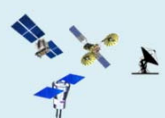


COOPERATION CAPABILITIES for ESCAP: Space Applications Developed by Russian Space Systems

Space technologies

Space systems

- Navigation
- Communication, broadcasting
- Remote sensing
- Distant space
- Human spacecraft



Ground facilities

- Ground control facility
- Data acquisition, processing and distribution ground facility

Products and services

Navigation data systems



GIS and remote sensing



Satcom

Integrated products and services



Markets

Real estate and construction

- Building plans;
- Construction monitoring;
- Status monitoring for complicated engineering structures;
- Communication and object status data delivery



Emergency management, government control, security

- Natural and industrial disaster monitoring and post-analysis;
- Fire monitoring service;
- Drug control;
- Government and special comms;
- Satellite internet



Agriculture, forest sector, ecology, geology

- Agricultural land and ecosystem monitoring and analysis;
- Earthquake prediction;
- Forest inventory;
- Satcom and data acquisition from agricultural objects and remote lands



Mapping

- Cadaster plans;
- Mapping services;
- Delivery of mapping data



Transport and communication

- Monitoring of ground, air, marine transport;
- Transport and logistics services;
- Mobile satcom;
- Global on-way internet



Education, science

- Joint investigations;
- Training of space application specialists;
- Space products for education



Tourism

- Rescue system;
- Mobile satcom and internet;
- Navigation data services



Governmental authorities

- ✓ Scientific, engineering, procedural support for development of space service centers and implementation of utilization projects;
- ✓ Pilot projects in the area of space data applications

**Education
Science**

- ✓ Joint development of space applications technologies;
- ✓ Development of methodological materials;
- ✓ Integration of available data resources, data bases, knowledge, for commercial purposes as well

Business communities

- ✓ Commercial and socially-oriented projects

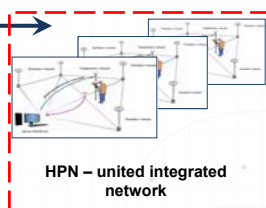
**SOCIAL DEVELOPMENT.
High-Precision Positioning Network (HPN)**

HPNN unites reference stations and networks of different property and manufactured by various companies, allowing operator to construct a set of services taking into account constantly growing user requirements to high-precision positioning



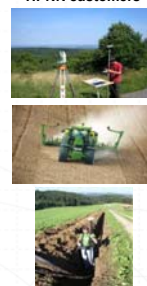
GNSS space segment
(GLONASS, GPS, Galileo,
BeiDou)

GNSS signal



Correcting data

HPNN customers



2017

- ✓ 250 stations



2020

- ✓ 1400 stations
- ✓ Station maintenance system

ENVIRONMENTAL and DISASTER CONTROL. Remote Sensing Data Application

PARAMETRES:



1m
Spatial resolution



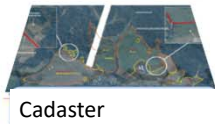
2 years
Data actuality



10-15 m
Customers



Stage-by-state commissioning
depending on a region



Cadaster



Mapping



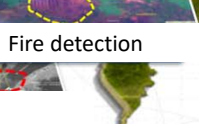
Regional
development



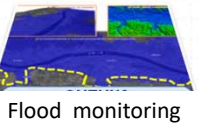
Forest monitoring



Land monitoring



Fire detection



Flood monitoring

State customers in Russia



EMERCOM



Ministry
of Transport



Ministry of Nature



Ministry of Agriculture



Rosreestr

Commercial Customers in Russia



P/RA



Railway



Rostelecom



Oil and gas



GAZPROM

Remote sensing coverage provides data basis for services and products for state and commercial customers

TRANSPORT. RSS-COMPLEX NAVIGATION DATA SYSTEM



Road
infrastructure



Passenger
transport



Communal
service transport



RSS COMPLEX

School buses



Field services



Hazardous cargo
transportation



The system supports

- Transport real-time control and monitoring in accordance with time-table, including route, speed, stop location and timing, distance run estimation; development of optimal routes, traffic schedules;
- Monitoring of fuel consumption, operations of car mechanical components, technical status of the vehicle (i.e. monitoring of main parameters for the vehicle components and assemblies);
- Monitoring of vehicle deviation from the defined operational areas, routes, schedules;
- Analysis of vehicle long-term status;
- Reports for transporting company (orders, route lists, updates for running and waiting, etc.)

RSS-Complex advantages

- Wide spectrum of the system functions;
- Capability to monitor 5000- 100000 vehicles;
- Flexible control of users' rights;
- Protocols of users' actions;
- Reports in .pdf, .doc, .xls (set of typical reports);
- The system can be applied with SW with open source code (operational systems, data base management systems, apps servers, web-servers);
- Enhanced integration capabilities due to open API, all server functions are implemented as web-services.

INDUSTRIAL DISASTER MANAGEMENT. MARINE VESSEL MONITORING SYSTEM

Marine Vessel Monitoring System provides capabilities for ship/crew technological control based on application of space navigation and communication data.

The system is intended for:

- Monitoring of vessel motion and status, as well as their missions and tasks;
- Monitoring of the crew activities;
- Optimization of fleet control business processes.



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INDUSTRIAL DISASTER MANAGEMENT. Engineering Construction Disturbance High-precision Monitoring System (ECDHMS)

**ECDHMS
is intended for:**

permanent monitoring of disturbances and shifts in bridge, dam, tower, etc. structure elements with the aim to:

- Early diagnostics of construction integrity;
- Prompt detection of construction stability loss.



Vibration spectral parameter assessment error	Test results
Vibration range, Hz	0,1-10
Shift in the plan, mm	< 0,1
Shift in the height, mm	< 0,2
Real-time shift measurement error	Test results
Shift in the plan, mm	1,8
Shift in the height, mm	3,0

Basis line measurement system – approval certificate
for measurement tool
RU.C.27.002.A №49297
Federal Agency of Technical Regulation and Metrology

2013 – ECDHMS mockup
2014 – ECDHMS installed on the bridge over the Ob' river, Novosibirsk
2016 – ECDHMS installed on the bridge over the Zeya river, Siberia

Invention patent № 2496124 «ECDHMS system», patent holder – JSC Russian Space Systems

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JSC Russian Space Systems

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