INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.2119

(07/96)

SERIES Q: SWITCHING AND SIGNALLING

Broadband ISDN – ATM adaptation layer

B-ISDN ATM adaptation layer – Convergence function for SSCOP above the frame relay core service

ITU-T Recommendation Q.2119

(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
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATION 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
General aspects	Q.2000–Q.2099
ATM adaptation layer	**Q.2100–Q.2199**
Signalling network protocols	Q.2200–Q.2599
Common aspects of B-ISDN application protocols for access signalling and network signalling and interworking	Q.2600–Q.2699
B-ISDN application protocols of the network	Q.2700–Q.2899
B-ISDN application protocols for access signalling	Q.2900–Q.2999

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

ITU-T RECOMMENDATION Q.2119

B-ISDN ATM ADAPTATION LAYER – CONVERGENCE FUNCTION FOR SSCOP ABOVE THE FRAME RELAY CORE SERVICE

Summary

This Recommendation specifies a mapping function that allows B-ISDN data communications applications utilizing protocol stacks which include SSCOP (Recommendation Q.2110) also to be deployed in an HDLC-based environment. The required mapping function is called "convergence function for SSCOP above the frame relay core service".

This Recommendation makes use of the fact that the subset of services provided by AAL type 5 (Recommendation I.363.5) that SSCOP uses can also be provided by the services of the core service for the frame mode bearer services (Annex A/Q.922).

This Recommendation also provides, in Annex A, suggested parameter values for use in support of SS No. 7 applications. Such an arrangement would allow one approach to a migration from N-ISDN to B-ISDN.

This Recommendation is applicable to equipment to be attached to a frame relay network when protocol stacks developed for a B-ISDN environment are deployed in a narrow-band environment.

Source

ITU-T Recommendation Q.2119 was prepared by ITU-T Study Group 11 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 9th of July 1996.

Keywords

AAL, B-ISDN, frame relay, N-ISDN, SSCOP and SS No. 7

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 expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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/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.

CONTENTS

Recommendation Q.2119

B-ISDN ATM ADAPTATION LAYER – CONVERGENCE FUNCTION FOR SSCOP ABOVE THE FRAME RELAY CORE SERVICE

(Geneva, 1996)

1 Scope

This Recommendation specifies a function that allows B-ISDN data communication applications utilizing protocol stacks which include SSCOP [3] also to be deployed in an HDLC-based environment. The required mapping function specified in this Recommendation is called "convergence function for SSCOP above the frame relay core service".

This Recommendation makes use of the fact that SSCOP uses only a subset of the services offered by the preferred underlying (sub)layer, the AAL type 5 [1]. This particular service subset can also be derived as a subset from the service of the core service for the frame mode bearer service as specified in Annex A/Q.922 [2].

This Recommendation is applicable to equipment to be attached to a frame relay network when protocol stacks developed for a B-ISDN environment are deployed in a narrow-band environment. If this Recommendation is applied to signalling at a B-ISDN Network Node Interface (NNI), Annex A specifies further restrictions on the use of the frame relay core service.

2 Normative references

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

[1] ITU-T Recommendation I.363 (1993), *B-ISDN ATM Adaptation Layer (AAL) specification.*

[2] CCITT Recommendation Q.922 (1992), *ISDN data link layer specification for frame mode bearer services.*

[3] ITU-T Recommendation Q.2110 (1994), *B-ISDN signalling ATM Adaptation – Service Specific Connection Oriented Protocol (SSCOP).*

[4] ITU-T Recommendation X.200 (1994), *Information technology – Open Systems Interconnection – Basic reference model: The basic model.*

[5] ITU-T Recommendation X.210 (1993), *Information technology – Open Systems Interconnection – Basic reference model: Conventions for the definition of OSI Services.*

[6] ITU-T Recommendation I.365.1 (1993), *B-ISDN ATM adaptation layer sublayers: Frame Relaying Service Specific Conversion Sublayer (FR-SSCS).*

[7] CCITT Recommendation I.233.1 (1991), *Frame mode bearer services: ISDN – Frame relaying bearer service.*

[8] ITU-T Recommendation X.263 (1995) | ISO/IEC TR 9577: 1996, *Information technology – Protocol identification in the Network Layer*.

