
**Information technology —
Telecommunications and information
exchange between systems — Corporate
telecommunication networks — Signalling
interworking between QSIG and H.323 —
Call transfer supplementary services**

*Technologies de l'information — Télécommunications et échange
d'information entre systèmes — Réseaux de télécommunications
cororatifs — Signalisation de travail entre QSIG et H.323 — Services
supplémentaires de transfert d'appel*

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 21410 was prepared by ECMA (as ECMA-308) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Annex A forms a normative part of this International Standard. Annex B is for information only.

Introduction

This International Standard is one of a series of Standards defining the interworking of services and signalling protocols deployed in Corporate telecommunication Networks (CNs). The series uses telecommunication concepts as developed by ITU-T and conforms to the framework of International Standards on Open Systems Interconnection as defined by ISO/IEC.

This International Standard defines the signalling protocol interworking for call transfer supplementary services between a Private Integrated Services Network (PISN) and a packet-based private telecommunications network based on the Internet Protocol (IP). It is further assumed that the protocol for the PISN part is that defined for the Q reference point (QSIG) and that the protocols for the IP-based network are based on ITU-T Recommendation H.323.

This International Standard is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of ISO/IEC JTC 1, ITU-T, ETSI and other international and national standardization bodies. It represents a pragmatic and widely based consensus.

Information technology - Telecommunications and information exchange between systems - Corporate telecommunication networks - Signalling interworking between QSIG and H.323 - Call transfer supplementary services

1 Scope

This International Standard specifies signalling interworking between “QSIG” and “H.323” in support of the call transfer supplementary services within a Corporate telecommunication Network (CN).

“QSIG” is a signalling protocol that operates at the Q reference point between Private Integrated Services eXchanges (PINX) within a Private Integrated Services Network (PISN). The Q reference point is defined in ISO/IEC 11579-1. A PISN provides circuit-switched basic services and supplementary services to its users. QSIG is specified in other Standards, in particular ISO/IEC 11572 (call control in support of basic services), ISO/IEC 11582 (generic functional protocol for the support of supplementary services) and a number of standards specifying individual supplementary services. ISO/IEC 13869 specifies the QSIG protocol in support of call transfer by consultation and ISO/IEC 19460 specifies the QSIG protocol in support of single step call transfer.

“H.323” is a set of signalling protocols for the support of voice or multimedia communication within a packet network, in particular a packet network that uses the Internet Protocol (IP) as its network layer protocol (IP network). H.323 signalling protocols operate between endpoints in an IP network, either indirectly via one or more gatekeepers, or directly. An endpoint can be a terminal or a gateway to another network. H.323 is an “umbrella” recommendation referring to various ITU-T recommendations, in particular Recommendations H.225.0 and H.245 (basic communication capabilities) and Recommendation H.450.1 (generic functional protocol for the support of supplementary services). Recommendation H.450.2 specifies the H.323 protocol in support of call transfer.

NOTE - H.450.2 applies only to the 1998 version of H.323 (also known as H.323 version 2) and to later versions.

Call transfer by consultation, as supported by ISO/IEC 13869, is a supplementary service that enables a user (user A) to transform two of that user's calls (at least one of which must be answered) into a new call between the two other users in the two calls (users B and C).

Single step call transfer, as supported by ISO/IEC 19460, is a supplementary service that enables a user (user A) to transform an existing call between user A and user B into a new call between user B and user C without user A needing to establish a call with user C prior to transfer.

Call transfer, as supported by H.450.2, is a supplementary service that enables the served user (user A) to transform an existing call with a second user (user B) into a new call between user B and a third user (user C) selected by user A. User A may or may not have a call established with user C prior to call transfer. If a call is already established between user A and user C, this is known as transfer by consultation and is equivalent to call transfer as supported by ISO/IEC 13869. If a call is not already established between user A and user C, this is known as single step call transfer and is equivalent to call transfer as supported by ISO/IEC 19460.

Interworking between QSIG and H.323 permits a call originating at a user of a PISN to terminate at a user of an IP network, or a call originating at a user of an IP network to terminate at a user of a PISN. This International Standard provides the following additional capabilities:

- a PISN user with two calls established, at least one of which being to or from a user in an IP network, to be able to transform those two calls into a new call between the other two users involved;
- a PISN user with a call established to or from a user in an IP network to be able to transform that call into a new call between the IP network user and a third user selected by the PISN user, that third user being either in the IP network or in the PISN;
- a PISN user with a call established to a second PISN user to be able to transfer that call into a new call between the second user and a third user selected by the first user, that third user being in an IP network;
- an IP network user with two calls established, at least one of which being to or from a user in a PISN, to be able to transform those two calls into a new call between the other two users involved;
- an IP network user with a call established to or from a user in a PISN to be able to transform that call into a new call between the PISN user and a third user selected by the IP network user, that third user being either in the IP network or in the PISN; and

- an IP network user with a call established to a second user in the IP network to be able to transfer that call into a new call between the second user and a third user selected by the first user, that third user being in a PISN.

This International Standard is applicable to any interworking unit that can act as a gateway between a PISN employing QSIG and an IP network employing H.323.

2 Conformance

In order to conform to this International Standard, a gateway shall satisfy the requirements identified in the Implementation Conformance Statement (ICS) proforma in annex A.

