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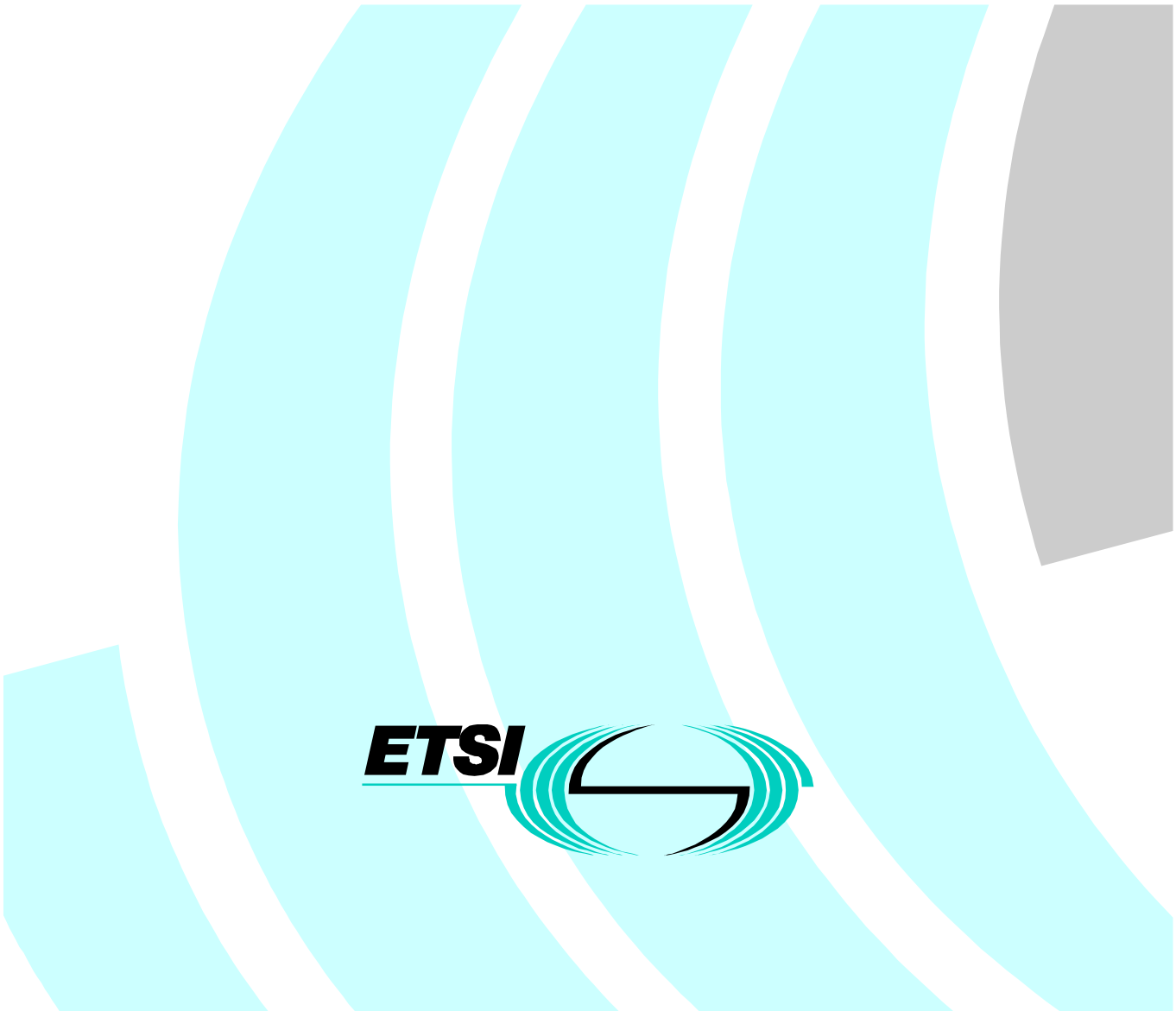
Technical Specification

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Signalling for basic calls and inter domain calls, between an H.323 Terminal and a Terminal in a Switched-Circuit Network (SCN) Phase II: Scenario 1 + Scenario 2



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Foreword

This Technical Specification (TS) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

1 Scope

The present document describes interactions between ITU-T Recommendation H.323 [13] Terminals, Gatekeepers, Gateways and Switched-Circuit Networks (SCN) for support of TIPHON scenario 1 and scenario 2 (see TR 101 307 [20]).

The present document specifies a profile to be applied to the ITU-T Recommendation H.323 [13] for the purposes of TIPHON compliant systems.

Call trace protocols, e.g. for use in tracing malicious calls, are outside the scope of the present document.

The present document is applicable to Basic Calls and Inter-Domain Calls for voice only telephone calls:

- from H.323 Terminals on networks using Internet Protocol (IP) transport to Terminals on SCNs, e.g. Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN) or GSM Public Land Mobile Network (PLMN); and
- from Terminals on SCNs to H.323 Terminals on networks using IP transport.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] TS 101 323: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Interoperable Security Profiles" .

[2] ETS 300 092-1 (1992): "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[3] ETS 300 189: "Private Telecommunication Network (PTN); Addressing".

[4] ETS 300 356 (1995): "Integrated Services Digital Network (ISDN); Signalling System No. 7; ISDN User Part (ISUP) version 2 for the international interface".

[5] ETS 300 403-1 (1995): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".

[6] ETS 300 659-1 (1997): "Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 1: On hook data transmission".

[7] ISO/IEC 11571 (1998): "Information technology - Telecommunications and information exchange between systems - Numbering and sub-addressing in private integrated services networks".

[8] ISO/IEC 11572 (1996): "Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit mode bearer services - Inter-exchange signalling procedures and protocol".

[9] ITU-T Recommendation H.225.0 (1998): "Call signalling protocols and media stream packetization for packet based multimedia communications systems".

[10] ITU-T Recommendation H.235 (1998): "Security and encryption for H Series (H.323 and other H.245 based) multimedia terminals".

[11] ITU-T Recommendation H.245 (1998): "Control protocol for multimedia communication".

[12] ITU-T Recommendation H.246: "Interworking of H-Series multimedia terminals with H-Series multimedia terminals and voice/voiceband terminals on GSTN and ISDN".

[13] ITU-T Recommendation H.323 (1998): "Packet based multimedia communications systems".

[14] ITU-T Recommendation Q.731.3 (1993): "Calling line identification presentation (CLIP)".

[15] ITU-T Recommendation Q.761 (1997): "Signalling System No. 7 - ISDN User Part functional description".

[16] ITU-T Recommendation Q.762 (1997): "Signalling System No. 7 - ISDN user part general functions of messages and signals".

[17] ITU-T Recommendation Q.763 (1997): "Signalling System No. 7 - ISDN user part formats and codes".

[18] ITU-T Recommendation Q.764 (1997): "Signalling System No. 7 - ISDN user part signalling procedures".

[19] ITU-T Recommendation Q.932 (1998): "Digital Subscriber Signalling System No. 1 - Generic procedures for the control of ISDN supplementary services".

[20] TR 101 307 (1999): "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Requirements for service interoperability; Phase 2".

[21] TS 101 313 (1999): "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Network architecture and reference configurations; Phase II: Scenario 1 + Scenario 2".

[22] ITU-T Recommendation Q.931 (1998): "ISDN user-network interface layer 3 specification for basic call control".

