

INDUSTRIAL USE OF SPACE – BASED INFORMATIONAL SERVICES

Nikolay Sevastiyanov



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NEED FOR SPACE SERVICES IN OIL & GAS INDUSTRY

INFRASTRUCTURE OF RUSSIAN OIL & GAS INDUSTRY :

gas transmittal pipelines
gas distributing pipelines
gas distributing stations
gas booster stations
gas processing facility
gas refining complexes
gas storages
gas wells
electrical substations

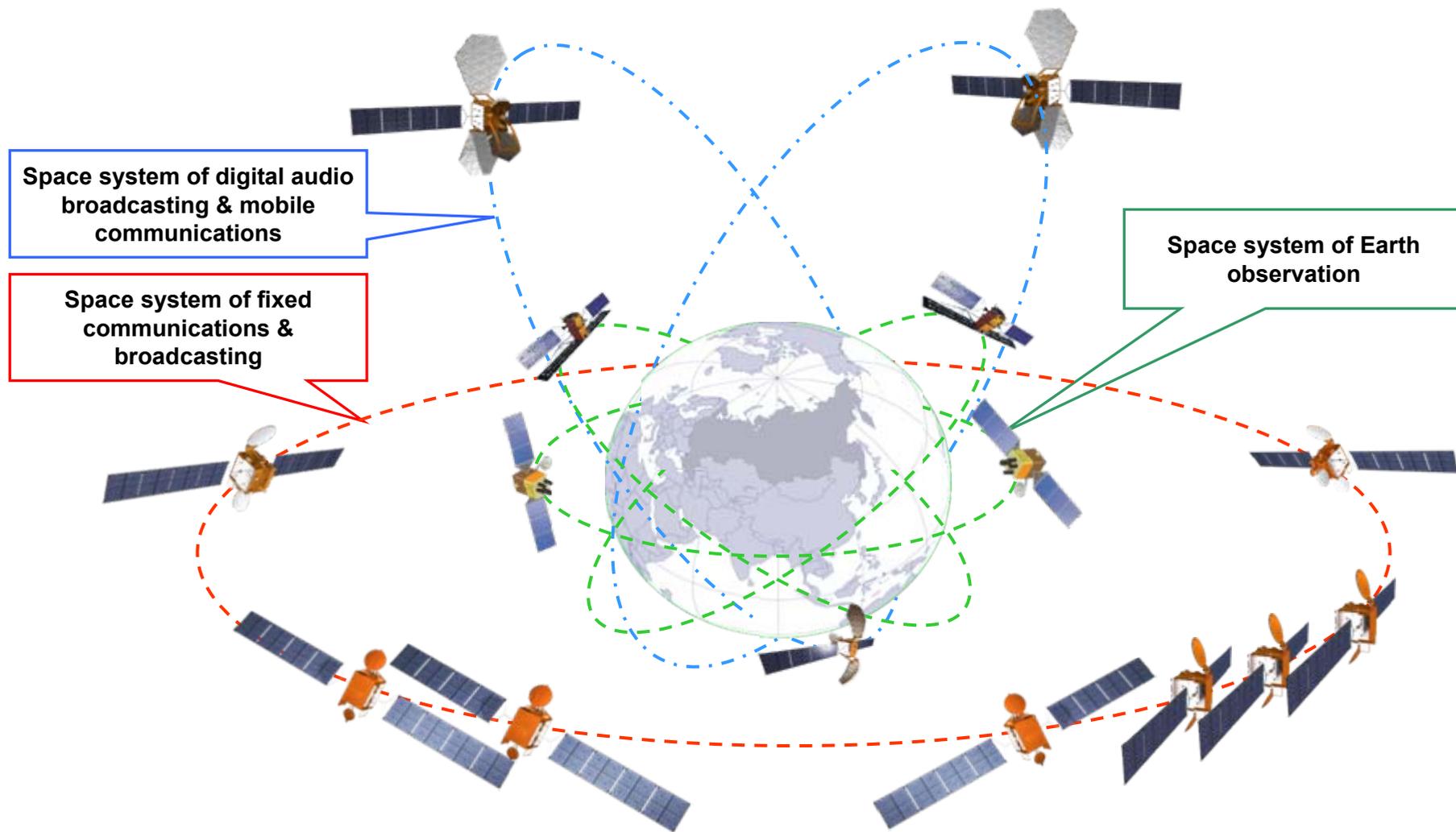
over 155 thousand kilometers;
over 400 thousand kilometers;
over 3300 stations;
254 stations;
158 sites;
6 sites;
24 sites;
over 10000 sites;
over 11000 sites.



oil pipelines
oil-products pipelines
oil-pump stations
oil wells
oil refinery plants
grease plants

