



## A Location protocol for the Internet

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- The Internet uses standard protocols for standard services regardless of the underlying access technology
  - An Internet host uses DHCP to get an IP address and local configuration data.
  - An Internet host uses DNS to resolving a host name to an IP address.
  - An internet host uses HTTP to talk with a web server to display a web page
- Location traditionally has been a niche and access dependent service. Different protocols exist across different technologies.
- All communication is converging on IP and the IETF has defined a standard Internet location service and a standard protocol for talking with the service.
  - Service :- Location Information Server (LIS)
  - Protocol :- HELD



## HELD and the LIS

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- HELD is the protocol used to request location information from a LIS.
- HELD is made up of two main parts:
  - LIS discovery
  - Location Request/Response
- LIS Discovery
  - Location is a local service, so it is important to find the LIS that is able to provide location for the network you are in.
  - LIS discovery is done with a combination of DHCP and DNS
- Location Request/Response
  - Defines the semantics of device interaction with the LIS

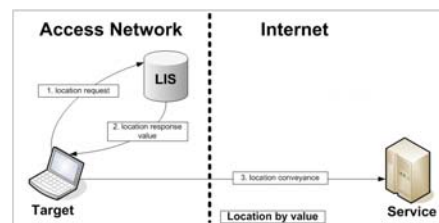


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## Internet Location Service Semantics

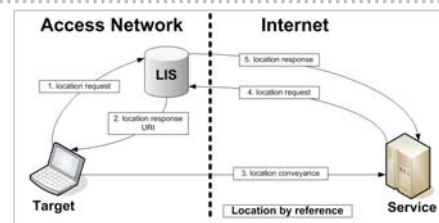
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### Location by value

1. Device request location from the location server in the access network.
2. LIS returns location to device.
3. Device conveys location\* to the service in the applicable application protocol.

\* Location values are encoded as a PIDF-LO per RFC4119, RFC5139, RFC5491.



### Location by reference

1. Device requests reference from the location server in the access network.
2. LIS returns location reference to device.
3. Device conveys reference to the service in the applicable application protocol.
4. Service queries location server directly for location value one or more times.
5. LIS returns location to service.

The protocol used for 1-2 & 4-5 is HELD (HTTP Enabled Location Delivery). Step 3, location conveyance, is application protocol dependent (e.g. SIP and W3C support location conveyance).



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## Location standards

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- Standard mechanisms supporting any application category
  - Location by value
  - Location by reference
  - Location conveyance (e.g. SIP, W3C web geo)
- Same mechanisms can be used, in total or as a subset for any application
  - Device-based applications
  - Presence applications
  - Web services

Note: A HELD Client and location conveyance using the W3C specification will be available in firefox 3.7

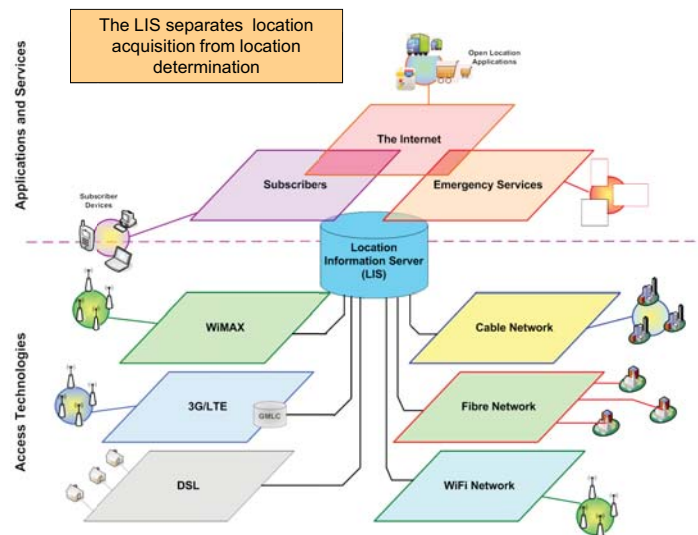


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## The Location Information Server (LIS)

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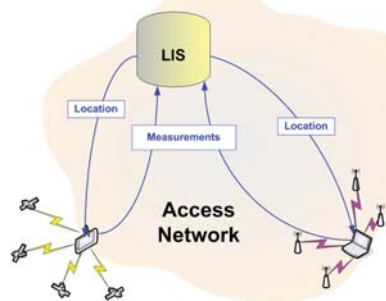
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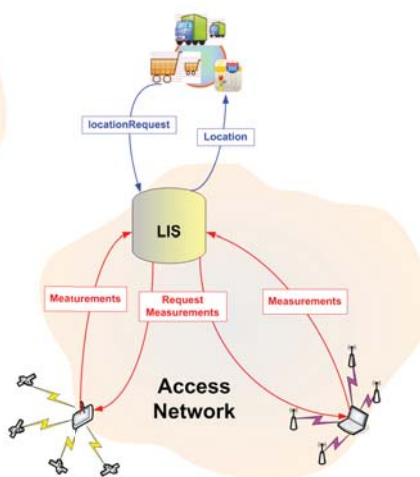


