



GEOSTATIONARY ATMOSPHERIC NETWORK

New telecommunication technology

GYRONAUTICA – Welcome to the Future

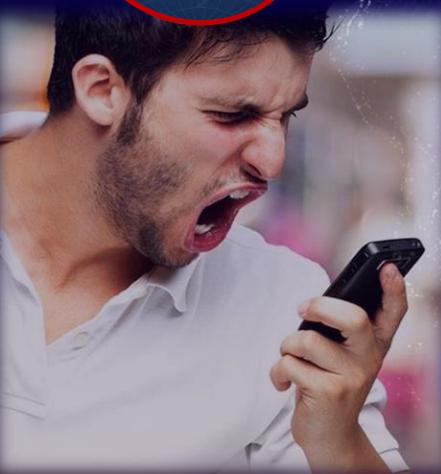
Sergey Kuzikov
CEO Gyronautica LLC

Where is the Internet?



2/3 of the earth ‘out of reach’

1/2 of Humanity is offline



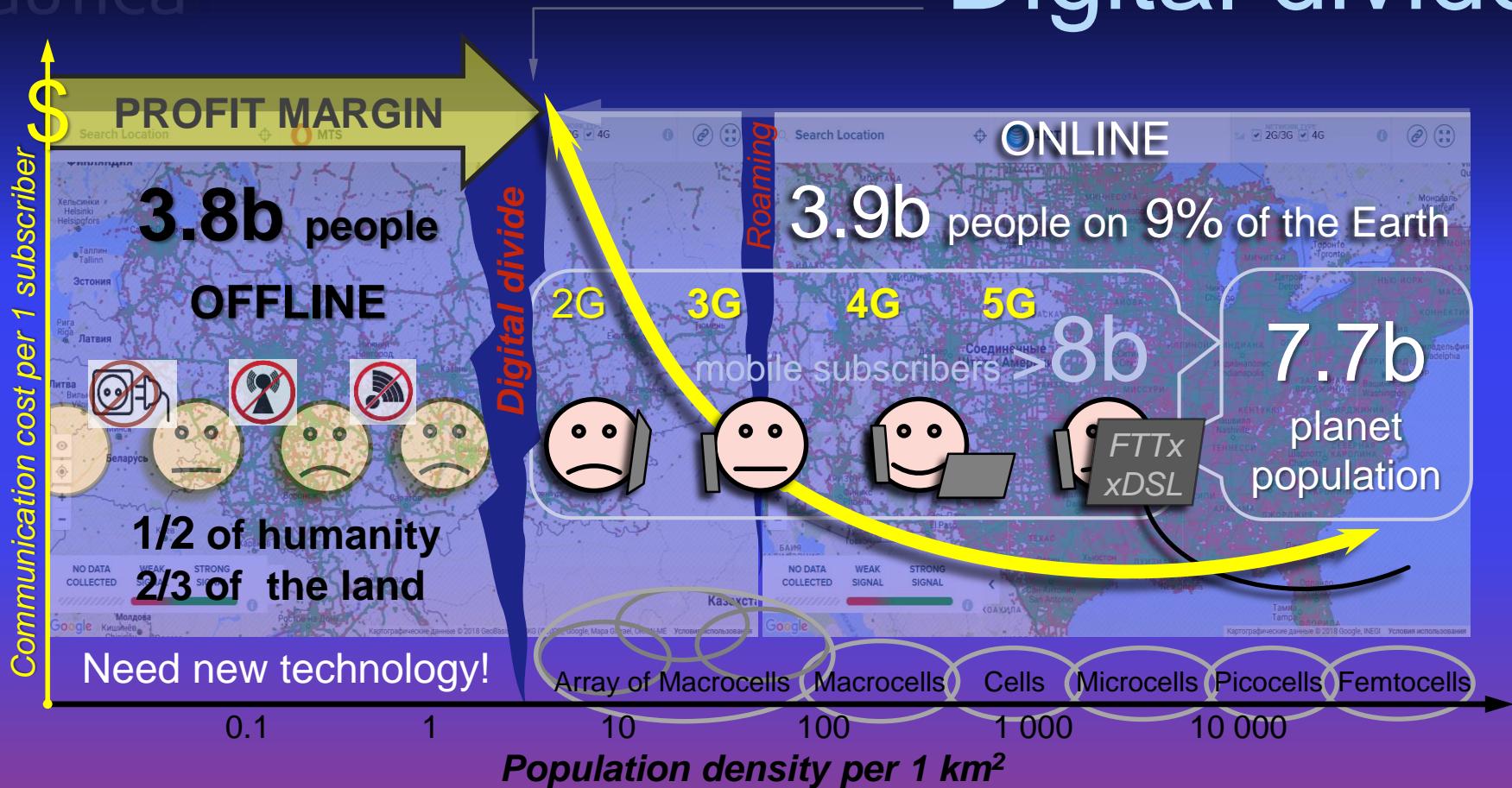
Why?



