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Supplement 1

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SERIES Q: SWITCHING AND SIGNALLING
Intelligent Network

**Intelligent Network user's guide: Supplement for
IN CS-1**

Supplement 1

ITU-T Recommendation Q.1219 – Supplement 1
(Previously CCITT Recommendation)

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SUPPLEMENT 1 TO

ITU-T RECOMMENDATION Q.1219

INTELLIGENT NETWORK USER'S GUIDE: SUPPLEMENT FOR IN CS-1

Summary

This is Recommendation Q.1219-Supplement – Intelligent Network User's Guide: Supplement for IN CS-1. This Recommendation is a supplement to Recommendation Q.1219 – Intelligent Network User's Guide for Capability Set 1 (1994). As a supplement, this Recommendation does not replace Recommendation Q.1219 (1994). Rather, this Recommendation contains supplementary information to be used in conjunction with Recommendation Q.1219 (1994). The intent of this Supplement is to present information to the user which focuses on the refinements which have been made to IN Capability Set 1 (IN CS-1).

The IN CS-1 Recommendations were significantly enhanced and refined during the period from 1993 to 1995. A new set of IN CS-1 Recommendations (1995) was created to replace the original IN CS-1 Recommendations (1993). The scope of IN CS-1 (1995) is the same as for IN CS-1 (1993). No additional capabilities have been added to IN CS-1. However, as a result of the refinement work, IN CS-1 (1995) is a mature set of implementable Recommendations.

This Recommendation Q.1219-Supplement should be used as a supplement to Recommendation Q.1219 (1994) Intelligent Network User's Guide. This Supplement describes the refinements made to the IN CS-1(1993) Recommendations and included in the ITU-T IN CS-1 (1995) Recommendations.

Source

Supplement 1 to ITU-T Recommendation Q.1219, was prepared by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 12th of September 1997.

FOREWORD

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The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 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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INTELLIGENT NETWORK USER'S GUIDE: SUPPLEMENT FOR IN CS-1

(Geneva, 1997)

0 Introduction

This is Recommendation Q.1219-Supplement – Intelligent Network User's Guide: Supplement for IN CS-1. This Recommendation is a supplement to Recommendation Q.1219 – Intelligent Network User's Guide for Capability Set 1 (1994). As a supplement, this Recommendation does not replace Recommendation Q.1219 (1994). Rather, this Recommendation contains supplementary information to be used in conjunction with Recommendation Q.1219 (1994). The intent of this Supplement is to present information to the user which focuses on the refinements which have been made to IN Capability Set 1 (IN CS-1).

The IN CS-1 Recommendations were significantly enhanced and refined during the period from 1993 to 1995. A new set of IN CS-1 Recommendations (1995) was created to replace the original IN CS-1 Recommendations (1993). The scope of IN CS-1 (1995) is the same as for IN CS-1 (1993). No additional capabilities have been added to IN CS-1. However, as a result of the refinement work, IN CS-1 (1995) is a mature set of implementable Recommendations.

Recommendation Q.1219-Supplement should be used as a supplement to Recommendation Q.1219 (1994) Intelligent Network User's Guide. This Supplement describes the refinements made to the IN CS-1 (1993) Recommendations and included in the IN CS-1 (1995) Recommendations. It is expected users will find the information contained in this Supplement to be a useful addition to the information already presented in Recommendation Q.1219 (1994).

No changes were made to the Q.120x General series of IN Recommendations and no changes were made to Recommendation Q.1211 as part of the IN CS-1 refinements. Modifications were made to other IN CS-1 Recommendations as well as to Recommendation Q.1290 (IN terminology).

0.1 Background of the IN CS-1 refinements effort

Intelligent network capability set 1 is the first standardized stage of the Intelligent Network (IN) as an architectural concept for the creation and provision of telecommunications services. The IN CS-1 Recommendations were published by the ITU-T in 1993, except for Recommendation Q.1219 which was published by the ITU-T in April 1994. IN CS-1 consists of the Recommendations listed in Table 1. This list is taken from Table 1/Q.1211 with the additional listing of Recommendation Q.1290. Users should be aware that the IN Service Plane was not developed as part of IN CS-1 and therefore Recommendation Q.1212 does not exist.

