ATIS-1000623.2014(R2019)

Digital Subscriber Signalling System Number 1 (DSS1) – Signalling Specification for the User Bearer Services

AMERICAN NATIONAL STANDARD FOR TELECOMMUNICATIONS

As a leading technology and solutions development organization, ATIS brings together the top global ICT companies to advance the industry's most-pressing business priorities. Through ATIS committees and forums, nearly 200 companies address cloud services, device solutions, emergency services, M2M communications, cyber security, ehealth, network evolution, quality of service, billing support, operations, and more. These priorities follow a fast-track development lifecycle — from design and innovation through solutions that include standards, specifications, requirements, business use cases, software toolkits, and interoperability testing.

ATIS is accredited by the American National Standards Institute (ANSI). ATIS is the North American Organizational Partner for the 3rd Generation Partnership Project (3GPP), a founding Partner of oneM2M, a member and major U.S. contributor to the International Telecommunication Union (ITU) Radio and Telecommunications sectors, and a member of the Inter-American Telecommunication Commission (CITEL). For more information, visit < www.atis.org >.

AMERICAN NATIONAL STANDARD

Approval of an American National Standard requires review by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made towards their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Notice of Disclaimer & Limitation of Liability

The information provided in this document is directed solely to professionals who have the appropriate degree of experience to understand and interpret its contents in accordance with generally accepted engineering or other professional standards and applicable regulations. No recommendation as to products or vendors is made or should be implied.

NO REPRESENTATION OR WARRANTY IS MADE THAT THE INFORMATION IS TECHNICALLY ACCURATE OR SUFFICIENT OR CONFORMS TO ANY STATUTE, GOVERNMENTAL RULE OR REGULATION, AND FURTHER, NO REPRESENTATION OR WARRANTY IS MADE OFMERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. ATIS SHALL NOT BE LIABLE, BEYOND THE AMOUNT OF ANY SUM RECEIVED IN PAYMENT BY ATIS FOR THIS DOCUMENT, AND IN NO EVENT SHALL ATIS BE LIABLE FOR LOST PROFITS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. ATIS EXPRESSLY ADVISES THAT ANY AND ALL USE OF OR RELIANCE UPON THE INFORMATION PROVIDED IN THIS DOCUMENT IS AT THE RISK OF THE USER.

NOTE - The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to whether use of an invention covered by patent rights will be required, and if any such use is required no position is taken regarding the validity of this claim or any patent rights in connection therewith. Please refer to [http://www.atis.org/legal/patentinfo.asp] to determine if any statement has been filed by a patent holder indicating a willingness to grant a license either without compensation or on reasonable and non-discriminatory terms and conditions to applicants desiring to obtain a license.

ATIS-1000623.2014(R2019), *Digital Subscriber Signalling System Number 1 (DSS1) – Signalling Specification for the User Bearer Services*

Is an American National Standard developed by the **Signaling, Architecture, and Control (SAC)** Subcommittee under the **ATIS Packet Technologies and Systems Committee (PTSC).**

Published by
Alliance for Telecommunications Industry Solutions
1200 G Street, NW, Suite 500
Washington, DC 20005

ATIS-1000623.2014(R2019)

American National Standard for Telecommunications

Digital Subscriber Signalling System Number 1 (DSS1) – Signalling Specification for the User Bearer Services

Alliance for Telecommunications Industry Solutions

Approved June 2014

American National Standards Institute, Inc.

Abstract

This standard presents the procedures at the S or T reference point for D-channel access connection on basic rate interfaces and primary rate interfaces within the Integrated Services Digital Network (ISDN) to support ISDN user signalling bearer service.