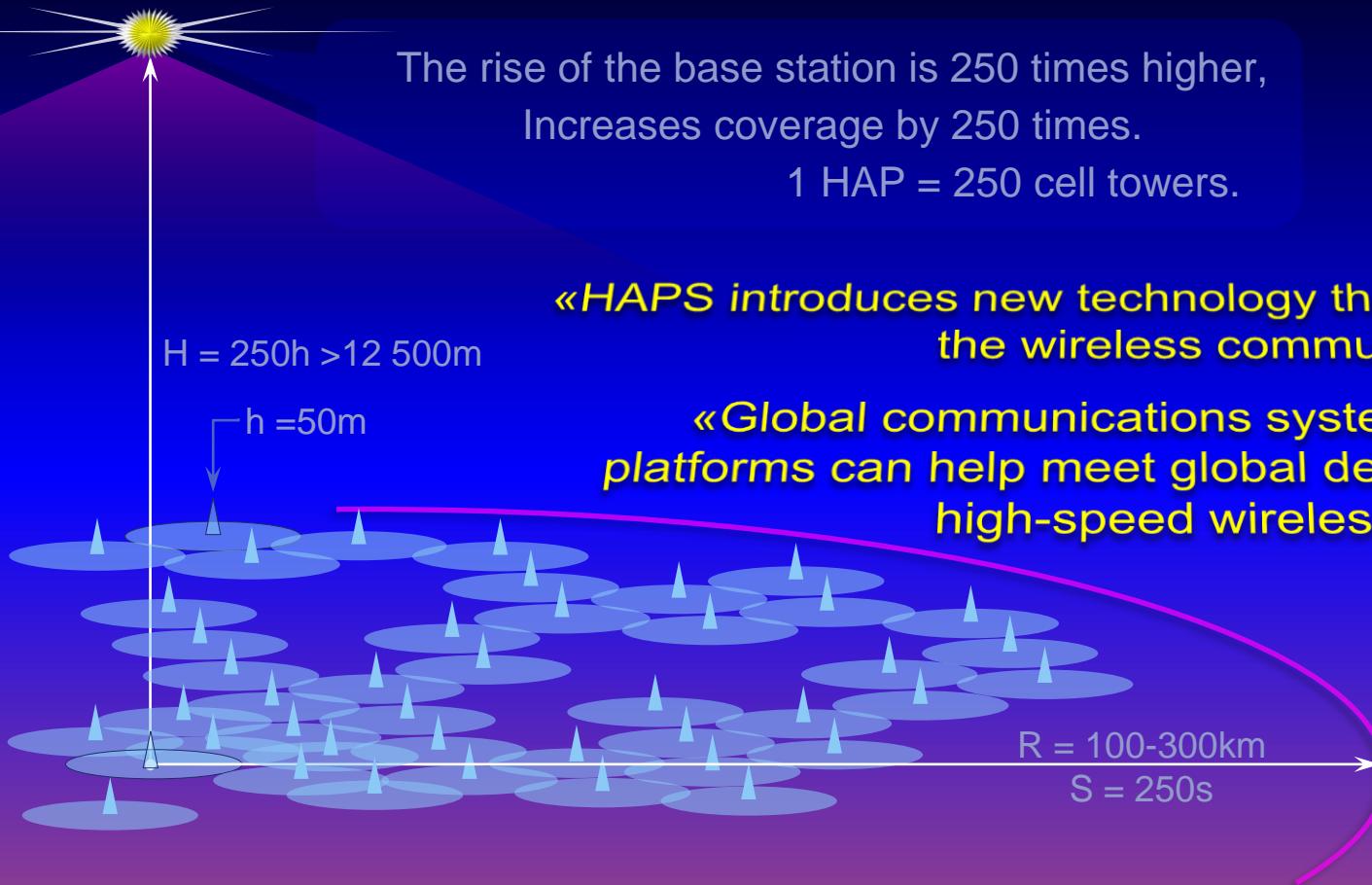
- Low density of subscribers.
- Remoteness from the channels.
- There are no sources of energy.



Digital divide



The only solution is HAPs

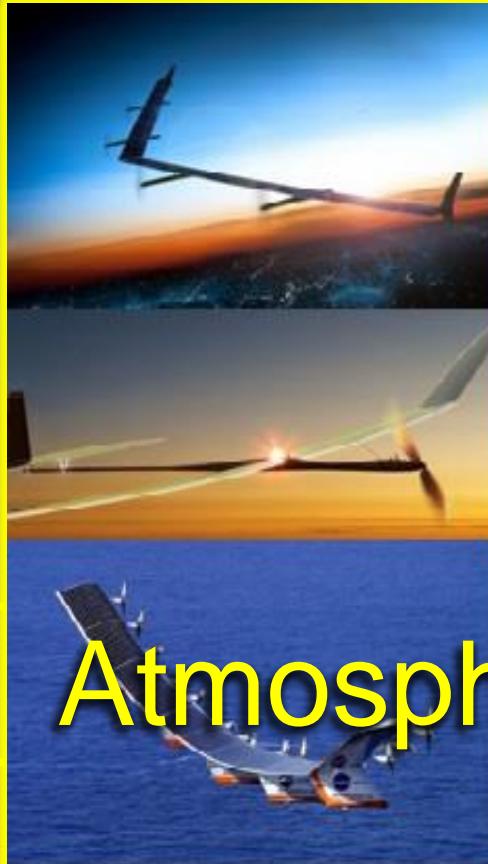


High Altitude Platforms
Atmospheric satellites

International
Telecommunication
Union ITU



HAPs technology



Atmospheric satellites

Green energy for HAPs

SOLAR CELLS

< 1 kW/m² - low Power Density

<< 20% - low efficiency

- 90% - to fight with the WIND

**Heavy batteries + Giant sizes
= High cost**

HIGH-ALTITUDE WIND

global, powerful, reliable

High Power Density 5-10 kW/m²

High efficiency up to 59%.

