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## **SECTION 5 – GENERIC SDH INTERFACE SPECIFICATION**

### **1. INTERCONNECT REQUIREMENTS**

The Synchronous Digital Hierarchy interface between the PTCL and Operator Systems shall be as defined in the appropriate “Technical Recommendations” agreed in the Public Network Operator Interest Group (PNO-IG) (the PNO-IG supports the Network Interoperability Consultative Committee) relating to STM-1 and STM-4.

The Operator shall provide a suitable compliance statement against the above Technical Recommendation. This compliance statement shall be discussed by PTCL and the Operator and when agreed shall confirm that the SDH system is suitable for interconnection of the PTCL and Operator Systems.

### **2. FUNCTIONAL CHARACTERISTICS OF THE 2 MBIT/S INTERFACE**

The functional characteristics of the 2 Mbit/s interface shall be as specified in the PTCL Generic Electrical and Physical Interface Specification.

### **3. REQUIREMENTS FOR COMPLIANCE STATEMENT**

SPECIFICATION	DESCRIPTION
SDH interconnect between Licensed Operators - Technical Recommendation, Issue 6.	Defines interworking requirements at the Point of Connection for all SDH network layers
Electrical and Physical Specification	Section 5 functional characteristics of the 2Mbit/s interface.

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## **SECTION 6 – GENERAL ASPECTS OF CCS No.7 SIGNALLING FOR THE NATIONAL NETWORK OF PAKISTAN**

### **CCS 0101 ISSUE 1.0 CCS 0104 - Issue 1.0 - 22.01.1996 and CCS 0105 - Issue 1.0 - 22.01.1996**

#### **4. SUBJECT**

These requirements specifies the version of the CCITT Common Channel Signalling System No.7 (CCS No.7) to be implemented in digital telephone/ ISDN exchanges installed in the national telephone/ ISDN Network of Pakistan.

#### **5. SCOPE**

The specified version consists of Message Transfer Part and ISDN User Part. The implementation of other parts of CCS No.7 in the national network of Pakistan is for further study.

#### **6. FIELD OF APPLICATION**

The specified version of CCS No.7 will be applied between local, transit, combined, and international digital exchanges over terrestrial and satellite transmission links.

#### **7. REFERENCES TO CCITT RECOMMENDATIONS**

##### **7.1 MESSAGE TRANSFER PART (MTP)**

The MTP shall be established conforming to the CCITT Rec. Q.701- .709 and Q.791 of Blue Book.

##### **7.2 SDN USER PART (ISUP)**

For the international as well as for the national interface the ISUP shall be established conforming to the CCITT Rec. Q.767, which is based on the CCITT Blue Book Recommendations Q.730 and Q.761- Q.764.

The required support of the generic notifications indicator for the call waiting, call hold, and call forwarding supplementary services, and for the generic number, which are not included in the CCITT Rec. Q.767, shall be established conforming to the new CCITT Recommendations Q.761- Q.764 (COM-XI-R233 to R235-E, Issue April/ May 1992). The Call Forwarding Supplementary Services shall be established conforming to the new CCITT Recommendation Q.732 (COM XI-R 228-E, Issue April 1992). For details regarding the requirements for the ISUP, please refer to clause **10** of this document.

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## 8. INTER WORKING WITH DIFFERENT SIGNALLING SYSTEMS

The digital exchanges shall provide inter working between Q CCS No. 7- ISUP and all other inter exchange signalling systems used in the national network of Pakistan.

The following Table provides an overview of required inter working cases.

To From	ISUP	TUP	F6a	E&M
ISUP	Yes	Yes	Yes	Yes
TUP	Yes	Yes	Yes	Yes
F6a	Yes	Yes	Yes	Yes
E&M	Yes	Yes	Yes	Yes

In the inter working the ISUP shall be adapted to the capacity of the weaker signalling system. For details please refer to the specification CCS 0104, in which the requested national coding is specified and to the specification CCS 0105, in which representative flow charts are included.

A summary of the requested national messages and the requested national parameters is included in clause **10.4** of this document. The requested subscriber categories for the national network of Pakistan are summarised in clause **10.5** of this document.

The particular procedures requested for malicious call identification! tracing, charging and trunk offering shall be implemented similarly to those procedures included in the National Telephone User Part (TUP).

With regard to the TUP implementation reference is made to the Requirement Specification P30304- A2760- AOOI- 2- 7626

## 9. SUMMARY OF THE REQUIREMENTS FOR THE MTP

The MTP implementation shall be in compliance with the CCITT Blue Book Recommendations Q.701 to Q.709 and Q.791, excluding the various optional procedures as well as the Signalling Point Restart and the User Part Flow Control (User Part Unavailability) procedures. Details with regard to the requested functions are specified in document CCS 0102.

In the following, the Heading Code Allocation Table the Messages and Signals to be implemented are shown.

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<b>Messages and Signals to be implemented</b>									
<b>Message Group</b>	<b>HO HI</b>	<b>0001</b>	<b>0010</b>	<b>0011</b>	<b>0100</b>	<b>0101</b>	<b>0110</b>	<b>0111</b>	<b>1000</b>
<b>CHM</b>	0001	COO	COA			CBD	CBA		
<b>ECM</b>	0010	ECO	ECA						
<b>FCM</b>	0011		TFC						
<b>TFM</b>	0100	TFP				TFA			
<b>RSM</b>	0101	RST							
<b>MIM</b>	0110	LIN	LUN	LIA	LUA	LID	LFU	LLT	LRT

Note: Abbreviations used as per Blue Book CCITT Recommendation Q.704, Table I/Q.704 (pages 192 and 193)

## **10. SUMMARY OF THE REQUIREMENTS FOR THE ISUP**

### **10.1 GENERAL**

The ISUP implementation shall be in compliance with the CCITT Rec. Q.767 and shall include some enhancements in order to cater for national specific requirements as:

- Charging aspects
- Malicious Call Identification/holding
- Trunk offering

which are not relevant to the international interface<sup>1</sup>.

Besides of the services defined in the CCITT Rec. Q. 767, the ISUP Implementations shall also supports the following supplementary services:

- Call Forwarding Unconditional (CFU),

<sup>1</sup> The CCITT Re. Q.767 specifies the ISUP for use on international interconnections.

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- Call Forwarding Busy (CFB),
- Call Forwarding on No Reply (CFNR),

on the basis of the new CCITT Rec. Q.732 (please refer to clause **7.2** of this document).

Furthermore some protocol elements of the newest CCITT Recommendations Q.761-Q.764 (please refer to clause **7.2** of this document) shall be included, in order to ease the introduction of some supplementary services.

As general information the main required enhancements are summarized as follows:

- Adaptation of certain timer values as agreed in the Geneva meeting in April 1991 (now incl. in the new CCITT Recommendations Q.761- Q.764, please refer also to clause **7.2** of this document).
- Treatment of the MTP- Pause/ Resume primitives as agreed in the Geneva meeting in April 1991 (now incl. in the new CCITT Recommendations Q.761- Q.764, please refer also to clause **7.2** of this document).
- Inclusion of additional category's for the national application.
- Inclusion of additional code points needed for national applications (e.g. "National Significant Number" for the Calling Party Number Parameter) in accordance with the. Blue Book CCITT Recommendations Q.761- Q.764.
- Implementation of INF/ INR cycle as per Blue Book CCITT Recommendations Q.761- Q.764, only for the calling line identity request.
- Use of the Notification Indicator Parameter Field on the basis of the new CCITT Recommendations Q.761- Q.764 (please refer also to clause **7.2** of this document), in order to ease the introduction of the Call Waiting, Call Hold, and Call Forwarding supplementary services.
- Use of the Generic Number in order to support the additional Calling Party Number and the additional Called Party Number, on the basis of the new CCITT Recommendations Q.761- Q.764 (please refer also to clause **7.2** of this document).



- Support of the Call Forwarding Supplementary Services on the basis of the new CCITT Rec. Q.732 (please refer also to clause 7.2 of this document).

Details with regard to the requested functions are specified in the document CCS 0103, 0104 and 0105.

## **10.2 SERVICES TO BE SUPPORTED BY THE ISUP IMPLEMENTATION**

### **10.2.1 *Bearer Services***

- 64 kbit/s unrestricted
- 64 kbit/s for 3.1 kHz audio
- 64 kbit/s for speech

### **10.2.2 *Teleservices***

- Telephony
- Teletex
- Telefax Gr. 4
- Mixed mode
- Videotex
- Telefax Gr. 2/3

### **10.2.3 *Supplementary Services***

- Calling line identification presentation restriction (CLIP/ CLIR)
- Connected line identification presentation restriction (COLP/ COLR)
- Call forwarding (CFU, CFB, CFNR)

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- Call hold (HOLD)
- Call waiting (CW)
- Closed user group (CUG)
- Direct dialling in (DDI)
- Multiple subscriber number (MSN)
- Sub- addressing (SUB)
- Terminal portability (TP)
- User- to- user signalling 1, implicit (USS 1)

### 10.3 USED MESSAGES AND PARAMETERS AS PER CCITT

#### 10.3.1 *The following CCITT defined messages shall be used*

Message type	Code
Address complete	00000110
Answer	00001001
Blocking	00010011
Blocking acknowledgement	00010101
Call progress	00101100
Circuit group blocking	00011000
Circuit group blocking acknowledgement	00011010
Circuit group reset	00010111
Circuit group reset acknowledgement	0010 100 1
Circuit group unblocking	00011001
Circuit group unblocking acknowledgement	00011011
Charge information	00110001
Connect	00000 III

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Message type	Code
Continuity	00000101
Continuity check request	00010001
Forward transfer	00001000
Information	00000100
Information request	00000011
Initial address	00000001
Release	00001100
Release complete	00010000
Reset circuit	00010010
Resume	00001110
Subsequent address	00000010
Suspend	00001101
Unblocking	00010100
Unblocking acknowledgement	00010110

**10.3.2 The following CCITT defined parameters shall be used:**

Parameter name	Code
Access transport	00000011
Automatic congestion level	00100111
Backward call indicators	0001000 I
Call Diversion Information	00110110
Called party number	00000100
Calling party number	00001010
Calling party's category	0000100 I
Cause indicators	00010010

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Parameter name	Code
Circuit group supervision message type indicator	00010101
Closed user group interlock code	00011010
Connected number	0010000 1
Continuity indicators	00010000
End of optional parameters	00000000
Event information	00100100
Forward call indicators	00000111
Generic Digits	11000001
Generic Notification Indicator	00101100
Generic Number	11000000
Information indicators	00001111
Information request indicators	00001110
Nature of connection indicators	00000110
Optional backward call indicators	00101001
Optional forward call indicators	00001000
Original called number	00101000
Range and status	00010110
Redirecting number	00001011
Redirection information	00010011
Subsequent number	00000101
Suspend/Resume indicators	00100010
Transmission medium requirement	00000010
User service information	00011101
User-to-user indicators	00101010
User-to-user information	00100000

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## 10.4 NATIONAL MESSAGES AND PARAMETERS

### 10.4.1 *The following national messages shall be used:*

Message type	Code
End of Hold	11111101
Identification	11111110
On Hook	11111100
Trunk Offer	11111111

### 10.4.2 *The following national parameters shall be used*

Parameter name	Code
Charge Band Number	11111111
National Forward Call Indicator	11111101
Number of Charging Units	11111110

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## **10.5 USED CATEGORIES**

The following categories shall be provided:

- National operator
- Ordinary calling subscriber
- Calling subscriber with priority
- Data call
- Test call
- Coin Box
- Maintenance line
- Multi party line
- VIP subscriber
- Charge information request
- ISD barred subscriber
- ANI equipment trouble

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## **Chapter 1**

### **1.        INTRODUCTION**

In the following chapters 2- 6 the specification for the Message Transfer Part (MTP) is included, This specification is based on the CCITT Blue Book Recommendations Q.701 - Q.704, Q.707 and Q.791, and is valid for the national as well as for the international application.