Table 1/Suppl. 1 to Rec. Q.1219 – IN CS-1 Recommendations

Recommendation	Title
Q.1211	Introduction to intelligent network capability set 1
Q.1212	Service Plane Recommendation (does not exist for IN CS-1)
Q.1213	Global functional plane for intelligent network CS-1
Q.1214	Distributed functional plane for intelligent network CS-1
Q.1215	Physical plane for intelligent network CS-1
Q.1218	Interface Recommendation for intelligent network CS-1
Q.1219	Intelligent network user's guide for capability set 1
Q.1290	Glossary of terms used in the definition of intelligent network

An IN CS-1 refinement activity was started shortly after publication of the 1993 IN CS-1 Recommendations. The need for refinements based upon implementation experience was anticipated during the development of IN CS-1. The following quote from the summary of Recommendation Q.1211 (1993) illustrates the anticipation of a future revision:

"The CS-1 Recommendations (Q.121x-Series) form a useful basis for achieving implementation experience. As with any project of this size and complexity, it can be anticipated that there may be some difficulties in interworking the various implementations of IN CS-1 physical elements. In order that the IN objective for working in a multi-vendor environment may be fully achieved, the IN CS-1 Recommendations text may go through some future revision in the light of implementation experience."

The IN CS-1 refinements activity was completed with the approval of the 1995 IN CS-1 Recommendations by the ITU-T on May 12, 1995. Recommendation Q.1219-Supplement is published a year (or more) following the 1995 IN CS-1 Recommendations, just as Recommendation Q.1219 (1994) was published a year after the 1993 IN CS-1 Recommendations. The IN CS-1 Recommendations that were modified in 1995 are listed in Table 2.

Table 2/Suppl. 1 to Rec. Q.1219 – IN CS-1 Recommendations modified in 1995

Recommendation	Title
Q.1213	Global functional plane for intelligent network CS-1
Q.1214	Distributed functional plane for intelligent network CS-1
Q.1215	Physical plane for intelligent network CS-1
Q.1218	Interface Recommendation for intelligent network CS-1
Q.1219 (Supplement only)	Intelligent network user's guide: Supplement for IN CS-1
Q.1290	Glossary of terms used in the definition of intelligent network

0.2 Relationship of the Q.1219-Supplement to Recommendation Q.1219

Recommendation Q.1219-Supplement should be used in conjunction with Recommendation Q.1219 (1994). Together, these two Recommendations provide a complete User's Guide for IN Capability Set 1. This Recommendation Q.1219-Supplement provides a record of the differences between IN CS-1 (1993) and IN CS-1 (1995). It also reflects the major changes made to IN CS-1 as a result of the refinements effort. As much as possible, this Recommendation Q.1219-Supplement follows the outline of the original Recommendation Q.1219 (1994) with clarifying statements added as required.

0.3 Summary of this Recommendation Q.1219-Supplement

The IN CS-1 Recommendations were significantly enhanced and refined during the period from 1993 to 1995. A new set of IN CS-1 Recommendations (1995) was created to replace the original IN CS-1 Recommendations (1993). The scope of IN CS-1 (1995) is the same as for IN CS-1 (1993). No additional capabilities have been added to IN CS-1. IN CS-1 (1995) is a mature set of implementable Recommendations. This Recommendation Q.1219-Supplement is a supplement to Recommendation Q.1219 (1994) Intelligent Network User's Guide. This Supplement describes the refinements made to the IN CS-1 (1993) Recommendations and included in the IN CS-1 (1995) Recommendations.

1 Scope

The 1995 IN CS-1 Recommendations were developed for the correction of errors or refinements identified by implementors of the 1993 IN CS-1 Recommendations (Q.121x). Specifically, the 1995 IN CS-1 Recommendations were developed using the following guidelines:

- 1) They contain sure fixes for errors identified in the 1993 IN CS-1 Recommendations.
- 2) They contain refinements for the 1993 IN CS-1 Recommendations, i.e., items that implementors found that needed further clarification.
- 3) They do not contain enhancements to the 1993 IN CS-1 Recommendations (enhancements are found in the IN CS-2 Recommendations).

1.1 Target Audience

The Target Audience for this Recommendation Q.1219-Supplement for IN CS-1 remains unchanged from Recommendation Q.1219 (1994). See 1.1/Q.1219 (1994) for details.

1.2 Intended use

This User's Guide maintains the intent to be a detailed Implementor's Guide for the IN CS-1 Recommendations and should be used in conjunction with Recommendation Q.1219 (1994). This Recommendation Q.1219-Supplement reflects the major changes made to IN CS-1 as a result of the refinements effort. This Recommendation Q.1219-Supplement contains details on the refinements made to IN CS-1 in 1995. Users requiring additional details will be directed to specific clauses in IN CS-1 Recommendations.

1.3 Framework outline of Q.1200-Series

The original IN CS-1 Recommendation structure remains unchanged from the IN CS-1 (1993) Recommendations. The IN Recommendation structure, taken from clause 1/Q.1200 is shown in Table 3.