3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 11572:2000, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit mode bearer services - Inter-exchange signalling procedures and protocol*

ISO/IEC 11579-1:1994, *Information technology - Telecommunications and information exchange between systems - Private integrated services network - Part 1: Reference configuration for PISN Exchanges (PINX)*

ISO/IEC 11582:1995, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Generic functional protocol for the support of supplementary services - Inter-exchange signalling procedures and protocol*

ISO/IEC 13869:1995, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call transfer supplementary service*

ISO/IEC 19460:2001, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Single Step Call Transfer Supplementary Service*

ISO/IEC 21409:2001, *Information technology - Telecommunications and information exchange between systems - Corporate telecommunication networks - Signalling interworking between QSIG and H.323 - Generic functional protocol for the support of supplementary services*

ITU-T Rec. H.225.0:1998 (or later edition), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*

ITU-T Rec. H.245:1998 (or later edition), *Control protocol for multimedia communication*

ITU-T Rec. H.323:1998 (or later edition), *Packet-based multimedia communications systems*

ITU-T Rec. H.450.1:1998, *Generic functional protocol for the support of supplementary services in H.323*

ITU-T Rec. H.450.2:1998, *Call transfer supplementary service for H.323*

4 Definitions

For the purposes of this International Standard, the following definitions apply.

4.1 External definitions

This International Standard uses the following terms defined in other documents:

– Call	(ISO/IEC 21409)
– Corporate telecommunication Network (CN)	(ISO/IEC 21409)
– Endpoint	(ITU-T Rec. H.323)
– IP network	(ISO/IEC 21409)
– Gatekeeper	(ITU-T Rec. H.323)
– Private Integrated Services Network (PISN)	(ISO/IEC 21409)

- Private Integrated services Network eXchange (PINX) (ISO/IEC 11579-1)

Additionally the definitions in ISO/IEC 13869, ISO/IEC 19460 and ITU-T Recommendation H.450.2 apply as appropriate.

4.2 Other definitions

4.2.1 Entity A : In call transfer by consultation, the signalling entity at the PINX or H.323 endpoint serving the transferring user (user A).

4.2.2 Entity A* : In single step call transfer, the signalling entity at the PINX or H.323 endpoint serving the transferring user (user A).

4.2.3 Entity B : In call transfer by consultation, the signalling entity in the PISN or IP network associated with the call between the transferring user (user A) and the transferred user (user B).

4.2.4 Entity B* : In single step call transfer, the signalling entity in the PISN or IP network associated with the call between the transferring user (user A) and the transferred user (user B).

4.2.5 Entity B' : Signalling entity at the PINX or the H.323 endpoint serving the transferred user (user B).

4.2.6 Entity C : In call transfer by consultation, the signalling entity in the PISN or IP network associated with the call between the transferring user (user A) and the transferred-to-user (user C).

4.2.7 Entity C* : In single step call transfer, the signalling entity in the PISN or IP network associated with the call between the transferred user (user B) and the transferred-to-user (user C).

4.2.8 Entity C' : Signalling entity at the PINX or H.323 endpoint serving the transferred-to-user (user C).

4.2.9 Gateway : A gateway as defined in H.323 specifically for the purpose of interworking with a network employing QSIG.

4.2.10 Leg AB : In call transfer by consultation, the call segment that lies between entity A and entity B.

4.2.11 Leg AB* : In single step call transfer, the call segment that lies between entity A* and entity B*.

4.2.12 Leg AC : In call transfer by consultation, the call segment that lies between entity A and entity C.

4.2.13 Leg BC : In call transfer by consultation, the call segment that lies between entity B and entity C.

4.2.14 Leg BC* : In single step call transfer, the call segment that lies between entity B* and entity C*.

4.2.15 Leg B : In call transfer by consultation, the call segment that lies between the entity B and entity B'.

4.2.16 Leg B* : In single step call transfer, the call segment that lies between entity B* and entity B'.

4.2.17 Leg C : In call transfer by consultation, the call segment that lies between entity C and entity C'.

4.2.18 Scenario AB1 : Interworking arrangement in which entity A (PINX A) is in the PISN and entity B is in the IP network.

4.2.19 Scenario AB*1 : Interworking arrangement in which entity A* (PINX A) is in the PISN and entity B* is in the IP network.

4.2.20 Scenario AB2 : Interworking arrangement in which entity A (endpoint A) is in the IP network and entity B is in the PISN.

4.2.21 Scenario AB*2 : Interworking arrangement in which entity A* (endpoint A) is in the IP network and entity B* is in the PISN.

4.2.22 Scenario AC1 : Interworking arrangement in which entity A (PINX A) is in the PISN and entity C is in the IP network.

4.2.23 Scenario AC2 : Interworking arrangement in which entity A (endpoint A) is in the IP network and entity C is in the PISN.

4.2.24 Scenario BC1 : Interworking arrangement in which entity B (PINX B) is in the PISN and entity C is in the IP network.

4.2.25 Scenario BC*1 : Interworking arrangement in which entity B* (PINX B) is in the PISN and entity C* is in the IP network.

4.2.26 Scenario BC2 : Interworking arrangement in which entity B is in the IP network and entity C is in the PISN.

4.2.27 Scenario BC*2 : Interworking arrangement in which entity B* is in the IP network and entity C* is in the PISN.

4.2.28 Scenario B1 : Interworking arrangement in which entity B (PINX B) is in the PISN and entity B' is in the IP network.

4.2.29 Scenario B*1 : Interworking arrangement in which entity B* (PINX B) is in the PISN and entity B' is in the IP network.

4.2.30 Scenario B2 : Interworking arrangement in which entity B (diverting endpoint or its gatekeeper) is in the IP network and entity B' is in the PISN.

