

**GHz**  
**12.75-14.3**

**USA/ /18 MOD**

| Allocation To Services |  |
|------------------------|--|
| Region 1               | Region 2   |
| Region 3               |  |
| <b>12.75-13.25</b>     | <b>FIXED</b><br>FIXED-SATELLITE (Earth-to-space) MOD 792A [S5.441]<br><u>(space-to-Earth) 809C [S5.458C]</u><br><br><b>MOBILE</b><br>Space Research (deep space) (space-to-Earth)<br><br><u>809D [S5.458D]</u> |

**Reason:** Revisions to the Table in the 12.75-13.25 GHz band are necessary to allocate spectrum specifically for feeder links in the 8 to 16 GHz frequency range to support current and future requirements of mobile-satellite services provided from non-geostationary satellite networks. The CPM-95 indicated that studies have shown that bi-directional spectrum sharing between the geostationary fixed-satellite service and non-geostationary mobile-satellite service feeder link networks is technically feasible given careful site selection and antenna sizing. Modification of No. 792A [S5.441] and addition of Nos. 809C [S5.458C] and 809D [S5.458D] is therefore consequential. Potentially, the paired bands in the Earth-to-space direction of transmission could be 10.7-10.95 GHz and 11.2-11.45 GHz.

**USA/ /19 ADD**  
**809C [S5.458C]**

Use of the band 12.75-13.25 GHz by the fixed-satellite service in the space-to-Earth direction of transmission is limited to feeder links for non-geostationary satellite networks of the mobile-satellite service. The provisions of No. 2613 [S22.2] do not apply to the fixed-satellite service in this band in the space-to-Earth direction of transmission.

**Reason:** The CPM-95 has indicated that bi-directional sharing between non-geostationary mobile-satellite service feeder links in the space-to-Earth direction and geostationary fixed-satellite service networks operating in the Earth-to-space direction in the 12.75-13.25 GHz band is technically feasible. Therefore, ADD No. 809C [S5.458C] allocates the 12.75-13.25 GHz band, in the space-to-Earth direction of transmission, to the fixed-satellite service and limits the allocation to non-geostationary mobile-satellite service feeder links. The CPM-95 has also indicated that procedural revisions would be necessary to provide a regulatory base which would permit the orderly operation of non-geostationary mobile-satellite service feeder links without any regulatory uncertainties to their full operational life. Consequently, the provisions of No. 2613 [S22.2] would not apply in this band for non-geostationary mobile-satellite service feeder links in the space-to-Earth direction of transmission.

**USA/ /20 ADD**  
**809D [S5.458D]**

The use of the band 12.75-13.25 GHz by the fixed-satellite service in the space-to-Earth direction of transmission is subject to the application of the

coordination and notification procedures set forth in MOD Resolution 46. Emissions from a non-geostationary space station shall not exceed the power flux-density levels at the Earth's surface as specified in MOD Article 28 [No. S21.16] for the 12.75-13.25 GHz band. The aggregate of all emissions from a non-geostationary feeder link constellation shall not exceed the power flux-density limit at the geostationary-satellite orbit as specified in ADD No. 2631A [S22.5A].

**Reason:**

The application of the coordination and notification procedures set forth in MOD Resolution 46 would be necessary for shared, bi-directional use of the 12.75-13.25 GHz band by non-geostationary mobile-satellite service feeder links. The power flux-density values at the Earth's surface specified in MOD Article 28 [No. S21.16] for the 12.75-13.25 GHz band would be necessary to protect terrestrial services. The power flux-density limits specified in ADD No. 2631A [S22.5A] would be necessary to protect space stations at the geostationary satellite orbit. [See Document -E for proposals for MOD Article 28 [No. S21.16] and ADD No. 2631A [S22.5A]] .

**GHz**  
**15.35-17.7**

**USA/ I21 MOD**

| Allocation To Services           |  |
|----------------------------------|--|
| Region 1                         | Region 2   |
| <b>15.4-15.7</b><br><b>15.45</b> | AERONAUTICAL RADIONAVIGATION<br>MOD 733 [S5.367] MOD 797 [S5.445]  |
| <b>15.45-15.65</b>               | AERONAUTICAL RADIONAVIGATION<br><u>FIXED-SATELLITE (Earth-to-space) 797E [S5.447C]</u><br><u>(space-to-Earth) 797G [S5.447E]</u><br><br>733-797 797F [S5.447D] 797H [S5.447F] 797I [S5.447G] |
| <b>15.65-15.7</b>                | AERONAUTICAL RADIONAVIGATION<br><br>MOD 733 [S5.367] MOD 797 [S5.445]  |

**Reason:**

Revisions to the Table in the 15.4-15.7 GHz band are necessary to allocate spectrum specifically for feeder links in the 8 to 16 GHz frequency range to support current and immediate requirements of mobile-satellite services provided from non-geostationary satellite networks. The CPM-95 indicated that the feasibility of sharing in this band in either the Earth-to-space or space-to-Earth direction of transmission depends on the nature of use under No. 797 [S5.445]. The CPM-95 did not, however, identify current use of the 15.4-15.7 GHz band by the fixed-satellite and inter-satellite services used in conjunction with the aeronautical radionavigation service and/or with the aeronautical mobile (R) services, in accordance with No. 797 [S5.445], and indicated that no sharing studies were conducted to assess the feasibility of sharing between these services and non-geostationary satellite networks. The CPM-95 also did not identify use of the 15.4-15.7 GHz band by the aeronautical mobile (R) service, in accordance with No. 733 [S5.367]. Modification of Nos. 733 [S5.367] and 797 [S5.445] would therefore be necessary to accommodate non-geostationary mobile-satellite service feeder links in the 15.45-15.65 GHz band. Addition of Nos. 797E [S5.447C], 797F [S5.447D], 797G [S5.447E], 797H [S5.447F] and 797I [S5.447G] is also consequential. As indicated by the CPM-95, a potential paired band in the space-to-Earth direction of transmission could be 6650-7075 GHz and, in the Earth-to-space direction, the 19.4-19.7 GHz band.

