



**Documents of the World Administrative Radio Conference for the Planning of the  
Broadcasting-Satellite Service in Frequency Bands 11.7-12.2 GHz (Regions 2 and 3)  
and 11.7-12.5 GHz (Region 1) (WARC SAT-77)**

**(Geneva, 1977)**

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- The complete set of conference documents includes Document No. 1 - 388, DL No. 14 – 50 (incomplete), DT No. 1 - 53.

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Document N° DL/14-E

18 January 1977

Original: English

SUB-WORKING GROUP 6B-1

Your comments are invited on the attached draft of a document summarising the work of Sub-Working Group 6B-1.

It would be appreciated if you would direct any comments to me at Box 1092 by 16.00 hours on 19 January 1977.

H.E. WEPPLER

Chairman of Sub-Working Group 6B-1



DRAFT

FIRST REPORT OF SUB-WORKING GROUP 6B-1 TO THE CHAIRMAN OF WORKING GROUP 6B

Having considered the subject of procedures for the Fixed Satellite Service relative to the Broadcasting-Satellite Service, based on the documents presented to it and on the applicable portion of Article 9A of the Radio Regulations, Sub-Working Group 6B-1 has reached the following conclusions:

1. The present provisions for advance publication of information, co-ordination and notification of frequency assignments as contained in Sections I, II and III of Article 9A of the Radio Regulations provide suitable procedures for the Fixed Satellite Service relative to the Broadcasting-Satellite Service.
  2. In this connection it is felt that No. 639AD should be understood to provide consideration of interference to Broadcasting-Satellite Services which are included in a formal plan which may be a part of the Final Acts of this Conference, or a modification of the plan.
  3. Similarly, No. 639AJ should be understood to provide for co-ordination with stations in the same band which are included in a formal plan which may be a part of the Final Acts of this Conference, or a modification of the plan.
  4. It may be desirable at a future time to revise Appendix 29 to treat the Broadcasting-Satellite Service more explicitly. However, such revision is not essential to the Final Acts of this Conference.
  5. The proposals for procedures contained in Documents Nos. 7 (U.S.A.) and 33 (Brazil) appear to have secondary implications for the Fixed Satellite Service. However, since those proposals are primarily directed to the Broadcasting-Satellite Service, Sub-Working Group 6B-1 will give further consideration to those documents only if requested by those delegations following consideration of the documents in the appropriate groups concerned with the Broadcasting-Satellite Service.
  6. The decisions of other Working Groups or Committees may later require some revision of the above conclusions.
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WORKING GROUP 5A

PROPOSAL OF THE CHAIRMAN OF WORKING GROUP 5A  
CONCERNING INSTRUCTIONS TO THE SUB-WORKING  
GROUPS ON ORBIT POSITION ASSIGNMENTS TO BE  
USED IN THE ESTABLISHMENT OF THE PLAN

It is well recognised that certain conditions which countries have specified in connection with their possible orbit position assignments constitutes an important part of their requirements. It is probably appreciated by all Delegations that the experts given the task of making the plan must be given some flexibility to make small adjustments to orbital positions in order to produce a successful plan. It also is important to take into account at an early stage in planning the problems relating to propagation data for African countries which has been brought to our attention and the problems of high-latitude countries.

With these points in mind the following proposed instructions to the Sub-Working Groups is submitted for the consideration of the Working Group 5A.

- (i) It is desirable that the most easterly orbit positions assigned to any country should be such that eclipse effects will not start to occur until after 1 a.m. It is essential that eclipse effects will not start to occur until after mid-night for all countries.
- (ii) It is essential (with the exception of point (iv)) that the most westerly orbit position assignment to any country should be such that the minimum elevation at any point in that country does not fall below 20°.
- (iii) For tropical countries it is essential that the orbital assignment is chosen such that the minimum elevation angle at any point in that country does not fall below 35°.
- (iv) For high-latitude countries (countries whose territory extends to latitudes of more than 60°) it will not be possible to give the minimum elevation angle provision mentioned in (ii). For such countries the experts should use the range of acceptable orbital position given in the requirements submitted by those Administrations.



WORKING GROUP 5A

SOME AGREED PRINCIPLES ON WHICH PLANNING SHOULD BE BASED  
FOR THE BROADCASTING-SATELLITE SERVICE IN THE BANDS  
11.7 - 12.2 GHz (REGION 3) AND 11.7 TO 12.5 GHz (REGION 1)

Working Group 5A has taken into account the documents relevant to its work and whilst some items remain to be discussed it has reached a unanimous agreement on the following:

a) that planning studies should begin within the Working Group on the basis of a unified technical and planning standards throughout Regions 1 and 3;

b) that planning should be based on the principles contained in No. 428A of the Radio Regulations. In particular where a country intends to include the territory of another country (or countries) within its service area (the whole of that territory or a part), such a proposal should only be taken into account in establishing a plan providing there has been the prior consent of the latter country (or countries). To this end the Working Group 5A agreed, without exception, to a deadline of noon on Wednesday, 19 January 1977 by which time all delegations from countries intending that their service areas should include the territory of another country should have deposited with the I.F.R.B. a list of the other countries to which that service is intended together with a statement that the prior agreement has been obtained from these other countries. This would be published by the I.F.R.B.;

c) that planning should be based on the use of satellite antenna beams having the minimum elliptical or circular cross-section to just embrace the intended service area;

d) that for countries that are not represented at the Conference:

i) the Chairman of the Conference should consult with the Secretary-General and the I.F.R.B. with a view to eliciting before the end of the Conference the requirements of the countries not attending the Conference or at least attempt to get their views on the coverage beams that would be used in establishing the Plan;

ii) that meanwhile "spare beams" not exceeding the equivalent of national coverage should be included for countries not represented at the Conference and an appropriate number of channels (the number to be decided) should be assigned to those "spare beams" in establishing the Plan. All reference to these spare beams should be by a number prefixed by the letters SB;

e) that planning should be on the basis of individual reception (an attempt will be made to add any specific requirement for community reception only at a later stage in the Conference if this proves possible);

f) that the Working Group 5A should attempt to establish a Region 1 and 3 frequency assignment/orbit position plan based on the requirements submitted by Administrations to the Conference;

g) that in view of the great difficulties that are likely to be experienced in producing a Plan on account of the requirements which have been requested from some Regions, and taking into account the limited time available to the experts in making a Plan, it would be desirable that, in parallel with the effort mentioned in f), the Working Group should attempt to establish Region 1 and 3 plans based on:

- i) giving countries in Region 1 the same number of channels (5 channels in a beam not exceeding national coverage);
- ii) a compromise proposal, agreed amongst the countries in Region 1 which have submitted requirements which would result in an intention to provide for the reception of more than 5 programmes at a given point in a service area.

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M. Temple  
Chairman of Working Group 5A

WORKING GROUP 5A

COMPOSITION AND TERMS OF REFERENCE OF SUB-WORKING GROUPS OF  
WORKING GROUP 5A

1. Sub-Working Group 5A1 (Planning Support Group)

To examine each service area requirements presented by Administrations to the Conference and derive from it the polygon meeting those service area requirements. (These service area polygons will facilitate negotiations on orbit position requirements at a later point in the Conference). To provide a checking point for the accuracy of data at all stages in the planning process and other such important planning support tasks.

2. Sub-Working Group 5A2

To construct a Region 1 and 3 frequency assignment/orbit position plan based on meeting fully the requirements which administrations have presented to the Conference notwithstanding any changes under Section 6. In respect of orbit position requirements, however, the instructions given in Document DL/15 should be followed.

3. Sub-Working Group 5A3

To construct a Region 1 and 3 frequency assignment/orbit position plan based on meeting :

- a) For countries between lines A and C of the Radio Regulations, the requirements which have been presented to the Conference by those administrations.
- b) For countries between lines A and B of the Radio Regulations, a regular plan which provides 5 programmes to be received in a territory and has coverage not exceeding that of the national territory. Requirements for polarization should be taken into account.

In respect of orbit position requirements, however, the instructions given in Document DL/15 should be followed.

4. Sub-Working Group 5A4

To construct a Region 1 and 3 frequency assignment/orbit position plan based on meeting :

Some different assumptions lying between those mentioned in the terms of reference of Sub-Working Groups 5A3 and 5A4, vis / which have yet to be defined by Working Group 5A /.

In respect of orbit position requirements, however, the instructions given in Document DL/15 should be followed.



5. Sub-Working Group 5A5

To define the spare beams to be taken into the planning studies.

6. Composition of Sub-Groups

This shall comprise of experts made available by the delegations and shall :

- a) include representation from all Regions;
  - b) and will be the minimum number consistent with bringing results rapidly back to Working Group 5A for discussion amongst all delegations.
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WORKING GROUP 5B

Report of Drafting Party to Working Group 5B

PLANNING PRINCIPLES

1. Equality for allocated services

The 11.7 to 12.2 GHz band is allocated by Article 5 of the Radio Regulations to Broadcasting-Satellite, Fixed-Satellite and Terrestrial Services on an equal, primary basis. Each administration within Region 2 has the right to decide for itself which of these Services are to be implemented within its own territory.