4.2.31 Scenario B*2 : Interworking arrangement in which entity B* (diverting endpoint or its gatekeeper) is in the IP network and entity B' is in the PISN.

4.2.32 Scenario C1 : Interworking arrangement in which entity C (PINX C) is in the PISN and entity C' is in the IP network.

4.2.33 Scenario C2 : Interworking arrangement in which entity C (endpoint C) is in the IP network and entity C' is in the PISN.

5 Acronyms

APDU	Application Protocol Data Unit
CN	Corporate telecommunication Network
ICS	Implementation Conformance Statement
IP	Internet Protocol
PINX	Private Integrated services Network eXchange
PISN	Private Integrated Services Network
SS-CT	Supplementary Service Call Transfer
SS-SSCT	Supplementary Service Single Step Call Transfer

6 Service architecture

6.1 Service architecture for invocation and operation

6.1.1 QSIG service architecture

QSIG supports two different call transfer services:

- transfer by consultation (ISO/IEC 13869); and
- single step call transfer (ISO/IEC 19460).

6.1.1.1 ISO/IEC 13869 service architecture - transfer by consultation

ISO/IEC 13869 supports a call transfer service that starts from a situation where user A has two calls (typically one of which is on hold). Transfer from this situation can be performed in two ways: by join (at the PINX serving user A) or by rerouteing.

A single model can be derived to accommodate both scenarios. The model involves five signalling entities as follows:

- entity A – acts on behalf of user A and co-ordinates the transfer;
- entity B – initiates the re-routed connection from the first transferred user (user B) to the other transferred user (user C);
- entity B' – acts on behalf of user B;
- entity C – terminates the re-routed connection from user B to user C and completes the join; and
- entity C' – acts on behalf of user C.

This can be represented diagrammatically as shown in figure 1.

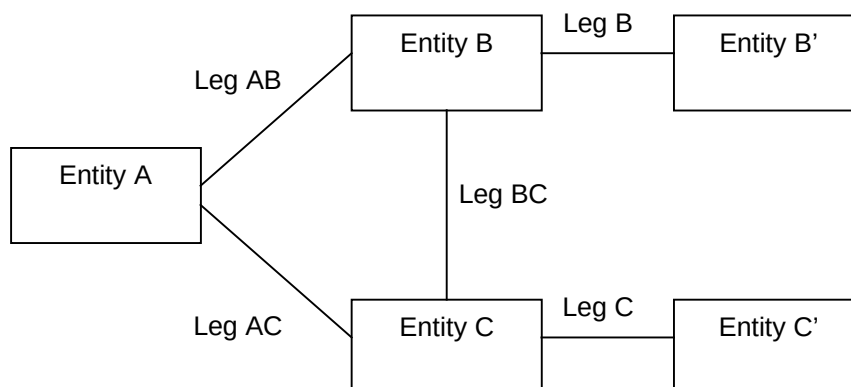


Figure 1 – Generalised call transfer model for QSIG transfer by consultation

From this it can be seen that there are five segments or “legs” to the call:

- leg AB between entity A and entity B;
- leg AC between entity A and entity C;
- leg BC between entity B and entity C;
- leg B between entity B and entity B’; and
- leg C between entity C and entity C’.

The protocol defined in ISO/IEC 13869 supports each of these five legs.

For both transfer by join and transfer by rerouting, entities A, B’ and C’ are located at the PINX serving user A, user B and user C respectively.

For call transfer by join, entities B and C are collocated with entity A in the PINX serving user A. This means that legs AB, AC and BC are all internal to that PINX, and therefore the QSIG protocols for these legs do not apply. Only the QSIG protocols for legs B and C apply. This is shown in figure 2.

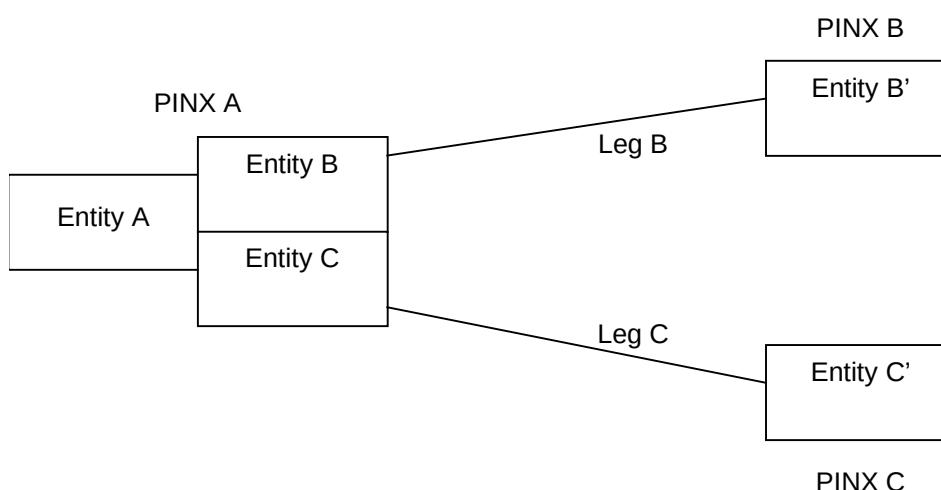


Figure 2 – Call transfer by join model for QSIG

For call transfer by rerouting, entity B is collocated with entity B’ in the PINX serving user B, and entity C is collocated with entity C’ in the PINX serving user C. This means that legs B and C are internal to the respective PINXs, and therefore the QSIG protocols for these legs do not apply. Only the QSIG protocols for legs AB, AC and BC apply. This is shown in figure 3.

