



ATIS-1000610.1998(R2013)

Generic Procedures for the Control of ISDN Supplementary  
Services



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## ATIS-1000610.1998(R2013), *Generic Procedures for the Control of ISDN Supplementary Services*

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American National Standard  
for Telecommunications –  
**Generic Procedures for the Control  
of ISDN Supplementary Services**

Secretariat

**Alliance for Telecommunications Industry Solutions**

Approved January 14, 1998

**American National Standards Institute, Inc.**

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# Contents

	Page
Foreword .....	ii
<b>1</b> Purpose, scope, and application .....	1
<b>2</b> Normative references .....	1
<b>3</b> Requirements .....	2
<b>Tables</b>	
<b>7-10</b> CALL PROCEEDING message content .....	6
<b>7-11</b> CONNECT message content .....	7
<b>7-12</b> RELEASE message content .....	8
<b>7-13</b> RELEASE COMPLETE message content .....	9
<b>7-14</b> SETUP message content .....	10
<b>8-2</b> Information elements specific to supplementary service control .....	11
<b>8-5</b> Facility information element .....	13
<b>8-17</b> Bearer capability information element for NCICS .....	19
<b>8-18</b> Channel identification information element .....	21
<b>8-19</b> Reason for Redirection codepoints .....	22
<b>Figures</b>	
<b>8-2</b> Facility information element .....	12
<b>8-2a</b> NFE Component ASN.1 Structure .....	15
<b>8-2b</b> Network Protocol Profile Component ASN.1 Structure .....	16
<b>8-2c</b> Interpretation Component ASN.1 Structure .....	18
<b>8-10</b> Bearer capability information element .....	19
<b>8-11</b> Channel identificaion information element .....	20
<b>8-12</b> Redirecting number information element .....	22
<b>8-13</b> Redirecting subaddress information element .....	23
<b>8-14</b> Redirection number information element .....	23
<b>8-15</b> Redirection subaddress information element .....	24
<b>Annexes</b>	
<b>D</b> Display Procedures .....	25
<b>E</b> Call Independent Signaling Procedures .....	32
<b>F</b> Bibliography .....	37

**Foreword** (This foreword is not part of American National Standard T1.610-1998.)

This standard specifies the generic procedures applicable for the control of Integrated Services Digital Network (ISDN) supplementary services at the user-network interface.

This standard was developed by Working Group T1S1.1 of Accredited Standards Committee T1 – Telecommunications.

This standard contains three annexes. Annexes D and E are normative and are considered part of the standard. Annex F is informative and is not considered part of the standard.

Suggestions for improvement of this standard will be welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, T1 Secretariat, 1200 G Street NW, Suite 500, Washington, DC 20005.

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American National Standard  
for Telecommunications –

# Generic Procedures for the Control of ISDN Supplementary Services

## 1 Purpose, scope, and application

This standard specifies the generic procedures applicable for the control of Integrated Services Digital Network (ISDN) supplementary services at the user–network interface.

This standard is identical to the 1993 Recommendation Q.932 issued by the International Telecommunications Union - Telecommunications Standardization Sector (ITU-T) with the changes described in clause 3.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the references indicated below.

ANSI T1.408-1990, *Telecommunications – Integrated Services Digital Network (ISDN) primary rate – Customer installation metallic interfaces – Layer 1 specification*

ANSI T1.601-1992, *Telecommunications – Integrated Services Digital Network (ISDN) – Basic access interface for use on metallic loops for application on the network side of the NT (Layer 1 specification)*

ANSI T1.602-1996, *Telecommunications – Integrated Services Digital Network (ISDN) – Data-Link Layer Signaling Specification for Application at the User–Network Interface*

ANSI T1.605-1991, *Telecommunications – Integrated Services Digital Network (ISDN) – Basic access interface for S and T reference points (Layer 1 specification)*

ANSI T1.607-1990 (R1995), *Telecommunications – Integrated Services Digital Network (ISDN) – Layer 3 Signaling specification for circuit-switched bearer service for digital subscriber signaling system number 1 (DSS1)*

ANSI T1.607a-1996, *Telecommunications – Integrated Services Digital Network (ISDN) – Layer 3 Signaling specification for circuit-switched bearer service for digital subscriber signaling system number 1 (DSS1)*

ANSI T1.650-1995, *Telecommunications – Integrated Services Digital Network (ISDN) – Layer 3 Usage of the Cause Information Element in digital subscriber system number 1 (DSS1)*

ITU-T Recommendation Q.932-1993, *Digital Subscriber Signalling System No.1 (DSS1) Generic Procedures for the Control of ISDN Supplementary Services*<sup>1)</sup>

<sup>1)</sup> Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

ISO/IEC 11582: 1995, *Information Technology – Telecommunications and information exchange between systems – Private Integrated Services Network – Generic Functional Protocol for the Support of Supplementary Services – Interexchange Signalling Procedures and Protocol*<sup>1)</sup>

### 3 Requirements

This standard is identical to ITU-T Recommendation Q.932-1993, with the following changes:

- 1) *Change references from ITU-T Recommendation Q.920 and Q.921 to ANSI T1.602.*
- 2) *Change references from ITU-T Recommendation Q.930 and Q.931 to ANSI T1.607 plus ANSI T1.607a.*
- 3) *Change references from ITU-T Recommendation I.430 to ANSI T1.601 and ANSI T1.605 and references from I.431 to ANSI T1.408.*
- 4) *Change references from ITU-T Q.95x series of Recommendations to “current and future ANSI T1 standards on individual supplementary services.”*
- 5) *Change the words “S/T reference points” to read “S, T, or U reference points” in clause 2.*
- 6) *The following subclause shall be added:*

#### **2.1.1.4 Notification of service profile change**

When the network determines that a change has occurred to a User’s Service Profile and the network needs to indicate this to the user, the network shall send a NOTIFY message to the user whose Service Profile has been updated, using the procedures of 9.3.2.2. This message shall be sent point-to-point at layer 2 and shall include the dummy call reference as well as the notification indicator information element coded to “service profile update.”

The terminal is expected to convey this information to the user (e.g., in the form of a display). Based on the receipt of this indication, the user may decide to reprogram the terminal to be compatible with the information contained in the network.

- 7) *Change the beginning of the last sentence of the second paragraph of 2.1.1.2 to read “As a service provider option to support the user’s need, more than one service profile...”.*
- 8) *Replace the Note contained in 4.1 of Recommendation Q.932 with the following:*

NOTE – While it is recognized that some non-U.S. networks may send the Keypad facility information element in the network-to-user direction, for all networks adopting this standard, the Keypad facility information element shall not be used in the network-to-user direction.

- 9) *The following subclauses shall be added:*

#### **4.5.2.4 Network Initiated Service Activation or Deactivation**

It may be necessary for the network to either activate a supplementary service for a user, or to deactivate a service that had previously been activated. For example, a network may provide service activation for a user at a specified time of day or a supplementary service that is active may need to be deactivated by the network for such reasons as:

- a. by prior arrangement with the user, deactivation is to occur at a specified time of day;
- b. an active service’s timer expires, requiring service deactivation;
- c. an action or operation by a user requires that a service be deactivated;
- d. an interaction with another supplementary service causes deactivation; that is, another service takes precedence over an active service causing it to be deactivated.

If the network needs to activate or deactivate a supplementary service and the Keypad protocol applies to the served user's interface, then the network may send an appropriate message (e.g., INFORMATION message) to the user that includes a Display text information element containing an appropriate indication that a supplementary service has been activated or deactivated. Networks supporting both the Keypad and the Feature key management protocols per access, in the network-to-user direction, may choose to send to the user a Feature indication information element in an INFORMATION message that identifies the feature and whether it is being activated or deactivated. Additional indications may be provided to the user via the Display text information element in appropriate messages.

### 5.2.3.3 Network initiated service activation or deactivation

It may be necessary for the network to either activate a supplementary service for a user, or to deactivate a service that had been previously activated. See 4.5.2.4 for examples of when the network may need to activate or deactivate a service.

If the network needs to activate or deactivate a supplementary service and the Feature key management protocol applies to a served user's interface, then the network shall send to the user a Feature indication information element in an appropriate message (e.g., INFORMATION message) that identifies the feature and whether it is being activated or deactivated. Additional indications may be provided to the user via the Display text information element in appropriate messages.

10) *The following shall be added after the third paragraph of 6.2.1:*

Enhancements to the procedures may be required for users requesting that no B-Channel be reserved or that the reserved B-Channel be released on a per call basis.

