Location in SIP/IP Core (LOCSIP)

Location Conveyance with IMS: the OMA LOCSIP Service Enabler

Mike Loushine / Don Lukacs
Telcordia Applied Research

Location in SIP/IP Core (LOCSIP)
Topics

- General Background Material
  - LOCSIP – Objectives / General / Terminology
  - Open Mobile Alliance (OMA) LOCSIP Enabler Release Package
    - Overview of related documents
    - LOCSIP status
- LOCSIP Technical Discussion
  - General Capabilities
  - Architecture
  - Illustrative Flows
  - Specific Capabilities supported in LOCSIP Specifications
- Conclusions / Next Steps

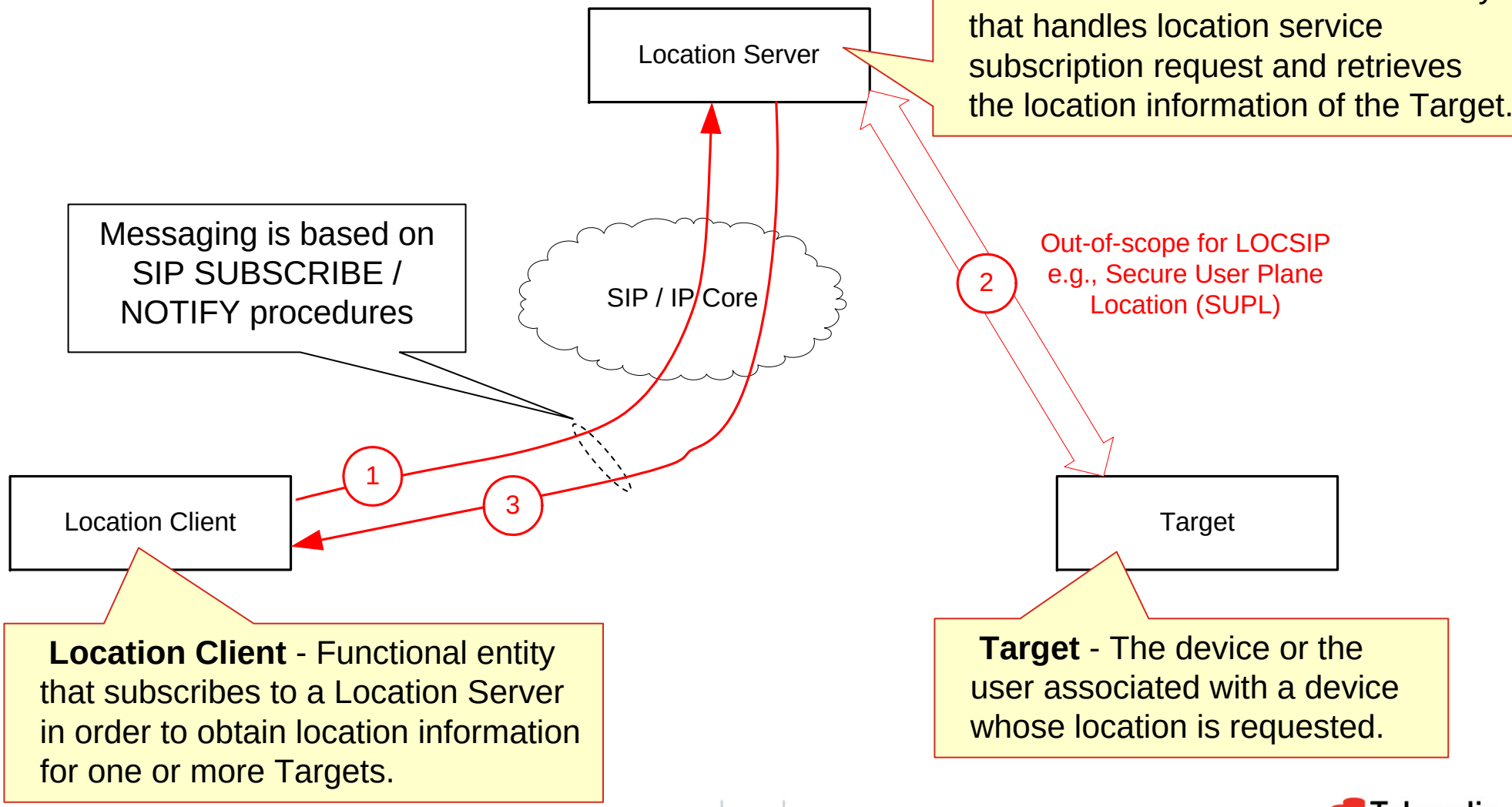
LOCSIP – Objectives

- Create a service enabler to convey location information to applications in a SIP/IP core network (e.g., an IP Multimedia Subsystem [IMS])
- Out-of-scope: Positioning determination functions
  - May interwork with applicable positioning determination functions in access networks and/or in User Equipment
  - Position determination functionality specified elsewhere (e.g., OMA Secure User Plane Location [SUPL])
- Reuse capabilities in a SIP/IP core network, for receiving and responding to location subscriptions over a standardised SIP-based interface
  - Benefit from existing functionality (registrations / security associations) in the SIP/IP core for the location retrieval
  - SIP Applications Servers can avoid additional interface types
- Synergy with other OMA enablers that potentially use location information (e.g., Presence SIMPLE and PoC)
- Reuse available IETF specifications (e.g., IETF Geopriv deliverables)

SIMPLE: SIP for Instant Messaging and Presence Leveraging Extensions
PoC: Push to talk Over Cellular

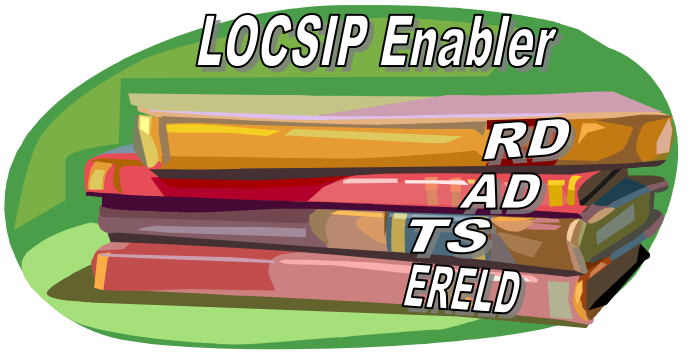
LOCSIP – General / Terminology

- LOCSIP specifies how to use Session Initiation Protocol (SIP) to convey location information

