INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.1220

(09/97)

SERIES Q: SWITCHING AND SIGNALLING

Intelligent Network

Q.1220-series Intelligent Network Capability Set 2 Recommendation structure

ITU-T Recommendation Q.1220

(Previously CCITT Recommendation)

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4 AND No. 5	Q.120–Q.249
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250–Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.399
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	**Q.1200–Q.1999**
BROADBAND ISDN	Q.2000–Q.2999

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

ITU-T RECOMMENDATION Q.1220

Q.1220-SERIES INTELLIGENT NETWORK CAPABILITY SET 2 RECOMMENDATION STRUCTURE

Summary

This Recommendation explains the structure of the Q.122x (CS-2)-series IN Recommendations and provides their outlines.

Source

ITU-T Recommendation Q.1220 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

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The 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 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 term *recognized operating agency (ROA)* includes any individual, company, corporation or governmental organization that operates a public correspondence service. The terms *Administration*, *ROA* and *public correspondence* are defined in the *Constitution of the ITU (Geneva, 1992)*.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

© ITU 1999

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.

CONTENTS

		Page
0	Introduction	1
1	General Q.1200-series structure	1
2	Q.122x-series Intelligent Network Recommendations overview	1

Q.1220-SERIES INTELLIGENT NETWORK CAPABILITY SET 2 RECOMMENDATION STRUCTURE

(Geneva, 1997)

0 Introduction

A block of one hundred numbers has been set aside in the Q series (Q.1200-Q.1299) for the development of Intelligent Network (IN) Recommendations. This Recommendation has been developed to organize the IN CS-2 Recommendations in a meaningful way in order to assist users in locating topics of interest. It provides a structural overview of the content of the Q.1220 series.

Terms and definitions pertinent to IN CS-2 are included in Recommendation Q.1290.

1 General Q.1200-series structure

Table 1 shows the overall Q.1200-series Intelligent Network Recommendation naming structure.

Table 1/Q.1220 – Recommendation framework structure

1200 – General	
1210 – CS-1	121 – Principles introduction
1220 – CS-2	122 – Service plane (not included for CS-1)
1230 – CS-3	123 – Global functional plane
1240 – CS-4	124 – Distributed functional plane
1250 – CS-5	125 – Physical plane
1260 – CS-6	126 – For future use
1270 – CS-7	127 – For future use
1280 – CS-8	128 – Interface Recommendation
1290 – Glossary	129 – Intelligent network user's guide
NOTE 1 – 1200 is assigned for the IN Recommendation framework structure. NOTE 2 – 1290-series has been set aside for the glossary.	

2 Q.122x-series Intelligent Network Recommendations overview

Q.1220-Q.1220-series Intelligent Network Capability Set 2 Recommendation structure

0 Introduction

1 General Q.1200-series structure

2 Q.122x-series Intelligent Network Recommendations overview

Q.1221 – Introduction to Intelligent Network Capability Set 2

1 Introduction

2 Phased standardization

3 General description and scope of IN CS-2
- 3.1 Criteria for IN CS-2
- 3.2 Evolution of IN CS-2

4 Overview of IN CS-2 Recommendations

5 Service aspects
- 5.1 Telecommunication services
- 5.2 Service management services
- 5.3 Service creation services
- 5.4 Network support of IN CS-2 services

6 Network aspects
- 6.1 Network functions
- 6.2 Control architecture principles
  - 6.2.1 Service invocation and control
  - 6.2.2 End-user interactions
  - 6.2.3 Service management
- 6.3 Feature interactions
- 6.4 Consistency among IN CS-2 supported service features

7 Functional relationships and interfaces
- 7.1 Functional relationships and control classes
  - 7.1.1 Bearer connection control
  - 7.1.2 Non-IN call control
  - 7.1.3 IN service control
  - 7.1.4 Service management control
  - 7.1.5 Non-IN call unrelated control
- 7.2 Key functions and interfaces
  - 7.2.1 Single point/multiple points of control
  - 7.2.2 Single-ended/multi-ended calls
  - 7.2.3 Mid-call interruption
  - 7.2.4 Call party handling
  - 7.2.5 Enhanced SRF
  - 7.2.6 Call unrelated user interaction
  - 7.2.7 Out-channel call related user interaction
  - 7.2.8 Service/feature interaction (service processing)
  - 7.2.9 Internetworking
  - 7.2.10 Security
  - 7.2.11 IN-TMN
  - 7.2.12 Service management
  - 7.2.13 Service creation
  - 7.2.14 Personal mobility

Appendix I – IN CS-2 benchmark services and features
- I.1 General
- I.2 Definitions
  - I.2.1 Telecommunication services
  - I.2.2 Service management services
  - I.2.3 Service creation services
- I.3 Telecommunication services
  - I.3.1 General
  - I.3.2 Definitions
  - I.3.3 Mobility service features (UPT, FPLMTS)
  - I.3.4 Other services
  - I.3.5 Other service features