11) *The following shall be added to 6.2.1.1:*

Auxillary states v and vi are not supported.

12) *The following shall be added to 6.2.2.1 at the end of the second paragraph (i.e., immediately after the line "Active (U10), (N10)":*

The Hold function is not applicable to call termination states other than the active state.

13) *Subclause 6.3.2.1 and its subclauses shall be replaced with the following text:*

For supplementary service procedures independent of an active call, the initiating side must first establish a reliable data link connection between the network and the user according to the data link services described in ANSI T1.602. Once the data link connection is established, the user or the network starts the establishment of the signalling connection by transferring a REGISTER message across the user-network interface. This signalling connection is identified by the call reference associated with the REGISTER message. The requested supplementary service is identified by the operation value within the Facility information element. This signalling connection may be released by the exchange of return result, return error or reject component types contained in the Facility information element within a RELEASE COMPLETE message. Alternatively, the Networked Call Independent, Connection Oriented procedures of Annex E may be used. The choice of signaling mechanisms is network and application dependent.

Examples of message exchange for supplementary service control for various scenarios is described by means of arrow diagrams in Appendix I.

To assign a call reference value and convey the supplementary service invocation, a REGISTER message with a Facility information element is used. The invoke operation contained in the Facility information element present in the REGISTER message identifies the supplementary service involved. One of the following will occur:

1) When the REGISTER message containing a Facility information element is sent and the requested service is available, a FACILITY message containing the Facility information element may be returned. One or more exchanges of FACILITY messages may subsequently occur. To terminate the service interaction and release the call reference value, a RELEASE COMPLETE message is sent by either side of the interface. The RELEASE COMPLETE message may also contain the Facility information element.

2) If the content of the Facility information element is not understood, then a FACILITY message or a RELEASE COMPLETE message operation with the Facility information element is returned with the Reject component type. When the rejection has been returned in a FACILITY message, the Facility information element can be resent in another FACILITY message or the call reference value released with a RELEASE COMPLETE message.

3) If the content of the Facility information element is understood, but the supplementary service request cannot be provided, then a FACILITY message or a RELEASE COMPLETE message with the Facility information element is returned with the component return error. When the rejection has been returned in a FACILITY message, the Facility information element can be resent in another FACILITY message or the call reference value released with a RELEASE COMPLETE message.

14) *The following text shall be added as a new subclause 6.3.7:*

#### **6.3.7 Invoke ID Reuse**

The user or network may begin to reuse the invoke identifier value after a correlated response is received or sent (either a Return result, Return error, or Reject component).

If a response is not expected, the user or network may begin to reuse the invoke identifier value after sending the invoke component.

If the operation is of the class "report failure only" or "report success only," the operation will define when the invoke identifier can be reused.

15) *The following Note shall be added at the end of 6.3:*

NOTE – Operation classes 2, 3, 4, and 5 as defined in CCITT Recommendation X.219 are valid for use in Supplementary Services defined in American National Standards.

16) *The following text shall be added to the end of the next-to-last paragraph of 6.3.6.3.*

If call clearing was initiated by the requester (e.g., the user), the recipient (e.g., the network) shall continue with the clearing procedures. If the call reference is released before a response can be sent, the requestor may not receive a response. In this case, ANSI Supplementary Service Standards will specify additional service-specific procedures.

17) *The following new paragraph shall be added after the next-to-last paragraph of 6.3.6.4.*

If a REGISTER message does not contain the Facility information element, the REGISTER message shall be discarded and a RELEASE COMPLETE message containing cause value #96, "mandatory information element is missing" shall be sent.

- 18) *Replace Table 7-2 with the following (text addition is underlined):*

Message type: FACILITY				
Significance: local or <u>global</u> (Note 1)				
Direction: both				
Information element	Reference	Direction	Type	Length
Protocol discriminator	4.2/T1.607	both	M	1
Call reference	4.3/T1.607	both	M	2-*
Message type	8.1	both	M	1
Facility	8.2	both	M (Note 4)	8-*
Display	4.5/T1.607	both	O (Note 2)	(Note 3)
M Mandatory				
O Optional				
NOTES				
1 This message has local significance, however, it may carry information of global significance. This message may have <u>a global significance when it contains a facility information element with a protocol profile coded "Networking Extensions" and for some applications may need to be conveyed unchanged to the remote user side.</u>				
2 Included if the network provides information that can be presented to the user.				
3 The minimum length is 2 octets. The maximum length is network dependent and is either 34 or 82 octets.				
4 Extended Facility information element may be used instead.				

- 19) *Change the inclusion condition for the Facility information element in Table 7-6 to "Mandatory." In addition, Note 4 shall be deleted.*
- 20) *Add the following subclauses to the end of clause 7:*

## **7.2 Messages for Call Independent, Connection-Oriented Signalling**

This clause defines the messages that are associated with Networked Call Independent, Connection-Oriented Signalling (NCICS). For certain messages, reference is made to other clauses of this standard or to ANSI T1.607 where it is noted that there is a change necessary to an already defined message. Where there is a change, the entire message and applicable information elements are shown here. The Display information element (defined in ANSI T1.607) and the Display text information element are not applicable to NCICS.

### 7.2.1 CALL PROCEEDING

This message is sent by the called user to the network or by the network to the calling user to indicate that requested NCICS connection establishment has been initiated and no more NCICS connection establishment information will be accepted. See Table 7-10.

TABLE 7-10  
CALL PROCEEDING message content

Message type: CALL PROCEEDING Significance: local Direction: both				
Information element	Reference (subclause)	Direction	Type	Length
Protocol discriminator	4.2/ T1.607	Both	M	1
Call reference	4.3/ T1.607	Both	M	2-*
Message type	4.4/ T1.607	Both	M	1
Channel identification	8.2.11	Both	M	3

### 7.2.2 CONNECT

This message is sent by the called user to the network and by the network to the calling user, to indicate NCICS connection acceptance by the called user. See Table 7-11.

TABLE 7-11  
**CONNECT message content**

Message type: CONNECT Significance: global Direction: both				
Information element	Reference (subclause)	Direction	Type	Length
Protocol discriminator	4.2/ T1.607	Both	M	1
Call reference	4.3/ T1.607	Both	M	2-*
Message type	4.4/ T1.607	Both	M	1
Facility	8.2.3	Both	O (Note 1)	2-*
Connected number	4.5/ T1.607	Both	O	4-*
NOTES 1 Included if a component needs to be exchanged.				

### 7.2.3 CONNECT ACKNOWLEDGE

This message is sent by the network to the called user to indicate the user has been awarded the NCICS connection. It may also be sent by the calling user to the network to allow symmetrical NCICS control procedures. See 3.1.4 of ANSI T1.607.

### 7.2.4 FACILITY

This message may be sent to request or acknowledge a supplementary service. See 7.1.1 for more information.

### 7.2.5 RELEASE

This message is sent by the user or the network to indicate that the equipment sending the message intends to release the call reference. Thus the receiving equipment shall clear the NCICS connection and prepare to release the call reference after sending a RELEASE COMPLETE. See Table 7-12.

TABLE 7-12  
RELEASE message content

Message type: RELEASE Significance: local (Note 1) Direction: both				
Information element	Reference (subclause)	Direction	Type	Length
Protocol discriminator	4.2/ T1.607	Both	M	1
Call reference	4.3/ T1.607	Both	M	2-*
Message type	4.4/ T1.607	Both	M	1
Cause	4/ T1.650	Both	M	2-32
Facility	8.2.3	Both	O (Note 2)	2-*
NOTES				
1 This message has local significance; however, it may carry information of global significance when used as the first clearing message.				
2 Included if a component needs to be exchanged.				

### 7.2.6 RELEASE COMPLETE

This message is sent by the user or the network to indicate that the equipment sending the message has cleared the NCICS connection, released the call reference and the receiving equipment shall release the call reference. See Table 7-13.

TABLE 7-13  
**RELEASE COMPLETE message content**

Message type: RELEASE COMPLETE Significance: local (Note 1) Direction: both				
Information element	Reference (subclause)	Direction	Type	Length
Protocol discriminator	4.2/T1.607	Both	M	1
Call reference	4.3/T1.607	Both	M	2-*
Message type	4.4/T1.607	Both	M	1
Cause	4/T1.650	Both	O (Note 2)	2-32
Facility	8.2.3	Both	O (Note 3)	2-*
NOTES 1 This message has local significance; however, it may carry information of global significance when used as the first clearing message. 2 Mandatory in the first clearing message, including when the RELEASE COMPLETE message is sent as a result of an error handling condition. 3 Included if a component needs to be exchanged.				

