

Network Provided User Location Information reporting extensions over S2b interface

ePDG supports Network Provided User Location Information reporting extensions over S2b interface.

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Feature Description

P-CSCF receives location information from the network when an IMS session is set-up, media is added / modified / removed within a session and when the session is released. This applies to emergency sessions and also to regular sessions set-up over an Untrusted access to EPC. The following IEs are added to the Create Session Request, Create Bearer Response, Update Bearer Response, Modify bearer Request, Delete Session Request and Delete Bearer Response messages over the S2b interface:

- WLAN Location Information
- WLAN Location Timestamp
- UE Local IP address
- UE UDP Port

The Retrieve Location Information flag is also added to the Update Bearer Request message over the S2b interface.

User location Information reporting extensions over S2b interface Supports the following features:

- ePDG provides WLAN Location Information and WLAN Location Timestamp in Create Session request, Create Bearer response, Delete Session request, Delete Bearer response, Update bearer response to PGW on S2b interface.
- ePDG provides UE Local IP/Port in Create Session request, Create Bearer response, Modify Bearer request, Delete Session request, Delete Bearer response, Update bearer response to PGW over S2b interface. UE Port will be included only if NAT is detected between UE and ePDG.
- ePDG processes WLAN Location Information and WLAN Location Timestamp sent by AAA over SWm interface in DEA/AAA messages.

- ePDG deletes stored WLAN Location Information/Timestamp if it doesn't receive same in AAA when AAR was sent with bit set for location retrieval.
- ePDG can trigger AAR towards AAA over SWm interface when it needs updated WLAN location information to be sent towards PGW.

The NPLI (Network Provided Location Information) of an UE in case of a TWAN access

The TWAN reports over S2a TWAN related Access Network Information at PDN connection establishment, at bearer creation / modification / release and at PDN connection release. Such TWAN related Access Network Information may correspond to a "TWAN Identifier" and/or to a UE Time Zone. Same is applicable on S2b interface for WLAN access in untrusted UE attachment on EPC.

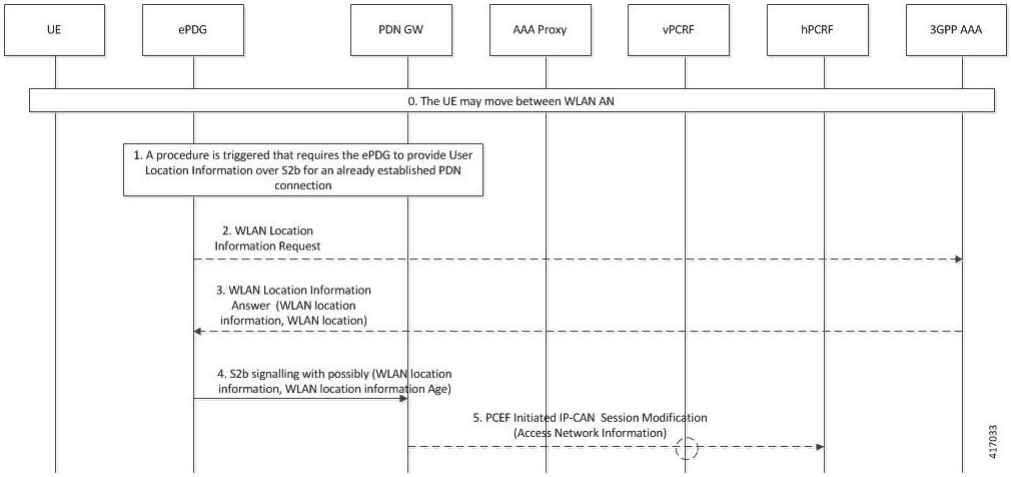
When as part of procedures for Authentication and Authorization on an Access Point based on USIM credentials, the WLAN Access Network provides WLAN Access Network location information to the 3GPP AAA server that it considers as network provided location, the 3GPP AAA server stores this information and provides it to the ePDG at the SWm Authentication and or Authorization procedure or upon request of the ePDG.

