XVII A.P.
DÜSSELDORF
21.5-1.6 1990
CCIR

XVIIth PLENARY ASSEMBLY
DÜSSELDORF, 1990

INTERNATIONAL TELECOMMUNICATION UNION

QUESTIONS OF THE CCIR, 1990

VOLUME XV-2

SG 8 MOBILE, RADIODETERMINATION, AMATEUR AND RELATED SATELLITE SERVICES

CCIR INTERNATIONAL RADIO CONSULTATIVE COMMITTEE

Geneva, 1990

CCIR

1. The International Radio Consultative Committee (CCIR) is the permanent organ of the International Telecommunication Union responsible under the International Telecommunication Convention "... to study technical and operating questions relating specifically to radiocommunications without limit of frequency range, and to issue recommendations on them..." (International Telecommunication Convention, Nairobi 1982, First Part, Chapter I, Art. 11, No. 83).*

2. The objectives of the CCIR are in particular:

a) to provide the technical bases for use by administrative radio conferences and radiocommunication services for efficient utilization of the radio-frequency spectrum and the geostationary-satellite orbit, bearing in mind the needs of the various radio services;

b) to recommend performance standards for radio systems and technical arrangements which assure their effective and compatible interworking in international telecommunications;

c) to collect, exchange, analyze and disseminate technical information resulting from studies by the CCIR, and other information available, for the development, planning and operation of radio systems, including any necessary special measures required to facilitate the use of such information in developing countries.

* *See also the Constitution of the ITU, Nice, 1989, Chapter 1, Art. 11, No. 84.*

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STUDY GROUP 8

CCIR INTERNATIONAL RADIO CONSULTATIVE COMMITTEE

92-61-04341-0

Geneva, 1990

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XVIIth PLENARY ASSEMBLY OF THE CCIR

(Düsseldorf, 1990)

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All references within the texts to CCIR Recommendations, Reports, Resolutions, Opinions, Decisions and Questions refer to the 1990 edition, unless otherwise noted; i.e., only the basic number is shown.

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DISTRIBUTION OF TEXTS OF THE XVIIth PLENARY ASSEMBLY OF THE CCIR IN VOLUMES I TO XV

Volumes and Annexes I to XV, XVIIth Plenary Assembly, contain all the valid texts of the CCIR and succeed those of the XVIth Plenary Assembly, Dubrovnik, 1986.

1. Recommendations, Resolutions, Opinions are given in Volumes I-XIV and Reports, Decisions in the Annexes to Volumes I-XII.

1.1 *Numbering of texts*

When a Recommendation, Report, Resolution or Opinion is modified, it retains its number to which is added a dash and a figure indicating how many revisions have been made. Within the text of Recommendations, Reports, Resolutions, Opinions and Decisions, however, reference is made only to the basic number (for example Recommendation 253). Such a reference should be interpreted as a reference to the latest version of the text, unless otherwise indicated.

The tables which follow show only the original numbering of the current texts, without any indication of successive modifications that may have occurred. For further information about this numbering scheme, please refer to Volume XIV.

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* Not reprinted, see Dubrovnik, 1986.

(1) Published separately.

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* Not reprinted, see Dubrovnik, 1986.

(1) Published separately.

1.3.1 *Note concerning Reports*

The individual footnote "Adopted unanimously" has been dropped from each Report. Reports in Annexes to Volumes have been adopted unanimously except in cases where reservations have been made which will appear as individual footnotes.

1.4 *Resolutions*

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2. **Questions** (Vols. XV-1, XV-2, XV-3, XV-4)

2.1 *Numbering of texts*

Questions are numbered in a different series for each Study Group: where applicable a dash and a figure added after the number of the Question indicate successive modifications. The number of a Question is completed by an *Arabic figure indicating the relevant Study Group.* For example:

– Question 1/10 would indicate a Question of Study Group 10 with its text in the original state;

– Question 1-1/10 would indicate a Question of Study Group 10, whose text has been once modified from the original; Question 1-2/10 would be a Question of Study Group 10, whose text has had two successive modifications.

Note – The numbers of the Questions of Study Groups 7, 9 and 12 start from 101. In the case of Study Groups 7 and 9, this was caused by the need to merge the Questions of former Study Groups 2 and 7 and Study Groups 3 and 9, respectively. In the case of Study Group 12, the renumbering was due to the requirement to transfer Questions from other Study Groups.

2.2 *Assignment of Questions*

In the plan shown on page II, the relevant Volume XV in which Questions of each Study Group can be found is indicated. A summary table of all Questions, with their titles, former and new numbers is to be found in Volume XIV.

2.3 *References to Questions*

As detailed in Resolution 109, the Plenary Assembly approved the Questions and assigned them to the Study Groups for consideration. The Plenary Assembly also decided to discontinue Study Programmes. Resolution 109 therefore identifies those Study Programmes which were approved for conversion into new Questions or for amalgamation with existing Questions. It should be noted that references to Questions and Study Programmes contained in the texts of Recommendations and Reports of Volumes I to XIII are still those which were in force during the study period 1986-1990.

Where appropriate, the Questions give references to the former Study Programmes or Questions from which they have been derived. New numbers have been given to those Questions which have been derived from Study Programmes or transferred to a different Study Group.

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VOLUME XV-2

QUESTIONS CONCERNING STUDY GROUP 8

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QUESTION 1-2/8

SIGNAL-TO-INTERFERENCE PROTECTION RATIOS AND MINIMUM FIELD STRENGTHS REQUIRED IN THE MOBILE SERVICES

(1963-1986-1992)

The CCIR,

considering

a) that full effect should be given to the studies which the World Administrative Radio Conference (Geneva, 1979) in its Recommendation No. 64 (WARC-79) invited the CCIR to continue for all services;

b) that for certain kinds of mobile services, partial data relating to interference protection ratios and minimum field strengths required, exist in documents of some Conferences of the International Telecommunication Union (ITU), for example, in the Final Acts of the International Administrative Aeronautical Radio Conference (Geneva, 1948-1949) and of the Special Regional Conference (Geneva, 1960);

c) that such documents, however, do not constitute a complete and consistent set of data relating to all kinds of mobile services operating in all frequency ranges, particularly with respect to VHF-UHF mobile services,

decides that the following Question should be studied

1. What are the signal-to-interference protection ratios which define the threshold of harmful interference for mobile services utilizing modulation techniques such as FM, AM, amplitude companded single sideband (ACSSB), digital, etc.?

2. What are the signal-to-noise ratios and the minimum field strengths required for satisfactory reception of the different classes of emission in the mobile services utilizing modulation techniques such as FM, AM, ACSSB, digital, etc.?

3. What are the appropriate fading allowances in the mobile services utilizing modulation techniques such as FM, AM, ACSSB, digital, etc.?

Note 1 - The above studies should be continued simultaneously and with the same urgency.

Note 2 - Particular attention should be given to those studies which will assist the further refinement of the technical standards used by the International Frequency Registration Board.

Note 3 - The above-mentioned studies should be carried on and Recommendations and possible revisions be published as soon as practicable.

Note 4 - See Reports 358, 914, 924 and Recommendation 441.

QUESTION 5-5/8*

THE INTRODUCTION OF DIRECT-PRINTING TELEGRAPH EQUIPMENT IN THE MARITIME MOBILE SERVICE

(1965–1966–1970–1978–1982–1986–1990)

The CCIR,

CONSIDERING

(a) Resolutions Nos. 329 (Mob-87), 332 (Mob-87) and 333 (Mob-87) and Recommendation No. 319 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) that there is a requirement for communication in the maritime mobile service by means of direct-printing telegraph techniques;

(c) that Recommendation 476 recommends a direct-printing telegraph system which uses error-detecting and error-correcting methods;

(d) that this system has proved to provide a satisfactory technical solution and is in actual operation, in accordance with Appendix 38 to the Radio Regulations (Geneva, 1979);

(e) that Recommendation 625 describes an improved narrow-band direct-printing system, providing automatic identification of both stations and enables the use of 9-digit identities (see reference Appendix 43 to the Radio Regulations), while maintaining compatibility with equipment in accordance with Recommendation 476;

(f) that further improvements may be possible;

(g) that operational procedures should be agreed upon,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what improvements and additional procedures should be recommended for direct-printing telegraph systems in the maritime mobile service?

2. what are the technical characteristics of a direct-printing telegraph system to provide for the transmission of NAVTEX-type information on the frequencies 490 kHz and 4209.5 kHz;

3. what are the technical characteristics of a direct printing telegraph system to provide for the transmission of High Seas Maritime Safety Information in the HF band;

4. what technical factors need to be considered to facilitate global coordination and utilization of NAVTEX-type systems by the IMO, the WMO, the IHO and the IFRB;

5. what are the factors which determine the technical compatibility between adjacent direct-printing channels in the HF bands?

Note – See Reports 585, 909, Report 1027 and Recommendations 476, 490, 491, 492, 540 and 625.

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* The Director of the CCIR is requested to bring this Question to the attention of the International Maritime Organization (IMO), the International Hydrographic Organization (IHO) and the World Meteorological Organization (WMO) and the IFRB.

QUESTION 7-4/8*

CHARACTERISTICS OF EQUIPMENT AND FREQUENCY PLANNING FOR THE LAND MOBILE SERVICE BETWEEN 25 AND 3 000 MHz

(1956-1966-1970-1974-1990-1992)

The CCIR,

considering

a) that there is a necessity for efficient use of the frequency bands allocated to the land mobile service;

b) that an interchange of information on the requirements of administrations concerning the technical characteristics of equipment used in land mobile services between 25 and 3 000 MHz, would be advantageous in the development of those services;

c) that an exchange of information among different countries concerning the practices applied to the assignment of channels and the experience gained in the operation of land mobile services between 25 and 3 000 MHz is of value in general;

d) that a certain measure of agreement may be desirable on the characteristics of the land mobile equipment that are used in the border areas of neighbouring countries to minimize mutual interference;

e) that a certain measure of agreement may also be desirable on the practices governing the allocation and use of channels in land mobile services between 25 and 3 000 MHz in border areas;

f) that a degree of standardization is desirable, since the land mobile service connected to the national network may form part of an international connection;

g) that it is desirable to determine equipment technical characteristics, to facilitate the planning of channel allocation in the land mobile bands;

h) that it would therefore be desirable to reach agreement upon which are the essential technical characteristics for VHF and UHF radiotelephone equipment for use in the land mobile service, in order to expedite the international interchange of data on such equipment;

j) that it is also desirable to investigate the relationship between subjective measurement techniques and objective measurement techniques for the various systems operating in the land mobile service,

decides that the following Question should be studied

1. What are the technical requirements of administrations concerning equipment used in land mobile services between 25 and 3 000 MHz that are of international importance in the development of such services, e.g. transmitter power, antenna characteristics, emission characteristics, frequency tolerance?

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* This Question merges Question 7/8, Study Programme 7A/8, and Question 100/8 (previously Study Programme 7E/8). The Director, CCIR, is requested to bring this Question to the attention of the International Electrotechnical Commission (IEC) and the CCITT.

2. To what extent would it be desirable to standardize the performance characteristics of land mobile equipment between 25 and 3 000 MHz internationally?

3. What are the broad practices adopted by administrations in the allocation of channels to the various kinds of user in the land mobile service between 25 and 3 000 MHz, e.g. channel separation, geographical spacing of stations in the same adjacent channels, frequency separation for duplex operation, degree of frequency sharing in a particular service area?

4. To what extent is it desirable to reach international agreement on the practices for the allocation and coordination of frequencies in the land mobile service between 25 and 3 000 MHz?

5. What are the equipment characteristics (and/or methods of measurement) for the various land mobile services between 25 and 3 000 MHz which may be adopted by administrations, in particular:

5.1 for frequency-modulation systems:

5.1.1 the maximum frequency deviation for various channel-frequency spacings;

5.1.2 pre-emphasis and de-emphasis characteristics;

5.2 for amplitude and frequency-modulation systems:

5.2.1 the maximum audio-frequency bandwidth;

5.2.2 frequency tolerances of transmitters;

5.2.3 typical and maximum output powers of base and mobile station transmitters;

5.2.4 mean power limits of harmonic and other spurious emissions:

- falling in any other land mobile channel;
- falling within the bands of other radio services;

5.3 receiver characteristics, particularly:

5.3.1 frequency stability;

5.3.2 selectivity;

5.3.3 radiation;

5.3.4 intermodulation;

5.3.5 choice of intermediate frequency;

5.3.6 sensitivity;

5.3.7 audio-frequency response;

5.4 for systems utilizing digital modulation techniques:

5.4.1 optimum bandwidth for direct modulation;

5.4.2 direct and indirect digital modulation methods;

5.4.3 the bit rate;

5.4.4 the bit error ratio (BER);

5.4.5 harmonics and other spurious emissions:

- falling on any other land mobile channel;
- falling within the bands of other radio services;

5.4.6 typical and maximum output powers of base and mobile station transmitters;

5.4.7 receiver characteristics;

5.4.8 frequency tolerance, and its definition, in the case of direct digital modulation;

5.5 for amplitude companded single sideband (ACSSB) systems:

5.5.1 frequency and channelling plans;

5.5.2 frequency tolerance of transmitter;

5.5.3 companding characteristics;

5.5.4 pre-emphasis and de-emphasis characteristics;

5.5.5 pilot characteristics;

5.5.6 typical and maximum output powers of base and mobile station transmitters;

5.5.7 harmonics and other spurious emissions:

- falling on any other land mobile channel;
- measurement method;

5.5.8 receiver characteristics;

5.6 appropriate methods of:

5.6.1 measuring subjective voice quality with particular attention to voice recognizability and intelligibility;

5.6.2 relating objective and subjective measurements;

5.6.3 comparing either the peak or average RF powers;

5.6.4 comparing the interference caused by co-channel and/or adjacent-channel emissions modulated by voice and/or data;

5.6.5 measuring adjacent-channel and co-channel interference for the digital-to-analogue, digital-to-digital and analogue-to-digital cases;

5.6.6 measuring BER;

5.6.7 measuring of frequency tolerance in the case of direct digital modulation?

Note 1 - Questions 37/8, 72/8 and 99/8 should be kept under consideration.

Note 2 - See Reports 319, 740, 898, 1019, 1021, Recommendation 478 and Resolution 20.

QUESTION 9-6/8*

DIGITAL SELECTIVE-CALLING SYSTEM FOR FUTURE OPERATIONAL REQUIREMENTS OF THE MARITIME MOBILE SERVICE

(1967-1970-1974-1978-1982-1986-1990)

The CCIR,

CONSIDERING

(a) Recommendation No. 312 (Rev.Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) Articles N37 to N41 of the Radio Regulations relating *inter alia* to the use of digital selective calling for distress and safety requirements in the maritime mobile service;

(c) the establishment in the Radio Regulations of a frequency plan including channels for digital selective calling;

(d) the 1988 amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, concerning digital selective calling;

(e) that Recommendation 493 recommends the operational characteristics and the technical characteristics of the digital selective-calling system for use in the maritime mobile service;

(f) that Recommendation 541 recommends the operational procedures for the use of digital selective-calling equipment in the maritime mobile service,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what information, in conjunction with the selective call, may be required for the operation of future maritime communication systems;

2. what operational procedures should be added to Recommendation 541 as operational experience is gained with the digital selective-calling system by administrations?

Note – See Reports 501, 908 and Recommendations 493 and 541.

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* The Director, CCIR, is requested to draw the attention of the International Maritime Organization (IMO) to this Question and invite it to cooperate in the study.

QUESTION 12-3/8*

RADIO-PAGING SYSTEMS**

(1968-1974-1986-1990)

The CCIR,

CONSIDERING

(a) that systems for paging by means of radio are in operation in a number of countries and that their use is extending;

(b) that as the areas of coverage are increased, the possibility of interference between different radio-paging systems, and between radio-paging systems on the one hand and other radiocommunication systems on the other hand is increased;

(c) that the various systems already in use, or proposed, are not necessarily compatible one with another;

(d) that system compatibility is necessary in the case of international operation;

(e) that for international operation it is desirable to agree on the parameters of the system or systems, and arrange some degree of technical and operational harmony if there is more than one system;

(f) that it is essential to make the most efficient use of the available radio-frequency spectrum;

(g) that Report 499 indicates the need for a standardized signalling format with the choice of the appropriate coding technique taking account of the capacity of code combinations, the speed of transmission and the reliability of call reception;

(h) that Recommendation 539 recommends that the transmission of alternative messages should be possible to any paging receiver in an international service;

(j) that a standardized code and format are desirable to permit receivers to operate freely in radio-paging systems providing an international service;

(k) that the alternative of code conversion is uneconomic of equipment and results in a significant reduction of the paging rate achievable;

(l) that an acceptable standard would lead to compatibility of eqlipment and systems;

(m) that large scale production of decoders is beneficial to operators and users alike;

(n) that national systems are being established which require codes providing up to 2 million discrete combinations;

(o) that international systems will require many more combinations;

(p) that each code combination has to be associated with a unique dialling code used in the public telephone network with which the radio-paging service operates;

(q) that for international use the code should be applicable to both large and small national systems without creating problems for either,

UNANIMOUSLY DECIDES that the following question should be studied:

1. based on service area considerations, what types of radio-paging systems may be identified and of these, which are of international importance;

2. from a technical point of view, what frequency bands are most suitable for radio-paging systems;

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* This Question merges Question 12/8 and Study Programme 12A/8.

