Falcon-MX

Access Service Aggregation/Demarcation Platform

- 10G service aggregation/demarcation unit for business Ethernet and mobile backhaul
- Based on 3rd generation Falcon platform with 160Gbps throughput
- Full set of MEF CE2.0 compliant services
- SDN and NFV ready with expansion slot for processing cores
- Advanced QoS and service level traffic management
- Complete OAM toolbox (802.1ag, Y.1731, RFC2544, Y.1564) for OPEX reduction
- Advanced high speed protection mechanisms for link, path, and ring service resilience
- Extensive Sync and Timing options with GNSS, SyncE, PTP (including GM), BITS, etc
- Compact design, with low power consumption

Product Overview

The **Falcon-MX** is a highly integrated, high performance, service aggregation and demarcation system, delivering high end Carrier Ethernet services.

This product extensively supports the evolving needs for broadband access services delivery, including high throughput, granular SLA enforcement and monitoring, flexible management capabilities, and a high degree of scalability and flexibility to cater for future requirements and technology trends.

The **Falcon-MX** primarily addresses the rapidly expanding market of mobile backhauling and business access applications.

The **Falcon-MX**'s extensible hybrid (ASIC-FPGA) HW architecture supports remote data plane upgrades, as well as adding processing capacity via expansion modules.

The **Falcon-MX** delivers a complete toolbox for precision timing based on SyncE, PTP, GNSS, etc., suitable for all modes of mobile backhaul applications.

The system is equipped with an expansion slot that can be utilized for multiple functions, such as a Rubidium Atomic Clock Module (for timing applications), or a processor/storage module (for SDN/NFV enabled environments).

The **Falcon-MX** is also designed to perform as a 10G demarcation device (on applicable models).

The **Falcon-MX** series is equipped with up to 24 dual-rate FE/GE SFP ports, up to 4 tri-speed Copper ports and up to 4 10G SFP+ uplink ports. All ports can operate at full wire speed, with a total processing capacity of 160Gbps (non-blocking).

The **Falcon-MX** offers advanced Quality of Service (QoS) features including classification and mapping based on layer 1 through layer 4 attributes, rate limiting per service, with highly flexible scheduling, queuing and shaping options (including HQoS).

All MEF defined services (EPL, EVPL, ELAN, etc) can be configured on the **Falcon-MX** series and can also be protected through use of high performance mechanisms, based on G.8031, G.8032, etc., for link, path, and ring resilience.

These features make the **Falcon-MX** a highly comprehensive package that can handle virtually any network topology and type of service.

The system implements current OAM standards (802.3ah, 802.1ag, Y.1731with HW assist as well as proactive measurements and alarming facilities.

To complete the OAM toolset, the **Falcon-MX** has a built in packet generator and analyzer to implement RFC2544/Y.1564 for quick service turn-up and verification.

The **Falcon-MX** series is MEF CE2.0 compliant.

The **Falcon-MX** devices are packaged in a robust 19"/1RU housing allowing the installation of hot swappable redundant AC and/or DC power supplies.

Technical Specifications

Interfaces & Indicators

- 12/24 x 100/1000BaseX (SFP)
- 4 x 10/100/1000BaseT (RJ45)
- 2/4 x 1/10G (SFP+)
- Supported SFP/SFP+: MM, SM, SFS, CWDM, DWDM, Copper
- 1 x RS232 (RJ45) Console
- 1 x USB port (console)
- *LEDs:*
  - Power (per PS)
  - CPU, alarm
  - Link/Activity (per port)
  - Aux. module (Rubidium, processing engine for SDN/NFV, etc.)