**USA/ I22 ADD**  
**797E [S5.447C]**

Use of the band 15.45-15.65 GHz by the fixed-satellite service in the Earth-to-space direction of transmission is limited to feeder links for non-geostationary satellite systems of the mobile-satellite service. The provisions of No. 2613 [S22.2] do not apply to the fixed-satellite service in the Earth-to-space direction of transmission. For elevation angles equal to or less than 20 degrees, the eirp density over the necessary bandwidth of any emission from an earth station in the fixed-satellite service shall be at least 66.2 dB(W/MHz) for emission bandwidths of less than or equal to 3 MHz. For emission

bandwidths greater than 3 MHz, the eirp shall be 71 dBW. For elevation angles greater than 20 degrees, the eirp density and eirp values can be reduced respectively by 5 dB. In addition, the average eirp radiated by a station in the radionavigation service shall not exceed 42 dBW. These values shall apply subject to review by the ITU-R and until it is changed by a future competent World Radio Conference.

**Reason:** The CPM-95 has indicated that bi-directional operation of non-geostationary mobile-satellite service feeder links in the 15.4-15.7 GHz band depends on the nature of use under No. 797 [S5.445]. MOD No. 797 [S5.445] applies to the 15.4-15.45 GHz and 15.65-15.7 GHz segments in the 15.4-15.7 GHz band. ADD No. 797C [S5.447C] therefore allocates the 15.45-15.65 GHz band in this specific direction of transmission to the fixed-satellite service and limits the allocation to non-geostationary mobile-satellite service feeder links. The CPM-95 has also indicated that procedural revisions would be necessary to provide a regulatory base which would permit the orderly operation of non-geostationary mobile-satellite service feeder links without any regulatory uncertainties to their full operational life. Consequently, the provisions of No. 2613 [S22.2] would not apply in this band for non-geostationary mobile-satellite service feeder links in the Earth-to-space or space-to-Earth directions of transmission. The minimum eirp on the earth station transmitter is necessary to prevent interference to the satellite receiver from emissions from aeronautical radionavigation transmissions. The eirp limit on the radionavigation service is necessary to prevent the radionavigation service from interfering with the fixed-satellite receivers.

**USA/ I23 ADD  
797F [S5.447D]**

The use of the band 15.45-15.65 GHz by the fixed-satellite service in the Earth-to-space and space-to-Earth directions of transmission is subject to the application of the coordination and notification procedures set forth in MOD Resolution 46.

**Reason:** The application of the coordination and notification procedures set forth in MOD Resolution 46 would be necessary for shared use of the 15.45-15.65 GHz band by non-geostationary mobile-satellite service feeder links.

**USA/ I24 ADD  
797G [S5.447E]**

Use of the band 15.45-15.65 GHz by the fixed-satellite service in the space-to-Earth direction of transmission is limited to feeder links for non-geostationary satellite systems of the mobile-satellite service. The provisions of No. 2613 [S22.2] do not apply to the fixed-satellite service in the space-to-Earth direction of transmission.

**Reason:** The CPM-95 has indicated that co-directional operation of non-geostationary mobile-satellite service feeder links in the 15.4-15.7 GHz band depends on the nature of use under No. 797 [S5.445]. MOD No. 797 [S5.445] applies to the 15.4-15.45 GHz and 15.65-15.7 GHz segments in the 15.4-15.7 GHz band. ADD No. 797G [S5.447E] therefore allocates the 15.45-15.65 GHz band in this specific direction of transmission to the fixed-satellite service and limits the allocation to non-geostationary mobile-satellite service feeder links. The CPM-95 has also indicated that procedural revisions would be necessary to provide a regulatory base which would permit the orderly

operation of non-geostationary mobile-satellite service feeder links without any regulatory uncertainties to their full operational life. Consequently, the provisions of No. 2613 [S22.2] would not apply in this band for non-geostationary mobile-satellite service feeder links feeder links in the space-to-Earth or Earth-to-space directions of transmission.

**USA/ /25 ADD  
797H [S5.447F]**

The use of the band 15.45-15.65 GHz by the fixed-satellite service in the space-to-Earth direction of transmission is subject to the application of the coordination and notification procedures set forth in MOD Resolution 46. Non-geostationary satellite networks (space-to-Earth) shall not exceed the power flux-density levels produced at the Earth's surface as specified in MOD Article 28 [No. S21.16]. This value shall apply subject to review by the ITU-R and until it is changed by a future competent World Radio Conference.

**Reason:**

The application of the coordination and notification procedures set forth in MOD Resolution 46 would be necessary for shared use of the 15.45-15.65 GHz band by non-geostationary mobile-satellite service feeder links. The pfd limit at the surface of the Earth will assure that non-geostationary mobile-satellite service feeder link networks will not interfere with aeronautical radionavigation receivers.

