

PDP Context Aggregation and NSAPI/SAPI/PFI relation during PS handover

TSG GERAN2#19bis,
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Source: Nokia

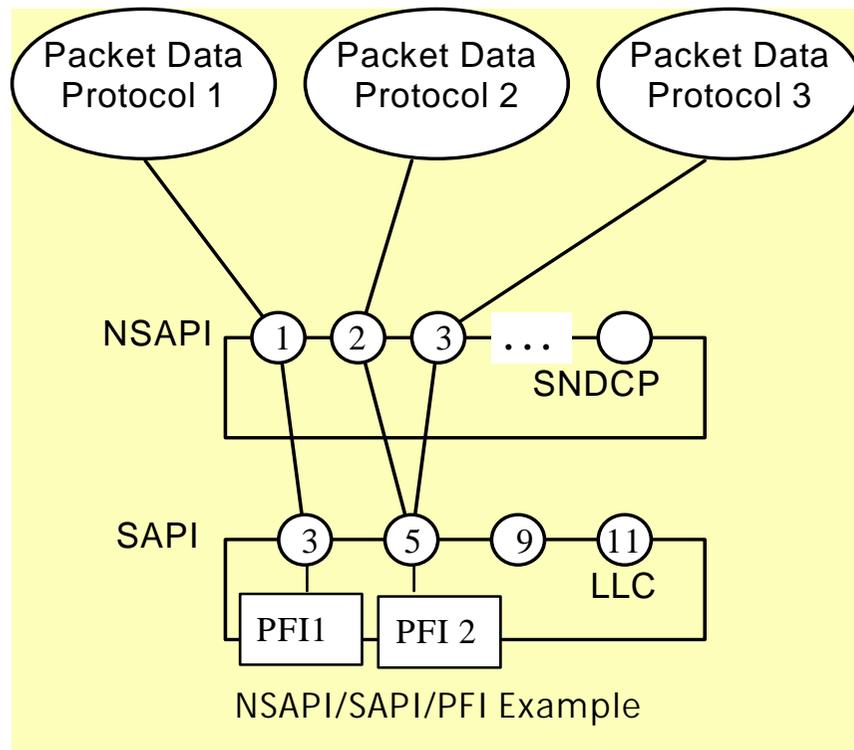
Outline

- NSAPI, SAPI, PFI in *GERAN A/Gb mode*
- NSAPI, RB Identity, and RAB ID in *Iu Mode* (UTRAN, GERAN *Iu mode*)
- PDP context and PFI in *GERAN A/Gb mode*
 - PDP Context Negotiation
 - PDP Context Modification
- PDP context and PFI in PS Handover Discussions
- Conclusion

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, QoS traffic handling priority, 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

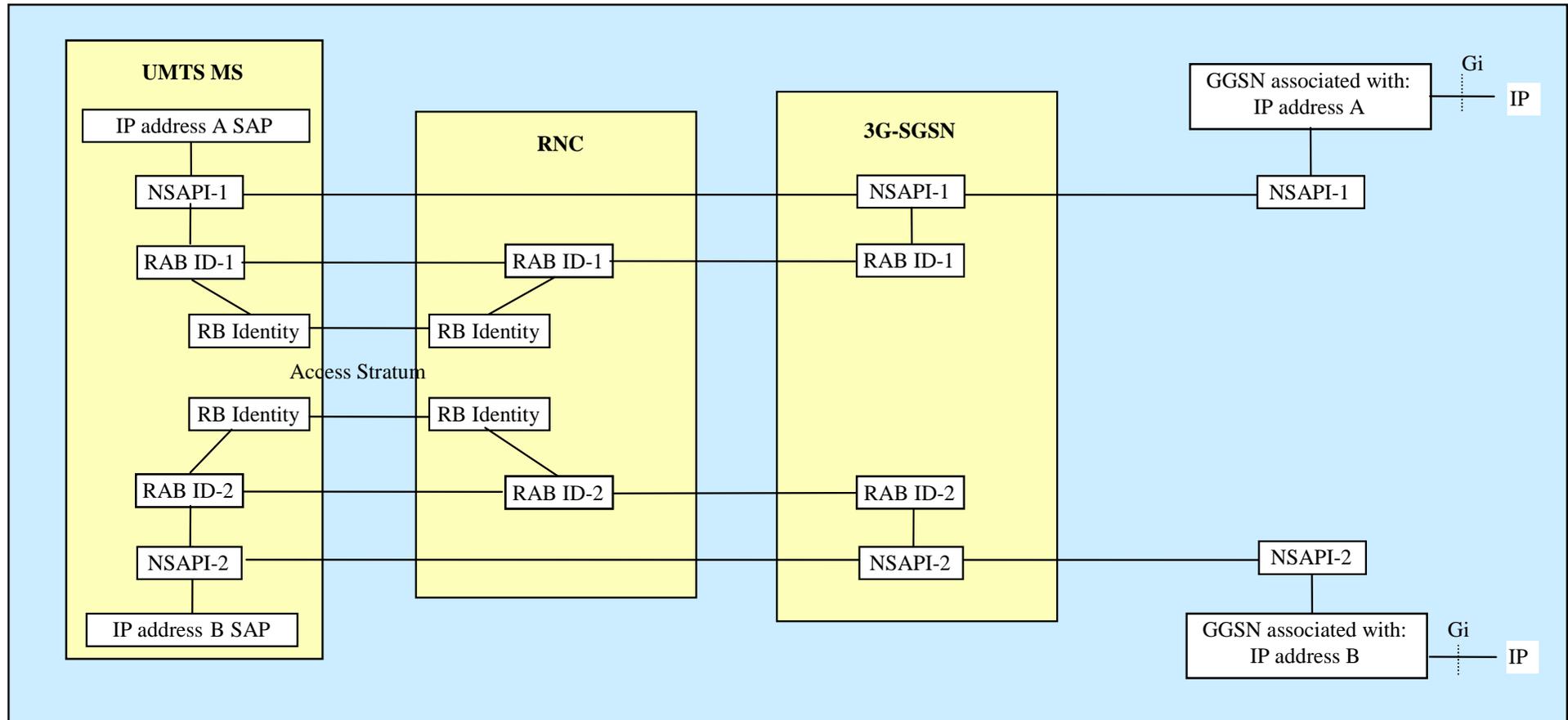
[TS44.064]