Architecture & Forwarding

- Hybrid (ASIC-FPGA) HW architecture
- 1GB RAM, 256MB flash memory
- L2 forwarding (802.1D MAC bridging)
- Flow-based forwarding
- Performance: wire-speed, on all ports, all frame sizes
- Switching fabric: 160Gbps, non-blocking
- MTU: 10K bytes
- MAC table: 32K addresses
- VLANs: 4K concurrent
- Provider bridging: 802.1ad (Q-in-Q)
- Private VLANS
- L1-L4 ACLs
- Multicast*:*
  - IGMPv3 snooping
  - MLD snooping
  - Up to 8K MC groups
- Static routes

Quality of Service

- Classification based on L1-L4 information
- Ingress policing per flow (MEF BW profiles)
- Two rate, 3-color marking
- Hierarchical queuing/scheduling
- Hierarchical shaping
- Priority based flow control (802.1Qbb)
- Scheduling: Strict and DWRR (WFQ equivalent)
- 4 drop precedence levels w/ WRED and tail drop for CA
- P-bit and DSCP remarking
- Storm control: UC, MC, BC
- QoS Control Lists
- Compliant with 3GPP QoS requirements for LTE backhaul

Protection

- *Link*:
  - Link aggregation: static or LACP
  - Link Protection
- Linear protection: G.8031
- Ring protection : G.8032v2
- Spanning tree: STP, RSTP, MSTP
- Loop protection

OAM & Diagnostics

- IEEE802.3ah link OAM
- IEEE802.1ag CFM (HW assisted)
- ITU-T Y.1731 PM (HW assisted)
- RFC2544 traffic generator & analyzer (up to wire speed)
- L2 loopbacks w/ MAC swap
- Throughput metering
- SFP diagnostics (SFF-8472)
- Traffic mirroring and remote mirroring
- sFlow

Management

- *Interfaces*:
  - CLI: Console (RS232), Telnet, SSH1/2
  - SNMP: v1/v2c/v3, extensive MIBs, trap profiles
  - Web: HTTP/HTTPS
  - Management VLAN
  - IPv6 management
- *Authentication:*
  - RADIUS, TACACS+
  - Multiple local users
  - User access levels (15)
  - Management ACLs
  - 802.1x (port/MAC based)
- DHCP client & relay (incl. option 82)
- Link discovery: LLDP, CDP snooping
- *Operations:*
  - Remote System Update (TFTP or Web)
  - Configuration upload/download (TFTP or Web)
  - Text based config files
- *Alarms:*
  - SNMP traps
  - Syslog (internal and remote server)
  - CLI events
  - Dying gasp (802.3ah or SNMP trap)
- Remote temperature reading & alarm
- Per port, EVC and CoS detailed statistics, RMON; NTPv4
- Integrated into the NetACE NMS

Synchronization (G models)

- Synchronous Ethernet
- G.8261, G.8262
- ESMC (G.8264)
- Built-in Stratum 3 clock
- *Physical interfaces:*
  - 2 x SMA connectors for 1PPS/Clk, in/out
  - BITS
  - ToD/1PPS
  - GNSS active antenna (5VDC)
- *IEEE1588-2008 (PTP):*
  - Ordinary Clock (master, slave)
  - Transparent Clock
  - Boundary Clock
  - Grandmaster (w/ GNSS)
- *PTP Profiles supported:*
  - Telecom Frequency (G.8265.1)
  - Telecom Phase (G.8275.1, G.8275.2)
  - Default (1588)

Power & Environmental

- Dual, redundant, hot swappable power supplies
- AC/DC: 100-240VAC, 50/60Hz or 125VDC
- DC: 20-60VDC, ST connector
- *Power consumption:*
  - Maximum: <60W; typical: <50W
- *Operating temperature:*
  - Standard: -10°C ÷ +50°C (14°F ÷ 122°F)
  - Extended: -40°C ÷ +65°C (-40°F ÷ 149°F)
- Storage temperature: -40°C ÷ +80°C (-40°F ÷ 176°F)
- Humidity: 10-90%, non-condensing

