INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.713
(03/2001)

SERIES Q: SWITCHING AND SIGNALLING

Specifications of Signalling System No. 7 – Signalling connection control part (SCCP)

Signalling connection control part formats and codes

ITU-T Recommendation Q.713

(Formerly CCITT Recommendation)

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ITU-T Recommendation Q.713

Signalling connection control part formats and codes

Summary

This Recommendation specifies the Signalling Connection Control Part (SCCP) messages formats and codes for the purpose of connection-oriented services, connectionless services and management of SCCP.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. 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.

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NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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ITU-T Recommendation Q.713

Signalling connection control part formats and codes

1 General

This Recommendation specifies the SCCP messages formats and codes for the support of connection-oriented services, connectionless services and the management of SCCP.

The SCCP messages are passed between SCCP and MTP across the MTP-SAP by means of the user data parameter of the MTP-TRANSFER request or indication primitives as appropriate (see Table 1/Q.701).

NOTE – The MTP-TRANSFER primitive, in addition to the user data parameter, contains four parameters with the contents as follows (see Table 1/Q.701):

• the contents of the OPC consisting of information equivalent to 14 bits, to be conveyed in the standard routing label of the MTP;

• the contents of the DPC consisting of information equivalent to 14 bits, to be conveyed in the standard routing label of the MTP;

• the contents of the SLS consisting of information equivalent to 4 bits. If the MTP service "in-sequence delivery" of SDUs is a requirement, SCCP shall use the same SLS value for all SDUs with the same sequence control and called address parameters;

• information equivalent to the contents of the SIO. For SCCP, the encoding for the service indicator is 0011 binary (see 14.2.1/Q.704).

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

– 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.
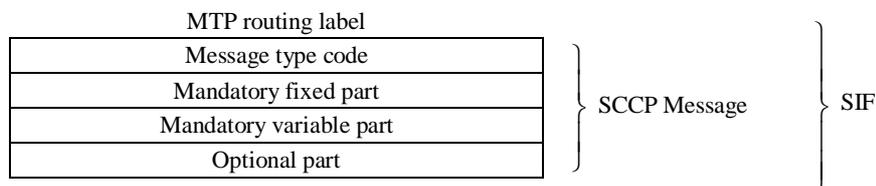
Figure 1/Q.713 – General layout

1.1 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.

1.2 Formatting principles

Each message consists of a number of parameters listed and described in clause 3. Each parameter has a "name" that can be represented by a single octet (see clause 3), and is present in optional parameters. 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 length indicator of the long data parameter shall be two octets, with the less significant octet preceding the transmission of the more significant octet.

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.
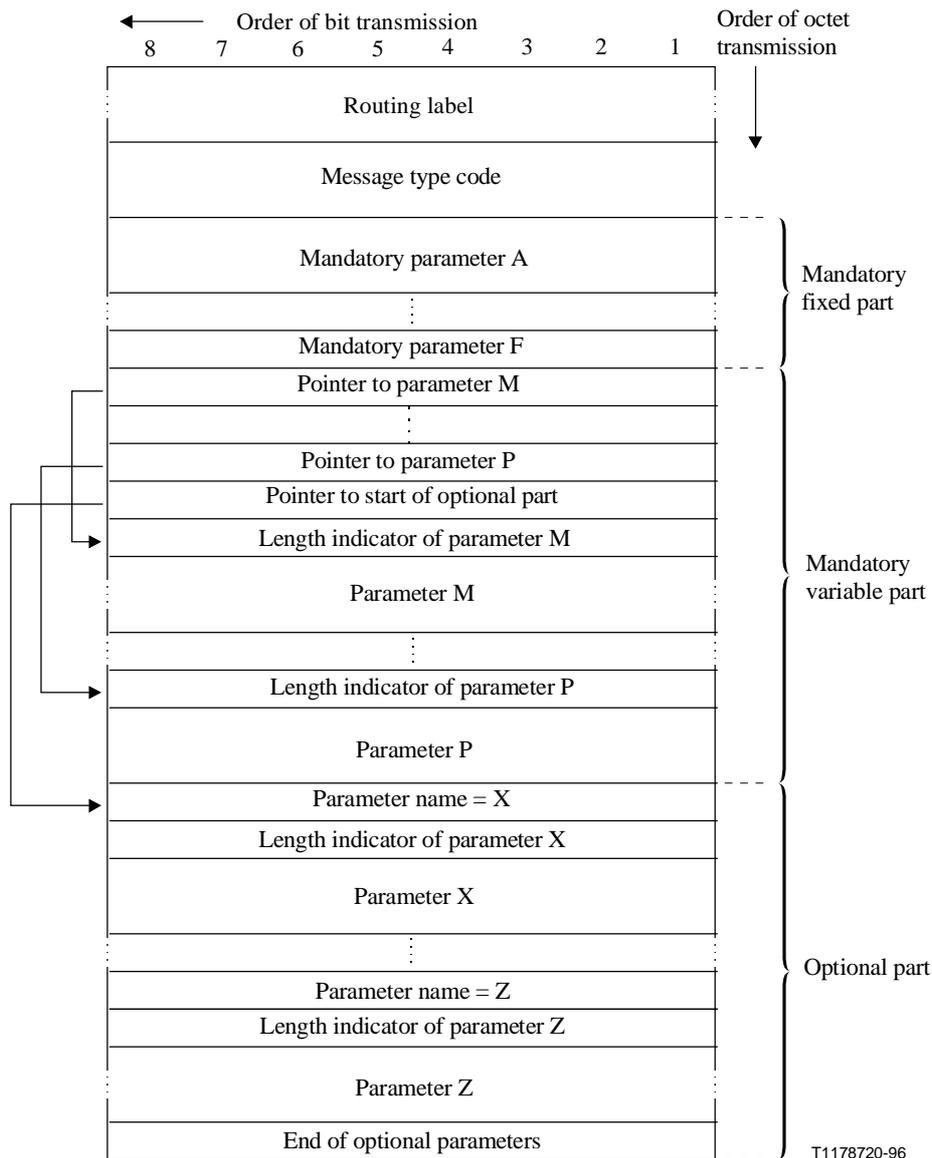
Figure 2/Q.713 – General SCCP message format

1.3 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.

1.4 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 or two octets in the case of LUDT and LUDTS. In the case of the two-octet pointer, the less significant octet shall be transmitted before the more significant 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[1].

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.

All the pointers indicating the beginning of each mandatory variable parameter and the beginning of the optional part shall ensure that at the originating node the parameters are contiguous; and "gaps" shall not be left in between parameters in generating messages. Treatment of "gaps" at the receiving side is specified in 1.1.4.5/Q.714. Gaps should not be generated between the last pointer and first mandatory variable parameter. No extraneous octets should be added after the last parameter. All the above cases will not cause a protocol error.

1.5 Optional part

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

1.6 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 included only if optional parameters are present in the message. The end of optional parameters octet should not be used to detect the end of messages.

1.7 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).

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[1] There are currently messages (RSR and ERR) containing one pointer to the beginning of the optional part although no optional parameters are currently defined for them.

1.8 Coding of spare bits

According to the general rules defined in ITU-T Q.700 and Q.1400, spare bits are coded 0 unless indicated otherwise at the originating nodes. Handling of spare fields is specified in 1.1.4.4/Q.714.

