
**Information technology —
Telecommunications and information
exchange between systems — Private
Integrated Services Network —
Inter-exchange signalling protocol —
Private User Mobility (PUM) —
Registration supplementary service**

*Technologies de l'information — Télécommunications et échange
d'information entre systèmes — Réseau privé à intégration de
services — Protocole de signalisation d'interéchange — Mobilité de
l'utilisateur privé (PUM) — Service supplémentaire d'enregistrement*

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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 17876 was prepared by ECMA (as ECMA-282) 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. Annexes B, C and D are for information only.

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 Private User Mobility Registration supplementary service.

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 JTC1, 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 — Private User Mobility (PUM) — Registration supplementary service

1 Scope

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

SS-PUMR is a supplementary service which enables a PUM user to register at, or de-register from, any wired or wireless terminal within the PISN. The ability to register at different locations in the PISN at different times enables the PUM user to maintain the provided services (including the ability to make and receive calls) at different access points. De-registration is used to inform the PISN that the PUM user is temporarily unable to make use of the provided services (including the receipt of calls). SS-PUMR may provide the PUM user with the ability to obtain information on the current registration sessions (interrogation).

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 Rec. 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 17875.

The signalling protocol for SS-PUMR 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-PUMR and other supplementary services and ANFs.

NOTE 1 - 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.

This International Standard applies to PUM only within a single 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-PUMR 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 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 11571:1998, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Addressing*.

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 15428:1999, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Specification, functional model and information flows — Wireless Terminal Location Registration supplementary service and Wireless Terminal Information Exchange additional network feature.*

ISO/IEC 15429:1999, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Inter-exchange signalling protocol — Wireless Terminal Location Registration supplementary service and Wireless Terminal Information exchange additional network feature.*

ISO/IEC 15506:1997, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Inter-exchange signalling protocol — Message waiting indication supplementary service.*

ISO/IEC 17875:2000, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Specification, functional model and information flows — Private User Mobility (PUM) — Registration supplementary service.*

CCITT Rec. I.130,1988 *Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN (Blue Book).*

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.950:1993, *Digital Subscriber Signalling System No. 1 (DSS 1) — Supplementary services protocols, structure and general principles.*

ITU-T Rec. Z.100:1993, *Specification and description language.*

4 Definitions

For the purpose of this International Standard the following definitions apply.

4.1 External definitions

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

— AllCall registration	(ISO/IEC 17875)
— Application Protocol Data Unit (APDU)	(ISO/IEC 11582)
— Basic Service	(ITU-T Rec. I.210)
— Call, Basic Call	(ISO/IEC 11582)
— Complete Number	(ISO/IEC 11571)
— Coordination Function	(ISO/IEC 11582)
— De-registration	(ISO/IEC 17875)
— Directory PINX	(ISO/IEC 15428)
— End PINX	(ISO/IEC 11582)
— Gateway PINX	(ISO/IEC 11582)
— Home data base (HDB)	(ISO/IEC 17875)
— Home PINX	(ISO/IEC 17875)
— Hosting address	(ISO/IEC 17875)
— InCall registration	(ISO/IEC 17875)
— Network Facility Extension (NFE)	(ISO/IEC 11582)
— PISN Number	(ISO/IEC 11571)
— Originating PINX	(ISO/IEC 11582)
— OutCall registration	(ISO/IEC 17875)
— Private Integrated Services Network (PISN)	(ISO/IEC 11579-1)
— Private Integrated Services Network Exchange (PINX)	(ISO/IEC 11579-1)

— Private User Mobility (PUM)	(ISO/IEC 17875)
— PUM number	(ISO/IEC 17875)
— PUM user	(ISO/IEC 17875)
— Registration	(ISO/IEC 17875)
— Registration session	(ISO/IEC 17875)
— 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)
— Visitor data base (VDB)	(ISO/IEC 17875)
— Visitor PINX	(ISO/IEC 17875)

4.2 Remote PINX : Any PINX in the private network not coincident with the Visitor PINX, from which a PUM user or another authorized user has access to the features (registration/de-registration and interrogation) of SS-PUMR.

4.3 Previous Visitor PINX : A PINX in the private network, at which a PUM user is still registered and has to be de-registered from when he attempts to register at another Visitor PINX.

4.4 Alternative identifier : An identifier, other than the PISN number, which identifies the PUM user uniquely.

4.5 Activating user : Either the PUM user himself or an authorized user acting on behalf of the PUM user.

5 List of acronyms

ANF	Additional Network Feature
APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation no.1
CT	Call Transfer
HDB	Home Data Base
ISDN	Integrated Services Digital Network
MWI	Message Waiting Indication
NFE	Network Facility Extension
PICS	Protocol Implementation Conformance Statement
PINX	Private Integrated Services Network Exchange
PISN	Private Integrated Services Network
PUM	Private User Mobility
SDL	Specification and Description Language
SS	Supplementary Service
SS-PUMR	Private User Mobility Registration supplementary service
VDB	Visitor Data Base
WT	Wireless Terminal
WTM	Wireless Terminal Mobility

6 Signalling protocol for the support of SS-PUMR

6.1 SS-PUMR description

SS-PUMR is a supplementary service which enables a PUM user to register at, or de-register from, any wired or wireless terminal within the PISN. The ability to register for incoming calls (InCall registration) is mandatory, whereas the ability to register for outgoing calls (OutCall registration) or for both incoming and outgoing calls (AllCall registration) is optional. The ability to register at different locations in the PISN at different times enables the PUM user to maintain the provided services (including the ability to make and receive calls) at different access points. De-registration is used to inform the PISN that the PUM user is temporarily unable to make use of the provided services (including the receipt of calls). SS-PUMR may provide the PUM user with the ability to obtain information on the current registration sessions (interrogation).