## HELD can support measurements too!

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- Where a device can provide measurements to the LIS it may, and the LIS may use these.
- Measurements may be provided in a HELD request by the device to the LIS.
- Measurements may be requested from the device by the LIS when needed.
  - This requires an arrangement before-hand which is established using a capabilities exchange between the Device and the LIS



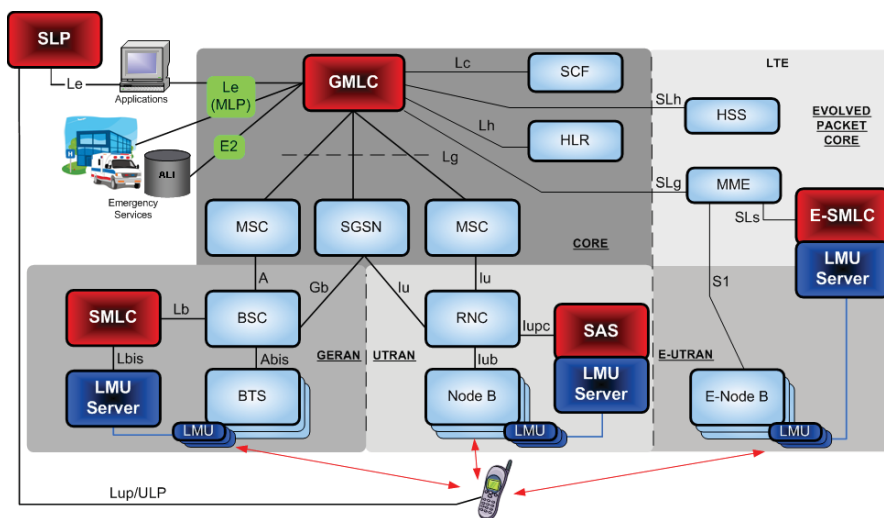
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## Location Service Architecture in 3GPP Networks

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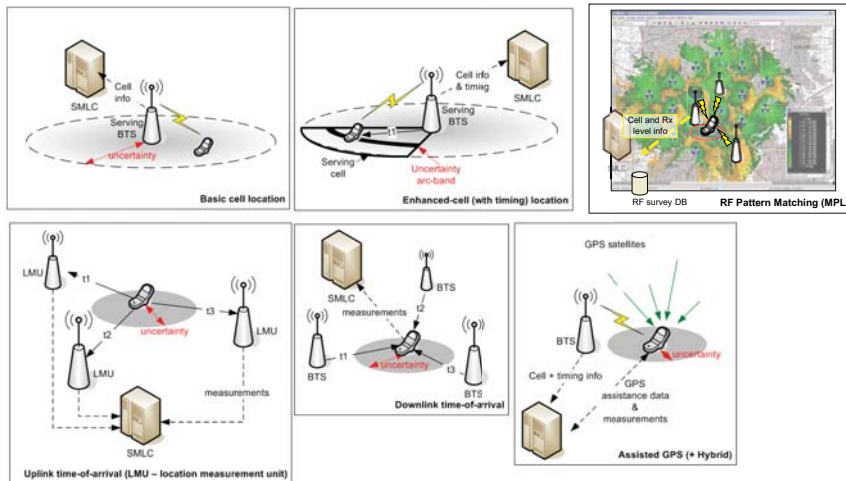
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## A quick tour of cellular positioning technologies

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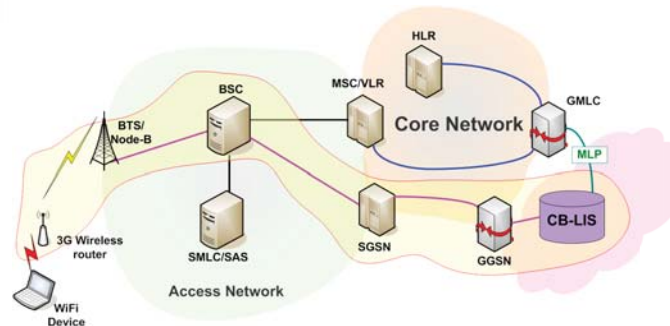
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## CB-LIS- Location Services for the future

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- Device requires a general location protocol, not a cellular specific one
- CB-LIS can be used to obtain location from GMLC using MLP and requested QoS.
- A-GPS, OTDOA, etc. will be exercised natively on the cellular device where supported. HELD also allows the IP location client to optionally negotiate user plane A-GPS and other device measurement methods where supported by the device and network.

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## References



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## References

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2nd Opportunistic RF Localization for  
Next Generation Wireless Devices  
June 13-14, 2010  
Worcester Polytechnic Institute  
Worcester, MA, USA



# The Location-Enabled Network

A new paradigm for network location services



Geolocation-Enabled Network solutions

PT-103989-EN