µFalcon-SG

Edge & Enterprise Timing Master

- Advanced Edge/Enterprise Timing Master platform delivering synchronization and timing for mobile networks, power grids, data centers, enterprises, transportation, healthcare, etc.
- Comprehensive timing and synchronization features, including GNSS receiver, IEEE1588v2, NTP, SyncE and external frequency/phase
- Flexible configurations for timing distribution over physical and logical interfaces, HW timestamping, SyncCenter™
- 1588v2 (PTP) Grandmaster, Boundary Clock, Transparent Clock, Slave, one/two step, L2/L3, unicast/multicast
- NTPv4/SNTP client and server, for IT oriented applications
- TCXO and OCXO options for extended holdover
- MEF compliant switching core, supporting Carrier Ethernet features, with full wire speed capability on all ports, resiliency capabilities and OAM tools

Product Overview

The **µFalcon-SG** is a highly integrated, compact, high performance, and cost-effective Edge and Enterprise Timing and Synchronization system.

This product extensively supports packet based timing, with PTP and NTP, as well as physical interface based synchronization, including SyncE and 1PPS/10MHz.

The **µFalcon-SG** primarily addresses applications requiring a local timing distribution function with high accuracy, in compact form factor and low power consumption.

Such applications include mobile networks, power grids, data centers, enterprises, transportation (ground, air, naval), healthcare and more.

The **µFalcon-SG** offers a complete toolbox of precision timing support, including an **integrated GNSS receiver**, **Synchronous Ethernet**, **1588v2/PTP GM** and **NTP** (server).

The PTP implementation can support multiple concurrent modes of operation including: Grandmaster, Master, Slave, Boundary Clock and Transparent Clock. These can operate at L2/L3, unicast/multicast, one/two step, with highly flexible configurations, allowing support for common profiles, such as Telecom.

For IT oriented applications, the **uFalcon-SG** features an NTP server that can be timed by GNSS or another NTP server.

Oscillator options include TCXO and OCXO for different levels of holdover, depending on application and requirements.

The **µFalcon-SG** is equipped with 4x10/100/1000BaseT (RJ45) user ports and 4xSFP ports. These ports can be used in a flexible manner and can all operate at full wire speed, with a total processing capacity of 20Gbps (non-blocking) on the switching core.

The **µFalcon-SG**'s additional QoS, flow forwarding as well as multiple resilience mechanisms (e.g. xSTP, G.8032v2) increase deployment and integration flexibility, thus saving additional equipment in many cases (CAPEX reduction).

The system implements current OAM standards (802.3ah, 802.1ag, Y.1731), HW assisted, as well as proactive measurements and alarming facilities. To complete the OAM toolset, the **µFalcon-SG** has a built in packet generator, analyzer and loopback facility to implement RFC2544 and Y.1564*.

To easily control and monitor the required timing and sync setup, the uFalcon-SG features several embedded GUI based tools, such as SyncCenter and SkyView, visualizing the clocking scheme and simplifying the system's provisioning and operation (lower OPEX).

The **µFalcon-SG** is housed in a compact, half-19", 1RU chassis (only 150mm/6" deep), and has an integrated internal, dual feed DC power supply (AC is optional).

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
- *LEDs:*
  - Power (per feed)
  - CPU, GPS
  - Link/Activity (per port)
  - Speed (per port)

Architecture & Forwarding

- Dual Hybrid Core (DHC) HW architecture
- Data Plane Upgradable (DPU)
- 128MB RAM, 32MB flash memory
- L2 forwarding
- Flow-based forwarding
- Performance: wire-speed, on all ports, all frame sizes
- Total throughput: 20Gbps, non-blocking
- MTU: 9600 bytes
- MAC table: 8K 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

Timing & Synchronization

- *Synchronous Ethernet:*
  - G.8261, G.8262
  - ESMC (G.8264)
- *GNSS receiver:*
  - Stratum 1 traceable source
  - Operates on GPS, GLONASS, Galileo, BeiDou, and others
  - Automatic tracking of up to 32 satellites simultaneously
  - 1xSMA connector (antenna input)
  - Suitable for 3.3VDC active antenna
  - Generates 1PPS and 10MHz (to sync system internally)
- *IEEE1588-2008 (PTP):*
  - Grandmaster
  - Ordinary Clock (master, slave)
  - Transparent Clock
  - Boundary Clock
  - One and two step
  - Ethernet and UDP (including VLANs)
  - Unicast and Multicast
  - HW timestamping
- *NTP:*
  - Server (from GNSS)
  - Client (can sync NTP server)
- *Built-in Oscillator options:*
  - TCXO (Stratum 3)
  - OCXO (Stratum 3E)
- 1xSMA connector for 1PPS/Clk (in/out)
- *Management features:*
  - SyncCenter
  - SkyView
  - GPS satellite tracking charts