The requirements included in the Blue Book CCITT Rec.'s Q.705, Q.706, Q.708 and Q.709 are fully applicable for the international network and! or for the national network of Pakistan. They are therefore not included in the following.

In accordance with the CCITT Blue Book Recommendation Q. 700, § 9.1, a selection has been made for the national application, giving a standard with regard to the implementation within the national network of Pakistan. In order to clarify which of the MTP procedures and functions shall be used, all the paragraphs of the a.m. Recommendations are listed and shortly commented with regard to their applicability. For the detailed description of the chosen procedures, messages and signals, reference is made to the respective paragraphs of the CCITT Blue Book Recommendations.

## **Chapter 2**

### **1.        INTRODUCTION**

#### **1.1       General**

Please refer to the comments on the recommendations Q.702, Q.703, Q.704, Q.707 and Q.791 in Chapters 3,4, 5, and 6 respectively.

#### **1.2       Objectives**

Shall be implemented

#### **1.3       General characteristics**

##### **1.3.1    *Method of description***

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Please refer to the comments on the recommendations Q.702, Q.703, Q.704, Q.707, and Q.791 in Chapters 3, 4, 5, and 6 respectively.

### 1.3.2 *Primitives*

Shall be implemented

### 1.3.3 *Peer- to peer communication*

Shall be implemented

### 1.3.4 *Contents of Recommendations Q. 70X Series relating to the MTP*

Please refer to the comments on the recommendations Q.702, Q.703, Q.704, Q.707, and Q.791 in Chapters 3, 4, 5, and 6 respectively.

## 2. **SIGNALLING SYSTEM STRUCTURE**

### 2.1 **Basic functional division**

Shall be implemented

### 2.2 **Functional levels**

#### 2.2.1 *General*

Please refer to the comments on the recommendations Q.702, Q.703, Q.704, Q.707 and Q.791 in Chapters 3, 4, 5, and 6 respectively.

#### 2.2.2 *Signalling data link function (level 1)*

Please refer to the comments on the recommendation Q.702 in Chapter 3.

#### 2.2.3 *Signalling link function (level 2)*

Please refer to the comments on the recommendation Q.703 in Chapter 4.

#### 2.2.4 *Signalling network functions (level 3)*

Shall be implemented.

Please refer to the comments on the recommendations Q.704 and Q.707 in Chapters 5 and 6 respectively.

#### 2.2.5 *User Part functions (level 4)*

Please refer to the signalling requirements definitions for the respective User Parts.



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### **2.2.6 *Signalling message***

Shall be implemented.

## **2.3 Functional interfaces**

Shall be implemented

Please refer also to the comments on § 4.

## **3. MESSAGE TRANSFER DART AND THE SIGNALLING NETWORK**

### **3.1 General**

Shall be implemented.

#### **3.1.1 *Signalling network components***

Shall be implemented.

#### **3.1.2 *Signalling modes***

Shall be implemented.

#### **3.1.3 *Signalling point modes***

Shall be implemented.

#### **3.1.4 *Message labelling***

Shall be implemented

The standard routing label shall be also used for the national application.

Please refer also to the comments on recommendation Q. 704, §§ 2.2 and 15.2 in chapter 5.

### **3.2 Signalling message handling functions**

Shall be implemented

Please refer to the comments on the recommendation Q. 704 §§ 1.1, 1.2, 2.1, 2.2, 2.3 and 2.4 in chapter 5.

#### **3.2.1 *Message routing***

Shall be implemented

Please refer to the comments on the recommendation Q. 704 §§ 1.1, 1.2, 2.1, 2.2 and 2.3 in chapter 5.

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A uniform routing of messages belonging to different User Parts shall be used.

### **3.2.2 *Message distribution***

Shall be implemented

Please refer to the comments on the recommendation Q. 704 §§ 1.1, 1.2, 2.1 and 2.4 in chapter 5.

### **3.2.3 *Message discrimination***

Shall be implemented

Please refer to the comments on the recommendation Q. 704 §§ 1.1, 1.2, 2.1 and 2.4 in chapter 5.

## **3.3 *Signalling network management functions***

Shall be implemented

Please refer to the comments on the recommendations Q. 704 §§ 1.1 and 3-15 in chapter 5.

### **3.3.1 *Signalling traffic management***

Shall be implemented

Please refer to the comments on the recommendation Q. 704 §§ 1.1, 3-9 and 11 in chapter 5.

### **3.3.2 *Signalling link management***

Shall be implemented

Please refer to the comments on the recommendation Q. 704 §§ 1.1, 3 and 12 in chapter 5.

### **3.3.3 *Signalling route management***

Shall be implemented

Please refer to the comments on the recommendation Q. 704 §§ 1.1, 3 and 13 in chapter 5.

## **3.4 *Testing and maintenance functions***

Shall be implemented

Please refer to the comments on the recommendations Q. 707 and 791 in chapter 6.

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### **3.5 Use of the signalling network**

#### **3.5.1 *Signalling network structure***

Different types of signalling network structures shall be possible.

#### **3.5.2 *Provision of signalling facilities***

Redundancy of signalling links within a link set and redundancy in signalling routes for each destination shall be implemented within the national signalling network, in order to achieve the reliability requirements as per CCITT Recommendation Q.706.

#### **3.5.3 *Application of signalling network functions***

In dependence of the structure of the signalling network.

Please refer to the comments on the recommendation Q. 704 in chapter 5.

## **4. MESSAGE TRANSFER CAPABILITY**

### **4.1 General**

Shall be implemented

### **4.2 User location in system structure**

Shall be implemented

### **4.3 Message content**

#### **4.3.1 *Code transparency***

Shall be implemented

#### **4.3.2 *Service information***

Shall be implemented

Please refer to the comments on the recommendation Q. 704 § 14.2 in chapter 5.

#### **4.3.3 *Message label***

The standard routing label shall also be used for national application.

Please refer also to the comments on the recommendation Q. 704 §§ 2.2 and 15.2 in Chapter 5.

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#### **4.3.4 *Message length***

Shall be implemented

### **4.4 User accessibility**

In dependence of the signalling network structure, the routing plan, and the signalling modes.

Both, the associated and the quasi- associated signalling modes shall be used.

### **4.5 Transport service performance**

Performances as stated in the recommendation Q. 706 are applicable.

Please refer also to the comments on § 4.5.2.

#### **4.5.1 *Message transfer delay***

In dependence of the signalling network structure, bit rate, processing delays and signalling data link type.

#### **4.5.2 *Message transfer failures***

Complied.

Please refer also to the comments on § 3.5.2

## **5. DIFFERENCES FROM THE RED BOOK**

### **5.1 Signalling information field length**

Shall be implemented

### **5.2 Signalling Point restart**

Not used.

Please refer to the comments on the recommendation Q. 704 § 9 in chapter 5.

### **5.3 Management Blocking**

Shall be implemented

### **5.4 Signalling Link Test**

Shall be implemented

Please refer to the comments on the recommendation Q. 707 in chapter 6.

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## **5.5 Compatibility mechanism**

Please refer to the comments on § 6.

## **5.6 Timer values**

Shall be implemented

## **5.7 Processor Outage**

Shall be implemented

Please refer to the comments on the recommendations Q. 703 § 8 in chapter 4.

## **5.8 User flow control**

Not used.

Please refer to the comments on the recommendation Q. 704 § 11.2.7 in chapter 5.

## **5.9 Management Inhibiting and Management Inhibiting test procedure**

Shall be implemented

## **5.10 Signalling point/ signalling transfer point congestion**

Shall be implemented

# **6. COMPATIBILITY IN THE MESSAGE TRANSFER PART**

Shall be implemented in case of necessity, for the inter working between the implementations of different suppliers.

## **6.1 Unreasonable Information**

### **6.1.1 *Messages containing an unallocated SIO value***

Shall be implemented

### **6.1.2 *Message containing an unallocated HO/HI code***

Shall be implemented

### **6.1.3 *Message containing an unallocated value in a recognised field***

Shall be implemented

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## **6.2 Treatment of spare fields**

Shall be implemented

## **6.3 Lack of acknowledgement**

Shall be implemented

## **7. INTER WORKING OF YELLOW. RED AND BLUE MTP IMPLEMENTATIONS**

Shall be implemented in case of necessity, for the inter working between implementations of different suppliers.

## **8. PRIMITIVES AND PARAMETERS OF THE MESSAGE TRANSFER PART**

### **8.1 Transfer**

Shall be implemented

### **8.2 Pause**

Shall be implemented

### **8.3 Resume**

Shall be implemented

### **8.4 Status**

Shall be implemented

Please refer also to the comments on the recommendation Q. 704 §§ 2.3.5.1, 2.4.2, 3.8.2.1.b, 3.8.2.3, 11.2.6, 11.2.7, 13.4, 13.7, 13.8 and 13.9 in chapter 5.

### **8.5 Restart**

Not used.

Please refer to the comments on the recommendation Q. 704 §9 in chapter 5.

## **Chapter 3**

### **Signalling Data Link (Rec. Q.702, Level 1)**

#### **1. GENERAL**

##### **1.1 A signalling data link is...**

Shall be implemented

##### **1.2 Functional configuration of...**

Please refer to the comments on § 4.1.

##### **1.3 A digital signalling data link is...**

Please refer to the comments on §§ 5.1 and 5.5.

##### **1.4 An analogue signalling data link is...**

Please refer to the comments on § 6.

##### **1.5 Signalling System No.7 is capable...**

Shall be implemented

##### **1.6 The operational signalling data link shall...**

Shall be implemented

##### **1.7 Equipment such as echo suppressers**

Shall be implemented

##### **1.8 64- kbit/s digital channels entering...**

Shall be implemented

#### **2. SIGNALLING BIT RATE**

##### **2.1 General**

###### **2.1.1 *The standard bit rate on...***

Shall be implemented

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### **2.1.2 *Lower bit rates may be adopted...***

As a standard lower bit rate, 4.8 kbit/sec shall be used in case no digital transmission is available.

**[Note: In such case only the TUP is applicable]**

Please refer also to the comments on § 6.

### **2.1.3 *The minimum signalling bit rate...***

Please refer also to the comments on § 2.1.2.

## **2.2 Use of bit rates lower than 64 kbit/s**

Please refer also to the comments on § 2.1.2.

### **2.2.1 *For national telephone call control...***

Please refer also to the comments on § 2.1.2.

### **2.2.2 *Signalling System No.7...***

Please refer also to the comments on § 2.1.2.

### **2.2.3 *The possible use of Signalling System No.7...***

Not used.

## **3. ERROR CHARACTERISTICS AND AVAILABILITY**

Shall be implemented

## **4. INTERFACE SPECIFICATION POINTS**

### **4.1 Interface requirements may be...**

For digital transmission point C shall be applicable.

For Analogue 4.8 kbit/sec transmission, the points A and B shall be applicable.

Please refer also to the comments on § 2.1.2.

### **4.2 For the international application...**

Shall be implemented

Please refer to the comments on § 4.1.



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#### **4.3 Interface requirements for an...**

Please refer to the comments on § 5.1.

#### **4.4 Interface requirements for an...**

Please refer to the comments on § 6.

#### **4.5 Interface at Point A mayor...**

Please refer to § 4.1.

As interface the requirements as CCITT per Rec. v.24 shall be implemented

#### **4.6 Implementations which do not follow...**

Please refer to the comments on the recommendation Q. 707 in chapter 6.

### **5. DIGITAL SIGNALLING DATA LINK**

#### **5.1 Signalling data link derived from 2048- kbit/s digital path**

Shall be implemented

#### **5.2 Signalling data link derived from 8448- kbit/s digital path**

Not used.

#### **5.3 Signalling data link derived from 1544- kbit/s digital path**

Not applicable.

#### **5.4 Signalling data link established over a digital path made up by digital sections based on different digital hierarchies**

Not applicable.

#### **5.5 Signalling data links established over data circuits**

Not used.