**USA/ /26 ADD  
797I [S5.447G]**

In making assignments to space stations of the fixed satellite service in the 15.45-15.65 GHz band, administrations shall take all practicable steps to protect the radio astronomy service operating in the band 15.35-15.4 GHz from harmful interference from unwanted emissions.

**Reason:**

ADD No. 797I [S5.447G] would protect radio astronomy operations in the band 15.35-15.4 GHz.

**GHz**  
**18.8-22.21**

**USA/ I27 MOD**

|                  |                        | Allocation To Services |  |                       |
|------------------|------------------------|------------------------|--|-----------------------|
|                  |                        | Region 1               | Region 2                               | Region 3              |
| <b>18.8-19.7</b> | <b>FIXED</b>           |                        |  |                       |
|                  | <b>FIXED-SATELLITE</b> |                        | (space-to-Earth) <b>872A [S5.523A]</b> |                       |
|                  |                        |                        | (Earth-to-space) <b>872C [S5.523C]</b> |                       |
|                  | <b>MOBILE</b>          |                        |  |                       |
|                  |                        |                        | <b>872B [S5.523B]</b>                  | <b>872D [S5.523D]</b> |

**Reason:**

Revisions to the Table in the 18.8-19.7 GHz band are necessary to allocate spectrum specifically for feeder links in the 16 to 30 GHz frequency range to support current and immediate requirements of mobile-satellite services provided from non-geostationary satellite networks. The CPM-95 indicated that studies have shown that co-directional spectrum sharing between the geostationary fixed-satellite service and non-geostationary mobile-satellite service feeder link networks is technically feasible. Addition of Nos. 872A [S5.523A] and 872B [S5.523B] is therefore consequential. A potential paired band in the Earth-to-space direction of transmission could be 29.1-29.5 GHz. Revisions to the Table are also necessary to allocate spectrum specifically for feeder links in the 16 to 30 GHz frequency range to support future requirements of mobile-satellite services provided from non-geostationary satellite networks. The CPM-95 also has indicated non-geostationary mobile-satellite service feeder links could share spectrum in a bi-directional mode either with other non-geostationary mobile-satellite service feeder links or alternatively with geostationary fixed-satellite service networks in the 19.4-19.7 GHz band. It noted further that such use should be paired with a frequency band below 17.7 GHz. Addition of Nos. 872C [S5.523C] and 872D [S5.523D] is therefore also consequential.

**NOTE:**

Proposed footnote Nos. 872A, 872B, 872C, and 872D and proposed footnote Nos. 873H and 873I [see Document -E] involve frequencies which overlap. In the event that both of these proposals are adopted by the Conference, final footnotes would need to include a combination of all proposed footnotes in an amended table of allocations.

**USA/ I28 ADD**  
**872A [S5.523A]**

The band 19.3-19.7 GHz may also be used by the fixed-satellite service on a primary basis in the space-to-Earth direction of transmission for feeder links for non-geostationary satellite networks of the mobile-satellite service. The provisions of No. 2613 [S22.2] do not apply to this fixed-satellite allocation in the space-to-Earth direction of transmission.

**Reason:**

The CPM-95 has indicated that co-directional sharing between non-geostationary mobile-satellite service feeder links in the space-to-Earth direction and geostationary fixed-satellite service networks operating in the space-to-Earth direction in the 19.3-19.7 GHz band is technically feasible. Therefore, ADD No. 872A [S5.523A] allocates the band 19.3-19.7 GHz for use by the fixed-satellite service for feeder links for the non-geostationary mobile-satellite service in the space-to-Earth direction of

transmission. The CPM-95 has also indicated that procedural revisions would be necessary to provide a regulatory base which would permit the orderly operation of non-geostationary mobile-satellite service feeder links without any regulatory uncertainties to their full operational life. Consequently, the provisions of No. 2613 [S22.2] would not apply in this band for non-geostationary mobile-satellite service feeder links in the space-to-Earth or Earth-to-space directions of transmission.

**USA/ I29 ADD  
872B [S5.523B]**

The use of the band 19.3-19.7 GHz by the fixed-satellite service in the space-to-Earth direction of transmission is subject to the application of the coordination and notification procedures set forth in MOD Resolution 46. Emissions from a non-geostationary space station shall not exceed the power flux-density levels at the Earth's surface as specified in MOD Article 28 [No. S21.16].

**Reason:** The application of the coordination and notification procedures set forth in MOD Resolution 46 would be necessary for shared, bi-directional use of the 19.3-19.7 GHz band by non-geostationary mobile-satellite service feeder links. The power flux-density values at the Earth's surface specified in MOD Article 28 [No. S21.16] would be necessary to protect terrestrial services.

**USA/ I30 ADD  
872C [S5.523C]**

Use of the band 19.4-19.7 GHz by the fixed-satellite service in the Earth-to-space direction of transmission is limited to feeder links for non-geostationary satellite networks of the mobile-satellite service. The provisions of No. 2613 [S22.2] do not apply to the fixed-satellite service in the Earth-to-space direction of transmission.

**Reason:** The CPM-95 has indicated non-geostationary mobile-satellite service feeder links could share spectrum in a bi-directional mode either with other non-geostationary mobile-satellite service feeder links or alternatively with geostationary fixed-satellite service networks in the 19.4-19.7 GHz band. Therefore, ADD No. 872C [S5.523C] allocates the 19.4-19.7 GHz band, in the Earth-to-space direction of transmission, to the fixed-satellite service and limits the allocation to non-geostationary mobile-satellite service feeder links. The CPM-95 has also indicated that procedural revisions would be necessary to provide a regulatory base which would permit the orderly operation of non-geostationary mobile-satellite service feeder links without any regulatory uncertainties to their full operational life. Consequently, No. 2613 [S22.2] would not apply in this band for non-geostationary mobile-satellite service feeder links in the Earth-to-space or space-to-Earth directions of transmission.