Table 3/Suppl. 1 to Rec. Q.1219 – IN Recommendation framework structure

00 – General	
10 – CS-1	1 – Principles introduction
20 – CS-2	2 – Service plane (not included for CS-1)
30 – CS-3	3 – Global functional plane
40 – CS-4	4 – Distributed functional plane
50 – CS-5	5 – Physical plane
60 – CS-6	6 – For future use
70 – CS-7	7 – For future use
80 – CS-8	8 – Interface Recommendations
90 – Glossary	9 – Intelligent Network user's guide

The IN CS-1 Recommendations (1995) were completed in May 1995. No changes were made to the Recommendation Q.120x General series of IN Recommendations and no changes were made to Recommendation Q.1211. Modifications were made to other IN CS-1 Recommendations as well as Recommendation Q.1290 (Glossary of terms

used in the definition of intelligent networks). Recommendation Q.1219-Supplement for IN CS-1 is a new Recommendation. The full set of IN CS-1 Recommendations is shown in Table 4. Users interested in a brief summary of each Recommendation are directed to 1.3/Q.1219 (1994).

Table 4/Suppl. 1 to Rec. Q.1219 – Complete list of IN CS-1 Recommendations after refinement

Recommendation	Title	Impact from the 1995 refinements
Q.1211 (1993)	Introduction to intelligent network capability set 1	No change
Q.1213 (1995)	Global functional plane for intelligent network CS-1	Revised
Q.1214 (1995)	Distributed functional plane for intelligent network CS-1	Revised
Q.1215 (1995)	Physical plane for intelligent network CS-1	Revised
Q.1218 (1995)	Intelligent network interface specifications for Interface Recommendation for intelligent network CS-1	Revised
Q.1219 (1994)	Intelligent network User's guide for capability set 1	No change
Q.1219-Supplement	Intelligent network User's guide: Supplement for IN CS-1	New
Q.1290 (1995)	Glossary of terms used in the definition of intelligent networks	Revised

1.4 Initial set of capabilities

No additional capabilities have been added to IN CS-1. Additional capabilities are included in the IN CS-2 set of Recommendations.

1.5 State of maturity of the IN CS-1 Recommendations

The 1995 IN CS-1 Recommendations represent a stable set of Recommendations that have been tested by implementors and updated to provide fixes and refinements where necessary to insure that they are implementable. As noted in 1.5/Q.1219 (1994), the 1993 IN CS-1 Recommendations were not fully mature as "CS-1 must be recognized as not being specified 100% in detail, but is conceptually complete. In some cases there may be insufficient detail to allow manufacturers to truly build 100% compliant IN capabilities." The 1995 IN CS-1 Recommendations were developed to resolve these maturity issues.

1.6 Service decomposition

The IN CS-1 procedure for decomposing services, using the INCM plane structure, remains unchanged in the 1995 IN CS-1 Recommendations. Users requiring additional details on service decomposition for IN CS-1 are directed to 1.6/Q.1219 (1994).

2 Intelligent Network objectives

The overall objectives of the IN Recommendations and IN CS-1 specifically have not been impacted by the 1995 IN CS-1 Recommendations. They remain as stated in clause 2/Q.1219 (1994).

Note however that clause 2, item c)/Q.1219 (1994) states that thirteen SIBs and one specialized SIB are defined in Recommendation Q.1213. It should be noted that this has been increased to fourteen SIBs and one specialized SIB (i.e. the Basic Call Process SIB) in the 1995 IN CS-1 Recommendations.

3 Capabilities provided by IN CS-1

While no new capabilities have been added with the 1995 IN CS-1 Recommendations, major refinements were added to the 1995 IN CS-1 Recommendations as described in the following subclauses. These refinements were developed to provide fixes for areas overlooked initially, and to ensure implementability. A list of the major refinements to each 1995 Recommendation is shown below.

- Refinements to Recommendation Q.1211 (1993):
There is no change to this Recommendation.
- Refinements to Recommendation Q.1213 (1995):
Authenticate SIB (Stage 1 Description).
- Refinements to Recommendation Q.1214 (1995):
Information available at detection points
IN BCSM transitions
BCSM signalling indications
DP criteria
Trigger types and trigger precedence
Authenticate SIB (Stage 2 description)
IE population rules
BCSM SDLs
Charging scenarios
- Refinements to Recommendation Q.1215 (1995):
No major refinements are identified.
- Refinements to Recommendation Q.1218 (1995):
Use of ASN.1
Use X.500 for the SCF-SDF interface
Operation timers
Detailed error handling procedures
Services assumed from TCAP
Detailed operation procedures template
Application context
Expanded ASN.1
- Refinements to Recommendation Q.1290 (1995):
The IN terminology was updated for IN CS-1

The above refinements are discussed in further detail below.