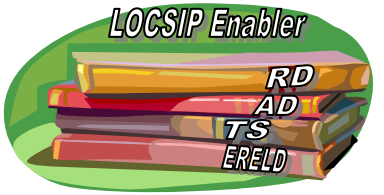


Open Mobile Alliance (OMA)
LOCSIP Status

- OMA Location (LOC) Working Group (WG) completed LOCSIP Enabler Release Package (ERP) as a Candidate Enabler in August 2009
  - ERELD - Enabler Release Definition
  - RD – Requirements Document
  - AD – Architecture Document
  - TS - Technical Specifications



LOCSIP Requirements Document (RD)



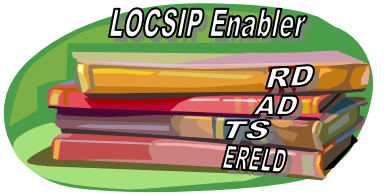
- Candidate version: http://member.openmobilealliance.org/ftp/Public_documents/LOC/Permanent_documents/OMA-RD-LOCSIP-V1_0-20090818-C.zip, *Location in SIP/IP core Requirements*, Candidate Version 1.0 – 18 Aug 2009

- LOCSIP RD defines four use cases (informative):
  - Immediate Location Delivery
    - Fetch current location (e.g. location-based charging)
  - Periodic Location Delivery
    - Obtain location updates periodically
    - Illustrates reporting for group of Targets (“buddy list”)
  - Area Trigger Location Delivery
    - Report location updates if certain filter criteria satisfied (e.g., movement within or outside a certain geographic area)
  - Find Friends
    - Report location updates if a member of a secondary Target group moves within a certain distance from a primary Target
    - Illustrates location request by Location Client in a Terminal

LOCSIP Requirements Document (RD)

- LOCSIP RD defines high-level functional requirements
  Examples:
  - Support for “Immediate”, “Periodic” and “Area Trigger” Location Delivery
  - Support filtering of location notifications (accuracy, response time, age)
  - Support for Location Client in a SIP Application Server or in a terminal.
  - Location Client able to request location information for a group of Targets, based on referenced list or request-contained list.
  - Format of location information to be compliant with:
    - [RFC4119] - “Presence-based GEOPRIV Location Object Format”
    - [RFC5491] - “GEOPRIV Presence Information Data Format Location Object (PIDF-LO) Usage Clarification, Considerations, and Recommendations”
    - [RFC5139] - “Revised Civic Location Format for Presence Information Data Format Location Object (PIDF-LO)”
  - Additional requirements covering Security, Charging, Administration and Configuration, Privacy aspects, Emergency Services

LOCSIP Architecture Document (AD)



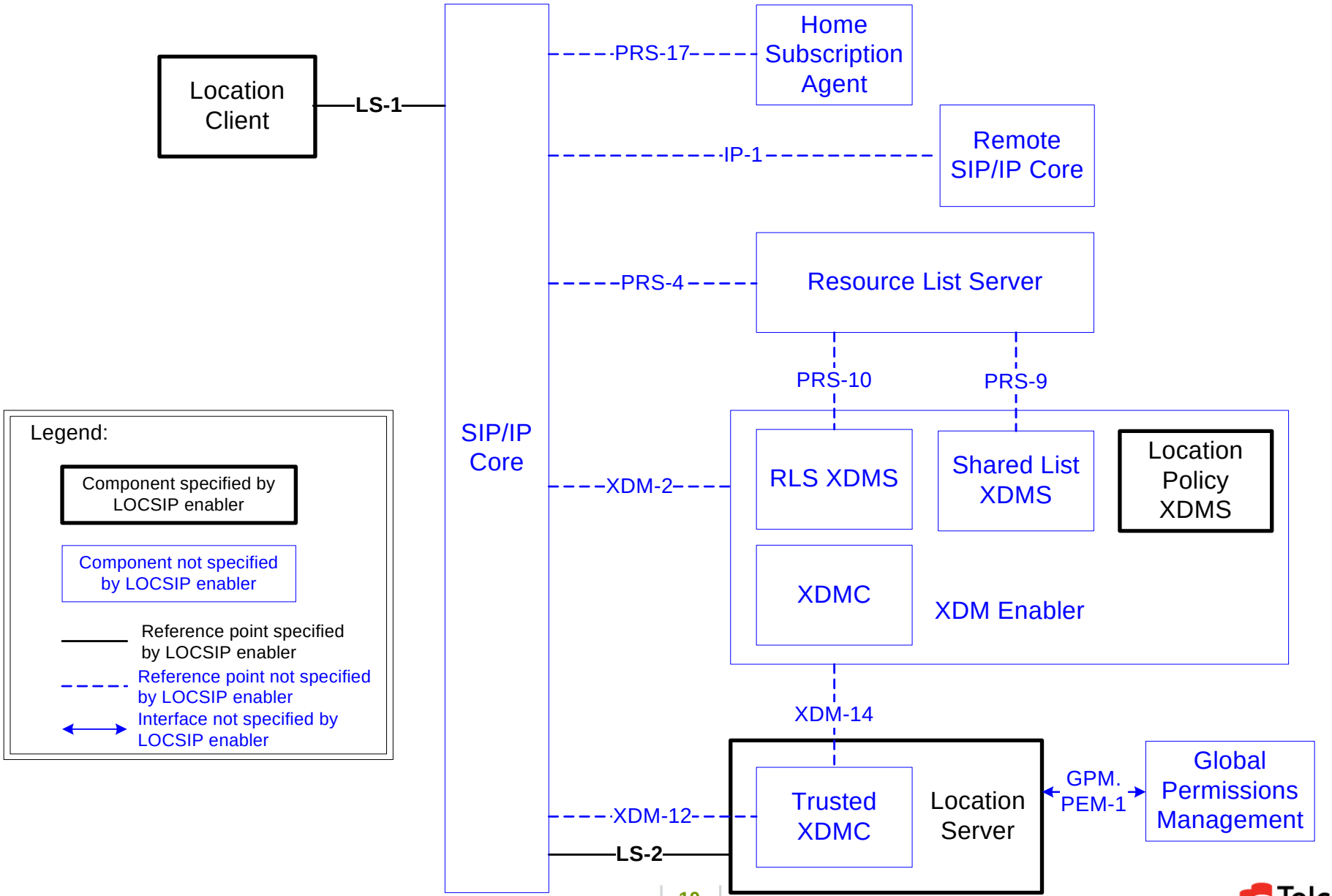
- Candidate version: http://member.openmobilealliance.org/ftp/Public_documents/LOC/Permanent_documents/OMA-AD-LOCSIP-V1_0-20090818-C.zip, *Location in SIP/IP core Architecture*, Candidate Version 1.0 – 18 Aug 2009
- Key Contents:
  - Defines Overall Architecture
  - Defines Architectural Components and Interfaces / Reference Points
  - Describes Flows
  - Discusses Security Considerations

