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SPECIFICATIONS OF SIGNALLING SYSTEM No. 7

SIGNALLING SYSTEM No. 7 – SCCP FORMATS AND CODES

ITU-T Recommendation Q.713

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. 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, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation Q.713 was revised by the ITU-T Study Group XI (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 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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SIGNALLING SYSTEM No. 7 – SCCP FORMATS AND CODES

(Malaga-Torremolinos, 1984; modified at Helsinki, 1993)

1 General

The Signalling Connection Control Part (SCCP) messages are carried on the signalling data link by means of Signal Units the format of which is described in 2.2/Q.703.

The Service Information Octet format and coding is described in 14.2/Q.704. The Service Indicator is coded 0011 for the SCCP.

The Signalling Information Field (SIF) of each Message Signal Unit containing an SCCP message consists of an integral number of octets.

A message consists of the following parts (see Figure 1):

- the routing label;
- the message type code;
- the mandatory fixed part;
- the mandatory variable part;
- the optional part, which may contain fixed length and variable length fields.

The description of the various parts is contained in the following clauses. SCCP Management messages and codes are provided in clause 5.

1.1 Routing label

The standard routing label specified in 2.2/Q.704 is used. The rules for the generation of the Signalling Link Selection (SLS) code are described in 2.2.1/Q.711.

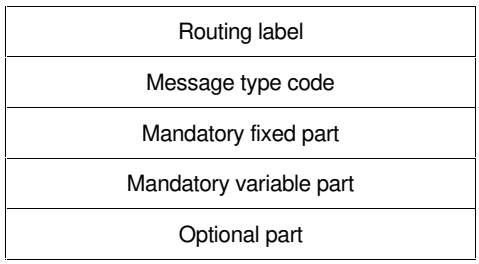

FIGURE 1/Q.713

General layout

1.2 Message type code

The message type code consists of a one octet field, and is mandatory for all messages. The message type code uniquely defines the function and format of each SCCP message. The allocation of message type codes, with reference to the appropriate descriptive clause of this Recommendation is summarized in Table 1. Table 1 also contains an indication of the applicability of the various message types to the relevant classes of protocol.

TABLE 1/Q.713

SCCP message types

Message type	Classes				Reference (subclause)	Code
	0	1	2	3		
CR Connection Request			X	X	4.2	0000 0001
CC Connection Confirm			X	X	4.3	0000 0010
CREF Connection Refused			X	X	4.4	0000 0011
RLSD Released			X	X	4.5	0000 0100
RLC Release Complete			X	X	4.6	0000 0101
DT1 Data Form 1			X		4.7	0000 0110
DT2 Data Form 2				X	4.8	0000 0111
AK Data Acknowledgement				X	4.9	0000 1000
UDT Unitdata	X	X			4.10	0000 1001
UDTS Unitdata Service	X	X			4.11	0000 1010
ED Expedited Data				X	4.12	0000 1011
EA Expedited Data Acknowledgement				X	4.13	0000 1100
RSR Reset Request				X	4.14	0000 1101
RSC Reset Confirm				X	4.15	0000 1110
ERR Protocol Data Unit Error			X	X	4.16	0000 1111
IT Inactivity Test			X	X	4.17	0001 0000
XUDT Extended Unitdata	X	X			4.18	0001 0001
XUDTS Extended Unitdata Service	X	X			4.19	0001 0010
X Type of message in this protocol class.						

1.3 Formatting principles

Each message consists of a number of parameters listed and described in clause 3. Each parameter has a “name” which is coded as a single octet (see clause 3). The length of a parameter may be fixed or variable, and a “length indicator” of one octet for each parameter may be included as described below.

The detailed format is uniquely defined for each message type as described in clause 4.

A general SCCP message format is shown in Figure 2.

1.4 Mandatory fixed part

Those parameters that are mandatory and of fixed length for a particular message type will be contained in the mandatory fixed part. The position, length and order of the parameters is uniquely defined by the message type. Thus the names of the parameters and the length indicators are not included in the message.