Protection

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

OAM & Diagnostics

- IEEE802.3ah link OAM
- IEEE802.1ag CFM
- ITU-T Y.1731 PM (HW based measurements)
- RFC2544 & Y.1564* traffic generator & analyzer (HW based)
- L2/L3 loopbacks with MAC/IP swap
- Micro Burst Detection (MBD) with logging and reporting
- Throughput metering
- Copper TDR
- 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
- Operations
  - Remote System Update (TFTP or Web)
  - Configuration upload/download (TFTP or Web)
  - 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
- NetACE support
- NTP

Quality of Service

- Classification based on L1-L4 info
- Ingress policing per flow
- Two rate, 3-color marking
- 8 HW queues/port
- Egress shaping per queue/CoS
- Egress shaping per port
- Scheduling: Strict and DWRR
- P-bit and DSCP remarking
- Storm control: UC, MC, BC

Power & Environmental

- *Power supply*
  - Internal power supply: 20-60VDC, dual feed
  - (AC adapter option)
- Power consumption:
  - Maximum: <20W
  - Typical: <15W
- Passive cooling (no fans)
- *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

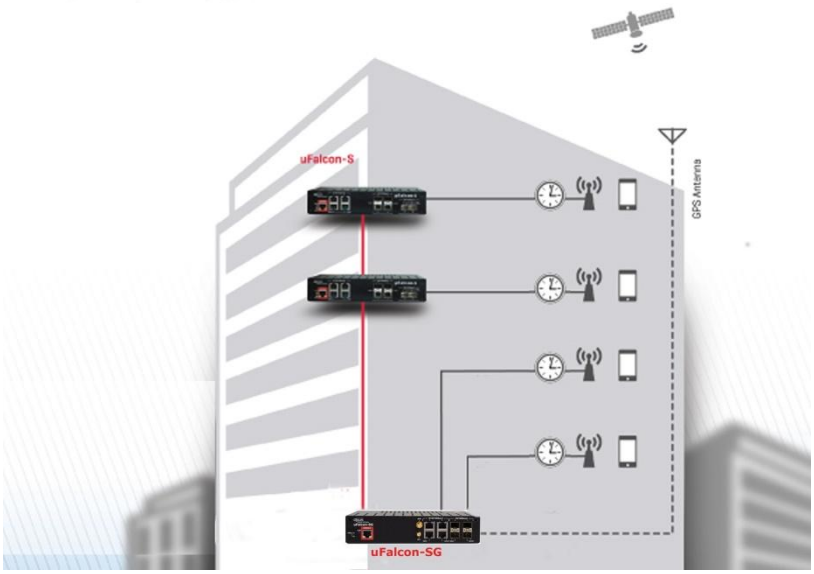
Physical

- *Dimensions* (HxWxD): 44x221x150mm (1.73x8.70x5.90")
- Weight: ~0.8kg (1.76lb)
- *Mounting:*
  - Desktop/Rack/wall
- *Accessories (more available):*
  - Power cable
  - Console cable
  - Rack mounting kit (optional)

Regulatory & Compliance

- *Safety:*
  - IEC EN60950-1: 2006
- *EMC:*
  - EN 300 386 V1.3.3: Class A
  - FCC CFR 47 part 15, subpart B, Class A
- MEF: **CE2.0**, MEF9, MEF14, MEF20, MEF22
- CE, RoHS

Typical Application: Small Cell Synchronization



Ordering Information

Model	Part #	Description
µFalcon-SG/SE/D	7081	Edge Timing Master, 4xUNI,10/100/1000BaseT ports, 2xUNI SFP ports, 2xNNI SFP ports, SyncE (precision timing) support, integrated GNSS receiver, internal DC (20-60VDC) dual feed power supply
µFalcon-SG/SE/D/ET	7082	Edge Timing Master, 4xUNI,10/100/1000BaseT ports, 2xUNI SFP ports, 2xNNI SFP ports, SyncE (precision timing) support, integrated GNSS receiver, internal DC (20-60VDC) dual feed power supply, ext. temp. range (-40°C ÷ +65°C)

Specifications are subject to change w/o prior notice

GNSS accessories (antenna, cable, etc.) are available – contact for details

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

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