### **6. ANALOGUE SIGNALLING DATA LINK**

#### **6.1 Signalling bit rate**

##### **6.1.1 *Application of the analogue signalling...***

Shall be implemented

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### **6.1.2 *For telephone call control applications...***

Shall be implemented

A bit rate over an analogue signalling data link with 4.8 kbit/s shall be implemented.

The delay requirements described in Rec. Q. 27 shall be taken into account.

## **6.2 Interface requirements**

Shall be implemented

Separate modems shall be used for analogue signalling links. The interface requirements specified in Rec. Y.24 shall be applicable at the point A of Figure 2/ Q.702.

Only Transmission channel according to Rec. M.1020 shall be used, full duplex operation over 4- wire transmission link shall be adopted.

## **Chapter 4 Signalling Link (Rec. Q.703, Level 2)**

### **1. GENERAL**

#### **1.1 Introduction**

##### **1.1.1 *This recommendation describes...***

Shall be implemented

##### **1.1.2 *The signalling link functions...***

Shall be implemented

#### **1.2 Signal delimitation and alignment**

Shall be implemented

#### **1.3 Error detection**

Shall be implemented

#### **1.4 Error correction**

##### **1.4.1 *Two forms of error correction...***

Shall be implemented

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#### **1.4.2    *The basic method is a non compelled...***

Shall be implemented

#### **1.4.3    *The preventive cyclic retransmission...***

Shall be implemented

### **1.5      Initial alignment**

Shall be implemented

### **1.6      Signalling link error monitoring**

Shall be implemented

### **1.7      Link state control functions**

Shall be implemented

### **1.8      Flow control**

Shall be implemented

## **2.      BASIC SIGNAL UNIT FORMAT**

### **2.1      General**

Shall be implemented

### **2.2      Signal unit format**

Shall be implemented

### **2.3      Function and codes of the signal unit fields**

#### **2.3.1    *General***

Shall be implemented

#### **2.3.2    *Flag***

Shall be implemented

#### **2.3.3    *Length indicator***

Shall be implemented

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#### **2.3.4   *Service information octet***

Shall be implemented

The handling of messages for different users under consideration of different priorities shall not be used.

#### **2.3.5   *Sequence numbering***

Shall be implemented

#### **2.3.6   *Indicator bits***

Shall be implemented

#### **2.3.7   *Check bits***

Shall be implemented

#### **2.3.8   *Signalling information field***

Shall be implemented

#### **2.3.9   *Status field***

Shall be implemented

#### **2.3.10 *Spare fields***

Shall be implemented

### **2.4    Order of bit transmission**

Shall be implemented

## **3.    SIGNAL UNIT DELIMITATION**

### **3.1   Flags**

Shall be implemented

### **3.2   Zero insertion and deletion**

Shall be implemented

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## **4. ACCEPTANCE PROCEDURE**

### **4.1 Acceptance of alignment**

#### **4.1.1 *A flag, which is not followed...***

Shall be implemented

#### **4.1.2 *If seven or more consecutive...***

Shall be implemented

#### **4.1.3 *After deletion of the...***

Shall be implemented

#### **4.1.4 *When the octet counting mode is...***

Shall be implemented

### **4.2 Error detection**

Shall be implemented

## **5. BASIC ERROR CORRECTION METHOD**

### **5.1 General**

Shall be implemented

### **5.2 Acknowledgements (positive and negative acknowledgement)**

#### **5.2.1 *Sequence numbering***

Shall be implemented

#### **5.2.2 *Signal unit sequence control***

Shall be implemented

#### **5.2.3 *Positive acknowledgement***

Shall be implemented

#### **5.2.4 *Negative acknowledgement***

Shall be implemented

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### **5.3 Retransmission**

#### **5.3.1 *Response to a positive acknowledgement***

Shall be implemented

#### **5.3.2 *Response to a negative acknowledgement***

Shall be implemented

#### **5.3.3 *Repetition of message signal units***

Shall not be used

## **6. ERROR CORRECTION BY PREVENTIVE CYCLIC RETRANSMISSION**

### **6.1 General**

Shall be implemented

### **6.2 Acknowledgements**

#### **6.2.1 *Sequence numbering***

Shall be implemented

#### **6.2.2 *Signal unit sequence control***

Shall be implemented

#### **6.2.3 *Positive acknowledgement***

Shall be implemented

### **6.3 Preventive cyclic retransmission**

#### **6.3.1 *Response to positive acknowledgement***

Shall be implemented

#### **6.3.2 *Preventive cyclic retransmission procedure***

Shall be implemented

### **6.4 Forced retransmission**

Shall be implemented

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#### **6.4.1    *Forced retransmission procedure***

Shall be implemented

#### **6.4.2    *Limitation of the values N 1 and N 2***

Shall be implemented

### **7.        INITIAL ALIGNMENT PROCEDURE**

#### **7.1       General**

Shall be implemented

#### **7.2       Initial alignment status indications**

Shall be implemented

#### **7.3       Initial alignment procedures**

Shall be implemented

#### **7.4       Proving periods**

Shall be implemented

### **8.        PROCESSOR OUTAGE**

Shall be implemented

### **9.        LEVEL 2 FLOW CONTROL**

#### **9.1       General**

Shall be implemented

#### **9.2       Detection of congestion**

Shall be implemented

#### **9.3       Procedures in the congestion situation**

Shall be implemented

#### **9.4       Congestion abatement procedures**

Shall be implemented

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## **10. SIGNALLING LINK ERROR MONITORING**

### **10.1 General**

Shall be implemented

### **10.2 Signal unit error rate monitor**

#### **10.2.1 *The signal unit error rate monitor has...***

Shall be implemented

#### **10.2.2 *The signal unit error rate monitor may...***

Shall be implemented

#### **10.2.3 *In the “octet counting” mode (see § 4.1) the...***

Shall be implemented

#### **10.2.4 *When the link is brought into service the...***

Shall be implemented

#### **10.2.5 *The values of the three parameters...***

Shall be implemented

#### **10.2.6 *In case where only random signal...***

Shall be implemented

### **10.3 Alignment error rate monitor**

#### **10.3.1 *The alignment error rate monitor...***

Shall be implemented

#### **10.3.2 *The counter is started from zero...***

Shall be implemented

#### **10.3.3 *When the counter reaches a threshold...***

Shall be implemented

#### **10.3.4 *The values of the four parameters...***

Shall be implemented



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## 11. LEVEL 2 CODES AND PRIORITIES

### 11.1 Link status signal unit

#### 11.1.1 *The link status signal unit is...*

Shall be implemented

#### 11.1.2 *The format of the one octet is...*

Shall be implemented

#### 11.1.3 *The use of the link status indications...*

Shall be implemented

### 11.2 Transmission priorities within level 2

#### 11.2.1 *Five different items can...*

Shall be implemented

#### 11.2.2 *For the basic error control method...*

Shall be implemented

#### 11.2.3 *For the preventive cyclic retransmission...*

Shall be implemented

The basic error correction method employing the repetition of MSU's shall not be used.

## 12. STATE TRANSITION DIAGRAMS

Shall be implemented.

### LEVEL 2 TIMERS

<b>T1</b>	“Alignment ready”	40,0 – 50,0 sec
<b>T2</b>	“Not aligned”	24,0 – 25,0 sec
<b>T3</b>	“Aligned”	1,3 – 1,4 sec
<b>T4</b>	“Proving period” normal	8,0 – 9,0 sec
	“Proving period” emergency	0,5 – 0,6 sec

## LEVEL 2 TIMERS

<b>T5</b>	“Sending SIB”	0,1 – 0,2 sec
<b>T6</b>	“Remote congestion”	3,0 – 6,0 sec
<b>T7</b>	“Excessive delay of acknowledgement”	0,9 – 1,0 sec

## Chapter 5 Signalling Network Functions (REC. Q.704, LEVEL 3)

### 1. INTRODUCTION

#### 1.1 General characteristics of the signalling network functions

##### 1.1.1 *This recommendation describes the functions and...*

Shall be implemented

##### 1.1.2 *According to these principles, the signalling...*

Shall be implemented

#### 1.2 Signalling message handling

##### 1.2.1 *The purpose of the signalling message handling...*

Shall be implemented

##### 1.2.2 *The signalling message handling functions are...*

Shall be implemented

##### 1.2.3 *As illustrated in Figure IIQ. 704, the signalling...*

Shall be implemented

#### 1.3 Signalling network management

##### 1.3.1 *The purpose of the signalling network management...*

Shall be implemented

##### 1.3.2 *As illustrated in Figure I/Q. 704, the signalling...*

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Shall be implemented

**1.3.3    *§§ 4 to 11 specify the procedures pertaining...***

Please refer to the comments on §§ 4 to 11.

**1.3.4    *The different procedures pertaining to...***

Please refer to § 12.

**1.3.5    *The different procedures pertaining to...***

Please refer to the comments on § 13.

**1.3.6    *The format characteristics, common to all...***

Please refer to the comments on § 14.

**1.3.7    *Labelling, formatting and coding of the...***

Please refer to the comments on § 15.

**1.3.8    *The description of signalling network functions...***

Please refer to the comments on § 16.

**2.        *SIGNALLING MESSAGE HANDLING***

**2.1       *General***

**2.1.1    *Signalling message handling comprises...***

Shall be implemented

**2.1.2    *When a message comes from level 4 (or is...***

Shall be implemented

**2.1.3    *When a message comes from level 2, the...***

Shall be implemented

**2.1.4    *In the case that the message is destined...***

Shall be implemented

**2.1.5    *Message routing, discrimination and...***

Shall be implemented

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### **2.1.6 *The position and coding of the service indicator...***

Shall be implemented

## **2.2 Routing label**

### **2.2.1 *The label contained in a signalling message...***

For the national application the standard routing label shall be implemented

### **2.2.2 *The standard routing label has a length...***

Shall be implemented

### **2.2.3 *The destination point code (DPC)...***

Shall be implemented

DPC and OPC length = 14 bits.

### **2.2.4 *The signalling link selection (SLS)...***

Shall be implemented

### **2.2.5 *From the rule stated in § 2.2.4 above...***

Shall be implemented

### **2.2.6 *The above principle should also apply...***

The standard label shall be implemented

Please refer to the comments on § 2.2.1.

## **2.3 Message routing function**

### **2.3.1 *The message routing function is based...***

Shall be implemented

The service indicator shall be exclusively used for discrimination of the User Part and the selection of the routing data with regard to the respective network. It shall not be used for routing purposes with regard to a specific User Part.

The MTP Testing User Part is not required.

### **2.3.2 *Two basic cases of load sharing are defined...***

Shall be implemented

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Load sharing between signalling links belonging to max. 2 different signalling link sets is required.

### **2.3.3 *The routing information mentioned in § 2.3.1...***

Please refer to the comments on § 3 and § 4.

### **2.3.4 *Handling of level 3 messages***

#### **2.3.4.1 Messages not related to a signalling link...**

Shall be implemented

#### **2.3.4.2 Messages related to a signalling link...**

Shall be implemented

### **2.3.5 *Handling of messages under signalling link congestion***

#### **2.3.5.1 In the international signalling network...**

Shall be implemented

Congestion priorities shall not be used.

#### **2.3.5.2 In national signalling networks using multiple congestion priorities**

Not used.

## **2.4 Message discrimination and distribution functions**

### **2.4.1 *The routing criteria and load sharing method...***

Shall be implemented

### **2.4.2 *If the destination point code of the message...***

Not used.

### **2.4.3 *In the case of a signalling point handling...***

Shall be implemented

## **3. SIGNALLING NETWORK MANAGEMENT**

### **3.1 General**

#### **3.1.1 *The signalling network management functions...***

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Shall be implemented

**3.1.2 *The occurrence of, or recovery from failures or...***

Please refer to the comments on §§ 3.2, 3.4 and 3.6.

**3.1.3 *Whenever a change in the status of a signalling...***

Please refer to the comments on §§ 5- 13.

**3.1.4 *An overview of the use of the procedures...***

Please refer to the comments on §§ 3.3, 3.5 and 3.7.