LOCSIP Architecture Document (AD)

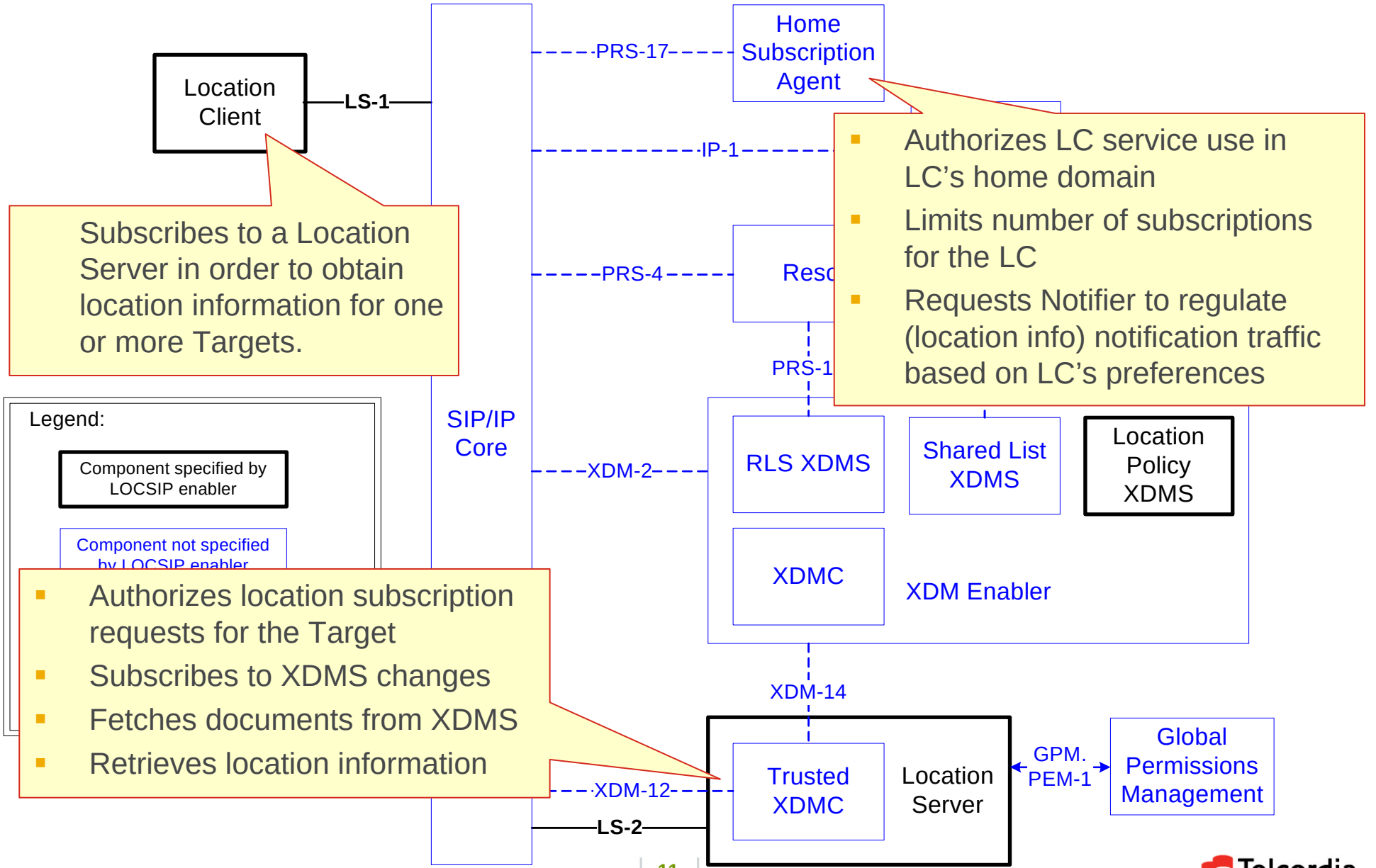
- LOCSIP Reuse of Other OMA Enablers
  - OMA Presence SIMPLE
  - OMA XML Document Management (XDM)
  - IMS in OMA Architecture
- Functional Components
  - **Location Client (LC)**
  - **Location Server (LS)**
  - Home Subscription Agent
  - Resource List Server (RLS)
  - XDM Client (XDMC)
  - XDM Server (XDMS)
    - Shared List XDMS
    - RLS XDMS
    - **Location Policy XDMS**
  - Global Permissions Management (GPM)

SIMPLE: SIP for Instant Messaging and Presence Leveraging Extensions
IMS: IP Multimedia Subsystem

