SPEC SHEET

Timing and synchronization

1588 PRECISION TIME PROTOCOL (PTP) AND SYNCHRONOUS ETHERNET (SyncE) TEST SOLUTION

The complete, all-in-one FTB 5GPro test solution offers all the functionalities to confirm, both in the lab and in the field, that 1588 PTP and SyncE protocols are delivered correctly and to validate that networks meet stringent 5G timing accuracy requirements.

KEY FEATURES

- 1588v2 PTP protocol validation with IP packet delay variation (IPDV) measurements for ITU G.8265.1, 8275.1 and 8275.2 profiles
- SyncE protocol validation
- High accuracy time error (TE) measurement for 1 PPS and 1588v2 PTP using ITU G.8275.1 and G.8275.2 profiles including PDV and round-trip delay time (RTD) measurements
- Wander measurement and analysis
- Integrated, 184-channel, highly accurate global navigation satellite system (GNSS) receiver capable of accuracy down to the nanosecond
- High-accuracy GNSS receiver slashes test set-up time from 3 hours to under 20 minutes—the industry's fastest test set-up time for validating timing and synchronization
- Holdover mode for TE measurement without GNSS signal (future release)

RELATED PRODUCTS AND APPLICATIONS

1G to 100G network tester
FTBx-88260

Complete, all-in-one 4G and 5G test solution
FTB 5GPro

Timing and synchronization antenna kit
GP-3166 GNSS antenna kit

TIMING IS CRITICAL FOR 5G

Accurate network synchronization is critical for 5G, which now requires frequency and phase synchronization to support advanced features such as time division duplexing (TDD), coordinated multipoint (CoMP), carrier aggregation (CA) and beamforming. Therefore, operators are turning to network synchronization relying on IEEE 1588 PTP and SyncE as the preferred solution to synchronize every network element, in frequency and in phase, from the core to the radios. Whether you are qualifying new transport equipment in the lab or deploying 5G equipment in the field, simple and reliable test solutions are needed to validate proper delivery of 1588 PTP and SyncE protocols and ensure that networks meet stringent 5G timing accuracy requirements.

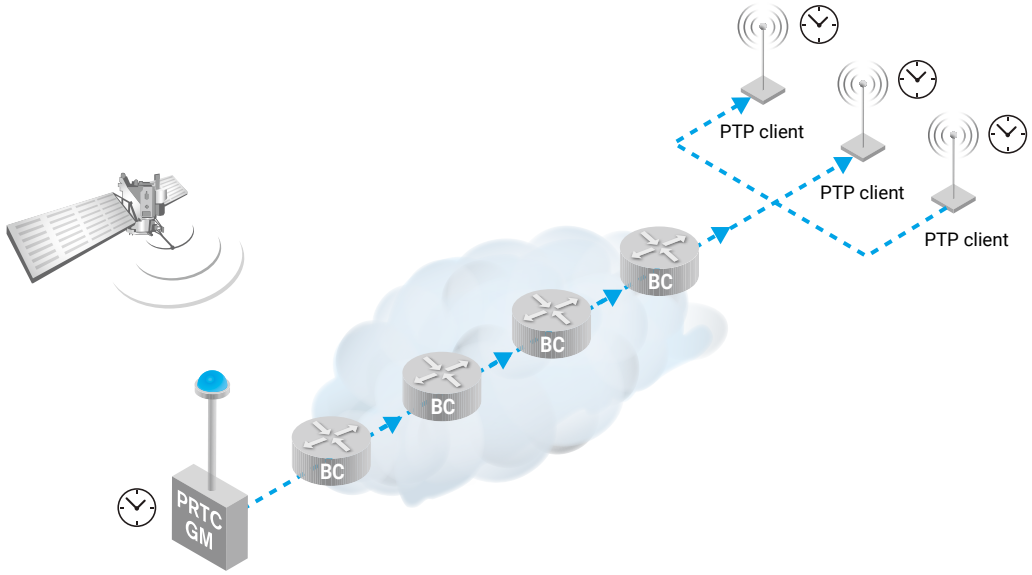


Figure 1. Network synchronization relying on 1588 PTP and SyncE

TIMING AND SYNCHRONIZATION TEST APPLICATIONS

EXFO is supporting operators with a combination of three test applications optimized for network synchronization test requirements.

Figure 2. Timing and synchronization test applications.

