

PCC.III/REC. 25 (VI-96)

**SHARING BETWEEN LOCAL MULTIPOINT DISTRIBUTION/
COMMUNICATION SERVICE (LMDS/LMCS) AND NON-GEOSTATIONARY MOBILE
SATELLITE SERVICE (NGSO MSS) FEEDER LINKS**

The Sixth Meeting of the Permanent Consultative Committee III: Radiocommunications,

CONSIDERING:

1. That a Working Group was established at the Fifth Meeting of the Permanent Consultative Committee III in August 1996 to study the various aspects of the implementation of LMDS/LMCS in the Americas and that the terms of reference of this Working Group include the preparation of guidelines needed for the implementation of LMDS/LMCS in the Americas (see Resolution PCC.III/RES.35 (V-96)).
2. That the 1995 World Radiocommunication Conference designated the 29.1-29.4 GHz band for use by NGSO MSS feeder links (Earth-to-space) on a coequal basis with geostationary networks in the Fixed Satellite Service subject to ITU Resolution 46 coordination procedures.
3. That NGSO MSS feeder links will be implemented globally and that licensing of NGSO MSS feeder link earth stations in the Americas is underway.
4. That specific sharing rules will be required to allow LMDS-type fixed systems to co-exist in the same bands used for feeder links to NGSO MSS systems.
5. That recently the U.S. approved a plan for national use of the Ka-band that provides for sharing of the 29.1 - 29.25 GHz band between LMDS (hub-to-subscriber only) and NGSO MSS feeder links, thereby reducing the potential for interference without adversely affecting the commercial viability of either service.
6. That these sharing rules were based on typical characteristics of LMDS systems and the space station and earth station characteristics of NGSO MSS feeder link networks currently under development.
7. That with the type of sharing rules adopted in the U.S., it will be possible for LMDS and NGSO MSS feeder links to co-exist in the same spectrum.
8. That these type of sharing rules can be used by other administrations in the Americas.

RECOMMENDS:

1. That CITEL administrations consider the sharing rules between LMDS and NGSO MSS feeder links attached in evaluating the domestic implementation of LMDS in the 29.1-29.25 GHz band.

A n n e x A

RULES ON SHARING BETWEEN LOCAL MULTIPOINT DISTRIBUTION SERVICE AND NON-GEOSTATIONARY MOBILE SATELLITE SERVICE FEEDER LINKS IN THE 29.1-29.25 GHz BAND

Rule 1. Definitions.

- (a) Feeder link earth station complex. A complex that includes up to three (3) earth station groups, with each earth station group having up to four (4) antennas, located within a radius of 75 nautical miles of a given set of geographic coordinates provided by a non-geostationary mobile satellite service (NGSO MSS) operator.
- (b) Local Multipoint Distribution Service Hub Station. A fixed point-to-multipoint radio station in a Local Multipoint Service System that provides one-way or two-way communication with Local Multipoint Distribution Service Subscriber Stations.
- (c) Local Multipoint Distribution Service System. A fixed point to-multipoint radio system consisting of Local Multipoint Distribution Service Hub Stations and their associated Local Multipoint Distribution Service Subscriber Stations.
- (d) Local Multipoint Distribution Service Subscriber Station. Any one of the fixed microwave radio stations located at users premises, lying within the coverage area of a Local Multipoint Distribution Service Hub Station, capable of receiving one-way communications from or providing two-way communications with the Local Multipoint Distribution Service Hub Station.
- (e) Local Multipoint Distribution Service Backbone Link. A point-to-point radio service link in a Local Multipoint Distribution Service System that is used to interconnect Local Multipoint Distribution Service Hub Stations with each other or with the public switched telephone network.

Rule 2. LMDS Single Station EIRP Limit.

Point-to-point stations in the 29.1-29.25 GHz band for the LMDS backbone between LMDS hubs shall be limited to a maximum allowable e.i.r.p. density per carrier of 23 dBW/MHz in any one megahertz in clear air, and may exceed this limit by employment of adaptive power control in cases where link propagation attenuation exceeds the clear air value due to precipitation and only to the extent that the link is impaired.

Rule 3. LMDS Hub Transmitter EIRP Spectral Area Density Limit.

LMDS applicants shall demonstrate that, under clear air operating conditions, the maximum aggregate of LMDS transmitting hub stations in the authorized service area in the 29.1-29.25 GHz band will not transmit a co-frequency hub-to-subscriber e.i.r.p. spectral area density in any azimuthal direction in excess of X dBW/(MHz-km²) when averaged over any 4.375 MHz band, where X is defined in Table 1. Individual hub

stations may exceed their clear air e.i.r.p.s by employment of adaptive power control in cases where link propagation attenuation exceeds the clear air value and only to the extent that the link is impaired.

