ATIS-1000006.2005 (R2015)

SIGNALLING SYSTEM NO. 7 (SS7) – EMERGENCY TELECOMMUNICATIONS SERVICE (ETS)

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ATIS-1000006.2005 (R2015), *Signalling System No. 7 (Ss7) – Emergency Telecommunications Service (ETS)*

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

American National Standard for Telecommunications

SIGNALLING SYSTEM NO. 7 (SS7) –
EMERGENCY TELECOMMUNICATIONS SERVICE (ETS)

Secretariat

Alliance for Telecommunications Industry Solutions

Approved April 8, 2005

American National Standards Institute, Inc.

Abstract

This document builds upon the High Probability of Completion (HPC) Network Capability as described in T1.631-1993 (R1999). The ETS service is expanded to address bearer networks and the ITU-T Recommendation E.106, *International Emergency Preference Scheme for Disaster Relief Operations (IEPS)*.

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, 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.

This document is entitled American National Standard for Telecommunications ATIS-1000006.2005, *Signalling System No. 7 (SS7) – Emergency Telecommunications Service (ETS)*.

This document builds upon the High Probability of Completion (HPC) Network Capability as described in T1.631-1993 (R1999). The ETS service is expanded to address bearer networks and the ITU-T Recommendation E.106, International Emergency Preference Scheme for Disaster Relief Operations. It is based on T1.113-2000, *Signalling System No. 7 (SS7) – Integrated Services Digital Network (ISDN) User Part* (revised as ATIS-1000113.2005) It is suited for anticipated needs and applications within and between U.S. networks. These specifications are the result of extensive work by the members of the Interoperability Subcommittee (IOP) – formerly T1S1.3 Subworking Group on U.S. Standards for Common Channel Signalling.

This standard contains three informative annexes, which are not considered part of this standard.

This standard is intended for use in conjunction with American National Standards T1.111-2000, *Signalling system no. 7 (SS7) – Message transfer part (MTP)*; T1.113-2000, *Signalling system no. 7 (SS7) – Integrated services digital network (ISDN) User part*; and T1.401-2000, *Interface between carriers and customer installations – Analog voice grade switched access lines using loop-start and ground-start signalling*.

Footnotes are not officially part of this standard.

Future control of this document will reside with Packet Technologies and Systems Committee (PTSC). This control of additions to the specification, such as protocol evolution, new applications, and operational requirements, will permit compatibility among U.S. networks. Such additions will be incorporated in an orderly manner with due consideration to the ITU-T layered model principles, conventions, and functional boundaries.

The Packet Technologies and Systems Committee (PTSC) – formerly T1S1 – 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 standard will be welcome. These should be sent to the Alliance for Telecommunications Industry Solutions, PTSC Secretariat, 1200 G Street, NW, Suite 500, Washington DC 20005.

This standard was processed and approved for submittal to ANSI by PTSC. Committee approval of this standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, PTSC had the following members:

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The Interoperability Subcommittee (IOP) and the Signalling, Architecture, and Control Subcommittee (SAC) – formerly T1S1.3 and T1S1.7, respectively – developed this standard.

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1 SCOPE, PURPOSE, AND APPLICATION

1.1 Scope

To ensure that a survivable and enduring National Security/Emergency Preparedness (NS/EP) telecommunications capability is available during emergencies, the U.S. government has endorsed the development and adoption of standards to support increased call completion capabilities for critical users. The Emergency Telecommunications Service (ETS) would be applied during the call setup by providing an identifier for those calls in the SS7 network protocol. This identifier would allow ETS calls to be recognized as they are routed across and between networks so that call completion improvement techniques could be applied by service providers to increase the probability of completion during periods of network congestion or damage.

ETS in its most generic sense provides for preferential telecommunications connectivity for any authorized user from any originating point in the public network. ETS can provide various multi-media features to the user. This standard is limited to the set of features, such as voice, that can be supported by ISUP and BICC.

This standard specifies ISUP and BICC call control protocol enhancements and procedures to support ETS. When such a call goes over a BICC network, the call and bearer are separated and different types of bearer technologies (e.g., ATM and IP) can be used for bearer connection setup. Therefore, a priority indicator is required in bearer networks to identify that a connection set up is associated with an ETS call and to cause priority allocation of bearer resources. As the connection set up progresses through the bearer networks, this identifier enables special routing and preferential treatment to ensure the higher probability of connection establishment. The preferential allocation of bearer resources is maintained for the duration of the call.

The techniques used by service providers to enhance call completions in the network might vary from the application of special network management controls, to the invocation of special routing or queuing mechanisms, to partitioning and prioritizing completion of ETS calls. This standard does not describe any of these special routing or handling procedures in detail, nor does it describe the specific manner in which the user originating the call would indicate to the network the need to have the call so marked. These may be the subject of future American National Standards or may be provided by non-standardized procedures based on agreements among network providers, service providers, and users. This standard also includes descriptions of some allowed options for recognizing an originating call as an ETS call, but these options are not exhaustive, and this standard does not necessarily require support for all options at every originating switch.

The service described in this standard includes these essential portions:

♦ The capability at the originating switch to authenticate the calling party and therefore to authorize the call as an ETS call;

♦ A special indicator carried through the network with the call set-up signalling to identify the call as an ETS call; and

♦ Use of higher MTP message priority level value for SS7 messages to increase the probability of successful transfer in the case of congestion in the signalling network.

This service shall not be used except as authorized by the appropriate U.S. government agency. The authorization mechanism is beyond the scope of this standard other than the prohibition for unauthorized use.

2 NORMATIVE REFERENCES

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

ATIS-PP-1000111.2005, *Signalling system no. 7 (SS7) – Message transfer part (MTP)*.[1,2]

ATIS-PP-1000113.2005, *Signalling system no. 7 (SS7) – Integrated services digital network (ISDN) User part*.[1,3]

T1.PP-114-2004, *Signalling System Number 7 (SS7) – Transaction Capabilities Application Part (TCAP)*.[1,4]

T1.401-2000, *Network to Customer Installation Interfaces - Analog Voicegrade Switched Access Lines Using Loop-Start and Ground Start Signaling*.[1]

T1.609-1999, *Interworking between the ISDN UserNetwork Interface Protocol and the Signaling System No. 7 ISDN User Part*.[1]

T1.615-1992 (R2004), *Digital Subscriber Signaling System No. 1 DSS1 Layer 3 Overview*.[1]

T1.667-2002, *Intelligent Network*.[1]

T1.673-2002, *Bearer Independent Call Control (BICC) Capability Set (CS) 1+*.[1]

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[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/default.aspx >

[2] Pre-published version; the number of this standard upon formal publication will be ATIS-1000111.2005.

[3] Pre-published version; the number of this standard upon formal publication will be ATIS-1000113.2005.

[4] Pre-published version; the number of this standard upon formal publication will be T1.114-2004.

ITU-T Recommendation Q.761, Amendment 2, *ISUP functional description, Support for the International Emergency Preference Scheme.*[5]

ITU-T Recommendation Q.762, Amendment 1, *ISUP general functions of messages and signals, Support for the International Emergency Preference Scheme.*[5]

ITU-T Recommendation Q.763, Amendment 2, *ISUP formats and codes, Support for the International Emergency Preference Scheme.*[5]

ITU-T Recommendation Q.764, Amendment 2, *ISUP signalling procedures, Support for the International Emergency Preference Scheme.*[5]

ITU-T Recommendation Q.767, Amendment 1, *Application of the ISUP of CCITT Signalling System No. 7 for International ISDN Interconnections, Support for the International Emergency Preference Scheme.*[5]

ITU-T Recommendation Q.1902.1, Amendment 1, *Bearer independent call control protocol (CS2) functional description, Support for the International Emergency Preference Scheme.*[5]

ITU-T Recommendation Q.1902.2, Amendment 1, *Bearer independent call control protocol (CS2) and Signalling system No.7 – ISDN user part general functions of messages and signals, Support for the International Emergency Preference Scheme.*[5]

ITU-T Recommendation Q.1902.3, Amendment 1, *Bearer independent call control protocol (CS2) and Signalling system No.7 – ISDN user part formats and codes, Support for the International Emergency Preference Scheme.*[5]

ITU-T Recommendation Q.1902.4, *Amendment 1, Bearer independent call control protocol – Basic call procedures, Support for the International Emergency Preference Scheme.*[5]

ITU-T Recommendation Q.1950, *Bearer independent call control protocol.*[5]

ITU-T Recommendation E.106, *International Emergency Preference Scheme for Disaster Relief Operations (IEPS).*[5]

ITU-T Recommendation H.323, *Packet-based Multimedia Communications Systems.*[5]

ITU-T Recommendation H.225.0, *Call Signalling Protocols and Media Stream Packetization for Packet-based Multimedia Communication Systems.*[5]

ITU-T Recommendation H.460.4, *Call Priority Designation for H.323 Calls.*[5]

3 DEFINITIONS

3.1 Local Exchange (LE): A switch in the public network to which "users" are connected.

3.2 Transit Exchange (TE): A switch in the public network that provides connections between two Exchanges.

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

4 ABBREVIATIONS, ACRONYMS, AND SYMBOLS

ACM   Address Complete Message

ACR   Alternate Carrier Routing

ANM   Answer Message

ANSI   American National Standards Institute

ATIS   Alliance for Telecommunications Industry Solutions

BCF   Bearer Control Function

BICC   Bearer Independent Call Control

BNC   Bearer Network Connection

CIC   Circuit Identification Code [ISUP]

CIC   Call Instance Code [BICC]

CMN   Call Mediation Node

COT   Continuity Message

CPC   Calling Party's Category

CSF   Call Service Function

ETS   Emergency Telecommunications Service

IAM   Initial Address message

IEPS   International Emergency Preference Scheme

ISDN   Integrated Services Digital Network

ISUP   ISDN User Part

LE   Local Exchange

LNP   Local Number Portability

MTP   Message Transfer Part

NS/EP   National Security and Emergency Preparedness

PIN   Personal Identification Number

PSTN   Public Switched Telephone Network

SIP   Session Initiation Protocol

SN   Serving Node

STP   Signalling Transfer Point

TCAP   Transaction Capabilities Application Part

TE   Transit Exchange

5 GENERAL DESCRIPTION

The configurations of network entities described in this standard are depicted in Figure 1. The network entities and signalling interfaces shown with dashed lines are included for reference only and are not specified in this standard.

The network and user equipment configurations shown are based on the "functional groupings" defined in T1.615–1992 (R2004) and applicable ITU-T Recommendations on ISDN. Although these

functional groupings may correspond to actual physical entities, an actual implementation may incorporate more than one of these functional groupings in a single physical entity or may provide a subset of one or more of these functional groupings.

5.1   End User Perspective

The calling party's authorization to initiate an ETS call must be authenticated. Authentication may be on a per-call basis, on a one-time (time-limited) authentication basis applicable to the calling party's current access, or on a subscription basis. If authentication is per call, the end user may initiate authentication via a call to an authentication function using a unique directory number or an access code. The authentication process may involve an interactive exchange of authorization details that may include a Personal Identification Number (PIN) or other authorization/identification code. Authorization information may be directly entered by either the calling party or by the network.

If the calling party fails authentication, the call shall fail with an indication to the user. This indication may be ETS-specific. If there is no response to a request for authentication (e.g., the authentication function itself has failed), the call shall proceed as an ETS call with default priority. The user may receive an indication that the call is proceeding with default priority.

The delay caused by invocation of ETS-specific functions during setup of an ETS call may be conveyed to the calling party by the use of specialized signals that inform the calling party that the setup attempt is continuing – e.g., to reflect invocation of network functions to increase the probability of call completion.