** Radio-paging: a non-speech, one-way, personal selective calling system with alert, without message or with defined message such as numeric or alphanumeric.

3. what overall quality of transmission (capacity, degree of immunity from false calls, successful call ratio, etc.) should be provided by radio-paging systems;

4. what are the technical characteristics of radio-paging systems on which international agreement is desirable, including consideration of harmonization if more than one solution (for example, to cater for a range of transmission rates) is needed;

5. what operational facilities need to be specified to permit international operation of radio-paging systems, and in what circumstances could they share frequencies with other radiocommunication systems;

6. what code and format is suitable for use in international radio-paging systems, taking account of:

6.1 the frequency bands likely to be used;

6.2 the error rates likely to be encountered, particularly in urban areas;

6.3 the possible range of system sizes;

6.4 the code capacity necessary;

6.5 the rate or rates of code transmission required;

6.6 any differences in code made necessary if more than one rate is required, bearing in mind the need to achieve as much harmonization as possible;

7. what is the most appropriate means of transmission of such codes over the radio system;

8. what is the format for codewords and combinations of codewords which would fully exploit the advantages of the chosen code whilst allowing to the maximum extent future modification and expansion?

Note – See Recommendations 539, 584 and Reports 499 and 900.

QUESTION 14-1/8

DIRECT-PRINTING AND OTHER DATA SIGNALS USING VOICE-FREQUENCY TECHNIQUES ON VHF RADIOTELEPHONY CHANNELS IN THE MARITIME MOBILE SERVICE

(1970–1978)

The CCIR,

CONSIDERING

(a) that provision is made in Appendix 18 of the Radio Regulations for radiotelephony in the maritime mobile service in the frequency band 156 to 174 MHz;

(b) that provision is also made for high-speed data and facsimile transmissions as well as narrowband direct-printing telegraphy and data transmissions, subject to special arrangement between interested and affected administrations;

(c) that the application of VHF radio techniques enables communication services to be made available to ships on coastal and inland waters with predictable reliability and coverage area;

(d) that in many such areas, the use of digital and analogue voice-frequency techniques now utilized over land circuits can be extended to ships by VHF radio using existing radio equipment;

(e) that there are developing requirements for reliable facilities enabling the exchange of direct-printed information, and of data and facsimile traffic between ships and subscribers ashore;

(f) that a number of administrations have already introduced direct-printing techniques in the maritime mobile service;

(g) that the required shipborne equipment should not be unduly complex;

(h) that a VHF maritime radiotelephone channel may be suitable for direct-printing and other data signals or that such a channel may be suitable for simultaneous transmission of radiotelephony and direct-printing or similar data signals;

(j) that preferably the radiotelephone traffic-handling capacity, and the service quality, of the available channels should not be unduly reduced by the introduction of direct-printing or other kinds of traffic,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what technical standards should be adopted in the use of voice-frequency techniques for direct-printing, data and facsimile transmissions in the VHF maritime mobile service;

2. what are the comparative advantages of using the same or different channels for radiotelephony and the other kinds of traffic referred to in § 1 above;

3. what procedures, including choice of frequency channels, should be adopted for types of communication other than radiotelephony with duplex and simplex radio equipment?

Note – See Report 584.

QUESTION 27-3/8*

TECHNICAL PARAMETERS OF RADAR BEACONS (RACONS)

(1982–1986–1990)

The CCIR,

CONSIDERING

(a) that shipborne radars operate in the bands 2920-3100 MHz and 9320-9500 MHz;

(b) that aeronautical mobile radars operate in the band 9320-9500 MHz;

(c) that there are various types of maritime radar beacons (maritime racons) which operate in the frequency bands 2920-3100 MHz and 9320-9500 MHz;

(d) that the use of fixed frequency racons is not permitted in the band 9320-9500 MHz;

(e) that in the band 9300-9320 MHz the use of shipborne radars in the radionavigation service is not permitted until 1 January 2001 with a view to accomodating existing aeronautical fixed frequency racons in this band;

(f) that the use of shipborne transponder systems is confined to the bands 2930-2950 MHz and 9280-9300 MHz;

(g) that the use of the band 2900-3100 MHz by the aeronautical radionavigation service is limited to ground-based radars;

(h) that the use of processing techniques in radars is increasing;

(j) that the use of the band 9300-9500 MHz by the aeronautical radionavigation service is limited to airborne weather radars and ground-based radars. In addition, ground-based radar beacons in the aeronautical radionavigation service are permitted in the band 9300-9320 MHz on condition that harmful interference is not caused to the maritime radionavigation service. In the band 9300-9500 MHz, ground-based radars used for meteorological purposes have priority over other radiolocation devices,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what general technical parameters should be recommended for radar beacons (racons) taking into account electromagnetic compatibility with other services having allocations in the same frequency bands;

2. what specific technical parameters should be recommended for fixed frequency racons;

3. what specific technical parameters should be recommended for the various types of racons which could operate in the same frequency bands as shipborne radars?

Note – See Report 774 and Recommendation 554.

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* The Director, CCIR, is requested to bring this Question to the attention of the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO), the World Meteorological Organization (WMO) and the International Association of Lighthouse Authorities (IALA).

QUESTION 28-2/8 *

FREQUENCY REQUIREMENTS FOR SHIPBORNE TRANSPONDERS **

(1974–1982–1990)

The CCIR,

CONSIDERING

(a) Recommendations No. 14 (Mob-87) and No. 605 (Rev.Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) the need to ensure that the response of a shipborne transponder is not capable of being interpreted as that of a radar beacon,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what is the most suitable order of frequencies and bandwidth required for shipborne transponders and the technical parameters to be met by such devices, taking into account electromagnetic compatibility with other services having allocations in the same frequency bands;

2. what are the most suitable techniques to be used for the identification and location of special vessels, such as medical transports, by means of standard maritime radar transponders, taking into account the technical and economic impact of their introduction?

Note – See Report 775 and Recommendations 628 and 630.

* The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO) and to the International Association of Lighthouse Authorities (IALA).

** A receiver-transmitter which emits a signal automatically when it receives the proper interrogation.

QUESTION 30-3/8

IMPROVED USE OF THE HF RADIOTELEPHONE CHANNELS FOR COAST STATIONS IN THE BANDS ALLOCATED EXCLUSIVELY TO THE MARITIME MOBILE SERVICE

(1974-1978-1982-1990)

The CCIR,

CONSIDERING

(a) Recommendation No. 302 (Rev.Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) that the level of man-made noise on board ships may affect the efficient use of radiotelephone channels (see Recommendation 218);

(c) the limited number of channels available for HF radiotelephony in the maritime mobile service;

(d) the increasing demands for radiotelephony in the maritime mobile service,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the technical and operational sharing criteria relating to the use of HF coast radiotelephone channels in the bands allocated exclusively to the maritime mobile service, which should be recommended including the use of electronic or other means to facilitate multiple access to the channels;

2. what improved operational procedures should be adopted for setting up calls to obtain a more efficient channel utilization;

3. what new methods of determining sharing patterns are feasible;

4. in the case of man-made noise on board ships:

4.1 what is the preferred method of measurement;

4.2 what are the sources and levels, and

4.3 what further measures other than those indicated in Recommendation 218 are possible for effectively reducing these noise levels?

Note – See Reports 748 and 1032.

QUESTION 31-4/8*

FUTURE USE AND CHARACTERISTICS OF EMERGENCY POSITION-INDICATING RADIO BEACONS IN THE MOBILE SERVICE

(1974–1978–1982–1986–1990)

The CCIR,

CONSIDERING

(a) Resolution No. 601 (Rev.Mob-87) and Recommendation No. 604 (Rev.Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) the development of automated watch-keeping facilities for use on board ships;

(c) that the Global Maritime Distress and Safety System shall provide for the receipt of distress alerts and the location of units situated in all maritime areas;

(d) that administrations may find it necessary to develop EPIRBs to satisfy unique national requirements;

(e) that requirements for carriage of EPIRBs operating on the frequencies 121.5 MHz and 243.0 MHz have been included in the International Convention for the Safety of Life at Sea (SOLAS), 1974;

(f) that requirements for the carriage of satellite EPIRBs operating in the frequency bands 406-406.1 MHz and 1645.5-1646.5 MHz have been included in the 1988 amendments to the 1974 SOLAS Convention,

UNANIMOUSLY DECIDES that the following question should be studied:

what are the preferred technical and operating characteristics of EPIRBs to meet the requirements of IMO and ICAO and what is the preferred order of frequencies, with particular reference to the prime requirement for homing and the desirability for unification?

Note – See Report 749 and Recommendation 439.

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* The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO) and to invite these organizations to make their requirements known to the CCIR.

QUESTION 33-2/8

INTERFERENCE TO RADIONAVIGATION SERVICES FROM OTHER SERVICES IN THE BANDS BETWEEN 70 kHz AND 130 kHz

(1976-1978-1990)

The CCIR,

CONSIDERING

(a) Resolution No. 705 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) that the Radio Regulations authorize radionavigation, fixed and maritime mobile services in various combinations in the bands between 70 and 130 kHz depending on region;

(c) that radionavigation systems are either operational or being implemented to provide coverage in all regions;

(d) that since radionavigation is a safety service, it is essential that there be no harmful interference to any system of the service;

(e) that both pulse and continuous wave radionavigation systems are used in the separately allocated bands between 70 kHz and 130 kHz;

(f) that separation in time domain of radionavigation signals of one system enables several stations of that system to overlap the same geographic area,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what system parameters must be defined to assure compatibility and to avoid harmful interference between the different systems of the radionavigation service and/or other services authorized in the bands between 70 and 130 kHz;

2. what system factors may cause interference between the same and different types of radionavigation systems where the former operate in the same band and the latter operate in one or more of the other bands between 70 and 130 kHz;

3. what operational characteristics should be recommended to avoid mutual interference between stations providing the same type of radionavigation service?

Note – See Recommendation 589 and Report 915.

QUESTION 35-1/8 *

EFFICIENT USE OF THE RADIO SPECTRUM BY RADAR STATIONS IN THE RADIODETERMINATION SERVICE

(1977-1978)

The CCIR,

CONSIDERING

(a) that the radio spectrum available for use by the radiodetermination service is limited;

(b) that the necessary bandwidths of emissions from radar stations in the radiodetermination service are large compared with emissions from stations in many other services;

(c) that wherever possible, it is desirable for different radar stations to use the same frequencies;

(d) that various techniques, including Pulse Recurrence Frequency Discrimination (PRFD) have been used successfully in a number of countries to reduce mutual interference and enable radar stations in close proximity to use the same frequencies;

(e) that maritime radar stations should be compatible with radar beacons in the maritime radionavigation service,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what economy in spectrum utilization, and improvement in operational performance can be achieved by the use of interference suppression techniques for radar stations;

2. what technical characteristics of radar stations should be recommended for international application;

3. what radiodetermination services could utilize interference suppression techniques effectively;

4. what are the limitations on the use of interference suppression techniques;

5. what other factors could improve the efficiency of utilization of the frequency spectrum?

Note – See Report 914.

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* The Director, CCIR, is requested to bring this Question to the attention of the International Association of Lighthouse Authorities (IALA), the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO).

QUESTION 36/8

RADIATING CABLE SYSTEMS IN THE LAND MOBILE SERVICES

(1978)

The CCIR,

CONSIDERING

(a) that the number of radio stations in the land mobile service is increasing very rapidly;

(b) that new stations can sometimes only be introduced at the expense of degrading the performance of existing systems by interference;

(c) that systems employing radiating cables having a low interfering potential are in use;

(d) that radiating cable systems could be used with advantage to meet certain operational needs, for example: coverage of motorways, railways and tunnels,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what frequency bands are to be preferred for the applications in which it is advantageous to use radiating cables;

2. whether frequency bands allocated to other radio services could be used additionally for land mobile services using radiating cables and, if so, under what conditions;

3. what are the preferred technical and operating characteristics for use in radiating cable systems?

Note – See Report 902.

QUESTION 37-2/8

SYSTEMS WITH IMPROVED SPECTRUM EFFICIENCY FOR THE LAND MOBILE SERVICE

(1978-1982-1992)

The CCIR,

considering

a) that the number of radio stations in the land mobile service is increasing very rapidly;

b) that in several geographical areas the growing demand for radio channels in the land mobile service has resulted in a serious congestion in the frequency bands allocated to this service;

c) that in order to alleviate these bands as well as those to be allocated in the future, it is desirable for the land mobile service to employ spectrum saving techniques;

d) that Question 7/8 deals with the spectrum efficiency to be achieved by modulation techniques;

e) that improved spectrum efficiency might be achieved:

- by employing automatic techniques for the sharing of radio channels;
- by optimizing the size of base station coverage areas, particularly for stations operating in the higher frequency bands, e.g. in the 900 MHz region, where the coverage areas may be small;
- by combining these techniques and others;

f) that, particularly for systems operating in border areas of neighbouring countries, it is desirable to reach international agreement on certain system parameters and technical equipment characteristics which result in maximum usage flexibility,

decides that the following Question should be studied

1. What techniques are appropriate to improve spectrum efficiency of public and private land mobile systems covering one or more radio zones, taking the following aspects into consideration:

- frequency bands and propagation conditions;
- switching of radio channels for calls-in-progress, when mobile stations move from one coverage area to a neighbouring area (hand-over);
- the initiation and receiving of calls through a control centre other than the control centre to which the mobile station is assumed to be assigned (roaming);
- the diverse nature of mobile systems operating in urban and rural areas?

2. In which way and to what extent is it possible to achieve improved spectrum efficiency by employing automatic techniques for the sharing of radio channels, for example by means of trunking systems covering one or more radio zones, taking into account essential system characteristics like traffic density, grade of service, etc. and costs?

3. What are the optimum sizes of base station coverage areas from the point of view of frequency spectrum efficiency, complexity of equipment, propagation factors and performance objectives?

4. What are the preferred frequency assignment methods?

5. Can spectrum efficiency be improved by integration of public and private networks and if so, in what way and to what extent?

6. How can the improvement in spectrum efficiency be defined and measured?

Note 1 - See also relevant Reports of Study Group 1.

7. What are the system parameters and technical characteristics of equipment on which international agreement is desirable?

8. What technology and system design characteristics specific to cellular systems and personal communications could be adapted for use in conventional dispatch mobile applications?

Note 1 - See Recommendation 622, Reports 740, 741 and 901.

QUESTION 38-2/8

USE OF FREQUENCIES IN THE BANDS BETWEEN ABOUT 1606 AND 4000 kHz ALLOCATED TO THE MARITIME MOBILE SERVICE

(1978-1982-1990)

The CCIR,

CONSIDERING

(a) the fact that the frequency bands shared between the mobile and the fixed services between about 1606 and 4000 kHz are very useful to the land mobile service and to the fixed service for certain types of circuits;

(b) that during the time of day when the traffic of the maritime mobile service is highest only the surface wave is usable in practice in these bands,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the technical and operational aspects to be considered in the use of frequencies in the bands between about 1606 and 4000 kHz allocated to the maritime mobile service;

2. what are the criteria for geographical and time sharing of the frequency bands between about 1606 and 4000 kHz between the maritime mobile service and the fixed and land mobile services, in view of the different conditions under which these frequencies are used by these various services?

Note – See Report 1030.

