INTERNATIONAL STANDARD

ISO/IEC 15429

Second edition
2003-04-01

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

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseau privé à intégration de services — Protocole de signalement d'interéchange — Service supplémentaire d'enregistrement de localisation de terminal sans fil et caractéristiques de réseau additionnelles pour l'échange d'information de terminal sans fil

Reference number
ISO/IEC 15429:2003(E)

© ISO/IEC 2003

--`,,,`-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2003

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

© ISO/IEC 2003 – All rights reserved

Not for Resale

Contents

Foreword		vi
Introduction		vii
1	Scope	1
2	Conformance	1
3	Normative references	1
4	Terms and definitions	2
4.1	External definitions	2
4.2	Other definitions	3
4.2.1	WTM user	3
5	Symbols and abbreviated terms	3
6	Signalling protocol for the support of SS-WTLR	3
6.1	SS-WTLR description	3
6.2	SS-WTLR operational requirements	3
6.2.1	Requirements on the Visitor PINX	3
6.2.2	Requirements on the Home PINX	3
6.2.3	Requirements on a Transit PINX	3
6.2.4	Requirements on the Directory PINX	4
6.3	SS-WTLR coding requirements	4
6.3.1	Operations	4
6.3.2	Information elements	7
6.3.3	Messages	7
6.4	SS-WTLR state definitions	7
6.4.1	States at the Visitor PINX	7
6.4.2	States at the Home PINX	7
6.4.3	States at the Directory PINX	7
6.5	SS-WTLR Signalling procedures for location registration	7
6.5.1	Actions at the Visitor PINX for location registration	7
6.5.2	Additional actions at the Visitor PINX for enquiry to the previous Visitor PINX	8
6.5.3	Additional actions at the Visitor PINX for enquiry to a Directory PINX	9
6.5.4	Actions at the Home PINX for location registration	9
6.5.5	Actions at a Transit PINX for location registration	10
6.5.6	Actions at the previous Visitor PINX for location registration	10
6.5.7	Additional actions at the previous Visitor PINX for enquiry from the Visitor PINX	10
6.5.8	Actions at the Directory PINX for enquiry from the Visitor PINX	10
6.6	SS-WTLR signalling procedures for location deregistration	11
6.6.1	Actions at the Visitor PINX for location deregistration	11
6.6.2	Actions at the Home PINX for location deregistration	11
6.6.3	Actions at a Transit PINX for location deregistration	12
6.7	SS-WTLR Impact of interworking with public ISDNs	12
6.8	SS-WTLR Impact of interworking with non-ISDNs	12
6.9	Protocol interactions between SS-WTLR and other supplementary services and ANFs	12

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.9.1 Interaction with Calling Name Identification Presentation (SS-CNIP) **12**
6.9.2 Interaction with Connected Name Identification Presentation (SS-CONP) **12**
6.9.3 Interaction with Completion of Calls to Busy Subscriber (SS-CCBS) **12**
6.9.4 Interaction with Completion of Calls on No Reply (SS-CCNR) **12**
6.9.5 Interaction with Call Transfer (SS-CT) **12**
6.9.6 Interaction with Call Forwarding Unconditional (SS-CFU) **12**
6.9.7 Interaction with Call Forwarding Busy (SS-CFB) **12**
6.9.8 Interaction with Call Forwarding No Reply (SS-CFNR) **12**
6.9.9 Interaction with Call Deflection (SS-CD) **12**
6.9.10 Interaction with Path Replacement (ANF-PR) **12**
6.9.11 Interaction with Call Offer (SS-CO) **12**
6.9.12 Interaction with Call Intrusion (SS-CI) **12**
6.9.13 Interaction with Do Not Disturb (SS-DND) **12**
6.9.14 Interaction with Do Not Disturb Override (SS-DNDO) **13**
6.9.15 Interaction with Advice Of Charge (SS-AOC) **13**
6.9.16 Interaction with Recall (SS-RE) **13**
6.9.17 Interaction with Call Interception (ANF-CINT) **13**
6.9.18 Interaction with Transit Counter (ANF-TC) **13**
6.9.19 Interaction with Route Restriction Class (ANF-RRC) **13**
6.9.20 Interaction with Message Waiting Indication (SS-MWI) **13**
6.9.21 Interaction with Wireless Terminal information exchange (ANF-WTINFO) **13**
6.9.22 Interaction with Wireless Terminal Incoming Call (SS-WTMI) **13**
6.9.23 Interaction with Wireless Terminal Outgoing Call (SS-WTMO) **13**
6.9.24 Interaction with Wireless Terminal Authentication of Terminal (SS-WTAT) **13**
6.9.25 Interaction with Wireless Terminal Authentication of Network (SS-WTAN) **13**

6.10 SS-WTLR parameter values (timers) **13**

6.10.1 Timer T1 **13**
6.10.2 Timer T2 **13**
6.10.3 Timer T3 **13**
6.10.4 Timer T4 **14**

7 Signalling protocol for the support of ANF-WTINFO **14**

7.1 ANF-WTINFO description **14**
7.2 ANF-WTINFO operational requirements **14**

7.2.1 Requirements on the Visitor PINX **14**
7.2.2 Requirements on the Home PINX **14**
7.2.3 Requirements on a Transit PINX **14**

7.3 ANF-WTINFO coding requirements **14**

7.3.1 Operations **14**
7.3.2 Information elements **14**
7.3.3 Messages **14**

7.4 ANF-WTINFO state definitions **14**

7.4.1 States at the Visitor PINX **14**
7.4.2 States at the Home PINX **15**

7.5 ANF-WTINFO signalling procedures for transfer of restriction information **15**

7.5.1 Actions at the Visitor PINX for transfer of restriction information **15**
7.5.2 Actions at the Home PINX for transfer of restriction information **15**

7.6 ANF-WTINFO signalling procedures for check of location data **15**

7.6.1 Actions at the Visitor PINX for check of location data **16**
7.6.2 Actions at the Home PINX for check of location data **16**
7.6.3 Actions at a Transit PINX for support of ANF-WTINFO **17**

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

7.7 ANF-WTINFO Impact of interworking with public ISDNs **17**
7.8 ANF-WTINFO Impact of interworking with non-ISDNs **17**
7.9 Protocol interactions between ANF-WTINFO and other supplementary services and ANFs **17**
7.9.1 Interaction with Calling Name Identification Presentation (SS-CNIP) **17**
7.9.2 Interaction with Connected Name Identification Presentation (SS-CONP) **17**
7.9.3 Interaction with Completion of Calls to Busy Subscriber (SS-CCBS) **17**
7.9.4 Interaction with Completion of Calls on No Reply (SS-CCNR) **17**
7.9.5 Interaction with Call Transfer (SS-CT) **17**
7.9.6 Interaction with Call Forwarding Unconditional (SS-CFU) **17**
7.9.7 Interaction with Call Forwarding Busy (SS-CFB) **17**
7.9.8 Interaction with Call Forwarding No Reply (SS-CFNR) **17**
7.9.9 Interaction with Call Deflection (SS-CD) **17**
7.9.10 Interaction with Path Replacement (ANF-PR) **17**
7.9.11 Interaction with Call Offer (SS-CO) **17**
7.9.12 Interaction with Call Intrusion (SS-CI) **18**
7.9.13 Interaction with Do Not Disturb (SS-DND) **18**
7.9.14 Interaction with Do Not Disturb Override (SS-DNDO) **18**
7.9.15 Interaction with Advice Of Charge (SS-AOC) **18**
7.9.16 Interaction with Recall (SS-RE) **18**
7.9.17 Interaction with Call Interception (ANF-CINT) **18**
7.9.18 Interaction with Transit Counter (ANF-TC) **18**
7.9.19 Interaction with Route Restriction Class (ANF-RRC) **18**
7.9.20 Interaction with Message Waiting Indication (SS-MWI) **18**
7.9.21 Interaction with Wireless Terminal Location Registration (SS-WTLR) **18**
7.9.22 Interaction with Wireless Terminal Incoming Call (SS-WTMI) **18**
7.9.23 Interaction with Wireless Terminal Outgoing Call (SS-WTMO) **18**
7.9.24 Interaction with Wireless Terminal Authentication of Terminal (SS-WTAT) **18**
7.9.25 Interaction with Wireless Terminal Authentication of Network (SS-WTAN) **18**
7.10 ANF-WTINFO parameter values (timers) **18**
7.10.1 Timer T5 **18**
7.10.2 Timer T6 **19**

Annexes

A - Protocol Implementation Conformance Statement (PICS) proforma **20**
B - Imported ASN.1 definitions **28**
C - Examples of message sequences **29**
D - Specification and Description Language (SDL) representation of procedures **35**
E - ASN.1 definitions according to ITU-T Recs. X.208 / X.209 **43**

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

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 15429 was prepared by ECMA (as ECMA-302) 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 15429:1999), which has been technically revised.

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Introduction

This International Standard is one of a series of Standards defining Wireless Terminal Mobility (WTM) 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 WTM Wireless Terminal Location Registration supplementary service and the Wireless Terminal Information Exchange additional network feature. 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.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

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

1 Scope

This International Standard specifies the signalling protocol for the support of the Wireless Terminal Location Registration supplementary service (SS-WTLR) and the Wireless Terminal Information exchange additional network feature (ANF-WTINFO) at the Q reference point between Private Integrated services Network eXchanges (PINXs) connected together within a Private Integrated Services Network (PISN).

SS-WTLR is a supplementary service which enables a WTM user to register at, or deregister from, the current location within the PISN. The ability to register at different locations in the PISN at different times enables the WTM user to maintain the provided services (including the ability to make and receive calls) at different access points. Deregistration is used to inform the PISN that the WTM user is temporarily unable to make use of the provided services (including the receipt of calls).

ANF-WTINFO is an additional network feature which enables transfer of restriction information between Home PINX and Visitor PINX. ANF-WTINFO also enables the Visitor PINX or Home PINX to initiate a check of the current location information.

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

Supplementary Service specifications and Additional Network Feature specifications are produced in three stages and according to the method specified in ITU-T 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 15428.

The signalling protocol for SS-WTLR and ANF-WTINFO 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-WTLR 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 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 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

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 15506:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Message Waiting Indication supplementary service*

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 15433:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Wireless Terminal Aauthentication supplementary services*

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

ITU-T 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.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.100:2002, *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)
- Call, Basic Call (ISO/IEC 11582)
- Complete Number (ISO/IEC 11571)
- Co-ordination Function (ISO/IEC 11582)
- Directory PINX (ISO/IEC 15428)
- End PINX (ISO/IEC 11582)
- Home PINX (ISO/IEC 15428)
- Home data base (HDB) (ISO/IEC 15428)
- Interpretation APDU (ISO/IEC 11582)
- Location Area (LA) (ISO/IEC 15428)
- Network Facility Extension (NFE) (ISO/IEC 11582)
- Originating PINX (ISO/IEC 11582)
- PISN Number (ISO/IEC 11571)
- 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 11582)
- Transit PINX (ISO/IEC 11582)

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

– User (ISO/IEC 11574)
– Visitor area (ISO/IEC 15428)
– Visitor data base (VDB) (ISO/IEC 15428)
– Visitor PINX (ISO/IEC 15428)
– Wireless Terminal Mobility (WTM) (ISO/IEC 15428)
– WTM user's identity (ISO/IEC 15428)

4.2 Other definitions

4.2.1 WTM user

The user of SS-WTLR or other WTM services.

5 Symbols and abbreviated terms

ANF	Additional Network Feature
ANF-WTINFO	Wireless Terminal Information exchange
APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation no. 1
HDB	Home Data Base
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-MWI	Message Waiting Indication supplementary service
SS-WTLR	Wireless Terminal Location Registration supplementary service
VDB	Visitor Data Base
WTM	Wireless Terminal Mobility

6 Signalling protocol for the support of SS-WTLR

6.1 SS-WTLR description

SS-WTLR is a supplementary service which makes the location of a WTM user known to the PISN. By updating location information in the PISN, incoming calls can be routed to a WTM user, and the WTM user can access the PISN services from the current location area. SS-WTLR also enables a WTM user to inform the PISN that the current location area is no longer to be used to make and receive calls.

6.2 SS-WTLR 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 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.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.2.4 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.