**3.2 Status of signalling links**

**3.2.1 *A signalling link is always considered by...***

Please refer to the comments on §§ 3.2.2- 3.2.9.

**3.2.2 *Signalling link failure***

Shall be implemented

**3.2.3 *Signalling link restoration***

Shall be implemented

**3.2.4 *Signalling link deactivation***

Shall be implemented

**3.2.5 *Signalling link activation***

Shall be implemented

**3.2.6 *Signalling link blocking***

Shall be implemented

**3.2.7 *Signalling link unblocking***

Shall be implemented

**3.2.8 *Signalling link inhibiting***

Shall be implemented

Please refer to the comments on § 10.

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### **3.2.9 *Signalling link uninhibiting***

Shall be implemented

Please refer to the comments on § 10.

### **3.3 Procedures used in connection with link status changes**

Shall be implemented

#### **3.3.1 *Signalling link failed***

##### **3.3.1.1 Signalling traffic management...**

Shall be implemented

Please refer also to the comments on § 5.

##### **3.3.1.2 Signalling link management...**

Shall be implemented

Please refer also to the comments on § 12.

##### **3.3.1.3 Signalling route management...**

Basic requirements shall be implemented, options shall not be used.

Please refer also to the comments on § 13.

#### **3.3.2 *Signalling link restored***

##### **3.3.2.1 Signalling traffic management...**

Shall be implemented

Please refer also to the comments on § 6.

##### **3.3.2.2 Signalling link management...**

All signalling links shall be active at normal working conditions (no stand-by mode but load sharing mode).

Please refer also to the comments on § 12.

##### **3.3.2.3 Signalling route management..**

Shall be implemented

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Please refer also to the comments on § 13.

### 3.3.3 *Signalling link deactivated*

#### 3.3.3.1 Signalling traffic management...

All signalling links shall be active at normal working conditions (no stand- by mode but load sharing mode). Please refer to the note of § 12.2.1.1

Please refer also to the comments on § 12.1.1.

#### 3.3.3.2 Signalling link management...

All signalling links shall be active at normal working conditions (no stand- by mode but load sharing mode).

Please refer also to the comments on § 12.

#### 3.3.3.3 Signalling route management...

Basic requirements shall be implemented, options shall not be used.

Please refer also to the comments on § 13.

### 3.3.4 *Signalling link activated*

#### 3.3.4.1 Signalling traffic management...

Shall be implemented

Please refer also to the comments on § 4.

#### 3.3.4.2 Signalling link management...

All signalling links shall be active at normal working conditions (no stand- by mode but load sharing mode).

Please refer to the comments on § 12.2.1.1.

#### 3.3.4.3 Signalling route management...

Basic requirements shall be implemented, options shall not be used.

Please refer also to the comments on § 13.

### 3.3.5 *Signalling link blocked*

Shall be implemented



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#### 3.3.5.1 Signalling traffic management...

Shall be implemented

#### 3.3.5.2 Signalling route management...

Basic requirements shall be implemented, options shall not be used.

Please refer also to the comments on § 13.

### 3.3.6 *Signalling link unblocked*

#### 3.3.6.1 Signalling traffic management...

Shall be implemented

Please refer also to the comments on § 4.

#### 3.3.6.2 Signalling route management...

Shall be implemented

Please refer also to the comments on § 13.3.

### 3.3.7 *Signalling link inhibited*

#### 3.3.7.1 Signalling traffic management...

Shall be implemented

#### 3.3.7.2 Signalling link management

Shall be implemented

### 3.3.8 *Signalling link uninhibited*

#### 3.3.8.1 Signalling traffic management...

Shall be implemented

#### 3.3.8.2 Signalling link management...

Shall be implemented

#### 3.3.8.3 Signalling route management...

Shall be implemented

## 3.4 Status of signalling routes

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Basic requirements shall be implemented, options shall not be used.

Please refer also to the comments on § 13.

#### **3.4.1 *Signalling route unavailability***

Shall be implemented

#### **3.4.2 *Signalling route availability***

Shall be implemented

#### **3.4.3 *Signalling route restricted***

Not used.

Please refer also to the comments on § 13.4.

### **3.5 Procedures used in connection with route status changes**

Basic requirements shall be implemented, options shall not be used.

Please refer also to the comments on § 13.

#### **3.5.1 *Signalling route unavailable***

##### **3.5.1.1 Signalling traffic management**

Shall be implemented

##### **3.5.1.2 Signalling route management**

Basic requirements shall be implemented, options shall not be used.

Please refer also to the comments on § 13.

#### **3.5.2 *Signalling route available***

##### **3.5.2.1 Signalling traffic management**

Shall be implemented

Please refer to the comments on § 8.

##### **3.5.2.2 Signalling route management**

Basic requirements shall be implemented, options shall not be used.

Please refer also to the comments on § 13.

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### 3.5.3 *Signalling route restricted*

Not used.

## 3.6 **Please refer to the comments on § 13.4.**

Status of signalling point

Shall be implemented

### 3.6.1 *Signalling point unavailability*

Shall be implemented

#### 3.6.1.1 Unavailability of signalling point...

Shall be implemented

#### 3.6.1.2 Unavailability of an adjacent...

Shall be implemented

### 3.6.2 *Availability of an adjacent signalling...*

Shall be implemented

## 3.7 **Procedures used in connection with point status changes**

### 3.7.1 *Signalling point unavailable*

No special procedures are used. The transfer prohibited procedure shall be implemented

Please refer also to the comments on § 13 .2.

### 3.7.2 *Signalling point available*

#### 3.7.2.1 Signalling traffic management...

The signalling point restart procedure is not used

Please refer to the comments on § 9.

#### 3.7.2.2 Signalling link management...

The signalling point restart procedure is not used

Please refer also to the comments on §§ 9. and 12.2.2.

#### 3.7.2.3 Signalling route management...

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The transfer prohibited procedure shall be implemented. The signalling point restart procedure and the transfer restricted procedure are not used.

Please refer to the comments on §§ 9, 13.2 and 13.4.

### **3.7.3 *Signalling point congested***

The signalling point restart procedure is not used.

Please refer to our comments on § 11.2.6.

## **3.8 Signalling network congestion**

### **3.8.1 *General***

### **3.8.2 *Congestion status of signalling links***

#### **3.8.2.1 When predetermined levels of MSU fill...**

(a) shall be implemented

One congestion onset and one congestion abatement threshold shall be provided. The options as per (b) shall not be used.

#### **3.8.2.2 In national signalling networks with multiple...**

Not used.

Procedures using multiple congestion thresholds shall not be used.

#### **3.8.2.3 In national signalling networks using multiple...**

Not used.

Procedures using multiple congestion thresholds shall not be used.

### **3.8.3 *Procedures used in connection with link congestion status changes***

Shall be implemented

### **3.8.4 *Congestion status of signalling route sets***

(a) is shall be implemented

Options as per (b) and (c) shall not be used.

Please refer to the comments on §§ 3.8.2.2 and 3.8.2.3.

### **3.8.5 *Procedures used in connection with route set congestion status changes***

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### 3.8.5.1 Signalling traffic management...

Shall be implemented

Please refer to the comments on § 11.

### 3.8.5.2 Signalling route management...

Not used.

Procedures dealing with multiple congestion thresholds shall not be used.

Please refer also to the comments on § 13.9.

## 4. SIGNALLING TRAFFIC MANAGEMENT

### 4.1 General

#### 4.1.1 *The signalling traffic management function is used...*

Shall be implemented

#### 4.1.2 *The diversion of traffic in the cases...*

Shall be implemented, options shall not be used.

Please refer to the comments on §§ 5- 9.

#### 4.1.3 *The signalling traffic flow control procedures...*

Shall be implemented, options shall not be used.

Please refer to the comments on § 11.

### 4.2 Normal routing situation

#### 4.2.1 *Signalling traffic to be sent to ...*

Shall be implemented

All signalling links shall be active at normal working conditions (no stand- by mode but load sharing mode).

Please refer to our comments on § 12.2.1.1.

#### 4.2.2 *Message routing (normal as well as alternative)...*

Shall be implemented

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### **4.3 Signalling link unavailability**

#### **4.3.1 *When a signalling link becomes unavailable...***

Shall be implemented

#### **4.3.2 *In case when there is one or more alternative...***

(b) shall be implemented

All signalling links shall be active at normal working conditions (no stand- by mode but load sharing mode).

Please refer to the comments on § 12.2.1.1.

#### **4.3.3 *In case when there is no alternative signalling...***

Shall be implemented

### **4.4 Signalling link availability**

#### **4.4.1 *When a previously unavailable signalling link...***

Shall be implemented

#### **4.4.2 *In case when the link set, to which the...***

Shall be implemented

#### **4.4.3 *In the case when the link set (combined link set)...***

All signalling links shall be active at normal working conditions (no stand- by mode but load sharing mode).

Please refer to the comments on § 12.2.1.1.

### **4.5 Signalling route unavailability**

Shall be implemented

### **4.6 Signalling route availability**

Shall be implemented

### **4.7 Signalling route restriction**

Not used.

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## **5. CHANGEOVER**

Shall be implemented

### **5.1 General**

Shall be implemented

#### **5.1.1 *The objective of the changeover procedure...***

Shall be implemented

#### **5.1.2 *Changeover includes the procedures to be...***

Shall be implemented

Please refer to the comments on §§ 5.2 and 5.3.

### **5.2 Network configurations for changeover**

#### **5.2.1 *Signaling traffic diverted from an...***

Shall be implemented

Traffic shall be diverted to one or more signalling links of the same link set, or to one different link set

#### **5.2.2 *As a result of these arrangements, and...***

Shall be implemented

### **5.3 Changeover initiation and actions**

#### **5.3.1 *Changeover is initiated at a signalling point...***

Shall be implemented

Please refer also to the comments on §§ 5.4, 5.5 and 13.2.

#### **5.3.2 *In case when there is no traffic to transfer...***

Shall be implemented

#### **5.3.3 *If no alternative signalling link exists...***

Shall be implemented

Please refer also to the comments on §§ 12.1, 12.2 and 13.2.

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#### **5.3.4 *In some cases of failures or in some network...***

Shall be implemented

Please refer to the comments on § 5.6.

### **5.4 Buffer updating procedure**

Shall be implemented

#### **5.4.1 *When a decision to changeover is made,...***

Shall be implemented

#### **5.4.2 *The changeover order and the changeover...***

Shall be implemented

Please refer also to the comments on § 15.4.

#### **5.4.3 *Upon reception of a changeover order...***

Shall be implemented

Please refer also to the comments on § 5.6.

### **5.5 Retrieval and diversion of traffic**

### **5.6 Emergency changeover procedures**

Shall be implemented

#### **5.6.1 *Due to the failure in a signalling terminal...***

Shall be implemented

#### **5.6.2 *Time controlled changeover is initiated...***

Shall be implemented

Please refer also to the comments on § 8 of recommendation Q. 703 in chapter 5, as well as to the comments on § 10.

#### **5.6.3 *Due to failures, it may be impossible...***

Shall be implemented

### **5.7 Procedures in abnormal conditions**



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**5.7.1    *The procedures described in this section...***

Shall be implemented

**5.7.2    *If no changeover message in response to a...***

Shall be implemented

**5.7.3    *If a changeover order or a acknowledgement...***

Shall be implemented

**5.7.4    *If a changeover acknowledgement is received...***

Shall be implemented

**5.7.5    *If a changeover order is received relating to...***

Shall be implemented

**6.        CHANGE BACK**

Shall be implemented

**6.1       General**

**6.1.1    *The objective of the change back procedure...***

Shall be implemented

**6.1.2    *Change back includes the basic procedures to be...***

Shall be implemented

Please refer also to the comments on § 5.2.

**6.2       Change back initiation and actions**

**6.2.1    *Change back is initiated at a signalling point...***

Shall be implemented

Please refer also to the comments on §§ 5.6.2, 6.3, 13.2 and 13.3.

**6.2.2    *In the case when there is no traffic to...***

Shall be implemented

**6.2.3    *In the case that the signalling link...***

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Shall be implemented

With regard to action specified in (iii) the transfer allowed procedure shall be performed.

