

Global GNSS Correction Service

Topnet Live



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What is Topnet Live?

Topnet Live supplies a wide range of global GNSS correction services, with a variety of subscription packages, designed to meet the unique needs of our customers by providing accurate and reliable positioning information.

Topnet Live is a real-time GNSS correction service delivering high quality data to GNSS receivers used for surveying, construction, GIS, mapping, OEM, system integrators and agricultural applications worldwide. Fully interoperable with all makes of network capable rovers, subscriptions are made easily available through the Topnet Live website.

Topcon Positioning Group operates and monitors all Topnet Live networks. Our geodetic specialists and professional standards ensure high quality correction data is delivered globally to each GNSS receiver.

What are correction services?

Correction services are essential to the accuracy of GNSS-based guidance and autosteering to support key applications throughout the crop cycle, including soil preparation, seeding, crop care, and harvest.

To account for the variable conditions and demands of global agriculture, Topcon has built a full-suite including localized- and network-based solution to deliver the high-quality accuracy and repeatability for any agricultural operation, application and machine. Now more flexible than ever, including cellular and satellite subscriptions, Topcon correction services are globally tested, proven and reliable.

Equipped tractors, sprayers, spreaders and harvesters benefit from fast initializations and reliable positioning any time of the day or night.



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Technology Overview

To provide precise positioning accuracy, a GNSS receiver needs to compensate for inaccuracies caused by satellite constellations, receiver hardware and atmospheric conditions. These inaccuracies can be calculated by a network of fixed reference stations that constantly receive GNSS data.

This correction information is then broadcast to GNSS receivers as a correction service. Topnet Live is Topcon's GNSS correction service and consists of the reference station network, the correction calculation software and the correction broadcast service.

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Positioning methods

Topcon manages, operates and monitors all Topnet Live reference networks.

Real-time Kinematic (RTK)

RTK is a positioning method to enhance the precision of position data derived from satellite-based positioning systems. RTK works through a network of stations covering local regions. Single Base RTK provides fast and accurate correction from one specific or nearest reference station. Network RTK delivers the correction from a number of stations in a local network of reference stations.

Precise Point Positioning (PPP)

PPP is a positioning method to calculate precise positioning down to a few centimeters of accuracy using a single receiver in a global reference framework. PPP provides a service anywhere on the planet, independent of local networks. It delivers accuracy suitable for mapping and guidance applications and has a short start-up time.



Constant Coverage

Both types of networks offer advantages and disadvantages. That is why we designed and developed a service to provide our customers access to both systems simultaneously, even switching automatically between them as reception changes. This means the customer always has the best of both systems and a truly global service.

Full-Constellation Service

Our reference station network uses four GNSS satellite systems: GPS, GLONASS, Galileo and BeiDou. This ensures the best accuracy and reliability, often referred to as a full-constellation service.

| | NETWORK RTK | PPP |
|---|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| + | <ul style="list-style-type: none"> Provides survey-grade accuracy Quick start-up | <ul style="list-style-type: none"> Global coverage Seamless coverage – just one subscription required |
| – | <ul style="list-style-type: none"> Requires dense local network Requires individual subscriptions to each network | <ul style="list-style-type: none"> Less accurate than RTK Slower start-up than RTK |



Broadcasting

The Topnet Live correction service is broadcast to customer receivers in two ways:

- NTRIP – Over the Internet, typically accessed using a mobile phone SIM card data link.
- L-Band – Direct broadcasting from a satellite.

Customers have both options and can use whichever is most convenient.

Data Services

As an additional service, the raw data (RINEX) from the networks are available to download. There is also an online correction processing service for specialist applications.

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Why Topnet Live?



Truly global solution

Topnet Live is a truly global solution, providing correction service anywhere with the combination of global PPP and regional GNSS reference networks.



Reliable service

Topnet Live is managed by Topcon's own network and geodesy experts, ensuring a precise and reliable always-on service.



Operated by Topcon

Regional GNSS reference networks are operated by Topcon and our partners to provide coverage in all major regions of the world.



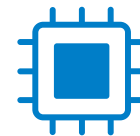
Flexible and tailored

Our OEM GNSS boards can be preconfigured for immediate use by system integrators' customers, with flexible subscription and licensing options to suit the exact need.