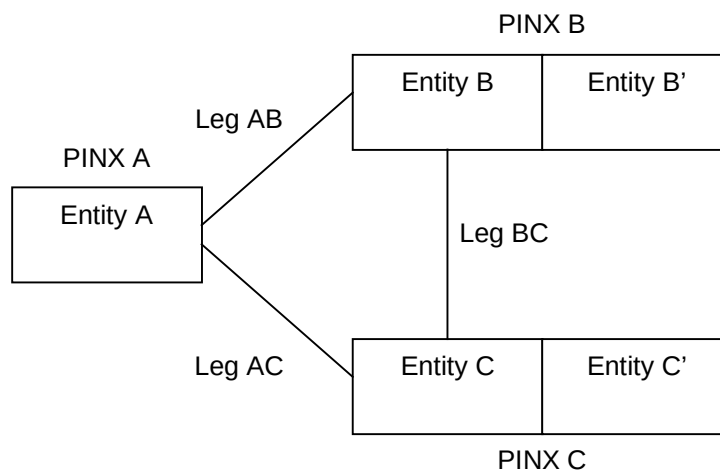


Figure 3 – Call transfer by rerouting model for QSIG

In both cases (transfer by join and transfer by re-routing), where a user is in another network, the role of entity A, entity B' or entity C' is performed by the other network, the gateway PINX or the two in combination. However, from the QSIG point of view the role is performed by the gateway PINX.

6.1.1.2 ISO/IEC 19460 service architecture – single step call transfer

ISO/IEC 19460 supports a call transfer service that starts from a situation where user A has an active call with user B and the call is to be transferred to user C in the case where A does not already have a call to user C.

If user A does not provide sufficient information to enable a call to be established to user C, user B may provide additional information to identify user C and enable the call to be established.

The generalised model for Single Step call Transfer is as shown in figure 4.

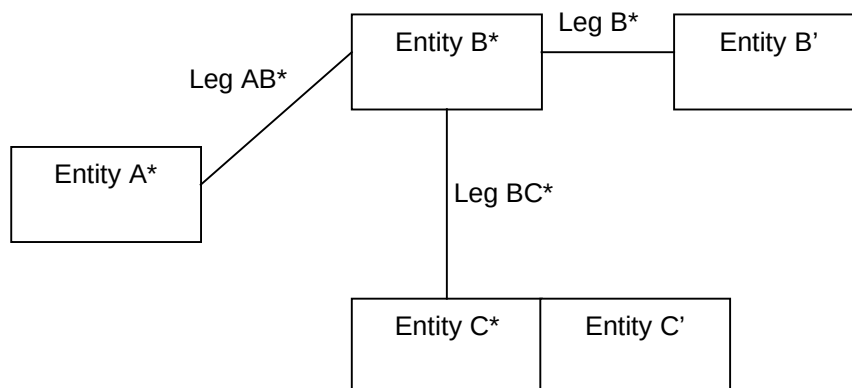


Figure 4 – Generalised model for QSIG Single Step Call Transfer

Compared with the general model for transfer by consultation, the following differences exist:

- entity A* replaces entity A (although it has some common functionality);
- entity B* replaces entity B (although it has some common functionality);
- entity C* replaces entity C;
- leg AB* replaces leg AB (but differs only slightly);
- leg BC* replaces leg BC (but differs only slightly);
- leg B* replaces Leg B (but differs only slightly); and
- leg AC does not exist.

Entities A*, B' and C' are located at the PINX serving user A, user B and user C respectively.

Entity B* may be located at any PINX between entity A* and Entity B'.

Entity C* is always collocated with entity C' in the PINX serving user C. This means that the leg between entity C* and entity C' is internal to the PINX, and therefore the QSIG protocol for this leg does not apply. Only the protocols defined in ISO/IEC 19460 for legs AB*, BC* and B* apply.

Where a user is in another network, the role of entity A*, entity B' or the combined entities C*/C' is performed by the other network, the gateway PINX or the two in combination. However, from the QSIG point of view the role is performed by the gateway PINX.

6.1.2 H.450.2 service architecture

H.450.2 supports two different call transfer services:

- transfer by consultation (similar to the service supported by ISO/IEC 13869); and
- single step call transfer (similar to the service supported by ISO/IEC 19460).

6.1.2.1 Transfer by consultation

The model shown in figure 1 for QSIG call transfer by consultation applies also to H.450.2. Various scenarios arise, depending on gatekeeper involvement. A gatekeeper can act on behalf of user B and/or a gatekeeper can act on behalf of user C.

If no gatekeepers are involved in the call transfer service, entity A is located at user A's endpoint, entities B and B' are located at user B's endpoint, and entities C and C' are located at user C's endpoint. Legs AB, AC and BC are supported by H.450.2 signalling. This is shown in figure 5.