I.4 Service management services
I.4.1 General
I.4.2 Definition
I.4.3 Service management service/service feature
I.5 Service creation services
I.5.1 General
I.5.2 Service specification services
I.5.3 Service development services
I.5.4 Service verification services
I.5.5 Service deployment services
I.5.6 Service creation service management services

Q.1222 – Service plane for Intelligent Network Capability Set 2

1 General
2 Service plane architecture
2.1 General
2.2 Characterization of services and service capability requirement
2.2.1 Service and service feature requirements
2.3 Service and service feature interaction
2.3.1 Types of features considered for interactions
2.3.2 Mechanisms for handling feature interactions
2.4 Service plane modelling

Q.1223 – Global functional plane for Intelligent Network Capability Set 2

1 General
2 Scope of IN global functional plane for capability set 2
3 References
4 Global functional plane modelling for capability set 2
4.1 Elements on the global functional plane
4.1.1 Modelling requirements
4.1.2 Modelling elements
4.2 The basic call process
4.3 The capability view
4.3.1 Definition
4.3.2 Service independent building blocks
4.3.3 Methods to describe SIBs
4.4 Interaction management
4.4.1 Interaction between SIBs
4.4.2 Interaction handling methods in the SIB definition phase
4.5 The service view
4.5.1 Definition
4.5.2 Global service logic
4.5.3 SIB operations
4.5.4 Characteristics of an HLSIB
4.5.5 Characteristics of a service process
4.5.6 Communication between service processes
4.5.7 Domains
4.6 Terminology
5 IN CS-2 Service Independent Building Blocks (SIBs)
5.1 ALGORITHM
5.2 AUTHENTICATE
5.3 CHARGE
5.4 COMPARE
5.5 DISTRIBUTION
5.6 END
5.7 INITIATE SERVICE PROCESS
5.8 JOIN

5.9 LOG CALL INFORMATION
5.10 MESSAGE HANDLER
5.11 QUEUE
5.12 SCREEN
5.13 SERVICE DATA MANAGEMENT
5.14 SERVICE FILTER
5.15 SPLIT
5.16 STATUS NOTIFICATION
5.17 TRANSLATE
5.18 USER INTERACTION
5.19 VERIFY

6 IN CS-2 specialized SIBs
6.1 The basic call process
6.1.1 General
6.1.2 Points of initiation and points of return
6.1.3 BCP stage 1 description
6.2 Basic call unrelated process
6.2.1 General
6.2.2 Points of initiation and points of return
6.2.3 BCUP stage 1 description

7 Mapping of the service plane to the global functional plane

Annex A – Overview of the SIBs and SIB operations

Appendix I – IN management
I.1 Management view
I.2 The Basic Service Management Process (BSMP)
I.2.1 The basic service management process

Q.1224 – Distributed functional plane for Intelligent Network Capability Set 2

1 General
1.1 Normative references
1.2 Abbreviations and acronyms

2 Scope of IN distributed functional plane for capability set 2
2.1 End user access
2.2 Service invocation and control
2.3 End user interaction
2.4 IN service management functionality
2.5 Call Party Handling
2.5.1 Overview
2.5.2 Background and motivation
2.5.3 Scope
2.5.4 Assumptions
2.5.5 Core Capabilities
2.6 Internetworking
2.7 Security
2.8 Out-Channel Call Related User Interaction (OCCRUI)
2.9 Out-Channel Call Unrelated User Interaction (OCUUI)
2.10 Wireless access
2.11 Feature interactions

3 Distributed functional model for IN CS-2
3.1 Explanation of diagram
3.2 IN functional model
3.3 Definition of functional entities related to IN service execution
3.3.1 CCA function (CCAF)
3.3.2 CC function (CCF)
3.3.3 SS function (SSF)
3.3.4 SC function (SCF)
3.3.5 SD function (SDF)
3.3.6 SR function (SRF)
3.3.7 IA function (IAF)
3.3.8 CUS function (CUSF)
3.3.9 SCUA function (SCUAF)
3.3.10 SM function (SMF)
3.4 Use of individual relationships between functional entities related to IN service execution
3.4.1 SCF-SSF relationship
3.4.2 SCF-SCF relationship
3.4.3 SCF-IAF relationship
3.4.4 SRF-CCF relationship
3.4.5 SCF-SRF relationship
3.4.6 SRF-SCF relationship
3.4.7 SRF-SMF relationship
3.4.8 SDF-SDF relationship
3.4.9 SCF-SDF relationship
3.4.10 SCF-CUSF relationship
3.4.11 CUSF-SSF relationship
3.4.12 CUSF-CCF relationship
3.4.13 SMF-SCF relationship
3.4.14 SMF-SDF relationship
3.4.15 SMF-SSF/CCF relationship
3.4.16 SMF-SRF relationship
3.4.17 SMF-SMAF relationship
3.4.18 SMF-SCEF relationship
3.4.19 SMF-SMF relationship
3.4.20 SMF-CUSF relationship
3.5 Overview of functional entity call/service logic processing models
4 SSF/CCF model
4.1 General
4.2 Basic Call Manager (BCM)
4.2.1 BCSM
4.2.2 CS-2 BCSM description
4.2.3 BCSM resume points and BCSM transitions in the IN CS-2 call model
4.2.4 BCSM indications for the CS-2 call model
4.2.5 BCSM detection points
4.2.6 DP criteria
4.2.7 Trigger types and trigger precedence
4.2.8 DP processing
4.2.9 Out-Channel Call Related User Interaction (OCCRUI)
4.3 IN-Switching Manager (IN-SM)
4.3.1 IN-Switching State Model (IN-SSM)
4.3.2 IN-SM Core Capabilities for Call Party Handling
4.3.3 The Connection View State (CVS) approach
4.3.4 The Hybrid Approach
4.3.5 IN-SSM EDPs
4.3.6 SSF resource control