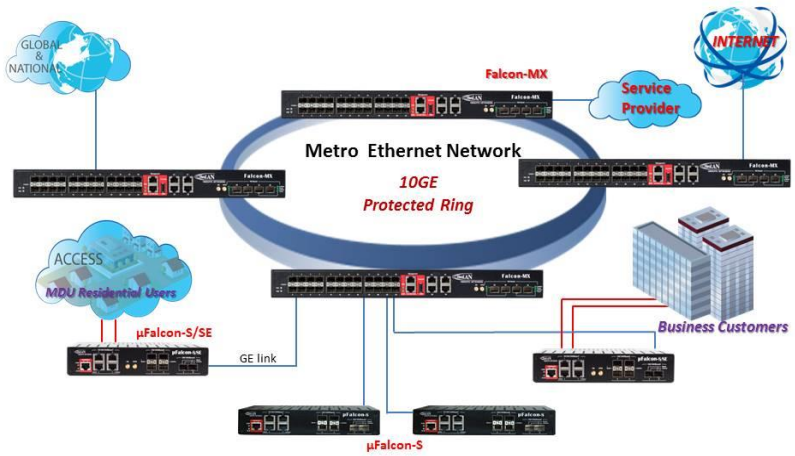
Physical

- 1RU/19”, ETSI compatible
- Dimensions (HxWxD): 44x440x244mm (1.73x17.33x9.60 inch)
- Weight: ~3.3Kg (6.6 lb)
- *Mounting:*
  - Desktop
  - Rack (19”, 23”)
  - Wall
- *Accessories:*
  - Power cable
  - RS232 cable (console)
  - USB cable (console)
  - Rack mounting kit (optional)

Regulatory & Compliance

- *Safety:*
- IEC EN60950-1
- *EMC:*
  - EN 300 386 V1.3.3: 05
  - FCC CFR 47 part 15, subpart B, Class A
- MEF: **CE2.0**
- CE
- RoHS

Typical Application: Business Ethernet



Ordering Information

Model	Part #	Description
Falcon-MX/428/A	7120	Access Service Aggregator, 24x100/1000BaseX (SFP), 4x10/100/1000BaseT, 4x10GE (SFP+), 1 removable AC power supply (FPS10012/A), CE SW license
Falcon-MX/428/D	7121	Access Service Aggregator, 24x100/1000BaseX (SFP), 4x10/100/1000BaseT, 4x10GE (SFP+), 1 removable DC power supply (FPS10012/D), CE SW license
Falcon-MX/428/G/A	7122	Access Service Aggregator, 24x100/1000BaseX (SFP), 4x10/100/1000BaseT, 4x10GE (SFP+), advanced timing spec (w/ GNSS), 1 removable AC power supply (FPS10012/A), CE SW license
Falcon-MX/428/G/D	7123	Access Service Aggregator, 24x100/1000BaseX (SFP), 4x10/100/1000BaseT, 4x10GE (SFP+), advanced timing spec (w/ GNSS), 1 removable DC power supply (FPS10012/D), CE SW license
Falcon-MX/216/A	7124	Access Service Aggregator, 12x100/1000BaseX (SFP), 4x10/100/1000BaseT, 2x10GE (SFP+), 1 removable AC power supply (FPS10012/A), CE SW license
Falcon-MX/216/D	7125	Access Service Aggregator, 12x100/1000BaseX (SFP), 4x10/100/1000BaseT, 2x10GE (SFP+), 1 removable DC power supply (FPS10012/D), CE SW license
Falcon-MX/404/A	7126	Access Service Aggregator/EDD, 4x10/100/1000BaseT, 4x10GE (SFP+), 1 removable AC power supply (FPS10012/A), CE SW license
Falcon-MX/404/D	7127	Access Service Aggregator/EDD, 4x10/100/1000BaseT, 4x10GE (SFP+), 1 removable DC power supply (FPS10012/D), CE SW license

Specifications are subject to change w/o prior notice

**** Roadmap features (via remote upgrade); some require SW license***

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