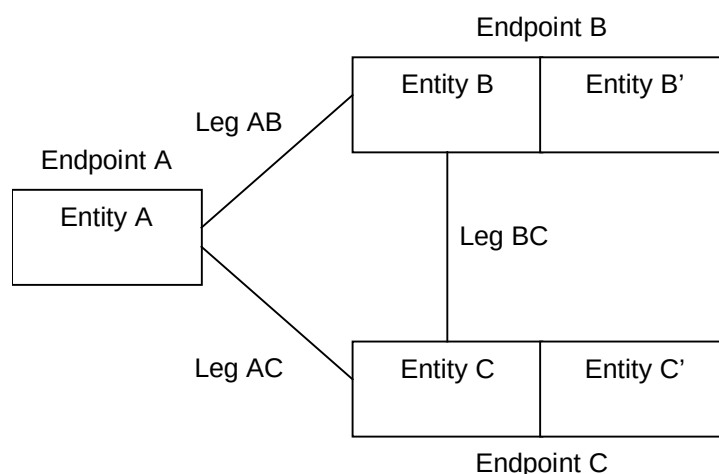


Figure 5 – H.450.2 call transfer by consultation model – no gatekeepers involved

If a gatekeeper is involved in call transfer on behalf of user B and another gatekeeper is involved on behalf of user C, entities B and C are located in the respective gatekeepers and legs AB, AC, CB, B and C are all supported by H.450.2 signalling. This is shown in figure 6.

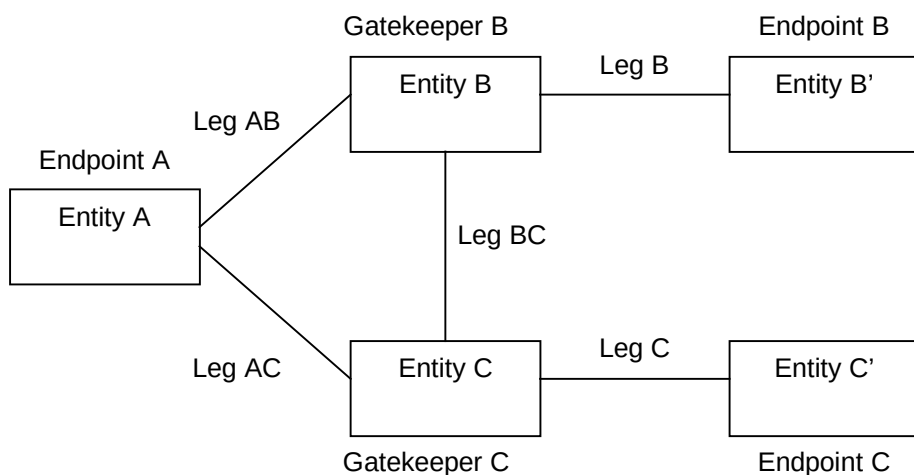


Figure 6 – H.450.2 call transfer by consultation model – gatekeepers involved on behalf of endpoint B and endpoint C

Models for the cases where only entity B or only entity C is located at a gatekeeper can easily be derived.

If the same gatekeeper acts on behalf of user B and user C, the model in figure 7 applies. In this case leg BC is internal to the gatekeeper and H.450.2 signalling does not apply.

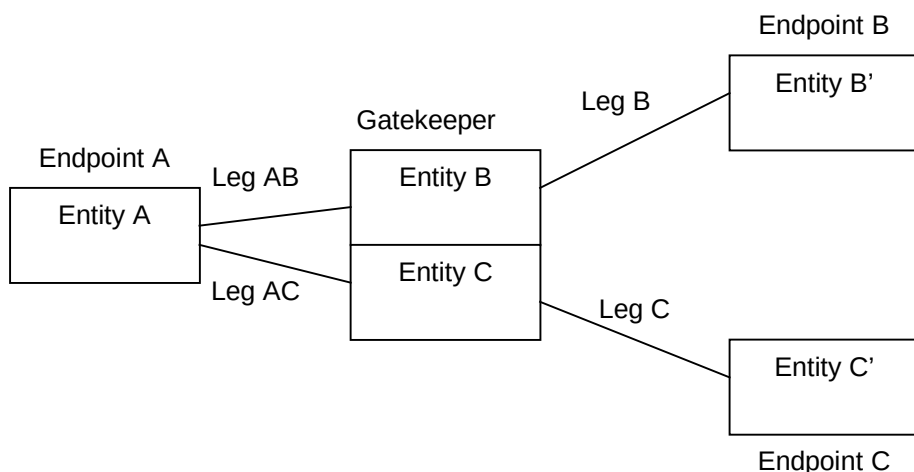


Figure 7 – H.450.2 call transfer by consultation model – single gatekeeper involved on behalf of endpoint B and endpoint C

Where a user is in another network, the role of entity A, entities B and B' or entities C and C' is performed by the other network, the gateway, or the two in combination. However, from the H.450.2 point of view the role is performed by the gateway.

NOTE - The equivalent of QSIG transfer by join does not exist with H.450.2. Legs AB and AC exist in all scenarios (although leg BC can be hidden inside a gatekeeper).

6.1.2.2 Single step call transfer

For single step call transfer, the general model is as shown in figure 4.

Unlike the QSIG single step call transfer supplementary service (see 6.1.1.2), the H.450.2 single step call transfer supplementary service does not enable user B to provide additional information to identify user C if user A did not provide sufficient information to enable a call to be established to user C.

Various scenarios arise, depending on gatekeeper involvement. A gatekeeper can act on behalf of user B and/or a gatekeeper can act on behalf of user C. This has impact on the exposure of legs B* and C*, as for transfer by consultation.

If no gatekeepers are involved in single step call transfer, entity A* is located at user A's endpoint, entities B* and B' are located at user B's endpoint, and entities C* and C' are located at user C's endpoint. Legs AB*, and BC* are supported by H.450.2 signalling. This is shown in figure 8.