5.2   Operation at the Originating Exchange

5.2.1   Identifying a Request for ETS Service

This standard does not specify a particular method that must be used by an originating Local Exchange (LE) to identify an ETS request.   Examples of how this might be performed include, but are not limited to, the following:

♦ A special access code such as *XXX preceding the dialed called party number;

♦ Call origination from a specially marked line;

♦ Recognition of calls to a set of unique called party numbers or a range of numbers;

♦ Administrative actions to activate the service for all calls from a particular line for a period of time.

The originating LE may query an ETS-specific database application as part of the process of verifying whether a request for ETS service is valid. The query to this database includes information identifying the calling line and the complete set of digits dialed by the calling party. The query may also include additional information collected by the originating LE – e.g., a personal identification number (PIN) collected following a prompt by the originating LE. The originating LE shall mark the outgoing Transaction Capabilities Application Part (TCAP) message with a Message Transfer Part (MTP) message priority of 2.

The reply from the ETS-specific database shall either direct the originating LE to continue with ETS call setup (since the calling party has been authenticated as an authorized user of the service) or to fail the call (since the calling party is not an authorized user of the service.) In the event the reply is not received in the allowed response time, or if the reply contains a protocol error, the originating LE will assign a default priority level and treat the call request as coming from an authorized user of the service (i.e., will continue with ETS call setup).

5.2.2 Progressing an ETS Call

The originating Local Exchange:

♦ Shall include the special ETS indicator described in clause 6.1.1 of this standard in the outgoing SS7 ISUP Initial Address Message (IAM) used to set up the call.

♦ Shall mark the outgoing IAM with a MTP message priority level of 1. This will increase the probability of successful transfer of the IAM during signalling network congestion as messages are discarded, in accordance with the procedures of ATIS-PP-1000111.2005 (MTP).

♦ Shall set the outgoing IAM timer (T7) to the maximum value within the range specified by T1.113 (ISUP) for this timer. This will result in additional time before call time out would occur for this ETS call, and will allow additional time for succeeding exchanges to perform needed operations prior to responding to the IAM. This additional time will allow some ETS calls to successfully complete that would otherwise have failed because of excessive call processing time in succeeding exchanges experiencing traffic overloads. If the exchange is not capable of setting the IAM timer on specific calls to a value different from the timer value established for the exchange, then the timer value established for the exchange shall be used for this call.

♦ Shall mark any outgoing TCAP message associated with this call with an MTP message priority level of 2. This will increase the probability of successful transfer of ETS TCAP messages during signalling network congestion as messages are discarded in accordance with procedures of ATIS-PP-1000111.2005 (MTP).

5.2.3 Network Management Controls at Originating Exchange

5.2.3.1 Call Setup Controls

For ETS calls, the originating LE shall not apply restrictive network management controls. Therefore, the originating LE shall not apply to:

1. ISUP or BICC Automatic Congestion Control (ACC) procedures.

2. Manual or automatic network management controls that minimize call setup congestion (e.g., Cancel To, Skip, or Reroute).

For ETS calls, the originating LE may apply expansive network management controls (e.g., providing additional call setup routes).

5.2.3.2   TCAP Automatic Code Gap (ACG) Controls

The Automatic Code Gap (ACG) network capability provides a means for one application to limit the rate at which another application allows calls to access an overloaded network resource.

Invocation of the ACG network capability is by an application (i.e., the one that sets the limit); however, the primary beneficiary of a particular use of the network capability may be some other entity (e.g., the overloaded resource). The invocation of ACG specifies a duration and a gap interval of control. The duration is the period of time that the control is active. The gap interval specifies the period of time that the ACG receiving application enforces between query attempts that satisfy the control criteria. Specifically, at the originating LE, one query satisfying the control criteria is processed normally; then, during the gap interval, subsequent queries satisfying the control criteria do not generate the expected TCAP queries. When the gap interval expires, the first query that satisfies the control criteria is processed normally, and the cycle repeats until expiration of a duration interval.

The originating LE shall apply an ACG control that is received from an ETS-specific application. The originating LE shall not apply the ACG control that is received from any non-ETS application to a query related to an ETS call. Therefore, for example, an ACG request received from the Local Number Portability (LNP) database will only apply to restrict LNP queries related to non-ETS calls.

If an ETS call encounters an active ACG control from the ETS authentication application, the exchange shall not query the ETS authentication application, but shall proceed as if a TCAP response had been received indicating the call is from an authorized ETS user.

5.3   Operation at the Transit Exchange

The Transit Exchange (TE) shall recognize the need for special handling by detection of the special ETS indicator in its received call set-up message (IAM). The TE shall pass on the ETS indicator to the succeeding exchange without regard to the activity of any local application. A service at the TE, not specified in this standard, may determine the need to mark a call set-up message with the ETS indicator, for example, by recognizing the called party number as describing an ETS call, as described in clause 5.2.1 of this standard.

The TE shall perform the same procedures as described for the originating exchange in clause 5.2 above, with the following addition:

In keeping with clause 2.10B.3 of ATIS-PP-1000113.2005, Chapter 4, if no hop counter is received with the incoming IAM, then if the hop counter capability is active, a non-forwarding transit exchange shall include the hop counter parameter in the outgoing Initial Address Message. In addition, if the initial count value can be set by the network operator on a per-call-type basis, then the initial count value for ETS calls shall be the maximum value allowed in the exchange.

5.3.1   Network Management Controls at the Transit Exchange

Network Management controls at the TE shall apply as described for the Originating Exchange. See clause 5.2.3 of this standard.

5.4 Operation at the Terminating Exchange

The Terminating Exchange shall recognize the need for special handling by detection of the special ETS indicator in its received call set-up message (IAM).

The Terminating Exchange shall perform the following functions:

♦ It shall route the call to the destination user via its normal processing; and

♦ Further processing, such as return of answer, cut-through of the speech path, and release shall be performed as described in other applicable American National Standards (ATIS-PP-1000113.2005 and T1.609-1999).

5.5 Operation at an Interworking Exchange (Non-ISDN to ISDN)

In the case of a call entering the ISDN from a non-ISDN signalling system at an interworking exchange (TE in configuration (b) of Figure 1), the operation depends on the capability of that non-ISDN signalling system. The ISDN Interworking Exchange shall recognize the need to mark a call set-up with the special ETS indicator; however, that method is not covered by this standard. For example, it may perform this function by recognition of one or a combination of the following:

♦ Recognition of the called party number being a number from a set of unique numbers or within a range of numbers, or other information received in the non-ISDN signaling.

♦ Administrative actions to activate the service for calls from a particular calling number for a period of time.

The non-ISDN to ISDN interworking exchange shall perform the same functions as described for the Originating Exchange. See clause 5.2 of this standard.

If an ETS call enters an ISDN from a Session Initiation Protocol (SIP) network, the information associated with the namespaces contained in the Resource-Priority header ("ets", "wps" or both) will be interworked to create ETS-specific ISUP information (CPC NS/EP indicator and possibly Precedence parameter priority level).

See clause 13.2 for H.323 network to ISDN interworking.

5.6 Operation at an Interworking Exchange (ISDN to non-ISDN)

In the case of a call encountering interworking from the ISDN to an inband signalling system at a transit exchange (TE in configuration (c) of Figure 1), the call over the inband signalling system proceeds as a non-ETS call.

If an ETS call enters a SIP network from an ISDN, ETS-specific signalling information (CPC NS/EP indicator and Precedence parameter priority level if present) will be interworked to create the information associated with the namespaces contained in the SIP Resource-Priority header ("ets", "wps" or both).

See clause 13.1 for ISDN to H.323 network interworking.

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5.7 Operation at the Signalling Transfer Point (STP)

Since ISUP processing is not performed at the STP, the STP will not recognize the special marking of the call set-up (IAM) as a ETS call or perform any special function based on the special ISUP marking. However, in accordance with ATIS-PP-1000111.2005, the STP shall act on and shall maintain the MTP message priority level value when it transfers a message (call set-up or TCAP) to the succeeding signalling point (e.g., exchange or STP).

5.8 Operation at a Gateway Exchange

5.8.1 Operation at a National Gateway Exchange, Serving Node (SN) or Call Mediation Node (CMN)

In the case of a United States exchange, SN, or CMN performing a gateway function with another United States network, the gateway exchange, SN or CMN shall continue an ETS call with a Calling Party's Category (CPC) of "National Security and Emergency Preparedness (NS/EP) call". If the gateway node receives the Precedence parameter in the incoming IAM, it shall include the parameter unaltered in the outgoing IAM. The outgoing IAM shall be marked with a MTP message priority level of 1 and any outgoing TCAP message associated with the ETS call shall be marked with a MTP message priority level of 2 to increase their probability of successful transfer during signalling network congestion.

5.8.1.1 Network Management Controls at a National Gateway Exchange, SN or CMN

Network Management controls at a National Gateway Exchange, SN or CMN shall apply as described for the Originating Exchange. See clause 5.2.3 of this standard.

5.8.2 International Call Originating from a National Network

If an outgoing international gateway exchange, SN, or CMN receives an IAM with the CPC coded as "NS/EP call" and the call is routed to an ITU-T SS7 network, the call establishment proceeds with priority. The CPC in the outgoing IAM is set to IEPS even if other values of the CPC may be applicable to the call. Any received Precedence parameter shall not be included in the outgoing IAM.

If an outgoing international gateway exchange, SN, or CMN receives an IAM with the CPC coded as "NS/EP call" and the call is routed to another country's ANSI SS7 network, the call establishment proceeds with priority. If a prior agreement between the U.S.A and the country of call destination is in place for providing ETS treatment to such calls within the destination country, the call is progressed with the CPC coded as "NS/EP call" in the outgoing IAM. The outgoing IAM shall be marked with a MTP message priority level of 1 and any outgoing TCAP message associated with the ETS call shall be marked with a MTP message priority level of 2 to increase their probability of successful transfer during signalling network congestion.

In the absence of a prior agreement such as the one described above, the CPC coding shall be changed to "calling party's category unknown" and the call shall be progressed as a non-ETS call.

Any received Precedence parameter shall not included in the outgoing IAM whether the call is progressed towards the destination country as an ETS call or not.

5.8.3 International Call Originating outside the National Network

If an incoming international gateway exchange, SN, or CMN receives a call from an ITU-T SS7 network with the CPC set to IEPS, the call establishment proceeds with priority. Where the exchange logic, or the CSF logic at the SN or CMN, determines that ETS-call treatment within U.S. networks is to be provided based on policy or mutual agreement between the U.S.A. and the country or international network originating the IEPS call, the call is progressed with the CPC coded as "NS/EP call" in the outgoing IAM. The outgoing IAM shall be marked with a MTP message priority level of 1 and any outgoing TCAP message associated with the ETS call shall be marked with a MTP message priority level of 2 to increase their probability of successful transfer during signalling network congestion. See Figure 4. In the absence of a prior agreement as described above, the CPC coding shall be changed to "ordinary calling subscriber" and the call shall be progressed in U.S.A. networks as a non-ETS call.

If an incoming international gateway exchange, SN, or CMN receives a call from another country's ANSI SS7 network with the CPC coded as "NS/EP", the call establishment proceeds with priority. Where the exchange logic, or the CSF logic at the SN or CMN, determines that ETS-call treatment within U.S. networks is to be provided based on policy or mutual agreement between the U.S.A. and the country originating the call, the call is progressed with the CPC coded as "NS/EP call" in the outgoing IAM. The outgoing IAM shall be marked with a MTP message priority level of 1 and any outgoing TCAP message associated with the ETS call shall be marked with a MTP message priority level of 2 to increase their probability of successful transfer during signalling network congestion.

In the absence of a prior agreement as described above, the CPC coding shall be changed to "calling party's category unknown" and the call shall be progressed in U.S.A. networks as a non-ETS call.

