



Positioning and Timing and Navigation System in Ukraine: European Cooperation Aspects

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Kathmandu, Nepal, 16 December 2016



STNSU in 2013



Total: 26 RS in 2013

- SSAU (15)
- «System.net» (3)
- «Europromservice» (2)
- ZakPos (4)
- TNT (1)
- NAU (1)

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Positioning and Timing and Navigation System in Ukraine (STNSU) using GNSS was established in the framework of the National Space Programs of Ukraine (1998-2012).

The main goal of establishing STNSU is to meet users' requirements, related to increasing of accuracy, continuity and reliability of positioning and navigation, with utilizing GNSS capabilities.

Main tasks of STNSU are: “non-stop” monitoring of GNSS signals and integrity of radio-navigation fields of GPS, GLONASS, EGNOS, Galileo and BeiDou, forming and distributing via Internet the differential corrections for users of GNSS in Ukraine (in the RTCM standards).

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STNSU as Regional Element of GNSS



Users of the STNSU services

Providers of the STNSU services

Operator of the STNSU

Service Centers

Service Centers

Res. Center of NF Monitoring

Main Center of NF Monitoring

GPS

SONG

Galileo

National&Foreign GNSS-Networks

GBAS
GBAS
GBAS

Regional Point of NF Monitoring

Regional Point of NF Monitoring

Facilities for STNSU Quality Testing and Monitoring

Regional Network

Regional Network

RS

RS

RS

RS

RS

RS

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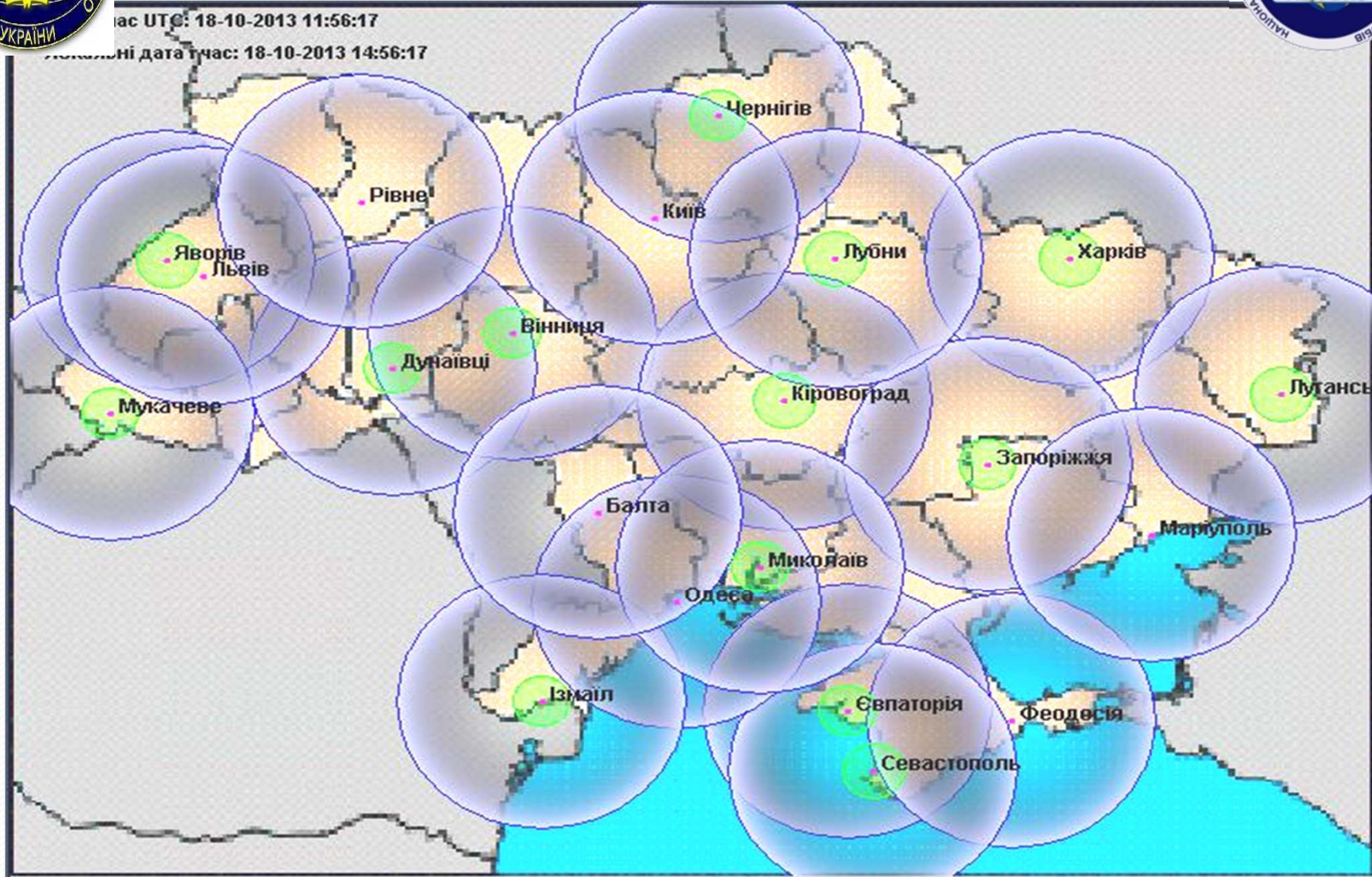