**USA/ I31 ADD  
872D [S5.523D]**

The use of the band 19.4-19.7 GHz by the fixed-satellite service in the Earth-to-space direction of transmission is subject to the application of the coordination and notification procedures set forth in MOD Resolution 46.

**Reason:** The application of the coordination and notification procedures set forth in MOD Resolution 46 would be necessary for shared, bi-directional use of the 19.4-19.7 GHz band by non-geostationary mobile-satellite service feeder links.

**GHz**  
**25.5-29.9**

**USA/ /32 MOD**

| Allocation To Services |  |
|------------------------|--|
| Region 1               | Region 2   |
| <b>28.5 - 29.5</b>     | FIXED<br>FIXED-SATELLITE (Earth-to-space) 882D [S5.539] <u>882H</u><br><u>[S5.542A]</u><br>MOBILE<br>Earth Exploration-Satellite (Earth-to-space) 882C [S5.538]<br><br>882B [S5.537] <u>882I</u> [S5.542B] |

**Reason:** Revisions to the Table in the 28.5-29.5 GHz band are necessary to allocate spectrum specifically for feeder links in the 16 to 30 GHz frequency range to support current and immediate requirements of mobile-satellite services provided from non-geostationary satellite networks. The CPM-95 indicated that studies have shown that co-directional spectrum sharing between the geostationary fixed-satellite service and non-geostationary mobile-satellite service feeder link networks is technically feasible. Addition of Nos. 882H [S5.542A] and 882I [S5.542B] is therefore consequential. A potential paired band in the space-to-Earth direction of transmission could be 19.3-19.7 GHz.

**NOTE:** Proposed footnote Nos. 882H, and 882I and proposed footnote Nos. 873H and 873I [see Document -E] involve frequencies which overlap. In the event that both of these proposals are adopted by the Conference, final footnotes would need to include a combination of all proposed footnotes in an amended table of allocations.

**USA/ /33 ADD**  
**882H [S5.542A]**

The band 29.1-29.5 GHz may also be used by the fixed-satellite service on a primary basis in the Earth-to-space direction of transmission for feeder links for non-geostationary satellite networks of the mobile-satellite service. The provisions of No. 2613 [S22.2] do not apply to the fixed-satellite service in the Earth-to-space direction of transmission.

**Reason:** The CPM-95 has indicated that co-directional sharing between non-geostationary mobile-satellite service feeder links and geostationary fixed-satellite service networks in the 27.5-29.5 GHz band is technically feasible. Therefore, ADD No. 882H [S5.542A] allocates the band 29.1-29.5 GHz for use by the fixed-satellite service for feeder links for the non-geostationary mobile-satellite service in the Earth-to-space direction of transmission. The CPM-95 has also indicated that procedural revisions would be necessary to provide a regulatory base which would permit the orderly operation of non-geostationary mobile-satellite service feeder links without any regulatory uncertainties to their full operational life. Consequently, the provisions of No. 2613 [S22.2] would not apply in this band for non-geostationary mobile-satellite service feeder links in the Earth-to-space direction of transmission.

**USA/ /34 ADD  
882I [S5.542B]**

The use of the band 29.1-29.5 GHz by the fixed-satellite service in the Earth-to-space direction of transmission is subject to the application of the coordination and notification procedures set forth in MOD Resolution 46.

**Reason:**

The application of the coordination and notification procedures set forth in MOD Resolution 46 would be necessary for shared, co-directional use of the 29.1-29.5 GHz band by non-geostationary mobile-satellite service feeder links.

## United States of America

Proposals for Agenda Items 2.1c and 3d

### REGULATORY ASPECTS FOR FEEDER LINKS FOR THE MOBILE-SATELLITE SERVICES

#### **Introduction:**

The WARC-92 allocated spectrum in the 1.6/2.4 GHz frequency bands for mobile-satellite services. The United States has since licensed three non-geostationary mobile-satellite systems to operate in these frequency bands. Two additional U.S. non-geostationary mobile-satellite systems may also be licensed after January 1996. The first U.S. 1.6/2.4 GHz non-geostationary mobile-satellite launch is expected to occur prior to the WRC-97.

In addition to the 1.6/2.4 GHz service link allocations for these mobile-satellite networks, allocations for feeder link operations are necessary. Feeder link networks are needed to complete the service link transmission paths, process the information being transmitted, and interconnect the system with other radiocommunication networks or with other mobile earth stations. Though feeder link earth stations for non-geostationary mobile-satellite systems would operate at fixed locations, and they would operate in frequency bands allocated to the fixed-satellite service according to No. 22, WRC-95 must allocate specific frequency bands for non-geostationary mobile-satellite service feeder link networks to operate on a co-primary basis with other radiocommunication networks. The procedural aspects associated with feeder link allocations for the non-geostationary mobile-satellite service must also be considered by the WRC-95.

In preparation for the WRC-95, the CPM-95 has identified various procedural revisions that would be necessary for non-geostationary mobile-satellite service feeder link networks to share certain frequency bands in the 4 to 8 GHz, 8 to 16 GHz, and 16 to 30 GHz frequency ranges with current and future users of those frequency bands. The United States proposals to modify Articles **28 [S21]** and **29 [S22]** of the simplified international Radio Regulations, contained herein, are to support immediate and actual needs of the mobile-satellite service and are based on the output from the CPM-95 and the recommendation by the VGE to simplify the Radio Regulations.

