

NKG Working Group for GNSS positioning

Assoc. prof.
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Litpos
administrator

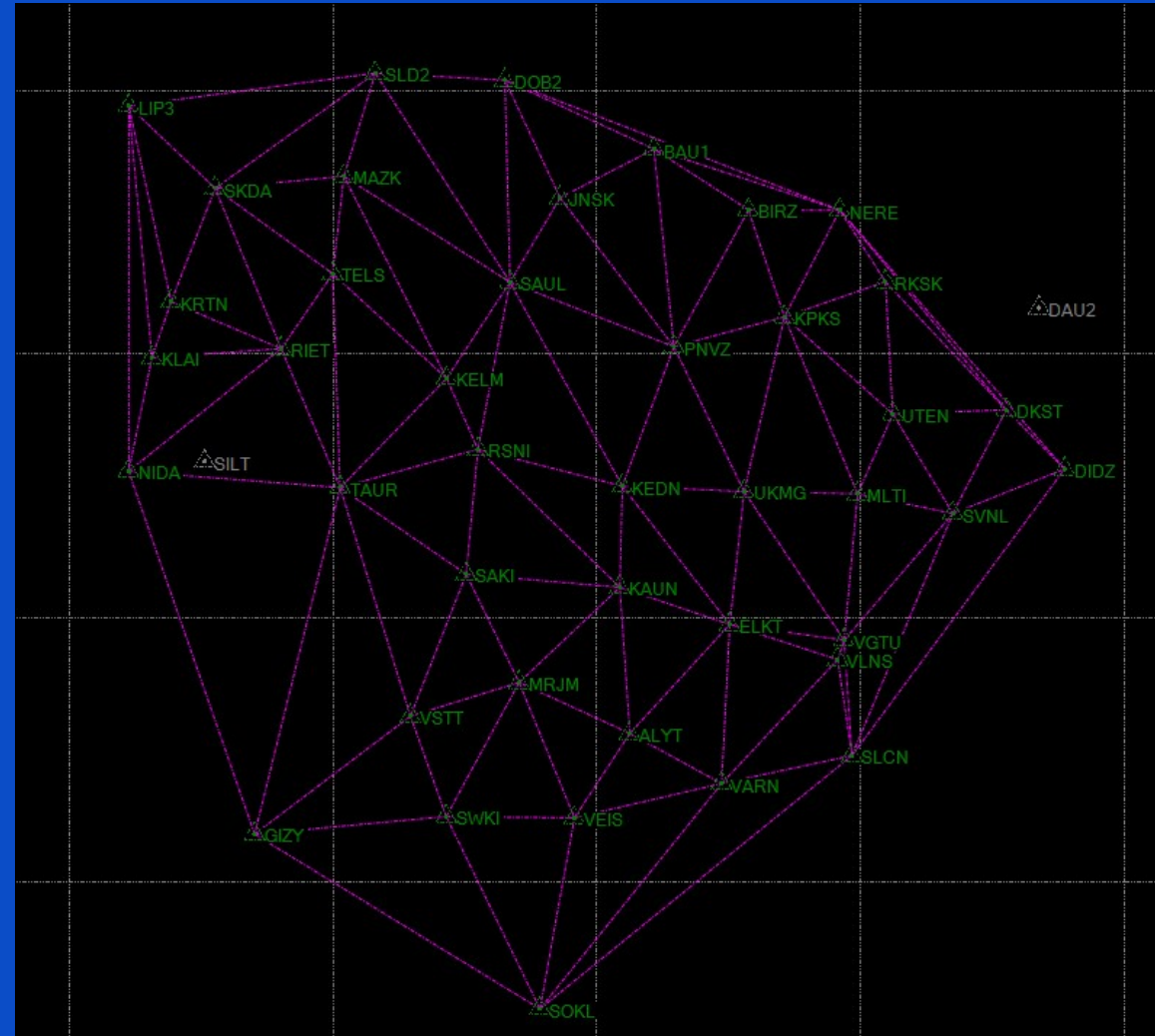
Marius
Petniunas

**Lithuanian
national report**

LitPOS