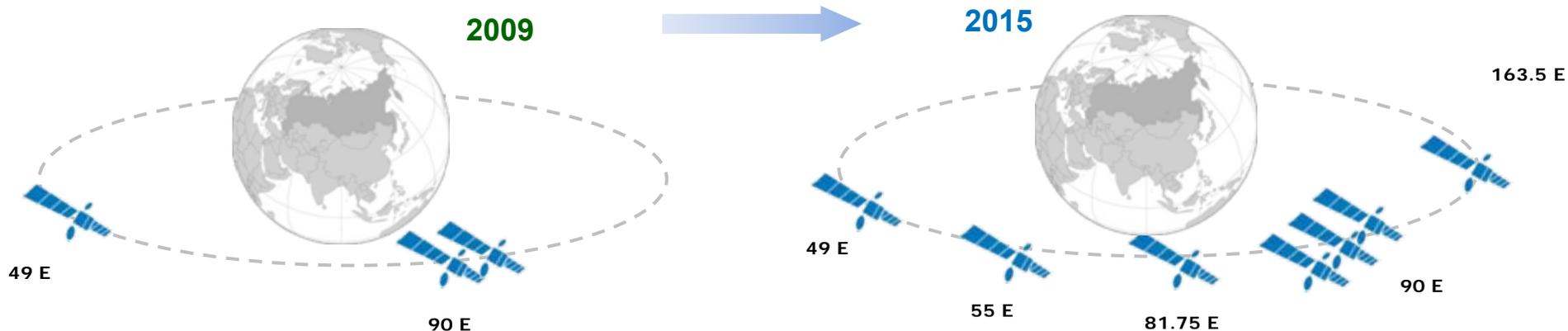
over 47 thousand kilometers;
over 19 thousand kilometers;
over 500 stations;
over 118000 sites;
25;
6.

INDUSTRIAL SPACE INFORMATIONAL SYSTEM «YAMAL» (PLAN 2015)

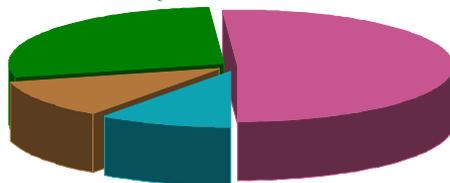


SPACE SEGMENT on GEOSTATIONARY ORBIT

ORBITAL CONSTELLATION AND OPERATOR ACTIVITY

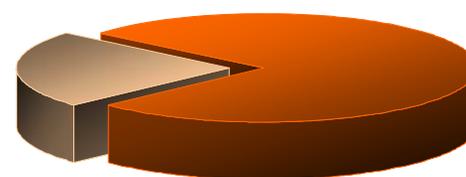


CUSTOMER BASE (over 200 companies)



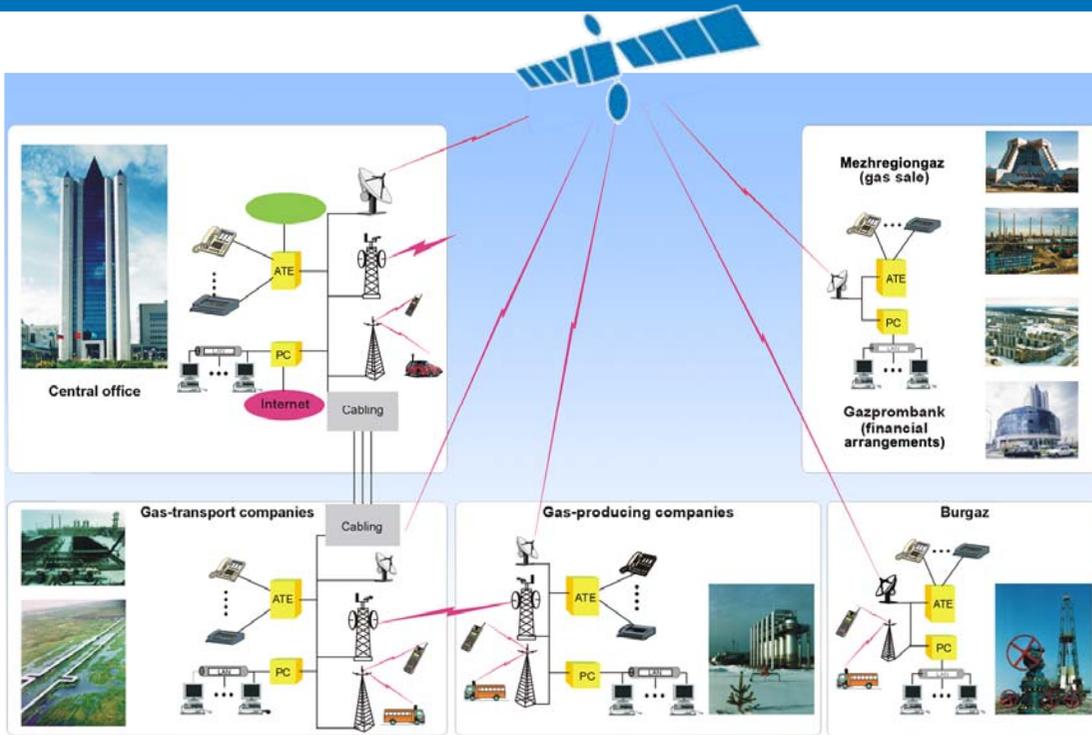
GAZPROM	10%
State companies	11%
TV companies	28%
Corporate and commercial service-providers	51%