6.2 SS-PUMR operational requirements

6.2.1 Requirements on the Visitor PINX

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating and Terminating PINX, shall apply.

6.2.2 Requirements on the Home PINX

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for a Terminating and an Originating PINX, shall apply.

6.2.3 Requirements on the Previous Visitor PINX

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for a Terminating PINX, shall apply.

6.2.4 Requirements on a Transit PINX

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for a Transit PINX, shall apply.

6.2.5 Requirements on the Directory PINX

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for a Terminating PINX, shall apply.

6.2.6 Requirements on the Remote PINX

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating PINX, shall apply.

6.3 SS-PUMR 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-PUMR

PUM-Registration-Operations { iso (1) standard (0) pss1-pum-registration (17876) pum-registration-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-extension-definition { iso (1) standard (0) pss1-generic-procedures (11582) msi-definition (0) }
	notAvailable, invalidServedUserNumber, supplementaryServiceInteractionNotAllowed FROM General-Error-List { ccitt recommendation q 950 general-error-list (1) }
	-- Note: The definition of these errors is reproduced in annex D
	PartyNumber FROM Addressing-Data-Elements { iso (1) standard (0) pss1-generic-procedures (11582) addressing-data-elements (9) }
	-- Note: The definition of PartyNumber is reproduced in annex D
	BasicService FROM Basic-Service-Elements { iso (1) standard (0) pss1-call-diversion (13873) call-diversion-operations (0) }
	-- Note: The definition of BasicService is reproduced in annex D
	pisnEnquiry FROM WTM-Location-Registration-Operations { iso (1) standard (0) pss1-location-registration (15429) wtlr-operations (0) };
	-- Note: The definition of pisnEnquiry is reproduced in annex D
PumRegistr ::=	OPERATION -- Registration (sent from the Visitor PINX to the Home PINX or -- from a Remote PINX to the Visitor PINX) ARGUMENT PumRegistrArg RESULT PumRegistrRes ERRORS { invalidServedUserNumber, notAuthorized, unspecified, notAvailable, temporarilyUnavailable, supplementaryServiceInteractionNotAllowed, pumUserNotSubscribedToThisServiceOpt, pumUserFailedAuthentication, hostingAddrInvalid }
PumDelReg ::=	OPERATION -- Delete Registration (sent from the Home PINX to the Previous Visitor PINX) ARGUMENT PumDelRegArg RESULT DummyRes ERRORS { notAvailable, temporarilyUnavailable, unspecified, supplementaryServiceInteractionNotAllowed }

Table 1 — Operations in Support of SS-PUMR (continued)

PumDe-reg ::=	OPERATION	
	--	<i>De-registration (sent from the Visitor PINX or Remote PINX to the Home PINX)</i>
	ARGUMENT	PumDe-regArg
	RESULT	DummyRes
	ERRORS	{ invalidServedUserNumber, notAuthorized, unspecified, supplementaryServiceInteractionNotAllowed, pumUserNotSubscribedToThisServiceOpt, pumUserFailedAuthentication, hostingAddrInvalid, pumUserNotRegistered }
PumInterrog ::=	OPERATION	
	--	<i>Interrogation (sent from the Visitor PINX or Remote PINX to the Home PINX and from the Home PINX to the Visitor PINX)</i>
	--	
	ARGUMENT	PumInterrogArg
	RESULT	PumInterrogRes
	ERRORS	{ invalidServedUserNumber, notAuthorized, unspecified, supplementaryServiceInteractionNotAllowed, pumUserFailedAuthentication, hostingAddrInvalid, pumUserNotRegistered }
PumRegistrArg ::=	SEQUENCE	{ pumUserId CHOICE { pumNumber PartyNumber, -- The PISN number of the PUM user, -- always a Complete Number. alternativeld Alternativeld }, basicService BasicService, -- specific basic service or all basic services, hostingAddr PartyNumber, -- The PISN number of the hosting user, -- always a Complete Number. activatingUserAddr [0] PartyNumber OPTIONAL, -- The PISN number of the activating user, -- always a Complete Number. -- Mandatory if sent from a Remote PINX, else not included. serviceOption ServiceOption DEFAULT inCallRegistration, -- Type of registration (InCall, OutCall or AllCall) sessionParams SessionParams OPTIONAL, -- Duration of session, Number of outgoing calls userPin CHOICE { pumUserPin [6] IMPLICIT UserPin, activatingUserPin [7] IMPLICIT UserPin } OPTIONAL, argExtension PumrExtension OPTIONAL }
PumRegistrRes ::=	SEQUENCE	{ pumNumber PartyNumber, serviceOption ServiceOption OPTIONAL, -- Type of registration (InCall, OutCall or AllCall) sessionParams SessionParams OPTIONAL, -- Duration of session, Number of outgoing calls argExtension PumrExtension OPTIONAL }
DummyRes ::=	CHOICE	{ null NULL, extension [1] IMPLICIT Extension, sequOfExtn [2] IMPLICIT SEQUENCE OF Extension }