5.8.4 Network Management Controls at an International Gateway Exchange, SN and CMN

When an exchange, SN, or CMN performing an international gateway function receives an invocation for a network management control, the network management control rules (ANSI or ITU) applicable at the invoking exchange shall apply. When an exchange performing an international gateway function invokes a network management control, the network management control rules (ANSI or ITU) governing the node receiving the invocation shall apply. When ANSI network management controls apply to an international gateway exchange, SN or CMN in accordance with the above rules, the network management controls as described for the originating exchange shall apply. See clause 5.2.3 of this standard.

5.9   Operation at an ETS-specific Database

When an ETS-specific database receives a query requesting authentication of a request for ETS service, the query will include information identifying the calling line and the complete set of

digits dialed by the calling party. The query may also include additional information collected by the originating LE (e.g., a personal identification number (PIN) collected following a prompt by the originating LE).

The database shall mark the outgoing Transaction Capabilities Application Part (TCAP) with a Message Transfer Part (MTP) message priority of 2. Based on the received information, this reply message shall either direct the originating LE to continue with ETS call setup (since the calling party has been authenticated) or to fail the call (since the calling party is not a valid user of the service).

5.10   Operation at Destination End Nodes Supporting TCAP Applications

SS7 end nodes supporting TCAP applications (e.g., the LNP database or a switch supporting certain supplementary services) should use MTP message priority level 2 when responding to a TCAP query related to an ETS call. Specifically, the applications that are not ETS-specific (e.g., LNP or switch-based supplementary services) may not have any explicit protocol information indicating that a particular TCAP query message is associated with an ETS call. The only information that might be available is the MTP message priority level in the received TCAP message. Therefore, end nodes supporting TCAP applications can use the MTP message priority level in received messages to determine the value to be used for the TCAP response messages. This should be considered as an objective for destination end nodes supporting TCAP applications that are currently deployed and as a requirement for any new deployment.

6   ISUP Switching and Signalling Specifications for ETS

6.1   Formats and Coding

The functional description, formats and codes, and general procedures for the ISDN User Part are contained in ATIS-PP-1000113.2005.

6.1.1   ISDN-User Part Formats and Parameter Codings

The IAM purpose, format, and coding are specified in ATIS-PP-1000113.2005. The Calling Party's Category parameter in the IAM for an ETS call will use the "National Security and Emergency Preparedness (NS/EP) call" codepoint 11100010.

6.2   Procedures

Normal call control procedures according to ATIS-PP-1000113.2005 apply. ETS end user procedures or services may also be available at selected exchanges. The flow diagram for a successful call is shown in Figure 2.

6.2.1 Successful Call Set-up

6.2.1.1 Originating Exchange

When the originating exchange has received complete call information from the calling party and has determined that the call is to be routed to another exchange, the selection of a suitable idle interexchange circuit takes place and an IAM is sent to the succeeding exchange. Appropriate routing information is either stored at the originating exchange or at a remote database to which a request may be made. If the originating exchange recognizes the call as an ETS call, the NS/EP call code will be set in the CPC parameter of the IAM. Although this standard does not specify a particular method, the originating exchange may perform this function as described in clause 5.2. The originating exchange may include the Precedence parameter (clause 3.26C of ATIS-PP-1000113.2005, Chapter 3) in the outgoing IAM, populated with the ETS user's priority level, if available. In this case, the Precedence parameter will include the appropriate value for the Precedence Level (0 through 4; value 0 – highest, 4 – lowest) and the Domain Name populated with the corresponding value (4194891 through 4194895, respectively). This parameter will be used to carry the ETS user's priority level.

ISUP restrictive network management controls (e.g., ACC) are not applied to an ETS call. Expansive network management controls may be applied to an ETS call, either as part of improving the probability of completion for ETS calls or as part of normal network management for all calls. TCAP restrictive network management controls (i.e., ACG) may only be applied to TCAP queries directed to an ETS-specific application. TCAP restrictive network management controls shall not apply to TCAP queries related to an ETS call that are not directed to an ETS-specific application. (See clause 5.2.3.2.)

If routing procedures fail to find an outgoing circuit, the ETS call is queued and shall take precedence over any normal call attempts when a circuit becomes available. The calls in a given queue are handled in the order of "first in, first out". The ETS call request remains active until the subscriber abandons the call, T7 times out, or the ETS queuing mechanism is exhausted. Queue size is configurable by the network operator.

The IAM will be sent to the succeeding exchange using a MTP message priority level of 1.

6.2.1.2 Intermediate Exchange

As in a normal call, an intermediate exchange on receipt of an IAM shall analyze the called party number, the Protocol Control Indicator, the ISUP Preference Indicator, the bearer capability specified in the User Service Information parameter, and any other routing information to determine the routing of the call. An ETS call shall be recognized by the intermediate exchange by the presence of the NS/EP call code in the CPC parameter of the IAM. The IAM for an ETS call will be sent to the succeeding exchange using a MTP message priority level of 1. In addition, the IAM shall include the CPC parameter indicating that it is an ETS call. If the exchange had received the Precedence parameter in the incoming IAM, it shall include the Precedence parameter unaltered in the outgoing IAM.

ISUP restrictive network management controls (e.g., ACC) are not applied to an ETS call. Expansive network management controls may be applied to an ETS call, either as part of improving the probability of completion for ETS calls or as part of normal network management for all calls. TCAP restrictive network management controls (i.e., ACG) may only be applied to

TCAP queries directed to an ETS-specific application. TCAP restrictive network management controls shall not apply to TCAP queries related to an ETS call that are not directed to an ETS-specific application. (See clause 5.2.3.2.)

If routing procedures fail to find an outgoing circuit, the ETS call is queued and shall take precedence over any normal call attempts when a circuit becomes available. The calls in a given queue are handled in the order of "first in, first out". The ETS call request remains active until the subscriber abandons the call, T7 times out, or the ETS queuing mechanism is exhausted. Queue size is configurable by the network operator.

If ETS call request queuing occurs, an early Address Complete Message (ACM) – called party's status indicator in the Backward Call Indicator's parameter set to "no indication" – shall be returned to the originating exchange. The ACM may optionally include the Notification Indicator parameter set to "call completion delay". The parameter may be used at the originating exchange to provide suitable call progress information to the calling subscriber. However, if the incoming IAM had requested continuity check (either on this circuit or a previous circuit), the early ACM shall not be sent until a successful continuity indication has been received. The aim of sending early ACM is to reduce call set-up failures due to timer expiration caused by, for example, queuing delays for trunk allocation on congested routes.

6.2.1.3 Destination Exchange

There are no special procedures at the destination exchange.

7   BEARER INDEPENDENT CALL CONTROL (BICC) SWITCHING AND SIGNALLING SPECIFICATIONS FOR ETS

7.1 Formats and Coding

The functional description, formats, codes, and general procedures for the BICC protocol are contained in T1.673-2002.

7.1.1 BICC Formats and Parameter Codings

The IAM purpose, format, and coding are specified in T1.673-2002. The relevant parameter is the CPC parameter.

7.2 BICC Procedures

Normal call control procedures according to T1.673-2002 apply with the additions noted below. ETS end user procedures or services may also be available at selected Serving Nodes (SNs). The flow diagram for a successful call is shown in Figure 5.

7.2.1 Successful Call Set-up

7.2.1.1 Originating SN

When the originating SN has received complete call information from the calling party, and has determined that the call is to be routed to another Call Service Function (CSF), the selection of a suitable free Call Instance Code (CIC) takes place and an IAM is sent to the succeeding CSF. Appropriate routing information is either stored at the originating SN or at a remote database to which a request may be made. If the originating exchange recognizes the call as an ETS call, the NS/EP call code will be set in the CPC parameter of the IAM. Although this standard does not specify a particular method, the originating CSF may perform this function as described in clause 5.2. The originating SN may include the Precedence parameter (clause 3.26C of ATIS-PP-1000113.2005, Chapter 3) in the outgoing IAM, populated with the ETS user's priority level, if available. In this case, the Precedence parameter will include the appropriate value for the Precedence Level (0 through 4; value 0 – highest, 4 – lowest) and the Domain Name populated with the corresponding value (4194891 through 4194895, respectively). When present, this parameter carries the ETS user's priority level.

BICC restrictive network management controls (e.g., ACC) are not applied to an ETS call. Expansive network management controls may be applied to an ETS call, either as part of improving the probability of completion for ETS calls or as part of normal network management for all calls. TCAP restrictive network management controls (i.e., ACG) may only be applied to TCAP queries directed to an ETS-specific application. TCAP restrictive network management controls shall not apply to TCAP queries related to an ETS call that are not directed to an ETS-specific application. (See clause 5.2.3.2.)

For an ETS call, BICC codec negotiation procedures are not to be invoked. This is because of the interaction between codec negotiation procedures and ETS call queuing that can cause the call to be aborted. Potential consequences of call queuing are delay in end-to-end transmission of the IAM, delay in end-to-end codec negotiation, delay in bearer setup, delay in sending of COT, and the expiry of timer T8 causing the call to be aborted. This is undesirable for ETS calls. See Annex B for details.

If routing procedures fail to find an outgoing CIC value, the ETS call is queued and shall take precedence over any normal call attempts when a CIC becomes available. The calls in a given queue are handled in the order of "first in, first out". The ETS call request remains active until the subscriber abandons the call, T7 times out, or the ETS queuing mechanism is exhausted. Queue size is configurable by the network operator.

The IAM will be sent to the succeeding CSF using a MTP message priority level of 1.

7.2.1.2 Intermediate SN

As in a normal call, an intermediate SN on receipt of an IAM shall analyze the called party number, the Protocol Control Indicator, the BICC Preference Indicator, the bearer capability specified in the User Service Information parameter, and any other routing information to determine the routing of the call. An ETS call shall be recognized by the intermediate SN by the presence of the NS/EP call code in the CPC parameter of the IAM. The IAM for an ETS call will be sent to the succeeding CSF using a MTP message priority level of 1. In addition, the IAM shall include the CPC parameter indicating that it is an ETS call. If the SN had received the Precedence parameter in the incoming IAM, it shall include the Precedence parameter unaltered in the outgoing IAM.

For an ETS call, BICC codec negotiation procedures are not to be invoked. If codec negotiation is already invoked on a preceding bearer path, the SN shall terminate the codec negotiation procedures and the call shall proceed. This is because of the interaction between codec negotiation procedures and ETS call queuing that can cause the call to be aborted. Potential consequences of call queuing are delay in end-to-end transmission of the IAM, delay in end-to-end codec negotiation, delay in bearer setup, delay in sending of COT, and the expiry of timer T8 causing the call to be aborted. This is undesirable for ETS calls. See Annex B for details.

BICC restrictive network management controls (e.g., ACC) are not applied to this call setup. Expansive network management controls may be applied to this call, either as part of improving the probability of completion of ETS calls or as part of normal network management for all calls. TCAP restrictive network management controls (i.e., ACG) may only be applied to TCAP queries directed to an ETS-specific application. TCAP restrictive network management controls shall not apply to TCAP queries related to an ETS call that are not directed to an ETS-specific application. (See clause 5.2.3.2.)

If routing procedures fail to find an outgoing CIC, the ETS call is queued and shall take precedence over any normal call attempts when a CIC becomes available. The calls in a given queue are handled in the order of "first in, first out". The ETS call request remains active until the subscriber abandons the call, T7 times out, or the ETS queuing mechanism is exhausted. Queue size is configurable by the network operator.

If ETS call request queuing occurs, an early ACM – called party's status indicator in the Backward Call Indicator's parameter set to "no indication" – shall be returned to the originating SN. The ACM may optionally include the Notification Indicator parameter set to "call completion delay". The parameter may be used at the originating SN to provide suitable call progress information to the calling subscriber. However if the incoming IAM had indicated "COT to be expected", the early ACM shall not be sent until Continuity Message with Continuity Indication has been received. The aim of sending early ACM is to reduce call set-up failures due to timer expiration caused by, for example, queuing delays.