Differential Corrections of STNSU (in 2013)



час UTC: 18-10-2013 11:56:17

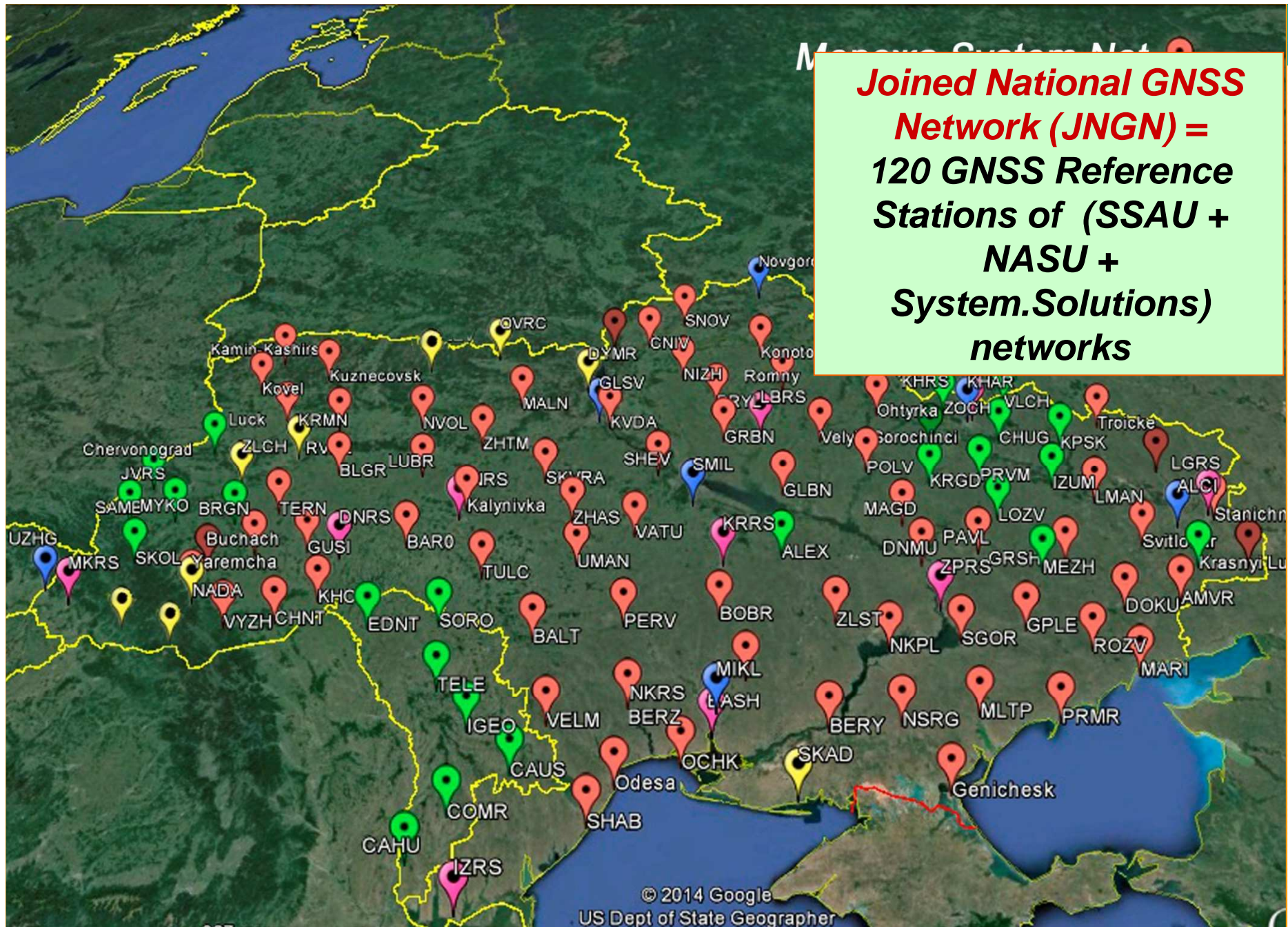
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Map of GNSS Reference Stations