4.4 Feature Interactions Manager (FIM)/Call Manager (CM)
4.4.1 FIM/CM functions
4.4.2 Service logic instance interactions considerations
4.4.3 FIM mechanisms
4.5 Relationship of SSF/CCF Model Components
4.5.1 General
4.5.2 Typical sequence of model actions
4.6 Relationship of SSF/CCF to SCF
5 Specialized Resource Function (SRF) model
5.1 General
5.2 SRF Components
5.2.1 Functional Entity Access Manager (FEAM)
5.2.2 Resource Control Part (RCP)
5.2.3 Resource Function Part (RFP)
5.2.4 Data Part (DP)
5.3 Objects of SRF management
6 Service Control Function (SCF) model
6.1 General
6.2 SCF components
6.2.1 General
6.2.2 Service Logic Execution Manager (SLEM)
6.2.3 SCF data access manager
6.2.4 Functional routine manager
6.2.5 Functional Entity Access Manager (FEAM)
6.2.6 SLP manager
6.2.7 Security manager
6.3 Functional routine categories
6.3.1 SLPI management functional routines
6.3.2 SLPI communication functional routines
6.3.3 Timer management functional routines
6.3.4 Data management interface functional routines
6.3.5 Asynchronous event handling functional routines
6.3.6 Connection management functional routines
6.3.7 Specialized resource management functional routines
6.3.8 OAM functional routines
7 Service Data Function (SDF) model
7.1 General
7.2 SDF components
7.2.1 General
7.2.2 SDF data manager
7.2.3 Functional entity access manager
7.2.4 Security manager
7.3 Data types handled by SDF
8 Call Unrelated Service Function (CUSF) model
8.1 General
8.2 Basic Non-Call Manager (BNCM)
8.2.1 BCUSM
8.2.2 BCUSM description for CS-2
8.2.3 Transition for BCUSM
8.2.4 BCUSM DP criteria
8.3 Description of relationship model

9 Service Management Function (SMF) model
9.1 General
9.2 SMF components
9.2.1 General
10 Mapping of the global functional plane to the distributed functional plane
10.1 Mapping of POIs and PORs to DPs and PICs
11 Information flow diagrams and distributed service logic in the DFP
11.1 Introduction
11.1.1 Functional model
11.1.2 Description of functional entities
11.1.3 Numbering of functional entity actions
11.1.4 Relationship with clause 12 (information flow descriptions)
11.1.5 Organization of clause 11
11.1.6 Generic security information flows
11.1.7 SDF-SDF interactions
11.1.8 SCF-SCF interactions
11.2 SIB stage 2 descriptions
11.2.1 ALGORITHM SIB
11.2.2 AUTHENTICATE SIB
11.2.3 CHARGE SIB
11.2.4 COMPARE SIB
11.2.5 DISTRIBUTION SIB
11.2.6 END SIB
11.2.7 INITIATE SERVICE PROCESS SIB
11.2.8 JOIN SIB
11.2.9 LOG CALL INFORMATION SIB
11.2.10 MESSAGE HANDLER SIB
11.2.11 QUEUE SIB
11.2.12 SCREEN SIB
11.2.13 SERVICE DATA MANAGEMENT SIB
11.2.14 SERVICE FILTER SIB
11.2.15 SPLIT SIB
11.2.16 STATUS NOTIFICATION SIB
11.2.17 TRANSLATE SIB
11.2.18 USER INTERACTION SIB
11.2.19 VERIFY SIB
11.3 BASIC PROCESS SIBs
11.3.1 BASIC CALL PROCESS SIB
11.3.2 BASIC CALL UNRELATED PROCESS SIB
11.4 Stage 2 description of other distributed functionality
11.4.1 Activity test functionality
11.4.2 Call gap capability
11.5 Distributed service logic
11.5.1 SDL diagrams
11.5.2 Distributed service logic for SSF
11.5.3 Distributed service logic for assist/hand-off SSF
11.5.4 Distributed service logic for SRF
11.5.5 Distributed service logic for SCF
11.5.6 Distributed service logic for SDF
11.5.7 Distributed sercice logic for CUSF
11.6 Mapping between information flows and SIBs
12 Relationships between FEs
12.1 General
12.2 Relationships
12.3 Information flows between FEs

