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Contents

Foreword

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Introduction

There is interest in providing LCS over 3GPP WLAN interworking. The architectural impacts on LCS and on WLAN interworking are considered in this report. These include (but not limited) to:

a) To study the LCS architectural requirements for 3GPP WLAN Interworking scenarios.

b) To study the different possible LCS architectures to fulfil the LCS requirements for 3GPP WLAN Interworking scenarios

c) To investigate the use of OMA SUPL to communicate with the 3GPP location server and the WLAN UE

d) To investigate whether there are WLAN Interworking architecture enhancements necessary to support LCS

The overall objective is to enhance the 3GPP specifications to support LCS in 3GPP WLAN interworking.

1 Scope

The present document investigates solutions for providing LCS over 3GPP WLAN interworking architecture. The architectural requirements and different possible LCS architectures to provide the location services over I-WLAN are analyzed. The procedures to obtain the location information of a WLAN UE attached to I-WLAN network are also studied. The LCS aspects for I-WLAN as IP-CAN in the IMS Emergency call, i.e., the emergency location information handling for I-WLAN are described in this TR.

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, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.101: "Service principles".

[3] 3GPP TS 23.002: "Network architecture".

[4] 3GPP TS 23.003: "Numbering, addressing and identification".

[5] 3GPP TS 23.271: "Functional Stage 2 description of Location Services (LCS)".

[6] 3GPP TR 22.935: "Feasibility Study on Location Services for Interwoking-WLAN".

[7] 3GPP TS 22.234 : "Requirements on 3GPP system to Wireless Local Area Network (WLAN) interworking".

[8] 3GPP TS 23.234: "3GPP system to Wireless Local Area Network (WLAN) interworking; System description".

[9] 3GPP TS 33.234: "WLAN Interworking Security."

[10] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[11] Open Mobile Alliance, OMA RD SUPL: "Secure User Plane Requirements", (http://www.openmobilealliance.org).

[12] Open Mobile Alliance, OMA AD SUPL: "Secure User Plane Location Architecture", (http://www.openmobilealliance.org).

[13] Open Mobile Alliance, OMA TS ULP: " UserPlane Location Protocol", (http://www.openmobilealliance.org).

[14] 3GPP TS 23.167: "IP Multimedia Subsystem (IMS) emergency sessions".

[15] 3GPP TR 21.905. "Vocabulary for 3GPP Specifications".

[16] IETF RFC 4119: "A Presence-based GEOPRIV Location Object Format".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Location Identifier: Information about the current location of the UE in the network. Location is indicated in network terms, for example using the global cell id in cellular networks, line-id in fixed broadband networks, the (MAC) address of the WLAN AP or Location Object as defined by IETF RFC 4119 [16], (OMA-Location also uses this term, but OMA so far defines the Location Identifier only for cellular access).

Location Retrieval Function (LRF): This functional entity handles the retrieval of location information for the UE including, where required, interim location information, initial location information and updated location information. The LRF may interact with a separate RDF or contain an integrated RDF in order to obtain routing information. The LRF may interact with a separate GMLC or contain an integrated GMLC in order to obtain location information. The LRF may interact with or contain other types of location server functions in order to obtain location information.

Routing Determination Function (RDF): The functional entity, which may be integrated in a Location Server (e.g. GMLC) or in an LRF, provides the proper PSAP destination address to the E-CSCF for routing the emergency request. It can interact with a location functional entity (e.g. GMLC) to manage ESQK allocation and management, and deliver location information to the PSAP.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AAA	Authentication, Authorization, Accounting
E-SLP	Emergency-SLP
ESQK	Emergency Service Query Key
GMLC	Gateway Mobile Location Centre
H-SLP	Home-SLP
I-WLAN	Interworking WLAN
IW-MT-LR	Mobile Terminated Location Request for an I-WLAN
LRF	Location Retrieval Function
OMA	Open Mobile Alliance
RDF	Routing Determination Function
SLP	SUPL Location Platform
SUPL	Secure User Plane Location

4 Architectural requirements and considerations

Editor's Note: This section will describe requirements that apply to the architecture design and considerations which will be used when making decisions on the preferred architectural alternative.

4.1 Architectural principles

A general description of location services architecture and architectural requirements for GSM and UMTS are given in the specification TS 23.271 [5]. The general architectural assumptions described in TS 23.271 [5] can be applied also for LCS over I-WLAN. However, the new entity can be added and the functionality of a each existing entity can be added or modified. Based on the architectures for LCS over I-WLAN, the procedures to obtain the location of a WLAN UE attached to I-WLAN are defined. The architectural principles to provide LCS over I-WLAN are described in this section.

1. Multiple positioning methods shall be supported in the I-WLAN including, but not limited to, Assisted GPS and WLAN access network specific methods. The WLAN access network specific positioning methods are FFS.

