

## Contents

Preface . . . . .	Preface-1
1. Overview . . . . .	1-1
1.1 Reasons for Reissue . . . . .	1-3
1.1.1 Release to Pivot (RTP) Capability . . . . .	1-4
1.2 Requirements Terminology . . . . .	1-5
1.3 Requirement Labeling Conventions . . . . .	1-5
1.3.1 Numbering of Requirement and Related Objects . . . . .	1-5
1.3.2 Requirement, Conditional Requirement, and Objective Object Identification . . . . .	1-6
1.4 CCS Network Access . . . . .	1-6
1.5 Signaling System Number 7 Protocol . . . . .	1-7
1.6 Multiple Point Code Capability . . . . .	1-14
2. Signaling Link Characteristic . . . . .	2-1
2.1 Description of Signaling Data Links . . . . .	2-1
2.1.1 High-Speed Signaling Links . . . . .	2-1
2.2 Synchronization Requirements for DS0A Interfaces . . . . .	2-2
2.2.1 Composite Clock Redundancy Requirements . . . . .	2-2
2.2.2 Composite Clock Robustness Requirements . . . . .	2-2
2.3 SS7 Signal Units . . . . .	2-4
2.4 Error Detection and Recovery . . . . .	2-6
2.5 Signal Unit Error Monitoring . . . . .	2-8
2.6 Signaling Link Initial Alignment . . . . .	2-9
2.7 Processor Outage . . . . .	2-11
2.8 Signaling Link Busy . . . . .	2-13
2.9 Link Performance . . . . .	2-14
2.10 False Link Congestion Detection . . . . .	2-15
3. Message Signal Unit Information Handling . . . . .	3-1
3.1 Routing Label Information . . . . .	3-1
3.2 Message Discrimination and Distribution . . . . .	3-1
3.3 Message Routing . . . . .	3-1
3.3.1 Back-up Routing Procedures . . . . .	3-2
3.4 Loadsharing . . . . .	3-3
3.5 Message Sequencing . . . . .	3-4
4. Signaling Network Management . . . . .	4-1
4.1 Signaling Link Activation . . . . .	4-1
4.2 Signaling Link Changeover . . . . .	4-2
4.3 Signaling Link Changeback . . . . .	4-5
4.4 Forced Rerouting . . . . .	4-7
4.5 Controlled Rerouting . . . . .	4-8
4.6 MTP Restart . . . . .	4-9
4.6.1 Overview of the MTP Restart Procedures . . . . .	4-10
4.6.2 Requirements for a Restarting SPCS . . . . .	4-10

4.6.3	Requirements for an SPCS Adjacent to a Restarting Node . . . . .	4-14
4.6.4	Receipt of an Unexpected TRW/TRA Message . . . . .	4-16
4.6.5	General Requirements . . . . .	4-17
4.7	Management Inhibiting . . . . .	4-18
4.7.1	Signaling Link Inhibiting . . . . .	4-18
4.7.2	Signaling Link Uninhibiting . . . . .	4-19
4.8	Message Priorities and Congestion Control . . . . .	4-21
4.9	Signaling Route Management . . . . .	4-23
4.9.1	Terminology . . . . .	4-23
4.9.2	Route Management . . . . .	4-25
4.9.2.1	Cluster Route Management Overview . . . . .	4-25
4.9.2.2	Cluster Route Management Requirements . . . . .	4-26
4.9.3	Transfer-Prohibited . . . . .	4-30
4.9.4	Transfer-Cluster-Prohibited . . . . .	4-30
4.9.5	Transfer-Allowed . . . . .	4-31
4.9.6	Transfer-Cluster-Allowed . . . . .	4-32
4.9.7	Transfer-Restricted . . . . .	4-33
4.9.8	Transfer-Cluster-Restricted . . . . .	4-35
4.9.9	Signaling-Route-Set-Test Procedures . . . . .	4-36
4.9.10	Transfer Controlled . . . . .	4-39
4.9.11	Signaling-Route-Set-Congestion-Test . . . . .	4-40
4.10	Signaling Link Tests . . . . .	4-41
4.11	MTP User Flow Control . . . . .	4-42
5.	Noncircuit-Related Information Exchange - SCCP . . . . .	5-1
5.1	SCCP Protocol Class . . . . .	5-1
5.2	Connectionless Signaling Procedures . . . . .	5-1
5.2.1	SCCP Message Return . . . . .	5-3
5.3	SCCP Segmentation and Reassembly . . . . .	5-4
5.3.1	Segmenting . . . . .	5-5
5.3.1.1	Segmentation Criteria . . . . .	5-5
5.3.1.2	Segmentation Procedures . . . . .	5-5
5.3.2	Reassembling . . . . .	5-7
5.3.2.1	Initiating a Reassembly Process . . . . .	5-7
5.3.2.2	Reassembly Procedures . . . . .	5-8
5.4	SCCP Management . . . . .	5-10
6.	Additional Procedures for SPCS-to-SPCS/SCP TCAP Messages . . . . .	6-1
6.1	Scope and Applicability . . . . .	6-1
6.2	Definitions . . . . .	6-3
6.3	Overview . . . . .	6-4
6.4	The Analysis Processing Units . . . . .	6-11
6.5	Formatting and Coding Requirements . . . . .	6-25
6.6	Treatment Processing Summary . . . . .	6-29
6.7	Administrative Data . . . . .	6-31
6.8	Error Procedures . . . . .	6-32
7.	Circuit-Related Information Exchange . . . . .	7-1

