

Falcon-MTS

Master Timing & Synchronization System



- High capacity, versatile master timing system
- Suitable for any application requiring accurate timing and synchronization
- High performance GNSS receiver for Stratum 1 traceable timing
- Field replaceable Rubidium modules for Stratum 2 holdover performance
- BITS input and outputs (up to 33)
- HW based 1588v2 high capacity Grandmaster
- Gigabit Ethernet ports (RJ45/SFP, 8 total) for maximum deployment flexibility
- ToD/1PPS (RJ45/RS422) interfaces
- Clock/1PPS inputs/outputs (SMA) for direct external synchronization
- Expansion modules for record high clock redundancy
- Integrated NTP client and server
- Compact design (1RU/2RU), low power consumption
- Comprehensive front panel indications

Product Overview

The **Falcon-MTS** is a highly integrated, fully featured, high accuracy master timing and synchronization distribution system. It addresses multiple applications including mobile backhauling, transportation, healthcare, finance and others.

This product extensively supports the distribution of Stratum 1 traceable timing for both legacy and modern networks, based on a multi-constellation (e.g. GPS) integrated GNSS subsystem.

Synchronization in networks has always been a key functionality. This has become even more challenging when modern transport networks are based on

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asynchronous packet infrastructure, while at the same time functional and accuracy requirements are becoming tighter and more demanding.

The **Falcon-MTS** has the ability to drive sync to both local systems (typically core machines), via its physical interfaces (e.g. BITS) as well as remote edge devices via SyncE and 1588 (PTP).

The unit provides integrated NTP client and server.

The system features 1 or 2* expansion slots for optional Rubidium Clock Modules (RBCM-x), to allow long periods of Stratum 2 level holdover and high availability.

Based on a unique HW architecture, the **Falcon-MTS** presents an industry leading degree of flexibility and scalability. It can drive hundreds of PTP slaves (including Unicast) at full packet rate.

The **Falcon-MTS** is equipped with 4x10/100/1000BaseT (RJ45) ports and 4xSFP ports for packet based communication and timing. All ports can be used in a flexible manner and operate at full wire speed, leading to a total processing capacity of 16Gbps (non-blocking).

Timing is delivered over a multitude of physical interfaces, including BITS (33 outputs), 10MHz, 1PPS (SMA), ToD/1PPS (RS422/RJ45) and SyncE.

For packet based timing, the **Falcon-MTS** implements the 1588v2 standard, as Grandmaster, Boundary Clock or Transparent Clock. In all modes of operation, up to 2000 slaves can be supported, including Unicast, at full packet rate.

The **Falcon-MTS** series is packaged in a robust 19"/1RU (or 2RU) housing that allow the installation of hot swappable redundant AC and/or DC power supplies.

Technical Specifications

Interfaces & Indicators

- 4 x 10/100/1000BaseT (RJ45)
- 4 x 100BaseFX/1000BaseX (SFP)
- Supported SFPs: MM, SM, SFS, CWDM, DWDM
- 1 x RS232 (RJ45) Console
- 32 x BITS output (E1/T1, 4 x DB25)
- 1 x BITS input/output
- 1 x ToD/1PPS input (RJ45), 1 x ToD/1PPS output (RJ45)
- 1 x GNSS active antenna (TNC, 5VDC)
- 2 x Clock/1PPS input/output (SMA)
- **LEDs:**
 - Power (per PS)
 - Link/Activity (per GE port)
 - Speed (per GE port)
 - BITS active (per E1/T1)
 - PTP, Holdover
 - GNSS, Rb (per Rubidium module)
 - CPU, Alarm

Architecture & Packet Forwarding

- Dual Hybrid Core (DHC) HW architecture
- Data Plane Upgradable (DPU)
- 128MB RAM, 32MB flash memory
- L2 and flow based forwarding
- Performance: wire-speed, on all ports, all frame sizes
- Total throughput: 16Gbps, non-blocking
- MTU: 9600 bytes
- MAC table: 8K addresses
- VLANs: 4K concurrent
- Provider bridging: 802.1ad (Q-in-Q)
- L1-L4 ACLs
- **Multicast:**
 - IGMPv3 snooping
 - MLD snooping

