions are designed to operate even in tough conditions with limited or no cooling. Supporting a temperature range between -20 and +70°C allows the MS8000 to be deployed into street cabinets or other exposed installation enclosures. The unique airflow solution with front-to-side airflow allows units to be installed in confined spaces, close to a rear wall or ETSI 300mm cabinets and still provide sufficient cooling of the front-panel SFPs.

Zero touch deployment

The MS8000 can be deployed into the network directly out of the box. There is no need for pre-configuration of the switch before installation. Using standard protocols the switch can have its firmware upgraded and complete system configuration downloaded when connected to the network.

Connectors in the front

All connectors for network, administration and power are located in the front of the unit. In addition the MS8000 has a small form factor, only 24 cm deep. This simplifies installation and makes the MS8000 fit into narrow spaces in multi-dwelling unit environments as well as dense deployment in central office or wiring-closet sites. An additional 12V DC power input connector is located in the rear enables dual external power sources.

Customer and service VLAN topologies

The MS8000 can be used in a wide variety of network topologies and supports:

- Ethernet wholesale with C-VLAN and S-VLAN, supporting double-tagging for business services or open-access networks.
- Customer VLAN topologies with a central Service Router/BNG
- Service VLAN topologies using DHCP snooping for end-user and network security
- IP strict clients for anti-spoofing
- MAC Forced Forwarding prevents layer 2 interaction between clients in the VLAN, including ARP inspection for increased security

A major concern in BNG 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 BNG topologies this both increases the number of devices that need configuration and requires advanced rate-limiting functions to avoid a negative impact on traffic flows. The MS8000 can use RADIUS to automatically obtain configuration instructions for 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. MS8000 supports simultaneous forwarding of up to 4000 multicast groups.

The MS8000 supports full VLAN range, up to 4,096 vlans, including double-tagging, and 16,000 MAC addresses.

Support for dual stack services

IPv6 deployment is now becoming mandatory in many networks. MS8000 also supports classification on IPv6 including policies for traffic management and QoS.

Service Assurance of IPTV-multicast

The MS8000 can also inspect multicast MPEG using the RPM feature to measure the quality. If an end user reports a problem with the TV service, the RPM data provides an immediate information if a problem is seen in the network, and if it affected the entire network or only a part of the network. The RPM help network engineers to pinpoint the location of the problem in seconds.

MPEG over RTP as well as UDP is supported. Metrics are collected from 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 and misaligned per TS multicast group

Both SD-TV and HD-TV streams can be monitored.



Telemetry data visualized by Grafana

Streaming telemetry

The MS8000 supports streaming telemetry data from over 1,500 data points to provide indepth information about system health and network performance. Data points include optical transmit/receive levels, temperature, fan operation, multicast delay and lost/error packets, packet drop counters, packet flow counters, buffer allocation and more. Telemetry data can be uploaded directly to an InfluxDB or as JSON objects.

Environmental touch

The MS8000 series has been adapted to meet Swedish legislation to reduce certain hazardous materials commonly used in electronics. The MS8000 contains less bromide, phosphorous and chlorine compounds than comparable products which reduces the health risks associated with electronics.

In addition, the MS8000 supports Waystreams super low power SFPs that can reduce carbon emission and the electricity bill by 20-25% on average for FTTx equipment.