1.9 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.

1.10 International message types and parameters

Message type codes and parameter codes are required for international use. These codes are selected from the lowest code values upwards, i.e., starting at 00000000. Note that the special codes applicable for international use are specified in each relevant section.

2 Coding of the general parts

2.1 Coding of the message type

The coding of the message is shown in Table 1.

Table 1/Q.713 – SCCP message types

Message type		Classes 0	Classes 1	Classes 2	Classes 3	Clause	Message Type Code
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[1]	X[1]			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 confirmation				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[1]	X[1]			4.19	0001 0010
LUDT	Long unitdata	X	X			4.20	0001 0011
LUDTS	Long unitdata service	X[1]	X[1]			4.21	0001 0100

X   Type of message of this protocol class.

X[1]   Type of protocol class is indeterminate (absence of protocol class parameter).

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 most significant octet of the pointer itself (included) and the first octet (not included) of the parameter associated with that pointer[2] as shown in the following diagram.
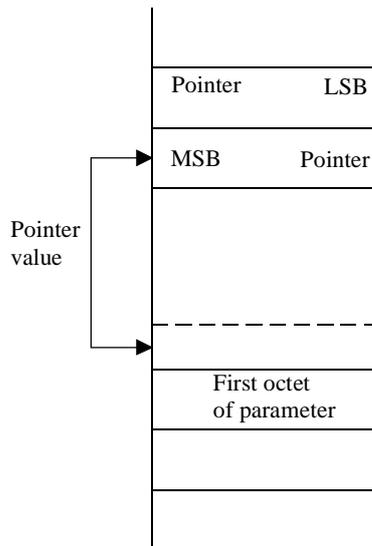
T1178730-96

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

3 SCCP parameters

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

Table 2/Q.713 – SCCP parameter name codes

Parameter name	Clauses	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

---

[2] For example, a pointer value of "00000001" indicates that the associated parameter begins in the octet immediately following the most significant octet of the pointer. A pointer value of "00001010" indicates that ten octets of information exist between the most significant octet of the pointer octet (included) and the first octet of the parameter associated with that pointer (not included). A two-octet pointer value of "00000000 00001010" indicates that ten octets of information exist between the most significant octet of the pointer (included) and the first octet of the parameter associated with that pointer (not included).

Table 2/Q.713 – SCCP parameter name codes *(concluded)*

Parameter name	Clauses	Parameter name code 8765 4321
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
Importance	3.19	0001 0010
Long data	3.20	0001 0011
Reserved for International Use		0001 0100 to 1111 0011
Reserved for National Networks		1111 0100 to 1111 1110
Reserved		1111 1111

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 for future use.

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 after the connection section is set up.

The coding "all ones" is reserved for future use.

3.4 Called party address

The "called party address" is a variable length parameter. Its structure is shown in Figure 3.
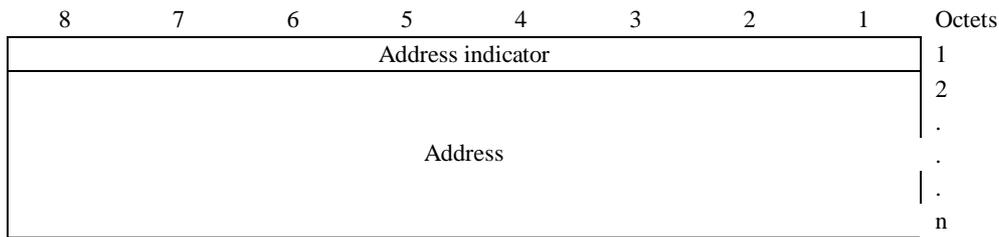
Figure 3/Q.713 – Called/calling party address

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.
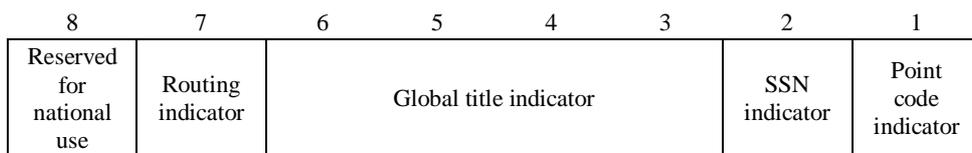
Figure 4/Q.713 – Address indicator encoding

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 (GTI), which is encoded as follows:

Bits 6 5 4 3	
0 0 0 0	no global title included
0 0 0 1	global title includes nature of address indicator only
0 0 1 0	global title includes translation type only
0 0 1 1	global title includes translation type, numbering plan and encoding scheme
0 1 0 0	global title includes translation type, numbering plan, encoding scheme and nature of address indicator
0 1 0 1 to 0 1 1 1	spare international
1 0 0 0 to 1 1 1 0	spare national
1 1 1 1	reserved for extension.

Bit 7 of the address indicator octet contains routing information identifying which address element shall be used for routing, and is encoded as follows:

Bit
<u>7</u>
1   Route on SSN
0   Route on GT

Bit 8 of the address indicator octet is reserved for national use and is always set to zero on international network.

3.4.2   Address

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

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 shall be encoded "00000000" when the subsystem number is not known, e.g. before translation.

8	7	6	5	4	3	2	1
Signalling point code							
Subsystem number							
Global title							
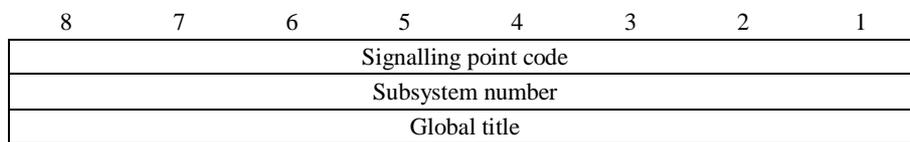
Figure 5/Q.713 − Ordering of address elements

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).
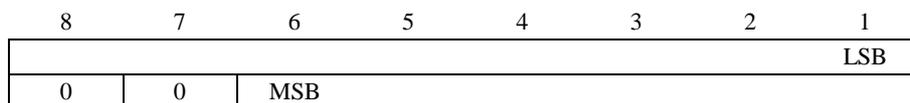
8	7	6	5	4	3	2	1
							LSB
0	0	MSB					

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
<u>8 7 6 5 4 3 2 1</u>
0 0 0 0 0 0 0 0   SSN not known/not used
0 0 0 0 0 0 0 1   SCCP management
0 0 0 0 0 0 1 0   reserved for ITU-T allocation
0 0 0 0 0 0 1 1   ISDN user part
0 0 0 0 0 1 0 0   operation, maintenance and administration part (OMAP)
0 0 0 0 0 1 0 1   mobile application part (MAP)
0 0 0 0 0 1 1 0   home location register (HLR)
0 0 0 0 0 1 1 1   visitor location register (VLR)
0 0 0 0 1 0 0 0   mobile switching centre (MSC)

0 0 0 0 1 0 0 1	equipment identifier centre (EIC)
0 0 0 0 1 0 1 0	authentication centre (AUC)
0 0 0 0 1 0 1 1	ISDN supplementary services
0 0 0 0 1 1 0 0	reserved for international use
0 0 0 0 1 1 0 1	broadband ISDN edge-to-edge applications
0 0 0 0 1 1 1 0	TC test responder
0 0 0 0 1 1 1 1 to 0 0 0 1 1 1 1 1	reserved for international use
0 0 1 0 0 0 0 0 to 1 1 1 1 1 1 1 0	reserved for national networks
1 1 1 1 1 1 1 1	reserved for expansion of national and international SSN.