Table 1 — Operations in Support of SS-PUMR (continued)

PumDelRegArg ::= SEQUENCE	{ pumUserId CHOICE { pumNumber PartyNumber, -- The PISN number of the PUM user, -- always a Complete Number. alternativeld Alternativeld }, basicService BasicService, -- specific basic service or all basic services, hostingAddr PartyNumber, -- The PISN number of the hosting user, -- always a Complete Number. serviceOption ServiceOption, -- Type of registration session (InCall, OutCall or AllCall) argExtension PumrExtension OPTIONAL }
PumDe-regArg ::= SEQUENCE	{ pumUserId CHOICE { pumNumber PartyNumber, -- The PISN number of the PUM user, -- always a Complete Number. alternativeld Alternativeld }, basicService BasicService, -- specific basic service or all basic services, hostingAddr [0] PartyNumber OPTIONAL, -- The PISN number of the hosting user, -- always a Complete Number. -- Not included if serviceOption indicates 'inCallRegistration', -- optional if serviceOption indicates 'outCallRegistration' -- or 'allCallRegistration'. activatingUserAddr [1] PartyNumber OPTIONAL, -- The PISN number of the activating user, -- always a Complete Number. -- Mandatory if sent from a Remote PINX, else not included. serviceOption ServiceOption DEFAULT inCallRegistration, -- Type of registration session (InCall, OutCall or AllCall) -- If serviceOption indicates 'outCallRegistration' and -- hostingAddr is omitted, the de-registration applies to -- all OutCall registrations of this PUM user. -- If serviceOption indicates 'allCallRegistration' and -- hostingAddr is omitted, the de-registration applies to the -- AllCall and all OutCall registrations of this PUM user. userPin CHOICE { pumUserPin [6] IMPLICIT UserPin, activatingUserPin [7] IMPLICIT UserPin } OPTIONAL, argExtension PumrExtension OPTIONAL }
PumInterrogArg ::= SEQUENCE	{ pumUserId CHOICE { pumNumber PartyNumber, -- The PISN number of the PUM user, -- always a Complete Number. alternativeld Alternativeld }, basicService BasicService, -- specific basic service or all basic services, hostingAddr [0] PartyNumber OPTIONAL, -- The PISN number of the hosting user, -- always a Complete Number. -- Omission indicates 'all hosting addresses'. activatingUserAddr [1] PartyNumber OPTIONAL, -- The PISN number of the activating user, -- always a Complete Number. serviceOption [2] ServiceOption OPTIONAL

Table 1 — Operations in Support of SS-PUMR (concluded)

	homeInfoOnly	BOOLEAN	DEFAULT TRUE,
			-- True = Only Home PINX information (default)
			-- False = Complete information
	userPin	CHOICE	{ pumUserPin [6] IMPLICIT UserPin,
			activatingUserPin [7] IMPLICIT UserPin } OPTIONAL,
	argExtension	PumrExtension	OPTIONAL }
PumInterrogRes ::=	SET SIZE(1..8) OF		
	SEQUENCE	{ basicService [0] IMPLICIT BasicService	OPTIONAL,
		-- specific basic service or all basic services,	
		-- (Home PINX information)	
	hostingAddr	[1] PartyNumber	OPTIONAL,
		-- The PISN number of the hosting user,	
		-- always a Complete Number.	
		-- (Home PINX information)	
	serviceOption	[2] IMPLICIT ServiceOption	OPTIONAL,
		-- Type of registration session	
		-- (InCall, OutCall or AllCall)	
		-- (Home PINX information)	
	interrogParams	SessionParams	OPTIONAL,
		-- Time left in registration session,	
		-- Number of outgoing calls left	
		-- (Visitor PINX information)	
	argExtension	PumrExtension	OPTIONAL }
AlternativeId ::=	OCTET STRING	(SIZE(1..20))	
ServiceOption ::=	ENUMERATED	{ inCallRegistration	(0),
		outCallRegistration	(1),
		allCallRegistration	(2) }
SessionParams ::=	SEQUENCE	{ durationOfSession [1] IMPLICIT INTEGER	OPTIONAL,
		-- Duration of session in seconds,	
		-- default if omitted: duration of session unlimited.	
		numberOfOutgCalls [2] IMPLICIT INTEGER	OPTIONAL }
		-- Default if omitted: number of outgoing calls unlimited.	
UserPin ::=	OCTET STRING	(SIZE(1..20))	
PumrExtension ::=	CHOICE	{	
	extension	[4] IMPLICIT Extension,	
	sequOfExtn	[5] IMPLICIT SEQUENCE OF Extension }	
pumRegistr	PumRegistr	::=	localValue 89
pumDelReg	PumDelReg	::=	localValue 90
pumDe-reg	PumDe-reg	::=	localValue 91
pumInterrog	PumInterrog	::=	localValue 92
notAuthorized	ERROR	::=	localValue 1007
temporarilyUnavailable	ERROR	::=	localValue 1000
unspecified	Unspecified	::=	localValue 1008
Unspecified ::=	ERROR	PARAMETER Extension	
pumUserNotSubscribedToThisServiceOpt	ERROR	::=	localValue 1019
pumUserFailedAuthentication	ERROR	::=	localValue 1020
hostingAddrInvalid	ERROR	::=	localValue 1021
pumUserNotRegistered	ERROR	::=	localValue 1022
END	-- of PUM-Registration-Operations		

