



GNSS Interoperability Solution at the User Level

*S. Silin, A. Muravyev
Design Bureau of Navigation Systems
(NAVIS Inc.)*

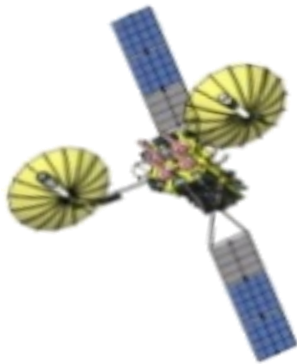
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GNSS Interoperability Solution



Issues of GNSS interoperability at the user level can be resolved in the following main directions:

- at the user receiver equipment level;
- at the augmentation systems level,

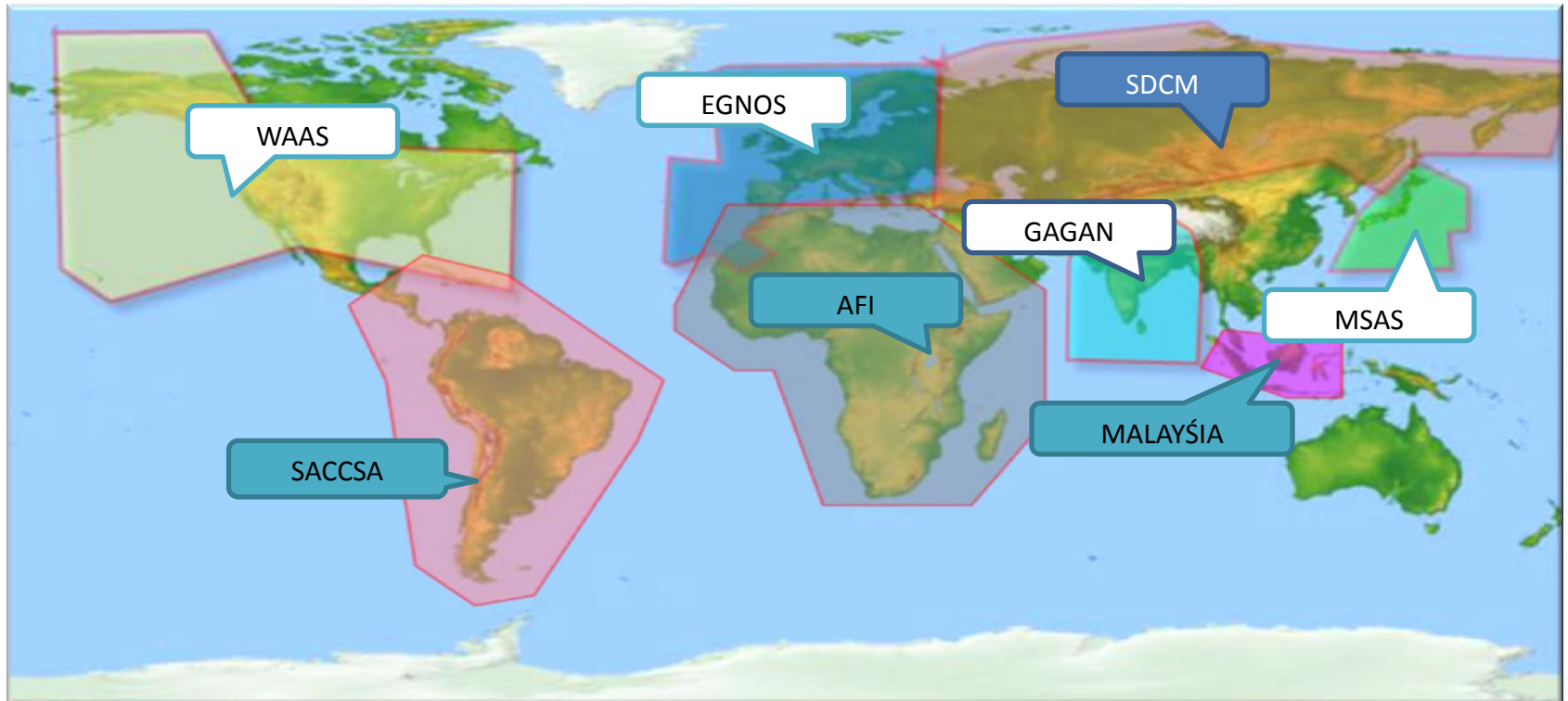


which is also subdivided into two levels:
the space based segment level,
the land based segment level.





