3GPP TSG SA SA Meeting #24
Seoul, Korea, 7-10 June 2004

SP-040454

CR-Form-v7

CHANGE REQUEST

⌘ **23.234** **CR** **053** ⌘ **rev** **2** ⌘ Current version: **6.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Merge of approved CR's in TS 23.234, Annex F
Source:	⌘	Orange, NTT DoCoMo, T-Mobile
Work item code:	⌘	WLAN
Date:	⌘	08/06/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Merge of CR no 9r3, 26r4, 40r2, 42r1 towards TS 23.234. Additional clarifications were also needed on the NSAPI allocation.
Summary of change:	⌘	Merge of CR no 9r3, 26r4, 40r2, 42r1 towards TS 23.234. Additional clarifications were also made on NSAPI allocation.
Consequences if not approved:	⌘	Agreed CR's cannot be implemented correctly.

Clauses affected:	⌘	F1, F2, F3, F4, F5

		Y	N			
Other specs affected:	⌘		X	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

****** First change ******

6.2.6 Packet Data Gateway

The Packet Data Gateway applies to scenario-3.

3GPP PS based services (Scenario 3) are accessed via a Packet Data Gateway. 3GPP PS based services may be accessed via a Packet Data Gateway in the user's Home Network or a PDG in the selected VPLMN. The process of authorisation and service selection (e.g. W-APN selection) and subscription checking determines whether a service shall be provided by the home network or by the visited network. The resolution of the IP address of the Packet Data Gateway providing access to the selected service will be performed in the PLMN functioning as the home network (in the VPLMN or HPLMN).

Successful activation of a selected service results in:

- Determination of the Packet Data Gateway IP address used by the WLAN UE;
- Allocation of a WLAN UE's remote IP address to the WLAN UE (if one is not already allocated);
- Registration of the WLAN UE's local IP address with the Packet Data Gateway and binding of this address with the WLAN UE's remote IP address.

The Packet Data Gateway:

- Contains routeing information for WLAN-3G connected users;
- Routes the packet data received from/sent to the PDN to/from the WLAN-3G connected user;
- Performs address translation and mapping;
- Performs de-capsulation and encapsulation;
- accepts or rejects the requested W-APN according to the decision made by the 3GPP AAA Server;
- redirects the tunnel establishment request towards another PDG if this is indicated to be done by the 3GPP AAA Server

Allows allocation of the WLAN UE's remote IP address;

- Relays the WLAN UE's remote IP address allocated by an external IP network to the WLAN UE, when external IP network address allocation is used.
- Performs registration of the WLAN UE's local IP address and binding of this address with the WLAN UE's remote IP address;
- Provides procedures for unbinding a WLAN UE's local IP address with the WLAN UE's remote IP address;
- Provides procedures for authentication and prevention of hijacking (i.e. ensuring the validity of the WLAN UE initiating any binding of the WLAN UE's local IP address with the WLAN UE's remote IP address, unbinding etc.)
- May filter out unauthorised or unsolicited traffic with packet filtering functions. All types of message screening are left to the operators' control, e.g. by use of Internet firewalls.
- Generates per user charging information.
- Generates charging information related to user data traffic for offline and online charging purposes.
- May apply IP flow based bearer level charging [13], e.g. in order to differentiate or suppress WLAN bearer charging for 3GPP PS based services.
- Performs the functions of Service-based Local Policy Enforcement Point (controls the quality of service that is provided to a set of IP flow as defined by a packet classifier, control admission based on policy that is applied to

the IP bearers associated with the flow, and configuration of the packet handling and "gating" functionality in the user plane.)

- Communicates with Policy Decision Function (PDF) to allow service-based local policy and QoS inter-working information to be "pushed" by the PDF or to be requested by the PDG. This communication also provides information to support the following functions in the PDG:
  - Control of Diffserv inter-working;
  - Control of RSVP admission control and inter-working;
  - Control of "gating" function in PDG;
  - WLAN bearer authorization;
  - QoS charging related function.

Annex F describes how PDG functionality can be provided by re-useing existing unmodified GGSN functionality.

****** Second change ******

Annex F (~~informative~~normative): Information on re-using the GGSN to implement the PDG function~~via the Gn' reference point~~

This annex does not introduce new normative requirements for the PDG.