Please refer also to the comments on § 13.3 and 13.5.

**6.2.4 *In the case that the signalling link made...***

Not used.

The transfer restricted procedure is not used.

Please refer to the comments on § 13.4.

**6.2.5 *If the. signalling point at the far end of...***

Shall be implemented

Please refer to the comments on §§ 6.3 ,6.4 and 9.

**6.3 Sequence control procedure**

**6.3.1 *When a decision is made at a given signalling...***

Shall be implemented

**6.3.2 *The concerned signalling point will restart...***

Shall be implemented

**6.3.3 *The change back declaration and change back...***

Shall be implemented

Please refer to the comment on § 15.5

**6.3.4 *A particular configuration of the change back...***

Shall be implemented

**6.3.5 *In the case that a signalling point intends...***

Shall be implemented

**6.4 Time controlled diversion procedure**

**6.4.1 *The time controlled diversion procedure...***

Shall be implemented

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The signalling point restart procedure is not used.

Please refer to the comments on § 9.

#### **6.4.2 *When the change back is initiated after...***

The signalling point restart procedure is not used.

Please refer to the comments on § 9

### **6.5 Procedures in abnormal conditions**

#### **6.5.1 *If a change back acknowledgement is received...***

Shall be implemented

#### **6.5.2 *If a change back declaration is received...***

Shall be implemented

Please refer also to the comments on § 6.3.2

#### **6.5.3 *If no change back acknowledgement is received...***

Shall be implemented

### **7. FORCED REROUTING**

Shall be implemented

#### **7.1 General**

##### **7.1.1 *The objective of the forced rerouting...***

Shall be implemented

Please refer also to the comments on § 5.3.3.

##### **7.1.2 *Forced rerouting is the basic procedure...***

Shall be implemented

#### **7.2 Forced rerouting initiation and actions**

##### **7.2.1 *Forced rerouting is initiated at a...***

Shall be implemented

Please refer also to the comments on § 13.2.2.

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### **7.2.2 *In the case when there is no signalling...***

Shall be implemented

### **7.2.3 *If no alternative route exists for signalling...***

Shall be implemented

Please refer to the comments on § 5.3.3.

## **8. CONTROLLED REROUTING**

Shall be implemented

### **8.1 General**

#### **8.1.1 *The objective of the controlled rerouting...***

Shall be implemented

Please refer also to the comments on § 6.4

#### **8.1.2 *Controlled rerouting is the basic...***

(a) shall be implemented, the transfer restricted procedure is not used.

Please refer also to the comments on § 13.4.

### **8.2 Controlled rerouting initiations and actions**

#### **8.2.1 *Controlled rerouting is initiated...***

Shall be implemented in connection with the transfer allowed and the transfer prohibited procedures.

The transfer restricted procedure is not used.

Please refer also to the comments on §§ 13.2, 13.3 and 13.4.

#### **8.2.2 *In the case when there is no signalling traffic...***

Shall be implemented

Please refer also to the comments on § 8.2.1.

#### **8.2.3 *If the destination was inaccessible or...***

Shall be implemented

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The transfer restricted procedures is not used.

Please refer also to the comments on §§ 6.2.3, 6.2.4, 13.2, 13.3 and 13.4.

## **9.      SIGNALLING POINT RESTART**

Not used

## **10.     MANAGEMENT INHIBITING**

Shall be implemented

### **10.1    General**

Shall be implemented

### **10.2    Inhibiting initiation and actions**

Shall be implemented

### **10.3    Uninhibiting initiation and actions**

Shall be implemented

#### **10.3.1   *Management- initiated uninhibiting***

#### **10.3.2   *Signalling routing control initiated uninhibiting***

Shall be implemented

### **10.4    Receipt of unexpected inhibition message**

Shall be implemented

### **10.5    Management inhibited link status and processor recovery**

Shall be implemented

### **10.6    Inhibit test procedure**

Shall be implemented

#### **10.6.1   *A local inhibit test is performed when...***

Shall be implemented

#### **10.6.2   *A remote inhibit test is performed when...***

Shall be implemented

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## **11. SIGNALLING TRAFFIC FLOW CONTROL**

### **11.1 General**

Shall be implemented

### **11.2 Flow control indications**

#### **11.2.1 *Signalling route set unavailability***

Shall be implemented

Please refer also to the comments on §§ 5.3.3 and 7.2.3.

#### **11.2.2 *Signalling route set availability***

Shall be implemented

Please refer also to the comments on §§ 6.2.3 and 8.2.3.

#### **11.2.3 *Signalling route set congestion (International Signalling Network)***

Shall be implemented.

##### **11.2.3.1 When the congestion status of a signalling...**

Shall be implemented.

##### **11.2.3.2 After the reception of a transfer controlled...**

Shall be implemented.

##### **11.2.3.3 When the status of a signalling route set...**

Shall be implemented.

#### **11.2.4 *Signalling route set congestion (National option with congestion priorities)***

Not used.

Please refer also to the comments on §§ 13.7 and 13.9.

#### **11.2.5 *Signalling route set congestion (National option without congestion priorities)***

Not used.

#### **11.2.6 *Signalling point/ signalling transfer point congestion***

Shall be implemented.

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### 11.2.7 *MTP user flow control*

Not used

## 12. **SIGNALLING LINK MANAGEMENT**

### 12.1 **General**

#### 12.1.1 *The signalling link management functions is...*

The basic set of signalling link management procedures shall be implemented, options shall not be used.

Please refer to the comments on § 12.2.

#### 12.1.2 *A signalling link set consists of one...*

Shall be implemented with regard to the basic set of signalling link management procedures.

Please refer to the comments on § 12.2.

#### 12.1.3 *When a link set is to be brought into...*

(a) is Shall be implemented

Please refer to the comments on § 12.2.

### 12.2 **Basic signalling link management procedures**

Shall be implemented

#### 12.2.1 *Signalling link activation*

##### 12.2.1.1 In the absence of failures, a link...

Shall be implemented

All signalling links in a link set shall be active in the absence of failures.

##### 12.2.1.2 When a decision is taken to activate an inactive...

Shall be implemented

Please refer also to the comments on the recommendation Q. 703 § 7 in chapter 4.

#### 12.2.2 *Signalling link restoration*

Shall be implemented

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### **12.2.3 *Signalling link deactivation***

Shall be implemented

### **12.2.4 *Link set activation***

Shall be implemented

#### **12.2.4.1 Link set normal activation**

Shall be implemented

#### **12.2.4.2 Link set emergency activation**

Shall be implemented

#### **12.2.4.3 Please refer to the comments on § 12.2.4.1.**

#### **12.2.4.4 Time- out values**

Shall be implemented

Please refer also to the comments on the recommendation Q. 703 § 7.3 in chapter 4.

### **12.3 Signalling link management procedures based on automatic allocation of signalling terminals**

Not used.

Please refer to the comments on § 12.1.1.

### **12.4 Signalling link management procedures based on automatic allocation of signalling data links and signalling terminals.**

Not used.

Please refer to the comments on § 12.1.1.

### **12.5 Automatic allocation of signalling terminals**

Not used.

Please refer to the comments on § 12.1.1

### **12.6 Automatic allocation of signalling data links**

Not used.



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Please refer to the comments on § 12.1.1.

### **13. SIGNALLING ROUTE MANAGEMENT**

#### **13.1 General**

Shall be implemented

Options shall not be used.

Please refer to the comments on §§ 13.2- 13.9.

#### **13.2 Transfer- prohibited Shall be implemented**

Shall be implemented

##### **13.2.1 *The transfer- prohibited procedure is performed..\_***

Shall be implemented

Please refer also to the comments on § 15.7.

##### **13.2.2 *A transfer prohibited message relating to a given...***

Shall be implemented for the cases (i)- (iii).

Please refer to the comments on § 9.

##### **13.2.3 *When a signalling point receives a transfer...***

Shall be implemented

Please refer to the comments on §§ 3.4.1 and 7.

##### **13.2.4 *In some circumstances it may happen that a...***

Shall be implemented

#### **13.3 Transfer- allowed**

Shall be implemented

##### **13.3.1 *The transfer- allowed procedure is performed at...***

Shall be implemented

Please refer also to the comments on § 15.8.

##### **13.3.2 *The transfer- allowed message relating to...***

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Shall be implemented

Please refer also to the comments on §§ 6.2.3 and 8.2.3.

#### 13.3.3 *When a signalling point receives a transfer...*

Shall be implemented

Please refer also to the comments on §§ 3.4.2 and 8.

#### 13.3.4 *In some circumstances it may happen that a...*

Shall be implemented

### 13.4 **Transfer restricted (National option)**

Not used.

Please refer to the comments on § 13.1.

### 13.5 **Signalling- route- set- test**

Shall be implemented

#### 13.5.1 *The signalling- route- set test procedure is...*

Shall be implemented

#### 13.5.2 *A signalling- 3route- set- test message is sent...*

Shall be implemented

The transfer restricted procedure is not used.

Please refer to the comments on §§ 13.4 and 13.1

#### 13.5.3 *A signalling- route- set- test message is sent...*

Shall be implemented

#### 13.5.4 *At the reception of a signalling- route- set- test...*

Shall be implemented

The transfer restricted procedure is not used.

Please refer to the comments on § § 13.4 and 13.1.

#### 13.5.5 *At the reception of the transfer- prohibited or...*

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Shall be implemented

Please refer also to the comments on §§ 13.2.3, 13.2.4 13.3.3 and 13.3.4.

### **13.6 Transfer controlled (international network)**

Shall be implemented

Also applicable for the national network.

### **13.7 Transfer controlled (National option with congestion priorities)**

Not used.

Please refer to the comments on §§ 13.1 and 13.6.

### **13.8 Transfer controlled (National option without congestion priorities)**

Not used.

Please refer to the comments on § § 13.1 and 13.6.

### **13.9 Signalling route set congestion test (National option)**

Not used.

Please refer to the comments on §§ 13.1 and 13.5.

## **14. COMMON CHARACTERISTICS OF MESSAGE SIGNAL UNIT FORMATS**

### **14.1 General**

Shall be implemented

Please refer to the comments on the recommendation Q. 703 § 2 in chapter 4.

### **14.2 Service information octet**

Shall be implemented

#### **14.2.1 *Service indicator***

Shall be implemented

Message routing is not performed by means of the service indicator.

Please refer to the comments on §§ 2.3 and 2.4.

Allocation of the service indicator codes:

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<b>bits</b>	<b>DCBA</b>	
	0 1 0 0	Telephone User Part
	0 1 0 1	ISDN User Part

#### 14.2.2 *Sub- service field*

Shall be implemented

The service indicator is exclusively used as a network indicator.

Please refer to the comments on §§ 2.3 and 2.4.

### 14.3 Label

Shall be implemented

Please refer to the comments on § 2.2

## 15. FORMATS AND CODES OF SIGNALLING NETWORK MANAGEMENT MESSAGES

### 15.1 General

Shall be implemented

### 15.2 Label

The standard label structure shall be implemented

Please refer to the comments on § 2.2

### 15.3 Heading code (HO)

Shall be implemented

Please refer also to the comments on Table 1/Q. 704.

### 15.4 Changeover message

§§ 15.4.1- 15.4.3 shall be implemented

### 15.5 Changeback message

§§ 15.5.1- 15.5.4 shall be implemented

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Please refer to the comments on § 6.

#### **15.6 Emergency changeover message**

§§ 15.6.1- 15.6.3 shall be implemented

#### **15.7 Transfer- prohibited message**

§§ 15.7.1- 15.7.4 shall be implemented

#### **15.8 Transfer- allowed message**

§§ 15.8.1- 15.8.3 shall be implemented

#### **15.9 Transfer- restricted message**

Not used.

Please refer to the comments on §§ 13.1 and 13.4.

#### **15.10 Signalling- route- set- test-message**

§§ 15.10.1- 15.10.3 shall be implemented

#### **15.11 Management inhibiting message**

§§ 15.11.1- 15.11.3 shall be implemented

#### **15.12 Traffic restart allowed message.**

Not used.