2. Equal rights for Regions sharing the usable geostationary orbit

When any segment of the geostationary orbital arc is visible and therefore usable by more than one Region, in accordance with the Conventions and the Radio Regulations, it shall be shared equitably between the Regions concerned so that the burden of sharing falls equally on those Regions. (This principle does not affect any sovereign rights which might exist.)

3. Recognition of national requirements

All administrations of Region 2 shall take into consideration the national requirements which have been presented or shall be presented in the future.

4. Equitable rights of access to the geostationary orbit spectrum resource

Subject to the provisions of the Convention, Radio Regulations, and the Resolutions in force, it is recognized that all administrations have a right to access the geostationary orbit spectrum resource in order to fulfill their requirements. (This principle does not affect any sovereign rights which might exist.)

5. Flexible planning approach\*)

The Plan adopted must be sufficiently flexible to allow for : future technical developments, definition of future requirements, changes in existing or stated requirements, requirements by administrations not represented at the

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\*) Paragraph 5 does not imply recognition of systems existing prior to the implementation of the Plan.



Conference, further information on propagation data, and diverse system design approaches. The Plan can be modified only by a competent administrative radio conference.

6. Efficient geostationary orbit and spectrum utilization

The Plan shall use, to the maximum extent technically and economically practicable, available techniques in order to make most efficient use of the geostationary orbit and frequency spectrum to fulfill the Region's requirements, and the individual requirements of each administration.

7. Consultations among administrations

Administrations shall consult all other administrations affected or concerned in planning for the implementation of systems in the 11.7 to 12.2 GHz band.

8. Reception

The plan shall have as a basis individual reception, although each administration may choose the reception system that they find most suitable according to their requirements, namely individual, community, or both.

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WORKING GROUP 5A

TERMS OF REFERENCE OF SUB-WORKING GROUP 5A3

As a first step to meeting the full requirements, to construct a frequency assignment orbit position plan for Regions 1 and 3 which, as an exercise, provides up to five programmes intended to be received in a service area, but does not provide services exceeding the requirements submitted.

The Sub-Working Group shall then, on instructions from the Working Group 5A, build up the base-line plan in order to satisfy to the maximum extent practicable, the requirements of administrations.

Requirements for polarization should be taken into account. In respect of orbit positions, however, the instructions given in DL/15 should be followed.

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WORKING GROUP 5A

REPORT OF JOINT MEETING OF SUB-WORKING GROUPS 5A2 AND 5A3

20 January 1977

The joint meeting noted Documents Nos. 66, 67, 68, 69, 75, 77, 78, 79, 80, 86, 92, 93, 97 and 105, which provide much of the essential technical data for planning. Other technical principles related to planning were discussed, with the following results :

- a) The orbital spacing is tentatively taken as  $6^\circ$  starting at  $2^\circ\text{E}$ .
- b) Recognizing that Working Group 5A has adopted a principle of planning with approximately 20 MHz channel spacing, a figure of 14 dB is proposed for the adjacent-channel protection ratio. For obtaining the protection margins 1 dB will be added to the protection ratio.
- c) It was not possible to agree on the use of a single system of channel grouping for both Regions 1 and 3. The decision as to a preferable grouping was left to each Sub-Working Group to make independently.
- d) The use of alternate polarizations on alternate channels may be used as a useful technique within a limited geographical area but, taking the plan as a whole, the use of both polarizations on each channel and from each orbit position can be allowed.
- e) The question of the grouping of countries requesting the same orbital position was discussed because there appeared to be an excessive number of countries making such requests for certain orbit positions. It was decided to resolve this matter through the consultation process adopted at the second meeting of Working Group 5A.

C. AMIRA

Chairman, Sub-Working Group 5A2



WORKING GROUP 5B

Working Group 5B

A PROPOSED PLAN FOR REGION 2

1. Replace paragraph 2 by the following :
  - "2. Space stations in the Fixed-Satellite Service shall be located in that portion of the orbit other than those listed in paragraph 1 above and if located within 10° of a location in the portion of the arc listed in paragraph 1 above, shall be operated in such a way that unacceptable interference is not caused to, nor protection required from, services which may be located in the portions of the orbit listed in paragraph 1 above."
  2. Add the following underlined words at the beginning of paragraph 3 :  
Prior to the Regional Conference mentioned in paragraph 8 below,  
systems in the ....
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WORKING GROUP 5B

Working Group 5B

A PROPOSED PLAN FOR REGION 2

In accordance with the principles given in Document No. 110, the following plan is proposed for Region 2 for the Broadcasting-Satellite Service in the frequency band 11.7 - 12.2 GHz:

1. Space stations in the Broadcasting-Satellite Service shall be located in the following portions of the orbit:

- 75°W to 100°W longitude (75°W to 95°W longitude for service to Canada, USA and Mexico);
- 140°W to 170°W<sup>1)</sup> longitude.

Space stations in the Broadcasting-Satellite Service could also be located in the remaining portions of the orbit, they shall then be operated in accordance with the provisions of No. 139 of the Radio Regulations. As an exception to the foregoing, it is accepted that, for Greenland, a position in the geostationary satellite orbit between 55°W and 60°W is used for the Broadcasting-Satellite Service as a primary service. All efforts should be made by the Administrations concerned to allow for the sharing of a broadcasting satellite for Greenland and the fixed satellites of other Administrations in Region 2 in this portion of the arc.

2. Space stations in the Fixed Satellite Service shall be located in that portion of the orbit other than those listed in paragraph 1 above and shall be operated in such a way that unacceptable interference is not caused to, nor protection required from, services which may be provided by space stations in the Broadcasting-Satellite Service, which may be located in the portions of the orbit listed in paragraph 1 above.

Space stations in the Fixed Satellite Service could also be located in the portions of the orbit listed in the paragraph 1 above, they shall then be operated in accordance with the provisions of No. 139 of the Radio Regulations.

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1) The acceptance of these values depend upon the work of the IFRB confirming the results of an analysis of the capacity of this segment of the geostationary orbit.



E.S

Document No. DL/22(Rev.1)-E  
27 January 1977  
Original : English

WORKING GROUP 5B

Working Group 5B

A PROPOSED PLAN FOR REGION 2

In accordance with the principles given in Document No. 110, the following plan is proposed for Region 2 for the Broadcasting-Satellite Service in the frequency band 11.7 to 12.2 GHz :

For that portion of the geostationary satellite orbit between  $75^{\circ}\text{W}$  and  $100^{\circ}\text{W}$  longitude (for service to Canada, the USA and Mexico, the relevant portion is only between  $75^{\circ}\text{W}$  and  $95^{\circ}\text{W}$  longitude) and also that portion between  $140^{\circ}\text{W}$  and  $170^{\circ}\text{W}^{1)}$  longitude, the Broadcasting-Satellite Service shall be the primary service and the Fixed-Satellite Service shall be the secondary service. For the remaining portions of the geostationary orbit from which Region 2 coverage can be provided, and for service to Region 2 countries, the Fixed-Satellite Service shall be the primary service and the Broadcasting-Satellite Service shall be the secondary service. As an exception to the foregoing, it is accepted that, for Greenland, a position in the geostationary satellite orbit between  $55^{\circ}\text{W}$  and  $60^{\circ}\text{W}$  is used for the Broadcasting-Satellite Service as a primary service. All efforts should be made by the Administrations concerned to allow for the sharing of a Broadcasting Satellite for Greenland and the Fixed-Satellites of other Administrations in Region 2 in this portion of the arc. For the purpose of this plan, the words "primary" and "secondary" shall have the same meaning as in Section II of Article 5 of the Radio Regulations.

2. Space stations in the Fixed-Satellite Service shall be located in those portions of the geostationary satellite orbit in which that service has primary status in such a way that unacceptable interference is not caused to, nor protection required from, services which may be provided by space stations in the Broadcasting-Satellite Service which may be located at or within those limits indicated above wherein the Broadcasting-Satellite Service is the primary service. The level of unacceptable interference shall be determined in accordance with the latest CCIR Recommendations and Appendix 1 (Document No. ... Committee 4) as a guide. However, this protection to the Broadcasting-Satellite Service is afforded only to the extent that the criteria outlined in Appendix 1 are met.

3. Systems in the Broadcasting-Satellite Service shall be operated in accordance / with the sharing criteria and technical characteristics contained in Appendix 1\_ / / with the plan given in Appendix 2\_ / to this document.

1) The acceptance of these values depend upon the work of the IFRB confirming the results of an analysis of the capacity of this segment of the geostationary orbit



4. Administrations may implement systems which utilize values for the technical characteristics different than the relevant values of Appendix 1, provided that such action does not create interference to operational or planned systems of other Administrations in excess of that determined in accordance with Appendix 1.

5. The introduction of systems in the Fixed-Satellite Service shall be in accordance with the relevant provisions of the Radio Regulations and, in particular, with Article 9A.

6. Space systems in the frequency band 11.7 to 12.2 GHz shall use, to the maximum extent technically and economically practicable, available techniques in order to make most efficient use of the geostationary orbit and frequency spectrum. Examples of such techniques are described in Appendix ... to this plan.