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

3.4.2.3 Global title

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

3.4.2.3.1 Global title indicator = 0001

Figure 7 shows the format of the global title, if the global title indicator equals "0001".

8	7	6	5	4	3	2	1	Octets
O/E	Nature of address indicator							1
Global title address information								2 and further
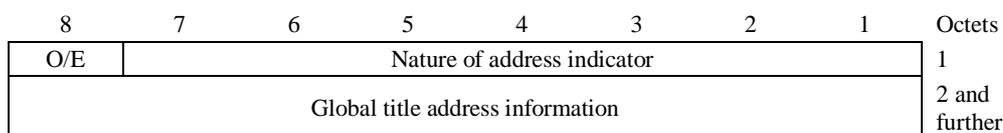
Figure 7/Q.713 – Global title format for indicator 0001

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

Bits
<u>7 6 5 4 3 2 1</u>
0 0 0 0 0 0 0	unknown
0 0 0 0 0 0 1	subscriber number
0 0 0 0 0 1 0	reserved for national use
0 0 0 0 0 1 1	national significant number
0 0 0 0 1 0 0	international number
0 0 0 0 1 0 1 to 1 1 0 1 1 1 1	spare
1 1 1 0 0 0 0 to 1 1 1 1 1 1 0	reserved for national use
1 1 1 1 1 1 1	reserved

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

Bit
<u>8</u>
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.

8	7	6	5	4	3	2	1	Octets
2nd address signal				1st address signal				2
4th address signal				3rd address signal				3
. . .								
filler (if necessary)				nth address signal				m (Note)

NOTE – m depends on the restriction posed by the numbering plan in its defining Recommendation.

Figure 8/Q.713 – Global title address information
(if encoding scheme is BCD)

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
1100 code 12
1101 spare
1110 spare
1111 ST

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".

The translation type (TT) is a one-octet field that is used to direct the message to the appropriate translator.

8	7	6	5	4	3	2	1	Octets
Translation type								1
Global title address information								2 and further

Figure 9/Q.713 – Global title format for indicator 0010

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.

Global title with GTI = 0010 is for national use only and is not used on the international interface. The allocation of the translation types for GTI = 0010 is a national matter.

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

Figure 10 shows the format of the global title, if the global title indicator equals "0011".

8	7	6	5	4	3	2	1	Octets
Translation type								1
Numbering plan				Encoding scheme				2
Global title address information								3 and further
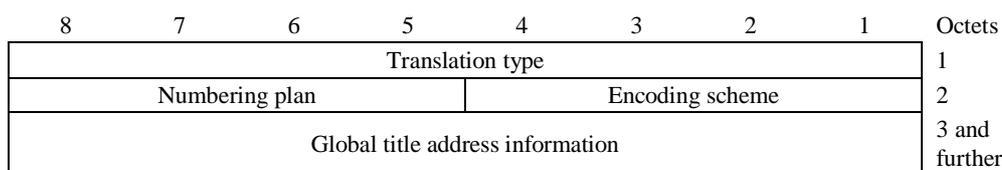
Figure 10/Q.713 – Global title format for indicator 0011

The coding and definition of the translation type for this global title format (0011) is for further study.

The numbering plan (NP) is encoded as follows:

```
Bits
8 7 6 5
0 0 0 0        unknown
0 0 0 1        ISDN/telephony numbering plan (ITU-T E.163 and E.164)
0 0 1 0        generic numbering plan
0 0 1 1        data numbering plan (ITU-T X.121)
0 1 0 0        telex numbering plan (ITU-T F.69)
0 1 0 1        maritime mobile numbering plan (ITU-T E.210, E.211)
0 1 1 0        land mobile numbering plan (ITU-T E.212)
0 1 1 1        ISDN/mobile numbering plan (ITU-T E.214)
1 0 0 0  ⎫
   to    ⎬     spare
1 1 0 1  ⎭
1 1 1 0        private network or network-specific numbering plan
1 1 1 1        reserved
```

The encoding scheme (ES) is encoded as follows:

```
Bits
4 3 2 1
0 0 0 0        unknown
0 0 0 1        BCD, odd number of digits
0 0 1 0        BCD, even number of digits
0 0 1 1        national specific
0 1 0 0  ⎫
   to    ⎬     spare
1 1 1 0  ⎭
1 1 1 1        reserved
```

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

3.4.2.3.4 Global title indicator = 0100

Figure 11 shows the format of the global title, if the global title indicator equals "0100".

8	7	6	5	4	3	2	1	Octets
Translation type								1
Numbering plan				Encoding scheme				2
0	Nature of address indicator							3
Global title address information								4 and further

Figure 11/Q.713 – Global title format for indicator 0100

This global title format (0100) is used for international network applications. In this case, the "translation type" along with the allowable combination of its "numbering plan", "nature of address indicator", and "encoding scheme" is specified in Annex B.

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 address information, starting from octet 4, is encoded as shown in Figure 8.

The ranges of the translation types to be allocated for global title with GTI = 0100 are shown as follows:

```
Bits
8 7 6 5 4 3 2 1     Decimal Value
0 0 0 0 0 0 0 0          0              unknown
0 0 0 0 0 0 0 1          1        ⎫
      to               to         ⎬     international services
0 0 1 1 1 1 1 1         63        ⎭
0 1 0 0 0 0 0 0         64        ⎫
      to               to         ⎬     spare
0 1 1 1 1 1 1 1        127        ⎭
1 0 0 0 0 0 0 0        128        ⎫
      to               to         ⎬     national network specific
1 1 1 1 1 1 1 0        254        ⎭
1 1 1 1 1 1 1 1        255              reserved for expansion
```

3.5 Calling party address

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

For compatibility reasons with earlier versions, an SCCP should be able to receive and/or transfer a (X)UDT 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 address indicator 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 one-octet parameter and is structured as follows:

Bits 1-4 indicating protocol class are coded as follows:

```
Bits
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
8 7 6 5
0 0 0 0        no special options
0 0 0 1    ⎫
   to      ⎬   spare
0 1 1 1    ⎭
1 0 0 0        return message on error
1 0 0 1    ⎫
   to      ⎬   spare
1 1 1 1    ⎭
```

3.7 Segmenting/reassembling

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

8	7	6	5	4	3	2	1
			spare				M
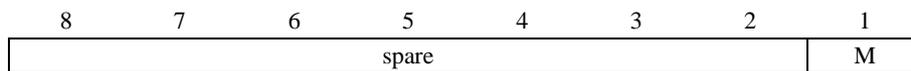
Bits 8-2 are spare.

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:

8	7	6	5	4	3	2	1
			$P(R)$				spare
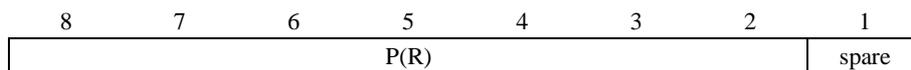
Bits 8-2 contain the receive sequence number $P(R)$ used to indicate the sequence number of the next expected message. $P(R)$ is binary coded and bit 2 is the LSB.