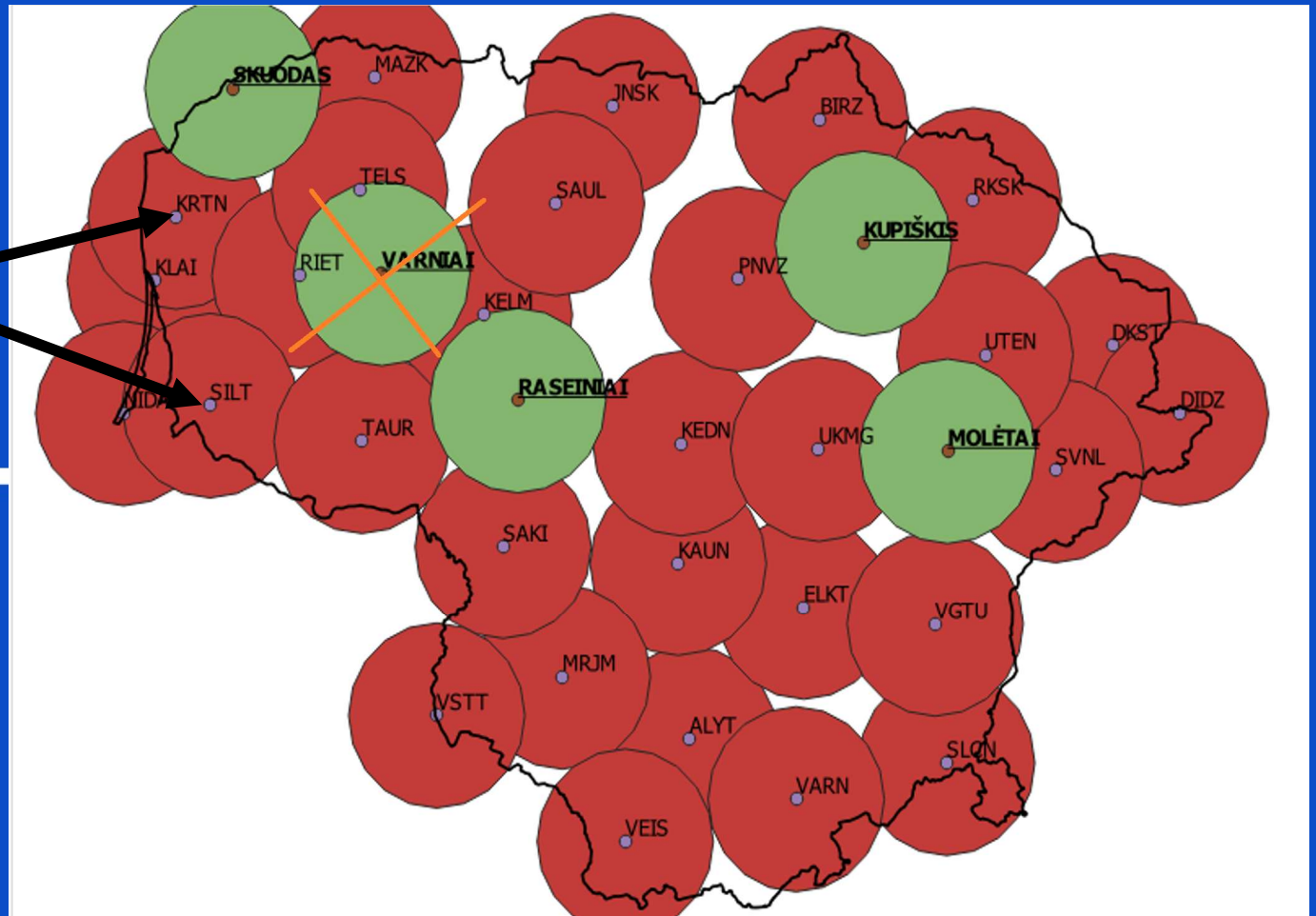
Currently there are 35
LitPOS stations, 6
LatPOS stations and 3
ASG-PL stations.

LitPOS service is free
of charge.



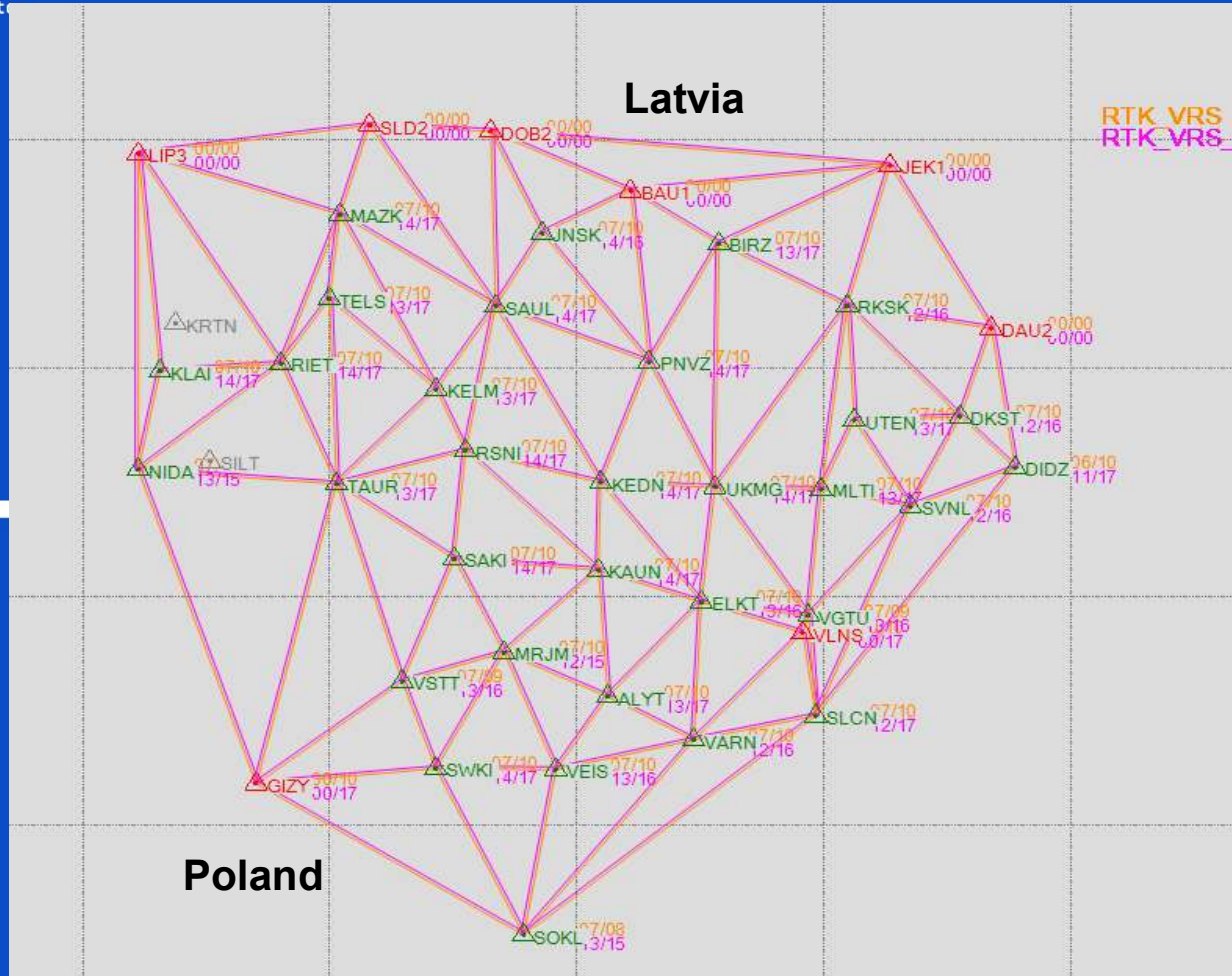
LitPOS new stations (31+4)