2. The MT-LR and MO-LR shall be supported in LCS over I-WLAN.

3. It shall be possible to ensure that the WLAN UE user's privacy is consistent with the user's privacy preferences, except for emergency or lawful purposes depending on local/regional regulations.
4. Location service with IMS emergency call shall be possible.
5. Based on the local policy, the Capability of Le interface shall be possible in IMS emergency call

4.2 Architectural considerations

LCS procedures described in TS 23.271 may not be applicable for LCS over I-WLAN. The considerations on the alternative architectures, new or modified entities, new or modified functionalities are described in this section.

4.2.1 Functional Description of LCS per network element

4.2.1.1 Access Network

The Access Network may be involved in the handling of various positioning procedures. The WLAN access network specific positioning methods are FFS.

Editor's Note: IEEE 802.11v Task Group is considering proposals for calculating location information relative to the IEEE 802.11 AP (Access Point) for an IEEE 802.11 station.

Editor's Note: IEEE 802.11k Task Group has defined a mechanism for carrying location information (per RFC-3825) from one IEEE 802.11 station/AP to another IEEE 802.11 station/AP. The mechanism for calculating/provisioning location information on the AP are not however being considered by IEEE 802.11k.

4.2.1.2 LCS Client, LCS applications, Requestors

Refer general functional descriptions for LCS Client, LCS applications, Requests to TS 23.271 [5].

Editor's Note: Currently, there are no new issues identified for LCS Client, LCS applications and Requestors for LCS over I-WLAN specifically.

4.2.1.3 Gateway Mobile Location Center (GMLC)

The Gateway Mobile Location Center (GMLC) contains functionality required to support LCS. In one PLMN, there may be more than one GMLC.

To perform a routing information query to obtain the address of serving AAA server of a WLAN UE and the address of WLAN UE, a new reference point, La, is supported by GMLC.

To support OMA SUPL in LCS over I-WLAN, the GMLC and the SLP may be integrated into a single system or GMLC can be connected to the SLP.

Refer general functional descriptions for GMLC to TS 23.271 [5].

4.2.1.4 LCS support in the UE

The UE may be involved in the various positioning procedures. The UE may support OMA SUPL for LCS over I-WLAN. The use of OMA SUPL in IW-MT-LR and Mobile Originated procedure are specified in this TR. Specific UE involvement in positioning procedures in WLAN AN is FFS.

Refer general functional descriptions of LCS support in the UE to TS 23.271 [5].

4.2.1.5 HLR

The HLR contains LCS subscription data and routing information. The HLR is accessible from the GMLC via the Lh interface. The Lh interface supports a routing information query to release the address of serving AAA server of a WLAN UE to the GMLC.

4.2.1.6 HSS

The HSS contains LCS subscription data and routing information. The HSS is accessible from the GMLC via the Lh interface. The Lh interface supports a routing information query to release the address of serving AAA server of a WLAN UE to the GMLC.

4.2.1.7 PPR

Refer general functional descriptions for PPR to TS 23.271 [5].

4.2.1.8 PMD

Refer general functional descriptions for PMD to TS 23.271 [5].

4.2.1.9 SLP

To support OMA SUPL in LCS over I-WLAN, the SLP and the GMLC may be integrated into a single system or SLP can be connected to the GMLC.

Refer general functional descriptions for SLP to OMA AD SUPL [12] and OMA TS SUPL [13].

4.3 Security considerations

FFS

4.4 Radio network considerations

1. The Access Network may support various positioning procedures. The WLAN access network specific positioning methods are FFS.

2. Emergency capability advertisement for WLAN UE from WLAN AN to select the appropriate network shall be supported.

Editor's Note: IEEE 802.11u Task Group currently has a requirement to provide capability advertisement for WLANs supporting Emergency Calls. IEEE 802.11u Task Group currently has a requirement to support Emergency Calls when the user does not have authentication credentials but both the network and the WLAN station are capable of supporting VoIP calls.

4.5 IMS emergency location information and LCS functions for IMS emergency call

Location information is needed for 2 main reasons in emergency services. The initial purpose of the location information is to enable the IMS network to determine which PSAP serves the area where the UE is currently located, so that the IMS network can route the emergency session to the correct PSAP. The second purpose is for the PSAP to get location information for the terminal during or after the emergency session.

If the UE has location information available, the UE shall include the location information in the request to establish an emergency session. The location information may consist of network location information, that is the Location Identifier, and/or the Geographical location information. The UE using WLAN access may use identifier of the access node (e.g., the MAC address of the WLAN Access Point) or a location key as Location Identifier. The format of location information shall be specified in Stage 3.

Location determination by the UE is done per TS 23.167 [14].

NOTE: The mechanism used by the UE to obtain location information from the I-WLAN IP-CAN is out of scope. One method that could be used is the mechanism defined by IEEE 802.11k Task Group for carrying location information (per RFC-3825) from one IEEE 802.11 station/AP to another IEEE 802.11 station/AP.

If the UE is unable to provide its own location, then the UE shall include an indication in the emergency SIP INVITE that its location is unknown.

The IMS core may query the LRF to obtain further location information or to validate the location information provided initially by the UE. The IMS network may also request from LRF the Geographical location information, in case the UE did not provide the Geographical location information. The IMS core routes the emergency request to the PSAP/Emergency Centre that corresponds to the current location of the UE. The IMS core may forward the SIP request containing the UE's location information to the PSAP/Emergency Centre. The location information can contain explicit location information and/or a reference key to allow the PSAP to retrieve location at a later stage.