QUESTION 39-3/8*

FUTURE PUBLIC LAND MOBILE TELECOMMUNICATION SYSTEMS

(1978-1982-1990-1992)

The CCIR,

considering

a) that public mobile telephone services, i.e. services for public correspondence via radio stations connected to the switched public telephone network, are in operation in a number of countries and that their use is extending;

b) that the various systems already in use or proposed for such services, are not necessarily compatible one with another;

c) that for international operation it is desirable to agree on the parameters of the system;

d) Resolution No. 212 (WARC-92) of the World Administrative Radio Conference (Malaga-Torremolinos, 1992);

e) that the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement the future public land mobile telecommunication systems (FPLMTS), including the bands 1 980-2 010 and 2 170-2 200 MHz for the satellite component of FPLMTS;

f) Question 52/8 on the integration of public radiocommunication services in the VHF/UHF frequency bands;

g) the need to improve spectrum utilization efficiency and hence system capacity (erlang/MHz/unit area);

h) that system compatibility is necessary for international operation, and that maximum commonality is desirable to ensure that the overall system cost per mobile user is significantly less than with present systems;

j) the need for a flexible system structure able to match network investment to revenue growth, readily to adapt to environmental factors and to respond to new development rather than restrict innovation;

k) the increasing importance of the various types of non-voice telecommunication services;

l) Question 101/8 on digitized speech transmission, Question 107/8 and Question 37/8 on cellular systems;

m) Recommendation No. 717 of WARC-92;

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* The Director, CCIR, is requested to bring this Question to the attention of the CCITT.

n) CCITT Recommendations and on-going work items that are relevant to this work;

o) that various systems are currently under study;

p) that the use of internationally agreed frequency bands also facilitates the planning of national networks and reduces the risk of harmful interference with other radio services;

q) that personal telecommunication services are expected to be introduced throughout the public telecommunication networks based on evolving intelligent network capability;

r) that the cost of radio and VLSI technology is continually decreasing, thus making, in a number of cases, the radio approach a competitive alternative access option to the voice and non-voice telecommunication services;

s) that FPLMTS will comprise both terrestrial and satellite components with some stations capable of accessing both components, see Recommendation 818;

t) that there is a need for mobile terminals to roam between public land mobile telecommunication networks in different countries;

u) that a standardized radio interface would facilitate the roaming of mobile units between networks;

v) that users may want to be able to use the same terminal equipment and procedures as in the fixed network ISDN to access similar telecommunication services in FPLMTS,

decides that the following Question should be studied

1. What are the overall objectives for future public land mobile telecommunication systems such as (see Note 1):

- type of service - voice, data, other;
- mode - vehicular, personal (hand-held, portable), combined;
- flexibility to provide a wide range of services, national and local adaptation, and accommodation of future state-of-the-art advancement?

2. What operational facilities and technical characteristics need to be specified to permit international operation?

3. What are the system parameters and technical characteristics of equipment used on which international agreement is desirable?

4. What is the degree of compatibility or commonality which is desirable or achievable such as (see Note 1):

- international, regional, national compatibility (roaming);
- radio interface compatibility;
- common signalling and numbering;

- components and technological commonality;
- the application of FPLMTS technology for the provision of fixed services, particularly for the needs of the developing countries?

5. What are the significant impacts (quantified) on system solutions which arise from environmental and economic factors such as (see Note 1):

- estimated demand, e.g. demand and demand distribution (temporal, geographical and service by service);
- status of technology;
- spectrum availability;
- costs (user equipment and infrastructure);
- propagation factors;
- network interfaces;
- integration of services?

6. What are the technical characteristics such as (see Note 1):

- modulation and radio transmission techniques;
- access methods;
- radio channel interfaces and control methods;
- system configurations;
- deployment of transmission resources, for example, demand assignment;
- techniques to provide system flexibility as in § 1;

7. What are the spectrum requirements including:

- spectrum bandwidth needs, based on relevant technical and operational parameters together with FPLMTS services and traffic estimates;
- special spectrum needs for FPLMTS, for example that to enable international/worldwide roaming?

8. What are the special criteria for spectrum sharing between FPLMTS and other radio services?

9. What are the appropriate FPLMTS matters corresponding to CCITT studies of Universal Personal Telecommunication (UPT) and other relevant areas, in particular:

- mobility-based service definitions;
- requirements for CCITT concerning numbering, routing and charging matters;
- the requirements for signalling over the radio interface and within the fixed network;

- coding/transcoding of information, especially speech coding, by methods suitable for radio systems;
- requirements for interworking and integration between FPLMTS and other telecommunication networks;
- appropriate working relationships with CCITT Study Groups for the above subjects?

10. What are the services and relevant technical and operational characteristics for FPLMTS, in particular:

- personal telecommunication services;
- mobility-based services;
- basic structure of information and control channels;
- overall performance objectives;
- network management?

11. What are the optimum arrangements and technical characteristics needed to adapt FPLMTS for use as fixed or mobile services in rural or remote or low populated areas or low-income urban areas?

Special attention should be paid to:

- the need of providing an economical, reliable and high quality telecommunications infrastructure;
- the possibility of using the equipment in a variety of environments including extremes of heat and cold, high humidity, dust, corrosive atmospheres and other environmental hazards;
- the need for rugged, simple-to-maintain equipment;
- the possibility of using satellite, and other radio systems.

Particular emphasis should be given to the following items:

- modular design (easily expandable) for both hardware and software;
- universal protocols and standards.

Note 1 - The list of examples is not exhaustive.

Note 2 - See Recommendations 624, 687, 816, 817, 818 and 819.

QUESTION 40-2/8

DIGITAL TRANSMISSION IN THE LAND MOBILE SERVICE

(1978-1982-1986)

The CCIR,

CONSIDERING

(a) that digital signals in various formats are being used to improve the communications efficiency of the land mobile service;

(b) that there may be advantages in adopting digital transmission standards that are compatible with the characteristics of the speech channel of existing land mobile systems;

(c) that there may also be advantages in adopting for the land mobile service standards that are compatible with the CCITT Recommendations relevant to the fixed services;

(d) that the transmission characteristics of land mobile systems may differ from those of the fixed services, due to the particular characteristics of the service, its radio frequency propagation path and noise environment;

(e) that digital transmission systems which are not compatible with existing land mobile systems should also be considered, including the transmission of digitally encoded speech signals,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what data speeds are suitable and how should the data be formed (e.g. word and block length)*;

2. what improvements in performance can be achieved by the use of, for example, various diversity techniques, various error detection/correction codes or other techniques*;

3. what bit error ratio and error distribution will occur as a result of the following channel impairments:

3.1 multipath propagation, shadowing and receiver noise (the effects of multipath propagation are different at low and high bit rates);

3.2 ignition noise;

3.3 co-channel and adjacent-channel interference;

4. how does the service area of a digital data system compare with the service area of digital and analogue speech systems;

5. what are the requirements for digital modulation methods which could directly modulate the radio frequency carrier of the transmitting equipment of future land mobile systems;

6. what are the possibilities of conveying digitally encoded speech signals in the systems referred to in § 5;

7. what characteristics of data modems* should be specified to ensure compatibility with existing mobile equipment, taking into account the particular characteristics of the radio path and available information from the CCITT?

Note – See Recommendation 623, Report 903.

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* See V and X Series Recommendations of the CCITT.

QUESTION 42-1/8

CHARACTERISTICS OF DIGITAL CHANNELS IN THE MARITIME MOBILE SERVICE

(1978-1990)

The CCIR,

CONSIDERING

(a) Recommendation No. 319 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) that the administrations of many countries are developing equipment designed for the transmission of digital information by radio channels in the maritime mobile service;

(c) that the adoption of technical recommendations should be based on a comparison of the quality of the equipment proposed by various administrations;

(d) that it is difficult to arrange for joint comparative tests of different types of equipment;

(e) that the operational characteristics of digital information transmission equipment depend to a large extent on the radio-channel conditions;

(f) that, in view of the variable nature of radio propagation in the maritime mobile service, the test results obtained on the equipment by the administrations may differ;

(g) that it is essential to develop a standard method for assessing test conditions in radio channels in the maritime mobile service,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what parameters should be considered in assessing the quality of digital radio channels, for example, the (bit, symbol, word) error probability in a specified time interval, the error grouping rate for blocks of various lengths, strength of signal and interference, etc.;

2. on what scope should tests be conducted;

3. what test signals should be used for evaluating the quality of channels;

4. what method should be used to assess the quality of radio channels when administrations carry out full-scale tests of digital information transmission equipment;

5. in what range of variation of channel quality should tests be carried out on digital information transmission equipment;

6. what are the factors which determine the technical compatibility between adjacent digital channels in the HF bands?

Note – See Report 743 and Recommendation 626.

QUESTION 45-4/8*

TECHNICAL AND OPERATING CONSIDERATIONS FOR A GLOBAL LAND AND MARITIME DISTRESS AND SAFETY SYSTEM

(1978-1982-1983-1986-1990)

The CCIR,

CONSIDERING

(a) Resolution No. 209 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) that provisions have been included in the Radio Regulations relating to the Global Maritime Distress and Safety System (GMDSS) to meet the specific needs of the maritime mobile and maritime mobile-satellite services for distress and safety communications;

(c) that stations of the land mobile and land mobile-satellite services may use the frequencies and procedures of the GMDSS in sparsely populated, uninhabited or remote areas for distress and safety purposes;

(d) that further development of the communication facilities in the GMDSS is necessary to meet the specific needs of the land mobile and land mobile-satellite services for distress and safety,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are operational requirements for distress and safety communications in sparsely populated, uninhabited or remote areas of the world;

2. what are the technical and operational characteristics, organizational arrangements and operating procedures necessary to meet the specific needs of the land mobile and land mobile-satellite services for distress and safety communications?

* The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO) and invite these Organizations to make their requirements known to the CCIR.

QUESTION 48-2/8

TECHNIQUES AND FREQUENCY USAGE IN THE AMATEUR SERVICE AND AMATEUR-SATELLITE SERVICE

(1978–1982–1990)

The CCIR,

CONSIDERING

(a) that the Radio Regulations define an amateur service and that the World Administrative Radio Conference for Space Telecommunications, Geneva, 1971, established an amateur-satellite service, allocated frequencies to it in bands already allocated to the amateur service on an exclusive or shared basis, and adopted No. 2741 of the Radio Regulations concerning cessation of emissions from amateur satellites;

(b) that the amateur and amateur-satellite services provide benefits of self-training, intercommunication, and technical investigation carried on by amateurs, that is, by duly qualified and authorized persons throughout the world interested in radio techniques solely for the development of personal skills and mutual exchange of information without pecuniary interest;

(c) that, incidental to their basic purposes, the amateur and amateur-satellite services have pioneered in new and novel techniques for radio reception and transmission using inexpensive equipment with relatively small antennas;

(d) that frequency dependent factors determine to a large extent the effectiveness of radiocommunications in the amateur and amateur-satellite services;

(e) that the amateur service and the amateur-satellite service continue to make significant contributions to the observation and understanding of propagation phenomena;

(f) that amateur and amateur-satellite station operators continue to contribute to the development and demonstration of spectrum conservation techniques throughout the radio frequency spectrum;

(g) that the amateur and amateur-satellite services are able to and do provide communications during natural disasters and other catastrophic events when normal communications are temporarily interrupted or inadequate for the needs of human relief operations,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what technical and operating factors influence the usage by the amateur and amateur-satellite service of the frequency bands allocated to them throughout the radio spectrum;

2. what techniques being applied or investigated in these services may be of interest to other services;

3. what uses are made of the frequency bands allocated to these services and what techniques and operating modes are employed;

4. what are the appropriate criteria for frequency sharing between the amateur, amateur-satellite and other radiocommunication services;

5. what is the potential interference from and to the amateur-satellite service in frequency bands shared with other services; what sharing criteria should be applied in these bands; and what are the differences in these criteria that should be applied with satellites in geostationary and non-geostationary orbits?

Note – See Report 1154.

QUESTION 49/8

RADIOCOMMUNICATION FOR SHORT-RANGE HEARING AIDS

(1978)

The CCIR,

CONSIDERING

(a) that in certain conditions, e.g. in noisy environments or for persons with impaired hearing it is desirable to operate appropriate radiocommunication hearing aids;

(b) that a significant number of persons have impaired hearing;

(c) that in such conditions acoustically linked hearing aids do not allow speech to be presented at an optimum level and without environmental noise;

(d) that radio emission is a practical means of transferring a signal with a favourable signal-to-noise ratio from a microphone located near the lips of the person whose speech is being auditioned to a hearing aid;

(e) that such a radiocommunication hearing aid could be designed to assist persons with a hearing loss to communicate over distances as are ordinarily spanned by unaided speech;

(f) that a range of transmission of about 10 metres would be adequate;

(g) that such a short range transmission can be obtained in an induction field having an approximately inverse cubic decay characteristic;

(h) that certain countries are carrying out research and development into such systems;

(j) that such a communication system may have wider application;

(k) that persons with hearing impairments would benefit from using radiocommunication hearing aids when travelling;

(l) that international agreement to the use of these devices is desirable,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the most suitable technical characteristics of a short-range radiocommunication hearing aid system;

2. what interference is likely to be caused to other services by the widespread use of low power radiocommunication hearing aids;

3. what protection is required from other services to permit satisfactory operation of radiocommunication hearing aids using an internationally common radio frequency channel;

4. what is the preferred frequency band and mode of operation for a short-range hearing aid system?

Note – See Report 778.

QUESTION 51-2/8

AUTOMATIC DETERMINATION OF LOCATION AND GUIDANCE IN THE LAND MOBILE SERVICE

(1982-1986-1990)

The CCIR,

CONSIDERING

(a) that within the land mobile service there is a great and growing demand for automatic vehicle location (AVL), including portables;

(b) that in advanced land mobile systems which use computer-controlled dispatch this requirement is often essential;

(c) that radio location systems are in operation for other services which can give accurate position data;

(d) that the operational requirements for AVL systems can vary considerably e.g. between urban and rural areas and between various types of operations in the land mobile service;

(e) that the introduction of AVL in international land mobile services may be required;

(f) that in some circumstances AVL systems may be shared by a number of land mobile radio systems;

(g) that minimizing the number of types of AVL systems could improve spectrum efficiency;

(h) that a considerable part of the voice communications on radio dispatch channel is location and other routine messages;

(j) that the costs of running land mobile dispatch operations are sharply increasing;

(k) that an AVL system integrated in a land mobile radio dispatch system can potentially reduce the cost of running land mobile dispatch operation;

(l) that within the land mobile service there is growing demand for guidance systems;

(m) that both guidance systems and AVL systems may use the same basic techniques for location;

(n) that collaboration has been established to develop a standardized guidance system throughout Europe;

(o) that guidance can potentially reduce journey costs and improve road safety,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what type of AVL systems are suitable for use in the land mobile service; for what type of operations and which of these types are suitable for international use;

2. what are the operational requirements for AVL systems e.g. procedures, accuracy and coverage;

3. what are the frequency bands of operation and bandwidth requirements for the various AVL techniques;

4. what are the advantages and disadvantages of the different AVL techniques;

5. what are the technical characteristics for AVL systems which need to be standardized, including those required when an AVL system is shared by a number of land mobile systems and when it is used in international services;

6. whether existing radio location systems in other services can be used to meet the needs of the land mobile services;

7. how can existing land mobile installations and frequency assignments be used to provide AVL;

8. what data traffic levels are expected and what are the requirements as concerns acceptable transmission delay, frequency of up-date and error rate when the determination of location is made within a mobile unit;

9. what are the costs/benefits of AVL to land mobile dispatch operations;

10. what is the impact of AVL on spectrum efficiency as a result of the reduction in voice communications;

11. what types of guidance systems are available;

12. what are the advantages and disadvantages of the different guidance systems;

13. what are the additional techniques used in guidance systems;

14. what are the benefits of guidance systems to users?

Note – See Report 904.

QUESTION 52-1/8*

INTEGRATION OF PUBLIC MOBILE RADIOCOMMUNICATION SERVICES IN THE VHF/UHF FREQUENCY BANDS

(1982-1986)

The CCIR,

CONSIDERING

(a) Recommendation No. 310 of the World Administrative Radio Conference (Geneva, 1979);

(b) Recommendations 586 and 587 related to an automated VHF/UHF maritime mobile telephone system;

(c) Question 39/8 on public land mobile telephone systems;

(d) Question 74/8 on a public mobile telephone system with aircraft;

(e) that advantages should be obtained from integration of the mobile services, for example, improved spectrum efficiency, economy in the production, use and operation of equipment, standard operating procedures and subscriber convenience;

(f) that various levels of integration are possible, for example, use of common frequency spectrum, switching equipment, and signalling and access procedures on the radio path;

(g) that the degree of integration might be influenced by operational constraints;

(h) that there is an urgent need to identify suitable frequency bands;

(j) Recommendation 478, especially in regard to the separation of transmit and receive frequencies;

(k) that some propagation characteristics differ for the respective mobile services;

(l) Questions 11/II and 6/XI of the CCITT,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what operating and technical characteristics need to be specified for the integration of public mobile radiocommunication services;

2. what levels of integration are practicable, and in what time frame;

3. what are the constraints associated with the different levels of integration and how can they be alleviated;

4. from a technical point of view what frequency bands are most suitable for integrated public mobile radiocommunication services?

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* The Director, CCIR is requested to bring this Question to the attention of the International Civil Aviation Organization, the International Maritime Organization and the CCITT.

QUESTION 53-3/8*

USE OF FREQUENCIES BY THE MARITIME MOBILE SERVICE IN THE BAND 435-526.5 kHz

(1982-1983-1986-1990)

The CCIR,

CONSIDERING

the need to share the band 435-526.5 kHz with services other than the maritime mobile service,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the technical and operational aspects to be considered in the use of frequencies by the maritime mobile service in the band 435-526.5 kHz in Region 1;

2. what are the sharing criteria with other services, and in particular in the band 510-526.5 kHz (510-525 kHz in Region 2) with special emphasis in the vicinity of the frequency 518 kHz, taking into consideration the three following propagation mechanisms:

- ground wave;
- receiving antenna located well above the ground level;
- sky wave?