New
places



Trimble R9 receivers
Choke ring antennas
Trimble Pivot 5.1

LitPOS connections



LitPOS services: DGPS, VRS and GPPS

Messages RTCM 2.3, RTCM 3.1, RTCM 3.4, CMR, CMR+, CMRx and, DGPS
RTCM 2.3, DGPS RTCM 2.4

GPS

CMR - Obs(1),Info(10),PrsInfo(11)
RTCM_23 - 3(6),22(6),23(5),24(5),18(1),19(1),59(9)
RTCM_30 - 4094,1005(5),1007+1033(5),1004(1)
DGPS - 1(1),3(6),22(6),23(5),24(5),59(9)

GPS+GLONASS

VRS_CM_plus - Obs(1),Info(10),PrsInfo(11)
VRS_RTCM23 - 3(6),18(1),19(1),22(6),23(5),24(5),59(9)
VRS_RTCM31 - 4094,1005(5),1007+1033(5),1004(1),1012(1)
DGPS_RTCM24 - 1(1),3(6),22(6),23(5),24(5),31(1),59(9)

GPS+GALILEO

RTX_RTCM34_GPS_GALILEO - 4094,1005(5),1007+1033(5),MSM7(1)

GPS+GLONASS+GALILEO+BEIDOU (only 2nd generation satellites C6-C15)

VRS_CMx - Obs(1),Info(8),PrsInfo(8)
RTX_RTCM34 - 4094,1005(5),1007+1033(5),MSM7(1)