F.1 Introduction

This section provides information on how to re-use existing GGSN deployments to implement the PDG functionality via using a subset of the Gn reference point (denoted here as Gn'). The Gn' reference point provides ~~an optional~~ means where GPRS mobile operators can reuse existing infrastructure and functionality for a user accessing from a WLAN UE. By using this existing standardized ~~standardizing this~~ reference point, interoperability ~~between a decomposed Packet Data Gateways (PDG) and~~ towards the Gateway GPRS Support Nodes (GGSN) is assured. ~~Both the decomposed PDG and the GGSN shall be located in the same PLMN, i.e. HPLMN or VPLMN. The use of Gn' reference point in an operator network is therefore independent of other operators networks. Gn' reference point will provide reuse of GPRS infrastructure. The decomposition of PDG functionality~~ Such a PDG implementation allows ~~to~~ re-use of existing GGSN functionality without upgrading GGSNs. For example, GGSN functions, which are used in this case are:

- Charging Gateway interfaces;
- IP address allocation;
- Authentication in external networks;
- Single access to 3GPP PS domain services.

Traffic Plane Functionality in the GGSN for online and offline service data flow charging (IP ~~bearer~~ flow level bearer charging), introduced in Release 6 may also be re-used ~~(although this function could equally be provided at the PDG)~~.

The following figure depicts a PDG implementation that re-uses GGSN functionality. It shall be noted that only a subset of the GGSN is reused for this purpose.

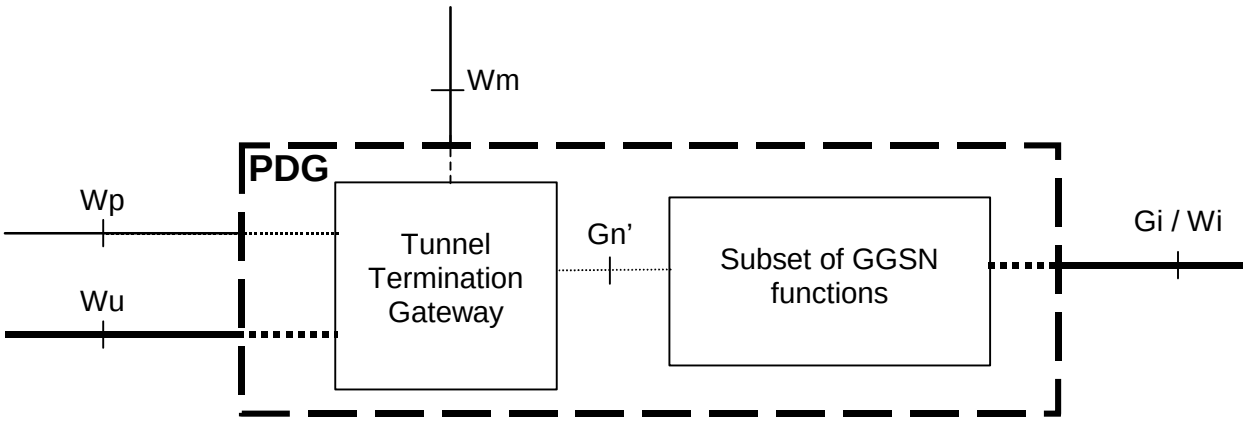

Figure F.1: PDG implementation re-using GGSN functionality

The PDG functionality described in this specification may be implemented using the architecture described above in Figure F.1. In case this implementation is applied, the TTG and GGSN parts of the PDG shall be in the same PLMN. This type of PDG implementation shall remain transparent to the other functional elements of the network.

F.2 Mapping between E2E tunnel and GTP tunnel

The end-to-end tunnel between the WLAN UE and the PDG is setup according to the procedure described in ~~TS 23.234~~ this specification. In a configuration when the Gn' reference point is used, then the end-to-end tunnel setup is terminated by the TTG of the PDG, and ~~with a decomposed PDG, then this procedure triggers~~ the setup of ~~the~~ a GTP tunnel is triggered towards the GGSN part of the PDG. ~~between the decomposed PDG and the GGSN.~~ Each end-to-end tunnel is mapped one-to-one to a GTP tunnel. The GTP tunnel between the ~~decomposed PDG~~ TTG part and the GGSN part of the PDG is established using the two messages Create PDP Context Request and Create PDP Context Response. A GTP tunnel is identified in each node with a TEID (Tunnel End-point Identifier - an integer), an IP address and a UDP port.