Bit 1 is spare.

3.9 Sequencing/segmenting

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

8	7	6	5	4	3	2	1	Octets
P(S)							spare	1
P(R)							M	2

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 class 3 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
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0        end user originated
0 0 0 0 0 0 0 1        end user congestion
0 0 0 0 0 0 1 0        end user failure
0 0 0 0 0 0 1 1        SCCP user originated
0 0 0 0 0 1 0 0        remote procedure error
0 0 0 0 0 1 0 1        inconsistent connection data
0 0 0 0 0 1 1 0        access failure
0 0 0 0 0 1 1 1        access congestion
0 0 0 0 1 0 0 0        subsystem failure
0 0 0 0 1 0 0 1        subsystem congestion
0 0 0 0 1 0 1 0        MTP failure
0 0 0 0 1 0 1 1        network congestion
0 0 0 0 1 1 0 0        expiration of reset timer
0 0 0 0 1 1 0 1        expiration of receive inactivity timer
0 0 0 0 1 1 1 0        reserved
0 0 0 0 1 1 1 1        unqualified
0 0 0 1 0 0 0 0        SCCP failure
0 0 0 1 0 0 0 1  ⎫
     to         ⎬     Reserved for International Use
1 1 1 1 0 0 1 1  ⎭
```

```
1 1 1 1 0 1 0 0  ⎫
      to         ⎬          Reserved for National Networks
1 1 1 1 1 1 1 0  ⎭
1 1 1 1 1 1 1 1             Reserved
```

3.12   Return cause

In the unitdata service or extended unitdata service or long 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
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0        no translation for an address of such nature
0 0 0 0 0 0 0 1        no translation for this specific address
0 0 0 0 0 0 1 0        subsystem congestion
0 0 0 0 0 0 1 1        subsystem failure
0 0 0 0 0 1 0 0        unequipped user
0 0 0 0 0 1 0 1        MTP failure
0 0 0 0 0 1 1 0        network congestion
0 0 0 0 0 1 1 1        unqualified
0 0 0 0 1 0 0 0        error in message transport (Note)
0 0 0 0 1 0 0 1        error in local processing (Note)
0 0 0 0 1 0 1 0        destination cannot perform reassembly (Note)
0 0 0 0 1 0 1 1        SCCP failure
0 0 0 0 1 1 0 0        hop counter violation
0 0 0 0 1 1 0 1        segmentation not supported
0 0 0 0 1 1 1 0        segmentation failure
0 0 0 0 1 1 1 1  ⎫
      to         ⎬     Reserved for International Use
1 1 1 0 0 1 0 0  ⎭
1 1 1 0 0 1 0 1  ⎫
      to         ⎬     Reserved for National Networks
1 1 1 1 1 1 1 0  ⎭
1 1 1 1 1 1 1 1        Reserved
```

NOTE – Only applicable to XUDT(S) 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
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0        end user originated
0 0 0 0 0 0 0 1        SCCP user originated
0 0 0 0 0 0 1 0        message out of order – incorrect P(S)
0 0 0 0 0 0 1 1        message out of order – incorrect P(R)
0 0 0 0 0 1 0 0        remote procedure error – message out of window
0 0 0 0 0 1 0 1        remote procedure error – incorrect P(S) after (re)initialization
0 0 0 0 0 1 1 0        remote procedure error – general
```

0 0 0 0 0 1 1 1	remote end user operational
0 0 0 0 1 0 0 0	network operational
0 0 0 0 1 0 0 1	access operational
0 0 0 0 1 0 1 0	network congestion
0 0 0 0 1 0 1 1	reserved
0 0 0 0 1 1 0 0	unqualified

0 0 0 0 1 1 0 1
  to   } Reserved for International Use
1 1 1 1 0 0 1 1

1 1 1 1 0 1 0 0
  to   } Reserved for National Networks
1 1 1 1 1 1 1 0

1 1 1 1 1 1 1 1	Reserved

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
8 7 6 5 4 3 2 1

0 0 0 0 0 0 0 0	local reference number (LRN) mismatch – unassigned destination LRN
0 0 0 0 0 0 0 1	local reference number (LRN) mismatch – inconsistent source LRN
0 0 0 0 0 0 1 0	point code mismatch[3]
0 0 0 0 0 0 1 1	service class mismatch
0 0 0 0 0 1 0 0	unqualified

0 0 0 0 0 1 0 1
  to   } Reserved for International Use
1 1 1 1 0 0 1 1

1 1 1 1 0 1 0 0
  to   } Reserved for National Networks
1 1 1 1 1 1 1 0

1 1 1 1 1 1 1 1	Reserved

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
8 7 6 5 4 3 2 1

0 0 0 0 0 0 0 0	end user originated
0 0 0 0 0 0 0 1	end user congestion
0 0 0 0 0 0 1 0	end user failure
0 0 0 0 0 0 1 1	SCCP user originated

---

[3] National option, Table B.2/Q.714.