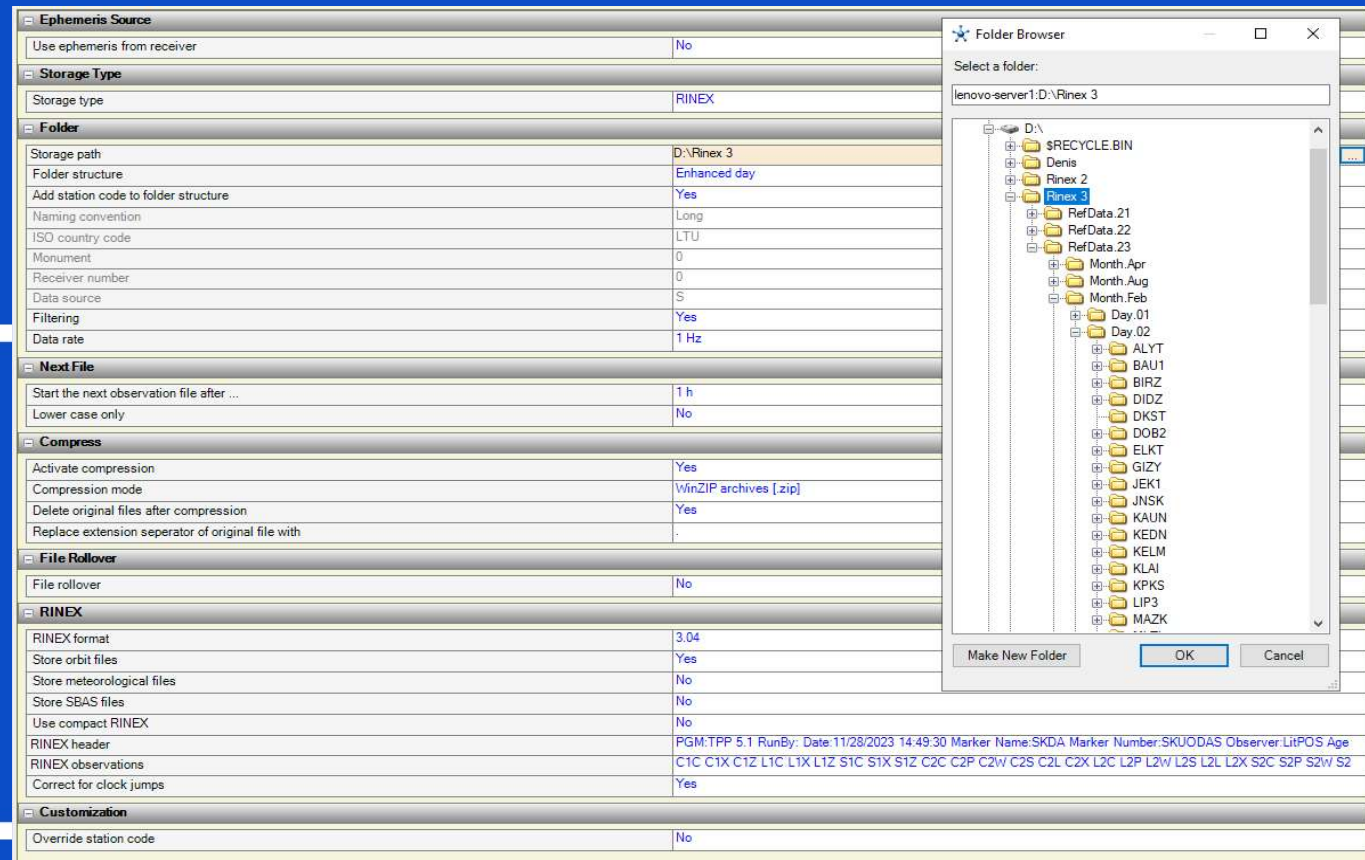
Data storage

LitPOS data stored on two servers. Amount of one month data:

Rinex 3.04 format – around 180 GB;

Rinex 2.11 format – 80 GB;

Other data– 200 GB.



The image shows two overlapping windows from a software application. The main window is a configuration panel for data storage settings, and the smaller window is a 'Folder Browser' showing a directory tree.

Configuration Panel Settings:

- Ephemeris Source:** Use ephemeris from receiver: No
- Storage Type:** Storage type: RINEX
- Folder:**
 - Storage path: D:\Rinex 3
 - Folder structure: Enhanced day
 - Add station code to folder structure: Yes
 - Naming convention: Long
 - ISO country code: LTU
 - Monument: 0
 - Receiver number: 0
 - Data source: S
 - Filtering: Yes
 - Data rate: 1 Hz
- Next File:**
 - Start the next observation file after ...: 1 h
 - Lower case only: No
- Compress:**
 - Activate compression: Yes
 - Compression mode: WinZIP archives [.zip]
 - Delete original files after compression: Yes
 - Replace extension separator of original file with: .
- File Rollover:** File rollover: No
- RINEX:**
 - RINEX format: 3.04
 - Store orbit files: Yes
 - Store meteorological files: No
 - Store SBAS files: No
 - Use compact RINEX: No
 - RINEX header: PGM:TPP 5.1 RunBy: Date:11/28/2023 14:49:30 Marker Name:SKDA Marker Number:SKUODAS Observer:LitPOS Age
 - RINEX observations: C1C C1X C1Z L1C L1X L1Z S1C S1X S1Z C2C C2P C2W C2S C2L C2X L2C L2P L2W L2S L2L L2X S2C S2P S2W S2Z
 - Correct for clock jumps: Yes
- Customization:** Override station code: No

Folder Browser: Shows a directory tree for 'lenovo-server1.D:\Rinex 3'. The tree structure is as follows:

- D:\
 - \$RECYCLE.BIN
 - Denis
 - Rinex 2
 - Rinex 3
 - RefData.21
 - RefData.22
 - RefData.23
 - Month, Apr
 - Month, Aug
 - Month, Feb
 - Day.01
 - Day.02
 - ALYT
 - BAU1
 - BIRZ
 - DIDZ
 - DKST
 - DOB2
 - ELKT
 - GIZY
 - JEK1
 - JNSK
 - KAUN
 - KEDN
 - KELM
 - KLAI
 - KPKS
 - LIP 3
 - MAZK