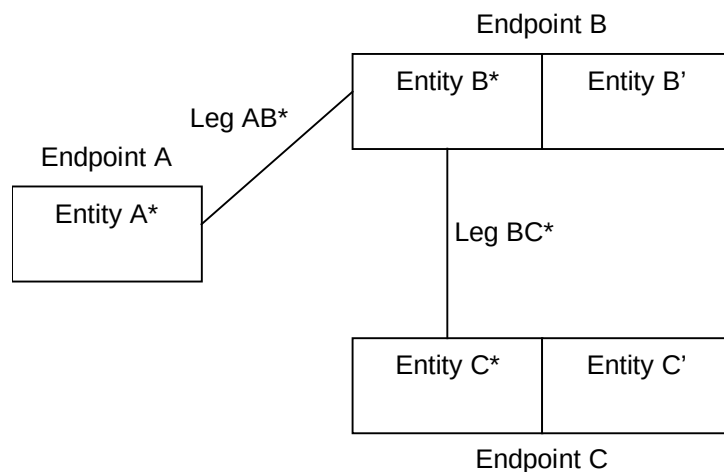


Figure 8 – H.450.2 single step call transfer model– no gatekeepers involved

If a gatekeeper is involved in single step call transfer on behalf of user B and another gatekeeper is involved on behalf of user C, entities B* and C*/C' are located in the respective gatekeepers and legs AB*, BC*, and B* are all supported by H.450.2 signalling. This is shown in figure 9.

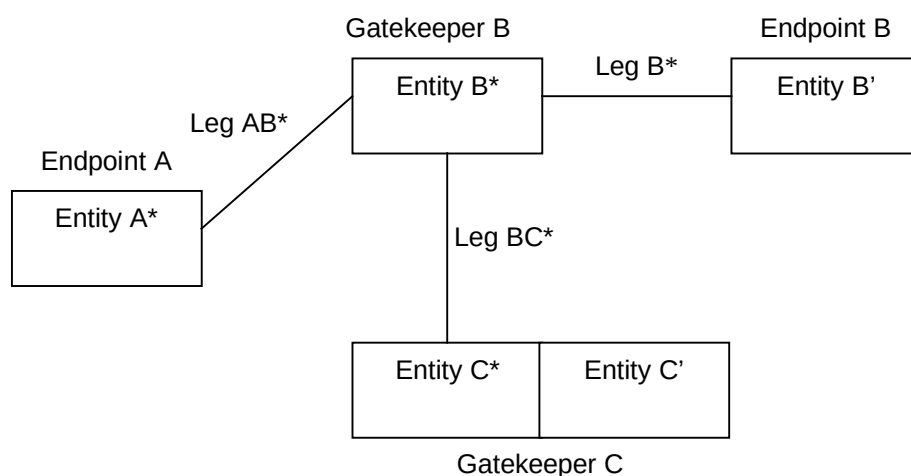


Figure 9 – H.450.2 single call transfer model – gatekeepers involved on behalf of endpoint B and endpoint C

Models for the cases where only entity B or only entity C is located at a gatekeeper can easily be derived.

If the same gatekeeper acts on behalf of user B and user C, the model in figure 10 applies. In this case leg BC* is internal to the gatekeeper and H.450.2 signalling does not apply.

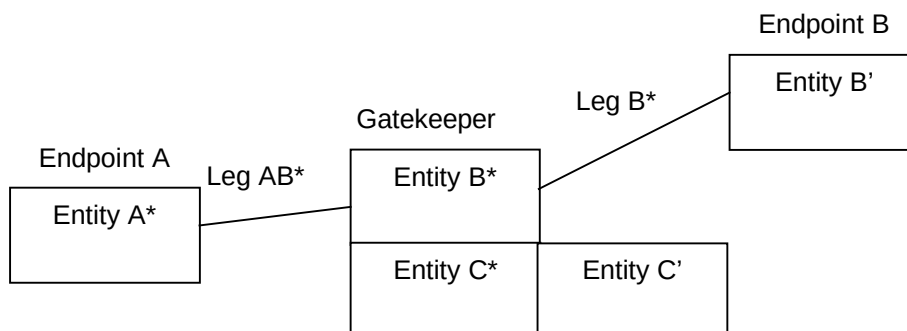


Figure 10 – H.450.2 single step call transfer model – single gatekeeper involved on behalf of endpoint B and endpoint C

In all of these cases of single step call transfer, where a user is in another network, the role of entity A*, entities B* and B' or entities C* and C' is performed by the other network, the gateway, or the two in combination. However, from the H.450.2 point of view the role is performed by the gateway.

6.1.3 Scenarios for interworking

6.1.3.1 Transfer by consultation

The models for QSIG and H.450.2 are very similar. This means that the same model is applicable to the inter-networking situation between an IP network and a PISN, where one or more of the users involved are served by the IP network and the others are served by the PISN.

Entities A, B' and C' are always located in the network of the user concerned, but there is some flexibility in the location of entities B and C. Interworking between H.450.2 and QSIG can occur on any of the five legs. For each of the five possible points of interworking, two scenarios arise, depending on which side of the interworking point the PISN lies. This gives 10 scenarios in total that need to be considered:

- Scenario AB1: Entity A (PINX A) in PISN, entity B (gatekeeper B or endpoint B) in IP network;
- Scenario AB2: Entity A (endpoint A) in IP network, entity B (PINX B) in PISN;
- Scenario AC1: Entity A (PINX A) in PISN, entity C (gatekeeper C or endpoint C) in IP network;
- Scenario AC2: Entity A (endpoint A) in IP network, entity C (PINX C) in PISN;
- Scenario BC1: Entity B (PINX B) in PISN, entity C (gatekeeper C or endpoint C) in IP network;
- Scenario BC2: Entity B (gatekeeper B or endpoint B) in IP network, entity C (PINX C) in PISN;
- Scenario B1: Entity B (PINX B) in PISN, entity B' (endpoint B) in IP network;
- Scenario B2: Entity B (gatekeeper B or endpoint B) in IP network, entity B' (PINX B) in PISN;
- Scenario C1: Entity C (PINX C) in PISN, entity C' (endpoint C) in IP network; and
- Scenario C2: Entity C (gatekeeper C or endpoint C) in IP network, entity C' (PINX C) in PISN.

