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Technical Specification

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); TIPHON/UMTS Harmonization; Extensions and additions to the protocol framework definition: General

ETSI

Reference

DTS/TIPHON-03026

Keywords

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Foreword

This Technical Specification (TS) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

Introduction

The present document contains proposals for extensions and additions to the TIPHON Release 3 and Release 4 deliverable on the protocol framework definition (TS 101 882 [1]).

TIPHON and UMTS developments do not share a common method to achieve a common goal. However the core methods proposed by TIPHON in TS 101 878 [2] of service capabilities as service independent building blocks allows the services defined in UMTS by the 3rd Generation Partnership Project (3GPP) to be synthesized. Examples of the synthesis of some example UMTS services are given in TS 102 289 [3]. The initial report on the harmonization (TS 102 285 [4]) did however identify some capabilities that may be required to be standardized in the TIPHON suite to ensure that all UMTS services can be synthesized. These missing capabilities are identified in TS 102 283 [5].

1   Scope

The present document defines extensions to the TIPHON meta-protocol suite of service capabilities to enable full harmonization with the UMTS services identified in 3GPP TR 24.841 [9].

2   References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

[1]   ETSI TS 101 882-1: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Protocol Framework Definition; Part 1: Meta-protocol design rules, development method, and mapping guideline".

[2]   ETSI TS 101 878: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Service Capability Definition; Service Capabilities for TIPHON Release 4".

[3]   ETSI TS 102 289: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); TIPHON/UMTS Harmonization: Guidelines for implementation of service capabilities".

[4]   ETSI TS 102 285: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); TIPHON/UMTS Harmonization; General Aspects".

[5]   ETSI TS 102 283: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); TIPHON/UMTS harmonization; Service capabilities for harmonization between TIPHON and 3G UMTS".

[6]   ETSI TS 101 882-2: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Protocol Framework Definition; Part 2: Registration and Service Attachment service meta-protocol definition".

[7]   ITU-T Recommendation I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[8]   ETSI TS 101 884-1: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Technology Mapping; Part 1: Implementation of TIPHON architecture using SIP".

[9]   3GPP TR 24.841 (V1.1.2): "3rd Generation Partnership Project; Technical Specification Group Core Network; Presence service based on Session Initiation Protocol (SIP); Functional models, information flows and protocol details (Release 6)".

[10]   ETSI TS 101 882-3: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Protocol Framework Definition; Part 3: TIPHON Simple Call service meta-protocol definition".

[11]   ITU-T Recommendation H.323: "Packet-based multimedia communications systems".

[12] ETSI TS 124 229: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); IP Multimedia Call Control Protocol based on SIP and SDP; Stage 3 (3GPP TS 24.229 version 5.5.0 Release 5)".

[13] IETF RFC 3261: "SIP: Session Initiation Protocol".

[14] IETF RFC 2327: "SDP: Session Description Protocol".

[15] ETSI TS 129 208: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); End to end Quality of Service (QoS) signalling flows (3GPP TS 29.208 version 5.4.0 Release 5)".

[16] ETSI TS 124 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Signalling flows for the IP multimedia call control based on SIP and SDP; Stage 3 (3GPP TS 24.228 version 5.5.0 Release 5)".

[17] ETSI TR 101 877: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Requirements Definition Study; Scope and Requirements for a Simple call".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the definitions given in TR 101 877 [17] and TS 101 878 [2] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 101 877 [17] and TS 101 878 [2] and the following apply:

3GPP	3rd Generation Partnership Project
ASN.1	Abstract Syntax Notation 1
CUG	Closed User Group
DECT	Digital Enhanced Cordless Telecommunication
EMTEL	ELergency TELecommunications
ETS	Emergency Telecommunications System
FE	Functional Entity
GSM	Global System for Mobile communication
ISDN	Integrated Services Digital Network
MSC	Message Sequence Chart
PSTN	Public Switched Telephone Network
SC	Service Capability
SDP	Session Description Protocol
SIP	Session Initiation Protocol
TDR	Telecommunications for Disaster Relief
TETRA	TErrestrial Trunked RAdio
TIPHON	Telecommunications and Internet Protocol Harmonization Over Networks
UMTS	Universal Mobile Telecommunications System
VLR	Visited Location Register
V-MSC	Visited-Mobile Switching Centre
VPN	Virtual Private Network

4 Registration and service attachment

TS 101 882-2 [6] describes the information flows and behaviour of the registration and service attachment service according to ITU-T Recommendation I.130 [7].