7. Each Administration shall file its identified requirements for the Broadcasting-Satellite Service with the IFRB, and these may be updated at any time. They may be as detailed with respect to channels, service areas, etc. as the Administration desires, but otherwise should be kept as general as possible in order to permit maximum flexibility. The IFRB shall keep a file of these requirements as updated and shall publish amendments in the Weekly Circular. They shall be taken into account by Administrations planning systems for implementation in the Broadcasting-Satellite Service.

8. A regional Administrative Radio Conference shall be held not later than 1981 between 1983 and 1985 for the purposes of carrying out such detailed planning as may then be considered necessary for the Broadcasting-Satellite and Fixed-Satellite Services bringing about such amendments to the plan given in Appendix 2 to take into account technological developments, changes in requirements, requirements by Administrations not represented at this Conference, etc.\*)

9. Any systems existing or planned prior to the implementation of any detailed plan such as referred to above that is not operating in accordance with the interim plan adopted by this Conference shall not cause interference to any systems operating in accordance with such a plan.

10. Until such time as a detailed plan may be adopted for the Broadcasting-Satellite Service, the provisions of Spa2 - 3 shall continue to apply for Region 2 to the Broadcasting-Satellite Service in the frequency band 11.7 to 12.2 GHz, except that for receiving earth stations in the Broadcasting-Satellite Service, the particulars in Section C of Appendix 1A to the Radio Regulations, referred to in 2.1 of Spa2 - 3, may describe a typical station indicating the related service area of the associated space station.

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\*) The Administrative Council is invited to make the necessary preparations for this conference.



WORKING GROUP 5B

SUB-WORKING GROUP 6A2

Working Group 5B

A PROPOSED PLAN FOR REGION 2

In accordance with the principles given in Document No. 110, the following plan is proposed for Region 2 for the Broadcasting-Satellite Service in the frequency band 11.7 to 12.2 GHz :

1. For that portion of the geostationary satellite orbit between  $75^{\circ}\text{W}$  and  $100^{\circ}\text{W}$  longitude (between  $75^{\circ}\text{W}$  and  $95^{\circ}\text{W}$  longitude for service to North America) and also that portion between  $145^{\circ}\text{W}$  and  $170^{\circ}\text{W}$  longitude, the Broadcasting-Satellite Service shall be the primary service and the Fixed-Satellite Service shall be the secondary service. For the remaining portions of the geostationary orbit from which Region 2 coverage can be provided, and for service to Region 2 countries, the Fixed-Satellite Service shall be the primary service and the Broadcasting-Satellite Service shall be the secondary service. For the purpose of this plan, the words "primary" and "secondary" shall have the same meaning as in Section II of Article 5 of the Radio Regulations.
2. Space stations in the Fixed-Satellite Service shall be located in those portions of the geostationary satellite orbit in which that service has primary status in such a way that unacceptable interference is not caused to services which may be provided by space stations in the Broadcasting-Satellite Service which may be located at or within those limits indicated above wherein the Broadcasting-Satellite Service is the primary service. The level of unacceptable interference shall be determined by agreement between the Administrations concerned using the latest CCIR Recommendations and Appendix 1 (Document No. ... Committee 4) as a guide. However, this protection to the Broadcasting-Satellite Service is afforded only to the extent that the criteria outlined in Appendix 1 are met.
3. Systems in the Broadcasting-Satellite Service shall be operated in accordance with the sharing criteria and technical characteristics contained in Appendix 1 with the plan given in Appendix 2 to this document.
4. Administrations may implement systems which utilize values for the technical characteristics different than the relevant values of Appendix 1, provided that such action does not create interference to operational or planned systems of other Administrations in excess of that determined in accordance with Appendix 1.
5. The introduction of systems in the Fixed-Satellite Service shall be in accordance with the relevant provisions of the Radio Regulations and, in particular, with Article 9A.



6. Space systems in the frequency band 11.7 to 12.2 GHz shall use, to the maximum extent technically and economically practicable, available techniques in order to make most efficient use of the geostationary orbit and frequency spectrum. Examples of such techniques are described in Appendix ... to this plan.

7. Each Administration has the right to file its identified requirements for the Broadcasting-Satellite Service with the IFRB, and these may be updated at any time. They may be as detailed with respect to channels, service areas, etc. as the Administration desires, but otherwise should be kept as general as possible in order to permit maximum flexibility. The IFRB shall keep a file of these requirements as updated and shall publish amendments in the Weekly Circular. They shall be taken into account by Administrations planning systems for implementation in the Broadcasting-Satellite Service.

8. A regional Administrative Radio Conference shall be held not later than 1981 between 1983 and 1985 for the purposes of carrying out such detailed planning as may then be considered necessary for the Broadcasting-Satellite and Fixed-Satellite Services bringing about such amendments to the plan given in Appendix 2 to take into account technological developments, changes in requirements, requirements by Administrations not represented at this Conference, etc.)\*

9. Any systems existing or planned prior to the implementation of any detailed plan such as referred to above of this plan shall not cause interference to any systems operating in accordance with such a this plan.

10. Until such time as a detailed plan may be adopted for the Broadcasting-Satellite Service, the provisions of Article 9A shall be deemed also to apply for Region 2 to the Broadcasting-Satellite Service in the frequency band 11.7 to 12.2 GHz, except that for receiving earth stations in the Broadcasting-Satellite Service, the particulars in Section C of Appendix 1A to the Radio Regulations may describe a typical station indicating the related service area of the associated space station.

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\*) The Administrative Council is invited to make the necessary preparations for this conference.

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WORKING GROUP 5B

Working Group 5B

A PROPOSED PLAN FOR REGION 2

In accordance with the principles given in Document No. 110, the following plan is proposed for Region 2 for the Broadcasting-Satellite Service in the frequency band 11.7 to 12.2 GHz :

1. For that portion of the geostationary satellite orbit between  $75^{\circ}\text{W}$  and  $100^{\circ}\text{W}$  longitude (between  $75^{\circ}\text{W}$  and  $95^{\circ}\text{W}$  longitude for service to North America) and also that portion between  $145^{\circ}\text{W}$  and  $170^{\circ}\text{W}$  longitude, the Broadcasting-Satellite Service shall be the primary service and the Fixed-Satellite Service shall be the secondary service. For the remaining portions of the geostationary orbit from which Region 2 coverage can be provided, and for service to Region 2 countries, the Fixed-Satellite Service shall be the primary service and the Broadcasting-Satellite Service shall be the secondary service. For the purpose of this plan, the words "primary" and "secondary" shall have the same meaning as in Section II of Article 5 of the Radio Regulations.
2. Space stations in the Fixed-Satellite Service shall be located in those portions of the geostationary satellite orbit in which that service has primary status in such a way that unacceptable interference is not caused to services which may be provided by space stations in the Broadcasting-Satellite Service which may be located at or within those limits indicated above wherein the Broadcasting-Satellite Service is the primary service. The level of unacceptable interference shall be determined by agreement between the Administrations concerned using the latest CCIR Recommendations and Appendix 1 (Document No. ... Committee 4) as a guide. However, this protection to the Broadcasting-Satellite Service is afforded only to the extent that the criteria outlined in Appendix 1 are met.
3. Systems in the Broadcasting-Satellite Service shall be operated in accordance / with the sharing criteria and technical characteristics contained in Appendix 1 / / with the plan given in Appendix 2 / to this document.
4. Administrations may implement systems which utilize values for the technical characteristics different than the relevant values of Appendix 1, provided that such action does not create interference to operational or planned systems of other Administrations in excess of that determined in accordance with Appendix 1.
5. The introduction of systems in the Fixed-Satellite Service shall be in accordance with the relevant provisions of the Radio Regulations and, in particular, with Article 9A.



6. Space systems in the frequency band 11.7 to 12.2 GHz shall use, to the maximum extent technically and economically practicable, available techniques in order to make most efficient use of the geostationary orbit and frequency spectrum. Examples of such techniques are described in Appendix ... to this plan.

7. Each Administration has the right to file its identified requirements for the Broadcasting-Satellite Service with the IFRB, and these may be updated at any time. They may be as detailed with respect to channels, service areas, etc. as the Administration desires, but otherwise should be kept as general as possible in order to permit maximum flexibility. The IFRB shall keep a file of these requirements as updated and shall publish amendments in the Weekly Circular. They shall be taken into account by Administrations planning systems for implementation in the Broadcasting-Satellite Service.

8. A regional Administrative Radio Conference shall be held not later than 1981 between 1983 and 1985 for the purposes of carrying out such detailed planning as may then be considered necessary for the Broadcasting-Satellite and Fixed-Satellite Services bringing about such amendments to the plan given in Appendix 2 to take into account technological developments, changes in requirements, requirements by Administrations not represented at this Conference, etc.)\*

9. Any systems existing or planned prior to the implementation of any detailed plan such as referred to above of this plan shall not cause interference to any systems operating in accordance with such a this plan.

10. Until such time as a detailed plan may be adopted for the Broadcasting-Satellite Service, the provisions of Article 9A shall be deemed also to apply for Region 2 to the Broadcasting-Satellite Service in the frequency band 11.7 to 12.2 GHz, except that for receiving earth stations in the Broadcasting-Satellite Service, the particulars in Section C of Appendix 1A to the Radio Regulations may describe a typical station indicating the related service area of the associated space station.