```
0 0 0 0 0 1 0 0          destination address unknown
0 0 0 0 0 1 0 1          destination inaccessible
0 0 0 0 0 1 1 0          network resource – QoS not available/non-transient
0 0 0 0 0 1 1 1          network resource – QoS not available/transient
0 0 0 0 1 0 0 0          access failure
0 0 0 0 1 0 0 1          access congestion
0 0 0 0 1 0 1 0          subsystem failure
0 0 0 0 1 0 1 1          subsystem congestion
0 0 0 0 1 1 0 0          expiration of the connection establishment timer
0 0 0 0 1 1 0 1          incompatible user data
0 0 0 0 1 1 1 0          reserved
0 0 0 0 1 1 1 1          unqualified
0 0 0 1 0 0 0 0          hop counter violation
0 0 0 1 0 0 0 1          SCCP failure
0 0 0 1 0 0 1 0          no translation for an address of such nature
0 0 0 1 0 0 1 1          unequipped user
0 0 0 1 0 1 0 0    ⎫
        to          ⎬    Reserved for International Use
1 1 1 1 0 0 1 1    ⎭
1 1 1 1 0 1 0 0    ⎫
        to          ⎬    Reserved for National Networks
1 1 1 1 1 1 1 0    ⎭
1 1 1 1 1 1 1 1          Reserved
```

3.16   Data

The "data" parameter field is a variable length field containing less than or equal to 255 octets of SCCP-user data to be transferred transparently between the SCCP user functions.

3.17   Segmentation

8	7	6	5	4	3	2	1	Octets
F	C	spare		Remaining segment				1
Segmentation local reference								2 3 4
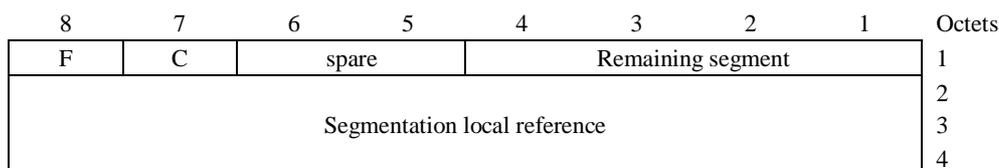
Bit 8 of octet 1 is used for First segment indication and is coded as follows:

–   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:   Class 0 selected;

–   1:   Class 1 selected.

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.

3.18 Hop counter

8	7	6	5	4	3	2	1
			Hop counter				
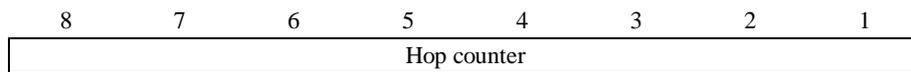
The hop counter parameter consists of one octet. The value of the hop counter, which is decremented on each global title translation, should be in range 15 to 1.

3.19 Importance

The "importance" parameter field is a one-octet field and is structured as follows:

8	7	6	5	4	3	2	1
		Spare				Importance	

Bits 1-3 are binary coded to indicate the importance of the messages. The values are between 0 and 7, where the value of 0 indicates the least important and the value of 7 indicates the most important.

Bits 4-8 are spare bits.

The importance values may be subject to improvement pending further analysis of the impact of the SCCP congestion control procedures in different network scenarios and based on the results of operational experiences.

3.20 Long data

The "long data" parameter field is a variable length field containing SCCP-user data up to 3952 octets to be transferred transparently between the SCCP user functions. The "long data" parameter has a two-octet "length indicator" field.

4 SCCP messages and codes

4.1 General

4.1.1 In the following clauses, 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 clause 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 parameter*s* 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. The pointer to the optional parameter block occurs after all pointers to variable parameters.

4.2 Connection request (CR)

The CR message contains:

– two pointers;

– the parameters indicated in Table 3.

Table 3/Q.713 – Message type: Connection request

Parameter	Clause	Type (F V O)	Length (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
Hop counter	3.18	O	3
Importance	3.19	O	3
End of optional parameters	3.1	O	1

4.3 Connection confirm (CC)

The CC message contains:

– one pointer;

– the parameters indicated in Table 4.

Table 4/Q.713 – Message type: Connection confirm

Parameter	Clause	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
Importance	3.19	O	3
End of optional parameter	3.1	O	1

4.4 Connection refused (CREF)

The message contains:

– one pointer;

– the parameters indicated in Table 5.

Table 5/Q.713 – Message type: Connection refused

Parameter	Clause	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
Importance	3.19	O	3
End of optional parameter	3.1	O	1

4.5 Released (RLSD)

The RLSD message contains:

– one pointer;

– the parameters indicated in Table 6.

Table 6/Q.713 – Message type: Released

Parameter	Clause	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
Importance	3.19	O	3
End of optional parameter	3.1	O	1

4.6 Release complete (RLC)

The RLC message contains:

– no pointers;

– the parameters indicated in Table 7.

Table 7/Q.713 – Message type: Release complete

Parameter	Clause	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:

– one pointer;

– the parameters indicated in Table 8.

Table 8/Q.713 – Message type: Data form 1

Parameter	Clause	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:

– one pointer;

– the parameters indicated in Table 9.

Table 9/Q.713 – Message type: Data form 2

Parameter	Clause	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:

– no pointers;

– the parameters indicated in Table 10.

Table 10/Q.713 – Message type: Data acknowledgement

Parameter	Clause	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:

– three pointers;

– the parameters indicated in Table 11.

Table 11/Q.713 – Message type: Unitdata

Parameter	Clause	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	3 minimum (Note 2)
Data	3.16	V	2-X (Note 1)
NOTE 1 – 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.			
NOTE 2 – The minimum length = 2 might apply in the special case of AI = X0000000 described in 3.5.			

4.11 Unitdata service (UDTS)

The UDTS message contains:

– three pointers;

– the parameters indicated in Table 12.

Table 12/Q.713 – Message type: Unitdata service

Parameter	Clause	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	3 minimum
Data	3.16	V	2-X (Note)
NOTE – See Note 1 Table 11.			

4.12 Expedited data (ED)

The ED message contains:

– one pointer;

– the parameters indicated in Table 13.

Table 13/Q.713 – Message type: Expedited data

Parameter	Clause	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:

– no pointers;

– the parameters indicated in Table 14.

Table 14/Q.713 – Message type: Expedited data acknowledgement

Parameter	Clause	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:

– one 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	Clause	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 confirmation (RSC)

The RSC message contains:

– no pointers;

– the parameters indicated in Table 16.

Table 16/Q.713 – Message type: Reset confirmation

Parameter	Clause	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:

– one 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	Clause	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:

– no pointers;

– the parameters indicated in Table 18.

Table 18/Q.713 – Message type: Inactivity test

Parameter	Clause	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 (Note)	3.9	F	2
Credit (Note)	3.10	F	1
NOTE – 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:

– four pointers;

– the parameters indicated in Table 19.

Table 19/Q.713 – Message type: Extended unitdata

Parameter	Clause	Type (F V O)	Length (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	3 minimum (Note 3)
Data	3.16	V	2 to Y+1 (Note 1)
Segmentation	3.17	O	6 (Note 2)
Importance	3.19	O	3
End of optional parameters	3.1	O	1

NOTE 1 – The maximum length of this parameter depends on the length of the called party address, calling party address parameters, and the presence of optional parameters. Y is between 160 and 254 inclusive. Y can be 254 when called party address and calling party address parameters do not include the GT, and the importance and segmentation parameters are absent. Y can be at most 247 if the segmentation parameter is included and the importance parameter is absent. See 8.3.2/Q.715.

NOTE 2 – Should not be present in case of a single XUDT message.

NOTE 3 – The minimum length = 2 might apply in the special case of AI = X0000000 described in 3.5

4.19 Extended unitdata service (XUDTS)

The XUDTS message contains:

– four pointers;

– the parameters indicated in Table 20.

Table 20/Q.713 – Message type: Extended unitdata service

Parameter	Clause	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	3 minimum
Data	3.16	V	2 to Y+1 (Note)
Segmentation	3.17	O	6
Importance	3.19	O	3
End of optional parameters	3.1	O	1