The meta-protocol in TS 101 882-2 [6] identifies 4 Functional Entities (FEs) and a mapping of these FEs to domains in a number of scenarios. The overall meta-protocol for the registration and service attachment service was developed to enable support of the mechanisms developed in 2nd generation mobile network devices (e.g. GSM, TETRA and DECT). There is no documented method of implementing the equivalent service using SIP in UMTS Release 6. It should be noted that the Radio Access Network of 3rd generation mobile systems has not abandoned the registration capabilities of 2nd generation systems and therefore the TIPHON meta-protocol, derived from 2nd generation systems, maintains support for 3rd generation systems. Furthermore services being introduced to UMTS based on SIP Instant Messaging concepts of a presence service also map to the capability set defined in TS 101 878 [2].

TS 101 884-1 [8] describes a mapping of SIP to TS 101 882-2 [6] that shows that the SIP registration service does not meet the TIPHON meta-protocol requirements completely. However in UMTS-Release 6 a SIP guide for implementing a presence service (as for instant messaging) has been defined in 3GPP TR 24.841 [9] that has similar capabilities to those defined in TS 101 878 [2] but that does not fully map to the registration service as defined by TS 101 882-2 [6].

The full support of the PUBLISH message in SIP and the behaviour surrounding it will require that this mapping and comparison of the capability of TIPHON and UMTS is revisited.

5 Simple call

5.1 Introduction

TS 101 882-3 [10] describes the information flows and behaviour of the simple call service according to ITU-T Recommendation I.130 [7].

The meta-protocol in TS 101 882-3 [10] identifies 11 Functional Entities (FEs) and a mapping of these FEs to domains in a number of scenarios. The overall meta-protocol for the simple call service was developed to enable support of the ISDN and PSTN call services and those call services defined by ITU-T Recommendation H.323 [11]. There is no documented method of implementing the equivalent service using SIP in UMTS Release 6, although a report on implementing multimedia call control using SIP is available as TS 124 228 [16].

TS 101 884-1 [8] describes a mapping of SIP to TS 101 882-3 [10] that shows that SIP does not meet the TIPHON meta-protocol requirements completely.

In some cases the data definitions in TIPHON are over restrictive for simple mapping to SIP. The following clauses identify where changes to the TIPHON specification in TS 101 882-3 [10] should be modified to allow greater harmonization of UMTS and TIPHON.

5.2 Detailed mapping of TIPHON simple call parameters to UMTS SIP

TIPHON parameters, in TS 101 882-3 [10], are defined using ASN.1 and do not map directly to the definitions used in SIP or in SDP.

5.2.1 Call identifier

The ASN.1 definition of Call identifier in TS 101 882-3 [10] is:

```
CallIDType ::= Natural
```

The UMTS SIP equivalent is the combination of the Call-ID, To tag, and From tag. Although it would be possible to map between the two domains, the CallIDType in TIPHON may be defined differently to enable a more direct mapping whilst retaining support for mapping between TIPHON and other (not SIP based) protocols.