[23] ITU-T Recommendation E.164 (1997): "The international public telecommunication numbering plan".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the ETSI Directives and the following apply:

access token: octet string which may be present in Registration, Admission, and Status (RAS) messages and the Setup message. It is used to specify the identity, authorization, or other security characteristics of a network element or a user

call: see "telephone call"

endpoint: H.323 Terminal or Gateway. An endpoint can call and be called. It generates and/or terminates information streams

Gatekeeper: gatekeeper is an H.323 entity on the network that provides address translation and controls access to the network for H.323 Terminals and Gateways. The Gatekeeper may also provide other services to the H.323 Terminals and Gateways such as bandwidth management and locating Gateways

Gateway: H.323 Gateway is an endpoint on the network which provides for real-time, two-way communications between H.323 Terminals on the packet based network and other Terminals on a switched circuit network

H.323 Terminal: entity which provides audio and optionally video and data communications capability in point-to-point or multipoint conferences in packet-based networks

telephone call: two-way speech communication between two users by means of Terminals via network infrastructure

3.2 Abbreviations

In addition to the abbreviations explained in TR 101 307 [20] and TS 101 313 [21], the following abbreviaitons apply:

ACF	AdmissionConfirm (RAS message)
ARJ	AdmissionReject (RAS message)
ARQ	AdmissionRequest (RAS message)
CLI	Calling Line Identification
CLIP	Calling Line Identification Presentation
DRC	Direct Routed Call
DSS1	Digital Subscriber Signalling System No. one
DTMF	Dual-Tone Multi-Frequency
GCF	GatekeeperConfirmation (RAS message)
GRC	Gatekeeper Routed Call
IAM	Initial Address Message [16]
IN	Intelligent Network
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part (of CCITT number 7 signalling)
LCF	LocationRequest (RAS message)
LRJ	LocationReject (RAS message)
LRQ	LocationRequest (RAS message)
NNI	Network-to-Network Interface
PLMN	GSM Public Land Mobile Network
PINX	Private Integrated services Network eXchange
PSTN	Public Switched Telephone Network
RAS	Registration, Admission, and Status
RCF	RegistrationConfirm (RAS message)
RRQ	RegistrationRequest (RAS message)
SCN	Switched-Circuit Network
UNI	User-to-Network Interface
ZCF	ZoneInformationConfirmation (RAS message)
ZRQ	ZoneInformationRequest (RAS message)

4 Entities participating in the setup of a basic call

The TIPHON system is a multi-component system. It consists of H.323 Terminals, Gateways, and Gatekeepers. For more details about these entitites and the scenarios in which they are acting refer to TS 101 313 [21].

5 Registration, call setup and call release

5.1 Overview

The procedures of ITU-T Recommendations H.323 [13], H.225.0 [9] and H.245 [11] shall apply with the limitations or extensions described in this specification. The procedures of ITU-T Recommendation H.235 [10] shall apply unchanged.

In accordance with ITU-T Recommendation H.323 [13], the protocol defined in ITU-T Recommendation H.225.0 [9] and the protocol defined in ITU-T Recommendation H.245 [11] shall be used for call control signalling and logical channel controlling within the packet based data network. The use of ITU-T Recommendations H.225.0 [9] and H.245 [11] is specified in more detail in the following subclauses.

NOTE: ITU-T Recommendation H.225.0 [9] defines two protocols: Registration, Admission, and Status (RAS) and a ITU-T Recommendation Q.931 [22] -like protocol.

Annex A describes changes to the ITU-T Recommendation Q.931 [22] messages and the contents of messages carried by the User-to-user information element in ITU-T Recommendation H.225.0 [9].

The RAS protocol shall apply unchanged.

The ASN.1 definitions given in annex H of ITU-T Recommendation H.225.0 [9] shall be used.

The precise translation of ITU-T Recommendation H.323 [13] messages to the SCN and vice versa shall depend on the nature of the SCN (an ISDN, a PSTN, etc.) and the level of connectivity to be supported. This translation shall provide support, as necessary, of:

- the semantics of the protocol specified in ITU-T Recommendations Q.761 [15], Q.762 [16], Q.763 [17] and Q.764 [18] with variations in implementation appropriate to the region in which the SCN operates; or
- the semantics of the protocol specified in ITU-T Recommendation Q.931 [22] with variations in implementation appropriate to the region in which the SCN operates; or
- the protocol specified in ISO/IEC 11572 [8].

5.2 Security principles

If security services are required, TIPHON compliant systems shall support the security profiles defined in TS 101 323 [1]. Security services are not required always to be activated.

5.3 Registration

5.3.1 Registration basics

Both H.323 Terminals and Gateways shall register with Gatekeepers. Registration shall be in accordance with ITU-T Recommendation H.323 [13] procedures. TIPHON compliant endpoints shall use Automatic Gatekeeper Discovery. The Gatekeeper shall convey information about as many alternate Gatekeepers as possible within security considerations, using the alternateGatekeepers field in the GatekeeperConfirmation (GCF) message.

NOTE: Gateway performance may be enhanced if the Gatekeeper issues the **PreGrantedARQ** indication in the Registration Confirm (RAS message) (RCF) message on successful registration of the Gateway.

Two types of registration shall be supported:

- authenticated registration with the Gatekeeper;
- anonymous registration with the Gatekeeper.

5.3.2 Authenticated Registration

Authenticated Registrations shall be in accordance with the security profiles in TS 101 323 [1].

5.3.3 Anonymous Registration

In this case the RegistrationRequest (RAS message) (RRQ) message shall not contain an access token. This type of registration shall be used only for calls from an H.323 Terminal to a terminal in an SCN.

NOTE 1: The intention here is to allow certain types of call, e.g. Freephone. The types of call are service provider dependent.

NOTE 2: Within the H.323 zone all calls from a terminal in an SCN to an H.323 Terminal are initiated by the Gateway, which always does authenticated registration. Nevertheless certain services like Freephone may be provided by an SCN operator.

5.3.4 Registration Keep Alive

Endpoints shall support the keep alive procedure as specified in subclauses 7.2.2 and 8.4.2 of ITU-T Recommendation H.323 [13]. If the registration ceases to be valid (e.g. the connection between the H.323 Terminal and its Gatekeeper goes down for some reason), the Gatekeeper shall remove the registration and release all ongoing calls associated with that terminal. A new registration may be established using the procedures of subclause 5.2.2 of ITU-T Recommendation H.323 [13].

5.4 Call setup

5.4.1 Prerequisites

Calls between users in the Internet Protocol (IP) network and users in the SCN shall be setup only after successful registration according to subclause 5.3.

The sequences in annex B are built on the principles described in the following subclauses.

5.4.2 Calls from an H.323 Terminal to a terminal in an SCN

5.4.2.1 The en-bloc procedure

If a CALL PROC message is returned to the H.323 Terminal, the "Sending complete" information element shall be inserted, if not already there, in the SETUP message towards the next network element (e.g. next Gatekeeper or a Gateway).

5.4.2.2 Overlap sending

On receipt of a SETUP message with a Called party number which the Gatekeeper cannot determine to be complete, the Gatekeeper starts timer T302 (the value of timer T302 is specified in ITU-T Recommendation Q.931 [22]) and sends a SETUP ACKNOWLEDGE message back.

The Gatekeeper shall restart timer T302 on the receipt of every INFORMATION message not containing a sending complete indication and containing the called party information element with at least one valid character.

An example of how to use the Overlap sending procedure within the IP network is shown in annex B, subclause 1.1.

NOTE: A Called party number can be regarded to be complete under the following conditions:

- if the Gatekeeper has the full knowledge about the Called party's numbering plan and can identify the number to be complete;
- if the SETUP message contains the *Sending complete* information element;
- if the canOverlapSend parameter is absent or set to FALSE;
- if the Called party number contains the '#' character as the last digit; or
- if the Called party is identified by means of a non E.164 [23] number contained in the destinationInfo parameter.

5.4.2.3 Establishment of media channels

5.4.2.3.1 Fast Connect procedure

TIPHON-compliant systems shall use the Fast Connect procedure of ITU-T Recommendation H.323 [13], subclause 8.1.7.

NOTE 1: This includes the capability to negotiate media channels using ITU-T Recommendation H.245 [11] or to fall back to ITU-T Recommendation H.245 [11] signalling at any time of the call.

NOTE 2: This enables in-band information to be passed prior to call establishment.

5.4.2.3.2 Encapsulation of H.245 messages within H.225.0 messages

TIPHON-compliant systems shall support encapsulation of ITU-T Recommendation H.245 [11] messages within ITU-T Recommendation H.225.0 [9] messages according to ITU-T Recommendation H.323 [13], subclause 8.2.1.