**USA/ /1 MOD**  
**Article 28 [S21.16]**

§ 6 The power flux-density limits at the Earth's surface produced by emissions from a space station, including emissions from a reflecting satellite, for all conditions and all methods of modulation, shall not exceed that limit given in Table [AR28] below. The limit relates to the power-flux density which would be obtained under assumed free-space propagation conditions and applies to transmission by space stations of the service indicated where the frequency bands are shared with equal rights with the fixed or mobile service unless otherwise stated.

| Frequency Band  | Service  | Limit in dB(W/m <sup>2</sup> ) for angle of arrival above the horizontal plane |                 |         | Reference Bandwidth |
|-----------------|--|--|-----------------|---------|---------------------|
|                 |  | 0°-5°  | 5°-25°          | 25°-90° |                     |
| 6650-7075 MHz   | Fixed-satellite<br>(for non-geostationary mobile-satellite feeder links) | -158   | -158 + 0.5(θ-5) | -148    | 4kHz                |
|                 |  | -134   | -134 + 0.5(θ-5) | -124    | 1MHz                |
| 12.75-13.25 GHz | Fixed-satellite<br>(for non-geostationary mobile-satellite feeder links) | -150   | -150 + 0.5(θ-5) | -140    | 4kHz                |
|                 |  | -126   | -126 + 0.5(θ-5) | -116    | 1MHz                |
| 15.45-15.65 GHz | Fixed-satellite<br>(for non-geostationary mobile-satellite feeder links) | -111   | -111            | -111    | 1MHz                |

**Reason:**

MOD Article 28 [No. S21.16] of the simplified Radio Regulations regarding the power flux-density limits for the frequency bands 6650-7075 MHz, 12.75-13.25 GHz, and 15.45-15.65 GHz would be necessary for shared use of the band by non-geostationary mobile-satellite service feeder links.

**USA/ I2 ADD  
2631A [S22.5A]**

§ 5 In the frequency bands 6650-7075 MHz (space-to-Earth) and 12.75-13.25 GHz (space-to-Earth), where feeder link networks of the mobile-satellite service share with geostationary fixed-satellite networks operating in the Earth-to-space direction of transmission, the maximum power flux-density produced at the geostationary-satellite orbit by the aggregation of all emissions from a non-geostationary mobile-satellite service feeder link satellite constellation shall not exceed  $-168 \text{ dB(W/m}^2\text{)}$  in any 4 kHz band. These values apply within  $\pm 5^\circ$  of the geostationary-satellite orbit.

**REASON:**

ADD No. 2631A [S22.5A] would provide protection to the geostationary satellite orbit from emissions from non-geostationary satellite networks providing mobile-satellite service feeder links.

**RESOLUTION No. XXX (WRC-95)**

Sharing Studies Concerning the Use  
of the Bands 5090-5150 MHz and 5150-5250 MHz for Feeder Links of the Non-Geostationary Mobile-  
Satellite Service (Earth-to-space)

The World Radiocommunication Conference for Dealing with  
Frequency Allocations in Certain Parts of the Spectrum  
(Geneva, 1995),

considering

- a) that agenda item 3(d) of this Conference requested the consideration, inter alia, of an allocation of frequency bands for feeder links for the mobile-satellite service;
- b) that the band 5000-5250 MHz is allocated to the aeronautical radionavigation service in all three ITU Regions;
- c) that Annex 10 to the Chicago Convention (April 1985) only contains a requirement for MLS operations in accordance with the channelization plan in 5031-5090.7 MHz; and
- d) that there is a need to determine the operational and technical means to facilitate sharing between feeder links for the mobile-satellite service (Earth-to-space) and the services mentioned in b), above, in the bands 5090-5150 MHz and 5150-5250 MHz;

resolves

1. that studies be undertaken by the ITU-R to develop the operational and technical measures that would facilitate sharing between feeder links for the mobile-satellite service (Earth-to-space) and the services mentioned in considerings d); and
2. that the International Civil Aviation Organization (ICAO) be invited to participate in these sharing studies;

invites

1. the ITU-R to continue to study, as a matter of urgency, the technical and operational issues relating to the sharing of the bands between the services mentioned in d), above, and the feeder links for the mobile-satellite service in the Earth-to-space direction; and
2. administrations to participate actively in such studies by sending contributions to the ITU-R relating to the aforementioned studies;

instructs the Director of the ITU-R

to bring the results of these studies to the attention of the next competent World Radiocommunication Conference and

instructs the Secretary-General

to bring this Resolution to the notice of ICAO.

Section D

**RECOMMENDED UNITED STATES PROPOSALS**

**Agenda Items 2.1 & 3d)**

**Regulatory/Procedural Constraints on MSS Below 3 GHz and MSS Feeder Links**

United States of America

Proposals for Agenda Item 1

**MOD RESOLUTION 46**

General:

CPM95 expressed the view that coordination pursuant to Resolution 46 should be extended to feeder links in bands identified by WRC95 for feeder links to non-geostationary space stations of the mobile satellite service. It also offered suggestions that would reduce the amount of such coordination vis-a-vis the fixed service where conditions that it identified are met. And finally, CPM95 offered examples of regulatory text.

This administration is in general agreement with the assumptions CPM95 has offered. We believe that coordination under Resolution 46 is not required in certain cases involving the fixed service, and we believe that MSS feeder links in bands designated by this conference should fall under Resolution 46. We offer a modified Resolution 46 (MOD Res 46) to accomplish these aims and to effect certain other improvements.