-> 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

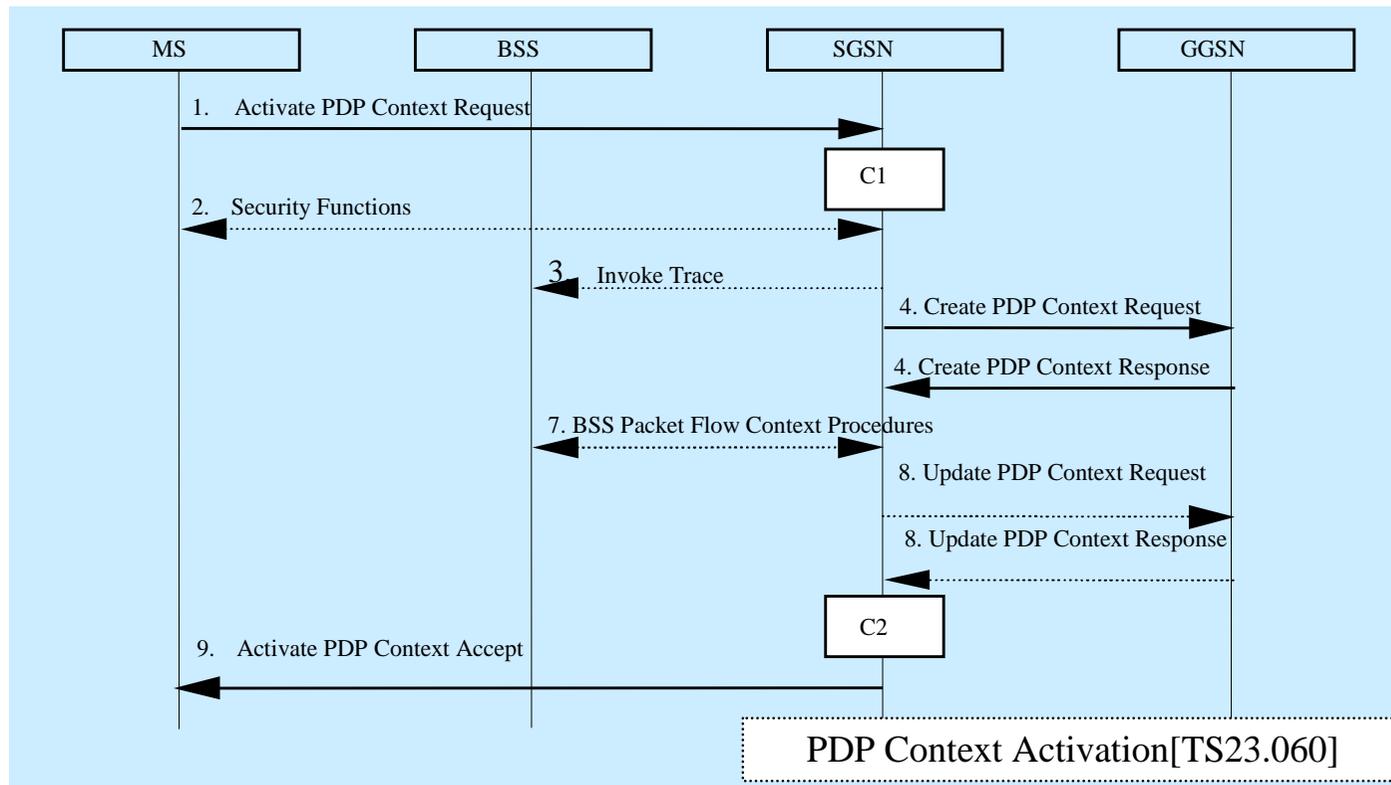
-> per MS there can be several NSAPIs utilizing the same SAPI and the same PFI

