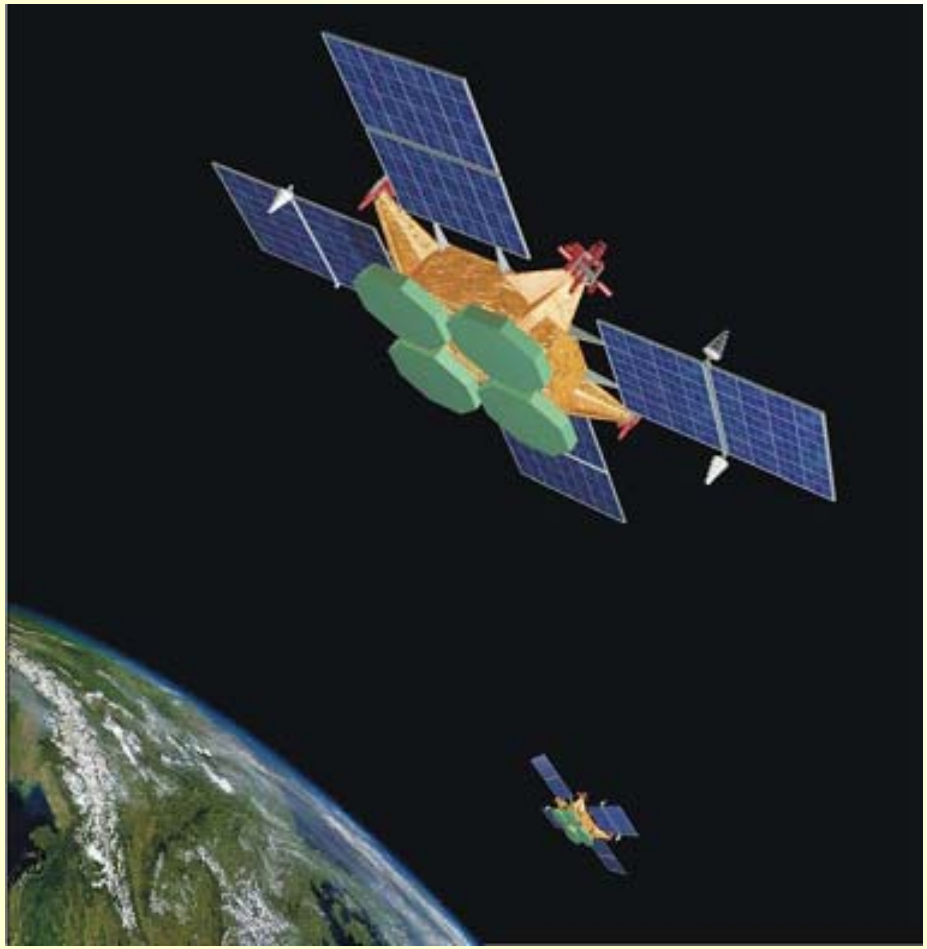


SPECIAL SATELLITE COMMUNICATION SYSTEM FOR DEVELOPMENT OF TELEMEDICINE SERVICE IN RUSSIA.

A.N.Perminov, V.I.Lukiashenko, A.A. Martinov, V.G.Shutchev,
A.I.Grigoriev, L.M.Mukhin, V.D. Kuznetsov, A.I. Stepanov,A.N. Afanasiev.

The dramatic difference between medical services in large cities and in the rural areas (especially the polar regions) is one of the main problems for public health in Russia.

The present state of public health in Russia has put the urgent task of raising the quality of the medical and sanitary care, professional skill and efficiency of the medical personnel in the forefront.

The impairment of health is, first of all, typical of poor and unprotected social groups, aged people, and residents of remote, sparsely populated areas, which consist more that 50% of the population of Russia.. The situation could be seriously improved by introducing new telecommunication technologies into medical practice.

In Russia, telecommunication medicine exists mainly in regions with well-developed communication systems where public health service is usually up to the mark. At the same time, the other territories are deeply in need of skilled personnel able to give qualified medical service. As a result, the quality of medical services differ significantly in different regions of the Russian Federation.

In spite of a certain success in developing telemedicine in Russia, it is evident that the ground-based communication systems alone cannot ensure transition to a new level of the public health service in remote regions in the emergency situations, when the wire and optical fiber facilities, and even the cell systems, fail.

Therefore the development of the satellite sector of telemedicine is especially important in Russia.