7.1	Local Number Portability (LNP)	7-1
7.1.1	Overview	7-1
8.	SPCS Capacity	8-1
9.	Performance	9-1
9.1	General Considerations	9-1
9.2	Service (All Causes) Downtime Objectives	9-1
9.2.1	SPCS Total System Downtime	9-2
9.2.2	SPCS Link Downtime	9-2
9.3	Hardware Downtime Requirements	9-2
9.3.1	Predicted SPCS Total System Downtime	9-3
9.3.2	Predicted SPCS Link Downtime	9-3
Appendix A:	SS7 Message Formatting Guidelines	A-1
A.1	Basic Principles	A-1
A.2	Signal Unit Encoding	A-1
A.3	Message Signal Unit Routing Label	A-4
A.4	Signaling Network Management Message Formats	A-5
A.4.1	Changeover Messages	A-7
A.4.2	Emergency Changeover Messages	A-7
A.4.3	Changeback Messages	A-8
A.4.4	Management Inhibit Messages	A-9
A.4.5	Transfer Prohibited/Restricted/Allowed Messages	A-9
A.4.6	Signaling-Route-Set-Test Messages	A-10
A.4.7	Transfer Controlled Message	A-11
A.4.8	Signaling-Route-Set-Congestion-Test Message	A-12
A.4.9	Traffic Restart Message	A-12
A.4.10	Signaling Link Test Messages	A-13
A.4.11	User Part Unavailable Message	A-14
A.5	Circuit-Related Message Format	A-15
A.6	Noncircuit-Related Message Formats	A-17
A.6.1	SCCP Interfaces to SCCP-User Parts	A-17
A.6.1.1	Transaction Capabilities	A-17
A.6.2	Unitdata and Extended Unitdata Messages	A-18
A.6.2.1	UDT Messages Without GTT	A-18
A.6.2.2	UDT Messages With GTT	A-22
A.6.2.3	XUDT Messages	A-25
A.6.3	Additional Information to Support Routing of TCAP Messages	A-28
A.6.3.1	Intermediate Network Selection (INS)	A-28
A.6.3.2	SCCP Connectionless Segmentation	A-30
A.6.3.3	Primitives to Support Routing of TCAP Messages	A-31
A.6.3.3.1	Data Item Definitions	A-33
A.6.4	SCCP Management	A-36
A.6.5	Non-Circuit Related Service Messages	A-38
A.6.6	Extended Unitdata Service Messages	A-41
Appendix B:	SPCS Internal Congestion Control	B-1