3.1 Refinements to Recommendation Q.1213 (1995)

The number of Service Independent Building Blocks (SIBs) has been increased from thirteen to fourteen. This number does not include one additional specialized SIB known as the BASIC CALL PROCESS (BCP) SIB which provides Basic Call capabilities along with nine Points Of Initiation (POI) and six Points Of Return (POR) for Global Service Logic (GSL) interfaces.

3.1.1 AUTHENTICATE SIB (Stage 1 description)

A new SIB, called AUTHENTICATE, was created. The AUTHENTICATE SIB provides an authentication function to establish an authorized relationship between the service logic and a database on behalf of a user. Three different authentication mechanisms are supported by this SIB:

- None, which implies that no authentication is performed;
- Simple, which implies that simple authentication is performed (i.e. use of a password);
- External, which implies that an externally defined authentication is performed.

Subclause 5.4/Q.1213 (1995) provides the Stage 1 service description for the AUTHENTICATE SIB.

3.2 Refinements to Recommendation Q.1214 (1995)

The presentation and quality of information contained in Recommendation Q.1214 (1995) has been greatly improved as compared with Recommendation Q.1214 (1993). The improvements involved the following areas of Recommendation Q.1214 (1995):

- Basic Call State Model (BCSM);
- Stage 2 descriptions of SIBs;
- Information flows; and
- BCSM SDLs.

Basic Call State Model (BCSM)

The IN CS-1 BCSM itself was not changed. Significant improvements were made to the amount and quality of information specified for each of the BCSM points in call and detection points. Areas which were improved include: information available at detection points, IN BCSM transitions, BCSM signalling indications, DP criteria, and trigger types.

Stage 2 Descriptions of SIBs

A Stage 2 description was added for the AUTHENTICATE SIB.

Information flows

Significant improvements were made to the amount and quality of information specified for the information flows particularly affecting the information elements. In particular, population rules were identified for information flows between the SSF/CCF and SCF.

BCSM SDLs

SDLs for the BCSM are now included as part of Recommendation Q.1214 (1995) in Annex B/Q.1214 (1995). The SDLs were not available when Recommendation Q.1214 (1993) was first published.

3.2.1 Information available at detection points

A new item, *Information available*, has been added to the description of each Point In Call (PIC) in both the originating and terminating BCSMs. The description of each IN CS-1 PIC now consists of the following items:

- Entry event;
- Functions;
- Information available;
- Exit event;
- Corresponding Q.931 call state.

Information available refers to information at the SSF/CCF that is associated with either the originating or terminating call portion. Some information is common to all originating or all terminating PICs. *Information available* at all originating BCSM PICs may be found by referral to 4.2.2.2.1/Q.1214 (1995). *Information available* at all

terminating BCSM PICs may be found by referral to 4.2.2.2/Q.1214 (1995). In addition, each PIC description includes specific *Information available* only at that PIC. PIC descriptions are found by reference to 4.2.2.1/Q.1214 (1995) (Originating) and 4.2.2.2/Q.1214 (1995) (Terminating).

3.2.2 IN BCSM transitions

The 1995 IN CS-1 Recommendations depict in greater detail the BCSM transitions that may be taken by a call. New diagrams and tables were added to the BCSM descriptions which show all of the transitions which are possible as a result of IN processing interacting with a basic call. The models in the 1993 IN CS-1 Recommendations did not show this level of detail.

As an example: The originating BCSM may be found in Figure 4-3/Q.1214 (1995). This figure indicates the call would normally transition from the Orig_Attempt_Authorized DP [1] to the Collect_Information PIC. However, more detailed transition information presented in 4.2.2.3/Q.1214 (1995) also shows additional transitions are possible to the Analyse_Information PIC or the Routing_&_Alerting PIC.

Four additional tables and two additional figures were added to Recommendation Q.1214 (1995) to show complete details on all IN Transitions. The new tables and figures are:

- Table 4-1/Q.1214: IN transitions beyond a basic call – Originating call model;
- Table 4-2/Q.1214: IN transitions beyond a basic call – Terminating call model;
- Table 4-3/Q.1214: Complete set of transitions for the IN CS-1 originating call model;
- Table 4-4/Q.1214: Complete set of transitions for the IN CS-1 terminating call model;
- Figure 4-5/Q.1214: Complete set of transitions for the IN CS-1 originating call model;
- Figure 4-6/Q.1214: Complete set of transitions for the IN CS-1 terminating call model.

