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Data Sheet

General Availability

MiCLK

1588 Grandmaster on an SFP with Built-in GNSS

- Fully-featured Primary Reference Time Clock (PRTC) and IEEE 1588-2008 (PTP) Grandmaster
- Built-in GNSS receiver
- Miniature, pluggable device fits in any MSA-Compliant 1G SFP port
- Ideal for 4G/5G small cell deployments
- Cost-effective upgrade solution for 3G/4G/5G networks

MiCLK® offers a pluggable, easy-to-replace, cost-effective migration path for providing robust synchronization near the network edge. It enables flexible deployment and easy integration into existing networks. The cutting-edge embedded GNSS receiver features excellent time accuracy even under challenging deployment scenarios, such as building walls and urban canyons that are typical for small-cell installations. Design and timing redundancy techniques provide resiliency against local GNSS outage.

MiCLK supports both Layer-2 and Layer-3 PTP distribution in unicast and multicast modes.

MARKET SEGMENTS AND APPLICATIONS

Deployment scenarios include mobile networks, such as LTE and LTE-A, with a particular focus on small cell applications. Furthermore, support of simultaneous L2/L3 PTP distribution also provides a cost-effective upgrade solution for legacy networks, by supporting SDH replacement scenarios.

MiCLK's deployment location is versatile. Due to its pluggability and cost-effectiveness, MiCLK can be placed close to base stations in order to reduce packet delay variation and asymmetry. Furthermore, MiCLK saves CAPEX by adding timing capabilities to existing aggregation points, servicing dozens of base stations.

FULL-FEATURED PTP GRANDMASTER

MiCLK distributes frequency and time simultaneously, according to both ITU-T G.8265.1 (IP/unicast) and ITU-T G.8275.1 (L2/multicast), and G.8275.2 (IP/unicast) PTP telecom profiles. This is especially effective in hybrid cellular environments that comprise co-located 3G/4G/5G base station technologies. When working in ITU-T G.8265.1 or G.8275.2 mode, MiCLK supports up to 128 simultaneous slaves (symmetric 128 packets/second).

PRIMARY REFERENCE TIME CLOCK

MiCLK is used as an ITU-T G.8272 Primary Reference Time Clock (PRTC), providing information on GNSS time and frequency information to the network, by supplying a Sync-E distribution chain (Sync-E Ethernet SSM messages) and using its 1-PPS external interface output.

RESILIENCY

To achieve network-wide resiliency, operators may allow two or more PTP flows to reach every slave (base station), as it is the slave who selects the best master available.

One option is to install two or more MiCLK units in geographically separated network elements located in the same backhaul network section.

Alternatively, two MiCLK units can be plugged into the same router/switch (connected to the same GNSS antenna via a standard passive RF splitter).

Operators may choose a combination of both resiliency types.

MiCLK supports multiple GNSS backup schemes. If the underlying network already supports Sync-E, MiCLK exploits the incoming Sync-E reference to maintain its accurate time during a GNSS outage.

Another resiliency option is the Assisted Partial Timing Support (APTS). MiCLK simultaneously functions as a Grandmaster (GM) and a slave of 1588. The slave inside MiCLK synchronizes to an incoming PTP stream received from the central GM. During a GNSS outage, MiCLK recovers the frequency from the central GM to maintain its accurate time.

RAD

Your Network's Edge®

MiCLK

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Specifications

CAPACITY

Master Capacity	128 slaves (Symmetric 128 packets/sec)

INTERFACES

PTP/Sync-E/ MGMT	GE PTP/Sync-E/MGMT input/output and management over SFP or SFP+ 1000BASE-X (MSA compliant)
GNSS	L1 GNSS input port, COAX DIN 1.0/2.3(F) screw-locking connector, 50 Ohm
1PPS/CLK	1-PPS output over COAX DIN 1.0/2.3(F) screw-locking connector (50 Ohm)

MANAGEMENT

Multilevel User Access	up to 4 sessions
Dedicated IP address/subnet	IPv4, IPv6
VLAN 802.1Q	
Saving User Default Configuration	
Zero Touch	
DHCP	DHCP client
Protocols	Remote SW upgrade via SFTP or TFTP
DSCP Configuration	
Options	Graphical web interface
	Remote CLI (Telnet/SSH)