Note – See Reports 910 and 1028.

* The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO); it should also be brought to the attention of Study Groups 5 and 6 concerning the propagation aspects involved, especially with regard to computer methods of propagation prediction.

QUESTION 54/8

TECHNICAL CHARACTERISTICS FOR MARITIME RADIO EQUIPMENT USING NARROWBAND PHASE-SHIFT KEYING (NB-PSK) TELEGRAPHY

(1982)

The CCIR,

CONSIDERING

(a) that digital communication modes are currently being widely introduced in the maritime mobile service;

(b) that the frequency stability of ship radio receivers and transmitters has considerably improved;

(c) that synchronous 7-unit codes with error detection are widely used in direct-printing links, using FSK modulation techniques;

(d) that the adoption of NB-PSK telegraphy could increase the number of channels available for digital communications;

(e) that the adoption of NB-PSK in the maritime service could replace the present use of FSK,

UNANIMOUSLY DECIDES that the following question should be studied:

1. with a view to determining the desirability of adopting narrowband PSK telegraphy what are:

1.1 the occupied bandwidths and out-of-band spectra of NB-PSK emissions;

1.2 the required frequency stability of radio links using NB-PSK;

1.3 the permissible deviations of the bit duration from the nominal value in systems using NB-PSK;

1.4 the comparative performance in the presence of noise fading and interference of maritime mobile service channels using NB-PSK and FSK;

1.5 the recommended characteristics of NB-PSK signal-shaping filters;

1.6 methods of using NB-PSK with transmitters, receivers and terminal equipment, and additional requirements for such equipment;

2. whether the NB-PSK modulation method is suitable for use with the codes being used in the maritime mobile service;

3. the operational and economic factors to be taken into account if NB-PSK were to be introduced into the maritime mobile service?

Note – See Report 909 and Recommendation 627.

QUESTION 55-2/8*

DEVELOPMENT AND FUTURE IMPLEMENTATION OF DATA EXCHANGE SYSTEMS AND SHIP MOVEMENT TELEMETRY AND TELECOMMAND SYSTEMS

(1982-1986-1990)

The CCIR,

CONSIDERING

(a) Resolution No. 310 (Rev.Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) that there may be a need for on-board data exchange systems between maritime navigation and radiocommunication equipment,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the bandwidths and the data formats required for data exchange systems and ship movement telemetry and telecommand systems;

2. which frequency bands are the most suitable, technically and operationally, for data exchange systems and ship movement telemetry and telecommand systems;

3. what would be the preferred characteristics of an on-board data exchange system between maritime navigation and radiocommunication equipment, and what additional technical requirements would the equipment need to meet, in order to exchange data;

4. what would be the characteristics of a system for gathering in real time the operational status of remotely located maritime navigation aids?

Note – See Reports 1043 and 1044.

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* The Director, CCIR, is requested to bring this Question to the attention of the International Association of Lighthouse Authorities (IALA), the International Maritime Organization (IMO), the International Electrotechnical Commission (IEC) and the CCITT.

QUESTION 56/8*

FREQUENCY SHARING BETWEEN SERVICES IN THE BAND 4-30 MHz

(1982)

The CCIR,

CONSIDERING

(a) that the World Administrative Radio Conference (Geneva, 1979) allocated several bands between 4 to 30 MHz on a shared basis to various services including the mobile services;

(b) that preliminary theoretical studies have indicated that satisfactory sharing can be carried out with high confidence under certain circumstances;

(c) that the frequencies in the 4-30 MHz band are typically used for propagating radio frequency energy over large distances using the sky-wave mode;

(d) that frequency sharing between the mobile services and other services requires a complete understanding of the technical parameters and operational procedures used in these services;

(e) that there is ever increasing need to improve the efficient use of the existing high frequency bands to satisfy the expanding world-wide communication requirement,

UNANIMOUSLY DECIDES that the following question should be studied:

what are the technical parameters and operational considerations which must be taken into account to permit satisfactory frequency sharing between the mobile and other services in the frequency bands between 4 to 30 MHz?

Note – See Report 911.

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* The Director of the CCIR is requested to bring this Question to the attention of the IFRB and Study Groups 1, 9, 10 and 12.

QUESTION 58-3/8*

TECHNICAL CHARACTERISTICS OF MARITIME RADIOBEACONS AND OTHER SYSTEMS FOR TRANSMITTING DIFFERENTIAL CORRECTIONS FOR RADIODETERMINATION AND SATELLITE RADIODETERMINATION SYSTEMS

(1982-1986-1990-1992)

The CCIR,

considering

a) Resolution No. 602 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

b) Resolution No. 3 and Recommendation No. 2 of the Regional Administrative Conference for the Planning of the Maritime Radionavigation Service (Radiobeacons) in the European Maritime Area (Geneva, 1985);

c) that the transmission of differential corrections can improve significantly the accuracy of radiodetermination and satellite radiodetermination systems,

decides that the following Question should be studied

1. What are the technical factors, bandwidth, coding format, modulation method, protection ratio and frequency offsets which should be used for continuous data transmissions by radiobeacons without degrading significantly the use of the beacons for direction-finding?

2. What are the technical characteristics required for hyperbolic radionavigation systems operating in the band 283.5-315 kHz in order to ensure compatibility with existing radiobeacons?

3. What operating and technical characteristics need to be specified for a differential correction transmitting system and what protection criteria are required for such systems?

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* The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO) and the International Association of Lighthouse Authorities (IALA).

QUESTION 62-2/8 *

INTERFERENCE TO THE AERONAUTICAL MOBILE AND AERONAUTICAL RADIONAVIGATION SERVICES

(1982-1986-1990)

The CCIR,

CONSIDERING

(a) that the aeronautical radionavigation service is a safety service;

(b) the increasing concern being expressed over the degree of control of harmful interference to the aeronautical mobile and aeronautical radionavigation services;

(c) that the types of radiation which can cause harmful interference can differ widely depending on the particular technical and operational characteristics of the services involved;

(d) that it may be possible in some cases to identify in detail the characteristics of the interfering radiation;

(e) that the radiations from many of the potential sources of harmful interference are the subject of standards and measurement methods developed by the International Electrotechnical Commission (IEC) and the International Special Committee on Radio Interference (CISPR);

(f) that the practical control of harmful interference often needs to be effected by the national legislation of individual Administrations and it is common for the above-mentioned IEC/CISPR standards and measurement methods to be adopted in this context;

(g) that there would be considerable practical advantages if there were a better understanding of the relationships between these IEC/CISPR test and measurement standards and the protection criteria for these services,

UNANIMOUSLY DECIDES that the following question should be studied:

1. are the IEC/CISPR recommended limits and measurement methods adequate for the protection of these aeronautical services;

2. what methods can be recommended for stating detailed protection criteria taking into account the cumulative effects of interference, including that caused by other radio services, information technology equipment and ISM?

Note – See Reports 926 and 927.

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* The Director, CCIR, is requested to bring the question to the attention of the International Civil Aviation Organization (ICAO), the International Electrotechnical Commission (IEC) and the International Special Committee on Radio Interference (CISPR). This Question should also be brought to the attention of Study Group 1.

QUESTION 64-2/8 *

HF BANDS ALLOCATED ON AN EXCLUSIVE OR SHARED BASIS TO THE MARITIME MOBILE SERVICE

(1983-1986-1990)

The CCIR,

CONSIDERING

Resolution No. 319 (Rev.Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

UNANIMOUSLY DECIDES that the following question should be studied:

what are the technical issues involved in a revision of the sub-allocations and channelling plans in the HF maritime mobile service, including the following issues:

- the establishment of sharing criteria between the maritime mobile and fixed services in the 4000-4063 kHz and 8100-8195 kHz frequency bands;
- radiotelegraph channel spacing based on existing and future requirements and technological advances in equipment;
- the most effective arrangement and channelling scheme for radiotelephone channels based on 3.0 kHz channel spacing;
- the minimum required separation between the receive and transmit frequencies used for duplex narrow-band direct-printing and radiotelephony, taking into consideration restrictions, especially on board ships, with regard to the installation of receiving and transmitting antennas?

Note – See Report 1035.

* The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO), and invite this Organization to make its requirements known to the CCIR.

QUESTION 67-1/8

MULTI-TRANSMITTER RADIO SYSTEMS USING QUASI-SYNCHRONOUS (SIMULCAST) TRANSMISSION IN THE LAND MOBILE SERVICE

(1986-1990)

The CCIR,

CONSIDERING

(a) that multiple transmitters using quasi-synchronous transmission are already used in the land mobile service;

(b) that propagation conditions and radiated power, limit the range and coverage of a single transmitter,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the advantages and disadvantages in using multiple transmitters for quasi-synchronous operation;

2. what performance can be obtained;

3. what provisions must be made to ensure satisfactory operation with speech systems and data systems;

4. what spectrum utilization efficiency can be obtained for quasi-synchronous data transmission in the land mobile service?

Note – See Report 1022.

QUESTION 68/8*

TECHNICAL CHARACTERISTICS FOR LAND MOBILE RADIO SYSTEMS WHICH USE EQUIPMENT OF REDUCED COST WITHOUT LOSS OF SYSTEM PERFORMANCE

(1986)

The CCIR,

CONSIDERING

(a) that significant savings in equipment cost, size and power consumption can be realized by a moderate reduction of currently existing equipment specifications;

(b) that in systems using an exclusive frequency band, mutual interference can be reduced through suitable network arrangements;

(c) that techniques such as improved modulation and multiple access methods will have a considerable impact on system design and on the optimum system selectivity;

(d) that it may be appropriate to limit the extent of the specification, leaving more freedom to the system designers to make a total optimization;

(e) that there is a need to achieve good spectrum utilization efficiency,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the technical characteristics to be considered for systems using an exclusive frequency band, to allow for equipment of reduced cost without loss of system performance, and without compromising spectrum utilization efficiency;

2. what kind of radio system can provide an acceptable system performance using equipment of reduced cost.

Note – See Report 1020.

* This Question should be brought to the attention of Study Group 1.

QUESTION 71-1/8

TECHNICAL AND OPERATING CHARACTERISTICS OF LAND MOBILE SYSTEMS USING MULTI-CHANNEL ACCESS TECHNIQUES WITHOUT A CENTRAL CONTROLLER, INCLUDING CONSUMER-TYPE SYSTEMS

(1986-1990)

The CCIR,

CONSIDERING

(a) that new land mobile services such as cordless telephones and personal radio now being introduced have different characteristics from existing services and may be available to a large public;

(b) that these services can use consumer-type devices which may create difficulties to administrations, and may be misused;

(c) that the utilization of the radio spectrum should be economical as possible and that the use of multi-channel access techniques conserves frequency spectrum;

(d) that highly flexible and economical systems can be achieved without using a central controller for setting-up control of the radio path;

(e) that the widespread and increasing use of these equipments and the characteristics of their utilization may create operational problems;

(f) that systems may require coordination of certain system parameters on a national and international basis;

(g) the Question concerning "cordless telephones" adopted by the World Plan Committee at its meeting in Lisbon, 3-10 February 1988 (see the report of the World Plan Committee, Lisbon, 1988);

(h) that certain administrations are encountering problems of mutual interference and inadvertant interaction between "cordless telephone" systems,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the required radiocommunication parameters for analogue and digital systems circuit connection quality and speech quality;

2. what is the preferred multi-channel access technique and its protocol including detection of an idle radio channel;

3. how does the spectrum efficiency compare with systems which use a central controller;

4. what steps should be taken to ensure the quality of the communications;

5. what technical steps should be taken to avoid adverse effects of misuse of these equipments;

6. what methods can be used to optimize spectrum conservation and service area or range;

7. what measures should be taken in order that a large number of equipments may coexist in the same frequency band with minimum mutual interference;

8. what technical parameters are required in order to allow these equipments to function without creating interferences to other services, noting the potentially very large number of users;

9. what are the system parameters and technical characteristics of equipment on which international agreement is desirable?

Note – See Reports 1024 and 1025.

QUESTION 72-1/8*

MINIMUM CHANNEL SEPARATION AND OPTIMUM SYSTEMS OF MODULATION, CO-CHANNEL AND ADJACENT-CHANNEL COORDINATION CRITERIA FOR SIMULTANEOUS USE OF DIFFERENT MODULATION TECHNIQUES IN SYSTEMS OF THE LAND MOBILE SERVICES BETWEEN 25 AND 3000 MHz

(1986-1990)

The CCIR,

CONSIDERING

(a) that congestion in the VHF and UHF bands is a serious problem in many countries;

(b) that in a number of countries many base stations are operated from within a limited geographical area;

(c) that the frequency tolerances given in Table I (Column 3) of Report 181 are now readily achievable with equipment used in the land mobile service;

(d) that in a number of countries impulse noise is at such a level as to cause serious degradation to communications range,

(e) that due to various approaches in technological development, systems with widely different characteristics may be using the same band;

(f) that both transmitter and receiver characteristics will have a direct impact on effective utilization of the spectrum;

(g) that emission characteristics are directly dependent on parameters including the modulation technique;

(h) that the identification of the appropriate parameters affecting the use of spectrum is important;

(j) that the development of a common approach in deriving co-channel and adjacent-channel coordination criteria is desirable,

UNANIMOUSLY DECIDES that the following question should be studied:

1. with regard to minimum channel separation and optimum systems of modulation:

1.1 what is the minimum bandwidth necessary for various known modulation techniques, in particular for double-sideband amplitude-modulation, frequency-modulation and single-sideband emissions;

1.2 what are the relative advantages and disadvantages of various types of modulation system as the occupied bandwidth approaches the minimum necessary for the transmission of intelligence, taking into account the necessary signal-to-noise ratio at the receiver input;

1.3 what is the minimum channel separation achievable between base station transmitters located within a limited geographical area or at a common site;

1.4 what is the minimum frequency separation between transmitters and receivers under conditions of duplex operation at the same site;

1.5 what are the technical characteristics, criteria and techniques to achieve, in practice, the channel and frequency separations in § 1.3 and 1.4;

2. with regard to co-channel and adjacent channel coordination criteria for simultaneous use of different modulation techniques:

2.1 what are the frequency coordination criteria, considering co-channel and adjacent-channel interference between systems which use different modulation techniques;

2.2 what are the equipment characteristics that are considered to have an impact on co-channel and adjacent-channel interference for different modulation techniques;

2.3 what are the appropriate values for the co-channel and adjacent-channel parameters, e.g. spurious emissions, receiver selectivity, etc., and how should they be specified;

2.4 what is the impact of the value of these parameters on efficient spectrum utilization;

2.5 what are the relationships and trade-offs amongst parameters and the impact on equipment complexity?

Note – See Reports 899, 1018.

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* This Question merges Question 72/8 and Study Programme 7B/8. This Question should be brought to the attention of Study Group 1.

QUESTION 73/8*

VHF RADIOTELEPHONE SYSTEM FOR THE MARITIME MOBILE SERVICE WITH AUTOMATIC FACILITIES

(1986)

The CCIR,

CONSIDERING

(a) that there is a need for automatic facilities for handling radiotelephone calls in the maritime mobile service, particularly from ship-to-shore;

(b) that an automatic VHF/UHF radiotelephone system for the maritime mobile service has been defined in Recommendation 586 but is not foreseen to come into service in the immediate future;

(c) that the Radio Regulations and particularly Appendix 18 thereto have fostered the extensive development of maritime radiotelephony in the band 156-174 MHz;

(d) that a system has come into operation for automatically routing calls from ships to the public switched telephone network with a signalling system using audio frequencies of Appendix 39 to the Radio Regulations;

(e) that other signalling systems are available e.g. conforming to Recommendations 493 and 586;

(f) that automatic operations should be extended to shore-to-ship traffic;

(g) that there is a need to ensure compatibility of automatic ship equipment with the different coast stations they are likely to contact;

(h) that such a system would not hamper the subsequent development of a fully automatic digital system,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what minimum technical characteristics should mobile equipment meet for handling calls automatically from ship-to-shore while ensuring international compatibility with the different coast stations participating in this automatic service;

2. what conditions must be met for extending this automatic service to calls from shore-to-ship;

3. what conditions should be observed to ensure that the system can use the channels in Appendix 18 to the Radio Regulations without in any way impairing current manual operations;

4. what are the conditions for ensuring the international operation of the system?

Note – See Reports 1033 and 1034.

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* The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO).