CUSTOMER GEOGRAPHY

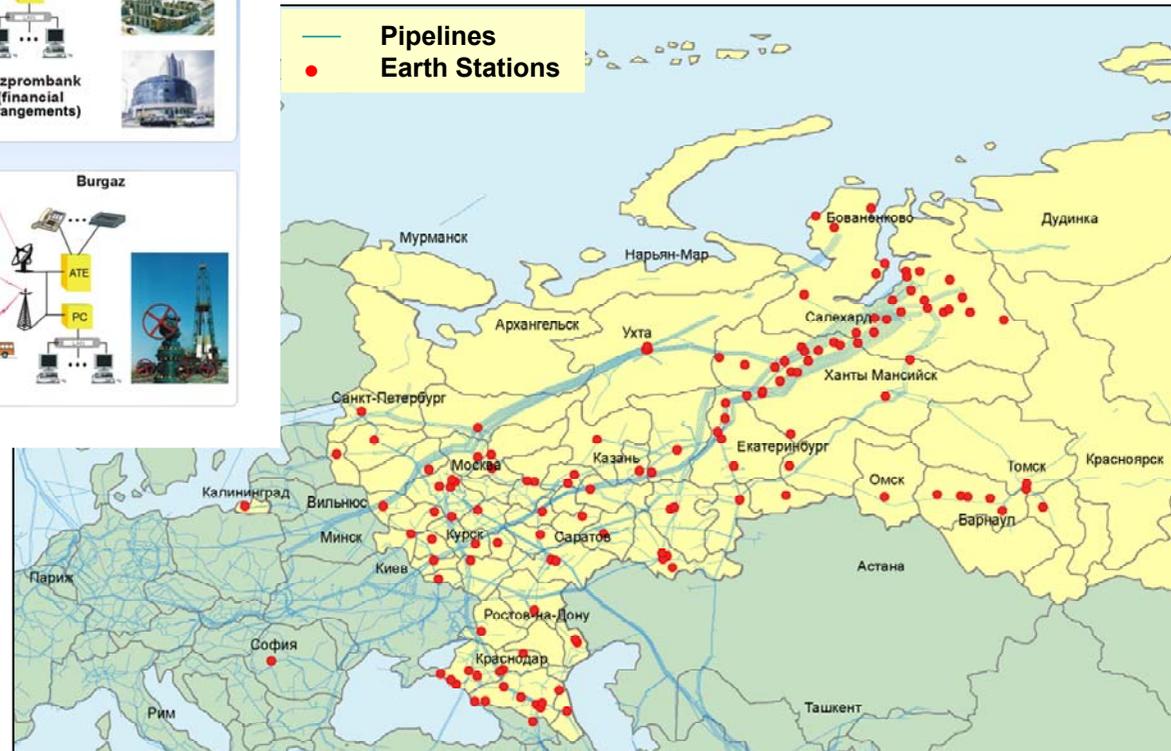


Russian market	75%
International market	25%

SATELLITE COMMUNICATIONS FOR SUPPORT OF "GAZPROM" ACTIVITIES



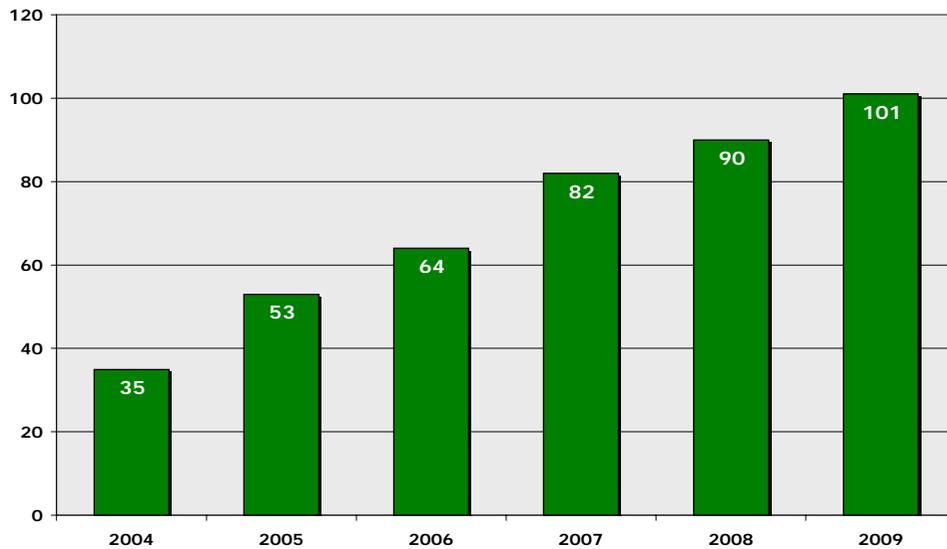
SATELLITE COMMUNICATIONS STATIONS, DELIVERING SERVICES TO COMPANIES OF "GAZPROM" GROUP



