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SERIES Q: SWITCHING AND SIGNALLING

Specifications of Signalling System No. 7 – Signalling
connection control part (SCCP)

Functional description of the signalling connection control part

ITU-T Recommendation Q.711

(Formerly CCITT Recommendation)

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For further details, please refer to the list of ITU-T Recommendations.

ITU-T Recommendation Q.711

Functional description of the signalling connection control part

Summary

The Q.71X-series Recommendations defines the services of the SCCP. The SCCP is part of SS No. 7 and provides, above the MTP network or networks, connectionless, connection-oriented, routing and management services.

Source

ITU-T Recommendation Q.711 was revised by ITU-T Study Group 11 (2001-2004) and approved under the WTSA Resolution 1 procedure on 1 March 2001.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. 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 Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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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ITU-T Recommendation Q.711

Functional description of the signalling connection control part

1 Scope and field of application

The Signalling Connection Control Part (SCCP) provides additional functions to the Message Transfer Part (MTP) to cater for both connectionless as well as connection-oriented network services to transfer circuit-related and non-circuit-related signalling information and other types of information between exchanges and specialized centres in telecommunication networks (e.g. for management and maintenance purposes) via a Signalling System No. 7 network.

A functional block above the message transfer part performs the functions and procedures of the SCCP. The SCCP is capable of using the services of the MTP as described in ITU-T Q.701 to ITU-T Q.707, and/or in ITU-T Q.2210. The combination of the MTP and the SCCP is called "network service part" (NSP).

The network service part follows the principles of the OSI-reference model as defined in ITU-T X.200, providing a subset of the layer 3 services defined in ITU-T X.213.

It is the intent of ITU-T Q.711, ITU-T Q.712, ITU-T Q.713 and ITU-T Q.714 to specify protocol entities which perform the functions according to the SCCP of the Signalling System No. 7. These protocol entities conform at their lower boundary to the upper boundary conditions specified in ITU-T Q.704 or ITU-T Q.2210 for use of the service offered by the underlying layers.

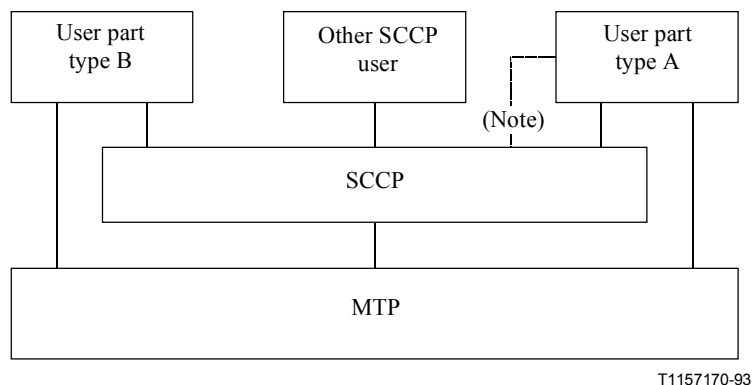
The SCCP making use of the services of the MTP, as specified in ITU-T Q.2210, provides the connectionless network service as specified in this Recommendation. A connection-oriented network service can only use the services which are common to ITU-T Q.2210 and ITU-T Q.704 for the MTP.

ITU-T Q.715 gives guidance on a number of specific issues related to the incorporation of SCCP in actual networks. These guidelines are in their entirety informal and do not specify any requirement.

The SCCP congestion control procedures may be subject to improvement pending further analysis of the impact of these procedures in different network scenarios and based on the results of operational experience. The overall objectives of the signalling connection control part are to provide the means for:

- a) logical signalling connections within the Signalling System No. 7 network;
- b) a transfer capability for network service data units with or without the use of logical signalling connections.

Functions of the SCCP are also used for the transfer of circuit-related and call-related signalling information of the ISDN user part with or without setup of end-to-end logical signalling connections. These functions are described in ITU-T Q.714 and ITU-T Q.730. Figure 1 illustrates the embedding of the SCCP within the Signalling System No. 7.



NOTE – Interface using the signals as defined in 6.1.1.3.3, i.e. for the connection-oriented network service.
The ISDN-UP that provides end-to-end signalling as defined in ITU-T Q.730 is a type A user part.

Figure 1/Q.711 – Functional diagram for the SCCP in Signalling System No. 7

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

The references contained in 2.1 and 2.2 contain the reference list for ITU-T Q.711, ITU-T Q.712, ITU-T Q.713 and ITU-T Q.714.