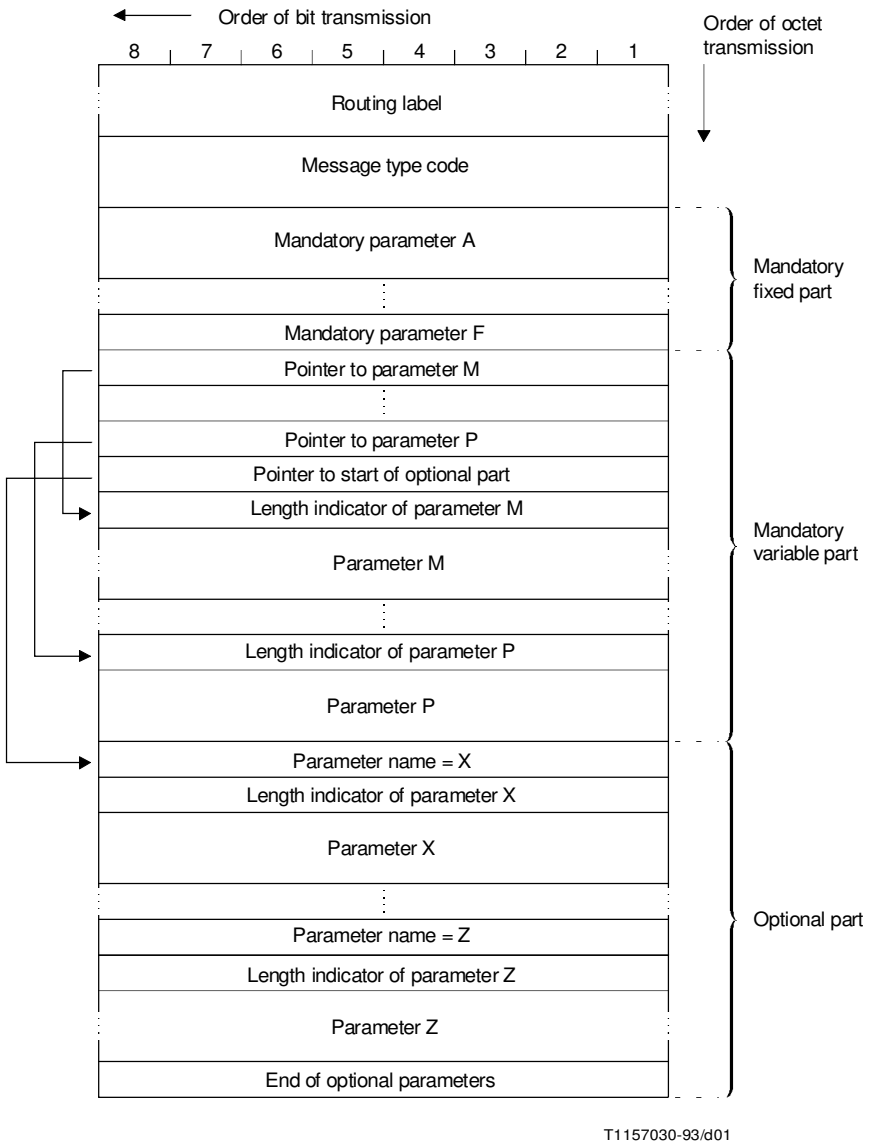

FIGURE 2/Q.713

General SCCP message format

1.5 Mandatory variable part

Mandatory parameters of variable length will be included in the mandatory variable part. The name of each parameter and the order in which the pointers are sent is implicit in the message type. Parameter names are, therefore, not included in the message. A pointer is used to indicate the beginning of each parameter. Because of this, parameters may be sent in an order different from that of the pointers. Each pointer is encoded as a single octet. The details of how pointers are encoded is found in 2.3. The number of parameters, and thus the number of pointers is uniquely defined by the message type.

A pointer is also included to indicate the beginning of the optional part. If the message type indicates that no optional part is allowed, then this pointer will not be present. If the message type indicates that an optional part is possible, but there is no optional part included in this particular message, then a pointer field containing all zeros will be used.

All the pointers are sent consecutively at the beginning of the mandatory variable part. Each parameter contains the parameter length indicator followed by the contents of the parameter.

1.6 Optional part

The optional part consists of parameters that may or may not occur in any particular message type. Both fixed length and variable length parameters may be included. Optional parameters may be transmitted in any order[1]. Each optional parameter will include the parameter name (one octet) and the length indicator (one octet) followed by the parameter contents.

1.7 End of optional parameters octet

After all optional parameters have been sent, an end of optional parameters octet containing all zeros will be transmitted. This octet is only included if optional parameters are present in the message.

1.8 Order of transmission

Since all the parameters consist of an integral number of octets, the formats are presented as a stack of octets. The first octet transmitted is the one shown at the top of the stack and the last is the one at the bottom (see Figure 2).

Within each octet, the bits are transmitted with the least significant bit first.

1.9 Coding of spare bits

According to the general rules defined in Recommendation Q.700, spare bits are coded 0 unless indicated otherwise at the originating nodes. At intermediate nodes, they are passed transparently. At destination nodes, they need not be examined.

1.10 National message types and parameters

If message type codes and parameter codes are required for national uses, it is suggested that the codes be selected from the highest code downwards, that is starting at code 11111110. Code 11111111 is reserved for future use.

2 Coding of the general parts

2.1 Coding of the message type

The coding of the message is shown in Table 1.

2.2 Coding of the length indicator

The length indicator field is binary coded to indicate the number of octets in the parameter content field. The length indicator does not include the parameter name octet or the length indicator octet.

2.3 Coding of the pointers

The pointer value (in binary) gives the number of octets between the pointer itself (included) and the first octet (not included) of the parameter associated with that pointer[2].

The pointer value all zeros is used to indicate that, in the case of optional parameters, no optional parameter is present.

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1) It is for further study if any constraint in the order of transmission will be introduced.

2) For example, a pointer value of "00000001" indicates that the associated parameter begins in the octet immediately following the pointer. A pointer value of "00001010" indicates that nine octets of information exist between the pointer octet and the first octet of the parameter associated with that pointer.

3 SCCP parameters

The parameter name codes are given in Table 2 with reference to the subclauses in which they are described.

TABLE 2/Q.713

SCCP parameter name codes

Parameter name	Reference (Subclause)	Parameter name code 8765 4321
End of optional parameters	3.1	0000 0000
Destination local reference	3.2	0000 0001
Source local reference	3.3	0000 0010
Called party address	3.4	0000 0011
Calling party address	3.5	0000 0100
Protocol class	3.6	0000 0101
Segmenting/reassembling	3.7	0000 0110
Receive sequence number	3.8	0000 0111
Sequencing/segmenting	3.9	0000 1000
Credit	3.10	0000 1001
Release cause	3.11	0000 1010
Return cause	3.12	0000 1011
Reset cause	3.13	0000 1100
Error cause	3.14	0000 1101
Refusal cause	3.15	0000 1110
Data	3.16	0000 1111
Segmentation	3.17	0001 0000
Hop counter	3.18	0001 0001

3.1 End of optional parameters

The “end of optional parameters” parameter field consists of a single octet containing all zeros.

3.2 Destination local reference

The “destination local reference” parameter field is a three-octet field containing a reference number which, in outgoing messages, has been allocated to the connection section by the remote node.

The coding “all ones” is reserved, its use is for further study.

3.3 Source local reference

The “source local reference” parameter field is a three-octet field containing a reference number which is generated and used by the local node to identify the connection section.

The coding “all ones” is reserved, its use is for further study.

3.4 Called party address

The “called party address” is a variable length parameter. Its structure is shown in Figure 3.

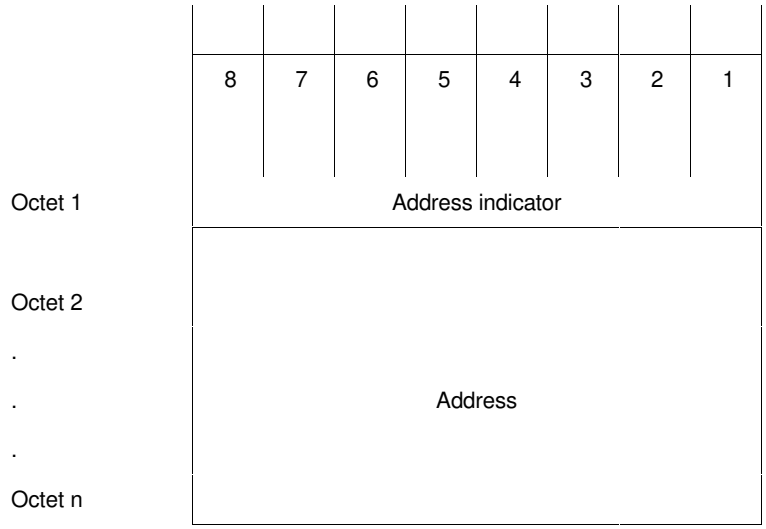

FIGURE 3/Q.713

Called/Calling party address

3.4.1 Address indicator

The “address indicator” indicates the type of address information contained in the address field (see Figure 4). The address consists of one or any combination of the following elements:

- signalling point code;
- global title (for instance, dialled digits);
- subsystem number.