Do not fight, but use!

Minimum dimensions, weight
and platform cost.

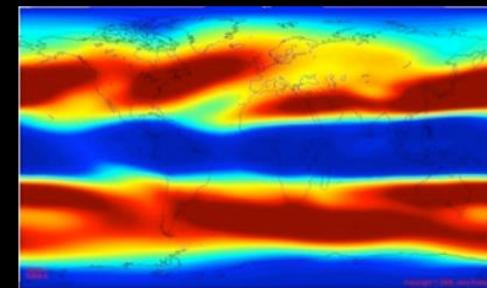
Comparison of Mean Power Density (kW/m²)



Surface Solar



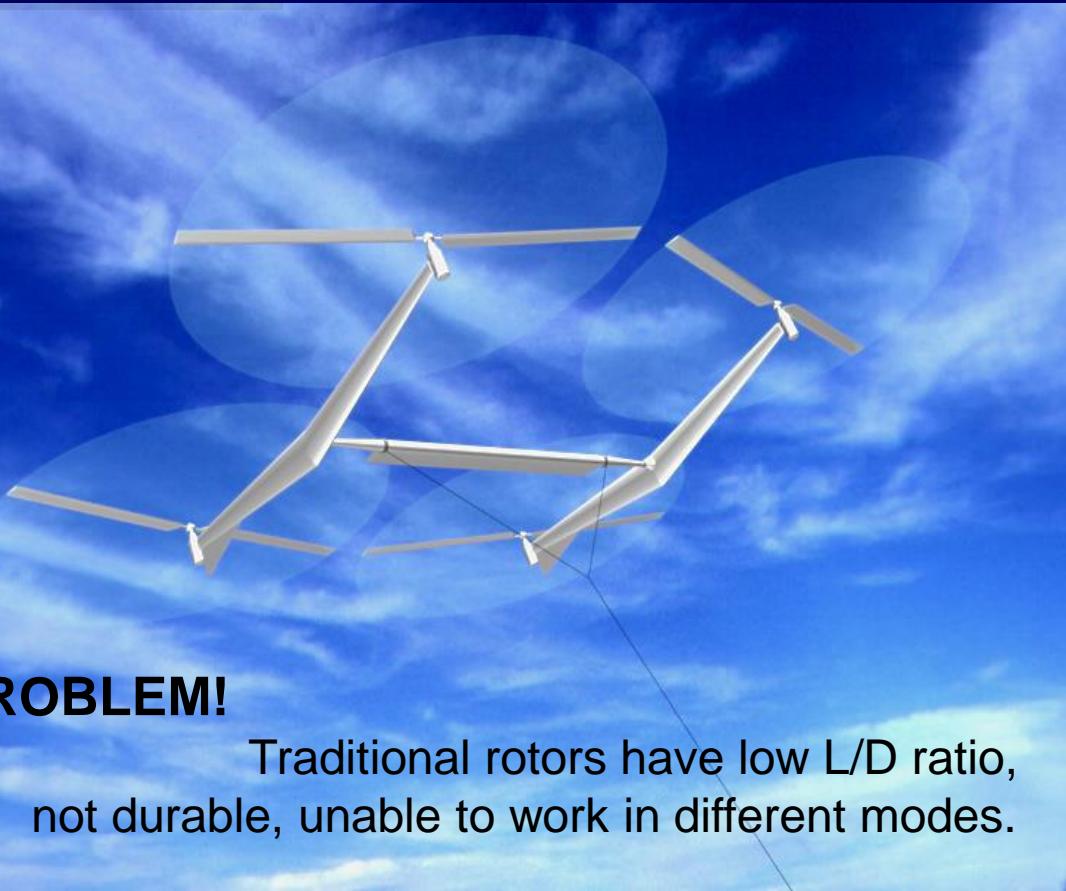
Surface Wind @ 50m



Wind @ 10,000m



High-altitude wind power

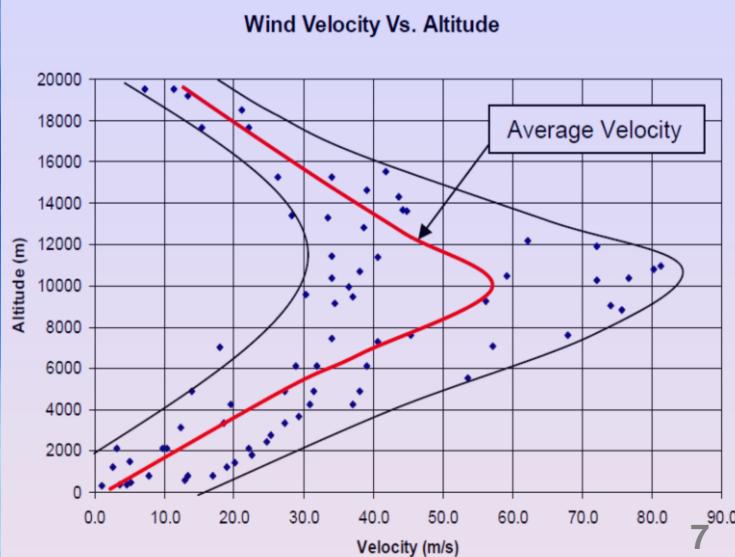


PROBLEM!

