INTERNATIONAL STANDARD

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Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Inter-exchange signalling protocol — Path Replacement additional network feature

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseau privé à intégration de services — Protocole de signalisation d'échange — Caractéristique de réseau additionnelle de remplacement de chemin

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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 13874 was prepared by ECMA (as ECMA-176) 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 third edition cancels and replaces the second edition (ISO/IEC 13874:1999), 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 Path Replacement additional network feature. The protocol defined in this 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.

Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Inter-exchange signalling protocol — Path Replacement additional network feature

1 Scope

This International Standard specifies the signalling protocol for the support of the Path Replacement additional network feature (ANF-PR) at the Q reference point between Private Integrated services Network eXchanges (PINXs) connected together within a Private Integrated Services Network (PISN).

ANF-PR is a feature which applies to an established call, allowing that call's connection between PINXs to be replaced by a new connection.

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 13863.

The signalling protocol for ANF-PR 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 ANF-PR 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.

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 13863:1998, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Path replacement additional network feature*

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

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:

- ANF-PR user (ISO/IEC 13863)
- Application Protocol Data Unit (APDU) (ISO/IEC 11582)
- Basic Service (ITU-T Rec. I.210)
- Call, Basic Call (ISO/IEC 11582)
- Connection (ISO/IEC 13863)
- Incoming Gateway PINX (ISO/IEC 11572)
- Interpretation APDU (ISO/IEC 11582)
- Network Facility Extension (NFE) (ISO/IEC 11582)
- New Connection (ISO/IEC 13863)
- Old Connection (ISO/IEC 13863)
- Originating PINX (ISO/IEC 11572)
- Outgoing Gateway PINX (ISO/IEC 11572)
- Private Integrated Services Network (PISN) (ISO/IEC 11579-1)
- Private Integrated services Network eXchange (PINX) (ISO/IEC 11579-1)
- Signalling (ITU-T Rec. I.112)
- Supplementary Service (ITU-T Rec. I.210)
- Supplementary Services Control Entity (ISO/IEC 11582)
- Terminating PINX (ISO/IEC 11572)
- Transit PINX (ISO/IEC 11572)
- Trombone Connection (ISO/IEC 13863)
- User (except in the context of ANF-PR user) (ISO/IEC 11574)

4.2 Other definitions

4.2.1 Branching PINX

The Transit PINX at which the retained connection finishes and the new connection starts.

4.2.2 Cooperating PINX

The end PINX which initiates the establishment of the new connection towards other end PINX involved in the call.

4.2.3 End PINX

Within the context of a call, a PINX which is not acting as a Transit PINX, i.e., an Originating PINX, a Terminating PINX, an Incoming Gateway PINX or an Outgoing Gateway PINX.

4.2.4 Preceding PINX

The adjacent PINX in the direction of the Cooperating PINX, relative to a particular PINX involved in the old connection.

NOTE 1 - This can be the Cooperating PINX itself or a Transit PINX.

4.2.5 Replaced connection

That part of the old connection which is not retained and is replaced by the new connection.

4.2.6 Requesting PINX

The end PINX which invokes ANF-PR and towards which the new connection is routed.

4.2.7 Retained connection

That part of the old connection which is retained and not replaced by the new connection.

4.2.8 Subsequent PINX

The adjacent PINX in the direction of the Requesting PINX, relative to a particular PINX involved in the old connection.

NOTE 2 - This can be the Requesting PINX itself or a Transit PINX.

4.2.9 Inviting PINX

Any PINX in the connection that is associated with the ANF-PR user and able to request either end PINX to invoke ANF-PR.

5 List of acronyms

ANF	Additional Network Feature
ANF-PR	Path Replacement 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-CT	Call Transfer supplementary service

6 Signalling protocol for the support of ANF-PR

6.1 ANF-PR description

ANF-PR is invoked by an established call, allowing that call's connection through the PISN to be replaced by a new connection. Optionally, the direction of the new connection may be decided by the ANF-PR user. If the new connection is required to satisfy certain criteria, ANF-PR should be used in conjunction with other supplementary services and/or ANFs. In the absence of specific criteria, the new connection should be established using the routeing rules which apply to basic call establishment.

NOTE 3 - Annex A of ISO/IEC 13863 gives examples of the circumstances under which ANF-PR can be used and criteria which can govern the selection of the new connection.

ANF-PR may be initiated locally at the Requesting PINX or optionally from an Inviting PINX. The Requesting PINX shall request the Cooperating PINX to attempt the establishment of a new connection from the Cooperating PINX to the Requesting PINX. If successful, the new connection shall replace the old connection.

NOTE 4 - The Requesting PINX can be either end PINX involved in a call, i.e., the Originating PINX or the Terminating PINX or, in the case of interworking with another network, the Incoming Gateway PINX or Outgoing Gateway PINX.

