
**Information technology —
Telecommunications and information
exchange between systems — Private
Integrated Services Network —
Inter-exchange signalling protocol — Call
offer supplementary service**

*Technologies de l'information — Télécommunications et échange
d'information entre systèmes — Réseau privé à intégration de services —
Protocole de signalisation d'interéchange — Service supplémentaire
d'offre 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.

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.

International Standard ISO/IEC 14843 was prepared by ECMA (as Standard ECMA-192) 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.

Annexes A and B form an integral part of this International Standard. Annexes C, D and E are for information only.

Introduction

This International Standard is one of a series of International Standards defining services and signalling protocols applicable to Private Integrated Services Networks (PISNs). The series uses ISDN concepts as developed by ITU-T and conforms to the framework of International Standards for Open Systems Interconnection as defined by ISO/IEC.

This particular International Standard specifies the signalling protocol for use at the Q reference point in support of the Call Offer (CO) supplementary service.

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Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call offer supplementary service

1 Scope

This International Standard specifies the signalling protocol for the support of the Call Offer supplementary service (SS-CO) at the Q reference point between Private Integrated Services Network Exchanges (PINXs) connected together within a Private Integrated Services Network (PISN).

SS-CO is a supplementary service which, on request from the calling user (or on that user's behalf), enables a call to be offered to a busy called user and to wait for that called user to accept this call.

The Q reference point is defined in ISO/IEC 11579-1.

Service specifications are produced in three stages and according to the method specified in CCITT Recommendation I.130. This International Standard contains the stage 3 specification for the Q reference point and satisfies the requirements identified by the stage 1 and stage 2 specifications in ISO/IEC 14841.

The signalling protocol for SS-CO operates on top of the signalling protocol for basic circuit switched call control, as specified in ISO/IEC 11572, and uses certain aspects of the generic procedures for the control of supplementary services specified in ISO/IEC 11582.

This International Standard also specifies additional signalling protocol requirements for the support of interactions at the Q reference point between SS-CO and other supplementary services and ANFs.

Note - Additional interactions that have no impact on the signalling protocol at the Q reference point can be found in the relevant stage 1 specifications.

This International Standard is applicable to PINXs which can interconnect to form a PISN.

2 Conformance

In order to conform to this International Standard, a PINX shall satisfy the requirements identified in the Protocol Implementation Conformance Statement (PICS) proforma in annex B.

3 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 11572:1996,	<i>Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit-mode bearer services - Inter-exchange signalling procedures and protocol.</i>
ISO/IEC 11574:1994,	<i>Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit-mode 64 kbit/s bearer services - Service description, functional capabilities and information flows.</i>
ISO/IEC 11579-1:1994,	<i>Information technology - Telecommunications and information exchange between systems - Private integrated services network - Part 1: Reference configuration for PISN Exchanges (PINX).</i>
ISO/IEC 11582:1995,	<i>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.</i>
ISO/IEC 13869:1995,	<i>Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call transfer supplementary service.</i>

ISO/IEC 13873:1995,	<i>Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call diversion supplementary services.</i>
ISO/IEC 14841:1996,	<i>Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Call offer supplementary service.</i>
ISO/IEC 14844:1996,	<i>Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Do not disturb and do not disturb override supplementary services.</i>
ISO/IEC 14846:1996,	<i>Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call intrusion supplementary service.</i>
CCITT Rec. I.112:1988,	<i>Vocabulary of terms for ISDNs (Blue Book).</i>
CCITT Rec. I.210:1988,	<i>Principles of telecommunication services supported by an ISDN and the means to describe them (Blue Book).</i>
CCITT Rec. Z.100:1988,	<i>Specification and Description Language (Blue Book).</i>
CCITT Rec. Q.950:1994	<i>Digital Subscriber Signalling System No. 1 (DSS1) supplementary services protocols; Structure and general principles.</i>

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:

– Application Protocol Data Unit (APDU)	(ISO/IEC 11582)
– Basic Service	(CCITT Rec. I.210)
– Call, Basic Call	(ISO/IEC 11582)
– Coordination Function	(ISO/IEC 11582)
– Diverted-to PINX	(ISO/IEC 13873)
– Notification	(ISO/IEC 11582)
– Originating PINX	(ISO/IEC 11572)
– Private Integrated Services Network (PISN)	(ISO/IEC 11579-1)
– Private Integrated Services Network Exchange (PINX)	(ISO/IEC 11579-1)
– Rerouting PINX	(ISO/IEC 13873)
– Served User	(ISO/IEC 13873)
– Signalling	(CCITT Rec. I.112)
– Supplementary Service	(CCITT Rec. I.210)
– Supplementary Services Control Entity	(ISO/IEC 11582)
– Terminating PINX	(ISO/IEC 11572)
– Transit PINX	(ISO/IEC 11572)
– User	(ISO/IEC 11574)
– User A	(ISO/IEC 13865)

- User B (ISO/IEC 13865)
- User C (ISO/IEC 13865)

4.2 Other definitions

inter-PINX link : The totality of a signalling channel and a number of user information channels at the Q reference point.

path retention : The retaining of the network connection between the Originating PINX and the Terminating PINX so that a supplementary service (such as SS-CO) can be invoked without establishing a new connection.