6.3 SS-WTLR 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 SS-WTLR and ANF-WTINFO

```
WTM-Location-Registration-Operations-asn1-97
                    {iso standard pss1-location-registration (15429) wtlr-operations-asn1-97 (1)}

DEFINITIONS EXPLICIT TAGS ::=

BEGIN
IMPORTS             OPERATION, ERROR FROM Remote-Operations-Information-Objects
                        {joint-iso-itu-t 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, invalidServedUserNr
                        FROM General-Errors-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)}
                    BasicService FROM Call-Diversion-Operations-asn1-97
                        { iso (1) standard (0) pss1-call-diversion (13873)
                        call-diversion-operations-asn1-97 (1) };

WTMLR-Operations OPERATION ::= {locUpdate | locDelete | locDeReg | pisnEnquiry | getRRCInf | locInfoCheck}


locUpdate           OPERATION ::={
                    -- Sent from the Visitor PINX to the Home PINX.
                        ARGUMENT    LocUpdArg
                        RESULT      DummyRes
                        ERRORS      { invalidServedUserNr | notAuthorized | unspecified }
                        CODE        local: 50}
```


© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table 1 - Operations in support of SS-WTLR and ANF-WTINFO (continued)

```
locDelete           OPERATION ::= {
                    -- Sent from the Home PINX to the previous Visitor PINX.
                          ARGUMENT      LocDelArg
                          RESULT        DummyRes
                          ERRORS        { temporarilyUnavailable | unspecified }
                          CODE          local: 51}

locDeReg            OPERATION ::= {
                    -- Sent from the Visitor PINX to the Home PINX.
                          ARGUMENT      LocDeRegArg
                          RESULT        DummyRes
                          ERRORS        { notAvailable | unspecified }
                          CODE          local: 52}

pisnEnquiry         OPERATION ::= {
                    -- Sent from the Visitor PINX to the previous Visitor PINX or a Directory PINX.
                          ARGUMENT      PisnEnqArg
                          RESULT        PisnEnqRes
                          ERRORS        { invalidServedUserNr | unspecified}
                          CODE          local: 53}

getRRCInf           OPERATION ::= {
                    -- Sent from the Visitor PINX to the Home PINX.
                          ARGUMENT      GetRRCInfArg
                          RESULT        GetRRCInfRes
                          ERRORS        { notAvailable | unspecified }
                          CODE          local: 97}

locInfoCheck        OPERATION ::= {
                    -- Sent from the Visitor PINX to the Home PINX or vice versa.
                          ARGUMENT      LocInfoCheckArg
                          RESULT        LocInfoCheckRes
                          ERRORS        { notAvailable | unspecified }
                          CODE          local: 98}

LocUpdArg ::=       SEQUENCE      { wtmUserId         WtmUserId,
                                  basicServiceBasicService DEFAULT allServices,
                                  visitPINX           PartyNumber,
                                  -- The pisnNumber of the Visitor PINX,
                                  -- always a Complete Number.
                                  argExtension        LrExtension OPTIONAL }

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

LocDelArg ::=       SEQUENCE      { wtmUserId         WtmUserId,
                                  basicServiceBasicService DEFAULT allServices,
                                  argExtension        LrExtension OPTIONAL }

LocDeRegArg ::=     SEQUENCE      { wtmUserId         WtmUserId,
                                  basicServiceBasicService DEFAULT allServices,
                                  argExtension        LrExtension OPTIONAL }
```

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table 1 - Operations in support of SS-WTLR and ANF-WTINFO (concluded)

```
PisnEnqArg ::=          SEQUENCE    { alternativeId     AlternativeId,
                                      -- Can be a temporary identifier, e.g. Network Assigned
                                      -- Identity structure, or a fixed handset identifier.
                                      argExtension      LrExtension OPTIONAL }

PisnEnqRes ::=          SEQUENCE    { wtmUserId         WtmUserId,
                                      resExtension      LrExtension OPTIONAL }

GetRRCInfArg ::=        SEQUENCE    { wtmUserId         WtmUserId,
                                      basicServiceBasicService DEFAULT allServices,
                                      argExtension      LrExtension OPTIONAL }

GetRRCInfRes ::=        SEQUENCE    { alternativeId     AlternativeId OPTIONAL,
                                      rrClass           RRClass OPTIONAL,
                                      argExtension      LrExtension OPTIONAL }

LocInfoCheckArg ::=     SEQUENCE    { wtmUserId         WtmUserId,
                                      basicServiceBasicService DEFAULT allServices,
                                      visitPINX         PartyNumber,
                                      -- The PISN number of the Visitor PINX,
                                      -- always a Complete Number.
                                      argExtension      LrExtension OPTIONAL }

LocInfoCheckRes ::=     SEQUENCE    { checkResult       CheckResult,
                                      argExtension      LrExtension OPTIONAL }

WtmUserId ::=           CHOICE      { pisnNumber        PartyNumber,
                                      -- The PISN number of the WTM user,
                                      -- always a Complete Number.
                                      alternativeId     AlternativeId }

AlternativeId ::=       OCTET STRING(SIZE(1..20))

LrExtension ::=         CHOICE      { extension   [ 1 ] IMPLICIT Extension{{WTMLRExtSet}},
                                      sequOfExtn  [ 2 ] IMPLICIT SEQUENCE OF
                                                          Extension{{WTMLRExtSet}} }

RRClass ::=             INTEGER (0..99)

CheckResult ::=         ENUMERATED  { locInfChk-correct (0),
                                      locInfChk-incorrect (1) }

WTMLRExtSet EXTENSION ::= {...}

notAuthorized               ERROR   ::=  {CODE local: 1007}
temporarilyUnavailable      ERROR   ::=  {CODE local: 1000}


unspecified                 ERROR ::= {
                                    PARAMETER     Extension{{WTMLRExtSet}}
                                    CODE          local: 1008}

END                     -- of WTM-Location-Registration-Operations-asn1-97
```

NOTE
Element visitPINX in LocUpdArg can either be a roaming number for the individual WTLR user or a single number for all WTLR users currently registered in this PINX. In the latter case the individual WTLR users are distinguished by their own WtmUserId.

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

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 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-WTLR 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-WTLR Supplementary Service Control entity in that PINX in association with a particular location handling request.

6.4.1.1 State VisitIdle

SS-WTLR is not operating.

6.4.1.2 State VisitUpdate

A locUpdate invoke APDU has been sent.

6.4.1.3 State VisitEnquiry

A pisnEnquiry invoke APDU has been sent.

6.4.1.4 State VisitDeReg

A locDeReg 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-WTLR Supplementary Service Control entity in that PINX in association with a particular location handling request.

6.4.2.1 State HomeIdle

Ready for receipt of a locUpdate or locDeReg APDU.

6.4.2.2 State HomeDelete

A locDelete 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-WTLR Supplementary Service Control entity in that PINX in association with a particular location handling request.

6.4.3.1 State DirectoryIdle

Ready for receipt of a pisnEnquiry APDU.

6.5 SS-WTLR Signalling procedures for location registration

Examples of message sequences are shown in annex C.

6.5.1 Actions at the Visitor PINX for location registration

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

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.5.1.1 Normal procedures

On receipt of a valid location registration request from a WTM user that is not already registered in the Visitor area, and if the Visitor PINX possesses sufficient addressing information to make a location registration request to the Home PINX, the Visitor PINX shall send a locUpdate 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 WTM user's identity shall be included in element wtmUserId, the basic service for which the WTM user is to be registered may be included in element basicService, and a PISN number identifying the Visitor PINX shall be included in element visitPINX. 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 Visitor PINX. The Visitor PINX shall enter state VisitUpdate and start timer T1.

NOTE 1 - Validation of the registration request can involve authentication of the WTM user.

NOTE 2 - In the absence of sufficient addressing information, the Visitor PINX can, before sending a locUpdate invoke APDU, use the procedures of 6.5.2 to make an enquiry to the previous Visitor PINX or the procedures of 6.5.3 to make an enquiry to a Directory PINX in order to translate an identifier provided by the WTM user in the registration request into a PISN number.

NOTE 3 - 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 WTM user in the location registration request or optionally the PISN number provided by the previous Visitor PINX or Directory PINX.

On receipt of the locUpdate return result APDU, the Visitor PINX shall stop timer T1, update the information in the VDB, revert to state VisitIdle and indicate acceptance to the WTM 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

On receipt of a locUpdate 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 WTM user.

If timer T1 expires (i.e. the locUpdate invoke APDU is not answered by the Home PINX), the Visitor PINX shall indicate rejection to the WTM 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 for enquiry to the previous Visitor PINX

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

6.5.2.1 Normal procedures

In order to make an enquiry to the previous Visitor PINX to translate an identifier provided by the WTM user in the location registration request into a WTM user's identity, the Visitor PINX may send a pisnEnquiry invoke APDU to the previous 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, element alternativeId shall contain the identifier provided by the WTM user. The Visitor PINX shall enter state VisitEnquiry and start timer T2.

NOTE 4 - The number to be used in the Called party number information element when establishing the call independent signalling connection to the previous Visitor PINX is outside the scope of this International Standard. It can, for example, be derived from the identifier provided by the WTM user.

On receipt of the pisnEnquiry return result APDU, the Visitor PINX shall stop timer T2. The WTM user's identity received in the pisnEnquiry return result APDU can be used for location registration.

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

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.5.2.2 Exceptional procedures

On receipt of a pisnEnquiry return error or reject APDU from the previous Visitor PINX, the Visitor PINX shall stop timer T2 and enter state VisitIdle. If timer T2 expires, the Visitor PINX shall enter state VisitIdle.

NOTE 5 - In any of these situations the Visitor PINX will be unable to proceed with location registration and should indicate rejection to the WTM user, unless there is another means available for obtaining the WTM user's identity of the WTM user.

The Visitor PINX is responsible for clearing the call independent signalling connection towards the previous Visitor PINX. This may occur on receipt of a return error or reject APDU or on expiry of timer T2. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.5.3 Additional actions at the Visitor PINX for enquiry to a Directory PINX

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

6.5.3.1 Normal procedures

In order to make an enquiry to a Directory PINX to translate an identifier provided by the WTM user in the location registration request into a WTM user's identity, the Visitor PINX may send a pisnEnquiry invoke APDU to the Directory 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, element alternativeId shall contain the identifier provided by the WTM user. The Visitor PINX shall enter state VisitEnquiry and start timer T2.

NOTE 6 - The number to be used in the Called party number information element when establishing the call independent signalling connection to the Directory PINX is outside the scope of this International Standard.

On receipt of the pisnEnquiry return result APDU, the Visitor PINX shall stop timer T2. The WTM user's identity received in the pisnEnquiry return result APDU can be used for location registration.

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

6.5.3.2 Exceptional procedures

On receipt of a pisnEnquiry return error or reject APDU from the Directory PINX, the Visitor PINX shall stop timer T2 and enter state VisitIdle. If timer T2 expires, the Visitor PINX shall enter state VisitIdle.

NOTE 7 - In any of these situations the Visitor PINX will be unable to proceed with location registration and should indicate rejection to the WTM user, unless there is another means available for obtaining the WTM user's identity of the WTM user.

The Visitor PINX is responsible for clearing the call independent signalling connection towards the Directory PINX. This may occur on receipt of a return error or reject APDU or on expiry of timer T2. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.5.4 Actions at the Home PINX for location registration

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

6.5.4.1 Normal procedures

On receipt of a locUpdate 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 WTM user's identity (element wtmUserId), and may check the requested basic service (element basicService) to verify that the WTM user may update the location information.

If the WTM user may update the location information, the Home PINX shall update the location information in the HDB using the Visitor PINX number received in element visitPINX and answer the locUpdate invoke APDU with a return result APDU. If the Visitor area has changed (i.e. the PISN number of the Visitor PINX optionally related to a basic service has changed), the Home PINX shall send a locDelete invoke APDU to the previous 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 WTM user's identity shall be included in element wtmUserId and the basic service for which the WTM user has registered may be included in element basicService. The Home PINX shall enter state HomeDelete and start timer T4.

On receipt of the locDelete return result APDU, the Home PINX shall stop timer T4 and enter state HomeIdle.

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

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

6.5.4.2 Exceptional procedures

If the Visitor area optionally related to a basic service is unchanged, the Home PINX shall revert to state HomeIdle after sending locUpdate return result.

If the WTM user is not found in the HDB, the Home PINX shall answer the locUpdate invoke APDU with a return error APDU containing the error invalidServedUserNr.

If the WTM user is not allowed to update the location information, the Home PINX shall answer the locUpdate invoke APDU with a return error APDU containing the error notAuthorized.

On receipt of a locDelete return error or reject APDU from the previous Visitor PINX, the Home PINX shall stop timer T4 and enter state HomeIdle.

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

NOTE 8 - Expiry of timer T4 or receipt of a locDelete return error or reject APDU may invoke management actions to correct the VDB data in the previous Visitor PINX.

6.5.5 Actions at a Transit PINX for location registration

No special actions are required in support of location registration.

6.5.6 Actions at the previous Visitor PINX for location registration

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

6.5.6.1 Normal procedures

On receipt of a locDelete 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 WTM user's identity (element wtmUserId), the basic service (element basicService) if received, and delete the corresponding VDB entry for the WTM user and answer the locDelete invoke APDU with a return result APDU.

6.5.6.2 Exceptional procedures

If the WTM user is not found in the VDB, the previous Visitor PINX shall answer the locDelete invoke APDU with a return result APDU.