2.1 Normative references

- CCITT *Blue Book*, Fascicle VI.7, Glossary (1988), *Glossary of terms used in Signalling System No. 7*.
- ITU-T Q.701 (1993), *Functional description of the message transfer part (MTP) of Signalling System No. 7*.
- ITU-T Q.704 (1996), *Signalling network functions and messages*.
- ITU-T Q.712 (1996), *Definition and function of signalling connection control part messages*.
- ITU-T Q.713 (2001), *Signalling connection control part formats and codes*.
- ITU-T Q.714 (1996), *Signalling connection control part procedures*.
- ITU-T Q.2210 (1996), *Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140*.
- ITU-T X.210 (1993), *Information technology – Open Systems Interconnection – Basic Reference Model: Conventions for the definition of OSI services*.

2.2 Informative references

- ITU-T Q.700 (1993), *Introduction to CCITT Signalling System No. 7*.
- ITU-T Q.706 (1993), *Message transfer part signalling performance*.

- ITU-T Q.715 (1996), Signalling connection control part user guide.
- ITU-T Q.716 (1993), *Signalling System No. 7 – Signalling Connection Control Part (SCCP) performance*.
- ITU-T Q.1400 (1993), *Architecture framework for the development of signalling and OA&M protocols using OSI concepts*.
- ITU-T Q.2110 (1994), *B-ISDN ATM adaptation layer – Service specific connection oriented protocol (SSCOP)*.
- ITU-T Q.2140 (1995), *B-ISDN ATM adaptation layer – Service specific coordination function for signalling at the network node interface (SSCF at NNI)*.
- ITU-T X.200 (1994), *Information Technology – Open Systems Interconnection – Basic Reference Model: The basic model*.
- ITU-T X.213 (1995), *Information technology – Open Systems Interconnection – Network service definition (Note)*.

NOTE – Further study is required to see which new parts of SCCP can use this Recommendation normatively.

3 Definitions

Definitions of SCCP terms are provided in the glossary of CCITT *Blue Book*, Fascicle VI.7.

In addition to the definitions referenced, the following definitions apply:

3.1 MTP-SAP instance: A logical point in the MTP network at which an MTP user can access the services provided by the MTP-3 or the MTP-3b and the MTP can deliver its services to the MTP user.

3.2 SCCP-SAP instance: A logical point in the SCCP network at which an SCCP user can access the services provided by the SCCP and the SCCP can deliver its services to the SCCP user.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations:

AAL	ATM Adaptation Layer
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband Integrated Services Digital Network
B-ISUP	Broadband ISDN User Part (of SS No. 7)
DPC	Destination Point Code
ISUP	Integrated Services User Part (of SS No. 7)
L3	Level 3
LSB	Least Significant Bit
MSB	Most Significant Bit
MTP	Message Transfer Part
MTP-SAP	SAP to access the services provided by MTP
MTP-3	MTP Level 3 according to ITU-T Q.704
MTP-3b	MTP Level 3 according to ITU-T Q.2210
NI	Network Indicator

NNI	Network Node Interface
NPCI	Network Protocol Control Information
NSDU	Network Service Data Unit
NSP	Network Service Part
OPC	Originating Point Code
SAAL	Signalling ATM Adaptation Layer
SAP	Service Access Point
SCCP	Signalling Connection Control Part (of SS No. 7)
SCCP-SAP	SAP to access the services provided by SCCP
SDU	Service Data Unit
SI	Service Indicator
SIO	Service Information Octet
SLC	Signalling Link Code
SLS	Signalling Link Selection
SSCF	Service Specific Coordination Function
SSCOP	Service Specific Connection Oriented Protocol
SS No. 7	ITU-T Signalling System No. 7
STP	Signalling Transfer Point
TUP	Telephone User Part (of SS No. 7)
UP	User Part (of SS No. 7)

5 General characteristics

5.1 Technique of description

The Signalling Connection Control Part (SCCP) is described in terms of:

- services provided by the SCCP;
- services assumed from the MTP;
- functions of the SCCP.

The functions of the SCCP are performed by means of the SCCP protocol between two systems that provide the NSP service to the upper layers.

The service interfaces to the upper layers and to the MTP are described by means of primitives and parameters, as recommended in ITU-T X.200. Figure 2 illustrates the relationship between the SCCP protocol specification and the definition of adjacent services.