NOTE: Encapsulation of ITU-T Recommendation H.245 [11] messages within ITU-T Recommendation H.225.0 [9] is preferred to a separate ITU-T Recommendation H.245 [11] channel because of its greater efficiency.

5.4.2.4 Basic call setup

Calls shall be setup using the procedures defined in ITU-T Recommendation H.323 [13] with the following changes/clarifications:

- within the context of this specification, call setup shall use only one user channel towards the SCN. Calls requiring a number of user channels shall not be supported;
- the Gatekeeper and its Gateway shall support both the en-bloc and the overlap sending procedure.

NOTE 1: Annex B gives possible mappings of messages to and from the SCN for overlap sending with fast connect.

If an element or a message not allowed to be used within the context of this specification is received, the receiver shall pass on, but otherwise ignore, the message or the element i.e. the receiver shall act as if the message or the element was not received.

If a element is received with a value, not allowed within the context of this specification, the receiver shall, if the element is optional, pass on, but otherwise ignore, the element (act as if the element is not received) or if the element is mandatory act as if the default value was received.

NOTE 2: The security policy of an operator's network or the security policy implemented in a network element may override the error handling as described above.

5.4.2.5 In-band information

5.4.2.5.1 During call setup

If the Gateway, connected to SCN, receives a PROGRESS message (before an ALERTING message is received) or a CALL PROCEEDING message with the Progress indicator information element included from SCN, the Gateway shall send a PROGRESS message to the Gatekeeper. The message shall contain the received Progress information element.

If the message received from SCN is the CALL PROCEEDING message and the CALL PROCEEDING message is not sent, the Gateway shall send a CALL PROCEEDING message. The message shall contain the Progress indicator information element.

When the Gatekeeper receives a CALL PROCEEDING message with a Progress indicator element included the Gatekeeper shall (before transferring the CALL PROCEEDING message) stop any running call supervision timer and start timer T301.

When the Gatekeeper receives a PROGRESS message (before an ALERTING message is received) with the progress indicator information element included (but no cause element, see subclause 5.4.2.5.2) the Gatekeeper shall (before transferring the PROGRESS message) stop any running call supervision timer and start timer T301.

When the H.323 Terminal receives a CALL PROCEEDING message with a Progress indicator element included the H.323 Terminal shall stop any running call supervision timer and start timer T301.

When an H.323 Terminal receives a PROGRESS message (before an ALERTING message is received) with a Progress indicator information element included (but no Cause information element is included, see subclause 5.4.2.5.2) the H.323 Terminal shall stop any running call supervision timer and start timer T301.

5.4.2.5.2 During release

If the Gateway, connected to SCN, receives a progress indicator information element in a DISCONNECT message from SCN the Gateway shall send a PROGRESS message to the Gatekeeper. The message shall include both the Progress indicator information element and the received cause.

NOTE: If the Gateway receives a PROGRESS message with a Cause information element and a Progress indicator element the message shall be sent "as received" towards the Gatekeeper.

When the Gatekeeper receives a PROGRESS message with both the Progress indicator information element and the Cause information element included the Gatekeeper shall (before transferring the PROGRESS message) stop any running call supervision timer and start timer T.301.

When the H.323 Terminal receives a PROGRESS message with both the Progress indicator information element and the Cause information element included the Gatekeeper stop any running call supervision and start timer T.301.

5.4.2.6 Usage of Called party numbers translated by the Gatekeeper

The ARQ message sent from the H.323 Terminal to the Gatekeeper contains information about the Called party number in the **destinationInfo** and **destExtraCallInfo** fields. The Gatekeeper possibly translates the Called party number he received from the H.323 Terminal to another number and additional information.

In the Direct Routed Call (DRC) case the translated information is sent back to the H.323 Terminal in the ACF message using the **destinationInfo**, **destExtraCallInfo**, and **remoteExtensionAddress** fields. If these fields contain information, the H.323 Terminal shall use that information in the SETUP message to the other endpoint. The H.323 Terminal shall hide this information from being accessed by the user. If these fields are not found, the H.323 Terminal shall use the number sent in the ARQ message also for the SETUP message. If these fields are found, but contain only zero elements, the H.323 Terminal shall not send any destination information in the SETUP message. In this case, the Gatekeeper may supply any relevant routing information in tokens to hide it from the H.323 Terminal.

If the network wishes to protect routing information from a possibly hacked H.323 Terminal, it shall use the Gatekeeper Routed Call (GRC) model with preGrantedARQ.

5.4.3 Calls from a terminal in an SCN to an H.323 Terminal

5.4.3.1 Locating a called H.323 Terminal

If the Gateway receives a call from the SCN, the Gateway shall attempt to locate the called H.323 Terminal.

The way the Gatekeeper may locate a H.323 Terminal is described in annex D.

5.4.3.2 Overlap sending

The Gatekeeper shall support overlap sending on the SCN interface. If the addressed H.323 endpoint supports it, the Gatekeeper may use overlap sending towards the endpoint.

NOTE: If the SCN uses overlap sending, the Gateway or its Gatekeeper need to retain the digits received until the H.323 Terminal can be found.

5.4.3.3 The en-bloc procedure

Once the H.323 Terminal is located by the Gatekeeper en-bloc procedures shall be used. The Gateway (DRC case) or the Gatekeeper (GRC case) shall include the Sending complete information element towards the H.323 Terminal.

5.4.3.4 Establishment of media channels

5.4.3.4.1 Fast Connect procedure

TIPHON-compliant systems shall use the Fast Connect procedure of ITU-T Recommendation H.323 [13], subclause 8.1.7.

NOTE 1: This includes the capability to negotiate media channels using ITU-T Recommendation H.245 [11] or to fall back to ITU-T Recommendation H.245 [11] signalling at any time of the call.

NOTE 2: This enables in-band information to be passed prior to call establishment.

5.4.3.4.2 Encapsulation of H.245 messages within H.225.0 messages

TIPHON-compliant systems shall support encapsulation of ITU-T Recommendation H.245 [11] messages within ITU-T Recommendation H.225.0 [9] messages according to ITU-T Recommendation H.323 [13], subclause 8.2.1.

NOTE: Encapsulation of ITU-T Recommendation H.245 [11] messages within ITU-T Recommendation H.225.0 [9] is preferred to a separate ITU-T Recommendation H.245 [11] channel because of its greater efficiency.

5.4.3.5 Ring control tone

When the called H.323 Terminal responds with an ALERTING message the called H.323 Terminal's Gatekeeper may start the ringing tone towards the calling party. If the Gatekeeper starts the ringing tone, then the Gatekeeper shall include the Progress Indicator information element with the PI set to No. 8 "In-band information or an applicable pattern is available".

If a Gateway receives an ALERTING message which does not include a Progress indicator information element, with the PI set to No. 8 "In-band information or an applicable pattern is available", the Gateway shall start the ringing tone.

If an ALERTING message is received on a call to an SCN, the Gateway shall include the Progress indicator information element with the PI set to No. 8 "In-band information or an applicable pattern is available" if the information is not already indicated.

5.4.3.6 Basic call setup

Calls shall be setup using the procedures defined in ITU-T Recommendation H.323 [13] with the following changes/clarifications:

- within the context of this specification, call setup shall use only one user channel from the SCN. Calls requiring a number of user channels shall not be supported;
- the Gatekeeper and its Gateway shall support both the en-bloc and the overlap sending procedure.

If an element or a message not allowed to be used within the context of this specification is received, the receiver shall pass on, but otherwise ignore, the message or the element i.e. the receiver shall act as if the message or the element was not received.

If a element is received with a value, not allowed within the context of this specification, the receiver shall, if the element is optional, pass on, but otherwise ignore, the element (act as if the element is not received) or if the element is mandatory act as if the default value was received.

NOTE 1: The security policy of an operator's network or the security policy implemented in a network element may override the error handling as described above.

When the fast Connect procedure is used, the Gatekeeper should set the **mediaWaitForConnec**t parameter to **TRUE** before sending the SETUP message to the H.323 Terminal.