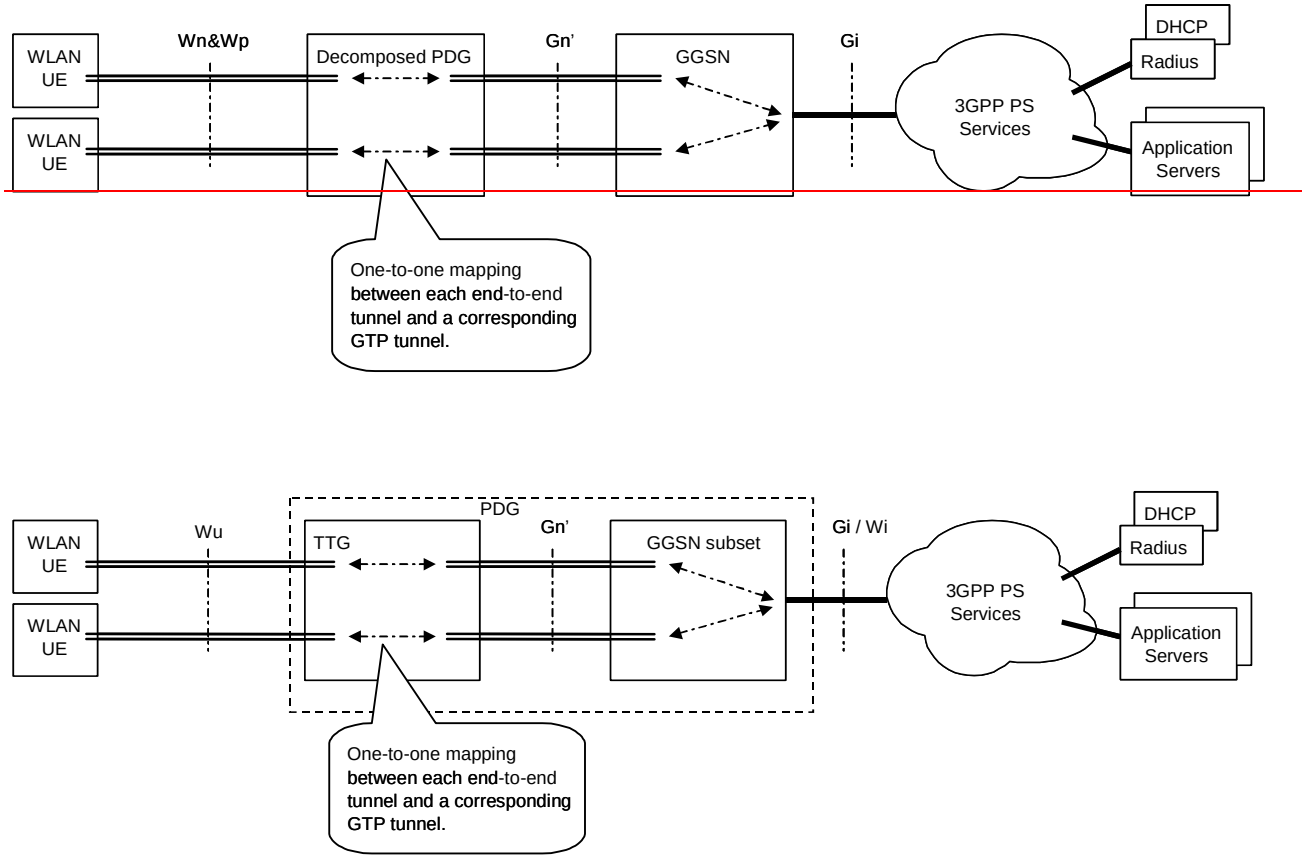

Figure F.2: Mapping between E2E tunnel and GTP tunnel

In GPRS different quality-of-service can be assigned to GTP tunnels. WLAN support of layer 2 QoS is being addressed by the IEEE 802.11e study group. Work specifying the interactions with signalling techniques to support the different quality of service techniques needs to be defined. It is unclear at this time how to have a QoS mapping from IEEE 802.11e to IP and hence to the GTP tunnel.

