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ATS SPEECH CIRCUITS **GUIDANCE MATERIAL** **ON SWITCHED NETWORK PLANNING**

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FOREWORD

In 1979 a proposal to amend Annex 10 to include Standards and Recommended Practices relating to switching and signalling over aeronautical speech circuits was referred to all Contracting States and interested international organizations for comment. Considering the diverse nature of the comments received, the Air Navigation Commission agreed that further rationalization of the proposal was required and that this would be an appropriate task for a study group.

Accordingly, the Aeronautical Speech Circuit Switching and Signalling (ASCSS) Study Group was formed and a revised amendment proposal was referred to States and interested international organizations in December 1983. Concurrently, the study group developed a set of guidance material which forms the basis of this circular.

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TABLE OF CONTENTS

	<u>Page</u>
Chapter 1. Background	1
1.1 The present situation with respect to ATS speech circuits and their implementation	1
1.2 Operational requirements	1
1.3 Implementation	2
1.4 Planning overview	2
Chapter 2. System characteristics	3
2.1 General	3
2.2 Signalling	4
2.3 2-wire versus 4-wire	4
2.4 Numbering	5
2.5 Grade of service	5
2.6 Alternate routing	6
2.7 Propagation time	6
2.8 Compensatory features	7
2.9 Class of service	7
Chapter 3. Planning principles	8
3.1 Network	8
3.2 Switches	8
Appendix 1 Characteristics of the standard CCITT signalling systems for general use	11
Appendix 2 General characteristics of a complete international telephone connexion	15

CHAPTER 1

BACKGROUND

1.1 THE PRESENT SITUATION WITH RESPECT TO ATS SPEECH CIRCUITS AND THEIR IMPLEMENTATION

1.1.1 The exchange of ATS messages between adjacent area control centres/flight information centres has ideally been carried out over direct speech circuits. However, in many cases, the volume of message traffic carried on such circuits could not economically justify the provision of a dedicated direct speech circuit and consequently there have been many direct speech circuit requirements in regional air navigation plans which have not been implemented. The problem is compounded when consideration is given to the desirability of providing standby facilities and geographically diverse routing to ensure a high degree of availability of service to these ATS voice communications.

1.1.2 One possible solution to this problem appears to lie in the network connexion of a more limited number of circuits to meet the operational requirement. Using through-switching this could provide an adequate and flexible speech network at minimum cost. While it is recognized that the optimum operational solution is the use of direct circuits between all adjacent area control centres (ACCs), a switched network is capable of affording the following advantages:

- a) means of speech communications not otherwise made available;
- b) alternate routing;
- c) enhanced system reliability;
- d) conference call facilities;
- e) reduction in number of circuits otherwise required;
- f) system management;
- g) priority access (break-in as required);
- h) automatic call-back; and
- i) a cost-effective system.

Possible lack of immediate access due to a "busy" condition is a disadvantage of a switched speech network but will be alleviated by g) and h) above.

1.2 OPERATIONAL REQUIREMENTS

1.2.1 Air traffic services requirements for communications between flight information regions are set out in Annex 11, 6.2.2. These requirements make it apparent that, except for the purpose of transfer of radar control where instantaneous establishment of communications is required, a switched speech network in which communications could normally be established within 15 seconds would be acceptable.

1.2.2 Detailed ATS communications requirements are set out in the relevant regional air navigation plan publication (ANPP). Currently, the requirements are

presented in both table and chart form as circuit requirements. The introduction of the speech network concept will require that this method of presentation be changed to allow one table to show the operational requirement - that is, a table showing the speech communications requirements for each station. A second table, together with a chart will be required to show the actual circuits required to meet the requirements - that is, a plan of the network. It may be appropriate in the future to consider moving the speech communications requirements table into the ATS section of the ANPP while retaining the speech circuits table and chart in the COM section.

1.2.3 Obviously the switched speech network concept could also be used to meet domestic operational requirements and the techniques outlined in this circular, although intended to meet international requirements, may also be applicable to domestic extensions of the network. To limit misuse of the international network by unauthorized domestic units, it may be prudent to limit calls to and from international circuits to those units which have an operational requirement to use the facility while barring other users by means of software tables in the switching centre.

1.3 IMPLEMENTATION

1.3.1 Implementation of a switched speech circuit network should be undertaken on an evolutionary basis. Where a number of States are involved there will be a need to establish adequate co-ordination through the appropriate ICAO regional offices. Until all States concerned have a high level of confidence in a newly implemented switched speech circuit network, the existing direct speech circuits should be retained in service. States should agree on a target date for implementation of a proposed network to achieve full implementation not later than that date. It should be noted, however, that even partial implementation of a switched speech network will represent an improvement over the existing system in many cases.

1.4 PLANNING OVERVIEW

1.4.1 Most of the following material discusses the application of the switched network concept to ATS direct speech circuits approaching the subject from a qualitative viewpoint, the reason being that quantitative specification for most functions, characteristics and/or parameters have already been developed by the International Telegraph and Telephone Consultative Committee (CCITT).

1.4.2 One task which the system planner faces is that in some instances the CCITT presents several recommended options or specifies ranges instead of discrete values for parameters that, for each specific system, should be discretely specified.

1.4.3 In such circumstances, planners are expected to make, preferably on a regional basis, their choice of the CCITT recommended options or tolerances selecting those which better take into account:

- a) the technology already being applied in the region concerned;
- b) the specific ATS requirements of the region;
- c) (once a) and b) have been considered) the choice that could facilitate interregional connexions.

CHAPTER 2

SYSTEM CHARACTERISTICS

2.1 GENERAL

2.1.1 There are several reasons to look for either alternative or complementary ways to improve the conventional structure of contiguous ACCs linked to each other by dedicated speech circuits. There are the cases where speech circuits are available from the post, telephone and telegraphs (PTTs) but the low density of air traffic has delayed their use because of cost-effectiveness considerations. In other cases, such speech channels either do not exist or, in cases where established channels exist, the provision of alternate routing has been deemed necessary to meet reliability criteria.

2.1.2 To overcome such situations the idea of networking the circuits was envisaged as a way to interconnect two adjacent ACCs through their link with a third party with which a satisfactory connexion already exists or could be implemented. To make those connexions operationally acceptable, through-switching was necessary.

2.1.3 Interconnexions made in that way may furnish the sole means of voice communications between those ACCs or provide alternative routing when another more direct route is not available due to either temporary outage or excessive loading.

2.1.4 It may happen when structuring a switched network that some of the segments to be incorporated are already served by dedicated voice channels and that the ACCs concerned appear to have nothing to gain from their inclusion in the network. Nevertheless, they should be incorporated to ensure the proper operation and integrity of the system.

2.1.5 Admittedly, the application of the switched network concept could be seen as implying some theoretical degradation with respect to the conventional solution as defined in 2.1.1.

2.1.6 However, it should be considered that a switched network may afford the following advantages:

- a) means of speech communication not otherwise available;
- b) alternate routing;
- c) conference facilities;
- d) priority access (break-in) as required;
- e) automatic call-back;
- f) reduction in the number of circuits otherwise required;
- g) a cost-effective system;
- h) system management.