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

6.5.7 Additional actions at the previous Visitor PINX for enquiry from the Visitor PINX

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

6.5.7.1 Normal procedures

On receipt of a pisnEnquiry 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 if the VDB contains an entry for the WTM user. If there is an entry, the WTM user's identity shall be returned in a pisnEnquiry return result APDU.

6.5.7.2 Exceptional procedures

If the WTM user is not found in the VDB, the previous Visitor PINX shall answer the pisnEnquiry invoke APDU with a return error APDU containing the error invalidServedUserNr.

NOTE 9 - If a PINX that receives a pisnEnquiry invoke APDU is capable of behaving as a Visitor PINX and as a Directory PINX, it should respond with a return error APDU only if the WTM user is present in neither the VDB nor the directory.

6.5.8 Actions at the Directory PINX for enquiry from the Visitor PINX

The SDL representation of procedures at the Directory PINX is shown in D.4 of annex D.

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.5.8.1 Normal procedures

On receipt of a pisnEnquiry invoke APDU using the call reference of a call independent signalling connection (as specified in 7.3 of ISO/IEC 11582), the Directory PINX shall attempt to translate the identity received in the pisnEnquiry invoke APDU to a WTM user's identity. The WTM user's identity shall be returned in a pisnEnquiry return result APDU.

6.5.8.2 Exceptional procedures

If the Directory PINX is unable to translate the identity received in the pisnEnquiry invoke APDU, a pisnEnquiry return error APDU containing the error invalidServedUserNr shall be returned.

NOTE 10 - If a PINX that receives a pisnEnquiry invoke APDU is capable of behaving as a Visitor PINX and as a Directory PINX, it should respond with a return error APDU only if the WTM user is present in neither the VDB nor the directory.

6.6 SS-WTLR signalling procedures for location deregistration

Examples of message sequences are shown in annex C.

6.6.1 Actions at the Visitor PINX for location deregistration

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

6.6.1.1 Normal procedures

When a Visitor PINX determines that a WTM user is deregistered or on receipt of a valid location deregistration request from a WTM user, the Visitor PINX shall send a locDeReg 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 WTM user's identity shall be included in element wtmUserId and the basic service for which the WTM user has deregistered may be included in element basicService. The Visitor PINX shall enter state VisitDeReg and start timer T3.

NOTE 11 - Validation of the deregistration request can involve authentication of the WTM user.

On receipt of the locDeReg return result APDU, the Visitor PINX shall stop timer T3, delete the corresponding VDB information, revert to state VisitIdle and, if applicable, indicate acceptance to the WTM 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.

6.6.1.2 Exceptional procedures

On receipt of a locDeReg return error or reject APDU from the Home PINX, the Visitor PINX shall stop timer T3, revert to state VisitIdle and, if applicable, indicate rejection to the WTM user.

If timer T3 expires (i.e. the locDeReg invoke APDU is not answered by the Home PINX), the Visitor PINX shall enter state VisitIdle and, if applicable, indicate rejection to the WTM 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 error or reject APDU or on expiry of timer T3. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.6.2 Actions at the Home PINX for location deregistration

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

6.6.2.1 Normal procedures

On receipt of a locDeReg 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 WTM user's identity (element wtmUserId), and may check the requested basic service (element basicService) to verify that the WTM user may deregister.

If the WTM user may deregister, the Home PINX shall update the location information in the HDB and answer the locDeReg invoke APDU with a return result APDU.

6.6.2.2 Exceptional procedures

If the WTM user may not deregister, the Home PINX shall answer the locDeReg invoke APDU with a return error APDU containing the error notAvailable.

--`,,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.6.3 Actions at a Transit PINX for location deregistration

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

6.7 SS-WTLR Impact of interworking with public ISDNs

Not applicable.

6.8 SS-WTLR Impact of interworking with non-ISDNs

Not applicable.

6.9 Protocol interactions between SS-WTLR and other supplementary services and ANFs

This clause specifies protocol interactions with other supplementary services and ANFs for which stage 3 Standards had been published at the time of publication of this International Standard. For interactions with supplementary services and ANFs for which stage 3 Standards are published subsequent to the publication of this International Standard, see those other stage 3 Standards.

NOTE 12 - Additional interactions that have no impact on the signalling protocol at the Q reference point can be found in the relevant stage 1 specifications.

NOTE 13 - Simultaneous conveyance of APDUs for SS-WTLR and another supplementary service or ANF in the same message, each in accordance with the requirements of its respective stage 3 Standard, does not, on its own, constitute a protocol interaction.

6.9.1 Interaction with Calling Name Identification Presentation (SS-CNIP)

No protocol interaction.

6.9.2 Interaction with Connected Name Identification Presentation (SS-CONP)

No protocol interaction.

6.9.3 Interaction with Completion of Calls to Busy Subscriber (SS-CCBS)

No protocol interaction.

NOTE 14 - SS-CCBS may need to be cancelled if the WTM user (as either the calling user or called user) changes location or deregisters.

6.9.4 Interaction with Completion of Calls on No Reply (SS-CCNR)

No protocol interaction.

NOTE 15 - SS-CCNR may need to be cancelled if the WTM user (as either the calling user or called user) changes location or deregisters.

6.9.5 Interaction with Call Transfer (SS-CT)

No protocol interaction.

6.9.6 Interaction with Call Forwarding Unconditional (SS-CFU)

No protocol interaction.

6.9.7 Interaction with Call Forwarding Busy (SS-CFB)

No protocol interaction.

6.9.8 Interaction with Call Forwarding No Reply (SS-CFNR)

No protocol interaction.

6.9.9 Interaction with Call Deflection (SS-CD)

No protocol interaction.

6.9.10 Interaction with Path Replacement (ANF-PR)

No protocol interaction.

6.9.11 Interaction with Call Offer (SS-CO)

No protocol interaction.

6.9.12 Interaction with Call Intrusion (SS-CI)

No protocol interaction.

6.9.13 Interaction with Do Not Disturb (SS-DND)

No protocol interaction.

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.9.14 Interaction with Do Not Disturb Override (SS-DNDO)

No protocol interaction.

6.9.15 Interaction with Advice Of Charge (SS-AOC)

No protocol interaction.

6.9.16 Interaction with Recall (SS-RE)

No protocol interaction.

6.9.17 Interaction with Call Interception (ANF-CINT)

No protocol interaction.

6.9.18 Interaction with Transit Counter (ANF-TC)

No protocol interaction.

6.9.19 Interaction with Route Restriction Class (ANF-RRC)

No protocol interaction.

6.9.20 Interaction with Message Waiting Indication (SS-MWI)

The following interaction shall apply if SS-MWI is supported in accordance with ISO/IEC 15506.

6.9.20.1 Interaction at the previous Visitor PINX

On receipt of a locDelete invoke APDU using the call reference of a call independent signalling connection, the previous Visitor PINX shall check if there are any stored mwiActivate APDU's, and if so include the mwiActivate APDU's together with the locDelete return result APDU sent to the Home PINX.

6.9.20.2 Interaction at the Home PINX

On receipt of mwiActivate APDU's together with the locDelete return result APDU from the previous Visitor PINX, the Home PINX shall forward the mwiActivate APDU's to the new Visitor PINX if applicable.

6.9.21 Interaction with Wireless Terminal information exchange (ANF-WTINFO)

No protocol interaction.

6.9.22 Interaction with Wireless Terminal Incoming Call (SS-WTMI)

No protocol interaction.

6.9.23 Interaction with Wireless Terminal Outgoing Call (SS-WTMO)

No protocol interaction.

6.9.24 Interaction with Wireless Terminal Authentication of Terminal (SS-WTAT)

No protocol interaction.

6.9.25 Interaction with Wireless Terminal Authentication of Network (SS-WTAN)

No protocol interaction.

6.10 SS-WTLR parameter values (timers)

6.10.1 Timer T1

Timer T1 operates at the Visitor PINX during state VisitUpdate. Its purpose is to protect against the absence of a response to the locUpdate invoke APDU.

Timer T1 shall have a value not less than 15 s.

6.10.2 Timer T2

Timer T2 operates at the Visitor PINX during state VisitEnquiry. Its purpose is to protect against the absence of a response to the pisnEnquiry invoke APDU.

Timer T2 shall have a value not less than 15 s.

6.10.3 Timer T3

Timer T3 operates at the Visitor PINX during state VisitDeReg. Its purpose is to protect against the absence of a response to the locDeReg invoke APDU.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Timer T3 shall have a value not less than 15 s.

6.10.4 Timer T4

Timer T4 operates at the Home PINX during state HomeDelete. Its purpose is to protect against the absence of a response to the locDelete invoke APDU.

Timer T4 shall have a value not less than 15 s.

7 Signalling protocol for the support of ANF-WTINFO

7.1 ANF-WTINFO description

ANF-WTINFO is an additional network feature for information exchange between the Home PINX and the Visitor PINX. ANF-WTINFO is used for transfer of restriction information for a WTLR user from the Home PINX to the Visitor PINX. ANF-WTINFO also enables the Visitor PINX or the Home PINX to initiate a check of the current location information.

7.2 ANF-WTINFO operational requirements

7.2.1 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.

7.2.2 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.

7.2.3 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.

7.3 ANF-WTINFO coding requirements

7.3.1 Operations

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

7.3.2 Information elements

7.3.2.1 Facility information element

APDUs of the operations defined in 7.3.1 shall be coded in the Facility information element in accordance with ISO/IEC 11582.

When conveying the invoke APDU of operations defined in 7.3.1, the destinationEntity data element of the NFE shall contain value endPINX.

When conveying the invoke APDU of operations defined in 7.3.1, the Interpretation APDU shall either be omitted or be included with value rejectAnyUnrecognisedInvokePdu.

7.3.2.2 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.

7.3.3 Messages

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

7.4 ANF-WTINFO state definitions

7.4.1 States at the Visitor PINX

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

7.4.1.1 State VisitIdle

ANF-WTINFO is not operating.

7.4.1.2 State VisitWaitRRC

A getRRCInf invoke APDU has been sent.

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

7.4.1.3 State VisitWaitIC

A locInfoCheck invoke APDU has been sent.

7.4.2 States at the Home PINX

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

7.4.2.1 State HomeIdle

ANF-WTINFO is not operating.

7.4.2.2 State HomeWaitIC

A locInfoCheck invoke APDU has been sent.

7.5 ANF-WTINFO signalling procedures for transfer of restriction information

Examples of message sequences are shown in annex C.

7.5.1 Actions at the Visitor PINX for transfer of restriction information

The SDL representation of procedures at the Visitor PINX is shown in D.5 of annex D.

7.5.1.1 Normal procedures

On determining that transferring of restriction information is to be invoked for a WTM user, the Visitor PINX shall send a getRRCInf 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 WTM user's identity shall be included in element wtmUserId, the basic service for the WTM user may be included in element basicService. The Visitor PINX shall enter state VisitWaitRRC and start timer T5.

On receipt of the getRRCInf return result APDU, the Visitor PINX shall stop timer T5, and may update the VDB with the retrieved restriction information and shall 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 a return result APDU. Alternatively, the signalling connection may be retained for other applications, if appropriate.

7.5.1.2 Exceptional procedures

On receipt of a getRRCInf return error or reject APDU from the Home PINX, the Visitor PINX shall stop timer T5 and revert to state VisitIdle.

If timer T5 expires (i.e. the getRRCInf invoke APDU is not answered by the Home PINX), the Visitor PINX shall 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 T5. Alternatively, the signalling connection may be retained for other applications, if appropriate.

7.5.2 Actions at the Home PINX for transfer of restriction information

The SDL representation of procedures at the Home PINX is shown in D.6 of annex D.

7.5.2.1 Normal procedures

On receipt of a getRRCInf 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 attempt to retrieve the requested restriction information from the HDB and shall return a getRRCInf return result APDU. If applicable, the route restriction class and/or the alternative identity for the WTM user shall be included in the APDU.

7.5.2.2 Exceptional procedures

If the Home PINX is unable to retrieve the requested information (e.g. WTM user not known), a getRRCInf return error APDU shall be returned.

7.6 ANF-WTINFO signalling procedures for check of location data

Examples of message sequences are shown in annex C.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

7.6.1 Actions at the Visitor PINX for check of location data

The SDL representation of procedures at the Visitor PINX is shown in D.5 of annex D.

7.6.1.1 Normal procedures

On determining that check of location data is to be invoked for a WTM user, the Visitor PINX shall send a locInfoCheck 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 WTM user's identity shall be included in element wtmUserId, the basic service for which the WTM user is registered may be included in element basicService, and the PISN number identifying the Visitor PINX shall be included in element visitPINX. The Visitor PINX shall enter state VisitWaitIC and start timer T6.

On receipt of the locInfoCheck return result APDU, the Visitor PINX shall stop timer T6, and may take appropriate actions depending on the indicated result.