TIMING

PTP	Full featured IEEE 1588-2008 Grandmaster
	1-step and 2-step clocks supported as slave
	1-step clock supported as master
	ITU-T G.8265.1 or 8275.2 (IP/unicast) Telecom profile frequency and time distribution (IPv4, IPv6)
	ITU-T G.8275.1 (Eth/multicast) Telecom profile frequency and time distribution
	APTS opposite G.8275.2 GM over UDP/IP
	PTP/Sync-E hybrid (Sync-E for frequency and PTP for time)
	VLAN 802.1Q
	DSCP configuration for PTP (G.8265.1 and G.8275.2) packets
Synchronous Ethernet (Sync-E)	Sync-E Primary Reference Clock (PRC) output with Ethernet SSM according to G.8262 and G.8264 (with GNSS)
	Sync-E reference input (with Ethernet SSM handling) for GNSS backup
Internal Oscillator	Stratum 3E OCXO (complies with MTIE under variable temperature defined in G.8263)
Time Accuracy	Normal GNSS operation: Time error <UTC +/- 100nsec and MTIE<100nsec according to ITU-T G.8272 and ITU-T G.8273.1
	Sync-E based GNSS backup
	APTS based GNSS backup: Time error complies with test cases defined in G.8261
	Holdover time w/o any inputs: Time error < UTC +/- 1.5 µsec for at least 2 hours
Frequency Accuracy	Compliant with G.811 PRC requirements (during both GNSS normal and backup operation)

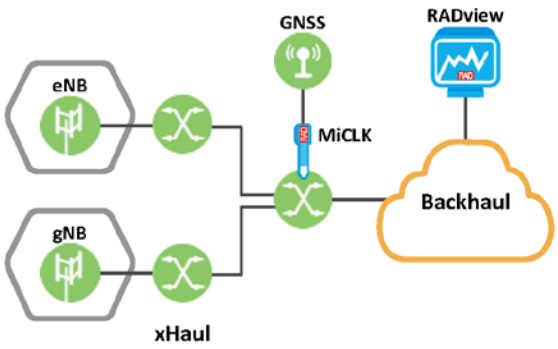

Figure 1. Timing and Synchronization with MiCLK

MiCLK

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GNSS Receiver	72-channel multi-GNSS receiver engine
	Dual frequency GNSS
	GPS L1C/A /QZSS L1 C/A
	SBAS L1 C/A: WAAS, EGNOS, MSAS
	GLONASS L1OF (L1 band)
	3.3 VDC antenna voltage supply

SECURITY

ACL	ACL security for management
TACACS+	TACACS+ Authentication, Authorization and Accounting

DIAGNOSTICS

Performance Monitoring	for timing
Syslog	
Indicators	GNSS operation status LED
	General fault indication LED

