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SERIES Q: SWITCHING AND SIGNALLING

Specifications of Signalling System No. 7 – General

INTRODUCTION TO CCITT SIGNALLING SYSTEM No. 7

Reedition of CCITT Recommendation Q.700 published in the Blue Book, Fascicle VI.7 (1988)

NOTES

1 CCITT Recommendation Q.700 was published in Fascicle VI.7 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.

INTRODUCTION TO CCITT SIGNALLING SYSTEM No. 7

1 General

This Recommendation provides an overview of the Signalling System by describing the various functional elements of CCITT No. 7 and the relationship between these functional elements. This Recommendation provides a general description of functions and capabilities of the Message Transfer Part (MTP), Signalling Connection Control Part (SCCP), Telephone User Part, ISDN User Part (ISDN-UP), Transaction Capabilities (TC), and the Operations, Maintenance and Administration Part (OMAP) which are covered elsewhere in the Q.700 to Q.795 series of Recommendations. However, in the case of contradiction between the specifications and Q.700, the Q.700 to Q.795 specification shall apply.

Supplementary Services in CCITT S.S. No.7 ISDN applications are described in the Q.73x series of Recommendations.

In addition to these functions in the CCITT No. 7 signalling system, the Q.700 to Q.795 series of Recommendations describes the CCITT No. 7 network structure, and also specifies the Tests and Measurements applicable to CCITT No. 7.

This Recommendation is also a specification of those aspects such as CCITT S.S. No. 7 Architecture, Flow Control and general compatibility rule which are not specified in separate Recommendations, and are applicable to the overall scope of S.S. No. 7.

The remainder of this Recommendation describes:

– § 2: Signalling network concepts components and modes;
– § 3: The functional blocks within CCITT Signalling System No. 7 and the services provided by them;
– § 4: CCITT Signalling System No. 7 protocol layering and its relationship to OSI modelling;
– § 5: Node, application entity and user part addressing;
– § 6: Operations, administration and maintenance aspects of CCITT S.S. No. 7;
– § 7: Performance aspects of the functional blocks within CCITT S.S. No. 7;
– § 8: Flow control for both the signalling network and within nodes;
– § 9: Rules for evolving CCITT S.S. No. 7 protocols while preserving compatibility with earlier versions;
– § 10: A cross-reference to a glossary of terms.

1.1 *Objectives and fields of application*

The overall objective of Signalling System No. 7 is to provide an internationally standardised general purpose common channel signalling (CCS) system:

– optimised for operation in digital telecommunications networks in conjunction with stored program controlled exchanges;
– that can meet present and future requirements of information transfer for inter-processor transactions within telecommunications networks for call control, remote control, and management and maintenance signalling;
– that provides a reliable means for transfer of information in correct sequence and without loss or duplication.

The signalling system meets requirements of call control signalling for telecommunication services such as the telephone, ISDN and circuit switched data transmission services. It can also be used as a reliable transport system for other types of information transfer between exchanges and specialised centres in telecommunications networks (e.g. for management and maintenance purposes). The system is thus applicable for multipurpose uses in networks that are dedicated for particular services and in multiservices networks. The signalling system is intended to be be applicable in international and national networks.

The scope of CCITT S.S. No. 7 encompasses both circuit related and non-circuit related signalling.

Examples of applications supported by CCITT S.S. No. 7 are:

– PSTN,

– ISDN,
– Interaction with Network Databases, Service Control Points for service control,
– Mobiles (Public Land Mobile Network),
– Operations Administration and Maintenance of Networks.

The signalling system is optimized for operation over 64-kbit/s digital channels. It is also suitable for operation over analogue channels and at lower speeds. The system is suitable for use on point-to-point terrestrial and satellite links. It does not include the special features required for use in point-to-multipoint operation but can, if required, be extended to cover such an application.

1.2 *General characteristics*

Common channel signalling is a signalling method in which a single channel conveys, by means of labelled messages, signalling information relating to, for example, a multiplicity of circuits, or other information such as that used for network management. Common channel signalling can be regarded as a form of data communication that is specialised for various types of signalling and information transfer between processors in telecommunications networks.