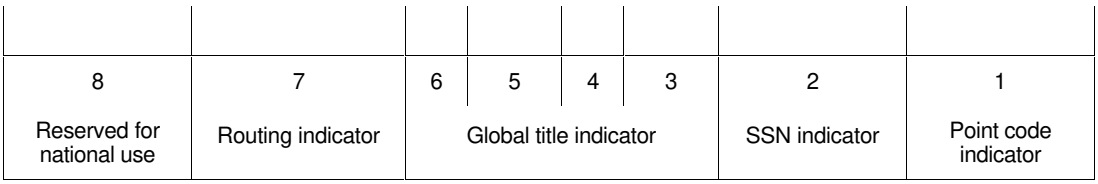

FIGURE 4/Q.713

Address indicator encoding

A “1” in bit 1 indicates that the address contains a signalling point code.

A “1” in bit 2 indicates that the address contains a subsystem number.

Bits 3 - 6 of the address indicator octet contain the global title indicator, which is encoded as follows:

Bits 6543	
0000	No global title included
0001	Global title includes nature of address indicator only
0010	Global title includes translation type only[3)]
0011	Global title includes translation type, numbering plan and encoding scheme[3)]
0100	Global title includes translation type, numbering plan, encoding scheme and nature of address indicator
0101 to 0111	Spare international
1000 to 1110	Spare national
1111	Reserved for extension

When a global title is used in the called party address, it is suggested that the called party address contain a subsystem number. This serves to simplify message reformatting following global title translation. The subsystem number should be encoded "00000000" when the subsystem number is not known, e.g. before translation.

Bit 7 of the address indicator octet contains routing information identifying which address element should be used for routing.

A "0" in bit 7 indicates that routing should be based on the global title in the address.

A "1" in bit 7 indicates that routing should be based on the destination point code in the MTP routing label and the subsystem number information in the called party address.

Bit 8 of the address indicator octet is designated for national use.

3.4.2 Address

The various elements, when provided, occur in the order: point code, subsystem number, global title, as shown in Figure 5.

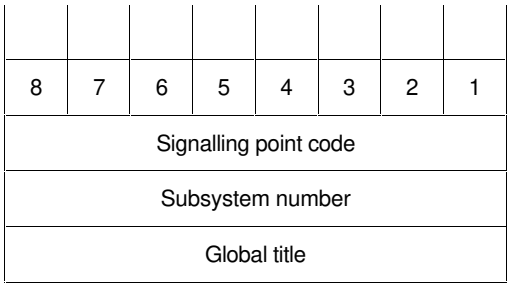

FIGURE 5/Q.713

Ordering of address elements

3) Full E.164 numbering plan address is used in these two cases for Recommendation E.164 based global titles.

3.4.2.1 Signalling point code

The signalling point code, when provided, is represented by two octets. Bits 7 and 8 in the second octet are set to zero (see Figure 6).

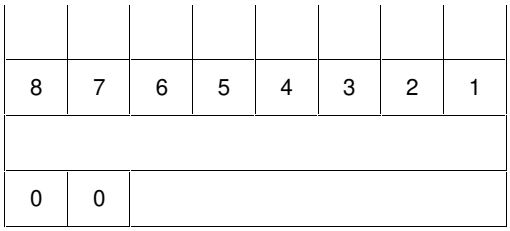

FIGURE 6/Q.713

Signalling point code encoding

3.4.2.2 Subsystem number

The subsystem number (SSN) identifies an SCCP user function and, when provided, consists of one octet coded as follows:

Bits 87654321	
00000000	SSN not known/not used
00000001	SCCP management
00000010	Reserved for CCITT allocation
00000011	ISDN user part
00000100	OMAP (Operation, Maintenance and Administration Part)
00000101	MAP (Mobile Application Part)
00000110	HLR (Home Location Register)
00000111	VLR (Visitor Location Register)
00001000	MSC (Mobile Switching Centre)
00001001	EIC (Equipment Identifier Centre)
00001010	AUC (Authentication Centre)
00001011 to 11111110	Spare
11111111	Reserved for expansion

Network specific subsystem numbers should be assigned in descending order starting with "11111110".

3.4.2.3 Global title[4)]

The format of the global title is of variable length. Figures 7, 9, 10 and 11 show four possible formats for global title.

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4) Incorporation of NSAP address in the SCCP global title is for further study.

3.4.2.3.1 Global title indicator = 0001

See Figure 7.

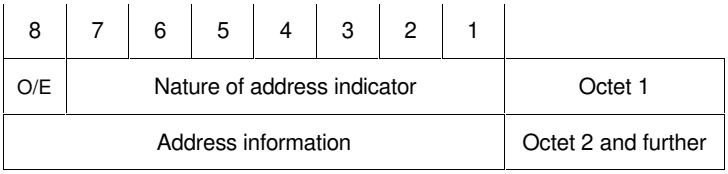

FIGURE 7/Q.713

Global title format for indicator 0001

Bits 1 to 7 of octet 1 contain the nature of address indicator and are coded as follows:

Bits 7654321

0000000	Spare
0000001	Subscriber number
0000010	Reserved for national use
0000011	National significant number
0000100	International number
0000101 to 1111111	Spare

Bit 8 of octet 1 contains the odd/even indicator and is coded as follows:

Bit 8

0 Even number of address signals

1 Odd number of address signals

The octets 2 and further contain a number of address signals and possibly a filler as shown in Figure 8.