NSAPI, RB Identity, and RAB ID



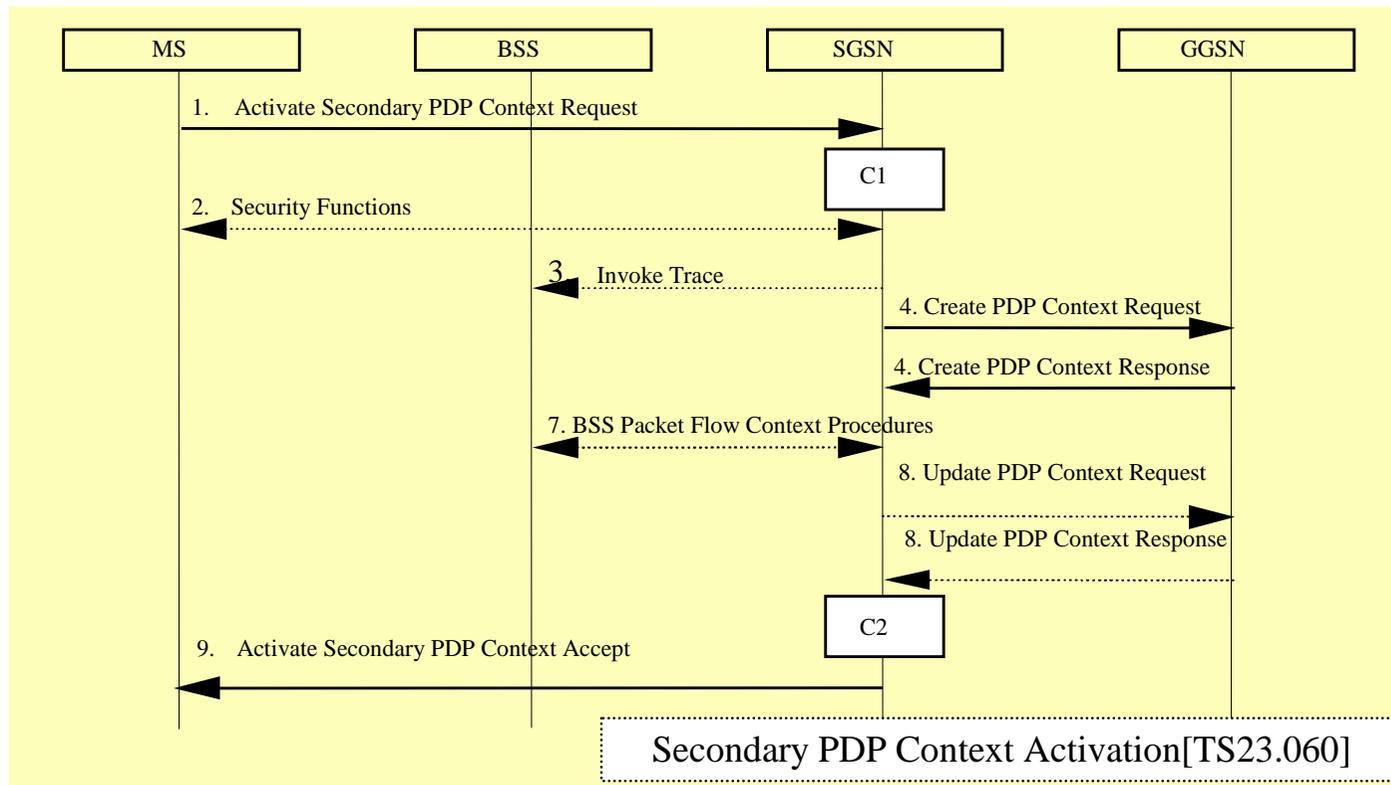
- There is a one-to-one relationship between NSAPI, Radio Access Bearer, and PDP context.
- In the packet domain, there is also a one-to-one relationship with Radio Bearer Identity