Tables 4-1/Q.1214 and 4-2/Q.1214 were added to show IN transitions beyond a basic call. The Basic Call State Model (BCSM) diagrams (i.e. Figure 4-3/Q.1214 and Figure 4-4/Q.1214) do not show all possible IN transitions a call may take. The BCSM diagrams therefore show a simplified model of IN call progress by focusing on the basic transitions a call goes through as it progresses from one point in call (PIC) or Detection Point (DP) to the next PIC.

There are additional IN transitions, which are not depicted in the BCSM figures, which can take a call that has been halted at a Detection Point (DP) to other PICs where call processing resumes (hence the name – Resume Point). These additional transitions may involve jumping ahead of or around a PIC in normal basic call setup or backing up in the call model to earlier PICs. Tables 4-1/Q.1214 and 4-2/Q.1214 were added to identify transitions from a DP to other Resume Points (i.e. a PIC) which were not documented in the BCSM figures.

Tables 4-3/Q.1214 and 4-4/Q.1214 show the complete set of transitions for the IN CS-1 originating and terminating call models, respectively. These tables include the basic call transitions depicted in the BCSM diagrams (i.e. Figure 4-3/Q.1214 and Figure 4-4/Q.1214) plus the transitions listed in Tables 4-1/Q.1214 and 4-2/Q.1214.

Figures 4-5/Q.1214 and 4-6/Q.1214 depict the complete set of transitions for the IN CS-1 originating and terminating call models, respectively. These figures provide a visual depiction of the information shown in Tables 4-3/Q.1214 and 4-4/Q.1214 respectively.

3.2.3 BCSM signalling indications

Recommendation Q.1214 (1995) includes a new clause on signalling indications. Three types of indications are presented:

- User – O_BCSM access signalling indications;
- T_BCSM – User access signalling indications;
- Intra-local exchange BCSM indications.

The first two types of access signalling indications represent the network's perception of actions taken by the user or the user's perception of actions taken by the network. This material is derived from Access Signalling systems such as DSS 1 and/or Analogue systems.

The third type of intra-local exchange BCSM indications shows indications that flow between originating and terminating BCSMs in IN CS-1. Users should note the intra-local exchange BCSM indications are based on material originally contained in Annex A/Q.1214 (1993). This material has been incorporated into the main body of Recommendation Q.1214 (1995).

Users requiring further detail are referred to 4.2.2.3/Q.1214 (1995) BCSM indications for the IN CS-1 Call Model.

3.2.4 DP criteria

IN CS-1 (1993) originally provided an itemized list of fifteen DP criteria but with no descriptive material for each criterion. The IN CS-1 1995 refinements provide a significant amount of descriptive material for each of the fifteen DP criteria.

In addition, information is now presented on the assignment of DP criteria to a TDP and its relationship to the information available at a TDP. In Table 4-6/Q.1214 (1995) is provided the applicability of DP criteria to DPs 1 through 18.

Users requiring further detail are referred to 4.2.2.5/Q.1214 (1995) DP criteria.

3.2.5 Trigger types and trigger precedence

New material is included in Recommendation Q.1214 (1995) on trigger types and trigger precedence. Trigger types denote classes of events of interest. They are used to establish trigger precedence rules at TDPs and indicate to the SCF the service logic to be invoked. A non-exhaustive list of 20 trigger types are defined. It is also possible for the network operator to define additional trigger types. The network operator is responsible for defining the implementation of the IN CS-1 set of trigger types, or a subset of the IN CS-1 trigger types, or network provider-defined trigger types.

Each trigger type is described in terms of:

- 1) TDP – the TDP at which the trigger can be detected.
- 2) DP Criteria – the conditions needed to trigger.
- 3) Category – office, group, or subscribed (line based).
- 4) Interface – type of interface to which it can be assigned (e.g., ISDN line).
- 5) Trigger type – the value that identifies the type of criteria that caused the SSF/CCF to detect a valid trigger condition at this TDP (i.e., the trigger type).
- 6) Fault handling – defines fault handling procedures for the case when the SCF does not respond to the SSF/CCF message. Details on possibilities for fault handling is for further study.

Table 5 depicts the 20 trigger types and the corresponding subclause in Recommendation Q.1214 (1995) where each trigger type is defined.