### 7.2.7 SETUP

This message is sent by the originating user to the network and by the network to the terminating user to initiate NCICS connection establishment. See Table 7-14.

TABLE 7-14  
**SETUP message content**

Message type: SETUP Significance: global Direction: both				
Information element	Reference (subclause)	Direction	Type	Length
Protocol discriminator	4.2/ T1.607	Both	M	1
Call reference	4.3/ T1.607	Both	M	2-*
Message type	4.4/ T1.607	Both	M	1
Bearer capability	8.2.10	Both	M	4
Channel identification	8.2.11	Both	M	3
Facility	8.2.3	Both	O (Note 1)	2-*
Calling party number	4.5/ T1.607	Both	O (Note 2)	2-*
Called party number	4.5/ T1.607	Both	M	2-*
NOTES				
1 Included if a component needs to be exchanged.				
2 May be included by the originating user or the network to identify the originating user.				

### 7.2.8 STATUS

This message is sent by the user or the network in response to a STATUS ENQUIRY message or at any time during an NCICS connection or to report certain error conditions listed in 5.8 of ANSI T1.607. See 3.1.13 of ANSI T1.607 for more information.

### 7.2.9 STATUS ENQUIRY

This message is sent by the user or the network at any time to solicit a STATUS message from the peer layer 3 entity. See 3.1.14 of ANSI T1.607 for more information.

21) *Table 8-2 shall be replaced with the following table:*

**Table 8-2 – Information elements specific to supplementary service control**

Bits								Clause reference	Maximum length (octets) Note 1
8	7	6	5	4	3	2	1		
0	:	:	:	:	:	:	:	Variable length information elements	
	0	0	0	0	1	0	0	Bearer capability	4.5.10 4
	0	0	0	1	0	0	0	Cause	4/T1.650, 8.2.16 32
	0	0	0	1	1	0	1	Extended facility	8.2.4 Note 4
	0	0	1	1	0	0	0	Channel identification	4.5.11 3
	0	0	1	1	1	0	0	Facility	8.2.3 Note 3
	0	0	1	0	1	0	0	Call state	8.2.1 3
	0	1	1	0	0	1	0	Information request	8.2.7 3
	0	1	0	0	1	1	1	Notification Indicator	8.2.8 Note 4
	0	1	1	1	0	0	0	Feature activation	8.2.5 4
	0	1	1	1	0	0	1	Feature indication	8.2.6 5
	0	1	1	1	0	1	0	Service profile identification	8.2.9 32
	0	1	1	1	0	1	1	Endpoint identifier	8.2.2 4
	1	0	0	0	0	0	1	Precedence level	6.1.3.1/T1.619 Note 4, 5
	1	1	1	0	1	0	0	Redirecting number	8.2.12 *
	1	1	1	0	1	0	1	Redirecting subaddress	8.2.13 23
	1	1	1	0	1	1	0	Redirection number	8.2.14 * (Note 6)
	1	1	1	0	1	1	1	Redirection subaddress	8.2.15 23 (Note 6)
	1	1	1	1	1	1	0	User-user	6.2/T1.621 128
	0	1	0	1	0	1	0	Display text (National-specific, Codeset 5)	Annex D Note 4
All other values are reserved (Note 2)									

**Table 8-2 (concluded)**

NOTES	
1	The length limits described for the variable length information elements below take into account only the present ITU-T standardized coding values. Future enhancements and extensions to this Standard will not be restricted to these limits.
2	The reserved values with bits 5-8 coded "0000" are for future information elements for which comprehension by the receiver is required (see 5.8.7.1 of ANSI T1.607).
3	The maximum length of the Facility information element is application dependent, consistent with the maximum length of the message.
4	The maximum length is network dependent.
5	It is expected that the length of the Precedence level information element will be 9 octets in a supplement to ANSI T1.619-1992.
6	It is anticipated that this information element will be used by call forwarding and call deflection.
*	Undefined maximum length

22) Replace Figure 8-2 with the following:

Figure 8-2  
**Facility information element**

8	7	6	5	4	3	2	1	
0	0	0	1	1	1	0	0	Octet 1
Facility Information element identifier								
Length of Facility information element								2
1 ext .	0	0	Protocol profile					3
Network Facility Extension (note 1)								3.1*
Network Protocol Profile (note 2 & 5)								3.2*
Interpretation Component (note 3 & 5)								3.3*
Service Components (note 4)								4, etc.

(continued)

**Figure 8-2 (concluded)**

<p>NOTES</p> <ol style="list-style-type: none"> <li>1 A component of type Network Facility Extension may be included.</li> <li>2 A component of type Network Protocol Profile may be included to specify the contents of the component of type Service Component (other than ROSE) when the Protocol profile field in Octet 3 contains the value "Networking Extensions". To indicate that the contents of the Service Component field is ROSE, the Network Protocol Profile Component shall be excluded.</li> <li>3 A component of type Interpretation Component may be included.</li> <li>4 One or more components of type Service Component may be included.</li> <li>5 Octet groups 3.1 through 3.3 may only be included when the Protocol profile field in Octet 3 contains the value "Networking Extensions".</li> </ol>
--

23) Replace Table 8-5 with the following:

TABLE 8-5  
**Facility information element**

<p><i>Protocol Profile (Octet 3)</i></p> <p>Bits</p> <p><u>5 4 3 2 1</u></p> <p>1 0 0 0 1 ROSE (Note 1)</p> <p>1 0 0 1 0 CMIP (Note 2)</p> <p>1 0 0 1 1 ACSE (Note 3)</p> <p>1 1 1 1 1 Networking Extensions (Note 4)</p> <p>All other values are reserved.</p>
<p>NOTES</p> <ol style="list-style-type: none"> <li>1 When this codepoint is used, the NFE, NPP, and the Interpretation components shall be excluded. In addition, ITU-T locally defined values apply.</li> <li>2 When this codepoint is used, the NFE, NPP, and the Interpretation components shall be excluded. <i>See Recommendation Q.941 for the CMIP protocol.</i></li> <li>3 When this codepoint is used, the NFE, NPP, and the Interpretation components shall be excluded. <i>See Recommendations X.217 and X.227 for the ACSE protocol.</i></li> <li>4 When this codepoint is used, the NFE, NPP, and the Interpretation components can be included. In this case, only ISO/IEC defined local values apply. For consistency with ISO/IEC 11582, a Facility information element with the protocol profile of "Networking Extensions" shall not be permitted in the SETUP ACKNOWLEDGE, CALL PROCEEDING, and CONNECT ACKNOWLEDGE messages.</li> </ol>

24) *Within 8.2.3, the following subclauses shall be added:*

### **8.2.3.2 Networking Extensions Protocol**

This subclause defines the PDU contents for the Protocol Profile of Networking Extensions.

#### **8.2.3.2.1 Network Facility Extension Component**

The NFE is defined in ISO/IEC 11582, Issue 1. An extract of the ASN.1 description of the NFE (see Figure 8-2a) is provided here for information purposes. Any difference from the NFE defined in ISO/IEC 11582 shall be resolved in favor of ISO/IEC 11582.

```

Network-Facility-Extension
  { iso (1) standard (0) pss1-generic-procedures (11582) network-facility-extension (2) }

DEFINITIONS ::=
BEGIN
EXPORTS      NetworkFacilityExtension;
IMPORTS      PartyNumber FROM Addressing-Data-Data elements
             { iso (1) standard (0) pss1-generic-procedures (11582) addressing-data-data
             elements(9)};

NetworkFacilityExtension ::= [10] IMPLICIT SEQUENCE
  { sourceEntity           [0] IMPLICIT EntityType,
    sourceEntityAddress    [1] AddressInformation OPTIONAL,
    destinationEntity      [2] IMPLICIT EntityType,
    destinationEntityAddress [3] AddressInformation OPTIONAL}

EntityType ::= ENUMERATED
  { endPINX( 0),
    anyTypeOfPINX( 1)}

AddressInformation ::= PartyNumber

END -- of Network Facility Extension

```

**Figure 8-2a.** NFE Component ASN.1 Structure

### 8.2.3.2.2 Network Protocol Profile Component

The Network Protocol Profile component provides a means whereby the originator can identify the protocol that is being signaled via the Facility information element. This may optionally be included when the Protocol Profile is encoded to "Networking Extensions." To indicate "ROSE", the Network Protocol Profile component shall be excluded. If this is not included, the receiver shall assume "ROSE".