7.2.1.3 Intermediate Call Mediation Node (CMN)

As in a normal call, an intermediate CMN on receipt of an IAM shall analyze the called party number, the Protocol Control Indicator, the BICC Preference Indicator, the bearer capability specified in the User Service Information parameter, and any other routing information to determine the routing of the call. An ETS call shall be recognized by the intermediate CMN by the presence of the NS/EP call code in the CPC parameter of the IAM. The IAM for an ETS call will be sent to the succeeding CSF using a MTP message priority level of 1. In addition, the IAM shall include the CPC parameter indicating that it is an ETS call. If the CMN had received the Precedence parameter in the incoming IAM, it shall include the Precedence parameter unaltered in the outgoing IAM.

BICC restrictive network management controls (e.g., ACC) are not applied to an ETS call. Expansive network management controls may be applied to an ETS call, either as part of improving the probability of completion for ETS calls or as part of normal network management for all calls. TCAP restrictive network management controls (i.e., ACG) may only be applied to TCAP queries directed to an ETS-specific application. TCAP restrictive network management controls shall not apply to TCAP queries related to an ETS call that are not directed to an ETS-specific application. (See clause 5.2.3.2.)

If routing procedures fail to find an outgoing CIC, the ETS call is queued and shall take precedence over any normal call attempts when a CIC becomes available. The calls in a given queue are handled in the order of "first in, first out". The ETS call request remains active until the subscriber abandons the call, T7 times out, or the ETS queuing mechanism is exhausted. Queue size is configurable by the network operator.

If ETS call request queuing occurs, an early ACM – called party's status indicator in the Backward Call Indicator's parameter set to "no indication" – shall be returned to the originating SN. The ACM may optionally include the Notification Indicator parameter set to "call completion delay". The parameter may be used at the originating SN to provide suitable call progress information to the calling subscriber. However if the incoming IAM had indicated "COT to be expected", the early ACM shall not be sent until Continuity Message with Continuity Indication has been received. The aim of sending early ACM is to reduce call set-up failures due to timer expiration caused by, for example, queuing delays.

7.2.1.4   Destination SN

There are no special procedures at the destination SN.

7.3   Outgoing Bearer Set-up Procedures

In addition to the procedures specified in T1.673-2002, the following procedures apply:

♦ The Bearer Control Function (BCF) shall select appropriate bearer resources for a call with CPC set to "NS/EP call" to ensure that the quality of the bearer path is guaranteed throughout the lifetime of the call. This applies both to the set-up phase of the call as well as to the connection phase of the call in case of congested network situations. The CSF shall accordingly pass an emergency call indicator to the BCF in the Bearer Network Connection (BNC) Information Request primitive and/or in the Bearer Set-up Request primitive.

♦ A priority indicator is required in bearer networks. This is a method of marking and identifying ETS connection set ups and should cause priority allocation of bearer resources. As the ETS connection setup progresses through the bearer networks, this identifier could enable special routing and preferential treatment to ensure a higher probability of connection establishment. The preferential allocation of bearer resources should continue to be maintained throughout the duration of the call. Therefore, the BICC bearer control protocols must carry an ETS priority indicator. Related procedures to enable priority treatment of the bearer connection associated with the ETS call are not specified in this document.

7.4   Incoming Bearer Set-up Procedures

In addition to the procedures specified in T1.673-2002, the following procedures apply:

♦ The BCF shall select appropriate bearer resources for a call with CPC set to "NS/EP call" to ensure that the quality of the bearer path is guaranteed throughout the lifetime of the call. This applies both to the set-up phase of the call as well as to the connection phase of the call in case of congested network situations. The CSF shall accordingly pass an emergency call indicator to the BCF in the BNC Information Request primitive and/or in the Bearer Set-up Request primitive.

♦ A priority indicator is required in bearer networks. This is a method of marking and identifying ETS connection set ups and should cause priority allocation of bearer resources. As the ETS connection setup progresses through the bearer networks, this identifier could enable special routing and preferential treatment to ensure a higher probability of connection establishment. The preferential allocation of bearer resources should continue to be maintained throughout the duration of the call. Therefore, the BICC bearer control protocols must carry an ETS priority indicator. Related procedures to enable priority treatment of the bearer connection associated with the ETS call are not specified in this document.

8 TCAP Signalling Specifications for ETS

8.1 Originating Local Exchange Authentication Query

If the originating LE requires a query to authenticate the calling party as an authorized user of ETS, the originating LE shall send an Intelligent Network Application Part (INAP) collectedInformation message (code Private 25602) including the mandatory parameters UserID and BearerCapability and (at a minimum) the optional parameters CallingPartyID, DialedDigitsCD, and (if applicable) VerticalServiceCode.

The query shall be sent with MTP message priority 2.

8.2 ETS Authentication Response

For authorized ETS users, the ETS-specific database application shall reply to a received INAP collectedInformation message with an INAP continue message (code Private 25869). None of the optional parameters of the continue message are required by ETS.

To invoke an Automatic Code Gap, the ETS-specific database application shall include an acg operation in the reply. The acg operation shall be populated as follows:

♦ controlType – Indication of control source (SCP or SMS) and digit string length.

♦ gapIndicatorsDuration – Duration of the ACG control.

♦ gapIndicatorsGapInterval – Gap interval requested.

♦ translationType – Translation type used to send the query.

♦ globalTitleAddress – First one to ten digits of the calling party number.

♦ extensionParameter – Not sent.

8.3 TCAP Network Management

If an ETS call receives either:

♦ An ACG Indicators parameter (see clause 4.2 of T1.PP.114-2004);

♦ An acg operation (see 8.2 and clause 7.4.3.1 of T1.667-2002)

as part of the response to a TCAP query, the resulting behavior depends on the source of the ACG invocation as follows:

♦ If the invocation is from an ETS-specific application (e.g., the ETS authentication application), the exchange shall apply the requested ACG control. When this control prevents the exchange from querying the ETS authentication application, the exchange shall assign a default ETS priority level to the call and proceed as if a TCAP response had been received indicating the call is from an authorized ETS user.

♦ If the invocation is from a non-ETS-specific application, the exchange shall apply the requested ACG control, but shall exempt ETS calls from this restriction. Therefore, for ETS calls only, the control shall not prevent the exchange from sending a query to the far-end application. Exempting ETS calls from the ACG control shall have no other effect. In particular, sending the query shall not restart the ACG gap interval timer.

8.3.1 ACG Control Procedures

For purposes of this description, the "sending application" is defined as the ETS-specific application that sends an ACG control commands along with a response to a query. The "receiving application" is defined as the application that receives the ACG control command and responds by controlling queries.

To apply ACG, the receiving application initiates duration timers and gap interval timer according to the values contained in the control command. Until the gap timer expires, subsequent queries to the sending application associated with calls that use the digits contained in the control command are blocked. The associated calls are assigned a default ETS priority as described in 5.2.1. If the ACG control command is returned along with the response to a query (as opposed to being manually invoked), the call that generated the query should be processed normally based on the received response to the query. After the gap timer expires, the next call attempt that matches the control parameters should be processed normally, and the gap timer should be reset to start another blocking period. This cycle should continue until the duration timer expires. When the duration timer expires, the control should be stopped, even if the gap timer has not expired.

The gap interval contained in the control command is used as the mean gap interval at the receiving application.

If an ACG control command is received for a code which is already on the control list, then the new control should replace the existing control. Note that the new command may be to remove the gap control, in which case control for the concerned code should be stopped immediately.

The digits for one call may match more than one of the entries on the control list. For example, the codes 800-999 and 800-999-1111 may both be under control when a call to 800-999-1111 arrives. In this case, only the control on the longer of the matched codes should apply. If the query is allowed based on the longer digit string because the gap interval timer has expired, only that timer is reset.

9   ETS INITIAL ADDRESS MESSAGE MTP MESSAGE PRIORITY ASSIGNMENT

An ETS IAM will be sent using a MTP message priority level 1 to provide a higher probability of successful call initiation during periods of network congestion.

10   USER NETWORK INTERACTION

If an ISUP exchange or a BICC SN needs to collect additional information (e.g., authorization information) from the ETS calling party before the call can be routed further, the generic ISUP/BICC user network interaction procedure (clause 4A.6 of ATIS-PP-1000113.2005, Chapter 4 and clause 13A.6 of T1.673-2002, Chapter 4) shall be used. This procedure makes use of the User-Network Interaction Indicator (Bit H of the Optional Backward Call Indicators parameter) in the ACM. See Annex A for an ETS call example that uses this procedure.

11   EARLY ACM AND ALTERNATE CARRIER ROUTING

The originating network may be connected to multiple transit carriers and may have implemented Alternate Carrier Routing (ACR) feature to increase the probability of call completion for ETS and other calls. The ACR allows an ETS call to be routed to an alternate transit carrier if the call cannot be routed through the first transit carrier selected.

If ACR is active on a call, then if the switch sending an IAM to a transit carrier receives a Release message as the first backward message (e.g., prior to the ACM that could indicate that call setup has reached the destination exchange) the exchange follows the following high-level procedures:

1. The received Release Cause is compared to a list of Release Cause codes for which ACR is to be applied. If the received Release Cause is not on the list, the switch fails the call. E.g., for a Release Cause of 'busy,' the switch should fail the call, while for a Release Cause of 'network congestion,' further ACR processing may be appropriate.

2. If the received Release Cause is on the list, the carrier that sent the Release message is marked as having been attempted.

3. The exchange consults a local list of ACR-specific alternate carriers. Then:

    3a. If there is an alternate carrier that is not marked as having been attempted on this call, the switch sends an IAM to that transit carrier. The IAM is populated with the same parameter values as the original IAM that was sent to the previous transit carrier.

    3b. If there is no alternate carrier that is not marked as having been attempted on this call, the switch fails the call.

Since the ACR functionality may send a second IAM, the call setup (IAM) information must be retained at the originating ISUP exchange or BICC SN. However, according to normal procedures, the originating ISUP exchange/BICC SN may release from memory the IAM information when the ACM is received (see clause 2.1.11 of ATIS-PP-1000113.2005, Chapter 4 and clause 7.10 of T1.673-2002, Chapter 4). Therefore, once the ACM is received the originating ISUP exchange or BICC SN may not be able to

apply ACR to the call. Therefore, an intermediate ISUP exchange or BICC SN/CMN in the originating network shall not send the early ACM on trunk queuing described in clauses 6.2.1.2, 7.2.1.2, and 7.2.1.3 of this standard if the ETS call can be subject to ACR. If an Intermediate ISUP exchange or BICC SN/CMN in the originating network cannot determine whether the ETS call is subject to ACR or not, it shall not send the early ACM on trunk queuing as described in clauses 6.2.1.2, 7.2.1.2, and 7.2.1.3 of this standard.

12 SERVICE AND FEATURE INTERACTIONS

An ETS call can be routed to a different destination number or a different destination switch or SN due to operation of another service (e.g., call forwarding) or feature (e.g., number portability, number pooling, etc.). An ETS call should be provided with preferential treatment along the end-to-end call path to increase its probability of completion even when it is subjected to such a service or feature interaction. Therefore, the passing of ETS related signalling information (CPC coded as "NS/EP" call, Precedence parameter) is required under such scenarios.

13 H.323-ISUP/BICC INTERWORKING FOR ETS

13.1 Interworking from ISUP/BICC to H.225

The mapping of the ISUP/BICC Calling Party's Category and Precedence parameters to the H.323 Call Priority Designation parameter is shown in Table 1. The Call Priority Designation parameter is defined in ITU-T Recommendation. H.460.4.