Seamless subscriptions

Customers can have a single subscription that provides borderless service which automatically switches between regional GNSS reference networks.



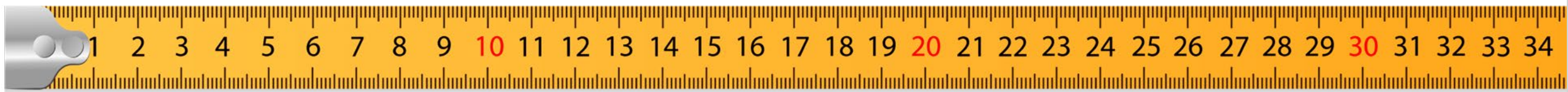
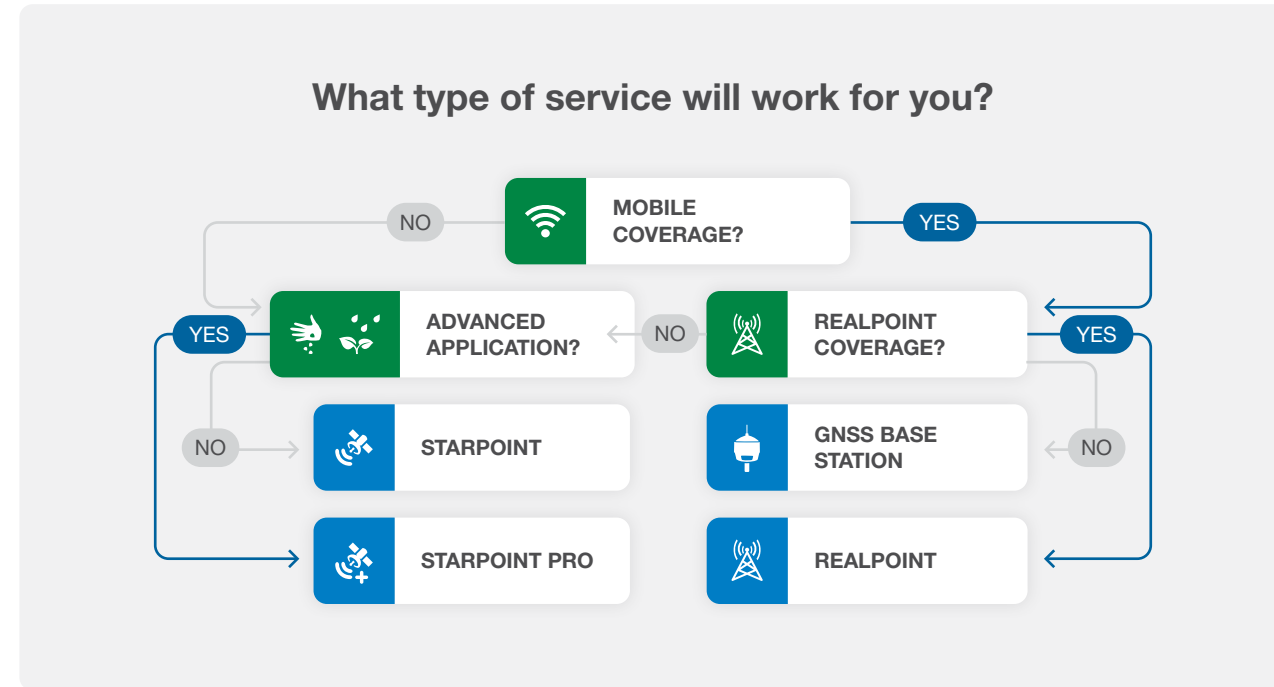
Fully scalable

The entire solution is scalable, so system integrators do not need to limit locations or numbers of customers.

How precise do you need to be?

The key to any precision farming solution is the correct accuracy for the job at hand.

Topcon pioneered multi-constellation GNSS pinpoint positioning and has supported the global industry standards – ISO protocol, from the start. Pick the accuracy you need based on your field applications and/or crop types and the Topcon modular platform technology will let you get the job done quickly, easily and for less monetary outlay.