The Gatekeeper should remove the **fastStart** parameter from any message, received from the H.323 Terminal, prior to the CONNECT message.

NOTE 2: As a subscription option, the Gatekeeper may allow activation of the media channel in one or both directions prior to the CONNECT message for certain trusted users or equipment.

5.4.4 Interworking with Dual Tone Multi-Frequency (DTMF) signalling

Transfer of the DTMF tones within the IP network shall be by means of the ITU-T Recommendation H.245 [11] message **userInputIndication**.

Information received from the H.323 Terminal in the **userInputIndication** message shall be extracted from the **userInputIndication** message and injected into the media stream by using DTMF tones. This shall be done by the Gateway connected to the SCN.

DTMF tones received from the SCN shall be extracted from the media stream and encoded in **userInputIndication** messages by the Gateway.

NOTE: The userInputIndication could be tunneled via the FACILITY message if necessary.

5.4.5 Carrier selection

Carrier selection shall be performed by transmitting the necessary information to the Gatekeeper and Gateway within the called party number field. This procedure shall not preclude overlap sending.

5.5 Active phase

5.5.1 General aspects

On calls to the SCN the active phase of the call shall commence when the called party answers and the Gateway issues the **Connect** message as a result. On calls from the SCN the Gateway shall pass the answer indication to the SCN.

Upon detection of failure of the call in the IP network, accounting and charging functions shall be informed.

NOTE 1: In order to detect call failures in the IP network, which affect accounting and charging functions, Gatekeepers should specify an **irrFrequency** value inside the AdmissionConfirm (RAS message) (ACF).

Transfer of the DTMF tones shall be by means of the ITU-T Recommendation H.245 [11] message **userInputIndication**.

Information received from the H.323 Terminal in the **userInputIndication** message shall be extracted from the **userInputIndication** message and injected into the media stream by using DTMF tones. This shall be done by the Gateway connected to the SCN.

DTMF tones received from the SCN shall be extracted from the media stream and encoded in **userInputIndication** messages by the Gateway.

NOTE 2: The **userInputIndication** could be tunnelled via the FACILITY message if necessary.

5.5.2 Exceptional cases during the active phase

If the Gatekeeper detects a failure, the Gatekeeper shall initiate clearing of the call as described in subclause 5.6.

If the Gateway detects a failure, the Gateway shall initiate clearing towards the SCN, and clear the call in the IP network as described in subclause 5.6.

If the H.323 Terminal detects a failure, the H.323 Terminal shall initiate clearing of the call as described in subclause 5.6.

5.6 Call release

Call release may be initiated by the H.323 Terminal, the Gateway (e.g. as a result of the terminal in the SCN initiating release), or the Gatekeeper. The reason for initiating call release may e.g. be normal disconnection of a call or a call failure.

Message collisions shall be handled by H.323 Terminals, Gatekeepers and Gateways.

NOTE: Message collision occurs when the endpoint and the Gateway initiate clearing at the same time.

5.7 Calling Line Identification (CLI)

CLI information may be provided by calling users and may be received by called users. When a user wishes to provide a calling number it shall be provided using the signalling elements described in ITU-T Recommendation H.225.0 [9].

Users may provide a number using the optional Calling Party Number information element in the Setup message.

NOTE: The procedures and protocols for handling these information elements may be defined in regional and national regulations and/or codes of practice. Wherever such requirements exist they may supercede the requirements expressed here.

According to ITU-T Recommendation H.225.0 [9] the number cannot have qualifications defined in accordance with octet 3a information (Presentation Indicator and Screening Indicator) as in tables 4 to 11 of ITU-T Recommendation Q.931 [22]. Accordingly in the absence of octet 3a information the calling party number information element shall be treated as if octet 3a contained the following values:

- "presentation allowed"; and
- "user-provided not screened".

As a consequence of the above the Gateway shall not include the Calling party number IE in the SETUP message towards the IP network if the Calling party information, received from the SCN network, indicates a restriction.

Annex A (normative): Required support of H.225.0 call control protocol

ITU-T Recommendation H.323 [13] uses a call control protocol derived from ITU-T Recommendation Q.931 [22] which is specified in the ITU-T Recommendation H.225.0 [9].

This annex defines a profile which is intended to clarify the use of ITU-T Recommendation H.225.0 [9] in TIPHON-compliant systems. Whenever the contents of this annex are in conflict with ITU-T Recommendation H.225.0 [9] this annex shall take precedence.

The current version of the Q.931 part of ITU-T Recommendation H.225.0 [9] includes a number of optional messages and information elements. The EN 300 403-1 [5] standard (ETSI DSS1) forbids some of the information elements which are optional in ITU-T Recommendation H.225.0 [9], listed below. Gateways that interconnect with ETSI DSS1 networks shall not send these information elements.

Table A.1 identifies changes to entries in table 4 of ITU-T Recommendation H.225.0 [9].

The changes in the table shall apply to TIPHON Phase 2 systems.

Table A.1: Modification to ITU-T Recommendation H.225.0 [9]
Usage of Q.931 [22] and Q.932 [19] Messages

Call Establishment Messages	Transmit (M, CM)	Receive and act on (M, CM)
Call Proceeding	M	M
Progress	M	M
Setup Acknowledge	M	CM (see note 1)
Miscellaneous Messages		
Information	CM	M
NOTE 1: Only mandatory if the H.323 Terminal indicates **canOverlapSend** in the Setup message. NOTE 2: M = mandatory, CM = conditionally mandatory.		

A.1 Message definitions

A.1.1 Alerting

Table A.2 identifies changes to entries in table 5 of ITU-T Recommendation H.225.0 [9].

Table A.2: Modifications to ITU-T Recommendation H.225.0 [9]
Usage of the Alerting message

Information element	H.225.0 status	Length in H.225.0
Signal	F	NA
NOTE: F = forbidden.		

A.1.2 Information

Table A.3 identifies changes to entries in table 9 of ITU-T Recommendation H.225.0 [9].

Table A.3: Modifications to ITU-T Recommendation H.225.0 [9]
Usage of the Information message

Information element	H.225.0 status	Length in H.225.0
Signal	F	NA

A.1.3 Release Complete

Table A.4 identifies changes to entries in table 10 of ITU-T Recommendation H.225.0 [9].

Table A.4: Modifications to ITU-T Recommendation H.225.0 [9]
Usage of the Release Complete message

Information element	H.225.0 status	Length in H.225.0
Signal	F	NA

A.1.4 Setup

Table A.5 identifies changes to entries in table 11 of ITU-T Recommendation H.225.0 [9].

Table A.5: Modifications to ITU-T Recommendation H.225.0 [9]
Usage of the Setup message

Information element	H.225.0 status	Length in H.225.0
Signal	F	NA

A.1.5 Setup Acknowledge

The contents and semantics of a SETUP ACKNOWLEDGE message received from the network are defined in tables 3 to 16 of ITU-T Recommendation Q.931 [22] with the single modification that the Signal information element is not allowed.

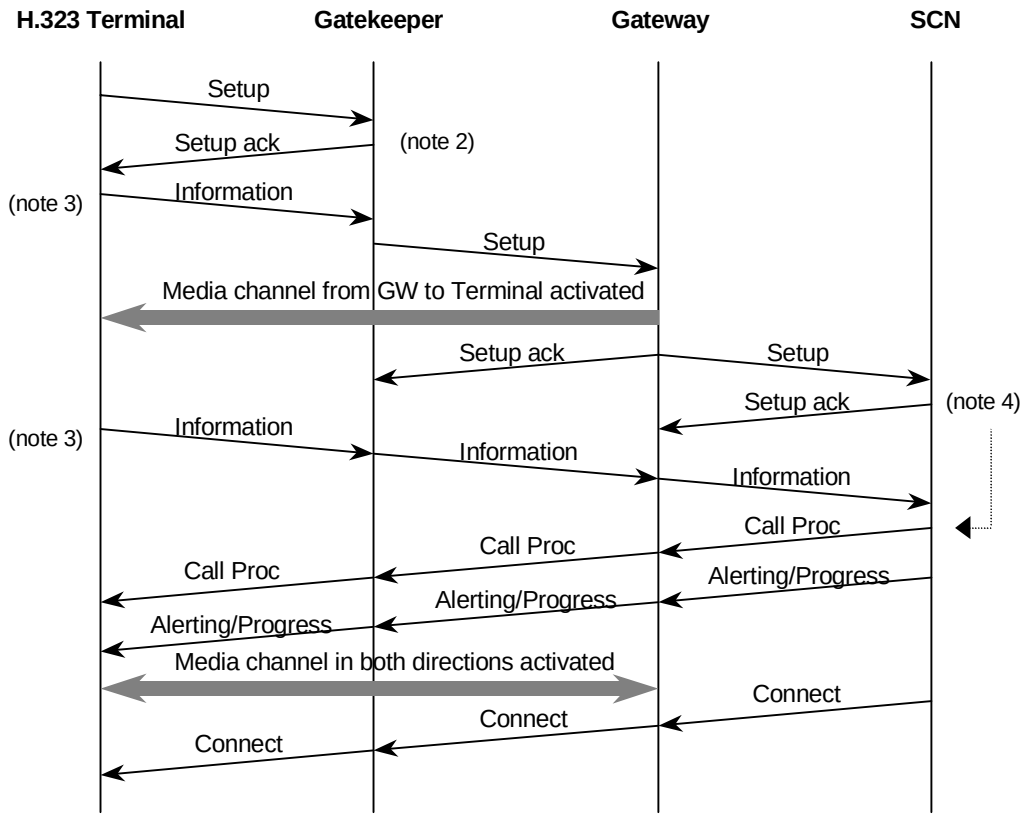
Annex B (informative): Message flows for call setup

B.1 Gatekeeper Routed Calls

The signalling procedures, described in the following subclause, are based on the Gatekeeper routed model.

B.1.1 Calls to a terminal in an SCN

Figure B.1 illustrates message flows for a call from an H.323 Terminal to a terminal in an SCN. The H.323 Terminal and the Gateway are registered to the same Gatekeeper; the fast connect procedure and overlap sending are used.

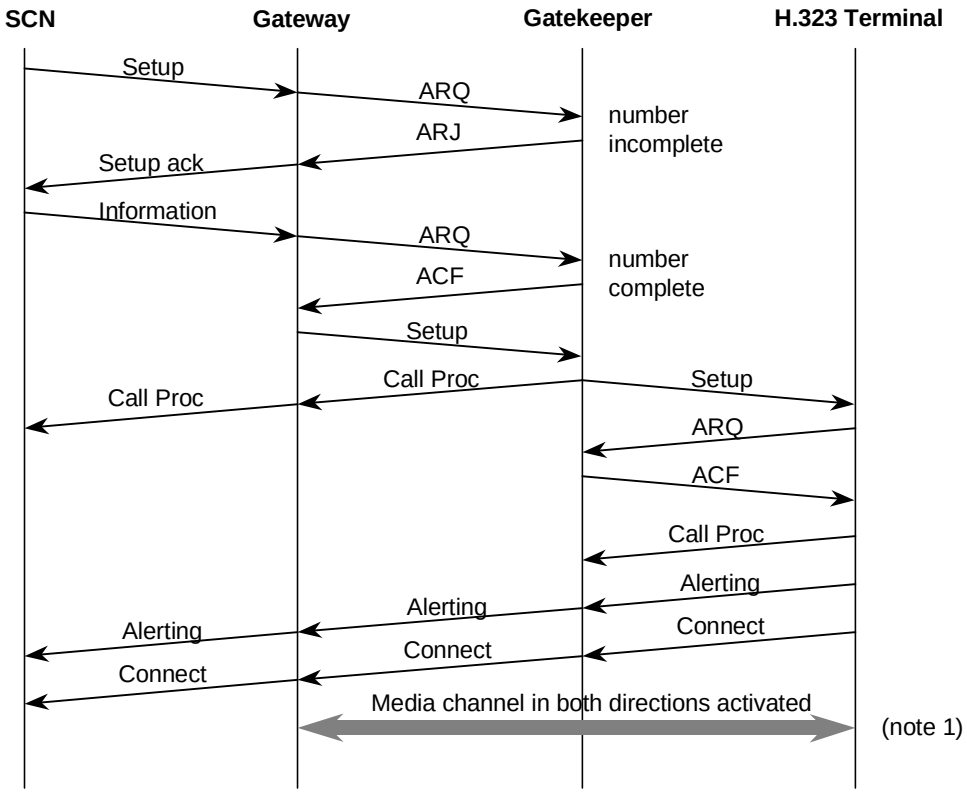


NOTE 1: This figure is given only for informative purposes and reflects ITU-T Recommendation Q.931 [22] cases only.
NOTE 2: As soon as the Gatekeeper has received sufficient digits to route the call, it shall send Setup to the Gateway.
NOTE 3: Information messages may be sent as a result of a user providing more information.
NOTE 4: If the SCN has received sufficient digits to complete number analysis, Call Proceeding shall be sent instead of Setup Ack in response to Setup and the Information message(s) will be discarded.
NOTE 5: It is assumed that registration of the H.323 Terminal is performed before the start of the entire message sequence. In addition, in this flow diagram the ARQ/ACF procedure between Gateway and Gatekeeper is not shown since preGrantedARQ is assumed.

Figure B.1: Fast call setup using overlap sending and Gatekeeper routed call model within a Zone

B.1.2 Calls to an H.323 Terminal

Figure B.2 illustrates message flows for a call to an H.323 terminal. The H.323 Terminal and the Gateway are registered to the same Gatekeeper; the fast connect procedure and overlap sending are used.



NOTE 1: Despite the use of the fast connect procedure the activation of the media channel is delayed until the Connect message is received by the Gatekeeper. This is accomplished by the use of the **mediaWaitForConnec**t parameter and the removal of **fastStart** parameters by the Gatekeeper as described in subclause 5.4.3.6.

NOTE 2: This figure is given only for informative purposes and reflects ITU-T Recommendation Q.931 [22] cases only.

Figure B.2: Fast call setup using overlap sending and Gatekeeper routed call model within a Zone

Annex C (informative): Basic call scenario definitions

Scenario 2 calls in annex C are for further study.

C.1 Successful calls

A successful call is one in which the network receives the called address and routes the call to a network Terminal which can accept two way speech communication. The network signalling will normally have sent an Answer signal back from the terminating exchange. The generally understood meaning of this is that the calling user is able to speak to a user handling calls directed at the called address or to some automatic call answering device. The normal expectation is that the caller will be required to pay for such calls.

In addition to the simple meaning above there are cases, notably associated with mobile telephones, where network operators send back an answer signal even though two way speech has not been established. The normal expectation is that the caller will be required to pay for such calls.

C.2 Unsuccessful calls

Unsuccessful calls do not reach the two way or one way speech condition which follows Answer. The reasons for this are for example:

- caller clears prior to ringing;
- caller clears prior to answer;
- called party is engaged on another call;
- called party is not accepting calls;
- called party does not answer;
- network congestion is encountered.

In all of these cases the user is not offered the service associated with a successful call but there is no fault in the network.

C.3 Call failures

A call failure occurs when the network fails to complete a call and is therefore neither successful or unsuccessful. A call failure also occurs when an established call, whether or not answer has occurred, is broken down as a result of equipment failure. The normal expectation is that customers do not pay for calls after the point at which the fault is detected.

C.4 Calling line Identification (CLI)

Whilst the text in this clause deals with CLI from the perspective of Scenario 1, the principles contained in this clause shall apply also for Scenario 2. Specific requirements for Scenario 2 are given in subclause 5.7.

The following subclauses deal with two kinds of calling line identity. The general purpose is to ensure that a CLI is available for use by the terminating network.

