STONEX S5
GNSS Receiver
White Paper

MAY, 2016

ABSTRACT

Over than 30 years ago the use of GPS was limited to 'First level Survey jobs' and to few ultraprofessionals engineers, ready to invest up to 100K € for a base + rover system, good to calculate a limited number of very accurate baselines per day.

30 years later the use of GPS is a common feature for billions of people, who use car navigators, smartphones and several other equipments with integrated GPS.

Thanks to this 'open facility', the use of satellite positioning became usual even for professional uses, like GIS data collection, forestry, agricolture, but immediately any professional realized that only in a few cases the accuracy of the integrated GPS in consumer equipments is enough for non professional use, and good for path tracking, trekking and other recreational activities.

On the other side, the use of a Survey GNSS system is not a solution, both on the economical point of view and on the practical, forcing the User to use an heavy equipment made of several components (GNSS unit, telescopic pole, controller, accessories...).

Today, thanks to the introduction of the small, smart, rugged and cheap STONEX S5 GNSS, that can be paired to any Bluetooth and WiFi device, the accuracy of GPS positioning increased to meters to submeter and over just adding this receiver to already existent Android, Windows, Windows Mobile, Ios 'controllers'.

Why S5 GNSS is a smart solution? Because the User is not forced to learn a different equipment and software, he is familiar with the current system and will continue to use it, in a much more accurate environment.

SMART connections and WEB UI

STONEX S5 uses the most modern connection technologies: even if the traditional Bluetooth™ connectivity is present, Stonex S5 Linux based System, is equipped with WiFi connectivity, for an efficient, fast and reliable data connection with the external device. The friendly Web User Interface makes Stonex S5 an 'active device', giving the User a complete control of the unit, regardless of the application software used on the external device.

Moreover, thank to the GNSS Server APK supplied with S5, any Android device will be automatically and seamless paired and any software fitted with GPS input facility can be used immediately, since the NMEA customizable output can fit any data configuration. High accuracy Agricolture, Mapping, GIS data collection, environmental agencies, Forestry are just a short list of the fields where Stonex S5 will give a decisive impulse to the productivity and to the quality of the positioning data: and using the already existent devices, as Smartphones and Tablet with Android, Ios, Windows operating system.

The **RED** route is obtained joining GPS points measured with a Smartphone, the **GREEN** one with STONEX S5 GNSS connected with the smartphone.

Work where you need

Stonex S5 SMART Mobile GNSS supports multiple constellations – GPS, GLONASS, Beidou, Galileo – and SBAS accuracy augmentation systems, to make safe working sessions using several available and visible satellites. Thanks to the integrated GPRS modem, S5 can take advantage from existing GPS Networks, directly receiving corrections from the Network and without to keep busy the extenal device phone and using slow and not always reliable non WiFi connections.

And the submeter accuracy will be always available without the necessity to use other additional and expensive services.
STONEX S5 GNSS is rugged and protected against dust, rain and any external ingress (it is IP67 graded), its battery lasts a complete work day even using the GPRS integrated modem.

The scalable accuracy makes Stonex S5 the most flexible GNSS receiver with the best price/benefit ratio

From submeter to centimeter accuracy with one L1 GNSS receiver: today is possible!

The use of S5, a 372 channel Multiconstellation receiver with augmented SBAS accuracy, allows to get submeter accuracy everywhere and everytime, just using S5 alone with no GPS network connection.

When the submeter accuracy is not enough and a GPS Network is available, S5 will get correction services through the INTEGRATED WCDMA 3.75 modem (NOT using the external device modem, which will remain free for other uses), without the need for post-processing.

At the end of this doc is reported the result of a test, comparing the coordinates measured with an high accuracy Survey GPS (STONEX S10 with active tilt sensor) to the coordinates obtained using STONEX S5 connected to a reliable GPS Network (Italpos), both in FLOAT mode and in FIXED; the results are amazing!

From the GPS Network test, S5 gave an accuracy of 30-50 cm (FLOAT) and of 6-8 cm (FIXED).

This does not mean that STONEX S5 can replace a Survey GPS in RTK works, because the time to fix is not measured in a few seconds as using STONEX S10 but in minutes; anyway, is important to know that S5 can be used to get even centimeter accuracy.

No GPS Network: no decimeter accuracy?
False!

Where no GPS Network is available, and a decimeter accuracy is a must, S5 can be used for Static and Kinematik Survey (Stop & Go), and the data will be

post processed with Stonex GIS Processor.

Using the new Stonex CUBE 2016 the Stop & Go operations will be almost automatic and accessible even to non expert Users.