Precision Application



Seeding

accuracy up to 4 cm



Crop Care

accuracy up to 10 cm



Harvest

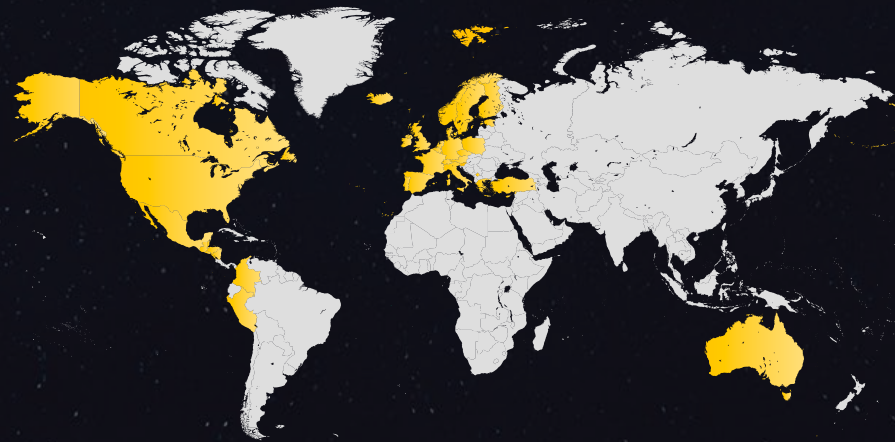
accuracy up to 15 cm



Soil Preparation

accuracy up to 30 cm

Topnet Live



Realpoint

Provides network RTK accuracy and quick start-up time.



Starpoint

Provides the PPP service anywhere on the planet, independent of local networks.

The graphics are intended as a representation of countries that have coverage available. However, coverage may not be fully available within the countries indicated.



Skybridge

Skybridge allows RTK subscribers to combine RTK with PPP correction services. RTK is supported by PPP during lack of coverage or service outages.

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The Best of RTK and PPP

| | REALPOINT | STARPOINT | STARPOINT PRO | SKYBRIDGE |
|---------------------------------------------|------------------------------------------------------|------------------|------------------------------------|------------------------------------------------------------------------------------------|
| Correction Type / Delivery | RTK via NTRIP | PPP via L-Band | | Correction via satellite |
| Coverage | Regional | Global | Global | Regional or Local |
| Horizontal Accuracy* | 2 cm | 50 cm | 3 cm | Infill for RTK |
| Pass-to-Pass Accuracy* | 2 cm | 15 cm | 2.5 cm | |
| Initialization or Convergence Time** | Seconds | < 5 mins | < 20 mins | Seamless Activate automatically |
| Applications | Seeding, Crop Care, Harvesting, and Soil Preparation | Soil Preparation | Seeding, Crop Care, and Harvesting | For areas where cellular signal is unreliable or experience frequent radio interruption. |

*The specifications are based upon field and laboratory testing. Accuracy and convergence time may be affected by user hardware type (antenna / receiver), available GNSS constellation (PDOP), and site conditions.

**Performance may be degraded in conditions with high Ionospheric activity, extreme multipath, or under dense foliage. For maximum system accuracy, always follow best practices for GNSS data collections.

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Trust Topcon

We are the ideal partner for developing advanced solutions for your positioning and machine control challenges. Our experience, technical expertise and overall company strength make us uniquely qualified to provide enhanced automation technology and ultimately drive your customers' productivity to higher levels—along with your market share.

We can provide customized or off the shelf products, including GNSS hardware or correction services. Our global technical centers ensure personalized support can be available no matter where your manufacturing operations exist.