[9] ITU-T Recommendation Q.704 (1996), *Signalling network functions and messages.*

3 Definitions

The term "frame relay core service" refers to the core aspects of the frame relaying bearer service (see Annex A/Q.922 [2]). Otherwise, this Recommendation introduces no new terms beyond the ones defined in Recommendations Q.2110 [3] and Q.922 [2]. As in those Recommendations, extensive use is made of the layering concepts defined in Recommendation X.200 [4] and the service primitive concepts defined in Recommendation X.210 [5].

4 Abbreviations

This Recommendation uses the following abbreviations.

AAL	ATM Adaptation Layer
ATM	Asynchronous Transfer Mode
CP	Common Part
CPCS	Common Part Convergence Sublayer
CPCS-CI	CPCS-Congestion Indication
CPCS-LP	CPCS-Loss Priority
CPCS-UU	CPCS-User-to-User-Indication
DLCI	Data Link Connection Identifier
HDLC	High-level Data Link Control
IPI	Initial Protocol Identifier
PCI	Protocol Control Information
PDU	Protocol Data Unit
SAAL	AAL for Signalling
SAP	Service Access Point
SS No. 7	Signalling System No. 7
SSCOP	Service Specific Connection-Oriented Protocol

5 General description

The convergence function for SSCOP above the frame relay core service provides for the possibility, to deploy SSCOP (Recommendation Q.2110 [3]) on top of the frame relay core service. The frame relay core service is implemented as frame relay services utilizing the protocol according to Annex A/Q.922 [2] (used on leased lines or narrow-band ISDN) or utilizing the protocol according to Recommendation I.365.1 [6] (as an AAL type 5 on B-ISDN).

All protocol stacks that include SSCOP can, therefore, also be used in a frame relay environment (see Figure 1). For an intermediate period of time, a particular application of this Recommendation is in a protocol stack for SS No. 7 signalling. This option is defined further in Annex A.

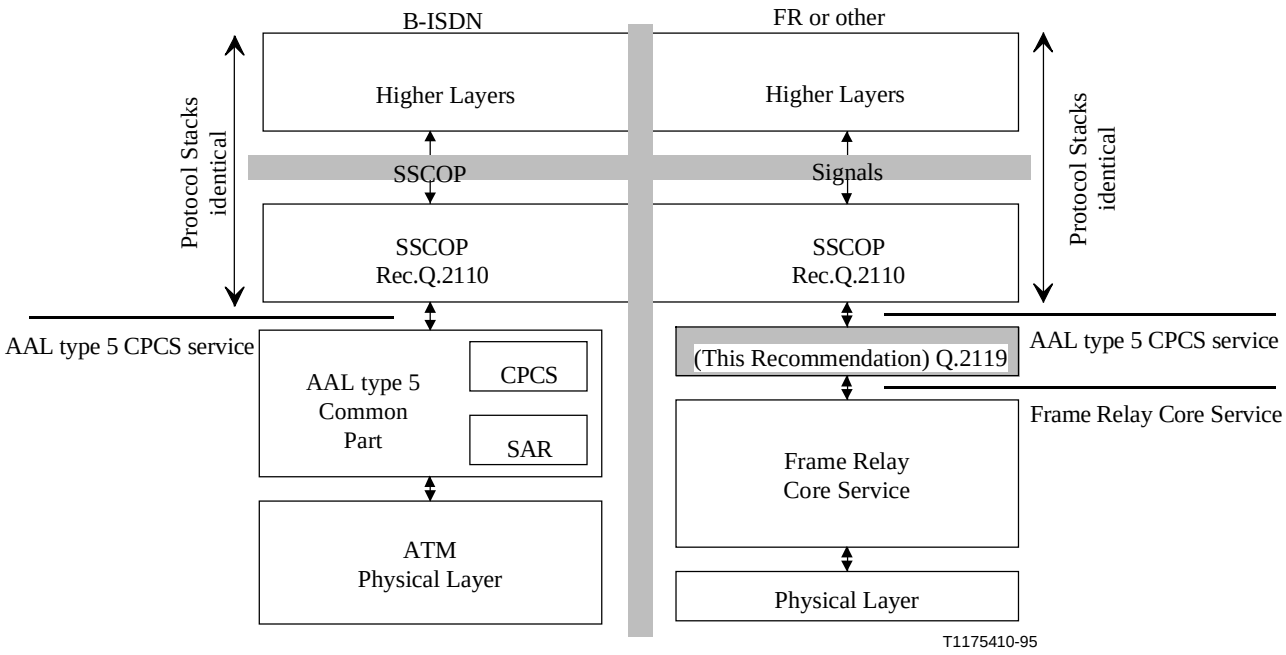


Figure 1/Q.2119 – Environment for the convergence function for SSCOP above the frame relay core service

6 Functions of the convergence function

The purpose of the convergence function is to map SSCOP signals that use a subset of the AAL type 5 Common Part Convergence Sublayer (CPCS) service into a subset of the frame relay core service. In addition, a protocol identifier is added at the beginning of the frame relay core service PDU as is customarily done in the frame relay environment.