The protocol profiles supported in this standard can be found in 8.2.3. The "dse" protocol profile is not supported in this standard.

The interpretation of the Service Components Field depends on the coding of the NPP component. If the receiving entity does not recognize or support the indicated NPP coding, the receiving destination entity shall discard the entire Facility information element.

The NPP is defined in ISO/IEC 11582, Issue 1. An extract of the ASN.1 description of the NPP (see Figure 8-2b) is provided here for information purposes. Any difference from the NPP defined in ISO/IEC 11582 shall be resolved in favor of ISO/IEC 11582.

```

Network-Protocol-Profile-component
  { iso( 1) standard( 0) pss1-generic-procedures( 11582)network-protocol-profile-component( 8)
  }

DEFINITIONS ::=
BEGIN
EXPORTS      NetworkProtocolProfile;

NetworkProtocolProfile :=      [18]IMPLICIT INTEGER
                               { acse ( 19),
                               dse ( 32)
                               -- the coding for dse is not supported in this
                               -- Standard                                     } (0..254)

END -- of Network-Protocol-Profile-component

```

**Figure 8-2b.** Network Protocol Profile Component ASN.1 Structure

### 8.2.3.2.3 Interpretation Component

The Interpretation component provides a means whereby the originator can include optional instructions to the receiving destination entity in the event that the receiver does not understand the operation value of an Invoke component.

The network or user may send the Interpretation Component to the user if the protocol profile field of the Facility information element is coded "Networking Extensions." Individual ISDN Supplementary Services will specify the conditions under which the network includes this component in the Facility information element.

When the network or user receives the Facility information with the protocol profile field coded to "Networking Extensions", the receiving entity shall be able to accept and act on the Interpretation Component if the receiving entity does not understand one of the ROSE Invoke components carried within the Facility information element as follows:

- a) If the Interpretation Component is coded to "discardAnyUnrecognisedInvokeComponent", then the receiving entity shall discard any unrecognized Invoke Component contained within the Facility information element. It shall process all recognized components according to the specific Supplementary Service procedures defined in other ANSI Standards.
- b) If the Interpretation Component is coded to "clearCallIfAnyInvokeComponentNotRecognised", the receiving entity shall clear the call if there is at least one Invoke Component that is not recognized within the Facility information element and return a Reject component with the Invoke-Problem-Value unrecognized operation.
- c) If the Interpretation Component is coded to "rejectAnyUnrecognisedInvokeComponent", then the receiving entity shall discard any unrecognized Invoke Component contained within the Facility information element. In addition, for each Invoke Component that is unrecognized, the receiving entity shall send the sending entity a Reject component. The receiving entity shall process all recognized components according to the specific Supplementary Service procedures defined in other ANSI Standards.

The Interpretation Component is defined in ISO/IEC 11582, Issue 1. An extract of the ASN.1 description of the Interpretation Component (see Figure 8-2c) is provided here for information purposes. Any difference from the Interpretation Component defined in ISO/IEC 11582 shall be resolved in favor of ISO/IEC 11582.

```

Interpretation-component
  { iso( 1) standard( 0) pss1-generic-procedures( 11582)interpretation-component( 3) }

DEFINITIONS ::=
BEGIN
EXPORTS      InterpretationComponent;

InterpretationComponent      :=      [11]IMPLICIT ENUMERATED
      {discardAnyUnrecognisedInvokePdu( 0),
      clearCallIfAnyInvokePduNotRecognised( 1),
      rejectAnyUnrecognisedInvokePdu( 2)
      -- this coding is implied by the absence of an
      -- Interpretation Component.
      }

END      --of Interpretation-component

```

**Figure 8-2c.** Interpretation Component ASN.1 Structure

25) *In Table 8-14, the following notification descriptions shall be added:*

0 1 0 0 0 0 0	
to	Reserved for ISO
0 1 1 1 1 1 1	
1 0 0 0 0 0 0	discriminator for extension to ASN.1 encoded component for ISO (Note)
1 1 0 1 1 1 1	reverse charging (for the rest of the call)
1 1 1 0 1 0 0	service profile update

*and the following note shall replace the existing note:*

NOTE – Octet 4 shall only be included if one of these values is used.

26) *The following subclauses describing new information elements shall be added at the end of 8.2.*

### **8.2.10 Bearer capability**

The Bearer capability information element is defined in 4.5.5 of ANSI T1.607. This clause describes the fields and the valid coding of those fields that shall be used in conjunction with Networked Call Independent Signalling Connections described in Annex E. For NCICS, the Bearer capability information element shall consist only of octets 1, 2, 3, and 4 as shown in Figure 8-10 and as coded in Table 8-17.

Bits								Octets
8	7	6	5	4	3	2	1	
Bearer capability								1
0	0	0	0	0	1	0	0	
Information element identifier								
Length of the bearer capability contents (Note 1)								2
1 ext.	Coding standard		Information transfer capability					3
1 ext.	Transfer mode		Information transfer rate					4

NOTES

1 This octet is coded to an integer value of 2 (i.e., "0 0 0 0 0 0 1 0").

FIGURE 8-10

**Bearer capability information element**

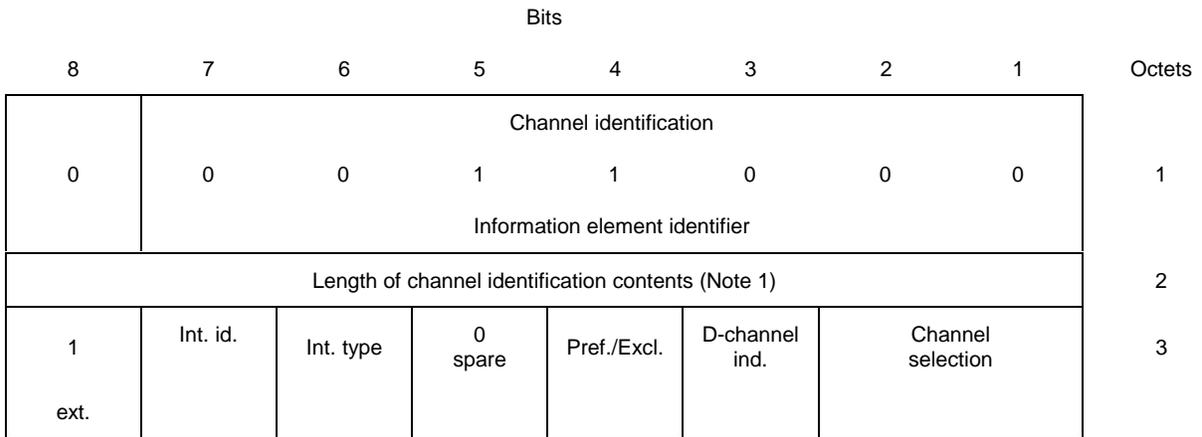
TABLE 8-17

**Bearer capability information element for NCICS**

<i>Coding standard (octet 3)</i>	
Bits	
<u>7 6</u>	
0 1	ISO/IEC
<i>Information transfer capability (octet 3)</i>	
Bits	
<u>5 4 3 2 1</u>	
0 1 0 0 0	Unrestricted digital information
<i>Transfer mode (octet 4)</i>	
Bits	
<u>7 6</u>	
0 0	Networked Call Independent Signaling Connection
<i>Information transfer rate (octets 4 , bits 5 to 1)</i>	
Bits	
<u>5 4 3 2 1</u>	
0 0 0 0 0	Networked Call Independent Signalling Connections

### 8.2.11 Channel identification

The Channel identification information element is defined in 4.5.12 of ANSI T1.607. This clause describes the fields and the valid coding of those fields that shall be used in conjunction with Networked Call Independent Signalling Connections described in Annex E. In this context, the Channel identification information element may attain a maximum length of 3 octets as shown in Figure 8-11 below. This figure is based on Figure 19 of ANSI T1.607 where octets that are not applicable to NCICS have been removed.



NOTES

- 1 This octet is coded to an integer value of 1 (i.e., "0 0 0 0 0 0 0 1").

