ASG-EUPOS reference system
Last year activities and future plans

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ASG-EUPOS system

Tasks accomplished in 2019:

- 12 reference stations with Trimble NetR5 (GR) exchanged with Trimble NetR9 (GREC)
- 13 Antennas with individual chamber calibration (GREC)
ASG-EUPOS system

Tasks accomplished in 2018:

- 36 Leica GR10 was upgraded to Leica GR30 (GREC)
- 22 Trimble NetR9 (GRE) was „upgraded” to Leica GR30 (GREC)
- Upgrade Trimble Pivot Platform to RTX Network processing (GREC)
Current status of ASG-EUPOS network: GUGiK has prepared hardware and software for calculation of network correction data from GPS, GLONASS, Galileo and Beidou.
Unfortunatelley Trimble NetR9 will not be able to track all Beidou III signals.

Tracking and data formats

- The Alloy receiver can now track the new signals that are part of the third generation of Beidou satellites (B1C and B2A). B1C is on frequency 1575.42 MHz and B2A is on frequency 1176.45 MHz. The Beidou tracking option is required for this improvement. If you already have the Beidou upgrade for the Alloy receiver, please contact support (RTNS_Support@trimble.com) to get a new key to track the Beidou Gen 3 B1C signal. B2A is already supported.

See table below for details.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>BDS Gen II</th>
<th>BDS Gen III</th>
<th>Receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1I</td>
<td>✓</td>
<td></td>
<td>NetR9/Alloy</td>
</tr>
<tr>
<td>B1C</td>
<td></td>
<td>✓</td>
<td>Alloy</td>
</tr>
<tr>
<td>B2I</td>
<td>✓</td>
<td></td>
<td>NetR9/Alloy</td>
</tr>
<tr>
<td>B2A</td>
<td></td>
<td>✓</td>
<td>Alloy</td>
</tr>
<tr>
<td>B3I</td>
<td>✓</td>
<td>✓</td>
<td>NetR9/Alloy</td>
</tr>
</tbody>
</table>

**NOTE** – Due to CPU limitations, NetR9 is unable to track B1C and B2A signals.

**NOTE** – The NetR9 receiver also supports B1I, B2I, and B3I signals.

Source: Trimble Release Notes for Firmware 5.37
Current status of ASG-EUPOS network:
Since January 2019 we are providing new correction data streams:

RTN4G_VRS_RTCM32
RTN4G_VRS_CMRx

and after user’s feedback in March 2019 we have added:

RTN3G_VRS_RTCM32

Some problems with initialization time and getting fixed position. Under investigation
ASG-EUPOS system

Number of active users is still growing:

✓ In reference to 2018 we have 300 active subscriptions more
✓ In reference to 2015 we have 1000 active subscriptions more

Number of active subscriptions year to year
Future plans

- Densification of the network in places where distances between stations are the highest.
- In 2018 new 19 sites were chosen and formally prepared for installation.
- Installation is planned for 2020.
Future plans

- Exchange the hardware in MC:
  - One set of network hardware (switches and router) to Katowice MC
  - New servers dedicated for Trimble databases
  - Upgrade of data storage array (increase the capacity)
  - Reorganization in MC (removal of old servers)
  - Maintenance contract for network hardware
✓ Trimble Pivot Platform data flow
✓ Network RTK solution (only GR):

![Diagram]

- Receiver
- GNSS Receiver Raw Data Analysis
- Ephemeris Manager: Broadcast almanach + Predicted Orbit Information
- RTK Network processor
- Real Time Output

**Trimble Pivot Platform**
Trimble Pivot Platform data flow

Network RTK solution (GREC):

- Receiver
  - GNSS Receiver
    - Raw Data Analysis
  - RTX Network processor
  - Real Time Output

Ephemeris Manager
- Broadcast almanach + Predicted Orbit Information

RTX Real Time data

Code Bias Calibration
Galileo and Beidou implementation

✓ Number of satellites decrease on each level of dataflow specially for Galileo and Beidou

### Satellites - General Information

<table>
<thead>
<tr>
<th>Constellation</th>
<th>Tracked Satellites</th>
<th>Constellation</th>
<th>Tracked Satellites</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS</td>
<td>10</td>
<td>GLONASS</td>
<td>9</td>
</tr>
<tr>
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<td>2, 3, 4, 5, 7, 9, 16, 22, 23, 26</td>
<td>9, 6, 7, 0, 15, 16, 21, 22, 23</td>
<td>8, 3, 5, 13, 15, 24, 25, 31</td>
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<td>Galileo</td>
<td>8</td>
<td>QZSS</td>
<td>0</td>
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<td>3, 5, 8, 11, 12, 13, 18, 19, 23, 27</td>
<td>4</td>
<td></td>
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<tr>
<td>Beidou</td>
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<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>5, 7, 9, 12, 19, 21, 22</td>
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<td>6</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Receiver</th>
<th>5 deg. elev. mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNSS Receiver</td>
<td>Raw Data Analysis</td>
</tr>
<tr>
<td>RTX Network</td>
<td>processor</td>
</tr>
<tr>
<td>Real Time</td>
<td>Output</td>
</tr>
</tbody>
</table>

- 36 svvs
- 34 svvs
- 9/9/7/9
- 26 svvs
- 9/7/5/5
Conclusions

✓ ASG-EUPOS is modernized to track and generate Network RTK correction data from Galileo and Beidou

✓ Trimble NetR9 receivers does not fully support Beidou III

✓ Densification and modernization of ASG-EUPOS will be continued

✓ First feedback from users of 4GNSS correction data streams is low number of satellites and sometimes long time to first fix
Thank for your attention...

www.eupos.org
www.asgeupos.pl
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