12.4 SCF-SSF relationship
12.4.1 General
12.4.2 DP specific Common Elements
12.4.3 Information flows between SCF and SSF
12.4.4 IE Definitions for SSF/CCF to SCF information flows
12.5 SCF-SRF relationship
12.5.1 General
12.5.2 Information flows between the SCF and SRF
12.5.3 IE Definitions for SCF to SRF information flows
12.6 SCF-SCF relationship
12.6.1 General
12.6.2 Information flows between the SCF and SCF
12.6.3 IE Definitions for SCF to SCF information flows
12.7 SCF-CUSF relationship
12.7.1 General
12.7.2 Information flows between the SCF and CUSF
12.7.3 IE Description for the SCF-CUSF information flows
12.8 SCF-SDF relationship
12.8.1 General
12.8.2 Information flows between the SCF and SDF
12.8.3 IE Description for the SCF-SDF information flows
12.9 SDF-SDF relationship
12.9.1 General
12.9.2 Information flows between the SDF and SDF
12.9.3 IE Description for the SDF-SDF information flows
12.10 IE Population Rules
12.10.1 SSF/CCF to SCF Information Flows
12.11 Summary of information flows and related SIBs
Annex A – Mobility aspects
A.1 General
A.2 Scope
A.3 Mobility Aspects of Distributed Functional Model for IN CS-2
A.3.1 Explanation of the diagram
A.3.2 Wireless access enhancements to the IN functional model
A.3.3 Definitions of wireless access specific functional entities related to IN service execution
A.3.4 Use of individual relationships between FEs for wireless access
A.4 Example mapping of wireless access FEs to physical platforms
A.4.1 Example mapping 1
A.4.2 Example mapping 2
A.4.3 Example mapping 3
A.4.4 Example mapping 4
A.4.5 Example mapping 5
A.4.6 Example mapping 6
A.4.7 Example mapping 7: RCF and CRACF in RS, CURACF in SCP
A.4.8 Example mapping 8: RCF and CRACF in RS, CURACF in standalone platform
A.4.9 Example mapping 9: RCF in Radio System, CRACF in standalone platform CURACF in SCP
A.4.10 Example mapping 10: RCF in Radio System, CRACF in standalone platform and CURACF in standalone platform

Annex B – Telecommunications Management Network (TMN) concepts
- B.1 Introduction
- B.2 The TMN functional architecture
  - B.2.1 Operations Systems
  - B.2.2 Work Station Functions
  - B.2.3 The Human Machine Adaptation (HMA)
  - B.2.4 TMN information modelling
- B.3 Applying TMN concepts to the IN
  - B.3.1 IN management functional model
  - B.3.2 Correspondence between the IN concept of SIB and the TMN concept of MO
  - B.3.3 IN management protocols
- B.4 Modelling aspects imported from TMN
  - B.4.1 Mappings of IN SMF onto TMN logical layers
  - B.4.2 Mapping of IN SMF onto TMN management functions
  - B.4.3 Mapping of the IN SCEF onto TMN logical layers
- B.5 IN management and generic TMN management
  - B.5.1 Management process independence
  - B.5.2 SMF complexity
- B.6 IN SMF-SMF internetworking relationship mapping to TMN
  - B.6.1 Fault management example

Annex C – IN SSF Q3 Management Information Model
- C.1 Introduction
  - C.1.1 Technical approach
- C.2 SSF functional decomposition
  - C.2.1 Rationale
  - C.2.2 Method
- C.3 SSF management requirements
  - C.3.1 Rationale
  - C.3.2 Method
- C.4 SSF management information model

Annex D – IN testing and fault management
- D.1 Introduction
- D.2 IN testing capabilities for the SSF/CCF
  - D.2.1 Translation Check
  - D.2.2 Trigger Data Check
  - D.2.3 SSF/CCF Query Test
  - D.2.4 Using the SSF/CCF testing capabilities
- D.3 IN end-to-end testing
  - D.3.1 IN end-to-end testing information elements
  - D.3.2 SSF to SCF
  - D.3.3 SCF to SSF
  - D.3.4 SCF-SRF
  - D.3.5 SRF-SCF

Appendix I – Example/application of IN SSF Q3 management information model
- I.1 Introduction
- I.2 SSF functional decomposition
  - I.2.1 SSF model
- I.3 Example to illustrate development of information models and managed object requirements
  - I.3.1 General
  - I.3.2 Example of trigger management information model and managed objet requirements
  - I.3.3 SMF functionality mapping to information model
  - I.3.4 SSF/CCF functionality mapping to information model
  - I.3.5 SSF/CCF information model managed object requirements