PDP CONTEXT and PFI in GERAN *A/Gb mode* (1)



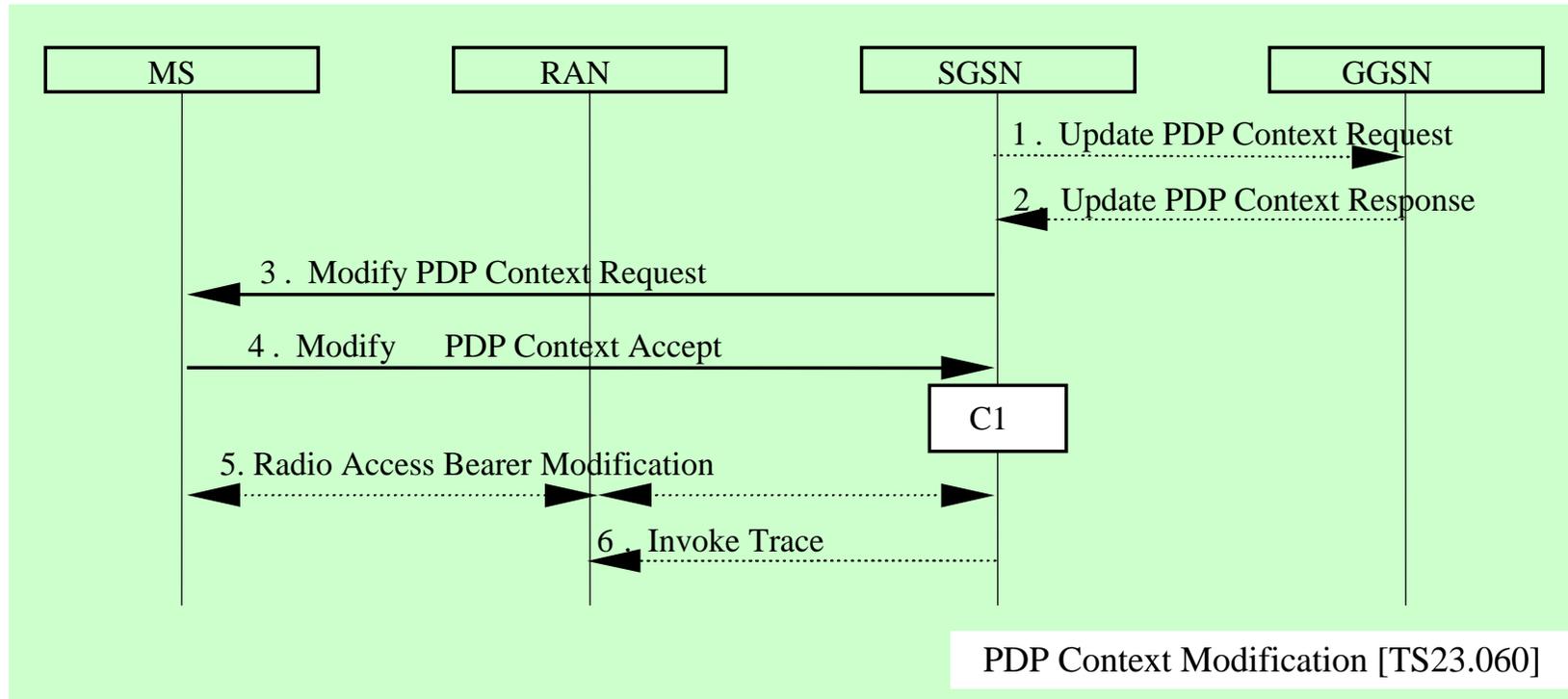
- The MS sends an *Activate PDP Context Request (NSAPI, TI, PDP Type, PDP Address, Access Point Name, QoS Requested, PDP Configuration Options)* message to the SGSN.
- The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and returns an *Activate PDP Context Accept (PDP Type, PDP Address, TI, QoS Negotiated, Radio Priority, Packet Flow Id, PDP Configuration Options)* message to the MS.