This location information is called WLAN Location Information and contains the same information as is contained in the TWAN Identifier. The Age of the WLAN Location information is provided in conjunction with the WLAN Location information.

The ePDG stores WLAN Location Information associated with an UE when it receives WLAN Access Network location information from the 3GPP AAA server. The ePDG removes the stored WLAN Location Information associated with an UE when it receives from the 3GPP AAA server an indication that no WLAN Access Network location information is available for this UE.

The WLAN Location Information information and its Age, when available, are propagated by the ePDG to the PDN(Config driven). This takes place at the UE-initiated connectivity to an initial PDN connection (Attach Procedure), at the UE-initiated connectivity to an additional PDN connection or, as described below, when the ePDG needs to send Network Provided User Location Information about an already established PDN connection.

When the AAA server has sent WLAN Location Information at the UE-initiated connectivity to an initial (Attach Procedure) or additional PDN connection, and when later the ePDG needs to send Network Provided User Location Information towards the PDN GW over S2b, the ePDG may initiate a WLAN Location Information Request to fetch the most up to date WLAN Location Information in conjunction with the age of this Information(CLI controlled).



0. When the 3GPP AAA server detects that the UE has moved between WLAN AN, it locally updates or removes the WLAN Location information and its Age it stores for the UE.

1. A procedure is triggered that requires the ePDG to provide Network Provided User Location Information over S2b for an already established PDN connection. The corresponding procedures are:
   - UE/ePDG-initiated Detach Procedure and UE-Requested PDN Disconnection with GTP on S2b.<Delete Session Request>
   - PDN GW initiated Resource Allocation Deactivation with GTP on S2b.<Delete Bearer Response>
   - Dedicated S2b bearer activation with GTP on S2b.<Create Bearer Response>
   - S2b bearer modification with GTP on S2b.<Update Bearer Response>
2. When the AAA server has sent WLAN Location Information at the set-up of a SWm session and the ePDG has detected a change of the outer IP address of the UE, the ePDG initiates a WLAN Location Information Request towards the 3GPP AAA server by sending AAR message with "WLAN-Location-Info-Request" bit set.
3. The 3GPP AAA server provides a WLAN Location Information Answer that may contain WLAN location information and WLAN location information Age or an indication that no WLAN location information is available. The ePDG replaces any WLAN location information and WLAN location information Age it may have stored beforehand by the information received from the 3GPP AAA server. When the WLAN Location Information Answer contains an indication that no WLAN location information is available, the ePDG removes any WLAN location information and WLAN location information Age it may have stored beforehand about the UE.
4. The ePDG issues S2b signalling with Network Provided User Location Information. The Network Provided User Location Information includes UE local IP address and optionally UDP source port number (if NAT is detected). The Network Provided User Location Information includes WLAN Location Information (and its age) only when the ePDG has such information currently available about the UE. When the PDN GW receives no WLAN Location Information from the ePDG it will delete any such information it may have stored for the PDN connection.
5. If requested by the PCRF the PDN GW forwards to the PCRF following information extracted from Network Provided User Location Information it may have received from the ePDG:
   - The UE local IP address
   - WLAN location information in conjunction with the Age of this information

     When the PCRF receives no WLAN location information from the PDN GW within Network Provided User Location Information the WLAN location information is considered as not any longer valid.

WLAN location support in initial attach: Create Session Request

If NPLI configuration enabled and AAA has provided, WLAN information in DEA during initial attach, ePDG will update same in CSR towards ePDG.

WLAN location support during other S2b procedure

This section describes producers like Create Bearer Response, Delete Bearer Response, Delete Session Request.