Sync Inputs

- **Global Navigation Satellite System (GNSS) receiver:**
 - Stratum 1 traceable source
 - Operates on GPS, GLONASS, Galileo, BeiDou and others
 - Optimized for timing applications
 - Automatic tracking of up to 32 satellites
 - Cable delay compensation
 - TNC connector active antenna (5VDC)
 - Generates 1PPS and 10MHz (internally)
 - Receiver phase accuracy: <15nsec (@ 1 sigma)
- BITS – T1, ESF/SSM; E1, CRC4/SSM
- SyncE on GE ports
- **1588-2008 (PTP):**
 - Ordinary Clock (slave)
 - Boundary Clock
- **External:**
 - SMA connectors
 - 1PPS or Clock (5*/10MHz)
- ToD/1PPS, RS422, RJ45

Sync System

- Designed to deliver Stratum 1 traceable timing
- Compliant with G.812
- High accuracy clock center
- Flexible locking to inputs and distribution to outputs
- Frequency and phase sync
- Tracking within <100nsec to UTC (comply w/ G.8272)
 - Slave capacity: up to 2000 (license dependent)
- Timestamp accuracy: <8nsec
- **Holdover:**
 - Built in OCXO for Stratum 3E
 - Optional 1 or 2* Rb modules for Stratum 2E (>7 days)
 - Accuracy w/ Rb: $\pm 2.5E-11$ /day (max); $\pm 1E-10$ /month (max)
 - Time drift w/ Rb: <1.5usec/day; typical: <1usec/day

Sync Outputs

- BITS outputs – T1, ESF/SSM; E1, CRC-4/SSM
- Synchronous Ethernet
- G.8261, G.8262, ESMC (G.8264)
- SMA connectors for Clock/1PPS
- ToD/1PPS interfaces (RJ45, RS422)
- NTP server
 - 1K requests/sec (10Ks clients) in SW mode
 - >100K req/sec in HW mode (future release)
- NTPv4 client
- *IEEE1588-2008 (PTP):*
 - Grandmaster, OC and BC modes
 - Eth/UDP, Multicast and Unicast
 - HW based Sync and Delay Req. processing (SW option)
 - G.8272 (PRTC) and G.811 (freq.) compliance
 - G.8265.1 and G.8275.1 (Telecom profile) compliance
 - Up to 2K unicast slaves @ full message rate (SW options)
 - 1 and 2 step operation

OAM & Diagnostics

- IEEE802.3ah link OAM
- IEEE802.1ag CFM
- ITU-T Y.1731 PM
- Throughput metering
- CopperLinkTest (TDR on Ethernet Copper ports)
- SFP diagnostics (SFF-8472)
- Traffic mirroring

Management

- *Interfaces:*
 - CLI: Console (RS232), Telnet, SSH1/2
 - SNMP: v1/v2c/v3, extensive MIBs
 - 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
- Multiple IP interfaces/subnets, static routes
- *Operations:*
 - Remote System Update (FTP/TFTP or Web)
 - Configuration upload/download (FTP/TFTP or Web)
 - Text based (CLI) configuration files
 - Auto-configuration*
- *Alarms:*
 - SNMP traps
 - Syslog (internal and remote server)
 - CLI events
 - Dying gasp (802.3ah or SNMP trap)
- Remote temperature reading & alarm
- Per port and CoS detailed statistics

Protection

- Link aggregation: static or LACP
- Linear: G.8031 (<50msec)
- Ring: G.8032v2 (<50msec)
- Spanning tree: STP, RSTP, MSTP

Power & Environmental

- Dual, redundant, hot swappable power supplies
- AC/DC: 100-240VAC, 50/60Hz or 125VDC
- DC: 20-60VDC, ST connector
- *Power consumption:*
 - Maximum: <45W (including RBCM)
 - Typical: <30W
- *Operating temperature:*
 - Standard: -10°C ÷ +50°C (14°F ÷ 122°F)
 - Extended: -25°C ÷ +60°C (-13°F ÷ 140°F)
- Storage temperature: -40°C ÷ +80°C (-40°F ÷ 176°F)
- Humidity: 10-90%, non-condensing