5.2.2 Calling user ID and called user ID

The ASN.1 definition of Calling user ID and Called user ID in TS 101 882-3 [10] is:

```
TiphonUserName ::= CHOICE
{ e164         E164Number,
  url          Visiblestring,
  displayName  Visiblestring
}
```

The UMTS SIP equivalent is the From header field, that contains a URI and an optional display name. The current meta protocol type definition allows the SIP calling user information to be mapped, however a more direct mapping is possible if the meta-protocol definition for calling and called user ID is modified. The TiphonUserName definition should be modified to a SEQUENCE type with an optional element for displayName as shown below:

```
TiphonUserName ::= SEQUENCE
{
  primaryName  CHOICE{e164     E164Number, url  Visiblestring},
  displayName  Visiblestring OPTIONAL
}
```

5.2.3 Calling user ID restriction

The ASN.1 definition of Calling user ID restriction in TS 101 882-3 [10] is:

```
IdentityRestrictionType ::= ENUMERATED
{ identityAvailable,
  identityUnavailable
}
```

The UMTS SIP/SDP equivalent is the From header field. If in a session initiation a user wants to restrict the identity the string "Anonymous" is assigned to the From header field, clause 5.1.2A.1, TS 124 229 [12].

5.2.4 Operator selection

The ASN.1 definition of Operator selection in TS 101 882-3 [10] is:

```
OperatorSelection ::= CHOICE
{ prefixdial   SEQUENCE OF TelephoneDigitType,
  operatorID   Visiblestring
}
```

No equivalent capability is supported by the UMTS SIP/SDP protocol, TS 124 229 [12].

5.2.5 Service offer ticket

The ASN.1 definition of the Service Offer Ticket in TS 101 882-3 [10] is:

```
TicketType ::= SEQUENCE
{ registrantId       Visiblestring,
  registrarId        Visiblestring,
  serviceCredential  ServiceCredentialsType,
  cryptoDigest       DigestType OPTIONAL
}

ServiceCredentialsType ::= SEQUENCE OF ServiceCredentialType

ServiceCredentialType ::= SEQUENCE
{ serviceAppId  ServiceApplicationType,
  spoA          SpoAType,
  startTime     GeneralizedTime,
  stopTime      GeneralizedTime,
  cryptoDigest  DigestType OPTIONAL
}

ServiceApplicationType ::= Visiblestring

SpoAType ::= Visiblestring

DigestType ::= Visiblestring
```

The equivalent UMTS SIP/SDP is the Authorization header field, (RFC 3261 [13], clause 20.7).

5.2.6 QoSServiceClass

The ASN.1 definition of the QoSClass in TS 101 882-3 [10] is:

```
QoSClass  ::= Integer(0..maxQoSClass)

maxQoSClass Integer ::= 255

NonStandardQoSClass ::= QoSClass(16..maxQoSClass)

predefinedQoS          QoSClass ::= 0
tiphonQoSClass-1       QoSClass ::= 1
tiphonQoSClass-2A      QoSClass ::= 2
tiphonQoSClass-2M      QoSClass ::= 3
tiphonQoSClass-2H      QoSClass ::= 4
tiphonQoSClass-3       QoSClass ::= 5
```

No equivalent information exists in the UMTS SIP, however the SDP (RFC 2327 [14]) parameter "a=quality" may be used, and the specified domain enable a direct mapping.

5.2.7 TrafficDescriptor

The ASN.1 definition of the TrafficDescriptor in TS 101 882-3 [10] is:

```
TrafficDesc  ::= SEQUENCE
{ peakFrameRate   FrameRateType,
   maxFrameLength  FrameLength
}

FrameRateType  ::= Integer (1..255)

FrameLength    ::= Integer (1..65535)
```

There is no equivalent information in the UMTS SIP.

5.2.8 Codec

The ASN.1 definition of the CodecList in TS 101 882-3 [10] is:

```
CodecList     ::= SEQUENCE (SIZE (1..8)) OF CodecType

CodecType     ::= SEQUENCE
{ codecID          CodecID,
  framesperPacket   FrameCountType
}
```

There is no equivalent in the UMTS SIP, however the SDP "m" field is used to convey codec information as defined in TS 124 229 [12], clause 6. The "m" field defines different "payload type numbers" that identifies specific payloads.