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

On receipt of a locInfoCheck invoke APDU using the call reference of a call independent signalling connection (as specified in 7.3 of ISO/IEC 11582), the Visitor PINX shall verify the location information in the VDB for the WTM user identified by element wtmUserId. The result of the verification shall be returned in a locInfoCheck return result APDU.

7.6.1.2 Exceptional procedures

On receipt of a locInfoCheck return error or reject APDU from the Home PINX, the Visitor PINX shall stop timer T6 and revert to state VisitIdle.

If timer T6 expires (i.e. the locInfoCheck invoke APDU is not answered by the Home PINX), the Visitor PINX shall 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 T6. Alternatively, the signalling connection may be retained for other applications, if appropriate.

On receipt of a locInfoCheck invoke APDU where the indicated WTM user is not found in the VDB, the Visitor PINX shall answer the locInfoCheck invoke APDU with a return error APDU containing the error notAvailable.

7.6.2 Actions at the Home PINX for check of location data

The SDL representation of procedures at the Home PINX is shown in D.6 of annex D.

7.6.2.1 Normal procedures

On receipt of a locInfoCheck 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 verify the location information in the HDB for the WTM user identified by element wtmUserId. The result of the verification shall be returned in a locInfoCheck return result APDU.

On determining that check of location data is to be invoked for a WTM user, the Home PINX shall send a locInfoCheck 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 WTM user's identity shall be included in element wtmUserId, the basic service for which the WTM user is registered may be included in element basicService, and the PISN number identifying the Visitor PINX shall be included in element visitPINX. The Home PINX shall enter state HomeWaitIC and start timer T6.

On receipt of the locInfoCheck return result APDU, the Home PINX shall stop timer T6, and may take appropriate actions depending on the indicated result.

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

7.6.2.2 Exceptional procedures

If the indicated WTM user is not found in the HDB, the Home PINX shall answer the locInfoCheck invoke APDU with a return error APDU containing the error notAvailable.

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

On receipt of a locInfoCheck return error or reject APDU from the Visitor PINX, the Home PINX shall stop timer T6 and revert to state VisitIdle.

If timer T6 expires (i.e. the locInfoCheck invoke APDU is not answered by the Visitor PINX), the Home PINX shall enter state VisitIdle.

The Home 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 T6. Alternatively, the signalling connection may be retained for other applications, if appropriate.

7.6.3 Actions at a Transit PINX for support of ANF-WTINFO

No special actions are required in support of ANF-WTINFO.

7.7 ANF-WTINFO Impact of interworking with public ISDNs

Not applicable.

7.8 ANF-WTINFO Impact of interworking with non-ISDNs

Not applicable.

7.9 Protocol interactions between ANF-WTINFO and other supplementary services and ANFs

This clause specifies protocol interactions with other supplementary services and ANFs for which stage 3 Standards had been published at the time of publication of this International Standard. For interactions with supplementary services and ANFs for which stage 3 Standards are published subsequent to the publication of this International Standard, see those other stage 3 Standards.

NOTE 16 - Additional interactions that have no impact on the signalling protocol at the Q reference point can be found in the relevant stage 1 specifications.

NOTE 17 - Simultaneous conveyance of APDUs for ANF-WTINFO and another supplementary service or ANF in the same message, each in accordance with the requirements of its respective stage 3 Standard, does not, on its own, constitute a protocol interaction.

7.9.1 Interaction with Calling Name Identification Presentation (SS-CNIP)

No protocol interaction.

7.9.2 Interaction with Connected Name Identification Presentation (SS-CONP)

No protocol interaction.

7.9.3 Interaction with Completion of Calls to Busy Subscriber (SS-CCBS)

No protocol interaction.

7.9.4 Interaction with Completion of Calls on No Reply (SS-CCNR)

No protocol interaction.

7.9.5 Interaction with Call Transfer (SS-CT)

No protocol interaction.

7.9.6 Interaction with Call Forwarding Unconditional (SS-CFU)

No protocol interaction.

7.9.7 Interaction with Call Forwarding Busy (SS-CFB)

No protocol interaction.

7.9.8 Interaction with Call Forwarding No Reply (SS-CFNR)

No protocol interaction.

7.9.9 Interaction with Call Deflection (SS-CD)

No protocol interaction.

7.9.10 Interaction with Path Replacement (ANF-PR)

No protocol interaction.

7.9.11 Interaction with Call Offer (SS-CO)

No protocol interaction.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

7.9.12 Interaction with Call Intrusion (SS-CI)

No protocol interaction.

7.9.13 Interaction with Do Not Disturb (SS-DND)

No protocol interaction.

7.9.14 Interaction with Do Not Disturb Override (SS-DNDO)

No protocol interaction.

7.9.15 Interaction with Advice Of Charge (SS-AOC)

No protocol interaction.

7.9.16 Interaction with Recall (SS-RE)

No protocol interaction.

7.9.17 Interaction with Call Interception (ANF-CINT)

No protocol interaction.

7.9.18 Interaction with Transit Counter (ANF-TC)

No protocol interaction.

7.9.19 Interaction with Route Restriction Class (ANF-RRC)

No protocol interaction.

7.9.20 Interaction with Message Waiting Indication (SS-MWI)

No protocol interaction.

7.9.21 Interaction with Wireless Terminal Location Registration (SS-WTLR)

No protocol interaction.

7.9.22 Interaction with Wireless Terminal Incoming Call (SS-WTMI)

No protocol interaction.

7.9.23 Interaction with Wireless Terminal Outgoing Call (SS-WTMO)

No protocol interaction.

7.9.24 Interaction with Wireless Terminal Authentication of Terminal (SS-WTAT)

The following protocol interaction shall apply if SS-WTAT is supported in accordance with ISO/IEC 15433.

7.9.24.1 Actions at the Home PINX

On receipt of a getRRCInf invoke APDU the Home PINX may obtain authentication parameters and include a transferAuthParam invoke APDU in the same message as the getRRCInf return result APDU. The invoke APDU shall contain element wtatParamInfo with choice authKey or challLen.

7.9.24.2 Actions at the Visitor PINX

When the element wtatParamInfo is received in the transferAuthParam invoke APDU, the authentication information may be stored in the Visitor PINX. It may later be used by the Visitor PINX during authentication of the WTM user.

7.9.25 Interaction with Wireless Terminal Authentication of Network (SS-WTAN)

No protocol interaction.

7.10 ANF-WTINFO parameter values (timers)

7.10.1 Timer T5

Timer T5 operates at the Visitor PINX during state VisitWaitRRC. Its purpose is to protect against the absence of a response to the getRRCInf invoke APDU.

Timer T5 shall have a value not less than 15 s.

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

7.10.2 Timer T6

Timer T6 operates at the Visitor PINX during state VisitWaitIC and at the Home PINX during state HomeWaitIC. Its purpose is to protect against the absence of a response to the locInfoCheck invoke APDU.

Timer T6 shall have a value not less than 15 s.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex A
(normative)

Protocol Implementation Conformance Statement (PICS) proforma

A.1 Introduction

The supplier of a protocol implementation which is claimed to conform to this International Standard shall complete the following Protocol Implementation Conformance Statement (PICS) proforma.

A completed PICS proforma is the PICS for the implementation in question. The PICS is a statement of which capabilities and options of the protocol have been implemented. The PICS can have a number of uses, including use:

– by the protocol implementor, as a check list to reduce the risk of failure to conform to the Standard through oversight;

– by the supplier and acquirer, or potential acquirer, of the implementation, as a detailed indication of the capabilities of the implementation, stated relative to the common basis for understanding provided by the Standard's PICS proforma;

– by the user or potential user of the implementation, as a basis for initially checking the possibility of interworking with another implementation - while interworking can never be guaranteed, failure to interwork can often be predicted from incompatible PICS's;

– by a protocol tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

A.2 Instructions for completing the PICS proforma

A.2.1 General structure of the PICS proforma

The PICS proforma is a fixed format questionnaire divided into sub-clauses each containing a group of individual items. Each item is identified by an item number, the name of the item (question to be answered), and the reference(s) to the clause(s) that specifies (specify) the item in the main body of this International Standard.

The "Status" column indicates whether an item is applicable and if so whether support is mandatory or optional. The following terms are used:

m	mandatory (the capability is required for conformance to the protocol);
o	optional (the capability is not required for conformance to the protocol, but if the capability is implemented it is required to conform to the protocol specifications);
o.<n>	optional, but support of at least one of the group of options labelled by the same numeral <n> is required;
x	prohibited;
c.<cond>	conditional requirement, depending on support for the item or items listed in condition <cond>;
<item>:m	simple conditional requirement, the capability being mandatory if item number <item> is supported, otherwise not applicable;
<item>:o	simple conditional requirement, the capability being optional if item number <item> is supported, otherwise not applicable.

Answers to the questionnaire items are to be provided either in the "Support" column, by simply marking an answer to indicate a restricted choice (Yes or No), or in the "Not Applicable" column (N/A).

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

A.2.2 Additional information

Items of Additional Information allow a supplier to provide further information intended to assist the interpretation of the PICS. It is not intended or expected that a large quantity will be supplied, and a PICS can be considered complete without any such information. Examples might be an outline of the ways in which a (single) implementation can be set up to operate in a variety of environments and configurations.

References to items of Additional Information may be entered next to any answer in the questionnaire, and may be included in items of Exception information.

A.2.3 Exception information

It may occasionally happen that a supplier will wish to answer an item with mandatory or prohibited status (after any conditions have been applied) in a way that conflicts with the indicated requirement. No pre-printed answer will be found in the Support column for this. Instead, the supplier is required to write into the support column an x.<i> reference to an item of Exception Information, and to provide the appropriate rationale in the Exception item itself.

An implementation for which an Exception item is required in this way does not conform to this International Standard. A possible reason for the situation described above is that a defect in the Standard has been reported, a correction for which is expected to change the requirement not met by the implementation.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

A.3 PICS proforma for SS-WTLR

A.3.1 Implementation identification

Supplier	
Contact point for queries about the PICS	
Implementation Name(s) and Version(s)	
Other information necessary for full identification, e.g., name(s) and version(s) for machines and/or operating systems; system name(s)	

Only the first three items are required for all implementations; other information may be completed as appropriate in meeting the requirement for full identification.

The terms Name and Version should be interpreted appropriately to correspond with a suppliers terminology (e.g., Type, Series, Model).

A.3.2 Protocol summary

Protocol version	1.0
Addenda Implemented (if applicable)	
Amendments Implemented	
Have any exception items been required (see A.2.3)?	No [ ] Yes [ ] (The answer Yes means that the implementation does not conform to this International Standard)

Date of statement	

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

A.3.3 General

Item	Question/feature	References	Status	N/A	Support
A1	Behaviour as Visitor PINX and previous Visitor PINX for SS-WTLR		o.1		Yes [ ] No [ ]
A2	Behaviour as Home PINX for SS-WTLR		o.1		Yes [ ] No [ ]
A3	Behaviour as Directory PINX for SS-WTLR		o.1		Yes [ ] No [ ]
A4	Support as a Visitor PINX of enquiry to previous Visitor PINX		A1:o	[ ]	o: Yes [ ] No [ ]
A5	Support as a Visitor PINX of enquiry to Directory PINX		A1:o	[ ]	o: Yes [ ] No [ ]

A.3.4 Procedures

Item	Question/feature	References	Status	N/A	Support
B1	Support of ISO/IEC 11582 procedures at a Visitor and previous Visitor PINX	6.2.1	A1:m	[ ]	m: Yes [ ]
B2	Support of ISO/IEC 11582 procedures at a Home PINX	6.2.2	A2:m	[ ]	m: Yes [ ]
B3	Support of ISO/IEC 11582 procedures at a Directory PINX	6.2.4	A3:m	[ ]	m: Yes [ ]
B4	Signalling procedures at a Visitor and previous Visitor PINX	6.5.1 6.5.6	A1:m	[ ]	m: Yes [ ]
B5	Additional signalling procedures at a Visitor PINX and previous Visitor PINX for enquiry from Visitor PINX to the previous Visitor PINX	6.5.2 6.5.7	A4:m	[ ]	m: Yes [ ]
B6	Additional signalling procedures at a Visitor PINX for enquiry from Visitor PINX to a Directory PINX	6.5.3	A5:m	[ ]	m: Yes [ ]
B7	Signalling procedures at a Home PINX	6.5.4	A2:m	[ ]	m: Yes [ ]
B8	Signalling procedures at a Directory PINX	6.5.8	A3:m	[ ]	m: Yes [ ]
B9	Signalling procedures at a Visitor PINX for location de-registration	6.6.1	A1:o	[ ]	o: Yes [ ] No [ ]
B10	Signalling procedures at a Home PINX for location de-registration	6.6.2	A2:o	[ ]	o: Yes [ ] No [ ]