Technical Specifications



| Physical | | |
|--|---|---|
| Model | MS8024/MS8024E | MS8048/MS8048E |
| Uplink ports | 4 1000/10000base-X (SFP+) | 4 1000/10000base-X (SFP+) |
| Downlink ports | 24 1/10G (SFP+ fiber) / 2.5G (SFP copper) | 48 1/10G (SFP+ Fiber) / 2.5G (SFP copper) |
| 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, dual color Power LED indicator System LED indicator | |
| Acoustic | Temperature controlled fans. At room temperature (22 degrees C) all units <50 dB | |
| | MS8024 Typical: 44 dB Max: 58 dB | |
| | MS8048 Typical: 50 dBMax: 65 dB | |
| | MS8024E Max: 62 dB MS8048E Max: 67 dB | |
| Cooling | Redundant fan. The MS8000 has sufficient cooling capacity even with one fan failing. Commercial temp: Front-to-side airflow Extended temp: Front-to-side + back airflows | |
| Environmental | | |
| Operating temperature | Commercial temperature: 0 to 45°C, Extended temperature: -20 to 70C (E-models) | |
| Operating humidity | 10% to 90%, non-condensing | |
| Storage temperature | -40 to 70°C | |
| Storage humidity | 5% to 95%, non-condensing | |
| Rack mounting | Standard 19" rack mountable | |
| Heat dissipation | See power consumption | |
| Power and Safety | | |
| Power connector | AC: One IEC 60320-1 C14, located on the front panel One 12VDC connector located on the back panel for external power supply DC: One four-pin female JK2EDGR-508-4 with dual power inputs | |
| Power | AC: Front-panel AC power input 100-240V, 50/60 Hz to internal PSU DC 24-port: Front-panel DC power input -38V~-57V to internal PSU DC 48-port: Front-panel DC power input -40V~-72V to internal PSU Rear-panel 12V DC power input to mainboard | |
| Power consumption (max/average using typical BX-D SFP) | MS8024 AC/DC: 54/42W, MS8024E AC/DC: 125/58W MS8048 AC/DC: 130/83W, MS8048E AC/DC: 133/91W | |
| Safety | LVD (2014/35/EU) IEC/EN 60825-1, IEC/EN 60825-2 CE mark: EN 62368-1:2014+A11 CB scheme: IEC/EN 60950-1 | |
| EMC | CE EMC (2014/30/EU) Emission: EN55032:2015 Class B Immunity: EN61000-4-2:2009, EN61000-4-3:2006+A1:2008+A2:2010, EN61000-4-5:2014, EN61000-4-6:2014 | |
| RoHS, WEEE and REACH | RoHS 2017/2102/EU and 2015/863/EU, WEEE 2012/19/EU, SFS2016:1067, REACH | |

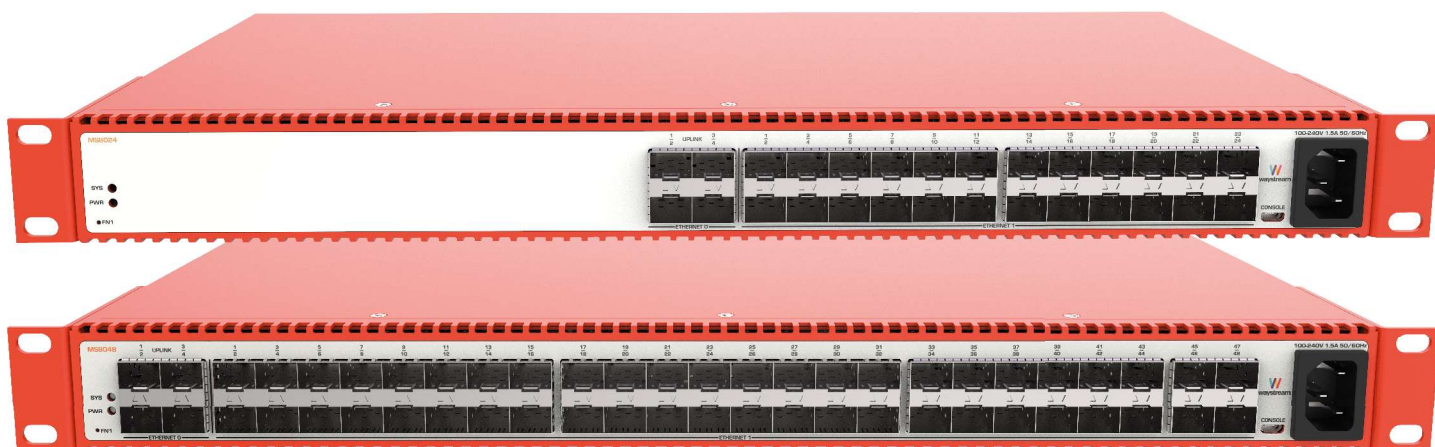
| Performance | |
|-------------------------|---|
| Switch ASIC performance | Forwarding bandwidth: 160 Gbps, 240Mpps |
| NPU Performance | 1200Mhz NPU with 4 cores, providing up to 10 Gbps throughout |
| MAC table | 16000 MAC addresses |
| VLAN table | 1000 vlans from full VLAN range |
| Multicast S,G entries | 2048 L2 multicast, 4000 IP multicast groups |
| Jumbo Frames | Up to 9 Kbyte |
| 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) Strict priority (SP) Weighted fair queuing (WFQ) in NPU |
| Policing ingress/egress | 2000 policers 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 802.3z – Gigabit Ethernet IEEE 802.3ae – 10Gbit/s over optical fibre IEEE 802.1p and 802.1Q with full VLAN range including Q-in-Q IEEE 802.1s Multiple 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 |
| Multicast | IGMPv2 snooping and proxy Static join of multicast groups |
| Other features | |
| System boot | BOOTP/DHCP client for address assignment |
| Flow export | Netflow version 9 |
| 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 Port security |
| Mirroring | Interface mirroring to local interface Interface mirroring over GRE to remote Wireshark or other packet capture tool |
| Programmable extension | ScriBOS script language for programmable extension |