First of all, state level systems of differential correction have to participate in the solution of the specified questions:
SDCM, EGNOS, WAAS, GAGAN, MSAS,
prospective Russian high-elliptic complex.



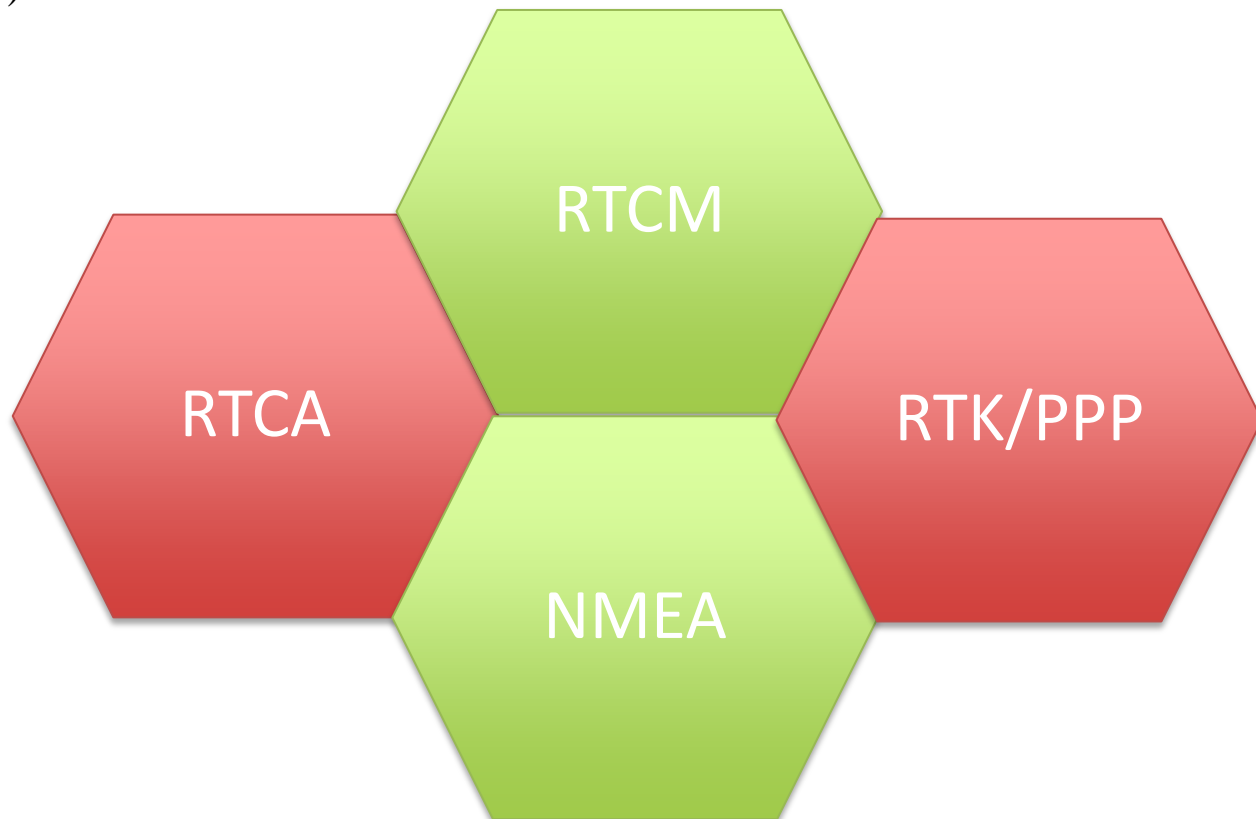


At the first stage it is necessary to bring into accord the international and interstate standards with internal normative documents of the states, being providers or users of services GNSS, namely, to coordinate the following line items:

uniform data transfer formats (RTCM, RTCA type),

uniform data transfer protocols (NMEA type),

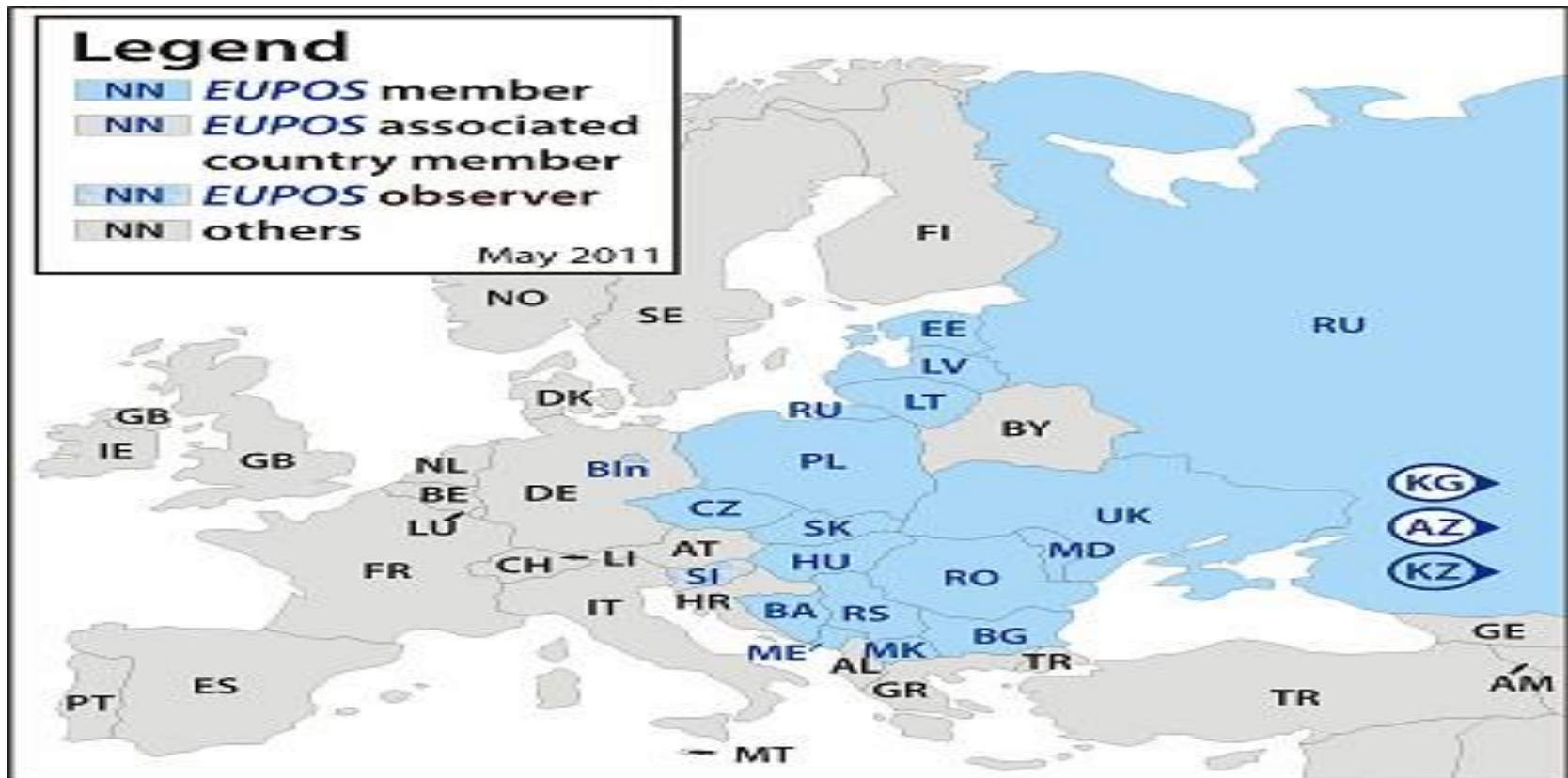
the new documents necessary, first of all, by transmission of operational information (RTK, PPP, etc.).



