

CHANGES OF PARAMETERS IN NON-GEOSTATIONARY CONSTELLATIONS

- ITU-R WORKSHOP ON NON-
GEOSTATIONARY CONSTELLATIONS

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1. Statement of the question

- Modifying the technical parameters of a non-geostationary constellation at notification stage (compared to coordination stage) may be required:
 - evolution of system design
 - coordination agreement
- how to assess the impact of changes to technical parameters of a constellation between coordination and notification stages?
- For geostationary satellite networks, application of the principle “no more interference, no more sensitivity”
 - reasonably easy to compute for geostationary satellite networks.
- The same principle could be applied to non-geostationary satellite systems
 - but computation is likely to be much more challenging!

1. Statement of the question

- When the changes do not affect the orbital characteristics, the situation is similar to the case of geostationary satellites
 - e.g. if the maximum power is reduced without reducing the minimum power or the minimum power is increased without increasing the maximum power, such modifications should not lead to a modification of the protection date
- When the changes affect the orbital characteristics, there is a variety of possible cases of study.
- More questions than answers, with the hope to also better understand on what topic focusing the efforts (i.e. what parameters seem relevant for satellite operators to change and to what extent.)

2. Changes in the orbital characteristics

Three layers of issues:

1. Permitted variations around the notified orbital parameters from a regulatory point of view (e.g. bringing into use, suspension)?
 - Allowed ranges of altitude, inclination angle, phase angles, etc. within which the satellite is operated:
 - For example, if you file a satellite altitude of 800 km, can you operate such filing with a satellite flying at 600, 700, 750 km...?
 - For geostationary satellite systems, covered by station-keeping window (see Section III of Article 22).
2. Need to take into account these variations from a point of view of technical conformity (e.g. conformity with RR Article 21 or 22 limits)?

2. Changes in the orbital characteristics

Three layers of issues:

3. Permitted variations of orbital parameters between the coordination stage and the notification stage?
 - Main criteria: interfering or sensitivity potential
 - However computing the difference between one orbital configuration and another one will be challenging and will need to be defined.
 - Can the epfd mask computed for the protection of geostationary satellite networks be also used differentially to assess the interference potential of two different configurations of a constellation?

3. Technical parameters related to Article 22 limits

Non-GSO filings also include parameters used in the calculation of epfd levels, for example:

- Earth station e.i.r.p. masks for $epfd_{up}$
 - satellite pfd masks for $epfd_{dn}$
 - satellite e.i.r.p. masks for $epfd_{is}$
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- To what extent can these be modified without impacting the NGSO network protection date, assuming the first set of masks submitted by an administration result in a favourable finding?

 - What circumstances would allow an administration to file new or modified masks?

 - What criteria would be used by the BR to accept new masks?

3. Technical parameters related to Article 22 limits

Other parameters are also used in the computation of epfd levels that are needed beyond the orbital characteristics, the simple frequency assignment parameters (gain, power, bandwidth) and the pfd/e.i.r.p. masks:

- locations of earth stations,
 - satellite selection strategy,
 - GSO avoidance angles, etc.
- To what extent can these other parameters be modified without impacting the protection date?