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

A.3.5 Coding

Item	Question/feature	References	Status	N/A	Support
C1	Sending of locUpdate invoke APDU and receipt of return result and return error APDUs	6.3	A1:m	[ ]	m: Yes [ ]
C2	Sending of locDelete invoke APDU and receipt of return result and return error APDUs	6.3	A2:m	[ ]	m: Yes [ ]
C3	Sending of locDeReg invoke APDU and receipt of return result and return error APDUs	6.3	B9:m	[ ]	m: Yes [ ]
C4	Sending of pisnEnquiry invoke APDU and receipt of return result and return error APDUs	6.3	c.1	[ ]	m: Yes [ ]
C5	Receipt of locUpdate invoke APDU and sending of return result and return error APDUs	6.3	A2:m	[ ]	m: Yes [ ]
C6	Receipt of locDelete invoke APDU and sending of return result and return error APDUs	6.3	A1:m	[ ]	m: Yes [ ]
C7	Receipt of locDeReg invoke APDU and sending of return result and return error APDUs	6.3	B10:m	[ ]	m: Yes [ ]
C8	Receipt of pisnEnquiry invoke APDU and sending of return result and return error APDUs	6.3	c.2	[ ]	m: Yes [ ]

c.1: if A4 or A5 then m else N/A
c.2: if A3 or A4 then m else N/A

A.3.6 Timers

Item	Question/feature	References	Status	N/A	Support
D1	Support of Timer T1	6.10.1	A1:m	[ ]	m: Yes [ ] Value [. . . .]
D2	Support of Timer T2	6.10.2	c.3	[ ]	m: Yes [ ] Value [. . . .]
D3	Support of Timer T3	6.10.3	A1:m	[ ]	m: Yes [ ] Value [. . . .]
D4	Support of Timer T4	6.10.4	A2:m	[ ]	m: Yes [ ] Value [. . . .]

c.3: if A4 or A5 then m else N/A

A.3.7 Protocol interactions with SS-MWI

Item	Question/feature	Reference	Status	N/A	Support
E1	Support of SS-MWI	ISO/IEC 15506	o		Yes [ ] No [ ]
E2	Interactions at previous Visitor PINX	6.9.20.1	E1:m	[ ]	m: Yes [ ]
E3	Interactions at Home PINX	6.9.20.2	E1:m	[ ]	m: Yes [ ]

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

A.4 PICS proforma for ANF-WTINFO

A.4.1 Implementation identification

Supplier	
Contact point for queries about the PICS	
Implementation Name(s) and Version(s)	
Other information necessary for full identification, e.g., name(s) and version(s) for machines and/or operating systems; system name(s)	

Only the first three items are required for all implementations; other information may be completed as appropriate in meeting the requirement for full identification.

The terms Name and Version should be interpreted appropriately to correspond with a suppliers terminology (e.g., Type, Series, Model).

A.4.2 Protocol summary

Protocol version	1.0
Addenda Implemented (if applicable)	
Amendments Implemented	
Have any exception items been required (see A.2.3)?	No [ ] Yes [ ] (The answer Yes means that the implementation does not conform to this International Standard)

Date of statement	

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

A.4.3 General

Item	Question/feature	References	Status	N/A	Support
A1	Behaviour as Visitor PINX for ANF-WTINFO		o.1		Yes [ ] No [ ]
A2	Behaviour as Home PINX for ANF-WTINFO		o.1		Yes [ ] No [ ]

A.4.4 Procedures

Item	Question/feature	References	Status	N/A	Support
B1	Support of ISO/IEC 11582 procedures at a Visitor PINX	7.2.1	A1:m	[ ]	m: Yes [ ]
B2	Support of ISO/IEC 11582 procedures at a Home PINX	7.2.2	A2:m	[ ]	m: Yes [ ]
B3	Signalling procedures at a Visitor PINX for transfer of restriction information	7.5.1	A1:o.2	[ ]	o: Yes [ ] No [ ]
B4	Signalling procedures at a Home PINX for transfer of restriction information	7.5.2	A2:o.3	[ ]	o: Yes [ ] No [ ]
B5	Signalling procedures at a Visitor PINX for check of location information	7.6.1	A1:o.2	[ ]	o: Yes [ ] No [ ]
B6	Signalling procedures at a Home PINX for check of location information	7.6.2	A2:o.3	[ ]	o: Yes [ ] No [ ]

A.4.5 Coding

Item	Question/feature	References	Status	N/A	Support
C1	Sending of getRRCInf invoke APDU and receipt of return result and return error APDUs	7.3	B3:m	[ ]	m: Yes [ ]
C2	Sending of locInfoCheck invoke APDU and receipt of return result and return error APDUs	7.3	c.1	[ ]	m: Yes [ ]
C3	Receipt of getRRCInf invoke APDU and sending of return result and return error APDUs	7.3	B4:m	[ ]	m: Yes [ ]
C4	Receipt of locInfoCheck invoke APDU and sending of return result and return error APDUs	7.3	c.1	[ ]	m: Yes [ ]

c.1: if B5 or B6 then m else N/A

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

A.4.6 Timers

Item	Question/feature	References	Status	N/A	Support
D1	Support of Timer T5	7.10.1	B3:m	[ ]	m: Yes [ ] Value [. . . .]
D2	Support of Timer T6	7.10.2	c.2	[ ]	m: Yes [ ] Value [. . . .]

c.2: if B5 or B6 then m else N/A

A.4.7 Protocol interactions with SS-WTAT

Item	Question/feature	Reference	Status	N/A	Support
E1	Support of SS-WTAT		o		Yes [ ] No [ ]
E2	Interactions at Home PINX	7.9.24.1	E1:o	[ ]	o: Yes [ ] No [ ]
E3	Interactions at Visitor PINX	7.9.24.2	E1:o	[ ]	o: Yes [ ] No [ ]

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex B
(informative)

Imported ASN.1 definitions

The content of this annex has been deleted to remove duplicate ASN.1 definitions defined elsewhere.

--`,,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex C
(informative)

Examples of message sequences

This annex describes some typical message flows for SS-WTLR and ANF-WTINFO. The following conventions are used in the figures of this annex.

1. The following notation is used:

▬ ▬ ▬

C.1 Message flows for SS-WTLR

C.1.1 Successful location registration

Figure C.1 shows an example message flow of successful location registration.

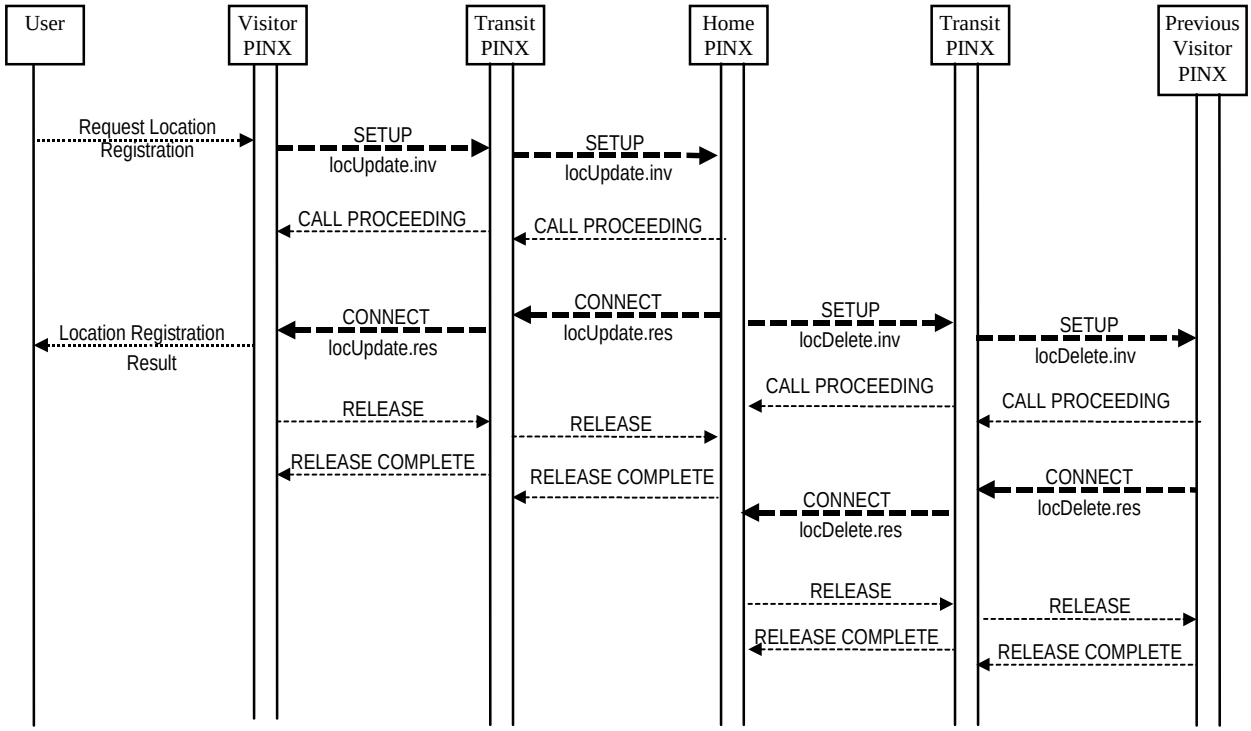


Figure C.1 - Example message flow for location registration

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

C.1.2 Location registration with additional enquiry to the previous Visitor PINX

Figure C.2 shows an example message flow of successful location registration using the additional procedure with enquiry to the previous Visitor PINX to obtain the WTM user's PISN number.

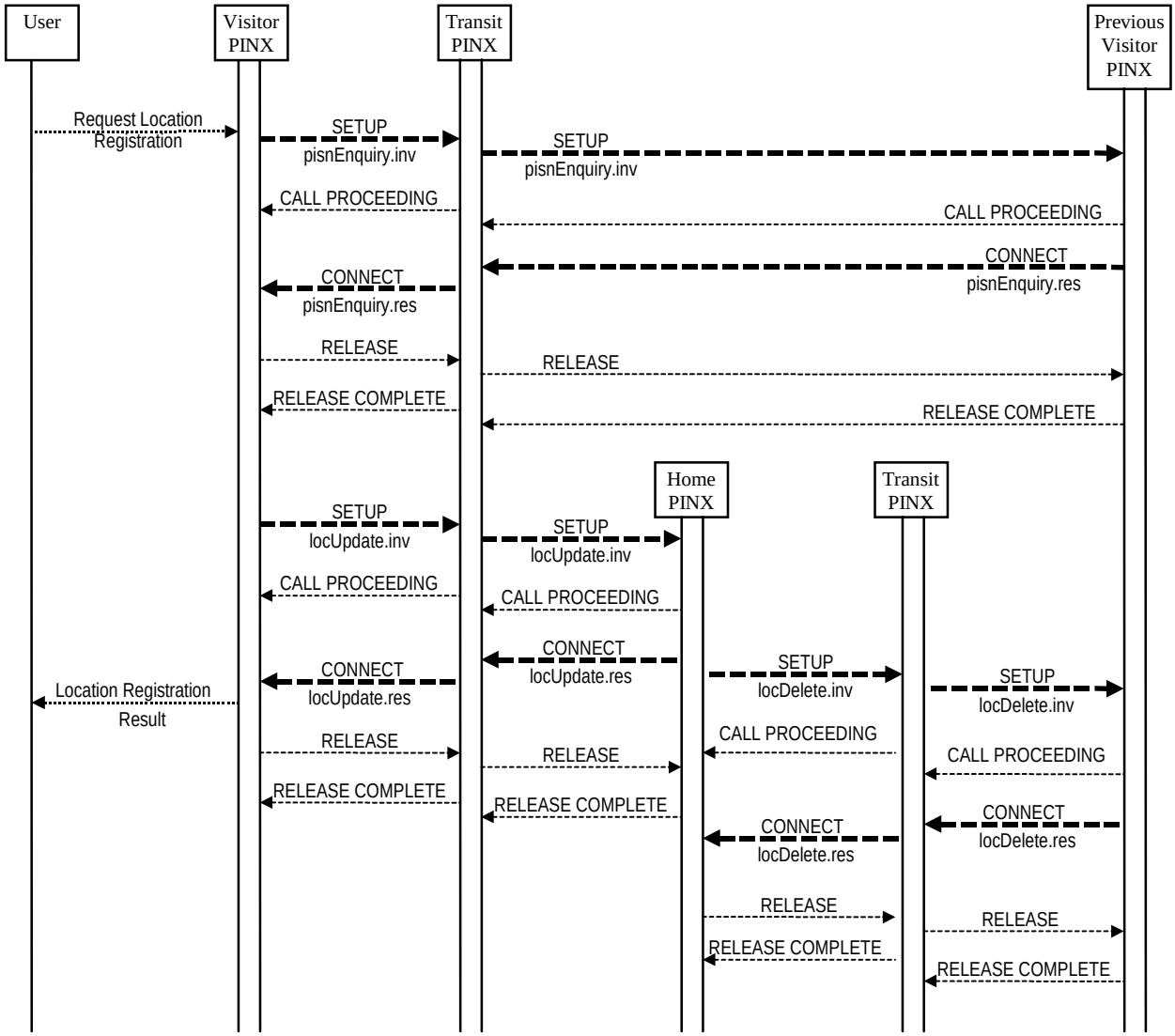


Figure C.2 - Example message flow for location registration with enquiry to the previous Visitor PINX

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

C.1.3 Location registration with additional enquiry to a Directory PINX

Figure C.3 shows an example message flow of successful location registration using the additional procedure with enquiry to a Directory PINX to obtain the WTM user's PISN number.