NOTE – The maximum length of this parameter depends on the length of the called party address, calling party address parameters, and the presence of optional parameters. Y is between 160 and 254 inclusive. Y can be 254 when called party address and calling party address parameters do not include the GT, and the importance and segmentation parameters are absent. Y can be at most 247 if the segmentation parameter is included and the importance parameter is absent. See 8.3.2/Q.715.

4.20   Long unitdata (LUDT)

The LUDT message contains:

–   four two-octet pointers;

–   the parameters indicated in Table 21.

Table 21/Q.713 – Message type: Long unitdata

Parameter	Clause	Type (F V O)	Length (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	3 minimum
Long data	3.20	V	3-3954 (Note 2)
Segmentation	3.17	O	6 (Note 1)
Importance	3.19	O	3
End of optional parameters	3.1	O	1
NOTE 1 – Originating SCCP node must include this parameter if segmentation at relay node may be encountered in certain network configuration.			
NOTE 2 – See 8.3.2/Q.715.			

4.21   Long unitdata service (LUDTS)

The LUDTS message contains:

–   four two-octet pointers;

–   the parameters indicated in Table 22.

Table 22/Q.713 – Message type: Long unitdata service

Parameter	Clause	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	3 minimum
Long data	3.20	V	3-3954 (Note)
Segmentation	3.17	O	6
Importance	3.19	O	3
End of optional parameters	3.1	O	1
NOTE – See 8.3.2/Q.715.			

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 no special option. The called and calling party address parameters will refer to SSN = 1 (SCMG) and will have routing indicator set to "route on SSN". SCCP management message parts are provided in the "data" parameter of the unitdata or extended unitdata message or "long data" of the LUDT message.

Descriptions of the various parameters are contained in the following subclauses. Format of the SCMG message is specified in 5.3.

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 23.

Table 23/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
SSC SCCP/subsystem-congested	00000110

5.1.2 Formatting principles

The formatting principles used for SCCP messages, as described in 1.3 and 1.4 apply to SCMG messages.

5.2 SCMG message parameters

5.2.1 Affected SSN

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

5.2.2 Affected PC

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

5.2.3 Subsystem multiplicity indicator

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

8	7	6	5	4	3	2	1
Spare						SMI	
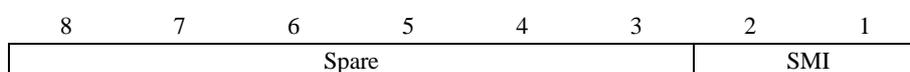
Figure 12/Q.713 – Subsystem multiplicity indicator format

The coding of the SMI field is as follows:

Bits
<u>2 1</u>
0 0   affected subsystem multiplicity unknown

1 0⎫
        ⎬ reserved for national use
1 1⎭

Bits   3-8 are spare.

5.2.4 SCCP congestion level

The "SCCP congestion level" parameter field consists of one octet coded as shown in Figure 13.

8	7	6	5	4	3	2	1
Spare				SCCP congestion level			

Figure 13/Q.713 – SCCP congestion level format

Bits 1-4 are binary coded to indicate the congestion level of the SCCP node. The values are between 1 and 8, where the value of 1 indicates the least congested condition and the value of 8 indicates the most congested condition.

The SCCP congestion level may be subject to improvement pending further analysis of the impact of the SCCP congestion control procedures in different network scenarios and based on the results of operational experiences.

5.3 SCCP Messages

The SCMG messages (SSA, SSP, SST, SOR and SOG) contain mandatory fixed parameters indicated in Table 24. These parameters are defined in the data field of the UDT, XUDT and LUDT message.

**Table 24/Q.713 – SCMG messages
(SSA, SSP, SST, SOR, SOG)**

Parameter	Clause	Type (F V O)	Length (octets)
SCMG format identifier (Message type code)	5.1.1	F	1
Affected SSN	5.2.1	F	1
Affected PC	5.2.2	F	2
Subsystem multiplicity indicator	5.2.3	F	1

The SCMG message of "SCCP/subsystem-congested" (SSC) shall contain the mandatory fixed parameters indicated in Table 25. These parameters are defined in the data field of the UDT, XUDT and LUDT message.

Table 25/Q.713 – SSC

Parameter	Clause	Type (F V O)	Length (octets)
SCMG format identifier (Message type code)	5.1.1	F	1
Affected SSN	5.2.1	F	1
Affected PC	5.2.2	F	2
Subsystem multiplicity indicator	5.2.3	F	1
SCCP congestion level	5.2.4	F	1

ANNEX A

Mapping for cause parameter values

A.1   Introduction

During connection refusal/release/reset, the SCCP and its users may take corrective action, if necessary, based upon relevant information available to them. Thus, it would be very helpful if such 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 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 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 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 (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 (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 (2.1.1.2.3/Q.711).

A.5   Return cause

There is a one-to-one mapping between the return cause of UDTS, XUDTS or LUDTS messages and the reason for return in the N-NOTICE primitives.

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 establishment timer	connection refusal – reason unspecified/transient	NSP[a)]
00001101	incompatible user data	connection refusal – incompatible information in NSDU	NSU
00001110	reserved	reserved	reserved
00001110	not obtainable	connection refusal – reason unspecified/transient	NSP[a)]
00001111	unqualified	connection refusal – reason unspecified/transient	NSU
00001111	unqualified	connection refusal – reason unspecified/non-transient	NSP
00001111	unqualified	connection refusal – undefined	undefined
00010000	hop counter violation	connection refusal – hop counter violation	NSP
00010010	no translation for an address of such nature	connection refusal – destination address unknown/non-transient condition	NSP
00010011	unequipped user	connection refusal – destination inaccessible/non-transient condition	NSP

NSU Network Service User

NSP Network Service Provider

[a)] When the originator is set to NSP, the causes referring to routing failures do not apply when the setup is initiated with a N-REQUEST interface element, since the routing is then done by ISUP. Only the case "SCCP user originated" with originator = NSU or those with originator = NSP and labelled with a) are then applicable.

Table A.2/Q.713 – Mapping during connection release

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	MTP 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	reserved	reserved	reserved
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
NSU Network Service User			
NSP Network Service Provider			

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 synchronisation	NSU
00000001	SCCP user originated	reset – user synchronisation	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 synchronisation	NSU
00001010	network congestion	reset – network congestion	NSP
00001011	reserved	reserved	reserved
00001100	unqualified	reset – unspecified	NSP
00001100	unqualified	reset – undefined	undefined
NSU Network Service User			
NSP Network Service Provider			

ANNEX B

International SCCP addressing and format specification

B.1   Introduction

This annex documents a list of the assigned code values of the translation types (TT), numbering plan (NP) and nature of address indicator (NAI), which are used to define the contents of the global title addresses information (GTAI); as well as the types of GT-addressable SCCP user entities allowed by the services or applications. In addition, this annex defines the address indicator (AI) and the SSN for each service or application. Guidelines are also included for application protocol development on using the SCCP addressing information. The purpose of this annex is to gather in one place all the address formats which the SCCP is currently required to support in the international network.

B.2   Guidelines on using SCCP addressing information elements in the international network

1)   If SCCP routing is to be performed using the GT and the next SCCP relay node is outside the national network boundary, only the GT with global title indicator (GTI) indicating "4" shall be sent in the SCCP called party address. In addition, a SSN address element shall always be present in the SCCP called party address, and shall take one of the following values:

- if known and internationally standardised, the SSN of the called SCCP user entity, or

- if known and not internationally standardised, the SSN (from the national range) for the called SCCP user entity in the destination network, or

- zero, and coded as"0" (where the identity of the called SCCP user entity is not known).

A PC may be present in the SCCP called party address, but is not evaluated.

If the SSN supplied in the called party address cannot be used by the destination network, the content of the GT at the final translation point needs to be sufficient for the translation to derive an SSN for message distribution from the SCCP at the message's destination SP. The values of the address elements of the CdPA (including the translation type (TT) and any SSN that is not internationally standard) need to be established between the operators of the end SCCP user entities.

If SCCP routing is based on the SSN and the destination SCCP user is outside the national boundary, an internationally standard Q.713 SSN shall be used and the GT may be optionally included in the SCCP CdPA parameter. If the GT is not included, the GT indicator (GTI) should be coded as "0".

2) When the SCCP messages are to be sent across the international network, the calling party address (CgPA) parameter, if provided, shall include one of the following set of SCCP address information elements to identify the originating SCCP user depending on the coding of the RI field:

- standard Q.713 global title and SSN of "0" if the RI is "route on GT", no internationally standard SSN is specified and it is not appropriate to use a national SSN value (it is not appropriate, for example, to use a national SSN value if messages would thereby be discarded);

- standard Q.713 global title and national SSN value if the RI is "route on GT" and no internationally standard SSN is specified;

- standard Q.713 global title and internationally standard SSN if the RI is "route on GT";

- Q.708 ISPC and internationally standard Q.713 SSN if the RI is "route on SSN".

If a global title is included in the calling party address parameter, the GTI shall be set to "4".

3) In case a GT is present in the SCCP calling and/or called party addresses, the structure of the global title in the addresses shall adhere to one of the international global title specifications in the following section (deviations are only possible if multilateral agreements are obtained).

4) If the SCCP nodes can be addressed on the international network using the Q.708 International Signalling Point Codes (ISPC) in the DPC of the MTP routing label, routing on SSN is also allowed; and the RI field shall indicate "route on SSN".

B.3   GT routing specification of international services

This clause identifies the types of address format defined in the next clause, which shall be used in the called and/or calling party address parameters for international services requiring the SCCP GT-based routing. Table B.1 lists the international services and the addressable SCCP user entities of their SCCP messages to be routed on global title; and indicates the types of address formats in the called/calling party address parameters associated with each message flow. When the "called/calling PA" entries of Table B.1 contain more than one translation selectors, the one to be used is subject to bilateral agreement.

Table B.1/Q.713 – Called/calling party address formats for international services requiring GT-based routing

Applications and references	Addressable SCCP user entities of messages route on GT	Called PA	Calling PA
ISDN supplementary service – CCBS, ITU-T Q.733.3.	Entities receiving query on the busy/idle status of called parties (as defined in ISUP).	B.4.1	B.4.1 B.4.3 B.4.4
	Entities receiving response about the busy/idle status of called parties (as defined in ISUP).	B.4.1 B.4.3 B.4.4	B.4.1 B.4.3 B.4.4
International Telecommunication Charge Card Calling (ITCC), ITU-T Q.736.1 and E.118.	Entities receiving query to validate the card.	B.4.2	B.4.3 B.4.4
	Entities receiving response of card validation or subsequent messages within the same dialogue.	B.4.3 B.4.4	B.4.3 B.4.4
Broadband ISDN edge-to-edge applications	Entities receiving query.	B.4.5	B.4.3 (Note) B.4.4 DPC+SSN
	Entities receiving response.	B.4.3 (Note) B.4.4 DPC + SSN	B.4.3 (Note) B.4.4 DPC + SSN
Authentication, Registration and Location Update for E.212-based roaming application.	Entities (Home Location Register) receiving queries.	B.4.6	B.4.3 B.4.4
	Entities receiving response.	B.4.3 B.4.4	B.4.3 B.4.4
Authentication, Registration and Location Update for E.214-based roaming application.	Entities (Home Location Register) receiving queries.	B.4.7	B.4.3 B.4.4
	Entities receiving response.	B.4.3 B.4.4	B.4.3 B.4.4
IN Services.	IN entities receiving queries.	B.4.4	B.4.3 B.4.4
	Entities receiving response.	B.4.3 B.4.4	B.4.3 B.4.4
NOTE – For further study.			

NOTE – If GTAI exclusivity between SCCP user entities is not possible and only part of the signalling route is also shared, then the translator cannot be shared by different SCCP user entities.

B.4 International GT routing specification

All code values in this clause will be specified in decimal unless specified otherwise.

B.4.1 Translation selector: TT = 17, NP = 1, NAI = 4

This translation selector identifies the type of global title used by the applications listed in Table B.1.

B.4.1.1 Format of address indicator and address

8	7	6	5	4	3	2	1	Octets
0	RI = 0	GTI = 4				SSNI = 1	PCI = 0	1
SSN = 11								2
Translation type = 17								3
Numbering plan = 1 (ITU-T E.164)				**Encoding scheme = 1 or 2**				4
0	**Nature of address indicator = 4 (International)**							5
Country code digit 2 (if present)				Country code digit 1				6
National significant number (NSN) digit 1				Country code digit 3 (if present)				•
NSN digit 3				NSN digit 2				•
•				•				10
•				•				11
NSN digit 11 (if present)				NSN digit 10 (if present)				12
If needed, filler = 0				NSN digit 12 (if present)				13

NOTE – The maximum number of the GTAI digits is normally determined by the maximum of the E.164 numbering plan.

Figure B.1/Q.713 – Address format for TT = 17, NP = 1, NAI = 4

B.4.1.2 Translation rules

1) A maximum of the first three digits of the GTAI are used to identify the destination country or region of the addressable entities of this application group.

2) The maximum number of CC + NDC digits to address an incoming international gateway to destination network is specified in the E.164 numbering plan.

3) The maximum number of the NSN digits used to identify a specific SCCP user entity of this application group is a national matter or network-specific.

4) An SSN of decimal 11 for ISDN supplementary services shall be included along with this global title in the called party address parameter at the international interface.

B.4.2 Translation selector: TT = 1, NP = 0, NAI = 4

This translation selector identifies the type of global title used by the applications listed in Table B.1.

B.4.2.1 Format of address indicator and address

See Figure B.2.

8	7	6	5	4	3	2	1	Octets
0	RI = 0	GTI = 4				SSNI = 1	PCI = 0	1
SSN = 11								2
Translation type = 1								3
Numbering plan = 0 (unknown)				**Encoding scheme = 1 or 2**				4
0	**Nature of address indicator = 4 (International)**							5
Second digit of E.118 number				First digit of E.118 number				6
Fourth digit of E.118 number				Third digit of E.118 number				7
Sixth digit of E.118 number				Fifth digit of E.118 number				8
Eighth digit of E.118 number				Seventh digit of E.118 number				9
•				•				•
•				•				•
If needed, filler = 0				Last digit of E.118 number				•

NOTE – The maximum number of the GTAI digits is determined by the maximum number of digits specified in the E.118 numbering plan.

Figure B.2/Q.713 – Called party address format for TT = 1, NP = 0, NAI = 4

B.4.2.2 Translation rules

1) A maximum of the first seven digits of the GTAI, are used to identify the card issuers, which administer the entities receiving card validation query and ITCC call disposition message. These digits are referred to "issuer identification number" (IIN).

2) If the first two digits are "89", the following 1/2/3 digits (third through fifth digit) shall indicate country codes (CC) of the card issuers according to the E.164 assignment. The format of the Issuer Identifier (II) that follows the CC, is a national matter.