Served User PINX : The PINX serving the served user.

5 List of acronyms

ANF	Additional Network Feature
APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation no. 1
ISDN	Integrated Services Digital Network
NFE	Network Facility Extension
PICS	Protocol Implementation Conformance Statement
PINX	Private Integrated Services Network Exchange
PISN	Private Integrated Services Network
SDL	Specification and Description Language
SS-CO	Call Offer supplementary service

6 Signalling protocol for the support of SS-CO

6.1 SS-CO description

Call Offer (SS-CO) is a supplementary service which, on request from the calling user (or on that user's behalf), enables a call to be offered to a busy called user and to wait for that called user to accept this call.

SS-CO is applicable to all circuit mode basic services defined in ISO/IEC 11574.

6.2 SS-CO operational requirements

6.2.1 Requirements on an Originating PINX

Call establishment procedures for the outgoing side of an inter-PINX link and call release procedures, as specified in ISO/IEC 11572, shall apply.

Generic procedures for the call-related control of supplementary services, as specified in ISO/IEC 11582 for an End PINX, shall apply.

6.2.2 Requirements on a Terminating PINX

Call establishment procedures for the incoming side of an inter-PINX link and call release procedures, as specified in ISO/IEC 11572, shall apply.

Generic procedures for the call-related control of supplementary services, as specified in ISO/IEC 11582 for an End PINX, shall apply.

6.2.3 Requirements on a Transit PINX

Basic call procedures specified in ISO/IEC 11572 for a Transit PINX shall apply.

Generic procedures for the call-related control of supplementary services, as specified in ISO/IEC 11582 for a Transit PINX, shall apply.

For SS-CO the requirements are limited to the passing on of Facility information elements for which the destination, as indicated in the NFE, is not the Transit PINX.

6.3 SS-CO coding requirements

6.3.1 Operations

The operations defined in Abstract Syntax Notation number 1 (ASN.1) in table 1 shall apply.

Table 1 - Operations in support of SS-CO

Call-Offer-Operations		{iso(1) standard(0) pss1-call-offer(14843) call-offer-operations (0) }
DEFINITIONS EXPLICIT TAGS ::=		
BEGIN		
IMPORTS		OPERATION, ERROR FROM Remote-Operation-Notation {joint-iso-ccitt(2) remote-operations(4) notation(0)} Extension FROM Manufacturer-specific-service-extension-definition {iso(1) standard(0) pss1-generic-procedures(11582) msi-definition(0)} notAvailable, supplementaryServiceInteractionNotAllowed FROM General-Error-List {ccitt recommendation q 950 general-error-list (1)};
PathRetain	::=	OPERATION ARGUMENT PathRetainArg -- this operation may be used by other supplementary services -- using other values of argument
ServiceAvailable	::=	OPERATION ARGUMENT ServiceAvailableArg -- this operation may be used by other supplementary services -- using other values of argument
CallOfferRequest	::=	OPERATION ARGUMENT DummyArg RESULT DummyRes ERRORS { notAvailable, notBusy, temporarilyUnavailable, supplementaryServiceInteractionNotAllowed, unspecified}
PathRetainArg	::=	CHOICE {serviceList ServiceList, extendedServiceList SEQUENCE{ serviceList ServiceList, extension Extension } }

Table 1 - Operations in support of SS-CO (continued)

```

ServiceAvailableArg ::= CHOICE {serviceList ServiceList,
                                extendedServiceList SEQUENCE{
                                    serviceList ServiceList,
                                    extension Extension
                                }
                                }

ServiceList ::= BIT STRING {callOffer(0)} (SIZE(1..32))
-- bits other than callOffer(0) are reserved for
-- other supplementary services

DummyArg ::= CHOICE{
            null NULL,
            extension [1] IMPLICIT Extension,
            sequenceOfExtn [2] IMPLICIT SEQUENCE OF Extension}

DummyRes ::= CHOICE{
            null NULL,
            extension [1] IMPLICIT Extension,
            sequenceOfExtn [2] IMPLICIT SEQUENCE OF Extension}

CfbOverride ::= OPERATION
              ARGUMENT DummyArg
              -- used in the interaction with Call Forwarding Busy

callOfferRequest CallOfferRequest ::= 34
pathRetain PathRetain ::= 41
serviceAvailable ServiceAvailable ::= 42
cfbOverride CfbOverride ::= 49
notBusy ERROR ::= 1009
-- used when an SS-CO request is received in
-- a Terminating PINX and the called user is not busy

temporarilyUnavailable ERROR ::= 1000
-- used when conditions for invocation of SS-CO
-- are momentarily not met

Unspecified ::= ERROR PARAMETER Extension

unspecified Unspecified ::= 1008

END
-- of Call-Offer-Operations

```

6.3.2 Notifications

The notification defined in Abstract Syntax Notation number 1 (ASN.1) in table 2 shall apply.

