

GNSS base station networks in Baltic states

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This article provides overview about GNSS base station networks in Baltic states – how many and what kind of networks (private or state-owned) are accessible in Latvia, Lithuania and Estonia, what are their comparative indicators – prices, precision, amount of base stations and users.

According to available information, there are at least 6 global satellite navigation systems (GNSS) base station networks in Baltic states, which data can be purchased and used in land surveyors' everyday's work. 2 of them are offering services in Estonia, 3 – in Latvia and 2 - in Lithuania.

Estonia has most liberalized market of GNSS base station networks data in Baltic states - there are only privately owned networks existing. Both in Latvia and Lithuania main services are provided by state or municipality in this sphere.

Regarding to comparison of prices, apparently Lithuanian surveyors has the most favourable conditions – until now they could use both state owned LITPOS and a private SmartNET LT networks data without charge. In Latvia, LATPOS network is financed both by state's budget and licence fees of surveyors but Estonia's private networks – only by licence fees. As you can see in data table below the article, state's networks are considerably cheaper for surveyors than private ones, but, of course, their maintenance is financed also by all taxpayers.

Estonia

In Estonia, private GNSS base station networks are owned by global producers of surveying instruments in cooperation with their local distributors. Estonia's branch of well-known Trimble VRS Now network is maintained in cooperation between Trimble and Estonian company Geosoft, led by Hugo Toll (also president of Estonia's Surveyors Association) who agreed to inform Mernieks.lv about network's specifications. According to Toll's given information, network has 19 base stations which „precision is difficult to say because every GPS measurement is absolute but we believe our network gives 2-3 cm horizontal and up to 5 cm vertical accuracy”. Trimble VRS Now is accessible through 2 licensing options – 1 year unlimited usage licence which costs 1195 Euros or approximately 840 Lats and 100h of correction service within 2 years which costs 695 Euros or approximately 487 Lats. However the second option apparently isn't very convenient because average Estonian customer use the VRSNow service approximately 223 hours per year. Total users amount of Estonia's Trimble VRS Now is about 50. Additional extras are web options - on the webshop user can download static data from stations or from virtual stations, see their rovers online and last 30 sessions track and also see atmospheric conditions.

Second Estonia's network, according to H. Toll, is owned by Topcon distributors but they didn't provide us with information about their network. In company's home page one can find only possibly outdated map of network which shows 12 base stations in Estonia.

Also Leica dealer IVA Leon has 2 GNSS stations in Estonia (third to be installed in May). However they don't provide RTK correction data as a separate network service but only as a feature when renting GNSS rovers. RTK correction is offered from single site and they said to have precision of 2 – 3 cm in horizontal and 2 – 4 cm in vertical plane.

In the future, also Estonian Land Board could offer real-time corrections data in the market. They have 9 GNSS stations which are included in EUPOS. There are existing plans to build 9 more stations and start to provide RTK data.

Latvia

Two state or municipality GNSS networks are working in Latvia – one is state-owned, Latvia's Geospatial Information agency (LGIA) maintained LATPOS network, other is Riga municipality owned, SIA „Rīgas Ģeometrs” maintained EUPOS-Riga network (it offers service in Riga territory). Licence fees of both networks are pretty similar – LATPOS costs 460 Ls a year but EUPOS-Riga – 423 Ls. Both networks offer also option to license shorter time periods – a month or a day. LATPOS costs 67 Ls for a month while EUPOS-Riga – 63 Ls, but for a day – respectively 13 and 11 Ls (all numbers rounded off). According to LGIA Geodesy and Cartography department's GPS network laboratory head Jānis Zvirgzds and SIA „Rīgas Ģeometrs” Informatics section head Sergejs Plotņikovs, LATPOS horizontal accuracy is 4 cm (however the differences from state's or local geodetic networks can be larger) but EUPOS-Riga 5 stations in Riga city in „normal conditions” ensures 2,5 cm horizontal and 3 cm vertical accuracy (vertical accuracy with Riga's geoid model). In LATPOS system, averagely 15-20 users are working during a day, and in workdays there are 2 times more users than in weekends.

