

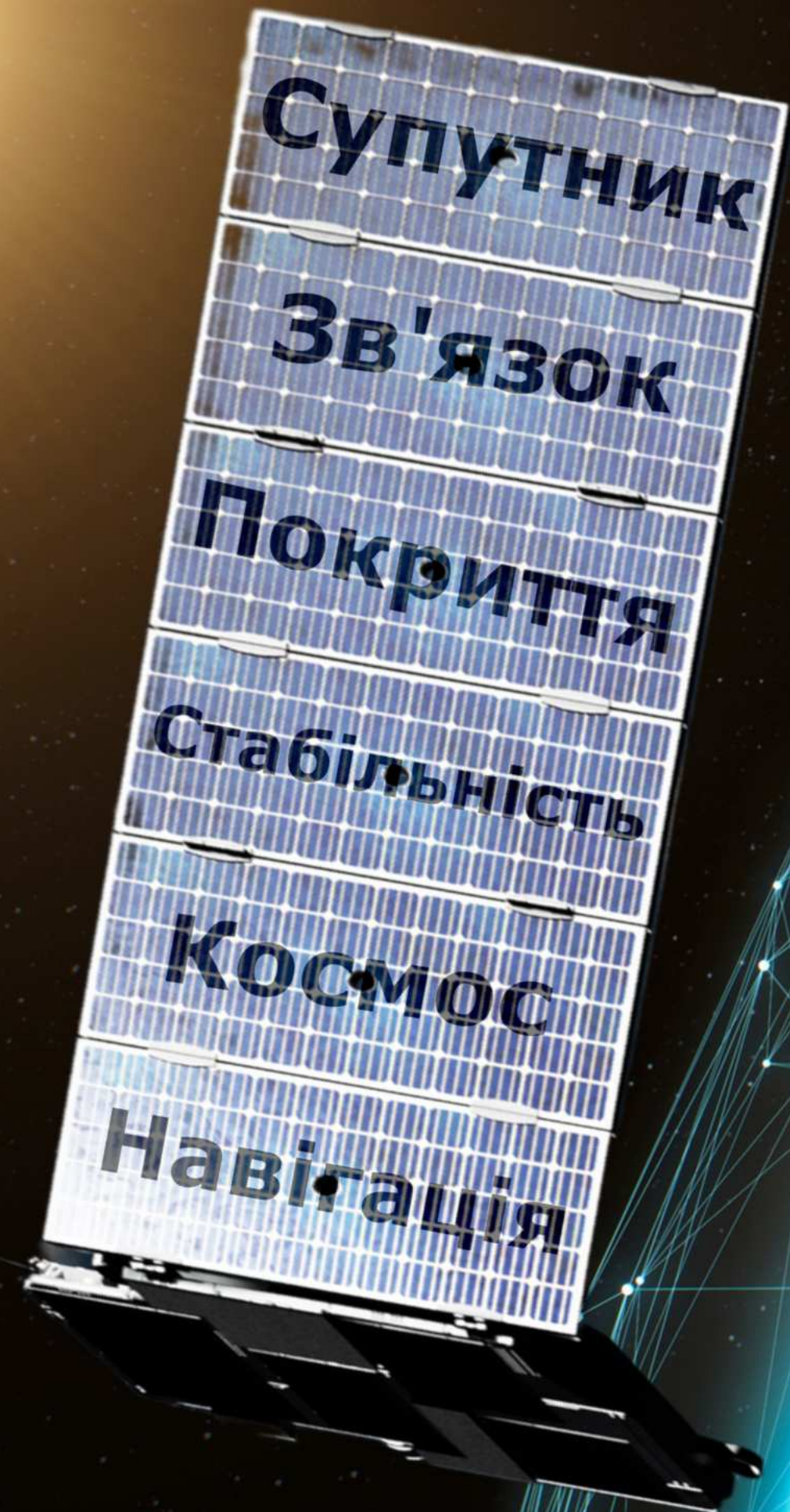
# **MODERN SATELLITE COMMUNICATION. SATELLITE SYSTEMS**

**Project type: research project**

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## Plan:

- ✓ Purpose and objectives;
- ✓ What is satellite communication?
- ✓ What are satellite systems?
- ✓ Principle of operation;
- ✓ Key benefits;
- ✓ Conclusion.