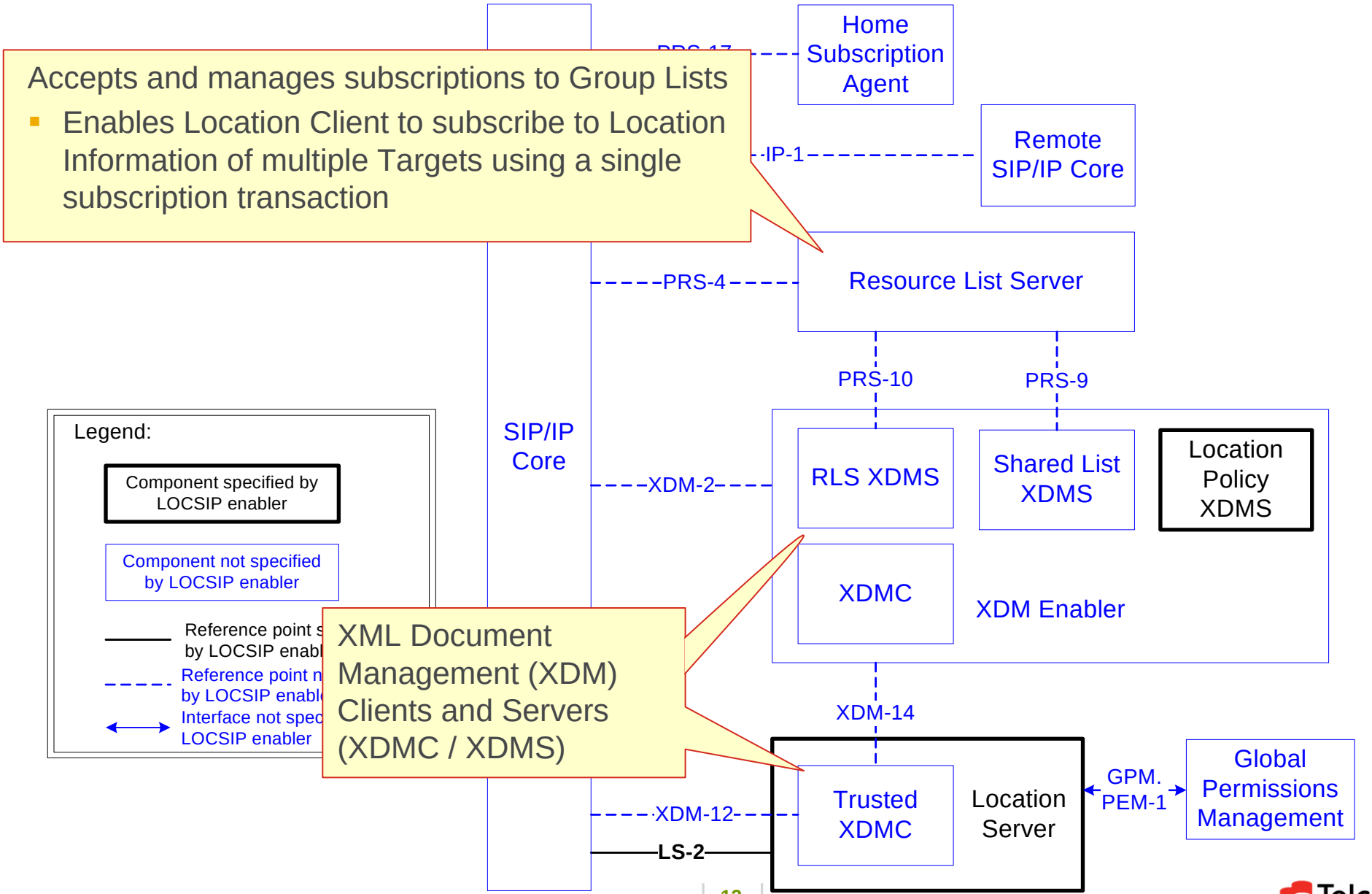
LOCSIP Architecture



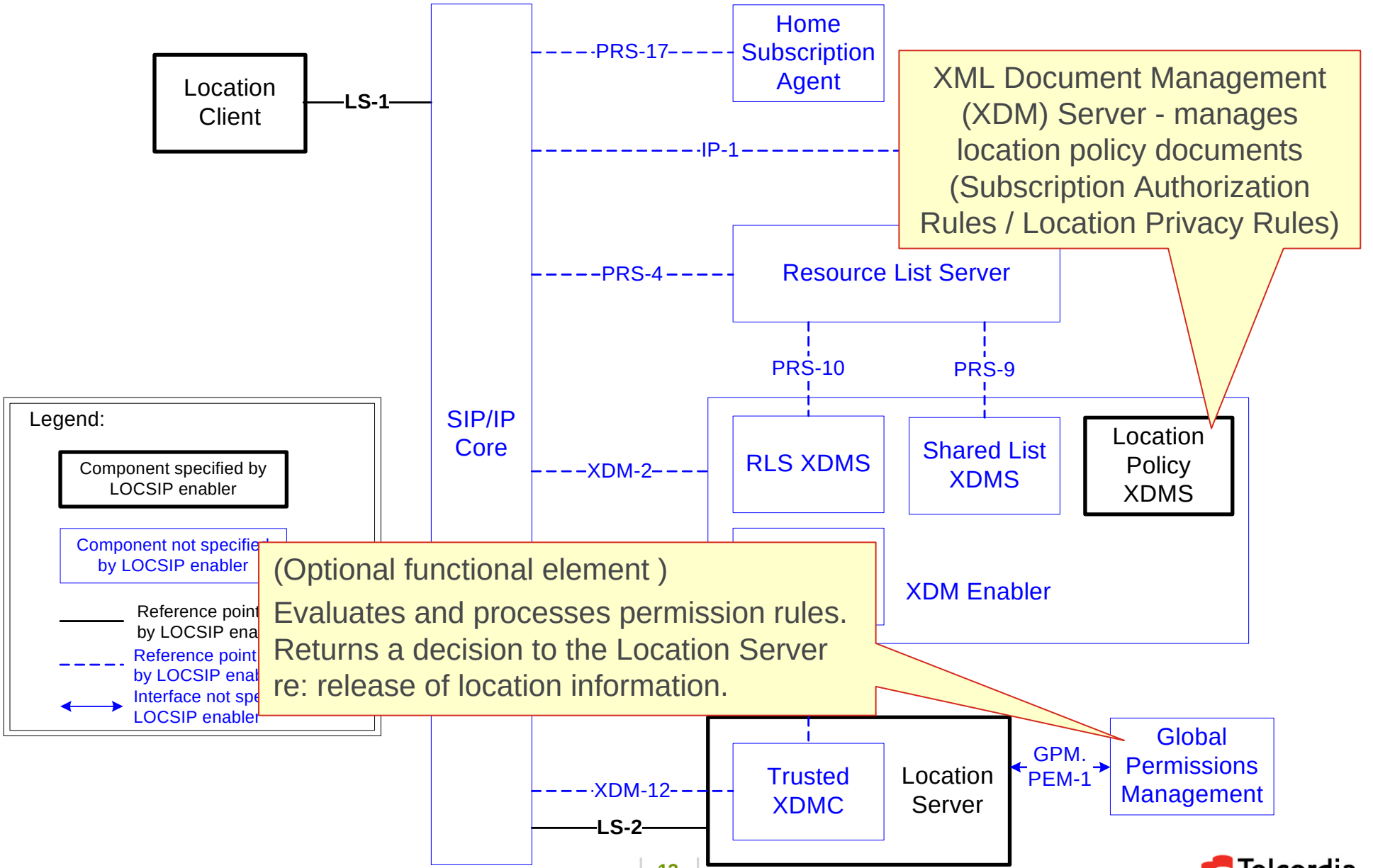
LOCSIP Architecture