The W-APN provided over the end-to-end tunnel shall be forwarded in the Create PDP Context Request message to GGSN to select external network e.g. PLMN service network, a corporate intranet or the Internet. Internet access can be provided directly from the WLAN Access Network using ~~scenario 2~~for WLAN Direct IP Access, but of course nothing prevents a PLMN operator from providing Internet access as well via Gi interface using ~~scenario 3~~for WLAN 3GPP IP Access. Some mobile operators might have benefits in using one unified access for all kinds of traffic.

The IMSI of the WLAN UE shall be forwarded to GGSN in the Create PDP Context Request message.

For further details on GTP tunnel management please refer to TS 29.060.

F.3 ~~Interworking procedures over~~ Gn' considerations

Editor's note: ~~The interworking procedures over the Gn' reference point should be specified. It is expected that these procedures are a true subset of the Gn reference point procedures.~~The Gn procedures shall comprise a subset of the Gn reference point procedures. There shall be no enhancements to Gn applied.

F.3.0 General

A minimum set of interworking procedures over the Gn' reference point would include the following messages:

- Create PDP Context Request / Response;

- Update PDP Context Request / Response;
- Delete PDP Context Request / Response;
- Error Indication;
- Version Not Supported;
- GTP payload forwarding (specified in 29.060).

Note: The messages above form a true subset of the Gn reference point messages and procedures.

The TTG must be provided with information, e.g. MCC and MNC of the VPLMN, needed to include the RAI Information Element within the messaging to the GGSN to enable simple position based billing and to enable the HPLMN to restrict certain content to those countries depending on that country's legal requirements.

The assignment of the remote IP address should be done from a pool of IP address belonging to the GGSN/RADIUS server or at least "address range coordinated" with those to enable correct routing on Gi. The End-user-address IE must be provided in the Create PDP Context Request. If address assignment is done by the GGSN/RADIUS, the IE shall be empty in the request message (indicating dynamic address assignment by GGSN/RADIUS), which makes the GGSN/RADIUS assign and return an IP address in the Response message.

To support WLAN UEs, which may use GPRS and WLAN access simultaneously, the NSAPI value to use by TTG need either be a value reserved for TTG or an NSAPI value passed from WLAN UE to TTG. In Existing GPRS, the NSAPI is assigned in the UE and is used to distinguish between a UE´s PDP contexts. The NSAPI is an integer value between 5 and 15.

If a certain charging profile should be applied in GGSN the Charging Characteristics IE may be included. In that case this information needs to be available in the TTG. The Charging Characteristics may be used to give special charging for WLAN in the GGSN. The Charging Characteristic is defined per subscriber and is stored in HLR. For GPRS the Charging Characteristic is sent to SGSN at attach and is forwarded to GGSN at PDP context creation. For WLAN interworking, the TTG may for example get this information from HLR via the 3GPP AAA Server.