6.3.2 Information elements

6.3.2.1 Facility information element

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

When conveying the invoke APDU of operations defined in 6.3.1, the Interpretation APDU shall either be omitted or be included with value rejectAnyUnrecognisedInvokePdu.

6.3.2.2 Other information elements

Any other information elements (e.g. Calling party number, Called party number) shall be coded in accordance with the rules of ISO/IEC 11582.

6.3.3 Messages

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

6.4 SS-PUMR state definitions

6.4.1 States at the Visitor PINX

The procedures for the Visitor PINX are written in terms of the following conceptual states existing within the SS-PUMR Supplementary Service Control entity in that PINX in association with a particular registration request.

6.4.1.1 State VisitIdle

SS-PUMR is not operating.

6.4.1.2 State VisitReg

A pumRegistr invoke APDU has been sent.

6.4.1.3 State VisitEnquiry

A pismEnquiry invoke APDU has been sent.

6.4.1.4 State VisitInterrogation

A pumInterrog invoke APDU has been sent.

6.4.1.5 State VisitDe-reg

A pumDe-reg invoke APDU has been sent.

6.4.2 States at the Home PINX

The procedures for the Home PINX are written in terms of the following conceptual states existing within the SS-PUMR Supplementary Service Control entity in that PINX in association with a particular registration request.

6.4.2.1 State HomeIdle

SS-PUMR is not operating. Ready for receipt of a pumRegistr or pumDe-reg invoke APDU.

6.4.2.2 State HomeDelete

A pumDelReg invoke APDU has been sent.

6.4.2.3 State HomeInterrogation

A pumInterrog invoke APDU has been sent.

6.4.3 States at the Directory PINX

The procedures for the Directory PINX are written in terms of the following conceptual states existing within the SS-PUMR Supplementary Service Control entity in that PINX in association with a particular registration request.

6.4.3.1 State DirectoryIdle

Ready for receipt of a pismEnquiry invoke APDU.

6.4.4 States at the Previous Visitor PINX

The procedures for the Previous Visitor PINX are written in terms of the following conceptual states existing within the SS-PUMR Supplementary Service Control entity in that PINX in association with a particular registration request.

6.4.4.1 State PreVisitorIdle

Ready for receipt of a pumDelReg invoke APDU.

6.4.5 States at the Remote PINX

The procedures for a Remote PINX are written in terms of the following conceptual states existing within the SS-PUMR Supplementary Service Control entity in that PINX in association with a particular registration request.

6.4.5.1 State RemoteIdle

SS-PUMR is not operating.

6.4.5.2 State RemoteReg

A pumRegistr invoke APDU has been sent.

6.4.5.3 State RemoteEnquiry

A pismEnquiry invoke APDU has been sent.

6.4.5.4 State RemoteInterrogation

A pumInterrog invoke APDU has been sent.

6.4.5.5 State RemoteDe-reg

A pumDe-reg invoke APDU has been sent.

6.5 SS-PUMR signalling procedures for registration

Examples of message sequences are shown in annex B.

6.5.1 Actions at the Visitor PINX for registration

The SDL representation of procedures at the Visitor PINX is shown in C.1 of annex C.

6.5.1.1 Normal procedures

On receipt of a valid registration request from a PUM user and if the Visitor PINX possesses sufficient addressing information to make a registration request to the Home PINX, the Visitor PINX shall send a pumRegistr invoke APDU to the Home PINX using the call reference of a call independent signalling connection. The call independent signalling connection shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in 7.3 of ISO/IEC 11582. Within the argument of the invoke APDU, the PISN number or an alternative identifier of the PUM user shall be included in element pumUserId, the basic service for which the PUM user is to be registered shall be included in element basicService, and the PISN number of the hosting user shall be included in element hostingAddr. This PISN number shall be suitable for use in the Called party number information element of a call or call independent signalling connection that is to be routed to the hosting user. If provided by the registration request from the PUM user, the Visitor PINX shall additionally include in element serviceOption the type of registration (InCall, OutCall or AllCall). If provided by the registration request from the PUM user, the Visitor PINX shall further include the PUM user's PIN in element userPin. The Visitor PINX shall enter state VisitReg and start timer T1.