Traditional rotors have low L/D ratio,
not durable, unable to work in different modes.

***High-altitude Wind –
powerful reliable source.***

***The only one in the Arctic.
How to get it?***



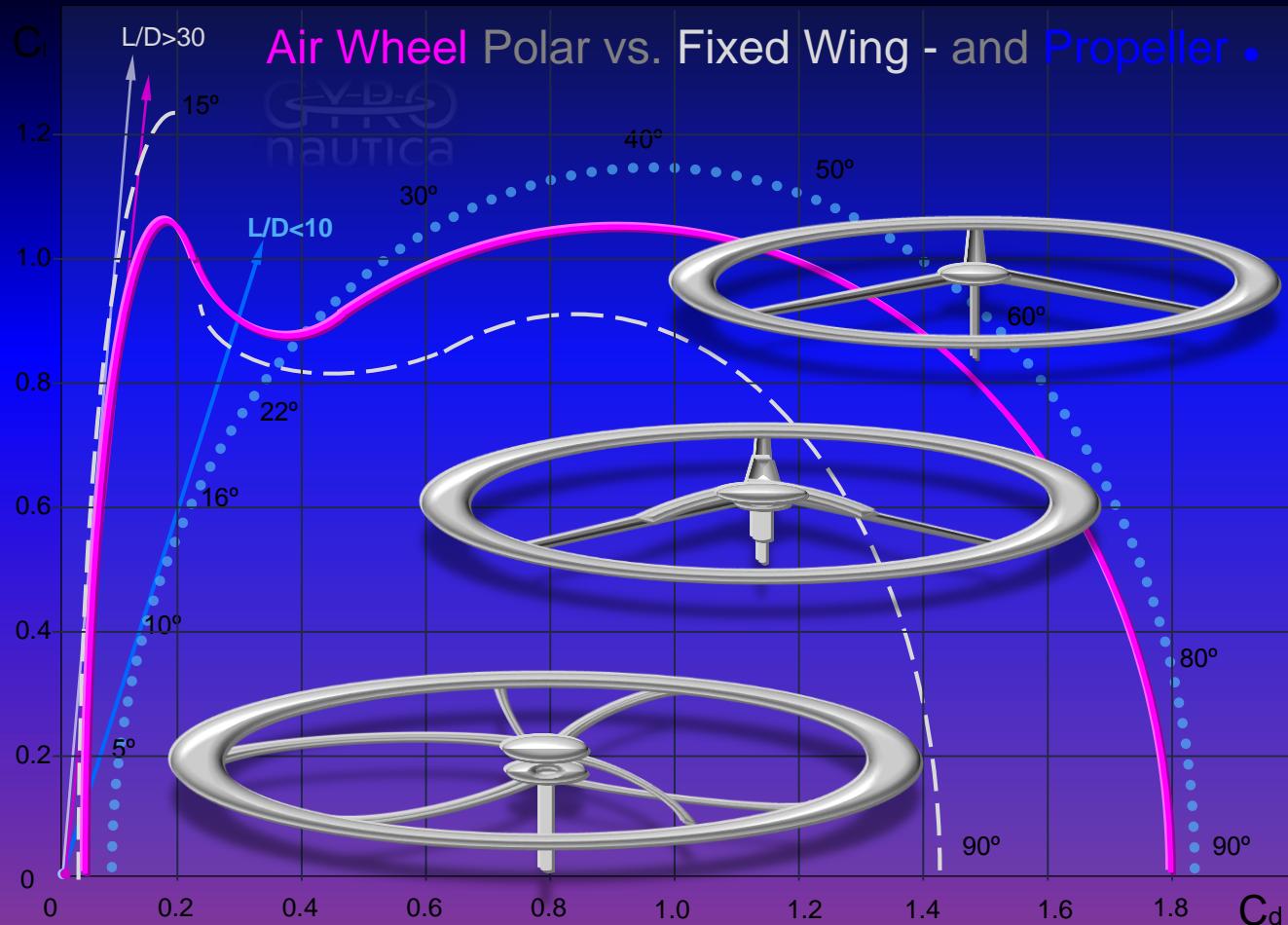
Solution

A key element
of the technology is
the Air Wheel rotor.

Work in 3 modes:

- ✓ helicopter,
- ✓ autorotations,
- ✓ wind turbines.

Maximum:
strength, resource,
efficiency, L/D ratio,
elevation angle, ...