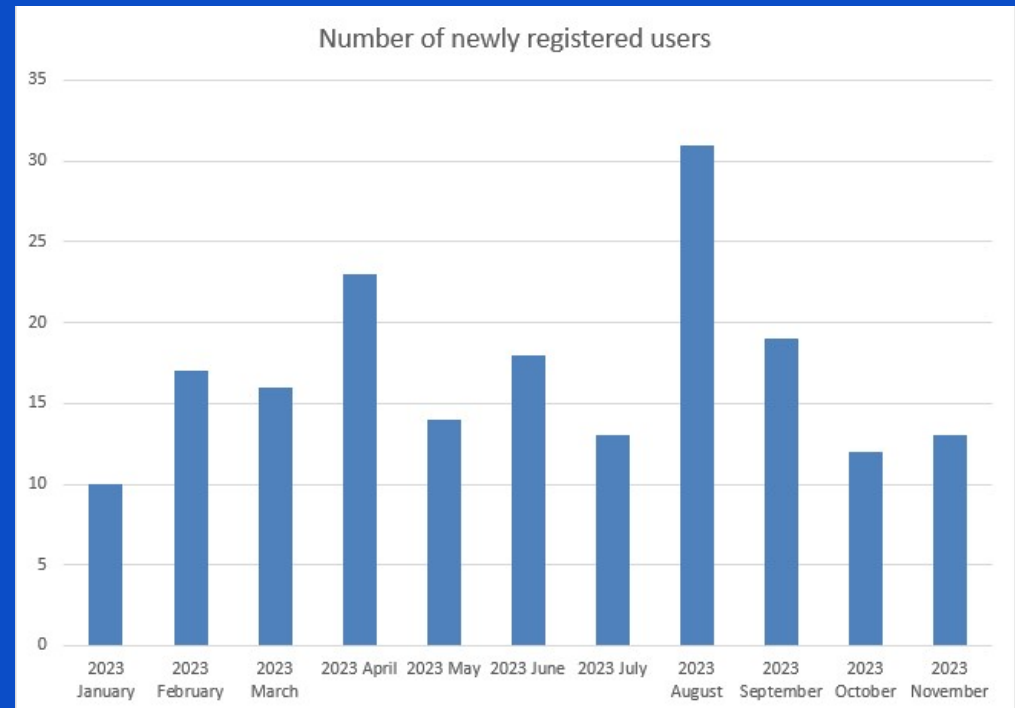
Number of users

Registered users 2182

Registered receivers 6335

Active distinct users in last
three months 986

On average, each server
receives around 600 000
requests from user receivers
each month. These requests
include failed connections.