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\*) The Administrative Council is invited to make the necessary preparations for this conference.

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COORDINATION GROUP

To enable the Editorial Committee to deal with the texts from Committee 4 as rapidly as possible, a decision must be taken on the order in which the technical data used in establishing the plan /s/ should be presented.

The following annex was compiled with reference to CCIR Report AG/10-11 and merely constitutes an example.

Note : The Coordination Group will meet in ROOM X at 1700 hours on 24 January.

TECHNICAL DATA WHICH WERE USED IN ESTABLISHING  
THE PLAN /s/ AND WHICH SHOULD BE USED IN THE APPLICATION OF THE PLAN /s/

1. Definitions (technical)
2. Propagation
3. Basic technical characteristics
  - 3.1 Type of emission
  - 3.2 Polarization
  - 3.3 Angle of elevation
  - 3.4 Carrier-to-noise ratio at edge of /service area/
  - 3.5 Receiving installation
    - 3.5.1 Figure of merit (G/T)
    - 3.5.2 Reference pattern of receiving antenna
    - 3.5.3 Receiver tuning range
  - 3.6 Protection ratio and satellite ageing margin
  - 3.7 Bandwidth
  - 3.8 Channel spacing
  - 3.9 Spacing on orbit
  - 3.10 Energy dispersal
  - 3.11 Satellite transmitter



- 3.11.1 Antenna beam
- 3.11.2 Antenna gain at edge of service area
- 3.11.3 Reference pattern
- 3.11.4 Spacing between channels of same beam
- 3.11.5 Station-keeping
- 3.11.6 Pointing accuracy of antenna beam
- 3.11.7 Effect of up-path
- 3.12 Satellite power
  - 3.12.1 Power flux-density for individual reception  
community reception
  - 3.12.2 Difference between e.i.r.p. at centre and edge of service area.

4. Guard bands

A. FADAMI

STEERING COMMITTEE

Note by the Chairman of the Coordination Group

TECHNICAL DATA WHICH WERE USED IN ESTABLISHING  
THE PLAN /S̄/ AND WHICH SHOULD BE USED IN THE APPLICATION OF THE PLAN /S̄/  
(Provisional)

1. Definitions (technical)
2. Propagation
3. Basic technical characteristics
  - 3.1 Type of emission
  - 3.2 Polarization
  - 3.3 Carrier-to-noise ratio at edge of / service area /
  - 3.4 Protection ratio
  - 3.5 Receiving installation
    - 3.5.1 Figure of merit (G/T)
    - 3.5.2 Reference pattern of receiving antenna
    - 3.5.3 Receiver tuning range
  - 3.6 Bandwidth
  - 3.7 Channel spacing and guard bands
  - 3.8 Orbit utilization
    - 3.8.1 Orbital spacing
    - 3.8.2 Angle of elevation and choice of the orbital position
    - 3.8.3 Station keeping
  - 3.9 Energy dispersal
  - 3.10 Satellite transmitter
    - 3.10.1 Antenna beam
    - 3.10.2 Antenna gain
    - 3.10.3 Reference patterns
    - 3.10.4 Spacing between channels of same beam
    - 3.10.5 Pointing accuracy of antenna beam
    - 3.10.6 Effect of up-link
  - 3.11 Satellite power
    - 3.11.1 Power flux-density
      - 3.11.1.1 for individual reception
      - 3.11.1.2 for community reception
    - 3.11.2 Difference between e.i.r.p. at centre and edge of service area

A. FADAMI  
Chairman, Coordination Group



WORKING GROUP 5B

Drafting Group 5B3

SPECTRUM-ORBIT UTILIZATION

Since sharing the spectrum-orbit resource in Region 2 between the Broadcasting-Satellite Service and the Fixed-Satellite Service on an equal basis is inherently difficult and may impose some restrictions on both services, it is important that the technical parameters be chosen, and the techniques for efficient spectrum-orbit utilization be applied, in such a way that both space services will benefit as much as possible.

The following techniques are among those identified as leading to more efficient spectrum-orbit utilization, and should therefore be applied to the maximum extent, technically and economically, possible, consistent with the capability of systems to fulfil the requirements which they were designed to satisfy.

1. Clustering

Extensive analyses have shown that orbit-utilization is improved when satellites are grouped according to the sensitivity to interference, and the potential for generating interference, of the system of which they are a part. In most cases, this means that satellites of similar characteristics should be grouped in the same part of the orbit.

2. Cross-polarization

The proper use of cross-polarization, whether right- and left-handed circular, or vertical and horizontal linear, can significantly improve spectrum-orbit utilization by providing additional isolation between potentially interfering systems.

3. Crossed-beam geometry

The principle of crossed-beam geometry is that adjacent satellites should not serve adjacent service areas. In that way, discrimination from both the satellite and the earth station antennae can be utilized to achieve maximum isolation between systems.

4. Paired service areas

The principle of crossed-beam geometry can be extended : If service areas are far enough apart, then the satellite antenna discrimination alone may be sufficient to permit satellites serving these widely separated service areas to be colocated in the orbit, leading to practical doubling of the orbit capacity.





5. Frequency interleaving

The mutual interference between channels in different systems is usually a maximum when the two carrier frequencies coincide. When channelling design is such that frequencies are interleaved, or more generally such that coincidence of carrier frequencies is avoided, mutual interference can be greatly reduced in many cases.

6. Minimum satellite spacings

It is obvious that, for maximum orbit utilization, satellites should be placed as close to each other as possible, consistent with keeping the mutual interference to acceptable levels.

7. Satellite antenna discrimination

The discrimination in the sidelobes of the satellite antenna determines how much isolation exists between beams serving non-overlapping or non-adjacent service areas. To achieve maximum isolation, all efforts should be made to improve the discrimination by technological advances in antenna design.

8. Earth-station antenna discrimination

The sidelobe discrimination of the earth-station antenna determines how much isolation is obtained from satellite spacing. To achieve maximum isolation, every effort should be made to improve the discrimination by taking advantage of technological advances in antenna design.

9. Minimizing e.i.r.p.

The interference caused by relatively powerful satellites (broadcasting or certain types of fixed satellites) is directly proportional to their e.i.r.p. Sharing with such satellites is greatly facilitated if their e.i.r.p. is kept as low as possible, consistent with the requirements.

10. Minimizing up-link contribution

Since the up-link frequencies for broadcasting-satellite systems will not lie in the 11.7 - 12.2 GHz band, and assuming that these up-link frequencies will almost certainly also lie in bands shared with other space services, it may well be that the sharing criteria in these bands may place additional constraints on the orbital positions of broadcasting satellites, thus decreasing efficiency of orbit utilization. To keep these constraints at a minimum, link design should minimize the up-link contributions to mutual interference.

11. Realistic quality and reliability objectives

The quality and reliability objectives for a TV channel (or any channel in the Fixed-Satellite Service) have a significant effect on spectrum-orbit utilization. If the objectives are set unnecessarily high, the capacity of the orbit is decreased. Quality and reliability objectives should be set no higher than is absolutely necessary.

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I/11/14

Article 4

PROCEDURE FOR MODIFICATIONS TO THE PLAN

4.1 When a Contracting Member Administration intends to make a modification to the Plan, i.e. either

- to change the characteristics of any of its frequency assignments \* to a space station in the Broadcasting-Satellite Service shown in the Plan, or for which the procedures in this Article have been successfully applied, whether or not the station has been brought into use, or
- to include in the Plan a new frequency assignment to a space station in its Broadcasting-Satellite Service, or
- to cancel a frequency assignment to a space station in its Broadcasting-Satellite Service,

the following procedure shall be applied before any notification of the frequency assignment is made to the International Frequency Registration Board (see Article 5 of this Agreement).

4.2 In the remainder of the present Article, the term "frequency assignment in accordance with the Agreement" means any frequency assignment appearing in the Plan or for which the procedure of this Article has been successfully applied.

I/11/15 4.3 Proposed changes to a frequency assignment in accordance with the Agreement or the inclusion in the Plan of a new frequency assignment

4.3.1 Any Administration proposing a change in the characteristics of a frequency assignment in accordance with the Agreement or the inclusion of a new frequency assignment in the Plan shall seek the agreement of those Administrations:

- having a frequency assignment to a space station in the Broadcasting-Satellite Service in the same channel or an adjacent channel in accordance with the Plan, or in respect of which, modifications to the Plan have been published by the Board in accordance with the provision of this Article; or

\* The expression "frequency assignment" as used throughout this Article is as defined in the Radio Regulations and is associated with a given orbital position recorded in the Plan.

\*The expression "frequency assignment" wherever it appears in this Article, shall be understood to refer either to a new frequency assignment or to a change in a frequency assignment already recorded in the Plan and shall be understood to be associated with a given orbital position.

- having no frequency assignment for the Broadcasting-Satellite Service in the channel concerned but whose terrestrial services may be affected as a result of the proposed modification to the / Plan /, or
- having a frequency assignment in the band 11.7 - 12.2 GHz to a space station in the Fixed-Satellite Service recorded in the Master Register or for which the information prescribed in No. 639AL\* of the Radio Regulations has been published;

which are considered to be affected. A frequency assignment is considered to be affected when the limits shown in / Appendix A / are exceeded.

4.3.2 An Administration intending to make a modification to the / Plan / shall send to the Board the relevant information listed in / Appendix B /.

4.3.2.1 Where as a result of the intended modification the limits defined in / Appendix A / are not exceeded, this fact shall be indicated when submitting to the Board the information required by 4.3.2. The Board shall then publish this information in a special section of its weekly circular.

4.3.2.2 In all other cases the Administration shall notify the Board of the names of the Administrations whose agreement it considers should be sought in order to arrive at the agreement in 4.3.1 as well as of those with whom agreement has already been reached.

4.3.3 The Board shall determine on the basis of / Appendix A / the Administrations whose assignments are considered to be affected within the meaning of 4.3.1. The Board shall include the names of those Administrations with the information received under 4.3.22 and shall publish the complete information in a special section of its weekly circular. The results of these calculations shall be sent immediately by the Board to the Administration proposing the modification to the / Plan /.

4.3.4 The Board shall send a telegram to the Administrations listed in the special section of the weekly circular drawing their attention to the information it contains and shall also send them the results of its calculations.

4.3.5 Any Administration which considers that it should have been included in the list of Administrations considered to be affected may, giving the technical basis for so doing, request the Board to include its name. The Board shall study this request on the basis of / Appendix A / and, where appropriate, add the name of the Administration to the list and in any case send a copy of the request with an appropriate recommendation to the Administration proposing the modification to the / Plan /.

/ 4.3.6 Any intended change in a frequency assignment in accordance with the / Agreement / or / inclusion in the / Plan / of a new frequency assignment that would degrade the protection of the services concerned in 4.3.1 beyond the limits set in / Appendix A / must be subject to the agreement of all affected Administrations. /

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\* or the corresponding number of the Radio Regulations currently in force.

Note: Appendix A contains the p.f.d limits  
Appendix B lists the basic characteristics of the frequency assignments.

4.3.7 Either the Administration seeking agreement, or the Administration with which agreement is sought, may request any additional information it considers necessary. The Board shall be informed of such requests.

4.3.8 Comments from Administrations on the information published pursuant to 4.3.3 should be sent either directly to the Administration proposing the modification or through the Board. In any event the Board shall be informed that comments have been made.

4.3.9 An Administration which has not notified its comments either to the Administration seeking agreement or to the Board within a period of /120 days/ /150 days/ following the date of the weekly circular referred to in 4.3.2.1 or 4.3.3 shall be understood to have agreed to the proposed change. This time limit may be extended by /60 days/ /80 days/ in the case of an Administration which has requested additional information in response to 4.3.7 or of an Administration which has requested the assistance of the Board in conformity with 4.3.15. In the latter case the Board shall inform the Administrations concerned of this request.

4.3.10 If in seeking agreement an Administration makes changes in its initial proposal, it shall again apply the provisions of 4.3.2 and the consequent procedure with respect to any other Administration whose services might be affected due to changes made to the initial proposal.

4.3.11 If no comments have been received on expiry of the periods specified in 4.3.9 or if agreement has been reached with the Administrations which have made comments and with which agreement is necessary, the Administration proposing the modification may continue with the appropriate procedure and shall inform the Board indicating the final characteristics of the frequency assignment together with the names the Administrations with which agreement has been reached.

/4.3.12 When the proposed modification to the /Plan/ involves developing countries Administrations shall seek all practicable solutions conducive to economical development of the broadcasting-satellite system of these countries. /

4.3.13 The Board shall publish in a special section of its weekly circular the information received under 4.3.11 together with the names of any Administrations with which the provisions of this /Article/ have been successfully applied. The frequency assignment concerned shall enjoy the same status as those appearing in the /Plan/ and will be considered as a frequency assignment in accordance with the /Agreement/.

J/18/40 4.3.13bis When an Administration proposing to change the characteristics of a frequency assignment or to make a new frequency assignment receives notice of disagreement from an Administration whose agreement it has sought, it should first endeavour to solve the problem by exploring all possible means of meeting its requirement. If the problem cannot still be solved by such means, the Administration whose agreement has been sought should endeavour to overcome the difficulties as far as possible, and should state the technical reasons for any disagreement if the Administration seeking the agreement requests it to do so.

4.3.14 If no agreement is reached between the Administrations concerned, the Board shall make any study that may be requested by these Administrations; the Board shall inform them of the result of the study and shall make such recommendations it may be able to offer for the solution of the problem.

4.3.15 Any Administration may at any stage in the procedure described, or before applying it, request the assistance of the Board particularly in seeking the agreement of another administration.

[ 4.3.16 If after application of the procedure described in this [ Article ] the Administrations concerned have been unable to reach agreement, they may resort to the procedure described in Article 50 of the Convention. Administrations may also agree to apply the Optional Additional Protocol to the Convention. ]

4.3.17 The relevant provisions of [ Article 5 ] of this [ Agreement ] shall be applied when frequency assignments are notified to the Board.

I/11/16 4.4 Cancellation of frequency assignments

When a frequency assignment in accordance with the [ Agreement ] is released, whether or not as a result of a modification, the Administration concerned shall immediately so inform the Board. The Board shall publish this information in a special section of its weekly circular.

I/11/17 4.5 Master copy of the [ Plan ]

4.5.1 The Board shall maintain an up-to-date master copy of the [ Plan ] taking account of the application of the procedure specified in this [ Article ]. The Board shall prepare a document listing the amendments to be made to the [ Plan ] as a result of modifications made in accordance with the procedure in this [ Article ].

4.5.2 The Secretary-General shall be informed by the Board of modifications made to the [ Plan ] and shall publish an up-to-date version of the [ Plan ] in an appropriate form as and when the circumstances justify [ and in any case every three years ].

I/11/18

/ Article 5 /

NOTIFICATION, EXAMINATION AND RECORDING IN THE  
MASTER REGISTER OF FREQUENCY ASSIGNMENTS TO SPACE STATIONS  
IN THE BROADCASTING-SATELLITE SERVICE

5.1 Notification

5.1.1 Whenever an Administration intends to bring into use a frequency assignment to a space station in the Broadcasting-Satellite Service it shall notify this frequency assignment to the Board. The notifying Administration shall apply for this purpose the following provisions.

5.1.2

For any notification under 5.1.1  
, an individual notice for each frequency assignment shall be drawn up as prescribed in Appendix 1A, the various Sections of which specify the basic characteristics to be furnished according to the case. It is recommended that the notifying administration should also supply the additional data called for in Section A of that Appendix, together with such further data as it may consider appropriate.

5.1.3 Each notice must reach the Board not earlier than three years before the date on which the assignment is to be brought into use. The notice must reach the Board in any case not later than ninety days<sup>1</sup> before this date.

5.1.4 Any frequency assignment, the notice of which reaches the Board after the applicable period specified in 5.1.3, shall, where it is to be recorded, bear a ~~mark~~ in the Master Register to indicate that it is not in conformity with 5.1.3. /remark

5.1.5 Any notice made under 5.1.1 which does not contain the characteristics specified in Appendix 1A<sup>3)</sup> shall be returned by the Board immediately by airmail to the notifying Administration with the reasons therefore.

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5.1.3.1 <sup>1</sup> The notifying administration shall take this limit into account when deciding, where appropriate, to initiate the co-ordination procedure(s).

Note: Appendix 1A in paragraph 5.1.2 corresponds with Appendix B in Article 4 paragraph 4.3.2.

3) These characteristics and the Appendix are to be established by the Conference.

5.1.6 Upon receipt of a complete notice, the Board shall include the particulars thereof, with the date of receipt, in the weekly circular referred to in No. 497<sup>o</sup> which shall contain the particulars of all such notices received since the publication of the previous circular. /<sup>o</sup> of the Radio Regulations\*

5.1.7 The circular shall constitute the acknowledgement to the notifying administration of the receipt of a complete notice.

5.1.8 — Complete notices shall be considered by the Board in the order of their receipt. The Board shall not postpone the formulation of a finding unless it lacks sufficient data to render a decision in connection therewith; moreover, the Board shall not act upon any notice which has a technical bearing on an earlier notice still under consideration by the Board, until it has reached a finding with respect to such earlier notice.

I/11/19 5.2 Examination and recording

5.2.1 The Board shall examine each notice:

- a) with respect to its conformity with the Convention and the relevant provisions of the Radio Regulations and Appendix 1<sup>1)</sup> with the exception of those relating to conformity with the Plan;
- b) with respect to its conformity with the Plan.

5.2.2 Where the Board reaches a favourable finding with respect to 5.2.1, the frequency assignment of a Contracting Member Administration shall be recorded in the Master Register. The date of receipt by the Board of the notice shall be entered in Column 2d of the Master Register. In relations between Contracting Members Administrations all frequency assignments brought into use in conformity with the Agreement and recorded in the Master Register shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments.

5.2.3 Where the Board reaches an unfavourable finding with respect to paragraph 5.2.1, the notice shall be returned immediately by airmail to the notifying Administration with the reasons of the Board for this finding and with such suggestions as the Board may be able to offer with a view to a satisfactory solution of the problem.