Foreword

The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

The Alliance for Telecommunication Industry Solutions (ATIS) serves the public through improved understanding between providers, customers, and manufacturers. The Packet Technologies and Systems Committee (PTSC) develops and recommends standards and technical reports related to services, architectures, and signaling, in addition to related subjects under consideration in other North American and international standards bodies. PTSC coordinates and develops standards and technical reports relevant to telecommunications networks in the U.S., reviews and prepares contributions on such matters for submission to U.S. ITU-T and U.S. ITU-R Study Groups or other standards organizations, and reviews for acceptability or per contra the positions of other countries in related standards development and takes or recommends appropriate actions.

ANSI guidelines specify two categories of requirements: mandatory and recommendation. The mandatory requirements are designated by the word *shall* and recommendations by the word *should*. Where both a mandatory requirement and a recommendation are specified for the same criterion, the recommendation represents a goal currently identifiable as having distinct compatibility or performance advantages.

Suggestions for improvement of this document are welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, PTSC, 1200 G Street NW, Suite 500, Washington, DC 20005.

At the time of consensus on this document, PTSC, which was responsible for its development, had the following leadership:

M. Dolly, PTSC Chair (AT&T)
V. Shaikh, PTSC Vice-Chair (ACS)
M. Dolly, PTSC SAC Chair (AT&T)

The **SAC** Subcommittee was responsible for the development of this document.

Table of Contents

Table of Figures

Table of Tables

ATIS Standard on –

Digital Subscriber Signalling System Number 1 (DSS1) – Signalling Specification for the User Bearer Services

1 Purpose, Scope, & Structure

1.1 Purpose

This interface standard was written to provide a set of requirements for User-Network Signalling for ISDN support of user signalling bearer service, while conforming, wherever possible, with the Q- and I- Series Recommendations of the International Telegraph and Telephone Consultative Committee (ITU-T), and adhering to the principles of evolution expressed therein. Equipment may be implemented with additional functions and procedures.

1.2 Scope

The scope of this standard covers the user signalling bearer service procedures at the S or T reference points. The user signalling bearer service is a packet mode bearer ser- vice.

This standard defines the use of the procedures of ANSI T1.602-1989, Telecommunications – Integrated services digital network (ISDN) – Data-link layer signalling specification for application at the user-network inter- face, and ANSI T1.607-1990, Telecommunications – Integrated services digital network (ISDN) – Layer 3 signalling specification for circuit-switched bearer service for digital sub- scriber signalling system number 1 (DSS1), on basic rate interfaces and primary rate interfaces for the establishment and release of user signalling bearer service through an ISDN. The user signalling bearer service allows users to communicate by means of user-to-user signalling without setting up a circuit-switched connection (no B-channel). The user signalling bearer service is established and cleared in a manner similar to the control of a circuit-switched connection.

1.3 Structure

Clause 1 describes the purpose, scope, and structure of this document. Clause 2 lists normative references. Clause 3 references definitions helpful in interpreting the specifications. Clause 4 provides an overview of call control and defines the control states for the user signalling bearer service. Clause 5 specifies the message functional definitions. Clause 6 specifies the message structure and information element coding. Clause 7 specifies the procedures for the user signalling bearer service. Clause 8 specifies the system parameters. Annex A (informative) lists the departures from the provisions of ITU-T Recommendation Q.931 (I.451), ISDN user- network interface layer 3 specification. Annex B (informative) lists standards for information only and is not essential for the completion of the requirements of this standard

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 standards indicated below.

ATIS-1000602.1996(R2014), Telecommunications – Integrated services digital network (ISDN) – Data-link layer signalling specification for application at the user-network interface[1]

ATIS-1000607.2000(R2009), Telecommunications – Integrated services digital network (ISDN) – Layer 3 signalling specification for circuit- switched bearer service for digital subscriber signalling system number 1 (DSS1)[2]

ATIS-1000615.1992(R2009), Telecommunications – Digital subscriber signalling system number 1 (DSS1) – Layer 3 overview[3]

ITU-T Recommendation Q.921, ISDN user- network data link layer specification, 1988

ITU-T Recommendation Q.931 (I.451), ISDN user-network interface layer 3 specification, 1992

ITU-T Recommendation X.25, Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet-mode and connected to public data networks by dedicated circuit, 1988

ITU-T Recommendation V.120, Support by an ISDN of data terminal equipment with V-series type interfaces with provision for statistical multiplexing, 1988

ITU-T Recommendation X.208, Specification of Abstract Syntax Notation One (ASN.1), 1988

ITU-T Recommendation X.209, Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1), 1988

ITU-T Recommendation X.244, Procedure for the exchange of protocol identification during virtual call establishment on packet-switched public data networks, 1988

3 Definitions

In the context of this standard, the definitions found in ANSI T1.615 apply.