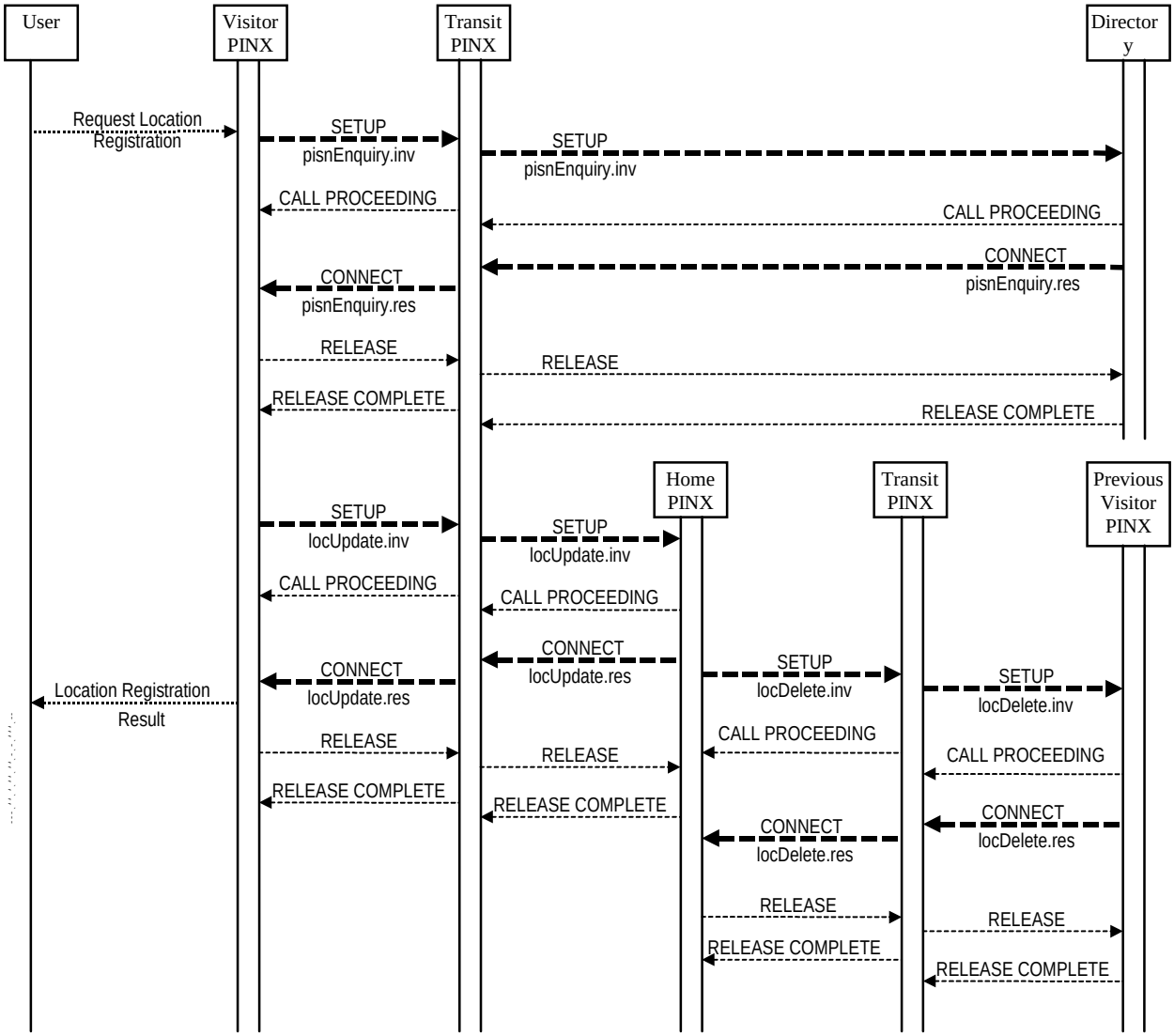


Figure C.3 - Example message flow for location registration with enquiry to a Directory PINX

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

C.1.4 Successful location deregistration

Figure C.4 shows an example message flow of successful location deregistration.

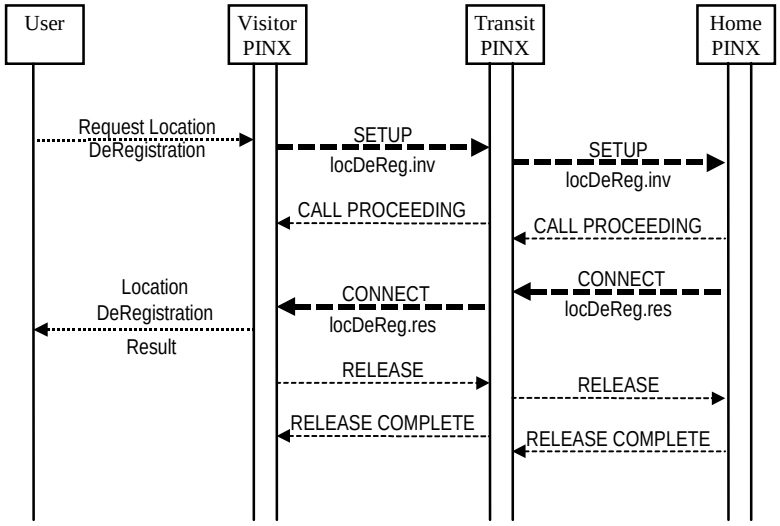


Figure C.4 - Example message flow for location deregistration

C.2 Message flows for ANF-WTINFO

C.2.1 ANF-WTINFO transfer of restriction information

Figure C.5 shows an example message flow of successful transfer of restriction information.

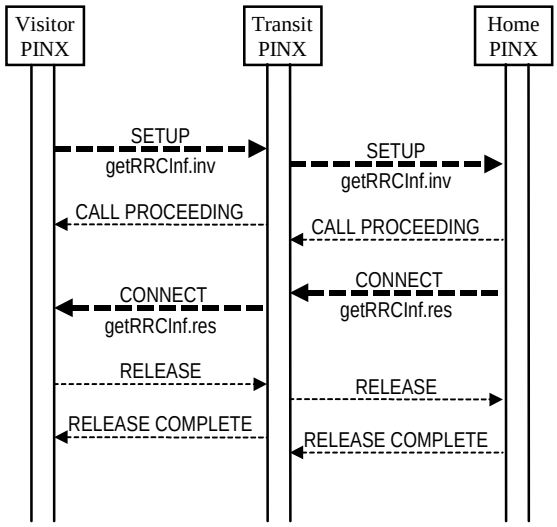


Figure C.5 - Example message flow for transfer of restriction information

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

C.2.2 ANF-WTINFO check of location information

Figure C.6 shows an example message flow of successful check of location information initiated from the Visitor PINX.

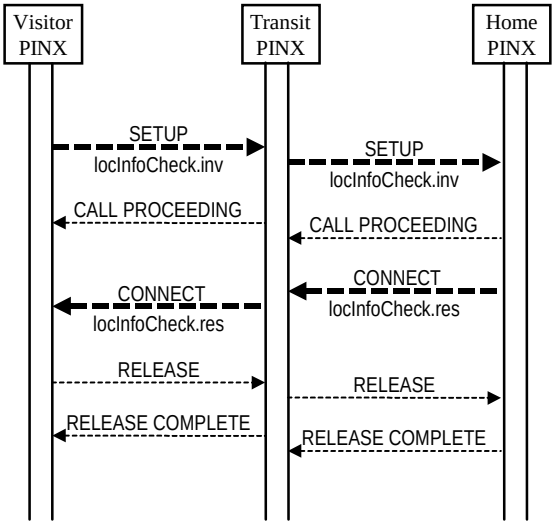


Figure C.6 - Example message flow for check of location information

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex D
(informative)

Specification and Description Language (SDL) representation of procedures

The diagrams in this annex use the Specification and Description Language defined in ITU-T Recommendation Z.100.

Each diagram represents the behaviour of an SS-WTLR Supplementary Service Control entity at a particular type of PINX. In accordance with the protocol model described in ISO/IEC 11582, the Supplementary Service Control entity uses, via the Coordination Function, the services of Generic Functional Transport Control and Basic Call Control.

Where an output symbol represents a primitive to the Coordination Function, and that primitive results in a message being sent, the output symbol bears the name of the message and any remote operations APDU(s) or notification(s) contained in that message.

Where an input symbol represents a primitive from the Coordination Function, and that primitive is the result of a message being received, the input symbol bears the name of the message and any remote operations APDU(s) or notification(s) contained in that message.

The following abbreviations are used:

inv. invoke APDU

res. return result APDU

err. return error APDU

rej. reject APDU

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

D.1 SDL representation of SS-WTLR at the Visitor PINX

Figure D.1 shows the behaviour of an SS-WTLR Supplementary Service Control entity within the Visitor PINX.

Input signals from the left and output signals to the left represent primitives to and from the user.

Input signals from the right and output signals to the right represent primitives to and from the Co-ordination Function. Also protocol timer expiry is indicated by an input signal from the right.

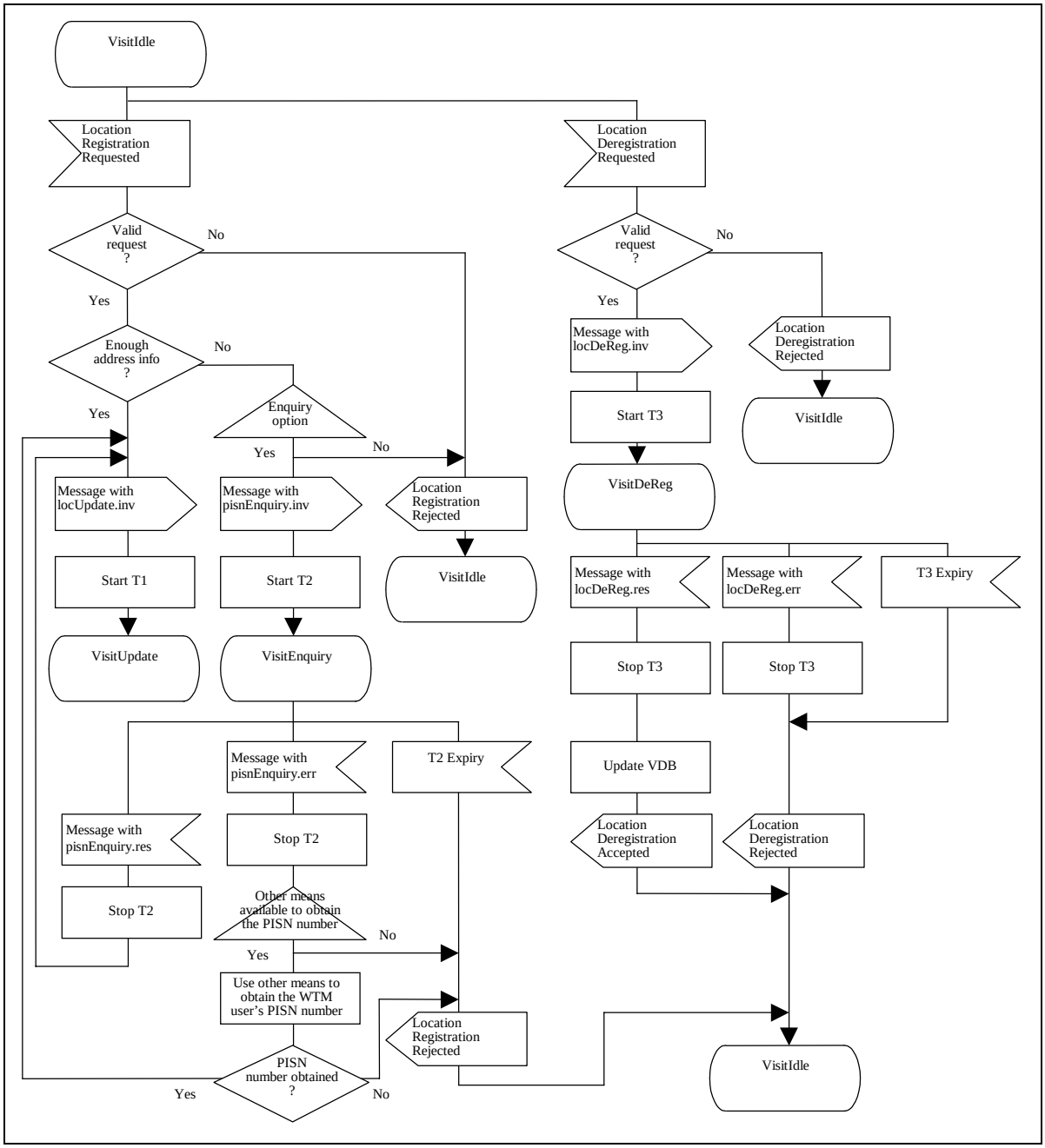


Figure D.1 - Visitor PINX behaviour (sheet 1 of 2)