Table 5/Suppl. 1 to Rec. Q.1219 – IN CS-1 trigger types

Q.1214 subclause	trigger type
4.2.2.6.1	Origination_Attempt_Authorized
4.2.2.6.2	Off-Hook_Delay
4.2.2.6.3	Channel_Setup_PRI
4.2.2.6.4	Shared_Interoffice_Trunk
4.2.2.6.5	BRI_Feature_Activation_Indicator
4.2.2.6.6	Public_Feature_Code
4.2.2.6.7	Specific_Feature_Code
4.2.2.6.8	Customized_Dialling_Plan
4.2.2.6.9	Specific_Digit_String
4.2.2.6.10	Emergency_Service
4.2.2.6.11	AFR (Automatic Flexible Routing)
4.2.2.6.12	O_Called_Party_Busy
4.2.2.6.13	O_No_Answer
4.2.2.6.14	O_Answer
4.2.2.6.15	O_Disconnect
4.2.2.6.16	Term_Attempt_Authorized
4.2.2.6.17	T_Busy
4.2.2.6.18	T_No_Answer
4.2.2.6.19	T_Answer
4.2.2.6.20	T_Disconnect

Users seeking additional details are referred to 4.2.2.6/Q.1214 (1995), trigger types and trigger precedence.

3.2.6 AUTHENTICATE SIB (Stage 2 description)

One new SIB is defined. This new SIB is the AUTHENTICATE SIB which provides the capability for the SCF to establish an authorized relationship between the service logic and the SDF on behalf of a user by means of a requested authentication mechanism.

The Stage 1 description is given in Recommendation Q.1213 (1995). See the description of refinements to Recommendation Q.1213 (1995) earlier in this Supplement.

The AUTHENTICATE SIB Stage 2 description and two supporting information flows were added to IN CS-1 Recommendation Q.1214 (1995). The Stage 2 description is found in 5.2.1.4/Q.1214 (1995), which provides a description, information flow diagram, information flow definition and an SDL diagram for SCF actions.

Two new information flows were defined to support the AUTHENTICATE SIB, namely Authenticate and Authenticate Result. Authenticate is an SCF-SDF information flow and is defined in 6.6.2.5/Q.1214 (1995). Authenticate Result is an SDF-SCF information flow and is defined in 6.6.2.6/Q.1214 (1995).

3.2.7 IE population rules

Population rules were identified for thirteen information flows between the SSF/CCF and SCF. This is new information for implementors and network operators which was not available in the 1993 IN CS-1 Recommendations. Population

rules provide guidance to the implementors and network operators on how and where to obtain the information contained in the information elements of each information flow. The thirteen SSF-SCF information flows for which population rules have been defined are listed below.

- Analysed Information;
- Collected Information;
- O Answer;
- O Called Party Busy;
- O Disconnect;
- O No Answer;
- Origination Attempt Authorized;
- Route Select Failure;
- T Answer;
- T Busy;
- T Disconnect;
- Term Attempt Authorized;
- T No Answer.

Users requiring further detail are referred to 6.4.4/Q.1214 (1995).

3.2.8 BCSM SDLs

SDLs for the BCSM are now included as part of Recommendation Q.1214 in Annex B/Q.1214 (1995). The SDLs were not available when Recommendation Q.1214 (1993) was first published.

Following publication of the 1993 IN CS-1 Recommendations, an earlier set of BCSM SDLs became available before publication of the 1994 IN CS-1 User's Guide Recommendation Q.1219 (1994). A decision was made to include the available SDLs in Recommendation Q.1219 (1994) User's Guide as Annex B. These BCSM SDLs have been further refined and are now included as Annex B/Q.1214 (1995).

3.2.9 Charging scenarios

Charging scenarios is new information which has been introduced into the IN CS-1 Recommendation Q.1214 as Appendix II/Q.1214 (1995). Appendix II/Q.1214 (1995) is not an integral part of Recommendation Q.1214, therefore its inclusion with that Recommendation is for information only.

Appendix II/Q.1214 (1995) describes how charging might be impacted by an IN structured network. A number of scenarios are described showing the possible involvement of IN FEs such as the SSF and the SCF in the charging process and the usage of IN information flows where appropriate. Appendix II/Q.1214 (1995) makes note that networks may support different or additional charging capabilities other than those described in the appendix.

3.3 Refinements to Recommendation Q.1218 (1995)

The IN CS-1 refinements efforts greatly improved the presentation and quality of information contained in Recommendation Q.1218 (1995). The improvements involved the following areas of Recommendation Q.1218 (1995):

- Use of ASN.1;
- Use of X.500 for the SCF-SDF interface;
- Operation timers;
- Detailed error handling procedures;
- Services Assumed from TCAP;
- Detailed Operation Procedures Template;
- Application Context;
- Expanded ASN.1.

3.3.1 Use of ASN.1

The use of ASN.1 has been updated to include the new Recommendation X.680 Recommendations that was not available at the time of the 1993 IN CS-1 publication. Recommendation X.680 ASN.1 encoding is used for the SCF-SDF interface. ASN.1 encoding on the SCF-SSF and the SCF-SRF interface is based upon Recommendation X.208.