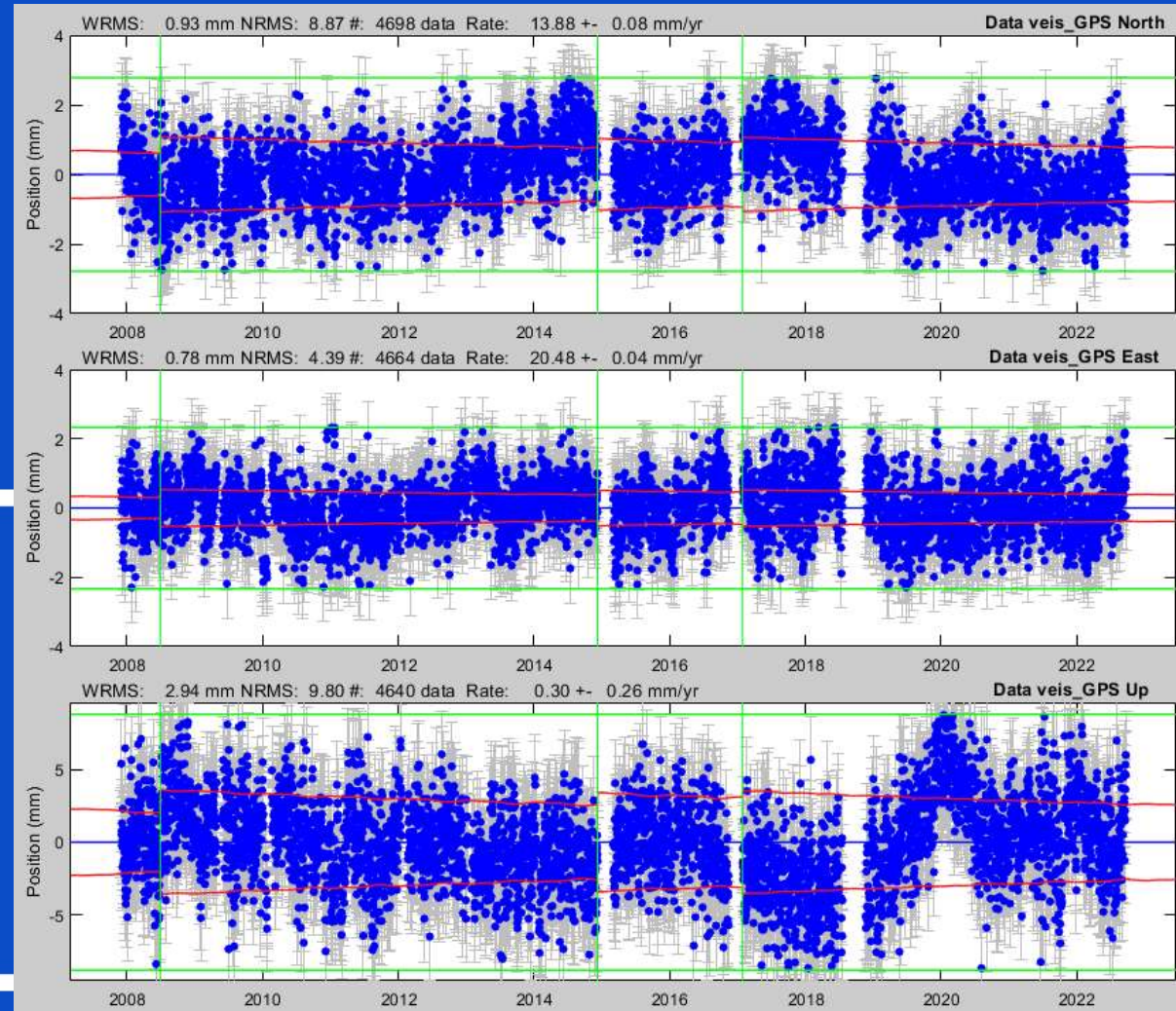


Time series analysis

Analysis of the time series of geodetic coordinate variations of the LitPOS network stations from the end of year 2016 has been performed.