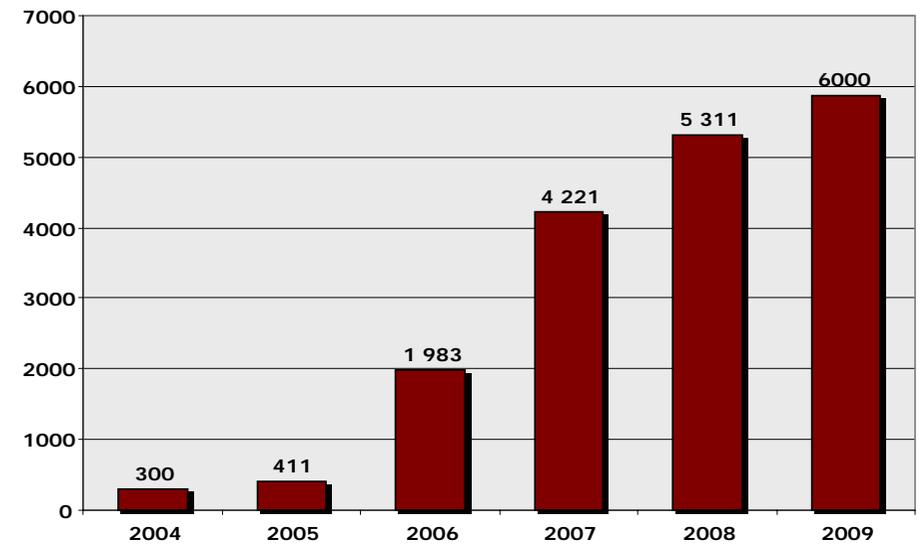
Satellite communications is used for the all Gazprom production activities – gas drilling, extraction, processing and transportation, financial transactions and also the company management

TV & VSAT SERVICES ON "YAMAL" SATELLITES

TV CHANNELS ON "YAMAL" SATELLITES

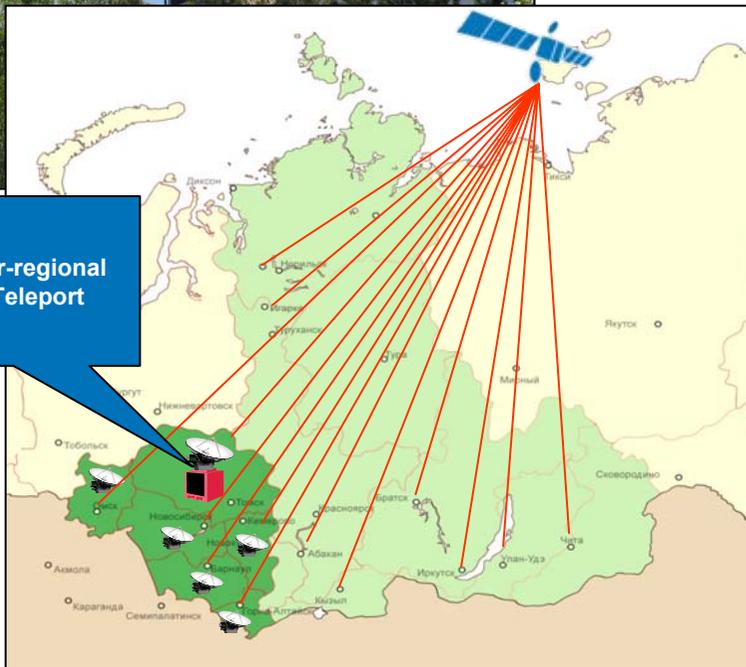
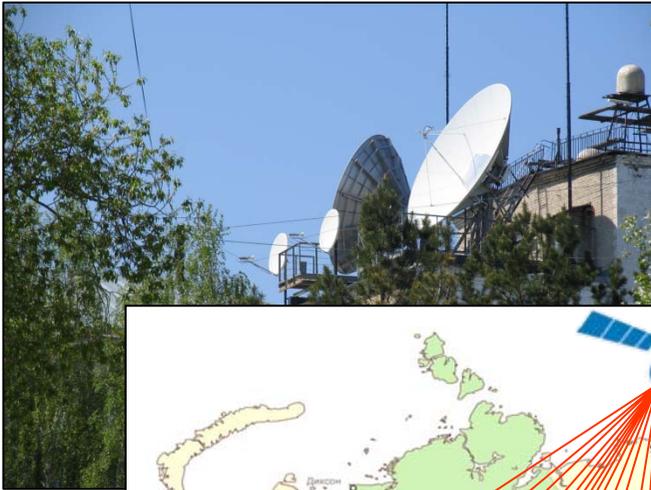