3.3.2 Use of X.500 for the SCF-SDF interface

A limited set of X.500 Recommendations were used to specify the SCF-SDF interface and the contents of the SDF. Most of the concepts of the X.500-Series are directly used in the IN environment; however, some alignments were necessary between the Directory concept and the IN applications. A limited subset of X.500 was adopted for the 1995 IN CS-1 Recommendations to meet the needs identified in this time-frame.

3.3.3 Operation timers

Each SSF-SCF and SCF-SRF operation defined in 2.1/Q.1218 (1995) has an operation-specific timer associated with it that was defined as part of the IN CS-1 refinements. These timers were not defined in the 1993 IN CS-1 Recommendations.

Fifty-three (53) operation specific timers are listed in Table 2/Q.1218. The definitive value for each operation timer may be network-specific and has to be defined by the network operator. Recommendation Q.1218 (1995) provides guidance to the implementor on value ranges for many of the timers. The value of the TC Operation Timers is set by the SACF according to the operation invoked for the interaction between a pair of PEs. IN CS-1 (1995) uses the following timers:

- SSF-SCF Operation Timers
 - Tasf: ActivateServiceFiltering
 - Tat: ActivityTest
 - Tai: AnalyseInformation
 - Tadi: AnalysedInformation
 - Tac: ApplyCharging
 - Tacr: ApplyChargingReport
 - Tari: AssistRequestInstructions
 - Tcg: CallGap
 - Tcirp: CallInformationReport
 - Tcirq: CallInformationRequest
 - Tcan: Cancel
 - Tcsr: CancelStatusReportRequest
 - Tcdi: CollectedInformation
 - Tci: CollectInformation
 - Tcon: Connect
 - Tctr: ConnectToResource
 - Tcue: Continue
 - Tdfc: DisconnectForwardConnection
 - Tetc: EstablishTemporaryConnection
 - Tenc: EventNotificationCharging
 - Terb: EventReportBCSM
 - Tfci: FurnishChargingInformation
 - Then: HoldCallInNetwork
 - Tidp: InitialDP
 - Tica: InitiateCallAttempt
 - Toa: OAnswer
 - Tob: OCalledPartyBusy
 - Tod: ODisconnect
 - Tomc: OMidCall
 - Tona: ONoAnswer
 - Toaa: OriginationAttemptAuthorized
 - Trc: ReleaseCall
 - Trcs: RequestCurrentStatusReport
 - Tres: RequestEveryStatusChangeReport
 - Trfs: RequestFirstStatusMatchReport
 - Trnc: RequestNotificationChargingEvent

Trrb:	RequestReportBCSMEEvent
Trt:	ResetTimer
Trsf:	RouteSelectFailure
Tsf:	SelectFacility
Tsr:	SelectRoute
Tsci:	SendChargingInformation
Tsfr:	ServiceFilteringResponse
Tsrp:	StatusReport
Tta:	TAnswer
Ttb:	TBusy
Ttd:	TDisconnect
Ttaa:	TermAttemptAuthorized
Tmc:	TMidCall
Ttna:	TNoAnswer

- SCF-SRF Operation Timers

Tpa:	PlayAnnouncement
Tpc:	PromptAndCollectUserInformation
Tsrr:	SpecializedResourceReport

3.3.4 Detailed error handling procedures

Both the 1993 and the 1995 versions of Recommendation Q.1218 contain ASN.1 protocol for IN CS-1 Error Types in 2.1.2. However, Error procedures are not contained in the 1993 version. The Error procedures were developed and included in Recommendation Q.1218 (1995).

Two types of generic error procedures are defined in the 1995 IN CS-1 IN Application Protocol (INAP), namely:

- errors related to INAP operations, and
- errors detected in an IN Functional Entity (FE) which was not directly related to an INAP operation.

Twenty-one (21) operation-related error procedures are defined for SSF-SCF, SCF-SRF and SCF-SDF operations. Two IN FE-related error procedures are defined; one for timeout in the SSF on the response from the SCF, a second on timeout in the SRF on the response from the SCF.

The Error procedures are contained in 3.2/Q.1218 (1995).

3.3.5 Services assumed from TCAP

Both the 1993 and the 1995 IN CS-1 Recommendation Q.1218 assume that the INAP will use SS No. 7 TCAP to support transmission of messages between SSF-SCF, SCF-SRF and SCF-SDF. However, the 1993 version of Recommendation Q.1218 provided only very high-level details on the use of TCAP consisting mostly of physical scenario examples and INAP Protocol Architecture diagrams in the introductory clauses.