5.2.9 Transcode count

The ASN.1 definition of the TranscodeCountType in TS 101 882-3 [10] is:

```
TranscodeCountType ::= Integer (0..255)
```

There is no equivalent information in the UMTS SIP.

NOTE: The SDP protocol provides the "rtpmap" attribute value that allows specification of the media format, however it does not define the maximum number of transcodings allowed in a media path.

5.2.10 Previous domain egress point

The ASN.1 definition of the NextworkSpecificAddrType in TS 101 882-3 [10] is:

```
NetworkSpecificAddrType ::= CHOICE
{
  slotNumber SlotNumberType,
  ipAddress  IPAddressType
}
```

There is no similar information in UMTS SIP. In SDP the media stream can be specified using the "m"-field to identify the port and the "c"-field to specify the previous domain address.

5.2.11 Next domain egress point

The ASN.1 definition of the NextworkSpecificAddrType in TS 101 882-3 [10] is:

```
NetworkSpecificAddrType ::= CHOICE
{
  slotNumber SlotNumberType,
  ipAddress  IPAddressType
}
```

There is no similar information in UMTS SIP. In SDP the media stream can be specified using the "m"-field to identify the port and the "c"-field to specify the next domain address.

5.2.12 Result

The ASN.1 definition of the Result types in TS 101 882-3 [10] are:

```
OrigCallResultType   ::= ENUMERATED
{ requestedCallEstablished (0),
  noCompatibleCodec,
  busy,
  MediaOrTransportNotAvailable,
  qoSNotAvailable,
  unknownUser,
  policyRejection
}

NWCallResultType ::= OrigCallResultType (<= unknownUser)

DestCallResultType ::= OrigCallResultType (<= busy)
CallAcceptType ::= ENUMERATED
{ callAccepted,
  noCompatibleCodec,
  busy
}
```

For all enumerated result values used in the Meta-protocol corresponding numeric values used in the UMTS SIP/SDP protocols can be identified.

5.2.13 Bearer identifier

The ASN.1 definition of the BearerIdentifierType in TS 101 882-3 [10] is:

```
Visiblestring (SIZE (0..128))
```

No equivalent exists in the UMTS SIP. In SDP the origin parameter "o" serves a similar purpose as the bearer identifier and can be mapped to the Meta-protocol Bearer identifier information.

5.2.14   Transport QoS parameters

The ASN.1 definition of the Transport Parameters in TS 101 882-3 [10] is:

```
TransportParams ::= SEQUENCE
{ maximumDelay  MicroSeconds,
  maxDelayVariation MicroSeconds,
  maxMeanPacketLoss PercentX1000
}
```

The UMTS SIP/SDP provides support for end-to-end QoS signalling as defined in the (TS 129 208 [15]). The QoS parameter is defined in terms of a max bit rate and a traffic class value, indicating the priority of the media stream. These parameters may be mapped to the meta-protocol QoS information.

5.2.15   Transport parameter qualifier

The ASN.1 definition of the TransportParmQualifierType in TS 101 882-3 [10] is:

```
TransportParmQualifierType ::= ENUMERATED
{ totalRemainingBudget,
  budgetAvailableForDomain
}
```

There is no equivalent in the UMTS SIP/SDP. The UMTS SIP/SDP only specifies QoS requirements in terms of requirements for each domain (TS 124 229 [12]).

5.2.16   Destination service domain

The ASN.1 definition of the Destination Service domain in TS 101 882-3 [10] is:

```
DomainAddr      ::= CHOICE
{ ipv4DomainAddr  [0] FourOctetsType,
  ipv6DomainAddr  [1] SixteenOctetsType
}
```

In UMTS SIP/SDP similar information can be specified in a Route header field. In order to enable a direct mapping to the meta-protocol, the meta-protocol definition shall be modified to support an additional format for the domain specification. The additional type shall be as a string type as shown below:

```
DomainAddr      ::= CHOICE
{ ipv4DomainAddr  [0] FourOctetsType,
  ipv6DomainAddr  [1] SixteenOctetsType,
  RouteDomainAddr [2] Visiblestring
}
```