4 Overview of the User Signalling Bearer Service

This standard specifies the essential features, procedures, and messages for establishing, maintaining, and clearing of network connections at the ISDN user-network interface used for user signalling bearer service communication. These procedures are defined in terms of messages exchanged over the D-channel of basic and primary rate interface structures.

The basic call control states are defined in 4.1. These definitions do not apply to the state of the interface itself, any attached equipment, the D-channel, or logical links used for signalling on the D-channel. Because several connections may exist simultaneously at a user-network interface, and each connection may be in a different state, the state of the interface itself cannot be unambiguously defined.

---

[1] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=24726>

[2] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=24729>

[3] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=24739>

Detailed description of the procedures for control are given in clause 7 in terms of:

a) The messages defined in clause 5, which are transferred across the user-net- work interface; and
b) The information processing and actions that take place at the user side and the net- work side.

A user can have multiple user signalling connections simultaneously via the same D-channel, with each user signalling connectionbeing identified by a different call reference value.

4.1 States for the User Signalling Bearer Service

This clause defines the basic call controlstates for user-to-user signalling not associated with circuit-switched calls. The procedures for call control are given in clause 7.

4.1.1 Call States at the User Side of theInterface

The states that may exist on the user side of the user-network interface are defined in 2.1.1 of ATIS-1000607. The Call Delivered (U4), Call Received (U7), Disconnect Request (U11), and Disconnect Indication (U12) states are not supported.

4.1.2 Network Call States

The states that may exist on the network side of the user-network interface are defined in 2.1.2 of ATIS-1000607. The Call Delivered (N4), Call Received (N7), Disconnect Request (N11), and Disconnect Indication (N12) states are not supported.

4.1.3 Call States Associated with the Global Call Reference

Clause 2.2 of ATIS-1000607defines the states that the protocol may adopt using the global call reference.

Table 1 - Messages for the user signalling bearer service

Call establishment messages:	Reference
CALL PROCEEDING	5.1.1
CONNECT	5.1.3
CONNECT ACKNOWLEDGE	5.1.4
SETUP	5.1.8
SETUP ACKNOWLEDGE	5.1.9
Call information phase messages:	**Reference**
USER INFORMATION	5.1.12
Call clearing messages:	**Reference**
RELEASE	5.1.6
RELEASE COMPLETE	5.1.7
Miscellaneous messages:	**Reference**
CONGESTION CONTROL	5.1.2
INFORMATION	5.1.5
STATUS	5.1.10
STATUS ENQUIRY	5.1.11

5 Message Functional Definitions & Content

For an overview of the ATIS-1000607message structure, which highlights the functional definition and information content (i.e., semantics) of each message, see clause 3 of ATIS-1000607.

5.1 Messages for the User Signalling Bearer Service

Table 1 summarizes the messages for the user signalling bearer service control.

5.1.1 CALL PROCEEDING

This message is defined in 3.1.2 of ATIS-1000607. For USBS, the Progress indicator information element is not required.

5.1.2 CONGESTION CONTROL

This message is sent by the user or the net- work to indicate the establishment or termination of flow control on the transmission of USER INFORMATION messages. See table 2.

5.1.3 CONNECT

This message is defined in 3.1.3 of ATIS-1000607. For USBS, the Low layer compatibility, Progress indicator, and Signal information elements are not required.

5.1.4 CONNECT ACKNOWLEDGE

This message is defined in 3.1.4 of ATIS-1000607. For USBS, the Signal information element is not required.

Table 2 - CONGESTION CONTROL Message Content

Message type: CONGESTION CONTROL
Significance: local (note 1)
Direction: both

Information element	Reference	Direction	Type	Length
Protocol discriminator	4.2 (T1.607)	both	M	
Call reference	4.3 (T1.607)	both	M	2 - *
Message type	6.4	both	M	
Congestion level	6.5	both	M	
Cause	4.5 (T1.607)	both	M	4 - 32
Display	4.5 (T1.607)	n -> u	O (note 2)	(note 3)

NOTES

1 This message has local significance, but may carry information of global significance.

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 82 octets.

5.1.5 INFORMATION

This message is defined in 3.1.6 of ATIS-1000607. For USBS, the Signal information element is not required.

5.1.6 RELEASE

This message is defined in 3.1.9 of ATIS-1000607. For USBS, the Signal information element is not required.

5.1.7 RELEASE COMPLETE

This message is defined in 3.1.10 of ATIS-1000607. For USBS, the Signal information element is not required.

5.1.8 SETUP

This message is defined in 3.1.11 of ATIS-1000607. For USBS, the Progress indicator, Repeat indicator, Signal, and Operator system access information elements are not required.

5.1.9 SETUP ACKNOWLEDGE

This message is defined in 3.1.12 of ATIS-1000607. For USBS, the Progress indicator and Signal information elements are not required.

5.1.10 STATUS

This message is defined in 3.1.13 of ATIS-1000607.

5.1.11 STATUS ENQUIRY

This message is defined in 3.1.14 of ATIS-1000607.

5.1.12 USER INFORMATION

This message is sent by the user to the net- work to transfer information to the remote user. This message is also sent by the net- work to the user to deliver information from the other user. See table 3.

5.2 Messages Used with the Global Call Reference

These messages are defined in 3.2 of ATIS-1000607.

6 General Message Format & Information Elements Coding

This clause describes the identification codings for messages and information elements associated with the user signalling bearer service. For a complete description of the messagecontents identified in this clause, see ATIS-1000607, clause 4.

6.1 Overview

See 4.1 of ATIS-1000607.

Table 3 - USER INFORMATION Message Content

Message type: USER INFORMATION
Significance: access
Direction: both

Information element	Reference	Direction	Type	Length
Protocol discriminator	4.2 (T1.607)	both	M	
Call reference	4.3 (T1.607)	both	M	2 - *
Message type	6.4	both	M	
More data	6.5	both	O (see note)	
User-user	6.5	both	M	3-255

NOTE – Included by the sending user to indicate that another USER INFORMATION message pertaining to the same block of data will follow.

Table 4 - Message types

8	7	6	5	4	3	2	1	
0	0	1	– 0	– 0	– 0	– 0	– 0	Call information phase message: - USER INFORMATION
0	1	1	– 1	– 1	– 0	– 0	– 1	Miscellaneous messages: - CONGESTION CONTROL

6.2 Protocol Discriminator

See 4.2 of ATIS-1000607.

6.3 Call Reference

See 4.3 of ATIS-1000607.

6.4 Message Type

The purpose of the message type is to identify the function of the message being sent. The message type is the third part of every message.

The message types for the messages defined in clause 5 are defined in 4.4 of ATIS-1000607. The message types for the CONGESTION CONTROL and USER INFORMATION are coded as shown in table 4. Bit 8 is reserved for possible future use as an extension bit.

6.5 OTHER INFORMATION ELEMENTS

6.5.1 Coding Rules

The coding rules and the identifier coding of the information elements identified in clause 5 are defined in 4.5.1 of ATIS-1000607. The identifier codings for the More data, Congestion level, and the User-user information elements are identified in table 5.

6.5.2 Extensions of Codesets

See 4.5.2 of ATIS-1000607.

6.5.3 Locking Shift Procedure

See 4.5.3 of ATIS-1000607.

6.5.4 Non-Locking Shift Procedure

See 4.5.4 of ATIS-1000607.

Table 5 - Information element identifier coding

8 7 6 5 4 3 2 1		Clause reference	Maximum length (octets) (note 1)	Maximum occurrences (note 2)
1 : : : – – – –	Single octet information element			
0 1 0 0 0 0 0	More data	6.5.6	1	
0 1 1 – – – –	Congestion level	6.5.5	1	
0 : : : : : : :	Variable length information element			
1 1 1 1 1 1 0	User–user	6.5.7	(note 3)	

NOTES

1 The length limits described for the variable length information elements below take into account only the present coding values described in ANSI standards.

2 Maximum number of occurrences allowed for variable length information element.

3 When the User-user information element is included in a call control message, the maximum length is 131 octets. When the User–user information element is included in the USER INFORMATION message, the maximum length is 255 octets.

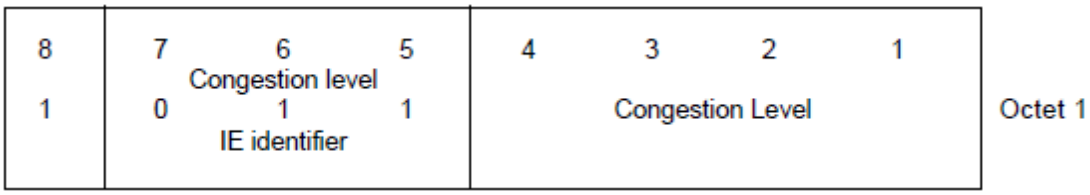

Figure 1 - Congestion level

Table 6 - Congestion level

Congestion level (Octet 1, Bits 4 through 1)

Bits 4	3	2	1	
0	0	0	0	receiver ready
1	1	1	1	receiver not ready

All other values are reserved

6.5.5 Congestion Level

The purpose of the Congestion level information element is to describe the congestion status of the call on the local interface. It is a single octet information element coded as shown in figure 1 and table 6.

6.5.6 More Data

The More data information element is sent by the user to the network in a USER INFORMATION message, and delivered by the network to the destination user(s) in the corresponding USER INFORMATION message. The presence of the More data information element indicates to the destination user that another USER INFORMATION message will follow, containing information belonging to the same block of data.

The use of the More data information element is not supervised by the network.

The More data information element is coded as shown in figure 2.

6.5.7 User-User

The purpose of the User-user information element is to convey information between ISDN users. This information is not interpreted by the network, but rather is carried transparently and delivered to the remote user(s).

The User-user information element is coded as shown in figure 3 and table 7. There are no restrictions on the content of the user information field.

In SETUP, CONNECT, RELEASE and RELEASE COMPLETE messages, the User-user information element has a network-dependent maximum size of 131 octets.

For USER INFORMATION messages sent in an on-demand or permanent User-user signalling connection, the User-user information element contained inside this message has a maximum size equal to 255 octets.

NOTE – The User-user information element is transported transparently by an ISDN between a call originating entity, e.g., a calling user, and the addressed entity, e.g., a remote user or a high-layer function network node addressed by the call originating entity.

8	7	6	5	4	3	2	1	
	More data							
1	0	1	0	0	0	0	0	Octet 1
	Information element identifier							

Figure 2 - More data information element

8	7	6	5	4	3	2	1	
	User–user							
0	1	1	1	1	1	1	0	Octet 1
	Information element identifier							
Length of User-user contents								2
Protocol discriminator								3
User information								4
								etc.

Figure 3 - User–user information element

7 Procedures for the User Signalling Bearer Service

7.1 General Characteristics

This feature allows the users to communicate by means of user-to-user signalling without setting up a circuit-switched connection. The user signalling bearer service is established and cleared in a manner similar to the control of a circuit-switched connection.