Appendix II – Information flows and call models for terminal mobility
II.1 General
II.2 Functional entity call/service processing models for wireless access
II.2.1 Overview
II.2.2 Terminal Access State Model (TASM)
II.2.3 Basic Non-Call Associate State Model for CURACF (BNCSM)
II.2.4 BCSM
II.3 Information flow enhancements for wireless access
II.3.1 General
II.3.2 Relationships
II.3.3 Information flows between FEs
II.3.4 SCF-SSF relationship
II.3.5 SCF-CRACF relationship
II.3.6 SCF-CURACF relationship

Q.1225 – Physical plane for Intelligent Network Capability Set 2

1 General
2 Requirements and assumptions
2.1 Requirements
2.2 Assumptions
3 Physical Entities (PEs)
4 Mapping requirements
5 Mapping the distributed functional plane to the physical plane
5.1 Mapping of functional entities to physical entities
5.2 Mapping of FE-FE relationships to PE-PE relationships
5.3 Selection of underlying protocol platforms
5.3.1 SCP-SSP interface
5.3.2 AD-SSP interface
5.3.3 IP-SSP interface
5.3.4 SN-SSP interface
5.3.5 SCP-IP interface
5.3.6 AD-IP interface
5.3.7 SCP-SDP interface
5.3.8 User interfaces
5.3.9 Enhanced ISDN CPE-CUSP interface
5.3.10 AD-CUSP interface

Q.1228 – Interface Recommendations for Intelligent Network Capability Set 2

1 Introduction
2 General
2.1 Normative references
2.2 Abbreviations and acronyms
2.3 Conventions
3 Interface recommendation for telecommunication services
3.1 General
3.1.1 Definition methodology
3.1.2 Example physical scenarios
3.1.3 INAP protocol architecture
3.1.4 INAP addressing
3.1.5 Relationship between Recommendation Q.1224 and this Recommendation
3.1.6 Compatibility mechanisms used for INAP
3.2 SACF/MACF rules
3.2.1 Reflection of TCAP AC
3.2.2 Sequential/parallel execution of operations

4 Common IN CS-2 Types
4.1 Data types
4.2 Error types
4.3 Operations codes
4.4 Error codes
4.5 Classes
4.6 Object identifiers
5 SSF/SCF interface
5.1 Operations and arguments
5.2 SSF/SCF packages, contracts and Application Contexts
5.2.1 Protocol overview
5.2.2 SSF/SCF ASN.1 module
6 SCF/SRF interface
6.1 SCF/SRF operations and arguments
6.2 SRF/SCF contracts, packages and Application Contexts
6.2.1 Protocol overview
6.2.2 SRF/SCF ASN.1 modules
7 SCF-SDF interface
7.1 Introduction to the reuse of X.500 for SDF interfaces
7.1.1 Alignment between the X.500 concepts and the IN
7.1.2 Use of a limited subset of X.500
7.1.3 Working assumptions
7.2 The SDF Information Model
7.2.1 Information framework
7.2.2 Basic Access Control
7.2.3 Attribute contexts
7.2.4 Attribute definitions
7.3 The SCF-SDF Interface Protocol
7.3.1 Information types and common procedures
7.3.2 Operations
7.3.3 Errors
7.4 Protocol overview
7.4.1 Remote Operations
7.4.2 Directory ROS-Objects and Contracts
7.4.3 DAP Contract and Packages
7.5 Directory protocol abstract syntax
7.5.1 Abstract syntaxes
7.5.2 Directory application contexts
7.5.3 Operation codes
7.5.4 Error codes
7.5.5 Versions and the rules for extensibility
7.6 Conformance
7.6.1 Conformance by SCFs
7.6.2 Conformance by SDFs
7.7 ASN.1 modules for the SCF-SDF interface
7.7.1 IN-CS2-SDF-InformationFramework module
7.7.2 IN-CS2-SDF-BasicAccessControl Module
7.7.3 IN-CS2-SCF-SDF-Operations Module
7.7.4 IN-CS2-SCF-SDF-Protocol Module
8 SDF/SDF interface
8.1 Introduction to the IN X.500 DSP and DISP Subset
8.2 Working assumptions