Harmonization of the State systems for high-precision navigation in Europe



European system of positioning (EUPOS), in particular, for example: SAPOS - geodetic service of satellite positioning of Germany, national GPS network of Great Britain (OS Net), CZEPOS (Czech Republic), APOS (Austria), SKPOS (Slovakia), ASG (Poland), etc.

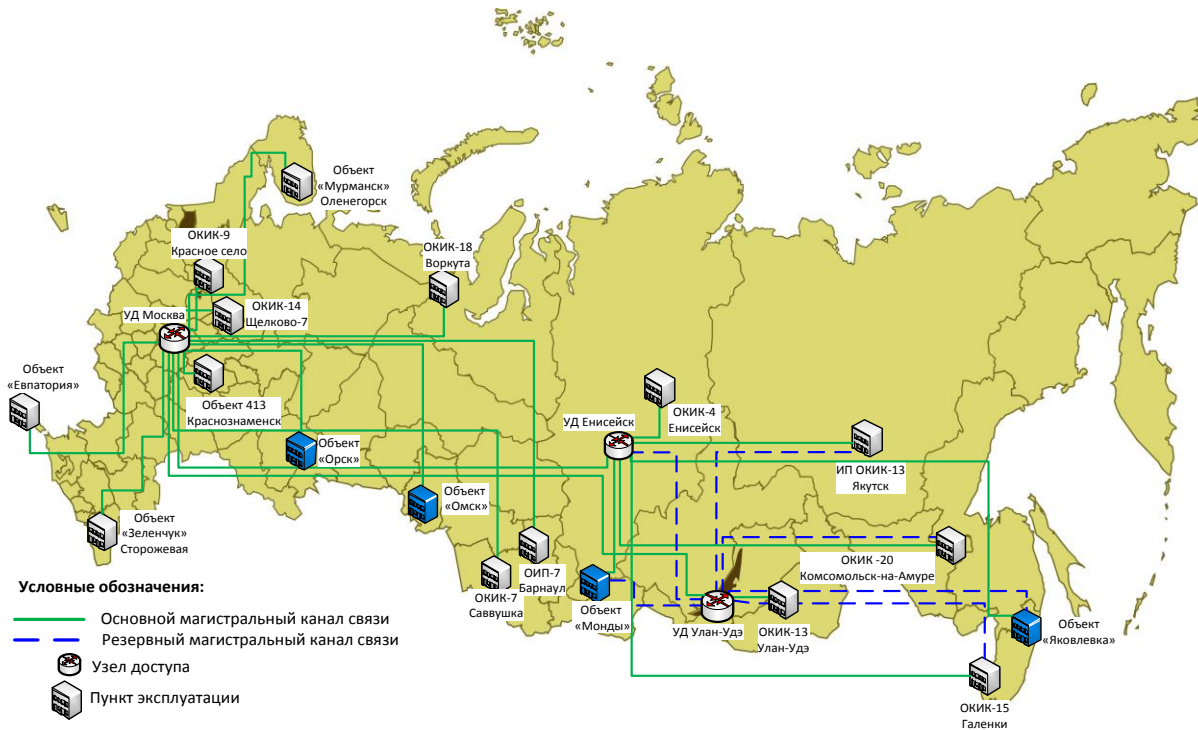




Basis for harmonization of the GNSS land segment – the existing network of basic stations IGS in Russia

Level of the state guarantees provided by GNSS services providers

Existence of the bodies guaranteeing providing navigation service on a constant basis



