

RECOMMENDATION ITU-R F.444-3*

**Preferred characteristics for multi-line switching arrangements
of analogue radio-relay systems**

(1966-1970-1978-1982)

The ITU Radiocommunication Assembly,

considering

- a) that protection arrangements for wide-band telephony and television radio-relay systems may be required to meet availability objectives;
- b) that international agreement on the major characteristics required for interconnection of such systems appears to be desirable and feasible for baseband-frequency and intermediate-frequency multi-line switching systems;
- c) that many characteristics of multi-line switching systems are still under study, while others represent areas of agreement;
- d) that an objective of multi-line switching arrangements is to facilitate compliance with Recommendation ITU-R F.393 and ITU-T Recommendation J.61,

recommends

that, as far as practicable, the characteristics of multi-line switching systems should conform to the following:

- 1 the criteria for protection switching and restoration should be based on:
 - 1.1 the level of the continuity pilot (see Recommendation ITU-R F.401);
 - 1.2 the evaluation of noise power within a frequency band in the vicinity of the pilot frequency (see Table 1, Recommendation ITU-R F.401);
 - 1.3 the received carrier level;
- 2 seizure and restoration of a protection channel should depend on the following criteria:
 - § 1.1 alone
 - § 1.2 alone
 - § 1.3 in combination with § 1.1
 - § 1.3 in combination with § 1.2
 - § 1.1 in combination with § 1.2;
- 3 the threshold levels should be adjustable, and the actual threshold should be chosen so that switching occurs only when essential for reasons of performance and reliability;

* Radiocommunication Study Group 9 made editorial amendments to this Recommendation in 2001 in accordance with Resolution ITU-R 44.

4 in each switching section, recognition of a failure of a regular radio-frequency channel should initiate changeover to a protection radio-frequency channel *within* the section involved. Unnecessary switchover and re-set operations in other sections should be avoided;

5 the following control signals should be provided:

5.1 from the main traffic receive-end to the transmit-end, a signal for bridging or switching. This signal includes identification of the degraded channel, and, where appropriate, a preference for a particular protection channel. The signal should comprise voice frequency telegraph tones which conform in frequency with the relevant ITU-T Recommendations. Other types of signal and levels may be used by agreement between the administrations concerned. A service channel should be used (see Recommendation ITU-R F.400) to convey this signal. A failure of the control signal information should freeze the situation as it was immediately preceding the failure. In certain cases where priority is used, it may be desirable to change the situation to some preferred configuration;

5.2 from the main traffic transmit-end to the receive-end, confirmation that bridging or switching has taken place. This may be transmitted, for instance, by suitably modulating the continuity pilot of the protection channel, or by changing its frequency, or by other means;

6 the protection channels should be made available as much as possible. If the operational requirements make it necessary, it should be possible to give priority to any regular channel;

7 the operate time of the entire automatic switching system should not exceed 40 ms. An operate time of 10 ms can be achieved by using a wide-band signalling channel;

8 the effective transfer time in most cases depends on the switching element used. Reduction of this time below 2 ms and down to 10 μ s may be realized by using modern design techniques;

9 the noise allocated as a contribution by the switching equipment should generally be a small fraction of the total allowable noise of the link (see Recommendations ITU-R F.393 and ITU-R F.395);

10 conformity with ITU-R Recommendations relating to interconnection and characteristics at baseband and intermediate frequencies should, in no way, be affected by the use of multi-line switching equipment.