Solution

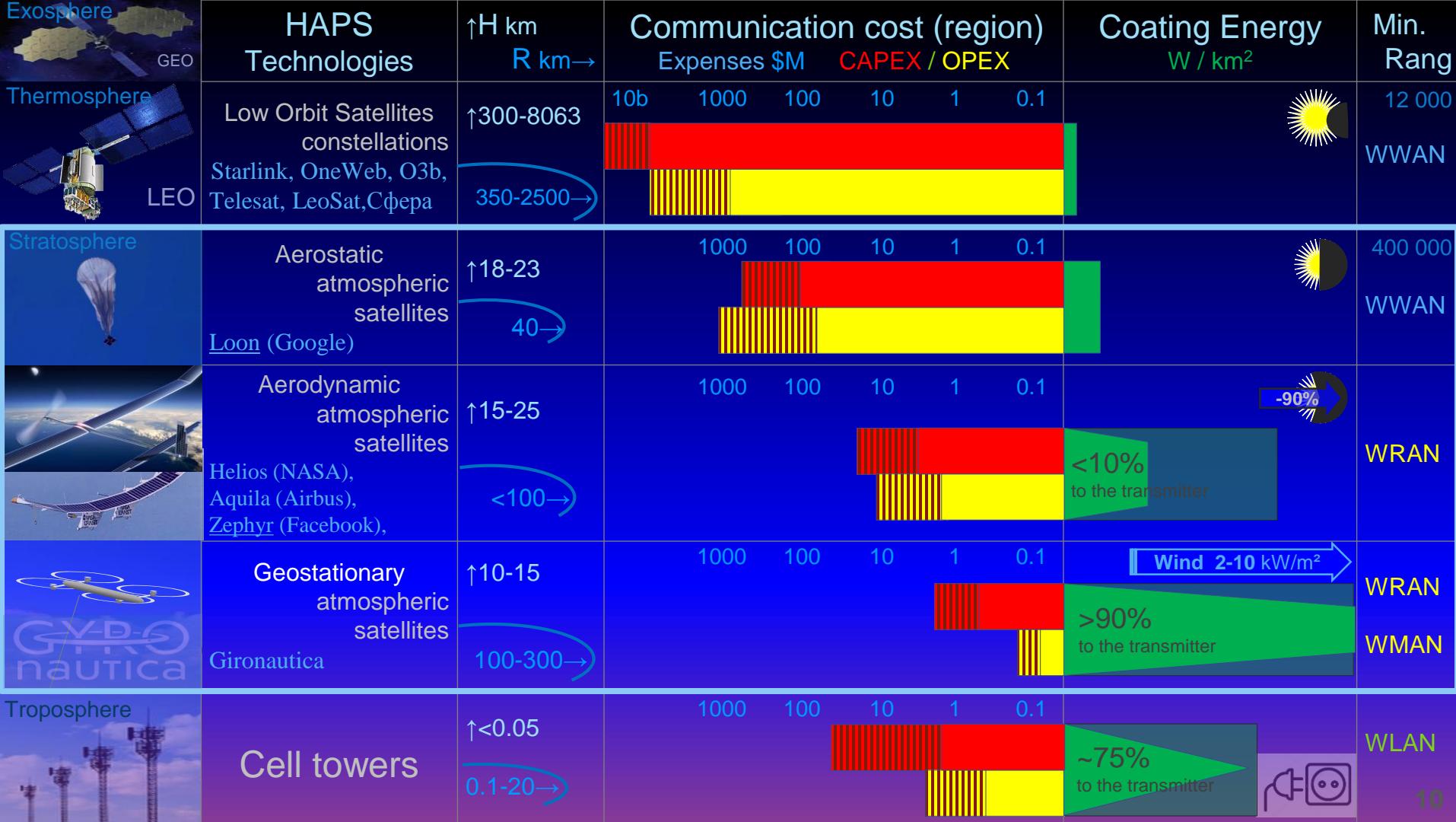
GAS Geostationary Atmospheric Satellite

high-altitude aerodynamic tethered platform
on bearing Air Wheel rotors.

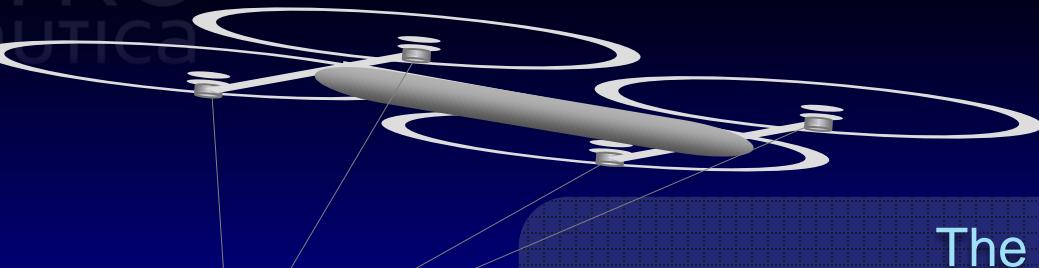
Altitude up to 14 km ,
Horizon up to 400 km ,
Coverage area
from 30 000 km²,
up to 300 000 km².