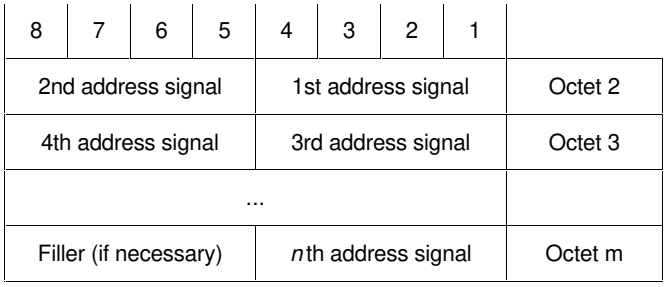

FIGURE 8/Q.713

Address information

Each address signal is coded as follows:

0000	digit 0
0001	digit 1
0010	digit 2
0011	digit 3
0100	digit 4
0101	digit 5
0110	digit 6
0111	digit 7
1000	digit 8
1001	digit 9
1010	Spare
1011	Code 11[5)]
1100	Code 12[5)]
1101	Spare
1110	Spare
1111	ST[5)]

In case of an odd number of address signals, a filler code 0000 is inserted after the last address signal.

3.4.2.3.2 Global title indicator = 0010

Figure 9 shows the format of the global title, if the global title indicator equals "0010".

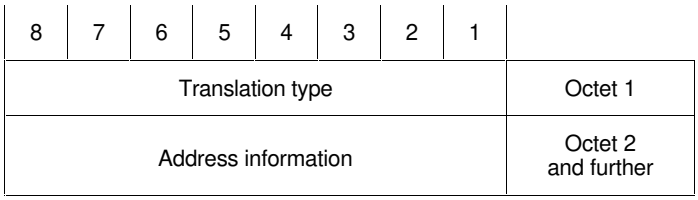

FIGURE 9/Q.713

Global title format for indicator 0010

The translation type is a one-octet field that is used to direct the message to the appropriate global title translation function[6)]. Thus, it may be possible for the address information to be translated into different values for and different combinations of DPCs, SSNs and GTs.

This octet will be coded "00000000" when not used. Translation types for internetwork services will be assigned in ascending order starting with 00000001". Translation types for network specific services will be assigned in descending order starting with "11111110". The code "11111111" is reserved for expansion. However, the exact coding of translation types in the international network is for further study. Additional requirements may be placed on this field as a result of further work on Transaction Capabilities and the ISDN User Part.

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5) The application of these codes in actual networks is for further study.

6) A translation type may for instance imply a specific service to be provided by the SCCP user, such as free phone number translation, or identify the category of service to be provided, for example, dialed number screening, password validation or transmission of digits to telephone network address.

In the case of this global title format (0010), the translation type may also imply the encoding scheme, used to encode the address information and the numbering plan.

3.4.2.3.3 Global title indicator = 0011

See Figure 10.

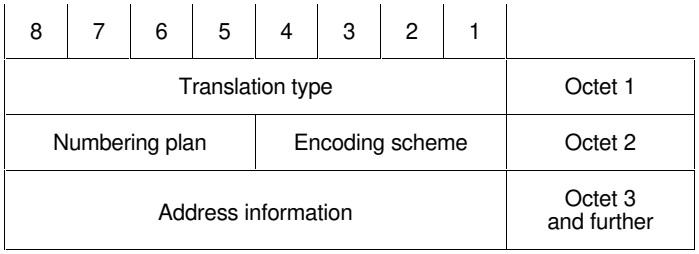


FIGURE 10/Q.713

Global title format for indicator 0011

The translation type is as described in 3.4.2.3.2.

The numbering plan is encoded as follows[7]:

Bits 8765	
0000	Unknown
0001	ISDN/Telephony Numbering Plan (see Recommendations E.163 and E.164)
0010	Spare
0011	Data Numbering Plan (Recommendation X.121)
0100	Telex Numbering Plan (Recommendation F.69)
0101	Maritime Mobile Numbering Plan (Recommendations E.210 and E.211)
0110	Land Mobile Numbering Plan (Recommendation E.212)
0111	ISDN/Mobile Numbering Plan (Recommendation E.214)
1000 to 1110	Spare
1111	Reserved

The encoding scheme is encoded as follows:

Bits 4321	
0000	Unknown
0001	BCD, odd number of digits
0010	BCD, even number of digits
0011 to 1110	Spare
1111	Reserved

7) The support of all numbering plans is not mandatory.

If the encoding scheme is binary coded decimal, the global title value, starting from octet 3, is encoded as shown in Figure 8.

3.4.2.3.4 Global title indicator = 0100

See Figure 11.

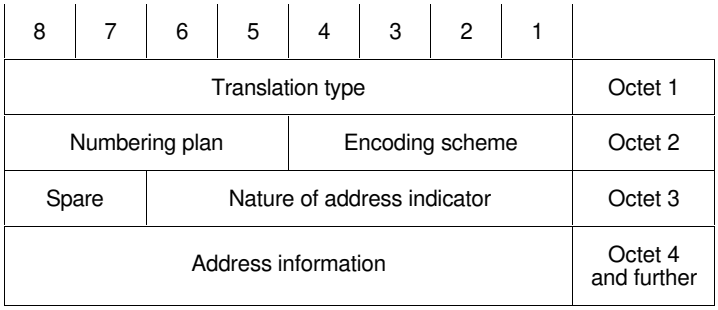


FIGURE 11/Q.713

Global title format for indicator 0100

The field "translation type" is as described in 3.4.2.3.2. The fields "numbering plan" and "encoding scheme" are as described in 3.4.2.3.3. The field "nature of address indicator" is as described in 3.4.2.3.1.

If the encoding scheme is binary coded decimal, the global title value, starting from octet 4, is encoded as shown in Figure 8.

3.5 Calling party address

The "calling party address" is a variable length parameter. Its structure is the same as the "called party address".

An SCCP should be able to receive and/or transfer a connectionless message in which the calling party address parameter only consists of the address indicator octet, where bits 1 to 7 are coded all zeros.

However, it is recommended that the origination point does not code the calling party address octet where bits 1 to 7 are coded all zeros. It is recommended that further information (GT and/or SSN) should be provided.

3.6 Protocol class

The "protocol class" parameter field is a four bit field containing the protocol class.

Bits 1 - 4 are coded as follows:

4 3 2 1	
0 0 0 0	class 0
0 0 0 1	class 1
0 0 1 0	class 2
0 0 1 1	class 3

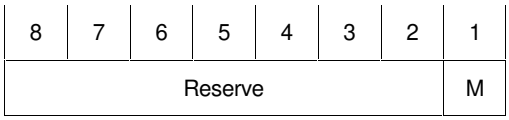
When bits 1 - 4 are coded to indicate a connection-oriented-protocol class (class 2, class 3), bits 5 - 8 are spare.