As with its predecessor, MOD Res 46 should come into force on the day this conference rises.

## MOD RESOLUTION No. 46

### Interim Procedures for the Coordination and Notification of Frequency Assignments of Non-Geostationary Satellite Networks in Certain Space Services and the Other Services to Which ~~the~~ Certain Bands are Allocated

The World ~~Administrative~~ Radiocommunication Conference (Geneva, ~~1992~~ 1995),

considering

a) that in several different space radiocommunication services there is increasing interest in the use of space systems using non-geostationary-satellite networks;

b) that, in order to ensure the satisfactory operation of such networks, other networks and other radio services sharing the same frequency bands, taking into account the relevant allocations, there is a need for procedures to regulate the frequency assignments of non-geostationary-satellite networks;

USA/ /1 SUP ~~e) that the coordination methods for non-geostationary satellite networks require specific criteria and calculation methods which are not yet available;~~

Reason: ITU-R work since WARC-92 has evolved criteria and methodology in some cases.

USA/ /2 MOD ~~dc) that, consequently, there is a need for interim procedures to be applied until such time as the coming into force of a suitable a future conference, with the benefit of further studies by the CCIR and taking account of the experience gained in practice, is able to adopt a permanent procedure such as that set forth in Chapter SIII of the simplified draft of the Radio Regulations.~~

Reason: To recognise ITU-R progress on point to date.

USA/ /3 ADD d) that there is a need as well for these interim procedures to be applied in certain bands made available by the present conference for the purpose of providing feeder links to space stations in non-geostationary-satellite networks of the mobile-satellite service;

Reason: To extend applicability to feeder links.

USA/ /4 ADD e) that preparatory work by the ITU-R demonstrates that the amount of coordination between stations of a non-geostationary satellite network on the one hand and the fixed service on the other can, in certain cases, be reduced below that envisaged in Resolution 46 (WARC-92) while precluding harmful interference being caused to either the space service or the fixed service;

Reason: To simplify by eliminating unnecessary coordination.

considering also

USA/ /5 SUP e) ~~that the Plenipotentiary Conference (Nice, 1989), initiated the formation of a Voluntary Group of Experts, one of whose tasks is to simplify the procedures of the Radio Regulations.~~

~~f) that any new procedures adopted by this Conference must therefore be as simple as possible and should, wherever appropriate, make use of the existing procedures of the Radio Regulations.~~

Reason: Overtaken by events.

USA/ /6 (MOD)

ge) that any interim procedures must take full account of the status of the allocations to services, both terrestrial and space, in frequency bands which may be used by non-geostationary-satellite networks;

Reason: Consequential to USA/ /5.

USA/ /7 (MOD)

hf) that any interim procedures must also take full account of the interests of all countries, including the state of development of their terrestrial and space radiocommunication services.

Reason: Consequential to USA/ /5.

USA/ /8 SUP ~~considering further~~

~~i) that the provisions of No. 2613 of the Radio Regulations, while necessary to safeguard geostationary satellite networks in the fixed satellite service from interference which might be caused by non-geostationary satellite networks, would, if more widely applied, prejudice the development of such systems in other space radiocommunication services.~~

Reason: Footnotes to the Table of Frequency Allocations have been proposed which treat this matter.

*recognising*

USA/ /9 MOD that the operation of telecommunication systems in ~~the MSS~~ those bands allocated to the mobile-satellite service as well as bands allocated to the fixed-satellite service and used for feeder links of non-geostationary satellite networks of the mobile-satellite service must be in conformity with the International Telecommunication Constitution and Convention and the Administrative Regulations in force, in particular their respective preambles and, in this respect:

- a) the right of each Member to decide how or whether to participate in the above systems, and to determine the terms and conditions of access to such systems from its territory;
- b) the obligation for entities and organisations providing international or national telecommunications services by non-geostationary-satellite networks to operate at the point of delivery under the legal, financial and regulatory requirements of the Member of the Union in whose territory these services are authorised;

Reason: To broaden the applicability to relevant bands addressed by this conference.

*resolves*

USA/ /10 MOD 1. that, pending the adoption of a permanent procedure such as that set forth in Chapter SIII of the simplified draft of the Radio Regulations by a future competent conference, the use of frequency assignments by:

Reason: To signify the general acceptability of the VGE approach.

- a) non-geostationary-satellite systems in the space services in relation to other non-geostationary-satellite systems, geostationary-satellite systems and terrestrial systems;

USA/ /11 ADD b) feeder links supporting non-geostationary-satellite systems in the mobile-satellite service in relation to other non-geostationary-satellite systems, geostationary-satellite systems and terrestrial systems;

Reason: To extend applicability to feeder links.

USA/ /12 MOD                   bc) geostationary-satellite systems in relation to non-geostationary-satellite systems including feeder links supporting non-geostationary-satellite systems in the mobile-satellite service; and,

Reason:           To extend applicability to feeder links.

USA/ /13 MOD                   ed) terrestrial systems in relation to the earth stations and space stations of non-geostationary-satellite networks to which this Resolution applies shall be regulated in accordance with the interim procedures and the associated provisions in the annex hereto;

Reason:           Consequential.

USA/ /14 MOD                   2.       That the interim procedures annexed to this Resolution apply in addition to those of Articles 11 and 13 for geostationary-satellite networks and shall replace those of Articles 11 and 13 for non-geostationary-satellite networks for the mobile-satellite service and the fixed-satellite service in those frequency bands specifically identified by footnote to Article 8, the Table of Frequency Allocations;

Reason:           To specify the applicability.