# GOAL:

find out what modern satellite communications and satellite systems are.



# PROJECT OBJECTIVES:

1. Learn what satellite communication is.
2. What are satellite systems?
3. The principle of operation of satellite communication.



## ЗАВДАННЯ ПРОЄКТУ:

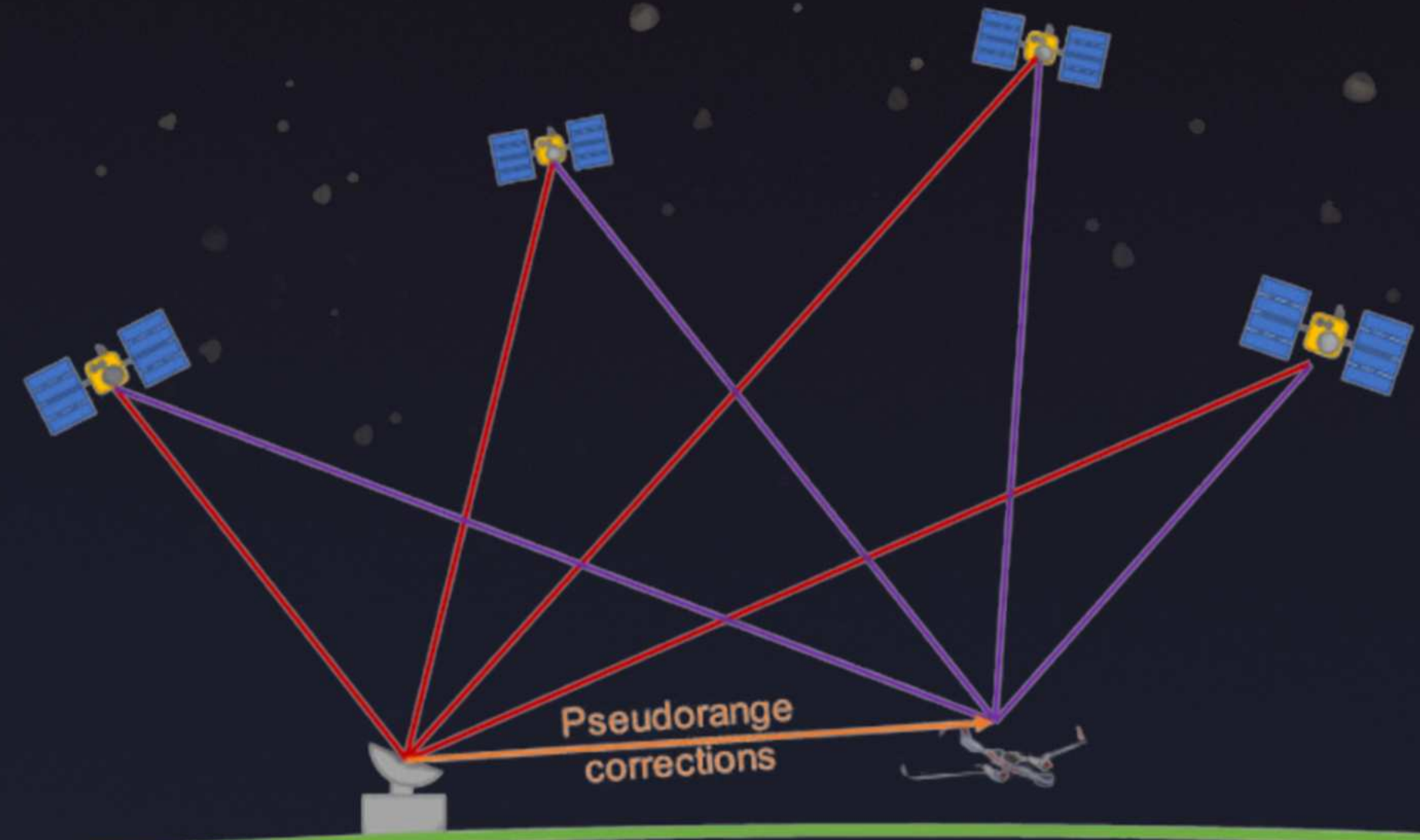
Щоб ви максимально зрозуміли, що таке сучасний супутниковий зв'язок та принцип його дії !!!