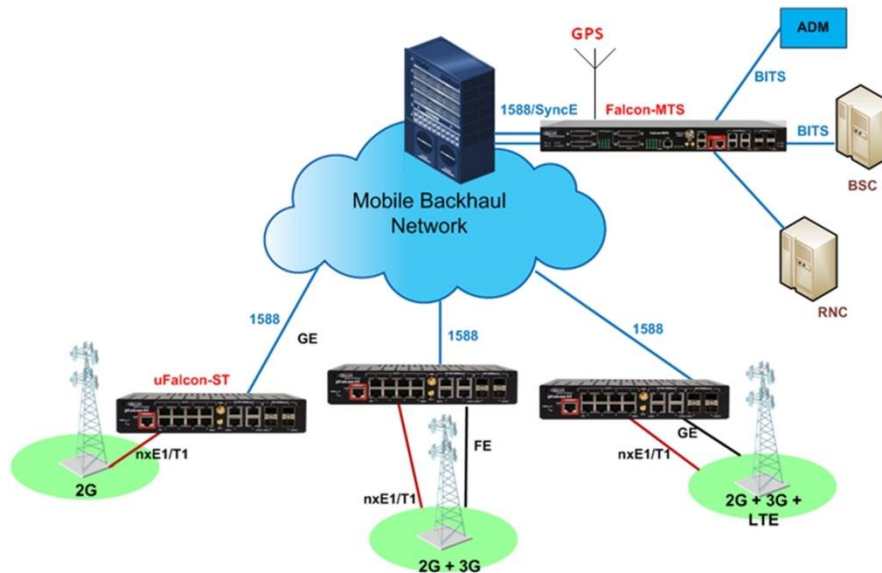
Physical

- 1RU/19", ETSI compatible (2RU for Falcon-MTS/2R)
- Dimensions (HxWxD): 44x440x244mm (1.73x17.33x9.60")
- Weight: up to 5kg (11 lb), including one RBCM
- *Mounting:*
 - Desktop
 - Rack (19", 23")
 - Wall
- *Accessories:*
 - Power cable
 - Console cable
 - Rack mounting kit (optional)
 - BITS hydra to 8 x RJ48 (optional)
 - GNSS antenna cables (optional)
 - GNSS antenna (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, MEF9, MEF14, MEF20, MEF22
- CE
- RoHS

Typical Application: Multi-Generation Mobile Network Timing



Ordering Information

Model	Part #	Description
Falcon-MTS/A	7054	Master Timing System, 4x10/100/1000BaseT ports, 4x1000BaseX SFP ports, 32xBITS outputs, Rb module (RBCM-x) ready, 1 removable AC power supply (FPS10012/A)
Falcon-MTS/D	7055	Master Timing System, 4x10/100/1000BaseT ports, 4x1000BaseX SFP ports, 32xBITS outputs, Rb module (RBCM-x) ready, 1 removable DC power supply (FPS10012/D)
Falcon-MTS/2R/A*	7054-2R	Master Timing System, 4x10/100/1000BaseT ports, 4x1000BaseX SFP ports, 32xBITS outputs, dual Rb module (RBCM-x) ready, 1 removable AC power supply (FPS10012/A)
Falcon-MTS/2R/D*	7055-2R	Master Timing System, 4x10/100/1000BaseT ports, 4x1000BaseX SFP ports, 32xBITS outputs, dual Rb module (RBCM-x) ready, 1 removable DC power supply (FPS10012/D)
Falcon-MTS/SWL/PTP-1	7056	SW license for enhanced capacity (1K) PTP Master
Falcon-MTS/SWL/PTP-2	7056-2	SW license for enhanced capacity (2K) PTP Master
RBCM-1	7110	Rubidium Clock Module, type 1
FPS10012/A	7106	Redundant power supply, AC/DC (100-240VAC/125VDC), 50 to 60Hz, 100W
FPS10012/D	7107	Redundant power supply, DC (20-60V), 100W

Specifications are subject to change w/o prior notice

Note: for a complete list of available Falcon models please contact Fibrolan

** Roadmap item/model*

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