QUESTION 74-2/8*

PUBLIC MOBILE TELEPHONE SERVICE WITH AIRCRAFT

(1986-1990-1992)

The CCIR,

considering

a) that public mobile telephone services, i.e. services for public correspondence via radio stations connected to the switched public telephone network, are in operation in a certain number of countries;

b) that these systems serve primarily surface-operated mobile units;

c) that public correspondence is not permitted in bands allocated exclusively to the aeronautical mobile service;

d) that the public travelling in private and air transport aircraft are generally without public correspondence communications while airborne (see Radio Regulation (RR) No. 3571 (Mob-83));

e) that user demand has been expressed for an automated airborne voice/data public correspondence system which should be capable of providing adequate capacity in all regions of operation;

f) that the aeronautical safety services must have absolute priority in any sharing configuration;

g) that various national systems in use, or proposed, both terrestrial and satellite, are not necessarily compatible;

h) that for international operation it is essential to agree upon common parameters of the system for world-wide use;

j) Question 52/8 on the integration of public communication services in the VHF/UHF frequency bands;

k) that as decided by the World Administrative Radio Conference (Malaga-Torremolinos, 1992) (WARC--92), the bands 1 670-1 675 MHz and 1 800-1 805 MHz are intended for use, on a worldwide basis, by administrations wishing to implement aeronautical public correspondence (see RR No. 740A),

decides that the following Question should be studied

1. What operational facilities and technical characteristics, including grade of service, need to be specified to permit international operation of a public mobile telephone service with aircraft?

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* The Director, CCIR, is requested to bring this Question to the attention of the International Civil Aviation Organization (ICAO) and the CCITT.

2. What are the criteria for sharing between the terrestrial public mobile telephone service with aircraft operating in the frequency bands designated for this use and other radiocommunication services operating in the same or adjacent frequency bands?

3. What level of integration, if any, with other public mobile telephone systems is practicable and in what time frame?

4. What protection criteria are required for the aeronautical safety services?

5. What degree of automatic operation is possible or desirable for the system?

Note 1 - See Report 1051.

QUESTION 75/8

MARITIME RADIOLOCATION OPERATING IN THE MEDIUM FREQUENCY BAND AND USING SPREAD-SPECTRUM TECHNIQUES

(1986)

The CCIR,

CONSIDERING

(a) that there are both day-time and night-time requirements, particularly in maritime applications, for radiolocation systems offering high precision at long distances;

(b) that radiolocation systems should not cause harmful interference;

(c) that, as experiments have shown, maritime radiolocation systems can operate accurately by using spread-spectrum techniques;

(d) that the use of spread-spectrum techniques may increase the level of noise,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what technical characteristics should be used for maritime radiolocation systems operating in the medium frequency band using spread-spectrum techniques;

2. what criteria should be applied for compatibility with all services including the radiolocation services?

Note – See Report 1041.

QUESTION 76-2/8

DATA COMMUNICATION IN THE MARITIME MOBILE SERVICE

(1986-1990-1992)

The CCIR,

considering

a) Recommendation No. 319 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

b) that provision is made in the Radio Regulations for radiotelephony in the maritime mobile service in various frequency bands;

c) that provision is also made for data and facsimile transmission as well as narrow-band direct-printing telegraphy, subject to special arrangements between interested and affected administrations;

d) that in many areas, the use of digital and analogue voice-frequency techniques now utilized over land circuits can be extended to ships using existing radio equipment;

e) that substantial advantage has been derived from the fact that means of communication ensuring international compatibility have been implemented within the maritime mobile service, allowing for universal exchanges in telephony and telegraphy, including direct printing;

f) that a developing need exists for reliable facilities enabling the exchange of data, including direct-printing information and facsimile traffic between ships and subscribers ashore, using the bands allocated to the maritime mobile service;

g) that a number of administrations have already introduced direct-printing techniques in the maritime mobile service;

h) that it is desirable to achieve efficient performance for data transmission in the maritime mobile service, with a degree of compatibility allowing for universal exchanges of data communication;

j) that the required shipborne equipment should not be unduly complex;

k) that a maritime radiotelephone channel may be suitable for direct printing and other data signals or that in some cases such a channel may be suitable for simultaneous transmission of radiotelephony and direct printing or similar data signals;

l) that preferably the radiotelephone traffic handling capacity, and the service quality, of the available channels should not be unduly reduced by the introduction of data or other kinds of traffic,

decides that the following Question should be studied

1. What means can be used to ensure data communication within the maritime mobile service?

2. What technical standards should be adopted in the use of voice-frequency techniques for direct printing, data and facsimile transmissions in the maritime mobile service?

3. What are the comparative advantages of using the same or different channels for radiotelephony and the other kinds of traffic referred to in § 2?

4. Which characteristics for modulation and coding are to be recommended to ensure international compatibility of data exchanges in the maritime mobile service?

5. What procedures, including choice of frequency channels, should be adopted for types of communication other than radiotelephony with duplex and simplex radio equipment?

6. What other characteristics have to be specified in order to comply with the provisions of the Radio Regulations and to ensure a flexible as well as reliable service?

Note 1 - See Reports 584 and 1158.

QUESTION 77-1/8*

ADAPTATION OF MOBILE RADIOCOMMUNICATION TECHNOLOGY TO THE NEEDS OF DEVELOPING COUNTRIES

(1986-1992)

The CCIR,

considering

a) the Questions submitted by the Plan Committee for Latin America at its meeting in Paramaribo in December 1985, in accordance with Provision No. 93 of the International Telecommunication Convention (Nairobi, 1982);

b) the work carried out so far by Study Group 8 on mobile radiocommunication systems;

c) the work carried out by Study Group 5 so far on radio propagation;

d) Recommendation 687 on future public land mobile telecommunication systems;

e) Recommendation 819 on adaptation of future public land mobile telecommunication systems to the needs of developing countries,

decides that the following Question should be studied

1. How can cellular-type and future mobile radiocommunication technology be adapted to the needs of developing countries?

Note 1 - Particular emphasis should be given to the following items:

- modular design (easily expandable) for both hardware and software;
- universal protocols and standards for terminal-to-base station and base station-to-central control unit, etc.;
- standard equipment for land, maritime and aeronautical mobile use;
- standardization of the interface with the public switched telephone network (PSTN);
- standardization of the use of the channels for control, voice and data;
- standardization of channel separation;
- standardization of frequency bands used.

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* The Director, CCIR, is requested to bring this Question to the attention of Study Group 5 and to the CCITT.

2. What are the optimum arrangements and technical characteristics needed to adapt land mobile equipment (cellular type or others) for use in rural or remote areas or low-income urban areas?

Note 1 - Special attention should be paid to:

- the need to provide an economical, reliable and high-quality telecommunications infrastructure;
- central office traffic-handling capacities;
- propagation problems in building complexes, and mountainous, coastal and sandy desert areas;
- the possibility of using the equipment in a variety of environments including extremes of heat and cold, high humidity, dust, corrosive atmospheres and other environmental hazards;
- the need for rugged, simple-to-maintain equipment;
- efficient and economical spectrum usage in local conditions where there may be only a small number of users and where severe propagation conditions may be encountered;
- the possibility of using satellite, and other radio systems.

QUESTION 82-2/8

SYSTEM CONCEPTS OF THE MOBILE-SATELLITE SERVICES

(1988-1990-1992)

The CCIR,

considering

a) Recommendations Nos. 312 (Rev. Mob-87), 313 (Rev. Mob-83) and 405 (WARC-79) of the World Administrative Radio Conference (Geneva, 1979);

b) that there is a need for more reliable communications between terrestrial networks and mobile earth stations in the maritime, aeronautical and land mobile-satellite services, and the mobile-satellite service;

c) that connectivity among mobile earth stations using the same satellite system is desirable;

d) that connectivity between the various mobile-satellite services using the same satellite system is desirable;

e) that integration of the various mobile-satellite services is now being studied to allow construction of economical national and international systems, provide all users with similar services, and to share the limited frequency resources effectively;

f) that integration of mobile-satellite and land-mobile (terrestrial) services is being studied in particular to achieve more economic systems;

g) that integration of mobile station equipment including equipment on board aircraft for communications through both satellite and terrestrial systems may be advantageous;

h) that a hypothetical reference circuit is needed to provide a guide for design, construction and maintenance of systems in the mobile-satellite services;

j) that terms and definitions that are required in connection with these studies should, as far as possible, be based on internationally accepted expressions,

decides that the following Question should be studied

1. What are the preferred fundamental system concepts in the following services:

1.1 maritime mobile-satellite service;

1.2 aeronautical mobile-satellite service;

1.3 land mobile-satellite service;

1.4 mobile-satellite service or a combination of two or more of the above services?

2. What are the technical requirements and preferred system concepts for interworking of the above-mentioned satellite services with terrestrial telecommunication services?

3. What are the technical requirements and preferred system concepts for the integration of terrestrial and satellite based mobile systems?

4. What are the advantages and preferred systems concepts, and to what extent is it technically and economically feasible to utilize a common mobile terminal to communicate using one or more of the above-mentioned satellite services together with the terrestrial and mobile services?

5. What are the technical and operational parameters to be recommended relating to the mobile-satellite services and their integrated systems?

6. What is the preferred configuration of a hypothetical reference circuit for mobile-satellite systems?

7. What is the preferred method for compilation of a list of terms and definitions currently used in the documents of various international bodies dealing with terminology which is applicable to these studies, and of additional terms and definitions which may be required?

Note 1 - See Recommendation 546 and Reports 770, 771, 921, 1047, 1153, 1173, 1177, 1180 and 1183.

QUESTION 83-2/8*

EFFICIENT USE OF THE RADIO SPECTRUM AND SHARING OF FREQUENCY RESOURCES WITHIN THE MOBILE-SATELLITE SERVICE (MSS) AND BETWEEN MSS AND OTHER SERVICES

(1988-1990-1992)

The CCIR,

considering

a) Resolution No. 208 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

b) that WARC-92 Resolutions Nos. 113, 213, 46, 70 and Recommendation No. 717 of the World Administrative Radio Conference (Malaga-Torremolinos, 1992) call for studies to be carried out in the CCIR to establish guidelines for sharing within the MSS, and between the MSS and other services;

c) that work is being carried out to develop techniques which can improve spectrum utilization;

d) that there are shared frequency bands allocated to different mobile-satellite services and other services;

e) that the operating and technical characteristics of a system supporting the mobile-satellite service may differ from those applicable specifically to the aeronautical mobile-satellite service, land mobile-satellite service or maritime mobile-satellite service;

f) that in the interest of efficient use of the radio-frequency spectrum and to minimize the equipment which mobile units carry, there might be overall merit in establishing shared or adjacent frequency allotments for the mobile services and the mobile-satellite services;

g) that the use of a common satellite system for the mobile-satellite services might be advantageous;

h) that the operating characteristics of mobile earth stations may require different coordination measures from those used for the fixed-satellite service,

decides that the following Question should be studied

1. What are the preferred frequency bands, from a technical and operational point of view, for such systems including satellite-to-mobile earth station links and mobile earth station-to-satellite links and feeder links?

2. What are the advantages and disadvantages of techniques which facilitate improvement of spectrum utilization e.g. voice coding, different modulation techniques, etc.?

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* The Director, CCIR, is requested to bring this Question to the attention of CCIR Study Groups 12, 4, 7 and 9.

Note from the Director, CCIR - Decides 1, 2, 3, 4, 5 and 7 are derived from existing Question 83-1/8. Decides 6, 8, 9, 10 and 11 are derived from existing Question 83-1/8 and WARC-92 Resolutions Nos. 113, 213, 46, 70 and/or Recommendation No. 717.

3. What is the feasibility of intersystem and intrasystem frequency sharing in the case of mobile-satellite systems, and what sharing criteria are needed for frequency coordination?

4. What are the more suitable spot beam system techniques which provide for both flexible frequency and flexible power distribution to satellite beams while providing for efficient use of the spectrum allocated to the mobile-satellite services?

5. What are the practical strategies for achieving efficient use of the geostationary orbit and frequencies allocated to the mobile-satellite services, recognizing that some networks will be optimized for regional coverage and some will be optimized for global coverage?

6. What are the practical strategies for efficient spectrum use and reuse by non-geostationary satellite systems?

7. What is the feasibility of frequency sharing between mobile-satellite systems which use non-geostationary orbits with systems which use the geostationary orbit?

8. What mechanisms can be employed to ensure efficient use of the geostationary orbit when non-geostationary systems are implemented in the same frequency bands?

9. What mechanisms can be employed to ensure efficient use of spectrum by non-geostationary systems when geostationary systems are implemented in the same bands?

10. What are the suitable technical and operational means facilitating the sharing between the mobile-satellite service and other services which include the aeronautical mobile service and meteorological-satellite and meteorological aids services?

11. What are the appropriate criteria for sharing between the mobile-satellite service and other services in the same frequency bands, including power limits and power flux-density limits as indicated in Articles 27 and 28 of the Radio Regulations, while placing minimum restrictions on the services operating in these bands?

Note 1 - See Reports 766, 770 (Annexes I, II, III), 772, 773, 917, 1171, 1172, 1173 (Annex I), 1179, 1182 and 1185.

QUESTION 84-2/8*

USE OF NON-GEOSTATIONARY-SATELLITE ORBITS IN MOBILE-SATELLITE SERVICES

(1988-1990-1992)

The CCIR,

considering

a) that various types of non-geostationary-satellite orbits can provide global coverage within latitudes between the 90° parallels utilizing configurations suitable for a variety of satellite communication applications;

b) that WARC-92 Resolutions Nos. 113, 213, 46, 70 and Recommendation No. 717 of the World Administrative Radio Conference (Malaga-Torremolinos, 1992) call for studies to be carried out in the CCIR to establish guidelines for sharing within MSS, and between MSS and other services;

c) that use of orbits other than geostationary for some mobile-satellite applications could provide better coverage for areas above 70° latitude and in general provide improved services because of shorter path links and also facilitate joint use with other services, e.g., the radiodetermination services;

d) that important international civil air routes traverse polar regions, and communication with aircraft by satellite in such regions is important and desirable;

e) that elevation angles to the geostationary orbit are very low from higher latitudes which accentuates the communication problems caused by multipath and shadowing effects. The use of orbits other than geostationary may improve this situation;

f) that such systems operating in different frequency bands may have distinctly different characteristics,

decides that the following Question should be studied

1. What types of non-geostationary-satellite orbits are suitable for providing mobile-satellite services?

2. What are the technical and operational advantages and limitations of those non-geostationary-satellite orbits, and the systems utilizing them?

3. What are the most suitable frequency bands for non-geostationary satellites and what frequency coordination aspects need to be addressed?

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* The Director, CCIR, is requested to bring this Question to the attention of CCIR Study Groups 12, 4, 7 and 9.

Note from the Director, CCIR - Decides 1 and 3 are derived from existing Question 84-1/8. Decides 2, 4, 5 and 6 are derived from existing Question 84-1/8 and WARC-92 Resolutions Nos. 113, 213, 46, 70 and/or Recommendation No. 717.

4. What are the necessary protection criteria for other services which operate in the same frequency bands as non-geostationary mobile-satellite systems?

5. What sharing techniques can be used by non-geostationary mobile-satellite service systems in frequency bands shared with other services?

6. What are the coordination methods, the necessary orbital data relating to non-geostationary-satellite systems and the sharing criteria?

QUESTION 85-1/8

AVAILABILITY OF CIRCUITS IN MOBILE-SATELLITE SERVICES

(1988-1990)

The CCIR,

CONSIDERING

(a) that service interruptions may be caused by natural and man-made phenomena, e.g. solar interference, interference from other systems, ignition noise, attenuation due to multipath or atmospheric effects, which adversely affect the wanted signal and in the case of digital transmission systems, result in bursts of errors;

(b) that use of appropriate techniques and inclusion of equipment redundancy, etc., can improve service availability;

(c) that system parameters such as receive signal margins affect the link, and therefore system availability;

(d) that circuit availability requirements may not be the same for different types and directions of transmission (telephone, telegraphy, data transmission);

(e) that since the link between the land earth station and the mobile earth station comprises two sections, the fixed (feeder) link and the service link (satellite to mobile), they need to be considered independently;

(f) that the performance of mobile earth stations will be subject to environmental conditions that vary not only with time but also with the location of the stations within the satellite coverage area,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what is the definition of availability in a hypothetical reference circuit of the mobile-satellite services for the different types of transmissions;

2. what are the realistically achievable system/link availabilities of each element of a mobile-satellite system and of the complete system bearing in mind economic considerations;

3. what is the technical relationship between availability and propagation characteristics;

4. what are the preferred technical characteristics (e.g. switching time) for the arrangement of service protection?

Note – See Report 918.