Table 2 - Notification in support of SS-CO

Call-Offer-Notifications			
{iso(1) standard(0) pss1-call-offer(14843) call-intrusion-notifications(1)}			
DEFINITIONS EXPLICIT TAGS ::=			
BEGIN			
IMPORTS			
NOTIFICATION FROM Notification-Data-Structure			
{iso(1) standard(0)			
pss1-generic-procedures(11582) notification-data-structure(7));			
RemoteUserAlerting	::=	NOTIFICATION	
		ARGUMENT	NULL
remoteUserAlerting	RemoteUserAlerting	::=	2000
END	--of Call-Offer-Notifications		

6.3.3 Information elements

6.3.3.1 Facility information element

APDUs of the operations defined in 6.3.1 shall be coded in the Facility information element in accordance with ISO/IEC 11582.

When conveying an APDU of operation callOfferRequest, the NFE shall be included.

When conveying the invoke APDU of operation callOfferRequest, the destinationEntity data element of the NFE shall contain value endPINX.

When conveying the invoke APDU of operation callOfferRequest, the Interpretation APDU shall be omitted.

Note - Additional requirements for the conveyance of APDUs of operations pathRetain and serviceAvailable are given in A.3.2 of annex A.

6.3.3.2 Notification indicator information element

The notification defined above shall be coded in the Notification indicator information element in accordance with ISO/IEC 11582.

6.3.3.3 Other information elements

Any other information elements (e.g. Cause, Progress indicator) shall be coded in accordance with the rules of ISO/IEC 11572.

6.3.4 Messages

The Facility information element and the Notification indicator information element shall be conveyed in the messages as specified in clause 10 of ISO/IEC 11582.

Messages used for call establishment and release shall be as specified in of ISO/IEC 11572.

6.4 SS-CO state definitions

6.4.1 States at the Originating PINX

The procedures for the Originating PINX are written in terms of the following conceptual states existing within the SS-CO functional entity in that PINX in association with a particular call.

6.4.1.1 State CO-Idle

SS-CO is not operating.

6.4.1.2 State CO-Wait-Ack

The Originating PINX has requested SS-CO and is waiting for an acknowledgement from the Terminating PINX.

6.4.2 States at the Terminating PINX

The procedures for the Terminating PINX are written in terms of the following conceptual states existing within the SS-CO Supplementary Service Control entity in that PINX in association with a particular call.

6.4.2.1 State CO-Idle

SS-CO is not operating.

6.4.2.2 State CO-Dest-Invoked

SS-CO has been invoked successfully.

6.5 SS-CO signalling procedures for activation, deactivation and registration

Not applicable.

6.6 SS-CO signalling procedures for invocation and operation

The following procedures are call-associated.

SS-CO may be invoked in two ways depending on whether the network connection is retained when a call encounters a busy called user. Retention of the network connection makes use of a generic path retention mechanism, which is specified in annex A.

Annex C contains some examples of message sequences.

6.6.1 Actions at the Originating PINX

For a given call, the Originating PINX shall choose one of the following two methods for invocation of SS-CO:

- invocation without path retention;
- invocation with path retention.

For invocation with path retention, the procedures specified below apply in conjunction with the procedures specified in A.5.1 of annex A.

For each method, if the basic call clears in circumstances other than those covered below, SS-CO shall terminate, any SS-CO timer shall be stopped, and state CO-Idle shall be entered (e.g. on calling user release, call failure, etc.).

The SDL representation of procedures at the Originating PINX is shown in D.1 of annex D.

6.6.1.1 Normal procedures

To invoke SS-CO the Originating PINX shall send a callOfferRequest invoke APDU, start timer T1 and enter state CO-Wait-Ack. For invocation without path retention, the APDU shall be sent in the SETUP message that establishes the call. For invocation with path retention, the APDU shall be sent in a FACILITY message using the call reference of a call for which the network connection has been retained in accordance with A.5.1 of annex A (Path Retention state PRTO-Retained) and for which the received serviceAvailable invoke APDU indicated that SS-CO is invocable.

In state CO-Wait-Ack, on receipt of a callOfferRequest return result APDU in a PROGRESS, a FACILITY or an ALERTING message, the Originating PINX shall stop timer T1 and shall enter state CO-Idle.

Note 1 - Successful invocation of SS-CO should be indicated to the calling user.