Optional procedures and coding are specified for allowing the retention of one or more elements of the old connection, starting from the Cooperating PINX and continuing as far as a Transit PINX, subject to any given criteria being achievable in that way. A new connection is established from the Transit PINX to the Requesting PINX instead of from the Cooperating PINX to the Requesting PINX.

6.2 ANF-PR operational requirements

6.2.1 Requirements on the Cooperating PINX

ANF-PR shall be applicable to a call whose protocol control state, as defined in ISO/IEC 11572, is Active.

NOTE 5 - State Active will have been reached as a result of ISO/IEC 11572 call establishment procedures, possibly in conjunction with supplementary service and/or ANF procedures.

ISO/IEC 11572 protocol control procedures for call establishment at the outgoing side of an inter-PINX link shall apply to the establishment of the new connection. ISO/IEC 11572 protocol control procedures for call clearing shall apply to the release of the old connection in the event of successful switch over to the new connection.

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 the Requesting PINX

ANF-PR shall be applicable to a call whose protocol control state, as defined in ISO/IEC 11572, is Active.

NOTE 6 - State Active will have been reached as a result of ISO/IEC 11572 call establishment procedures, possibly in conjunction with supplementary service and/or ANF procedures.

ISO/IEC 11572 protocol control procedures for call establishment at the incoming side of an inter-PINX link shall apply to the establishment of the new connection. ISO/IEC 11572 protocol control procedures for call clearing shall apply to the release of the old connection in the event of successful switch over to the new connection.

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

6.2.3.1 Transit PINX involved in the replaced connection

ANF-PR shall be applicable to a call whose protocol control state, as defined in ISO/IEC 11572, on each of the two links (incoming and outgoing) is Active and whose call control state, as defined in ISO/IEC 11572 is TCC_Call_Active.

NOTE 7 - State Active will have been reached as a result of ISO/IEC 11572 call establishment procedures, possibly in conjunction with supplementary service and/or ANF procedures.

ISO/IEC 11572 protocol control and call control procedures for call clearing at a Transit PINX shall apply to the release of the old connection in the event of successful switch over to the new connection.

Generic procedures for the call-related control of supplementary services, as specified in ISO/IEC 11582 for a Transit PINX, shall apply. For ANF-PR the requirements are limited to the passing on of Facility information elements for which the destination, as indicated in the Network Facility Extension (NFE), is not the Transit PINX.

6.2.3.2 Transit PINX involved in the new connection

ISO/IEC 11572 protocol control and call control procedures for call establishment at a Transit PINX shall apply to the establishment of the new connection.

ISO/IEC 11572 protocol control and call control procedures for call clearing at a Transit PINX shall apply to the release of the new connection in the event of failure to complete ANF-PR successfully.

Generic procedures for the call-related control of supplementary services, as specified in ISO/IEC 11582 for a Transit PINX, shall apply. For ANF-PR the requirements are limited to the passing on of Facility information elements for which the destination, as indicated in the Network Facility Extension (NFE), is not the Transit PINX.

6.2.3.3 Transit PINX involved in the retained connection

The procedures below are applicable only if the optional procedures for retention of part of the old connection (55) are supported.

ANF-PR shall be applicable to a call whose protocol control state, as defined in ISO/IEC 11572, on each of the two links (incoming and outgoing) is Active and whose call control state, as defined in ISO/IEC 11572 is TCC_Call_Active.

NOTE 8 - State Active will have been reached as a result of ISO/IEC 11572 call establishment procedures, possibly in conjunction with supplementary service and/or ANF procedures.

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

6.2.3.4 Branching PINX

The procedures below are applicable only if the optional procedures for retention of part of the old connection (55) are supported.

ANF-PR shall be applicable to a call whose protocol control state, as defined in ISO/IEC 11572, on each of the two links (incoming and outgoing) is Active and whose call control state, as defined in ISO/IEC 11572 is TCC_Call_Active.

NOTE 9 - State Active will have been reached as a result of ISO/IEC 11572 call establishment procedures, possibly in conjunction with supplementary service and/or ANF procedures.

ISO/IEC 11572 protocol control procedures for call establishment at the outgoing side of an inter-PINX link shall apply to the establishment of the new connection. ISO/IEC 11572 protocol control procedures for call clearing shall apply to the release of the replaced connection in the event of successful switch over to the new connection.

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

6.2.4 Requirements on the Inviting PINX

ANF-PR shall be applicable to a call whose protocol control state, as defined in ISO/IEC 11572, is Active. Generic procedures for the call-related control of supplementary services, as specified in ISO/IEC 11582 for an end PINX, shall apply.