QUESTION 86-1/8

PERFORMANCE OBJECTIVES FOR MOBILE-SATELLITE SERVICES

(1988-1990)

The CCIR,

CONSIDERING

(a) that cost aspects will limit achievable signal-to-noise ratio in the mobile-satellite services;

(b) that the total noise power or bit error ratio, as appropriate in the hypothetical reference circuit, should not be such as would appreciably affect transmission of information;

(c) that the extent of fading cannot be determined fully until more experimental data are available;

(d) that the bit error ratio may vary with time due to the effect of varying propagation conditions, including the effects of multipath fading;

(e) that the performance objectives may not be achievable for short periods due to the occurrence of noise, due to interference, etc;

(f) that Recommendation 522 defines bit error ratio requirements for fixed-satellite services for various percentages of any month;

(g) that the performance objectives of the fixed network should be taken into account, e.g. CCITT Recommendation G.821 defines ISDN bit error ratio requirements for various time intervals and also defines the permissible percentage of degraded minutes, severely degraded seconds and errored seconds (or equivalent error-free seconds);

(h) that Report 997 has applied the bit error ratio performance quality measures used in CCITT Recommendation G.821 to the fixed-satellite services;

(j) that less stringent performance objectives than those required for fixed-satellite services may be acceptable for mobile-satellite services due to the more severe environmental conditions under which these services operate;

(k) that different performance objectives may be appropriate to each of the various mobile-satellite services,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the allowable noise power/bit error performance objectives and preferable noise power/bit error performance distributions in a hypothetical reference circuit/path;

2. what is the preferred method for correlation of circuit noise power/bit error performance with propagation characteristics;

3. what bit error ratios, defined over what time intervals, or defined over percentages of any month as in Recommendation 522, are appropriate to mobile-satellite services;

4. what acceptable criteria relating to degraded minutes, severely degraded seconds and errored seconds (or equivalent error-free seconds), are appropriate to mobile-satellite services, bearing in mind CCITT Recommendation G.821 for the ISDN and CCIR Report 917;

5. which of the above criteria in DECIDES 3 and 4 are appropriate or is a combination required?

Note – See Recommendations 547, 549, 552 and Report 751.

QUESTION 87-2/8

TRANSMISSION CHARACTERISTICS FOR A MOBILE SATELLITE COMMUNICATION SYSTEM

(1988-1990-1992)

The CCIR,

considering

a) Resolution No. 44 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

b) that the International Maritime Satellite Organization (INMARSAT) provides international mobile-satellite communications and other organizations plan to offer international or domestic mobile-satellite services;

c) that digital communication techniques are being proposed for the mobile-satellite service and can provide efficient use of limited bandwidth and powers, and would support a wide variety of voice, data and message communication services;

d) that modulation techniques and systems should be robust under fading and shadowing conditions;

e) that the efficiency of orbit-spectrum utilization in mobile-satellite systems will be determined in part by the technical characteristics employed, such as modulation methods and parameters, impact of frequency re-use techniques or the arrangement of radio-frequency carriers,

decides that the following Question should be studied

1. What are the preferred transmission characteristics for the following systems:

1.1 land mobile-satellite systems;

1.2 maritime mobile-satellite systems;

1.3 aeronautical mobile-satellite systems;

1.4 mobile-satellite systems incorporating a combination of two or more of the above systems?

2. What are the technically preferred multiple access, modulation and coding methods for such systems?

3. What are the preferred performance characteristics of earth stations and space stations for such systems?

4. What transmission characteristics could be common to facilitate compatibility between the land, maritime, and aeronautical mobile-satellite services?

Note 1 - See Recommendations 548, 550 and 553, Reports 509, 760, 764, 923, 1049 and 1183.

QUESTION 88-1/8

PROPAGATION AND MOBILE EARTH STATION ANTENNA CHARACTERISTICS FOR MOBILE-SATELLITE SERVICES

(1988-1990)

The CCIR,

CONSIDERING

(a) that mobile earth-station antenna performance substantially affects system design in mobile-satellite services;

(b) that multipath fading due to reflection and shadowing due to foliage and natural or man-made structures are important factors in designing and constructing mobile-satellite systems;

(c) that there are various techniques which may be adopted for keeping mobile earth station antennas pointed correctly;

(d) that the configuration of airborne antenna systems is severely constrained by the effect on aircraft performance;

(e) that services using medium and low gain antenna systems are being used by INMARSAT and other organizations;

(f) that characteristics of multipath fading are being studied in CCIR Study Group 5 under Question 18/5;

(g) that some mobile ship, aircraft and land earth stations will be operating at high latitudes of the globe and may consequently have special propagation and antenna design problems,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the preferred types of antenna systems and their characteristics for:

1.1 shipborne use,

1.2 airborne use,

1.3 land use,

taking into account that some mobile earth stations may have elevation angles of less than 5° to satellites in the geostationary orbit;

2. what fading reduction techniques can be applied to mobile antenna systems in a mobile-satellite service?

Note – See Recommendation 694, Reports 762, 763, 920, 922, 925, 1047, 1048 and 1169.

QUESTION 89-1/8

COMPATIBILITY FOR INTERWORKING BETWEEN THE MOBILE-SATELLITE SYSTEMS AND TERRESTRIAL NETWORKS INCLUDING ISDN

(1988-1990)

The CCIR,

CONSIDERING

(a) that interconnection of mobile communication circuits with the terrestrial networks is required;

(b) that interworking between mobile-satellite systems and terrestrial networks is being studied by the CCITT;

(c) that interworking between a mobile-satellite system and the ISDN is also being studied by the CCITT;

(d) that mobile-satellite systems have inherent restrictions with regard to the channel characteristics resulting from the radio path;

(e) that consideration of communication characteristics in the mobile-satellite service needs to take account of the CCITT studies and that the CCITT studies would benefit from CCIR consideration of their impact on the mobile-satellite service,

UNINAMOUSLY DECIDES that the following question should be studied:

1. what are the preferred technical characteristics of future systems providing digital data and voice communication in the mobile-satellite service, taking into account the CCITT studies on interworking between mobile-satellite systems and the terrestrial networks;

2. what are the preferred interface points between mobile-satellite systems and the terrestrial network;

3. what are the preferred technical characteristics for interfaces between mobile-satellite systems and the terrestrial network;

4. what are the preferred characteristics of the interface between the ISDN and systems in the mobile-satellite services?

Note – See Report 1176.

QUESTION 90/8 *

TECHNICAL AND OPERATING CHARACTERISTICS OF SYSTEMS PROVIDING RADIOCOMMUNICATION USING SATELLITE TECHNIQUES FOR DISTRESS AND SAFETY OPERATIONS

(1988)

The CCIR,

CONSIDERING

(a) Resolution No. 205 (Rev.Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) Recommendation No. 201 (Rev.Mob-83) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1983) and Recommendation No. 604 (Rev.Mob-87);

(c) that the use of the band 406.0 to 406.1 MHz (Earth-to-space) which is allocated to the mobile-satellite service is limited to low power satellite emergency position-indicating radio beacons;

(d) that transmission characteristics of a satellite emergency position-indicating radio beacon (satellite EPIRB) system operating through a low polar-orbiting satellite system in the 406 MHz band have been evolved (Recommendation 633);

(e) that the bands 1544 to 1545 MHz (space-to-Earth) and 1645.5 to 1646.5 MHz (Earth-to-space) have been allocated to the mobile-satellite service and are limited to distress and safety operations;

(f) that transmission characteristics of a satellite emergency position-indicating radio beacon (satellite EPIRB) system operating through geostationary satellites in the 1.6 GHz band have been evolved (Recommendation 632);

(g) that the International Maritime Organization (IMO) is placing a major reliance on the use of satellites for the relay of distress signals in the development and design of their Global Maritime Distress and Safety System (GMDSS), which is scheduled to become operational in the early 1990s,

DECIDES that the following question should be studied:

1. what are the preferred technical and operating characteristics of systems providing radiocommunication using low-orbiting or geostationary-satellite techniques, for distress and safety operations;

2. what are the various technical and operating problems and economic factors concerning radiocommunication systems using satellite techniques for ships, aircraft and land mobile units (including satellite EPIRBs and ELTs), in particular with regard to distress, search and rescue and safety operations;

3. what are the conditions for compatibility between satellite EPIRBs in the band 406-406.1 MHz and services using adjacent bands?

Note – See Recommendations 632, 633, Reports 749, 761, 912, 919, 1042, 1045 and 1046.

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* The Director of the CCIR is requested to bring this Question to the attention of ICAO, IMO and INMARSAT.

QUESTION 91-1/8

TECHNICAL AND OPERATING CHARACTERISTICS OF THE RADIODETERMINATION-SATELLITE SERVICE

(1988-1990)

The CCIR,

CONSIDERING

(a) Resolution No. 708 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) that there is a need for reduction of the cost of terminal equipment;

(c) that few frequency bands are available for radiodetermination-satellite services;

(d) that there are various radiodetermination systems;

(e) that potential advantages, including those of frequency economy, might result from integrated systems for communication and radiodetermination,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the preferred system concepts and technical and operating characteristics of systems in the radiodetermination-satellite service;

2. what are the preferred frequency bands for radiodetermination-satellite services;

3. what is the technical feasibility of frequency sharing between the radiodetermination-satellite service and other services, and sharing criteria (considering the bands 1610-1626.5 MHz, 2483.5-2500 MHz and 2500-2516.5 MHz with the aeronautical radionavigation, fixed, mobile, radiolocation and radioastronomy services);

4. what are the potential interference conditions between the radiodetermination-satellite service and the services in adjacent frequency bands;

5. what are the technical and operational feasibility and potential advantages of an integrated system for communication and radiodetermination;

6. what are the preferred types of orbit for the radiodetermination-satellite service?

Note – See Report 1050.

QUESTION 92/8 *

STUDY ON GENERAL QUESTIONS RELATING TO THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)

(1988)

The CCIR,

CONSIDERING

(a) the considerable progress made in connection with the development of the GMDSS and the proposed initial introduction of the system in 1992;

(b) the need to provide the GMDSS with the necessary shore-based telecommunication networks to ensure that the system can function normally;

(c) the need to study the legal, technical, operational and economic ** questions involved in interfacing with shore-based telecommunication networks;

(d) the desirability and advisability of working out a general and methodical plan for providing rescue coordination centres with the necessary national and international telecommunication networks,

DECIDES that the following question should be studied:

1. with what existing CCIR Recommendations should international and national telecommunication services associated with shore-based facilities comply in order to ensure the proper functioning of the GMDSS;

2. what additional CCIR Recommendations concerning shored-based telecommunication services are needed to ensure the proper functioning of the GMDSS;

3. what recommendations should be made for the international operational functioning of the telecommunication services between rescue coordination centres of different administrations?

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* The Director of the CCIR is requested to bring this Question to the attention of the CCITT, ICAO, IMO, WMO, IHO, INMARSAT and the COSPAS-SARSAT Secretariat.

** The CCITT is invited to undertake studies, as a matter or urgency, on tariff and charging principles to be applied for the use of the public telecommunication networks for the interconnection of Rescue Coordination Centres (RCC) in the framework of the GMDSS.

QUESTION 93-1/8*

AUTOMATION OF MF, HF AND VHF MARITIME MOBILE COMMUNICATIONS

(1988-1992)

The CCIR,

considering

a) that there is a need for automatic facilities for handling radiotelephone calls in the maritime mobile service, particularly from ship-to-shore;

b) that automatic operation would also be desirable in the shore-to-ship direction;

c) that there is a need to ensure compatibility of automatic ship equipment with the different coast stations which the ship station is likely to contact;

d) that an automatic VHF/UHF radiotelephone system for the maritime mobile service has been defined in Recommendation 586 but is not foreseen to come into service in the immediate future;

e) that Articles 60 and 65 of the Radio Regulations do not permit coast stations to emit idle-channel signals on radiotelephone working channels;

f) that the digital selective-calling (DSC) system described in Recommendations 493 and 541 could be used for signalling over the radio path for such an automatic system using common DSC channels;

g) that the existing MF, HF and VHF working channels should be used in such an automatic system, if possible without impairing their use for manual operations from the same ship or coast station;

h) that such a system would not hamper the subsequent development of a fully automatic digital system;

j) that a VHF radiotelephone system with automatic facilities based on Recommendation 689 has been established;

k) that automation of other maritime mobile communications services would also be desirable,

* The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO).

decides that the following Question should be studied

1. What are the preferred technical and operating characteristics for ship and coast station equipments providing automatic connection of calls in the ship-to-shore direction in the maritime mobile service MF, HF and VHF bands to the public switched networks?

2. What conditions must be met for extending this automatic service to calls in the shore-to-ship direction?

3. What conditions should be observed to ensure that the system can use the existing MF, HF and VHF working channels without in any way impairing current manual operations?

4. What are the conditions for ensuring the international operation of the system?

Note 1 - See Recommendation 689 and Reports 1033 and 1161.

QUESTION 94/8*

NECESSARY BANDWIDTH REQUIRED FOR RADIO ALTIMETERS OPERATING IN THE BAND 4200-4400 MHz

(1990)

The CCIR,

CONSIDERING

(a) Recommendation No. 606 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

(b) that radio altimeters play a vital role in the safe operation of aircraft in particular when the aircraft is flying at low altitude,

UNANIMOUSLY DECIDES that the following question should be studied:

what is the bandwidth required for radio altimeters to maintain the necessary operational accuracy?

* The Director, CCIR, is requested to bring this Question to the attention of the International Civil Aviation Organization (ICAO).

QUESTION 95/8*

SHARING BETWEEN THE AERONAUTICAL RADIONAVIGATION SERVICE AND THE MOBILE SERVICE IN THE BAND 5000-5250 MHz

(1990)

The CCIR,

CONSIDERING

a) Recommendation No. 607 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

b) that within the band 5000-5250 MHz the internationally agreed microwave landing system (MLS) is presently in the process of implementation;

c) that MLS may require the complete band for its full implementation;

d) that the protection of this vital aeronautical radionavigation system is paramount;

e) that ICAO is studying the requirements of this band for MLS and other aeronautical radionavigation systems;

(f) that the WARC MOB-87 has allocated the band 5150-5250 MHz, in some countries, to the Mobile Service (RR 796A);

g) that the WARC MOB-87 has allocated the band 5150-5216 MHz, in a number of countries, to the Radio Determination Satellite Service (space-to-Earth) (RR 797A),

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the spectral requirements of the MLS and other aeronautical radionavigation systems being considered for the band 5000-5250 MHz;

2. how do these requirements allow for the possibility of the sharing of this band?

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* The Director, CCIR, is requested to bring this Question to the attention of the International Civil Aviation Organization (ICAO).

QUESTION 96/8*

IMPROVED EFFICIENCY IN THE USE OF THE BAND 156-174 MHz BY STATIONS IN THE MARITIME MOBILE SERVICE

(1990)

The CCIR,

CONSIDERING

a) Recommendation No. 318 (Mob-87) of the World Administrative Radio Conference for the Mobile Services, (Geneva, 1987);

b) that the VHF radio spectrum available for use by the maritime mobile service is limited and that significant congestion exists in many parts of the world;

c) that existing and new technologies different from those currently employed in the maritime mobile service may enable more efficient use of the available spectrum and accommodate foreseen future growth;

d) that Report 662 defines a procedure for assessing spectrum utilization efficiency,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what improvement in spectrum utilization can be achieved by use of the various radio technologies or techniques in the VHF maritime mobile service;

2. what technical and operational characteristics should be recommended for international application;

3. what impact will such technologies or techniques have on the existing VHF maritime arrangement?

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* The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO).

QUESTION 97/8*

SYSTEM FOR AUTOMATICALLY IDENTIFYING VHF AND UHF RADIO STATIONS TRANSMITTING IN THE MARITIME MOBILE SERVICE

(1990)

The CCIR,

CONSIDERING

a) that an increasing number of VHF and UHF radio stations are employed in the maritime mobile service;

b) that the number of transmissions which are not in accordance with the Radio Regulations for the use of VHF and UHF radiotelephones has increased;

c) that these unwanted transmissions can severely interfere with the operation of safety and public correspondence networks;

d) that at present, costly and time consuming efforts are being made to identify and locate the origin of these interfering transmissions;

e) that it is therefore desirable to define a system to unambiguously identify VHF and UHF radio stations in the maritime mobile service by means of the automatic transmission of identification signals;

(f) that these identification signals should be repeated periodically and should have a negligible effect on the communications for which VHF and UHF radiotelephone equipment is used;

g) that it is advantageous that such means of identification should be based on existing and internationally accepted techniques,

UNANIMOUSLY DECIDES that the following question should be studied:

In order to enable the unambiguous identification of stations causing interference, what system characteristics and operational procedures should be recommended for automatically identifying VHF and UHF radio stations transmitting in the maritime mobile service?

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* The Director of the CCIR is requested to bring this Question to the attention of the International Maritime Organization (IMO) and should also be brought to the attention of Study Group 1.