Prerogative of the GLONASS System General Designer

*Harmonization
of development
for GNSS technologies*

GNSS Interoperability Solution at the User Level



*Joint programs and
researches*

*Control of open service
characteristics, including
metrological*



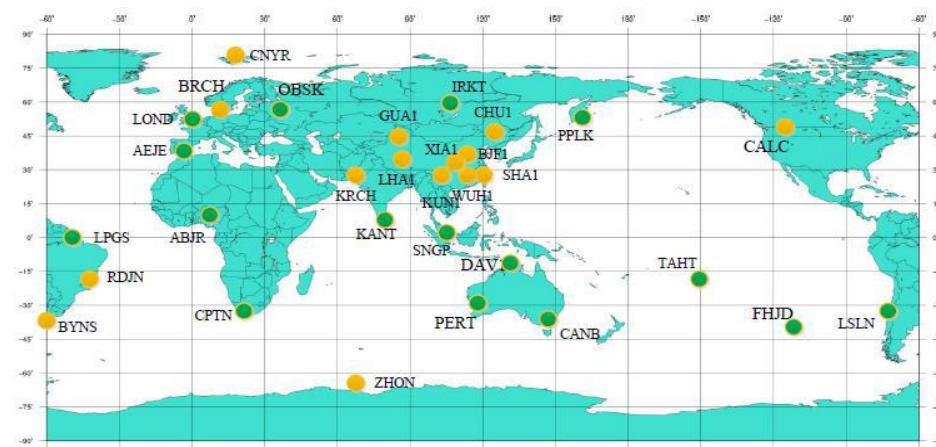
Test project on monitoring of GNSS open service characteristics



➤ It is based on use of the existing network of geodetic stations IGS and national control devices of iGMAS network



IGS MGEX network



iGMAS network

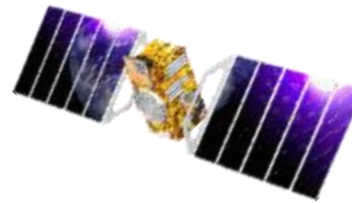
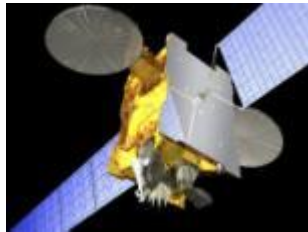
- IAC PNT coordinates this work in Russia and unites several available control devices with IGS network
- NAVIS Inc. is ready to provide several base stations for use in the project



The factors influencing on GNSS interoperability



- Now the major role is played by space based augmentation systems (SDCM, EGNOS, WAAS, etc.)



- Possible technical difficulties at joint processing of various signals in the navigation equipment of users can be solved by software, but not up to the end.

Here it is important that providers have agreed upon parameters of the used signals.

- The large role is played also by synchronization of a system time and coordinate systems of the existing and developing global navigation satellite systems.



- Besides, from our point of view, creation and synchronization of operations of services of the Russian GLONASS system and the Chinese BeiDou system is important.
- Already there are good premises and arrangements on mutual installation of certain stations of two systems on the territories of both countries.



Sharing of Various Equipment



Traditional navigation systems which can be integrated with GNSS
for ensuring interoperability:

- ✓ inertial systems;
- ✓ calculators of a way;



Radio engineering systems:

- ✓ pseudo-satellites,
- ✓ repeaters,
- ✓ radio navigational systems of distant navigation (RSDN);
- ✓ Survey: vizer, locators, direction finders;

Sensors of natural and artificial navigation fields:

- ✓ magnetic,
 - ✓ navigation,
 - ✓ barometric;
- ✓ Systems of technical sight



Forming and implementation in 2017 of the Test project on development the issues of prospective interaction for high-precision navigation national systems, taking into account:

IGS work experience;

the offers on information exchange made by the Japanese representatives at the intersession WG-S meeting in Vienna, June 2016;

work experience of national systems of high-precision navigation.



THANK YOU FOR ATTENTION!