Although the user information is not guaranteed, it is expected to be delivered with a high probability. Any acknowledgment of receipt of user information or accuracy of content shall be controlled at a higher layer between users.

7.2 Call Establishment

Procedures for call establishment are asdescribed in 5.1 and 5.2 of ATIS-1000607, with the following modifications:

On call requests, the calling user sends a SETUP message identifying, within the Bearer capability and Channel identification information elements, the user signalling bearer service to be established on SAPI=0. The SETUP message is encoded to indicate:

a) Bearer capability information element:

Table 7 - User–user information element

Protocol discriminator (octet 3)

Bits 8 7 6 5 4 3 2 1	
0 0 0 0 0 0 0 0	User-specific protocol (note 1)
0 0 0 0 0 0 0 1	OSI high layer protocols (note 2)
0 0 0 0 0 0 1 0	CCITT Recommendation X.244 (note 3)
0 0 0 0 0 0 1 1	Reserved for System management convergence function
0 0 0 0 0 1 0 0	ASCII characters (note 4)
0 0 0 0 0 1 0 1	CCITT Recommendations X.208 and X.209 coded user information (note 5)
0 0 0 0 0 1 1 1	CCITT Recommendation V.120 rate adaptation
0 0 0 0 1 0 0 0	ANSI T1.607 user-network call control message
0 0 0 1 0 0 0 0 through 0 0 1 1 1 1 1 1	Reserved for other network layer or layer 3 protocols, including CCITT Recommendation X.25. (note 6)
0 1 0 0 0 0 0 0 through 0 1 0 0 1 1 1 1	Reserved for national use
0 1 0 1 0 0 0 0 through 1 1 1 1 1 1 1 0	Reserved for other network layer or layer 3 protocols, including CCITT Recommendation X.25 (note 5)
All other values are reserved.	

NOTES

1 The user information is structured according to user needs.

2 OSI high-layer protocol are defined as protocols conforming to the OSI Reference Model, Layer 4 and above.

3 The user information is structured according to CCITT Recommendation X.244, which specifies the structure of CCITT Recommendation X.25 call user data.

4 The user information consists of ASCII characters.

5 The number of CCITT Recommendation X.208 and X.209 components in a user-user information element as well as their semantics and use are user-application dependent and may be subject to other CCITT Recommendations and American National Standards.

6 These values are reserved to discriminate these protocol discriminators from the first octet of a CCITT Recommendation X.25 packet including general format identifier.

- unrestricted digital information in the information transfer capability field;
- packet mode in the transfer mode field;
- user information layer 2 protocol is ITU-T Recommendation Q.921 and user information layer 3 protocol is ATIS-1000607 in the layer and protocol identification fields;

b) Channel identification information element:

- exclusive in the preferred/exclusive field;
- D channel in the D-channel indicator field;
- no channel in the channel selection field.

NOTE – A SETUP message for an incoming USBS call is very similar to the SETUP message used for notification of an incoming packet-mode call on the D-channel. In fact, if there is no map- ping of ITU-T Recommendation X.25 facilities to ITU-T Recommendation Q.931 information elements, the only difference rests in the coding of the User information layer 3 protocol, where this octet indicates “T1.607” for USBS, and “X.25packet level” for D channel packet.

If the network determines that the requested user signalling bearer service is not authorized or is not available, the network shall initiate call clearing in accordance with 5.3.2(1) of ANSI T1.607 or by sending a RELEASE message as described in 5.3.3 and 5.3.4 of ATIS-1000607 with one of the following causes:

a) #57 “bearer capability not authorized”;
b) #58 “bearer capability not presentlyavailable”;
c) #63 “service or option not available,unspecified”;
d) #65 “bearer service not implemented”;
e) #21 “call rejected”;
f) #42 “switching equipment congestion”;
g) #29 “facility rejected”.

The called user accepts the user signalling bearer service request by sending a CONNECT message toward the calling user. After the called user has received a CONNECT ACKNOWLEDGMENT message, it may begin sending USER INFORMATION messages. Once the calling user receives a CONNECT message, it can begin sending USER INFORMATION messages.

7.3 Transfer of USER INFORMATION Messages

Once an end-to-end signalling connection is established for the user signalling bearer service, both users can transfer information between themselves by transferring USER INFORMATION messages across the user- network interface. The network provides for the transfer of such messages from the called to the calling side and vice versa.

The USER INFORMATION message includes the Call reference, the Protocol discriminator, and the User-user information elements as defined in clause 6. The More data information element may also be sent by the source user to indicate to the remote user that another USER INFORMATION message will follow, containing information belonging to the same block of data. The use of the More data is not supervised by the network.

7.4 Congestion Control of USER INFORMATION Messages

The network or user will flow-control, when needed, the transfer of USER INFORMATION messages from its local peer by means of a CONGESTION CONTROL message containing a Congestion level information element. Two indications of congestion level are specified: “receive not ready” and “receive ready”. On receipt of the former, the user or network should suspend sending USER INFORMA- TION messages; on receipt of the latter, sending may recommence. After having sent a “receive not ready” indication, the network or user shall discard USER INFORMATION messages that are subsequently received. The network or user will send a CONGES- TION CONTROL message with a “receive not ready” indication whenever a USER INFOR- MATION message is locally discarded, if it is possible. The CONGESTION CONTROL message shall also include a cause #43 “access information discarded”.

If USER INFORMATION messages arereceived at a rate that exceeds the flow control limit set by the network, the network shall discard the messages that cannot be handled and respond to the first discarded message with the congestion level specified as “receive not ready”. The CONGESTION CONTROL message shall also include a cause #43 “access information discarded”.

The network shall notify the user that flow control restriction has been removed by sending a CONGESTION CONTROL message with the congestion level specified as “receive ready” to indicate that further messages may be sent. This message may be sent, as an implementation option, either (a) immediately upon removal of flow control restriction, (b) in response to the first USER INFORMATION message received following the removal of flow control restriction, or (c) in both cases.

The Congestion control procedure should be regarded as local. Congestion control procedure for remote applications is not covered by this standard.

7.5 Throttling of USER INFORMATION Messages

The user equipment shall provide a means to throttle USER INFORMATION messages sent to the network. A maximum of 16 USERINFORMATION messages shall be sent in any 10-second interval with a long-term average of no more than 0.8 messages per second.

NOTE – Some networks may establish other rates of information.

An example of an algorithm that may be used to achieve throttling is as follows:

In each direction of data transmission, a Burst Capability of sending n messages is immediately available where n initially equals the value of the Burst parameter x. The value of n is decremented by one for every message sent by the user and incremented by y at regular intervals of T, subject to the limitation that n may not exceed x, i.e., $n + y \leq x$.

The Burst parameter is set to a value of x =16.

The replenishment parameter y is set to a value of y = 8.

The internal timer T is set to a value of T = 10 seconds.

7.6 Call Clearing

The clearing of an established user signalling bearer service connection can be initiated by the user or network by sending a RELEASE message. The clearing procedure followed and the timers involved are the same as those for clearing a circuit-switched connection as described in 5.3.3 and 5.3.4 of ATIS-1000607 with the exception that no B-channel resources are released.

7.7 Handling of Error Conditions

In the event of a data link reset of failure, all USBS connections on the D-channel shall be released as in 7.6. For data link resets, the clearing messages shall indicate cause #41, “temporary failure”, to both local and remote users. For data link failures, the clearing message to the remote user shall indicate cause #27, “destination out of order”, and the local USBS connection shall be cleared internally.

Handling of other error conditions is defined in 5.8 of ATIS-1000607.

7.8 RESTART Procedures

If a RESTART message is received with the Restart indicator information element coded as “all interfaces”, or coded as “single interface” and the indicated interface includes the D-channel, then all USBS connections on the D-channel shall be released. The clearing message to the remote users shall include cause #43 “temporary failure”.

8 List of System Parameters

The detailed description of timers is found in clause 9 of ATIS-1000607.

8.1 Timers in the Network Side

The timers specified in 9.1 of ATIS-1000607are maintained in the network side of the interface.

8.2 Timers in the User Side

The timers specified in 9.2 of ATIS-1000607are maintained in the user side of the interface.

Annex A: Summary of Departures from ITU-T Recommendation Q.931 (I.451)

(informative)

The departures of this standard from the provisions of ITU-T Recommendation Q.931 (I.451) are summarized in this annex. Each clause containing a departure is identified and the difference is briefly described.

Clause 1, Purpose, scope, and structure: This clause recognizes the more limited scope of the USBS standard. There is no equivalent to the clause describing the structure.

Clause 2, Normative references: There is no equivalent to this clause.

Clause 3, Definitions: There is no equivalent to this clause.

Subclause 6.5.7, User-user: A new note was added to define OSI high-layer protocols as Layer 4 and above.

Subclause 7.2, Call establishment: A note was added to this subclause identifying the similarities and differences between a USBS call and other packet calls on the D-channel.

Three additional cause values, #21, #42, #29, were added.

Subclause 7.4, Congestion control of USER INFORMATION messages: When the network discards messages, it is required to include cause #43 in the CONGESTION CON- TROL message. A paragraph was added to define the network options when the flow con- trol restriction is removed.

Subclause 7.5, Throttling of USER INFOR- MATION messages: This subclause was modified for clarity, including specifying the average number of messages. The status of the flow control algorithm was changed from a requirement to one possible implementation.

Subclause 7.7, Handling of error conditions: The procedure to follow in the event of a data link reset was clarified.

Subclause 7.8, RESTART procedures: The procedure to follow in the event of a RESTART message was added.

Annex B: Bibliography

(informative)

These standards are listed for information only and are not essential for the completion of requirements of this standard.

ATIS-1000603.1993(R2009), Telecommunications – Integrated services digital network (ISDN) – Minimal set of bearer services for the primary rate interface[4]

ATIS-1000604.1990(R2013), Telecommunications – Integrated services digital network (ISDN) – Minimal set of bearer services for the basic rate interface[5]

ATIS-1000609.1999(R2009), Telecommunications – Interworking between the ISDN user-network interface protocol and the signalling system number 7 ISDN user part[6]

ATIS-1000614.1991(R2012), Telecommunications – Integrated services digital network (ISDN) – Packet mode bearer service category description[7]

ANSI X3.100-1989, Information systems – Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for operation with packet-switched data networks (PSDN), or between two DTEs, by dedicated circuit[8]

ITU-T Recommendation I.122, Framework for providing additional packet mode bearer services, 1988[9]

ITU-T Recommendation I.231, Circuit Mode Bearer Services, 1988[9]

ITU-T Recommendation I.232, Packet Mode Bearer Services, 1988[9]

ITU-T Recommendation I.320, ISDN protocol reference model, 1988[9]

ITU-T Recommendation I.430, Basic user- network interface layer 1 specification, 1988[9]

ITU-T Recommendation Q.920, ISDN user- network data link layer – General aspects, 1988[9]

ITU-T Recommendation Q.930, ISDN user- network interface layer 3: General aspects, 1988[9]

ITU-T Recommendation X.200, Reference model of open systems interconnection for ITU-T applications, 1988[9]

ITU-T Recommendation X.210, OSI layer service conventions, 1988[9]

ITU-T Recommendation X.612, Information Technology – Provision of the OSI connection-mode network service by packet mode terminal equipment connected to an integrated services digital network (ISDN), 1992[9]

---

[4] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=24727>

[5] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=24728>

[6] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=24732>

[7] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=26094>

[8] This document is available from the International Committee for Information Technology Standards (INCITS). < http://www.incits.org/standards-information/

[9] This document is available from the International Telecommunications Union. < http://www.itu.int/ITU-T/ >