

# The impact of the change of the NSAPI / SAPI /PFI relation during PS Handover on the MS side

TSG GERAN2#21bis

Malta, MT

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Source: Nokia

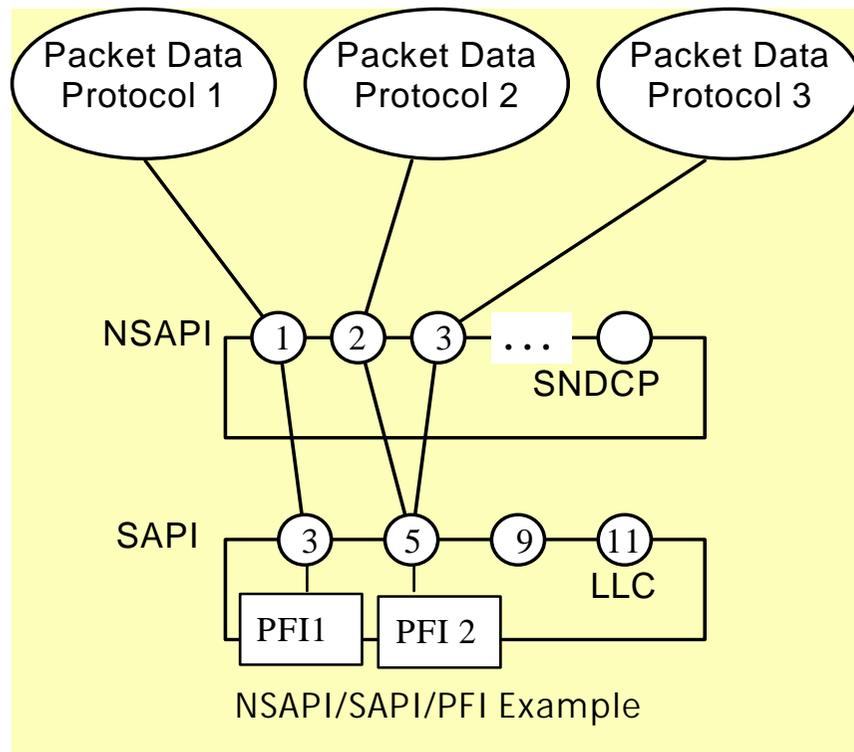
# Introduction

- During PS HO discussion it has been claimed that different vendors SGSNs may not be able to support the same relation of NSAPI to SAPI and the PFI as the old SGSN due to the following:
  - Local SGSN policies
  - No support for the PDP Context aggregation feature
- The change of SAPI and PFI for a certain NSAPI is done by means of the PDP Context Modification procedure, which is to be avoided during PS HO procedure.
- If the SGSN does not accept the SAPI and the PFI used by the old SGSN then 2 options are possible:
  - *The mapping is done by the MS*
  - *The SGSN modifies the PDP Context after the PS HO procedure according to its local policies using legacy procedures*
- The change of SAPI and PFI for a certain NSAPI during PS HO in the MS, leads to complexity in the terminal side
- The modification of PDP Context leads to service interruption

# NSAPI/SAPI/PFI – PDP Context Aggregation in GERAN *A/Gb mode*

PDP Context Aggregation refers to several NSAPI sharing one single SAPI and one PFI:

- SNDCP performs “Multiplexing of N-PDUs from one or several NSAPIs onto one LLC SAPI. NSAPIs that are multiplexed onto the same SAPI shall use the same radio priority level, and traffic class. In case BSS packet flow contexts are created all NSAPIs that are multiplexed onto the same LLC SAPI shall share the same BSS packet flow context.” [TS23.060]



There are four SAPI values defined for user data:

-SAPIs 3, 5, 9, and 11

- Default values for SAPIs 3, 5, 9, and 11 have been chosen to correspond with the four GPRS quality of service delay classes, although there is no fixed relationship between SAPI and delay class.

- The LLC layer parameters for any SAPI can be negotiated to support any QoS profile

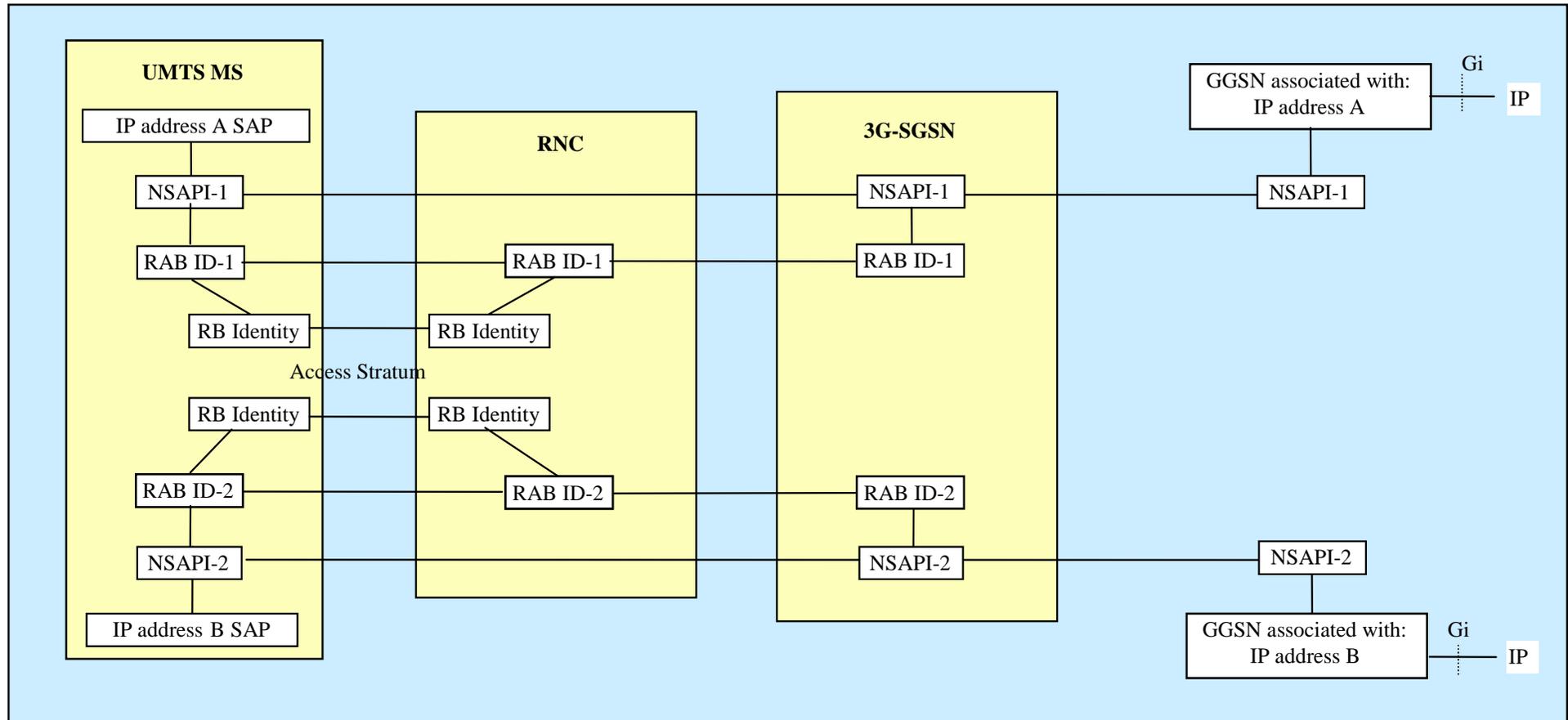
[TS44.064]

-> per MS per QoS class, one SAPI is related to one PFI

-> per MS per QoS class there can be no more than one SAPI utilizing the same PFI

-> per MS there can be several NSAPIs utilizing the same SAPI and the same PFI

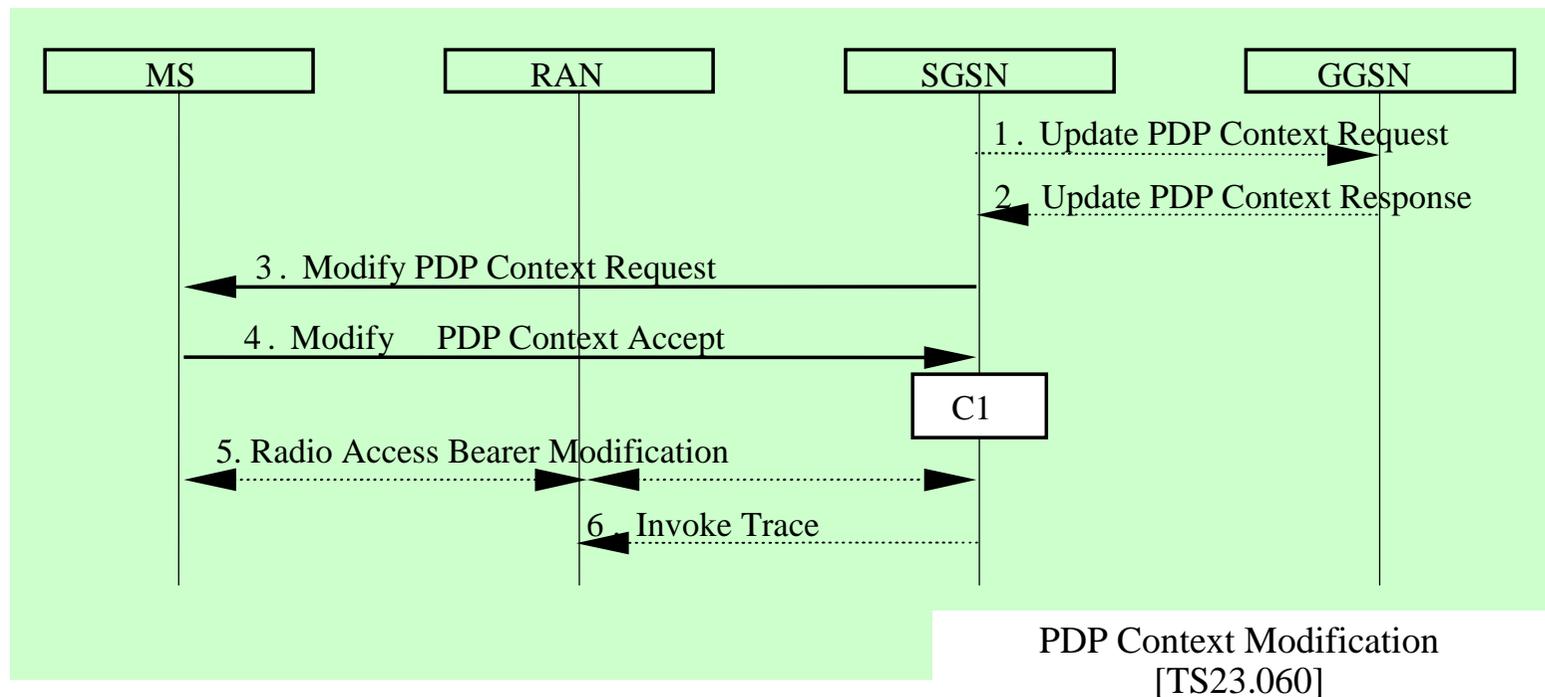
# NSAPI, RB Identity, and RAB ID



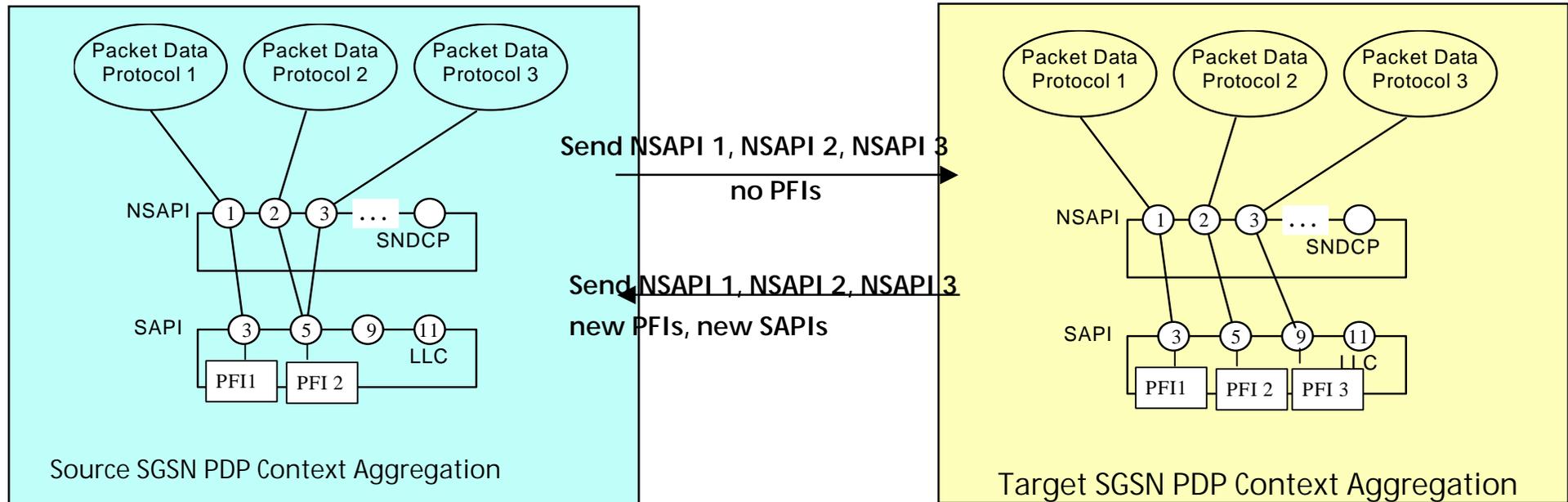
- There is a one-to-one relationship between NSAPI, Radio Access Bearer, and PDP context.
- In the packet domain, there is also a one-to-one relationship with Radio Bearer Identity

# SAPI and PFI change in legacy procedures in GERAN *A/Gb mode* (1)

- SAPI and PFI can be changed only by means of the PDP Context Modification procedure;
- PDP Context Modification Procedure
  - SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and may send a *Modify PDP Context Request (TI, QoS Negotiated, Radio Priority, Packet Flow Id)* message to the MS;
  - The MS acknowledges by returning a *Modify PDP Context Accept message*. If the MS does not accept the new QoS Negotiated it shall instead *de-activate the PDP context* with the PDP Context Deactivation Initiated by the MS procedure;



# Modifying the PDP Context during and after PS Handover



- According to the current specifications there is no indication that NSAPI/SAPI mapping may not be supported by an SGSN
- The assumption "Source SGSN and Target SGSN do not support the same mapping" leads to:
  - Target SGSN is allowed to modify the PDP context, i.e. QoS profile can be renegotiated during the PS Handover;
  - MS may reject the modification and deactivate the PDP context;

• **PDP Context Modification should not be initiated during PS HO**

• **Initiating PDP Context Modification for the real time flow by the SGSN during PS HO will lead to service interruption in data transfer, that will not be tolerable by the real-time services. SGSN may however based on its local policies following the legacy procedures initiate the modification of the PDP Contexts after the PS HO**

# Impact on the terminals if the MS performs the NSAPI/SAPI/PFI mapping

- MS receives the new values in the PS HO Command and applies these values, this results into the following complexity at the terminal side:
  - Impact to MS architecture in handling the XiD negotiation at the SNDSCP/LLC level if the NSAPI/SAPI relation is changing;
  - Session Management settings are to be changed by means of an RLC/MAC control message, which has an impact on the legacy procedures;
  - For the same NSAPI there will be 2 SNDSCP / LLC parameter settings for the duration of the PS Handover, which requires a fine triggering mechanisms for applying the new settings;
  - Relation between the old and new SAPIs and XiD parameters needs to be given to the MS by the SGSN, e.g. for NSAPI 1 replace SAPI 3 with SAPI 5 and then apply the new settings, leading to additional IE in the PS HO Command;
  - Impact on the SNDSCP and LLC protocol functionality at the MS side only, i.e. TS44.064 and TS44.065 need to describe specific SNDSCP /LLC - MS entity based functionality;
  - Failure scenarios due to different aggregation policies in SGSNs in the terminal side are not easily recoverable, e.g. two NSAPI with different QoS profile might end up sharing the same SAPI, PFI in case when one PDP Context has received resources in the target side and the other one did not;

# Conclusions

- Source SGSN shall always send for each NSAPI the related SAPI and PFI whenever available
  - 3G SGSN may not have the SAPI and PFIs to send to the Target SGSN
- Target SGSN shall apply the same SAPI and PFI related to the NSAPI whenever received
  - When no SAPI or PFI is received related to this NSAPI it shall choose its own values based on its local policies
- Applying the same settings from the old SGSN in the new SGSN avoids:
  - Complex terminal handling
  - Modification of the PDP Context that leads to additional delay for the PS HO
- In inter-RAT and inter-mode PS Handover NSAPI/SAPI/PFI and RAB Id relation is done at the MS /UE.
  - Note that in this case the MS does not have any SNDSCP/LLC parameters