#### **15.13 Signalling data link connection message**

Not used.

This message is related to the automatic allocation of signalling data links which is not used.

Please refer to the comments on § 12.1.1

#### **15.14 Signalling data link connection message - acknowledgement message**

Not used.

This message is related to the automatic allocation of signalling data links which is not used.

Please refer to the comments on § 12.1.1.

#### **15.15 Transfer controlled message**

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Shall be implemented

#### **15.16 Signalling- route- set- congestion- test- message**

Not used.

Please refer to the comments on §§ 13.1 and 13.9.

#### **15.17 User part unavailable message**

Not used.

### **16. STATE TRANSITION DIAGRAMS**

Shall be implemented.

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<b>LEVEL 3 TIMERS</b>	
<b>T1</b> “Delay to avoid missequencing on changeover”	0,9-1,0sec
<b>T2</b> “Waiting for changeover acknowledgement”	1,9-2,0sec
<b>T3</b> “Time controlled diversion delay to avoid missequencing on changeback”	0,9-1,0sec
<b>T4</b> “Waiting for changeback acknowledgement (first attempt)”	0,9-1,0sec
<b>T5</b> “Waiting for changeback acknowledgement (second attempt)”	0,9-1,0sec
<b>T6</b> “Delay to avoid message missequencing on controlled rerouting”	1,0 sec
<b>T7</b> “Waiting for signalling data link connection acknowledgement”	
<b>T8</b> “Transfer prohibited inhibition timer”	
<b>T9</b> “Not used”	
<b>T10</b> “Waiting to repeat route set test message”	29,0 - 30,0 sec.
<b>T11</b> “Transfer restricted”	Not used
<b>T12</b> “Waiting for uninhibit acknowledgement”	Not used
<b>T13</b> “Waiting for forced uninhibit”	Not used
<b>T14</b> “Waiting for inhibition acknowledgement”	Not used
<b>T15</b> “Waiting for repeat route set congestion test”	Not used
<b>T16</b> “Waiting for route set congestion status update”	Not used
<b>T17</b> “Delay to avoid oscillation of initial alignment failure and link restart”	0,8 - 1,5 sec.

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**TABLE 1/Q. 704**

Heading code allocation of signalling network management messages

Message	HO	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	...	1111
Group	HI													
	0000													
<u>CHM</u>	0001		<u>COO</u>	<u>COA</u>			<u>CBD</u>	<u>CBA</u>						
<u>ECM</u>	0010		<u>ECO</u>	<u>ECA</u>										
<u>FCM</u>	0011		RCT+	<u>TFC</u>										
<u>TFM</u>	0100		<u>TFP</u>	*	TFR+		<u>TFA</u>	*						
<u>RSM</u>	0101		<u>RST</u>	RST+										
<u>MIM</u>	0110		<u>UN</u>	<u>LUN</u>	<u>LIA</u>	<u>LUA</u>	<u>LID</u>	<u>LFU</u>	<u>LLT</u>	<u>LRT</u>				
TRM	0111		TRA											
DLM+	1000		DLC+	CSS+	CNS+	CNP+								
	1001													
UFC	1010		UPU											
	1011													
	1100													
	1101													
	1110													
	1111													

XXX

Used

XXX

Not used

XXX+

CCITT Option (Not used)

The values marked \* should not be used. (Codes used in the Yellow Book for TFP and TF A acknowledgements)



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<b>LIST OF ABBREVIATIONS</b>	
<b><u>CHM</u></b>	<b><u>Changeover and changeback messages</u></b>
COO	Changeover order signal
COA	Changeover acknowledgement signal
CBD	Changeback declaration signal
CBA	Changeback acknowledgement signal
<b><u>ECM</u></b>	<b><u>Emergency changeover messages</u></b>
ECO	Emergency changeover order signal
ECA	Emergency changeover acknowledgement signal
<b><u>FCM</u></b>	<b><u>Signalling traffic flow control messages</u></b>
TFC	Transfer controlled message
<b><u>TFM</u></b>	<b><u>Transfer prohibited transfer allowed transfer restricted messages</u></b>
TFP	Transfer prohibited signal
TFA	Transfer allowed signal
<b><u>RSM</u></b>	<b><u>Signalling route set test message</u></b>
RST	Signalling route set test signal
<b><u>MIM</u></b>	<b><u>Management inhibit messages</u></b>
LIN	Link inhibit signal
LUN	Link uninhibit signal
LIA	Link inhibit acknowledgement signal
LUA	Link uninhibit acknowledgement signal
LID	Link inhibit denied signal
LFU	Link forced uninhibit signal
LLT	Link local inhibit test signal

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<b>LIST OF ABBREVIATIONS</b>	
LRT	Link remote inhibit test signal
<b><u>TRM</u></b>	<b><u>Traffic- restart- allowed message</u></b>
TRA	Traffic- restart- allowed signal
<b><u>DLM</u></b>	<b><u>Signalling- data- link- connection order message</u></b>
DLC	Signalling- data- link- connection- order signal
CSS	Connection- successful signal
CNS	Connection- not- successful signal
CNP	Connection- not- possible signal
<b><u>UFC</u></b>	<b><u>User Dart flow control messages</u></b>
UPU	User part unavailable signal

## Chapter 6

### Testing, Monitoring And Measurements (Rec. Q.707 And Q.791)

#### REC. Q. 707

Shall be implemented

The test procedure may not be applied periodically, however compatibility mechanisms shall be included.

#### REC. Q. 791

All obligatory measurements as defined in the tables 1-6 shall be implemented

#### 1. ANALOGUE SIGNALLING DATA LINK

##### 1.1 Signalling bit rate

##### 1.1.1 *Application of the Analogue Signalling...*

Shall be implemented.

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### **1.1.2 *For telephone call control applications...***

Shall be implemented.

A bit rate over an analogue signalling data link with 4.8 kb/sec shall be implemented.

The delay requirements described in Rec. Q.27 shall be taken into account.

## **1.2 Interface requirements**

Shall be implemented.

Separate modems shall be used for analogue signalling links. The interface requirements specified in Rec. V.24 shall be applicable at the point A of Figure 2/ Q.702.

Only transmission channel according to Rec. M.1020 shall be used, full duplex operation over 4-wire transmission link shall be adopted.

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## **CCS 0103 - ISSUE 1.0 - CCS 0104 - Issue 1.0 - 22.01.1996 and CCS 0105 - Issue 1.0 - 22.01.1996**

### **1. PRELIMINARY REMARKS**

The required ISUP implementation shall be in compliance with the CCITT Reco Q.767 and shall include some enhancements in order to cater for national specific requirements as:

- Charging aspects
- Malicious Call Identification/ holding
- Trunk offering

which are not relevant to the international interface I.

Besides of the services defined in the CCITT Rec. Q.767, the ISUP Implementations shall also supports the following supplementary services:

- Call Forwarding Unconditional (CFU)
- Call Forwarding Busy (CFB),
- Call Forwarding on No Reply (CFNR)

on the basis of the new CCITT Rec. Q.732 (please refer to clause 7.2 of the specification CCS 0101).

Furthermore some protocol elements of the newest CCITT Recommendations Q 0 761 Q.764 (please refer to clause 7.2 of the specification CCS 0101) shall be included, in order to ease the introduction of some supplementary services.

As general information, the main required enhancements are summarised as follows:

- Adaptation of certain timer values as agreed in the Geneva meeting in April 1991 (now incl. in the new CCITT Recommendations Q.761- Q.764, please refer also to clause 7.2 of the specification CCS 0101).
- Treatment of the MTP- Pause! Resume primitives as agreed in the Geneva meeting in April 1991 (now incl. in the new CCITT Recommendations Q.761- Qo764, please refer also to clause 7.2 of the specification CCS 0101).
- Inclusion of additional category's for the national application.

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- Inclusion of additional code points needed for national applications (e.g. “National Significant Number” for the Calling Party Number Parameter) in accordance with the Blue Book CCITT Recommendations Q.761- Q.764.
- Use of the Notification Indicator Parameter Field on the basis of the new CCITT Recommendations Q.761- Q.764 (please refer also to clause 7.2 of the specification CCS 0101), in order to ease the introduction of the Call Waiting, Call Hold, and Call Forwarding supplementary services.
- Use of the Generic Number in order to support the additional Calling Party Number and the additional Called Party Number, on the basis of the new CCITT Recommendations Q.761- Q.764 (please refer also to clause 7.2 of the specification CCS 0101).
- Support of the Call Forwarding Supplementary Services on the basis of the new CCITT Rec. Q.732 (please refer also to clause 7.2 of the specification CCS 0101).

In this document the differences between the CCITT recommendation Q.767 and the requirements for the ISUP- implementation are described. The special procedures and the inter working to existing CAS in national networks are treated separately in the specifications CCS 0104 and 0105).

These clarification's are given in the form of tables, in which the exceptions/ clarification's in comparison to the Annexes of the CCITT Rec. Q.767 are included. Regarding the Call forwarding supplementary services, the clarification's are given in chapter 6, in comparison to the CCITT Rec. Q.732 (please refer also to clause 7.2 of the specification CCS 0101)

## 2. EXCEPTIONS AND CLARIFICATION'S TO ANNEX A OF THE CCITT REC. Q.767

Q. 767, Annex A	Title	Clarification's
§ A.2	Services supported by the  ISDN User Part	The support of Call Waiting, Call  Hold and Call Forwarding shall be  implemented in addition

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### 3. EXCEPTIONS AND CLARIFICATION'S TO ANNEX B OF THE CCITT REC. Q.767<sup>2</sup>

0.767, Annex B	Title	Clarification
§ B.1.8	Call Progress Message	Definition according to the new CCITT Rec. Q.762 2.  A message sent in either direction during the set- up or active phase of the call, indicating that an event which is of significance, should be relayed to the originating or terminating access, has occurred
§ B.1.9	Charge information message	Shall be implemented  Please refer to the specifications CCS 0104 and CCS 0105
§B.1.10	Circuit group message	A Circuit Group message (CRG) shall not be regarded as an acknowledgement for a previous sent Circuit Group Reset message (RSC)
§ B.1.27	Information message	Shall be implemented as per CCITT Blue Book Rec. Q.762,  § 1.27
§ B.1.28	Information request message	Shall be implemented as per CCITT Blue Book Rec. Q.762,  § 1.28
§ B.2.5	Call forwarding may occur  Indicator	Shall be implemented as per  CCITT Blue book Rec. Q.762,  § 2.5
§ B.2.12	Calling party address request	Shall be implemented as per

<sup>2</sup> Please refer to the specification 0101, clause 4.2

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<b>0.767, Annex B</b>	<b>Title</b>	<b>Clarification</b>
	indicator § 2.12	CCITT Blue Book Rec. Q,762,
<b>§ B.2.13</b>	Calling party address response indicator	Shall be implemented as per CCITT Blue Book Rec. Q,762, § 2.13
<b>§ B.2.51</b>	Malicious call identification request indicator	Shall be implemented as per CCITT Blue book Rec. Q,762, § 2.51
<b>§ B.2.57</b>	Original called number	Shall be implemented as per CCITT Blue book Rec. Q,762 § 2.57
<b>§ B.2.64</b>	Redirecting indicator	Shall be implemented as per the new CCITT Rec. Q.732 3. Please refer also to the clause <b>6.3</b> of this document
<b>§ B.2.65</b>	Redirecting number	Shall be implemented as per the new CCITT Recommendation Q.732 3. Please refer to the clause <b>6.3</b> of this document
<b>§ B.2.66</b>	Redirecting reason	Shall be implemented as per the new CCITT Recommendation Q.732 3. Please refer to the clause <b>6.3</b> of this document
<b>§ B.2.67</b>	Redirection counter	Shall be implemented as per the new CCITT Rec. Q.732 3. Please refer to the clause <b>6.3</b> of this document
<b>§ 2.4.B of the new CCITT</b>	Call diversion information	Shall be implemented  Please refer also to clause <b>6.3</b> of