Table 1 - Mapping from ISUP/BICC to H.323 for ETS

ISUP parameter	H.225 information element
Calling party's category	Call Priority Designation Parameter
Precedence	

Upon receipt of the ISUP/BICC IAM with the Calling Party's Category (CPC) parameter coded as "NS/EP call", the H.323 gateway shall send the H.225 SETUP message including the Call Priority Designation parameter with a priority value of "emergencyAuthorized". If the IAM also includes the Precedence parameter, the priority level from the Precedence parameter shall be mapped to the "priorityExtension" field in the Call Priority Designation parameter. If the Precedence parameter is not received, the call may be assigned a default priority level. The actions taken on the H.323 side are described in ITU-T Recommendation H.460.4.

13.2 Interworking from H.225 to ISUP/BICC

The mapping of the H.323 Call Priority Designation parameter to the ISUP/BICC Calling Party's Category and Precedence parameters is shown in Table 2.

Table 2 - Mapping from H.323 to ISUP/BICC for ETS

| H.225 information element	ISUP parameter
Call Priority Designation Parameter	Calling party's category
	Precedence

Upon receipt of the H.225 SETUP message including the Call Priority Designation parameter with a priority value of "emergencyAuthorized", the H.323 gateway shall send the ISUP/BICC IAM with the Calling Party's Category parameter coded as "NS/EP call". If the "priorityExtension" field is included in the Call Priority Designation parameter, it shall be mapped to a priority level in the Precedence parameter. If the "priorityExtension" field is not included in the Call Priority Designation parameter, the call may be assigned a default priority level. The actions taken on the ISUP and/or BICC side are described in clauses 6 and 7, respectively.
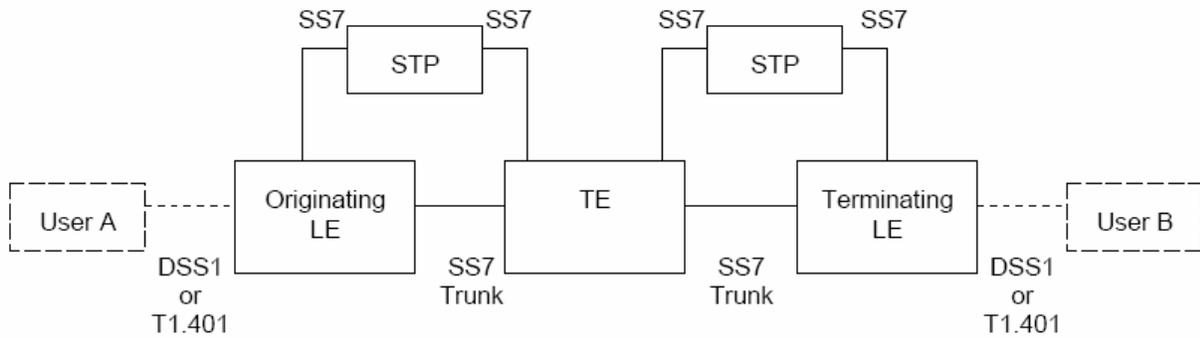
(a) Configuration when interworking does not occur
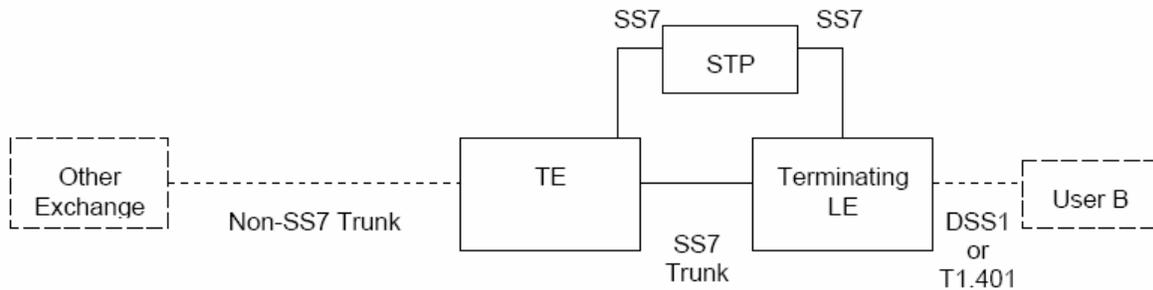
(b) Configuration when interworking from non-ISDN occurs (at TE)
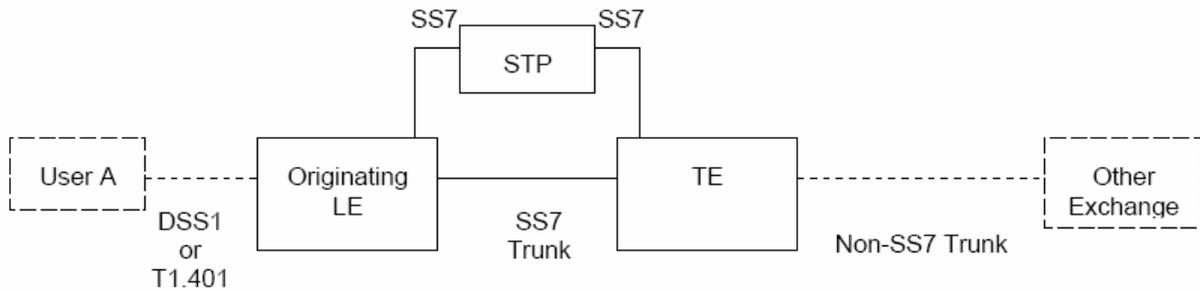
(c) Configuration when interworking to non-ISDN occurs (at TE)

NOTE – The calling party (A) in configurations (a) and (c) and the called party (B) in configurations (a) and (b) may consist of any configuration of equipment allowed for a subscriber, whether a standardized analog access, a standardized ISDN access, or a nonstandardized access. The TE shown represents 0, 1, or more TEs.

Figure 1 - Configuration of equipment of ETS
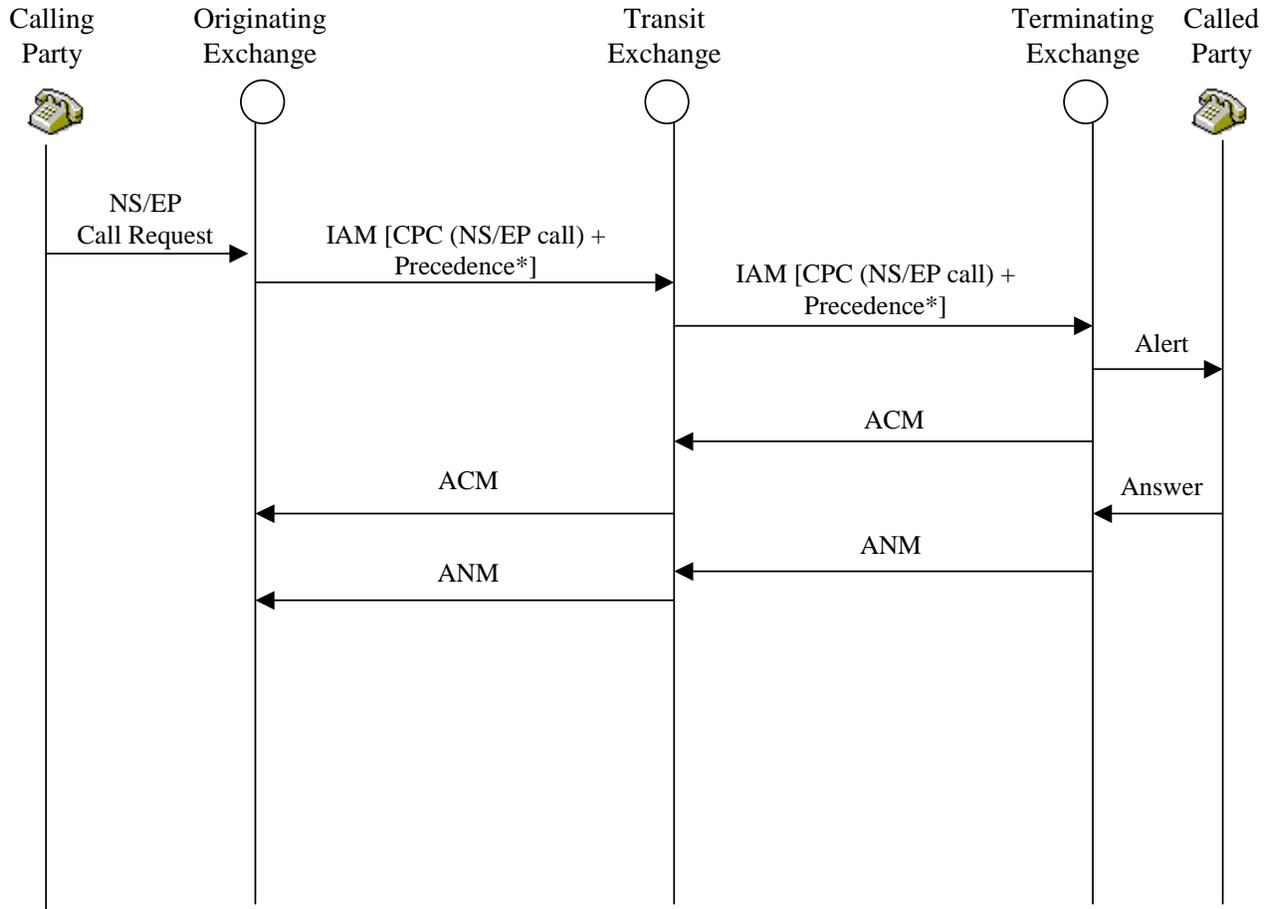
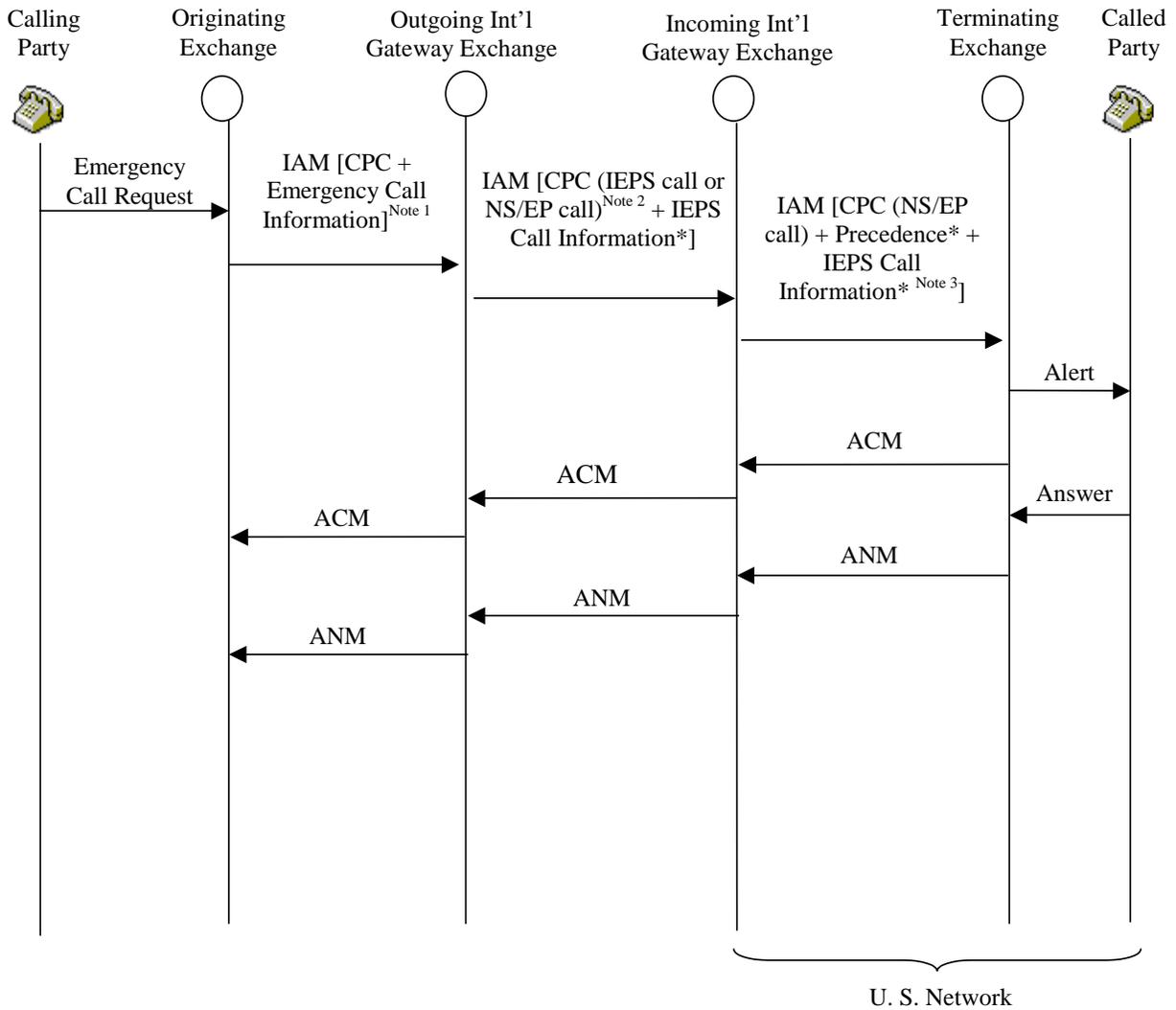**Figure 2 - Normal ETS Call Set-Up**
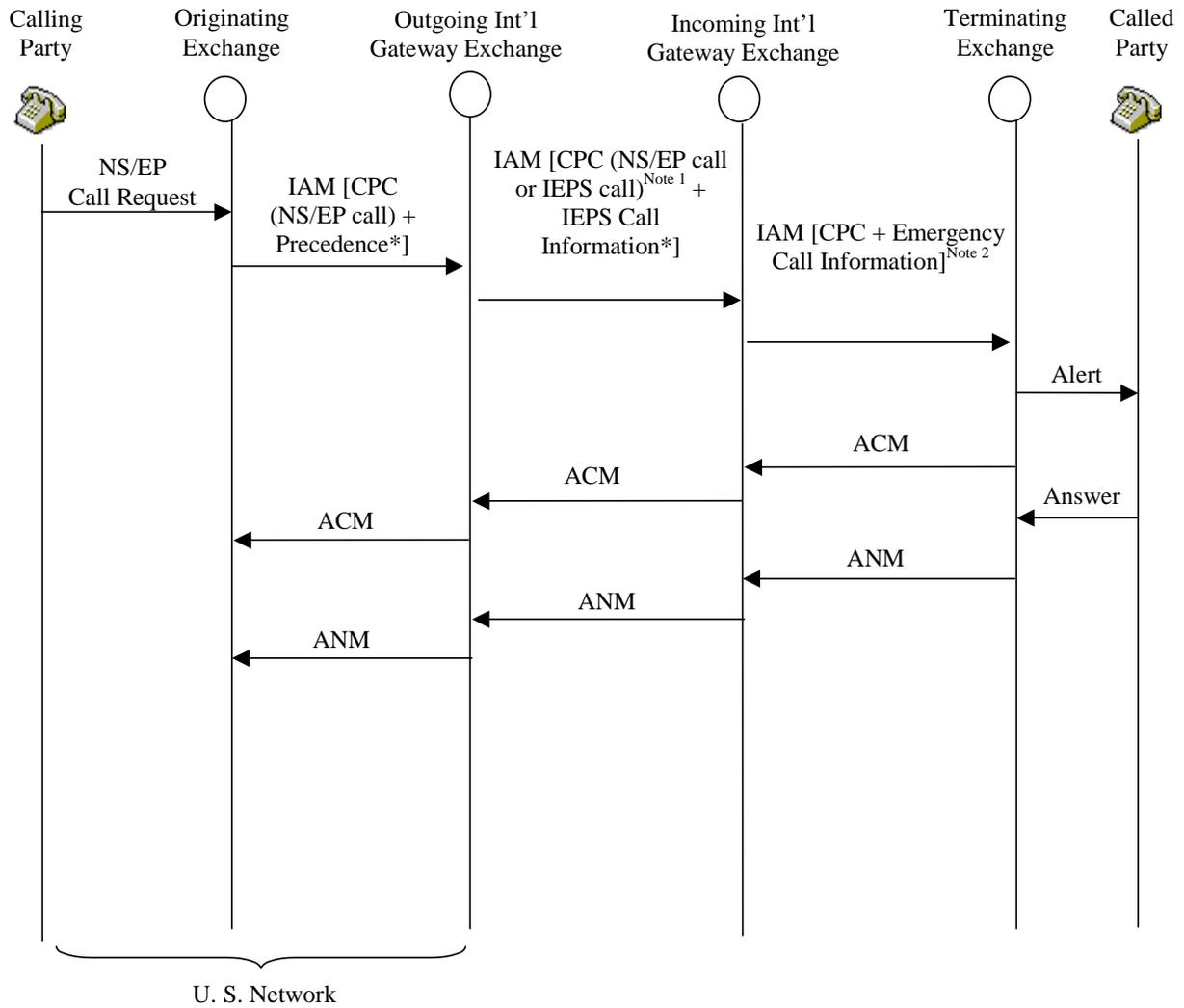
* Optional