- B.1 Background . . . . . B-1
- B.2 Guidelines Based on Processing Priority . . . . . B-2
  - B.2.1 Internal SPCS Processing Priority Classes . . . . . B-3
  - B.2.2 Internal SPCS Congestion Thresholds . . . . . B-3
  - B.2.3 Treatment During Internal SPCS Congestion . . . . . B-4
- B.3 Guidelines Based on Automatic Gapping . . . . . B-5
  - B.3.1 Internal SPCS Congestion Thresholds . . . . . B-5
  - B.3.2 Treatment During Internal SPCS Congestion . . . . . B-6
- Appendix C: Technical Description of INS . . . . . C-1
  - C.1 Introduction . . . . . C-1
  - C.2 Motivation . . . . . C-1
    - C.2.1 Definitions . . . . . C-1
  - C.3 INS Capability . . . . . C-2
    - C.3.1 Routing Function Definitions . . . . . C-2
    - C.3.2 SCCP INS Parameter . . . . . C-3
  - C.4 Message Routing With SCCP INS . . . . . C-5
    - C.4.1 SCCP INS Procedures in the Originating Network . . . . . C-5
    - C.4.2 SCCP INS Procedures in an ICN . . . . . C-6
    - C.4.3 SCCP INS Procedures in the Terminating Network . . . . . C-7
  - C.5 INS Symmetric Routing . . . . . C-8
  - C.6 Summary . . . . . C-9
- Appendix D: Test Considerations for GRP . . . . . D-1
  - D.1 Introduction . . . . . D-1
- Appendix E: Operations Requirements for Section 6.5 . . . . . E-1
  - E.1 Introduction . . . . . E-1
  - E.2 Memory Administration Requirements . . . . . E-1
    - E.2.1 General . . . . . E-1
    - E.2.2 Memory Administration Requirements for MTP Restart . . . . . E-2
      - E.2.2.1 General . . . . . E-2
      - E.2.2.2 Control Requirements . . . . . E-2
    - E.2.3 Memory Administration Requirements for False Link Congestion  
Detection . . . . . E-3
      - E.2.3.1 Control Requirements . . . . . E-3
    - E.2.4 Memory Administration Requirements for a Full Transmit  
Buffer . . . . . E-3
    - E.2.5 Memory Administration Requirements for E-Links . . . . . E-3
      - E.2.5.1 General . . . . . E-3
      - E.2.5.2 Provisioning Requirements . . . . . E-4
    - E.2.6 Memory Administration Requirements for SCCP  
Segmentation . . . . . E-4
    - E.2.7 Memory Administration Requirements for SPCS-to-SPCS/SCP  
TCAP Messages . . . . . E-4
      - E.2.7.1 Provisioning Requirements . . . . . E-4
    - E.2.8 Memory Administration Requirements to Support the Multiple  
Point Code Capability . . . . . E-9

	E.2.8.1	Provisioning Requirements . . . . .	E-9
E.2.9		Memory Administration Requirements for Unrecognized SCCP Messages . . . . .	E-9
E.2.10		Memory Administration Requirements for Connectionless Signaling Procedures . . . . .	E-9
	E.2.10.1	Provisioning Requirements . . . . .	E-9
	E.2.10.2	Control Requirements . . . . .	E-11
E.3		Surveillance Requirements . . . . .	E-11
E.3.1		Event Notification Requirements . . . . .	E-11
	E.3.1.1	General . . . . .	E-11
	E.3.1.2	Event Notification Requirements for MTP Restart	E-12
	E.3.1.3	Event Notification Requirements for False Link Congestion Detection . . . . .	E-13
	E.3.1.4	Event Notification Requirements for a Priority 3 MSU Discard . . . . .	E-13
	E.3.1.5	Event Notification Requirements for E-Links . . .	E-14
	E.3.1.6	Event Notification Requirements for SCCP Segmentation . . . . .	E-14
	E.3.1.7	Event Notification Requirements for SPCS-to-SPCS/SCP TCAP Messages . . . . .	E-14
	E.3.1.8	Event Notification Requirements to Support the Multiple Point Code Capability . . . . .	E-16
	E.3.1.9	Event Notification Requirements for Unrecognized SCCP Messages . . . . .	E-16
	E.3.1.10	Event Notification Requirements to Support Connectionless Signaling Procedures . . . . .	E-16
	E.3.1.11	Event Notification Requirements to Support SCCP Hop Counter . . . . .	E-16
E.3.2		Surveillance Measurement Requirements . . . . .	E-17
	E.3.2.1	General . . . . .	E-17
	E.3.2.2	Surveillance Measurement Requirements for MTP Restart . . . . .	E-18
	E.3.2.3	Surveillance Measurement Requirements for False Link Congestion Detection . . . . .	E-18
	E.3.2.4	Surveillance Measurement Requirements for Priority 3 MSU Discard . . . . .	E-18
	E.3.2.5	Surveillance Measurement Requirements for E-Links . . . . .	E-18
	E.3.2.6	Surveillance Measurement Requirements for SCCP Hop Counter . . . . .	E-18
	E.3.2.7	Surveillance Measurement Requirements for SCCP Segmentation . . . . .	E-19
	E.3.2.8	Surveillance Measurement Requirements for SPCS-to- SPCS/SCP TCAP Messages . . . . .	E-19
	E.3.2.9	Surveillance Measurement Requirements to Support the Multiple Point Code Capability . . . . .	E-20