PDP CONTEXT and PFI in GERAN *A/Gb mode* (2)



- The MS sends an *Activate Secondary PDP Context Request (Linked TI, NSAPI, TI, QoS Requested, TFT, PDP Configuration Options)* message to the SGSN (TI and NSAPI contain values not used by any other activated PDP context)
- The SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and returns an *Activate Secondary PDP Context Accept (TI, QoS Negotiated, Radio Priority, Packet Flow Id, PDP Configuration Options)* message to the MS

PDP CONTEXT and PFI in GERAN *A/Gb mode* (2)

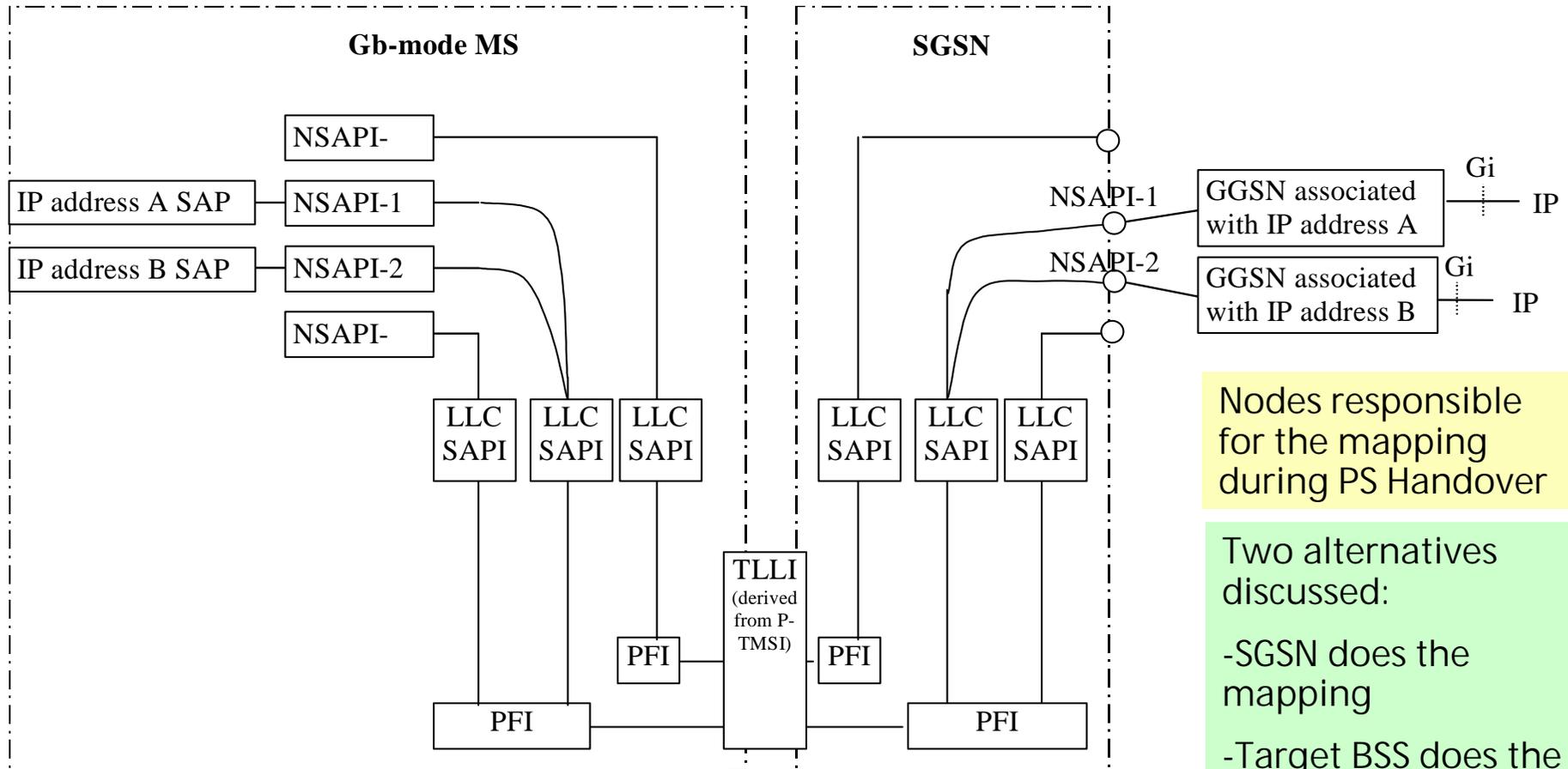


- SGSN selects Radio Priority and Packet Flow Id based on QoS Negotiated, and may send a *Modify PDP Context Request (TI, QoS Negotiated, Radio Priority, Packet Flow Id)* message to the MS.
- The MS acknowledges by returning a *Modify PDP Context Accept message*. If the MS does not accept the new QoS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

PDP Context IE [TS29.060]

