



ATIS-1000628.a.2001(R2010)

ECS – Connection and Ring Back Addendum

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ATIS-1000628.a.2001(R2010), ECS – Connection and Ring Back Addendum

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American National Standard for Telecommunications

ECS -- Connection and Ring Back Addendum

Secretariat

Alliance for Telecommunications Industry Solutions

Approved August 21, 2001

American National Standards Institute, Inc.

Abstract

This addendum to T1.628-2000 specifies the use of the Connection Hold network capability by the Emergency Calling Service (ECS) to support ECS call hold and ring back. This addendum also specifies the TCAP messages exchanged between a switching node routing ECS calls and a Selective Routing Database (SRDB) that contains information determining the PSAP that should receive the emergency calls originating from a given caller or calling location.

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.

Accredited Standards Committee T1, Telecommunications serves the public through improved understanding between carriers, customers, and manufacturers. Technical Subcommittee T1S1 of Committee T1 develops telecommunications 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.

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

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee on Telecommunications, T1. Committee approval of the standard does not necessarily imply that all members voted for its approval.

Working Group T1S1.7 on Services, Architecture, and Control of Technical Subcommittee T1S1 on Services, Architectures, and Signaling, was responsible for the development of this standard.

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American National Standard
for Telecommunications –

ECS -- Connection and Ring Back Addendum

1 Scope, Purpose, and Application

This addendum to T1.628-2000 specifies the use of the Connection Hold network capability by the Emergency Calling Service (ECS) to support ECS call hold and ring back. This addendum also specifies the TCAP messages exchanged between a switching node routing ECS calls and a Selective Routing Database (SRDB) that contains information determining the PSAP that should receive the emergency calls originating from a given caller or calling location.

The Connection Hold Network Capability disables a calling user's capability to initiate release of a call. Connection hold also provides a mechanism to indicate that the calling user has requested disconnect (or reconnect) without initiating release procedures.

The procedures described in this addendum supplement the procedures in T1.628–2000, *American National Standard for Telecommunications—Emergency Calling Service*. In particular the procedures described here take precedence over normal call release procedures when ECS Call Hold is invoked.

The use of connection hold is restricted when the caller has an ISDN user–network interface. Due to existing provisions of the DSS1 protocol it is not possible to prevent an ISDN caller from disconnecting an active call. When call hold is applied to ECS calls originating from an ISDN user–network interface and the caller disconnects, the network will attempt to reconnect to the user's terminal in cases when the network has information that permits it to identify the end user's terminal.

A PSAP using an ISDN access can invoke the network to apply ring back to the caller's terminal using the protocol defined in this addendum.

Following the references clause, the remainder of this addendum specifies changes to the existing text of T1.628-2000 using ~~strikeout~~ to indicate deletions and underlining to indicate insertions.

2 Normative References

The following listed 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.

T1.628-2000, *Emergency Calling Service*.¹

T1.666-1999, *Signalling System Number 7 (SS7)—Operator Services Network Capabilities*.¹

¹ This document is available from the Alliance for Telecommunications Industry Solutions, 1200 G Street N.W., Suite 500, Washington, DC 20005. <<http://www.atis.org>>

T1.667-1999, *Intelligent Network*.¹

3 Changes to T1.628-2000 §1, Scope, purpose, and application

NOTE - In this and in succeeding clauses, a section mark (§) indicates a reference to a clause of T1.628-2000.

§1.1, paragraph 3:

Capabilities needed for supporting ECS Call Hold and Ringback are described in Clauses ~~4-7 and 5~~.
~~However, there is no DSS1 or SS7 support for these capabilities at this time.~~

4 Changes to T1.628-2000 §2, Normative References

§2. Append:

T1.666-1999, *Signalling System Number 7 (SS7)—Operator Services Network Capabilities*.¹

T1.667-1999, *Intelligent Network*.¹

5 Changes to T1.628-2000 §4, Description of Emergency Calling Service

§4.1.4 and §4.1.5. Delete the second paragraph in each.

§4.5. Retitle to "Interactions with supplementary services and network capabilities."

Add a new 4.5.6, "Connection Hold Network Capability":

As a network option, ECS may attempt invocation of the connection hold network capability in conjunction with an emergency service call. Connection hold, if successfully invoked, disables the caller's ability to initiate release of the emergency service call.

When ECS employs the connection hold network capability, ECS is the 'network service' referred to in T1.666.4-1999.

6 Changes to T1.628-2000 §5, Functional Capabilities and Information Flows

§5.1.5. Append a sentence:

When ECS uses the optional connection hold network capability, FE5 controls the operation of connection hold functional entity CH3 described in T1.666.4-1999.

§5.1.11 and 5.1.12. Delete the second paragraph in each of these clauses, replacing each with:

FE11 and FE12 collectively provide the capabilities of functional entities CH1 and CH2 in the function entity model of T1.666.4-1999. Note that the distribution of capabilities between FE11 and FE12 differs from the distribution between CH1 and CH2.

§5.2, third paragraph. Append to the existing text:

An attempt to invoke FE11 when the caller is an ISDN user does not succeed. In this case, if acknowledgement of connection hold invocation is requested, a negative acknowledgement will be given.

7 Changes to T1.628-2000, §6 Switching and signalling specification for ECS at the user-network interface

§6.2.1.1. Replace the second sentence with:

In addition, the following additional service-specific states are defined for use with the ECS Call Hold capability:

§6.2.1.1. Insert a bulleted list and three new paragraphs following this new sentence:

- Idle.
- ECS Call Hold—Connected.
- ECS Call Hold—Held.