FIGURE 8-11  
Channel identification information element

TABLE 8-18  
Channel identification information element

<i>Interface identifier (octet 3)</i>	
Bit	
<u>7</u>	
0	Interface implicitly identified (see Note)
NOTE – The interface which includes the D-channel carrying this information element is indicated.	
<i>Interface type (octet 3)</i>	
Bit	
<u>6</u>	
0	Basic interface
1	Other interface e.g. primary rate (see Note)
NOTE – The type of interface should be understood because the interface is identified by the “interface identifier present” field (octet 3, bit 7) and the interface identifier field (octet 3.1), if any.	
<i>Preferred/Exclusive (octet 3) {see Note}</i>	
Bit	
<u>4</u>	
1	Exclusive; only the indicated channel is acceptable
NOTE – Preferred/exclusive has significance only for B-channel selection.	
<i>D-channel indicator (octet 3)</i>	
Bit	
<u>3</u>	
1	The channel identified is the D-channel
<i>Information channel selection (octet 3)</i>	
<i>Bits</i>	
<u>2 1</u>	
0 0	No channel

### 8.2.12 Redirecting Number

The purpose of the Redirecting number information element is to identify the number from which a redirection was invoked.

The Redirecting number information element is defined in Figure 8-12.

The various fields of the Redirecting number information element shall be coded as specified in ANSI T1.607, 4.5 (for Calling party number information element) except for the Reason for redirection field, which is defined in Table 8-19.

The maximum length of this information element is network-dependent.

8	7	6	5	4	3	2	1	Octets	
0	Redirecting number 1 1 1 0 1 0 0						0	1	
Information element identifier									
Length of redirecting number contents								2	
0/1 ext.	Type of number			Number plan identification				3	
0/1 ext.	Presentation indicator	0	0	0	Spare			Screening indicator	3a
0/1 ext.	0	0	0	Reason for redirection				3b	
Spare									
0	Number digits (ASCII characters)							4 etc.	

**Figure 8-12 – Redirecting number information element**

**Table 8-19 – Reason for Redirection codepoints**

Bits 4 3 2 1	Meaning
0 0 0 0	Unknown
0 0 0 1	call forwarding busy or called DTE busy (circuit-mode and packet-mode)
0 0 1 0	call forwarding no reply (circuit-mode only)
1 1 1 1	call forwarding unconditional or systematic call redirection (circuit-mode and packet-mode)
1 0 1 0	call deflection or call forwarding by the called DTE (circuit-mode and packet-mode)
All other values are reserved	

### 8.2.13 Redirecting Subaddress

The purpose of the Redirecting subaddress information element is to identify the subaddress from which a redirection was invoked.

The Redirecting subaddress information element is defined in Figure 8-13.

The various fields of the Redirecting subaddress information element shall be coded as specified in ANSI T1.607, 4.5 (for Calling party subaddress information element).

The maximum length of this information element is 23 octets.

8	7	6	5	4	3	2	1	
0	1	1	1	0	1	0	1	Octet 1
Redirecting subaddress Information element identifier								
Length of redirecting subaddress information								2
1 ext.	Type of subaddress			odd/even indicator	0	0	0	3
Spare								
Subaddress information								4 etc.

**Figure 8-13 – Redirecting subaddress information element**

#### 8.2.14 Redirection Number

The purpose of the Redirection number information element is to identify the number to which a redirection was invoked.

The Redirection number information element is defined in Figure 8-14.

The various fields of the Redirection number information element shall be coded as specified in ANSI T1.607, 4.5 (for Calling party number information element).

The maximum length of this information element is network-dependent.

8	7	6	5	4	3	2	1	Octets
0	1	1	1	0	1	1	0	1
Redirection number Information element identifier								
Length of redirection number contents								2
0/1 ext.	Type of number			Number plan identification				3
0/1 ext.	Presentation indicator	0	0	0	Screening indicator			3a
Spare								
0	Number digits (ASCII characters)							4 etc.

**Figure 8-14 – Redirection number information element**

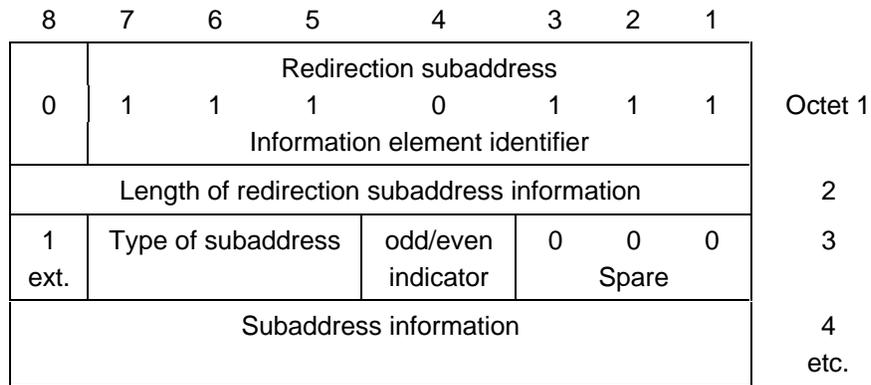
#### 8.2.15 Redirection Subaddress

The purpose of the Redirection subaddress information element is to identify the subaddress to which a redirection was invoked.

The Redirection subaddress information element is defined in Figure 8-15.

The various fields of the Redirection subaddress information element shall be coded as specified in ANSI T1.607, 4.5 (for Calling party subaddress information element).

The maximum length of this information element is 23 octets.



**Figure 8-15 – Redirection subaddress information element**

### 8.2.16 Cause

The cause information element and the specific cause values and diagnostics that have been defined for ISDN Supplementary Services are contained in ANSI T1.650.

27) *The following changes shall be made within Annex C:*

In the ASN.1 definition of PartyNumber (Annex C), specifically, the type PrivateTypeOfNumber, the coding of "level3RegionalNumber (5)", shall be removed:

```
PrivateTypeOfNumber ::= ENUMERATED {
    unknown (0),
    level2RegionalNumber (1),
    level1RegionalNumber (2),
    pTNSpecificNumber (3),
    localNumber (4),
level3RegionalNumber (5),
    abbreviatedNumber (6)}
```

In the ASN.1 the reference to "privateNumber" and "PrivateNumber" (Annex C), shall be changed by adding the word "Party" as shown below:

```
PartyNumber ::= CHOICE {
    unknownPartyNumber [0] IMPLICIT NumberDigits,
    -- the numbering plan is the default numbering plan
    -- of the network. It is recommended that this value
    -- is used.
    publicPartyNumber [1] IMPLICIT PublicPartyNumber,
    -- the numbering plan is according to
    -- Recommendations E.163 and E.164.
    dataPartyNumber [3] IMPLICIT NumberDigits,
    -- not used, value reserved.
    telexPartyNumber [4] IMPLICIT NumberDigits,
    -- not used, value reserved.
    privatePartyNumber [5] IMPLICIT PrivatePartyNumber,
    nationalStandardPartyNumber [8] IMPLICIT NumberDigits }
    -- not used, value reserved.
```

28) *Within Q.932, the existing Annexes and Appendices are “Normative” and “Informative” as follows:*

Annex A	Normative
Annex B	Normative
Annex C	Normative
Appendix I	Informative
Appendix II	Informative
Appendix III	Informative
Appendix IV	Informative
Appendix V	Informative

29) *The following annex D on Display procedures, annex E on Call Independent Signaling Procedures, and annex F comprising a bibliography shall be added.*

## **Annex D** (normative)

### **Display Procedures**

The following Display Procedures are applicable at the user–network interface for Terminal – Equipment at the S, T, or U – reference points, and supplement the sending of other information elements that may carry similar information. These procedures provide optional network control of terminal display in support of various supplementary services, and provide an alternative to the usage of the Display information element. Support of the Display text information element and its associated procedures is optional. This support does not preclude the usage of the Display information element. The applicability of these Display Procedures to Network Termination 2 (NT2) functional group equipment at a T or U – reference point is not addressed in this standard.

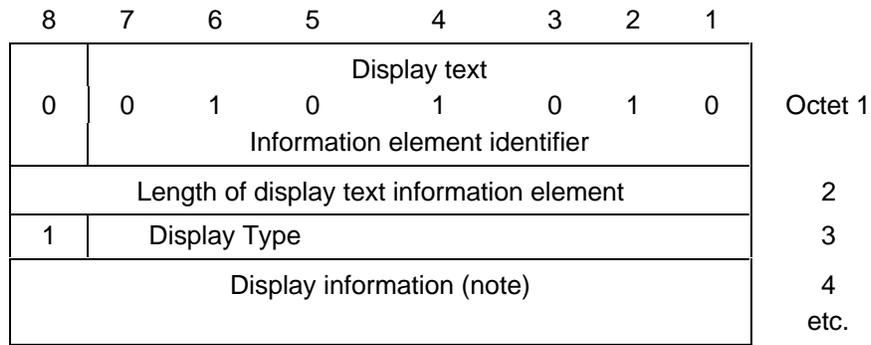
#### **D.1 Display Text Information Element**

The purpose of the Display text information element is to supply network-formatted display information that may be displayed by the user. The Display text information element is coded as shown in Figures D.1 and D.2 and Tables D.1, D.2, D.3, and D.4. The Display text information element is in codeset 5. The Display text information element should be sent only in the network-to-user direction when not used in a peer-to-peer environment (symmetrical). Although procedures for use in a symmetrical application are not addressed in this standard, the Display text information element may be sent in either direction in this situation.