VSAT STATIONS, OPERATING VIA "YAMAL" SATELLITES



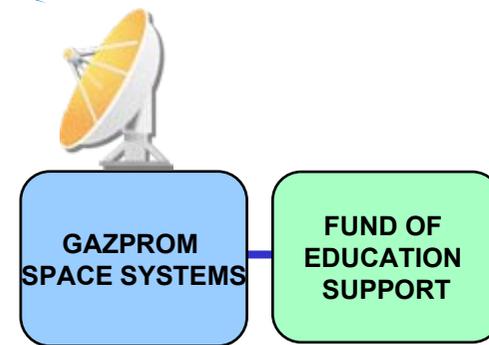
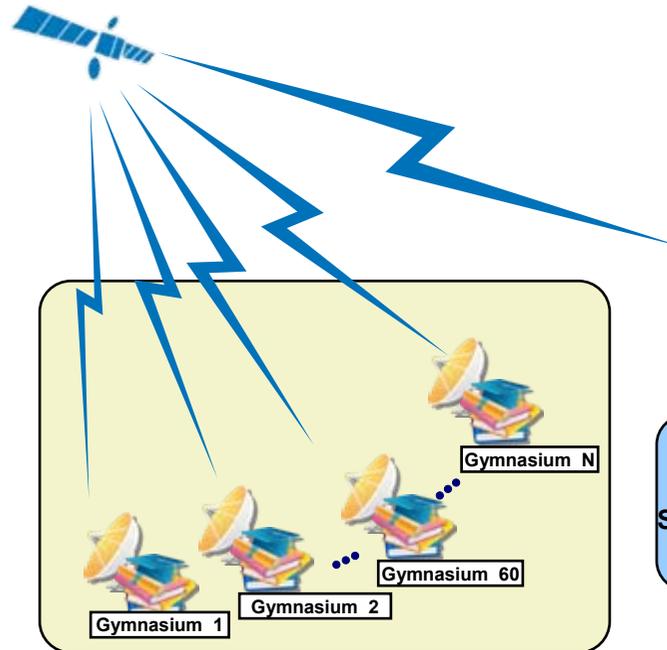
EDUCATIONAL PROJECTS

EDUCATIONAL FACILITIES OF SIBERIAN FEDERAL DISTRICT



Tomsk Inter-regional Satellite Teleport

SATELLITE INFORMATIONAL EDUCATIONAL NETWORK «GYMNASIUM UNION OF RUSSIA»