F.3.1 Interworking procedure over Gn' - Tunnel establishment procedure

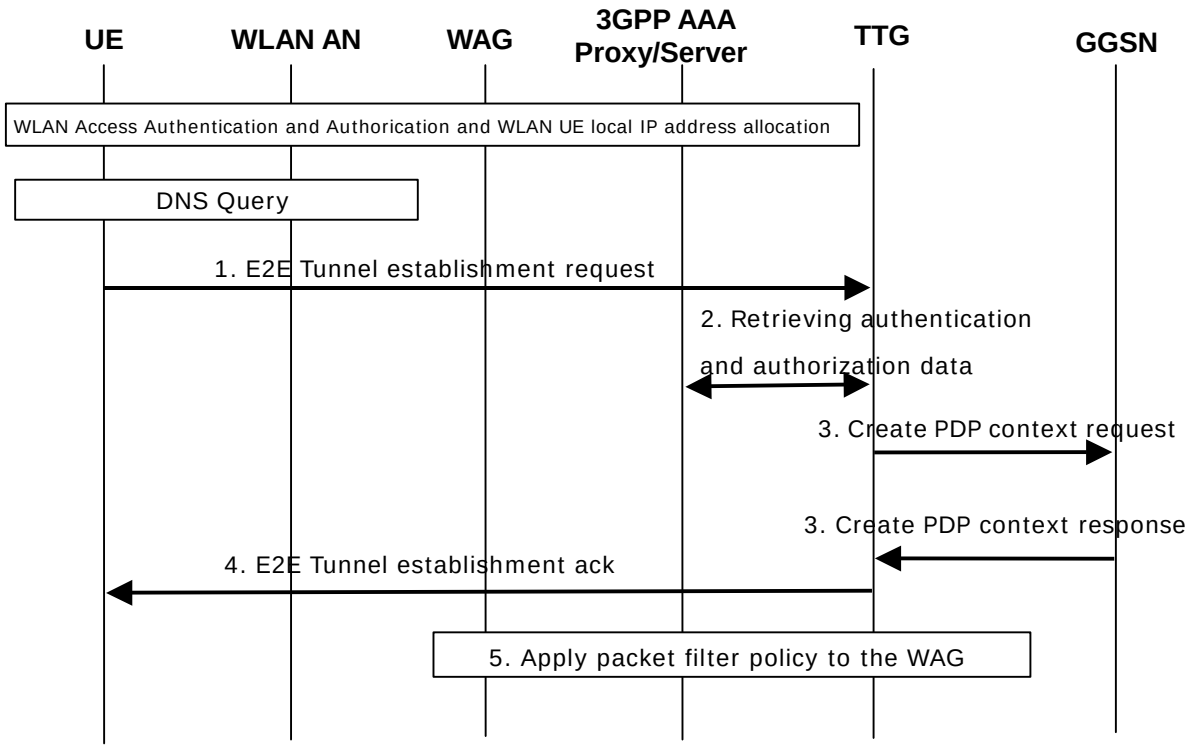

Figure F.3.1: Tunnel establishment procedure

1) The UE performs a DNS query to resolve the W-APN and sends E2E tunnel establishment request (W-APN, user identity) to the TTG (see subclause 7.9).

2) The TTG contacts the 3GPP AAA Server in the HPLMN possibly via the AAA proxy for authorization and authentication of the WLAN UE (see subclause 7.9). Additionally, the TTG retrieves the IMSI, MSISDN, and serving network identity from the AAA server.

3) The TTG performs PDP Context Activation procedure towards the GGSN by using Create PDP Context Request message and Create PDP Context Response message (see TS 23.060 [7]).

4) The TTG returns E2E tunnel establishment acknowledgement (remote IP address) to the WLAN UE.

5) The TTG provides filtering information to the WAG (see subclause 7.9).

Editor's Note : it is ffs how the NSAPI value is allocated when the tunnel establishment procedure over Gn' is performed.