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\* or the corresponding number of the Radio Regulations currently into force.

1) This Appendix relates to the sharing criteria

5.2.4 Where the notifying Administration resubmits the notice and the Finding of the Board becomes favorable with respect to 5.2.1, the notice shall be treated as in 5.2.2.

/ 5.2.5 If the notifying Administration resubmits the notice without modification and insists that the notice should be reconsidered, if the Board's Finding with respect to 5.2.1 remains unfavourable, the notification should be returned to the notifying Administration in accordance with 5.2.3. /

/ 5.2.5 If the notifying Administration resubmits the notice without modification and insists that the notice should be reconsidered, if the Board's Finding with respect to 5.2.1 remains unfavourable, the frequency assignment is recorded in the Master Register on the understanding that the notifying Administration has undertaken upon receipt of advice of harmful interference to eliminate this harmful interference. The recording will bear a remark in the Master Register to indicate that is recorded for information purposes only. /

/ 5.2.6 If the use of a frequency assignment not in conformity with the / Agreement / causes harmful interference to the reception of the emissions effectuated by a space station in the Broadcasting-Satellite Service using a frequency assignment in conformity with the / Agreement /, or to stations of other countries which are, in conformity with this / Agreement /, recorded in the Master Register, the Administration having jurisdiction over the interfering station on being advised accordingly shall take immediate measures to eliminate the interference. /



28 janvier 1976

Original: français  
anglais  
espagnol

SOUS-GROUPE DE TRAVAIL 6A1

SUB-WORKING GROUP 6A1

SUB-GRUPO DE TRABAJO 6A1

La Délégation des Etats-Unis d'Amérique a proposé que le troisième alinéa du paragraphe 4.3.1 devrait se lire :

"- ayant ou se proposant d'avoir des stations du service fixe par satellite dans la bande 11,7 - 12,2 GHz dans la Région 2 ".

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The United States Delegation proposed that the third inset of 4.3.1 should read :

"- having or intending to have Fixed-Satellite Service Stations in the band 11.7 - 12.2 GHz in Region 2 ".

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La Delegación de los Estados Unidos de América propuso que el tercer párrafo del punto 4.3.1 debiera leerse:

"- que tengan o se propongan tener estaciones del servicio fijo por satélite en la banda 11,7 - 12,2 GHz en la Región 2 ".

A. O. CARTER  
Président - Chairman - Presidente



Ad Hoc Groups 6D1/6D4

Draft

FINAL ACTS OF THE WORLD  
BROADCASTING-SATELLITE ADMINISTRATIVE  
RADIO CONFERENCE. GENEVA 1977

Preamble

The World Broadcasting-Satellite Administrative Radio Conference, having been convened at Geneva on 10 May 1977 on a proposal of the Administrative Council under Article 54 of the International Telecommunication Convention, in accordance with Resolution No. 27 of the Plenipotentiary Conference (Malaga-Torremolinos, 1973) and Resolution No. Spa2 - 2 of the World Administrative Radio Conference for Space Telecommunications (Geneva 1971), and bearing in mind the importance of making the best possible use of the geostationary-satellite orbit and of the bands allocated to the Broadcasting-Satellite Service at 11.7-12.5 GHz (11.7-12.2 GHz in Regions 2 and 3) and the need to enable other services with allocations in the band to use the band without mutual interference and the need to provide for all countries bearing in mind that all countries large and small have equal rights, and being charged by the Administrative Council to establish the sharing criteria for these bands between the Broadcasting-Satellite Service and the other services concerned :

- to plan for the Broadcasting-Satellite Services in the bands;
- to establish procedures to govern the use of these bands;
- and to consider the work of the Group of Experts on the possible re-arrangement of the Radio Regulations.

The delegates of the following members of the International Telecommunication Union have adopted, subject to the approval of their respective competent authorities, the following provisions :

Republic of Afghanistan etc.



Approval of the Final Acts

Members shall notify their approval of these Final Acts, as promptly as possible, to the Secretary-General, who shall at once inform the other Members of the Union. The act of approval shall constitute the agreement of Members to conform with the decisions jointly decided upon at the World Broadcasting-Satellite Administrative Radio Conference, Geneva 1977 and these Final Acts will be regarded as an agreement with the associated plan(s) in accordance with resolves 1 of Resolution No. Spa2 - 2 of the World Administrative Radio Conference for Space Telecommunications (Geneva 1971) which requires the stations in the Broadcasting-Satellite Service shall be established and operated in accordance with such agreements and associated plans.

Accession to the Final Acts

Any Member of the Union which has not signed these Final Acts may notify its approval to the Secretary-General at any time and will thereby be deemed to have become party to the decisions of this Conference and to be bound by these provisions. The Secretary-General shall at once inform the other Members of the Union of all such accessions.

R.G. RAJASINGAM  
The Convenor

SUB-WORKING GROUP 5A2

Sub-Working Group 5A2

Summary of work

On Wednesday, 26 January, the Sub-Working Group was requested, as an absolute necessity, to produce an orbit plan for the IFRB Synthesis Programme.

Much of the day was spent in accurately recording the orbit plan and this was presented to the IFRB for input to the computer. Also during Wednesday, 26 January, we received many additional and modified requirements as a result of the conciliatory procedure.

It was agreed that as many of these requests as possible would be accommodated.

On Thursday at about 5 p.m. we were informed by the IFRB that there would not be a synthesis run for this Working Group. Instead, the Group was advised that the deadline for input data for the trial plan to the IFRB was 10 a.m. on Friday, 28 January.

At the time of receiving this advice, the Group was engaged in connection with the trial plan on a second trial run with the TDF computer. This TDF computer run was based on these agreed modifications. The changes amounted to approximately 15 changes, involving ... countries requesting orbit grouping, orbit changes and changes to the beam sizes.

The results, based on these new requirements, for about 103 countries (most of Region 1) were received on Friday afternoon. Much greater negative margins were indicated by this run when compared with the first run which had been based on Document No. 103. The worst margins were about -10 dB and the general average was -8 dB. These values were considerably higher than for the first run.

Most of the high negative margins are caused by the large beams and high channel requirements in the region around 30° North latitude.

These problems in the trial plan are even more critical as a result of requests for particular orbit positions and also certain orbit groupings.

Summary of the trial plan (first section)

a) Region 1 (part, 103 countries)

Critical orbital positions where negative interference margins are excessive are 22° West, 16° West and 10° West.



For 22°W a possible solution could be achieved by having an additional satellite position at 40°W, using the upper part of the spectrum available in Region 1.

For the positions 10° West and 16° West there are two possibilities for improving the plan :

a) a separation of 18° between the position of the eight Central and West European countries and the position of the East European countries;

b) a separation of 6° for some countries in one of these two European groups and at least 18° separation for the remaining countries.

b) Region 3 (first part only)

The results available at present indicate that the difficult orbital arc is between 56° East and 92° East.

Examination so far indicates maximum negative margins of about 8 dB and general average negative margins of about 4 to 5 dB.

This is due to the large number of beams and to some extent the requested orbital arcs. The difficult areas are in parts of the region around the following coordinates :

90° East, 25° North  
115° East, 30° North  
120° East, 0

Possible solutions may be found in some cases by selecting orbital positions, reducing the number of channels, or by reduction of beam sizes.

The final output of this second trial plan using the TDF computer is expected to be available late on Friday, 28 January, to enable a more complete assessment to be carried out.

Ch. AMIRA  
Chairman of Sub-Working Group 5A2

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GROUPE DE TRAVAIL 5A

Note du Secrétaire général

INFORMATION COMPLEMENTAIRE

(voir Document N° DT/36)

Pour l'information de la Conférence, et comme suite aux Documents N°s DT/36 et DT/38, j'ai l'honneur de transmettre à la Conférence l'information complémentaire contenue dans les Annexes au présent document, ainsi qu'une note explicative (voir l'Appendice).

Cette information complémentaire, préparée par l'Union européenne de radio-diffusion (UER) a été traitée par l'ordinateur de la TéléDiffusion française (TDF).

M. MILI  
Secrétaire général

Appendice : 1  
Annexes : 3 (distribuées séparément)

WORKING GROUP 5A

Note by the Secretary-General

COMPLEMENTARY INFORMATION

(see Document No. DT/36)

For the information of the Conference, and further to Documents Nos. DT/36 and DT/38, I have the honour to transmit to the Conference the complementary information contained in the Annex to the present document as well as an explanatory note (see Appendix).

This complementary information was prepared by the European Broadcasting Union (EBU) and processed on the TéléDiffusion française (TDF) computer.

M. MILI  
Secretary-General

Appendix : 1  
Annexes : 3 (distributed separately)

GRUPO DE TRABAJO 5A

Nota del Secretario General

INFORMACIÓN COMPLEMENTARIA

(véase el Documento N.° DT/36)

Para información de la Conferencia, y como continuación de los Documentos N.°s DT/36 y DT/38, tengo el honor de transmitir a la Conferencia la información complementaria contenida en el Anexo al presente documento y una nota explicativa (véase el Apéndice).