6.3 ANF-PR 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 E.

Table 1 - Operations in support of ANF-PR

```
Path-Replacement-Operations-asn1-97
                    {iso standard pss1-path-replacement (13874) pr-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 standard
                        pss1-generic-procedures (11582) msi-class-asn1-97 (11)}
                    notAvailable, supplementaryServiceInteractionNotAllowed
                        FROM General-Error-List
                        {ccitt recommendation q 950 general-error-list (1)}
                    PartyNumber FROM Addressing-Data-Elements-asn1-97
                        {iso(1) standard(0) pss1-generic-procedures(11582)
                        addressing-data-elements-asn1-97 (20)};

Path-Replacement-Operations OPERATION ::={
pathReplacePropose | pathReplaceSetup | pathReplaceRetain | pathReplaceInvite}

pathReplaceInvite   OPERATION ::= {
                    ARGUMENT            DummyArg
                    RETURN RESULT       FALSE
                    ERRORS {
                            notAvailable |
                            temporarilyUnavailable |
                            supplementaryServiceInteractionNotAllowed |
                            criteriaPermanentlyUnachievable |
                            criteriaTemporarilyUnachievable |
                            invalidRerouteingNumber |
                            unrecognizedCallIdentity |
                            establishmentFailure |
                            collision |
                            unspecified }
                    ALWAYS RESPONDS     FALSE
                    CODE                local: 86 }
```

Table 1 - Operations in support of ANF-PR (continued)

```
pathReplacePropose      OPERATION ::= {
                        ARGUMENT                PRProposeArg
                        RETURN RESULT           FALSE
                        ERRORS {
                                notAvailable |
                                temporarilyUnavailable |
                                supplementaryServiceInteractionNotAllowed |
                                criteriaPermanentlyUnachievable |
                                criteriaTemporarilyUnachievable |
                                invalidRerouteingNumber |
                                unrecognizedCallIdentity |
                                establishmentFailure |
                                collision |
                                unspecified }
                        ALWAYS RESPONDS         FALSE
                        CODE                    local: 4 }

pathReplaceSetup        OPERATION ::= {
                        ARGUMENT                PRSetupArg
                        RESULT                  DummyResult
                        ERRORS {
                                criteriaPermanentlyUnachievable |
                                criteriaTemporarilyUnachievable |
                                invalidRerouteingNumber |
                                unrecognizedCallIdentity |
                                temporarilyUnavailable |
                                unspecified }
                        CODE                    local: 5 }

pathReplaceRetain       OPERATION ::= {
                        ARGUMENT                PRRetainArg
                        RESULT                  DummyResult
                        ERRORS {
                                notAvailable |
                                temporarilyUnavailable |
                                supplementaryServiceInteractionNotAllowed |
                                criteriaPermanentlyUnachievable |
                                criteriaTemporarilyUnachievable |
                                invalidRerouteingNumber |
                                unrecognizedCallIdentity |
                                establishmentFailure |
                                unspecified }
                        CODE                    local: 6 }
```

Table 1 - Operations in support of ANF-PR (continued)

```
PRProposeArg            ::=   SEQUENCE {
                                  callIdentity              CallIdentity,
                                  rerouteingNumber          PartyNumber,
                                  extension     CHOICE {
                                      single        [1] IMPLICIT Extension{{PRExtSet}},
                                      multiple      [2] IMPLICIT SEQUENCE OF Extension{{PRExtSet}}
                                  } OPTIONAL
                              }

PRSetupArg              ::=   SEQUENCE {
                                  callIdentity          CallIdentity,
                                  extension CHOICE {
                                      single        [1] IMPLICIT Extension{{PRExtSet}},
                                      multiple      [2] IMPLICIT SEQUENCE OF Extension{{PRExtSet}}
                                  } OPTIONAL
                              }

PRRetainArg             ::=   SEQUENCE {
                                  callIdentity          CallIdentity,
                                  rerouteingNumber PartyNumber,
                                  extension     CHOICE {
                                      single        [1] IMPLICIT Extension{{PRExtSet}},
                                      multiple      [2] IMPLICIT SEQUENCE OF Extension{{PRExtSet}}
                                  } OPTIONAL
                              }

DummyResult             ::=   CHOICE {
                                  null          NULL,
                                  single        [1] IMPLICIT Extension{{PRExtSet}},
                                  multiple      [2] IMPLICIT SEQUENCE OF Extension{{PRExtSet}}
                              }

DummyArg                ::=   CHOICE {
                                  null          NULL,
                                  single        [1] IMPLICIT Extension{{PRExtSet}},
                                  multiple      [2] IMPLICIT SEQUENCE OF Extension{{PRExtSet}}
                              }

PRExtSet EXTENSION ::= {…}

CallIdentity            ::=   NumericString (SIZE(1..4))


temporarilyUnavailable  ERROR ::= {CODE       local: 1000}
                              -- used when the operation is temporarily not available and none of
                              -- the other errors applies - a later attempt could be successful

collision               ERROR ::= {CODE       local: 1001}
                              -- used when a pathReplacePropose invoke APDU is received by a PINX
                              -- which has sent a pathReplacePropose invoke APDU
```