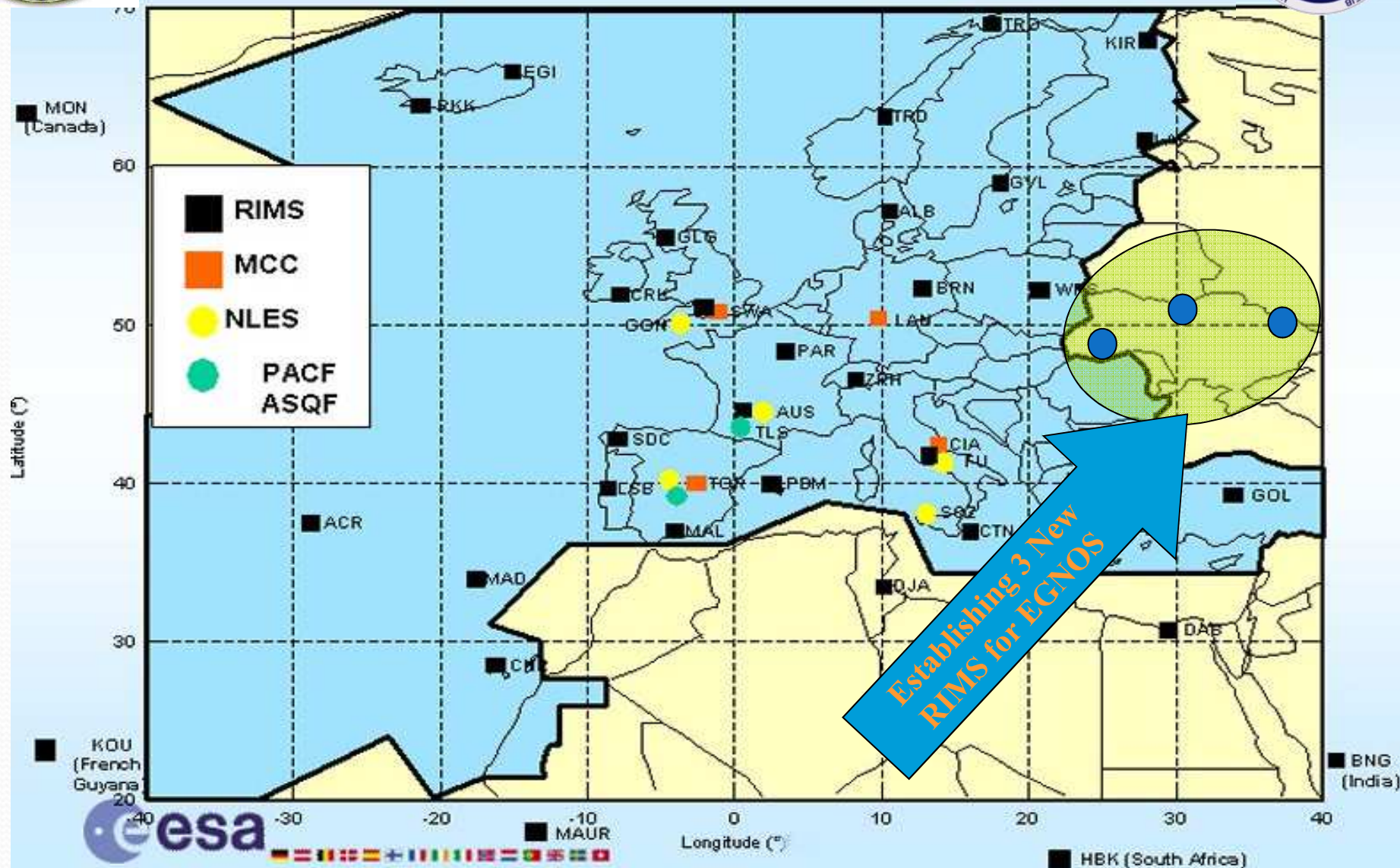
Joined National GNSS Network (JNGN) = 120 GNSS Reference Stations of (SSAU + NASU + System.Solutions) networks