The registration request from a PUM user may optionally contain session parameters (element sessionParams) specifying the maximum duration of the registration session or the maximum number of outgoing calls (in case of OutCall or AllCall registration). If the Visitor PINX supports these optional parameters, it shall set a duration timer and a counter for the number of outgoing calls to the values specified by these parameters. On expiry of the duration timer or when reaching the specified number of outgoing calls, the Visitor PINX shall terminate the registration session by means of a pumDe-reg invoke APDU to the Home PINX, as specified in 6.6.1.1 (conditional de-registration).

NOTE 2 - Validation of the registration request can involve authentication of the PUM user.

NOTE 3 - In the absence of sufficient addressing information, the Visitor PINX can, before sending a pumRegistr invoke APDU, use the procedures of 6.8.1 to make an enquiry to a Directory PINX in order to translate an identifier provided by the PUM user in the registration request into a PISN number.

NOTE 4 - The number to be used in the Called party number information element when establishing the call independent signalling connection to the Home PINX is outside the scope of this International Standard. It can, for example, be a PISN number provided by the PUM user in the registration request or optionally the PISN number provided by the Directory PINX.

On receipt of the pumRegistr return result APDU, the Visitor PINX shall stop timer T1, update the information in the VDB for the requested basic service and hosting address, revert to state VisitIdle and indicate acceptance to the PUM user.

The Visitor PINX is responsible for clearing the call independent signalling connection towards the Home PINX. This may occur on receipt of a return result APDU. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.5.1.2 Exceptional procedures

If the Visitor PINX is unable to proceed with the registration request, it shall enter state VisitIdle and indicate failure to the PUM user.

On receipt of a pumRegistr return error or reject APDU from the Home PINX, the Visitor PINX shall stop timer T1, revert to state VisitIdle and indicate rejection to the PUM user.

If timer T1 expires (i.e. the pumRegistr invoke APDU is not answered by the Home PINX), the Visitor PINX shall indicate rejection to the PUM user and enter state VisitIdle.

The Visitor PINX is responsible for clearing the call independent signalling connection towards the Home PINX. This may occur on receipt of a return error or reject APDU or on expiry of timer T1. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.5.2 Additional actions at the Visitor PINX in case of remote registration

The SDL representation of procedures at the Visitor PINX is shown in C.1 of annex C.

6.5.2.1 Normal procedures

On receipt of a pumRegistr invoke APDU from a Remote PINX using the call reference of a call independent signalling connection (as specified in 7.3 of ISO/IEC 11582), the actions specified in 6.5.1.1 shall apply with the term "PUM user" replaced by "Remote PINX". On receipt of the pumRegistr return result APDU from the Home PINX, the Visitor PINX shall send a pumRegistr return result to the Remote PINX. The contents of this pumRegistr return result APDU shall be the same as the contents of the pumRegistr return result APDU from the Home PINX.

6.5.2.2 Exceptional procedures

If the Visitor PINX is unable to proceed with the registration request, it shall send a pumRegistr return error APDU containing an appropriate error to the Remote PINX and enter state VisitIdle.

On receipt of a pumRegistr return error APDU from the Home PINX, the Visitor PINX shall send a pumRegistr return error APDU to the Remote PINX containing the same error as received in the pumRegistr return error APDU from the Home PINX, stop timer T1 and revert to state VisitIdle.

On receipt of a pumRegistr reject APDU from the Home PINX, the Visitor PINX shall send a pumRegistr return error APDU to the Remote PINX containing an appropriate error corresponding to the reject problem received in the pumRegistr reject APDU from the Home PINX, stop timer T1 and revert to state VisitIdle.

If timer T1 expires (i.e. the pumRegistr invoke APDU is not answered by the Home PINX), the Visitor PINX shall send a pumRegistr return error APDU containing the error temporarilyUnavailable to the Remote PINX and enter state VisitIdle.

6.5.3 Actions at the Home PINX for registration

The SDL representation of procedures at the Home PINX is shown in C.2 of annex C.

6.5.3.1 Normal procedures

On receipt of a pumRegistr invoke APDU using the call reference of a call independent signalling connection (as specified in 7.3 of ISO/IEC 11582), the Home PINX shall check the received basic service (element basicService) and the PUM user's PISN number or alternative identifier (element pumUserId), and verify that the PUM user is allowed to register.

If the PUM user is allowed to register, the Home PINX shall update the information in the HDB and answer the pumRegistr invoke APDU with a return result APDU.

If the received pumRegistr invoke APDU contained an InCall or AllCall registration (in element serviceOption), the Home PINX shall send a pumDelReg invoke APDU to the previous Visitor PINX using the call reference of a call independent signalling connection, in order to terminate the PUM user's previous InCall or AllCall registration session (if applicable).

If the received pumRegistr invoke APDU contained an OutCall registration (in element serviceOption), the Home PINX may optionally send a pumDelReg invoke APDU to the previous Visitor PINX using the call reference of a call independent signalling connection, in order to terminate the PUM user's previous InCall or AllCall registration session (if applicable).

The Home PINX may optionally leave the PUM user's existing OutCall registration session(s) unaffected (if applicable).

If the received pumRegistr invoke APDU does not contain the optional element serviceOption, i.e. does not specify the type of registration, the Home PINX shall assume an InCall registration and shall take the actions according to that type.