QUESTION 98/8 *

TRANSMISSION OF DIGITAL DATA FOR THE UPDATING OF ELECTRONIC CHART DISPLAY SYSTEMS (ECDIS)

(1990)

The CCIR,

CONSIDERING

(a) the Maritime Safety Committee of the International Maritime Organization (IMO) has approved Provisional Performance Standards for Electronic Chart Display Systems (ECDIS) at its fifty-seventh session (1989);

(b) the IMO has invited the CCIR to undertake a technical study of the most appropriate system and data medium which should be used for transmission of updating information to ships using satellite and terrestrial techniques and to recommend the most appropriate methods for such transmissions;

(c) the present method of updating paper charts consists of the weekly mailing of printed data which contain numerous single feature corrections and small sections of charts that are compiled by national Hydrographic Offices, and which the mariner manually applies to paper charts;

(d) the existence of ECDIS offers the opportunity to obtain the timely automatic updating of the Electronic Navigation Chart (ENC) by supplying Hydrographic Office produced digital data via terrestrial or satellite telecommunications to ships at sea or in port;

(e) the technology of ECDIS offers the additional opportunity to work toward the broadcast of those Radio Navigational Warnings that apply specifically to items normally associated with charts, resulting in the automatic display of those warnings,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what system, or combination of systems, should be employed for the transmission of Hydrographic Office produced ENC update information to ships at sea or in port throughout the world;

2. what are the comparative advantages (access, reliability, cost, etc.) of satellite and/or terrestrial systems for the broadcast or interactive selective distribution of Hydrographic Office produced digital update files;

3. what technical standards and operational procedures should be used to allow for automatic display on ECDIS of those chart-related Radio Navigational Warnings to be transmitted over radio systems;

4. what operational procedures and coding techniques are recommended to assure the accuracy of digital data received by ECDIS?

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* The Director, CCIR, is requested to bring this Question to the attention of the IMO, IHO and IEC.

QUESTION 99/8 *

INTERFERENCE DUE TO INTERMODULATION PRODUCTS IN THE LAND MOBILE SERVICES BETWEEN 25 AND 3000 MHz

(1990)

The CCIR,

CONSIDERING

(a) that large numbers of base station transmitters and receivers may be operated within the same limited geographical area;

(b) that such transmitters may produce high-level intermodulation emissions, the odd orders of which fall within and on either side of a land mobile band, and these may fall on receive frequencies of land mobile stations;

(c) that channelling plans can be devised so as to minimize the effects of intermodulation products;

(d) that receivers may have spurious intermodulation responses as a result of two or more strong input signals;

(e) that external non-linearly conducting elements may produce intermodulation products from two or more signals,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what are the various causes of intermodulation products arising within transmitters, receivers and external non-linear elements, and the various techniques which may be used to minimize their production and reduce their effects, the method used being stated in each case;

2. what is the maximum permissible mean power of intermodulation emissions for satisfactory operation in the land mobile services;

3. what are the precautions that are required against the formation of intermodulation products in receivers and which are compatible with satisfactory operation of the land mobile services?

Note – See Report 739.

* Previously Study Programme 7C/8.

QUESTION 100/8*

FREQUENCY PLANNING METHODS FOR THE LAND MOBILE SERVICE

(1990)

The CCIR,

CONSIDERING

(a) that there is a necessity for efficient use of the frequency bands allocated to the land mobile service;

(b) that the exchange of information on frequency planning methods for the land mobile service would be advantageous in the coordinated introduction and development of that service (see also Resolution 20);

(c) that a certain measure of agreement is desirable on frequency planning criteria that are used in border areas of neighbouring countries to minimize interference,

UNANIMOUSLY DECIDES that the following question should be studied:

1. which methods and criteria should be used for the choice of frequencies to be assigned to stations in the land mobile service, taking into account spectrum efficiency, the technical characteristics of equipment, propagation characteristics and also administrative procedures;

2. which methods and criteria are of particular use in the coordination of stations in the land mobile service in border areas of neighbouring countries?

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* Previously Study Programme 7E/8.

QUESTION 101/8*

DIGITIZED SPEECH TRANSMISSION IN THE LAND MOBILE SERVICE

(1990)

The CCIR,

CONSIDERING

(a) that there is a rapid development in methods for digitization of speech and digital modulation techniques;

(b) that this development gives new possibilities to obtain higher system flexibility and improved frequency economy;

(c) that there is a growing demand for data communication with higher speed and better reliability;

(d) that future mobile telephone systems might be integrated in the digital telephone system under development in several countries;

(e) that a digitized speech system based on a wider channel separation may have more spectrum efficiency than a corresponding analogue system;

(f) that there is a growing demand for more privacy in speech communication;

(g) that international agreement may be necessary for some characteristics of digital mobile radio;

(h) that analogue and digitized speech transmissions may have to co-exist in the same frequency band and that interference between these systems must be minimized,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what is the possible improvement, if any, in spectrum efficiency compared with analogue systems;

2. what is the definition of quality of digitized speech for different land mobile applications;

3. what is the proper choice of bit rate for digitized speech taking into account speech quality, required amount of channel coding, efficient frequency usage, and cost;

4. what digital modulation system should be used taking into account the characteristics of the radio channel;

5. what sharing principles should be applied between analogue and digital systems;

6. what is the proper choice of channel spacing, taking into account the bit rate required for digitized speech in the various land mobile services;

7. what are the technical characteristics on which international agreement is desirable to ensure compatibility of equipment between systems and/or operation of differing systems in neighbouring coverage areas?

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* Previously Study Programme 40A/8.

QUESTION 102-1/8*

SUITABLE FREQUENCY BANDS FOR THE OPERATION OF WIND PROFILER RADARS

(1990-1992)

The CCIR,

considering

a) Recommendation No. 621 (WARC-92) of the World Administrative Radio Conference (Malaga-Torremolinos, 1992);

b) that vertically oriented pulsed Doppler radars have been experimented in the range from 30 MHz to 1 200 MHz for the purpose of measuring wind velocity (so-called wind profiler radars);

c) that the World Meteorological Organization (WMO) has expressed the need to operate such radars in three frequency bands at about 50 MHz, 400 MHz and 1 000 MHz, to cover the remote sensing range from 100 m to 30 km;

d) that in comparison to the presently used radiosondes, wind profilers have the following operational advantages:

- wind profiler radars measure winds in a defined volume of air, while radiosondes are carried away by the winds themselves;
- a radar can operate unattended in a quasi-continuous manner producing a profile about every ten minutes whilst radiosondes can only be launched at relatively infrequent intervals (e.g. every six hours);

e) that it is highly desirable to operate the wind profiler radars in harmonized frequency bands;

f) that sharing of frequency bands with other services could be beneficial for the efficient use of the spectrum;

g) that the compatibility with other services having frequency spectrum allocated in adjacent bands must be considered;

h) that the frequency band 406-406.1 MHz, which is near one of the WMO-suggested bands, is used for distress purposes with satellite EPIRBs in cooperation with COSPAS/SARSAT (see Question 90/8);

j) that it is essential in the interest of distress communications to protect the COSPAS/SARSAT system from harmful interference which may be caused by wind profiler radars;

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* See also Question 144/7 of Study Group 7. The Director, CCIR, is requested to bring this Question to the attention of the World Meteorological Organization (WMO), the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO) and COSPAS/SARSAT.

Note from the Director, CCIR - Decides 1 and 2 are the same as in existing Question 102/8. Considering a), h), j), k) and l) are new or modified to carry out the studies set forth in WARC-92 Recommendation No. 621.

k) that studies have already shown that wind profiler radars operating in the vicinity of 400 MHz must be sufficiently separated in frequency from the COSPAS/SARSAT system centred on 406.025 MHz;

l) that the frequency band 960-1 215 MHz, which encompasses one of the WMO-suggested bands, is used to provide a safety service by the distance measuring equipment (DME) function for aircraft precision landing systems (ILS and MLS),

decides that the following Question should be studied

1. What are the most suitable frequency bands for the operation of wind profiler radars?

2. What are the pertinent criteria for sharing with other services in the same band and for compatibility with services in adjacent bands?

QUESTION 103/8*

CRITERIA FOR SHARING BETWEEN THE MOBILE SERVICE AND THE SPACE RESEARCH, SPACE OPERATION AND EARTH EXPLORATION-SATELLITE SERVICE SPACE STATIONS IN THE 2 025-2 110 MHz AND 2 200-2 290 MHz BANDS

(1992)

The CCIR,

considering

a) Resolutions Nos. 211 and 711 (WARC-92) of the World Administrative Radio Conference (Malaga-Torremolinos, 1992)**;

b) that there is an ever-increasing demand for the provision of a variety of mobile services and systems;

c) that in the 2 025-2 110 MHz and 2 200-2 290 MHz bands, the mobile service, the fixed service and the space research service (SRS), space operation service (SOS) and Earth exploration-satellite service (EESS) systems operate on a co-primary shared basis;

d) that several data relay satellites are in operation and others are planned;

e) that in some countries the space services have successfully shared with low-density mobile electronic news gathering (ENG) and with aeronautical telemetry systems for many years;

f) that the introduction in RR Article 27 of suitable limits on the characteristics of mobile systems may be an adequate means of facilitating the expansion of mobile systems in these bands without harmful interference to the space services;

g) the possibility that frequency assignments to some space missions could be relocated in bands above 20 GHz,

noting

a) that WARC-92 resolved to recommend that administrations do not introduce high-density or conventional type land mobile systems in these bands;

b) that WARC-92 further resolved that administrations, when considering in the near future the introduction of mobile systems in these bands, should permit only low-density mobile systems;

c) that the technical characteristics and operational densities of mobile stations are significant factors determining the aggregate interference to the space services;

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* The Director, CCIR, is requested to bring this Question to the attention of Study Groups 7, 9 and 12.

** See also ADD 747A of the Radio Regulations (RR).

d) that work is being carried out in CCIR Study Group 7 related to establishing protection criteria for the space services in these bands,

undertakes studies of the following Question

1. What criteria are appropriate to facilitate sharing between the mobile service and SRS, SOS and EESS space stations operating in the 2 025-2 110 MHz and 2 200-2 290 MHz bands?

2. What are the characteristics of low-density mobile systems which would facilitate sharing with the space services operating in these bands?

3. What suitable limits should be determined for the characteristics of mobile systems to be specified in RR Article 27 to facilitate sharing between mobile services and space services in these bands?

4. What are the protection criteria required for mobile services in these bands to protect them from harmful interference from emissions from space services?

5. What is the evolution of mobile services and their spectrum requirements in these bands?

QUESTION 104/8*

TECHNICAL AND OPERATIONAL CONSIDERATIONS FOR MULTISERVICE SATELLITES OPERATING IN THE FREQUENCY BANDS FROM ABOUT 20 TO ABOUT 30 GHz

(1992)

The CCIR,

considering

a) that the World Administrative Radio Conference (Malaga-Torremolinos, 1992) (WARC-92) allocated, on a primary basis, the bands 19.7-20.2 GHz and 29.5-30 GHz in Region 2, and 20.1 - 20.2 GHz and 29.9-30 GHz in Regions 1 and 3 to the mobile-satellite service and that these bands are also allocated to the fixed-satellite service;

b) that WARC-92 adopted Nos. 873A, 873B, 873C and 873E of the Radio Regulations (RR) that facilitate the introduction of multiservice satellite systems in the bands in § a);

c) that Recommendation No. 719 (WARC-92) calls for studies to be carried out in the CCIR on the technical characteristics of multiservice satellite networks and on the sharing criteria necessary for compatibility with the fixed-satellite service in the frequency bands referred to in § a);

d) that RR Recommendation No. 715 (Orb-88) calls for simplification of the process for bringing into use satellite networks with different classes of user terminals;

e) that technologies are under development which will permit implementing multiple purpose applications (fixed, mobile, other) in a single frequency band;

f) that specific technology development efforts are already under way in a number of nations to develop multiple purpose satellite systems in the 20/30 GHz bands;

g) that Study Group 4 is studying orbit/spectrum improvement measures for satellite networks having more than one service in one or more frequency bands;

h) that there may be a requirement to share with the fixed terrestrial service in the frequency bands of interest;

j) that the Voluntary Group of Experts (VGE), among other means of simplifying the RR, is studying service definition accommodating a range of services,

* The Director, CCIR, is requested to bring this Question to the attention of CCIR Study Group 4.

undertakes studies of the following Question to be completed within the study period 1990-1994

1. What are the technical characteristics and operational procedures to permit user terminals of fixed, mobile and other capabilities to be used in a multiservice satellite system operating in the frequency bands from about 20 to about 30 GHz without mutual harmful interference or undue constraints on user terminal design?

2. What additional technical coordination needs to be applied to allow different multiservice satellite systems, and single purpose satellite systems to operate in a common frequency band?

3. What are the advantages and disadvantages regarding the flexibility and efficiency of orbit and spectrum use, and the opportunity for access by different networks, made feasible by the use of multiservice systems as compared with single service systems?

4. What is the feasibility of and the criteria for sharing between multiservice satellite networks and the fixed terrestrial service in the frequency bands stated in § 1?

5. What are the technical characteristics, including antenna pointing techniques of multiservice satellite networks using the geostationary-satellite networks, encompassing mobile-satellite and fixed-satellite service applications?

6. What are the sharing criteria necessary for compatibility between the mobile-satellite and the fixed-satellite service in the frequency bands referred to in § a)?

QUESTION 105/8*

CRITERIA FOR SHARING BETWEEN THE FIXED SERVICE, AND THE MOBILE, RADIODETERMINATION, AMATEUR AND RELATED SATELLITE SERVICES WITHIN THE RANGE 1-3 GHz

(1992)

The CCIR,

considering

a) Resolution No. 113 (WARC-92) of the World Administrative Radio Conference (Malaga-Torremolinos, 1992);

b) evolving radio-frequency channelling arrangements for the fixed service in the relevant frequency bands;

c) that new technologies have been and are being developed which can facilitate sharing,

noting

a) that work has been carried out in CCIR Study Group 9 relevant to this Question;

b) that the CCIR report on the technical and operational bases for WARC-92 contains valuable information on sharing criteria relevant to this Question,

undertakes studies of the following Question

What are the technical parameters and operational considerations which must be taken into account to permit satisfactory frequency sharing between the fixed service and the mobile, radiodetermination, amateur and related satellite services within the range 1-3 GHz?

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* The Director, CCIR, is requested to bring this Question to the attention of Study Groups 7, 9 and 12.

QUESTION 106/8*

CRITERIA FOR SHARING BETWEEN THE BROADCASTING-SATELLITE SERVICE (SOUND) AND COMPLEMENTARY TERRESTRIAL BROADCASTING AND THE MOBILE, RADIOLOCATION AND AMATEUR SERVICES WITHIN THE RANGE 1-3 GHz

(1992)

The CCIR,

considering

Resolutions Nos. 528 and 522 (WARC-92) of the World Administrative Radio Conference (Malaga-Torremolinos, 1992),

undertakes studies of the following Question

What are the technical parameters and operational considerations which must be taken into account to permit satisfactory frequency sharing between the broadcasting-satellite service (sound) and complementary terrestrial broadcasting and the mobile, radiolocation and amateur services within the range 1-3 GHz?

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* The Director, CCIR, is requested to bring this Question to the attention of Study Groups 10 and 12.

QUESTION 107/8

CELLULAR LAND MOBILE TELECOMMUNICATION SYSTEMS

(1992)

The CCIR,

considering

a) that mobile telephone services, i.e. services for public correspondence via radio stations connected to the switched public telephone network, are in operation in a number of countries and that their use is extending;

b) that the various technical systems already in use or proposed for such services, are not necessarily compatible;

c) that system compatibility is necessary in the case of international operation;

d) that for international operation it is desirable to agree on the parameters of the system;

e) Recommendation No. 310 (WARC-79) of the World Administrative Radio Conference (Geneva, 1979);

f) Question 52/8 on the integration of public radiocommunication services in the VHF/UHF frequency bands;

g) the need to improve spectrum utilization efficiency and hence system capacity per MHz per unit area;

h) the need for a flexible system structure able to match network investment to revenue growth, readily to adapt to environmental factors and to respond to new development rather than restrict innovation;

j) the increasing importance of the various types of data and Telematic services;

k) Question 101/8 on digitized speech transmission, Question 37/8 on cellular systems;

l) Recommendation 622 on analogue cellular systems;

m) the possible need for a common frequency band or channel to allow international operation, particularly with the increasing use of personal (hand-held, portable) terminals;

n) CCITT Recommendations and on-going work items that are relevant to this work,

decides that the following Question should be studied

1. What are the system parameters and technical characteristics of equipment used in cellular mobile telecommunication systems on which international agreement is desirable?

2. What operational facilities and technical characteristics need to be specified to permit international operation of cellular mobile telecommunication systems?

3. What is the degree of compatibility or commonality which is desirable or achievable such as (see Note 1):

- international, regional, national compatibility (roaming),
- radio interface compatibility,
- user's terminal and technological commonality?

4. From a technical point of view, what frequency bands are most suitable for internationally compatible cellular land mobile telecommunication systems?

