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OF ITU

I.511

INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

INTERNETWORK INTERFACES

ISDN-TO-ISDN LAYER 1 INTERNETWORK INTERFACE

ITU-T Recommendation I.511

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation I.511 was published in Fascicle III.9 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

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

Recommendation I.511

ISDN-TO-ISDN LAYER 1 INTERNETWORK INTERFACE

(Melbourne, 1988)

1 General

The objective of this Recommendation is to define the layer 1 aspects of the ISDN interworking, including reference configuration and interworking functions.

Note - For the international interworking between networks based on different digital hierarchies and speech encoding laws, see Recommendation G.802.

2 Reference configuration

General reference configuration and logically defined reference points for ISDN interworking with other networks or other ISDNs are given in Figure 4/I.310, where K, M and N are defined as logical reference points for interworking. However, from the viewpoint of physical interworking, the digital sections and digital links defined in Rec. G.701 are shared among the logically different networks of the same network provider. Therefore, the commonly designated reference point for layer 1 interworking should be established so that it can be used as the common layer 1 specification for the logically different reference points K, M and N.

2.1 *Layer 1 reference configuration*

Figure 1/I.511 shows the layer 1 reference configuration and layer 1 reference point Q.

Figure 1/I.511 reflects the interworking between different network providers each of which has logically different networks or special facilities. The number of logically different networks which a network provider has is one or more; however, at least one network provider should contain an ISDN.

The internetwork termination (IT) is a functional grouping associated with the proper physical and electromagnetic termination of the network as well as section, link and/or circuit termination of the network. Note that specific functions of IT may be performed with one or more pieces of equipment.

Reference point Q should be one of the equipment interfaces listed in Recs. G.702 and G.707. The specification of Q can be used as the common description of the layer 1 specification for the different logical interfaces K, M and N.

The digital link of each network should be terminated at Q.

2.2 *Physical realizations of reference configuration*

Figure 2/I.511 gives examples of configurations made up of combinations of physical interfaces at reference point Q; Figure 2a/I.511 shows an interface without transmission section (line or radio); and Figures 2b/I.511 and 2c/I.511 show interfaces with transmission sections.

In every case, reference point Q should appear as the equipment interface.

The mandatory functions of IT described in § 3 are the same in each application, while the optional functions may be different according to the following cases, if interworking:

- with or without transmission sections,
- with or without master-slave relation, such as master-slave synchronization and remote maintenance between two network providers.

3 Layer 1 interworking functions

Layer 1 interworking functions at Q, which may be performed by the IT, should be classified into mandatory and optional functions.