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EGNOS Extension to Ukraine's Territory



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Proposed Sites for RIMS Deploying



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LEGAL ISSUES OF EGNOS EXTENSION TO UKRAINE

Implementation of the agreements on Ukraine's participation in European satellite navigation system "EGNOS-Galileo" and its extension to the territory of Ukraine is directly related to implementation of "Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Ukraine, of the other part".

Paragraph 320 of the Action Plan states: *Ensuring participation in activities regarding the extension of EGNOS satellite based augmentation system to the territory of Ukraine in accordance with the "Cooperation Agreement on a civil Global Navigation Satellite System (GNSS) between the European Community and its Member States and Ukraine"*

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CO-OPERATION AGREEMENT ON A CIVIL GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) BETWEEN THE EUROPEAN COMMUNITY AND ITS MEMBER STATES AND UKRAINE

ARTICLE 4

Scope of cooperation activities

1. The sectors for cooperative activities in satellite navigation and timing are: radio-spectrum, scientific research and training, industrial cooperation, trade and market development, standards, certification and regulatory measures, development of global and regional GNSS ground augmentation systems, security, liability and cost recovery. The Parties may adapt this list of issues by common agreement.

2. Extending cooperation, if requested by the Parties to:
 - 2.1. GALILEO sensitive technologies and items under EU, EU and ESA Member States, MTCR and WASSENAAR agreement export control regulation as well as cryptography and major information security technologies and items.

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CO-OPERATION AGREEMENT ON A CIVIL GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) BETWEEN THE EUROPEAN COMMUNITY AND ITS MEMBER STATES AND UKRAINE

ARTICLE 11

Development of global and regional GNSS ground augmentation systems

1. The Parties shall collaborate to define and implement ground system architectures allowing an optimal guarantee of GALILEO/EGNOS integrity and continuity of GALILEO and EGNOS services and interoperability with other GNSS systems
2. To this end at the regional level the Parties shall cooperate with a view to implement a ground regional augmentation system in Ukraine based on the GALILEO system. Such a regional system is foreseen to provide regional integrity and high accuracy services additional to those provided by the GALILEO system globally. As a precursor, the Parties envisage the extension of EGNOS in Ukraine region through a ground infrastructure involving Ukrainian Ranging and Integrity Monitoring Stations.
3. At local level the Parties shall facilitate the development of GALILEO local elements.