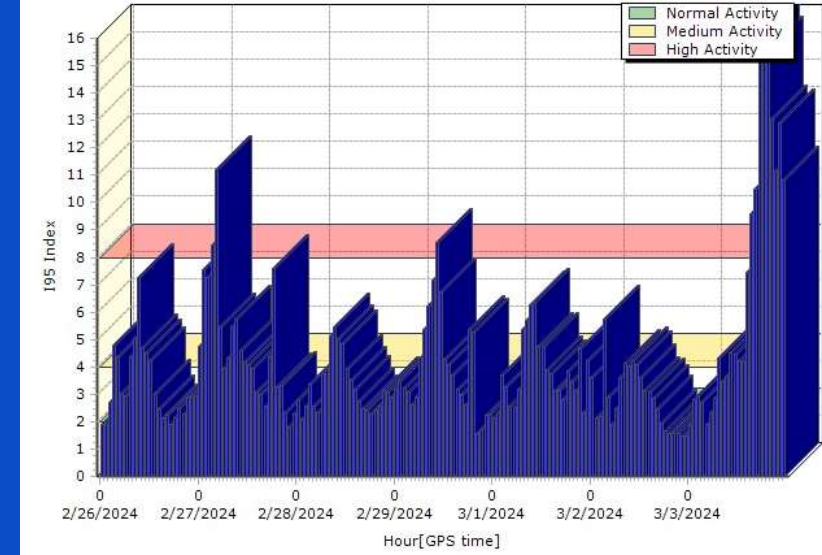
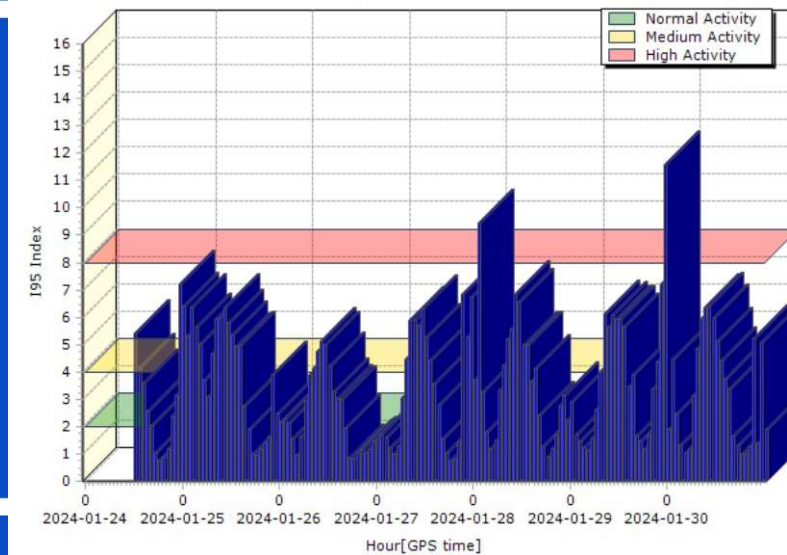
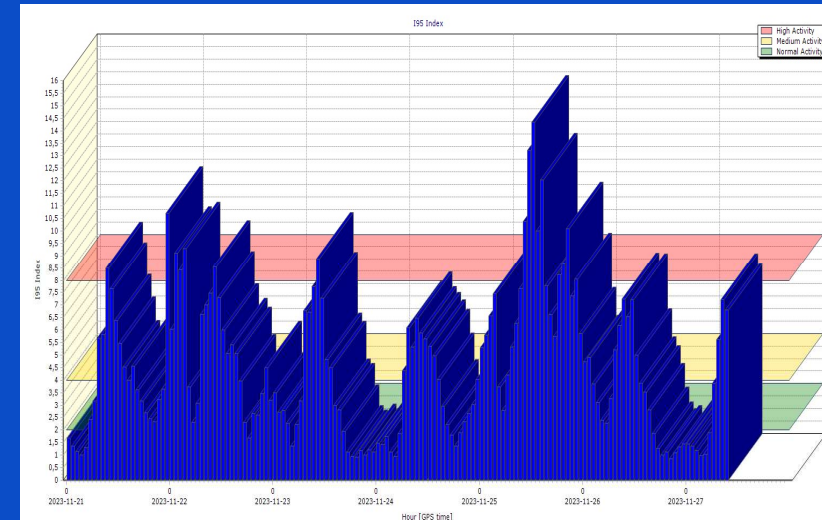
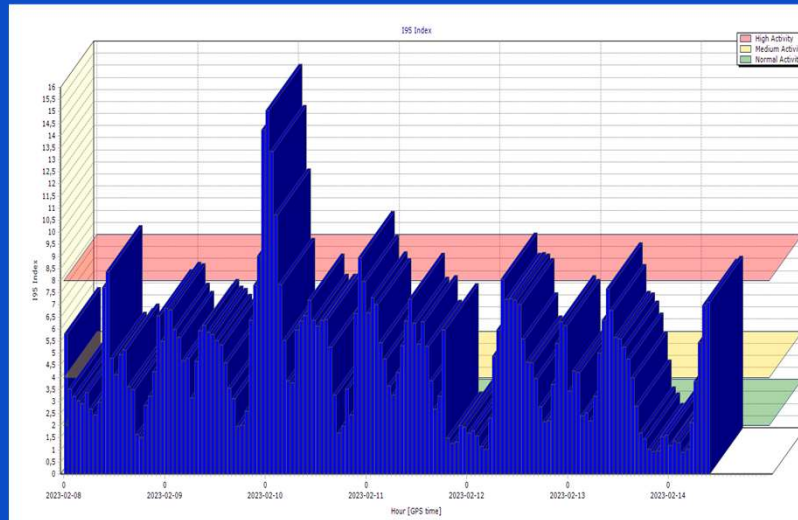
BERNESE 5.2 software is being used.