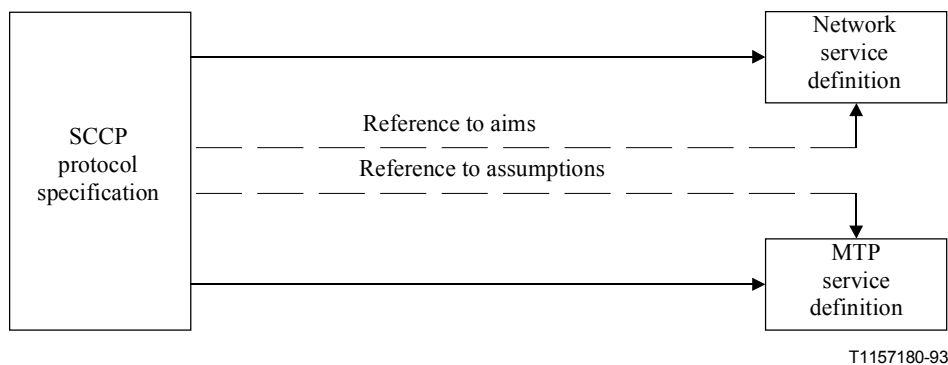


Figure 2/Q.711 – Relationship between the SCCP protocol specification and the definition of adjacent services

5.2 Primitives

Primitives define the information flow associated with the services requested of the SCCP and of the MTP (see Figure 3).

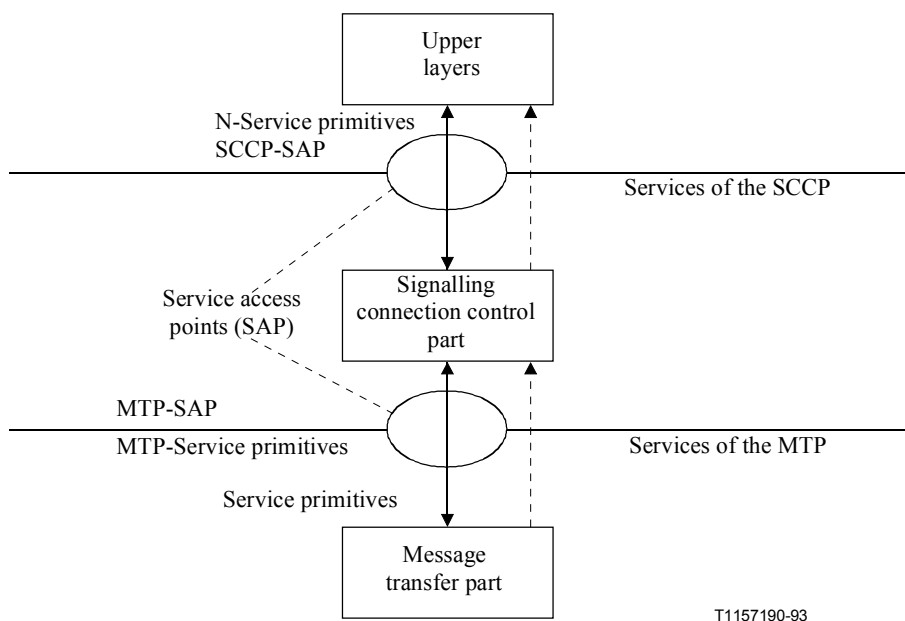


Figure 3/Q.711 – Service primitives

This diagram shows the points at which service primitives are invoked. It is not intended to constrain the architecture. For the architectural considerations, some information is provided in ITU-T Q.1400.

5.3 Peer-to-peer communication

Exchange of information between two peers of the SCCP is performed by means of a protocol. The protocol is a set of rules and formats by which the control information (and user data) is exchanged between the two peers. The protocol caters for:

- the set-up of logical signalling connection;
- the release of logical signalling connections;
- the transfer of data with or without logical signalling connections.

5.4 Model of the connection-oriented network service

A signalling connection is modelled in the abstract by a pair of queues. The protocol elements are objects on that queue added by the origination SCCP user and removed by the destination SCCP user. Each queue represents a flow control function. Figure 4 illustrates the modes described above.

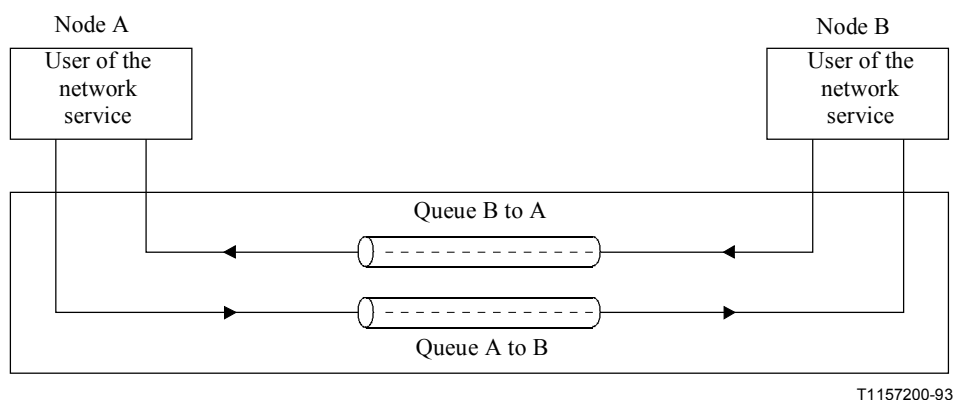


Figure 4/Q.711 – Model for the internode communication with the SCCP (connection-oriented services)