LOCSIP Architecture



LOCSIP Architecture

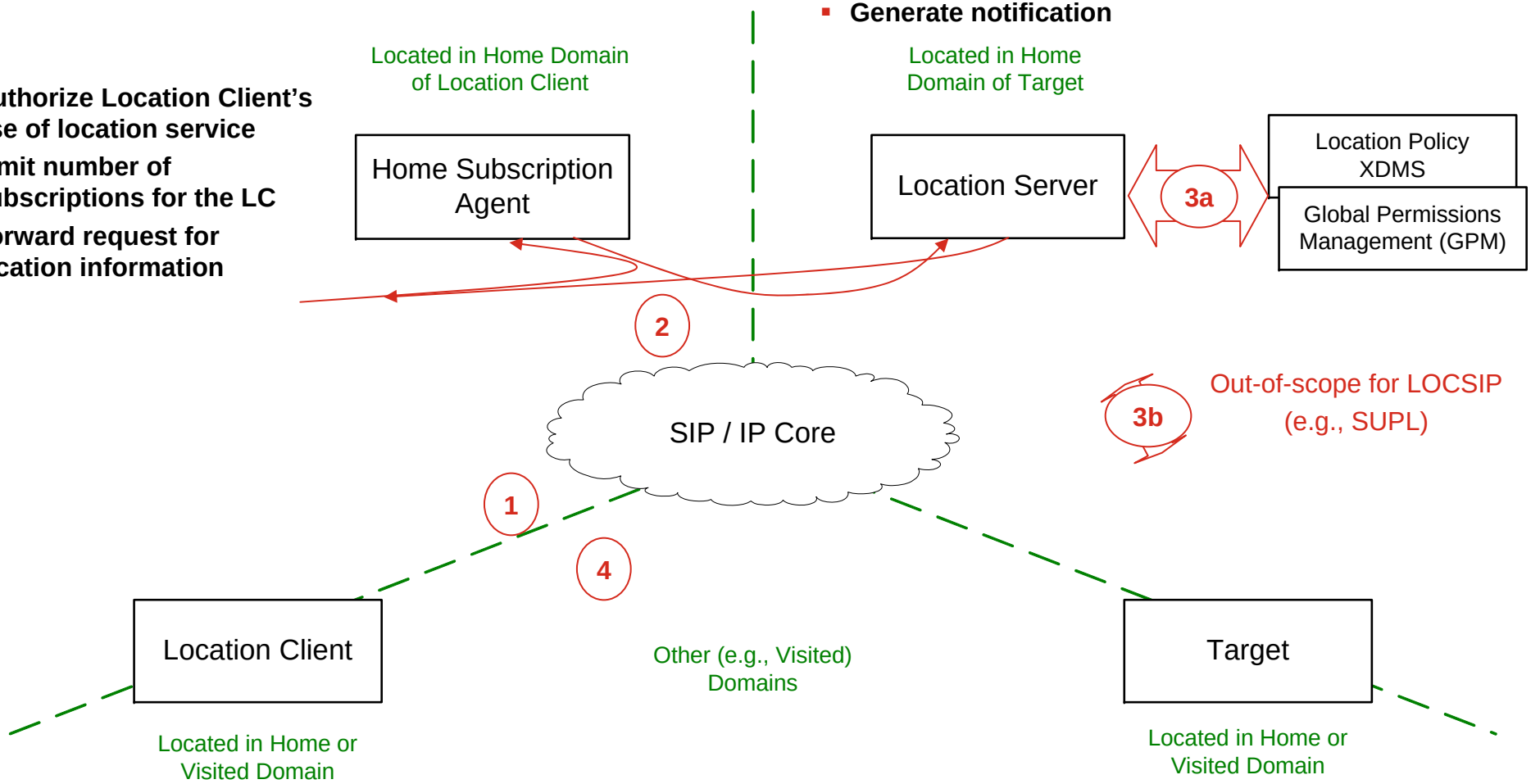


Immediate Location Delivery ("Location Fetch")

High-Level Flow

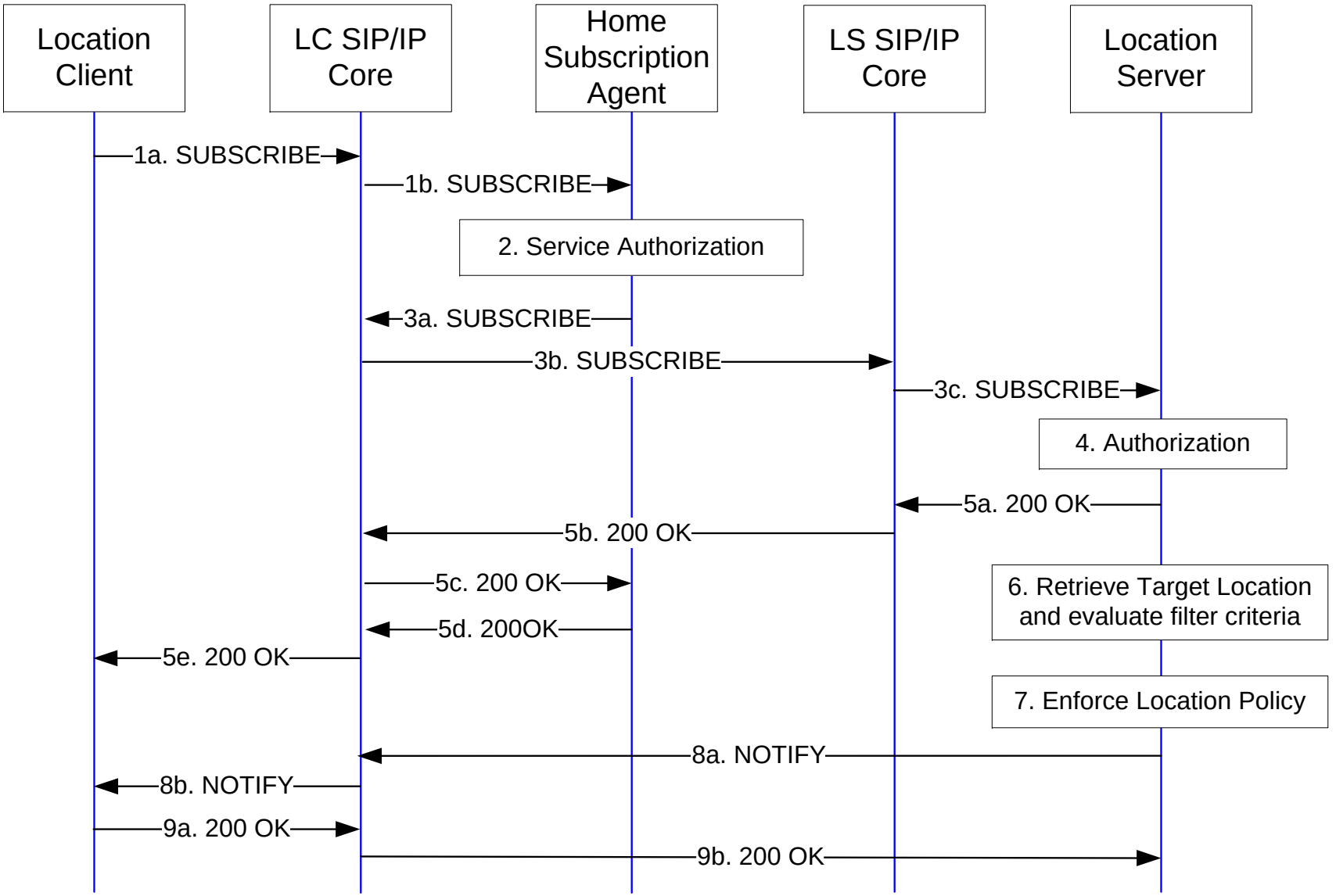
- **Fetch documents from XDMS**
- **Authorize Location Client's subscription to Target's location info**
- **Retrieve location information**
- **Generate notification**

- **Authorize Location Client's use of location service**
- **Limit number of subscriptions for the LC**
- **Forward request for location information**