Termination of previous registration session(s) shall be performed by sending appropriate pumDelReg invoke APDU(s) to the previous Visitor PINX(s) using the call reference(s) of (a) call independent signalling connection(s). The call independent

signalling connection(s) shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in 7.3 of ISO/IEC 11582.

Within the argument of the pumDelReg invoke APDU(s), the PISN number or an alternative identifier of the PUM user shall be included in element pumUserId, the basic service for which the PUM user has registered shall be included in element basicService, a PISN number identifying the hosting user shall be included in element hostingAddr, and the type of registration (InCall, OutCall, or AllCall) shall be included in element serviceOption. The Home PINX shall enter state HomeDelete and start timer T4.

On receipt of all outstanding responses to the pumDelReg invoke APDUs, the Home PINX shall stop timer T4 and enter state HomeIdle.

The Home PINX is responsible for clearing the call independent signalling connection(s) towards the previous Visitor PINX(s). This may occur on receipt of a return result APDU. Alternatively, the signalling connection(s) may be retained for other applications, if appropriate.

6.5.3.2 Exceptional procedures

If the Home PINX is unable to proceed with the registration request, it shall answer the pumRegistr invoke APDU with a return error APDU containing an appropriate error and enter state HomeIdle.

If the PUM user is not found in the HDB, the Home PINX shall answer the pumRegistr invoke APDU with a return error APDU containing the error invalidServedUserNumber.

If the PUM user is not allowed to register, the Home PINX shall answer the pumRegistr invoke APDU with a return error APDU containing the error notAuthorized.

On receipt of a pumDelReg return error or reject APDU from a previous Visitor PINX and if there are still responses to the pumDelReg invoke APDU(s) outstanding, no action shall be taken at the Home PINX.

If timer T4 expires (e.g. a pumDelReg invoke APDU is not answered by a previous Visitor PINX), the Home PINX shall enter state HomeIdle.

NOTE 5 - Expiry of timer T4 or receipt of a pumDelReg return error or reject APDU may invoke management actions to correct the VDB data in the previous Visitor PINX(s).

6.5.4 Actions at a Transit PINX for registration

No special actions are required in support of registration.

6.5.5 Actions at the previous Visitor PINX for registration

The SDL representation of procedures at the previous Visitor PINX is shown in C.3 of annex C.

6.5.5.1 Normal procedures

On receipt of a pumDelReg invoke APDU using the call reference of a call independent signalling connection (as specified in 7.3 of ISO/IEC 11582), the previous Visitor PINX shall check the received basic service (element basicService), the PUM user's PISN number or alternative identifier (element pumUserId), the hosting address (element hostingAddr) and the type of registration (element serviceOption), delete the specified VDB entry for the PUM user and answer the pumDelReg invoke APDU with a return result APDU.

6.5.5.2 Exceptional procedures

If the specified VDB entry for the PUM user is not found in the VDB, the previous Visitor PINX shall answer the pumDelReg invoke APDU with a return result APDU.

If the VDB is temporarily unavailable, the previous Visitor PINX shall answer the pumDelReg invoke APDU with a return error APDU containing the error temporarilyUnavailable.

6.5.6 Actions at the Remote PINX for registration

The SDL representation of procedures at the Remote PINX is shown in C.5 of annex C.

6.5.6.1 Normal procedures

On receipt of a valid registration request from an activating user, the Remote PINX shall send a pumRegistr invoke APDU to the Visitor PINX using the call reference of a call independent signalling connection. The call independent signalling connection shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in 7.3 of ISO/IEC 11582. Within the argument of the invoke APDU, the PISN number or an alternative identifier of the PUM user shall be included in element pumUserId, the basic service for which the PUM user is to be registered shall be included in element basicService, a PISN number identifying the hosting user shall be included in element hostingAddr, and

the PISN number of the activating user shall be included in element `activatingUserAddr`. The PISN number of the hosting user shall be suitable for use in the Called party number information element of a call or call independent signalling connection that is to be routed to the hosting user. If provided by the registration request from the activating user, the Remote PINX shall additionally include the type of registration (InCall, OutCall, or AllCall) in element `serviceOption` and the session parameters (maximum duration of the registration session, maximum number of outgoing calls) in element `sessionParams`. If provided by the registration request from the activating user, the Remote PINX shall further include the activating user's PIN in element `userPin`. The Remote PINX shall enter state `RemoteReg` and start timer T1.

NOTE 6 - Validation of the registration request can involve authentication of the activating user.

NOTE 7 - The number to be used in the Called party number information element when establishing the call independent signalling connection to the Visitor PINX is outside the scope of this International Standard. It can, for example, be a PISN number provided by the activating user in the registration request.

On receipt of the `pumRegistr` return result APDU, the Remote PINX shall stop timer T1, revert to state `RemoteIdle` and indicate acceptance to the activating user.

The Remote PINX is responsible for clearing the call independent signalling connection towards the Visitor PINX. This may occur on receipt of a return result APDU. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.5.6.2 Exceptional procedures

On receipt of a `pumRegistr` return error or reject APDU from the Visitor PINX, the Remote PINX shall stop timer T1, revert to state `RemoteIdle` and indicate rejection to the activating user.

