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                   SIP URI Inter Operator Traffic Leg parameter
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Abstract

   In telecommunication networks, the signalling path between a calling
   user and a called user can be divided into smaller parts, referred to
   as traffic legs. Each traffic leg may span networks belonging to
   different operators, and will have its own characteristics that can
   be different from other traffic legs in the same call. The
   directionality in traffic legs relates to a SIP request creating a
   dialogue and stand-alone SIP request.

   This document defines a new SIP URI parameter, 'iotl', which can be
   used in a SIP URI to indicate that the entity associated with the
   address, or an entity responsible for the host part of the address,
   represents the end of a specific traffic leg.

   The 'iotl' parameter is defined in order to fulfil requirements from
   the 3rd-Generation Partnership Project (3GPP), but it can also be
   used in other network environments.

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1. Introduction

   In a telecommunication network, an end user can be attached (e.g.
   using a radio access network) to its own operator network (home

network), or to another operator's network (visited network). In the
latter case the user is referred to as a roaming user.

Telecommunication operator networks are often not connected directly
to each other. Instead, there might be intermediate networks,
referred to as transit networks, between them. A transit network
might act on a SIP level or on IP level.

In telecommunication networks, the signalling path between a calling
user and a called user can be divided into smaller parts, referred to
as traffic legs. Each traffic leg may span networks belonging to
different operators, and will have its own characteristics that can
be different from other traffic legs in the same call. The
directionality in traffic legs relates to a SIP request creating a
dialogue and stand-alone SIP request.

The traffic leg information can be used by intermediary entities to
make policy decisions, related to e.g. media anchoring, signalling
policy, insertion of media functions (e.g. transcoder) and charging.

The figure below shows two users (Alice and Bob) and the different
type of networks that the signaling might traverse. The signalling
path can be divided into multiple traffic legs, and the type of
traffic legs depends on how the signalling is routed.

```
Alice -- ORIG HNW +++++ TRANSIT NW +++++ TERM HNW -- Bob
Home          +     +               +    +   +    Home
              +     +++++++++++++++++    +   +
              +                          +   +
              +                          +   +
              +     +++++++++++++++++++++++   +
              +     +               +         +
Alice -- ORIG VNW +++++ TRANSIT NW ++    TERM VNW -- Bob
Visited                                           Visited
```
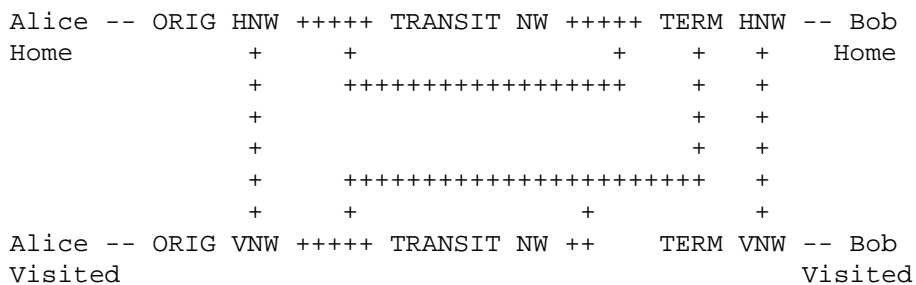
     Figure 1: Telecommunication operator network roaming roles

ORIG HNW = Originating Home Network

TERM HNW = Terminating Home Network

ORIG VNW = Originating Visited Network

TERM VNW = Terminating Visited Network

In Figure 1 Alice is a user initiating communication with Bob, and:

Alice is attached to an originating network, which is either the home
network of Alice, or a visited network (in case Alice is roaming).
In both cases any originating service is provided by the home network
of Alice.

Bob is attached to a terminating network, which is either the home
network of Bob, or a visited network (in case Bob is roaming). In
both cases any terminating service is provided by the home network of
Bob.

A transit network, providing transit functions (e.g. translation of
free phone numbers), may be included between the originating and
terminating networks and between visited and home networks.

This document defines a new SIP URI parameter [RFC3261], 'iotl',
which can be used in a SIP URI to indicate that the entity associated
with the address, or an entity responsible for the host part of the
address, represents the end of a specific traffic leg.

The 'iotl' parameter is defined in order to fulfil requirements from
the 3rd-Generation Partnership Project (3GPP), but it can also be
used in other network environments.

2. Use-cases

2.1. General

This section describes examples of different types of traffic legs in
3GPP networks.

2.2. Originating roaming call

In this case, Alice is located in a visited network. When Alice
sends the initial SIP INVITE request for a call, one traffic leg
(referred to as the 'visitedA-homeA' traffic leg) represents the
signalling path between the UA of Alice and the home S-CSCF of Alice.

2.3. Terminating roaming call

In this case, Bob is located in a visited network. When the home
S-CSCF of Bob forwards the initial SIP INVITE request for a call
towards Bob, one traffic leg (referred to as the 'homeB-visitedB'
traffic leg) represents the signalling path between the home S-CSCF
of Bob and the UA of Bob.

2.4. Originating home to terminating home call

   In this case, the home S-CSCF of Alice forwards the initial SIP
   INVITE request towards the home S-CSCF of Bob. The signalling path
   between the S-CSCFs represents one traffic leg (referred to as the
   'homeA-homeB' traffic leg).

3. Conventions

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
   document are to be interpreted as described in [RFC2119].