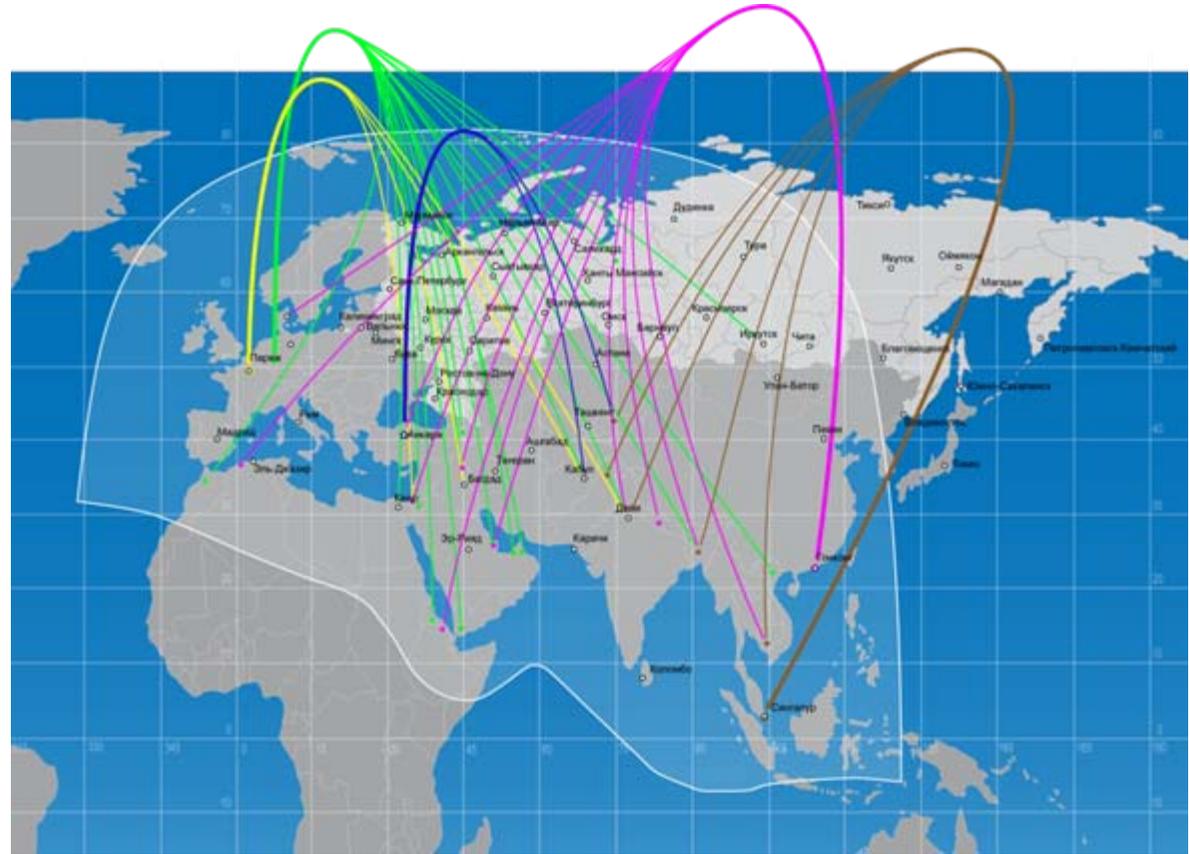


SERVICES OF "GAZPROM SPACE SYSTEMS" IN INTERNATIONAL MARKET

Transponder capacity of "Yamal" satellites is used for services in 50 countries

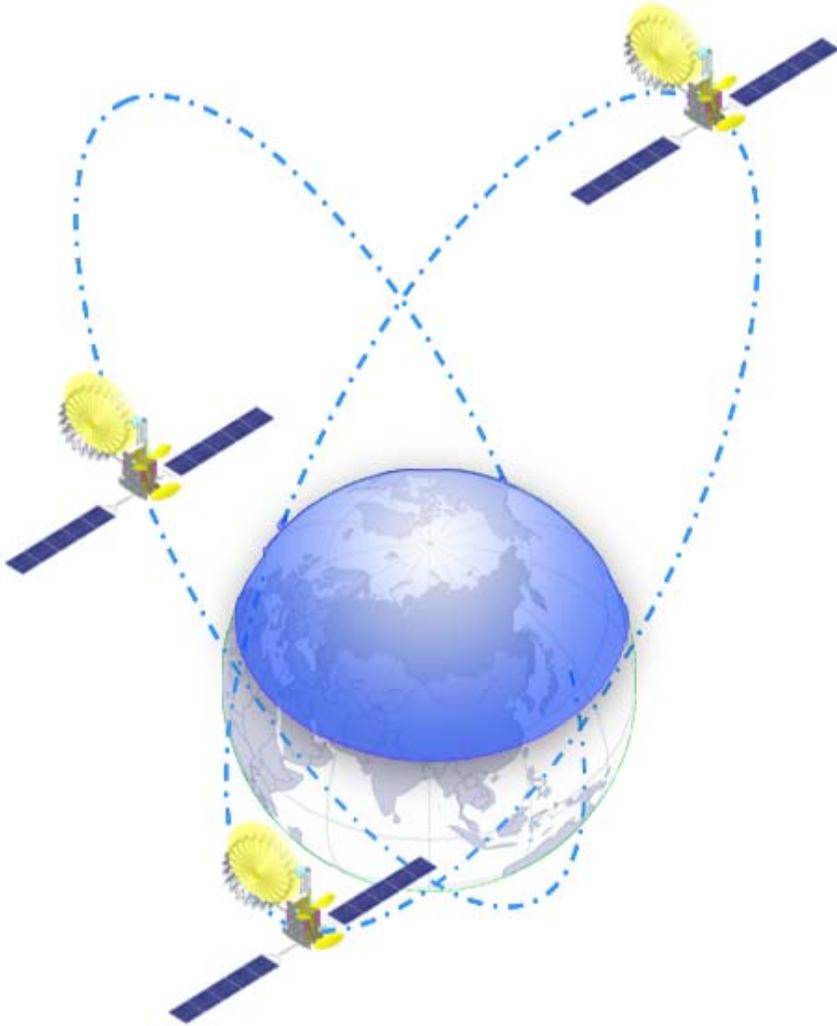


EMC, Raisting (Germany), 32 m



SPACE SEGMENT on HIGH ELLIPTIC ORBIT

ADVANCED MOBILE COMMUNICATIONS & AUDIO BROADCASTING SYSTEM "POLAR STAR"



Multimedia information transmission to mobile terminals
Multimedia Information exchange among mobile users
Mobile communications management