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

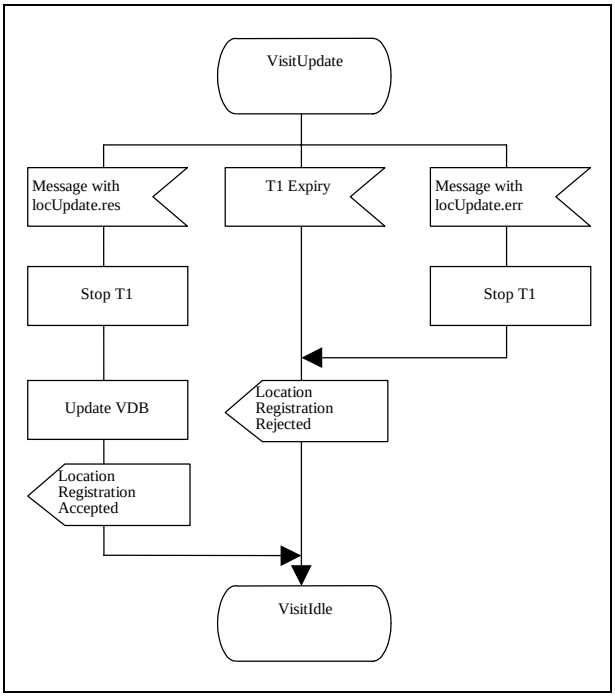


Figure D.1 - Visitor PINX behaviour (sheet 2 of 2)

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.2 SDL representation of SS-WTLR at the Home PINX

Figure D.2 shows the behaviour of an SS-WTLR Supplementary Service Control entity within the Home PINX.

Input signals from the right and output signals to the right represent primitives to and from the Co-ordination Function. Also protocol timer expiry is indicated by an input signal from the right.

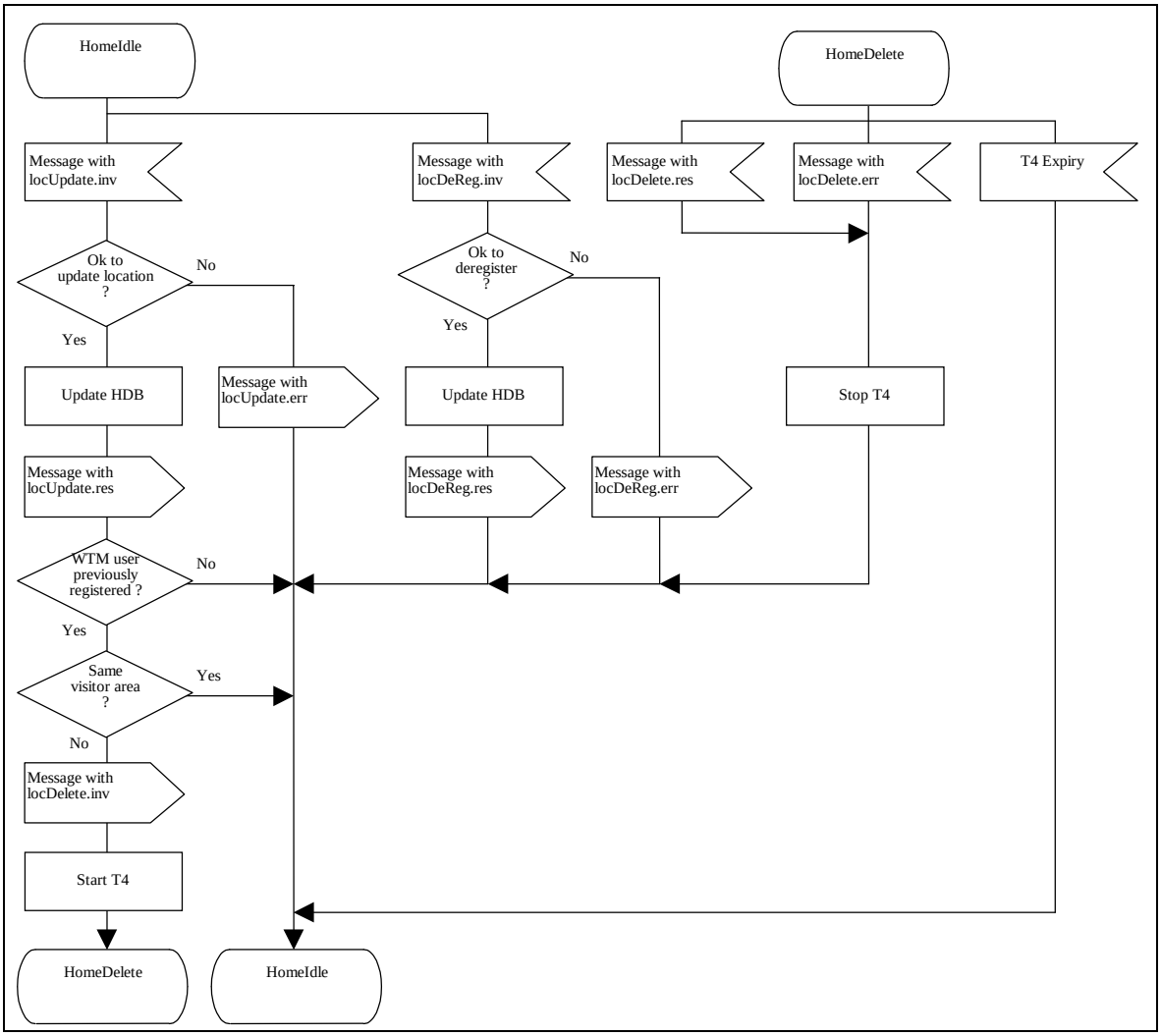


Figure D.2 - Home PINX behaviour

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.3 SDL representation of SS-WTLR at the previous Visitor PINX

Figure D.3 shows the behaviour of an SS-WTLR Supplementary Service Control entity within the previous Visitor PINX. Input signals from the right and output signals to the right represent primitives to and from the Co-ordination Function.

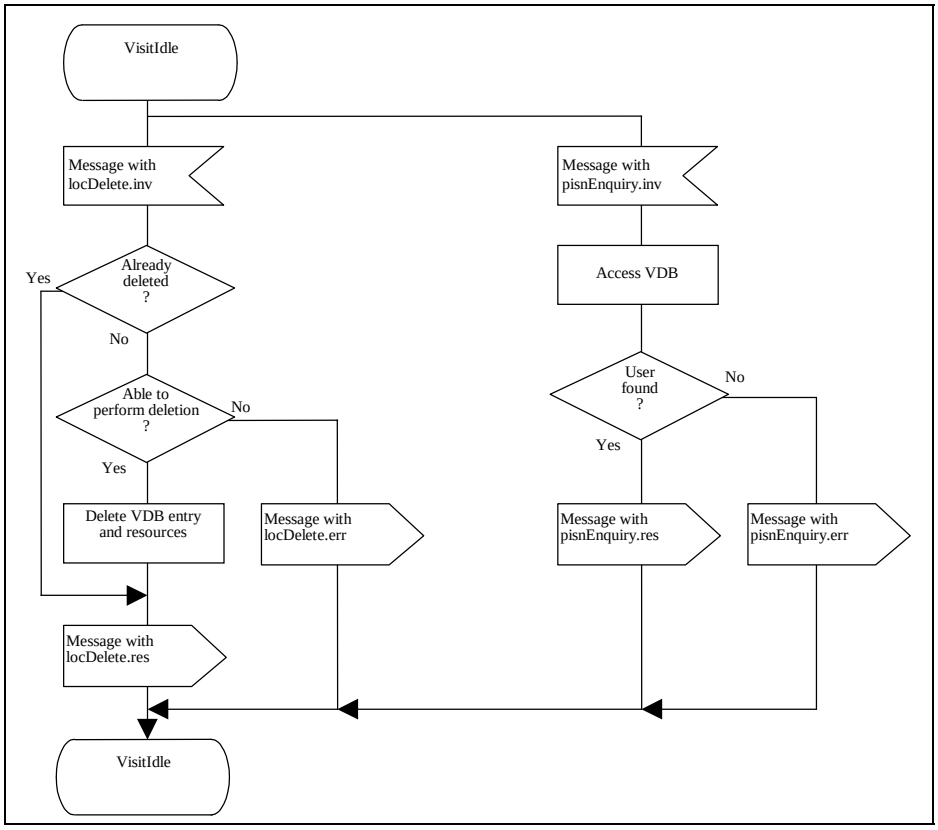


Figure D.3 - Previous Visitor PINX behaviour

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.4 SDL representation of SS-WTLR at the Directory PINX

Figure D.4 shows the behaviour of an SS-WTLR Supplementary Service Control entity within the Directory PINX.

Input signals from the right and output signals to the right represent primitives to and from the Co-ordination Function.

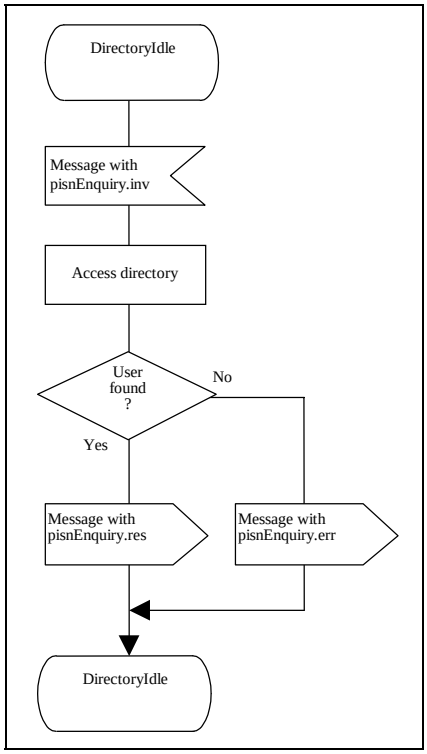


Figure D.4 - Directory PINX behaviour

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.5 SDL representation of ANF-WTINFO at the Visitor PINX

Figure D.5 shows the behaviour of an ANF-WTINFO Supplementary Service Control entity within the Visitor PINX.

Input signals from the left and output signals to the left represent internal stimuli.

Input signals from the right and output signals to the right represent primitives to and from the Co-ordination Function. Also protocol timer expiry is indicated by an input signal from the right.

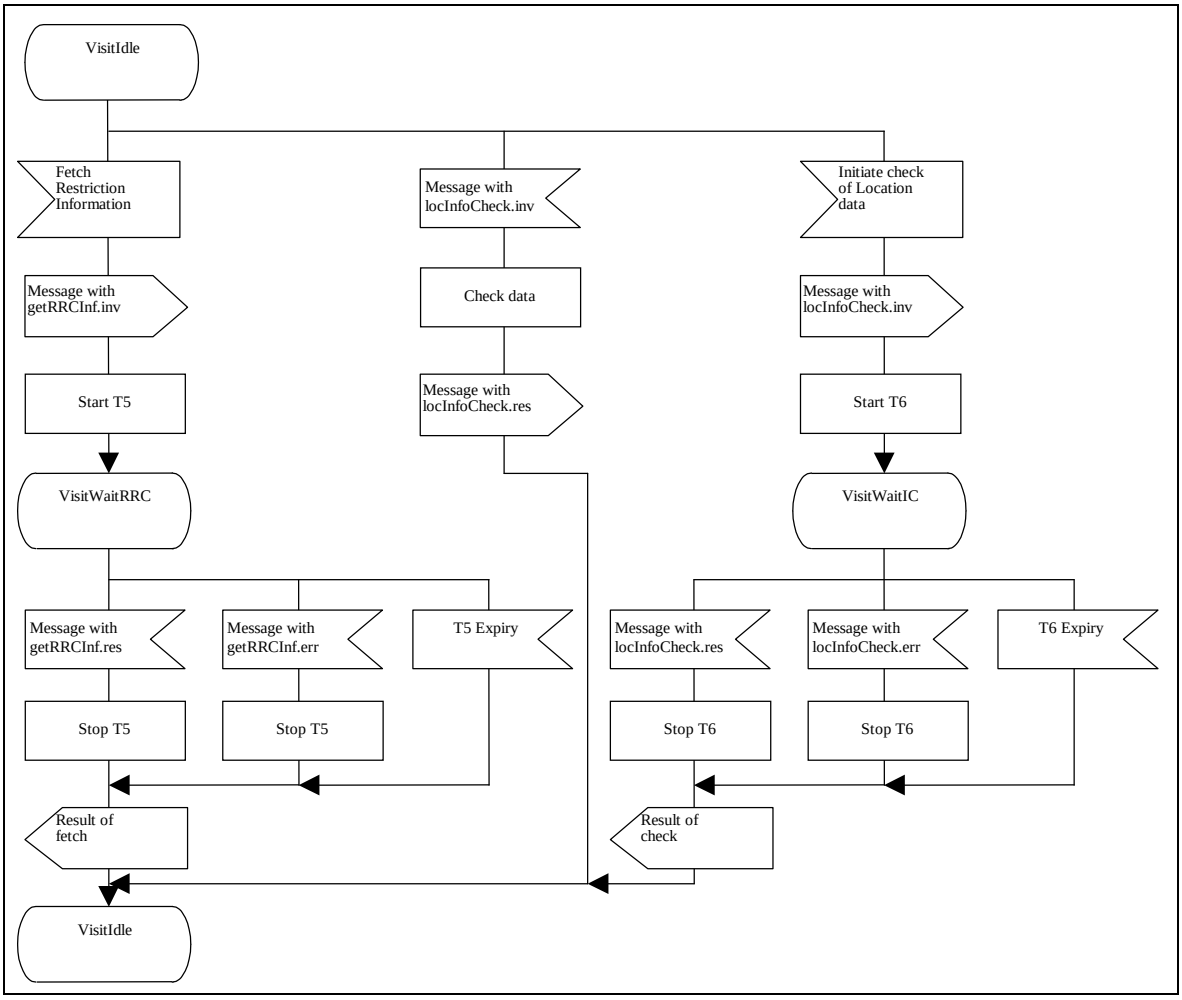


Figure D.5 - Visitor PINX behaviour

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.6 SDL representation of ANF-WTINFO at the Home PINX

Figure D.6 shows the behaviour of an ANF-WTINFO Supplementary Service Control entity within the Home PINX.