5.2.17   Routing number

The ASN.1 definition of the Routing number in TS 101 882-3 [10] is:

```
DomainAddr      ::= CHOICE
{ ipv4DomainAddr  [0] FourOctetsType,
  ipv6DomainAddr  [1] SixteenOctetsType
}
```

The UMTS SIP/SDP equivalent information is the domain set in Request-URI. The Request-URI may be defined not only as an IP-address, hence in order to support this in the meta-protocol the DomainAddr definition shall be extended with a "visibleString" choice type as shown below (and in clause 5.2.16):

```
DomainAddr      ::= CHOICE
{ ipv4DomainAddr  [0] FourOctetsType,
  ipv6DomainAddr  [1] SixteenOctetsType,
  RouteDomainAddr [2] Visiblestring
}
```

6 Additional service capabilities for UMTS harmonization

6.1 Introduction

Extensions to the suite of service capabilities in the profile class to enable full harmonization with the UMTS services identified in 3GPP TR 24.841 [9], as follows:

- Interrogate Location:

    - This capability will return the current location value maintained in the profile belonging to the identified user.

- Update Location:

    - This capability updates the current location value maintained in the profile belonging to the identified user.

- Update Service Status:

    - The status may mark the service as available or unavailable under user control independent of the overall availability of the identified user.

To enable VPN services and the authorization of CUG, the *authorize* service capability needs to explicitly address each of these (as it has to for TDR). Extensions are required to allow recognition that the authorization is being sought of as a particular type, in this case CUG.

The following clauses identify the provision of these advanced service capabilities in the TIPHON meta-protocol suite.

6.2 Interrogate location

The purpose of the *interrogate location* capability is to return the current location value maintained in the profile belonging to the user identified by regID. This Service Capability (SC) shall not be available to unauthorized users or entities.

The SC is defined by its prototype:

    <<sc>> location interrogateLocation(Charstring regID, Charstring requestingUser).

This capability shall accept as input the identity of the user whose location is to be interrogated and the identity of the user requesting the capability. It shall return the current location of the identified user.

To implement this capability, two signals are defined as below:

    +signal interrogateLocation_input(regID:Charstring, requestingUser:Charstring) on interface FromNGNUser.

    +signal interrogateLocation_Return (location:location) on interface ToNGNUser.

