

RECOMMENDATION ITU-R S.1255

**USE OF ADAPTIVE UPLINK POWER CONTROL TO MITIGATE CODIRECTIONAL
INTERFERENCE BETWEEN GEOSTATIONARY-SATELLITE ORBIT/FIXED-SATELLITE
SERVICE (GSO/FSS) NETWORKS AND FEEDER LINKS OF NON-GEOSTATIONARY
SATELLITE ORBIT/MOBILE-SATELLITE SERVICE (NON-GSO/MSS) NETWORKS
AND BETWEEN GSO/FSS NETWORKS AND NON-GSO/FSS NETWORKS**

(Questions ITU-R 206/4 and ITU-R 231/4)

(1997)

The ITU Radiocommunication Assembly,

considering

- a) that the World Radiocommunication Conference (Geneva, 1995) (WRC-95) made provisions for feeder links of non-GSO/MSS networks and GSO/FSS networks to operate on a shared basis in portions of the 20/30 GHz FSS bands, and also for non-GSO/FSS networks to operate on a shared basis with GSO/FSS networks in other portions of these bands;
- b) that the use of interference mitigation techniques, as shown by studies, will facilitate sharing between networks operating in these shared bands;
- c) that feeder links of non-GSO/MSS networks, non-GSO/FSS networks, and GSO/FSS networks intending to operate in the 20/30 GHz bands may include adaptive uplink power control in the system design in order to overcome the effects of impaired propagation;
- d) that Recommendation ITU-R S.1061 contains useful design information for several fade countermeasure strategies, including adaptive uplink power control;
- e) that when adaptive uplink power control is included in the design of these networks, it may be feasible to use this adaptive power control not only for combating the effects of impaired propagation, but also to maintain system performance during times of increased levels of interference between these networks;
- f) that the statistical nature of interference between feeder links of non-GSO/MSS networks and GSO/FSS networks, and between non-GSO/FSS networks and GSO/FSS networks, is significantly different from the statistical nature of impaired propagation at 20/30 GHz,

recommends

- 1 that networks employing adaptive uplink power control in the portions of the 20/30 GHz FSS bands in which feeder links of non-GSO/MSS networks and GSO/FSS networks share frequencies, and in the portions in which non-GSO/FSS networks and GSO/FSS networks share frequencies, should transmit the signals from their earth stations at the lowest possible power level which will achieve and maintain the desired link quality with appropriate link margin;
- 2 that in networks intending to utilize adaptive uplink power control to combat the effects of increased levels of interference between feeder links of non-GSO/MSS networks and GSO/FSS networks, and between non-GSO/FSS networks and GSO/FSS networks, consideration should be given in the design of the adaptive power control algorithm to the temporal characteristics of the statistics of this interference as compared to the statistics of impaired propagation;
- 3 that the extent to which power control is used to combat interference between feeder links of non-GSO/MSS networks and GSO/FSS networks, and between non-GSO/FSS networks and GSO/FSS networks should be defined by network operators during the frequency coordination process, if it is to be used.

NOTE 1 – In networks where adaptive power control designed primarily to combat propagation fades has a limited ability to respond to short-term interference events, use of adaptive power control will result in these networks being more sensitive to short-term interference events, especially from sources operating without adaptive power control.

NOTE 2 – When adaptive uplink power control is used to mitigate in-line interference between the feeder links of non-GSO/MSS networks and GSO/FSS networks, the possibility exists that this technique will be counter-productive when the earth stations are closely located. Depending on the interference geometry, and the relative interference levels between the two networks, the increase in link power by one network to overcome interference may result in progressive increases in link power on both networks, leading to more interference between the two networks. Further studies are required to determine the minimum spacing of earth stations, and how the adaptive power control algorithms may be designed to reduce this spacing.

NOTE 3 – In cases where the maximum level of “in-line” interference from the uplink of Network A to the uplink of Network B is substantially below the acceptable level, but simultaneously the “in-line” interference from Network B to Network A is substantially above the acceptable level, it may be advantageous for the adaptive power control of Network A to be designed to combat “in-line” interference (in addition to combating propagation fades) but for the adaptive power control of Network B to be designed to combat propagation fades only.