At present, according to ITU-T Recommendation H.225.0 [9] there is no definition of a mechanism for withholding CLI information derived by authentication or given as a presentation number. The behaviour of a TIPHON Gateway is that

the presentation indicator is set to Presentation Allowed in the SETUP and Initial Address Message (IAM) messages. If a Gateway does not have any number as a result of authentication of the supplied presentation number, the network number alone is supplied. The presentation indicator for network number is set to Presentation Restricted. In the case where no network number is available for whatever reason the value of the indicator is set to Number not available due to inter-working.

Thus when a user either supplies a presentation number or arranges for the network number to be displayed the relevant presentation indicators are set to presentation allowed.

C.4.1 Presentation number

If a user wants the called party to receive a presentation number it can be achieved by putting a suitable E164 number in the Calling party number parameter of the SETUP message If the calling user has a special arrangement with the service provider, as described in ETS 300 092-1 [2]. The type of number field may be a "subscriber number", "national number" or "international number" as specified in ETS 300 092-1 [2] with code point values defined in subclause 4.5.10 of ETS 300 403-1 [5].

The Gatekeeper may use the number supplied by the H.323 Terminal as well as the identification of the user determined by the authentication process. If the number appears to be a valid one, the user is authorized to provide presentation numbers and the interface from the Gateway is an Network-to-Network Interface (NNI) the number can be forwarded to the public network as "User provided, verified, and passed". If the interface is a User-to-Network Interface (UNI) the number will be passed to the network in exactly the same form as it was supplied in the ITU-T Recommendation H.225.0 [9] SETUP message. This number will be converted into a presentation number if the ISDN exchange allows the facility.

There is another way of generating a CLI to send to the called party. The user need not provide a number in the calling party field instead the Gatekeeper accesses a presentation number database indexed by the identification derived from the authentication operation. If the connection forwards into the narrow-band network is (ISUP) the number may be passed as "user provided, verified, and passed". This behaviour is specified in the Stage 3 Description for CLIP in ISUP, ITU-T Recommendation Q.731.3 [14]. If the interface to the narrow-band network is a UNI the calling party field is passed on in the same form as it was supplied by the user. The range of CLI values which can be passed over such an interface will make verification by the public network impossible. The UNI should therefore be registered with the service provider as one which uses the special arrangement described in subclause 6.2 of the CLIR protocol specification, ETS 300 092-1 [2]. The consequence of this is that all calling numbers passed over this interface will be delivered as "User provided, not verified".

Whichever way it is generated the calling number is passed over the network to the terminating exchange where it is passed to the called party. If the called party is connected using ISDN the calling number information is passed unchanged in accordance with ETS 300 403-1 [5]. For PSTN lines with the CLI display service the number is sent in accordance with ETS 300 659-1 [6] for on hook signalling. In ISDN the calling party number information element is passed on unchanged to the called party only if he subscribes to the CLIP service. In the case of an analogue with caller display the number is always delivered but the qualification, see below, of the calling number is not necessarily sent. This is because the qualification parameter is not in a normative part of the specification. Nevertheless the qualification type values are identical to the ISDN case, i.e.:

- 00: User provided, not verified;
- 01: User provided, verified, and passed;
- 10: User provided, verified, and failed;
- 11: Network provided.

Numbers in the category "00: User provided, not verified" convey the meaning that the recipient shall treat the number as unreliable. If the called party does not want to receive calls from uncertain numbers he need not answer the call. Where the interface from the Gateway is an NNI the and authentication allows it the number may be given as either verified and passed, for a limited range of presentation numbers. Since this range of uncertainty is already conveyed it is not necessary to generate a new category solely for internet use. There is no greater uncertainty about an internet telephony number than about one which is user provided, verified and failed. The issue of whether that extra information should be displayed on analogue display devices is a matter for national regulators.

C.4.2 Network number

For a normal telephone call the Network number is usually the same as the calling party number. In some cases the caller will choose not to release that number to the called party, nevertheless the callers number is transmitted to the terminating exchange with an indicator that it is not to be released. Certain customer lines, such as emergency services, are provided with an override facility which allows the calling number to be released irrespective of the caller's preference. The protocol used and the means of display is a national matter.

When a presentation number is provided either by the user or by a Gatekeeper the type of number is not set to network number unless the actual identity of the user is verified and can be treated with the same certainty as an equivalent fixed network calling number. The purpose of this subclause is to describe how to find a calling party number which can be used by law enforcement agencies in order to commence investigations in the same way as for a normal fixed network call.

There are a number of different configurations which need to be considered but the main issue is that of trust. For the scheme to meet its objective there shall be trust between the parties involved in the call which is equivalent to that between network operators providing calling line identities in today's network. The configurations include:

- directly connected IP links to the Gateway provider;
- indirectly connected permanent IP links to the Gateway provider;
- dial-in links to the Gateway provider;
- dial-in links to an indirectly connected Gateway provider;
- connections where the other providers act only third parties conveying IP traffic as if via a private data switch.

C.5 In-band information

The SCN may provide in-band information before the CONNECT message is sent. In-band information can be sent in the form of tones or announcements.

Some reasons for in-band information are as follows:

- information to the calling user that the SCN telephone is ringing;
- SCN wants to give information to the calling user about the progress of the call, e.g. "You have now dialled the police please disconnect or wait and the call will be set-up";
- progress tone is sent to avoid silence while routing over low speed routes;
- the called party number has changed and the new number is announced (changed number interception service);
- different types of interception services giving announcements;
- different types of interception services routing the call to an operator;
- prompt the calling user for more information. This case applies for some Intelligent Network (IN) services and it takes place before the active phase.

To allow in-band information from the SCN to be transported to the H.323 terminal, the audio channel may be set-up before the SETUP message is sent to the SCN.

C.5.1 Call to operator/Non-chargeable calls

If the user places a call to an operator who is connected to the SCN, or if the call is routed to an operator because of the invocation of a service, it might happen that the operator does not return a B-answer, i.e. there will be no CONNECT message sent from the SCN to the gateway. The reason for this behaviour is that the operator does not want to start charging.

C.5.2 IN Services

The user shall be able to utilize IN services within the SCN. Some of the IN services are simple number translation services while other IN services require user interaction.

When user interaction is required the IN node prompts the user, using in-band information, and the user answers, using DTMF tones.

The IN node may operate in two different modes:

- answered mode, i.e. the IN node sends a B-answer towards the calling user and then continues with the interactive part;
- non-answered mode, i.e. the IN node requests the SCN to establish the voice channels in both directions and then continues with the interactive mode.

The answered mode will be experienced by the Gateway as a normal call while the non-answered mode will be experienced as a progress indicator No. 8 *'In-band information or appropriate pattern is available'* in a CALL PROC or a PROGRESS message.

Annex D (informative): Call Signalling for calls from a terminal in an SCN to an H.323 Terminal

D.1 Introduction

Establishing calls from an H.323 Terminal to a terminal in an SCN raises a unique problem of addressing - the only mean of addressing a user on a basic terminal in an SCN is by the number associated with that terminal (i.e. its "SCN address"). In public SCN applications this is an E.164 [23] number, and in private IP network to private SCN applications, this is a "private network number" and will be formatted according to ISO/IEC 11571 [7] or ETS 300 189 [3].

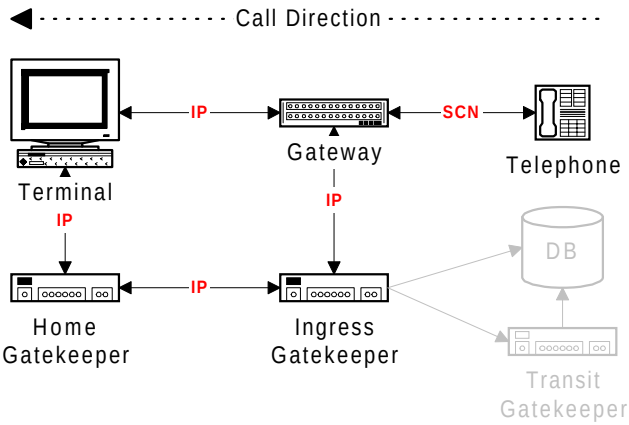


Figure D.1: Configuration for calls from a terminal in an SCN to an H.323 Terminal

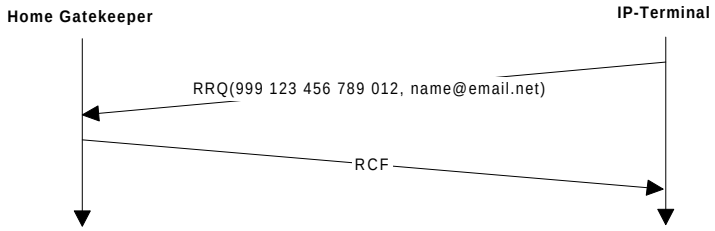
This has an interesting side effect, as the Ingress Gatekeeper shall resolve the IP address of the Terminal from an SCN number. The issue of SCN number to IP address resolution is complex, and is being developed in Working Group 4 and standard organizations outside ETSI (e.g. IETF, ITU-T WG16 WP2 Q.13). For private networks numbers however the conversion to an IP address is likely to be less complex and will depend on the implementation.