Note 2 - The completion of SS-CO will be indicated by release of the call, receipt of an ALERTING or a CONNECT message (handled in accordance with ISO/IEC 11572) or receipt of a NOTIFY message containing notification description value "remoteUserAlerting" (handled in accordance with ISO/IEC 11582).

6.6.1.2 Exceptional procedures

In state CO-Wait-Ack, on receipt of:

- any message containing a callOfferRequest return error or reject APDU; or
- an ALERTING, CONNECT or DISCONNECT message without a callOfferRequest return result, return error or reject APDU,

the Originating PINX shall stop timer T1 and enter state CO-Idle, and the call shall continue in accordance with ISO/IEC 11572.

On expiry of timer T1 the Originating PINX shall enter state CO-Idle and the call shall continue in accordance with ISO/IEC 11572.

Note - Failure of SS-CO should be indicated to the calling user.

6.6.2 Actions at the Terminating PINX

The Terminating PINX shall support the two methods of invocation.

For invocation with path retention, the procedures specified below apply in conjunction with the procedures specified in A.5.2 of annex A.

For each method, if the basic call clears in circumstances other than those covered below, SS-CO shall terminate and state CO-Idle shall be entered.

The SDL representation of procedures at the Terminating PINX is shown in D.2 of annex D.

6.6.2.1 Normal procedures

If, while processing an incoming SETUP message in accordance with the procedures of ISO/IEC 11572, the called user is found to be busy, and if the SETUP message contained a callOfferRequest invoke APDU, and if all conditions are met to allow SS-CO on the called user, the Terminating PINX shall not send a DISCONNECT message but shall instead send a callOfferRequest return result APDU. If, having retained a network connection in accordance with A.5.2 of annex A and having indicated in the serviceAvailable invoke APDU that SS-CO is invocable, a FACILITY message is received containing a callOfferRequest invoke APDU, the Terminating PINX shall check again whether the called user is busy, and if so, and if SS-CO is still invocable, shall send a callOfferRequest return result APDU.

On sending a callOfferRequest return result APDU, the Terminating PINX shall enter state CO-Dest-Invoked.

Note - The Terminating PINX should, by appropriate means, inform the called user that a call is waiting and allow the user to accept the call or ignore the call.

On entering the state CO-Dest-Invoked, the Terminating PINX shall either enter protocol control state Call Received with the consequent sending of an ALERTING message, or shall remain in protocol control state Incoming Call Proceeding while the call is being offered to the called user. If an ALERTING message is not sent, the Terminating PINX shall send a PROGRESS message containing a Progress indicator information element containing Progress description no. 8 "in-band information or appropriate pattern now available", if in-band tone or announcement is applied to the incoming B channel or if Progress description no. 8 has not been sent earlier in the call.

Note - The Terminating PINX can apply in-band tone or announcement to the incoming B-channel at this stage. However, even if no in-band tone or announcement is applied, the Progress description no. 8 is still required to be sent unless an ALERTING message is sent or Progress indicator no. 8 has been sent earlier in the call as a means of ensuring that basic call timer T310 is stopped at other PINXs. If an ALERTING message is sent, it can contain a Progress indicator information element containing progress description no. 8 to indicate the presence of in-band tone or announcement.

The return result APDU may be sent in the ALERTING or PROGRESS message. Otherwise it shall be sent separately in a FACILITY message.

In state CO-Dest-Invoked, if the called user becomes free and alerting commences, the Terminating PINX shall send an ALERTING message if an ALERTING message has not been sent earlier or a NOTIFY message containing notification description value "remoteUserAlerting" if an ALERTING message has been sent earlier and shall enter state CO-Idle.

In state CO-Dest-Invoked, if the called user accepts the waiting call, the Terminating PINX shall send a CONNECT message and shall enter state CO-Idle.

In state CO-Dest-Invoked, if the called user rejects the waiting call, the Terminating PINX shall send a DISCONNECT message and shall enter state CO-Idle.

6.6.2.2 Exceptional procedures

On receipt of a SETUP or FACILITY message containing a callOfferRequest invoke APDU, if the called user is not busy the call shall continue in accordance with ISO/IEC 11572. The Terminating PINX shall return a callOfferRequest return error APDU containing error notBusy in the resulting ALERTING or CONNECT message and shall remain in state CO-Idle.

Note - If supplementary service Call Waiting has been invoked on the called user, the ALERTING message can also include a Notification indicator information element containing a notification description value "call is a waiting call".

On receipt of a SETUP or FACILITY message containing a callOfferRequest invoke APDU, if the called user is busy but invocation of SS-CO is not possible the call shall be released in accordance with ISO/IEC 11572 or, if continued retention of the path is required, shall continue in accordance with A.5.2. The Terminating PINX shall return a callOfferRequest return