If the PSAP/EC needs updated location information of the UE, the PSAP/EC may retrieve such information from the UE itself or from LRF. The retrieval procedure may be based on OMA SUPL. In SUPL version 1.0, the LRF may function as, or make use of, a Home SUPL Location Platform (H-SLP) or a Requesting SUPL Location Platform (R-SLP) if the UE is registered in the H-PLMN or in the V-PLMN, respectively. In SUPL 2.0, the LRF will function as, or make use of the so-called Emergency SUPL Location Platform (E-SLP) whether the UE is registered in the H-PLMN or in the V-PLMN.

4.6 Applicability of OMA Secure User Plane solution to LCS for I-WLAN

The OMA Location working group has been working on the so-called Secure User Plane Location(SUPL) solution to provide the location information over TCP/IP connection between the terminal and the location server, OMA RD SUPL [11], OMA AD SUPL [12] and OMA TS ULP [13].

OMA SUPL employs user plane data bearers for transferring location assistance information such as GPS assistance data, and for carrying positioning technology-related protocols between mobile terminal and the network. SUPL is intended as an alternative and complement to the existing standards based on signalling in the mobile network control plane. SUPL assumes that the mobile network or other used access network is capable of establishing a data bearer connection between terminal and location server. Since I-WLAN is one of available data bearers to carry packets over TCP/IP, OMA SUPL can be adopted for location services in I-WLAN architecture.

SUPL utilises existing standards where available and possible, and SUPL is extensible to enabling more positioning technologies as the need arises so that they utilise the same mechanism. SUPL provides full functionality of A-GPS and other available conventional positioning technologies with minimum changes of current network elements.

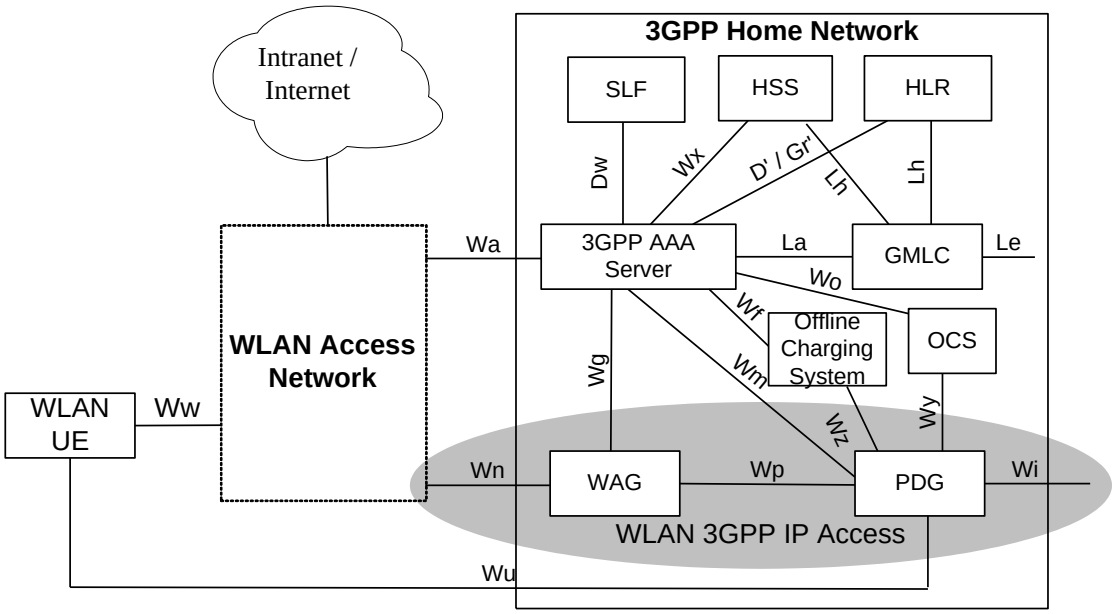
Since I-WLAN is also one of IP capable networks, it is believed that OMA SUPL can be utilized to provide LCS over I-WLAN.

5 Overall LCS architecture for Interworking WLAN

Editor's Note: This section will describe the feasible architectures to provide LCS for interworking WLAN.

5.1 Reference Model

5.1.1 Non Roaming WLAN Inter-working Reference Model



NOTE 1: The shaded area refers to WLAN 3GPP IP Access functionality.
NOTE 2: The LCS La interface is added to support LCS for I-WLAN
NOTE 3: The GMLC can have the SLP functionality or GMLC can be connected to the SLP.