7 Specification of the convergence function

7.1 The CPCS service of the AAL type 5

The CPCS service of the AAL type 5 is defined in clause 6/I.363 [1]. Table 1 summarizes the primitives and parameters in the AAL type 5 CPCS service. Where there are differences between the definitions in this Recommendation and those in Recommendation I.363, the one in Recommendation I.363 is definitive.

SSCOP (Recommendation Q.2110) defines the use of the parameters as follows:

Table 1/Q.2119 – AAL type 5 CPCS service primitives and parameters

	CPCS-UNITDATA.invoke	CPCS-UNITDATA.signal
Interface Data (ID)	X	X
More (M) (Note 1)	-	-
CPCS-Loss Priority (CPCS-LP)	X	X
CPCS-Congestion-Indication (CPCS-CI)	X	X
CPCS-User-to-User-Indication (CPCS-UU)	X	X
Reception Status (RS) (Note 2)	-	-

NOTE 1 – Not present in message mode.

NOTE 2 – Not present as the corrupted data delivery option is not utilized.

- Only message mode is utilized.
- The CPCS-LP parameter is set to "0" at the transmitter and ignored at the receiver.
- The CPCS-CI parameter is set to "0" at the transmitter and its use by the receiver is for further study.
- The CPCS-UU parameter is set to "0" at the transmitter and ignored at the receiver.
- The corrupted data delivery option is not utilized.

7.2 The core service of the frame mode bearer service

The frame relay core service is defined in Annex A/Q.922 [2] and in Annex D/I.233.1 [7]. Table 2 summarizes the primitives and parameters in the frame relay core service. Where there are differences between the definitions in this Recommendation and those in Recommendation Q.922 or I.233.1, the one in Recommendation Q.922 is definitive.

Table 2/Q.2119 – Core service primitives and parameters

	Core-DATA.request	Core-DATA.indication
Core-user-data	X	X
Discard eligibility (optional)	X	-
Congestion encountered backward (optional)	-	X
Congestion encountered forward (optional)	-	X
Core service user protocol control information	X	X

7.3 PDU format

SSCOP PDUs are prepended with two octets of PCI information. This is required to carry the protocol identifier; this situation is depicted in Figure 2. The coding of these two octets is as follows:

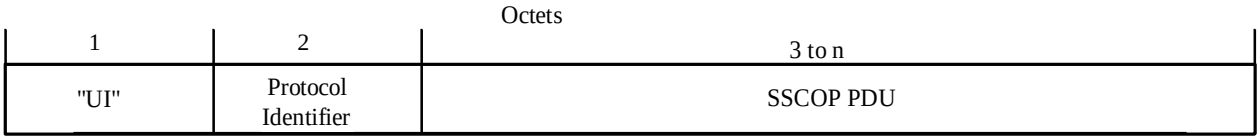
1) *Octet 1: Unnumbered Information "UI"*

   This octet shall be coded as $0000\text{-}0011_{2.}$

2) *Octet 2: Protocol identifier*

   This octet contains an Initial Protocol Identifier (IPI) and shall be coded as $0000\text{-}1010_2$ (this value is specified in ITU-T Rec. X.263 | ISO/IEC TR 9577 [8]).

NOTE – Discussion of the impact of 32-bit alignment in SSCOP on the DL-CORE-DATA-PDU format can be found in Appendix I.



T1175420-95

Figure 2/Q.2119 – PDU format to embed an SSCOP PDU in a frame relay SDU

7.4 Mapping the AAL type 5 CPCS signal into the frame relay core service primitives (transmitter)

As shown in Figure 3, upon receipt of a CPCS-UNITDATA.invoke signal from SSCOP, a DL-CORE-DATA.request primitive is formed with the parameters noted below and submitted to the frame relay core service:

a) The "core-user-data" parameter is formed as specified in 7.3 using the "interface data" parameter of the CPCS-UNITDATA.invoke signal (SSCOP PDU).

b) The "discard eligibility" parameter is set to "0".

c) The "core service user protocol control information" parameter is set to "0".

7.5 Mapping the frame relay core service primitives into the AAL type 5 CPCS signal (receiver)

As shown in Figure 3, upon receipt of a DL-CORE-DATA.indication primitive from the frame relay core service, a CPCS-UNITDATA.signal signal is formed with the parameters noted below and sent to SSCOP:

a) The "interface data" parameter is set to the value of the SSCOP PDU field of the "core-user-data" parameter of the DL-CORE-DATA.indication primitive (see 7.3).

b) The "CPCS-loss priority" parameter is set to "0".

c) The "CPCS-congestion indication" parameter is set to "0"; whether a mapping from the "congestion encountered forward" parameter of the DL-CORE-DATA.indication primitive is performed in some situations is for further study.

d) The "CPCS-user-to-user-indication" parameter is set to "0".

7.6 Layer management

There are no interactions with layer management defined. Interactions to report the values of the congestion management parameters of the frame relay core service are for further study.

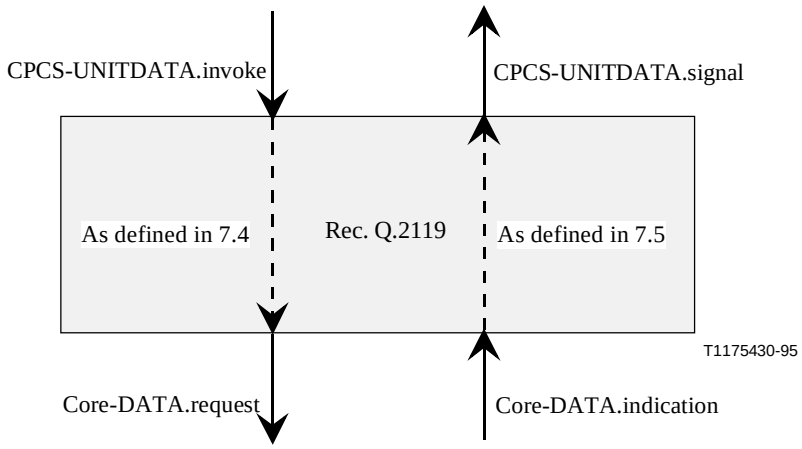


Figure 3/Q.2119 – Relationship of AAL type 5 CPCS signals and frame relay core service primitives

ANNEX A

Use of the frame relay core service for SS No. 7 signalling links at the NNI

This Annex specifies constraints on the values of frame relay and SSCOP parameters if this Recommendation is used for a signalling link at an NNI. The protocol stack applied in this use is shown in Figure A.1.