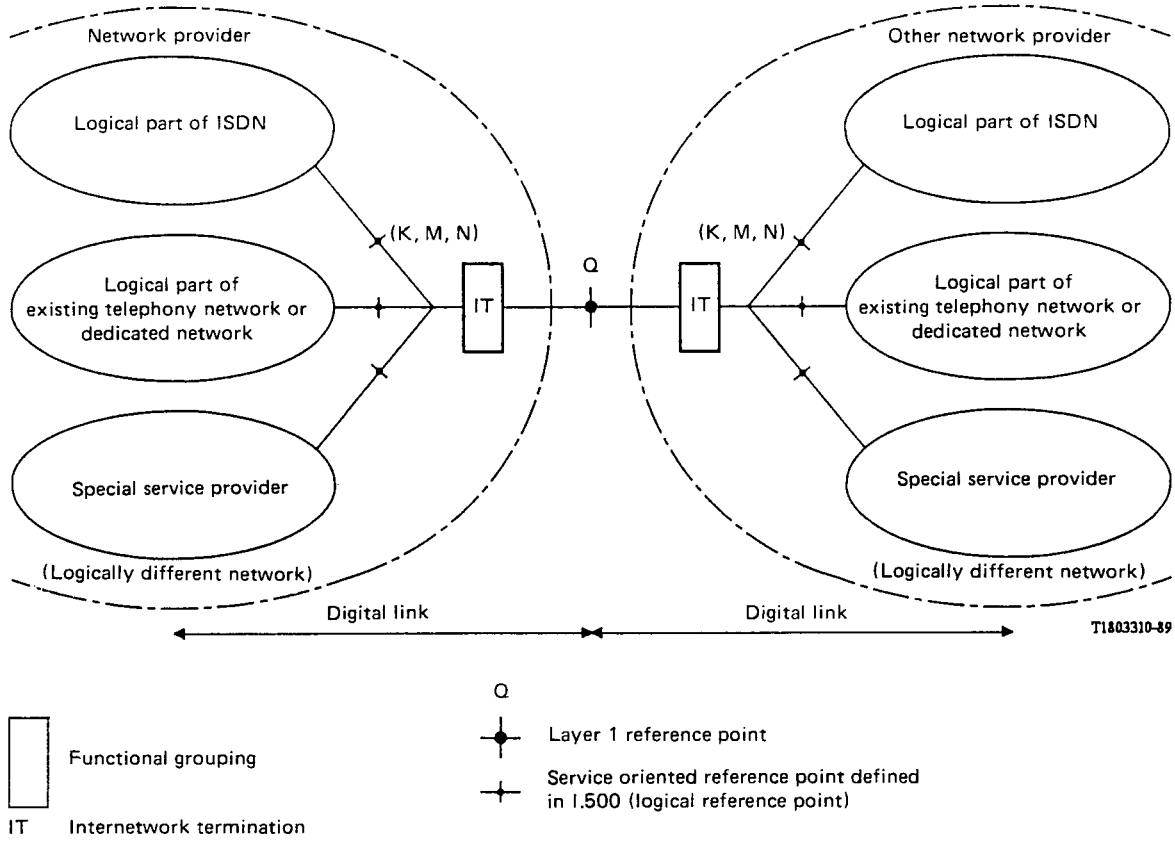
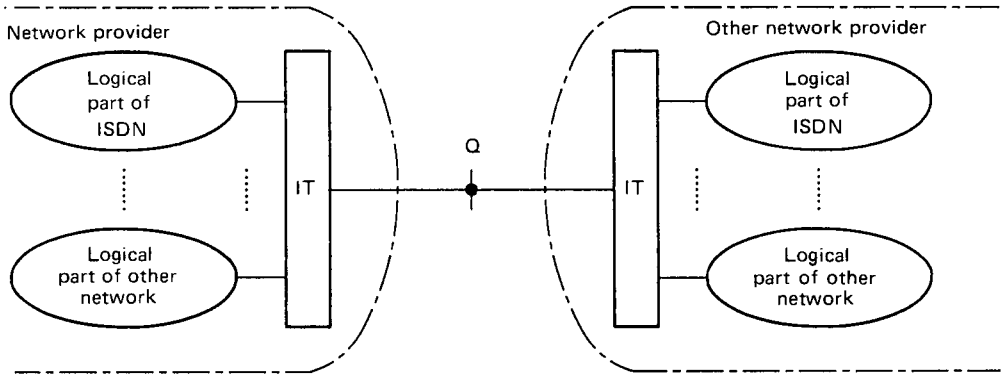
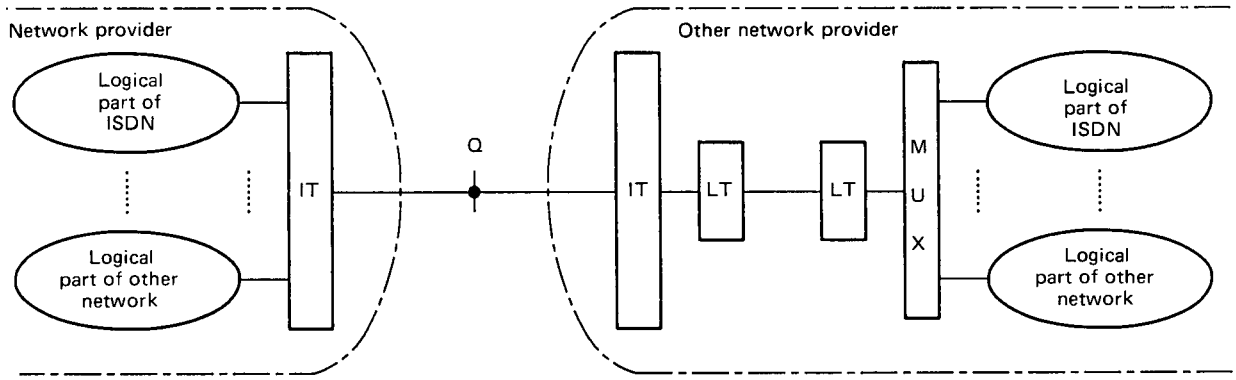


FIGURE 1/I.511

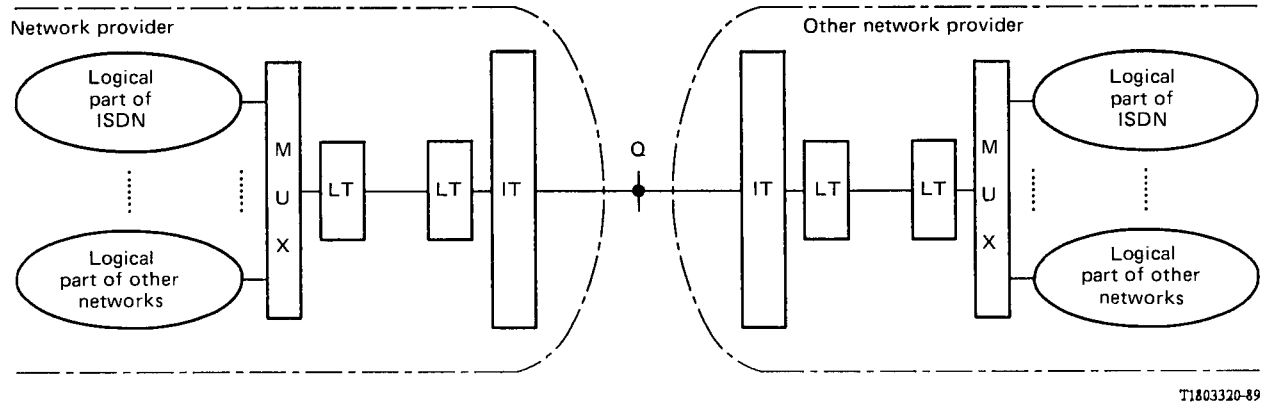
Reference configuration for the ISDN-related internetwork interface at layer 1



a) Interconnected without line (radio) section



b) Interconnected at the and of the line (radio) section



c) Interconnected with the line (radio) sections of both network providers

IT Internetwork termination
LT Line termination

FIGURE 2/I.511

Examples of physical configurations

3.1 *Mandatory functions*

Every item related to mandatory functions should always be carried out in order be classified into mandatory and optional functions.

3.1.1 *Providing standardized equipment interfaces*

Reference point Q should be applied to one of the equipment interfaces standardized in the G.700-G.900 Series Recommendations for digital networks, transmission systems and multiplexing equipment.

Items to be standardized are as follows:

1) *Interface bit rate*

Interface bit rate at Q should be selected from among the hierarchical bit rates defined in Recs. G.702 and G.707.

It should be noted that the interworking hierarchy be applied to the international interworking as defined in Rec. G.802 when interconnection based on an asynchronous hierarchy is adopted.

2) *Physical/electrical characteristics*

Physical/electrical characteristics at Q should conform to the relevant part of G.700-G.900 Series Recommendations.

3) *Functional characteristics*

Functional characteristics at Q should conform to the relevant part of G.700-G.900 Series Recommendations.