The use of TCAP was described in much more detail in Recommendation Q.1218 (1995). This information is found in two different parts of Recommendation Q.1218 (1995). Subclause 3.4/Q.1218 (1995), "Services Assumed from TCAP", addresses the use of TCAP between the SSF-SCF and between the SCF-SRF. The use of TCAP for SCF-SDF communication is based upon the X.500-Series of Recommendations and is described in 2.2.2.2/Q.1218 (1995).

Subclause 3.4/Q.1218 (1995) is a new subclause developed to describe in detail the TCAP services that would be employed to carry the INAP protocol between the SSF-SCF and the SCF-SRF functional entities. Subclause 3.4/Q.1218 (1995) identifies the portions of TCAP to be employed and provides considerable descriptive material on the use

of TCAP primitives, TCAP interaction with Finite State Model processing, and both normal and abnormal procedures. Specific subclauses in 3.4/Q.1218 (1995) include the following topics:

- Normal procedures for:
 - SSF-SCF messages
 - SCF-SSF messages
 - SCF-to/from-SRF messages;
- Abnormal procedures for
 - SCF-to-SSF/SRF messages
 - SSF/SRF messages to SCF messages;
- Dialogue establishment;
- Dialogue continuation;
- Dialogue termination;
- User Abort;
- Provider Abort;
- Procedures for INAP operations;
- Mapping to TC services.

Users wishing more detailed information should consult 2.2.2.2/Q.1218 (1995) and 3.4/Q.1218 (1995).

3.3.6 Detailed Operation Procedures Template

Both the 1993 and 1995 versions of Recommendation Q.1218 contain ASN.1 protocol for IN CS-1 Operation Types in their subclause 2.1. However, Detailed Operation Procedures are not contained in the 1993 version of Recommendation Q.1218. The Detailed Operation Procedures were developed as part of the 1995 IN CS-1 refinements.

The Detailed Operation Procedures are based on the following template which is filled in for each operation procedure:

- Operation (Name) Procedure:
 - General Description
 - Parameters
- Invoking Entity (FE name):
 - Normal Procedure
 - Error Handling
- Responding Entity (FE Name):
 - Normal Procedure
 - Error Handling

There are fifty-five (55) detailed operation procedures defined in Recommendation Q.1218 (1995). Users requiring additional details are referred to 3.3/Q.1218 (1995).

3.3.7 Application Context

The 1993 version of Recommendation Q.1218 did not contain an ASN.1 definition of Application Context as part of the INAP protocol. This was added to INAP in 1995. Application Contexts are defined for:

- IN CS-1 SSF-to-SCF generic application context;
- IN CS-1 SSF-to-SCF DP specific application context;
- IN CS-1 Assist handoff SSF-to-SCF application context;

- IN CS-1 SRF-to-SCF application context;
- IN CS-1 SCF-to-SSF application context;
- IN CS-1 SCF-to-SSF traffic management application context;
- IN CS-1 SCF-to-SSF service management application context;
- IN CS-1 SSF-to-SCF service management application context;
- IN CS-1 SCF-to-SSF status reporting application context.

The ASN.1 details on Application Context are found in 2.1.5/Q.1218 (1995).

3.3.8 Expanded ASN.1

The 1993 version of Recommendation Q.1218 did not contain an expansion of the ASN.1. This information is added to Recommendation Q.1218 (1995) as its Appendix III. The expanded ASN.1 shows the full ASN.1 details for each operation including all parameters, errors and extensions. The expanded ASN.1 is useful for some tools, e.g. code generators.

4 Service aspects

The service aspects of IN CS-1 are unchanged with the 1995 IN CS-1 Recommendations.

5 IN CS-1 architecture

The architecture remains unchanged with the 1995 IN CS-1 Recommendations.

6 Infrastructure

The basic infrastructure of IN CS1 was not changed with the 1995 IN CS-1 Recommendations. However, a new SIB, the AUTHENTICATE SIB, was developed by extracting this capability from where it resided in multiple SIBs and making a concise representation in this new SIB.

7 Service example

The Service examples shown in the Recommendations Q.1219 (1994) are still applicable as examples of the utilization of the capabilities provided by IN CS-1.

8 Physical deployment scenarios

The physical deployment scenarios presented in Recommendation Q.1215 (1995) are unchanged in the 1995 IN CS-1 Recommendations.

9 Future IN capability sets

Future IN capability sets are not impacted by the 1995 IN CS-1 Recommendations.

Annex A

IN CS-1 service scenario examples

No additional service scenarios are required.

Annex B

BCSM SDLs

The SDLs have been included in Annex B/Q.1214 (1995).

References

- ITU-T Recommendation X.680 (1994) | ISO/IEC 8824-1:1994, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.

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