If timer T1 expires (i.e. the `pumRegistr` invoke APDU is not answered by the Visitor PINX), the Remote PINX shall indicate rejection to the activating user and enter state `RemoteIdle`.

The Remote PINX is responsible for clearing the call independent signalling connection towards the Visitor PINX. This may occur on receipt of a return error or reject APDU or on expiry of timer T1. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.6 SS-PUMR signalling procedures for de-registration

Examples of message sequences are shown in annex B.

6.6.1 Actions at the Visitor PINX for de-registration

The SDL representation of procedures at the Visitor PINX is shown in C.1 of annex C.

6.6.1.1 Normal procedures

On receipt of a valid de-registration request from a PUM user or an authorized user, the Visitor PINX shall:

- If the de-registration request is for a particular registration session or all sessions of a PUM user, send a `pumDe-reg` invoke APDU to the Home PINX using the call reference of a call independent signalling connection.
- If the de-registration request is for all PUM users being registered at a specific hosting address, send a `pumDe-reg` invoke APDU for each registered PUM user to the Home PINX using the call reference of a call independent signalling connection.

The call independent signalling connection shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in 7.3 of ISO/IEC 11582. Within the argument of the invoke APDU(s), the PISN number or an alternative identifier of the PUM user shall be included in element `pumUserId` and the basic service for which the PUM user is to be de-registered shall be included in element `basicService`. If provided by the de-registration request from the PUM user or authorized user, the Visitor PINX shall additionally indicate:

- in element `serviceOption` which type of registration session is to be de-registered;
- in element `activatingUserAdress` the PISN number of the user activating the request;
- in element `activating userPIN` the PIN supplied by the activating user.

If only sessions at a specific hosting address are to be de-registered, a PISN number identifying the hosting user shall be included in element `hostingAddr` otherwise, element `hostingAddr` shall be omitted. The Visitor PINX shall enter state `VisitDe-reg` and start timer T3.

NOTE 8 - In the absence of sufficient addressing information, the Visitor PINX can, before sending a `pumDe-reg` invoke APDU, use the procedures of 6.8.1 to make an enquiry to a Directory PINX in order to translate an identifier provided by the PUM user in the registration request into a PISN number.

NOTE 9 - The same procedures apply if the duration timer for a session expires or if the maximum number of outgoing calls is reached (conditional de-registration).

NOTE 10 - Validation of the de-registration request can involve authentication of the PUM user or the authorized user.

On receipt of a pumDe-reg return result APDU, the Visitor PINX shall delete the information in the VDB for the requested PUM user and basic service and, if applicable, indicate acceptance to the PUM user or authorized user.

On receipt of all outstanding responses to the pumDe-reg invoke APDUs, the visitor PINX shall stop timer T3 and revert to state VisitIdle.

The Visitor PINX is responsible for clearing the call independent signalling connection towards the Home PINX. This may occur on receipt of all outstanding responses. Alternatively, the signalling connection may be retained for other applications, if appropriate.

On receipt of a pumDelReg invoke APDU from the Home PINX using the call reference of a call independent signalling connection (as specified in 7.3 of ISO/IEC 11582), the Visitor PINX shall check the received basic service (element basicService), the PUM user's PISN number or alternative identifier (element pumUserId), the hosting address (element hostingAddr) and the type of registration (element serviceOption), delete the specified VDB entry for the PUM user, and answer the pumDelReg invoke APDU with a return result APDU.

6.6.1.2 Exceptional procedures

On receipt of a pumDe-reg return error or reject APDU from the Home PINX and if there are still responses to the pumDe-reg invoke APDU(s) outstanding, no action shall be taken at the Visitor PINX, except, if applicable, indicate rejection to the PUM user or authorized user.

If timer T3 expires (i.e. a pumDe-reg invoke APDU is not answered by the Home PINX), the Visitor PINX shall enter state VisitIdle and, if applicable, indicate rejection to the PUM user.

The Visitor PINX is responsible for clearing the call independent signalling connection towards the Home PINX. This may occur on receipt of all outstanding responses or on expiry of timer T3. Alternatively, the signalling connection may be retained for other applications, if appropriate.

If, on receipt of a pumDelReg invoke APDU from the Home PINX, the specified VDB entry for the PUM user is not found in the VDB, the Visitor PINX shall answer with a pumDelReg return result APDU.

If the VDB is temporarily unavailable, the previous Visitor PINX shall answer the pumDelReg invoke APDU with a return error APDU containing the error temporarilyUnavailable.

6.6.2 Actions at the Home PINX for de-registration

The SDL representation of procedures at the Home PINX is shown in C.2 of annex C.

The procedures specified in the following apply for de-registration initiated by a PUM user at a Visitor PINX and for remote de-registration.

6.6.2.1 Normal procedures

On receipt of a pumDe-reg invoke APDU using the call reference of a call independent signalling connection (as specified in 7.3 of ISO/IEC 11582), the Home PINX shall check the received basic service (element basicService) and the PUM user's PISN number or alternative identifier (element pumUserId) and the activating user's PISN number if provided and verify that de-registration is permitted.