4. iotl SIP URI parameter

4.1. Usage

   As specified in [RFC3261], when a SIP entity inserts a SIP URI in an
   initial request for a dialog, or in a stand-alone request, the SIP
   URI will be used to route the request to another SIP entity,
   addressed by the SIP URI, or to a SIP entity responsible for the host
   part of the SIP URI (e.g. a SIP registrar). If such entity
   represents the end of a traffic leg, the SIP entity inserting the SIP
   URI can add a SIP URI 'iotl' parameter to the SIP URI, to indicate
   the type of traffic leg.

   For routing of a SIP request, a SIP entity can add the 'iotl'
   parameter to the SIP URI of the Request-URI [RFC3261], or to the SIP
   URI of a Route header field [RFC3261], of an initial request for a
   dialog, or of an stand-alone request.

   During SIP registration [RFC3261], entities can add the 'iotl'
   parameter to the SIP URI of a Path or Service-Route header field, if
   the entity is aware that SIP URI will be used to indicate the end of
   a specific traffic leg for initial requests for dialogs, or stand-
   alone requests, sent on the registration path.

   This document does not specify the usage of the 'iotl' parameter
   within a SIP URI of a Record-Route header field [RFC3261].

4.2. Parameter Values

4.2.1. General

   This section describes the SIP URI 'iotl' parameter values defined in
   this specification.

4.2.2. homeA-homeB

   This value indicates that a SIP entity responsible for the host part
   of the SIP URI associated with the parameter represents the end of a
   traffic leg between the home network (originating) of the calling
   user and the home network (terminating) of the called user.

   In 3GPP, this traffic leg is between two S-CSCFs.

4.2.3. homeB-visitedB

   This value indicates that the SIP entity addressed by the SIP URI
   associated with the parameter represents the end of a traffic leg
   between the home network (terminating) of the called user and the
   visited network (terminating) in which the called user is located.

   In 3GPP, this traffic leg is between the home S-CSCF and the UE of
   the called user, or between the Service Centralization and Continuity
   Application Server (SCC AS) in the home network of the called user
   and Access Transfer Control Function (ATCF) in the visited network of
   the called user.

4.2.4. visitedA-homeA

   This value indicates that a SIP entity responsible for the host part
   of the SIP URI associated with the parameter represents the end of a
   traffic leg between the visited network (originating) in which the
   calling user is located and the home network (originating) of the
   calling user.

   In 3GPP, this traffic leg is between the UE and the home S-CSCF of
   the calling user, or between the P-CSCF in the visited network,
   serving the calling user, and the home S-CSCF of the calling user.

4.2.5. homeA-visitedA

   This value indicates that the SIP entity addressed by the SIP URI
   associated with the parameter represents the end of a traffic leg
   between the home network (originating) and the visited network
   (originating) in which the calling user is located.

   In 3GPP, this traffic leg is between the home S-CSCF of the calling
   user and the Transit and Roaming Function (TRF) [3GPP TS 24.229]
   serving the calling user, and exists in scenarios where the home
   S-CSCF of the calling user forwards a request back to the visited
   network where the UE of the calling user is located. An example of
   this is when the Roaming Architecture for Voice over IMS with Local
   breakout (RAVEL) [3GPP TS 24.229] feature is enabled.

4.2.6. visitedA-homeB

   This value indicates that a SIP entity responsible for the host part
   of the SIP URI associated with the parameter represents represents
   the end of a traffic leg between the visited network (originating) of
   the calling user and the home network (terminating) of the called
   user.

   In 3GPP, this traffic leg is between the Transit and Roaming Function
   (TRF) [3GPP TS 24.229] serving the calling user and the home S-CSCF
   of the called user, and exists in scenarios where a request is
   forwarded from the visited network where the calling user is located
   directly to the home S-CSCF of the called user. An example of this
   is when the Roaming Architecture for Voice over IMS with Local
   breakout (RAVEL) [3GPP TS 24.229] feature is enabled.

5. Syntax

5.1. General

   This section defines the ABNF for the 'iotl' SIP URI parameter. The
   ABNF defined in this specification is conformant to RFC 5234
   [RFC5234].

5.2. ABNF

   The ABNF [RFC5234] grammar for the role SIP URI parameter is:

```
 uri-parameter = transport-param / user-param / method-param / ttl-param
                 / maddr-param / lr-param / iotl-param / other-param
 iotl-param    = iotl-tag "=" iotl-value
 iotl-tag      = "iotl"
 iotl-value    = "homeA-homeB" / "homeB-visitedB" / "visitedA-homeA"
                 / "homeA-visitedA" /" visitedA-homeB" / gen-value
```

6. Security Considerations

   There SHOULD exis a trust relationship between the networks that
   provide the roaming role and the networks that use the information
   for making policy decisions based on the role. In addition, there
   MUST exist an agreement between the operators for usage of the
   roaming role information.

7. IANA Considerations

   [RFC EDITOR NOTE: Please replace RFC-XXXX with the RFC number of this
   document.] This specification adds one new value to the IANA

registration in the "SIP/SIPS URI Parameters" registry as defined in [RFC3969].

Parameter Name	Predefined Values	Reference
iotl	NO	[This RFC]

8. Acknowledgments

   The authors wish to thank everyone in the 3GPP community that gave
   comments on the initial version of this document.

9. Change Log

   [RFC EDITOR NOTE: Please remove this section when publishing]

10. Normative References

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