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

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*Technologies de l'information — Télécommunications et échange
d'information entre systèmes — Réseau privé à intégration de
services — Protocole de signalisation d'interéchange — Service
supplémentaire de transfert d'appel à pas unique*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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 document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 19460 was prepared by ECMA (as ECMA-300) 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.

This second edition cancels and replaces the first edition (ISO/IEC 19460:2001), which has been technically revised.

Introduction

This International Standard is one of a series of 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 International Standard specifies the signalling protocol for use at the Q reference point in support of the Call Transfer supplementary service. The protocol defined in this International Standard forms part of the PSS1 protocol (informally known as QSIG).

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.

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

1 Scope

This International Standard specifies the signalling protocol for the support of the Single Step Call Transfer supplementary service (SS-SSCT) at the Q reference point between Private Integrated Network services eXchanges (PINXs) connected together within a Private Integrated Services Network (PISN).

SS-SSCT is a supplementary service which enables a user, user A, to transform an existing call between user A and user B into a new call between user B and a user C whereby user A does not have a call established with user C prior to call transfer.

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 ETS 300 387. 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 19459.

The signalling protocol for SS-SSCT 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 Single Step Call Transfer and other supplementary services and ANFs.

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 A.

Conformance to this International Standard includes conforming to those clauses that specify protocol interactions between SS-SSCT and other supplementary services and ANFs for which signalling protocols at the Q reference point are supported in accordance with the stage 3 standards concerned.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 11571:1998, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Networks - Addressing*

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 11574:2000, *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*

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 11582:2002, *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 13868:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Name identification supplementary services*

ISO/IEC 13869:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call Transfer supplementary service*

ISO/IEC 13873:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call Diversion supplementary services*

ISO/IEC 13874:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Path Replacement additional network feature*

ISO/IEC 15050:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Advice Of Charge supplementary services*

ISO/IEC 15054:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call Interception additional network feature*

ISO/IEC 15056:1997, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Transit counter additional network feature*

ISO/IEC 15772:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Common Information additional network feature*

ISO/IEC 15992:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call Priority Interruption and Call Priority Interruption Protection supplementary services*

ISO/IEC 19459:2001, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Single Step Call Transfer Supplementary Service*

ETS 300 387:1994, *Private Telecommunication Network (PTN); Method for the specification of basic and supplementary services*

ITU-T Rec. I.112:1993, *Vocabulary of terms for ISDNs*

ITU-T Rec. I.210:1993, *Principles of telecommunication services supported by an ISDN and the means to describe them*

ITU-T Rec. Q.950:2000, *Supplementary services protocols, structure and general principles*

ITU-T Rec. Z.100:1999, *Specification and description language (SDL)*

4 Terms and definitions

For the purposes of this document, the following terms and 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 | (ITU-T Rec. I.210) |
| – Gateway PINX | (ISO/IEC 11572) |
| – Complete Number | (ISO/IEC 11571) |
| – Interpretation APDU | (ISO/IEC 11582) |
| – Network Facility Extension (NFE) | (ISO/IEC 11582) |
| – New Call, New Connection | (ISO/IEC 19459) |
| – Original Call, Original Connection | (ISO/IEC 19459) |
| – Originating PINX | (ISO/IEC 11582) |
| – Private Integrated Services Network (PISN) | (ISO/IEC 11579-1) |
| – Private Integrated services Network eXchange (PINX) | (ISO/IEC 11579-1) |

- Subsequent PINX (ISO/IEC 11582)
- Signalling (ITU-T Rec. I.112)
- Supplementary Service (ITU-T Rec. I.210)
- Supplementary Service Control Entity (ISO/IEC 11582)
- Terminating PINX (ISO/IEC 11582)
- Transit PINX (ISO/IEC 11582)
- User (ISO/IEC 11574)
- User A, Transferring user (ISO/IEC 19459)
- User B, Transferred user (ISO/IEC 19459)
- User C, Transferred-to user (ISO/IEC 19459)

4.2 Other definitions

4.2.1 Rerouting number

The number of the Transferred-to user.

4.2.2 Rerouting PINX

A PINX on the call path of the original call, that reroutes that call to user C. This can either be the Transferring, the Transferred or a Transit PINX being capable of performing the rerouting function.

4.2.3 Transferred PINX

The End PINX which is on the end of the original call nearest to user B.

4.2.4 Transferred-To PINX

The End PINX which is on the end of the new call nearest to user C.

4.2.5 Transferring PINX

The End PINX which initiates single step call transfer procedures on behalf of user A.

5 Acronyms

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-SSCT	Supplementary Service Single Step Call Transfer

6 Signalling protocol for the support of SS-SSCT

6.1 SS-SSCT description

SS-SSCT is a supplementary service which enables a user, user A, to transform an existing call between user A and user B into a new call between user B and a user C whereby user A does not have a call established with user C prior to call transfer.