Octets	Bits							
	8	7	6	5	4	3	2	1
1	Type = 130 (Decimal)							
2-3	Length							
4	Res- erved	VAA	Res- erved	Order	NSAPI			
5	X	X	X	X	SAPI			
6	QoS Sub Length							
7 - (q+6)	QoS Sub [4..255]							
q+7	QoS Req Length							
(q+8)-(2q+7)	QoS Req [4..255]							
2q+8	QoS Neg. Length							
(2q+9)- (3q+8)	QoS Neg [4..255]							
(3q+9)- (3q+10)	Sequence Number Down (SND) (note)							
(3q+11)- (3q+12)	Sequence Number Up (SNU) (note)							
3q+13	Send N-PDU Number (note)							
3q+14	Receive N-PDU Number (note)							
(3q+15)- (3q+18)	Uplink Tunnel Endpoint Identifier Control Plane							
(3q+19)- (3q+22)	UplinkTunnel Endpoint Identifier Data I							
3q+23	PDP Context Identifier							
3q+24	Spare 1 1 1 1			PDP Type Organisation				
3q+25	PDP Type Number							
3q+26	PDP Address Length							
(3q+27)-m	PDP Address [0..63]							
m+1	GGSN Address for control plane Length							
(m+2)-n	GGSN Address for control plane [4..16]							
n+1	GGSN Address for User Traffic Length							
(n+2)-o	GGSN Address for User Traffic [4..16]							
o+1	APN length							
(o+2)-p	APN							
p+1	Spare (sent as 0 0 0 0)			Transaction Identifier				
p+2	Transaction Identifier							