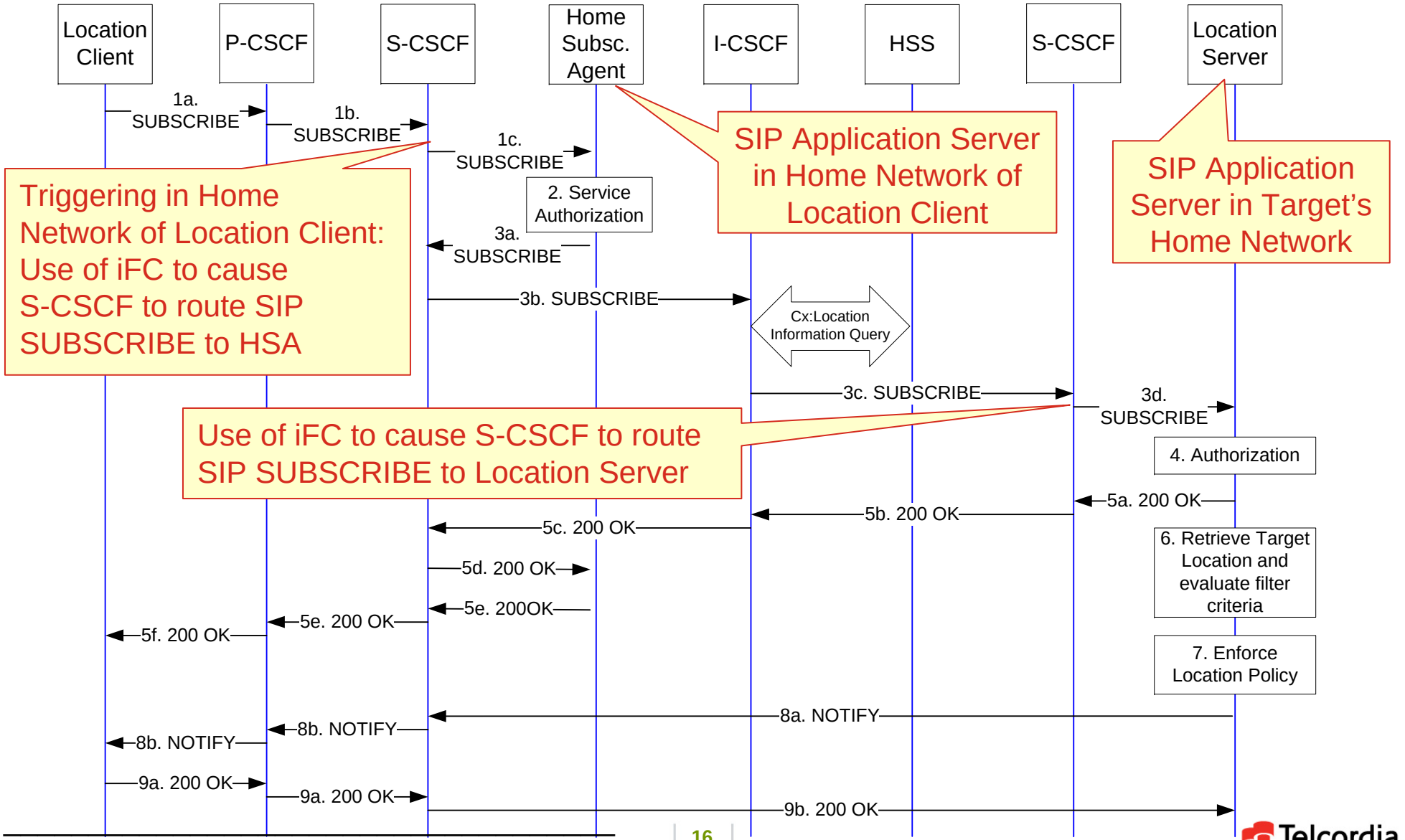


Immediate Location Delivery ("Location Fetch")

SIP Messaging



Immediate Location Delivery ("Location Fetch")
SIP Messaging (Potential IMS-based Realization)



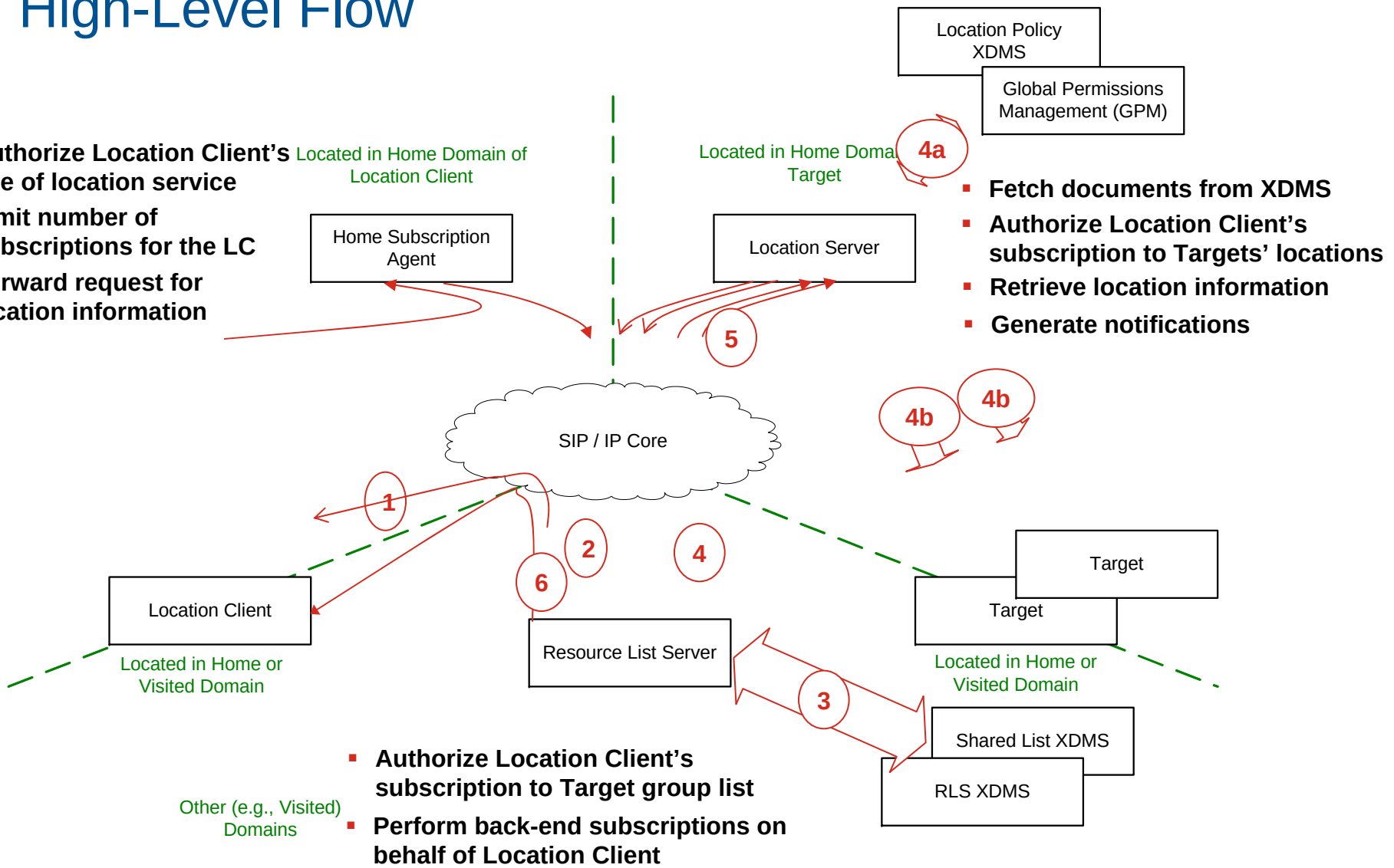
Based on: 3GPP TR 24.841, Section A.3.2.1

Additional LOCSIP Capabilities

- LOCSIP supports additional extensions beyond Immediate Location Delivery:
  - Periodic Location Delivery
    - Location Server provides SIP NOTIFY messages (with updated location) periodically
  - Area Trigger Location Delivery
    - Location Server provides SIP NOTIFY message whenever Target's location satisfies filter criteria
  - Location Retrieval for Multiple Targets
    - Targets identified via referenced list or request-contained list

Location Retrieval – Target List
High-Level Flow

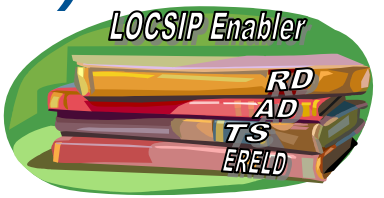
- **Authorize Location Client's use of location service**
- **Limit number of subscriptions for the LC**
- **Forward request for location information**



- **Fetch documents from XDMS**
- **Authorize Location Client's subscription to Targets' locations**
- **Retrieve location information**
- **Generate notifications**