8.3 The IN X.500 DISP Subset
8.3.1 Shadowing agreement specification
8.3.2 DSA Shadow Bind
8.3.3 IN-DSA Shadow Unbind
8.3.4 Coordinate Shadow Update
8.3.5 Update Shadow
8.3.6 Request Shadow Update
8.4 The IN X.500 DSP Subset
8.4.1 Information types and common procedures
8.4.2 DSA Bind
8.4.3 IN DSA Unbind
8.4.4 Chained Operations
8.4.5 Chained Errors
8.5 Protocol overview
8.5.1 ROS-Objects and contracts
8.5.2 DSP contract and packages
8.5.3 DISP contract and packages
8.6 Protocol abstract syntax
8.6.1 DSP Abstract Syntax
8.6.2 DISP Abstract Syntax
8.6.3 Directory System Application Context
8.6.4 Directory Shadow Application Context
8.6.5 Versions and the rules for extensibility
8.7 Conformance
8.7.1 Conformance by SDFs
8.7.2 Conformance by a shadow supplier
8.7.3 Conformance by a shadow consumer
8.8 ASN.1 modules for the SDF-SDF interface
8.8.1 IN-CS2-SDF-SDF-Protocol Module
9 SCF/SCF interface
9.1 SCF/SCF operations and arguments
9.2 SCF/SCF contracts, packages and Application Contexts
9.2.1 Protocol overview
9.2.2 ASN.1 modules
10 SCF/CUSF interface
10.1 Operations and arguments
10.2 SCF/CUSF Contracts, Operation Packages, and Application Contexts
10.2.1 Protocol overview
10.2.2 ASN.1 module
11 SSF application entity procedures
11.1 General
11.2 Model and interfaces
11.3 Relations between SSF FSM and the CCF and maintenance functions
11.4 SSF management finite state model (SSME FSM)
11.5 SSF switching state model (SSM) FSM
11.5.1 Finite State Model for Call Segment Association (CSA)
11.5.2 Finite State Model for Call Segment
11.6 Assisting SSF FSM
11.6.1 State aa: Idle
11.6.2 State ab: Waiting For Instructions
11.6.3 State ac: Waiting For End Of User Interaction

11.7 Handed-off SSF FSM
11.7.1 State ha: Idle
11.7.2 State hb: Waiting for Instructions
11.7.3 State hc: Waiting for End Of User Interaction
11.8 User Service Interaction USI FSM
12 SCF application entity procedures
12.1 General
12.2 Model and interfaces
12.3 Relationship between the SCF FSM and the SLPs/maintenance functions
12.4 Partial SCF Management Entity (SCME) State Transition Diagram
12.4.1 State M1: Status report idle
12.4.2 State M2: Waiting for SSF Resource Status Report
12.4.3 State M3: Service filtering idle
12.4.4 State M4: Waiting for SSF service filtering response
12.4.5 State M5: Activity test idle
12.4.6 State M6: Waiting for activity test response
12.4.7 State M7: ManageTriggerData idle
12.4.8 State M8: Waiting for ManageTriggerData activity test response
12.4.9 The Resource Control Object
12.5 The SCF Call State Model (SCSM)
12.5.1 SSF/SRF-related states (SCSM-SSF/SRF)
12.5.2 SDF-related states (SCSM-SDF)
12.5.3 SCF-related states
12.5.4 CUSF-related states (SCSM-CUSF)
12.5.5 USI_SCF FSM
13 SRF application entity procedures
13.1 General
13.2 Model and interfaces
13.3 Relationship between the SRF FSM and maintenance functions/bearer connection handling
13.4 The SRSM
13.4.1 State 1: Idle
13.4.2 State 2: Connected
13.4.3 State 3: User interaction
13.5 Example SRF control procedures
13.5.1 SRF connect procedures
13.5.2 SRF end-user interaction procedures
13.5.3 SRF disconnection procedures
13.5.4 Examples illustrating Complete User Interaction Sequences
14 SDF application entity procedures
14.1 General
14.2 Model and interfaces
14.3 The SDF FSM structure
14.4 SDF state transition models
14.4.1 SDF state transition model for SCF-related states
14.4.2 SDF state transition model for SDF-related states
15 CUSF application entity procedures
15.1 General
15.2 Model and interfaces
15.2.1 Background for the modelling and protocol
15.2.2 Modelling and protocol
15.3 Relations between CUSF FSM and the SSF/CCF and maintenance functions

