

High-Accuracy Time Transfer Solution Provides Sub-Nanosecond Time Transfer Up To 800 km Using Long-Haul Optical Networks

Microchip's TimeProvider® 4500 v3 grandmaster clock enables terrestrial alternative to GNSS for resilient critical infrastructure services

CHANDLER, Ariz., Oct. 27, 2025 (GLOBE NEWSWIRE) -- Governments across the globe are requesting critical infrastructure operators to adopt additional time sources alongside GNSS to enhance resilience and reliability, ensuring uninterrupted operations in the face of potential disruptions or service limitations. Microchip Technology (**Nasdaq: MCHP**) today announces the release of the [TimeProvider® 4500 v3 grandmaster clock](#) (TP4500) designed to deliver sub-nanosecond accuracy for time distribution across 800 km long-haul optical transmission.

This innovative solution provides critical infrastructure operators with the missing link the industry has been waiting for in terms of complementary Positioning, Navigation and Timing (PNT). The TP4500 provides a resilient, terrestrial solution in the absence of Global Navigation Satellite Systems (GNSS) for precise timing, alleviating physical obstruction, security and signal interference costs associated with GNSS-dependent deployments.

Most current deployments require GNSS at grandmaster sites, but the TP4500 enables highly resilient synchronization without relying on GNSS. The TP4500 supports time reference provided by UTC(k) UTC time provided by national labs, and is the first grandmaster to offer a premium capability that delivers High Accuracy Time Transfer (HA-TT) as defined by ITU-T G.8271.1/Y.1366.1 (01/2024) to meet 5 nanoseconds (ns) time delay over 800 km (equating to 500 picoseconds (ps) average per node, assuming 10 nodes), setting a new industry benchmark for accuracy.

The TP4500 system can be configured with multiple operation modes to form an end-to-end architecture known as virtual PRTC (vPRTC), capable of delivering PRTC accuracy over a long-distance optical network. vPRTC is a carrier-grade architecture for terrestrial distribution of HA-TT, which has been widely deployed in operator networks throughout the world. HA-TT is a proven and cost-effective approach, as opposed to other alternative PNT solutions that have no wide adoption into critical infrastructure networks to date, have low Technology Readiness Levels (TRL) and are still dependent on GNSS as the ultimate source of time.

“The TimeProvider 4500 v3 grandmaster is a breakthrough solution that empowers operators to deploy a terrestrial, standards-based timing network with unprecedented accuracy and resilience,” said Randy Brudzinski, corporate vice president of Microchip’s frequency and time systems business unit at Microchip. “This innovation reflects Microchip’s

commitment to delivering the most advanced and reliable timing solutions for the world's most essential services."

TimeProvider 4500 v3 is a key steppingstone towards support of the ITU-T G.8272.2 standard, which defines a coherent network reference time clock (cnPRTC) in amendment 2 (2024). An cnPRTC architecture ensures highly accurate, resilient, and robust timekeeping throughout a telecom network. This allows stable, network-wide ePRTC time accuracy, even during periods of regional or network-wide GNSS unavailability or other failures and interruptions.

Key features of the TimeProvider 4500 v3 series:

- Sub-nanosecond accuracy: Delivers 5 ns time delay over long distances up to 800 km
Terrestrial alternative to GNSS: Enables critical infrastructure to operate with resilient synchronization mechanisms independent of GNSS
- Seamless integration: Standards-based terrestrial network for time transfer, easily integrated with off-the-shelf small form-factor pluggable and existing Ethernet and optical deployments
- Exclusive capability: Premium software features available only on the TP4500 v3, integrating Microchip's PolarFire® FPGA and Azurite synthesizer for unmatched precision

Optimized for telecom, utilities, transportation, government, and defense, the TP4500 grandmaster ensures precise and resilient timing where it matters most. This latest version provides operators with a scalable solution for secure and reliable time distribution over long distances.

The TP4500 is the newest product to join Microchip's portfolio of IEEE®-1588 Precision Time Protocol (PTP) grandmaster clocks, which provide industry-leading performance and value. These field-proven solutions scale from low-density indoor applications to high-capacity 5G network timing requirements. For more information about the company's portfolio of grandmaster clocks, visit the [web page](#).

Pricing and Availability

The TimeProvider 4500 v3 grandmaster is available for purchase in production quantities. For additional information and to purchase, contact a [Microchip sales representative](#) or an authorized distributor.

Resources

High-res images available through Flickr or editorial contact (feel free to publish):

- Application image: www.flickr.com/photos/microchiptechnology/54779657607/sizes/l

About Microchip Technology:

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