When bits 1 - 4 are coded to indicate a connectionless protocol class (class 0, class 1), bits 5 - 8 are used to specify message handling as follows:

Bits 8765	
0000	No special options
0001 to 0111	Spare
1000	Return message on error
1001 to 1111	Spare

3.7 Segmenting/reassembling

The "segmenting/reassembling" parameter field is a one octet field and is structured as follows:



Bits 8 - 2 are spare.

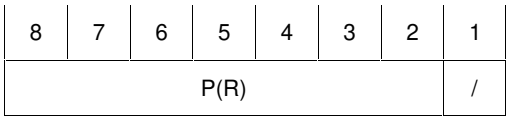
Bit 1 is used for the More Data indication and is coded as follows:

0 No more data

1 More data

3.8 Receive sequence number

The "receive sequence number" parameter field is a one octet field and is structured as follows:

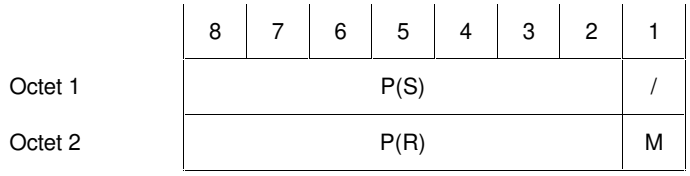


Bits 8 - 2 contain the receive sequence number P(R) used to indicate the sequence number of the next expected message. P(R) is binary coded and bit 2 is the LSB.

Bit 1 is spare.

3.9 Sequencing/segmenting

The sequencing/segmenting parameter field consists of two octets and is structured as follows:



Bits 8 - 2 of octet 1 are used for indicating the send sequence number P(S). P(S) is binary coded and bit 2 is the LSB.

Bit 1 of octet 1 is spare.

Bits 8 - 2 of octet 2 are used for indicating the receive sequence number P(R). P(R) is binary coded and bit 2 is the LSB.

Bit 1 of octet 2 is used for the More Data indication and is coded as follows:

0 No more data

1 More data

The sequencing/segmenting parameter field is used exclusively in protocol class 3.

3.10 Credit

The “credit” parameter field is a one octet field used in the protocol classes which include flow control functions. It contains the window size value coded in pure binary.

3.11 Release cause

The release cause parameter field is a one octet field containing the reason for the release of the connection.

The coding of the release cause field is as follows:

Bits 87654321

00000000	End user originated
00000001	End user congestion
00000010	End user failure
00000011	SCCP user originated
00000100	Remote procedure error
00000101	Inconsistent connection data
00000110	Access failure
00000111	Access congestion
00001000	Subsystem failure
00001001	Subsystem congestion[8)]

8) Subsystem congestion control procedure is for further study.

00001010	MTP failure
00001011	Network congestion
00001100	Expiration of reset timer
00001101	Expiration of receive inactivity timer
00001110	Not obtainable
00001111	Unqualified
00010000	SCCP failure
00010001 to 11111111	Spare

NOTE – A more comprehensive list of causes covering X.96 call progress information is for further study.

3.12 Return cause

In the *Unitdata Service* or Extended Unitdata Service message, the "return cause" parameter field is a one octet field containing the reason for message return. Bits 1 - 8 are coded as follows:

Bits 87654321

00000000	No translation for an address of such nature
00000001	No translation for this specific address
00000010	Subsystem congestion[8)]
00000011	Subsystem failure
00000100	Unequipped user
00000101	MTP failure
00000110	Network congestion
00000111	Unqualified
00001000	Error in message transport[a)]
00001001	Error in local processing[a)]
00001010	Destination cannot perform reassembly[a)]
00001011	SCCP failure
00010000 to 11111111	Spare

a) Only applicable to XUDTS message.

3.13 Reset cause

The "reset cause" parameter field is a one octet field containing the reason for the resetting of the connection.

The coding of the reset cause field is as follows:

Bits 87654321

00000000	End user originated
00000001	SCCP user originated
00000010	Message out of order – Incorrect P(S)

00000011	Message out of order – Incorrect P(R)
00000100	Remote procedure error – Message out of window
00000101	Remote procedure error – Incorrect P(S) after (re)initialization
00000110	Remote procedure error – General
00000111	Remote end user operational
00001000	Network operational
00001001	Access operational
00001010	Network congestion
00001011	Not obtainable
00001100	Unqualified
00001101 to 11111111	Spare

3.14 Error cause

The "error cause" parameter field is a one octet field containing the indication of the exact protocol error.

The coding of the error cause field is as follows:

Bits 87654321

00000000	Local reference number (LRN) mismatch – Unassigned destination LRN
00000001	Local reference number (LRN) mismatch – Inconsistent source LRN
00000010	Point code mismatch[9)]
00000011	Service class mismatch
00000100	Unqualified
00000101 to 11111111	Spare

3.15 Refusal cause

The refusal cause parameter field is a one octet field containing the reason for the refusal of the connection.

The coding of the refusal cause field is as follows:

Bits 87654321

00000000	End user originated
00000001	End user congestion
00000010	End user failure
00000011	SCCP user originated
00000100	Destination address unknown
00000101	Destination inaccessible
00000110	Network resource – QOS not available/non-transient
00000111	Network resource – QOS not available/transient

9) National option.

00001000	Access failure
00001001	Access congestion
00001010	Subsystem failure
00001011	Subsystem congestion[10)]
00001100	Expiration of the connection establishment timer
00001101	Incompatible user data
00001110	Not obtainable
00001111	Unqualified
00010000 to 11111111	Spare

NOTES

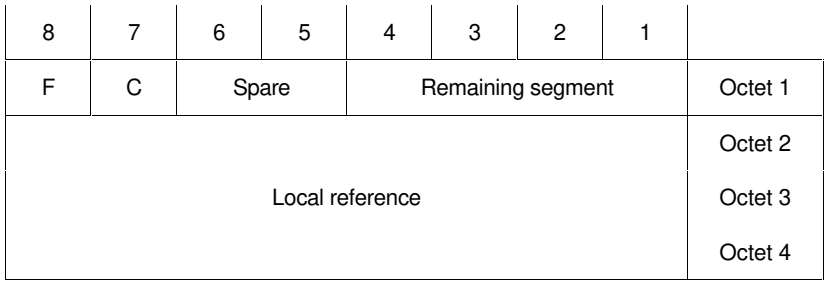
1 The inclusion of the routing failure causes as specified for the "return cause" parameter in 3.12 is for further study.