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<b>0.767, Annex B</b>	<b>Title</b>	<b>Clarification</b>
<b>Rec. Q.762 4.</b>		this document
<b>§ 2.40.B of the new CCITT Rec. Q.762 4.</b>	Generic notification indicators	Shall be implemented  Please refer also to clause <b>6.2</b> and <b>6.3</b> of this document

#### 4. EXCEPTIONS AND CLARIFICATION'S TO ANNEX C OF THE CCITT REC. Q.767<sup>3</sup>

<b>Q.767, Annex C</b>	<b>Title</b>	<b>Clarification</b>
<b>§ C.3.7</b>	Called party number	The code 000 0001 shall be used
<b>Item b)</b>	Nature of address indicators	
<b>§ C.3.8</b>	Calling party number	The codes 000 0001 and 0000011 shall be used
<b>Item b)</b>	Nature of address indicators	
<b>§ C.3.9</b>	Calling party's categories	National categories shall be implemented  Please refer to specification CCS 0104
<b>§ C.3.14</b>	Connected number	The codes 000 0001 and 0000011 shall be used
<b>Item b)</b>	Nature of address indicators	
<b>§ C.3.21</b>	Information indicators:	Shall be implemented as per CCITT Blue Book Rec. Q.763

<sup>3</sup> Please refer to the specification 0101, clause 4.2



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<b>Q.767, Annex C</b>	<b>Title</b>	<b>Clarification</b>
	Hold provided indicator	§3.21 Only the value 0 shall be used
	Charge information response indicator	Only the value 0 shall be used
	Solicited information indicator	Only the value 0 shall be used
<b>§ C.3.22</b>	Information request indicators:	Shall be implemented as per CCITT Blue Book Rec. Q.763
	Holding indicator	§3.22 Only the value 0 shall be used
	Charge information request indicator	Only the value 0 shall be used
<b>§ C 3.24</b>	Optional backward call indicators:	Shall be implemented as per CCITT Blue Book Rec. Q.763
	Call forwarding may occur indicator	§3.24 Only the value 1 shall be used
<b>§ C.3 .26</b>	Original called number	Shall be implemented as per CCITT Blue Book Rec. Q.763
<b>item b)</b>	Nature of address indicator	§ 3.26 The codes 000 0001 and 000 0011 shall be used
<b>item c)</b>	Numbering plan indicator	Only the code 001 shall be used
<b>item d)</b>	Address presentation restricted	The code 10 shall not be used

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<b>Q.767, Annex C</b>	<b>Title</b>	<b>Clarification</b>
	indicator	
<b>§ C.3.28</b>	Redirecting number	Shall be implemented as per CCITT Blue Book Rec. Q.763 § 3.28
<b>item b)</b>	Nature of address indicator	The codes 000 0001 and 000 0011 shall be used
<b>item c)</b>	Numbering plan indicator	Only the code 001 shall be used
<b>item d)</b>	Address presentation restricted indicator	The code 10 shall not be used
<b>§ C.3.29</b>	Redirection information:	Shall be implemented as per CCITT Blue Book Rec. Q.763 § 3.29
	Redirecting indicator	Only the codes 011 and 100 shall be used
	Original redirection reason	Only the code 0000 shall be used
	Redirecting reason	Only the code 0000 shall be used
<b>§ 3.20.B of the New CCITT</b>	Generic Notification Indicators	Shall be implemented

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<b>Q.767, Annex C</b>	<b>Title</b>	<b>Clarification</b>
<b>Rec. Q.763 5</b> <b>Item b)</b>	Notification Indicator	The codes 1100000,  1111 00 1 and  1111011 shall be used  Please refer also to the clauses <b>6.2</b> and <b>6.3</b> of this document
<b>§ 3.20.C of the</b> <b>New CCITT</b> <b>Rec. Q.763 5</b> <b>Item a)</b>	Generic Number    Number Qualifier Indicator	Shall be implemented    The codes 00000101 and 00000110 shall be used  Please refer also to the clause <b>6.2</b> of this document
<b>Table 5</b>	Address Complete	The generic notification indicators parameter shall be used in addition
<b>Table 6</b>	Answer	The generic notification indicators parameter shall be used in addition
<b>Table 7</b>	Call Progress	The following parameters shall be used in addition  - Cause indicators  - Generic notification indicators  - Call diversion information
<b>Table 12</b>	Connect	The generic notification indicators parameter shall be used in addition
<b>Table 14</b>	Information	The following parameters shall not be used:

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<b>Q.767, Annex C</b>	<b>Title</b>	<b>Clarification</b>
		<ul style="list-style-type: none"> <li>- Calling party's category</li> <li>- Call reference</li> <li>- Connection request</li> <li>- Access transport</li> </ul>
<b>Table 15</b>	Information Request	The call reference parameter shall not be used
<b>Table 16</b>	Initial address	<p>The following parameters shall be used in addition:</p> <ul style="list-style-type: none"> <li>- Redirecting number</li> <li>- Redirecting information</li> <li>- Original called number</li> <li>- National forward call indicator</li> </ul>

## 5. EXCEPTIONS AND CLARIFICATION'S TO ANNEX D OF THE CCITT REC. Q.767<sup>4</sup>

<b>Q.767, Annex D</b>	<b>Title</b>	<b>Clarification</b>
<b>§ D.2.1.1.1</b>	Actions required at the originating exchange	
<b>item a)</b>	Circuit selection	The routing information shall be stored at the originating exchange

<sup>4</sup> Please refer to clause 4.2 of the specification CCS 0101

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<b>Q.767, Annex D</b>	<b>Title</b>	<b>Clarification</b>
<b>item e)</b>	Completion of transmission Path	For speech and 3.1 kHz audio the call through connection shall be performed in both direction after the IAM has been sent.
<b>§ D.2.1.2.1</b>	Actions required at the originating exchange	
<b>item a)</b>	Circuit selection	The routing information shall be stored at the originating exchange
<b>item e)</b>	Completion of transmission Path	For speech and 3.1 kHz audio the call through connection shall be performed in both direction after the IAM has been sent
<b>§ D.2.1.4.8</b>	Return of ACM in inter working situation	
<b>item e)</b>		Not applicable
<b>§ D.2.1.6.1</b>	Requesting information	Shall be implemented as per CCITT Blue Book Rec. Q. 764, § 2.1.6.1
<b>§ D.2.1.6.2</b>	Sending information	Shall be implemented as per CCITT Blue Book Rec. Q. 764, § 2.1.6.2
<b>§ D.2.1.6.4 .</b>	Receiving an information message	Shall be implemented as per CCITT Blue Book Rec. Q. 764, § 2.1.6.4
<b>§ D.2.1.11</b>	Charging procedures	Shall be implemented, please refer to the specifications CCS 0104 and CCS 0105
<b>§ D.2.9.2.3</b>	Abnormal blocking and circuit group blocking procedures	

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<b>Q.767, Annex D</b>	<b>Title</b>	<b>Clarification</b>
<b>item iv)</b>		The maintenance system may not be informed
<b>item v)</b>		If CGBA message contain indications for which no acknowledgement was expected and these circuits are not blocked UBL/ CBU shall be sent to the partner exchange. The maintenance system may not be notified
<b>Item vi)</b>		If CGUA message contain indications for which no acknowledgement was expected and these circuits are not blocked, BLOt CBG shall be sent to the partner exchange. The maintenance system may not be notified
<b>§ 2.9.2.3</b>	Abnormal blocking and circuit group blocking procedures	
<b>items vii) and xii)</b>		CGUIUBL messages shall be sent for not locally blocked circuits that are indicated by the acknowledgement message. The maintenance system may not be notified
<b>items viii) and xiii)</b>		CBG/BLO messages shall be sent for locally blocked circuits that are indicated by the acknowledgement message. The maintenance system may not be notified

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<b>Q.767, Annex D</b>	<b>Title</b>	<b>Clarification</b>
<b>§ D.2.10.7</b>	Failure to receive a response to an information request message	Shall be implemented as per CCITT Blue Book Rec. Q.764, § 2.10.7
<b>§ D.2.12</b>	Automatic congestion control	Shall be implemented as per CCITT Blue Book Rec. Q.764, § 2.12
<b>Annex D.A</b>	Timers used in Annex D	<p>Timer T33 shall be implemented</p> <p>The time out of the following timers shall be implemented in accordance with the new CCITT Rec.'s Q.761- Q.764 6</p> <p>T1, T12, T14, T16, T18, T20, T22 = 15- 60 sec.</p> <p>TS, T13, T15, T17, T19, T21, T23 = 5- 15 min.</p>

**6. EXCEPTIONS AND CLARIFICATION'S TO SECTION 4 OF THE CCITT REC. Q.767, "GUIDELINES FOR ISDN INTERNATIONAL INTERCONNECTIONS"**

<b>Q.767,</b>	<b>Title</b>	<b>Clarification</b>
<b>§4.1.1.1</b>	In international transit Situations	With regard to the handling of unrecognised signalling information's national transit exchanges behave like international transit exchanges, i.e. the Table 8/Q.767 is also applicable for national transit exchanges. "Ignore" information shall be passed on unchanged
<b>Table 8</b>	Calling party number	The calling party number parameter shall be discarded if unrecognised signalling

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<b>Q.767,</b>	<b>Title</b>	<b>Clarification</b>
		information is received in the nature of address or number incomplete indicator
<b>§ 4.1.1.2</b>	In incoming! outgoing gateway or inter working situation	With regard to the handling of unrecognised signalling information's national local exchanges behave like international gateway exchanges, i.e. the Table 9/Q.767 is also applicable for national local exchanges. "Ignore" information shall be passed on unchanged
<b>§ 4.1.10</b>	MTP Pause/ resume	Please refer to clause <b>6.1</b> of this document
<b>§ 4.3</b>	Handling of Access Information	The Access Information shall be transferred transparently

## **7. ADDITIONAL PROCEDURES AND SUPPLEMENTARY SERVICES**

### **7.1 MTP Pause / Resume**

On reception of a MTP Pause primitive, the ISUP takes the following action:

- If the affected destination is not a destination (SP) known by the ISUP (not connected by circuits to the exchange), no action shall take place.
- If the affected destination is a destination (SP) known by the ISUP, all idle circuits shall be blocked for new calls. Calls in progress shall be released after 1 minute.

On reception of a MTP resume primitive, the ISUP takes the following action:

- If the affected destination is not a destination (SP) known by the ISUP (not connected by circuits to the exchange), no action take place.



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- If the affected destination is a destination (SP) known by ISUP, the circuits in the idle state can be used for calls. Normal call release procedures that may have started during the period of signalling isolation will ensure that affected circuits are returned to the idle state.

## 7.2 Generic notifications procedure

This capability enables supplementary services to transfer a notification indicator indicating an event which has occurred as the result of service invocation, in an generic notification parameter to either an originating or terminating user.

The generic notification parameter field is shall be passed on transparently in transit exchanges.

In local exchanges the parameter shall be passed on to the subscriber access in case the notifications related to the following supplementary services:

- Call Forwarding
- Call Hold
- Call Waiting

In case the notification is not related to one of the a.m. supplementary services, the parameter shall be discarded.

## 7.3 Call diversion supplementary service

The table below lists the exceptions against the new CCITT Rec. Q.732 (please refer also to Specification CCS 0101, clause 7.2).