| Management | |
|-------------------------------|--|
| Command Line Interface | Industry standard CLI with debugging, configuration and management Telnet SSH RADIUS/TACTACS AAA for CLI access |
| Serial interface | RS232 console serial port to access CLI |
| SNMP | SNMPv1, v2c and v3 |
| PFDP | PacketFront Device protocol exchange system information with other iBOS devices and selected PFNP customer premise equipment |
| System boot | BOOTP/DHCP client for address assignment |
| Time | NTP time synchronisation |
| Remote logging | Syslog |
| LLDP | Link Layer Discovery Protocol |
| Telemetry | Streaming telemetry as InfluxDB line-protocol or JSON over HTTP and REST API |
| Stacking | Stacking for network management, up to 8 switches per stack |

Purchase your MS8000

To find out how you can join the growing number of networks using the MS8000, please contact your local partner or sales@waystream.com.

| Article | Description |
|-------------------------|--|
| MS8024-AC | MS8024, 28-port 1G/10G SFP+, commercial temperature, AC power, iBOS Standard |
| MS8048-AC | MS8048, 52 port 1G/10G SFP+ commercial temperature, AC power, iBOS Standard |
| MS8024E-AC | MS8024, 28 port 1G/10G SFP+, -20 to +70C ext. temperature, AC power, iBOS Standard |
| MS8048E-AC | MS8048, 52 port 1G/10G SFP+, -20 to +70C ext. temperature, AC power, iBOS Standard |
| MS8024E-DC | MS8024, 28 port 1G/10G SFP+, -20 to +70C ext. temperature, DC power, iBOS Standard |
| MS8048E-DC | MS8048, 52 port 1G/10G SFP+, -20 to +70C ext. temperature, DC power, iBOS Standard |
| CBL-CONSOLE | Serial console cable (RJ-45 to DB9) (Note: MUSB adapter also needed) |
| CBL-CONSOLE-MUSB | Serial console cable adapter (Micro-USB to RJ-45 female) |
| PSU-12-180 | External AC to DC power supply 12VDC, 15A, 180W |



ABOUT WAYSTREAM

Waystream provides products fit for FTTH that are reliable, easy to operate and delivers great services. This means that the network can be built faster with better return on investment, more satisfied end-users and a robust solution. We provide switches, routers and related accessories that lets business and residential services be delivered over fiber.

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