This supplementary service is applicable to all basic services defined in ISO/IEC 11574.

6.2 SS-SSCT operational requirements

6.2.1 Provision/Withdrawal

Provision and withdrawal shall be in accordance with 6.2.1 of ISO/IEC 19459.

6.2.2 Requirements on a Transferring PINX

The basic call procedures specified in ISO/IEC 11572 shall be supported.

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 Rerouting PINX

The basic call procedures specified in ISO/IEC 11572 shall be supported.

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

6.2.4 Requirements on a Transferred PINX

The basic call procedures specified in ISO/IEC 11572 shall be supported.

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

6.2.5 Requirements on a Transferred-To PINX

The basic call procedures specified in ISO/IEC 11572 shall be supported.

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

6.2.6 Requirements on a Transit PINX

The basic call procedures specified in ISO/IEC 11572 shall be supported.

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

6.3 SS-SSCT coding requirements

6.3.1 Operations

The operations defined in Abstract Syntax Notation number 1 (ASN.1) in table 1 shall apply. The notation is in accordance with ITU-T Rec. X.680 and X.690. The ITU-T Rec. X.208 and X.209 superseded version is in annex G.

Table 1 - Operations in support of SS-SSCT

Single-Step-Call-Transfer-Operations-asn1-97 { iso(1) standard (0) pss1-single-step-call-transfer (19460) single-step-call-transfer-operations-asn1-97 (1)}	
DEFINITIONS EXPLICIT TAGS ::=	
BEGIN	
IMPORTS	
	OPERATION, ERROR FROM Remote-Operations-Information-Objects { joint-iso-itu-t (2) remote-operations (4) informationObjects(5) version1(0) }
	EXTENSION, Extension{} FROM Manufacturer-specific-service-extension-class-asn1-97 { iso (1) standard (0) pss1-generic-procedures (11582) msi-class-asn1-97 (11) }
	Name FROM Name-Operations-asn1-97 {iso(1) standard(0) pss1-name (13868) name-operations-asn1-97 (1)}
	supplementaryServiceInteractionNotAllowed, notAvailable, invalidCallState FROM General-Error-List { ccitt recommendation q.950 general-error-list (1) }
	PresentedAddressScreened, PartyNumber FROM Addressing-Data-Elements-asn1-97 {iso(1) standard (0) pss1-generic-procedures (11582) addressing-data-elements-asn1-97 (20)}
	PSS1InformationElement FROM PSS1-generic-parameters-definition-asn1-97 {iso(1) standard (0) pss1-generic-procedures (11582) pss1-generic-parameters-asn1-97 (17)}
	callTransferUpdate, callTransferComplete, callTransferActive, subaddressTransfer, invalidRerouteingNumber, establishmentFailure FROM Call-Transfer-Operations-asn1-97 {iso(1) standard (0) pss1-call-transfer (13869) call-transfer-operations-asn1-97 (1)};
	Single-Step-Call-Transfer-Operations OPERATION ::= { ssctInitiate ssctSetup ssctPostDial ssctDigitInfo }
ssctInitiate	OPERATION ::= { -- sent from the Transferring PINX to the Rerouting PINX ARGUMENT SSCTInitiateArg RESULT DummyRes ERRORS { notAvailable invalidCallState invalidRerouteingNumber establishmentFailure unspecified supplementaryServiceInteractionNotAllowed } CODE local: 99}

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

ssctSetup	OPERATION ::= { -- sent from the Rerouting PINX to the Transferred-To PINX ARGUMENT SSCTSetupArg RETURN RESULT FALSE ALWAYS RESPONDS FALSE CODE local: 100}
ssctPostDial	OPERATION ::= { -- sent from the Rerouting PINX to the Transferred PINX ARGUMENT DummyArg RETURN RESULT FALSE ALWAYS RESPONDS FALSE CODE local: 101}
ssctDigitInfo	OPERATION ::= { -- sent from the Transferred PINX to the Rerouting PINX ARGUMENT SSCTDigitInfoArg RETURN RESULT FALSE ALWAYS RESPONDS FALSE CODE local: 102}
DummyArg ::=	CHOICE { null NULL, single [1] IMPLICIT Extension{{SSCTExtSet}}, multiple [2] IMPLICIT SEQUENCE OF Extension{{SSCTExtSet}}
DummyRes ::=	CHOICE { null NULL, single [1] IMPLICIT Extension{{SSCTExtSet}}, multiple [2] IMPLICIT SEQUENCE OF Extension{{SSCTExtSet}}
SSCTInitiateArg ::=	SEQUENCE { reroutingNumber PartyNumber, -- Transferred-To Number transferredAddress PresentedAddressScreened, awaitConnect AwaitConnect, transferredName [1] Name OPTIONAL, transferringAddress [2] PresentedAddressScreened OPTIONAL, transferringName [3] Name OPTIONAL, argumentExtension CHOICE { single [4] IMPLICIT Extension{{SSCTExtSet}}, multiple [5] IMPLICIT SEQUENCE OF Extension{{SSCTExtSet}} } OPTIONAL }
AwaitConnect ::=	BOOLEAN -- FALSE = release the original call upon ALERTING received -- TRUE = release the original call upon CONNECT received