STONEX S5 GNSS for local GPS Network

Other unique features of Stonex S5 are the long range Bluetooth and Wifi, respectively capable for 50 and 100 m range

Therefore S5 can also be used for local network, getting data from a GPS Network and spreading the corrected data into an around 35K square meters area, often enough to cover a construction site or an urban area where GIS data collection are in progress.

STONEX S5 GNSS Break the barrier

Now the sentence should be more clear: the new S5 GNSS is a bridge between the low accuracy consumer GPS and the high accuracy Survey ones, offering a suitable and scalable positioning accuracy to consumer devices.

No user will be forced to change his way of working, and in case the device will be outclassed from new and more powerful units, S5 will continue its job even with the newest devices.

Any User can choose between the Stonex ready solutions or thousands of specific applications available all over the world.

Stonex S5 is the most intelligent solution today available for submeter to centimeter accuracy.

Highlights

ANDROID, iOS, Windows: choose your preferred controller and O.S.

Increase the accuracy of any device just adding the accurate S5 GNSS.

WiFi and Bluetooth connection to any external Android, Windows, Ios device.

GPRS integrated modem for an immediate GPS Network corrections support.

372 channel at your service, the most powerful L1 GNSS ever present on the market

Scalable accuracy from submeter (everywhere, everytime) to centimeter, using RTK Network

External GNSS antenna port: suitable for Professional GNSS antennas, not for toy flat antennas.

WEB UI gives the total control of the unit even to non expert Users

Ready APK for automatic connection to external Android devices

A world of ready solutions for several application fields

Rugged and small sized: use S5 in the pocket, on the belt, on the ground....

Tested on April 21st, 2016 - S5 + S4C CUBE SW + external GNSS antenna p/n 30-350161 - Corrections received using the integrated GPRS modem of S5 **Firmware version 20160329**

Point ID.	RTK S10 reference coordinates				S5 s/n 224 - RTK FIXED (GPS Network connected)						S5 s/n 224 - RTK FLOAT (GPS Network connected)					
	E	N	Z		E	N	Z	Δ E (m)	D N (m)	D Z (m)	E	N	Z	Δ E (m)	D N (m)	D Z (m)
1	518.731,036	5.049.548,040	181,042		518.731,044	5.049.548,057	180,977	-0,008	-0,017	0,065	518.731,511	5.049.547,754	181,303	-0,475	0,286	-0,261
2	518.728,906	5.049.567,870	181,002		518.728,912	5.049.567,881	180,938	-0,006	-0,011	0,064	518.729,062	5.049.567,457	181,611	-0,156	0,413	-0,609
3	518.709,508	5.049.595,039	180,976		518.709,499	5.049.595,033	180,925	0,009	0,006	0,051	518.709,763	5.049.594,566	181,660	-0,255	0,473	-0,684
4	518.698,827	5.049.598,552	180,980		518.698,806	5.049.598,534	180,933	0,021	0,018	0,047	518.699,136	5.049.598,384	181,570	-0,309	0,168	-0,590
5	518.689,101	5.049.621,537	181,167		518.689,062	5.049.621,552	181,131	0,039	-0,015	0,036	518.689,359	5.049.621,327	181,437	-0,258	0,210	-0,270
6	518.681,806	5.049.639,778	181,336		518.681,772	5.049.639,756	181,298	0,034	0,022	0,038						
7	518.676,294	5.049.643,274	181,333		518.676,263	5.049.643,258	181,293	0,031	0,016	0,040	518.676,504	5.049.642,992	181,675	-0,210	0,282	-0,342
8	518.694,567	5.049.651,341	181,481		518.694,551	5.049.651,325	181,433	0,016	0,016	0,048	518.694,781	5.049.651,000	181,899	-0,214	0,341	-0,418
9	518.753,750	5.049.681,719	181,648		518.753,739	5.049.681,700	181,622	0,011	0,019	0,026	518.753,825	5.049.681,431	182,218	-0,075	0,288	-0,570

	1	2	3	4	5	6	7	8	9
RTK Fixed Delta E	-0,008	-0,006	0,009	0,021	0,039	0,034	0,031	0,016	0,011
RTK FIXED Delta N	-0,017	-0,011	0,006	0,018	-0,015	0,022	0,016	0,016	0,019
RTK Float Delta E	-0,475	-0,156	-0,255	-0,309	-0,258		-0,210	-0,214	-0,075
RTK Float Delta N	0,286	0,413	0,473	0,168	0,210		0,282	0,341	0,288