### 7.3.1 Exceptions to CCITT REC. Q.732

Q.732	Title	Clarification
§ 2.1	Definition	Call deflection is not required
§ 2.2.2	Specific terminology	<p>The following terminology shall not be applicable:</p> <ul style="list-style-type: none"> <li>- Deflected user</li> <li>- Redirection number</li> </ul>

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<b>Q.732</b>	<b>Title</b>	<b>Clarification</b>
		-Redirection number restriction indicator
<b>§ 2.3.1</b>	Provision! Withdrawal	The paragraphs related to Call deflection (CD) are not applicable
<b>§ 2.4.11</b>	Messages:  Address complete (ACM)  Answer (ANS)  Call Progress (CPG)  Connect (CON)	The redirection number as well as the redirection number restriction shall not be used
<b>§ 2.4.2</b>	Parameters  Redirection reason (bits PONM)  Redirection number  Redirection number restriction indicator  Notification subscription option (bits CBA)  Redirecting reason (bits GFED)	The codes 0100,0101,0110 are not used  Not used  Not used  The code 000 is not used  The codes 0100,0101,0110 are not used
<b>§ 2.5.2.1</b>	Actions at the originating local exchange	Remarks related to call deflection shall not be applicable.

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<b>Q.732</b>	<b>Title</b>	<b>Clarification</b>
<b>§ 2.5.2.3</b>	Actions at the outgoing inter-national gateway exchange	The original called number and the redirecting number shall not be sent towards the international section.
<b>§ 2.5.2.4</b>	Actions at the incoming inter-national gateway exchange	The original called number shall be discarded if received from the international section
<b>§ 2.5.2.5.1.2.</b> <b>Item c)</b>	Diversion procedure at the diverting exchange	The text related to CD is not Applicable
<b>§ 2.5.2.5.1.2.</b> <b>Item c) ii)</b>	Call forwarding No Reply and Call Deflection during alerting	a) Option A shall not be included b) The text related to CD shall not be applicable
<b>§ 2.5.2.5.1.2.</b> <b>Item d)</b>	Notification Procedures	a) The text related to CD is not applicable b) The redirection number shall not be not sent c) The notification indicator shall be always sent. d) The value “unknown” in the notification subscriber option shall never be sent. If received in the originating local exchange, the value “presentation not allowed”

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<b>Q.732</b>	<b>Title</b>	<b>Clarification</b>
		shall be assumed
<b>§ 2.5.2.5.1.2. Item e)</b>	Handling of messages and parameters in a diverting exchange	The text related to CD is not applicable
<b>§ 2.5.2.5.2</b>	Exceptional procedures	Option A shall not be included
<b>§ 2.5.2.5.2. Item d)</b>	Exceptional procedures	Option B shall not be included
<b>Figures 2.</b>	Signalling Flows	<p>The figures</p> <p>2- 4,2- 6,2- 7, 2- 8, 2- 12, 2- 14,2- 15,2- 16, 2- 20, 2- 22, 2- 23,2- 24, 2- 28, and 2- 30 to 2- 31</p> <p>are not applicable</p>

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NATIONAL ISUP MESSAGES AND PARAMETERS FOR SPECIFIC FUNCTIONS OF THE NATIONAL NETWORK OF PAKISTAN

## **CCS 0104 -ISSUE 1.0 - CCS 0104 - Issue 1.0 - 22.01.1996 and CCS 0105 - Issue 1.0 - 22.01.1996**

### **1. PRELIMINARY REMARKS**

The ISUP implementations for the national network of Pakistan shall be in compliance with CCITT Rec. Q.767 and shall also include the requirements specified in the specification CCS 0103.

Additional functions shall be included in order to cater for the following national specific requirements.

- Charging aspects Malicious
- Call Holding
- Trunk offering
- Calling party's categories

In the following, the formats and codes of the correspondent necessary national Messages and Parameters are specified.

The correspondingly necessary procedures are described in the specification CCS 0105 in form of flow charts.

### **2. CHARGING**

#### **2.1 Charge information message (CRG)**

##### **2.1.1 *Definition***

Information sent in either direction for accounting and/or call charging purposes.

##### **2.1.2 *Formatting and coding***

Parameter	Type	Length	Coding
Message Type	F	1	00110001
Charge Brand Number	O	3	11111111
Number of Charging Units	O	3	11111110
End of optional parameter	O	1	00000000

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## 2.2 Charge band number parameter

### 2.2.1 *Definition*

Information sent in backward direction indicating the zone number that must be used for metering.

### 2.2.2 *Formatting and coding*

8	7	6	5	4	3	2	1
Charge Band Number							

The following codes shall be used in the charge band number parameter field:

000	No charge
001- 058	Charge Brand Number

## 2.3 National forward call indicator

### 2.3.1 *Definition*

Information sent in the forward direction indicating national call related events.

### 2.3.2 *Formatting and coding:*

National forward call indicators parameter field

The following codes are used in the national forward call indicators parameter field:

Bit	A	Zoning indicator
	0	Zoning done
	1	Zoning not done

## 2.4 Number of charging units

### 2.4.1 *Definition*

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Information sent in backward direction indicating the number of charging units received from CAS.

#### 2.4.2 *Formatting and coding:*

<b>8</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
<b>Number of Charging Units</b>							

Charging units parameter field

The following codes are used in the number of charging units parameter field:

Value:

0	Spare
1	Number of charging units

### 3. MALICIOUS CALL HOLDING

#### 3.1 Identification message (ident)

##### 3.1.1 *Definition*

The national ISUP message IDENT is sent in the backward direction, indicating that the malicious call data should be print out or be stored in a file.

##### 3.1.2 *Formatting and coding*

Parameter	Type	Length	Coding
<b>Message</b> Type Identification	F	1	11111110
<b>End of optional parameter</b>	O	1	00000000

#### 3.2 On hook message (on hook)

##### 3.2.1 *Definition*

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The national ISUP message ON HOOK is send in forward direction to inform that the call has been released by the calling party.

### 2.2.2 Formatting and coding

#### 3.2.2 *Formatting and coding*

Parameter	Type	Length	Coding
Message type:On hook	F	1	11111100
End of optional Parameter	O	1	00000000

### 3.3 END OF HOLD MESSAGE (HOLD)

#### 3.3.1 *Definition*

The national ISUP message HOLD is sent in backward direction in order to release the holding of the connection.

#### 3.3.2 *Formatting and coding*

Parameter	Type	Length	Coding
Message Type:End of hold	F	1	11111101
End of optional parameter	O	1	00000000

## 4. TRUNK OFFERING

### 4.1 TRUNK OFFER MESSAGE (TOF)

#### 4.1.1 *Definition*

The national ISUP message TOF is sent in forward direction indicating an operator's request for trunk: offering.

#### 4.1.2 *Formatting and coding*



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Parameter	Type	Length	Coding
Message Type	F	1	11111111
End of parameter	O	1	00000000

## 5. CALLING PARTY'S CATEGORY

besides of the categories as specified in the CCITT rec. Q.767, § C.3.9 (ANNEX C) the following additional categories shall be implemented for the national application:

CODE	CALLING PARTY'S CATEGORY
00001001	National operator
00001100	Maintenance line
00001101	Multi party line
00001110	VIP subscriber
00001111	Charge information request
00010000	IDS barred subscriber
00010001	ANI- equipment trouble

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MESSAGE FLOW DIAGRAMS

## **CCS 0105 - ISSUE 1.0 - CCS 0104 - Issue 1.0 - 22.01.1996 and CCS 0105 - Issue 1.0 - 22.01.1996**

INCLUDING REPRESENTATIVE MESSAGE FLOW DIAGRAMS FOR VARIOUS  
INTER WORKING CASES

### **1. PRELIMINARY REMARKS**

The ISUP implementation shall be in compliance with the CCITT Rec. Q.767 and shall also include the additional requirements as per specifications CCS 0103 and CCS 0104 in order to cater for national specific requirements as:

- Charging
- Malicious Call Identification / holding
- Trunk offering

In the following the required procedures for the implementation of the a.m. features, including inter working cases, are described.

### **2. NATIONAL CHARGING**

In the National Network of Pakistan the metering is depending on the type of call. Single pulse metering is used at local level, periodic pulse metering at long distance level. Central Automatic Message Accounting (CAMA) is used for international calls.

With regard to charging the following different kind of procedures shall be implemented:

- **Procedures for the determination of a zone number in the ISDN.**
- **Procedure for the determination of a zone number in the PSTN.**
- **Calling line identification for CAMA**

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MESSAGE FLOW DIAGRAMS

## 2.1 Determination of a zone number in the ISDN

The Charge Information Message (CRG)<sup>5</sup> shall be generated in the exchange where the zone number is determined to report the type of charging to be applied in a preceding exchange.

The CRG message shall contain the Charge Band Number Parameter<sup>6</sup> and shall be sent to the originating local exchange or, if lack of signalling capabilities due to Inter working with CAS exists, to the inter working exchange. In these exchanges the charging shall be performed or meter pulses shall be generated.

The **CRG** message shall always be sent before an **ACM** is returned.

The **formats and codes** of the required national message and national parameters are defined in the **specification CCS 0104, clauses 1.1, 1.2 and 1.3.**

## 2.2 Determination of a zone number in the PSTN

The charge information message CRG<sup>7</sup> shall be used in case meter pulses are received ITom the CAS, in inter working situation. The CRG sent backward on receipt of a meter pulse, shall contains the number of charge units parameter<sup>8</sup>.

The formats and codes of the required national message and national parameters are included in the specification CCS 0104, clauses 1.1 and 1.4.

## 2.3 Calling line identification for CAMA

In the National Network of Pakistan the calling line identity shall be transmitted to the international gateway exchange (IGE) by means of MFC- RI signals, if requested by the IGE, for charging and registration purposes.

In case of inter working where the F6a signalling system is at the origin of the connection, the calling line identity shall be requested by the ISUP using an **Information Request (INR)/ Information (INF)** Cycle. The F6 a signalling system shall transmits the calling line identity ITom the originating exchange to the IGE using MFC- RI signalling (in- band via the ISUP- controlled .trunk).

In case of inter working where the ISUP is at the origin of the connection, the calling line identity shall be already provided in the Initial Address Message (IAM). The calling line identity shall be transmitted ITom the inter working point to the IGE using MFC- RI signalling.

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<sup>5</sup> National Message

<sup>6</sup> National Parameter

<sup>7</sup> National Message

<sup>8</sup> National Parameter

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Currently the CCS No.7 is not included in the IGE' s. The relevant procedures for the future case where CCS No.7 (ISUP) will be also provided in the IGE's is for further study

### 3. MALICIOUS CALL IDENTIFICATION

The calling party shall have the option before lifting the hand set and during the call, of having the identity of the calling party established by means of MCI- request.

Call tracing shall not be used for calls using only ISUP controlled trunks, since the calling line identity is already included in the IAM and the called party can request the calling line identity by hook flash signal.

Interworking only exists with F6a signalling and TUP, since call tracing is only requested at local level, and shall be implemented following the rules specified in the TUP Specification P30304-A2760- AOOI-2- 7626.

For details please refer to the message flow diagrams included in **Annex C** of this document.

**The formats and codes** of the required national message and national parameters are included in the **specification CCS 0104, clauses 1.1 and 1.4.**

### 4. TRUNK OFFERING

Trunk offering shall enable an operator to offer a new call to a busy analogue subscriber. Trunk offering is not requested for busy ISDN subscriber.

The **Initial Address Message (IAM)** shall be sent from the operator's exchange containing a **calling party category** parameter encoded "**National Operator**". If the called party (analogue subscriber) is busy an **Address Complete Message (ACM)** including the cause (17) "User Busy" shall be returned from the terminating local exchange.

If the operator wants to enter the call a **Trunk Offer Message (TOF)5** shall be sent from the operator's exchange to the terminating local exchange and a 3 party conversation is established. The called subscriber is verbally informed by the operator about the new incoming call.

If the called subscriber releases the previous connection he will be automatically called back and a new connection can be established.

If the called subscriber wants to continue the actual call, the operator retires the offered call and the **Trunk Offer Message (TOF)5** shall be sent in order to terminate the 3 party conversation in the destination local exchange. When the called subscriber releases the call, the Resume Message (RES) (network initiated) immediately followed by the Suspend Message (SUS) (network initiated) shall be sent to the operator's exchange. When the operator activates the recall, a Trunk Offer Message (TOF)6 is sent to the terminating local exchange and the analogue subscriber will be called.

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**The formats and codes** of the required national message and the required category are included in the **specification CCS 0104, clauses 3.1 and 4.**