1588 PTP

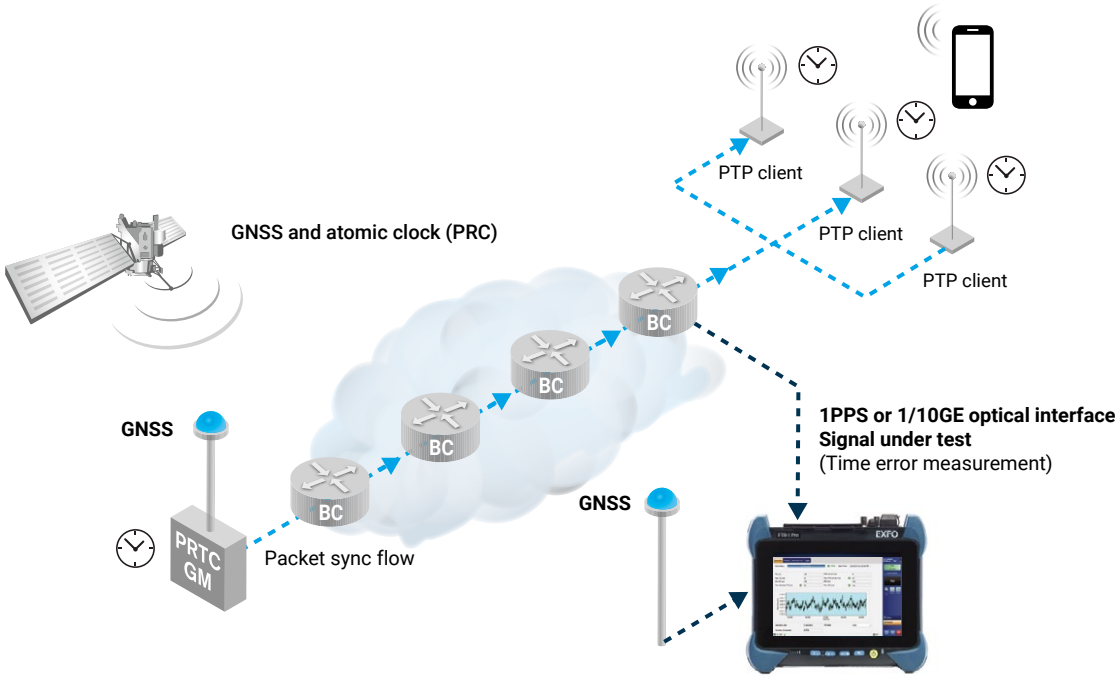
EXFO's 1588 PTP validates 1588 PTP packet network synchronization services, ensuring that the 1588 PTP protocol is delivered correctly at any critical location in the network. This is a quick and simple test application used to validate the presence of the PTP service, retrieve the boundary clock information and validate that the clock quality level is as expected. The 1588 PTP application supports G8265.1 as well as the two profiles that are critical for 5G: G.8275.1 (full timing support) and G.8275.2 (partial and assisted partial timing support).

SyncE

EXFO's SyncE application is a quick and easy-to-perform test which confirms that the SyncE protocol is running correctly on the network. The SyncE test validates that Ethernet synchronization message channel (ESMC) messages are propagated correctly, that the clock quality level is as expected and that SyncE frequency is correct and stable.

Time error/Wander

EXFO's TE/Wander application provides all the key test metrics to validate the accuracy of the network synchronization. And thanks to the built-in high precision GNSS receiver, the test is easy to setup and ready to measure in only a few minutes. The application performs multiple TE measurements such as maximum absolute time error (Max |TE|), dynamic time error (dTE), constant timer error (cTE), maximum time interval error (MTIE), time deviation (TDEV), etc. The TE/Wander application automatically evaluates if the signal under test meets different standardized masks such as the MTIE mask defined by ITU G.8271.1. Verdicts are presented to the user based on several different criteria. The TE/Wander feature also allows users to zoom into TE graphical test results.