The call signalling can be made generic enough to not require extra standardization for the special case of SCN number to IP resolution.

NOTE: The Gateway and the H.323 Terminal are not aware of the back-end service(s) used by the Ingress Gatekeeper to resolve the SCN number into an IP address.

D.2 H.323 Terminal Registration

As the Home Gatekeeper will be requested by Ingress Gatekeepers to locate the terminal using an SCN number, H.323 Terminals that wish to receive calls from terminals in SCNs need to register with their Gatekeeper an SCN number that is equal to their registered global SCN number (if applicable) or private network number.



NOTE: This does not stop a H.323 Terminal from also registering an additional e-mail-like alias, or from registering some well-known ID that the Gatekeeper will recognize and transform into the Client's global code (and return it in the RCF message).

Figure D.2: H.323 Terminal Registration for calls from a terminal in an SCN to an H.323 Terminal

D.3 SCN number-IP Identification

D.3.1 Identification by the Switch/Private Integrated Services Network Exchange (PINX)

The main problem for the Switch/PINX is to recognize that a given SCN number could be resolved into the IP address of an H.323 Terminal, instead of that of a remote terminal in an SCN or a Gateway. This may be done by looking for a global prefix (e.g. +999), local prefix (e.g. *999) or other means.

When the SCN number has been identified by the Switch/PINX as one assigned to IP, the Switch/PINX shall transfer the call to a Gateway (which may be collocated with the Switch/PINX).

D.3.2 Identification by the Ingress Gateway

The Gateway has not explicit knowledge whether an incoming call from an SCN is addressing an H.323 Terminal or another Gateway - it receives a call from the SCN with some destination number, and attempts to locate a callable TIPHON endpoint (Gateway or Terminal) by contacting its Gatekeeper - it makes no difference from the gateway's perspective.

D.3.3 Identification by the Ingress Gatekeeper

The Ingress Gatekeeper shall be able to recognize that the destination SCN number is that of an H.323 Terminal and not that of a terminal in an SCN. When recognizing the SCN number as that of an H.323 Terminal it shall consult some internal and/or external databases to find the address of the Home Gatekeeper of the owner of that SCN number.

When the address of the Home Gatekeeper is found, 4 resolution methods could be used:

- the Ingress Gatekeeper may return an LocationReject (LRJ) (Redirect ➠ Home Gatekeeper) message, which will cause the Gateway to reissue the LocationRequest (LRQ) message directly to the Home Gatekeeper;

- the Ingress Gatekeeper may issue an ITU-T Recommendation H.225.0 annex G [9] AccessRequest to the Home Gatekeeper, and reply with the result to the Ingress Gateway

- the Ingress Gatekeeper may issue an ITU-T Recommendation H.225.0 annex G [9] AccessRequest to the Home Gatekeeper, and reply with its own call-signalling address to facilitate a Gatekeeper-routed call;

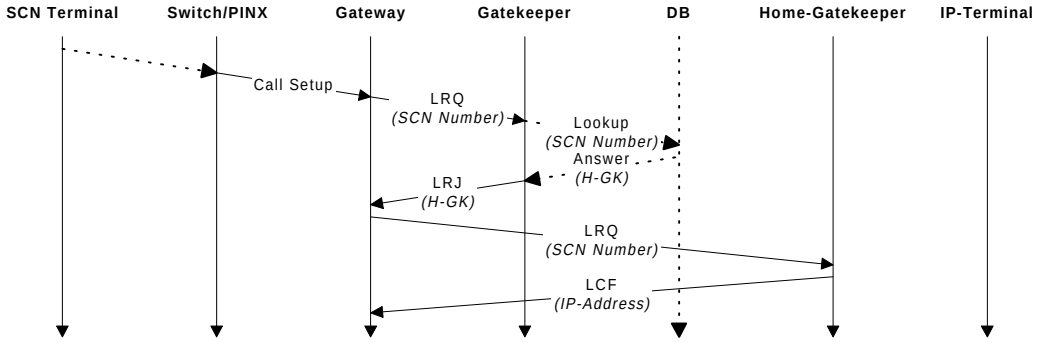
- both the Ingress Gateway and the Terminal may be registered with the same Gatekeeper, in which case the Gatekeeper does not have to perform any further queries or redirections.

D.4 Message flows

The following subclauses show the message flow for each possible sequence as described above.

D.4.1 Direct/LRJ (Redirect)

The following flow of messages shall be used to signal a call from a terminal in an SCN to an H.323 Terminal using the Direct/LRJ (Redirect) model:

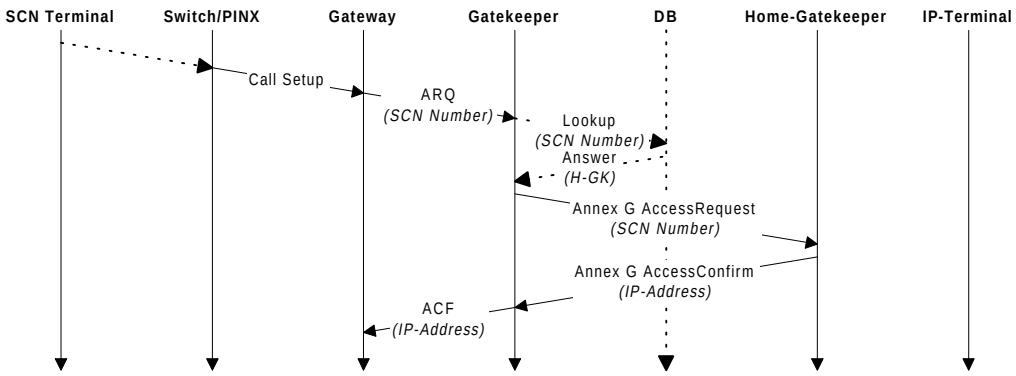


NOTE: The rest of the call is the same as for calls from an H.323 Terminal to a terminal in an SCN (e.g. ARQ/ACF, SETUP, etc.).

Figure D.3: Message flow for a call from a terminal in an SCN to an H.323 Terminal: Direct/LRJ (Redirect)

D.4.2 Direct/Inter-Gatekeeper

The following flow of messages shall be used to signal a call from a terminal in an SCN to an H.323 Terminal using the Direct/Inter-Gatekeeper model:

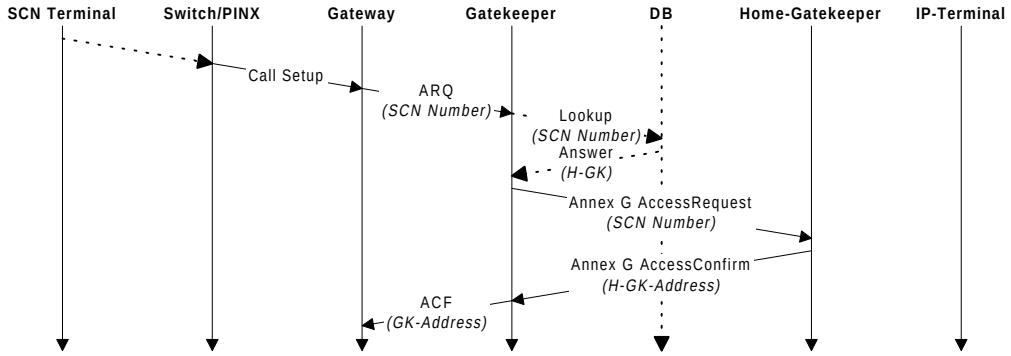


NOTE: The rest of the call is the same as for calls from an H.323 Terminal to a terminal in an SCN (e.g. ARQ/ACF, SETUP, etc.).