15.4 CUSF management finite state model (CUSME FSM)
15.5 CUSF state transition diagram
15.5.1 State a: Idle
15.5.2 State b: Waiting For Instructions
15.5.3 State c: Monitoring
16 Error procedures
16.1 Operation related error procedures
16.1.1 AttributeError
16.1.2 Cancelled
16.1.3 CancelFailed
16.1.4 DSAReferral
16.1.5 ETCFailed
16.1.6 ExecutionError
16.1.7 ImproperCallerResponse
16.1.8 MissingCustomerRecord
16.1.9 MissingParameter
16.1.10 Name Error
16.1.11 ParameterOutOfRange
16.1.12 Referral
16.1.13 RequestedInfoError
16.1.14 ScfReferral
16.1.15 Security
16.1.16 Service
16.1.17 Shadow
16.1.18 SystemFailure
16.1.19 TaskRefused
16.1.20 UnavailableResource
16.1.21 UnexpectedComponentSequence
16.1.22 UnexpectedDataValue
16.1.23 UnexpectedParameter
16.1.24 UnknownLegID
16.1.25 UnknownResource
16.1.26 Update
16.1.27 ChainingRefused
16.1.28 DirectoryBindError
16.1.29 ScfBindFailure
16.1.30 ScfTaskRefused
16.2 Entity-related error procedures
16.2.1 Expiration of T_{SSF}
16.2.2 Expiration of T_{SRF}
16.2.3 Expiration of T_{CUSF}
17 Detailed operation procedures
17.1 ActivateServiceFiltering procedure
17.2 ActivationReceivedAndAuthorized procedure
17.3 ActivityTest procedure
17.4 AddEntry procedure
17.5 AnalysedInformation procedure
17.6 AnalyseInformation procedure
17.7 ApplyCharging procedure
17.8 ApplyChargingReport procedure
17.9 AssistRequestInstructions procedure
17.10 AssociationReleaseRequested procedure
17.11 AuthorizeTermination procedure
17.12 CallGap procedure
17.13 CallInformationReport procedure
17.14 CallInformationRequest procedure
17.15 Cancel procedure
17.16 CancelStatusReportRequest procedure

17.17 chainedAddEntry procedure
17.18 ChainedConfirmedNotificationProvided procedure
17.19 ChainedConfirmedReportChargingInformation procedure
17.20 ChainedEstablishChargingRecord procedure
17.21 chainedExecute procedure
17.22 ChainedHandlingInformationRequest procedure
17.23 ChainedHandlingInformationResult procedure
17.24 chainedModifyEntry procedure
17.25 ChainedNetworkCapability procedure
17.26 ChainedNotificationProvided procedure
17.27 ChainedReportChargingInformation procedure
17.28 ChainedProvideUserInformation procedure
17.29 chainedRemoveEntry procedure
17.30 ChainedRequestNotification procedure
17.31 chainedSearch procedure
17.32 CollectedInformation procedure
17.33 CollectInformation procedure
17.34 ComponentReceived procedure
17.35 ConfirmedNotificationProvided procedure
17.36 ConfirmedReportChargingInformation procedure
17.37 Connect procedure
17.38 ConnectToResource procedure
17.39 Continue procedure
17.40 ContinueWithArgument procedure
17.41 CoordinateShadowUpdate procedure
17.42 CreateCallSegmentAssociation procedure
17.43 in-directoryBind procedure
17.44 DirectoryUnbind procedure
17.45 DisconnectForwardConnection procedure
17.46 DisconnectForwardConnectionWithArgument procedure
17.47 DisconnectLeg procedure
17.48 dSABind procedure
17.49 DSAShadowBind procedure
17.50 in-DSAShadowUnbind procedure
17.51 EntityReleased Procedure
17.52 EstablishChargingRecord procedure
17.53 EstablishTemporaryConnection procedure
17.54 EventNotificationCharging procedure
17.55 EventReportBCSM procedure
17.56 EventReportFacility procedure
17.57 Execute procedure
17.58 FacilitySelectedAndAvailable procedure
17.59 FurnishChargingInformation procedure
17.60 HandlingInformationRequest procedure
17.61 HandlingInformationResult procedure
17.62 HoldCallInNetwork procedure
17.63 in-DSAUnbind procedure
17.64 InitialDP procedure
17.65 InitiateAssociation procedure
17.66 InitiateCallAttempt procedure
17.67 ManageTriggerData procedure
17.68 MergeCallSegments procedure
17.69 ModifyEntry procedure

17.70 MoveCallSegments procedure
17.71 MoveLeg procedure
17.72 NetworkCapability procedure
17.73 NotificationProvided procedure
17.74 OAbandon procedure
17.75 OAnswer procedure
17.76 OCalledPartyBusy procedure
17.77 ODisconnect procedure
17.78 OMidCall procedure
17.79 ONoAnswer procedure
17.80 OriginationAttempt procedure
17.81 OriginationAttemptAuthorized procedure
17.82 OSuspended procedure
17.83 PlayAnnouncement procedure
17.84 PromptAndCollectUserInformation procedure
17.85 PromptAndReceiveMessage procedure
17.86 ProvideUserInformation procedure
17.87 Reconnect procedure
17.88 ReleaseAssociation procedure
17.89 ReleaseCall procedure
17.90 RemoveEntry procedure
17.91 ReportChargingInformation procedure
17.92 ReportUTSI procedure
17.93 RequestCurrentStatusReport procedure
17.94 RequestEveryStatusChangeReport procedure
17.95 RequestFirstStatusMatchReport procedure
17.96 RequestNotification procedure
17.97 RequestNotificationChargingEvent procedure
17.98 RequestReportBCSMEvent procedure
17.99 RequestReportBCUSMEvent procedure
17.100 RequestReportFacilityEvent procedure
17.101 RequestReportUTSI procedure
17.102 RequestShadowUpdate procedure
17.103 ResetTimer procedure
17.104 RouteSelectFailure procedure
17.105 SCFBind procedure
17.106 scfBind procedure (in the chaining case)
17.107 SCFUnBind procedure
17.108 scfUnBind procedure (in the chaining case)
17.109 ScriptClose procedure
17.110 ScriptEvent procedure
17.111 ScriptInformation procedure
17.112 ScriptRun procedure
17.113 Search procedure
17.114 SelectFacility procedure
17.115 SelectRoute procedure
17.116 SendChargingInformation procedure
17.117 SendComponent procedure
17.118 SendFacilityInformation procedure
17.119 SendSTUI procedure
17.120 ServiceFilteringResponse procedure