First of all it’s clear that geostationary satellites can’t operate properly for polar regions of Russia. Therefore the development of special satellites and corresponding ground-based communication links for telemedicine in Russia is especially important.

Russian space agency

Proposals

concerning the creation of a satellite communication and data transmission system for rendering services on the territory of the Russian Federation

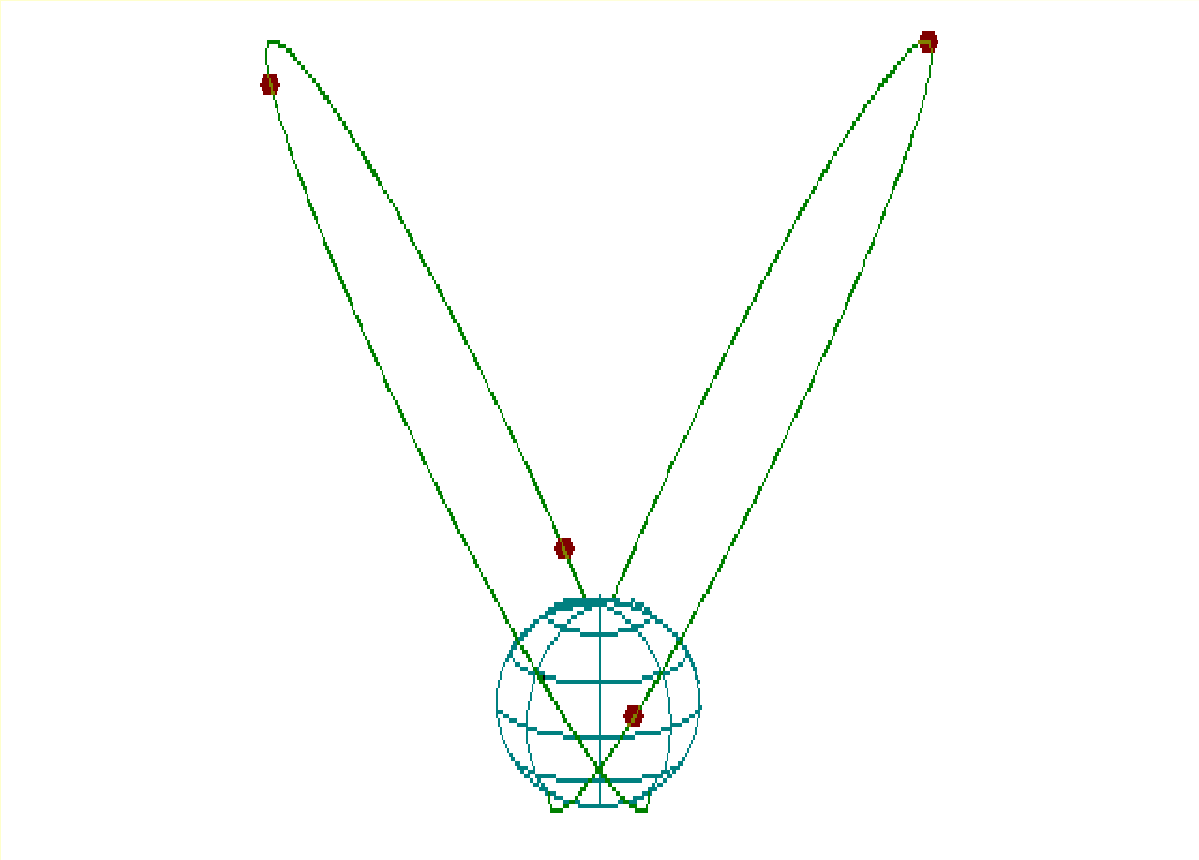
2006

Realized telemedicine projects

- Using the satellite telecommunication network “Crilion” free Telemedical consultations of Russian and foreign doctors are being given to the inhabitants of Sakhalin island;
- A mobile telemedical stations has been created by a group of Russian companies;
- GASCOM realize a constantly working telemedicine system in Beslan.

GEO Satellites were used in these projects.

Multimedia satellite constellation



Molniya-type orbit.