Figure D.4: Message flow for calls from a terminal in an SCN to an H.323 Terminal: Direct/Inter-Gatekeeper

D.4.3 Gatekeeper-routed

The following flow of messages shall be used to signal a call from a terminal in an SCN to an H.323 Terminal using the Gatekeeper-routed model:

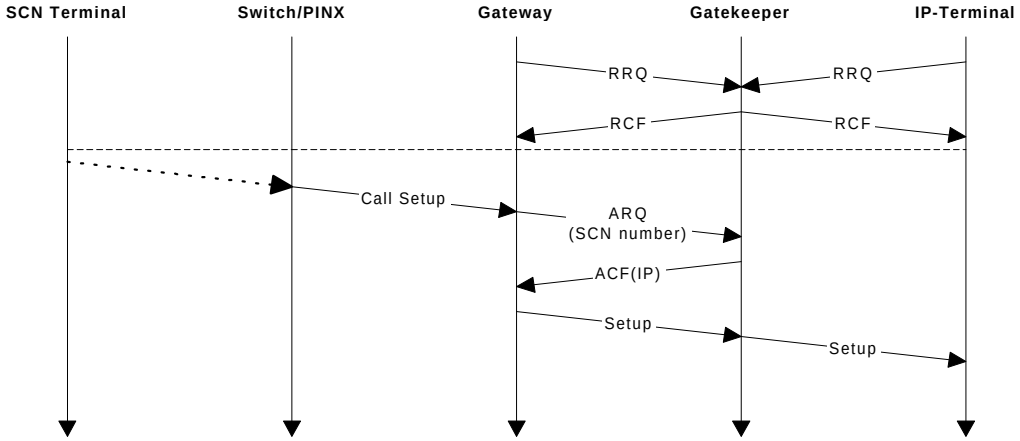


NOTE 1: In the message-flow above, both Gatekeepers route the call-control channel. It is also possible to have a mixed Direct-Routed/Gatekeeper-Routed at each side of the call.
NOTE 2: The rest of the call is the same as for calls from an H.323 Terminal to a terminal in an SCN (e.g. ARQ/ACF, SETUP, etc.).

Figure D.5: Message flow for calls from a terminal in an SCN to an H.323 Terminal: Gatekeeper-routed

D.4.4 Local Scope

The following flow of messages shall be used when both the Ingress Gateway and the H.323 Terminal are registered with the same Gatekeeper. Although an arguably rare case, this is still a possible scenario.

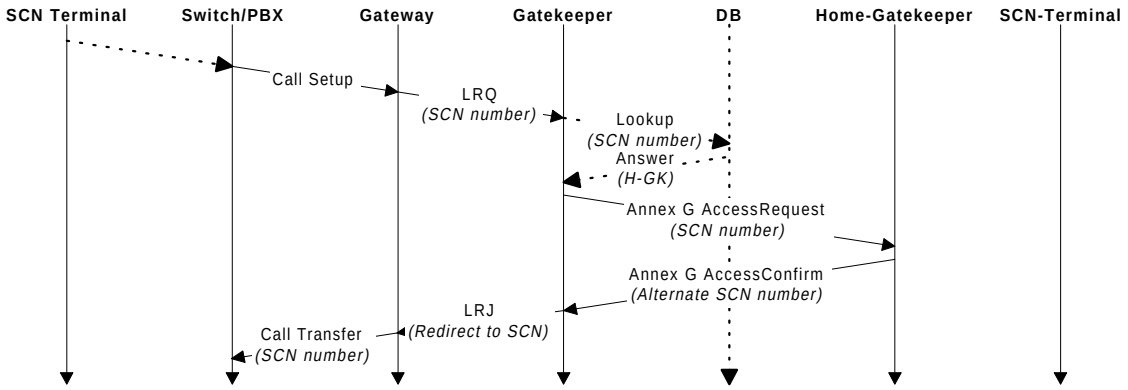


NOTE: The rest of the call is the same as for calls from an H.323 Terminal to a terminal in an SCN (e.g. ARQ/ACF, SETUP, etc.).

Figure D.6: Message flow for calls from a terminal in an SCN to an H.323 Terminal: Local Scope

D.5 SCN Re-routing

A special case exists when the current location of the user is returned by the Home Gatekeeper as an SCN number instead of a callable IP address. In this case the call may be returned to the Switch/PINX to be routed as a normal SCN call. Please note that ITU-T Recommendation H.225.0 version 3 [9] supports the "RedirectToSCN" reject code.



NOTE: In this scenario the TIPHON network is being used as IN infrastructure for the SCN network.

Figure D.7: Call flow for SCN Re-Routing

D.6 H.225.0 annex G as a Global-Code front-end Protocol

Annex G of ITU-T Recommendation H.225.0 [9] allows Gatekeepers to advertise SCN coverage. This allows Gatekeepers that cannot access an SCN-IP Database directly to request Gatekeepers that can to resolve the address on their behalf. It is also possible for the Global Code Gatekeeper itself to request the address of the terminal in the SCN from the Home Gatekeeper, which will result in the originating Gatekeeper receiving the address of that terminal directly from the Global Code Gatekeeper immediately (and not having to execute the reject/redirect sequence). This sequence does not require any special consideration, as it is already covered by the standard.

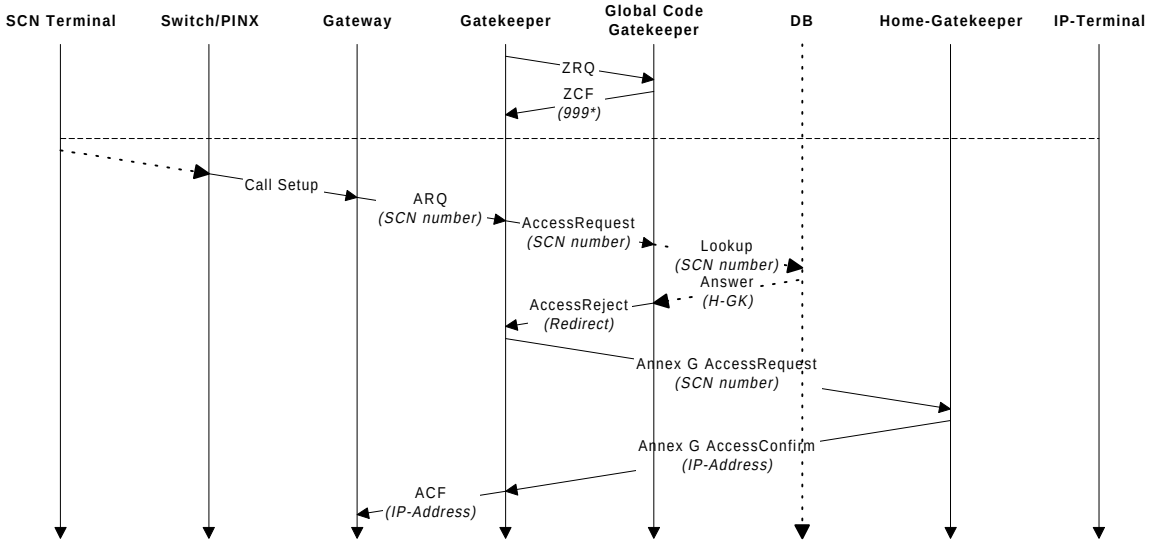


Figure D.8: Call flow for Indirect Inter-Gatekeeper

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

- TR 101 300: "Telecommunications and Internet Protocol Harmonization Over Network (TIPHON); Description of technical issues".

History

Document history		
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