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MAINTENANCE

COMMON CHANNEL SIGNALLING SYSTEMS

**INTER-ADMINISTRATION AGREEMENTS
ON COMMON CHANNEL
SIGNALLING SYSTEM No. 7**

ITU-T Recommendation M.4110

(Previously "CCITT Recommendation")

FOREWORD

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The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

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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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ABSTRACT

Provides the various technical aspects that need to be considered when undertaking inter-administration agreements to establish Common Channel Signalling System No. 7.

KEYWORDS

Agreements; common channel signalling; maintenance; propagation delay; signalling security; Signalling System No. 7.

INTER-ADMINISTRATION AGREEMENTS ON COMMON CHANNEL SIGNALLING SYSTEM No. 7

(Melbourne 1988 approved as M.770; revised and renumbered in 1992; revised in 1996)

1 Introduction

The bringing into service of new Signalling System No. 7 requires that a number of agreements be made in advance by the Administrations about the responsibilities involving the following issues:

- *Installation and maintenance*
 - *Link*

Two inter-connecting Administrations are responsible for the portion of an CCSS No. 7 link, which they maintain. Both Administrations are also responsible for ensuring that its portion of the CCSS No. 7 link(s) are installed and functioning properly. In addition, the Administrations should work cooperatively to perform CCSS No. 7 protocol tests to ensure the ability of the interfaces to correctly transmit and respond to CCSS No. 7 messages being passed between their networks.
 - *Trunk*

Conversion from in-band signalling to CCSS No. 7 cannot be accomplished without a thoroughly planned process. Two Administrations implementation team should meet to discuss and identify all of the steps necessary for a successful trunk conversion. The implementation team should include individuals from both Administrations. Each Administration should establish a Cutover Committee of its own to ensure a smooth conversion; the cutover committee consisting of permanent members from the ordering, provisioning, engineering, operations, and billing discipline.
- *Testing*

CCSS No. 7 Inter-Network signalling testing should be a pre-cutover requirement. MTP, ISUP and SCCP compatibility tests¹⁾, are recommended to verify the compatibility of networks during interconnection. These tests are intended to be used as a recommended set of minimum tests of the CCSS No. 7 protocol.
- *Diversity*

CCSS No. 7 route diversity, which assumes a network architecture that encompasses interconnecting STPs, is defined as signalling link sets that are on physically and electrically separate routes.
- *Screening and translations*

Interconnecting Administrations should discuss their routing and Gateway Screening of Network Management Messages between interconnecting STPs to ensure that all appropriate messages can be routed in the presence of route failures.
- *CCSS No. 7 security*

In the remote event that a total CCSS No. 7 failure is experienced, some means of communication between personnel in interconnecting networks may be required. Two interconnecting Administrations should determine what emergency communications are already available and/or what alternative methods, if any, will be provided.

¹⁾ See Recommendations Q.704, Q.781, Q.782, Q.784 and Q.785.

- *CCSS No. 7 Software Validation*

CCSS No. 7 Software Validation is essential to ensure that the software products perform according to “agreed upon” Administration product requirements and that all reasonable care has been taken to identify and correct any anomalies that have the potential to negatively impact the operation of switch/signalling nodes.

- *Some additional issues also need to be considered and those are:*

- routing of circuits (cable, satellite, etc.);
- mode of operation (incoming, outgoing, both-way);
- circuit designation;
- order of selection of both-way circuit.

This Recommendation outlines the inter-Administration responsibilities for provisioning and maintaining of the Signalling System No. 7. It deals with the physical interconnecting trunks and link(s) as well as the software necessary to support the use of the link(s) to transport CCSS No. 7 messages between Administrations. It is limited to procedures relating to the installation and maintenance of the CCSS No. 7 trunks and link(s) and associated software used to interconnect and provide services between two Administrations.

This Recommendation also explains the principal inter-Administration agreements which must be made in advance of opening service on a Signalling System No. 7, and is provided as guidance to those Administrations intending to operate such a service.

2 Common Channel Signalling System No. 7

Many of the aspects covered by this Recommendation relate to matters contained in the specifications of SS No. 7, as appearing in the Q.700-Series Recommendations [1]. Where appropriate, cross references to such Recommendations are given.

Recommendations Q.701 [2], Q.721 [3], Q.767 [13] and Q.750 [14] provide functional descriptions of the Message Transfer Part (MTP), Telephone User Part (TUP), ISDN User Part (ISUP), and Operation and Maintenance Application Part (OMAP), respectively.

The Q.780-Series Recommendations [4] provide guidance on how to test SS No. 7 (levels 2, 3 and 4).

3 Aspects of SS No. 7 requiring inter-Administration agreement

3.1 Signalling links and signalling security arrangements

Signals for a given group of speech circuits between two exchanges may be “associated” (routed on a signalling link between the two exchanges), or “non-associated” (routed on two or more signalling links in tandem, involving one or more signal-transfer points) or a mixture of both (see 3.1.2/Q.701 [2]).