USA/ /15 MOD                   3.       that the interim procedures annexed to this Resolution shall be applied from ~~4 March 1992~~ [ ] November 1995.

Reason:           To update Resolution 46.

Annex 1  
to  
MOD RESOLUTION No. 46

USA/ /16 MOD  
Interim Procedures for the Coordination and Notification of Frequency  
Assignments of Non-Geostationary Satellite Networks in Certain Space Services  
and the Other Services to Which ~~the~~ Certain Bands are Allocated<sup>1</sup>

Reason: To specify the applicability.

Section A. General Information

USA/ /17 MOD A.1 The assistance of the ~~IFRB~~ BR can be requested in the application of the provisions of this annex. The following provisions shall apply: RR 1054 to 1054C under Section I, RR 1088 to 1103 under Section II, RR 1130 to 1144 under Section III in relation to terrestrial stations and earth stations operated in the opposite direction of transmission, and RR 1168 to 1181 under Section IV.

Reason: To assist administrations.

USA/ /18 (MOD) A.2 In the absence of specific provisions relating to the evaluation of the interference, the calculation methods and the criteria should be based on relevant CCIR ITU-R Recommendations agreed by the administrations concerned either as a result of Resolution 703 (Rev. WARC-92) or otherwise. In the event of disagreement on a CCIR ITU-R Recommendation or in the absence of such Recommendation, the methods and criteria shall be agreed between the administrations concerned. Such agreements shall be concluded without prejudice to other administrations.

Reason: Consequential to the APP, Geneva, 1992.

USA/ /19 MOD A.3 When applying the provisions of this Resolution for non-geostationary satellite networks, administrations ~~should~~ shall provide the following information in addition to that of Appendix 3 or Appendix 4.

~~i) right ascension of the ascending node,~~

~~ii) argument of the perigee,~~

~~iii) active service arc.~~

1) Orientation of the satellite transmitting and

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<sup>1</sup> Section I, II and III apply to terrestrial services only in the case where a power flux-density threshold at the surface of the Earth (for a space station) or at the border of the territory of another administration (for an earth station) specified in a provision of the Radio Regulations is exceeded.

receiving antenna beams and their radiation pattern.

- 2) Type of modulation and multiple access.
- 3) Appropriate information required to calculate the affected region due to the MSS space stations. (As defined in draft new Recommendation ITU-R M. [Document 8/45].)
- 4) Maximum and average beam peak e.i.r.p./4 kHz and e.i.r.p./1 MHz for each beam where averaging is conducted across a stated time interval.
- 5) The satellite antenna gain G(e) as a function of elevation angle at a fixed point on the Earth. (To be provided either as part of Appendix 3 or as a formula to convert existing Appendix 3 data.)
- 6) The spreading loss (for a non-GSO space station) as a function of elevation angle. (To be determined by equations or provided in graphical form.)
- 7) New data elements required to properly characterise non-GSO satellites:

Np = number of orbital planes;

Ns = number of satellites in each orbital plane;

j = right ascension of the ascending node for the j-th orbital plane, measured counter clockwise in the equatorial plane from the direction of the vernal equinox to the point where the satellite makes its south-to-north crossing of the equator (0° ≤ j < 360°);

USA/ /20 (MOD)

ij = inclination angle for the j-th orbital plane with respect to the reference plane, which is taken to be the Earth's equatorial plane of the Earth (0° ≤ ij < 180°);

Reason: To improve by aligning CPM95's output on existing usage.

i = initial phase angle of the i-th satellite in its orbital plane at reference time t = 0, measured from the point of ascending node (0° ≤ i < 360°);

a = semi-major axis;

e = eccentricity (for circular orbit, e = 0);

p = argument of perigee, measured in the orbital plane, in the direction of motion, from the ascending node to perigee (0 ≤ p < 360°).

Reason: To specify useful technical information.

### Section I. Procedure for the Advance Publication of Information on Planned Satellite Networks

#### Publication of information

USA/ /21 (MOD) 1.1 An administration (or one acting on behalf of a group of named administrations) which intends to bring into use a satellite network within a satellite system shall, prior to the coordination procedure described in paragraphs 2.1 and 2.2, send to the ~~International Frequency Registration Board~~ Radiocommunication Bureau, not earlier than six years<sup>2</sup> and preferably not later than two years, before the date of bringing into service of each satellite network, the information listed in Appendix 4.

Reason: Consequential to the APP, Geneva, 1992.

USA/ /22 (MOD) 1.2 Amendments to the information sent in accordance with the provisions of paragraph 1.1 shall also be sent to the ~~Board~~ Bureau as soon as they become available. Modifications which are of such a nature as to change significantly the character of the network may require recommending the advance publication procedure.

Reason: See USA/ /21.

USA/ /23 (MOD) 1.3 On receipt of the complete information sent under paragraphs 1.1 and 1.2, the ~~Board~~ Bureau shall publish it in a special section of its weekly circular within three months and shall also, when the weekly circular contains such information, so advise all administrations by circular telegram. The circular telegram shall indicate the frequency bands to be used and, in the case of a geostationary satellite, the orbital location of the space station. When the ~~Board~~ Bureau is not in a position to comply with the time limit referred to above, it shall periodically so inform the administrations, giving the reasons therefor.

Reason: See USA/ /21.

#### Comments on Published Information

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<sup>2</sup> See also No 1550.