* Optional, see Annex C for IEPS Call Information parameter.

Figure 3 - Outgoing International ETS Call Set-Up

NOTE 1 - A call routed to an ITU-T SS7 networkis progressed with the CPC set to "IEPS call". A call routed to another country's ANSI SS7 network is progressed with the CPC set to "NS/EP call".

NOTE 2 - Use of CPC parameter and Emergency Call Information is a national matter.

* Optional, see Annex C for IEPS Call Information parameter.

Figure 4 - Incoming International ETS Call Set-Up

NOTE 1 - Use of CPC parameter and Emergency Call Information is a national matter.

NOTE 2 - The coding of the CPC parameter depends on whether the other country uses an ITU-T SS7 network or ANSI SS7 network.

NOTE 3 - The use of the IEPS Call Information parameter within the U.S.A networks is for further study.
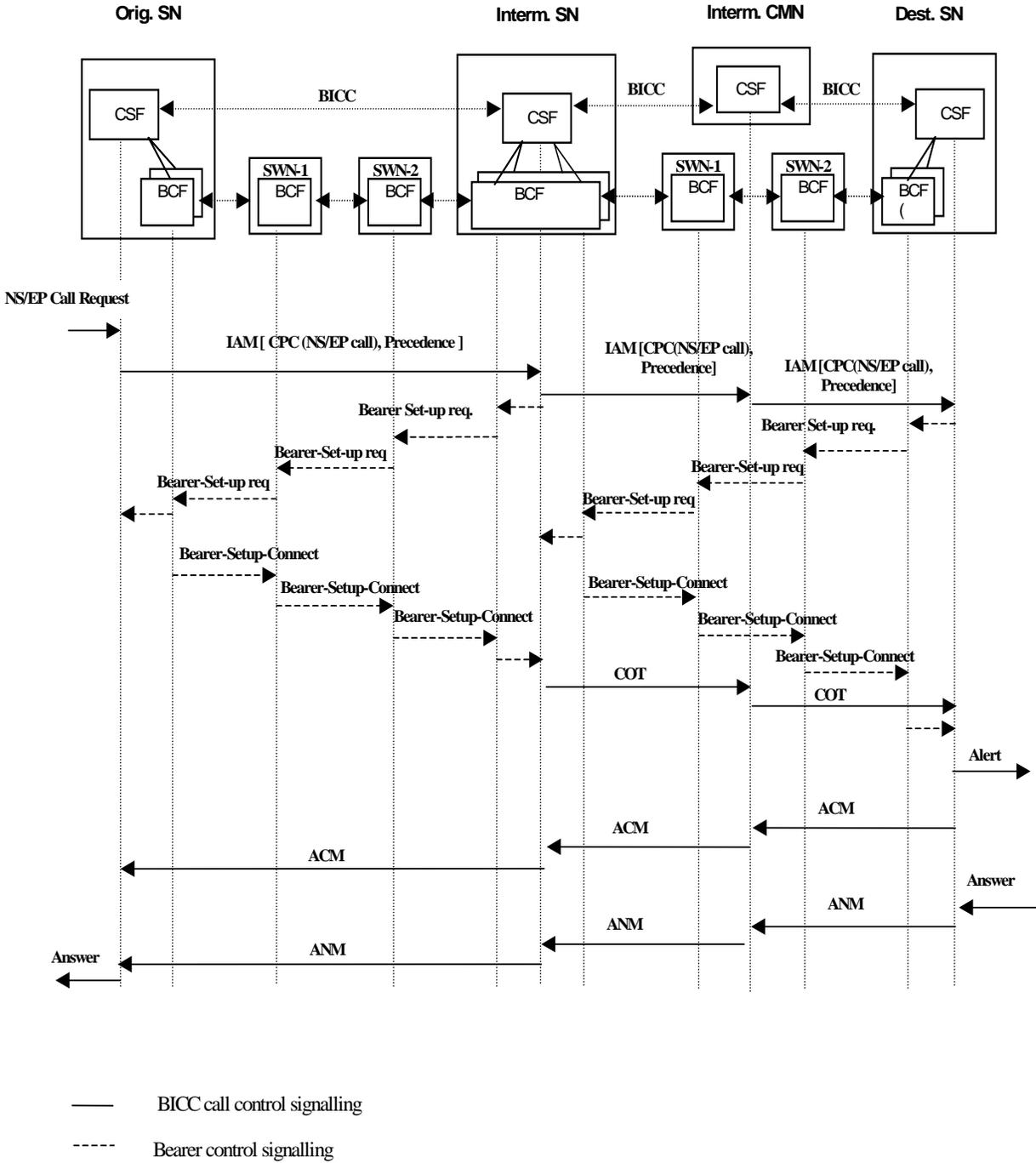
Figure 5 - Example BICC ETS call set-up - Backward Bearer Connection Setup

Annex A

(informative)

A ETS CALL EXAMPLES

Refer to ATIS-PP-1000005, *Service Description of ETS*.

A.1 Examples of the Possible Operation of ETS calls

Examples of the possible operation of ETS calls are described in the following clauses for information. It is not the intent of this clause to standardize the operation of these services, but rather to provide examples of services that might make use of the ETS.

A.1.1 Example 1

Figure A.1 shows a call that is similar to an 800 service with interactive features. In this example, the higher-level ETS functions such as user authentication are provided by a transit exchange.

In this example, the calling party goes off-hook and dials a 10-digit number that indicates that the caller wishes to place an ETS call. This number is an access number for ETS, not the called party number. The originating exchange recognizes this call as an ETS call based on 6-digit translation and assembles an IAM that includes an ETS identifier and an MTP message priority level of 1. The originating exchange routes the call toward the next exchange in the route. The routing of ETS calls will have been previously arranged.

The transit exchange recognizes the call as an ETS call, and that it requires further user/network interaction in order to authenticate the user and to get the called party number. In order to accomplish this, the transit exchange returns an ACM with User Network Interaction indicated in the optional backward call indicators parameter. This indicates to the originating exchange that it should make trunk connections in the forward and backward directions in order to allow an interaction between the user and the transit exchange. After successful authentication and collection of destination number digits, the transit exchange routes the call toward the terminating exchange, inserting the actual called party number into the IAM. Call completion proceeds using the standard procedures in this document.

A.1.2 Example 2

Figure A.2 shows a call that is similar to Figure A.1 except that the authentication and called party number exchange occur in the originating exchange. That is, at least some of the higher-level ETS functions are provided at the originating exchange.