3) The maximum number of the GTAI digits used to identify a specific SCCP user entity of this application group is determined by the issuer and is network-specific.

4) An SSN of decimal 11 for ISDN supplementary services shall be included along with this global title in the called party address parameter at the international interface.

B.4.3 Translation selector: TT = 2, NP = 2, NAI = 4

This translation selector identifies the type of global title used by the applications listed in Table B.1.

B.4.3.1 Format of address indicator and address

See Figure B.3.

8	7	6	5	4	3	2	1	Octets
0	RI = 0	GTI = 4				SSNI = 1	PCI = 0	1
SSN = 0 or standard SSN								2
Translation type = 2								3
Numbering plan = 2				**Encoding scheme = 1, 2 or 3**				4
0	**Nature of address indicator = 4 (International)**							5
Q.708 U digit (most significant)				Q.708 Z digit				6
Q.708 U digit (least significant)				Q.708 U digit				7
0 (Filler)				Q.708 V digit				8
National significant part								9
National significant part								•
•								•
•								•
•								•

Figure B.3/Q.713 – Address format for TT = 2, NP = 2, NAI = 4

Octet 6 to 8 is called the "Q.708 Part" and its encoding scheme shall be encoded in BCD. The Q.708 Z-UUU digits are decimal representation of the Q.708 signalling area/network codes (SANC) of the final destination countries, new code values are published regularly in the Operational Bulletin of the ITU.

Encoding for the national significant part is determined by the originating network and shall be indicated by the encoding scheme field of octet 4.

B.4.3.2 Translation rules

1) Only the Q.708 part of the GTAI shall be translated for routing in the international network.

2) The format of the national significant part (NSP) is a national matter. The maximum length of NSP is network-specific.

B.4.4 Translation selector: TT = 0, NP = 1, NAI = 4

This translation selector identifies the type of global title used by the applications listed in Table B.1.

B.4.4.1 Format of address indicator and address

See Figure B.4.

8	7	6	5	4	3	2	1	Octets
0	RI = 0	GTI = 4				SSNI = 1	PCI = 0	1
SSN = 0 or international standard value								2
Translation type = 0								3
Numbering plan = 1 (ITU-T E.164)				**Encoding scheme = 1 or 2**				4
0	**Nature of address indicator = 4 (International)**							5
Country code digit 2 (if present)				Country code digit 1				6
National destination code (NDC) Digit 1				Country code digit 3 (if present)				7
NDC digit 3 (if present)				NDC digit 2 (if present)				8
NDC digit 5 (if present)				NDC digit 4 (if present)				9
Equipment identification digit 2				Equipment identification digit 1				10
•				•				•
If needed, filler = 0				Equipment identification digit N (if present)				M

NOTE – The maximum number of the GTAI digits is normally determined by the maximum of the E.164 numbering plan.

Figure B.4/Q.713 – Address format for TT = 0, NP = 1, NAI = 4

The GTAI is formatted according to the E.164 numbering plan. It consists of the E.164 country codes, followed by the nationally-assigned NDC and the network-specific or operator-assigned equipment identification digits of the signalling point. This GT, together with the SSN unambiguously identifies a particular SCCP user entity in the network.

B.4.4.2 Translation rules

1) A maximum of the first three digits of the GTAI are used to identify the destination country or region of the addressable entities. For destination countries with only one operator, translation of the CC should be sufficient.

2) For destination countries with multiple network operators, only the CC and NDC are translated within the international network to identify the destination networks.

3) Translation of additional digits (i.e. equipment identification) to identify a specific SCCP user entity is a national matter or network-specific.

B.4.5 Translation selector: TT = 3, NP = 1, NAI = 4

This translation selector identifies the type of global title used by the applications listed in Table B.1.

B.4.5.1 Format of address indicator and address

See Figure B.5.

8	7	6	5	4	3	2	1	Octets
0	RI = 0	GTI = 4				SSNI = 1	PCI = 0	1
SSN = 13								2
Translation type = 3								3
Numbering plan = 1 (ITU-T E.164)				Encoding scheme = 1 or 2				4
0		Nature of address indicator = 4 (International)						5
Country code digit 2 (if present)				Country code digit 1				6
National significant N = number (NSN) digit 1				Country code digit 3 (if present)				•
NSN digit 3				NSN digit 2				•
•				•				10
•				•				11
NSN digit 11 (if present)				NSN digit 10 (if present)				12
If needed, filler = 0				NSN digit 12 (if present)				13

NOTE – The maximum number of the GTAI digits is normally determined by the maximum of the E.164 numbering plan.

Figure B.5/Q.713 – Address format for TT = 3, NP = 1, NAI = 4

B.4.5.2 Translation rules

1) A maximum of the first three digits of the GTAI are used to identify the destination country or region of the addressable entities of this application group.

2) The maximum number of CC + NDC digits to address an incoming international gateway to destination network is specified in the E.164 numbering plan.

3) The maximum number of the NSN digits used to identify a specific SCCP user entity of this application group is a national matter or network-specific.

4) An SSN of decimal 13 for broadband ISDN edge-to-edge applications, which will be transferred along with this global title in the called party address parameter, shall be provided by the originating application entity.

B.4.6 Translation Selector: TT = 40, NP = 6, NAI = 4

This translation selector identifies the type of global title used by the applications listed in Table B.1.

B.4.6.1 Format of Called Party Address and its GT

See Figure B.6.

8	7	6	5	4	3	2	1	Octets
0	RI = 0	GTI = 4				SSNI = 1	PCI = 0	1
SSN = "0" or internationally standard SSN value, if known								2
Translation type = 40								3
Numbering plan = 6 (ITU-T E.212)				Encoding scheme = 1 or 2				4
0		Nature of address indicator = 4 (International)						5
Second digit of E.212 Number				First digit of E.212 Number				6
Fourth digit of E.212 Number				Third digit of E.212 Number				7
Sixth digit of E.212 Number				Fifth digit of E.212 Number				8
Eighth digit of E.212 Number				Seventh digit of E.212 Number				9
•				•				•
•				•				•
If needed, filler = 0				Last digit of E.212 Number (max. 15 digits)				•

Figure B.6/Q.713 – Address format for TT = 40, NP = 6, NAI = 4

B.4.6.2   Translation Rules

–   The maximum number of the GTAI digits used to identify a specific destination network of a SCCP user entity for this application group should be the first 6 digits.

B.4.7   Translation Selector: TT = 0, NP = 7, NAI = 4

This translation selector identifies the type of global title used by the applications listed in Table B.1.

B.4.7.1   Format of Called Party Address and its GT

See Figure B.7.

8	7	6	5	4	3	2	1	Octets
0	RI = 0	GTI = 4				SSNI = 1	PCI = 0	1
SSN = "0" or internationally standard SSN value, if known								2
Translation type = 0								3
Numbering plan = 7 (ITU-T E.214)				**Encoding scheme = 1 or 2**				4
0	**Nature of address indicator = 4 (International)**							5
Second digit of E.214 Number				First digit of E.214 Number				6
Fourth digit of E.214 Number				Third digit of E.214 Number				7
Sixth digit of E.214 Number				Fifth digit of E.214 Number				8
Eighth digit of E.214 Number				Seventh digit of E.214 Number				9
•				•				•
•				•				•
If needed, filler = 0				Last digit of E.214 Number (max. 15 digits)				•

NOTE – The maximum number of the GTAI digits is determined by the maximum number of digits specified in the E.214 numbering plan.

Figure B.7/Q.713 – Address format for TT = 0, NP = 7, NAI = 4

B.4.7.2   Translation rules

1)   A maximum of the first three digits of the GTAI are used to identify the destination country or region of the addressable entities of this application group.

2)   The maximum number of CC + NDC digits to address an incoming international gateway to destination network is specified in the E.164 numbering plan.

3)   The maximum number of the NSN digits used to identify a specific SCCP user entity of this application group is a national matter or network-specific.

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