(a) The e.i.r.p. aggregate spectral area density is calculated as follows:

$$10\log_{10} \frac{1}{A} \sum_{i=1}^N p_i g_i \text{ dBW/MHz-km}^2$$

where:

- N = number of co-frequency hubs in authorized service area
- A = Authorized service area in km²
- p_i = spectral power density into antenna of i-th hub (in W/MHz)
- g_i = gain of i-th hub antenna at zero degree elevation angle

Each p_i and g_i are in the same 1 MHz within the designated frequency band.

(b) The climate zones in Table 1 are defined for different geographic locations as shown in Appendix 28 of the ITU Radio Regulations.

Table 1

Climate Zone	e.i.r.p. Spectral Density (Clear Air) (dBW/MHz-km ²)
1	-23
2	-25
3,4,5	-26

Rule 4. Hub Transmitter e.i.r.p. Spectral Area Density Limit at Elevation Angles Above the Horizon.

LMDS applicants shall demonstrate that, under clear air operating conditions, the maximum aggregate of LMDS transmitting hub stations in the authorized service area in the 29.1-29.25 GHz band will not transmit a co-frequency hub-to-subscriber e.i.r.p. spectral area density in any azimuthal direction in excess of X dBW/(MHz-km²) when averaged over any 4.375 MHz band where X is defined in Table 2. Individual hub stations may exceed their clear air e.i.r.p.s by employment of adaptive power control in cases where link propagation attenuation exceeds the clear air value and only to the extent that the link is impaired.

(a) The e.i.r.p. aggregate spectral area density is calculated as follows:

$$10\log_{10} \frac{1}{a} \sum_{i=1}^N \text{e.i.r.p. (ai)} \text{ dBW/MHz-km}^2$$

where:

N = number of co-frequency hubs in authorized service area

A = Authorized service area in km²

e.i.r.p. (ai) = equivalent isotropic radiated spectral power density of the i-th hub (in W/MHz) at elevation angle a

Table 2

Elevation Angle (a)	Relative e.i.r.p. Density (dBW/MHz-km ²)
0 ≤ a ≤ 4.01	$e.i.r.p.(a) = e.i.r.p.(0) + 20 \log (\sin \theta x)(1/\theta x)$ where $x = (a + 1)/7.51$
4.01 < a ≤ 7.71	$e.i.r.p.(a) = e.i.r.p.(0) - 3.85a + 7.7$
a > 7.71	$e.i.r.p.(a) = e.i.r.p.(0) - 22$

where a is the angle in degrees of elevation above horizon, e.i.r.p.(0) is the hub e.i.r.p. area density at the horizon used in Rule 3. The nominal antenna pattern will be used for elevation angles between 0 and 81, and average levels will be used for angles beyond 81, where average levels will be calculated by sampling the antenna patterns in each 11 interval between 81 and 901, dividing by 83.

Rule 5. LMDS Power Reduction Techniques.

LMDS hub transmitters shall employ methods to reduce average power levels received by non-geostationary mobile satellite receivers, to the extent necessary to comply with other applicable rules, by employing the methods set forth below:

(a) **Alternate Polarizations.** LMDS hub transmitters in the LMDS service area may employ both vertical and horizontal linear polarizations such that 50 percent (plus or minus 10 percent) of the hub transmitters shall employ vertical polarization and 50 percent (plus or minus 10 percent) shall employ horizontal polarization.

(b) **Frequency Interleaving.** LMDS hub transmitters in the LMDS service area may employ frequency interleaving such that 50 percent (plus or minus 10 percent) of the hub transmitters shall employ channel center frequencies which are different by one-half the channel bandwidth of the other 50 percent (plus or minus 10 percent) of the hub transmitters.

(c) Alternative Methods. As alternatives to (a) and (b) above, LMDS operators may employ such other methods as may be shown to achieve equivalent reductions in average power density received by NGSO MSS satellite receivers.

Rule 6. LMDS subscriber transmissions.

LMDS licensees shall not operate transmitters from subscriber locations in the 29.1-29.25 GHz band.

Rule 7. Special requirements for operations in the band 29.1-29.25 GHz.

(a) A maximum of two (2) feeder link earth station complexes associated with any single NGSO MSS system may be placed into operation in country [X] in the band 29.1-29.25 GHz.

(b)(i) LMDS receive stations operating on frequencies in the 29.1-29.25 GHz band within a radius of 75 nautical miles of the geographic coordinates provided by a NGSO MSS operator for NGSO MSS feeder link earth station complex (the "feeder link earth station complex protection zone") shall accept any interference caused to them by such earth station complexes and shall not claim protection from such earth station complexes. NGSO MSS operators shall attempt to locate NGSO MSS feeder link earth station complexes in areas that will minimize to the extent practicable potential interference to LMDS systems.

(ii) LMDS licensees operating on frequencies in the 29.1-29.25 GHz band outside a feeder link earth station complex protection zone shall cooperate fully and make reasonable efforts to resolve technical problems with the NGSO MSS licensee to the extent that transmissions from the NGSO MSS operator=s feeder link earth station complex interfere with an LMDS receive station.