



SATELLITE TIME AND LOCATION (STL)

extraordinary timing synchronization performance with exceptional reliability and high security



STL from Satelles® is a resilient, alternative PNT service from low Earth orbit (LEO) satellites. Telecom operators and other companies use STL today as a primary timing source, such as for 5G deployments where GPS/GNSS is unavailable indoors. STL is the preferred choice for timing when distributed PTP networks that synchronize RAN frequencies are unable to achieve accuracies within 500 nanoseconds of UTC. Critical infrastructure owners and operators also rely on STL as an essential contingency capability to protect the operations of PNT-dependent systems and ensure survivability and resilience.

Impressive Timing Specifications

- STL is a Stratum 0 source that can provide timing to a Stratum 1 PTP Grandmaster Clock operating as a Primary Reference Source (PRS).
- Timing accuracies of 60-250 nanoseconds are available depending on oscillator type.
- A study by the U.S. National Institute of Standards and Technology demonstrated timing stability of less than 1 nanosecond of UTC after 25 days.
- STL timing is traceable to UTC(USNO) via multiple, geographically distributed GPS tracking sources.

Innovative Operational Characteristics

- STL's high-power signals are 30 dB (1,000 times) stronger than GNSS, allowing them to penetrate deep into GNSS-challenged environments where signals are obstructed or degraded, including indoors and underground.
- In environments where distributed PTP is deployed but GNSS is unavailable, STL can provide timing synchronization with an indoor antenna — essential when exterior GNSS antennas are impractical to install or not allowed.

Enhanced Security

- The complex, overlapping beam patterns of the satellites combined with modern cryptographic techniques allow Satelles to deliver a trusted timing solution that is highly resistant to cyberattacks or other signal manipulation.

Worldwide Coverage

- An innovative mesh architecture of 66 cross-linked LEO satellites forms an efficient and flexible global network in space to ensure a robust service everywhere — including urban and rural locations, oceans, and polar regions.

Innovative and Affordable User Equipment

- Use of the L-band frequency allows STL to leverage GNSS chipsets that enable small receivers to operate with short antennas and at low power, thereby maximizing end-user convenience while minimizing cost.

Proven Technology

- STL has been commercially available for more than five years and currently provides reliable PNT service to banks, major stock exchanges, data centers, telecom operators, and other businesses around the world.

INDUSTRY FOCUS

STL for Wireless Carriers and 5G

Wireless communications networks rely on accurate timing and synchronization from GNSS signals to function properly. The inability to receive GNSS inside buildings — as well as the loss of GNSS via disruption, manipulation, equipment failure, or spacecraft anomaly — has been known to disable critical equipment, including macrocells and small cells.

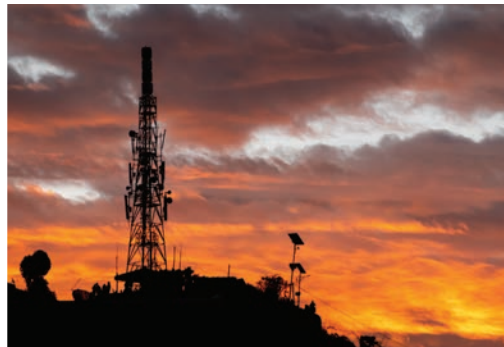
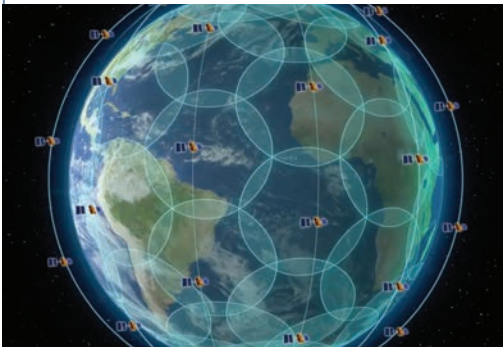
4G/LTE networks are particularly vulnerable to timing anomalies and often have timing requirements of one microsecond or better. The timing requirements of 5G are even more stringent — plus 5G requires five to ten times the number of nodes as 4G. The majority of 5G sites are indoors where GNSS is challenged: macro towers, small cells (indoors and outdoors), femtocells (enterprise and residential broadband), routers, large venues.

Using STL, a 5G router becomes an indoor local PTP grandmaster, enabling 5G to work deep indoors. Satelles offers standalone receivers that connect to a wireless operator's RAN gear or router to replace or augment GNSS so that STL provides timing sync whenever and wherever GNSS is unavailable.

STL offers the added advantage of utilizing an indoor antenna to deliver timing signals that penetrate most structures, including buildings with low-emissivity (Low-E) windows or metal and concrete siding and roofing. This means that in-building wireless installations that leverage STL can maintain synchronous timing without the need for an external GNSS antenna.

Having a signal that passes through structures is especially important for buildings where securing roof rights, obtaining landlord permissions, or complying with local zoning restrictions are a challenge. An indoor solution for assured PNT lowers cost and reduces the risks of installation and maintenance.

Modules using STL are capable of receiving both STL and GNSS signals, offering operators the best of both technologies. Timing solutions based on STL also detect and mitigate GNSS signal disruption and manipulation.



Count on Assured PNT with STL

Satelles offers alternative PNT at levels of stability, reliability, and trust required by commercial enterprises and government entities. Contact us directly to learn more about how STL can support a wide range of timing synchronization applications for telecommunications and other critical infrastructure sectors.



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