5.5 Model of the connectionless network service

This service definition uses the abstract model for a layer service defined in clause 5/X.210. The model defines the interactions between the user and the provider of the connectionless network service. These interactions take place at the two SCCP-SAPs (see Figure 5).

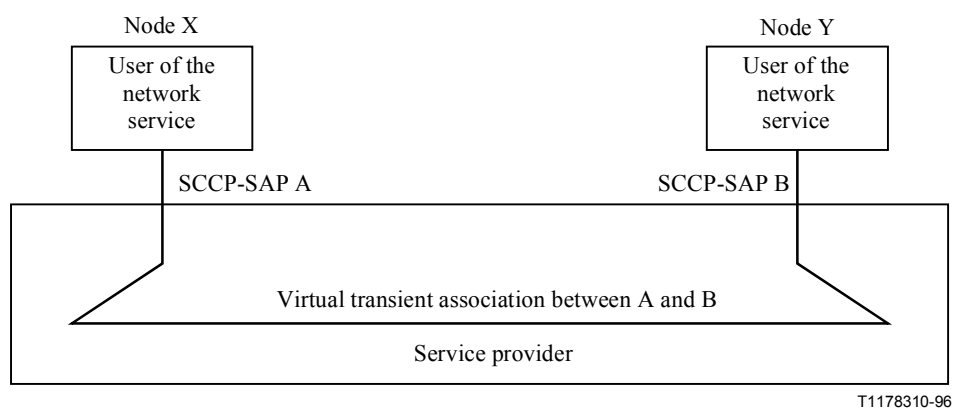


Figure 5/Q.711 – Model of a network connectionless transmission

A defining characteristic of network-connectionless transmission is the independent nature of each invocation of the connectionless network service. This basic service has been enhanced to provide sequence integrity between SDUs (see protocol class 1 service).

The connectionless network service, as provided between SCCP-SAPs, can be modelled in the abstract as a virtual transient association between the SCCP-SAPs (see Note).

NOTE – This model is intended solely to describe the appearance of the connectionless-mode network service to the SCCP users. It is not intended to be a model of the internal operation of the service provider in providing the connectionless network service.

Only one type of object, the Unitdata, can be exchanged between the users of the service. This relationship is illustrated in Figure 5.

5.6 Contents of the Q.71X-series Recommendations

ITU-T Q.711 contains a general description of the services provided by the MTP, the services provided by the SCCP and the functions within the SCCP.

ITU-T Q.712 defines the function of the messages, the set of protocol elements and their embedding into messages.

ITU-T Q.713 describes the formats and codes used for the SCCP messages.

ITU-T Q.714 is a detailed description of the SCCP procedures as a protocol specification.

ITU-T Q.715 is the SCCP user guide. Implementation-dependent aspects may be found in ITU-T Q.715.

ITU-T Q.716 defines and specifies values for the SCCP performance parameters, including quality of service parameters and internal parameters.

6 Services provided by the SCCP

The overall set of services is grouped into:

- connection-oriented services;
- connectionless services.

Four classes of service are provided by the SCCP protocol, two for connectionless services and two for connection-oriented services.

The four classes are:

- 0 basic connectionless class;
- 1 in-sequence delivery connectionless class;
- 2 basic connection-oriented class;
- 3 flow control connection-oriented class.

In the tables defining individual primitives, the notations given below are used:

- M indicates a mandatory parameter;
- O indicates an SCCP implementation option;
- C indicates that the parameter is conditional;
- U indicates a user option;
- n.a. not applicable;
- = indicates that the parameter must have the same value in the indication primitive, or confirm primitive as provided in the corresponding request primitive, or response primitive, respectively.

6.1 Connection-oriented services

A distinction has to be made between:

- temporary signalling connections;
- permanent signalling connections.

Temporary signalling connections are under control (establishment, data transfer including reset, release) of the SCCP user. Further details are given in 6.1.1.