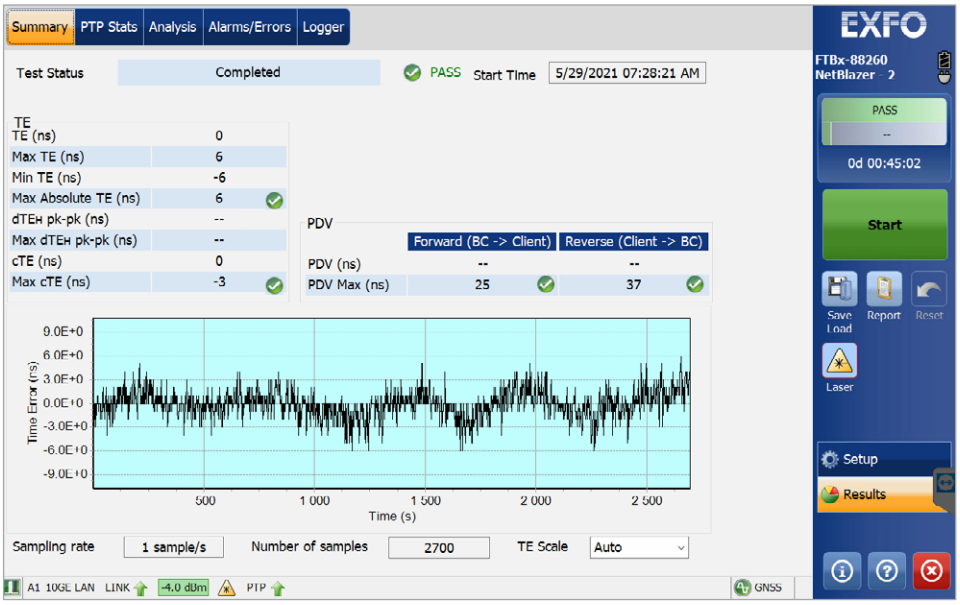


Figure 3. EXFO's TE/Wander validates timing accuracy at critical locations in the network.

TA-SYNC AND TA-SYNC PREMIUM

The TA-sync and TA-sync-premium are optional timing modules that include a multi-constellation GNSS receiver. These can be added to the FTBx-88260 module, available on the FTB 5GPro test solution, to provide a time reference for one-way latency or TE and wander measurements. The TA-sync connects directly to an active GNSS antenna (SMA) and provides a 1 PPS input (SMB) and EXT CLK option (SMB) that can be configured as input or output. The TA-sync-premium module integrates a higher accuracy GNSS receiver and supports clock holdover[a] to perform measurement when a GNSS signal is not available.

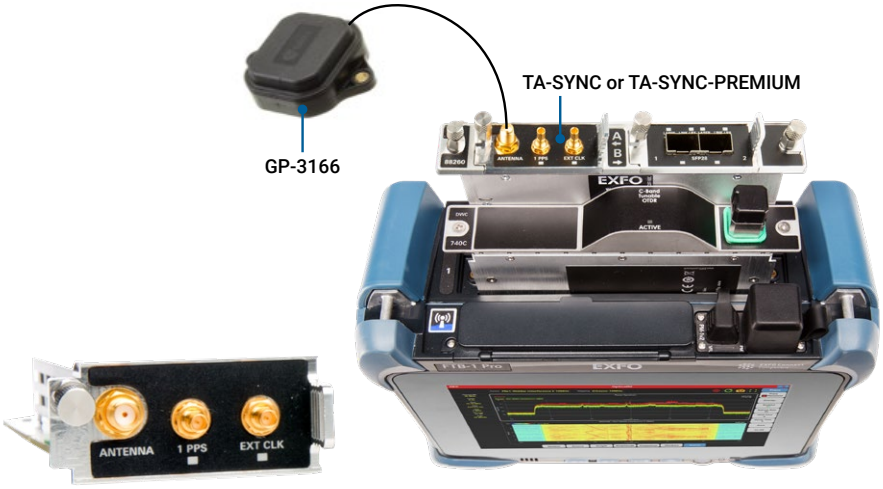


Figure 4. TA-sync/TA-sync-premium timing module on the FTBx-88260.