# WHAT IS SATELLITE COMMUNICATION?

Satellite communications is an information transmission technology that uses artificial satellites to transmit signals between different points on Earth or other objects in space.

This technology has become an important component of modern telecommunications infrastructure and finds applications in many fields, including communications, television broadcasting, navigation, and scientific research.



Satellite communications provide mobility and access to communications in areas where traditional terrestrial networks may be unavailable or ineffective. It is also used to provide global Internet connectivity, navigation, military communications, and other applications.



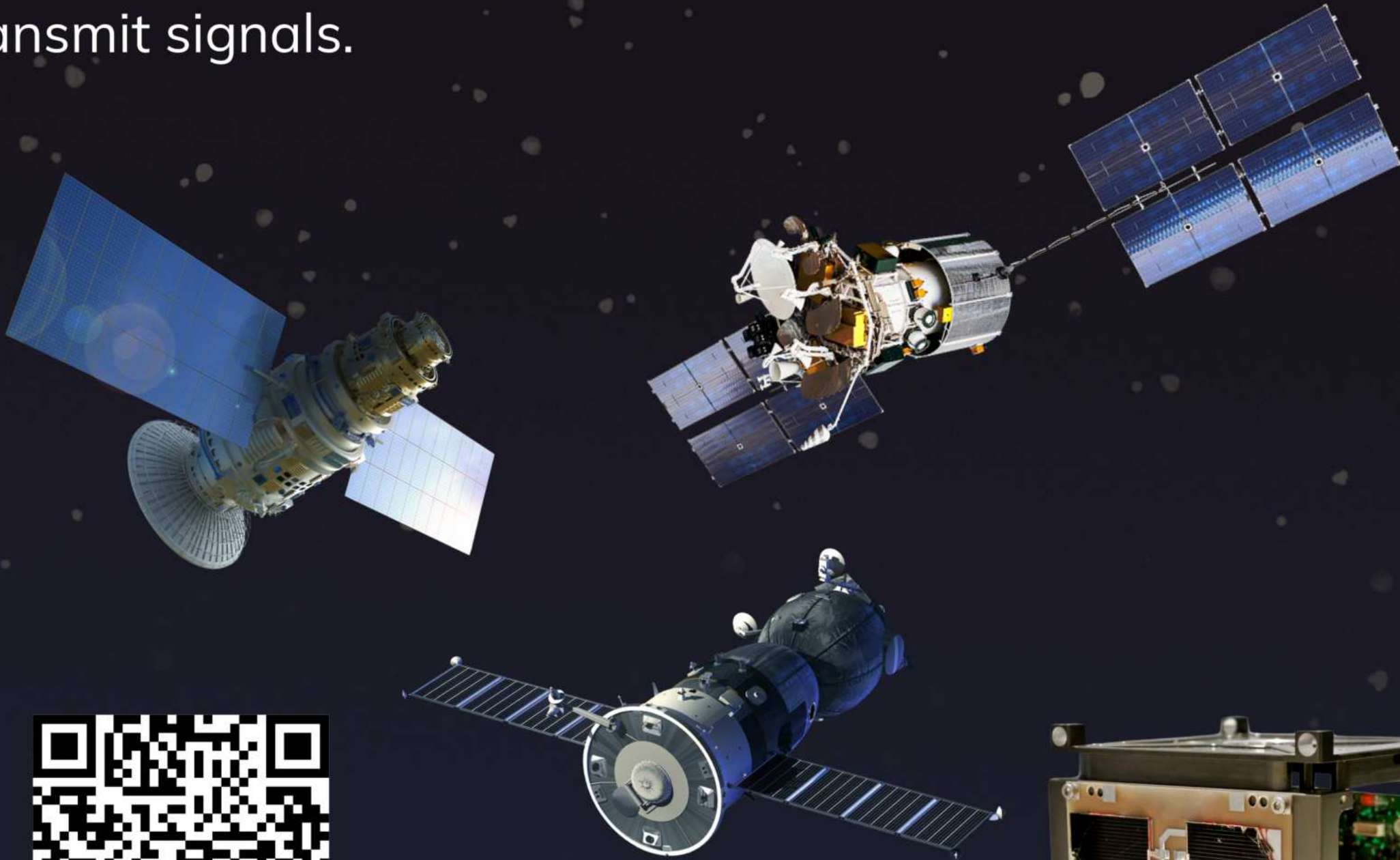
# WHAT ARE SATELLITE SYSTEMS?