The pumDe-reg invoke APDU may contain either a request for de-registration of a specific type of registration session (InCall, OutCall, AllCall) at a specific hosting address or a request for de-registration of all registration sessions at all hosting addresses.

If element serviceOption in the received pumDe-reg invoke APDU indicates 'outCallRegistration' and hostingAddr is omitted, the de-registration shall apply to all OutCall registrations of this PUM user.

If serviceOption indicates 'allCallRegistration' and hostingAddr is omitted, the de-registration shall apply to the AllCall and all OutCall registrations of this PUM user.

If a hosting address (in element hostingAddr) is contained in the received pumDe-reg invoke APDU, the de-registration shall apply only to the registration session indicated in element serviceOption of this PUM user at this hosting address.

If the received pumDe-reg invoke APDU does not contain the optional element serviceOption, i.e. does not specify which type of registration session is to be de-registered, the Home PINX shall assume an InCall de-registration and shall take the actions according to that type.

If the PUM user may de-register, the Home PINX shall update the location information in the HDB and answer the pumDe-reg invoke APDU with a return result APDU.

If required according to the contents of the pumDe-reg invoke APDU, the Home PINX shall additionally send (a) pumDelReg invoke APDU(s) to the Visitor PINX(s) using the call reference(s) of (a) call independent signalling connection(s). The call independent signalling connection(s) shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in 7.3 of ISO/IEC 11582.

Within the argument of the pumDelReg invoke APDU(s), the PISN number or an alternative identifier of the PUM user shall be included in element pumUserId, the basic service for which the PUM user is to be de-registered shall be included in element basicService, a PISN number identifying the hosting user shall be included in element hostingAddr, and the type of registration (InCall, OutCall, or AllCall) shall be included in element serviceOption. The Home PINX shall enter state HomeDelete and start timer T4.

On receipt of all outstanding responses to the pumDelReg invoke APDUs, the Home PINX shall stop timer T4 and enter state HomeIdle.

The Home PINX is responsible for clearing the call independent signalling connection(s) towards the Visitor PINX(s). This may occur on receipt of a return result APDU. Alternatively, the signalling connection(s) may be retained for other applications, if appropriate.

6.6.2.2 Exceptional procedures

If the Home PINX is unable to proceed with the de-registration request, it shall answer the pumDe-reg invoke APDU with a return error APDU containing an appropriate error and enter state HomeIdle.

If the PUM user is not found in the HDB, the Home PINX shall answer the pumDe-reg invoke APDU with a return error APDU containing the error invalidServedUserNumber.

If the PUM user is not allowed to de-register, the Home PINX shall answer the pumDe-reg invoke APDU with a return error APDU containing the error notAuthorized.

On receipt of a pumDelReg return error or reject APDU from a Visitor PINX and if there are still responses to the pumDelReg invoke APDU(s) outstanding, no action shall be taken at the Home PINX.

If timer T4 expires (e.g. a pumDelReg invoke APDU is not answered by a Visitor PINX), the Home PINX shall enter state HomeIdle.

NOTE 11 - Expiry of timer T4 or receipt of a pumDelReg return error or reject APDU may invoke management actions to correct the VDB data in the previous Visitor PINX(s).

6.6.3 Actions at a Transit PINX for de-registration

No special actions are required in support of SS-PUMR.

6.6.4 Actions at the Remote PINX for de-registration

The SDL representation of procedures at the Remote PINX is shown in C.5 of annex C.

6.6.4.1 Normal procedures

On receipt of a valid de-registration request from an activating user, the Remote PINX shall send a pumDe-reg invoke APDU to the Home PINX using the call reference of a call independent signalling connection. The call independent signalling connection shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in 7.3 of ISO/IEC 11582. Within the argument of the invoke APDU, the PISN number or an alternative identifier of the PUM user shall be included in element pumUserId, the basic service for which the PUM user is to be de-registered shall be included in element basicService, the PISN number of the activating user shall be included in element activatingUserAddr and, if provided, the activating user's PIN shall be included in element activatingUserPIN. The de-registration request from the activating user may contain a request for de-registration of either a specific type of session (InCall, OutCall, AllCall) at a specific hosting address or all sessions of a PUM user at all hosting addresses. If provided by the de-registration request from the activating user, the Remote PINX shall indicate in element serviceOption which type of registration session is to be de-registered. If only sessions at a specific hosting address are to be de-registered, a PISN number identifying the hosting user shall be included in element hostingAddr. The Remote PINX shall enter state RemoteDe-reg and start timer T3.

NOTE 12 - In the absence of sufficient addressing information, the Visitor PINX can, before sending a pumDe-reg invoke APDU, use the procedures of 6.8.1 to make an enquiry to a Directory PINX in order to translate an identifier provided by the PUM user in the registration request into a PISN number.

NOTE 13 - In the absence of sufficient addressing information, the Remote PINX can, before sending a pumDe-reg invoke APDU, use the procedures of 6.8.1 to make an enquiry to a Directory PINX in order to translate an identifier provided by the activating user in the de-registration request into a PISN number.

NOTE 14 - Validation of the de-registration request can involve authentication of the activating user.