4) *Time slot assignment*

There are two methods for assigning time slots in the frame structure to various channels: the fixed format method and the variable format method. A set of examples of both methods is described in Figure 3/I.511.

Fixed format - Time slots for interworking information channels are preassigned in a fixed manner in the interworking frame structure by bilateral negotiation.

Variable format - A flexible time slot is allocated to any information channel on a demand assignment basis.

5) *Time slot sequence integrity*

Time slot sequence integrity should be performed. Furthermore, it is preferable to perform time slot sequence integrity with 8 kHz integrity.

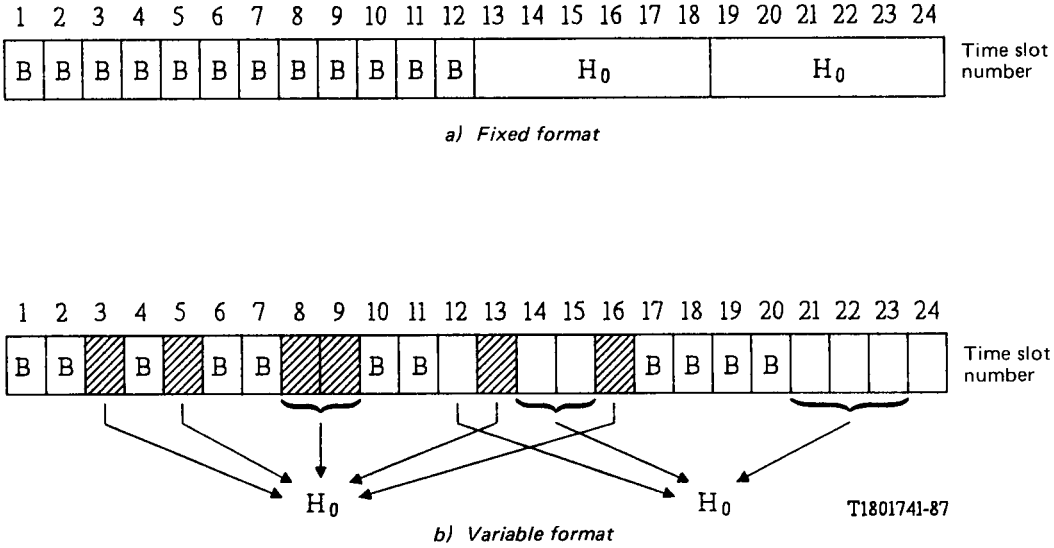


FIGURE 3/I.511

Examples of fixed format and variable format time slot assignment

3.1.2 *Providing layer 1 maintenance capability*

Reference point Q should meet the maintenance requirements defined in the relevant part of the M-Series and N-Series Recommendations.

Items to be standardized are as follows:

1) *Termination of the digital link*

Termination of the digital link should conform to the relevant part of the M-Series Recommendations.

2) *Termination of the digital circuit*

Termination of the digital circuit should conform to the relevant part of the M-Series Recommendations and is deferred for further study.

3.2 *Optional functions*

Not all of the items of the optional functions can be achieved at reference point Q. Only some of them are selected according to the features of each connection type or differences in the relationship between network providers.

3.2.1 *Providing interworking between different connection types in layer 1*

In some applications, connection types which are different in layer 1 items can be successfully interconnected over reference point Q by using the optional capabilities listed below.

Items to be standardized are as follows:

1) *Coding rule conversion*

i) μ-A law coding rule conversion should be performed according to Rec. G.802 in the case of speech and 3.1 kHz audio services;

ii) Unrestricted 64 kbit/s digital service shall not be subject to network provided conversion.

2) *Interconnection among connection types with different layer 1 attributes*

Rate adaption should be performed according to Recs. I.460, I.461, I.462, I.463 and I.464.

3.2.2 *Providing network synchronization clock*

If network synchronization is performed over reference point Q by other methods than the plesiochronous method, the clock should meet the requirement defined in Rec. G.812.