The signalling system uses signalling links for transfer of signalling messages between exchanges or other nodes in the telecommunication network served by the system. Arrangements are provided to ensure reliable transfer of signalling information in the presence of transmission disturbances or network failures. These include error detection and correction on each signalling link. The system is normally applied with redundancy of signalling links and it includes functions for automatic diversion of signalling traffic to alternative paths in case of link failures. The capacity and reliability for signalling may thus be dimensioned by provision of a multiplicity of signalling links according to the requirements of each application.

1.3 *Components of CCITT S.S. No. 7*

CCITT S.S. No. 7 consists of a number of components or functions which are defined as a series of Q.700 to Q.795 Recommendations.

CCITT S.S. No. 7 function	*Recommendations*
Message Transfer Part (MTP)	Q.701-Q.704, Q.706, Q.707
Telephone User Part (TUP) (including supplementary services)	Q.721-Q.725
Supplementary services	Q.730
Data User Part (DUP)	Q.741 (note 1)
ISDN User Part (ISDN-UP)	Q.761-Q.764, Q.766
Signalling Connection Control Part (SCCP)	Q.711-Q.714, Q.716
Transaction Capabilities (TC)	Q.771-Q.775
Operations Maintenance and Administration Part (OMAP)	Q.795

Note 1 – Functions of the DUP are fully specified in Recommendation X.61.

Other Q.700 to Q.795 series Recommendations which describe other aspects of the signalling system but not part of the CCITT S.S. No. 7 signalling interfaces are:

Title	*Recommendations*
Signalling Network Structure	Q.705
Numbering of International Signalling Point Codes	Q.708
Hypothetical signalling reference connection	Q.709
PABX application	Q.710
CCITT S.S. No. 7 Test Specification (General)	Q.780
MTP Level 2 Test Specification	Q.781
MTP Level 3 Test Specification	Q.782
TUP Test Specification	Q.783
Monitoring and measurements for the CCITT S.S. No.7 network	Q.791

§ 3 of Q.700 describes the relationship between these components.

1.4 *Description techniques in the Q.700 to Q.795 series of Recommendations*

The CCITT S.S. No. 7 Recommendation series define the signalling system using prose description which is complemented by SDL diagrams and state transition diagrams. Should any conflict arise between the text and the SDL definition, the textual description is taken as definitive.

Message sequence charts or arrow diagrams are used to illustrate examples of signalling procedures, but are not considered definitive.

2 CCITT S.S. No. 7 signalling network

2.1 *Basic concepts*

A telecommunications network served by common channel signalling is composed of a number of switching and processing nodes inter-connected by transmission links. To communicate using CCITT No. 7, each of these nodes requires to implement the necessary "within node" features of CCITT S.S. No. 7 making that node a signalling point within the CCITT S.S. No. 7 network. In addition, there will be a need to interconnect these signalling points such that CCITT S.S. No. 7 signalling information (data) may be conveyed between them. These data links are the signalling links of CCITT S.S. No. 7 signalling network.

The combination of signalling points and their interconnecting signalling links form the CCITT S.S. No. 7 signalling network.

2.2 *Signalling network components*

2.2.1 *Signalling points*

In specific cases there may be a need to partition the common channel signalling functions at such a (physical) node into logically separate entities from a signalling network point of view; i.e., a given (physical) node may be defined as more than one signalling point. One example is an exchange at the boundary between international and national signalling networks.

Any two signalling points, for which the possibility of communication between their corresponding User Part function exists, are said to have a signalling relation.

The corresponding concept for a given User Part is called a user signalling relation.

An example is when two telephone exchanges are directly connected by a bundle of speech circuits. The exchange of telephone signalling relating to these circuits then constitutes a user signalling relation between the Telephone User Part functions in those exchanges in their role as signalling points.

Another example is when administration of customer and routing data in a telephone exchange is remotely controlled from an operation and maintenance centre by means of communication through a common channel signalling system.

Examples of nodes in a signalling network that constitutes signalling points are:

- exchanges (switching centres),
- operation, administration and maintenance centres,
- service control points,
- signalling transfer points.

All signalling points in a CCITT S.S. No. 7 network are identified by a unique code known as a point code (Recommendation Q.704 refers).

2.2.2 *Signalling links*

The common channel signalling system uses signalling links to convey the signalling messages between two signalling points. A number of signalling links that directly interconnect two signalling points which are used as a module constitute a signalling link-set. Although a link set typically includes all parallel signalling links, it is possible to use more than one link set in parallel between two signalling points. A group of links within a link set that have identical characteristics (e.g., the same data link bearer rate) is called a link group.

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