Table 1 - Operations in support of SS-SSCT (concluded)

SSCTSetupArg ::= SEQUENCE {	transferringAddress	[1] PresentedAddressScreened	OPTIONAL,
	transferringName	[2] Name	OPTIONAL,
	argumentExtension	CHOICE {	
	single	[3] IMPLICIT Extension{{SSCTExtSet}},	
	multiple	[4] IMPLICIT SEQUENCE OF Extension{{SSCTExtSet}}	OPTIONAL
		}	
	}		
SSCTDigitInfoArg ::= SEQUENCE {	reroutingNumber[1]	PartyNumber	OPTIONAL,
		-- remaining digits of the Transferred-To Number	
	sendingComplete	[2] IMPLICIT NULL	OPTIONAL,
	argumentExtension	CHOICE {	
	single	[3] IMPLICIT Extension{{SSCTExtSet}},	
	multiple	[4] IMPLICIT SEQUENCE OF Extension{{SSCTExtSet}}	OPTIONAL
		}	
	}		
SSCTExtSet EXTENSION ::= {...}			
unspecified ERROR ::= {	PARAMETER	Extension{{SSCTExtSet}}	
	CODE	local:1008	
		ISO/IEC 19460-3	
		https://standards.iteh.ai/catalog/standards/sist/90eece5f0-bde9-44b3-adf8-87547845b510	
END		-- of SSCT Operations-asn1-97-	19460-2003

6.3.2 Information elements

6.3.2.1 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 the invoke APDU of the operations defined in 6.3.1, the destinationEntity data element of the NFE shall contain value endPINX.

When conveying the invoke APDU of operation ssctSetup, the Interpretation APDU shall contain value discardAnyUnrecognisedInvokePdu.

When conveying the invoke APDU of operations ssctInitiate, ssctPostDial or ssctDigitInfo the Interpretation APDU shall be included with the value rejectAnyUnrecognisedInvokePdu or omitted.

6.3.2.2 Information elements embedded in the Facility information element

APDUs of the operations defined in 6.3.1 may contain information elements defined in and coded according to ISO/IEC 11572. These shall be embedded in data elements of type PSS1InformationElement as specified in annex B of ISO/IEC 11582.

6.3.2.3 Other information elements

Information elements used during the establishment of the new connection shall be coded as specified in ISO/IEC 11572.

6.3.3 Messages

Except for cases where a basic call message is to be conveyed at the same time, the Facility information element shall be conveyed in a FACILITY message as specified in ISO/IEC 11582.

Messages used during the establishment of the new connection and release of the original connection shall be as specified in ISO/IEC 11572 and, where applicable, augmented in ISO/IEC 11582.

6.4 SS-SSCT state definitions

6.4.1 States at a Transferring PINX

The procedures at the Transferring PINX are written in terms of the following conceptual states existing within the SS-SSCT control entity in that PINX in association with a particular SS-SSCT request from the transferring user.

6.4.1.1 SSCT-Idle

SS-SSCT is not operating.

6.4.1.2 SSCT-Await-Initiate-Response

A `ssctInitiate` invoke APDU has been sent to the Rerouting PINX.

6.4.2 States at a Rerouting PINX

The procedures at the Rerouting PINX are written in terms of the following conceptual states existing within the SS-SSCT control entity in that PINX.

6.4.2.1 SSCT-Idle

SS-SSCT is not operating.

6.4.2.2 SSCT-Await-Setup-Response-Alert

A `ssctInitiate` invoke APDU has been received with element `waitConnect` set to FALSE. A `ssctSetup` invoke APDU has been sent to the Transferred-To PINX.

6.4.2.3 SSCT-Await-Setup-Response-Connect

A `ssctInitiate` invoke APDU has been received with element `waitConnect` set to TRUE. A `ssctSetup` invoke APDU has been sent to the Transferred-To PINX.

6.4.2.4 SSCT-Await-Info

A `ssctPostDial` invoke APDU has been sent to the Transferred PINX and further address information can be received in overlap mode.

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6.4.3 States at a Transferred PINX

The procedures at the Transferred PINX are written in terms of the following conceptual states existing within the SS-SSCT control entity in that PINX in association with the original call, i.e. a particular call of the transferred user.

6.4.3.1 CT-Idle

SS-SSCT is not operating.