Also Trimble has set up 2 stations in Latvia – in Riga and Ventspils. Company's dealers in Latvia SIA Geostar asserts Trimble technology's different qualities (real-time ionospheric model which heightens accuracy in large distances). According to them, it should be enough with 10 stations to cover all Latvia with 2 cm precision. However, Trimble already with existing stations (and all European network support) have started to offer RTK data in Latvia's market in network Trimble VRS Now TEC (it has lower precision than Estonia's Trimble VRS Now), trying to compete with state's subsidized LATPOS. Network's horizontal accuracy in all Latvia's territory fluctuates from 2-5 cm (around Riga and Ventspils in 40 km distance it is 2 cm, proven in accuracy tests). Price is considerably higher than LATPOS (even though it is lower than in Estonia) - ~696 Ls (995 EUR) for 1 licence, when buying 10 licences discount is applied – one costs ~556 Ls (795 EUR). Trimble dealers say to have no information about number of users because registration/authorization is fully automatized and is happening online.

Lithuania

In Lithuania everything is very similar to Latvia – there are state owned LITPOS network, private Leica SmartNET LT network which belongs to UAB „GPS partneris” and there are few individual GNSS stations in Klaipėda and Vilnius airport. The main difference from Latvia is that LITPOS and SmartNET LT offers data for free. State owned LITPOS provides high accuracy position (2 cm) and especially stands out with it’s huge number of users – active users are 360, in total 523 users registered in system (few months old data; it has been explained by the fact that LITPOS system is actively used not only by land surveyors but also cartographers). It has it’s cons too – although LITPOS maintains 25 base stations (distances between them doesn’t exceed 50 km), besides, thanks to cooperation in EUPOS project, LITPOS users have access also to 2 stations of Latvia (LATPOS) and 3 stations of Poland (ASG-EUPOS), LITPOS network is working over it’s capacity. In order to take over increasing number of users (better processing) LITPOS intends to upgrade software and hardware in the regional centres. They also plan to build 4 new stations in Lithuania, wants to include in network LATPOS stations in Liepāja, Saldus and Dobeles and also hopes to find cooperation possibilities with Belarus as soon as GNSS network will be implemented there.

Privately owned Leica SmartNET LT network provides high and stable accuracy in position and height (2 -3 cm). It has over 300 registered users and around 250 of them are active. Leica network maintains 16 GNSS base stations across Lithuania. Distances between them various from 70 km up to 100 km, but thankfully to the newest Leica technologies the whole country is fully covered. SmartNET LT is controlled by Leica Spider software and supports different RTK products for surveyors, farmers, road construction machinery, accumulates static data for post-processing, logs and stores data for each connection of each user for 1 year period. RTK corrections are transmitted over the internet and few stations have GSM modems. Leica SmartNET LT provider is going to sign contracts with some neighbor countries as Belorussia, Kaliningrad and Latvia which started to build or already have SmartNet networks working. 2 stations of Trimble VRS Now Tech network are also working in Lithuania but more specific information isn’t available.

Comparison of Baltic states GNSS base station networks

Network	Country	Licence fee for 1 year, Ls	Precision, cm	Base stations	Active users
Trimble VRS Now	Estonia	840*	2-3 (hor.), līdz 5 (vert.)	19	~50
Topcon	Estonia	?	?	12 (?)	?
LATPOS	Latvia	460	4 (hor.)	23	~70
EUPOS-Rīga	Latvia	423	2,5 (hor.), 3** (vert.)	5	43
Trimble VRS Now TEC	Latvia	696*	2 – 5 (hor.)	2	?
LITPOS	Lithuania	0	2 (hor.)	25	360
Leica SmartNET LT	Lithuania	0	2 (hor.)	16	250

* - By Bank of Latvia exchange rate LVL ↔ Euro 02.05.2011

** - with Riga’s geoid model