Esta información complementaria, preparada por la Union Europea de Radiodifusión (UER), ha sido tratada por el computador de TéléDiffusion française

El Secretario General  
M. MILI

Apéndice : 1  
Anexos : 3 (distribuidos separadamente)



A P P E N D I C E

NOTE EXPLICATIVE SUR LES ANALYSES DE PLANS PAR LE  
PROGRAMME D'ORDINATEUR DE L'UER

1. Généralités

Pour chaque zone de service, les calculs sont exécutés pour vingt points de contrôle (numérotés de 1 à 20) situés à l'intérieur et sur le contour du polygone définissant la zone.

Les symboles des zones de service sont les mêmes que ceux utilisés par TDF (voir Document N° DT/38 pour la correspondance avec les symboles de l'UIT).

Les brouillages sont calculés en l'absence de toute atténuation atmosphérique mais avec un facteur constant de dépolarisation par la pluie de -30 dB.

2. Récapitulation des faisceaux et des puissances

Deux options sont possibles pour les faisceaux :

- a) emploi des faisceaux calculés par le programme de TDF;
- b) emploi des faisceaux répertoriés dans le Document N° 103 et ses addenda.

Les puissances sont calculées pour satisfaire à la condition d'un rapport porteuse/bruit de 14 dB pour 90 % des points de contrôle et pour 99 % du temps, compte tenu de l'atténuation atmosphérique relative à la zone hydrométéorologique de la zone de service.

3. Statistique des marges de protection

On édite les marges de protection

- même canal
- canal adjacent inférieur
- canal adjacent supérieur
- équivalente

qui sont dépassées à 0 %, 50 %, 90 % et 100 % des points de contrôle. Cette statistique donne une idée approximative de la répartition de la marge de protection à l'intérieur et sur le contour de la zone. En regard de la valeur de la marge de protection, on édite le numéro du point de contrôle où cette valeur est atteinte.

Les valeurs des marges de protection sont calculées dans les conditions les plus défavorables pour l'erreur de pointage du satellite utile et des satellites brouilleurs, cette erreur étant égale à  $\pm 0,1^{\circ}$ . Les rapports de protection sont de 31 dB pour le même canal et de 15 dB pour les canaux adjacents.

#### 4. Statistique des rapports porteuse/bruit et signal/bruit

On édite respectivement les valeurs du rapport porteuse/bruit pour 99,9 % du mois le plus défavorable et du rapport signal/bruit non pondéré pour 99 % du mois le plus défavorable qui sont dépassées à 0 %, 50 %, 90 % et 100 % des points de contrôle, ainsi que le numéro du point de contrôle correspondant à la valeur indiquée.

Ces calculs sont effectués avec les données expérimentales d'atténuation atmosphérique obtenues

- en Malaisie pour la zone hydrométéorologique 1
- en Europe dans les autres cas.

Ces données d'atténuation atmosphérique sont extraites du Rapport 215-3 du CCIR.

#### 5. Analyse générale des brouillages

Pour les cas des

- brouillages dans le même canal
- brouillages dans le canal adjacent inférieur
- brouillages dans le canal adjacent supérieur

le programme édite la liste des quatre sources prépondérantes du brouillage avec :

- le symbole de la zone desservie par le satellite brouilleur;
- le numéro du point de contrôle où le brouillage indiqué est le plus défavorable;
- le rapport du brouillage (signal utile/signal brouilleur) en ce point si l'on ne considère que le seul brouillage indiqué;
- la marge de protection au point indiqué compte tenu de l'ensemble du brouillage.

Lorsque plusieurs canaux sont attribués à une zone de service, l'analyse des brouillages est effectuée successivement pour chacun des canaux, dans l'ordre croissant, le symbole désignant la zone brouillée n'étant cependant exprimé que par le premier canal (dans la colonne de gauche du tableau).

Remarque : Lorsque l'analyse d'un plan est divisée en plusieurs parties correspondant à des arcs orbitaux différents avec recouvrement, il y a lieu de prendre les résultats les plus défavorables pour les zones qui figurent dans plus d'une partie.



APPENDIX

EXPLANATORY NOTE ON THE ANALYSIS OF PLANS BY THE  
EBU COMPUTER PROGRAMME

1. General

For each service area the calculations are carried out for twenty test points (numbered 1 to 20) situated inside and on the contour of the polygon defining the area.

The symbols of the service areas are the same as the symbols used by TDF (see Document No. DT/38 for the correspondence with the ITU symbols).

Interference is calculated in the absence of any atmospheric attenuation but with a constant factor for depolarization by rain of -30 dB.

2. Recapitulation of beams and powers

Two options are possible for the beams :

- a) use of beams calculated by the TDF programme;
- b) use of beams listed in Document No. 103 and Addenda.

The powers are calculated to satisfy a carrier-to-noise ratio of 14 dB for 90 % of the test points and for 99 % of the time, account being taken of the atmospheric attenuation relative to the rain-climatic zone of the service area.

3. Protection margin statistics

Printouts are obtained for the protection margins

- co-channel
- lower adjacent channel
- upper adjacent channel
- equivalent

which are exceeded at 0 %, 50 %, 90 % and 100 % of the test points. These statistics give an approximate idea of the distribution of the protection margin within the area and on its contour. Opposite the value of the protection margin, a printout is obtained for the number of the test point where this value is reached.

The values of the protection margin are calculated for the worst pointing error conditions of the useful satellite and the interfering satellite. This error is  $\pm 0.10$  : the protection ratios are 31 dB for the co-channel and 15 dB for the adjacent channels.

4. Statistics of the carrier-to-noise and signal-to-noise ratios

The values of the carrier-to-noise ratio for 99.9 % of the worst month and of the unweighted signal-to-noise ratio for 99 % of the worst month which are exceeded at 0 %, 50 %, 90 % and 100 % of the test points are printed out, as well as the number of the test point corresponding to the indicated value.

These calculations are carried out with experimental atmospheric attenuation data obtained

- in Malaysia, for rain-climatic zone 1, and
- in Europe in the other cases.

These atmospheric attenuation data are taken from CCIR Report 215-3.

5. General analysis of interference

For

- co-channel interference,
- interference in the lower adjacent channel, and
- interference in the upper adjacent channel,

the programme prints out the four preponderant sources of interference with :

- the symbol of the area served by the interfering satellite,
- the number of the test point at which the indicated interference is worst,
- the interference ratio (useful signal-to-interfering signal) at that point, taking into account only the indicated interference, and
- the protection margin at the indicated point having regard to total interference.

When several channels are allocated to a single service area, the analysis of interference is carried out successively for each of the channels, in increasing order but the symbol designating the area suffering interference is given only for the first channel (in the lefthand column of Table 1).

Note : When the analysis of a plan is divided into several parts corresponding to different orbital arcs with overlapping, the worst results should be taken for areas included in more than one part.

## APÉNDICE

### NOTA EXPLICATIVA SOBRE EL ANÁLISIS DE PLANES CON EL PROGRAMA DE COMPUTADOR DE LA UER

#### 1. Consideraciones generales

Para cada zona de servicio, los cálculos se efectúan para veinte puntos de control (numerados de 1 a 20), situados dentro y en torno al polígono que define la zona.

Los símbolos de las zonas de servicio son los mismos que se utilizan por el TDF (véase el Documento N.º DT/38 para la correspondencia con los símbolos de la UIT).

Las interferencias se calculan en ausencia de toda atenuación atmosférica, pero con un factor constante de despolarización debida a la lluvia de -30 dB.

#### 2. Recapitulación de los haces y de las potencias

Dos opciones son posibles para los haces:

- a) el empleo de los haces calculados con el programa del TDF;
- b) el empleo de los haces que figuran en el Documento N.º 103 y sus Addenda.

Las potencias se calculan para satisfacer la condición y la relación portadora/ruido de 14 dB para el 90% de los puntos de control y el 99% del tiempo, habida cuenta de la atenuación atmosférica correspondiente a la zona hidrometeorológica de la zona de servicio.

#### 3. Estadística de los márgenes de protección

Se imprimen los márgenes de protección:

- del mismo canal;
- del canal adyacente inferior;
- del canal adyacente superior;
- equivalente;

que se rebasan en el 0%, 50%, 90% y 100% de los puntos de control. Esta estadística da una idea aproximada de la distribución del margen de protección dentro y en torno a la zona. Con respecto al valor del margen de protección, se imprime el número del punto de control en que se alcanza ese valor.

Los valores de los márgenes de protección se calculan en las condiciones más desfavorables para el error de puntería del satélite deseado y del satélite interferente, siendo ese error igual  $\pm 0,1^\circ$ . Las relaciones de protección son de 31 dB para el mismo canal y de 15 dB para los canales adyacentes.

4. Estadística de las relaciones portadora/ruido y señal/ruido

Se imprimen, respectivamente, los valores de la relación portadora/ruido para el 99,9% del mes más desfavorable y de la relación señal/ruido no ponderado para el 99% del mes más desfavorable, que se rebasan en el 0%, 50%, 90% y 100% de los puntos de control, así como el número del punto de control correspondiente al valor indicado.