The Display text information element for Display type 0 (Normal) shall not be repeated in a message. The need for repeating it is not addressed in this standard.

The Display text information element may be included in any message defined in ANSI T1.607 or in this standard, in the network-to-user direction.

The maximum length of the Display text information element is dependent on the maximum length of the message and the existence of additional information elements in that message.



NOTE – One or more groups of Display information may be included depending on specific service requirements.

**Figure D.1 – Display text information element**

**Table D.1 – Display text information element**

<u>Display type</u>
Bits
<u>7 6 5 4 3 2 1</u>
0 0 0 0 0 0 0      Normal

All other values are reserved. Additional values are for further study.

Table D.2 shows the order of display information that is contained in the Display information field of the Display text information element.

**Table D.2 – Display information**

Display group information	Reference
DisplayN tag	D.1.1
DisplayN length	D.1.3
DisplayN	D.1.4

NOTE – The Display group information may be repeated.

**D.1.1 Display tags**

There are three types of display tags:

- (1) Mandatory control tags (Blank and Skip),
- (2) Display text tags, and
- (3) Optional control tags.

Clause D.2 provides procedures associated with these three types of display tags. The coding of the display text and mandatory control tags is shown in Table D.4. The coding mechanism for the optional control tags is shown in Figures D.2 and D.3. The optional control tags are two or more octets in length.

This coding of the tags is consistent with the Basic Encoding Rules specified in X.209. The rules for coding tags with a value greater than or equal to 31 can be found in Appendix III.2.3.

Table D.3 shows the ASN.1 coding of the Display text and Mandatory control tags.

**Table D.3 – ASN.1 Coding of display text and mandatory control tags**

Display tag	ASN.1 Representation		
Blank	::=	[0]	IMPLICIT OCTET STRING
Skip	::=	[1]	IMPLICIT OCTET STRING
Continuation	::=	[2]	IMPLICIT OCTET STRING
Called address	::=	[3]	IMPLICIT OCTET STRING
Cause	::=	[4]	IMPLICIT OCTET STRING
Progress indicator	::=	[5]	IMPLICIT OCTET STRING
Notification indicator	::=	[6]	IMPLICIT OCTET STRING
Prompt	::=	[7]	IMPLICIT OCTET STRING
Accumulated digits	::=	[8]	IMPLICIT OCTET STRING
Status	::=	[9]	IMPLICIT OCTET STRING
Inband	::=	[10]	IMPLICIT OCTET STRING
Calling address	::=	[11]	IMPLICIT OCTET STRING
Reason	::=	[12]	IMPLICIT OCTET STRING
Calling party name	::=	[13]	IMPLICIT OCTET STRING
Called party name	::=	[14]	IMPLICIT OCTET STRING
Original called name	::=	[15]	IMPLICIT OCTET STRING
Redirecting name	::=	[16]	IMPLICIT OCTET STRING
Connected name	::=	[17]	IMPLICIT OCTET STRING
Originating restrictions	::=	[18]	IMPLICIT OCTET STRING
Date & time of day	::=	[19]	IMPLICIT OCTET STRING
Call appearance ID	::=	[20]	IMPLICIT OCTET STRING
Feature address	::=	[21]	IMPLICIT OCTET STRING
Redirection name	::=	[22]	IMPLICIT OCTET STRING
Redirection number	::=	[23]	IMPLICIT OCTET STRING
Redirecting number	::=	[24]	IMPLICIT OCTET STRING
Original called number	::=	[25]	IMPLICIT OCTET STRING
Connected number	::=	[26]	IMPLICIT OCTET STRING
Text [e.g. ASCII]	::=	[30]	IMPLICIT OCTET STRING

### D.1.2 Display tag definitions

The codings of the display text and mandatory control tags are shown in Table D.4 and their definitions are shown in Table D.5.

### D.1.3 Display lengths

The coding of the display lengths shall be done using the short form encoding specified in X.209 and as described in Appendix III. The maximum display length for display text associated with the tags shown in Table D.4 is 20 characters except that skip or blank display tags can have a value that can skip or blank up to 255 characters.

**Table D.4 – Coding of display text and mandatory control tags**

Display tag	8765 4321
Blank	1000 0000
Skip	1000 0001
Continuation	1000 0010
Called address	1000 0011
Cause	1000 0100
Progress indicator	1000 0101
Notification indicator	1000 0110
Prompt	1000 0111
Accumulated digits	1000 1000
Status	1000 1001
Inband	1000 1010
Calling address	1000 1011
Reason	1000 1100
Calling party name	1000 1101
Called party name	1000 1110
Original called name	1000 1111
Redirecting name	1001 0000
Connected name	1001 0001
Originating restrictions	1001 0010
Date & time of day	1001 0011
Call appearance ID	1001 0100
Feature address	1001 0101
Redirection name	1001 0110
Redirection Number	1001 0111
Redirecting Number	1001 1000
Original Called Number	1001 1001
Connected Number	1001 1010
Text [e.g. ASCII]	1001 1110

### D.1.4 Display

The display text shall be coded using ASCII display characters as a default. Other character sets, e.g. ISO 8859/1 are optional. The additional network or terminal procedures that may be required to support optional character sets are for further study.

bit	8	7	6	5	4	3	2	1	
	1	0	0/1	1	1	1	1	1	Octet 1
	1/0 Extension bit		1	X	X	X	X	X	2
	Optional Control Tag Identifier								3

Figure D.2 – Coding of optional control tags

bit	8	7	6	5	4	3	2	1	
	1	0	0/1	1	1	1	1	1	Octet 1
	1	1	X	X	X	X	X	X	2
	Optional Control Tag Identifier								
	0	X	X	X	X	X	X	X	3
	Optional Control Tag Identifier [continued]								

Figure D.3 – Three octet optional control tag example

### D.1.5 Optional Control Tags

Figure D.2 shows the format of a two-octet optional control tag. Bit 7 of the second octet of the optional control tag identifier is set to 1 to indicate that this tag is an optional control tag. Bit 7 of any following octets in an optional control tag is assignable to a particular optional control tag. The 0 or 1 value in bit 6 of the first octet of the optional control tag identifier allowed in optional control tags refers to a primitive or constructor data structure as described in Appendix III.2.3. For example, a 3 octet optional control tag would appear as shown in Figure D.3.

## D.2 Display procedures

Usage of the Display text information element shall not replace the sending of other functional information elements that may carry similar information.

The following display procedures describe the use of the default ASCII character set. These procedures also apply to other optional character sets.

The following principles shall be followed. When processing the Display text information element, a terminal with stimulus display control shall display the ASCII characters beginning at the upper left hand corner of the display area.

- (1) The network shall send tagged display text. The length of each display text field will vary from 1 to 20 characters. Terminals with stimulus display control shall display the ASCII text from successive fields by simply concatenating the fields without necessarily comprehending the display tag.
- (2) All terminals shall recognize the "blank" display tag. When a terminal encounters a "blank" display tag, it will have a one octet length and a value from 1 to 255. The terminal with stimulus display control shall create the required number (1 to 255) of ASCII blanks and append them to the previous (if any) ASCII characters. The network shall clear a terminal's display unit, including terminals with display sizes of 2 lines of 20 characters and 2 lines of 40 characters, by sending sufficient blank display tags.
- (3) All terminals shall recognize the "skip" display tag. When a terminal encounters a "skip" display tag, it will have a one octet length and a value from 1 to 255. The terminal with stimulus display control shall not overwrite information currently being displayed by those "skipped" ASCII characters, but be capable of displaying the information shown in the next display tag as the next ASCII character position after the skipped positions. If the network skips past the last displayable position, e.g. the 41 position on a 40 character display, the terminal with stimulus display control should ignore further information in the Display text information element.

