

RECOMMENDATION ITU-R S.673-1*

Terms and definitions relating to space radiocommunications

(Question ITU-R 209/4)

(1990-2001)

The ITU Radiocommunication Assembly,

considering

- a) that terms and definitions concerning space systems, services and stations are included in the Radio Regulations (RR);
- b) that it is necessary to establish definitions for additional terms relating to space radiocommunications in order to facilitate studies in the ITU-R,

recommends

1 that terms listed in Annex 1 should be used as far as possible with the meaning ascribed to them in the corresponding definition.

ANNEX 1

Terms and definitions relating to space radiocommunications

Terms and definitions concerning space systems, services and stations are included in the RR and are not reproduced in this Annex.

Active satellite

A satellite carrying a station intended to transmit or retransmit radiocommunication signals.

Adaptive beam

A tracking (sticky) beam with the additional property that the beam parameters are adapted to provide a constant footprint (or service area) as the satellite moves. This type of beam may or may not have adaptive peak gain, providing a constant peak e.i.r.p.

Altitude of the apogee (perigee)

The altitude of the apogee (perigee) above a specified hypothetical reference surface serving to represent the surface of the Earth.

Anomalistic period

The time elapsing between two successive passages of a satellite through its periapsis.

Apoapsis

The point in the orbit of a satellite or planet which is situated at the maximum distance from the centre of mass of the primary body.

* This Recommendation should be brought to the attention of the Coordination Committee for Vocabulary.

Apogee

The point in the orbit of an earth satellite which is situated at the maximum distance from the centre of the Earth.

NOTE 1 – The apogee is the apoapsis of an earth satellite.

Ascending (descending) node

The point at which the orbit of a satellite or planet intersects the principal reference plane, the third coordinate of the satellite or planet being increasing (decreasing) on passing through that point.

Attitude-stabilized satellite

A satellite with at least one axis maintained in a specified direction, e.g. toward the centre of the Earth, the Sun or a specified point in space.

Circular orbit (of a satellite)

A satellite orbit in which the distance between the centres of mass of the satellite and of the primary body is constant.

Constellation avoidance

In-line avoidance applied to each of a group of space stations that make up a satellite constellation.

dBsd

Decibel relative to the maximum value of power spectral density (PSD) within the necessary bandwidth. The maximum value of PSD of a random signal is found by computing the mean power in the reference bandwidth when that reference bandwidth is positioned in frequency such that the result is maximized.

Direct (retrograde) orbit (of a satellite)

A satellite orbit such that the projection of the centre of mass of the satellite onto the principal reference plane revolves about the axis of the primary body in the same (reverse) direction as (to) that in which the primary body rotates.

Dynamic link

A communications link, either or both of the end points of which change in time. An example is the link between an earth station and a constellation of non-GSO satellites.

Elliptical orbit (of a satellite)

A satellite orbit in which the distance between the centres of mass of the satellite and of the primary body is not constant but remains finite.

NOTE 1 – The unperturbed orbit is an ellipse within a frame of reference, the origin of which is the centre of gravity of the main body and the axes of which have fixed direction with reference to the stars.

Ephemeris

A table, or other method, giving the computed positions of some celestial bodies, including artificial satellites, over a specified period of time.

Equatorial orbit (of a satellite)

A satellite orbit, the plane of which coincides with that of the equator of the primary body.

Exocentric angle

The angle formed by imaginary straight lines that join any two points with a specific point in space.

Frequency re-use satellite network

A satellite network in which the satellite utilizes the same frequency band more than once, by means of antenna polarization discrimination, or by multiple antenna beams, or both.

Geocentric angle

The angle formed by imaginary straight lines that join any two points with the centre of the Earth.

Geostationary satellite

A stationary satellite having the Earth as its primary body.

Geostationary satellite orbit

The unique orbit of all geostationary satellites.

Geosynchronous satellite

Synchronous earth satellite.

NOTE 1 – The sidereal period of rotation of the Earth is about 23 h 56 min.

Inclination (of a satellite orbit)

The angle between the plane of the orbit of a satellite and the principal reference plane.

NOTE 1 – By convention, the inclination of a direct orbit of a satellite is an acute angle and the inclination of a retrograde orbit is an obtuse angle.

Inclined orbit (of a satellite)

A satellite orbit which is neither equatorial nor polar.

In-line avoidance

A tracking strategy that constrains the formation of links so that they fall outside a defined angle (the avoidance angle) relative to the direction of a station to be avoided.

LEO

Low-altitude Earth orbit, with an altitude below about 2 000 km above sea level.

MEO

Medium-altitude Earth orbit, with an altitude of about 10 000 km above sea level.

Nodal period

The time elapsing between two consecutive passages of a satellite through the ascending node of its orbit.

Orbit

The path, relative to a specified frame of reference, described by the centre of mass of a satellite or other body in space, subjected solely to forces of natural origin, mainly the force of gravity; by extension, the path described by the centre of mass of a body in space subjected to forces of natural origin and occasional low-energy corrective forces exerted by a propulsive device in order to achieve and maintain a desired path.

Orbital elements (of a satellite or other body in space)

The parameters by which the shape, dimensions and position of the orbit in space and the period of the body can be defined in relation to a specified frame of reference.