SPEED TO MARKET | GLOBAL NETWORK | EXPERIENCED OEM TEAM

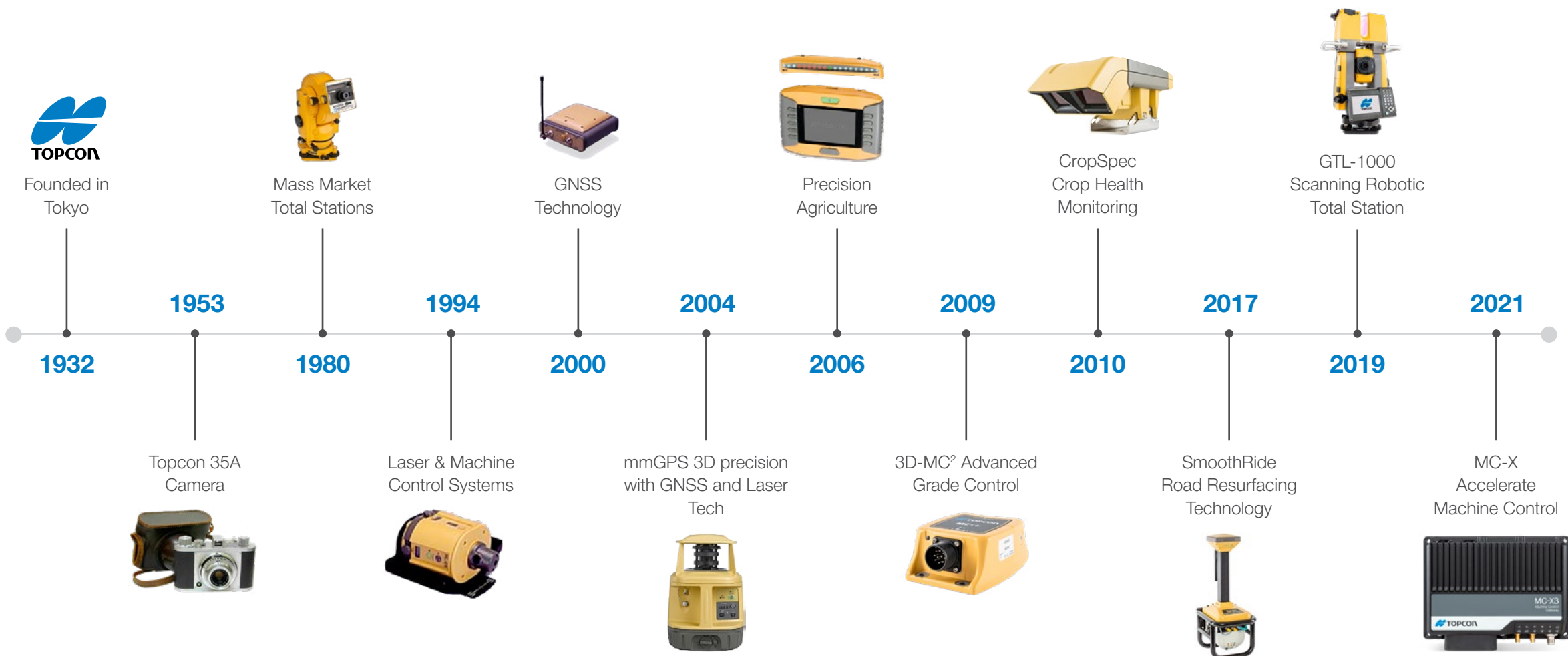
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A History of Topcon Corporation



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Trust Topcon to get you there faster with high-quality positioning and automation solutions tailored to your product strategy.

Independent Solutions

In an industry with many contractual alliances, we remain independent. We have the freedom to develop technologies that best fit your unique product goals. Our custom OEM solutions are all clean-sheet designs, providing more opportunities to differentiate your product from the competition.

Speed To Market

Product development carries an inherent pressure to do everything faster and better than before, particularly since technology is only viewed as innovative if it arrives before the competition. Our experience helps simplify and shorten the design process, allowing you to go to market with your product faster – and with the utmost confidence.



Topcon Training Center,
Livermore, CA

Topcon Technology
Roadshow Truck

Topcon Positioning Systems Headquarters,
Livermore, CA

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4900+ Employees | 2100+ Patents



Global Network

With an extensive worldwide network of corporate offices, R&D centers and technical groups, we have an unmatched capability to assist any manufacturer, no matter where they are located, with fully integrated machine automation solutions. This also positions us to create programs to assist and support your dealer networks, directly or through extensive training programs.

Experienced OEM Team

Our experienced OEM team knows what questions need to be answered first and the potential pitfalls to be avoided along the way. Their first objective is to make sure our technology is the right fit for your application, and then be your partner every step of the way.

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Always One Step Ahead

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