

**Title:** Discussion on architecture issues for NSAPI usage on the Gn' interface  
**Source:** Vodafone  
**Document for:** Discussion

## 1 Introduction

3GPP TSG SA WG2 approved a CR to 3GPP TS 23.234 (CR 23.234-40 rev.2 – S2-042221) that details the allocation of NSAPIs where Gn' is employed between the Tunnel Termination Gateway (TTG) and the GGSN for Scenario 3. However, on further investigation, this proposal does not appear to function as desired.

## 2 Issues Identified

### Issue 1 – lack of provision for fail-over/redundancy

The following text is copied from the end of CR 23.234-40 rev.2:

"NOTE: The mechanism above implies that it may not be possible to deploy distinct TTGs providing service for W-APNs which are then served from the same GGSN. That is, for a given user, all tunnels towards W-APNs served from a single GGSN shall be directed to the same TTG."

An issue with this note is linked with an implicit requirement for unique NSAPI values for a subscriber and/or GGSN in the added text:

"The TTG shall reject a tunnel establishment request if all available NSAPI values for the user/GGSN have already been used."

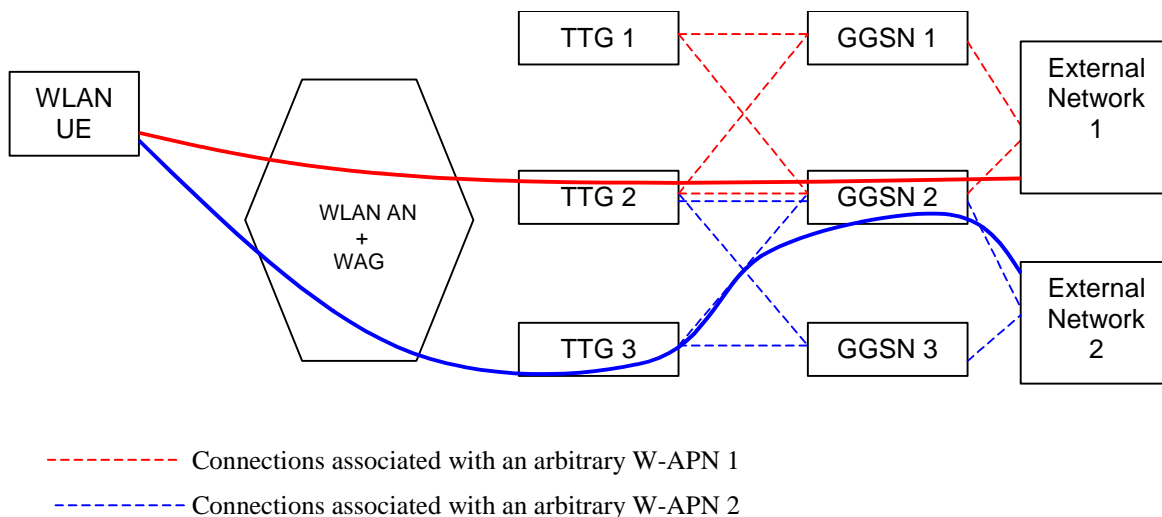
From the sentence above, it is necessary to clarify what the phrase "user/GGSN" means i.e. "user per GGSN", "or user or GGSN"? The use of the forward slash is misleading.

Given the implicit requirement stated above, Vodafone believe that it is insufficient to limit access to a particular W-APN always through one TTG and through one GGSN. For GPRS, APNs are in practice hardly ever homed onto a single GGSN for redundancy/failover reasons and to provide the usual carrier grade quality of 99.999% up-time. This principle should be extended to W-APNs to maintain service stability and high user expectations of the WLAN service. Therefore what is stated in the note quoted at the beginning of this section may cause problems if implemented by an operator.

### Issue 2 – NSAPIs unique on a per user per GGSN basis, or just on a per user basis?

If the requirement is for the NSAPI to be unique per user per GGSN, the same TTG must be mandated to be used for connections to any W-APN, given that W-APN resolution to find a TTG and W-APN resolution to find a GGSN are two different procedures. It is not possible to know which GGSN to connect to until the TTG has performed GGSN discovery (in the same way an SGSN would i.e. by interrogating a DNS server). A WLAN UE therefore knows only the TTG to which it needs to set-up an end-to-end tunnel (Wu) as a result of its W-APN resolution.

The text proposed in the CR allows for the situation depicted below where W-APNs are dual homed (i.e. the same W-APN is provisioned on more than one GGSN and TTG – one as primary and one as secondary) but the primary is different for W-APN 1 and W-APN2. In this situation the TTGs may allocate overlapping NSAPIs to the same GGSN for the same user.



If the requirement is for an NSAPI to be unique just on a per user basis at a particular point in time (as for GPRS), again the same TTTG must be used for all connections to any W-APN as it is the TTTG not the UE (as for GPRS) which allocates NSAPIs. W-APN resolution performed by the (WLAN) UE for different W-APNs may result in the return of different PDG addresses to the WLAN UE and therefore different TTTGs (i.e. to provide for failover/redundancy and also load control. Whether or not W-APNs are homed to different GGSNs, there is still a risk that a TTTG serving a W-APN allocates an already used NSAPI for a connection to another W-APN through a different TTTG/GGSN pair.

The requirement for NSAPI to be unique for a user or GGSN, makes no sense given that this would mean a limitation at the GGSN to only 16 simultaneous connections to 16 or less WLAN UEs (maximum number of different NSAPIs)!

### 3 Proposal/Conclusion

Vodafone do not dispute the need for passing NSAPI towards the GGSN via Gn', but believe the existing text in CR 23.234-40rev2 is insufficient and will cause conflicts for implementors. Also, given the different interpretations of the "user/GGSN" and consequences of each interpretation, it is necessary to clarify what is meant and then find a suitable fix before the CR can be approved.

In general, if the TTTG is to allocate the NSAPI, then the UE should only set up end-to-end tunnels to one TTTG regardless of W-APN used. However, this does not provide for failover/redundancy. Also, by mandating the allocation of NSAPIs at the TTTG and the use of reserved NSAPIs in 3GPP access, it effectively rules out possible "handover" based procedures to provide future support for scenarios 4 and 5 (which as yet, have not been defined).

Therefore, Vodafone propose that CR 23.234-40r2 (S2-042221) be sent back to SA2 for further technical review and discussion to resolve the above discussed open issues.

### 4 References

S2-042221 – CR#40rev2 – NSAPI handling in Gn'