PDP Context Aggregation and PFI in PS Handover Discussions

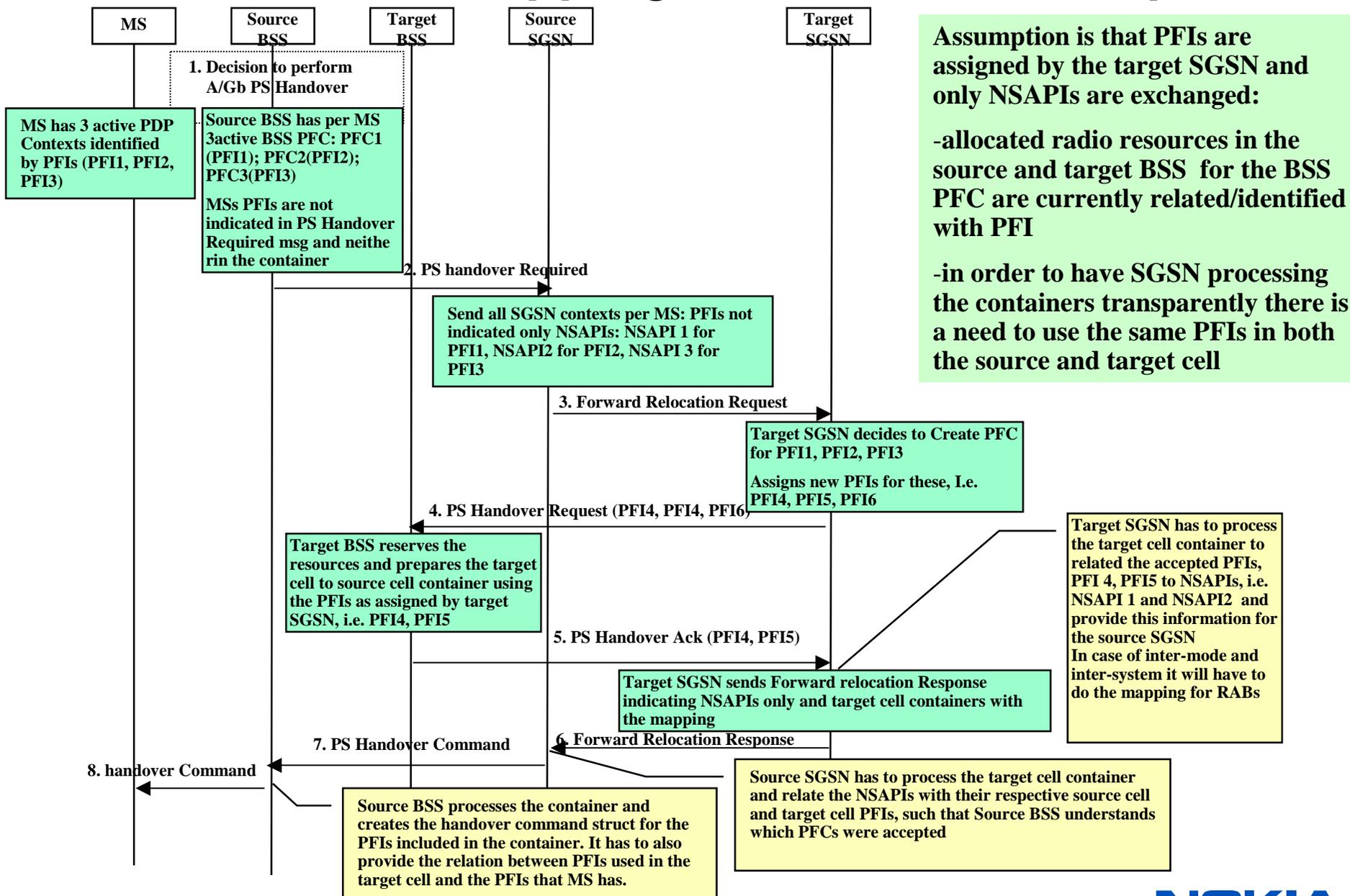


Nodes responsible for the mapping during PS Handover

Two alternatives discussed:
 -SGSN does the mapping
 -Target BSS does the mapping

There can be one or more NSAPIs per LLC SAPI according to 44.065. SAPI values are primarily used to keep the sequence order within one “flow”. PFI is used for traffic with similar QoS requirements.

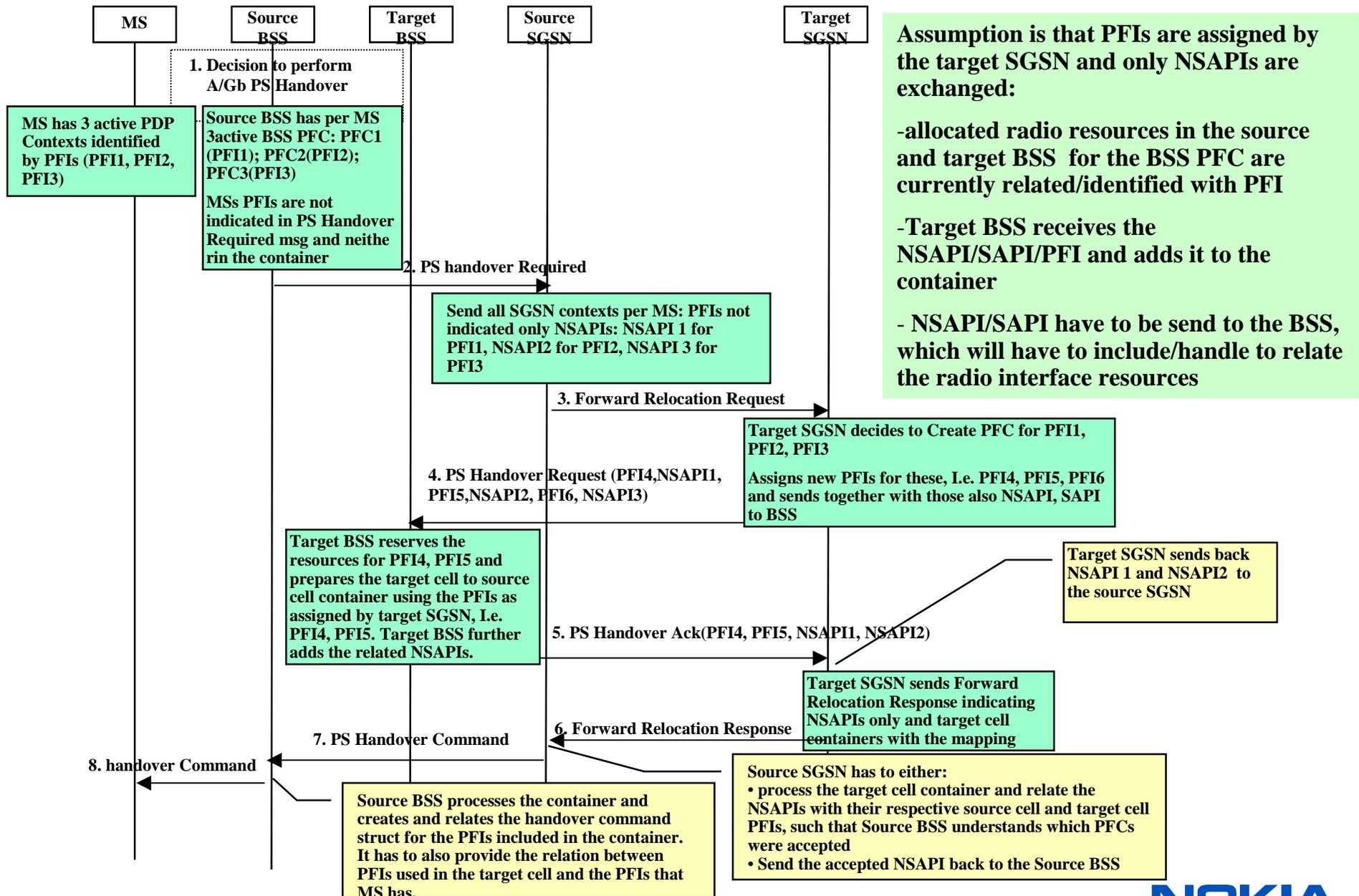
NSAPI/SAPI/PFI mapping – SGSN case example