Before entering into detailed discussions on the type of signalling security arrangements required, it is desirable that the terminal Administrations exchange information on the type and manufacturer of their international signalling point (exchange, signalling transfer point, or network database) and the options available within their existing software systems. This information will enable each Administration to have an overall view of available signalling security arrangements. It will avoid misunderstandings and thus enable rapid progress in establishing detailed arrangements. Subsequently, agreement on the following matters will be required.

3.1.1 CCSS No. 7 Link Control

- a) Provides trained personnel.
- b) Designates a Control office(s) for the overall responsibility for CCSS No. 7 link(s).

- c) Cooperates with the other Administration to ensure that the CCSS No. 7 link(s) are installed in accordance with the service request.
- d) Notifies the appropriate Administration service centre when the service due date is to be changed.
- e) Sectionalizes troubles to determine if the trouble is located in its facility, interface, or application or if the trouble is in other Administration facility, interface, or application.
- f) Ensures that any manually initiated tests performed on the CCSS No. 7 link(s) or applications will not negatively affect the other Administration CCSS No. 7 network.
- g) Coordinates any changes to its translations which may require changes to other Administration translations.
- h) Cooperatively participates with the other Administration to further identify, isolate and clear troubles which cannot be sectionalized into each other portions of the link or application software.
- i) Accepts and refers trouble reports from the other Administration relating to CCSS No. 7 and the services being provided over the link(s).
- j) Provides the other Administration Notification of Maintenance Releases.
- k) Overall coordination of control responsibilities:
 - i) tracking of orders;
 - ii) coordination of testing;
 - iii) coordination of link specific maintenance releases;
 - iv) referral to appropriate groups for repair;
 - v) establishing of interface agreements;
 - vi) responsibility for trouble agreements;
 - vii) link(s) surveillance.
- l) Maintains complete and accurate installation and repair records.
- m) Notifies the other Administration of due date jeopardy in a timely manner.
- n) Coordinates any changes to its translations which may require changes to the Administration network's translations.
- o) Maintains complete and accurate installation and repair records.
- p) Provides a trouble reporting number(s) that is readily accessible 24 hours, 7 days a week.

Some additional agreement on the following matters will be necessary for the reliability of CCSS No. 7 interconnection:

- i) The use of "associated" and/or "non-associated" modes of signalling.
- ii) The choice of Signalling Transfer Points (STPs) in the case where the "non-associated" mode of signalling is used.
- iii) Security measures against signalling network link failure, e.g. the use of load sharing between link sets. If load sharing between link sets is to be used, agreement must be reached as to the number of link sets involved.
- iv) Alternative routing within the signalling network in the event of failure of a link set, i.e. if load sharing is not used, which STPs are available for a given signalling network relation, and the order of selection of these. Due regard must be paid to the limitation of the number of STPs in tandem in a given signalling network relation (see clause 5/Q.705 [5]).
- v) The routing of the signalling network links must ensure that the propagation delay of the links is as low as possible, and not significantly higher than that of the speech circuits which are served by Signalling System No. 7. This is to minimize the initial speech clipping of the verbal answer from the called party. The above factors must also be considered in any restoration plans, although the non-availability of links may force Administrations to accept the possibility of clipping under failure conditions.

- vi) The nature of the signalling network link to be used, e.g. 4.8 kbit/s analogue or 64 kbit/s digital, transmission routing, etc.
- vii) The method of error correction to be employed in a given signalling relation, i.e. basic or preventive cyclic retransmission (see clause 5/Q.703 [6]).
- viii) Emergency restart conditions. (If there is automatic allocation of signalling terminals or signalling data links at the end of a signalling link, it must be ensured that the value (T2) of the time-out is different at each end (see 7.3/Q.703 [6] and 3.4.3/Q.704 [7]).)
- ix) For security reasons, the separation of routing of signalling links has to be considered when selecting higher order paths.

3.2 Mode of signalling

Signalling System No. 7 provides for two basic modes of sending signalling information namely, “*en bloc*” or “overlap” (see Recommendation Q.724 [8]).

3.3 Signalling network consideration for cross-border traffic

For cross-border traffic between signalling points, a bilateral agreement needs to be made for the routing label assignment of signalling point codes.

Two alternative arrangements are described in clause 6/Q.705 [5]. One arrangement provides for signalling points which are handling cross-border traffic to be given signal point codes taken from the international numbering plan contained in Recommendation Q.708 [9]. The other provides for these signalling points to be identified by common national point codes.

3.4 Routing label assignment

The routing label is that part of the message label which contains the information necessary to deliver the message to its destination point. It comprises the following (see 2.2/Q.704 [7]):

- Destination Point Code (DPC);
- Originating Point Code (OPC);
- Signalling Link Selection (SLS) field or Signalling Link Code (SLC).

DPC and OPC labelling will be in accordance with Recommendation Q.708 [9]. However, it may be necessary to have a bilateral agreement for the SLS so that it can be assigned individually to signalling links.

3.5 Circuit Identification Code

The Circuit Identification Code (CIC) indicates one speech circuit among those directly interconnecting the destination and the originating points. The allocation of CICs to individual circuits is determined by bilateral agreement and/or in accordance with predetermined rules. See 2.2.3/Q.723 [10].