Analysis is being done according EUREF “Guidelines for EPN Analysis Centres”,



Ionospheric Index Monitoring

Users have access to Ionospheric index and some other information through National Geoportal



Instrumentation of stations



- **Trimble NetR9 receivers with Chock ring antennas,**
- **DSL modem,**
- **AC adapter 12V,**
- **e-Power Switch,**
- **UPS,**
- **electric power gauge**

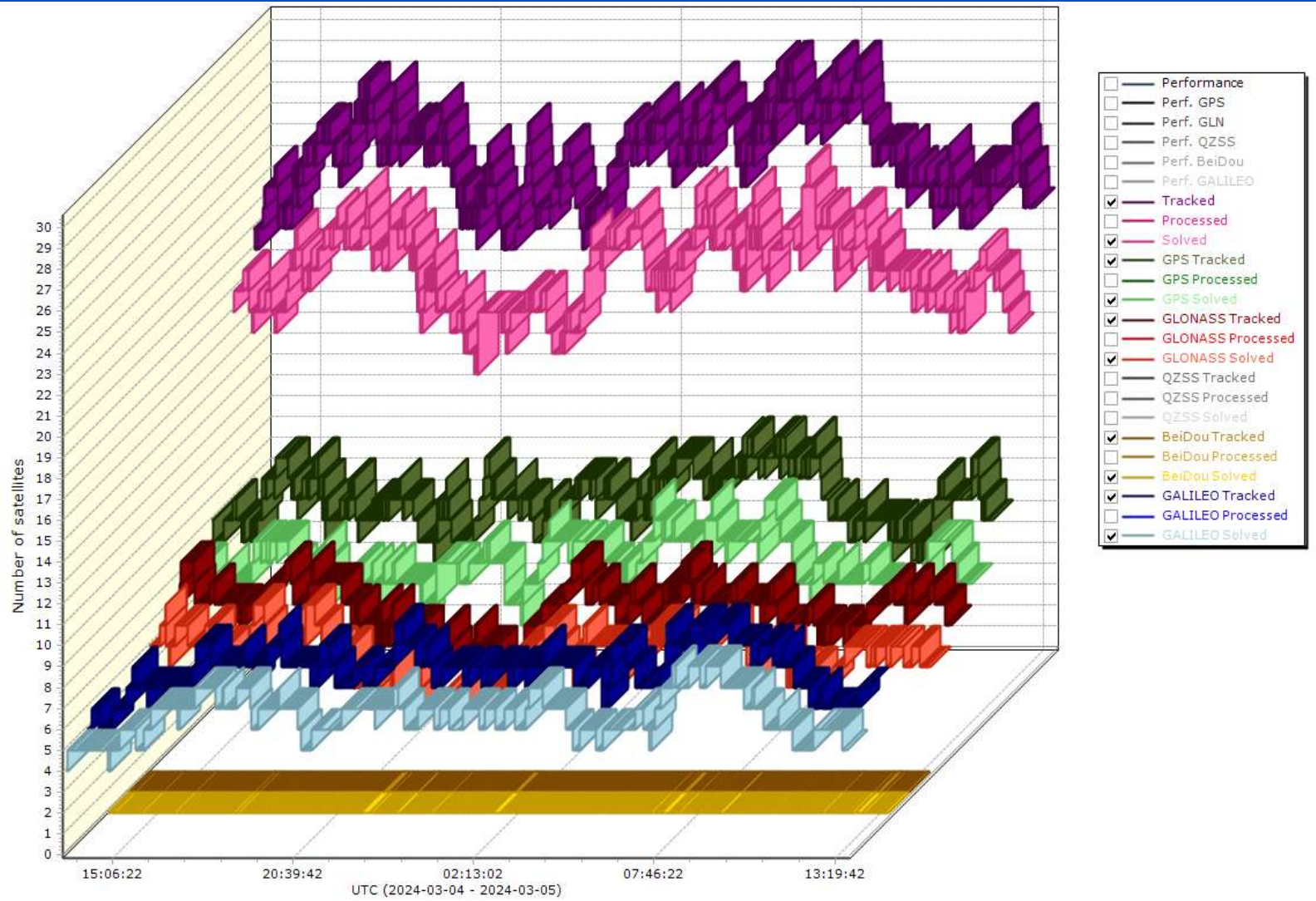
Recent developments

- In 2023 PIVOT software upgraded from v4.7 to v5.1 (RTX processor)
- From 2023.01 LitPOS system can receive signals from Galileo and BeiDou (first and second generation) satellites.
- Due to hardware limitations third generation BeiDou satellite signals are not supported.



RTXnet processor

Satellite tracking

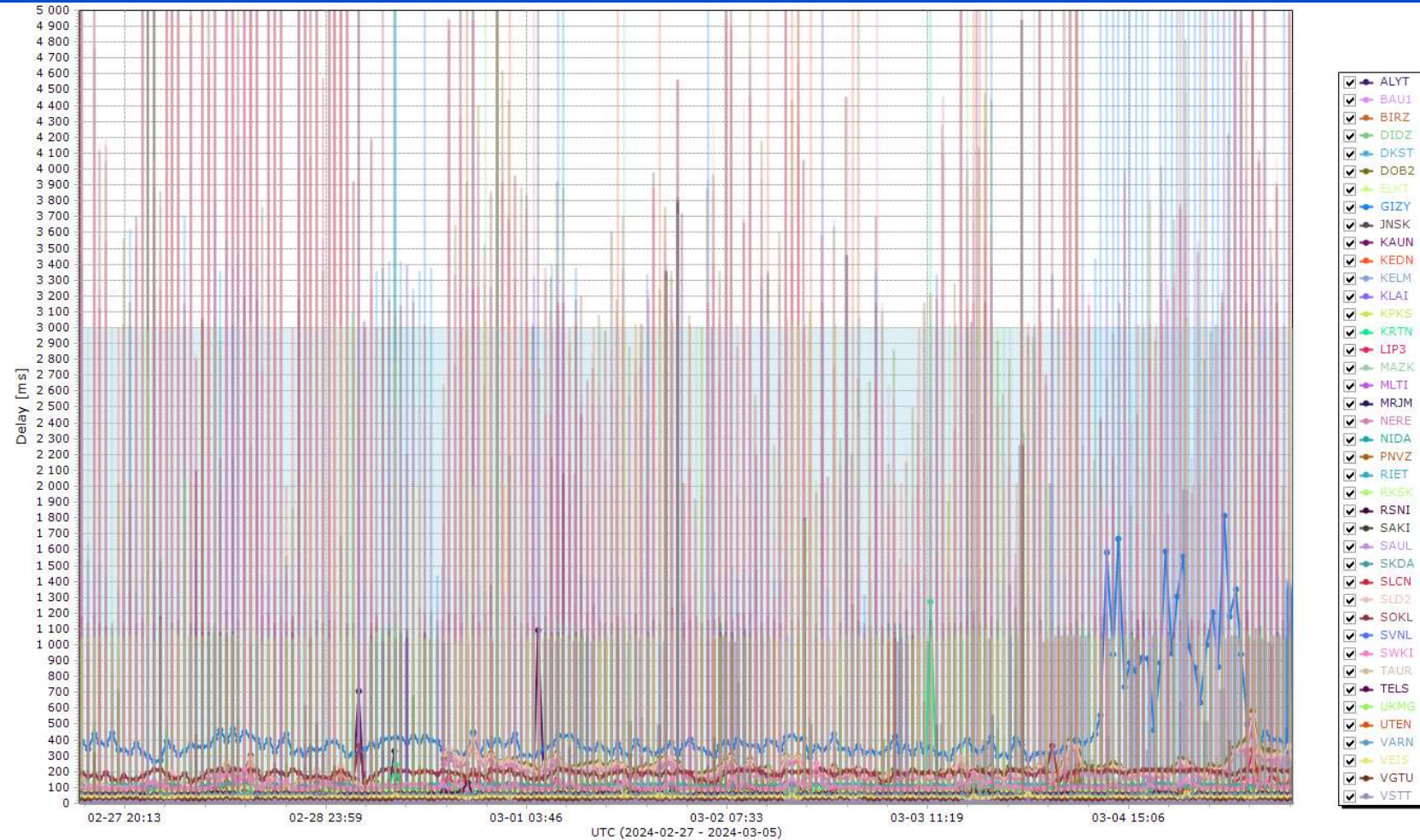




VILNIUS
TECH

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The Synchronizer Station Delay Chart



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