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THE INTEGRATED PROJECT SFERA FOR SPACE INFOCOMMUNICATION TECHNOLOGY  
IMPROVEMENT

**Abstract**

Following the newest global trends in development of multi-satellite constellations which performance depends on intra-constellation interactions, the Russian Federation represented by the Space State Corporation ROSCOSMOS initiated creation of the new integrated project SFERA for space infocommunication technology improvement (SFERA). SFERA project will be developed based upon constellations of various functionality and different-sized spacecrafts (joint infocommunication infrastructure), including small satellites. This approach will provide a completely new level (quality-wise) of digital space services on a global scale.

The challenge of creating SFERA is to reach an appropriate level of satellite services availability to all spheres of the Russian economic sector; make it possible to use satellite technologies for digitization of economic, production, educational, scientific, administrative, and cultural processes that contribute to the development of the Russian Federation; broaden representation of Russian space products on the international market; deploy the fullest potential of existing and advanced space infrastructure for the benefit of national and economic security of our country.

SFERA auxiliary program provides for the following comprehensive services:

- Advanced navigation system services, including rendering essential navigation services, navigation services which provide enhanced accuracy and reliability, relative navigation services, and high accuracy services;
- Communication, broadcasting and retransmission services which provide broadband access and fixed voice communication (IP) and increase coverage of the Russian Federation arctic zone to 100 %, improve total capacity of satellite-provided internet, provide broadband access and voice communication (IP) for mobile units, high-quality TV-broadcasting (live and distributional) in HD, 4K, 8K over the whole Russian Federation territory, digital sound broadcasting, data collection and transmission using sensors, and transmission of commands through spacecraft (internet of things IoT);

- Earth remote-sensing services including transmission (in passive on-line mode) of Earth surface overview images in visual and near infrared frequency bands, high-fidelity Earth surface imaging services in visual and near infrared frequency bands, all-whether radar imaging of Earth surface.

This paper focuses on development of the advanced space system, its anticipated performance characteristics, areas of concern, and possible solutions.