Figure 5.1: Non-roaming reference model

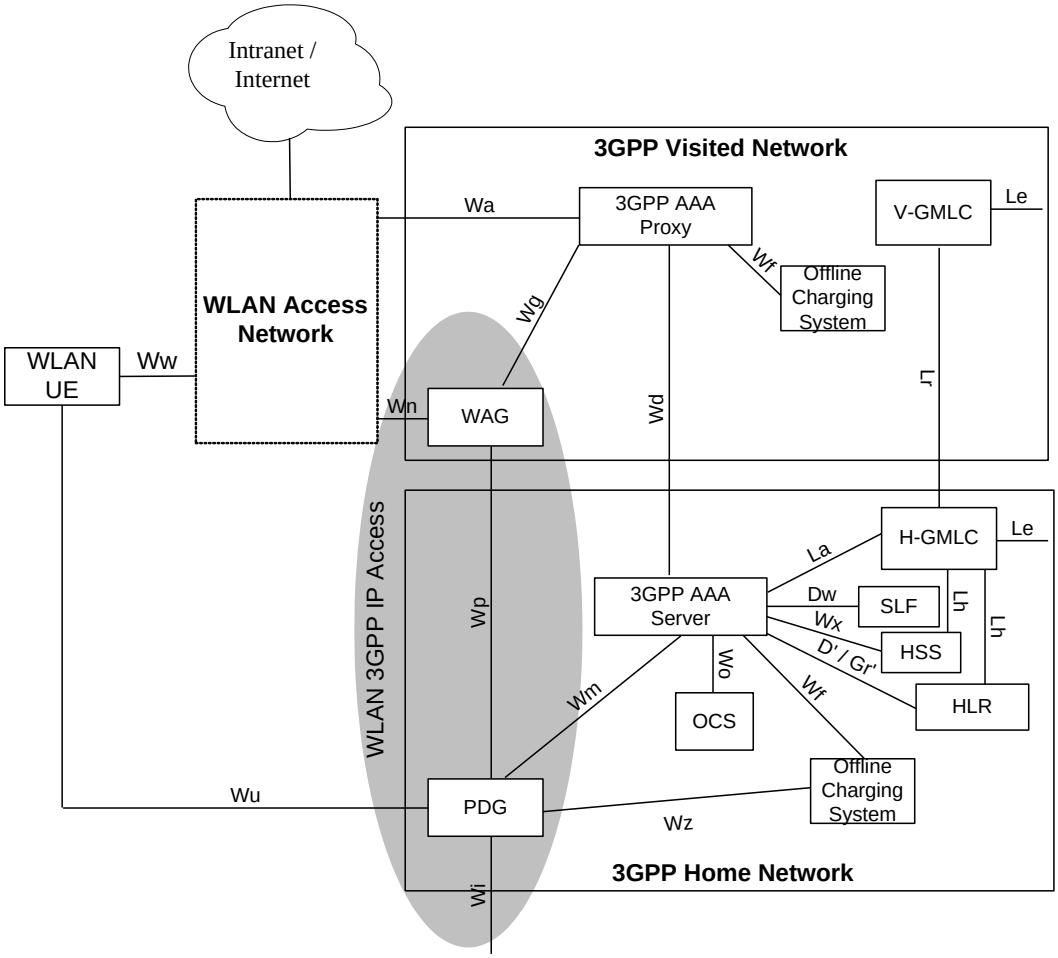
5.1.2 Roaming WLAN Inter-working Reference Model

The home network is responsible for access control. Charging records can be generated in the visited and/or the home 3GPP networks. The Wx and Wo reference points are intra-operator. The home 3GPP network interfaces to other 3GPP networks via the inter-operator Wd reference point.

The 3GPP AAA proxy relays access control signalling and accounting information to the home 3GPP AAA Server using the Wd reference point.

It can also issue charging records to the visited network Offline Charging System when required. The 3GPP network interfaces to WLAN Access Networks via the Wa reference point.

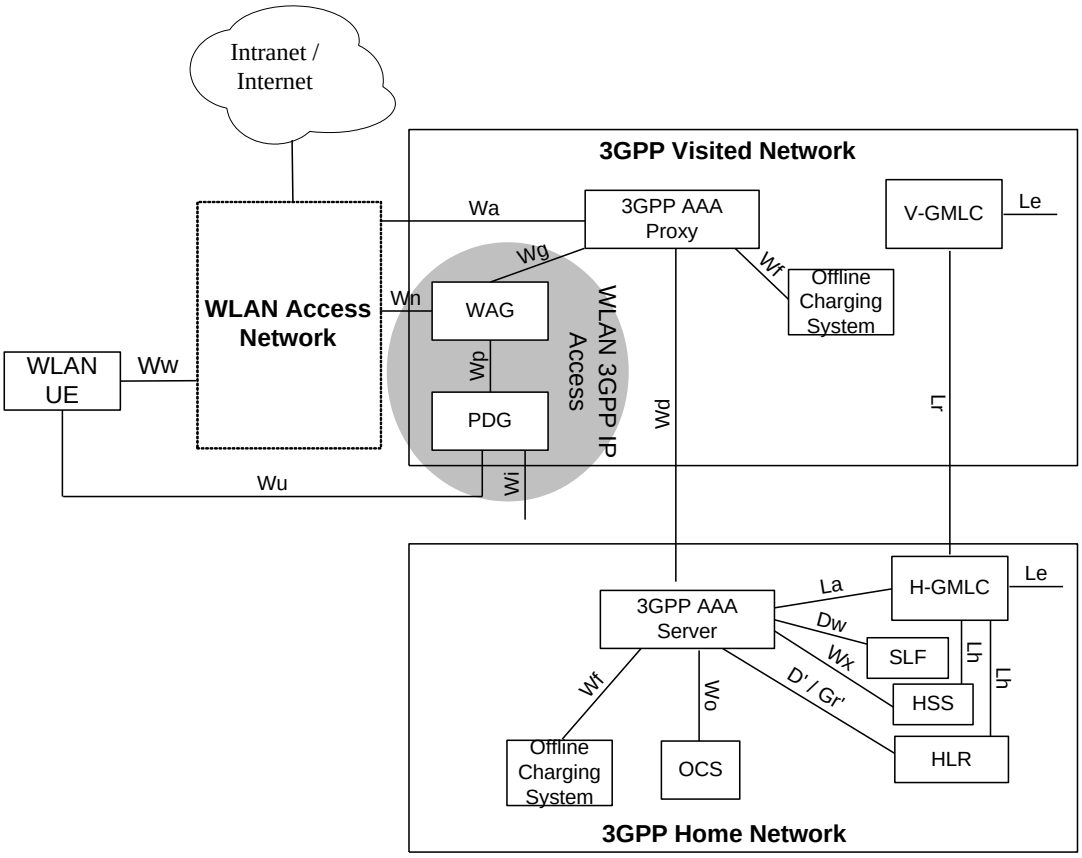
The home network and the visited network may have location server(s), i.e., the home location server and the visited location server, respectively.



