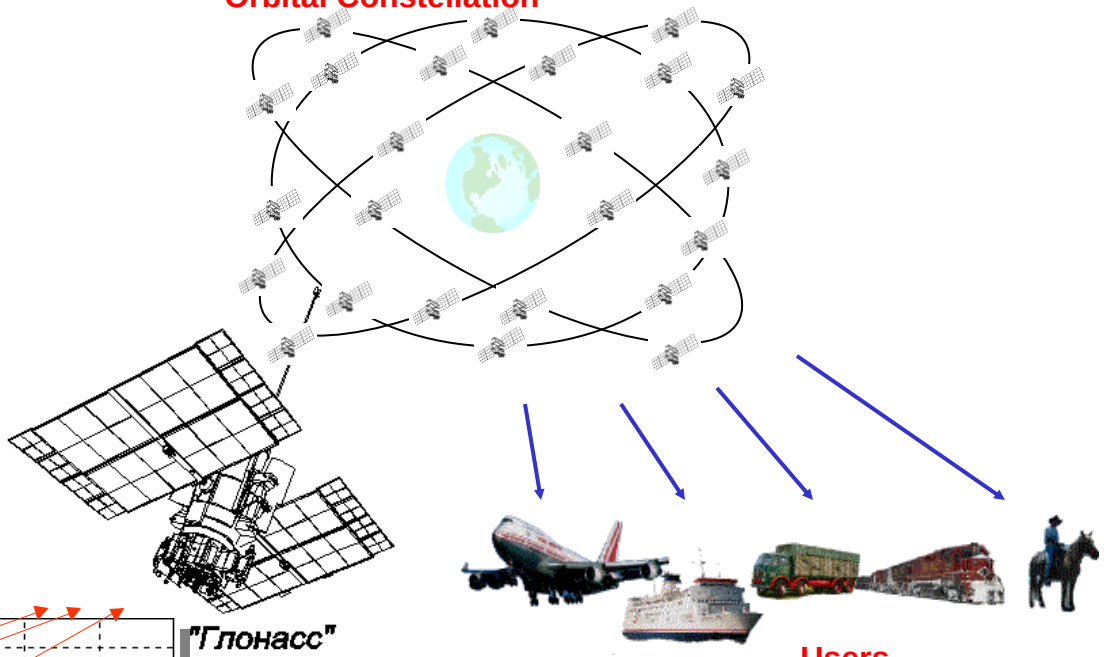
STATUS AND DEVELOPMENT OF GLONASS

Russian Aviation and Space Agency

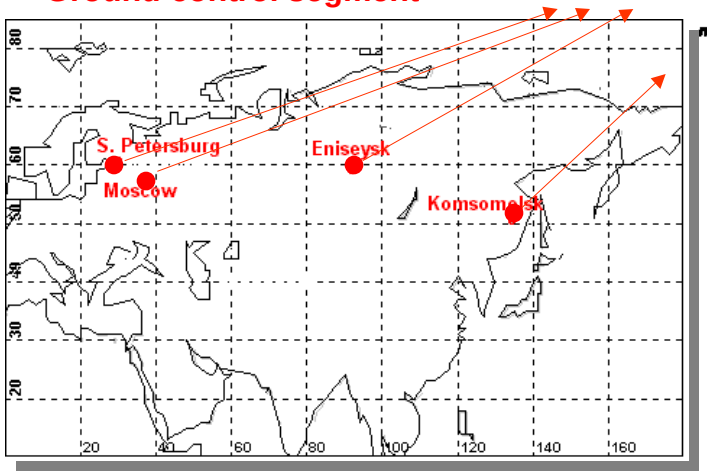
GLONASS Architecture

Orbital Constellation



Users

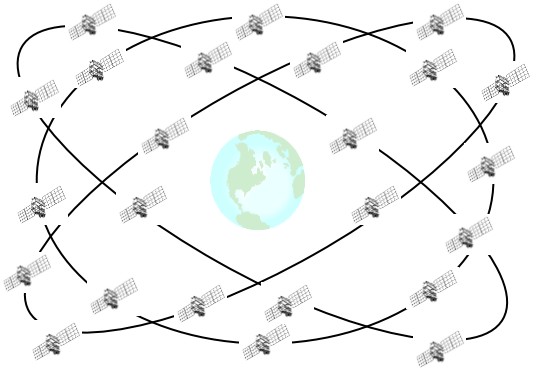
Ground control segment



Orbital constellation: 24 sat (3 planes x 8 sats)
orbit: circular,
H = 19 100 km,
i = 64.8°
Revolution time: 11h15m.
Orbit shift at equator plane: 120°

GLONASS civil application

Navigation for State Special Services



Navigation of tourist groups

Navigation of transport (aviation, maritime, inland waterways, Rail ways car navigation)

Traffic management, Fleet management

Search and Rescue

Geodesy

Geology explorations

Surveillance

Geodynamics, Earth quakes prediction

Present Status of GLONASS

Состояние орбитальной группировки ГЛОНАСС

26.06.02 г.

Пл. N	N точки на орбите	N НКУ	Космос N	Дата запуска	Дата ввода в систему	Дата вывода из системы	срок активного существ. месяцы	коментарий
	1	779	2364	30.12.98	18.02.99	31.01.02	35.4	на техобслуживании
	2							
	3	789	2381	01.12.01	04.01.02		5.7	
I	4							
пл.	5	711	2382	01.12.01				ЛКИ
	6	790	2380	01.12.01	04.01.02		5.7	
	7	784	2363	30.12.98	29.01.99		40.9	
	8	786	2362	30.12.98	29.01.99		40.9	
	9							
	10							
	11							
II	12							
пл.	13							
	14							
	15							
	16							
	17	787	2375	13.10.00	04.11.00		19.7	
	18	783	2374	13.10.00	05.01.01		17.7	
	19							
III	20							
пл.	21							
	22							
	23							
	24	788	2376	13.10.00	21.11.00		19.2	

Seven satellite in use:

1 plane – 4 SV of 8
2 plane – 0 SV of 8
3 plane – 3 SV of 8

Guaranteed SV life-time is 36 m.

Mean actual SV life-time is 52.6 m.

Next launch (3 sats):

November 2002

Federal Dedicated (Mission Oriented) Program "Global Navigation System"

Approved by The Government of The Russian Federation at August 20, 2001, Gov.Dec. No 587

Program budget: 23.6 BRu

Program Duration: 2002 – 2011

Main Program Goals

- Following development and effective use of GLONASS applying advanced SatNav technology to provide State social and economy development and State security.
- Save leading role in SatNav by guaranteed service provision for Russian and international users.

Fully deployed advanced SatNav System successfully competitive at the world navigation market

Main Program Tasks

- Development and implementation of Space Segment and Ground Control Infrastructure for GNSS
- GLONASS constellation sustainment for the required level
- GLONASS geodesy system improvement
- International commitments of Russia fulfillment in the field of satellite navigation, development of international cooperation, participation in international projects
- Development and manufacture of competitive user equipment to be implemented on Russian and international market
- Creation of new geodesy network structure implementing high accurate geocentric reference coordinate system
- Creation and development of scientific, technical and technological basis for further SatNav development

Program State Customers

- **Russian Aviation and Space Agency (Rosaviacosmos)– Program Coordinator**
- **Ministry of Defense of Russian Federation (MoD)– coordinator of program issues for Russian Federation defense and security**
- **Ministry of Industry, Science and Technology of Russian Federation (MoIST)**
- **Ministry of Transport of Russian Federation (MoT)**
- **Russian Agency of Control Systems (RACS)**
- **Russian Federal Mapping Service (Roskartographia)**

Content of Federal Program «Global Navigation System»

Subprogram 1.
Provision of GLONASS operation and development
State Customers: Rosaviacosmos, MoD

Subprogram 2.
Development, industry preparation and manufacture of user equipment for civil users
State Customer : RACS

Subprogram 3.
Implementation and Use of SatNav for Transport
State Customer : MoT

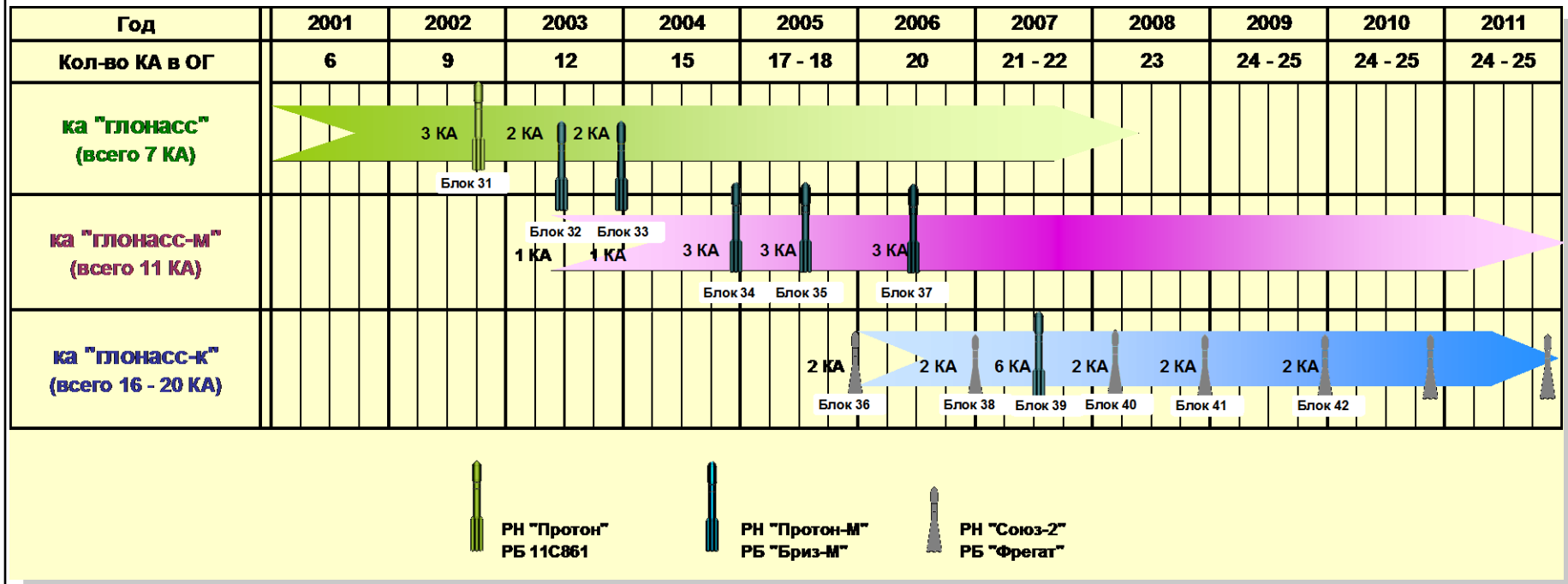
Subprogram 4.
Use of SatNav for geodetic provision of Russia
State Customer : Roskartographia

Subprogram 5.
SatNav Application for State Special Users
State Customer: MoD

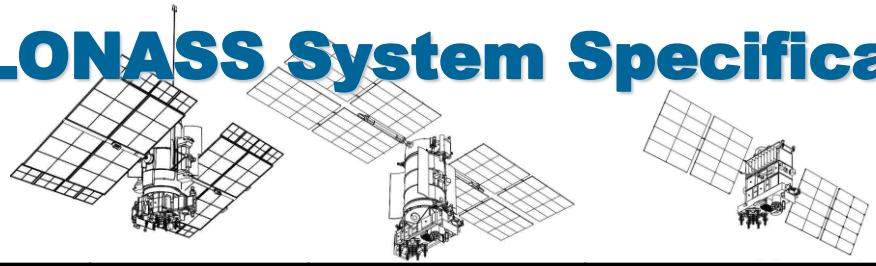
Subprogram 1.
Provision of GLONASS operation and development
State Customers: Rosaviacosmos, MoD

- GLONASS System Development. GLONASS SV modernization (GLONASS-M). New GLONASS SV development (GLONASS-K) with advanced performance.
- GLONASS ground segment modernization and development.
- System research and developments to provide GLONASS advanced performances (GLONASS-NG)
- Research and developments of GLONASS use for international cooperation
- GLONASS operation provision (serial product orders)

Program of orbital constellation deployment



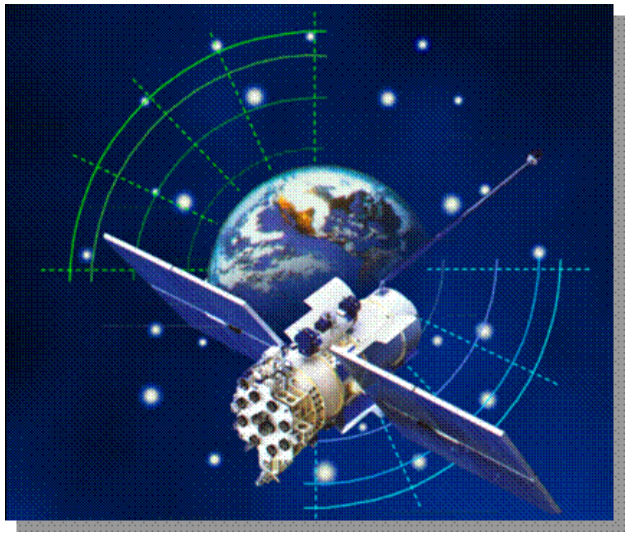
GLONASS System Specification



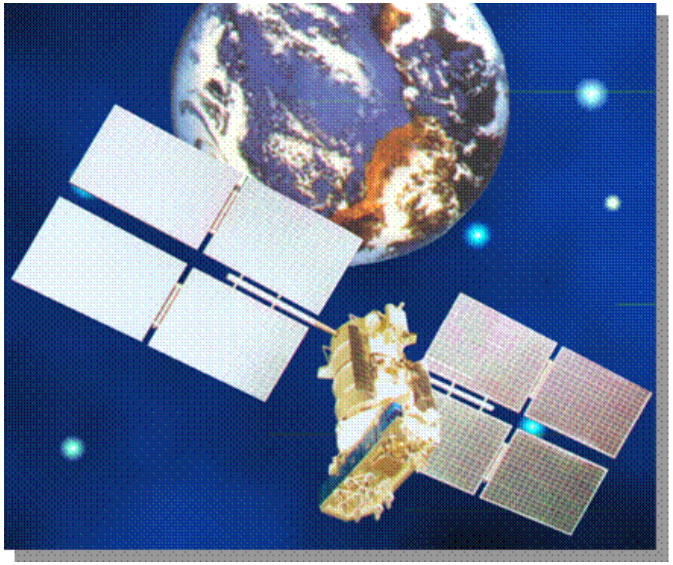
	GLONASS	GLONASS-M	GLONASS-K	GLONASS-NG
First Flight Test Launch	existing	2003	2005	2010-2011
Life-Time	3 years	7 years	10—12 years	extended
Mass	1400 kg	1400 kg	750 kg	TBD
SV Numberin a group launch: - PROTON - SOYUZ	 3 -	 3 -	 6 2	 6 (TBC) 2 (TBC)
Power capability	1000 W	1000 W	1000 W (TBC)	TBD
User positioning accuracy (vertical, real-time), 95%	60 m	30 m	5-8 m (TBC) (20 – 30 cm with global differential data)	TBD
Number of Civil Signals	1	2 (since G-M#1)	3 (TBC)	3 (TBC)
Number of Control Access Signals	2	2	3 (TBC)	TBD
On-board clock daily stability	$5 \bullet 10^{-13}$	$1 \bullet 10^{-13}$	$1 \bullet 10^{-14}$ (TBC)	TBD
Intersatellite Link	-	since G-M#3	yes	yes
Additional functions	-	-	Integrity signal (TBC) Differential corrections (TBC) SAR (TBC)	TBD

GLONASS General View

GLONASS



GLONASS-M



GLONASS-K