In this example, the calling party goes off-hook and indicates that the caller wishes to place an ETS call by dialing a unique access code. (Alternatively, this indication could be in one of several other forms.) The originating exchange recognizes the call as an ETS call, and that it requires further user/network interaction in order to authenticate the user and to get the called party number. In order to accomplish this, the originating exchange initiates an interaction with the user. After successful authentication and

collection of destination number digits[6], the originating exchange assembles an IAM that includes an ETS identifier and an MTP message priority level of 1 and routes the call toward the terminating exchange, using the actual called party number in the IAM. Call completion proceeds using the standard procedures in this document.
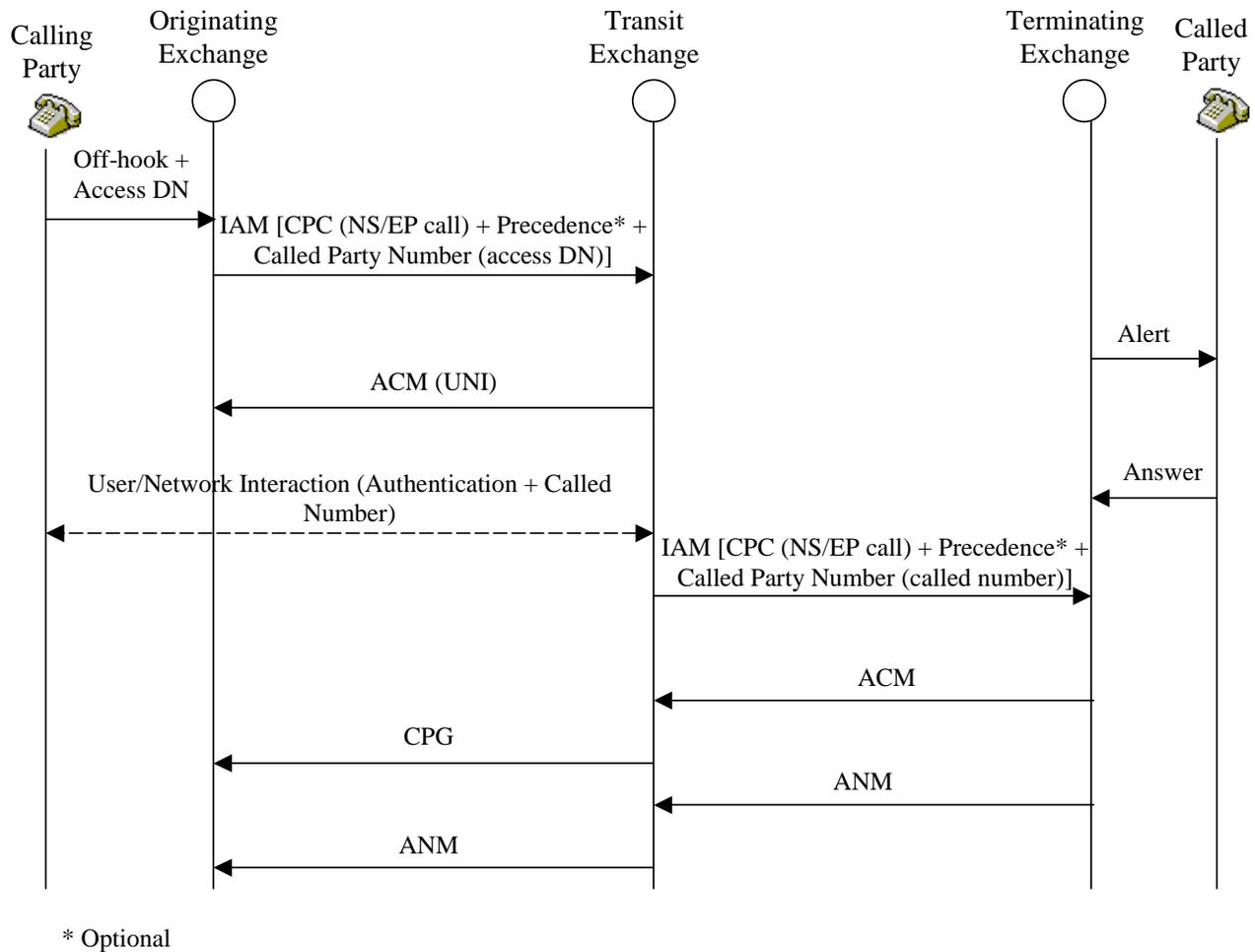

* Optional

Figure A.1 - Example 1 Call Flow

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[6] Note that the calling party may, alternatively, dial the unique access code and the destination number digits prior to any prompt from the originating exchange for authentication information.
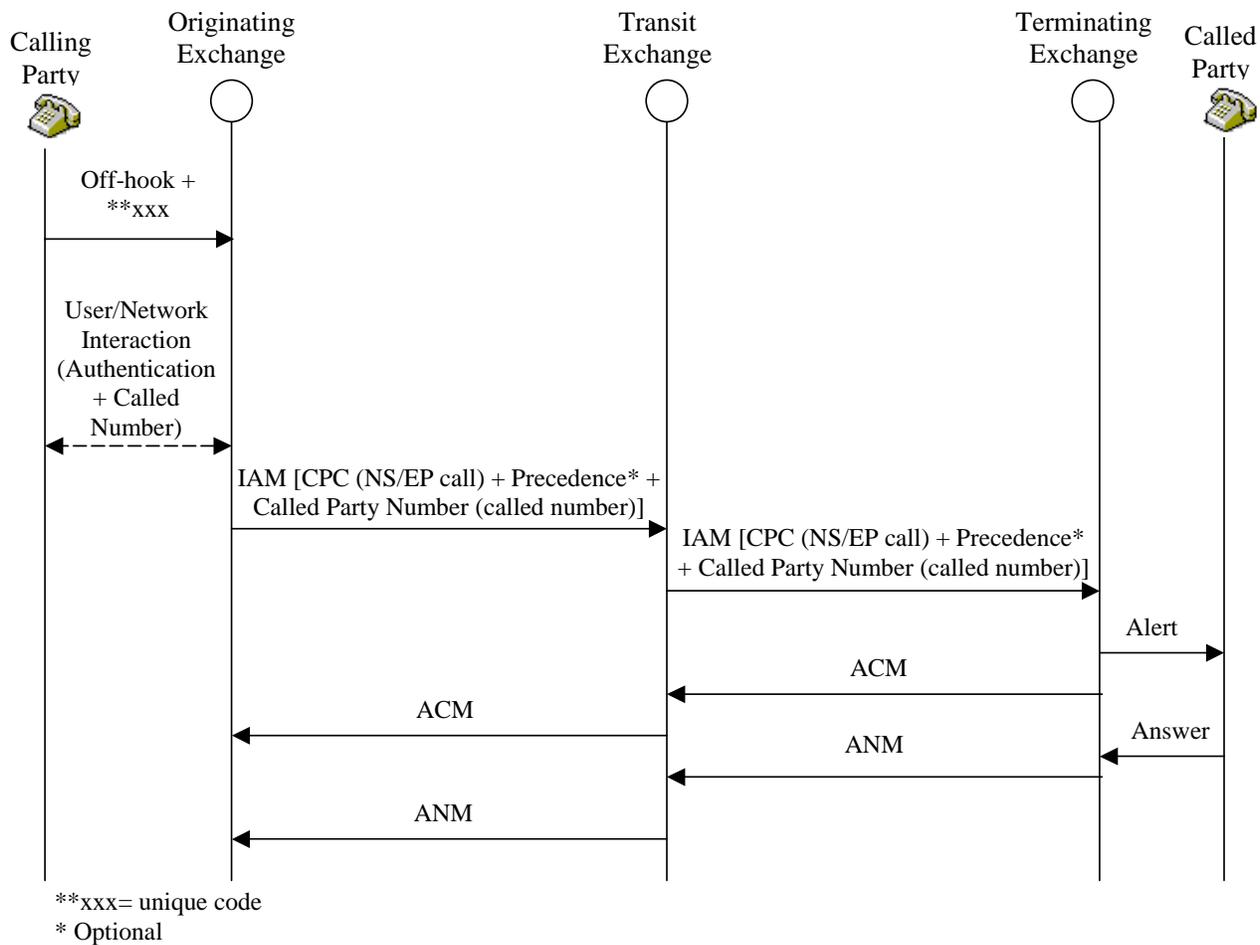
Figure A.2 - Example 2 Call Flow

Annex B
(informative)

B INTERACTION BETWEEN ETS CALL QUEUING AND BICC CODEC NEGOTIATION

Within the BICC procedures, the support of codec negotiation is optional. When codec negotiation is not being performed, the setup of the bearers is performed – call segment by call segment – concurrent with the progression of the IAM through the network. However, when codec negotiation is required, the negotiation is performed edge-to-edge, (i.e., across all the BICC network(s) that support this procedure), since the result of this negotiation – in particular the type of codec selected – is needed before the bearers can be set up. The BICC codec negotiation procedures take place between a codec negotiation invoking SN and a codec negotiation terminating SN. SN A (see Figure B.1), which is initiating the codec negotiation, generates an IAM containing a codec list consisting of all supported codecs in priority order (preferred codec first) that are offered by SN A for use in the call. SN A suspends its bearer setup procedure until the backward APM containing the selected codec information is received from SN D terminating the codec negotiation. Receipt of the APM completes the codec negotiation.

SN transiting codec negotiation (e.g., SN B in Figure B.1) suspends bearer setup procedure until the backward APM containing the selected codec information is received. The IAM sent by SN B to SN C includes the Supported Codec List parameter. This list is derived from the Supported Codec List in the received IAM by deleting those codecs from the received list that cannot be used for the call. The IAM also indicates "COT to be expected" according to the basic BICC call setup procedures. Note that the COT procedure allows the call setup to progress forward while the bearer is being setup.

SN C sets timer T8 (10-15 seconds) on receipt of the IAM indicating "COT to be expected". This timer is cancelled on receipt of COT. If the timer expires before receipt of COT, the call is released by sending REL. If the call is not queued at SN C, SN C will follow the same procedure as SN B and send the IAM to SN D.

SN D also sets timer T8 (10-15 seconds) on receipt of the IAM indicating "COT to be expected". SN D terminates the codec negotiation by selecting the codec with highest priority (that it also supports for the call) in the received Supported Codec List. (This codec becomes the Selected Codec for the bearer.) SN D also constructs an Available Codec List for the call by deleting the entries that it cannot use for the call. The Selected Codec is also included in the Available Codec List. SN D sends an APM in the backward direction that includes the Selected Codec parameter and the Available Codec List parameter and initiates the bearer setup procedures using the Selected Codec. On receipt of this APM, preceding SNs C, B, and A also initiate the bearer setup procedures using the Selected Codec. When the bearer is set up between SNs A and B, SN B sends COT to SN C. On receipt of this COT, SN C cancels timer T8 and sends COT to SN D when the bearer setup between SNs B and C is also completed.

The procedures described above for SNs C and D are delayed if the ETS call is queued at SN C (see Figure B.2). SN C sends an early ACM in the backward direction. The call setup, codec negotiation and sending of IAM are delayed at SN C until the required call processing and outgoing resources are made available to the call. When the IAM finally reaches SN D, SN D selects the codec to be used and includes the selected codec information in the APM sent in the backward direction. Bearer setup is delayed at each SN until the Selected Codec is known through the receipt of this APM. Similarly, the delay in sending the COT raises the possibility that T8 will expire and the call will be released as shown in Figure B.2.

