



Creation of the BRICS+ Time System to solve the problems of providing vehicles with high-precision space-time data

AVERYANOV A., MIPhT-Telecom

BALEGA Y., Russian Academy of Science

MAMULAT S., OCB-Telecom

NIKOLAEV E., Russian Academy of Science

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JSC MIPhT-Telecom

Telecom operating company with
Moscow Physic–Engineering Institute



JSC MIPhT-Telecom



*10 Nobles prize scientists,
150 academicians*



Telecom company operating
from 1997 with Russian
Space Corporation
ROSCOSMOS
(the best radiotelescopes)



РОСКОСМОС

Fields for international collaborations:

1. Future of highways and national transport networks
2. Digitalization and artificial intelligence in management of infrastructure

Problems of global satellite navigation systems (GNSS)

Criminals



Blocking of functions by the owner



Natural physical anomalies

5G/6G & LEO Satellite Networks



Key enabler for autonomous driving, telematics, real-time data exchange, and smart EV infrastructure



Global advancements position, enables impossible structure



Global high-speed connectivity for autonomous driving and V2X



USA



Direct satellite connection ("cell tower in space")



First mass implementation of direct satellite connectivity in U.S. vehicles.

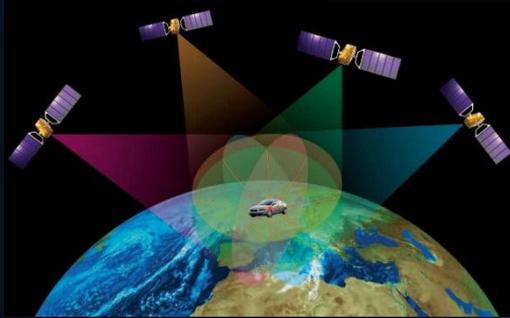


USA (2018)
Utilization of all available spatiotemporal data sources

China (2020)
Hierarchical interconnection of systems for diverse environments and purposes.

World experience in solving the problem

The proposed solution of MIPT-Telecom JSC.



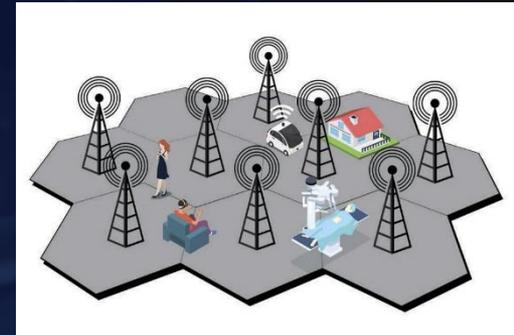
GNSS 20 000 км



UTC (Coordinated Universal Time) — State primary standard of units of time, frequency and national time scale



Core-network of the radio telescopes-receivers of radiation of quasars, connected by optical cables, with the powerful multibasic correlator (Base 12 000 км)



Delivery systems (400 MHz 5G special) users of navigation data and time tags



400 м – 22 км

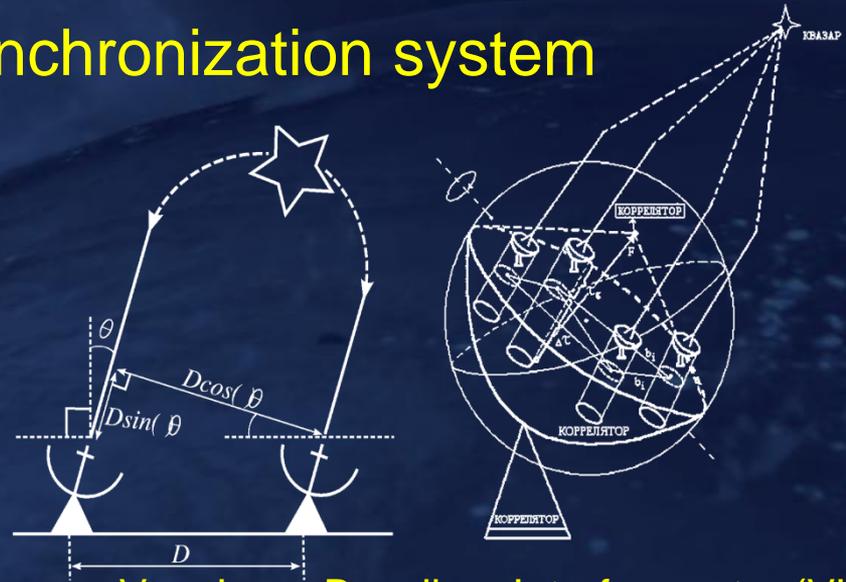
Technologies used in the creation of specialized transport communication networks, their characteristics and purpose

1. *Synchronization and location system (Moscow Time).*
2. *5G communication network technology.*
3. *Pseudosatellites (HAPS).*
4. *Spatial beam selection of signals at subscriber terminals.*
5. *Phasometric methods for determining the location of objects.*
6. *The 5G (IoT) standard.*
7. *The 5G NTN standard on geostationary satellites (GEO).*

MOSCOW TIME System

Decision basis.

Patent RU 2 833 299 C1 Global synchronization system



Very Long Baseline Interferometry (VLBI)

Design parameters

- Synchronization of remote time scales - at least 1 pS;
- Relative frequency instability - no worse than 10^{-18}
- Authentication and authorization of users
- High noise stability
- Direct measurements of distance and time
- Error of measurement of distance in real time 3MM

Conclusions and prospects PNT. To develop cooperative (BRICS+ or Russia – India?) modern PNT infrastructure for the transport.

Assured PNT (Positioning, Navigation, and Timing) Market Global Forecast (2025 – 2034)



MARKET STATISTICS

Market Value(2024)

\$665.6 MN

Market Value (2034)

\$7.9 BN

CAGR (2025-2034)

28.2%



SEGMENT STATISTICS

Atomic clocks segment

Market Share (2024): **>27%**

Air segment

CAGR (2025-2034): **>28.5%**



REGIONAL STATISTICS

**North
America**

Market Size (2034)

>\$3.5 BN



Authors



Andrey Averianov

The CEO of MPhTI-Telecom, tech.entrepreneur with more years of experience in the telecommunications and Space
Founder of the OKB-Telecom companies.



Yuriy Balega

The leading astrophysicist in Russian Academy of Sciences with world reputation.
In 2017-2022 — the vice-president of the Russian Academy of Sciences.



Stanislav Mamulat

More than 35 years of experience in high-tech innovations on the corporative and industrial levels. Expert of Russian Ministries of Transport, of Science, of Construction and regional development,



Thanks for attention,
Questions please

www.telecom.com
+7 916 123 6364