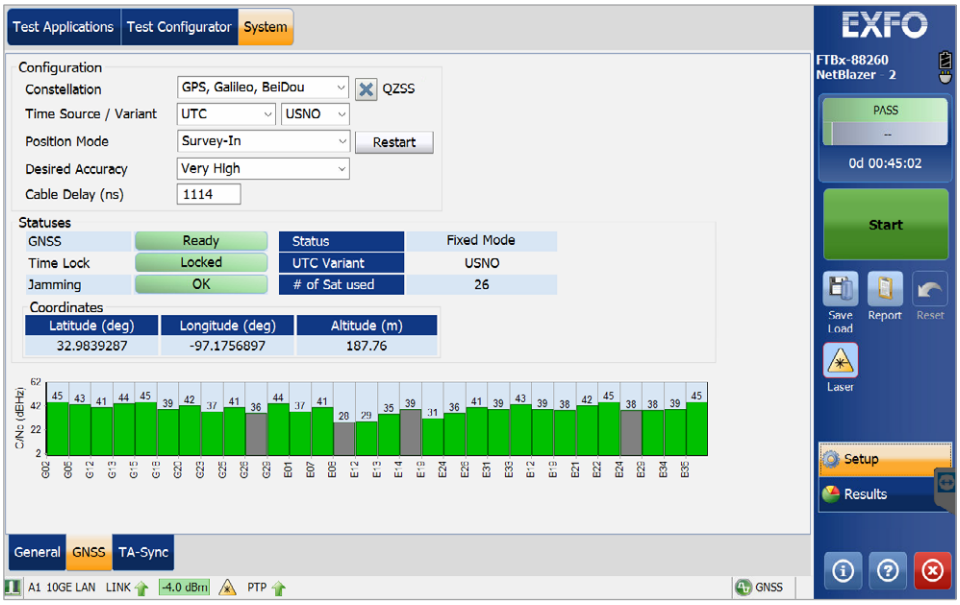


Figure 5. Integrated GNSS configuration and statuses user interface.

a. Future release.

FTB 5GPRO TEST SOLUTION: WITH TIMING AND SYNCHRONIZATION

EXFO's timing and synchronization feature is available on the FTBx-88260 network tester, part of the FTB 5GPro test solution.

A complete all-in-one 4G and 5G test solution, the FTB 5G Pro empowers technicians and contractors to efficiently validate next-generation fiber-based mobile networks and ensures your 5G deployment is done right.

Leveraging the powerful and intelligent FTB-1Pro handheld test platform, the FTB 5GPro is a complete and future-proof solution that takes the guesswork out of test set-up, execution and analysis.

The FTB 5GPro is designed to boost field-testing efficiency and deliver high-quality 5G and 4G/LTE networks, on time:

- Follows standardized, field-proven test procedures
- Enables technicians of any skill level to instantly interpret results and accelerate outcomes
- Addresses any potential issues when installing, activating and maintaining mobile networks

Portable tool

With the FTB 5GPro, field technicians no longer need to carry 3-4 heavy test sets to get the job done.

FTB 5GPro kit

Streamline field operations when deploying 5G fronthaul, midhaul and backhaul networks.

SPECIFICATIONS

	TA-SYNC	TA-SYNC-PREMIUM
Size (H x W x D)	25 mm x 56 mm x 100 mm (1 in x 2 ¼ in x 4 in)	25 mm x 56 mm x 100 mm (1 in x 2 ¼ in x 4 in)
Weight	0.070 kg (0.154 lb)	0.071 kg (0.157 lb)
Temperature Operating Storage	0 °C to 40 °C (32 °F to 104 °F) −40 °C to 70 °C (−40 °F to 158 °F)	0 °C to 40 °C (32 °F to 104 °F) −40 °C to 70 °C (−40 °F to 158 °F)
Relative humidity	≤ 95 % non-condensing	≤ 95 % non-condensing
GNSS receiver		
Receiver type	72-channel GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1, SBAS L1 C/A: WAAS, EGNOS, MSAS, GAGAN Galileo E1B/C	184-channel GPS L1C/A L2C, GLONASS L1OF L2OF, GALILEO E1B/C E5b, BeiDou B1I B2I, QZSS L1C/A L2C, SBAS L1C/A: WAAS, EGNOS, MSAS, GAGAN
Timing stability	≤ 20 ns 1-sigma (clear sky)	≤ 5 ns 1-sigma (clear sky)
Time-pulse jitter (ns)	±11	±4
Time-mark resolution (ns)	21	8
Supported antenna	Active	Active
Holdover [a]		
Time error	Not supported	≤ 100 ns over 1 hour, ≤ 200 ns over 2 hours [b, c]
Frequency stability	Not supported	±5 ppb over temperature
Interfaces		
Antenna (input)	SMA, 50 Ω ± 5 %, active antenna up to 5 V	SMA, 50 Ω ± 5 %, active antenna up to 5 V
PPS (input)	SMB, 50 Ω ± 5 %, unbalanced	SMB, 50 Ω ± 5 %, unbalanced
EXT CLK (input/output)	SMB, 50 Ω ± 5 %, (1 PPS, 10 MHz) or 75 Ω ± 5 %, (2 MHz)	SMB, 50 Ω ± 5 %, (1 PPS, 10 MHz) or 75 Ω ± 5 %, (2 MHz)

a. Future release.

b. Typical values.

c. Under validation. Final numbers to be confirmed.

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