2 A more comprehensive list of causes covering Recommendation X.96 call progress information is for further study.

3.16 Data

The "data" parameter field is a variable length field containing SCCP-user data to be transferred transparently between the SCCP user functions.

3.17 Segmentation



Bit 8 of octet 1 is used for First segment indication and is coded as follows:

0 In all segments but the first

1 First segment

Bit 7 of octet 1 is used to keep in the message in sequence delivery option required by the SCCP user and is coded as follows:

0 Not in sequence delivery

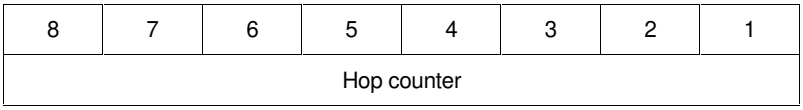
1 In sequence delivery

Bits 6 and 5 in octet 1 are spare bits.

Bits 4 - 1 of octet 1 are used to indicate the number of remaining segments. The values 0000 to 1111 are possible; the value 0000 indicates the last segment.

[10)] Subsystem congestion control procedure is for further study.

3.18 Hop counter



The hop counter parameter consists of one octet. The value of the hop counter, which is decremented on each global title translation, should be in range 15 to 1.

4 SCCP messages and codes

4.1 General

4.1.1 In the following subclauses, the format and coding of the SCCP messages is specified.

For each message a list of the relevant parameters is given in a tabular form.

4.1.2 For each parameter, the table also includes:

- a *reference* to the subclause where the formatting and coding of the parameter content is specified;
- the *type* of the parameter – The following types are used in the tables:

  F Mandatory fixed length parameter;

  V Mandatory variable length parameter;

  O Optional parameter of fixed or variable length;
- the *length* of the parameter – The value in the table includes:
  - for *type F parameters* the length, in octets, of the parameter content;
  - for *type V parameters* the length, in octets, of the length indicator and of the parameter content (the minimum and the maximum length are indicated);
  - for *type O parameters* the length, in octets, of the parameter name, length indicator and parameter content (for variable length parameters, the minimum and maximum length is indicated).

4.1.3 For each message the number of pointers included is also specified.

4.1.4 For each message type, type F parameters and the pointers for the type V parameters must be sent in the order specified in the following tables.

4.2 Connection request (CR)

The CR message contains:

- the routing label;
- 2 pointers;
- the parameters indicated in Table 3.

TABLE 3/Q.713

Message type – Connection request

Parameter	Reference (subclause)	Type (F V O)	Lenght (octets)
Message type code	2.1	F	1
Source local reference	3.3	F	3
Protocol class	3.6	F	1
Called party address	3.4	V	3 minimum
Credit	3.10	O	3
Calling party address	3.5	O	4 minimum
Data	3.16	O	3 - 130
End of optional parameters	3.1	O	1

4.3 Connection confirm (CC)

The CC message contains:

– the routing label;

– 1 pointer;

– the parameters indicated in Table 4.

TABLE 4/Q.713

Message type – Connection confirm

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Source local reference	3.3	F	3
Protocol class	3.6	F	1
Credit	3.10	O	3
Called party address	3.4	O	4 minimum
Data	3.16	O	3 - 130
End of optional parameter	3.1	O	1

4.4 Connection refused (CREF)

The message contains:

– the routing label;

– 1 pointer;

– the parameters indicated in Table 5.

TABLE 5/Q.713

Message type – Connection refused

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Refusal cause	3.15	F	1
Called party address	3.4	O	4 minimum
Data	3.16	O	3 - 130
End of optional parameter	3.1	O	1

4.5 Released (RLSD)

The RLSD message contains:

– the routing label;

– 1 pointer;

– the parameters indicated in Table 6.

TABLE 6/Q.713

Message type – Released

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Source local reference	3.3	F	3
Release cause	3.11	F	1
Data	3.16	O	3 - 130
End of optional parameter	3.1	O	1

4.6 Release complete (RLC)

The RLC message contains:

– the routing label;

– no pointers;

– the parameters indicated in Table 7.

TABLE 7/Q.713

Message type – Release complete

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Source local reference	3.3	F	3

4.7 Data form 1 (DT1)

The DT1 message contains:

– the routing label;

– 1 pointer;

– the parameters indicated in Table 8.

TABLE 8/Q.713

Message type – Data form 1

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Segmenting/reassembling	3.7	F	1
Data	3.16	V	2 - 256

4.8 Data form 2 (DT2)

The DT2 message contains:

– the routing label;

– 1 pointer;

– the parameters indicated in Table 9.

TABLE 9/Q.713

Message type – Data form 2

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Sequencing/segmenting	3.9	F	2
Data	3.16	V	2 - 256

4.9 Data acknowledgement (AK)

The AK message contains:

- the routing label;
- no pointers;
- the parameters indicated in Table 10.

TABLE 10/Q.713

Message type – Data acknowledgement

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Receive sequence number	3.8	F	1
Credit	3.10	F	1

4.10 Unitdata (UDT)

The UDT message contains:

- the routing label;
- 3 pointers;
- the parameters indicated in Table 11.

TABLE 11/Q.713

Message type – Unitdata

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Protocol class	3.6	F	1
Called party address	3.4	V	3 minimum
Calling party address	3.5	V	2 minimum
Data	3.16	V	2 - X[a)]

a) Due to the ongoing studies on the SCCP called and calling party address, the maximum length of this parameter needs further study. It is also noted that the transfer of up to 255 octets of user data is allowed when the SCCP called and calling party address do not include global title.

4.11 Unitdata service (UDTS)

The UDTS message contains:

- the routing label;
- 3 pointers;
- the parameters indicated in Table 12.

TABLE 12/Q.713

Message type – Unitdata service

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Return cause	3.12	F	1
Called party address	3.4	V	3 minimum
Calling party address	3.5	V	2 minimum
Data	3.16	V	2 - X[a)]

a) See [a)] Table 11.

4.12 Expedited data (ED)

The ED message contains:

- the routing label;
- 1 pointer;
- the parameters indicated in Table 13.

TABLE 13/Q.713

Message type – Expedited data

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Data	3.16	V	2 - 33

4.13 Expedited data acknowledgement (EA)

The EA message contains:

– the routing label;

– no pointers;

– the parameters indicated in Table 14.