NOTE 1: The shaded area refers to WLAN 3GPP IP Access functionality.
NOTE 2: The LCS La interface is added to support LCS for I-WLAN
NOTE 3: The GMLC can have the SLP functionality or GMLC can be connected to the SLP.

Editor's note: The use of V-GMLC and relevant procedures are FFS.

Figure 5.2a: Roaming reference model - 3GPP PS based services provided via the 3GPP Home Network



NOTE 1: The shaded area refers to WLAN 3GPP IP Access functionality.
NOTE 2: The LCS La interface is added to support LCS for I-WLAN
NOTE 3: The GMLC can have the SLP functionality or GMLC can be connected to the SLP.

Figure 5.2b: Roaming reference model - 3GPP PS based services provided via the 3GPP Visited Network

6 Impacts on the 3GPP Architecture

Editor's Note: This section will describe the impacts on current 3GPP architecture to provide LCS for interworking WLAN based on proposed architectures. There may be impacts on GMLC, WLAN UE, Interworking WLAN architecture, HSS and AAA.

6.1 Impacts on IW-MT-LR Procedure

Following impacts on 3GPP architecture and specifications are analyzed to realize an IW-MT-LR.

1.	**AAA server**	Support of routing information query to release the address of WLAN UE to the GMLC
2.	**HSS**	Support of routing information query to release the address of AAA server of WLAN UE to the GMLC
3.	**GMLC**	Support of routing information query to obtain the address of AAA server of WLAN UE and the address of WLAN UE
4.	**TS 23.271 [5]**	New section, "interworking with I-WLAN" derived from the proposal
5.	**TS 29.002 [10]**	Support of signalling between HSS and GMLC

7 Procedures

Editor's Note: This section will describe the procedures for the functional elements contained in the architecture.

7.1 IW-MT-LR Procedure

Figure 7.1 describes the IW-MT-LR procedure.