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Aim of the State Law # 4040 as of 02.08.2016

The purpose of the Law of Ukraine on "State Regulation in the Field of Satellite Navigation" is to determine the legal, economic, institutional and financial framework for the activities in the field of satellite navigation in Ukraine and establish the principles of state regulation in this area.

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Proposals for Cooperation on GNSS

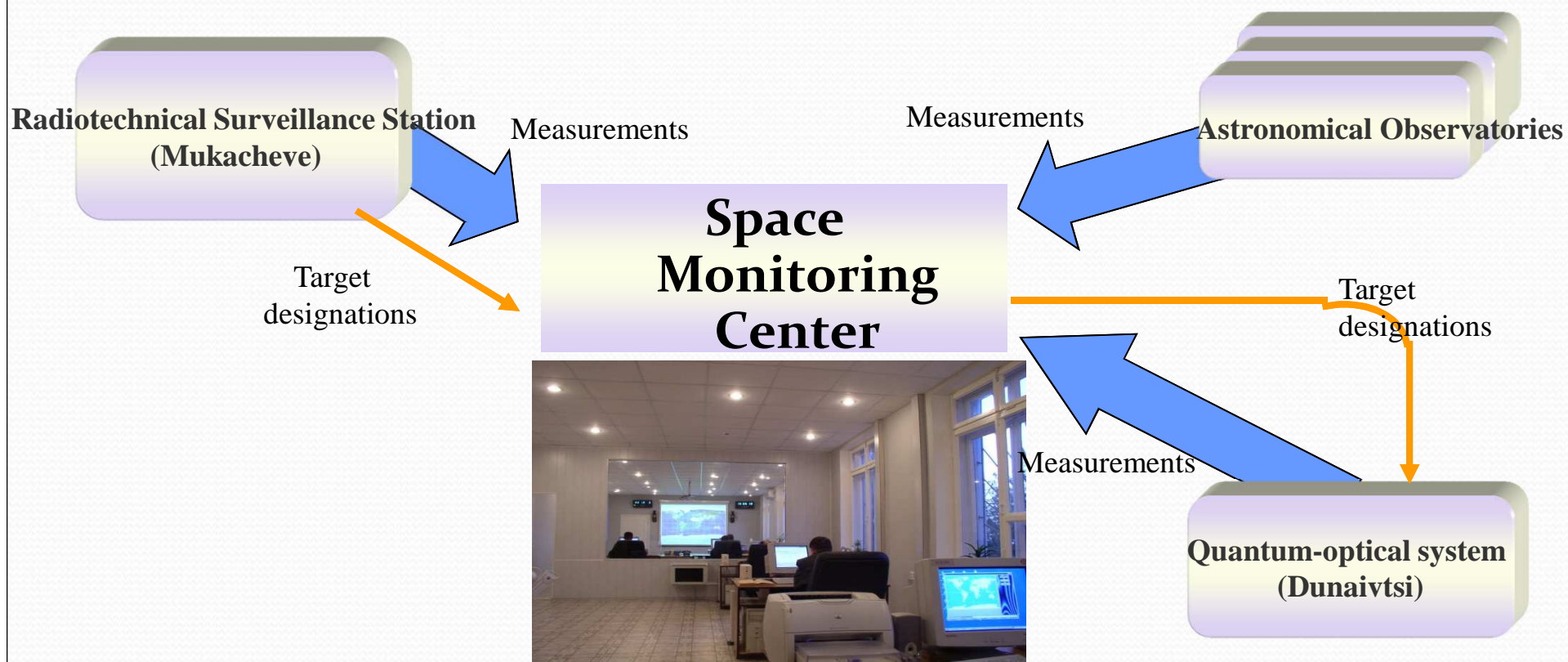
Signing of the Memorandum on cooperation in sphere of GNSS, including all the points below mentioned, but not restricted:

- Grants and technical assistance for the modernization of National GNSS Network for needs of State Border, Armed Forces, science and education, agriculture, environmental protection, transportation and other sectors.*
- Collecting raw Galileo and BeiDou measurements, ionosphere data using the Ukrainian network of GNSS reference stations and transferring them to the Galileo and BeiDou Control Center for calibration of Galileo and BeiDou signal in Space.*
- Collecting precision optical measurements from Ukrainian astronomical observatories and transferring them to the Galileo and BeiDou Control Center for tracking of Galileo and BeiDou satellites.*
- Deployment and utilization Galileo and BeiDou satellite monitoring stations in Ukraine.*
- Implementation of up-to-date Galileo and BeiDou equipment and modern GNSS-applications in Ukraine.*

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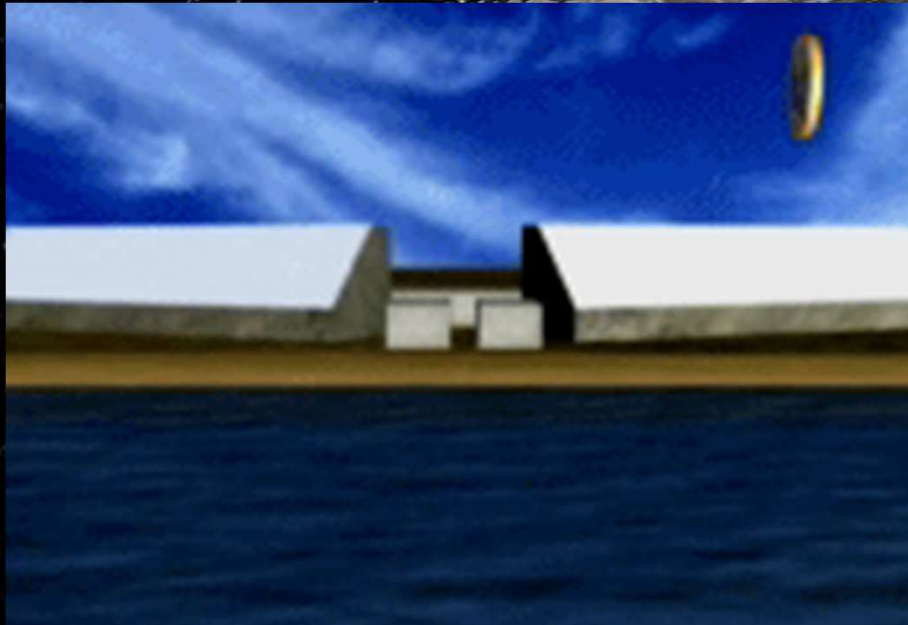
Space Monitoring and Analysis System (SMAS)



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Data sources of SMAS Space surveillance facilities of NSFCTC



5N86 DNEPR RADAR



Sazhen-S quantum-optical system

Data sources of SMAS.

Space surveillance facilities (SSF) of the Ukrainian Network of Optical Stations

SSF of RI MAO, Mykolaiv



SSF of UzhNU, Uzhhorod



SSF of the Ivan Franko NUL, Lviv



SSF of RI OAO, Odessa





Proposals for International Cooperation on SMAS

- Involvement of the Space Monitoring and Analysis System of Ukraine into the works in the framework of international projects on space monitoring, particularly under the Agreement on Space Surveillance and Tracking, signed by France, Germany, Italy, Spain and Great Britain;
- Ability to provide mutually beneficial SMAS information exchange and application (including space weather issues);
- Exchange of mutual experiences on the establishment of national space monitoring and analysis systems, specialists training.

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National Space Facilities Control and Test Center of SSAU



Thank you for your attention!

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