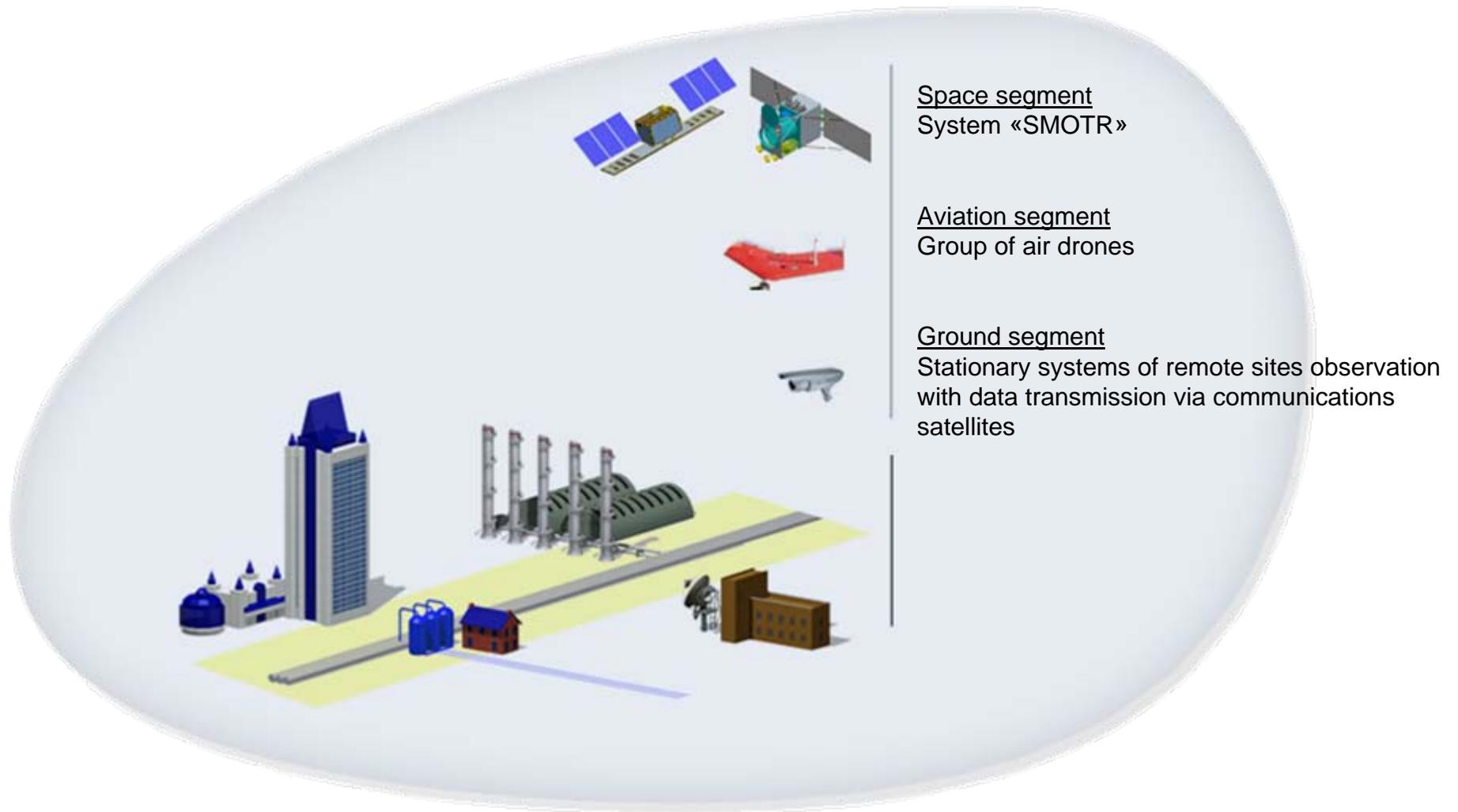
- **Number of satellites in the system** **4 (3)**
- **Orbit** **high elliptic**
- **Frequency bands** **Ku/Ka**
- **Satellite active lifetime** **min 12 years**

BENEFITS OF «POLAR STAR» SYSTEM for OIL & GAS INDUSTRY

- **Communications with shelf deposit remote and mobile facilities, including services for their emergency response;**
- **Communications with aircrafts and helicopters, air traffic control and rescue activities;**
- **Communications for ER repair teams, groups of the corporate defense service;**
- **Transmission of location definition corrections in GPS/GLONASS system for the network of geodesy and field survey monitoring;**
- **Monitoring of remote, hard accessible and mobile facilities.**
- **Internet access from mobile and remote facilities in Arctica.**

LOW ORBIT SEGMENT

EARTH OBSERVATION



EARTH OBSERVATION SYSTEM "SMOTR"

Number of satellites in the system

- | | |
|--|---|
| ■ Very high resolution multi - spectral satellites with resolution up to 0,4 m | 3 |
| ■ High resolution multi - spectral satellites with resolution up to 1 m | 3 |
| ■ Satellites for infra-red observations with resolution up to 40 m | 2 |
| ■ Satellites for hyper-spectral survey with resolution up to 10 m | 1 |
| ■ Satellites for detailed radar survey with resolution 1-3 m | 3 |