TABLE 14/Q.713

Message type – Expedited data acknowledgement

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3

4.14 Reset request (RSR)

The RSR message contains:

– the routing label;

– 1 pointer (this allows for inclusion of optional parameters in the future);

– the parameters indicated in Table 15.

TABLE 15/Q.713

Message type – Reset request

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Source local reference	3.3	F	3
Reset cause	3.13	F	1

4.15 Reset confirm (RSC)

The RSC message contains:

– the routing label;

– no pointers;

– the parameters indicated in Table 16.

TABLE 16/Q.713

Message type – Reset confirmation

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Source local reference	3.3	F	3

4.16 Protocol data unit error (ERR)

The ERR message contains:

– the routing label;

– 1 pointer (this allows for inclusion of optional parameters in the future);

– the parameters indicated in Table 17.

TABLE 17/Q.713

Message type – Protocol data unit error

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Error cause	3.14	F	1

4.17 Inactivity test (IT)

The IT message contains:

– the routing label;

– no pointers;

– the parameters indicated in Table 18.

TABLE 18/Q.713

Message type – Inactivity test

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Destination local reference	3.2	F	3
Source local reference	3.3	F	3
Protocol class	3.6	F	1
Sequencing/segmenting[a)]	3.9	F	2
Credit[a)]	3.10	F	1

a) Information in these parameter fields reflect those values sent in the last Data Form 2 or Data acknowledgement message. They are ignored if the protocol class parameter indicates class 2.

4.18 Extended unitdata (XUDT)

The XUDT message contains:

– the routing label;

– 4 pointers;

– the parameters indicated in Table 19.

TABLE 19/Q.713

Message type – Extended unitdata

Parameter	Reference (subclause)	Type (F V O)	Legnth (octets)
Message type	2.1	F	1
Protocol class	3.6	F	1
Hop counter	3.18	F	1
Called party address	3.4	V	3 minimum
Calling party address	3.5	V	2 minimum
Data	3.16	V	2 - Y[a)]
Segmentation	3.17	O	6[b)]
End of optional parameters	3.1	O	1

a) The maximum length of this parameter is for further study.

b) Should not be present in case of a single XUDT message.

4.19 Extended unitdata service (XUDTS)

The XUDTS message contains:

- the routing label;
- 4 pointers;
- the parameters indicated in Table 20.

TABLE 20/Q.713

Message type – Extended unitdata service

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type	2.1	F	1
Return cause	3.12	F	1
Hop counter	3.18	F	1
Called party address	3.4	V	3 minimum
Calling party address	3.5	V	2 minimum
Data	3.16	V	2 - Y[a)]
Segmentation	3.17	O	6
End of optional parameters	3.1	O	1

a) The maximum length of this parameter is for further study.

5 SCCP Management messages and codes

5.1 General

SCCP Management (SCMG) messages are carried using the connectionless service of the SCCP. When transferring SCMG messages, class 0 is requested with the "discard message on error" option. SCCP management message parts are provided in the "data" parameter of the *Unitdata message*.

The *Unitdata* message contains:

- the routing label;
- 3 pointers;
- the parameters indicated in Table 21.

Descriptions of the various parts are contained in the following subclauses.

5.1.1 SCMG format identifier

The SCMG format identifier consists of a one-octet field, which is mandatory for all SCMG messages. The SCMG format identifier uniquely defines the function and format of each SCMG message. The allocation of SCMG format identifiers is shown in Table 22.

TABLE 21/Q.713

SCCP management message format

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
Message type (= Unitdata)	2.1	F	1
Protocol class (= Class 0, no return)	3.6	F	1
Called party address (SSN = SCCP management)	3.4	V	3 minimum
Calling party address (SSN = SCCP management)	3.5	V	3 minimum[a)]
Data (Data consists of an SCMG message with form as in Table 22)	3.16	V	6

a) SSN is always present.

TABLE 22/Q.713

SCMG format identifiers

Message	Code 87654321
SSA Subsystem-allowed	00000001
SSP Subsystem-prohibited	00000010
SST Subsystem-status-test	00000011
SOR Subsystem-out-of-service-request	00000100
SOG Subsystem-out-of-service-grant	00000101

5.1.2 Formatting principles

The formatting principles used for SCCP messages, as described in subclauses 1.3, 1.4, 1.5, 1.6, 2.2 and 2.3 apply to SCMG messages.

5.2 SCMG message parameters

SCMG parameter name codes are given in Table 23 with reference to the subclauses in which they are described. Presently, these parameter name codes are not used since all SCMG messages contain mandatory fixed parameters only.

5.2.1 End of optional parameters

The “end of optional parameters” parameter field consists of a single octet containing all zeros.

TABLE 23/Q.713

SCMG parameter name codes

Parameter	Reference (subclause)	Parameter name code 87654321
End of optional parameters	5.2.1	00000000
Affected SSN	5.2.2	00000001
Affected PC	5.2.3	00000010
Subsystem multiplicity indicator	5.2.4	00000011

5.2.2 Affected SSN

The "affected subsystem number (SSN)" parameter field consists of one octet coded as directed for the called party address field (see 3.4.2.2).

5.2.3 Affected PC

The "affected signalling point code (PC)" parameter field is represented by two octets which are coded as directed for the called party address field (see 3.4.2.1).

5.2.4 Subsystem multiplicity indicator (for further study)

The "subsystem multiplicity indicator" parameter field consists of one octet coded as shown in Figure 12.

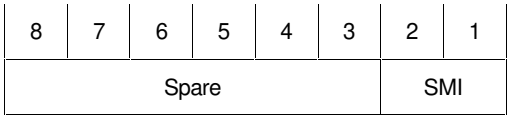


FIGURE 12/Q.713

Subsystem multiplicity indicator format

The coding of the SMI field is as follows:

Bits 2 1

0 0 Affected subsystem multiplicity unknown

0 1 Affected subsystem is solitary

1 0 Affected subsystem is duplicated

1 1 Spare

Bits 3 - 8 are spare.

5.3 SCMG messages

Presently, all SCMG messages contain mandatory fixed parameters only. Each SCMG message contains:

– 0 pointers;

– the parameters indicated in Table 24.