5. What are the characteristics of cellular radio channels needed in the specification of modems, including the following:

- the effects of vehicle motion on the signal-to-noise ratio;
- frequency and duration of transmission interruptions;
- variations in bulk delay of channel;
- stationary parameters such as amplitude response, group delay response and average signal-to-noise ratio?

Note 1 - The list of examples is not exhaustive.

Note 2 - See Recommendations 622 and 624, Reports 742 and 1156.

QUESTION 108/8*

MULTI-PURPOSE OPEN SYSTEM INTERCONNECTION STANDARDS FOR DATA COMMUNICATIONS IN THE MARITIME MOBILE SERVICE

(1992)

The CCIR,

considering

a) that the demand for mobile data communications is increasing;

b) that new applications (e.g. differential GPS transmissions, vessel traffic systems, etc.) require responsive data communications of a computer-to-computer nature;

c) that open systems interconnection (OSI) will be a principal means of interconnection between systems in both the information processing and telecommunication environment;

d) that OSI-related studies are carried out by the CCITT and the International Organization for Standardization (ISO);

e) that maritime data communications must interconnect with terrestrial data communications (see Annex 1);

f) that terrestrial networks are converging towards OSI standards supported by the CCITT;

g) that end-to-end service between data processing nodes is required;

h) that an addressing plan that allows worldwide unambiguous identification of any host computer is needed;

j) that a protocol framework is required that can route data communications internationally;

k) that topology must adapt as connectivity changes;

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* *Note from the Director, CCIR* - CCITT Study Group VII, in a liaison statement of April 1992, considers it appropriate for CCIR experts to work on the definition of protocols for use within maritime radio sub-networks.

The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO), the International Maritime Satellite Organization (INMARSAT), the International Civil Aviation Organization (ICAO) and the CCITT and invite these organizations to make their comments known to the CCIR. This Question should also be brought to the attention of Study Group 9.

l) that sub-network resources must be used efficiently as they are radio-spectrum based;

m) that interoperability between all mobile data communications protocols is desirable;

n) the constraints associated with radio paths, e.g. multi-path fading, interference, data transmission rates and end-to-end throughput efficiencies exist in varying degrees from MF to UHF, as compared to metallic paths,

decides that the following Question should be studied

1. What are the OSI maritime data communication protocols that can be used to provide effective and efficient data communications in the maritime mobile service and allow end-to-end interconnection through the terrestrial network?

2. What are the OSI network management and routing protocols necessary to provide effective and efficient data communications in the maritime mobile service while allowing end-to-end interconnection through the terrestrial network?

3. What is the applicability of maritime data communications protocols to land and aeronautical mobile communications?

ANNEX 1

Multi-purpose open systems interconnection (OSI) standards for maritime data communications, background information

The open systems interconnection (OSI) standards for the maritime mobile services would present a means to provide compatible communications among a wide variety of systems. Use of the OSI approach and implementation of a network consisting of both terrestrial and mobile components could result in a more efficient use of available bandwidth, reduction in the number of radios required for carriage, and result in an effective and cost-efficient means of point-to-point data communications (e.g., from the shipborne sensors/computers to office via land-based public switched telecommunications networks).

The OSI basic reference model as defined by CCITT Recommendation X.200 and ISO 7498 was based on a seven layer protocol; each with a distinct function. The lower layers (1-4 inclusive) deal with the interconnection of processors and define connections through which data in any format can move from source to destination. Layers 5-7 are concerned with interconnection applications on processors. The CCITT has developed X.200-Series Recommendations which cover service definition and protocol specifications on all seven layers and ISO has developed some equivalent standards to cover the same subjects. However, there are no protocols for radio-based sub-networks currently defined within the open systems interconnection framework. Existing CCIR/CCITT/ISO standards can provide a foundation on which to build radio-based standards in order to extend the internetworking technology to mobile platforms.

Multi-purpose OSI standards for maritime data communications would allow end-to-end digital connectivity to support a wide range of services, including voice and non-voice services.

Implementation of OSI data communications standards would allow multiple shipborne equipments (e.g., Loran-C receiver, GPS receiver, radar, vessel traffic system (VTS) communications, etc.) to communicate via a shipborne network and then transmit the data to the shore-based network. This shore-based network would then transmit the information to the required destination by use of the specialized networks (e.g., the VTS communications and ship navigation sensor information would be routed by the VTS computer network to the various destinations within the VTS centre) or by use of the public switched telecommunications networks.

As computers and computer-based equipment for maritime use are becoming more prevalent, ships will have a requirement to transmit data to and from the multiple computer/computer-based equipment. Use of a maritime OSI standard would allow these communications to be networked, both at the vessel and on shore, and communicated in an effective and efficient manner.

Use of multi-purpose OSI maritime data standards could result in a more efficient use of the radio spectrum, reduction in the number of required shipborne transmitters and a significant reduction in manpower.

QUESTION 109/8*

GMDSS REQUIREMENTS FOR MOBILE-SATELLITE SYSTEMS OPERATING IN THE BANDS 1 530-1 544 MHz AND 1 626.5-1 645.5 MHz

(1992)

The CCIR,

considering

a) Resolution No. 208 (Mob-87) of the World Administrative Radio Conference for the Mobile Services (Geneva, 1987);

b) that the requirements for the Global Maritime Distress and Safety System (GMDSS) entered into force on 1 February, 1992 in accordance with the 1988 Amendments to the 1974 International Convention for the Safety of Life at Sea (SOLAS) concerning radiocommunications for the GMDSS;

c) that multiple mobile-satellite systems designed for operation in the 1 530-1 544 MHz and 1 626.5-1 645.5 MHz bands are currently being developed and introduced;

d) that 1 530-1 544 MHz (No. N 3045 (Mob-87) of the Radio Regulations (RR)) and 1 626.5-1 645.5 MHz (RR No. N 3051) bands, used for GMDSS distress and safety communications, are also available for other services;

e) that INMARSAT participates in the GMDSS in these bands;

f) that if multiple mobile satellite systems operate in these bands, not all may elect to participate in the GMDSS;

g) that the INMARSAT system, as a major element of the GMDSS, provides for priority processing of distress alerts from ship earth stations to the coast earth stations;

h) that INMARSAT coast earth stations provide for expeditious handling and delivery of distress messages to their associated rescue coordination centres;

j) that, in these frequency bands, distress and safety receives the highest order of priority of communications in the maritime mobile-satellite service;

k) that, in these frequency bands, any emission causing harmful interference to maritime mobile-satellite distress and safety communications is prohibited;

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* The Director, CCIR, is requested to bring this Question to the attention of the International Maritime Organization (IMO), the International Maritime Satellite Organization (INMARSAT), the International Civil Aviation Organization (ICAO) and the CCITT.

l) that satellite systems participating in the GMDSS may provide a number of communication services not associated with the GMDSS;

m) that use of these bands for distress and safety purposes in the maritime mobile-satellite service is an important part of the GMDSS;

n) that implementation of these communication services under the GMDSS has begun,

decides that the following Question should be studied

1. What percentages of the total number of ship earth stations may be expected to be simultaneously conducting distress and safety communications in the GMDSS in the various oceanic areas and what traffic studies should be undertaken to assure the required grade of safety service?

2. What should the technical and operational characteristics be for mobile-satellite systems operating in the 1 530-1 544 MHz and 1 626.5-1 645.5 MHz bands in relation to distress and safety communications in the GMDSS?

3. What techniques including real-time pre-emption or the use of dedicated channels can be used to provide the necessary protection and priority access for maritime mobile service distress and safety communications in these bands?

4. What inter-system and intra-system protection criteria should be established for mobile satellite systems operating in these bands?

and further decides

1. that the results of the above studies should be included in (a) Recommendation(s);

2. that the above studies should be completed within the study period 1990-1994.

QUESTION 110/8

INTERFERENCE TO THE AERONAUTICAL MOBILE-SATELLITE (R) SERVICE

(1992)

The CCIR,

considering

a) that the aeronautical mobile-satellite (R) service (AMS(R)S) provides communications relating to safety and regularity of flight (see Nos. 35A (Mob-87) and 56 of the Radio Regulations (RR));

b) that there is a need to prevent harmful interference to the AMS(R)S;

c) that the types of radiation which can cause harmful interference can differ widely depending on the particular technical and operational characteristics of the services involved;

d) that it may not be possible in some cases to identify in detail the characteristics of the interfering radiation;

e) that the radiations from potential sources of harmful interference are, or should be, subject to certain standards;

f) that the practical control of harmful interference can only be effected by individual administrations;

g) that Contracting States of the International Civil Aviation Organization (ICAO) are under certain obligations relative to the Standards and Recommended Practices (SARPs) for aeronautical safety services;

h) that SARPs which provide technical data for AMS(R)S operations are nearing completion by ICAO;

j) that RR No. 953 recognizes that safety services require special measures to ensure freedom from harmful interference;

k) that a safety service must take considerable precautions to ensure that any radio service sharing the same radio band is constrained sufficiently to leave an adequate margin under all likely circumstances;

l) that parts of the frequency bands allocated to the AMS(R)S are also allocated to the fixed service in certain countries (RR No. 730) on a co-primary basis and also conditionally authorized for AM(R)S (RR No. 729 (Mob-87)),

decides that the following Question should be studied

1. What are the recommended methods of calculation of interference to the AMS(R)S?

2. What are the recommended aggregate and single-entry interference protection criteria for AMS(R)S?

3. How should the out-of-band emissions from other radio services and ISM operating in other bands be accounted for in the protection criteria of the AMS(R)S?

and further decides

1. that the results of the above studies should be included in (a) Recommendation(s);

2. that the above studies should be completed within the study period 1990-1994.

QUESTION 111/8

COORDINATION OF FREQUENCY ASSIGNMENTS IN BANDS ALLOCATED TO THE AERONAUTICAL MOBILE-SATELLITE (R) SERVICE

(1992)

The CCIR,

considering

a) that the aeronautical mobile-satellite (R) service (AMS(R)S) provides communications relating to safety and regularity of flight (see Nos. 35A (Mob-87) and 56 of the Radio Regulations (RR));

b) that, in accordance with RR No. 729A (Mob-87), administrations may authorize public correspondence with aircraft earth stations in the 1 545-1 555 MHz and 1 646.5-1 656.5 MHz bands;

c) that in accordance with RR No. 729A (Mob-87), public correspondence with aircraft earth stations must cease immediately if necessary to allow the transmission of messages with priority 1 to 6 as defined in RR Article 51;

d) that AMS(R)S may be provided by more than one satellite system in the same, or overlapping, areas;

e) that the 1990/1991 forecast for AMS(R)S spectrum requirement for circa 2010 exceeds the 1991 ITU allocations to AMS(R)S;

f) that procedures for coordination of frequency assignments to stations in a space radiocommunications service are given in RR Article 11 *et al.;*

g) that Standards and Recommended Practices (SARPs) which provide technical data for AMS(R)S operations are nearing completion by the International Civil Aviation Organization (ICAO);

h) that parts of the frequency bands allocated to the AMS(R)S are also allocated to the fixed services in certain countries (RR No. 730) on a co-primary basis and also conditionally authorized for AM(R)S (RR No. 729 (Mob-87)),

decides that the following Question should be studied

1. What procedures should be followed during the frequency coordination process to ensure that availability of frequency assignments, free from harmful interference for transmission of safety messages is not affected by transmission of public correspondence messages with aircraft earth stations or those of other mobiles in bands allocated to AMS(R)S?

2. What methods should be recommended to ensure sufficient satellite network resources, including spectrum and power, are available for AMS(R)S in each satellite network's coverage area?

and further decides

1. that the results of the above studies should be included in (a) Recommendation(s);

2. that the above studies should be completed within the study period 1990-1994.

QUESTION 112/8

PERFORMANCE OBJECTIVES FOR DIGITAL MOBILE-SATELLITE SERVICES

(1992)

The CCIR,

considering

a) that the total bit error ratio in the hypothetical reference circuit should not be such as would appreciably affect the transmission of information;

b) that the bit error ratio will vary with time due to the effects of varying propagation conditions, including the effects of multipath fading;

c) that the extent to which fading can affect various types of mobile terminals cannot be determined fully until more experimental data are available;

d) that fade margins in the bands typically used for service links (forward/return) to mobile terminals can be substantially different from those in bands typically used for feeder links and this may result in different performance objectives for these two types of links;

e) that the use of error correction coding techniques in mobile-satellite service (MSS) transmissions can result in satisfactory operation at reduced levels of carrier-to-noise plus interference ratio ($C/(N+I)$);

f) that the treatment of performance objectives for safety related services in bands allocated to the MSS could be different than for non-safety related services in those bands;

g) that for safety related services, performance objectives will be developed in close liaison with other appropriate international organizations (i.e. the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO));

h) that with respect to message transfer time (end-to-end), performance objectives for store-and-forward services may be less stringent than those for real-time services;

j) that, where appropriate, the performance objectives of the fixed-satellite services (FSS) e.g. CCIR Recommendation 614, should be taken into account, but that less stringent end-to-end objectives than those required for the fixed-satellite services may be acceptable for mobile-satellite services due to the severe environmental conditions under which these latter services operate;

k) that performance objectives for mobile-satellite services may be influenced by those of the terrestrial mobile service where the satellite service is used to complement such services,

decides that the following Question should be studied

For each of the various digital mobile-satellite services:

1. What are the bit error performance objectives and preferable bit error performance distributions in the appropriate hypothetical reference digital path?

2. What is the preferred method for correlation of bit error performance with propagation characteristics?

3. What performance parameters, if any, should be defined in order to take account of existing fixed-satellite service performance objectives, bearing in mind that interference levels in MSS systems are significantly different than for FSS systems?

4. How should the performance objective of § 1 be allocated amongst feeder links and service links?

and further decides

1. that the results of the above studies should be included in (a) Recommendation(s);

2. that the above studies should be completed within the study period 1990-1994.

QUESTION 113/8

TECHNICAL AND OPERATIONAL CHARACTERISTICS OF LAND MOBILE SYSTEMS USING MULTI-CHANNEL ACCESS TECHNIQUES WITHOUT A CENTRAL CONTROLLER

(1992)

The CCIR,

considering

a) that new land mobile services including for example, personal radios, typically providing communications up to a range of 5 km in urban areas and 15 km in rural areas which are now being introduced, have different characteristics from existing services and may be available to a large public;

b) that this service uses consumer-type devices which may create difficulties to administrations, and may be misused;

c) that the utilization of the radio spectrum should be as economical as possible and that the use of multi-channel access techniques conserves frequency spectrum;

d) that highly flexible and economical systems can be achieved without using a central controller for setting up control of the radio path;

e) that the widespread and increasing use of these equipments and the characteristics of their utilization may create operational problems;

f) that systems may require coordination of certain system parameters on a national and international basis,

decides that the following Question should be studied

1. What are the required radiocommunication parameters for analogue and digital systems?

2. What is the preferred multi-channel access technique and its protocol including detection of an idle radio channel?

3. How does the spectrum efficiency compare with systems which use a central controller?

4. What technical steps should be taken to avoid adverse effects of misuse of these equipments?

5. What methods can be used to optimize spectrum conservation and service area or range?

6. What kind of users can be served optimally by these kinds of land mobile systems?

7. What measures should be taken in order that a large number of equipments may coexist in the same frequency band with minimum mutual interference?

8. What technical parameters are required in order to allow these equipments to function without creating interference to other users, noting the potentially very large number of users?

9. What are the system parameters and technical characteristics of equipment on which international agreement is desirable?

QUESTION 114/8

TECHNICAL AND OPERATIONAL CHARACTERISTICS OF CORDLESS TELEPHONES AND CORDLESS TELECOMMUNICATION SYSTEMS

(1992)

The CCIR,

considering

a) that new land mobile services such as cordless telephony now being introduced have different characteristics from existing services and may be available to a large public;

b) that this service uses consumer-type devices which may create difficulties to administrations;

c) that the utilization of the radio spectrum should be as economical as possible and that the use of multi-channel access techniques conserves frequency spectrum;

d) that highly flexible and economical systems can be achieved without using a central controller for setting up control of the radio path;

e) the Question concerning "cordless telephones" adopted by the World Plan Committee at its meeting in Lisbon, 3-10 February, 1988 (see the report of the World Plan Committee, Lisbon, 1988);

f) that certain administrations are encountering problems of mutual interference and inadvertent interaction between "cordless telephone" systems,

decides that the following Question should be studied

1. What are the required radiocommunication parameters for analogue and digital systems circuit connection quality and speech quality?

2. What is the preferred multi-channel access technique and its protocol including detection of an idle radio channel?

3. What services, additional to telephony, can be offered by systems applying this technology?

4. What steps should be taken to ensure the quality of the communications?

5. What steps are necessary to ensure the security of communications and the access to the systems?

6. What methods can be used to optimize spectrum conservation and service area or range?

7. What measures should be taken in order that a large number of equipments may coexist in the same frequency band with minimum mutual interference?

8. What are the system parameters and technical characteristics of equipment on which international agreement is desirable?

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