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GENERAL CHARACTERISTICS OF INTERNATIONAL TELEPHONE CONNECTIONS AND INTERNATIONAL TELEPHONE CIRCUITS

CHARACTERISTICS OF N + M TYPE DIRECT TRANSMISSION RESTORATION SYSTEMS FOR USE ON DIGITAL AND ANALOGUE SECTIONS, LINKS OR EQUIPMENT

ITU-T Recommendation G.180

(Previously "CCITT Recommendation")

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FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation G.180 was revised by the ITU-T Study Group XV (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation G.180

CHARACTERISTICS OF N + M TYPE DIRECT TRANSMISSION RESTORATION SYSTEMS FOR USE ON DIGITAL AND ANALOGUE SECTIONS, LINKS OR EQUIPMENT

(Melbourne, 1988; amended at Helsinki, 1993)

1 General

Transmission restoration functions are often implemented in the modern telecommunication networks to improve the availability and quality of service, by minimizing the effects or potential effects of a transmission failure, and to make the maintenance operations easier.

The terminology and general principles of transmission restoration are described in Recommendation M.495. The functional organization for automatic transmission restoration is described in Recommendation M.496.

2 Object of Recommendation

This Recommendation specifies the characteristics of equipment for N + M type direct transmission restoration systems (protection link switching) for digital and analogue sections, links and equipment (see Recommendations G.701 and G.211). The general arrangement of a system for N + M direct transmission restoration is shown in Figure 1. This Recommendation refers to the equipment labelled as RSE (restoration switching equipment) and RSCE (restoration switching control equipment).

This Recommendation is intended also to cover the case where the signals at the interfaces T belong to different hierarchical levels. In this case, each access at one side can be a group of accesses as indicated in the example of Figure 2. The left part of this figure refers to the particular case where the restored path is not on a complete link but just through a multiplex equipment.

NOTE – The equipment specified in this Recommendation can possibly be used also for N + M automatic or semi-automatic transmission rerouting (protection network switching) but generally this type of restoration function is implemented by different equipment, often incorporating also other functions (such as, for example, automatic digital distribution frames).

Three types of direct transmission restoration systems are considered by this Recommendation:

The first one should permit routing of any one of N normal links on to any one of M restoration links.

The second type should permit the interconnection of any of the N accesses to any one of the N + M links.

The third one should permit routing of any one of N normal links to a single restoration link (in many cases this type can be considered just a special case of the first type).

For all the types two options exist:

a) to switch the two directions of transmission independently; and

b) to switch the two directions of transmission simultaneously.

This Recommendation does not cover the restoration systems fully embedded in transmission systems and the 1 + 1 systems where the switching occurs at the receive end only (see Recommendation G.181).

The hierarchical levels at interfaces T are those specified in Recommendation G.702 (hierarchy levels 1 and up). For RSE to be used on analogue transmission systems the frequency bands at interface T are those specified in Recommendation G.211.

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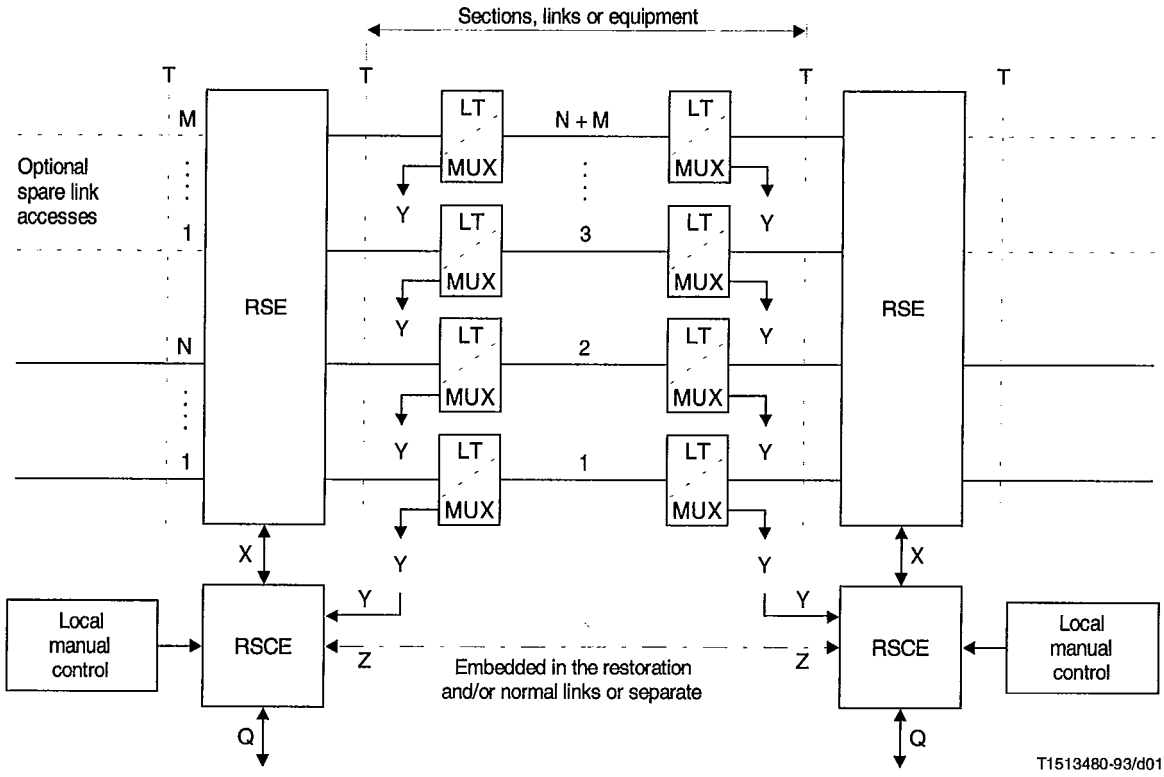

RSE Restoration switching equipment

RSCE Restoration switching control equipment

LT / MUX Line terminal, digital multiplexing or analogue translating equipment

This link can be replaced by connection in the TMN

X Non-standardized (or standard Q) interface. If RSE and RSCE are combined interface X does not exist

Y Interface to be standardized in the future (possibly standard Q)

Z Interface possibly to be standardized

Q Optional standard Q interface to the TMN (telecommunication management network) or to a control centre

T Transmission path interfaces

NOTES

1 The failing of a section or link can possibly be detected in the RSE and the information transferred to the RSCE. In this case interface Y may not exist.

2 The interworking with the TMN via interface Q is at present beyond the scope of the Recommendation.

3 The N + M links or sections can be in the same cable or follow different routes.

4 Spare link accesses may be used to convey low priority traffic.

5 The interface between the RSCE and local manual control is not standardized and it is not covered by this Recommendation.

FIGURE 1/G.180

N + M direct transmission restoration system

3 RSE specifications

Two types of RSE are considered by this Recommendation: "regenerative" and "non-regenerative".

The first type, where the digital signal undergoes a complete process of retiming and reshaping, is for digital systems only. It makes the RSE a digital equipment, and it is sometimes considered to be advantageous, e.g. from the station cabling point of view.

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