TABLE 24/Q.713

SCMG message

Parameter	Reference (subclause)	Type (F V O)	Length (octets)
SCMG format identifier (Message type code)	5.1.1	F	1
Affected SSN	5.2.2	F	1
Affected PC	5.2.3	F	2
Subsystem multiplicity indicator	5.2.4	F	1

Annex A

Mapping for cause parameter values

(This annex forms an integral part of this Recommendation)

A.1 Introduction

During connection refusal/release/reset, the SCCP and its users could take necessary corrective actions, if any, only upon relevant information available to them. Thus, it would be very helpful if those information could be conveyed correctly.

During connection release, the "release cause" parameter in the *Released* (RLSD) message and the N-DISCONNECT primitive (with parameters "originator" and "reason") are used together to convey those information on the initiator and the cause of the connection release. In addition, the N-DISCONNECT primitive is also used together with the "refusal cause" parameter in the *Connection Refused* (CREF) message to convey those information during connection refusal. During connection reset, the "reset cause" parameter in the *Reset Request* (RSR) message and the N-RESET primitive (with parameters "originator" and "reason") are used together similarly.

In order to convey those information correctly, this annex provides a guideline for the mapping of values between the cause parameters and the corresponding N-primitive parameters during various scenarios.

A.2 Connection refusal

Table A.1 describes the mapping of values between the "refusal cause" parameter (see 3.15) and the "originator", "reason" parameters in the N-DISCONNECT primitive (see 2.1.1.2.4/Q.711).

A.3 Connection release

Table A.2 describes the mapping of values between the "release cause" parameter (see 3.11) and the "originator", "reason" parameters in the N-DISCONNECT primitive (see 2.1.1.2.4/Q.711).

A.4 Connection reset

Table A.3 describes the mapping of values between the "reset cause" parameter (see 3.13) and the "originator", "reason" parameters in the N-RESET primitive (see 2.1.1.2.3/Q.711).

TABLE A.1/Q.713

Mapping during connection refusal

CREF Message		N-DISCONNECT primitive	
Code	Refusal cause	Reason	Originator
00000000	End user originated	Connection refusal – End user originated	NSU
00000001	End user congestion	Connection refusal – End user congestion	NSU
00000010	End user failure	Connection refusal – End user failure	NSU
00000011	SCCP user originated	Connection refusal – SCCP user originated	NSU
00000100	Destination address unknown	Connection refusal – Destination address unknown (non-transient condition)	NSP
00000101	Destination inaccessible	Connection refusal – Destination inaccessible/transient condition	NSP
00000110	Network resource – QOS unavailable/non-transient	Connection refusal – QOS unavailable/non-transient condition	NSP[a)]
00000111	Network resource – QOS unavailable/transient	Connection refusal – QOS unavailable/transient condition	NSP[a)]
00001000	Access failure	Connection refusal – Access failure	NSU
00001001	Access congestion	Connection refusal – Access congestion	NSU
00001010	Subsystem failure	Connection refusal – Destination inaccessible/non-transient condition	NSP
00001011	Subsystem congestion	Connection refusal – Subsystem congestion	NSU
00001100	Expiration of connection estimated timer	Connection refusal – Reason unspecified/transient	NSP[a)]
00001101	Inconsistent user data	Connection refusal – Incompatible information in NSDU	NSU
00001110	Not obtainable	Connection refusal – Reason unspecified/transient	NSP[a)]
00001110	Not obtainable	Connection refusal – Undefined	Undefined
00001111	Unqualified	Connection refusal – Reason unspecified/transient	NSP[a)]
00001111	Unqualified	Connection refusal – Undefined	Undefined

NSU Network Service User

NSP Network Service Provider

a) Only those cases will be applicable if the SCCP originates the refusal procedure in response to REQUEST interface element.

TABLE A.2/Q.713

Mapping during connection relesae

RLSD Message		N-DISCONNECT primitive	
Code	Release cause	Reason	Originator
00000000	End user originated	Disconnection – Normal condition	NSU
00000001	End user congestion	Disconnection – End user congestion	NSU
00000010	End user failure	Disconnection – End user failure	NSU
00000011	SCCP user originated	Disconnection – SCCP user originated	NSU
00000100	Remote procedure error	Disconnection – Abnormal condition of transient nature	NSP
00000101	Inconsistent connection data	Disconnection – Abnormal condition of transient nature	NSP
00000110	Access failure	Disconnection – Access failure	NSU
00000111	Access congestion	Disconnection – Access congestion	NSU
00001000	Subsystem failure	Disconnection - Abnormal condition of non-transient nature	NSP
00001001	Subsystem congestion	Disconnection – Subsystem congestion	NSU
00001010	Network failure	Disconnection – Abnormal condition of non-transient nature	NSP
00001011	Network congestion	Disconnection – Abnormal condition of transient nature	NSP
00001100	Expiration of reset timer	Disconnection – Abnormal condition of transient nature	NSP
00001101	Expiration of receive inactivity timer	Disconnection – Abnormal condition of transient nature	NSP
00001110	Not obtainable[a)]	Disconnection – Undefined	NSP
00001110	Not obtainable[a)]	Disconnection – Undefined	Undefined
00001111	Unqualified	Disconnection – Abnormal condition	NSU
00001111	Unqualified	Disconnection – Undefined	NSP
00001111	Unqualified	Disconnection – Undefined	Undefined
00010000	SCCP failure	Disconnection – Abnormal condition of non-transient nature	NSP

a) The need for this value is for further study.

TABLE A.3/Q.713

Mapping during connection reset

RSR Message		N-RESET primitive	
Code	Reset cause	Reason	Originator
00000000	End user originated	Reset – User synchronization	NSU
00000001	SCCP user originated	Reset – User synchronization	NSU
00000010	Message out of order – Incorrect P(S)	Reset – Unspecified	NSP
00000011	Message out of order – Incorrect P(R)	Reset – Unspecified	NSP
00000100	Remote procedure error – Message out of window	Reset – Unspecified	NSP
00000101	Remote procedure error – Incorrect P(S) after initialization	Reset – Unspecified	NSP
00000110	Remote procedure error – General	Reset – Unspecified	NSP
00000111	Remote end user operational	Reset – User synchronization	NSU
00001000	Network operational	Reset – Unspecified	NSP
00001001	Access operational	Reset – User synchronization	NSU
00001010	Network congestion	Reset – Network congestion	NSP
00001011	Not obtainable[a)]	Reset – Unspecified	NSP
00001011	Not obtainable[a)]	Reset – Undefined	Undefined
00001100	Unqualified	Reset – Unspecified	NSP
00001100	Unqualified	Reset – Undefined	Undefined

a) The need for this value is for further study.