Estos cálculos se efectúan con los datos experimentales de atenuación atmosférica obtenidos:

- en Malasia, para la zona hidrometeorológica 1
- en Europa, para los demás casos.

Estos datos de atenuación atmosférica provienen del Informe N.° 215-3 del CCIR.

5. Análisis general de las interferencias

Para los casos de:

- interferencias en el mismo canal,
- interferencias en el canal adyacente inferior,
- interferencias en el canal adyacente superior,

el programa imprime la lista de cuatro fuentes preponderantes de interferencia con:

- el símbolo de la zona cubierta por el satélite interferente;
- el número del punto de control en que la interferencia indicada es más desfavorable;
- la relación de interferencia (señal deseada/señal interferente) en ese punto, de considerarse únicamente la interferencia indicada;
- el margen de protección en el punto indicado, habida cuenta de la interferencia en su conjunto.

Cuando se atribuyen varios canales a una zona de servicio, necesariamente se efectúa el análisis de las interferencias para cada uno de los canales, en orden creciente, pero el símbolo que designa la zona interferida sólo se imprime para el primer canal (en la columna izquierda del Cuadro).

Observación: Cuando el análisis de un plan se divide en varias partes correspondientes a arcos orbitales distintos superpuestos, deben tomarse los resultados más desfavorables para las zonas que figuran en más de una parte.

WORKING GROUP 5A

Terms of reference of Sub-Working Group 5A4

To construct a frequency assignment/orbit positions plan for Regions 1 and 3. The plan shall meet the requirements of administrations given in Document No. 103(Rev.2) (the requirements represent reduction from those on which the Sub-Group 5A2 produced its planning studies). For orbit positions the guidelines given in Document No. 123 plus addendum shall be followed taking into account the requirements for preferred groupings, common polarization and restricted tuning range.

Only changes in requirements asked for by the Sub-Group to the Conciliation Group and approved by the delegations concerned on the blue forms shall be taken into account by the Sub-Group. When a service area given in Document No. 103(Rev.2) intentionally covers the territory (in whole or in part) of more than one administration, it should only be taken into account by the Sub-Group if the administrations, to which the service is intended, indicated their agreement to such a common or extended service area to the IFRB by the deadline of 28 January 1977.

The Sub-Group 5A2/3 shall endeavour, for the relevant requirements given in Document No. 103(Rev.2) to improve the general level of protection ratio values indicated in the planning example produced by the Sub-Working Group 5A3 so as to meet a level acceptable for all countries.

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WORKING GROUP 5B

DRAFT

RESOLUTION No. BS

CONCERNING THE CONVENING OF A REGIONAL ADMINISTRATIVE RADIO CONFERENCE  
FOR CARRYING OUT DETAILED PLANNING FOR THE SPACE SERVICES IN THE  
FREQUENCY BAND, 11.7 TO 12.2 GHz, IN REGION 2

The World Administrative Broadcasting-Satellite Conference,  
Geneva, 1977,

noting

a) that the detailed requirements of all administrations in  
Region 2 for the Broadcasting-Satellite Service in the frequency band, 11.7 to  
12.2 GHz are not as yet known;

b) that, because of the large demands expected for the various  
services with which this band is shared, there is a need to ensure that this  
frequency band and the geostationary orbit are used as efficiently as possible;

c) that a future Regional Administrative Radio Conference for the  
detailed planning of space services in the frequency band, 11.7 to 12.2 GHz  
would be able to take advantage of experiments now being carried out, of  
further technological advances, and of additional studies by the CCIR;

considering

a) the decision of the Region 2 administrations represented at  
the WARC-BS (Geneva, 1977) to hold a future Regional Administrative Conference  
to carry out detailed planning for the space services in the frequency band,  
11.7 - 12.2 GHz;

b) the provisions adopted by the WARC-BS (Geneva, 1977) to govern  
the implementation of space services in the frequency band, 11.7 - 12.2 GHz  
until the drafting of a detailed plan;

resolves

a) that a Regional Administrative Radio Conference shall be held  
not later than 1982 for the purpose of carrying out detailed planning for the  
Broadcasting-Satellite and Fixed-Satellite Services, as set forth below;



b) that the said Regional Administrative Radio Conference shall draw up a detailed plan for the orbit-spectrum available for the Broadcasting-Satellite Services in the 11.7 to 12.2 GHz band. The plan shall provide for the detailed assignment of the orbital positions and frequency channels available, ensuring that the Broadcasting-Satellite Service requirements submitted by the various administrations are met in an equitable manner satisfactory to all the countries concerned. It should be laid down as a matter of principle that each administration in the Region should be guaranteed a minimum number of channels for the operation of the Broadcasting-Satellite Service (4). Above this minimum, the special characteristics of the countries (size, time zones, language differences, etc.) shall be taken into account;

c) that planning shall be based on individual reception, but each administration may use the reception system which meets its requirements best, namely : individual, community, or both. Account shall also be taken of the decisions of the World Administrative Radio Conferences (Geneva, 1977 and 1979) and of the relevant Recommendations of the CCIR in the case of parameters covered by that body's studies and research;

d) that, when planning the Broadcasting-Satellite Service, it shall be borne in mind that systems should be designed with a view to reduce to a minimum technical differences and incompatibilities with the systems of other Regions;

e) that the Conference shall also take into account on an equitable basis the needs of the Fixed-Satellite Service to which this frequency band is also allocated in Region 2;

invites the Administrative Council

to make preparations for convening the said Regional Administrative Conference using the provisions as set out herein as a basis for the agenda of the Conference.

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WORKING GROUP 5B

DRAFT

RECOMMENDATION No. BS

TO THE IFRB RELATING TO THE SUBMISSION OF REQUIREMENTS  
FOR THE BROADCASTING-SATELLITE SERVICE IN REGION 2

The World Administrative Broadcasting-Satellite Conference, Geneva,  
1977,

considering

a) the decision taken by / the Administrations of Region 2 in attendance at / the above Conference that a Region 2 Administrative Radio Conference be held not later than 1982;

b) that the said Regional Administrative Radio Conference shall draw up a detailed plan for the orbit-spectrum available for the Broadcasting-Satellite Services in the frequency band, 11.7 to 12.2 GHz, taking into account on an equitable basis the needs of the Fixed-Satellite Service to which this frequency band is also allocated in Region 2.

c) that the plan shall provide for the detailed assignment of the orbital positions and frequency channels available, ensuring that the Broadcasting-Satellite Service requirements of the various administrations are met in an equitable manner satisfactory to all the countries concerned.

invites the IFRB

1. to request all administrations in Region 2 to submit their Broadcasting-Satellite Service requirements to the IFRB not later than one year before the start of the said Regional Administrative Radio Conference. These requirements are understood to / include / the number and boundaries of service areas and the number of channels requested for each of them. They may be updated as required by each administration;

2. to remind administrations, by means of a circular-letter and/or telegram six months before the above deadline for submitting requirements, of the need to submit them;

3. to assemble the information submitted by administrations in a form permitting a comparative study thereof and to communicate it to the Secretary-General for publication and despatch to administrations not later than / 3 months / prior to the said Regional Administrative Radio Conference.





WORKING GROUP 5B

DRAFT

RECOMMENDATION No. BS

TO THE CCIR RELATING TO THE PREPARATION FOR AN ADMINISTRATIVE RADIO  
CONFERENCE IN REGION 2 FOR THE PLANNING OF THE SPACE SERVICES  
IN THE FREQUENCY BAND, 11.7 to 12.2 GHz

The World Administrative Broadcasting-Satellite Conference,  
Geneva, 1977,

considering

- a) that a regional administrative radio conference has been requested to be held no later than 1982, to carry out detailed planning for the space services in the frequency band, 11.7 to 12.2 GHz, in Region 2;
- b) that the technical criteria and procedures adopted at the WARC-BS (Geneva, 1977) will be used in the interim;
- c) that a considerable amount of technical information will be required to ensure the success of this Regional Conference;

recommends

that the CCIR carry out such additional studies as are necessary to ensure timely provision of the technical information likely to be needed as a basis for the work of the Regional Conference.

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WORKING GROUP 4BAfrican Group

The African countries, meeting on 4 February 1977,

- after hearing expert opinion on the problems connected with <sup>No.</sup>Document 188 (Rev.2) and discussing the question,
- regret the fact that the problem in question should be regarded as one between Region 2 and the African countries;
- consider it unacceptable that certain countries in Region 2 which have not wanted a plan from the start should wish to impose additional technical constraints on the African countries;
- deplore any solution that might be to their detriment.

The African countries

- note that the problems raised in Document No. 188 (Rev.2) are ones which affect all planning (orbit - frequencies) and therefore concern Regions 1, 2 and 3 as a whole;
- consider accordingly that the criteria should be the same in all parts of the plan, and specifically the part concerning Regions 1 and 3.

Nevertheless, in a further attempt at conciliation, the African group is ready to accept the following points :

- 1) A pfd of  $-126 \text{ dBW/m}^2$  for their emissions on the territories of Region 2



2) The possibility of interposing only one fixed satellite between two broadcasting satellites spaced 6 degrees east of  $40^{\circ}$  West}.

The African countries base their requirements on individual reception.