E.3.2.10	Surveillance Measurement Requirements for Unrecognized SCCP Messages . . . . .	E-21
E.3.2.11	Surveillance Measurement Requirements to Support Connectionless Signaling Procedures . . . . .	E-21
E.4	Traffic Measurement Requirements . . . . .	E-21
E.4.1	General . . . . .	E-21
E.4.2	Traffic Measurement Requirements for MTP Restart . . . . .	E-22
E.4.3	Traffic Measurement Requirements for False Link Congestion Detection . . . . .	E-22
E.4.4	Traffic Measurement Requirements for a Priority 3 MSU Discard . . . . .	E-22
E.4.5	Traffic Measurement Requirements for E-Links . . . . .	E-22
E.4.6	Traffic Measurement Requirements for SCCP Segmentation	E-23
E.4.7	Traffic Measurement Requirements for SPCS-to-SPCS/SCP TCAP Messages . . . . .	E-23
E.4.8	Traffic Measurement Requirements to Support the Multiple Point Code Capability . . . . .	E-25
E.4.9	Traffic Measurement Requirements for Unrecognized SCCP Messages . . . . .	E-25
E.4.10	Traffic Measurement Requirements to Support Connectionless Signaling Procedures . . . . .	E-25
References	. . . . .	References-1
Glossary	. . . . .	Glossary-1
Requirement-Object Index	. . . . .	ROI-1

## List of Figures

Figure 1-1.	CCS GR Guide Diagram.....	1-2
Figure 1-2.	CCS Network Access .....	1-7
Figure 1-3.	SS7 Protocol Structure .....	1-8
Figure 1-4.	Relationship Between Primary PC of SPCS and Far End PC at STPs .....	1-15
Figure 4-1.	Relative Positioning of Congestion Thresholds .....	4-22
Figure 6-1.	Relationship to Features Using Procedures .....	6-2
Figure 6-2.	Terms Used in Section 6.....	6-4
Figure 6-3.	Symbols Used in Figures 6-4 Through 6-8.....	6-6
Figure 6-4.	Overview of Procedures.....	6-7
Figure 6-5.	Treatment Analysis .....	6-15
Figure 6-6.	ICN Identity Analysis .....	6-18
Figure 6-7.	Routing Data Analysis for Treatment 2 .....	6-23
Figure 6-8.	Routing Data Analysis for Treatment 3 .....	6-24
Figure C-1.	Intermediate Network Routing.....	C-2
Figure C-2.	SCCP Intermediate Network Selection Parameter .....	C-3





## List of Tables

Table 1-1.	Provisional Values for Level 2 Timers .....	1-11
Table 1-2.	Provisional Values for Level 3 Timers .....	1-12
Table 1-3.	Provisional Values for Signaling Link Test Timers .....	1-14
Table 1-4.	Provisional Values for SCCP Timers.....	1-14
Table 2-1.	Link Output Delay .....	2-15
Table A-1.	Signal Unit Formats .....	A-1
Table A-2.	Routing Label Format .....	A-4
Table A-3.	Signaling Network Management Message Format.....	A-5
Table A-4.	Changeover Signaling Information Format.....	A-7
Table A-5.	Emergency Changeover Signaling Information Format.....	A-7
Table A-6.	Changeback Signaling Information Format .....	A-8
Table A-7.	Management Inhibit Signaling Information Format.....	A-9
Table A-8.	Management Inhibit Signaling Information Format.....	A-10
Table A-9.	Signaling-Route-Set-Test Signaling Information Format.....	A-10
Table A-10.	Transfer Controlled Signaling Information Format.....	A-11
Table A-11.	Signaling-Route-Set-Congestion-Test Signaling Information Format .....	A-12
Table A-12.	Traffic Restart Signaling Information Format .....	A-12
Table A-13.	Link Test Message Signaling Information Format .....	A-13
Table A-14.	User Part Unavailable Information Format .....	A-14
Table A-15.	Circuit-Related Message Format .....	A-16
Table A-16.	Example of the SCCP Information for Messages Without GTT .....	A-19
Table A-17.	Example of SCCP Information for Messages Before GTT .....	A-23
Table A-18.	Example of SCCP Information for XUDT Message Before GTT....	A-26
Table A-19.	SCCP Intermediate Network Selection Parameter .....	A-28
Table A-20.	SCCP Connectionless Segmentation Parameter .....	A-30
Table A-21.	Initial TCAP Message Request Primitive .....	A-31
Table A-22.	Subsequent TCAP Message Request Primitive .....	A-32
Table A-23.	TCAP Message Failure Primitive.....	A-32
Table A-24.	N-Unitdata Indication Primitive .....	A-32
Table A-25.	N-Notice Indication Primitive.....	A-33
Table A-26.	SCCP Management Message Signaling Information .....	A-36
Table A-27.	Unitdata Service Message Format .....	A-39
Table A-28.	Extended Unitdata Service Message Format.....	A-42