**Table D.5 – Display tag definitions**

Blank:	A tag that always has a 1 octet length and a value from 1 to 255 that tells the terminal how many successive blank characters to append to any previous text. This value shall be interpreted as an unsigned integer.
Skip:	A tag that always has a 1 octet length and a value from 1 to 255 that tells the terminal how many characters to skip over before operating on the next display tag. This value shall be interpreted as an unsigned integer.
Continuation:	Text which is associated with the previously tagged information including a continuation tag [other than blank, skip, or optional control tags]. It is to be used for a continuation of the previous field and shall not be used as the first tag within the Display text information element.
Called address:	Text regarding the called number
Cause:	Text regarding the corresponding cause value
Progress indicator:	Text regarding the contents of the corresponding Progress indicator information element
Notification indicator:	Text regarding the contents of the corresponding Notification indicator information element
Prompt:	Text to request the user to input additional information, e.g. digits
Accumulated digits:	Text regarding digits input by the user
Status:	Text regarding feature condition, e.g. feature is active or feature has been deactivated
Inband:	Text regarding tones or other information that is being provided inband
Calling Address:	Text regarding the calling number
Reason:	Text regarding call diversion, e.g. the redirecting reason in the redirecting number information element
Calling party name:	Text regarding the calling party's name
Called party name:	Text regarding the called party's name
Original called name:	Text regarding the original called party's name [i.e. first redirecting name]
Redirecting name:	Text regarding the last redirecting name
Connected name:	Text regarding the name of the connected to party
Originating restrictions:	Text regarding restricting conditions that may apply to the calling party
Date & time of day:	Text in form mm-dd hh:mm am [or pm]
Call appearance ID:	Text regarding a call appearance in a key system environment
Feature address:	Text regarding an address associated with a feature
Redirection name:	Text regarding the redirection party's name
Redirection number:	Text regarding the redirection number
Redirecting number:	Text regarding the redirecting number
Original called number:	Text regarding the original called number
Connected number:	Text regarding the connected number
Text [e.g. ASCII]:	Text that does not have a specific tag

(4) At a minimum, all networks shall support terminals that have displays of 2 lines of 20 characters and 2 lines of 40 characters. When the network has no knowledge of a terminal's display size, default display sizes of 2 lines of 20 characters and 2 lines of 40 characters shall be supported. Display information must be arranged in this situation to take into account an available/unavailable segmentation of 40/80 display characters. By prioritizing the information sent to the terminal, the network may accommodate the smaller 40 character display while providing additional information to an 80 character display. When the network has knowledge that a specific terminal has a display size of 2 lines of 40 characters, the network as an option may send text with the expectation that all 80 characters will be displayed by the terminal. In addition, terminals of 2 lines of 24 characters or other sizes may be supported as a network provider option. When this option is supported on an interface basis, the procedures within this clause shall apply without any additional network or terminal procedures being required. Network or terminal procedures (e.g., terminal initialization and terminal compatibility checking) that may be required when the network has knowledge of different display sizes on an interface are not addressed in this standard.

(5) The network shall format display text such that coherent displays will be provided for terminals with lines of 40 characters, where the terminal simply concatenates the display text and processes the mandatory control tags. Therefore a terminal with stimulus display control may ignore any tags other than skip or blank, display the concatenated display text fields in the order received with all provided skips and blanks, fill the display left to right, move to the next line when each line becomes full until there is no more tagged information in the Display text information element or until the display size is exceeded, ignore subsequent information in that Display text information element.

(6) Functional display terminals may:

- (a) process the tagged display information that a terminal with stimulus display control would display transparently, or
- (b) delete or substitute tagged display information that would otherwise exceed the maximum display capability with locally generated ASCII text or tagged display information sent from the network, or
- (c) disregard the tagged display information entirely.

(7) If a Display text information element cannot fit in an appropriate message because it would exceed the message's length, the entire Display text information element shall be sent in an INFORMATION message immediately following the appropriate message. If the Display text information element cannot fit in a broadcast SETUP message, the switch shall wait and send the Display text information element in an INFORMATION message to only the terminals responding with other than call clearing messages. For example, if the Display text information element does not fit in a broadcast SETUP message and a terminal responds with an ALERTING message, the switch shall send the Display text information element to that terminal in an INFORMATION message.

(8) All terminals shall recognize an optional control tag whenever it occurs within a Display text information element. If the terminal does not support the function of the optional control tag, the terminal shall ignore the optional control tag and the display group content (if any) and shall not treat its content as display text. This mechanism is included to accommodate future extensions of display functionality, for example, blinking of display text or more sophisticated display control functionality (e.g. network-controlled soft keys). Having the terminal recognize and ignore the optional control tag will permit such terminals to be compatible with future control functions without having to understand or support the optional control functionality.

(9) Display information for each basic call shall be provided using only its respective active call reference. For a supplementary service associated with an active call reference, display information shall be provided using only its respective active call reference. If no call reference exists for a supplementary service event (e.g. Call Forward number programming outside the context of a call, CCBS Recall notification) the network shall use the dummy call reference for the appropriate INFORMATION and NOTIFY messages and if the Display text information element cannot fit in the first message, the network shall send the Display text information element in a separate INFORMATION message using the dummy call reference.

(10) The network may send the Display text information element in an INFORMATION message instead of a call control message.

(11) When an optional control tag is encountered, the terminal shall not change the cursor position when the terminal does not understand the meaning of the optional control tag. If some of the values of the optional control tags are standardized in the future, to move the position of the cursor, the network shall not send these optional control tag values to the terminal unless the network knows that the terminal understands the meaning of these tags. The mechanism that allows the network to know when optional control tags are understood by the terminal is not addressed in this standard.

## **Annex E** (normative)

### **Call Independent Signaling Control Procedures**

This annex describes optional procedures for call independent signaling control procedures.

#### **E.1 Networked Connection-Oriented Call Independent Component Transport Mechanism**

The Facility information element may be included in the following messages to transfer service requests and responses: SETUP, CONNECT, RELEASE, RELEASE COMPLETE, and FACILITY. The contents and use of the Facility information element are described in 8.2.3.

##### **E.1.1 Connection establishment at the originating interface**

Before these procedures are invoked, a reliable data link connection must be established between the user (TE/NT2) and the network. All layer 3 messages shall be sent to the data link layer using a DL-DATA request primitive. The data link services described in ANSI T1.602 are assumed.

###### **E.1.1.1 Connection Request**

A user initiates Networked Call Independent, Connection-Oriented Signaling (NCICS) connection establishment by transferring a call independent SETUP message across the user-network interface. Following the transmission of the SETUP message, the connection shall be considered by the user to be in the call initiated state. The SETUP message shall always contain a call reference, selected according to the procedures given in 4.3 of ANSI T1.607. In selecting a call reference, the dummy call reference value shall not be used.

Furthermore, the SETUP message shall contain all of the information (i.e. address and facility requests) necessary for connection establishment. Refer to 7.2.7 for the contents of the SETUP message.

The user shall start timer T303 upon transmission of the SETUP message and enter the Call Initiated state. If the user does not receive a response to the SETUP message prior to the expiry of timer T303, the user shall retransmit the SETUP message and restart timer T303. If the user does not receive any response to the retransmitted SETUP message prior to the expiration of timer T303, then the user shall send a RELEASE COMPLETE message to the network with cause 102, *recovery on timer expiry* and internally clear the NCICS connection.

On receipt of a call independent SETUP message, the network shall:

- if the request is valid and can be processed, follow the procedures of E.1.1.3
- if the request is invalid or cannot be accepted, follow the procedures of E.1.1.2.

The FACILITY message shall not be exchanged while in the call initiated state.

#### **E.1.1.2 Invalid connection information**

If the NCICS request is invalid or cannot be accepted, the network shall return a RELEASE COMPLETE message, release the call reference, and remain in the Null state. The RELEASE COMPLETE message shall contain an appropriate cause value.

If the network determines that a call independent signalling connection is not authorized or available, cause 63, "service option not available, unspecified," will be used.

#### **E.1.1.3 Call Proceeding**

If the NCICS request is valid and can be processed, the network shall:

- return a CALL PROCEEDING message
- enter the Outgoing Call Proceeding state
- attempt to establish the NCICS towards the terminating entity (for example, see E.1.2)

Upon receipt of the CALL PROCEEDING message, the user shall stop timer T303, enter the Outgoing Call Proceeding state, and start timer T310. If timer T310 expires, the user shall initiate NCICS clearing towards the network in accordance with E.1.3 using cause 102, *recovery on timer expiry*.

#### **E.1.1.4 Connection Connected**

Upon the network receiving an indication that the NCICS request has been accepted, the network shall send a CONNECT message across the originating user-network interface, and either: enter the Active state, or start timer T313 and enter the Connect request state.

This message indicates to the originating user that a NCICS connection has been established through the network.

