

**AVAILABILITY OBJECTIVES FOR REAL DIGITAL RADIO-RELAY LINKS
FORMING PART OF A HIGH-GRADE CIRCUIT WITHIN AN INTEGRATED
SERVICES DIGITAL NETWORK**

(1990)

Scope

This Recommendation provides availability objectives for real digital radio-relay links forming part of a high-grade circuit within an integrated services digital network including the factors affecting unavailability of digital radio-relay systems.

It should also be noted that this Recommendation could be used only for systems designed prior to the approval of Recommendation ITU-R F.1703 in 2005.

The ITU Radiocommunication Assembly,

considering

- a) that the availability objective of a high-grade 2500 km hypothetical reference digital path for digital radio-relay systems, operating above the second hierarchical level, is given in Recommendation ITU-R F.557;
- b) that real paths which form part of the high-grade portion of an integrated services digital network (ISDN) sometimes differ in composition from the hypothetical reference digital path (see Recommendation ITU-R F.556, Fig. 1), and share radio-relay links shorter than 2500 km with other digital links;
- c) that the availability of a radio-rely system is dependent upon many factors and particularly upon: the maintenance organization (which determines the time to restore), the reliability of equipments, the system design and propagation conditions, and that the relative importance of these various factors may vary significantly, sometimes without possibility of control, from one area to another;
- d) that it is desirable to give objectives for availability as a guide in the planning of real radio-relay links forming part of the high-grade portion of an integrated services digital network,

recommends

1. that the availability objective appropriate to a real digital radio link intended to form part of a high grade circuit within an ISDN, for a link with length, L , of between 280 km and 2500 km, should be as follows:

$$A = 100 - (0.3 \times L / 2500) \quad \%$$

the percentage being considered over a period of time sufficiently long to be statistically valid, this period is probably greater than one year; the period of time is under study (see Notes 1, 2 and 3);

2. that in the estimate of unavailability, one must include all causes which are statistically predictable, unintentional and resulting from the radio equipment (including all equipment within a digital radio section), power supplies, propagation (see Remark), interference and from auxiliary equipment and human activity, and that the estimate of unavailability should include consideration of the mean time to restore (see Notes 4 and 5);

Remark – The influence of the propagation-dependent part on the availability design objective is considered in Recommendations ITU-R F.1093 and ITU-R P.530.

3. that the following Notes should be treated as part of the Recommendation:

Note 1 – The value of 0.3 is a provisional one and it is recognized that, in practice, the value selected may fall into the range 0.1 to 0.5. The choice of a specific value in this range depends on the optimum allocation of outage time among

* Radiocommunication Study Group 9 made editorial amendments to this Recommendation in 2000 in accordance with Resolution ITU-R 44.

** Radiocommunication Study Group 5 made editorial amendments to this Recommendation in 2012 in accordance with Resolution ITU-R 1.

the various causes which may not be the same when local conditions are taken into account (i.e. propagation, geographical size, population distribution, organization of maintenance).

Furthermore, the availability of radio-relay systems is only one of the many factors that ensure that the grade of service of the telephony traffic is acceptable, the choice of an optimum value for this particular factor can only be done by considering all transmission systems either existing or planned in the network under study. For these reasons, administrations may select different values of availability objective for use by their planning organization, the selected values lying in the range shown above.

Note 2 – Availability of multiplex equipments is excluded from the foregoing. The ITU-T is expected to establish availability objectives for these equipments.

Note 3 – Availability objectives for circuits shorter than 280 km are under study.

Note 4 – Planners should indicate their assumptions concerning the mean time between failures, the mean time to restore, the precautions taken against interruptions and fading (in particular the use of protection channels and the number of hops per switching section) and the distribution of fading with a duration longer than 10 s.

Note 5 – The time to restore, which is the time that elapses between an interruption to traffic and its restoration, includes recognition time, travelling time as well as repair time. Differences in the time to restore will occur between administrations due to various factors such as site accessibility, weather, maintenance policy and other economic considerations.

Note 6 – This Recommendation does not take into account the improvements which could be obtained by means of re-routing traffic over other systems, e.g. cables and other radio-relay systems.