- **Authorize Location Client's subscription to Target group list**
- **Perform back-end subscriptions on behalf of Location Client**

LOCSIP Technical Specification (TS)



- Candidate version: http://member.openmobilealliance.org/ftp/Public_documents/LOC/Permanent_documents/OMA-TS-LOCSIP-V1_0-20090818-C.zip, *Location in SIP/IP core Specification*, Candidate Version 1.0 – 18 Aug 2009
- Contents include:
  - Specifications for LOCSIP Functional Entities
  - Specifications related to Security, Charging, and Registration
  - Specifications for related Location (Information / Filter / QoS) documents

LOCSIP Technical Specification (TS)

LOCSIP Capabilities

- Reuse of basic SIP SUBSCRIBE / NOTIFY Capabilities
  - [RFC 3265] - Session Initiation Protocol (SIP)-Specific Event Notification
  - [RFC 3856] - A Presence Event Package for the Session Initiation Protocol (SIP)
- LOCSIP extends above to support location conveyance
  - Include feature tag in SIP SUBSCRIBE
    - Distinguish location requests from Presence requests
    - Allow proper routing to HSA and Location Server
  - Use of Expires (=0) header to designate one-time location requests
  - Specification of format for location information in body of SIP NOTIFY

Additional LOCSIP Capabilities

Event Notification Rate Control

- Use of "throttle" (and “force”) Event header fields to indicate the minimum (and maximum) time period between two consecutive notifications in a subscription.
  - Throttle mechanism limits the rate of SIP event notifications.
  - Force mechanism triggers SIP event notifications at a minimum interval regardless of movement.

Examples:

Event: presence; throttle=10

--- Minimum of 10 seconds between successive SIP NOTIFY messages in a subscription

Event: presence; force=600

--- Force a SIP NOTIFY messages at least every 10 minutes for a subscription

- Based on IETF draft-niemi-sipping-event-throttle-08 “Session Initiation Protocol (SIP) Event Notification Extension for Notification Throttling”

Additional LOCSIP Capabilities

Location QoS Requirements

- Specify Location QoS requirements in SIP SUBSCRIBE Message Body
  - **Content-Type: application/location-qos+xml**
  - Specify required QoS class, location type, maximum uncertainty, maximum response time, maximum age, required civic elements

Examples:

--- Request location information as “assured” or “bestEffort”

<location-qos class=“assured”>

--- Request “geodetic”, “civic”, or “all” location information

<location-type>geodetic</location-type>

--- Request horizontal location within 150 meters, with 67% confidence

<maxUncertainty confidence=“67”>

<horizontal>150</horizontal>

</maxUncertainty>

--- Request recent location information (obtained within last 10 seconds)

<maxAge>10</maxAge>

</location-qos>

- Defined in LOCSIP TS, Section 11
- Based on IETF draft-thomson-geopriv-location-quality-02, “Specifying Location Quality Constraints in Location Protocols”

Additional LOCSIP Capabilities

Specification of Location-Event Notification Filters

- Specify Location Filter Document in Message Body of SIP SUBSCRIBE
  - **Content-Type: application/location-delta-filter+xml**
  - Location Event Filters suported: movedHoriz & movedVert, enter & exit, speedExceeds, valueChanges, inRange & outOfRange

Example:

--- Request event notification whenever Target is within 1000 meters of a secondary Target

```
<location-filter>
        <inRange>
                <entry uri="sip:alice@operator.com"/>
                <distance uom="urn:ogc:def:uom:EPSG::9001">1000</distance>
        </inRange>
</location-filter>
```

- Based on IETF draft-ietf-geopriv-loc-filters-03, "A Document Format for Filtering and Reporting Location Notifications in the Presence Information Document Format Location Object (PIDF-LO)"
- enter & exit defined in LOCSIP TS, Section 10.1
- inRange & outOfRange defined in LOCSIP TS, Section 10.2

Conclusions / Next Steps

- LOCSIP specifications have attained candidate enabler status (August 2009)
- Upcoming LOCSIP efforts: Focus on Interoperability Testing
  - Candidate LOCSIP Enabler Test Requirements (ETR): http://member.openmobilealliance.org/ftp/Public_documents/LOC/Permanent_documents/OMA-ETR-LOCSIP-V1_0-20090818-C.zip, *Enabler Test Requirements for Location in SIP/IP core*, Candidate Version 1.0 – 18 Aug 2009
  - Test Plans to be developed based on LOCSIP ETR material

Abbreviations

3GPP	Third Generation Partnership Project
3GPP2	Third Generation Partnership Project
AD	Architecture Document
AS	Application Server
CRS	Coordinate Reference System
CSCF	Call Session Control Function
EPSG	European Petroleum Survey Group
ERELD	Enabler Release Definition
ERP	Enabler Release Package
ETR	Enabler Test Requirements
GBA	Generic Bootstrapping Architecture
GEOPRIV	Geographical Location / Privacy
GML	Geography Markup Language
GPM	Global Permissions Management
HSA	Home Subscription Agent
HSS	Home Subscriber Server
I-CSCF	Interrogating CSCF
IMS	IP Multimedia Subsystem
LOCSIP	Location in SIP/IP core
LC	Location Client
LCS	LoCation Services
LS	Location Server
MLP	Mobile Location Protocol
MMD	Multimedia Domain
OMA	Open Mobile Alliance
P-CSCF	Proxy CSCF
PEEM	Policy Evaluation, Enforcement and Management
PEM-1	PEEM specified callable interface
PIDF	Presence Information Data Format
PIDF-LO	Presence Information Data Format, Location Object
PoC	Push to talk Over Cellular
RD	Requirements Document
RLS	Resource List Server
S-CSCF	Serving CSCF
SIMPLE	SIP for Instant Messaging and Presence Leveraging Extensions
SIP	Session Initiation Protocol
SUPL	Secure User Plane Location
TS	Technical Specifications
UoM	Unit of Measurement
URI	Uniform Resource Identifier
URN	Uniform Resource Namespace
XDM	XML Document Management
XDMC	XDM Client
XDMS	XDM Server
XML	eXtensible Markup Language