On receipt of the CONNECT message, the originating user shall send a CONNECT ACKNOWLEDGE message, stop timer T310, and shall enter the active state.

On receipt of a CONNECT ACKNOWLEDGE message, the network shall:

- take no action, if it perceives the NCICS connection to be in the Active state;
- if in the connect request state, stop timer T313 and enter the Active state.

If timer T313 expires before a CONNECT ACKNOWLEDGE message is received, the network shall initiate NCICS connection clearing with a RELEASE message using cause value 102, *recovery on timer expiry*.

#### **E.1.1.5 Connection Rejected**

Upon receiving an indication that the network or the terminating entity is unable to accept the NCICS request, the network shall initiate NCICS connection clearing at the originating user-network interface as described in E.1.3, using the cause provided by the terminating network or the terminating entity.

#### **E.1.2 Connection establishment at the destination interface**

Before these procedures are invoked, a reliable data link connection must be established between the user (TE/NT2) and the network. All layer 3 messages shall be sent to the data link layer using a DL-DATA request primitive. The data link services described in ANSI T1.602 are assumed.

The call reference contained in all messages exchanged across the user-network interface shall contain the call reference value specified in the SETUP message delivered by the network. In selecting a call reference, the dummy call reference shall not be used in conjunction with NCICS connections.

##### **E.1.2.1 Incoming Connection**

The network will indicate the arrival of a NCICS connection at the user-network interface by transferring a SETUP message across the interface. Refer to 7.2.7 for the contents of the SETUP message.

After sending the SETUP message, the network shall start timer T303, and enter the Call Present state. If the network does not receive a response to the SETUP message prior to the expiry of timer T303, the network shall retransmit the SETUP message and restart timer T303.

The FACILITY message shall not be exchanged while in the Call Present state.

##### **E.1.2.2 Connection Confirmation**

When the user determines that sufficient NCICS connection set-up information has been received, the user shall respond with a CALL PROCEEDING message and enter the Incoming Call Proceeding state.

Upon receipt of the CALL PROCEEDING message, the network shall stop timer T303, enter the Incoming Call Proceeding state, and start timer T310.

##### **E.1.2.3 Called User clearing during incoming connection establishment**

If a RELEASE or RELEASE COMPLETE message is received before a CONNECT message has been received, the network shall stop timer T303 or T310 (if running), continue to clear the terminating entity as described in E.1.3, and clear the NCICS connection to the originating entity with the cause received in the RELEASE or RELEASE COMPLETE message.

#### **E.1.2.4 Connection Failure**

If the network does not receive any response to the retransmitted SETUP message prior to the expiration of timer T303, then the network shall initiate clearing procedures towards the originating entity with cause 18, *no user responding*. The network shall also initiate clearing procedures towards the terminating entity in accordance with E.1.3, using cause 102, *recovery on timer expiry*.

If the network has received a CALL PROCEEDING message, but does not receive a CONNECT, RELEASE, or RELEASE COMPLETE message prior to the expiration of timer T310, then the network shall initiate clearing towards the terminating entity. The terminating entity shall be cleared in accordance with E.1.3, using cause 102, *recovery on timer expiry*. In addition, the network shall initiate clearing towards the originating entity in accordance with E.1.3, using cause 18, *no user responding*.

#### **E.1.2.5 Connection Accept**

The terminating entity indicates acceptance of an incoming NCICS connection by sending a CONNECT message to the network. Upon sending the CONNECT message, the terminating entity may start timer T313.

#### **E.1.2.6 Active Indication**

On receipt of a CONNECT message, the network shall stop (if running) timers T303 and T310, complete the NCICS connection, send a CONNECT ACKNOWLEDGE message to the terminating entity, initiate procedures to send a CONNECT message towards the originating entity and enter the active state.

The CONNECT ACKNOWLEDGE message indicates completion of the NCICS connection. There is no guarantee of an end-to-end connection until the originating entity receives a CONNECT message. Upon receipt of the CONNECT ACKNOWLEDGE message, the user shall stop timer T313, if running, and enter the active state.

If timer T313 expires prior to receipt of a CONNECT ACKNOWLEDGE message, the user shall initiate clearing in accordance with E.1.3, using cause 102, *recovery on timer expiry*.

### **E.1.3 Connection Clearing**

#### **E.1.3.1 Exception Conditions**

Under normal conditions, NCICS connection clearing is usually initiated when the user or the network sends a RELEASE message and follows the procedures defined in E.1.3.3 and E.1.3.4 respectively. The only exception to the above rule is the following. In response to a SETUP message, the user or network can reject an NCICS connection request by responding with a RELEASE COMPLETE message provided no other response has previously been sent (e.g. the CALL PROCEEDING message), releasing the call reference, and enter the Null state.

### **E.1.3.2 Clearing Initiated by the User**

Apart from the exception identified in E.1.3.1 and E.1.6, the user shall initiate clearing by sending a RELEASE message, starting timer T308 and entering the Release Request state.

On receipt of a RELEASE message, the network shall send a RELEASE COMPLETE message, release the call reference, and enter the null state.

On receipt of the RELEASE COMPLETE message the user shall cancel timer T308, release the call reference, and return to the Null state. If timer T308 expires for the first time, the user shall retransmit the RELEASE message and timer T308 shall be restarted. In addition, the user may indicate a second Cause information element with cause 102, *recovery on timer expiry*. If no RELEASE COMPLETE message is received from the network before timer T308 expires a second time, the user shall release the call reference and return to the Null state.

### **E.1.3.3 Clearing Initiated by the Network**

Apart from the exception identified in E.1.3.1 and E.1.6, the network shall initiate clearing by sending a RELEASE message, starting timer T308 and entering the Release Request state.

On receipt of a RELEASE message, the user shall send a RELEASE COMPLETE message, release the call reference, and enter the null state.

On receipt of the RELEASE COMPLETE message the network shall cancel timer T308, release the call reference, and return to the Null state. If timer T308 expires for the first time, the network shall retransmit the RELEASE message and timer T308 shall be restarted. In addition, the network may indicate a second Cause information element with cause 102, *recovery on timer expiry*. If no RELEASE COMPLETE message is received from the user before timer T308 expires a second time, the network shall release the call reference and return to the Null state.

### **E.1.3.4 Clear Collision**

Clear collision can occur when both sides simultaneously transfer RELEASE messages related to the same call reference value. The entity receiving such a RELEASE message while in the Release Request state shall stop timer T308, release the call reference and enter the Null state (without sending or receiving a RELEASE COMPLETE message).

### **E.1.4 Interaction with Restart procedure**

When a RESTART message is either sent or received and the Restart indicator information element is coded:

- 1) "all interfaces", or;
- 2) "single interface" and the interface contains the D-Channel,

the user and the network shall release all NCICS connections.

### **E.1.5 Interaction with Call rearrangements**

Not covered in this standard.

### **E.1.6 Handling of error conditions**

The error handling procedures of 5.8 of ANSI T1.607 shall apply to NCICS with the following modifications:

- a "call" should be interpreted as "call or NCICS connection";
- actions regarding the handling of B-channels are not applicable;
- actions regarding the handling of the DISCONNECT message (not defined for use with NCICS connections) are not applicable;
- on Data Link failure, for connections in the Active state, the NCICS connections may be released (i.e., release the call reference and enter the Null state) as an alternative to the procedures specified for active calls in ANSI T1.607;
- if a SETUP ACKNOWLEDGE, ALERTING, DISCONNECT, INFORMATION, or PROGRESS message (defined in ANSI T1.607) or HOLD, HOLD ACKNOWLEDGE, HOLD REJECT, RETRIEVE, RETRIEVE ACKNOWLEDGE, RETRIEVE REJECT, or REGISTER (defined in this standard) is received in any state for an NCICS connection (except in the Null state), it shall be treated as an unexpected or unrecognized message in accordance with 5.8.4 of ANSI T1.607.

### **E.1.7 Protocol timer values**

The following timers which are specified in Clause 9 of ANSI T1.607 are applicable to NCICS connections: T303, T308, T309, T310, T313, and T322. All other timers in Clause 9 of ANSI T1.607 are not applicable to NCICS connections

## **Annex F** (informative)

### **Bibliography**

The publications listed here are for information only and are not essential for the completion of requirements of this standard:

ANSI T1.619-1992, *Telecommunications – Integrated Services Digital Network (ISDN) Multi-level Precedence and Preemption (MLPP) Service Capability*

ANSI T1.621-1992, *Telecommunications – Integrated Services Digital Network (ISDN) User-to-User Signaling Supplementary Service*