← Ultra High Molecular PolyEthylene
UHMPE (Dyneema®, Spectra®)
specific strength = 378km, <15%TOW

- ✓ Absolute Green energy autonomy.
- ✓ Maximum reliability and power for transmitter.
- ✓ Minimum mass and dimensions.
- ✓ Minimum cost of the platform and its flight year.
- ✓ Minimal ground infrastructure (pile with a winch).
- ✓ Reliable fiber optic channel to Base Station.
- ✓ Work area from the tropics to high latitudes.



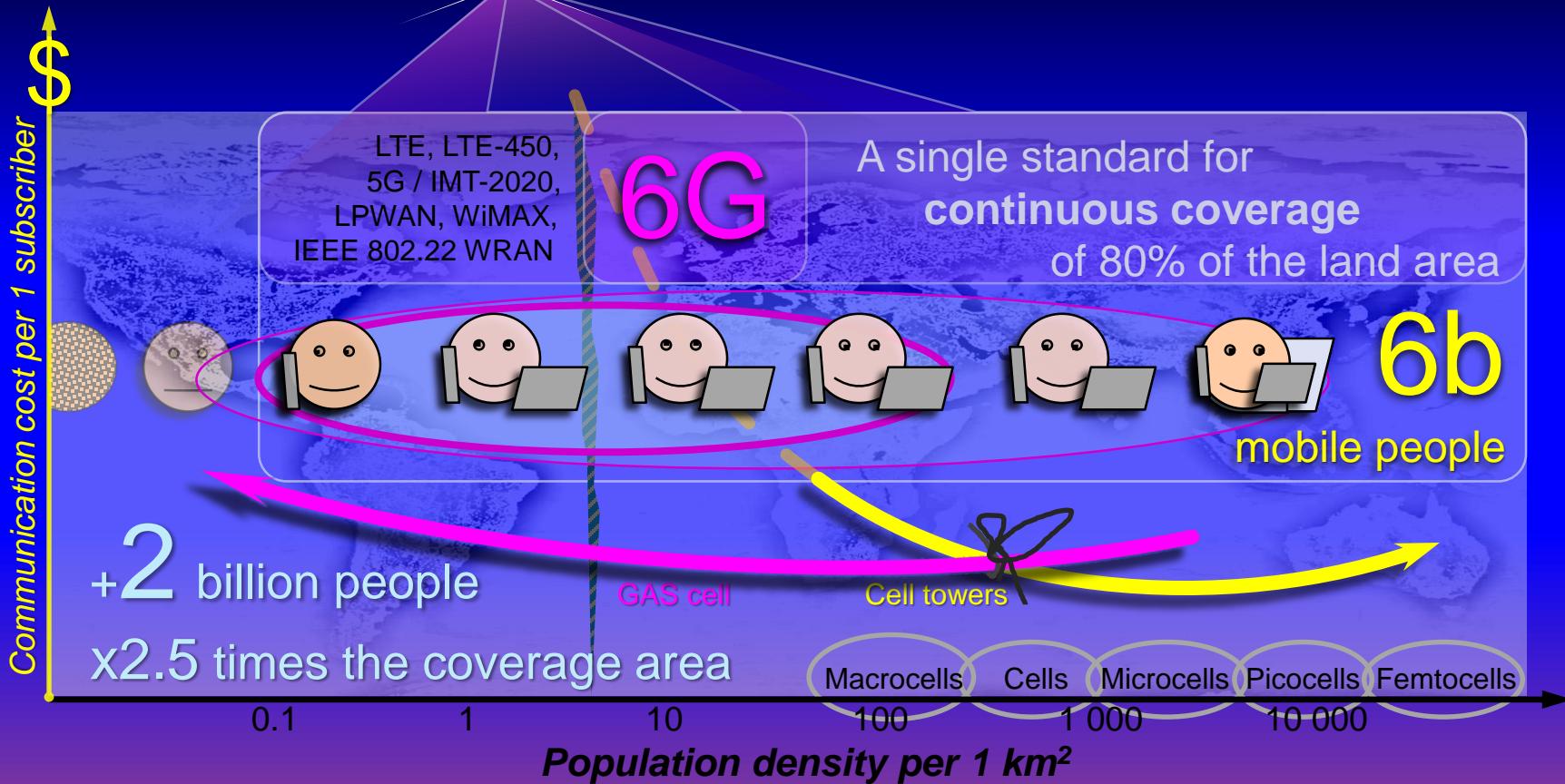
Competition



The technology of
Geostationary Atmospheric Satellites
is protected by patent and applications until 2034.