F.3.2 Interworking procedure over Gn' - Tunnel disconnection procedure

F.3.2.1 UE initiated tunnel disconnection

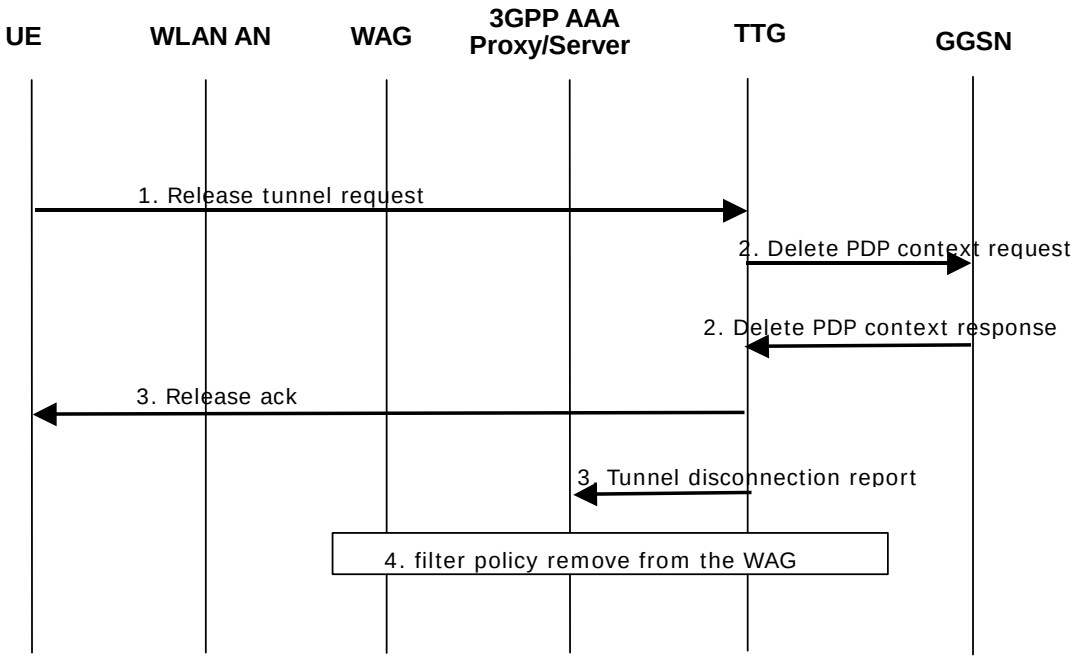

Figure F.3.2.1: UE initiated tunnel disconnection procedure

1) The WLAN UE determines to release the tunnel and sends a Release tunnel request to the TTG (see subclause 7.10.1).

2) Upon receiving the Release tunnel request, the TTG performs PDP Context Deactivation procedure towards the GGSN by using Delete PDP Context Request message and Delete PDP Context Response message (see TS 23.060 [7]).

3) The TTG sends a Release acknowledgement to the WLAN UE and Tunnel disconnection report to the 3GPP AAA server (see subclause 7.10.1).

4) Upon receiving the Tunnel disconnection report, the 3GPP AAA server removes the filtering policy from the WAG (see subclause 7.10.1).

F.3.2.2 Network initiated tunnel disconnection

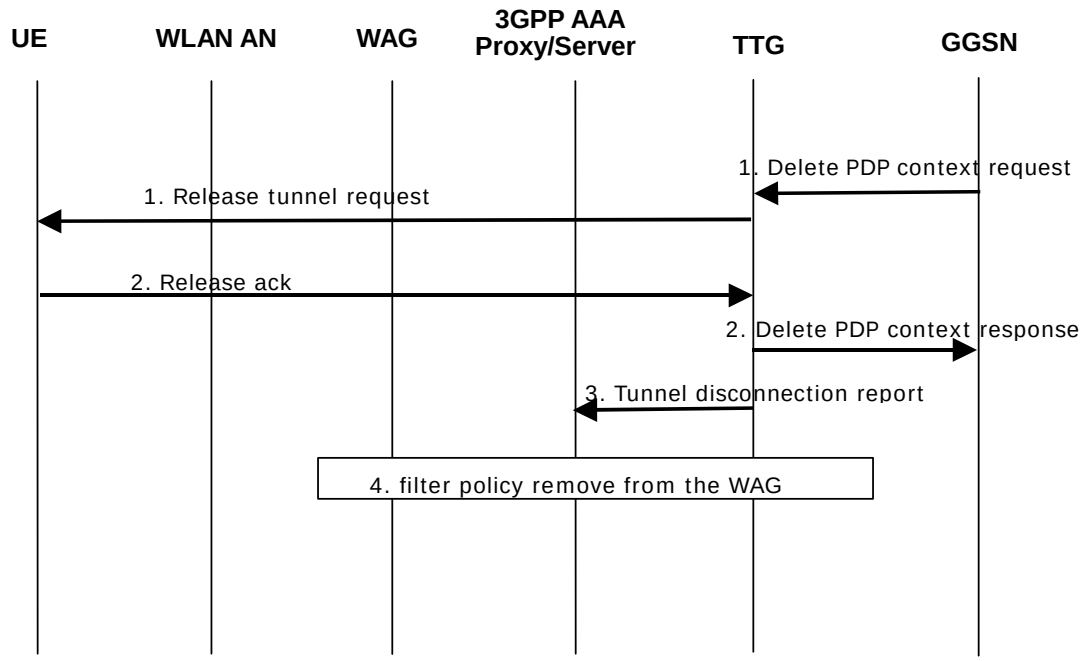

Figure F.3.2.2: Network initiated tunnel disconnection procedure

1) The GGSN determines to release the tunnel and sends Delete PDP Context Request message towards the TTG (see TS 23.060 [7]). The TTG then sends a Release tunnel request to the WLAN UE (see subclause 7.10.2).