With scenarios AB1, AB2, AC1, AC2, BC1 and BC2, the PISN is involved in transfer by rerouting. Since this is only an optional part of ISO/IEC 13869, these scenarios will not always be available.

It is possible for more than one scenario to apply to the same call. In particular, because of the triangular situation, scenarios AB1, AB2, AC1, AC2, BC1 and BC2 will always occur in pairs, e.g., scenarios AB1 and AC1 if entity A is in the PISN and entities B and C are in the IP network.

A point of interworking will be implemented in a gateway, which acts as both an H.323 endpoint from the point of view of the IP network and an end PINX from the point of view of the PISN. Call transfer entities can be located in the gateway but are logically separate from the point of interworking. For example, if user B is in the PISN and users A and C are in the IP network, entity B could be located in the gateway on the IP network side of the interworking point, with entity B' in the PISN (PINX B). Logically interworking would still be taking place on leg B.

6.1.3.2 Single step call transfer

The models for QSIG and H.450.2 are very similar. This means that the same model is applicable to the inter-networking situation between an IP network and a PISN, where one or more of the users involved are served by the IP network and the others are served by the PISN.

Entities A*, B*, C* and C' are always located in the network of the user concerned, but there is some flexibility in the location of entity B*. Interworking between H.450.2 and QSIG can occur on any of legs AB*, BC* and B*. For each of the three points of interworking, two scenarios arise, depending on which side of the interworking point the PISN lies. This gives six scenarios in total that need to be considered:

- Scenario AB*1: Entity A* (PINX A) in PISN, entity B* (gatekeeper B* or endpoint B*) in IP network;
- Scenario AB*2: Entity A* (endpoint A) in IP network, entity B* (PINX B) in PISN;
- Scenario BC*1: Entity B* (PINX B) in PISN, entity C* (gatekeeper C* or endpoint C*) in IP network;
- Scenario BC*2: Entity B* (gatekeeper B* or endpoint B*) in IP network, combined entities C*/C' (PINX C) in PISN;
- Scenario B*1: Entity B* (PINX B) in PISN, entity B' (endpoint B) in IP network;
- Scenario B*2: Entity B* (gatekeeper B* or endpoint B*) in IP network, entity B' (PINX B) in PISN.

It is possible for more than one scenario to apply to the same call e.g., scenarios BC*1 and B*1 if entity B* is in the PISN and entities B' and C* are in the IP network.

A point of interworking will be implemented in a gateway, which acts as both an H.323 endpoint from the point of view of the IP network and an end PINX from the point of view of the PISN. Single step call transfer entities can be located in the gateway but are logically separate from the point of interworking. For example, if user B is in the PISN and users A and C are in the IP network, entity B* could be located in the gateway on the IP network side of the interworking point, with entity B' in the PISN (PINX B). Logically interworking would still be taking place on leg B*.

6.1.4 Determination of the location of entities when interworking

6.1.4.1 Transfer by consultation

Entities A, B' and C' are always located in the network of the user concerned. The locations of entities B and C are determined as follows.

If user A and therefore entity A are in the QSIG network at PINX A and PINX A implements only transfer by join or chooses to perform transfer by join, entities B and C will be located at PINX A. Interworking will occur on leg B and/or leg C, depending on the location of users B and C. This is shown in figure 11.

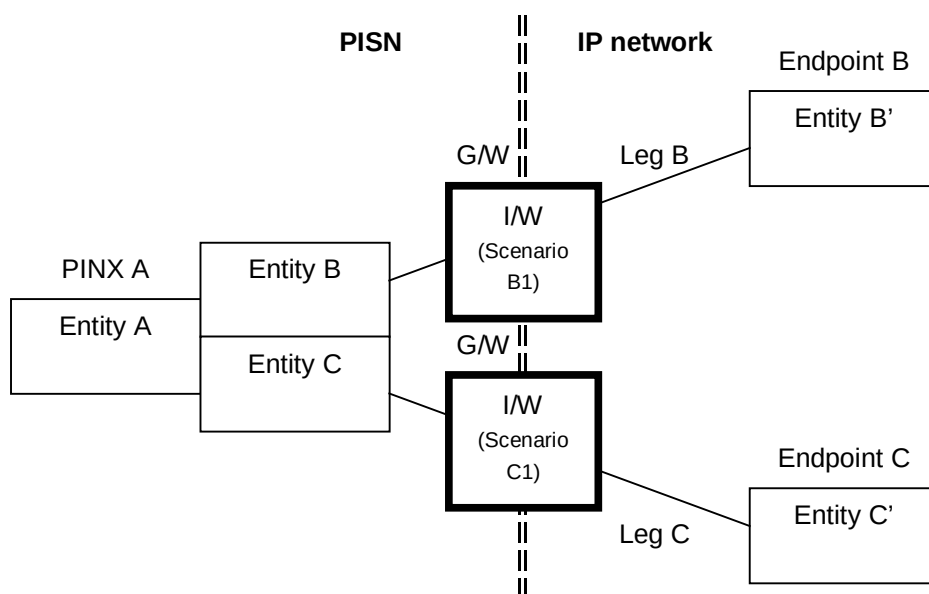


Figure 11 – Interworking – transfer by join in a PISN

If user A and therefore entity A are in the QSIG network at PINX A and PINX A performs transfer by rerouting, if user B is in the IP network the gateway between user A's network and user B's network can choose, on receipt of a transfer request from PINX A, whether to provide entity B (in which case interworking occurs on leg B) or to instruct the IP network to provide entity B (in which case interworking occurs on leg AB).