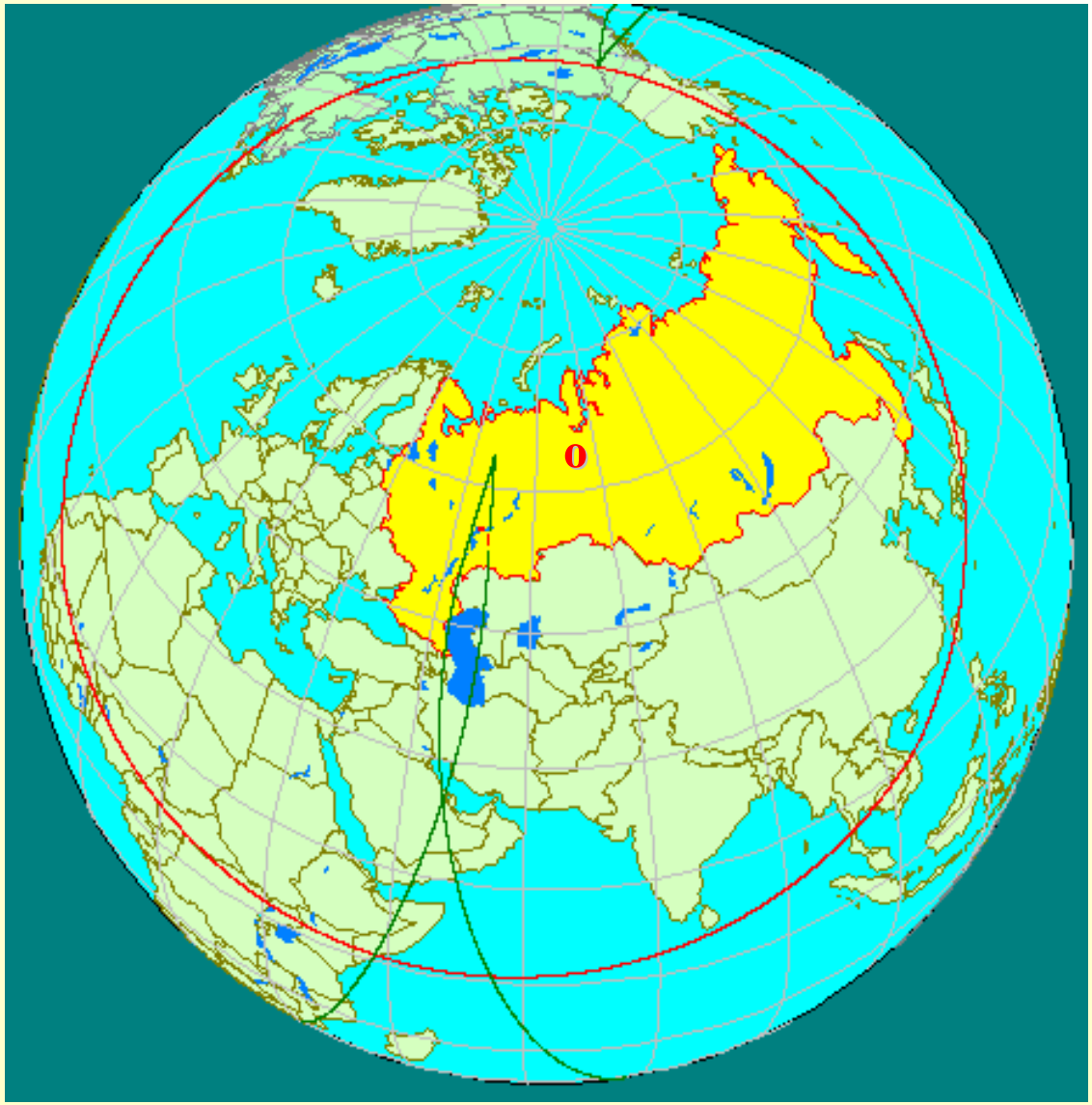
2 satellites in each plane.

Each satellite is shifted from the other by 6 hours.

Launchers:
«Soyuz-2» + buster «Fregat».

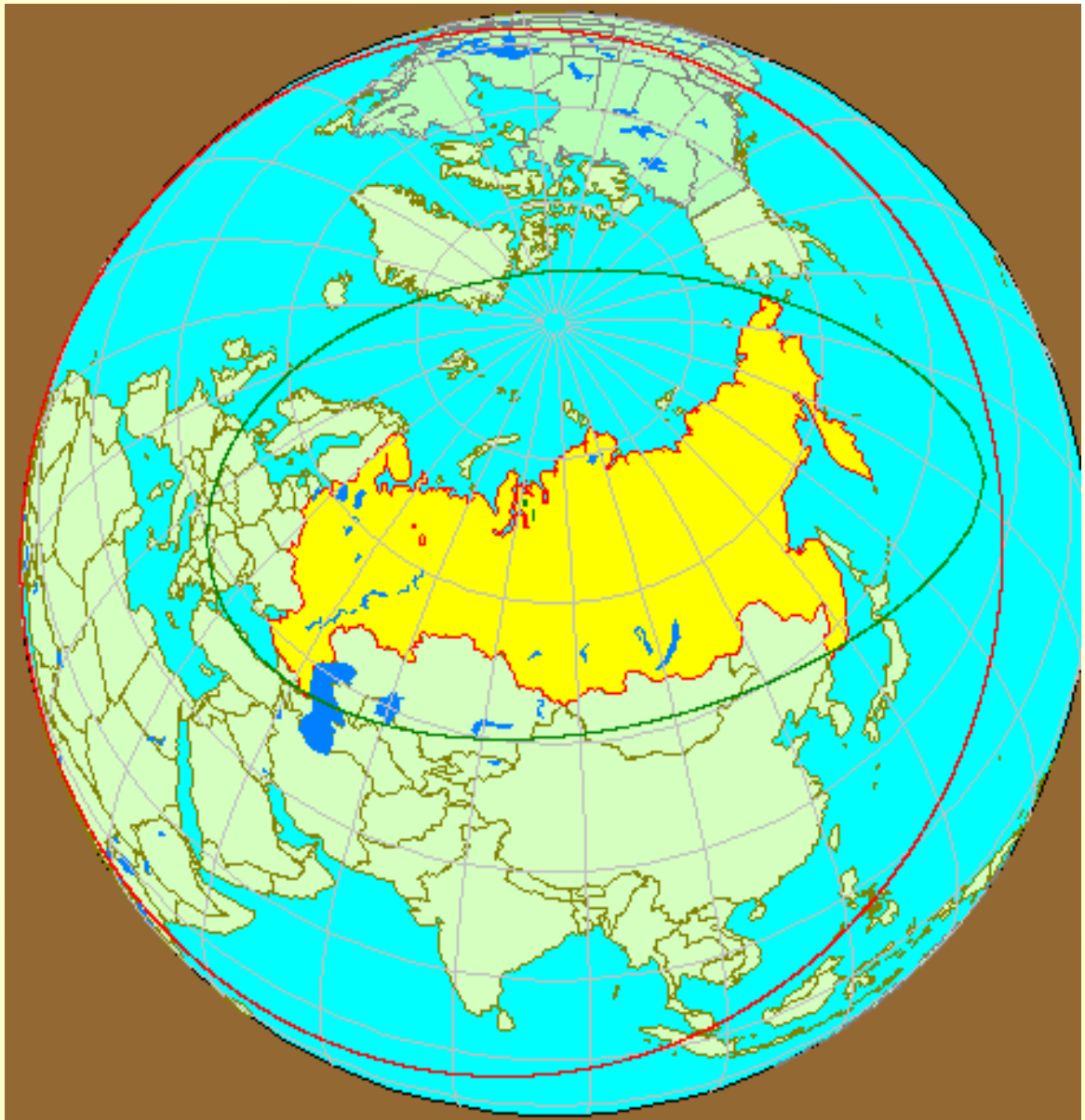
Multimedia satellite constellation

The areas of visibility of one sat on the working part of the orbit.

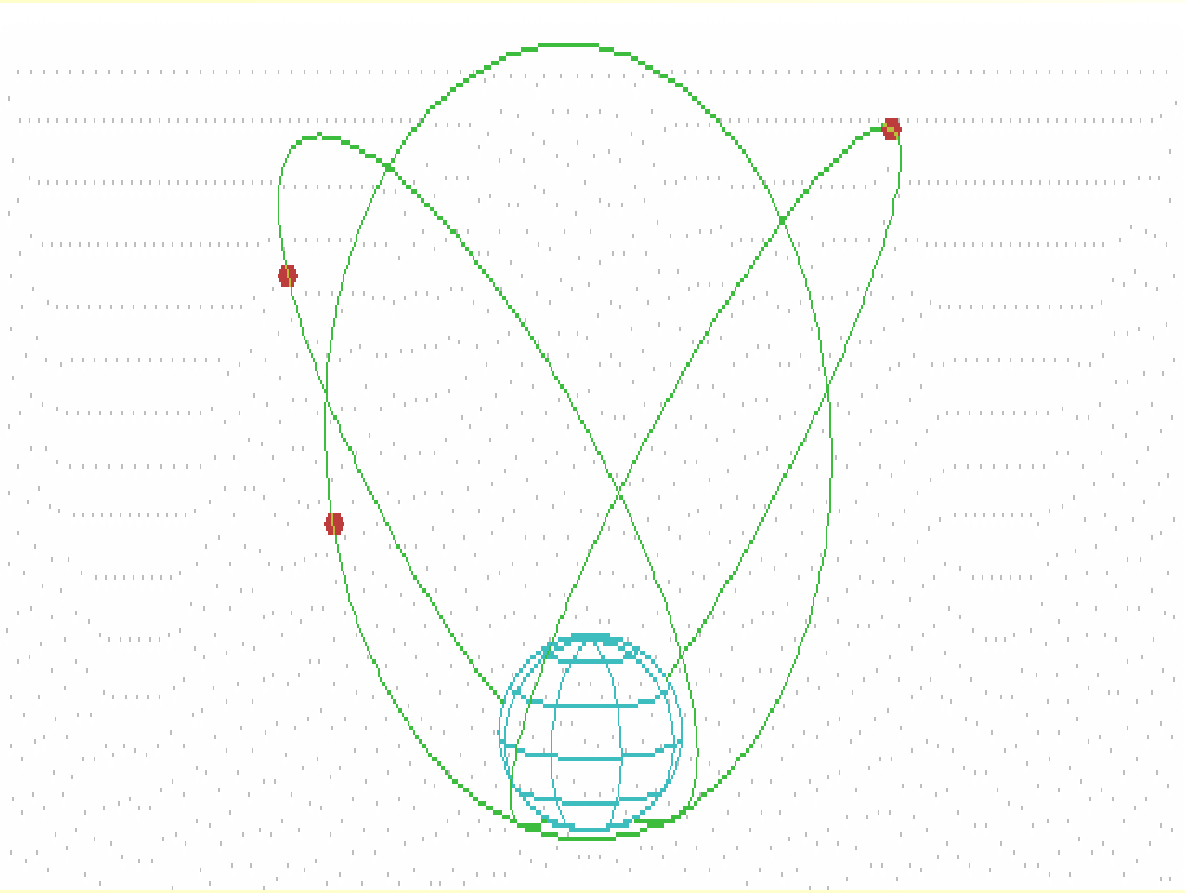


Multimedia satellite constellation

Link area for ~12x 8 degrees aperture.



Special constellation of 3 satellites for telemedicine



Molniya-type orbit.

One sat in each from 3 planes.

Each satellite is shifted from the other by 8 hours.

Launchers:
«Rokot» + buster «Breeze».

Special constellation of 3 satellites for telemedicine

The areas of visibility of one sat on the working part of the orbit

Structure of ground based segment

- **Main HUB**
- **6 Federal HUBs**
- **Regional ground based stations**
- **Small ground based stations**
- **Mobile stations**

- ***Total expenses for 10 year period*** **~ 30×10^6 USD**

- ***Space segment total expenses for 10 years period***

  ~100 x10^6 USD (Multimedia satellite constellation),

  ~ 120 x10^6 USD (Special constellation of 3 satellites).

The scheme of telemedicine network

Regional segment of Telemedicine network

- On-line registry
- Regional Telemedicine centers
- Regional data bank

HUB (7) Main Telemedicine center of federal level

- On-line registry
- Federal Telemedicine center
- Federal data bank

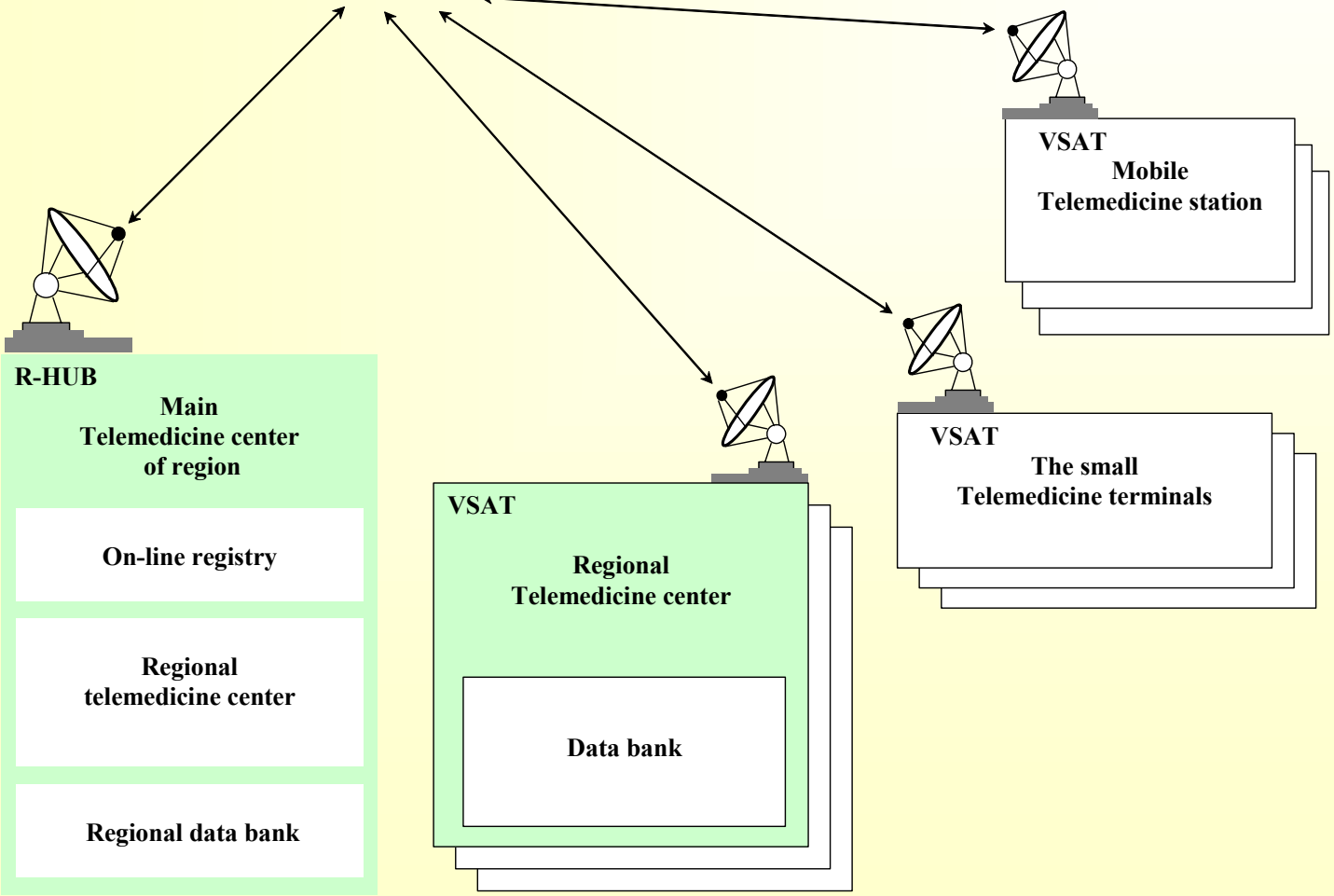
Foreign and corporative Telemedicine centers

Mobile Telemedicine stations

Federal telemedicine centers

- Data bank

The scheme of regional segment of Telemedicine network



The structure of the telemedicine network

- 7 Main telemedicine centers of federal level.

- Federal telemedicine centers and Main telemedicine centers of region.

Regional telemedicine centers and small telemedicine stations.

- Mobile Telemedicine terminals.

We propose a pilot project for the testing of elements of the future telemedicine network for Russian Federation and their interaction with space segment.

Total time of realization – 2 years

We propose to use:
Federal telemedicine center in Moscow
Regional telemedicine center.
Small telemedicine station.
Mobile telemedicine terminal.

Total expenses: **$2{,}3 \times 10^6$ USD**

The scheme of the pilot project

VSAT
The small
Telemedicine station

HUB

Federal
Telemedicine center
in Moscow

On-line registry

R-HUB
Regional
Telemedicine center

On-line registry

VSAT
Mobile
Telemedicine terminal

GCS Cheetah™ System Specifications

Size & Weight:

Number of Cases:	Two; airline carry-on suitcase/cabin baggage or hard cases
Case Size:	
Antenna System:	22 x 14 x 9 inches
RF System:	22 x 14 x 9 inches
Weight:	Each case approximately 50 lbs

Power Requirements:

AC Power:	90 – 132 and 180 – 264 VAC auto-ranging; 47 – 440 Hz
DC Power:	28 VDC per MIL-STD-1275A
Consumption:	600 VA Max

Environmental:

Temperature:	Operational: -15 – +52° C Storage: -40 – +60° C
Wind Loading:	Operational: 20 mph Survival: 30 gusting to 45 mph with anchoring weights
Pointing Loss in Wind:	
10 mph:	0.1 dB, 0.1° typical
20 mph:	0.2 dB, 0.2° typical