Input signals from the left and output signals to the left represent internal stimuli.

Input signals from the right and output signals to the right represent primitives to and from the Co-ordination Function. Also protocol timer expiry is indicated by an input signal from the right.

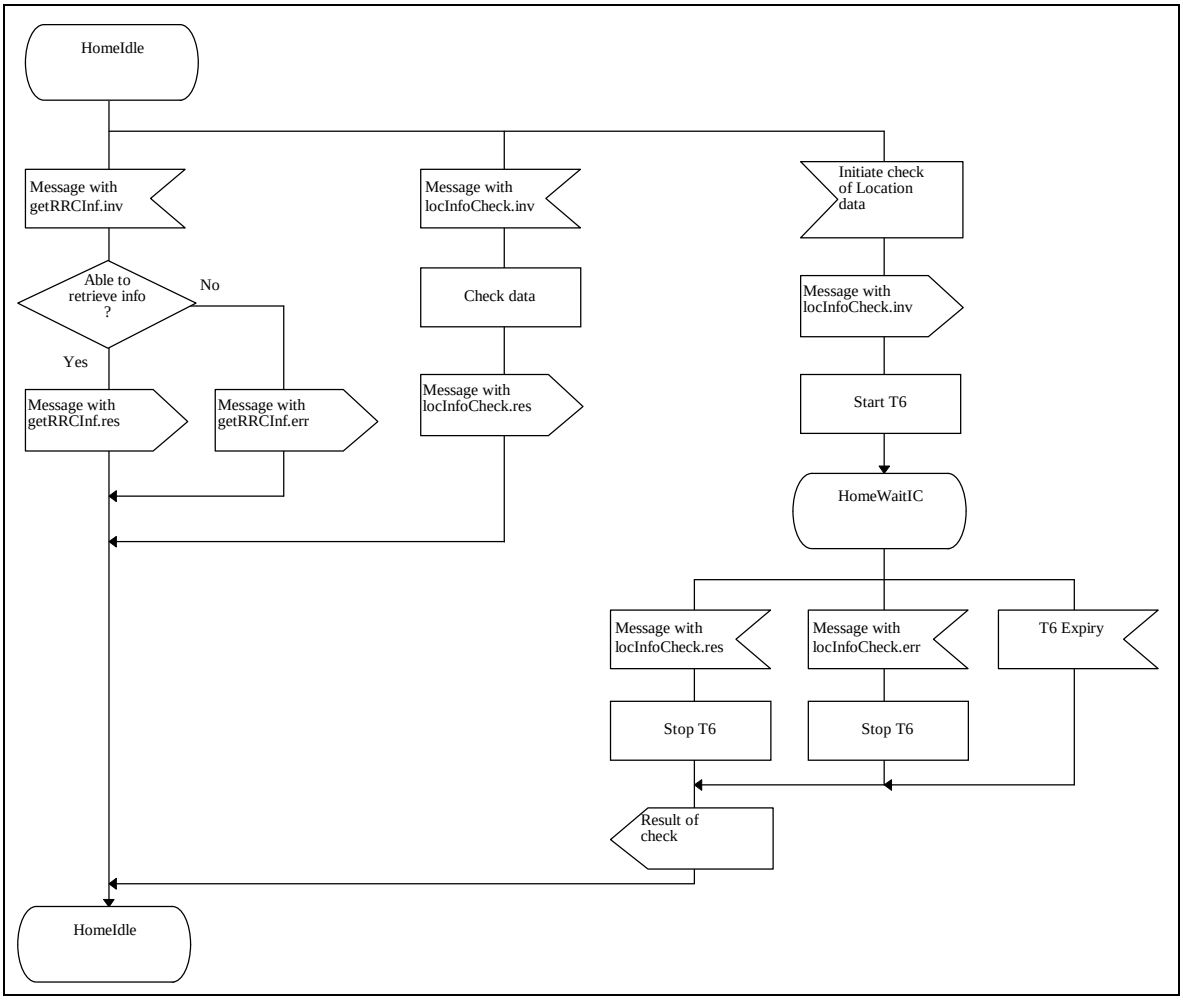


Figure D.6 - Home PINX behaviour

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex E
(normative)

ASN.1 definitions according to ITU-T Recs. X.208 / X.209

This annex lists all ASN.1 modules as they were defined in the first edition of ISO/IEC 15429, i.e. based on ITU-T Recommendations X.208 / X.209. Starting with this edition the ASN.1 modules within ISO/IEC 15429 comply with ITU-T Recommendations X.680 / X.690. Please note that regardless of which version of these modules is used as a base of a QSIG implementation, the line encoding remains unchanged. Changes in future editions to modules based on X.680 / X.690 ASN.1 are not reflected in the modules in this annex.

Table E.1 - WTM-Location-Registration-Operations – based on ITU-T Recs. X.208 / X.209

```
WTM-Location-Registration-Operations
                    {iso standard pss1-location-registration (15429) wtlr-operations (0)}

DEFINITIONS EXPLICIT TAGS ::=

BEGIN

IMPORTS             OPERATION, ERROR FROM Remote-Operation-Notation
                        {joint-iso-ccitt(2) remote-operations(4) notation (0)}
                    Extension FROM Manufacturer-specific-service-extension-definition
                        {iso  standard
                        pss1-generic-procedures (11582) msi-definition (0)}
                    notAvailable, invalidServedUserNumber
                        FROM General-Error-List
                        {ccitt recommendation q 950 general-error-list (1)}
                    PartyNumber FROM Addressing-Data-Elements
                        {iso(1) standard(0) pss1-generic-procedures(11582)
                        addressing-data-elements(9)}
                    BasicService FROM Call-Diversion-Operations
                        { iso (1) standard (0) pss1-call-diversion (13873)
                        call-diversion-operations (0) };
LocUpdate ::=       OPERATION
                    -- Sent from the Visitor PINX to the Home PINX.
                        ARGUMENT    LocUpdArg
                        RESULT      DummyRes
                        ERRORS      { invalidServedUserNumber, notAuthorized, unspecified }
LocDelete ::=       OPERATION
                    -- Sent from the Home PINX to the previous Visitor PINX.
                        ARGUMENT    LocDelArg
                        RESULT      DummyRes
                        ERRORS      { temporarilyUnavailable, unspecified }
```

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table E.1 - WTM-Location-Registration-Operations – based on ITU-T Recs. X.208 / X.209 (continued)

```
LocDeReg ::=            OPERATION
                        -- Sent from the Visitor PINX to the Home PINX.
                              ARGUMENT      LocDeRegArg
                              RESULT        DummyRes
                              ERRORS        { notAvailable, unspecified }

PisnEnquiry ::=         OPERATION
                        -- Sent from the Visitor PINX to the previous Visitor PINX or a Directory PINX.
                              ARGUMENT      PisnEnqArg
                              RESULT        PisnEnqRes
                              ERRORS        { invalidServedUserNumber, unspecified}

GetRRCInf ::=           OPERATION
                        -- Sent from the Visitor PINX to the Home PINX.
                              ARGUMENT      GetRRCInfArg
                              RESULT        GetRRCInfRes
                              ERRORS        { notAvailable, unspecified }

LocInfoCheck ::=        OPERATION
                        -- Sent from the Visitor PINX to the Home PINX or vice versa.
                              ARGUMENT      LocInfoCheckArg
                              RESULT        LocInfoCheckRes
                              ERRORS        { notAvailable, unspecified }

LocUpdArg ::=           SEQUENCE      { wtmUserId         WtmUserId,
                                      basicServiceBasicService DEFAULT allServices,
                                      visitPINX           PartyNumber,
                                      -- The pisnNumber of the Visitor PINX,
                                      -- always a Complete Number.
                                      argExtension        LrExtension OPTIONAL }

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

LocDelArg ::=           SEQUENCE      { wtmUserId         WtmUserId,
                                      basicServiceBasicService DEFAULT allServices,
                                      argExtension        LrExtension OPTIONAL }

LocDeRegArg ::=         SEQUENCE      { wtmUserId         WtmUserId,
                                      basicServiceBasicService DEFAULT allServices,
                                      argExtension        LrExtension OPTIONAL }

PisnEnqArg ::=          SEQUENCE      { alternativeId     AlternativeId,
                                      -- Can be a temporary identifier, e.g. Network Assigned
                                      -- Identity structure, or a fixed handset identifier.
                                      argExtension        LrExtension OPTIONAL }

PisnEnqRes ::=          SEQUENCE      { wtmUserId         WtmUserId,
                                      resExtension        LrExtension OPTIONAL }

GetRRCInfArg ::=        SEQUENCE      { wtmUserId         WtmUserId,
                                      basicServiceBasicService DEFAULT allServices,
                                      argExtension        LrExtension OPTIONAL }
```


© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table E.1 - WTM-Location-Registration-Operations – based on ITU-T Recs. X.208 / X.209 (concluded)

```
GetRRCInfRes ::=        SEQUENCE        { alternativeId     AlternativeId OPTIONAL,
                                          rrClass           RRClass OPTIONAL,
                                          argExtension      LrExtension OPTIONAL }

LocInfoCheckArg ::=     SEQUENCE        { wtmUserId         WtmUserId,
                                          basicServiceBasicService DEFAULT allServices,
                                          visitPINX         PartyNumber,
                                          -- The PISN number of the Visitor PINX,
                                          -- always a Complete Number.
                                          argExtension      LrExtension OPTIONAL }

LocInfoCheckRes ::=     SEQUENCE        { checkResult       CheckResult,
                                          argExtension      LrExtension OPTIONAL }

WtmUserId ::=           CHOICE          { pisnNumber        PartyNumber,
                                          -- The PISN number of the WTM user,
                                          -- always a Complete Number.
                                          alternativeId     AlternativeId }

AlternativeId ::=       OCTET STRING(SIZE(1..20))

LrExtension ::=         CHOICE      { extension   [ 1 ] IMPLICIT Extension,
                                      sequOfExtn  [ 2 ] IMPLICIT SEQUENCE OF Extension }

RRClass ::=             INTEGER (0..99)

CheckResult ::=         ENUMERATED  { locInfChk-correct (0),
                                      locInfChk-incorrect (1) }

locUpdate                   LocUpdate   ::=  localValue 50
locDelete                   LocDelete   ::=  localValue 51
locDeReg                    LocDeReg    ::=  localValue 52
pisnEnquiry                 PisnEnquiry ::=  localValue 53
getRRCInf                   GetRRCInf   ::=  localValue 97
locInfoCheck                LocInfoCheck ::= localValue 98

notAuthorized               ERROR       ::=  localValue 1007
temporarilyUnavailable      ERROR       ::=  localValue 1000
unspecified                 Unspecified ::=  localValue 1008

Unspecified ::=             ERROR       PARAMETER Extension

END                     -- of WTM-Location-Registration-Operations
```

NOTE
Element visitPINX in LocUpdArg can either be a roaming number for the individual WTLR user or a single number for all WTLR users currently registered in this PINX. In the latter case the individual WTLR users are distinguished by their own WtmUserId.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

ICS 33.040.35

Price based on 45 pages

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale