



ITU Backgrounders

SHARING THE SKY – ITU’S ROLE IN MANAGING SATELLITE AND ORBIT SPECTRUM RESOURCES

As the sole United Nations agency charged with managing the radio spectrum and orbital resources at global level, ITU plays the crucial role to ensure that operators’ multi-million dollar satellite systems operate smoothly throughout their lifetimes, delivering services to billions of people without interfering with each other.

Since the birth of commercial satellite systems in the 1960s, satellites have grown to deliver a broad range of essential services to people around the globe. They are a key element in delivering television broadcasting and mobile networks infrastructure, in providing emergency telecommunications, global positioning, meteorological information, environmental monitoring, and communication services that ensure safety of life on land, at sea and in the sky.

The development of satellite communication has highlighted the need for managing a new, previously unused, international resource – the satellite spectrum/orbit resource. Due to the growing demand for satellite capacity, this resource – particularly the geostationary-satellite orbit (GSO), which supports a large part of the world’s TV, live global broadcast and data services (VSAT and mobile networks backhaul) – is becoming increasingly crowded. At the same time, the increasing use of lower Earth orbits is further increasing the need for international coordination.

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In its role of manager of this resource, ITU is charged with:

- maintaining the [Master International Frequency Register](#) (MIFR)– which records the international rights and obligations of satellites and associated earth stations to use this resource, including international recognition and protection of that use;
- coordinating the planning of new satellite networks to ensure that new satellite systems are compatible with those previously recorded in the MIFR;
- ensuring that satellite systems operate in conformity with the provisions of the [Radio Regulations](#) – the ITU binding international treaty which governs the use of radiocommunication systems worldwide. The Radio Regulations ensure an interference-controlled environment for satellite operation and guarantee equitable access to use of the natural resources of the frequency spectrum and geostationary-satellite orbit.



As the geostationary-satellite orbit (GSO) becomes increasingly crowded, with some 400 geostationary satellites currently in operation and around 40 new satellites launched each year, ITU's role in facilitating the coordination of satellites remains increasingly important.

SATELLITE ORBITS

The commonly used satellite orbits are Low Earth Orbit (LEO), with altitudes below 2 000 km, Medium Earth Orbits (MEO) with altitude between 2 000 km–36 000 km, the geostationary-satellite orbit (GSO), with an altitude of 36 000 km above the equator, and High Earth Orbit (HEO), with an altitude higher than 36 000 km.

The GSO remains the most sought after because the satellites using it appear fixed in the sky, and hence can provide a permanent coverage without the need for earth stations to be equipped with expensive tracking systems. In addition, a single satellite in GSO can serve a very large area, which translates into the ability to serve millions of customers across a region.

The need for coordination

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Thirty years ago, six degrees of spatial separation between geostationary satellites using the same frequencies over the same geographic area was considered a minimum to ensure their harmonious coexistence. Today, thanks to technical advances and the painstaking coordination work of the stakeholders within the framework of the ITU Radio Regulations, the orbital separation between satellite systems is routinely two degrees.

As the number of satellites increases, the risk of harmful interference needs to be more carefully and accurately assessed in order to continue to ensure the viability of the large investments made in space activities.

ITU's coordination role for new satellite deployments involves complex technical calculations and liaison between administrations and operators whose satellite systems and terrestrial stations may be impacted by transmissions from a new satellite. ITU assesses every new planned satellite system in relation to its compatibility with all the systems and stations already included in the MIFR and that could be affected by it – to ensure that the new system will be able to operate free of harmful interference from satellites already in orbit, and will not itself cause interference to existing services.

In addition, experts participating in the ITU-R study groups develop recommendations and reports to reflect the latest developments with regard to the efficient orbit/spectrum utilization, and ensure compatibility among these systems, as well as with the terrestrial systems sharing the same frequency bands.



Beyond the initial phase, coordination needs to be an on-going effort as long as the use of the radio frequency is required by the satellite system, as an essential part in maintaining the quality and reliability of the service it provides.

SATELLITE JAMMING

In recent years, an increasing number of cases of harmful interference have emerged – among both space and terrestrial systems– disturbing or preventing the reception of satellite signals. In some cases, instances of harmful interference have affected radio navigation-satellite service (RNSS) signals used by civil aviation, threatening disruption to international air traffic.

As the United Nations agency responsible for the management of radio-frequency spectrum and satellite orbits, the ITU is responsible for applying the provision of the Radio Regulations in resolving the cases of harmful interference. It provides for all parties involved to reach a solution.