Satellite systems are complexes consisting of one or more artificial satellites and ground infrastructure that work together to perform certain functions.

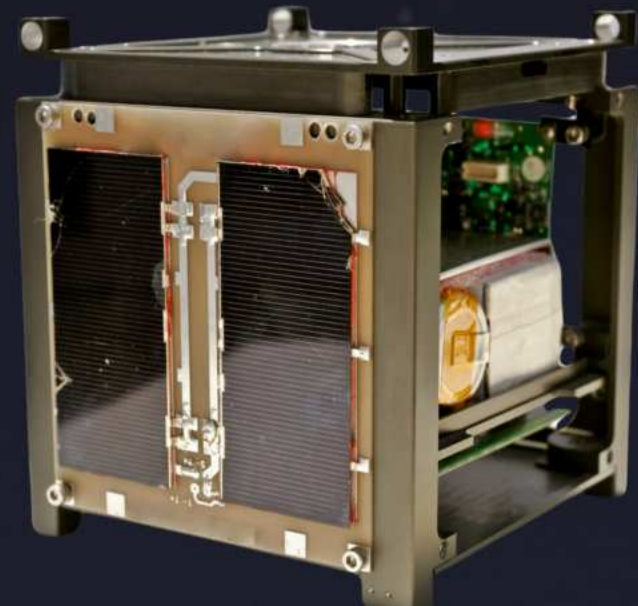


# The main elements of satellite systems:

1. Satellites: Artificial objects that orbit the Earth or another celestial body and are used to transmit signals.



Interesting content



<https://satellitemap.space>

Satellites can be placed in different orbits: geostationary, medium, and low. Each type of orbit has its own advantages and limitations.

**Geostationary (GEO)** – satellites in this orbit rotate synchronously with the Earth's rotation at an altitude of 35,786 km, remaining over a single point on the equator. This allows for constant coverage of a large area (e.g. satellite television, communications).

**Low Earth Orbit (LEO)** – satellites at an altitude of 500-2000 km, they provide low signal latency, but require a larger number of satellites for global coverage (Starlink, OneWeb).

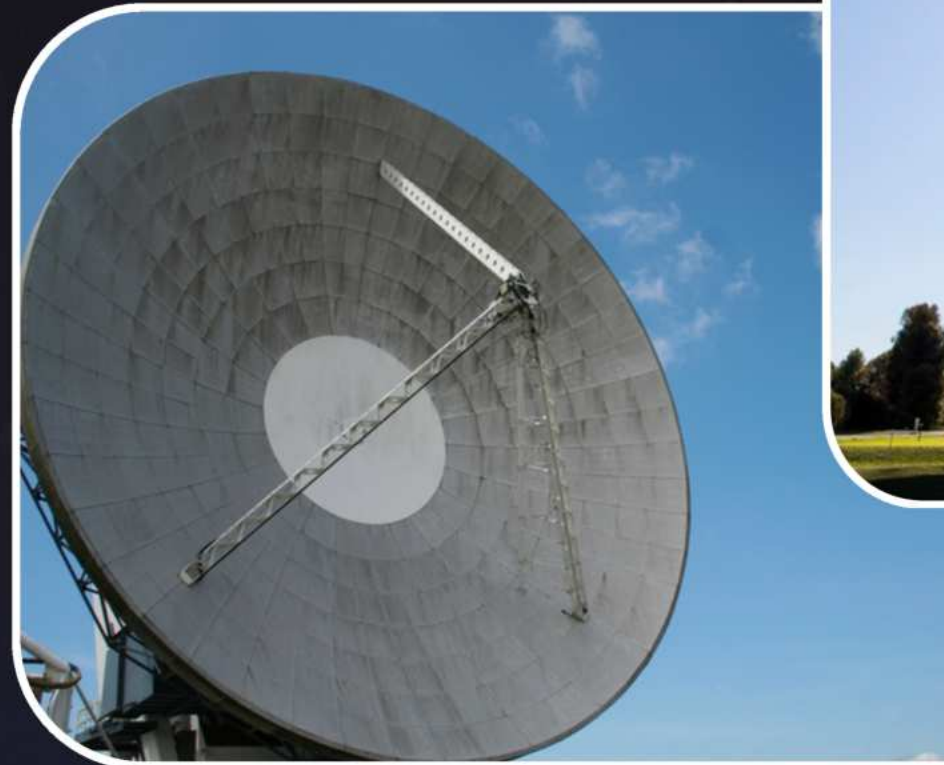
**Medium Earth Orbit (MEO)** – satellites orbit at an altitude of 2,000-35,000 km, they are used for navigation systems such as GPS, Galileo.



# The main elements of satellite systems:

2. Ground Stations: A complex of equipment on the Earth's surface that includes antennas, transmitters, and receivers.

Ground stations are used to transmit and receive signals to/from a satellite.



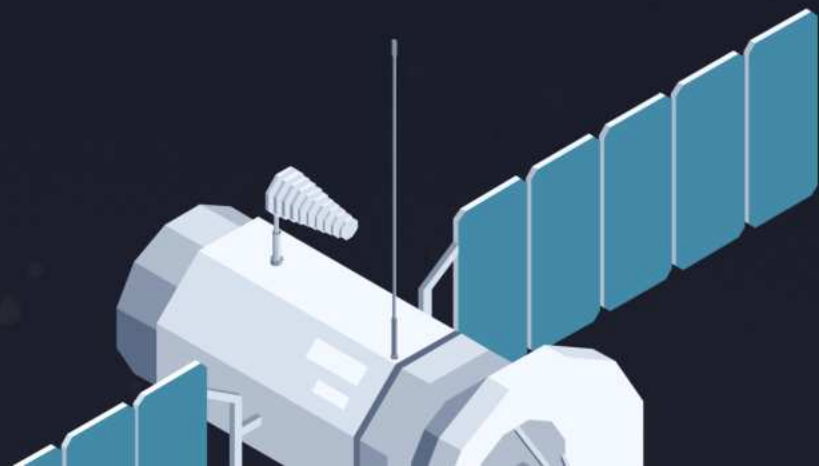
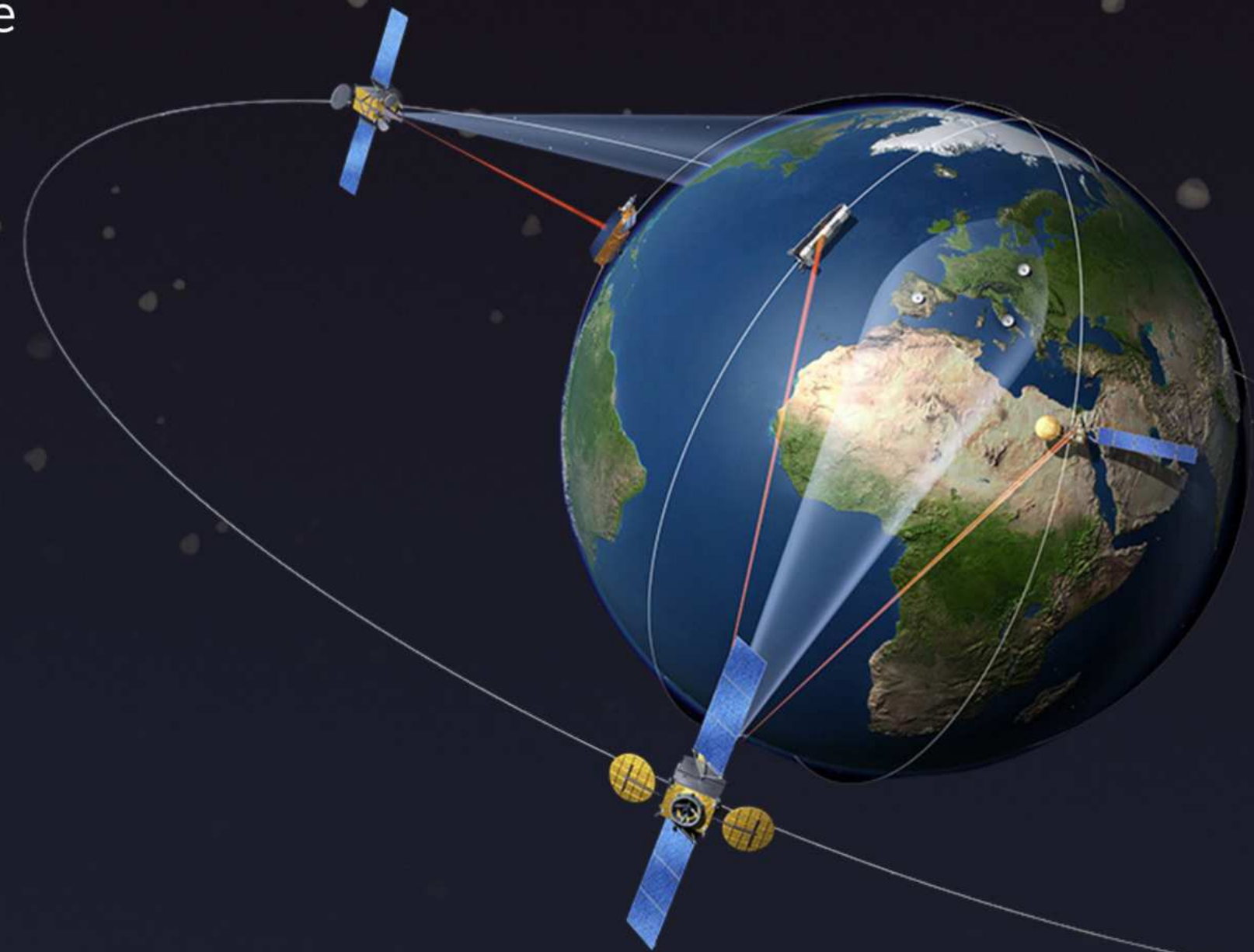
3. Infrastructure: Control, data processing and information transmission systems that ensure the operation of the entire satellite system.

# THE PRINCIPLE OF OPERATION OF A SATELLITE COMMUNICATION SYSTEM

The principle of operation of a satellite communication system is quite simple: a signal is transmitted from a ground station to a satellite, which retransmits it to other objects within its coverage area.

There is no signal correction (amplification, redirection, modification) on a passive repeater. The high effect is achieved due to the wide coverage area of the satellite repeater.

All modern satellite mobile communication systems have exclusively active repeaters that not only receive the signal from the ground station, but also amplify it and is sent directly to the reception area.



# THE PRINCIPLE OF OPERATION OF A SATELLITE COMMUNICATION SYSTEM

To improve the quality of signal reception and ensure constant communication regardless of the current position of the satellite, mobile satellite communication systems have been developed.

Mobile satellite communications — uses satellites in geostationary orbit, active repeaters, and ground stations to transmit and receive signals.

An ideal solution that has no analogues for providing radio communications in regions where it is not possible to use fixed communications due to some factors (lack of infrastructure, insufficient coverage, difficult weather conditions).



# KEY BENEFITS

Modern satellite communication has a number of advantages compared to other methods of transmitting information:

1. **Global coverage:** available almost anywhere on the planet, including remote, hard-to-reach or sparsely populated regions (mountains, deserts, oceans, polar zones) where there are no terrestrial communication networks.
2. **Scalability:** They allow you to easily expand the network by adding new terminals or satellites, making them flexible for different needs.
3. **High reliability:** provide stable communication even in difficult weather conditions, although heavy rainfall or thunderstorms may slightly affect signal quality.
4. **Wide range of applications:** used for data transmission, voice, video, TV and radio broadcasting, as well as for navigation (GPS) and monitoring (e.g. in agriculture or logistics).



# CONCLUSION

Satellite communications and satellite systems are an integral part of the modern world, providing reliable and global connectivity. They play a key role in telecommunications, navigation and scientific research, and continue to develop and improve. As technology advances, we may see even greater proliferation and improvement of satellite systems in the future.

# **THANK YOU FOR YOUR ATTENTION!!!**

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