3.6 Reset of circuit and circuit group messages

In systems which maintain status in memory, there may be occasions when the memory contains errors. In such cases the circuits must be reset to the idle condition in both exchanges to make them available for new traffic. Since the exchange with the erroneous memory has lost status information (idle, busy outgoing, busy incoming, blocked, etc.), reset-circuit signals or a circuit group reset should be sent as appropriate for the affected circuits (see 1.15/Q.724 [8]).

Under certain fault conditions however, where a large number of circuits is involved, it is possible that some realizations of SS No. 7 terminal equipment will be unable to process the volume of reset messages generated. It is necessary, therefore, that Administrations agree bilaterally whether circuit and circuit group messages should both be used.

3.7 Use of the circuit continuity check procedure

Because in SS No. 7 the signalling information does not pass over the circuit carrying the speech path, capabilities are provided for making an in-band continuity check of the circuit (see 1.4/Q.724 [8]).

Use of the continuity check procedure on circuits will depend upon the type of transmission system(s) used (e.g. analogue, digital, mixed analogue/digital, DCME, PCME) for the circuit, and whether end-to-end supervision of the transmission path is available and is indicated to the switching system. A continuity check may be applied on a call by call basis, or on a statistical basis only. Where end-to-end transmission path supervision is not available, continuity checks are advised. Any exceptions to this are for bilateral agreement.

3.8 Choice of the time slot to be used within the primary order digital path for the signalling link

In the case where time slot 16 is utilized for circuit supervision purposes (see A.1/Q.33 [11] and clause 7/Q.50 [12]), it is necessary to agree bilaterally on which time slot within the primary order digital path should be used for the signalling link.

3.9 Choice of tests to be performed

Before bringing into service the first SS No. 7 link between two Administrations, a bilateral agreement has to be made on which compatibility and pre-service tests have to be performed (see Recommendations Q.781, Q.782, Q.783 [4], Q.767 [13] and Q.750 [14]).

3.10 Changing from one specification of the signalling system to another

If an Administration changes from one version of the specification of the signalling system to another, distant Administrations should be informed as a precautionary measure before the change takes place, and to agree on the necessary tests, since potential interworking problems can then be anticipated. It is desirable therefore that Administrations should be aware of the need for, and agree to, this exchange of information.

3.11 Use of MTP Routing Verification Tests (MRVT), SCCP Routing Verification Tests (SRVT), and Circuit Validation Tests (CVT)

Signalling System No. 7 provides for test facilities MRVT, SRVT and CVT (see Recommendation Q.750 [14]) and Administrations will need to discuss and agree on the scope and constraints of operating such functions across network boundaries.

3.12 Exchange of signalling system operational measurements

Signalling System No. 7 provides for operational measurements (see Recommendation Q.752 [15]), and Administrations will need to discuss and agree on the scope and constraints for exchanging such measurements for the mutually effective management and maintenance of common channel signalling networks across network boundaries.

4 Timing on inter-Administration agreements

Due to the differing practices and procedures of Administrations, no specific timetable for the inter-Administration agreements necessary on SS No. 7 can be offered. However, experience indicates that initial discussions between Administrations concerning the implementation of a new common channel signalling system should preferably commence about two years prior to the required "ready for service" date.

References

- [1] Recommendations Q.700 to Q.795, *Specifications of Signalling System No. 7.*
- [2] ITU-T Recommendation Q.701 (1993), *Functional description of the Message Transfer Part (MTP) of Signalling System No 7.*
- [3] CCITT Recommendation Q.721 (1988), *Functional description of the Signalling System No. 7 Telephone User Part (TUP).*
- [4] Recommendations Q.780 to Q.783, *Signalling System No. 7 test specification.*
- [5] ITU-T Recommendation Q.705 (1993), *Signalling System No. 7 – Signalling network structure.*
- [6] ITU-T Recommendation Q.703 (1993), *Signalling System No. 7 – Signalling link.*
- [7] ITU-T Recommendation Q.704 (1993), *Signalling System No. 7 – Signalling network functions and messages.*
- [8] CCITT Recommendation Q.724 (1988), *Specifications of Signalling System No. 7 – Signalling procedures.*
- [9] ITU-T Recommendation Q.708 (1993), *Numbering of international signalling point codes.*
- [10] CCITT Recommendation Q.723 (1988), *Formats and codes.*
- [11] CCITT Recommendation Q.33 (1988), *Protection against the effects of faulty transmission on groups of circuits.*
- [12] ITU-T Recommendation Q.50 (1993), *Signalling between Circuit Multiplication Equipments (CME) and International Switching Centres (ISC).*
- [13] CCITT Recommendation Q.767 (1991), *Application of the ISDN user part of CCITT Signalling System No. 7 for international ISDN interconnections.*
- [14] ITU-T Recommendation Q.750 (1993), *Overview of Signalling System No. 7 management.*
- [15] ITU-T Recommendation Q.752 (1993), *Monitoring and measurements for Signalling System No. 7 networks.*