USA/ /24 (MOD)

1.4 If, after studying the information published under paragraph 1.3, any administration is of the opinion that interference which may be unacceptable may be caused to assignments of its existing or planned satellite networks or to assignments to its existing or planned terrestrial radiocommunication stations, it shall, within four months after the date of the weekly circular containing the complete information listed in Appendix 4, send the administration concerned its comments on the particulars of the interference to its existing or planned satellite systems or to its existing or planned terrestrial stations. A copy of these comments shall also be sent to the ~~Board~~ Bureau. If no such comments are received from an administration within the period mentioned above, it may be assumed that the administration has no basic objections to the planned satellite network(s) of the system on which details have been published.

Reason: See USA/ /21.

1.4A An administration sending information under paragraphs 1.1 and 1.2 shall, if requested by an administration receiving information published under paragraph 1.3, provide the technical methods and criteria it proposes to use for the evaluation of the interference.

1.4B An administration receiving information published under paragraph 1.3, may provide to the administration sending information under paragraphs 1.1 and 1.2 the technical methods and criteria it proposes to use for the evaluation of the interference.

*Resolution of Difficulties*

1.5 An administration receiving comments sent in accordance with paragraph 1.4 and administrations sending such comments shall endeavour to resolve any difficulties that may arise and shall provide any additional information that may be available.

1.5A In case of difficulties arising, the administration responsible for the planned network shall first explore all possible means of meeting its requirements without considering the possibility of adjustment to stations or networks of other administrations. If no such means can be found, the administration concerned may then request other administrations, either bilaterally or multilaterally, to mutually help resolve these difficulties.

1.5B An administration receiving a request under paragraph 1.5A shall, in consultation with the requesting administration, explore all possible means of meeting the latter's requirements.

1.5C If, after following the procedure described in paragraphs 1.5A and 1.5B, there are unresolved difficulties, the administrations concerned shall jointly make every possible effort to resolve these difficulties by means of mutually acceptable adjustments.

*Results of Advance Publication*

USA/ /25 (MOD) 1.6 An administration on behalf of which details of planned satellite networks have been published in accordance with the provisions of paragraphs 1.1 to 1.3 shall, after the period of four months specified in paragraph 1.4, inform the Board Bureau whether or not comments provided for in paragraph 1.4 have been received and of the progress made in resolving any difficulties. Additional information on the progress made in resolving any remaining difficulties shall be sent to the Board Bureau at intervals not exceeding six months prior to the commencement of coordination or the sending of the notices to the Board Bureau. The Board Bureau shall publish this information in the special section of its weekly circular.

Reason: See USA/ /21.

1.7 When, upon expiry of a period of six years plus the extension provided for in No. 1550 after the date of the publication of the special section referred to in paragraph 1.3, the administration responsible for the network has not submitted the Appendix 3 information for coordination under paragraph 2.1 or paragraph 2.2 or notification under No. 1488, as appropriate, the information published under paragraph 1.3 shall be canceled after the administration concerned has been informed.

*Commencement of Coordination or Notification Procedures*

USA/ /26 (MOD) 1.8 When communicating to the Board Bureau the information referred to in paragraph 1.1, an administration may, at the same time or at a later time, communicate:

Reason: See USA/ /21.

1.8A the information required for the network coordination of a frequency assignment to a station of a satellite network in accordance with the provisions of paragraph 2.6, or

1.8B the information required for notification of a frequency assignment to a station of a satellite network when coordination for that assignment is not required.

USA/ /27 (MOD) 1.8C Such coordination or notification information, as the case may be, shall be considered as having been received by the Board Bureau not earlier than six months after the date of receipt of the information referred to in paragraph 1.1.

Reason: See USA/ /21.

**Section II. Coordination of Frequency Assignments to a Station of a Satellite Network**

*Requirement for Coordination*

USA/ /28 (MOD) 2.1 Before an administration (or one acting on behalf of one or more named administrations) notifies to the ~~Board~~ Bureau or brings into use any frequency assignment to a station of a non-geostationary-satellite network, it shall effect coordination of the assignment with any other administration whose assignment to a station in a geostationary-satellite network, or whose assignment to a station of a non-geostationary-satellite network or whose assignment to a terrestrial station might be affected.

Reason: See USA/ /21.

USA/ /29 (MOD) 2.2 Before an administration (or one acting on behalf of one or more named administrations) notifies to the ~~Board~~ Bureau or brings into use any frequency assignment to a station of a geostationary-satellite network, it shall effect coordination of the assignment with any other administration whose assignment to a station of a non-geostationary-satellite network might be affected.

Reason: See USA/ /21.

2.3 . Coordination under paragraphs 2.1 and 2.2 may be effected for a satellite network using the information relating to the space station, including its service area, and the parameters of one or more typical earth stations which may be located in all or part of the space station service area.

USA/ /30 (MOD) 2.4 If a frequency assignment is brought into use before the commencement of the coordination procedure of paragraphs 2.1 or 2.2, when this coordination is required, the operation in advance of the receipt by the ~~Board~~ Bureau of the Appendix 3 information shall in no way afford any priority of the date.

Reason: See USA/ /21.

2.5 Frequency assignments to be taken into account in the application of paragraphs 2.1 and 2.2 are those with a frequency overlap with the planned assignment, pertaining to the same service or to another service to which the band is allocated with equal rights, or a higher category of allocation (see Nos. 420 to 425 and 435), and which:

for space services, are:

2.5.1 in conformity with No. 1503, and