GENERAL

Environment

Operating Case Temperature	-20 to 85°C (-4 to 185°F)
Relative Humidity	Up to 95%

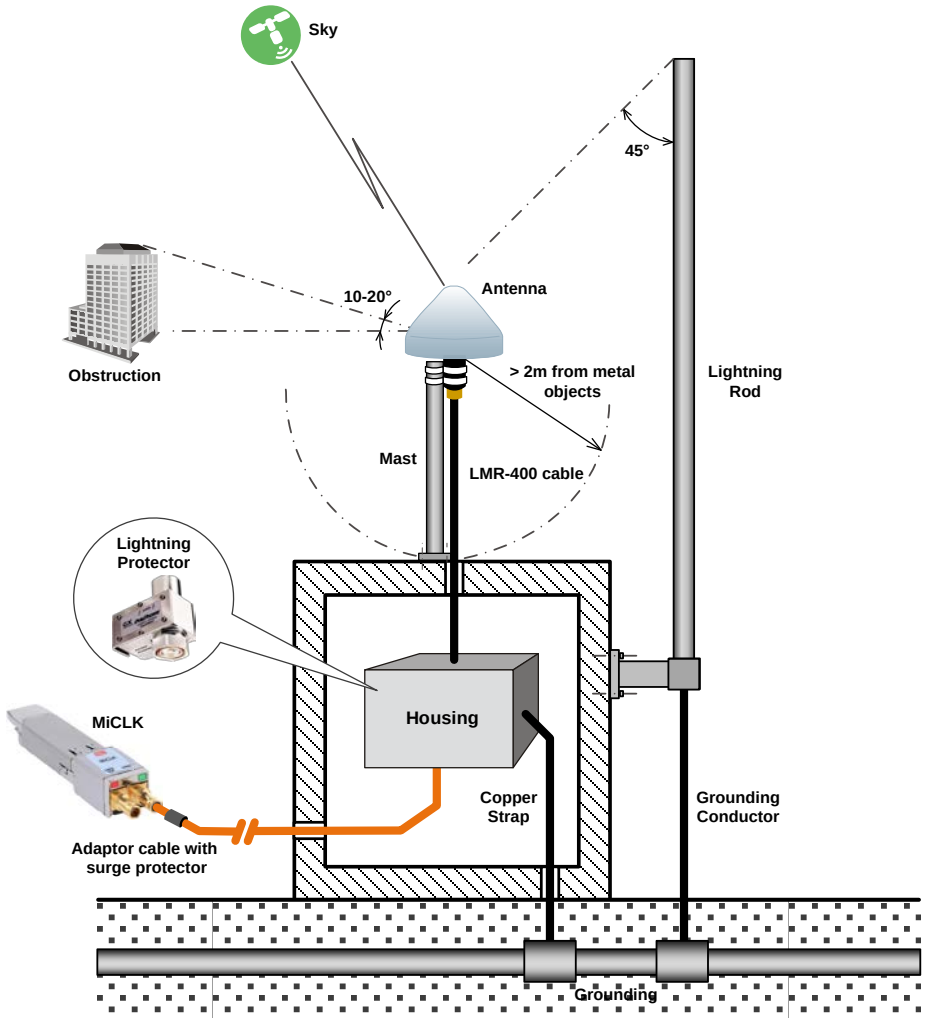

Figure 2. Outdoor Antenna Installation

MiCLK

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Power

Power Supply	Receives power from its host device.
Power Consumption	<1.65W

Physical

Height	12.4 mm (0.488 in)
Width	14.0 mm (0.55 in)
Depth	79.0 mm (3.11 in)
Extending from chassis:	31.0 mm (1.22 in)

Ordering

Legend

MiCLK/#

#	Maximum number of slaves
8S	8 slaves
24S	24 slaves
64S	64 slaves
128S	128 slaves

RECOMMENDED CONFIGURATIONS

MICLK/8S
MICLK/24S
MICLK/64S
MICLK/128S

OPTIONAL ACCESSORIES

CBL-SMA/F-1023/M/PROT

SMA/Female to DIN 1.0/2.3 internal adaptor cable, 1m (3.2 ft), with integrated low level, 500V surge protector, connecting MiCLK with LMR-400 cable (required for minimum installation). Can be ordered separately or as part of the MICLK-GNSS-ANT-KIT kit.

CBL-TNC/F-1023/M/PROT

TNC/Female to DIN 1.0/2.3 internal adaptor cable, 1m (3.2 ft), with integrated low level, 500V surge protector, connecting MiCLK with LMR-400 cable (required for minimum installation). Can be ordered separately or as part of the MICLK-GNSS-ANT-KIT kit.

CBL-MINIBNC-BNC/F

Adaptor cable (75 Ohm) to connect MiCLK's 1PPS/CLK connector to external equipment

MICLK-LIGHTARR-KIT/10M

GNSS lightning arrestor kit for MiCLK, including a lightning arrestor and 10m (32.8ft) outdoor cable with male TNC connectors on both sides

MICLK-GNSS-ANT-KIT/$

GNSS antenna kit including roof antenna with mounting kit, SMA/Female to DIN 1.0/2.3 cable and outdoor RF cable. Order this kit if your application requires antenna and long cabling.

The kit includes the following:

- CBL-SMA/F-1023/M/PROT or CBL-TNC/F-1023/M/PROT cable (see above)
- CBL-GSU-INT-20M/60M/120M – LMR-400 cable 20m/60m/120m long, connecting the adaptor cable to the lightning protection kit or antenna
- GPS antenna (PCTEL), 40 dB gain, with pipe mount adaptor – T-GPS-8178D-HR-DH-W-TAD
- General antenna mounting hardware kit, including a pipe adapter and an L-shaped stainless steel bracket mount – MMK1925

***Note: MICLK-GNSS-ANT-KIT/$** kit does not include the lighting protector which is part of MICLK-LIGHTARR-KIT/10M kit (see below).*

Legend

MICLK-GNSS-ANT-KIT/$

$	LMR-400 cable length
20M	20m (65.6 ft)
60M	60m (196.85 ft)
120M	120m (393.7 ft)

SFP-CA.2

Adapter to connect MiCLK to a PC

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