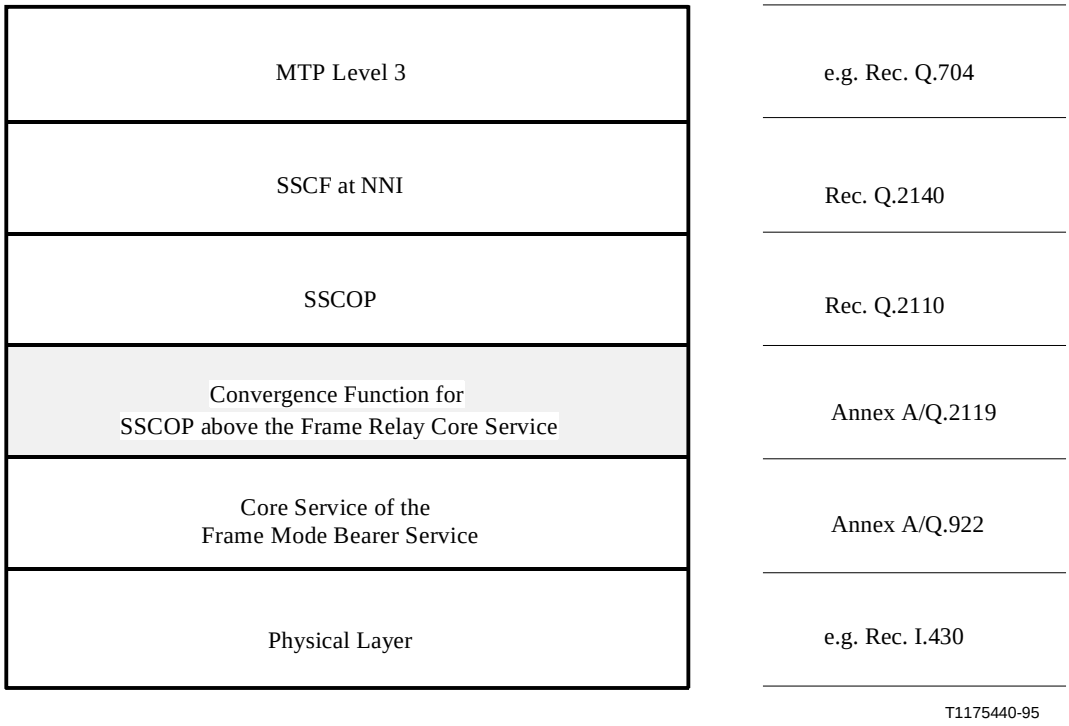


Figure A.1/Q.2119 – Example C-plane protocol stack using Q.2119 to support SS No. 7 signalling applications

A.1 Configuration

SS No. 7 signalling links that utilize a protocol stack including Recommendations Q.2119, Q.2110 and Q.2140 are deployed on a single "physical layer" end-to-end connection. For this application of Q.2119, a constraint is placed on the configuration such that the functionality of a frame relay network with multiplexing at the layer 2 of traffic directed to different destinations is not used.

A.2 Address field format

The default two-octet Data Link Connection Identifier (DLCI) format shall be used. By bilateral agreement, other DLCI formats may be used.

A.3 DLCI value

The decimal value 256 is assigned to the Data Link Connection Identifier (DLCI). By bilateral agreement, other values may be used.

A.4 Frame relay management procedures

Neither the consolidated link layer management procedures (Annex A/Q.922 [2]) nor the permanent virtual connection management procedures (Annex A/Q.933) shall be used.

A.5 Congestion control

No frame mode bearer service congestion control procedures shall be used.

A.6 Maximum PDU length

All networks shall support a default maximum length of the SSCOP information field (parameter "k" in Recommendation Q.2110) equal to 272 octets. Additional values for the maximum length of the SSCOP information field may be used upon bilateral agreement.

NOTE – The default maximum length SSCOP PDU is composed of a 272 octet SSCOP SDU (sized to contain an MTP-3 peer-to-peer message defined in Recommendation Q.704 [9]) and 4 octets of SSCOP PCI.

APPENDIX I

Impact of 32-bit alignment in SSCOP on the DL-CORE-DATA-PDU format

SSCOP is designed for a 32-bit environment; hence, its PDUs are designed to be aligned at 32-bit boundaries. If a default DLCI field length of two octets is used, the aligned structure is as shown in Figure I.1. With DLCI fields larger than two octets, i.e. three or four octets, the 32-bit alignment for the SSCOP PDUs can be achieved by putting the start of the DLCI other than at a 32-bit boundary as shown in Figures I.2 and I.3. As the HDLC environment of the frame relay core service of the frame mode bearer service is octet oriented, the beginning of the DLCI field need not be 32-bit aligned.

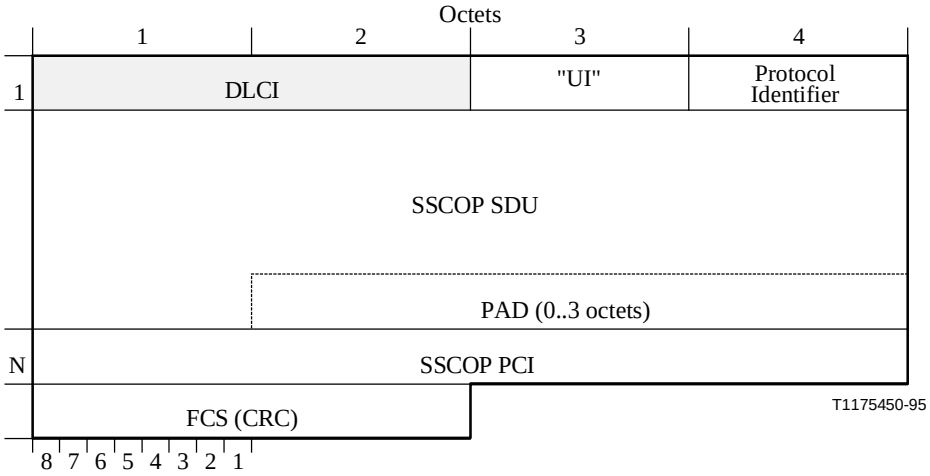


Figure I.1/Q.2119 – Typical SSCOP PDU embedded in a frame relay PDU when a 2-octet DLCI is used

