

RECOMMENDATION ITU-R F.1110-3

Adaptive radio systems for frequencies below about 30 MHz

(Question ITU-R 147/9)

(1994-1995-1997-2003)

The ITU Radiocommunication Assembly,

considering

- a) that HF sky-wave links allow communication over large distances;
- b) that, up to now, natural ionospheric variations and interference resulting from spectral congestion and propagation anomalies have made HF links difficult to operate and demanded highly-skilled operators;
- c) that technological progress in recent years has led to the development of adaptive systems which can be used to automate HF links and enhance their quality;
- d) that adaptive systems make it possible:
 - to achieve a higher quality of service by combining an ability to exploit modern radio-frequency technology with advanced real-time control software; the result is a system which is reliable, robust, cost-effective and easy to use;
 - to establish extensive HF networks with flexible, less hierarchical architecture;
 - to reduce transmission times thereby:
 - securing more efficient use of the spectrum,
 - reducing the interference between users,
 - providing the ability to increase traffic density,
 - to reduce the reliance on skilled operators;
- e) that adaptive automatic link establishment (ALE) systems are now in operation;
- f) that additional information on adaptive HF systems and networks can be found in the ITU-R Handbook on “Frequency-adaptive communication systems and networks in the MF/HF bands”,

recommends

- 1 that adaptive HF systems should have the general functions given in Annex 1.

Annex 1

General functions of HF adaptive systems

1 Introduction

Frequency-agile, adaptive HF systems may be used for any type of fixed or mobile service, but have a greater applicability for digital technologies where a high quality of service is required.

An adaptive system automates the processes involved in establishing, maintaining and terminating HF links or networks. It dispenses with the need for skilled operators and improves the quality of service and the efficiency of the link.

Basically, an adaptive system has a triple function:

- automatic selection of the frequency and of other system parameters to be used;
- automatic operation as regards calling, establishing the communication (with possible switch-over to the peripheral equipment needed for the type of service to be provided), and disconnecting;
- adaptivity during the communication so as to optimize at all times the quality of service according to the ionospheric conditions and spectrum congestion.

2 Automatic selection of the frequency to be used

The selection of the frequency to be used should utilize some or all of the following information:

- list of assigned frequencies;
- a stored ionospheric prediction schedule for predicting link quality at different frequencies as a function of the time, the season and the year;
- data on the quality of previous links, which may reduce the ALE time if the ionospheric duct is sufficiently stationary (short-term) or sufficiently reproducible during the same time interval on successive days;
- passive real-time analysis of channels in order to sort out free channels from channels suffering interference (reducing spectrum congestion);
- possibly, information provided by another device, e.g. ionospheric-sounding system.

On the basis of all this information, a preferential list can be drawn up, when required, of the frequencies to be used for a given link.