NOTE 1 - As the Transferred PINX acts in the same way as a SS-CT Primary PINX in case of SS-CT by join sub-clause 6.4.2.1 (States at a Primary PINX - CT-Idle) of ISO/IEC 13869 applies accordingly.

6.4.4 States at a Transferred-To PINX

The procedures at the Transferred-To PINX are written in terms of the following conceptual states existing within the SS-SSCT control entity in that PINX.

6.4.4.1 SSCT-Idle

SS-SSCT is not operating.

6.5 SS-SSCT signalling procedures

References in this clause to protocol control states refer to basic call protocol control states defined in ISO/IEC 11572.

NOTE 2 - The specification in this section is based on each of the End PINXs being a different PINX, but this section is also applicable to scenarios where two or more of the four PINXs are the same. In those scenarios some of the signalling procedures and message flows described in this section are internal to the PINX implementation and therefore outside the scope of this International Standard.

Annex C contains some examples of message sequences.

6.5.1 Actions at a Transferring PINX

The SDL representation of procedures at a Transferring PINX is shown in D.1 of annex D.

6.5.1.1 Normal Procedures

On receipt of a valid request for SS-SSCT from user A while in state SSCT-Idle for a call between user B and user A which is in protocol control state Active (the original call), the Transferring PINX shall

- send a `ssctInitiate` invoke APDU in a FACILITY message towards the Transferred PINX using the call reference of the original call. The `ssctInitiate` invoke APDU shall include the following elements:
 - `awaitConnect` set to TRUE if the original call shall be released after a CONNECT message from the Transferred-To PINX and set to FALSE if it shall be released on receipt of an ALERTING message from the Transferred-To PINX;
 - `reroutingNumber` set to the party number of the transferred-to user (i.e., user C), as far as available;
 - `transferredAddress` set to the address of the transferred user, i.e. user B;
 - optionally `transferredName` set to the name of the transferred user, i.e. user B;
 - optionally elements `transferringAddress` and `transferringName` set to the address and name of the transferring user, i.e. user A;
- start Timer T1;
- enter state SSCT-Await-Initiate-Response.

On receipt in state SSCT-Await-Initiate-Response of a DISCONNECT message with a `ssctInitiate` return result APDU from the Rerouting PINX, using the call reference of the original call, the Transferring PINX shall continue call clearing of the original call according to basic call procedures, stop timer T1, and enter state SSCT-Idle.

6.5.1.2 Exceptional Procedures

On receipt in state SSCT-Await-Initiate-Response of a message using the call reference of the original call, and conveying a `ssctInitiate` reject or return error APDU, the Transferring PINX shall stop timer T1, abort the procedure for single step call transfer and enter state SSCT-Idle. The original call shall continue.

On expiry of timer T1, the Transferring PINX shall abort the procedure for single step call transfer and enter state SSCT-Idle. The original call shall continue.

Upon receiving in state SSCT-Await-Initiate-Response an indication from basic call control that the original call has been cleared, the Transferring PINX shall stop Timer T1 and enter state SSCT-Idle.

6.5.2 Procedures at the Rerouting PINX

The SDL representation of procedures at a Rerouting PINX is shown in D.2 of annex D.

6.5.2.1 Normal procedures

On receipt in state SSCT-Idle of a FACILITY message containing a `ssctInitiate` invoke APDU while in protocol control state Active, the Rerouting PINX shall determine whether it can perform the SSCT rerouting request. If so, it shall attempt to establish a new connection by selecting a route determined by the contents of `reroutingNumber` (i.e. to the Transferred-To PINX) received within the argument of `ssctInitiate`. If a B-channel is available and if enough digits of the `reroutingNumber` are present, a SETUP message shall be sent using a new call reference in accordance with the procedures of ISO/IEC 11572. The SETUP message shall contain the following information elements:

- Bearer capability, containing the Bearer Capability information of the original call;
- Called party number, containing the number received in `reroutingNumber` within the received `ssctInitiate` invoke APDU;
- Calling party number, containing the number received in `transferredAddress` within the received `ssctInitiate` invoke APDU;
- Facility, conveying a `ssctSetup` invoke APDU with optional elements `transferringAddress` and `transferringName` set as within the received `ssctInitiate` invoke APDU and optionally conveying a `callingName` invoke APDU indicating the Name data as received within data element `transferredName` of the `ssctInitiate` invoke APDU;
- optionally Calling party subaddress, containing the subaddress information from element `transferredAddress` within the received `ssctInitiate` invoke APDU.

If the element `awaitConnect` within the received `ssctInitiate` invoke APDU was set to TRUE, state SSCT-Await-Setup-Response-Connect shall be entered. If the element was set to FALSE, state SSCT-Await-Setup-Response-Alert shall be entered.

The protocol procedures of ISO/IEC 11572 shall apply during the establishment of the new connection.