The Idle state exists before ECS Call Hold capability is invoked.

“ECS Call Hold-Connected” represents the state where the ECS Call Hold procedures have been invoked by the switch serving the calling user and the calling user is connected to the ECS call.

“ECS Call Hold-Held” represents the state where the ECS Call Hold procedures have been invoked by the switch serving the calling user and the calling user has disconnected from the ECS call.

§6.1.3.3.1. (ASN.1) Add a definition of the Ringback Request operation following the existing definition of the DCI Request operation and the ringbackRequest operation value following the definition of the dCIRequest operation value.

RingbackRequest ::= OPERATION

ringbackRequest RingbackRequest ::= {1 2 840 10005 0 13}

§6.2. Add new clauses 6.2.7 and 6.2.8 to describe the procedure for Call Hold and Ringback respectively:

6.2.7 ECS Call Hold

6.2.7.1 BRI/TE Operation

If the ECS Call Hold feature is supported and invoked for a BRI/TE, then the procedures of this section apply.

While in the “ECS Call Hold-Connected” service state and under normal conditions, the network shall not initiate call clearing over the ISDN access unless call clearing was initiated from the direction of the PSAP.

If the user initiates call clearing while the network is in the “ECS Call Hold-Connected” service state, then the network shall allow the call clearing procedures to complete on the ISDN access interface. In addition, the network shall:

- Retain the telephone number used as the calling party number for the calling user;
- Hold the ECS call/connection towards the PSAP;
- Reserve a B-channel for the held ECS call;
- Wait for the user to re-connect to the ECS held call; and
- Move to the “ECS Call Hold-Held” service state.

While in the “ECS Call Hold-Held” service state, if the network receives a SETUP message whose bearer capability is either speech or 3.1 kHz audio and the network determines that the calling party number for that call is the same as the retained calling party number for the held ECS call, then the network shall take the following actions.

- Assign a B-channel to the terminal (and un-reserve a B-channel);
- Connect the B-channel to the held ECS call;
- Move to the “ECS Call Hold-Connected” service state; and
- Complete the call origination procedures on the ISDN access by sending a CALL PROCEEDING message followed by a CONNECT message.

While in the “ECS Call Hold – Held” service state, if the network receives SETUP message for which a different DN is used for call origination, the network should follow the procedures of T1.607-2000 for call origination, with the exception that since a B-channel is reserved for the held ECS call, the network shall ensure that a B-channel continues to be reserved for that held call.

If the ECS call is cleared from the direction of the PSAP, the network shall release any B-channel that it might have been reserving for the ECS call.

6.2.7.2 BRI/NT2 and PRI/NT2 Operation

Support of ECS Call Hold capability by the NT2 on an ISDN BRI or PRI is optional. If the NT2 does not support ECS Call Hold and the caller hangs up, the user follows the normal call clearing procedures of T1.607-2000.

If the NT2 does support ECS call hold, then it enters the ECS Call Hold—Connected service state on recognizing a call as an ECS call. If the caller disconnects (hangs up) while in the ECS Call Hold—

Connected service state, the NT2 enters the ECS Call Hold—Held service state rather than disconnecting the B channel toward the network. There is no signalling that occurs between an NT2 and the network for an NT2 that supports ECS Call Hold when the end-user goes on-hook; therefore the network will remain in the ECS Call Hold—Connected service state while the NT2 is in the ECS Call Hold—Held service state.

If the NT2 receives a DISCONNECT message from the network while in either ECS Call Hold—Connected or ECS Call Hold—Held service states, then it follows normal call clearing procedures, as given in T1.607-2000.

If the network has received a request from the PSAP to invoke ECS Call Hold, but nevertheless receives a DISCONNECT message from the NT2 this indicates either that the NT2 does not support ECS Call Hold or that an exceptional condition has occurred within the NT2. The network follows the disconnect procedure of T1.607-2000 to release the connection with the NT2, enters the ECS Call Hold—Held service state, and informs the PSAP that the caller has disconnected (7.3.1 and T1.666.4-1999).

If the network receives a disconnect request from the PSAP while in the ECS Call Hold—Connected service state, it initiates the normal T1.607-2000 disconnect procedure toward the NT2. Receipt of a disconnect request from the PSAP while in either ECS Call Hold—Connected or ECS Call Hold—Held service states causes the state to revert to idle.

6.2.8 Ringback

6.2.8.1 Providing Ringback at a BRI/TE Interface

While in the “ECS Call Hold – Connected” service state, if the network determines that ringback should be applied to the calling ISDN access, the network shall proceed to apply a tone over the B-channel (specifically the “receiver off-hook warning” tone that would be applied to analog lines should be applied).

While in the “ECS Call Hold – Held” service state, if the network determines that ringback should be applied to the calling ISDN access, the network shall proceed to offer a call over the BRI using the procedures of T1.607-2000 with the following clarifications.

- The network shall include the retained telephone number in the Called Party Number information element.
- The network should include the digits “911” in the Calling Party Number information element.
- The network shall code the Bearer Capability information element with the original bearer capability used for the call.
- If a progress indicator information element was received indicating that either the call was not end-to-end ISDN or the called party is non-ISDN, the network may indicate that the call is not end-to-end ISDN or the calling party is non-ISDN, respectively.

The network shall follow the procedures of T1.607-2000 to complete the call establishment procedures at the ISDN access. Once the call is connected on the ISDN access to a B-channel, the network shall:

- Connect the B-channel assigned to the call to the held ECS call;

- Consider the reserved B-channel for the held ECS call to have been assigned; and
- Move to the “ECS Call Hold—Connected” service state.

Until the call is connected, the network shall maintain the ECS call in the “ECS Call Hold—Held” service state.

6.2.8.2 Providing Ringback at a BRI/NT2 or PRI/NT2 Interface

If the network receives a Ringback request from the direction of the PSAP while in the ECS Call Hold—Connected service state, the network shall send a FACILITY message including a Facility information element coded with the ringbackRequest operation. This FACILITY message shall use the call reference of the associated call on the ISDN interface. In addition, the network shall follow the procedures of T1.610-1998 for generating and sending the FACILITY message over the ISDN access.

ECS Ringback is not supported in BRI/NT2 and PRI/NT2 interfaces when the NT2 does not support ECS Call Hold. Thus if the network receives a Ringback request from the direction of the PSAP while in the ECS Call Hold—Held service state, the network discards the request.

Support of the RingbackRequest operation by the NT2 on an ISDN BRI or PRI is optional. If the NT2 supports the RingbackRequest, it provides the appropriate treatment² towards the end-user depending on the connection status of the end-user. An NT2 that does not support the ringbackRequest operation follows the procedure of T1.610-1998 for handling unrecognized operation codes, i.e., returns a reject component coded “unrecognized operation.” The network should not consider receipt of such a reject component in response to a Ringback request to be an error condition.

6.2.8.3 PSAP Request for Ringback

If the PSAP determines that it needs to request the network to invoke Ringback, then the procedures to be used depend on the type of interface to the network that is supported by the PSAP.

If the PSAP supports an ISDN interface with stimulus protocols, then the PSAP uses the Feature Key Management procedures of T1.610-1998 to request Ringback. In this case, the PSAP shall send an INFORMATION message to the network including the Feature Activation information element with a Feature Identifier assigned for Ringback Request. The call reference of the related call shall be used in this INFORMATION message. Upon receipt of such an INFORMATION message, the network shall proceed to pass the ringback request towards the originating interface, if the ringback capability is supported (7.3.3).

If the PSAP supports an ISDN interface that uses functional protocols, then the PSAP uses the common information element procedures of T1.610-1998 to request Ringback. In this case, the PSAP shall send a FACILITY message to the network including a Facility information element coded with the ringbackRequest operation. This FACILITY message shall use the call reference of the associated call on the ISDN interface. In addition, the PSAP interface shall follow the procedures of

² For example, 6.2.8.1 describes treatments applicable to NT2 users that interface using a BRI; similar considerations apply to users that use analog interfaces.

T1.610-1998 for generating and sending the FACILITY message over the ISDN access. Upon receipt of such a FACILITY message, the network shall proceed to pass the ringback request toward the originating interface, if the ringback capability is supported (7.3.3).

8 Changes to T1.628-2000 §7, Switching and signaling specification for ECS at interexchange interfaces

§7.1. Replace the first and second sentences with the following:

ISDNUP protocol has been identified in association with SS7 procedures supporting ECS call setup. TCAP procedures may be used between an exchange that is performing ECS call routing and an external SRDB to obtain ECS call routing information.

Create a new clause 7.1.1.1, titled "ISDNUP Messages" and containing the current body of §7.1.1, Messages. Add clause 7.1.1.2, titled "TCAP Messages." The content for this clause is:

The following TCAP messages are used by an exchange to request the directory number of a PSAP and by an SCP to meet that request:

- . The ECS analyzedInformation message is a T1.667-1999 analyzedInformation message with the addition of the GenericDigitsList and CallingGeodeticLocation parameters, as shown in Table 1/T1.628A.
 - . The UserID parameter is populated with the directory number of the calling party.
 - . The CalledPartyID parameter is populated with the dialed/called number (i.e., "9-1-1").
 - . The BearerCapability parameter is populated with the bearer capability associated with the ECS call.
 - . The TriggerCriteriaType is populated, depending on agreements with the Emergency Services Network provider, as either:
 - . "npa" (5);
 - . "npaNXXXXXX" (8); or
 - . "n11" (12).
 - . The optional ChargeNumber, when present, is populated with the charge number associated with the call.
 - . The optional CallingPartyID parameter, when present, is populated with the calling party number.
 - . The optional ChargePartyStationType parameter, when present, is populated with the ANI II value associated with the call.
 - . The optional GenericDigitsList parameter, when present, is populated with a GenericDigits parameter that contains the LIN that was received with the call.
 - . The optional CallingGeodeticLocation parameter, when present, is populated with the latitude and longitude information that was received with the call.
- . The ECS analyzeRoute message is a T1.667-1999 analyzeRoute message as shown in Table 2/T1.628A.
 - . The CalledPartyID parameter is populated with the directory number of the PSAP.

- The EDPRequest parameter contained in the RequestReportBCMEvent component of an ECS analyzeRoute message is populated with the list of events that the exchange is requested to report to the SRDB (i.e., oCalledPartyBusy, oNoAnswer, or networkBusy).
 - The O NoAnswerTimer parameter contained in the RequestReportBCMEvent component of an ECS analyzeRoute message is populated with the duration (in seconds) of the timer.
- The ECS terminationAttempt message is a T1.667-1999 terminationAttempt message with the addition of the GenericDigitsList and CallingGeodeticLocation parameters, as shown in Table 3/T1.628A.
 - The UserID parameter is populated with the directory number derived from the called number received by the exchange.
 - The BearerCapability parameter is populated with the bearer capability associated with the ECS call.
 - The CalledPartyNumber parameter is populated with the directory number derived from the called number received by the exchange.
 - The TriggerCriteriaType parameter is populated with a value of "terminationAttempt" (15).
 - The optional ChargeNumber, when present, is populated with the charge number associated with the call.
 - The optional CallingPartyID parameter, when present, is populated with the calling party number.
 - The optional ChargePartyStationType parameter, when present, is populated with the ANI II value associated with the call.
 - The optional GenericDigitsList parameter, when present, is populated with a GenericDigits parameter that contains the LIN that was received with the call.
 - The optional CallingGeodeticLocation parameter, when present, is populated with the latitude and longitude information that was received with the call.
- The ECS collectedInformation message is T1.667-1999 collectedInformation message with the addition of the GenericDigitsList and CallingGeodeticLocation parameters, as shown in Table 4/T1.628A.
 - The UserID parameter is populated with the trunk group identifier associated with the dedicated incoming trunk group over which the call was received.
 - The BearerCapability parameter is populated with the bearer capability associated with the ECS call.
 - The optional ChargeNumber, when present, is populated with the charge number associated with the call.
 - The TriggerCriteriaType parameter is populated with a value of "dedicated trunk group" (49).
 - The optional CallingPartyID parameter, when present, is populated with the calling party number.
 - The optional ChargePartyStationType parameter, when present, is populated with the ANI II value associated with the call.
 - The optional GenericDigitsList parameter, when present, is populated with a GenericDigits parameter that contains the LIN that was received with the call.
 - The optional CallingGeodeticLocation parameter, when present, is populated with the latitude and longitude information that was received with the call.

- E. The ECS forwardCall message is a T1.667-1999 forwardCall message as shown in Table 5/T1.628A.
- . The CalledPartyID parameter is populated with the directory number of the PSAP.
 - . The EDPRequest parameter contained in the RequestReportBCMEvent component of the ECS forwardCall message is populated with the list of events that the exchange is requested to report to the SRDB (i.e., oCalledPartyBusy, oNoAnswer, or networkBusy).
 - . The O NoAnswerTimer parameter contained in the RequestReportBCMEvent component of the ECS forwardCall message is populated with the duration (in seconds) of the timer.

ECS analyzedInformation, ECS collectedInformation, and ECS terminationAttempt are query messages. ECS analyzeRoute and ECS forwardCall are response messages. The queries and responses are related as follows:

Query Message	Response Message
ECS analyzedInformation	ECS analyzeRoute
ECS collectedInformation	ECS analyzeRoute
ECS terminationAttempt	ECS forwardCall

A given node may elect to support the full set or only a subset of these Query/Response pairs.

Table 1/T1.628A ECS analyzedInformation message

h	g	f	e	d	c	b	a	
1	1	1	0	0	0	1	0	Package Type (Query with Permission)
x	x	x	x	x	x	x	x	Total TCAP Message Length
1	1	0	0	0	1	1	1	Transaction ID Identifier
0	0	0	0	0	1	0	0	Transaction ID Length
Originating Transaction ID							Transaction ID	
1	1	1	0	1	0	0	0	Component Sequence Identifier
x	x	x	x	x	x	x	x	Component Sequence Length
1	1	1	0	1	0	0	1	Component Type Identifier [Invoke (Last)]
x	x	x	x	x	x	x	x	Component Length
1	1	0	0	1	1	1	1	Component ID Identifier
0	0	0	0	0	0	0	1	Component ID Length
Invoke ID							Component ID	
1	1	0	1	0	0	0	1	Operation Code Identifier [Private TCAP]
0	0	0	0	0	0	1	0	Operation Code Length
0	1	1	0	0	1	0	0	Operation Family [Request Notification]
0	0	0	0	0	0	1	1	Operation Specifier [analyzedInformation]
0	0	1	1	0	0	0	0	Parameter Sequence Identifier
x	x	x	x	x	x	x	x	Parameter Sequence Length
1	0	1	1	1	1	1	1	User ID Identifier
0	0	1	1	0	1	0	1	
0	0	0	0	0	1	0	1	User ID Length
2 nd digit				1 st digit				User ID [Calling Directory Number]
4 th digit				3 rd digit				
6 th digit				5 th digit				
8 th digit				7 th digit				
10 th digit				9 th digit				
1	0	0	0	1	1	0	1	Bearer Capability Identifier
0	0	0	0	0	0	0	1	Bearer Capability Length
Bearer Capability							Bearer Capability	

(continued)

Table 1/T1.628A (continued)

1	0	0	0	1	1	1	1	CalledPartyID Identifier
0	0	0	0	0	1	0	0	CalledPartyID Length
1	0	0	0	0	0	1	1	CalledPartyID (i.e., "911")
sp.	0	0	1	spare		spare		
0	0	0	1	1	0	0	1	
0	0	0	0	0	0	0	1	
1	0	0	1	1	1	1	1	
0	0	1	1	0	1	0	0	TriggerCriteriaType Identifier
0	0	0	0	0	0	0	1	TriggerCriteriaType Length
x	x	x	x	x	x	x	x	TriggerCriteriaType
1	0	0	1	0	0	1	1	ChargeNumber Identifier
0	0	0	0	0	1	1	1	ChargeNumber Length
O/ E	Nature of Number							ChargeNumber
Sp.	Numbering Plan		spare		spare			
2 nd digit			1 st digit					
4 th digit			3 rd digit					
6 th digit			5 th digit					
8 th digit			7 th digit					
10 th digit			9 th digit					
1	0	0	1	0	0	1	0	CallingPartyID Identifier
0	0	0	0	0	1	1	1	Calling PartyID Length
O/ E	Nature of Number							CallingPartyID
Sp.	Numbering Plan		Pres.		Screen.			
2 nd digit			1 st digit					
4 th digit			3 rd digit					
6 th digit			5 th digit					
8 th digit			7 th digit					
10 th digit			9 th digit					
1	0	0	1	0	1	0	0	ChargePartyStationType Identifier
0	0	0	0	0	0	0	1	ChargePartyStationType Length
ChargePartyStationType							ChargePartyStationType	

(continued)

Table 1/T1.628A (concluded)

1	0	0	1	1	1	1	1	GenericDigitsList Identifier
1	0	0	0	0	0	0	1	
0	0	0	1	0	1	1	0	
x	x	x	x	x	x	x	x	GenericDigitsList Length
1	0	0	1	1	1	1	1	GenericDigits Identifier
1	0	0	0	0	0	0	1	
0	0	0	1	0	1	0	1	
x	x	x	x	x	x	x	x	GenericDigits Length
0	0	0/1	0	1	1	0	1	GenericDigits [LIN]
2 nd digit			1 st digit					
*			*					
n th digit			n - 1 st digit					
1	0	0	1	1	1	1	1	CallingGeodeticLocation Identifier
1	0	0	0	0	0	0	1	
0	0	1	0	0	0	1	0	
x	x	x	x	x	x	x	x	CallingGeodeticLocation Length
spare				LPRI		Screen.		CallingGeodeticLocation (as described in T1.628-2000, 7.2.1.3) ³
ext	Type of Shape							
* Shape Description *								

³ Also note the clarification of this clause appearing in this addendum following Table 5/T1.628A.

Table 2/T1.628A ECS analyzeRoute⁴

h	g	f	e	d	c	b	a	
1	1	1	0	0	1	0	1	Package Type (Conversation with Permission)
x	x	x	x	x	x	x	x	Total TCAP Message Length
1	1	0	0	0	1	1	1	Transaction ID Identifier
0	0	0	0	1	0	0	0	Transaction ID Length
Originating Transaction ID								Transaction IDs
Responding Transaction ID								
1	1	1	0	1	0	0	0	Component Sequence Identifier
x	x	x	x	x	x	x	x	Component Sequence Length
1	1	1	0	1	1	0	1	Component Type Identifier [Invoke (Not Last)]
x	x	x	x	x	x	x	x	Component Length
1	1	0	0	1	1	1	1	Component ID Identifier
0	0	0	0	0	0	1	0	Component ID Length
Invoke ID								Component Ids
Correlation ID								
1	1	0	1	0	0	0	1	Operation Code Identifier [Private TCAP]
0	0	0	0	0	0	1	0	Operation Code Length
0	1	1	0	0	1	0	1	Operation Family [Connection Control (call model)]
0	0	0	0	0	0	0	1	Operation Specifier [analyzeRoute]
0	0	1	1	0	0	0	0	Parameter Sequence Identifier
x	x	x	x	x	x	x	x	Parameter Sequence Length

(continued)

⁴ An ECS analyzeRoute message will be sent in response to an ECS analyzedInformation message or an ECS collectedInformation message.

Table 2/T1.628A (continued)

1	0	0	0	1	1	1	1	CalledPartyID Identifier
0	0	0	0	0	1	1	1	CalledPartyID Length
O/ E	Nature of Number							CalledPartyID
Sp.	Numbering Plan		spare		spare			
2 nd digit			1 st digit					
4 th digit			3 rd digit					
6 th digit			5 th digit					
8 th digit			7 th digit					
10 th digit			9 th digit					
1	1	1	0	1	0	0	1	Component Type Identifier ⁵ [Invoke (Last)]
x	x	x	x	x	x	x	x	Component Length
1	1	0	0	1	1	1	1	Component ID Identifier
0	0	0	0	0	0	1	0	Component ID Length
Invoke ID							Component Ids	
Correlation ID								
1	1	0	1	0	0	0	1	Operation Code Identifier [Private TCAP]
0	0	0	0	0	0	1	0	Operation Code Length
0	1	1	0	1	1	0	1	Operation Family [RequestEvent]
0	0	0	0	0	0	0	1	Operation Specifier [Request_Report_BCM_Event]
0	0	1	1	0	0	0	0	Parameter Sequence Identifier
x	x	x	x	x	x	x	x	Parameter Sequence Length
1	0	0	1	1	1	1	1	EDPRequest Identifier
0	1	0	1	1	1	0	0	
0	0	0	0	0	0	1	1	EDPRequest Length
0	0	0	0	0	0	1	1	EDPRequest
0	0	0	0	0	0	0	1	
0	0	0	0	0	0	0	0	

(continued)

⁵ Note that the second component described here is sent to facilitate alternate routing of the ECS call under conditions of called party busy, no answer, or network busy.

Table 2/T1.628A (concluded)

1	0	0	1	1	1	1	1	O_NoAnswerTimer Identifier
0	1	0	1	1	0	1	1	
0	0	0	0	0	0	0	1	O_NoAnswerTimer Length
x	x	x	x	x	x	x	x	O_NoAnswerTimer

Table 3/T1.628A ECS terminationAttempt message

h	g	f	e	d	c	b	a	
1	1	1	0	0	0	1	0	Package Type (Query with Permission)
x	x	x	x	x	x	x	x	Total TCAP Message Length
1	1	0	0	0	1	1	1	Transaction ID Identifier
0	0	0	0	0	1	0	0	Transaction ID Length
Originating Transaction ID								Transaction ID
1	1	1	0	1	0	0	0	Component Sequence Identifier
x	x	x	x	x	x	x	x	Component Sequence Length
1	1	1	0	1	0	0	1	Component Type Identifier [Invoke (Last)]
x	x	x	x	x	x	x	x	Component Length
1	1	0	0	1	1	1	1	Component ID Identifier
0	0	0	0	0	0	0	1	Component ID Length
Invoke ID								Component ID
1	1	0	1	0	0	0	1	Operation Code Identifier [Private TCAP]
0	0	0	0	0	0	1	0	Operation Code Length
0	1	1	0	0	1	0	0	Operation Family [Request/Notification]
0	0	0	0	0	1	0	1	Operation Specifier [terminationAttempt]
0	0	1	1	0	0	0	0	Parameter Sequence Identifier
x	x	x	x	x	x	x	x	Parameter Sequence Length
1	0	1	1	1	1	1	1	User ID Identifier
0	0	1	1	0	1	0	1	
0	0	0	0	0	1	0	1	User ID Length
2 nd digit				1 st digit				User ID [Calling Directory Number
4 th digit				3 rd digit				
6 th digit				5 th digit				
8 th digit				7 th digit				
10 th digit				9 th digit				
1	0	0	0	1	1	0	1	Bearer Capability Identifier
0	0	0	0	0	0	0	1	Bearer Capability Length
Bearer Capability								Bearer Capability

(continued)

Table 3/T1.628A (continued)

1	0	0	0	1	1	1	1	CalledPartyID Identifier
0	0	0	0	0	1	1	1	CalledPartyID Length
O/ E	Nature of Number							CalledPartyID (i.e., Terminating Directory Number)
Sp.	Numbering Plan		spare		spare			
2 nd digit			1 st digit					
4 th digit			3 rd digit					
6 th digit			5 th digit					
8 th digit			7 th digit					
10 th digit			9 th digit					
1	0	0	1	1	1	1	1	
0	0	1	1	0	1	0	0	
0	0	0	0	0	0	0	1	TriggerCriteriaType Length
0	0	0	0	1	1	1	1	TriggerCriteriaType (i.e., termination attempt)
1	0	0	1	0	0	1	1	ChargeNumber Identifier
0	0	0	0	0	1	1	1	ChargeNumber Length
O/ E	Nature of Number							ChargeNumber
Sp.	Numbering Plan		spare		spare			
2 nd digit			1 st digit					
4 th digit			3 rd digit					
6 th digit			5 th digit					
8 th digit			7 th digit					
10 th digit			9 th digit					
1	0	0	1	0	0	1	0	
0	0	0	0	0	1	1	1	Calling PartyID Length
O/ E	Nature of Number							CallingPartyID
Sp.	Numbering Plan		Pres.		Screen.			
2 nd digit			1 st digit					
4 th digit			3 rd digit					
6 th digit			5 th digit					
8 th digit			7 th digit					
10 th digit			9 th digit					

(continued)

Table 3/T1.628A (concluded)

1	0	0	1	0	1	0	0	ChargePartyStationType Identifier		
0	0	0	0	0	0	0	1	ChargePartyStationType Length		
ChargePartyStationType								ChargePartyStationType		
1	0	0	1	1	1	1	1	GenericDigitsList Identifier		
1	0	0	0	0	0	0	1			
0	0	0	1	0	1	1	0			
x	x	x	x	x	x	x	x	GenericDigitsList Length		
1	0	0	1	1	1	1	1	GenericDigits Identifier		
1	0	0	0	0	0	0	1			
0	0	0	1	0	1	0	1			
x	x	x	x	x	x	x	x	GenericDigits Length		
0	0	0/1	0	1	1	0	1	GenericDigits [LIN]		
2 nd digit				1 st digit						
*				*						
n th digit				n - 1 st digit						
1	0	0	1	1	1	1	1	CallingGeodeticLocation Identifier		
1	0	0	0	0	0	0	1			
0	0	1	0	0	0	1	0			
x	x	x	x	x	x	x	x	CallingGeodeticLocation Length		
spare				LPRI	Screen.	CallingGeodeticLocation (as described in T1.628-2000, 7.2.1.3) ⁶				
ext	Type of Shape									
* Shape Description *										

⁶ Also note the clarification of this clause appearing in this addendum following Table 5/T1.628A.

Table 4/T1.628 ECS collectedInformation message

h	g	f	e	d	c	b	a	
1	1	1	0	0	0	1	0	Package Type (Query with Permission)
x	x	x	x	x	x	x	x	Total TCAP Message Length
1	1	0	0	0	1	1	1	Transaction ID Identifier
0	0	0	0	0	1	0	0	Transaction ID Length
Originating Transaction ID								Transaction ID
1	1	1	0	1	0	0	0	Component Sequence Identifier
x	x	x	x	x	x	x	x	Component Sequence Length
1	1	1	0	1	0	0	1	Component Type Identifier [Invoke (Last)]
x	x	x	x	x	x	x	x	Component Length
1	1	0	0	1	1	1	1	Component ID Identifier
0	0	0	0	0	0	0	1	Component ID Length
Invoke ID								Component ID
1	1	0	1	0	0	0	1	Operation Code Identifier [Private TCAP]
0	0	0	0	0	0	1	0	Operation Code Length
0	1	1	0	0	1	0	0	Operation Family [Request/Notification]
0	0	0	0	0	0	1	0	Operation Specifier [collectedInformation]
0	0	1	1	0	0	0	0	Parameter Sequence Identifier
x	x	x	x	x	x	x	x	Parameter Sequence Length
1	0	1	1	1	1	1	1	User ID Identifier
0	0	1	1	0	1	0	1	
x	x	x	x	x	x	x	x	User ID Length
TrunkGroupID								User ID [TrunkGroupID]
1	0	0	0	1	1	0	1	Bearer Capability Identifier
0	0	0	0	0	0	0	1	Bearer Capability Length
Bearer Capability								Bearer Capability

(continued)

Table 4/T1.628A (continued)

1	0	0	1	0	0	1	1	ChargeNumber Identifier	
0	0	0	0	0	1	1	1	ChargeNumber Length	
O/ E	Nature of Number							ChargeNumber	
Sp.	Numbering Plan		spare		spare				
2 nd digit			1 st digit						
4 th digit			3 rd digit						
6 th digit			5 th digit						
8 th digit			7 th digit						
10 th digit			9 th digit						
1	0	0	1	1	1	1	1		TriggerCriteriaType Identifier
0	0	1	1	0	1	0	0		
0	0	0	0	0	0	0	1	TriggerCriteriaType Length	
0	0	1	1	0	0	0	1	TriggerCriteriaType (i.e., dedicated trunk group)	
1	0	0	1	0	0	1	0	CallingPartyID Identifier	
0	0	0	0	0	1	1	1	Calling PartyID Length	
O/ E	Nature of Number							CallingPartyID	
Sp.	Numbering Plan		Pres.		Screen.				
2 nd digit			1 st digit						
4 th digit			3 rd digit						
6 th digit			5 th digit						
8 th digit			7 th digit						
10 th digit			9 th digit						
1	0	0	1	0	1	0	0		ChargePartyStationType Identifier
0	0	0	0	0	0	0	1	ChargePartyStationType Length	
ChargePartyStationType							ChargePartyStationType		
1	0	0	1	1	1	1	1	GenericDigitsList Identifier	
1	0	0	0	0	0	0	1		
0	0	0	1	0	1	1	0		
x	x	x	x	x	x	x	x	GenericDigitsList Length	

(continued)

Table 4/T1.628A (concluded)

1	0	0	1	1	1	1	1	GenericDigits Identifier		
1	0	0	0	0	0	0	1			
0	0	0	1	0	1	0	1			
x	x	x	x	x	x	x	x	GenericDigits Length		
0	0	0/1	0	1	1	0	1	GenericDigits [LIN]		
2 nd digit			1 st digit							
*			*							
n th digit			n - 1 st digit							
1	0	0	1	1	1	1	1	CallingGeodeticLocation Identifier		
1	0	0	0	0	0	0	1			
0	0	1	0	0	0	1	0			
x	x	x	x	x	x	x	x	CallingGeodeticLocation Length		
spare				LPRI	Screen.	CallingGeodeticLocation (as described in T1.628-2000, 7.2.1.3) ⁷				
ext	Type of Shape									
* Shape Description *										

⁷ Also note the clarification of this clause appearing in this addendum following Table 5/T1.628A.

Table 5/T1.628A ECS forwardCall message⁸

h	g	f	e	d	c	b	a	
1	1	1	0	0	1	0	1	Package Type (Conversation with Permission)
x	x	x	x	x	x	x	x	Total TCAP Message Length
1	1	0	0	0	1	1	1	Transaction ID Identifier
0	0	0	0	1	0	0	0	Transaction ID Length
Originating Transaction ID								Transaction IDs
Responding Transaction ID								
1	1	1	0	1	0	0	0	Component Sequence Identifier
x	x	x	x	x	x	x	x	Component Sequence Length
1	1	1	0	1	1	0	1	Component Type Identifier [Invoke (Not Last)]
x	x	x	x	x	x	x	x	Component Length
1	1	0	0	1	1	1	1	Component ID Identifier
0	0	0	0	0	0	1	0	Component ID Length
Invoke ID								Component Ids
Correlation ID								
1	1	0	1	0	0	0	1	Operation Code Identifier [Private TCAP]
0	0	0	0	0	0	1	0	Operation Code Length
0	1	1	0	1	0	1	0	Operation Family [Connectivity Control (call model)]
0	0	0	0	0	0	0	1	Operation Specifier [forwardCall]
0	0	1	1	0	0	0	0	Parameter Sequence Identifier
x	x	x	x	x	x	x	x	Parameter Sequence Length

(continued)

⁸ An ECS forwardCall message is sent in response to an ECS terminationAttempt message.

Table 5/T1.628A (continued)

1	0	0	0	1	1	1	1	CalledPartyID Identifier
0	0	0	0	0	1	1	1	CalledPartyID Length
O/ E	Nature of Number							CalledPartyID
Sp.	Numbering Plan		spare		spare			
2 nd digit			1 st digit					
4 th digit			3 rd digit					
6 th digit			5 th digit					
8 th digit			7 th digit					
10 th digit			9 th digit					
1	1	1	0	1	0	0	1	Component Type Identifier ⁹ [Invoke (Last)]
x	x	x	x	x	x	x	x	Component Length
1	1	0	0	1	1	1	1	Component ID Identifier
0	0	0	0	0	0	1	0	Component ID Length
Invoke ID							Component Ids	
Correlation ID								
1	1	0	1	0	0	0	1	Operation Code Identifier [Private TCAP]
0	0	0	0	0	0	1	0	Operation Code Length
0	1	1	0	1	1	0	1	Operation Family [RequestEvent]
0	0	0	0	0	0	0	1	Operation Specifier [Request_Report_BCM_Event]
0	0	1	1	0	0	0	0	Parameter Sequence Identifier
x	x	x	x	x	x	x	x	Parameter Sequence Length
1	0	0	1	1	1	1	1	EDPRequest Identifier
0	1	0	1	1	1	0	0	
0	0	0	0	0	0	1	1	EDPRequest Length
0	0	0	0	0	0	1	1	EDPRequest
0	0	0	0	0	0	0	1	
0	0	0	0	0	0	0	0	

(continued)

⁹ Note that the second component described here is sent to facilitate alternate routing of the ECS call under conditions of called party busy, no answer, or network busy.

Table 5/T1.628A (concluded)

1	0	0	1	1	1	1	1	O_NoAnswerTimer Identifier
0	1	0	1	1	0	1	1	
0	0	0	0	0	0	0	1	O_NoAnswerTimer Length
x	x	x	x	x	x	x	x	O_NoAnswerTimer

§7.1.2. Retitle clause from "Parameters" to "ISDNUP Parameters." In §7.1.2.3.2, "Ellipsoid point with uncertainty shape description," replace item (d) with:

d) Uncertainty code

The uncertainty r , expressed in meters (in the range ~~4m~~0m to 1,800 km), is mapped from the binary number K , with the following formula:

$$r = C((1+x)^K - 1)$$

with $C = 10$ and $x = 0.1$.

Add a new clause, §7.1.3, titled "TCAP Parameters" The content for this clause is:

The GenericDigitsList parameter, when used in a TCAP message has the identifier Private 150 (1001 1111 1000 0001 0001 0110.)

The GenericDigits parameter, when used in a TCAP message has the identifier Private 149 (1001 1111 1000 0001 0001 0101.)

The CallingGeodeticLocation parameter, when used in a TCAP message has the identifier Private 162 (1001 1111 1000 0001 0010 0010.)

§7.3.1. Append a new paragraph to the end of §7.3.1:

As a network option the originating exchange may support ECS call hold for emergency service calls. In this case the originating exchange may include an indication of connection hold availability in the IAM (T1.666.4-1999 §6.2.1). If the originating exchange subsequently receives a request to invoke connection hold for the call, it follows the procedure specified in T1.666.4-1999 §6.2.2.2. If connection hold is invoked for a call, the procedure for the release of the call specified in T1.666.4-1999 §6.2.3 supersede the normal call release procedure. If connection hold has been invoked for a call, the originating exchange will act upon any ringback request received as described in T1.666.4-1999 §6.2.4.2.

§7.3.3. Replace the existing first paragraph of §7.3.3 with:

From the SS7 perspective, the switch provides support for routing toward/access to a PSAP to deliver among other things, the caller location information.

§7.3.3. Append a new paragraph to the end of §7.3.3:

If the exchange supports the ECS call hold network option, then in general it performs the functions of the Service Controlling Exchange as described in T1.666.4-1999. More specifically the exchange should include a request to invoke connection hold in the ACM. This request should be coded "hold request." When connection hold has been requested, the release procedure in T1.666.4-1999 §6.2.3 supersedes the normal call release procedure. When connection hold has been invoked the exchange will act on a request from the access to perform ringback as described in T1.666.4-1999 §6.2.4.1.

§7.3.3.1. Change the first paragraph, the two list items following it, and the second paragraph to read:

If an IAM is received at an emergency services routing destination exchange where the Called Party Number parameter contains only the digits "911," the ECS procedures shall be invoked. In addition, if the call is incoming over dedicated facilities for handling emergency service calls and the Called Party Number parameter does not contain any digits or contains the digits "11" or "1," the ECS procedures shall be invoked. In these cases, the exchange shall query the Selective Routing Function (SRF) to determine the appropriate PSAP to whom the call shall be routed. As part of this query, the exchange shall provide the caller location information to the SRF:

- . For wireline callers, the preferred call back number (Calling Party Number or the Charge Number at the option of the service provider). If available, the Location Identification Number and the Calling Geodetic Location may also be sent.
- . For wireless callers, the Location Identification Number and Calling Geodetic Location (if available).

The SRF will provide the ESN and/or the Directory Number of the PSAP to which the call should be routed.

The TCAP query to the SRF may be an ECS analyzedInformation message, an ECS collectedInformation message or an ECS terminationAttempt message. Which query message is sent is determined as follows:

- . If an ECS call originates at an exchange and the exchange supports access to an SRF, or an ECS call originates at an exchange that does not support access to an SRF and is routed to a tandem exchange over a shared trunk group, and a trigger has been set against the called number received by the tandem in incoming call setup signaling (i.e., the digits "9-1-1") the tandem exchange will generate an ECS analyzedInformation message.
- . If an ECS call originates at an exchange that does not support access to an SRF and is routed to a tandem exchange, call processing at the tandem may involve a translation from the received called number (e.g., "9-1-1") to a "terminating directory number" against which a Termination Attempt trigger has been set. In this case, the exchange will generate an ECS terminationAttempt message.
- . If an ECS call originates at an exchange that does not support access to an SRF and is routed to a tandem exchange over a dedicated trunk group with the digits "9-1-1," "1-1," "1," or no digits as the called party number, then if an IN trigger is set against the incoming dedicated trunk group, the exchange will generate an ECS collectedInformation message.

The response to an ECS analyzedInformation message or an ECS collectedInformation message shall be an analyzeRoute message. The response to an ECS terminationAttempt message shall be a forwardCall message. These responses may request further interaction between the emergency services routing exchange and the SRF through the use of the RequestReportBCMEvent procedure. This interaction follows the procedures given in T1.667-1999. Specifically note clauses 7.4.3.38 RequestReportBCMEvent procedure and 7.4.3.20 ForwardCall procedure.

The SSF/SRF messages are shown in Table 1/T1.628A through Table 5/T1.628A.