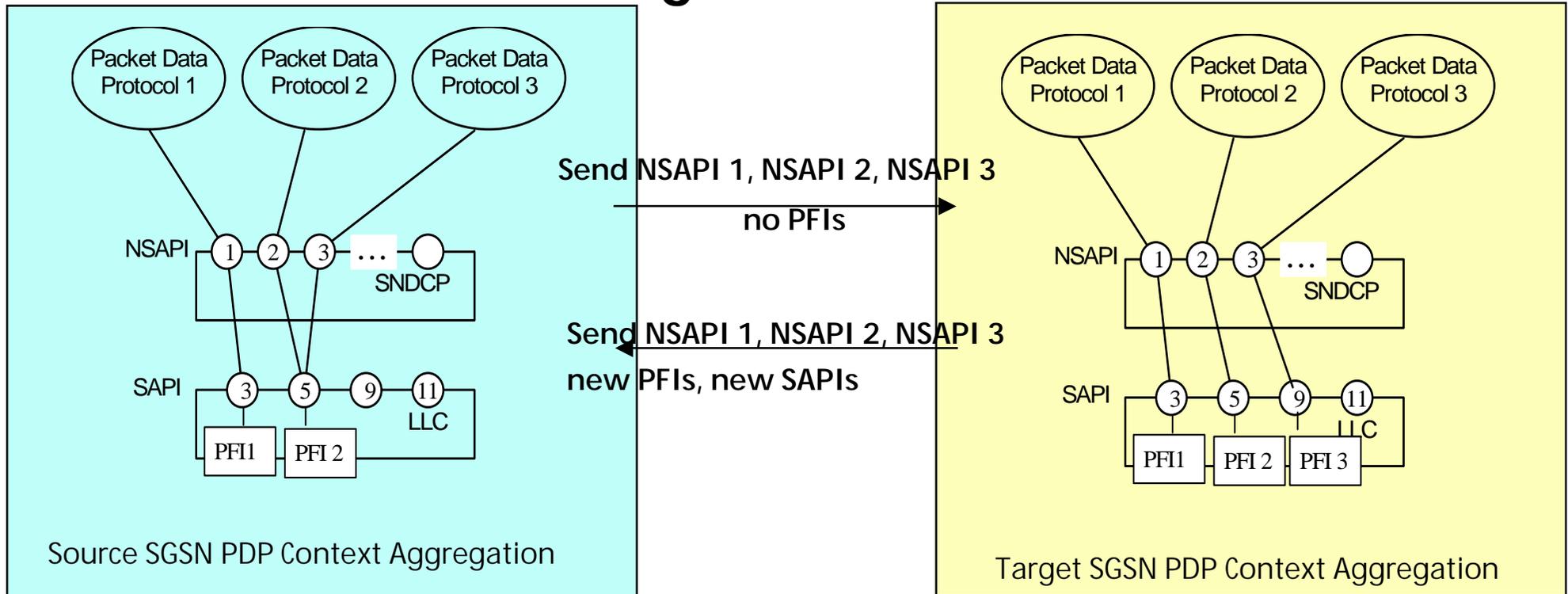
Assumption is that PFIs are assigned by the target SGSN and only NSAPIs are exchanged:

- allocated radio resources in the source and target BSS for the BSS PFC are currently related/identified with PFI
- in order to have SGSN processing the containers transparently there is a need to use the same PFIs in both the source and target cell

NSAPI/SAPI/PFI mapping – BSS case example



Impact of NSAPI/SAPI/PFI mapping during 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;
 - LLC settings will change as NSAPIs will be related to different SAPIs.

Conclusions

- There are only 4 SAPIs defined for user data
 - Future proof issues: is it expected that there will be more than 4 SAPIs defined for user data.
- NSAPI and SAPI information is already part of the PDP Context – the information on NSAPI/SAPI mapping is already there;
- PFI may be indicated during SGSN Context Transfer during RAU already according to the current specs;
- PFI is changed during an ongoing session only if QoS profile changes, i.e. during PDP Context Modification procedure;

Way Forward Proposal:

- » Target SGSN will be able to support the same mapping as Source SGSN NSAPI/SAPI/PFI
- » No need for the assumption that the mapping will not be supported
- » The PFIs used in the Source SGSN should be indicated to the Target SGSN
- » Relation between NSAPIs, RABs and PFIs should be defined separately from the NSAPI/SAPI/PFI mapping issue