2) Upon receiving the Release tunnel request, the WLAN UE sends a Release acknowledgement to the TTG (see subclause 7.10.2). The TTG sends a Delete PDP Context Response message to the GGSN (see TS 23.060 [7]).

3) The TTG sends a Tunnel disconnection report to the 3GPP AAA server (see subclause 7.10.2).

4) Upon receiving the Tunnel disconnection report, the 3GPP AAA server removes the filtering policy from the WAG (see subclause 7.10.2).

NOTE: Network initiated tunnel disconnection procedure may also be triggered by the TTG (e.g. request from AAA server).

F.4 Issues to investigate for Gn' reference point

Editor's note: This section is expected to be removed once the investigation on the issues listed here has been concluded.

Some issues that needs to be investigated have been identified~~.~~:

~~- Does the Gn' reference point have any impact on the GGSN? This shall be avoided.~~

~~- The Gn' reference point may introduce packet flows of higher bit rates into the GGSN. Does the current GGSN architecture put any unnecessary capacity constraints on these higher bit rate flows?~~

- GTP requires MSISDN. MSISDN might be a requirement for WLAN for charging or other reasons, but if it doesn't this is an issue. ~~MSISDN is no requirement for WLAN UE's. Is this an issue for GGSN or the GTP protocol?~~

~~- Is the UMTS Bearer Level QoS sufficient to support WLAN traffic?~~

~~- If parallel WLAN and GPRS sessions are allowed (FFS), the GGSN will serve several "SGSN's" i.e. one GPRS SGSN and one WLAN PDG simultaneously. Is his an issue for the GGSN?~~

~~- If Gn' reference point is used, the charging and service specific interfaces in PDG becomes redundant and needs to be handled in the specification in some way. One alternative is to make them conditional, and specify them to be not used if the Gn' reference point is present. Another alternative is to make the Gn' reference point mandatory, whereas the PDG charging and service specific interfaces don't need to be specified at all.~~

~~- As an alternative to reusing GPRS charging specifications and infrastructure, it has been proposed to e.g. co-locate the PDG with the GGSN. A mandatory Gn' reference point can however be a "specification tool", i.e. a way to describe, such an arrangement. This would provide PDG and GGSN co-location with a minimum of impact on existing GGSN specifications. In a PDG & GGSN co-location scenario, the Gn' will stay as a reference point only and never be materialized as an interface. This could be a scenario for future evolvement of the architecture.~~

~~*Editor's note: Functional description of a decomposed PDG is FFS.*~~

F.5 Tunnel Terminating Gateway (TTG) functionality

The functionality of the TTG shall cover all aspects of the PDG that are not covered by the GGSN.

The TTG shall be responsible for allocating NSAPI values before sending the Create PDP Context Request message to the GGSN. Although the TTG acts like the SGSN in terms of GTP tunnel establishment, it also manages NSAPI allocation as WLAN UE's proxy for the purpose of leaving the Gn' based PDG transparent to the WLAN UE.

If the network supports simultaneous GPRS and WLAN connections, the TTG shall ensure that the NSAPI values allocated do not overlap with those used by the UE for GPRS PDP Contexts.

NOTE: This can be achieved by restricting TTG allocated NSAPI values to those which are reserved on the mobile radio layer 3 interface in this case.

The TTG shall reject a tunnel establishment request if all available NSAPI values for this user in this GGSN have already been allocated. However, the TTG should not explicitly indicate the exhaustion of the NSAPI values to the UE in such a case.

NOTE: The mechanism above implies that it may not be possible to deploy distinct TTGs providing service for a single user for W-APNs which are then served from the same GGSNs. For a given user, all tunnels towards W-APNs served from the same GGSNs should be directed to the same TTG; the method by which this will be done is FFS.