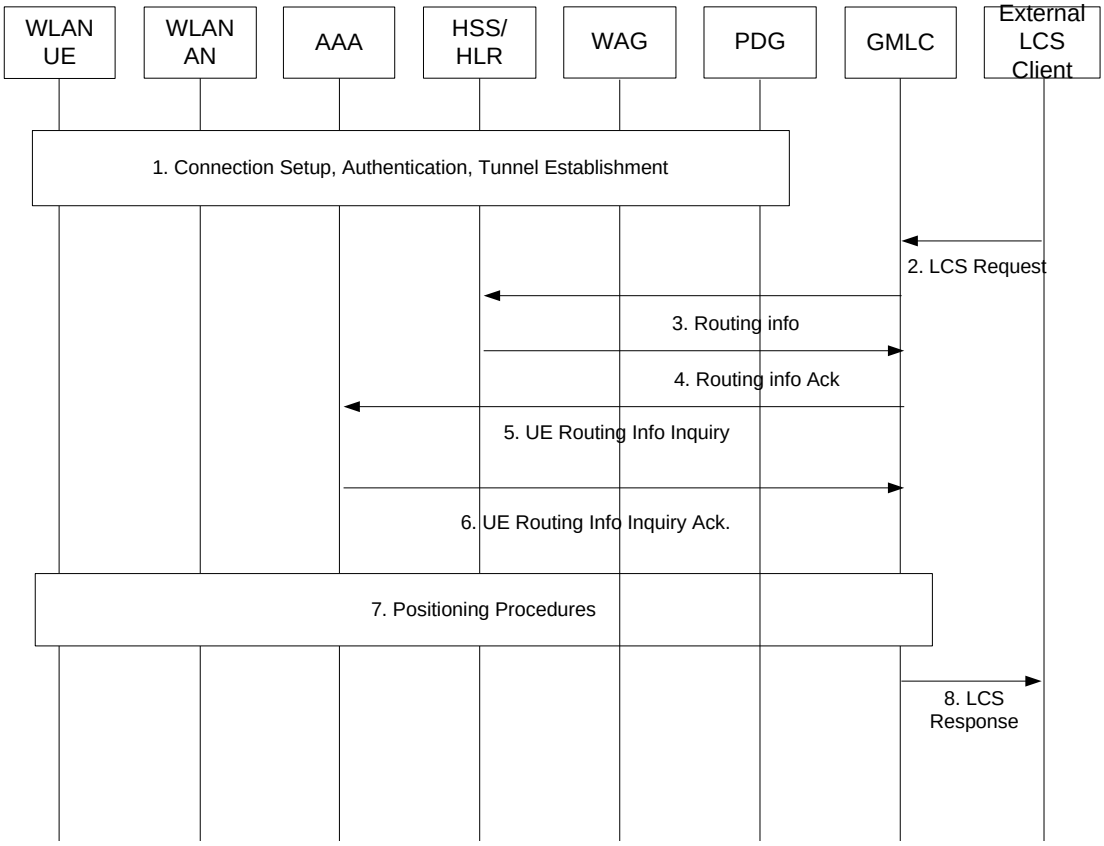


Figure 7.1: IW-MT-LR in I-WLAN

NOTE 1: Even though Figure 7.1 does not specify the specific services with IW-MT-LR, this flow can be applicable for both immediate and triggered services (e.g. periodic or change of area event case).

1. A WLAN UE selects a WLAN AN and establishes the WLAN connection and is authenticated in I-WLAN. The WLAN AN may send the current location of WLAN AN to the WLAN UE. The WLAN AN may send its location to the AAA. The tunnel may be established with between WLAN UE and one of PDGs in PLMN.

2. An external LCS client sends the LCS request to the GMLC. An external LCS client requests the current location, e.g. immediate location request, from a GMLC. The LCS Client may also request a triggered location request, e.g. periodic or change of area event. The GMLC verifies the identity of the LCS client and its subscription to the LCS service requested and derives the MSISDN or IMSI or pseudonym of the target UE to be located and the LCS QoS from either subscription data or data supplied by the LCS client.

   The LCS request may carry also the Service Identity and the Codeword. The GMLC may verify that the Service Identity received in the LCS request matches one of the service identities allowed for the LCS client. If the service identity does not match one of the service identities for the LCS client, the GMLC shall reject the LCS request. Otherwise, the GMLC can map the received service identity in a corresponding service type.
   If the location request is originated by a Requestor, the Requestor Identity may be added to the LCS service request. The LCS client should authenticate the Requestor Identity but this is outside the scope of this specification. The LCS service request may also contain the type of the Requestor identity if the requestor identity was included.

   The GMLC performs privacy check on the basis of the UE user's privacy profile stored in the GMLC or PPR.

3. Steps 3 and 4 may be skipped if the GMLC already has the address of the AAA server. Steps 3 to 6 may be skipped if the GMLC has alternative access to the UE's IP address (e.g. using dynamic DNS or from a previous interaction with the UE) or is able to instigate step 7 without knowing this address (e.g. using MT-SMS or WAP Push in the case of SUPL). GMLC requests the address of AAA server and WLAN UE capability to the HSS. In this case, the capability information of the WLAN UE refers to capability information of the terminal relevant to positioning such as whether the terminal supports the OMA SUPL (OMA AD SUPL [12], OMA TS ULP [13]) or whether it supports another location procedures.

4. HSS returns the address of AAA server of the target WLAN UE and the capability of the WLAN UE to GMLC.

5. If the target WLAN UE supports the OMA SUPL, GMLC queries AAA to obtain the address of WLAN UE. GMLC may request the location of WLAN UE.

6. If its location is available and the quality of position meets the LCS QoS requested by GMLC, then AAA responds with available location information of the WLAN UE to the GMLC. Otherwise, GMLC retrieves the address of WLAN UE from AAA. If there is no tunnel is available between the PDG and the WLAN UE, the AAA will return an indication that UE is not reachable.

7. GMLC initiates positioning procedure. This may use SUPL procedures based on OMA SUPL (OMA AD SUPL [12], OMA TS ULP [13]) and possibly other mechanisms are FFS. If the tunnel between the WLAN UE and the PDG is available and the GMLC has obtained the UE IP address, GMLC generates an SUPL initiation message, and transmits it to the WLAN UE by using the address of WLAN UE over available IP connection between the WLAN UE and the PDG. If the tunnel between the WLAN UE and the PDG is not available or if the GMLC did not obtain the UE IP address, GMLC sends an SUPL initiation message using the UE IP address if available or by other means (e.g. MT-SMS or WAP Push).