NOTE 1 – In order to determine the position of a body in space, at any instant it is necessary to know, in addition to its orbital elements, the position of its centre of gravity in its orbit at a given instant.

NOTE 2 – The frame of reference used is a direct rectangular coordinate system OXYZ, in which the origin is at the centre of mass of the primary body and the third axis OZ is perpendicular to the principal reference plane, also called the basic reference plane, or simply the reference plane.

NOTE 3 – For an artificial earth satellite, the reference plane is the Earth's equatorial plane and the third axis OZ has a South to North orientation.

Orbital plane (of a satellite)

The plane containing the centre of mass of the primary body and the velocity vector of a satellite, the frame of reference being that specified for defining the orbital elements.

Periapsis

The point in the orbit of a satellite or planet which is situated at the minimum distance from the centre of mass of the primary body.

Perigee

The point in the orbit of an earth satellite which is situated at the minimum distance from the centre of the Earth.

NOTE 1 – The perigee is the periapsis of an earth satellite.

Period of revolution (of a satellite)**Orbital period** (of a satellite)

The time elapsing between two consecutive passages of a satellite through a characteristic point on its orbit.

NOTE 1 – If the characteristic point on the orbit is not specified, the period of the revolution considered is, by convention, the anomalistic period.

Point and shoot beam

A satellite transmit and/or receive beam that is formed and pointed as required by traffic levels. The beam will hop around in time and/or space division multiplex schemes.

Polar orbit (of a satellite)

A satellite orbit, the plane of which contains the polar axis of the primary body.

Primary body (in relation to a satellite)

The attracting body which primarily determines the motion of a satellite.

Reference bandwidth

The reference bandwidth required for uniquely defining unwanted emission limits. Section II, Appendix 3 of the RR uses a reference bandwidth of 4 kHz for space services with regard to unwanted emission limits. However, for digital carriers a reference bandwidth of 1 MHz is often used (e.g. see Recommendation ITU-R SM.1448). Given the predominance of digital carriers above 15 GHz, and for systems with carriers greater than 1 MHz bandwidth, a 1 MHz reference bandwidth may be used for systems operating in these frequency bands, and a reference bandwidth of 4 kHz for all unwanted emissions, from the space services operating below 15 GHz.

Reflecting satellite

A satellite intended to transmit radiocommunication signals by reflection.

Satellite

A body which revolves around another body of preponderant mass and which has a motion primarily and permanently determined by the force of attraction of that other body.

NOTE 1 – A body so defined which revolves around the Sun is called a planet or planetoid.

Service arc

The arc of the geostationary satellite orbit within which the space station could provide the required service (the required service depends upon the system characteristics and user requirements) to all of its associated earth stations in the service area.

Sidereal period of revolution (of a satellite)

The time elapsing between two consecutive intersections of the projection of a satellite onto a reference plane which passes through the centre of mass of the primary body with a line in that plane extending from the centre of mass to infinity, both the normal to the reference plane and the direction of the line, being fixed in relation to the stars.

Sidereal period of rotation (of a body in space)

Period of rotation, around its own axis, of a body in space in a frame of reference fixed in relation to the stars.

Space probe

A spacecraft designed for making observations or measurements in space.

Spacecraft

A man-made vehicle which is intended to go beyond the major part of the Earth's atmosphere.

Stationary satellite

A satellite which remains fixed in relation to the surface of the primary body; by extension, a satellite which remains approximately fixed in relation to the surface of the primary body.

NOTE 1 – A stationary satellite is a synchronous satellite with an orbit which is equatorial, circular and direct.

Station-keeping satellite

A satellite, the position of the centre of mass of which is controlled to follow a specified law, either in relation to the positions of other satellites belonging to the same space system or in relation to a point on Earth which is fixed or moves in a specified way.

Sub-synchronous (super-synchronous) satellite

A satellite for which the mean sidereal period of revolution about the primary body is a sub-multiple (an integral multiple) of the sidereal period of rotation of the primary body about its own axis.

Synchronized satellite**Phased satellite (deprecated)**

A satellite controlled so as to have an anomalistic period or a nodal period equal to that of another satellite or planet, or to the period of a given phenomenon, and to pass a characteristic point in its orbit at specified instants.

Synchronous satellite

A satellite for which the mean sidereal period of revolution is equal to the sidereal period of rotation of the primary body about its own axis; by extension, a satellite for which the mean sidereal period of revolution is approximately equal to the sidereal period of rotation of the primary body.

Topocentric angle

The angle formed by imaginary straight lines that join any two points in space with a specific point of the surface of the Earth.

Tracking (sticky) beam

A steerable satellite beam that points to fixed areas on the ground as the satellite moves.

Tracking strategy

A set of conditions on link geometry that are used to determine when handover occurs in a system with dynamic links, and also determines to which of a candidate group of stations to handover.

Unperturbed orbit (of a satellite)

The orbit of a satellite in the idealized condition in which the satellite is subjected only to the attraction of the primary body, effectively concentrated at its centre of mass.

NOTE 1 – In a frame of reference whose centre is the centre of mass of the primary body, and whose axes have fixed directions in relation to the stars, the unperturbed orbit is a conic section.

Visible arc

The common part of the arc of the geostationary satellite orbit over which the space station is visible above the local horizon from each associated earth station in the service area.