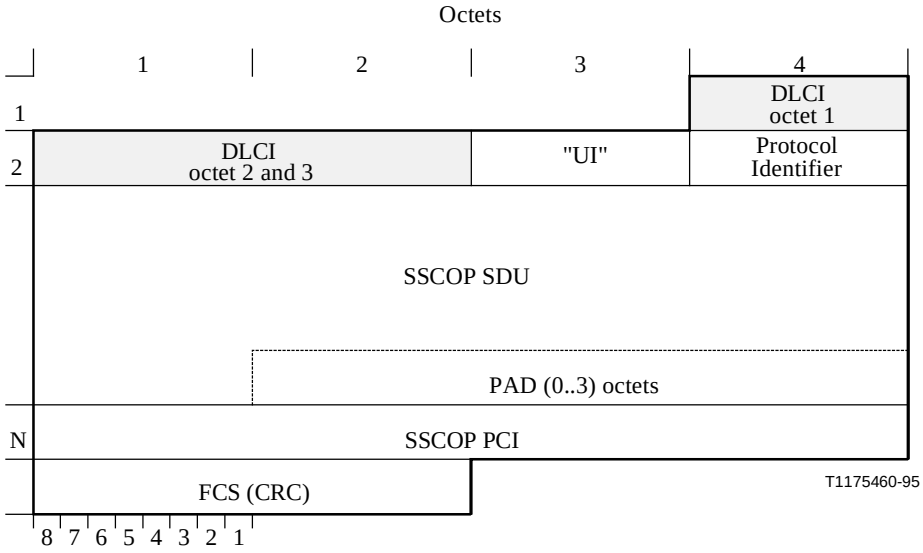


Figure I.2/Q.2119 – Typical SSCOP PDU embedded in a frame relay PDU when a 3-octet DLCI is used

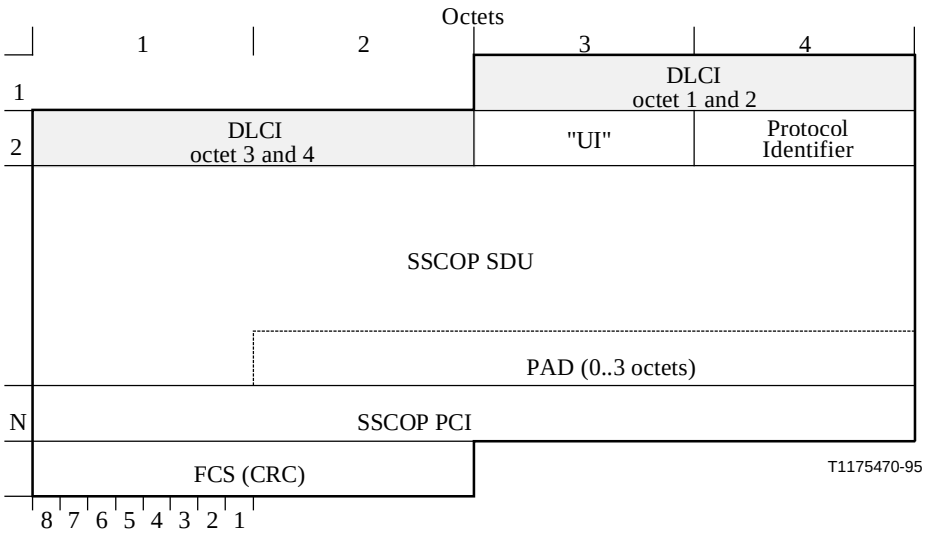


Figure I.3/Q.2119 – Typical SSCOP PDU embedded in a frame relay PDU when a 4-octet DLCI is used

ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Telephone network and ISDN
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media
Series H	Transmission of non-telephone signals
Series I	Integrated services digital network
Series J	Transmission of sound-programme and television signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	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
Series Q	**Switching and signalling**
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminal equipments and protocols for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communication
Series Z	Programming languages