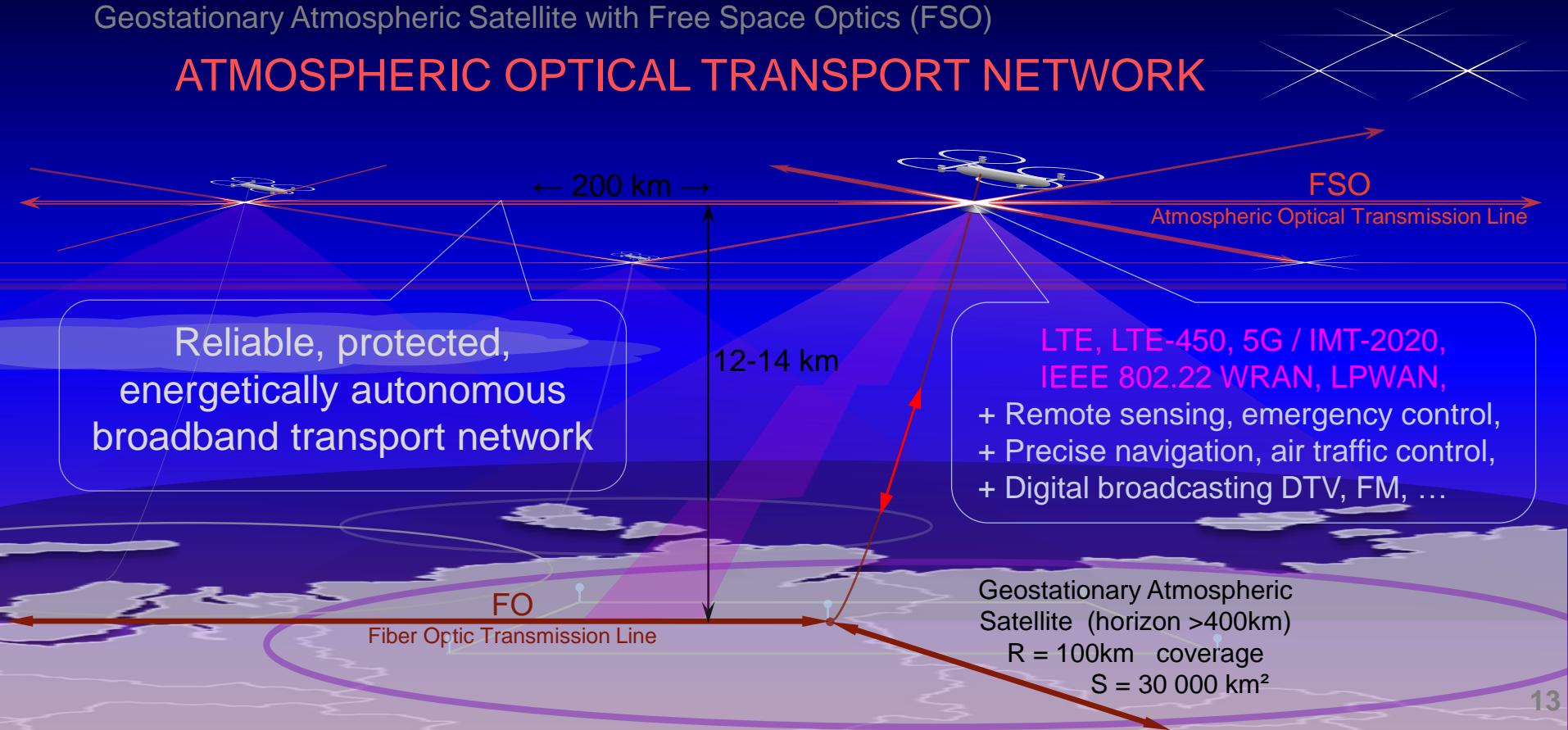
- Full compatibility and addition of cellular technologies.
- Organic combination with cable optic lines.
- The cost of coverage is lower than competitors by orders of magnitude.
- The maximum signal power in the direct line of sight of the Base Station.
- Internet backbone stratospheric Free Space Optic.
- A comprehensive solution to communication, navigation, remote sensing, digital broadcasting DTV, ...

GAS cellular 6G



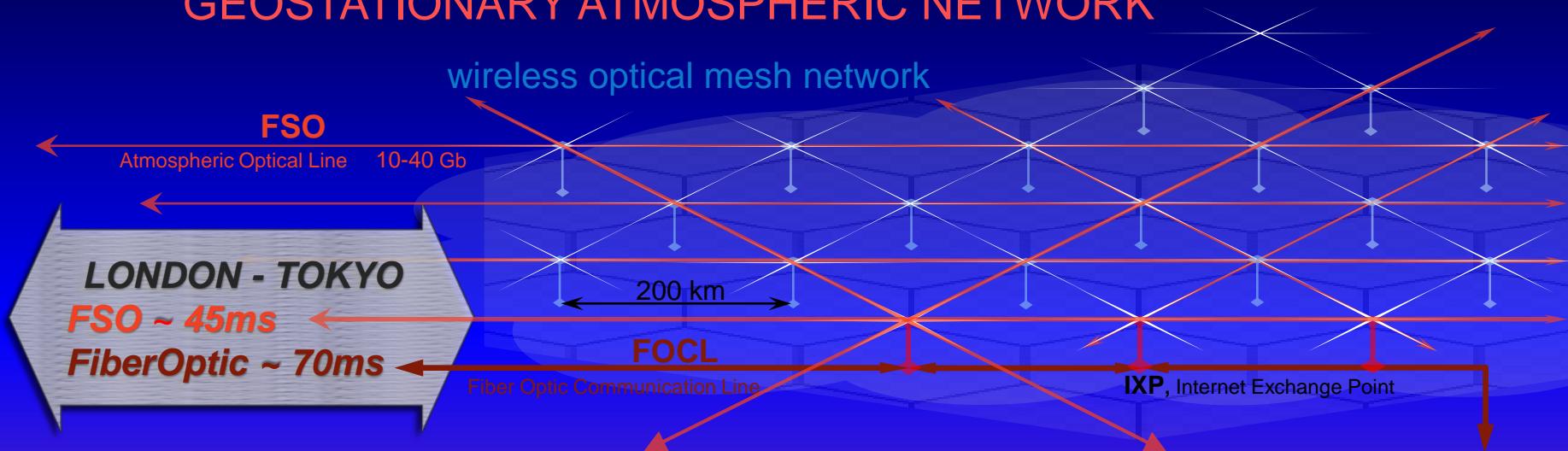
Geostationary Atmospheric Satellite with Free Space Optics (FSO)