8. The location information obtained will be transferred to external LCS client.

NOTE 2: The GMLC may, as an implementation option, cache the results received in step 4 and/or step 6 in order to avoid further queries when a location request is received for the same target UE at a later time and the AAA server address and/or WLAN UE address, respectively, has not changed.

7.2 IW-MT-LR Procedure without HLR/HSS or AAA Query

Figure 7.2 illustrates current or last known location requests for an emergency services call, where an emergency services client (i.e. a Public Safety Answering Point) requests updated location information for the target UE. In order to support location of emergency calls from UICC-less terminals, TR 23.167 [14] specifies that the IMS core shall push information identifying the terminal to the PSAP and GMLC during establishment of the emergency call.

NOTE 1: In some regions, based on regional specifications, the GMLC may use correlation information that was previously provided to it by the IMS Core to identify the target UE.

The IMS core also sends the correlation information to the PSAP during the call establishment as described in TS 23.167 [14]. Using the correlation key the PSAP may request the initial or updated location information from the GMLC. The management of this regional correlation information (e.g. ESQK in North America) and support of the Le interface to the external LCS Client may be handled by a separate functional entity from the GMLC - e.g. an RDF as defined in TS 23.167 [14].

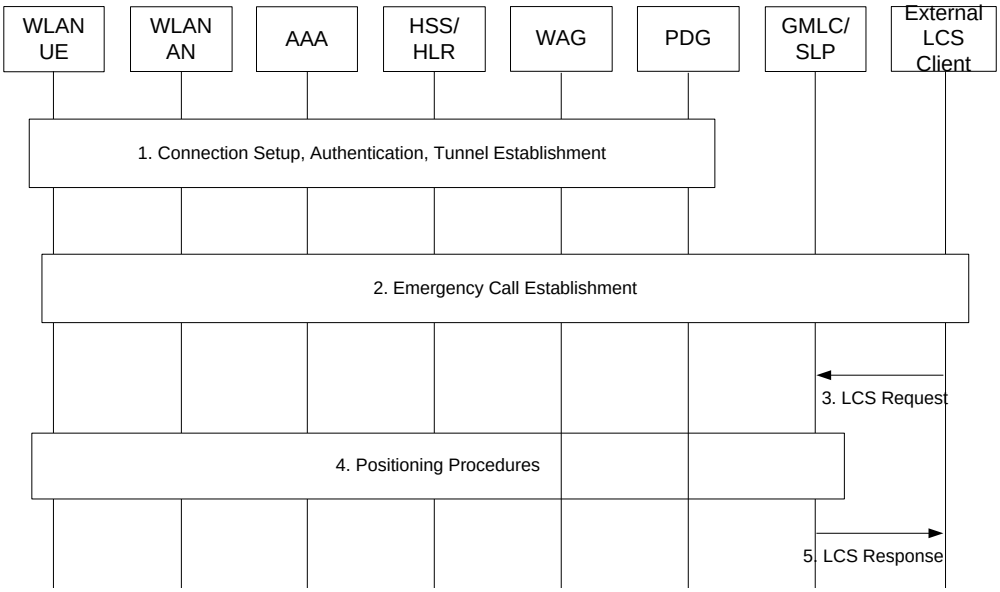


Figure 7.2: IW-MT-LR without an HLR/HSS or AAA Query

1. The WLAN UE selects a WLAN AN and establishes the WLAN connection and may be authenticated in I-WLAN. The tunnel is established between the WLAN UE and a PDG in PLMN.

2. The WLAN UE establishes an emergency services call as described in TS 23.167 [14]. The UE determines its own location if possible. The UE may include the identifier of access node (e.g., MAC address of the AP), if available, as location identifier in the session request and possibly other readily available location information, e.g. GPS based coordinates or the street address of the UE or the AP as provided by the user of the UE. If the UE is not able to determine its own location, the UE may, if capable, request the location information from the IP-CAN or SLP. The case when the UE requests its own location information or enhanced location information from the SLP using OMA-SUPL is described in clause 7.3. The IP-CAN may return a representation of the location information to the UE. During this step, the IMS core may push the WLAN UE's identification and the location information provided by the UE to the LRF (GMLC) along with correlation information, if applicable. The GMLC may record this information but in some regions only for the duration of the call as the case may be. The correlation information may be regionally specific (e.g. as is the case for support of location for an emergency call in the CS domain in TS 23.271 [4]). The IMS core shall also send the correlation information to the PSAP/ emergency centre during the call establishment as specified in TS 23.167 [14].

NOTE 2: The mechanism used by the UE to obtain location information from the I-WLAN IP-CAN is out of scope. One method that could be used is the mechanism defined by IEEE 802.11k Task Group for carrying location information (per RFC 3825) from one IEEE 802.11 station/AP to another IEEE 802.11 station/AP.

3. An external LCS client associated with the emergency centre PSAP sends a location request to the GMLC for the initial location or an updated location for the WLAN UE. The request may include the address and the identification of the WLAN UE and in some regions may include correlation information that enables the GMLC to associate the request with the information stored in step 2.