Orbit

circular sun-synchronous

Orbit height

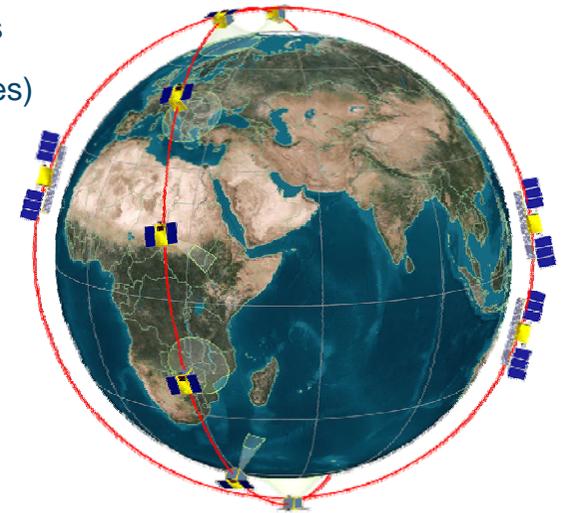
600-700 km (in two planes)

Service zones

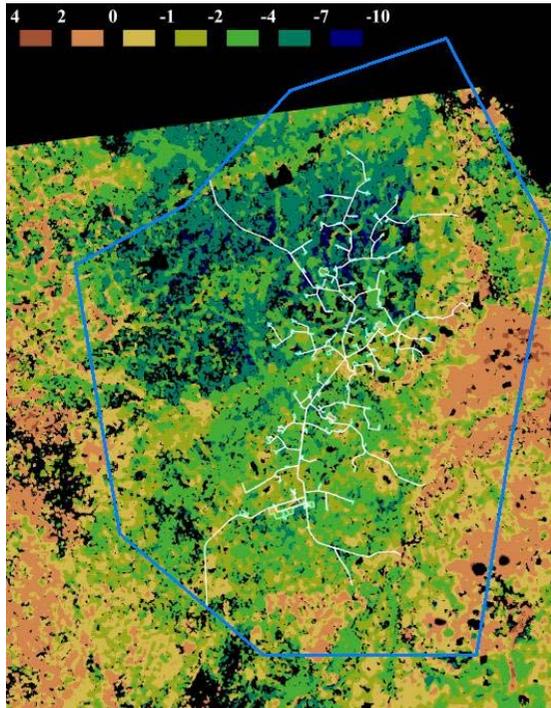
global

Observation recurrence of the specified area

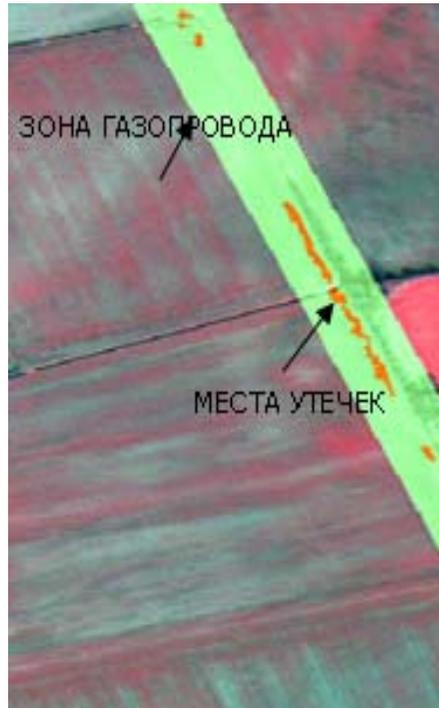
up to 5 times a day



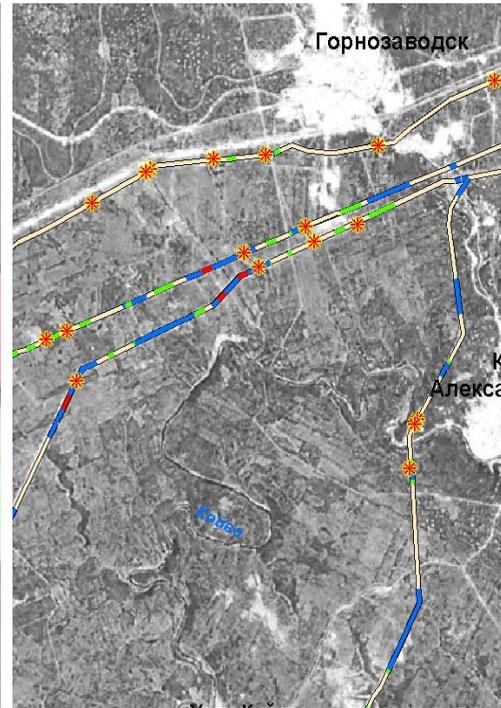
PRODUCT SAMPLES OF EARTH OBSERVATIONS SYSTEM



Strain map for the period 25/07/2006 – 14/09/2008, cm



Pipeline status control



Map indicating faults helps to optimize pipe laying



Monitoring of natural resources fields infrastructure

COMPLEX APPLICATION OF COMMUNICATIONS AND EARTH OBSERVATIONS SATELLITES FOR "GAZPROM" SITES MONITORING