ATMOSPHERIC OPTICAL TRANSPORT NETWORK



GAN on Free Space Optics (FSO)

GEOSTATIONARY ATMOSPHERIC NETWORK



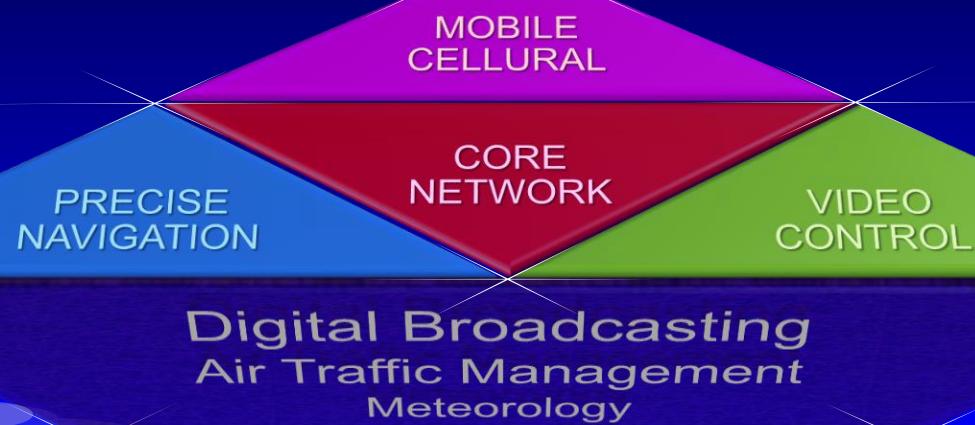
- The speed of light in FSO is 50% higher than in fiber.
- There are no nonlinear signal distortions.
- The stratosphere is more transparent and cheaper than optical fiber.

PRICE

3x200KM **FSO** < \$1M
200KM **FOCL** ~ \$10M

GAN on Free Space Optics (FSO)

SERVICES OF THE GEOSTATIONARY ATMOSPHERIC NETWORK



- Service Combinations*
- • ○ Car navigation
 - ○ ○ Social networks
 - ○ ○ Objects security
 - ○ ○ Surveillance
 - ○ ○ Building
 - ● ○ Telecontrol





Russian market



World market

2 billion new subscribers will receive mobile communications and Internet access.

+ **2 billion** cellular subscribers (~50%):

- will reduce cost of mobile tariffs;
- will increase the stability and speed;
- will expand the Internet access area on land, in the air, in coastal waters.

10 billion devices and sensors IoT (LPWAN).

Geostationary Atmospheric Satellites (GAS) able to expand and cover the mobile market

SOM > US\$30 billion / year

Satellite Market Assessment Starlink 2025 Elon Musk



Sergey Kuzikov

co-founder of the company,
IP author, patents owner,
aerodynamic calculation,
aircraft design,

The project team employs qualified young engineers.
Stable team from the foundation of the company in 2015.



Daniel Kuzikov

co-founder of the company,
design and product
experience management in
international startups,



Vladimir Vishnevskiy

Doctor of Technical Sciences,
Professor, Academician of the
International Academy of
Communications and the New York
Academy of Sciences, Full Member
IEEE Communications Society, ...



Project Current Status

- ✓ The current patent for the group of inventions RU2538737 opens up the possibility of selling the technology licenses.
- ✓ The final stages of patenting in USA, Europe, China, Canada.
- ✓ The R&D cycle of the Air Wheel rotors is completed.
- ✓ Aerodynamically stable schemes tested on the prototypes.
- ✓ Development of production technologies and components.
- ✓ LOMO started designing FSO modules for the GAN project.

To raise MVP in 2020 requires 3.5M₽ / ~50000€ / ~55000\$ / ~400000¥

To continue the GAN project, we need to make a responsible choice:

- Whose base stations will rise above the surface and cover the planet with 6G?
- Whose global atmospheric optical network will be the backbone of the Internet?



www.gyronaytica.ru
gyronautica@mail.ru
gyronautica@gmail.com

Contacts

GYRONAUTICA LLC
CEO Kuzikov Sergey
+7 911 227 1215

PROJECT

GEOSTATIONARY ATMOSPHERIC NETWORK

WELCOME TO THE FUTURE