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SERIES Q: SWITCHING AND SIGNALLING

Digital local, combined, transit and international exchanges in integrated digital networks and mixed analogue-digital networks – Exchange interfaces, functions and connections

EXCHANGE FUNCTIONS

Reedition of CCITT Recommendation Q.521 published in the Blue Book, Fascicle VI.5 (1988)

NOTES

1   CCITT Recommendation Q.521 was published in Fascicle VI.5 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 Q.521

EXCHANGE FUNCTIONS

1 General

This Recommendation applies to digital local, combined, transit and international exchanges for telephony in Integrated Digital Networks (IDN) and mixed (analogue/digital) networks and also to local, combined, transit and international exchanges in an Integrated Services Digital Network (ISDN).

The field of application of this Recommendation is more fully defined in Recommendation Q.500.

Some text may only apply to a certain type (types) of exchange, e.g. digital transit, local or combined. Where this occurs, the application is defined in the text. Not all the recommended functions will necessarily be provided in every exchange.

2 Exchange functions – Introduction and framework

2.1 *General*

The purpose of this Recommendation is to specifically address those functions required to support basic and supplementary services in performing this test, this Recommendation takes account of the principles set down in Recommendation I.310 and draws a clear distinction between services and the exchange capabilities required to support them.

It should be noted that the list of functions identified in this Recommendation is not necessarily extensive.

2.2 *Exchange model*

The functions described in this and associated Recommendations can be considered within the framework of an exchange functional model. Such a model is shown in Figure 1/Q.521. This divides the exchange into three functional areas as follows:

    a) control functions – Those functions required to control services and connections, e.g. signalling, routing and connection/resources handling functions;

    b) connection functions – Those functions directly related to the connection path through an exchange, i.e. switching and transmission mechanism (including ET);

    c) operation and maintenance functions – Those functions of an operational, management and maintenance nature which are not employed for call establishment and supervisory purposes, e.g. test functions.

The exchange functional model shown in Figure 1/Q.521 is appropriate to exchanges operating in an IDN and also those operating in an IDN which is evolving towards an ISDN. In terms of this Recommendation, most of the functions fall within the control functions area.
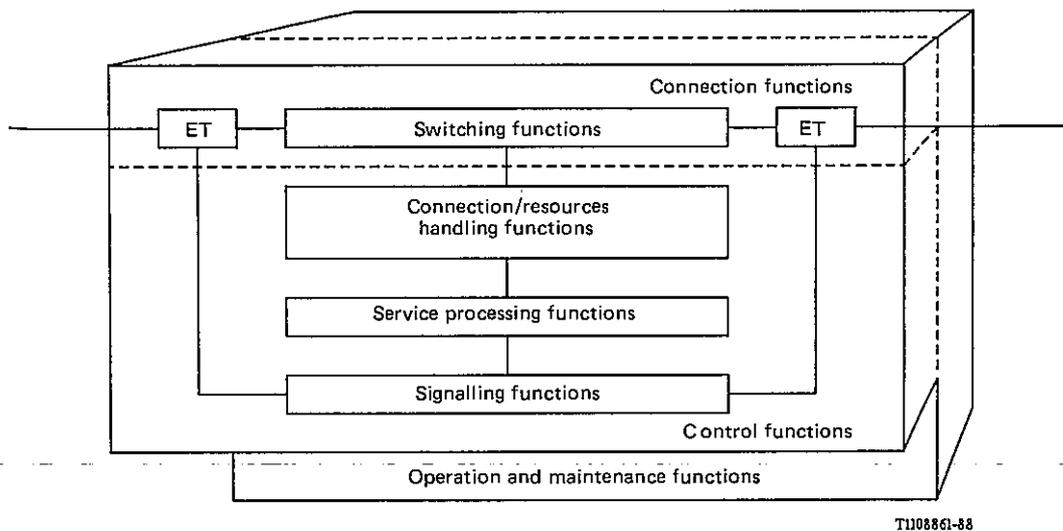
FIGURE 1/Q.521

Exchange functional model

Connection functions are primarily covered in Recommendation Q.522. These address the basic switch characteristics of different connection types. OAM functions are primarily covered in Recommendation Q.542.

3 Utilization of exchange functions for services

3.1 *General*

Exchange functions are used and reused in various stages of call processing. Some may be combined with others to create features used in providing supplementary services. The specific functions used in a given context will be determined by the requested service.

Within the framework of the model shown in Figure 1/Q.521 the utilization of functions arising from a service request, can be considered in the following way:

a) on receipt of a service request (via the Signalling Functions) the Service Processing Functions are used to identify the appropriate connection type(s);

b) the appropriate type of connection is established by use of the Connection/Resources Handling Functions;

c) Supplementary Services which involve additional functions and information flows beyond those required for bearer services, are provided under the control of logic residing in the Service Processing Function. This logic is designed to provide specific services. Corresponding service/feature capabilities must also reside in the Signalling and Connection/Resources Handling Functions.

In addition to services provided by use of logic/data residing in the exchange, some services may be provided under the control of logic located at separate specialized nodes (Service Control Points). Also, data required or process certain service requests may be kept in a remote data base accessed by use of the Signalling Function.

4 General functions required for operation of an exchange in the IDN, ISDN or mixed analogue/digital environment

4.1 *Timing and synchronization*

4.1.1   Exchange timing – Ability to distribute timing within the exchange so that it will maintain synchronism on 64 kbit/s channel timeslots in a connection through the exchange.

4.1.2   Synchronization – Ability to operate in the IDN or ISDN in synchronism with other digital entities and provide timing signals to other network entities as required.

4.1.3   Interval timing – Ability to measure time between events as required in call processing and/or in signalling.

4.1.4   Time-of-day clock – Ability to determine time of day.

Note – The level of accuracy is for further study.

4.2   *Signalling*

4.2.1   *User-access signalling functions*

4.2.1.1   Ability to receive and interpret decadic or ςDual Tone Multi-Frequency (DTMF) signalling from user terminals.

4.2.1.2   Ability to support user-access signalling layers 1 and 2 in accordance with Recommendations I.430, Q.921 (I.441).

4.2.1.3   Ability to communicate with user terminals using layer 3 signalling in accordance with Recommendation Q.931 (I.451).

4.2.2   *Network signalling functions*

4.2.2.1   Ability to use and support CCITT signalling systems included in Recommendation Q.7, particularly CCITT Signalling System No. 7.

4.2.2.2   Ability to communicate with other network entities using the CCITT Signalling System No. 7, Q.700-Series of Recommendations User Parts.

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