17.121 SpecializedResourceReport procedure
17.122 SplitLeg procedure
17.123 StatusReport procedure
17.124 TAnswer procedure
17.125 TBusy procedure
17.126 TDisconnect procedure
17.127 TerminationAttempt procedure
17.128 TermAttemptAuthorized procedure
17.129 TMidCall procedure
17.130 TNoAnswer procedure
17.131 TSuspended procedure
17.132 UpdateShadow procedure

18 Services assumed from Lower Layers
18.1 Services assumed from TCAP
18.1.1 Common procedures
18.1.2 SSF-SCF interface
18.1.3 SCF-SRF interface
18.1.4 SCF-CUSF interface
18.1.5 SCF-SCF interface
18.1.6 SCF-SDF interface
18.1.7 SDF-SDF interface
18.2 Services assumed from SCCP
18.2.1 Normal procedures
18.2.2 Service functions from SCCP

19 IN generic interface security
19.1 Interface security requirements
19.1.1 Data confidentiality
19.1.2 Data integrity and data origin authentication
19.1.3 Key management
19.2 Procedures and algorithms
19.2.1 Authentication procedures
19.2.2 SPKM algorithms and negotiation
19.2.3 Three-way mutual authentication
19.2.4 Assignment of credentials
19.3 Mapping of security information flow definitions to tokens
19.4 Security FSM definitions
19.4.1 Two-way mutual authentication FSMs
19.4.2 Three-way mutual authentication FSMs

Annex A.1 – Introduction to the INAP CS-1 and CS-2 SDL models
A.1.1 Introduction
A.1.2 Example for the interworking of the SSF/CCF SDL processes
A.1.3 Example for the Three-Party Call setup as seen from the environment

Annex A.2 – Transition diagrams
A.2.1 Call Segment Association transition diagram
A.2.2 Call Segment transition diagram

Annex A.3 – SDL Specification of CS-1 SSF/CCF

Annex A.4 – SDL Specification of CS-2 extensions to SSF/CCF

Annex A.5 – SDL Specification of CS-2 SRF

Annex A.6 – SDL Specification of CS-2 Assist/Hand-off SSF

Annex A.7 – SDL Specification of CS-2 CUSF

Annex A.8 – SDL Specification of CS-2 SCF

Appendix I – Expanded ASN.1 source

Appendix II – Data modelling

II.1 Introduction
II.1.1 Purpose and scope
II.1.2 Assumptions
II.1.2.1 Mobility service and subscriber identifiers
II.1.2.2 Disclosure of profile entries
II.2 Directory Information Tree (DIT) schema
II.2.1 X.500 DIT
II.2.1.1 Location of local profiles
II.2.1.2 Location of remote subscriber profiles
II.2.1.3 Location of locally visiting subscriber profiles
II.2.1.4 Reducing message flow
II.2.2 Object classes
II.2.2.1 inMobilityUserProfile
II.2.2.2 inMobilityServiceProvider
II.2.2.3 inMobilitySubscriberGroup
II.2.3 Attribute types
II.2.3.1 inMobilityID
II.2.3.2 inMobilityPIN
II.2.3.3 inMobilityPrefix
II.2.3.4 inMobilitySubPrefix
II.2.4 DIT structure definition
II.2.4.1 Name forms
II.2.4.2 Structure rules
II.2.4.3 Object identifier assignments

Appendix III – Examples of SPKM algorithms for IN CS-2

III.1 General
III.2 Integrity Algorithm (I-ALG)
III.2.1 Example–1
III.2.2 Example–2
III.2.3 Example–3
III.2.4 Example–4
III.3 Confidentiality Algorithm (C-ALG)
III.3.1 Example–1
III.4 Key Establishment Algorithm (K-ALG)
III.4.1 Example–1
III.4.2 Example–2
III.4.3 Example–3
III.5 One-Way Function (O-ALG) for Subkey Derivation Algorithm
III.5.1 Example–1

Q.1229 – Users' Guide for Intelligent Network Capability Set 2[1]

[1] Presently in the stage of draft.

ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	**Switching and signalling**
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure
Series Z	Languages and general software aspects for telecommunication systems