Similarly, if user C is in the IP network the gateway between user A's network and user B's network can choose, on receipt of a transfer identify request from PINX A, whether to provide entity C (in which case interworking occurs on leg C) or to instruct the IP network to provide entity C (in which case interworking occurs on leg AC).

Figure 12 and figure 13 show the two cases where the two gateways make the same decision. If the two gateways make different decisions, interworking will also occur on leg BC. The case where entity B is in the PISN and entity C is in the IP network is shown in figure 14. The reverse case is not shown.

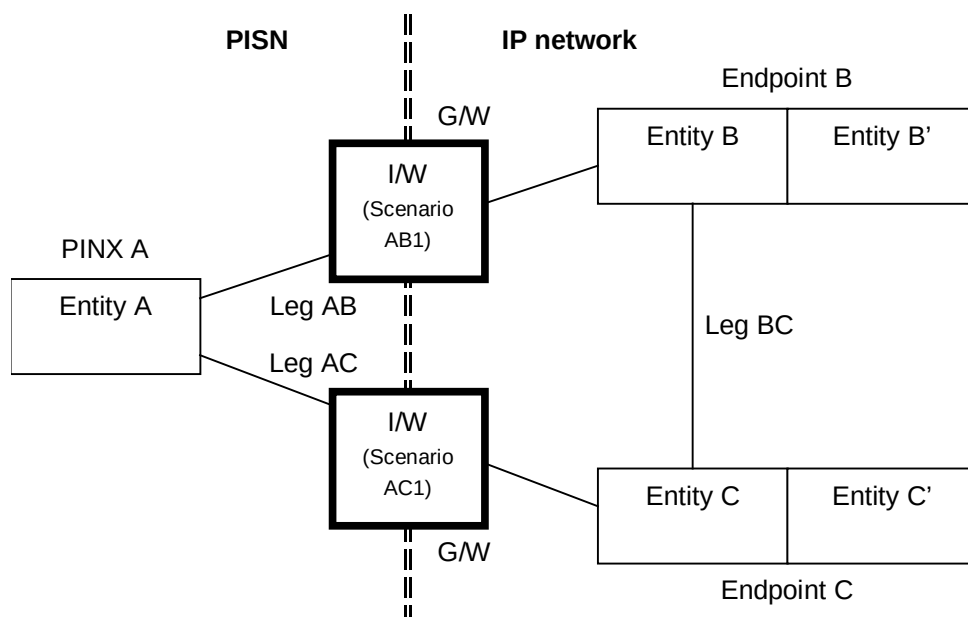


Figure 12 – Interworking – transfer by rerouting between PINX A and endpoints B and C in the IP network

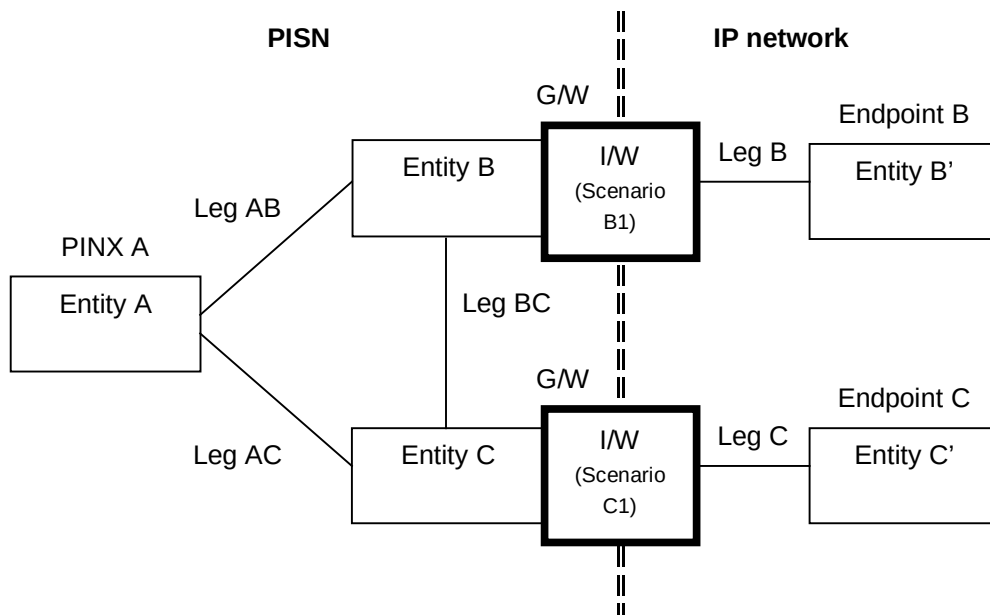


Figure 13 – Interworking – transfer by rerouting between PINX A and two gateways