There are three scenarios:

1. If WLAN Location Information/Timestamp is available at ePDG, it will send the same in this messages. If the last updated WLAN info received from AAA is still present and there is no change in UE IP/Port, ePDG will send last received WLAN info towards PGW in procedure like Create Bearer Response, Delete Bearer Response, Delete Session Response if NPLI config is enabled.
2. If there is a change in UE Local IP/Port (Mobike triggered procedure) from last updated WLAN info and the NPLI configuration is enabled and the configuration to take the latest WLAN info from AAA is also enabled, ePDG will trigger AAR and get the updated WLAN info from 3GPP-AAA-Server and now this new updated info will be sent in any of above message (Create Bearer Response, Delete Bearer Response, Delete Session Request) on S2b interface.
3. If no WLAN information present, none will sent in any of above message.

WLAN location support during Update bearer request/response

Update bearer response will have Location information. If request has " Retrieve Location bi t " set, it will be treated as specific request for getting WLAN Location information and ePDG. If it doesn't have same, it will still send UE Local IP/Port.

Exchange will be treated as success even if no WLAN info is available from AAA Server. With respect to triggering AAR towards AAA, ePDG will check if bit is set and Mobike has happened before triggering AAR. In case either bit is not set or Mobike has not happened, AAR will not be triggered.

UE local IP change(Mobike)

When ePDG detects UE IP/Port change in case of Mobike, it will trigger Modify Bearer request (MBR) with updated UE IP/port included. Triggering MBR on UE IP change will be driven by a new configuration under call-control-profile.



Note Refer section 7.2.7 of 3gpp specs 29.274 d50 for additional information.



Important Modify Bearer Request is triggered only if Mobike is enabled. i.e. IP address/ port is being updated by Update SA address request. IP address change with NAT reboot will not trigger Modify Bearer Request.

Following two IEs are sent in Modify Bearer request.

Information elements	IE Type
UE Local IP Address	IP Address
UE UDP Port	Port Number

Assumptions and Limitations

- If NPLI configuration is enabled and WLAN Location Information not received from AAA, ePDG will not send the same in S2b messages.
- If UBR has bit set, ePDG will respond with UE Local IP/Port and WLAN info. In case WLAN info is not available, ePDG will still respond IP/Port and treat exchange as sucess.

Configuring NPLI e2e VoWiFi on ePDG and PGW

A new keyword " **wlan-location-info-timestamp** " introduced as part of PLI e2e for VoWiFi on ePDG and PGW. Use the following configuration to configure PLI e2e for VoWiFi on ePDG and PGW.

```
config
       call-control-profile  ccp1
            epdg-s2b-gtpv2 send wlan-location-info-timestamp
          end
```

A new keyword " **message** " introduced as part of PLI e2e for VoWiFi on ePDG and PGW. Use the following configuration to configure PLI e2e for VoWiFi on ePDG and PGW.

```
config
       call-control-profile  ccp1
             epdg-swm send message aar trigger location-retrieval
          end
```

A new keyword " **mobike** " introduced as part of PLI e2e for VoWiFi on ePDG and PGW. Use the following configuration to configure PLI e2e for VoWiFi on ePDG and PGW.

```
config
       call-control-profile  ccp1
              epdg-s2b-gtpv2 send message mbr trigger mobike
          end
```

Performance Indicator Changes

Below are the show commands outputs added as part of this feature to support Sending SWm 3GPP AAA FQDN Address in CSReq

Show Configuration

call-control-profile *ccp_name*

- epdg-s2b-gtpv2 send aaa-server-id

When CLI is disabled, with "*remove epdg-s2b-gtpv2 send aaa-server-id*" Show commands outputs added as part of this feature for "*show configuration verbose*":

- remove epdg-s2b-gtpv2 send aaa-server-id

Show commands outputs added for "*show call-control-profile full {all | name <>}*" if enabled :

- Sending AAA Origin-host and origin-realm

Show commands outputs added for "*show call-control-profile full {all | name <>}*" if disabled:

- Sending AAA Origin-host and origin-realm