The authorization operation (ValidateAuthority) determines whether the requesting user is authorized to make the request. If authorization is granted, the profile is retrieved and the value of the CurrentLocation field returned to the requesting user.
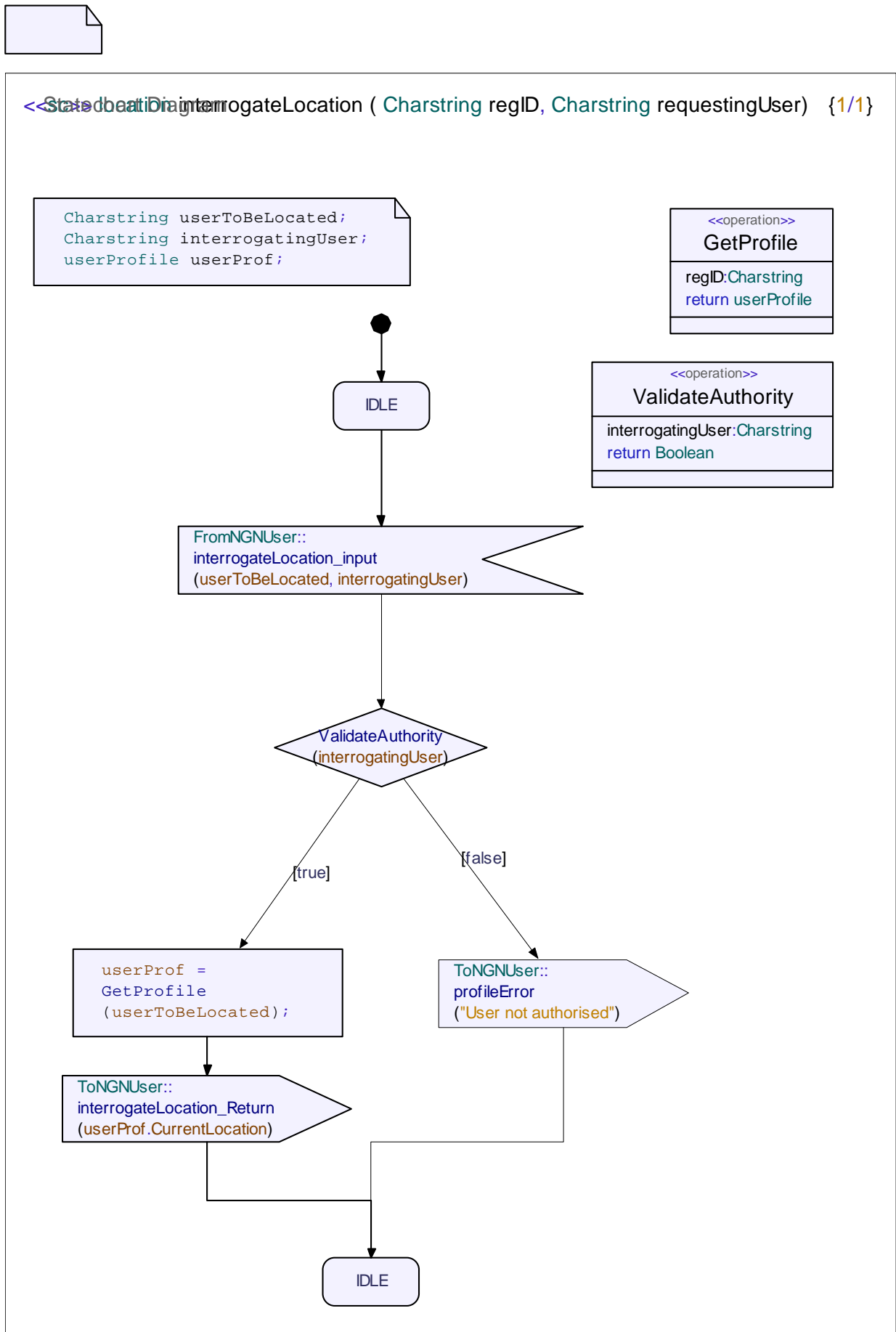
Figure 1: State chart specifying <<sc>>interrogateLocation

6.3   Update location

The purpose of this capability is to update the current location value maintained in the profile belonging to the identified user. This service capability shall not be available to unauthorized users or entities.

The definition of this capability needs some clarification. As part of the '"ocation update" mode of registration familiar from 2nd generation mobile networks this updates the current location entry in the profile (in 2nd generation mobile networks this may instigate the migration or roaming procedures to identify a new VLR/V-MSC). A second consideration of this capability is driven from EMTEL requirements where the current location of the calling user is required. In this second variant of the capability the location has to be derived from knowledge of the system and submitted to the profile store from where it may be read by an authorized user.

The SC is defined by its prototype:

   <<sc>> void updateLocation(Charstring regID, Charstring requestingUser, location newLocation).

The capability accepts as input the identity of the user whose location is to be updated and the identity of the user requesting the capability, plus the current location of the user. If the location field is NULL it indicates that the location has to be updated by the network hosting the capability.

To implement this capability one signal is defined as below on the interface FromNGNUser:

   +signal updateLocation_input.

6.4   Update service status

The profile for TIPHON includes a list of services that the user is able to access. Each entry for service includes service parameters and service status. As default the service status is set to be the same as the overall user-status but may be overridden by the user using this service capability.

History

Document history		
V1.1.1	November 2003	Publication