In summary, the potential consequences of call queuing are delay in end-to-end codec negotiation, delay in bearer setup, delay in sending of COT, and the expiry of timer T8. Expiry of timer T8 will cause the call to be aborted. This is undesirable for ETS calls. Therefore, codec negotiation shall not be invoked for ETS calls.
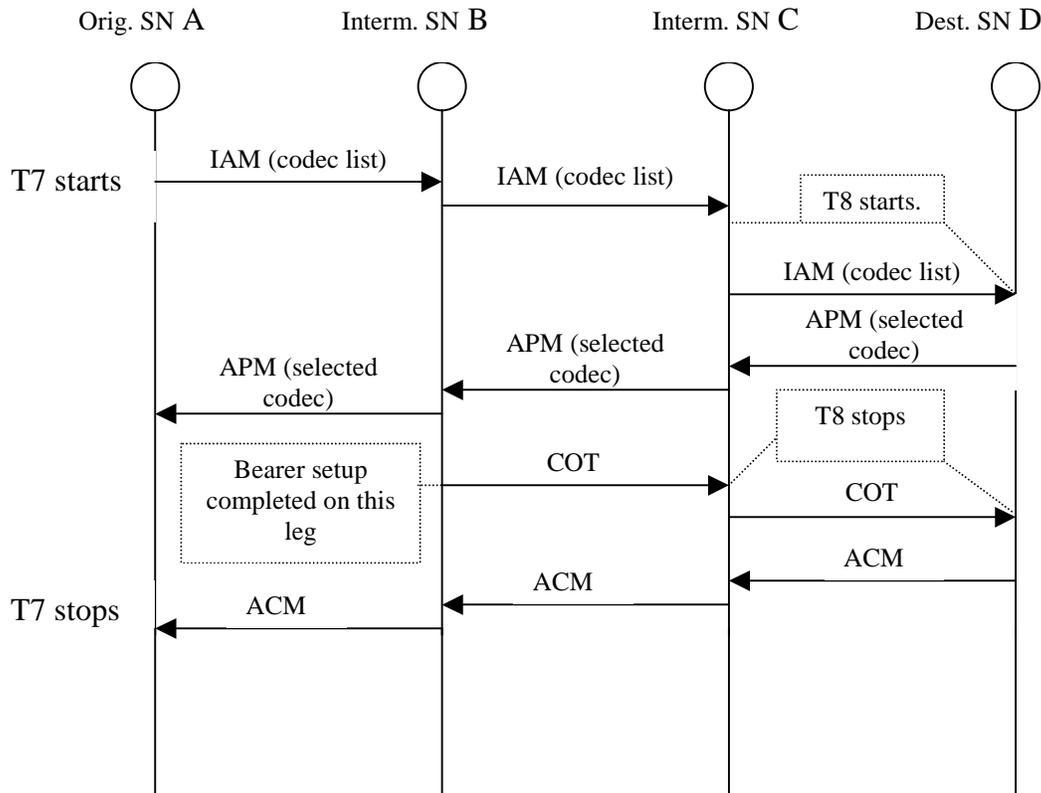
Figure B.1 - Codec Negotiation without Call Queuing

T7 starts

T7 stops

| Orig. SN A | Interm. SN B | Interm. SN C | Dest. SN D |

IAM (codec list)

IAM (codec list)

T8 starts.
Congestion,
Call queued.

Early ACM

Early ACM

Call proceeds
after delay

IAM (codec list)

APM (selected
codec)

APM (selected
codec)

APM (selected
codec)

T8 expires
Call released
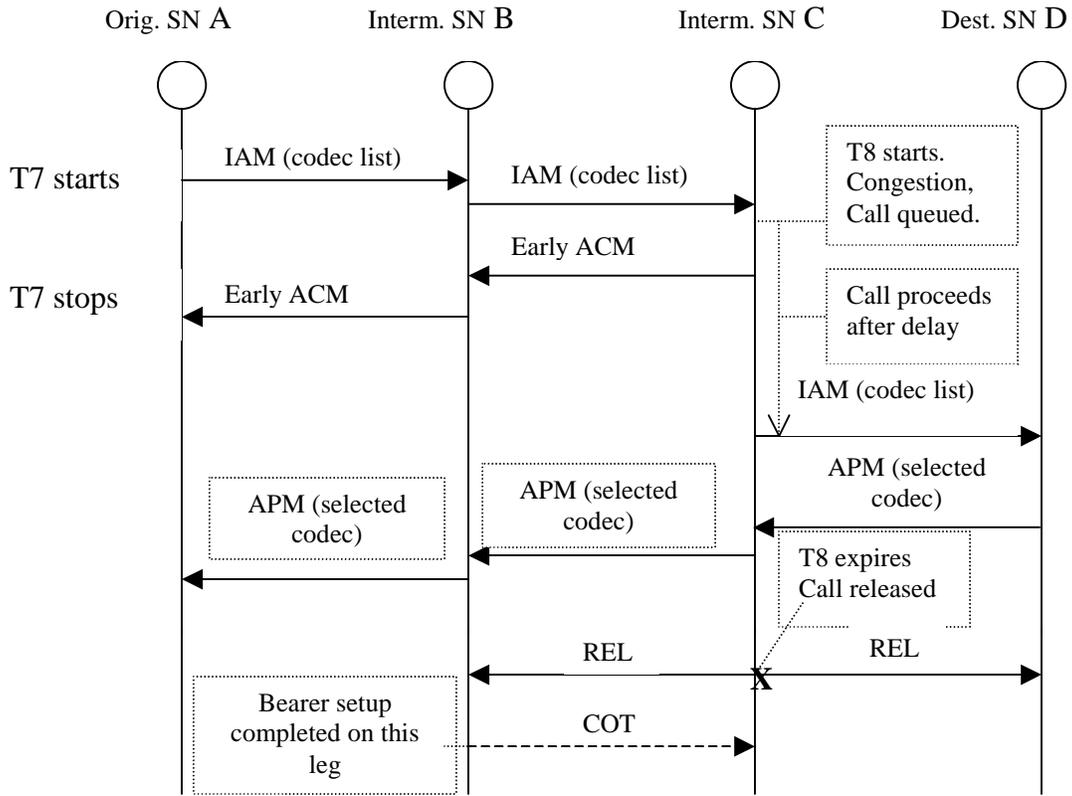
REL

REL

Bearer setup
completed on this
leg

COT

Figure B.2 - Interaction between Codec Negotiation and ETS Call Queuing

Annex C

(informative)

C PROCEDURES FOR INTERNATIONAL CALLS BASED ON THE NEW IEPS CALL INFORMATION PARAMETER

This annex contains procedures for international calls based on the new IEPS Call Information parameter that is being specified by ITU-T.

C.1 International Call Originating from a National Network

When an originating exchange or SN determines that an ETS call is an international call and the logic at this node determines that the ITU-T ISUP/BICC IEPS call information parameter is required to be transported in the forward direction, the node shall include the parameter in the outgoing IAM. Thus, the call will carry both the national CPC NS/EP indication, as well as the ITU-T ISUP/BICC IAM IEPS call information parameter. This parameter will contain the identity of the country originating the call (i.e., the X.121 country code for the U.S.A.) and the national priority level of the caller. The IAM shall also include the Precedence parameter. See Figure 3.

If an intermediate exchange, SN or CMN receives the IEPS call information parameter in the incoming IAM, it shall include the parameter unaltered in the outgoing IAM. When an intermediate exchange, SN, or CMN determines that an ETS call is an international call, and the logic at this node determines that the ITU-T ISUP/BICC IEPS call information parameter is required to be transported in the forward direction but is not included in the incoming IAM, the node shall include the parameter in the outgoing IAM. Thus, the call will carry both the national CPC NS/EP indication, as well as the ITU-T ISUP/BICC IAM IEPS call information parameter. This parameter will contain the identity of the country originating the call (i.e., the X.121 country code for the U.S.A.) and the national priority level of the caller. The priority level to be carried in the IEPS call information parameter shall be derived from the Precedence parameter (if received in the incoming IAM) or by some other means not specified in this standard.

If an outgoing international gateway exchange, SN, or CMN receives an IAM with the CPC coded as "NS/EP call" and the call is routed to an ITU-T SS7 network, the call establishment proceeds with priority. The call is progressed with the CPC set to IEPS in the outgoing IAM. In addition, where the exchange logic, or the CSF logic at the SN or CMN, determines that IEPS call information is required to be transported in the forward direction but the IEPS call information parameter was not included in the incoming IAM, the exchange, SN or CMN shall derive the required information from the received Precedence parameter and include the IEPS call information parameter in the outgoing IAM. The IEPS call information parameter will contain the identity of the country originating the call (i.e., the X.121 country code for U.S.A.) and the national priority level of the call. Any received Precedence parameter shall not be included in the outgoing IAM.

If an outgoing international gateway exchange, SN, or CMN receives an IAM with the CPC coded as "NS/EP call" and the call is routed to another country's ANSI SS7 network, the call establishment proceeds with priority. If a prior agreement between the U.S.A and the country of call destination is in place for providing ETS treatment to such calls within the destination country, the call is progressed with the CPC coded as "NS/EP call" in the outgoing IAM. The outgoing IAM shall be marked with a MTP message priority level of 1 and any outgoing TCAP message associated with the ETS call shall be

marked with a MTP message priority level of 2 to increase their probability of successful transfer during signalling network congestion. In addition, where the exchange logic or the CSF logic at the SN or CMN determines that IEPS call information is required to be transported in the forward direction but the IEPS call information parameter was not included in the incoming IAM, the exchange, SN, or CMN shall derive the required information from the received Precedence parameter and include the IEPS call information parameter in the outgoing IAM. In the absence of a prior agreement such as the one described above, the CPC coding shall be changed to "calling party's category unknown", the IEPS call information parameter shall not be included in the outgoing IAM and the call shall be progressed as a non-ETS call. Any received Precedence parameter shall not be included in the outgoing IAM whether the call is progressed towards the destination country as an ETS call or not.

C.2 International Call Originating outside the National Network

If an incoming international gateway exchange, SN or CMN receives a call from an ITU-T SS7 network with the CPC set to IEPS, the call establishment proceeds with priority. Where the exchange logic, or the CSF logic at the SN or CMN, determines that ETS-call treatment within U.S. networks is to be provided based on policy or mutual agreement between the U.S.A. and the country or international network originating the IEPS call, the call is progressed with the CPC coded as "NS/EP call" in the outgoing IAM. The outgoing IAM shall be marked with a MTP message priority level of 1 and any outgoing TCAP message associated with the ETS call shall be marked with a MTP message priority level of 2 to increase their probability of successful transfer during signalling network congestion. In addition, on receipt of the optional IEPS call information parameter in the IAM, the incoming international gateway exchange, SN, or CMN may provide enhanced service features based on policy and by analyzing the contents of this parameter. For example, the international gateway exchange, SN, or CMN may map the multi level preference scheme implemented in the entity (the country or international network) originating the IEPS call to the ETS priority levels used in the U.S.A. based on policy and mutual agreement between the U.S.A. and the call originating entity. The priority level of the ETS call shall be carried in the Precedence parameter. The received IEPS call information parameter may be included in the outgoing IAM. See Figure 4. Further call treatment based on the IEPS call information parameter within the U.S.A. networks is for further study. In the absence of a prior agreement as described above, the CPC coding shall be changed to "ordinary calling subscriber" and the call shall be progressed in U.S.A. networks as a non-ETS call.

If an incoming international gateway exchange, SN, or CMN receives a call from another country's ANSI SS7 network with the CPC coded as "NS/EP", the call establishment proceeds with priority. Where the exchange logic, or the CSF logic at the SN or CMN, determines that ETS-call treatment within U.S. networks is to be provided based on policy or mutual agreement between the U.S.A. and the country originating the call, the call is progressed with the CPC coded as "NS/EP call" in the outgoing IAM. The outgoing IAM shall be marked with a MTP message priority level of 1 and any outgoing TCAP message associated with the ETS call shall be marked with a MTP message priority level of 2 to increase their probability of successful transfer during signalling network congestion. In addition, on receipt of the optional IEPS call information parameter in the IAM, the incoming international gateway exchange, SN, or CMN may provide enhanced service features as described above for the incoming international gateway providing interworking from ITU-T SS7 network to ANSI SS7 network.

In the absence of a prior agreement as described above, the CPC coding shall be changed to "calling party's category unknown" and the call shall be progressed in U.S.A. networks as a non-ETS call.