4. If initial location was requested the procedure continues from step 5. If updated location was requested the GMLC initiates a positioning procedure where either the UE or GMLC determines the position of the UE. GMLC/SLP may request the UE to establish a so called user plane connection with the GMLC/SLP and use the OMA SUPL mechanism specified by OMA (OMA AD SUPL [12], OMA TS ULP [13]) to transport location related assistance data and location information between the UE and GMLC/SLP. Other mechanisms are FFS. The UE may send the identifier of the access node (e.g., MAC address of the AP) to the GMLC and GMLC,

possibly using an external database, maps this location identifier to the corresponding geographical information, e.g. coordinates or street address. GMLC may return this geographical information to the UE.

NOTE 3: The location information obtained based on the mapping of an identifier of access node (e.g. MAC address of the AP) to location information stored in a database may not be correct, e.g., the location of the AP might be changed without any updates to the database.

5. GMLC sends the initial location information, if so requested, or the updated location information obtained in step 4 to the external LCS client.

7.3 WLAN UE Originated Procedure in I-WLAN

Figure 7.3 describes the MO-LR procedure for LCS for I-WLAN.

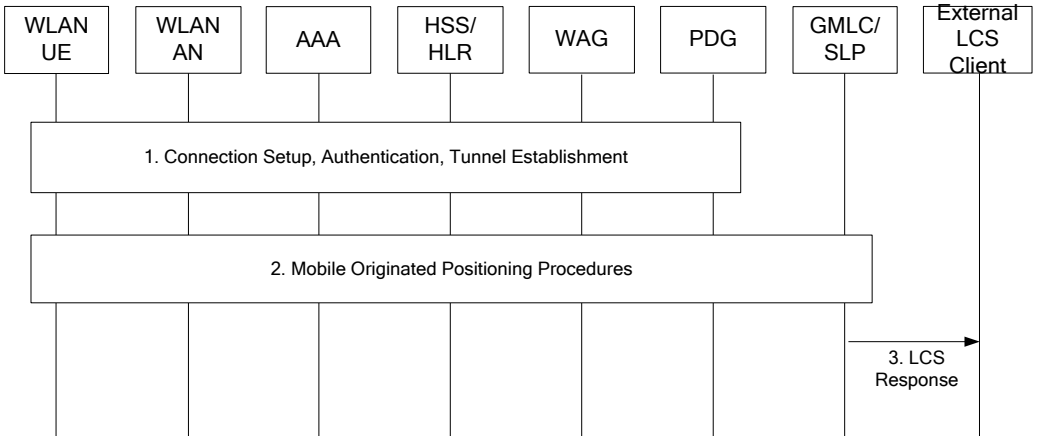


Figure 7.3: WLAN UE Originated Procedure in I-WLAN

1. The WLAN UE selects a WLAN AN and establishes the WLAN connection and is authenticated in I-WLAN. The tunnel is established with between WLAN UE and one of PDGs in PLMN.

2. WLAN UE initiates positioning procedure by establishing a so called user plane connection with the GMLC/SLP and may use the OMA SUPL mechanism specified by OMA (OMA AD SUPL [12], OMA TS ULP [13]) to transport location related assistance data and location information between the UE and GMLC/SLP. Other mechanisms are FFS. The UE may receive assistance data and determine its own location and send its location information to the GMLC/SLP or the UE sends measurement results to the GMLC/SLP. In case GMLC/SLP determines the location of the UE, the GMLC/SLP shall send the location information to the WLAN UE. The UE may also send the identifier of the access node (e.g., MAC address of the AP) to the GMLC and GMLC, possibly using an external database, maps this location identifier to the corresponding geographical information, e.g. coordinates or street address and returns the result to the UE.

3. The location information obtained is transferred to external LCS client if requested by WLAN UE. The estimated position of a WLAN UE can be stored in the GMLC after WLAN UE originated positioning procedure for future uses subject to the privacy settings of the WLAN UE. If there is an LCS request from an external LCS Client, the stored location information can be delivered to the external LCS client if the stored location information satisfies LCS QoS requested.

Editor's note: Saving the calculated position in the AAA or HLR/HSS for future use is FFS.

8 Conclusion and recommendations

Editor's Note: This section will contain the conclusion, if any, of the study.

Annex A:
Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2005-11	SA2#49	-	-	-	First version created		0.0.0
2006-01	SA2#49	-	-	-	Updated based on the contributions S2-052496, S2-052798, S2-052498 and S2-052499.	0.0.0	0.1.0
2006-02	SA2#51	-	-	-	Updated based on the contributions S2-060623, S2-060627, S2-061044, S2-061045, S2-061046, S2-061047, S2-061048, S2-061049, S2-061050 and S2-061051	0.1.0	0.2.0
2006-06	SA2#52	-	-	-	Updated based on the contributions S2-061297, S2-061298, S2-061877, S2-061878, S2-061875, S2-061950, S2-061881, and S2-061953	0.2.0	0.3.0
2006-09	SA2#54	-	-	-	Updated based on the contributions S2-063367, S2-063368, and S2-063369	0.3.0	0.4.0
2006-09	SP-33	SP-060589	-	-	Updated editorially by MCC for presentation to TSG SA#33 for information	0.4.0	1.0.0