

3GPP PS DATA OFF PHASE 2

EPC handling of Non-IMS Data Exempt Services

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BACKGROUND

- › Key Issue 2 - making the UE aware of 3GPP PS Data Off Exempt Services:
For Key Issue 2 in Release 15, the solution shall assume **a separate list of PS Data Off exempted services per VPLMN** (per TS 22.011). The solution has not been selected, but at least one solution described in clause 6.2 of TR 23.702 can satisfy this additional requirement. Hence, it is agreed to determine the solution to adopt for normative specification during the normative work.
- › Solution proposals in TR23.702
 - Solution 2.1: A new management object in the ME
 - › Non-SIP services, identified by an APN and an uplink filter (assumption that IP addresses for the list of non-SIP based services that are Data Off exempt are published)
 - › SIP services, identified by enumeration (e.g. MMTel Voice, SMS over IMS, USSD over IMS, MMTel Video) or by IMS communication service identifier
 - Solution 2.3: HSS based solution (per VPLMN is possible)
- › **Key Issue1 should be in the WID : UE informing the network about the UE's status**
 - New IE over NAS is needed to inform MME of UE's Data Off capability.
Note: PCO is transparent to MME therefore Data Off info introduced in PCO in Rel-14 is not sufficient

ALTERNATIVES

- › Requirement: Support PLMN-based List of 3GPP Data Off Exempted Services
- › Two alternatives are possible:
 - **Alt 1 HSS/HLR based approach**
 - Assumption:** List of 3GPP DOES is provisioned in HSS under the APN-configuration data
 - **Alt 2 PCRF based approach (not covered in TR23.702)**
 - Assumption:** PCRF is always available if PLMN based list of 3GPP DOES is required
- › Both options require knowledge of list of exempted services in the visited domain.

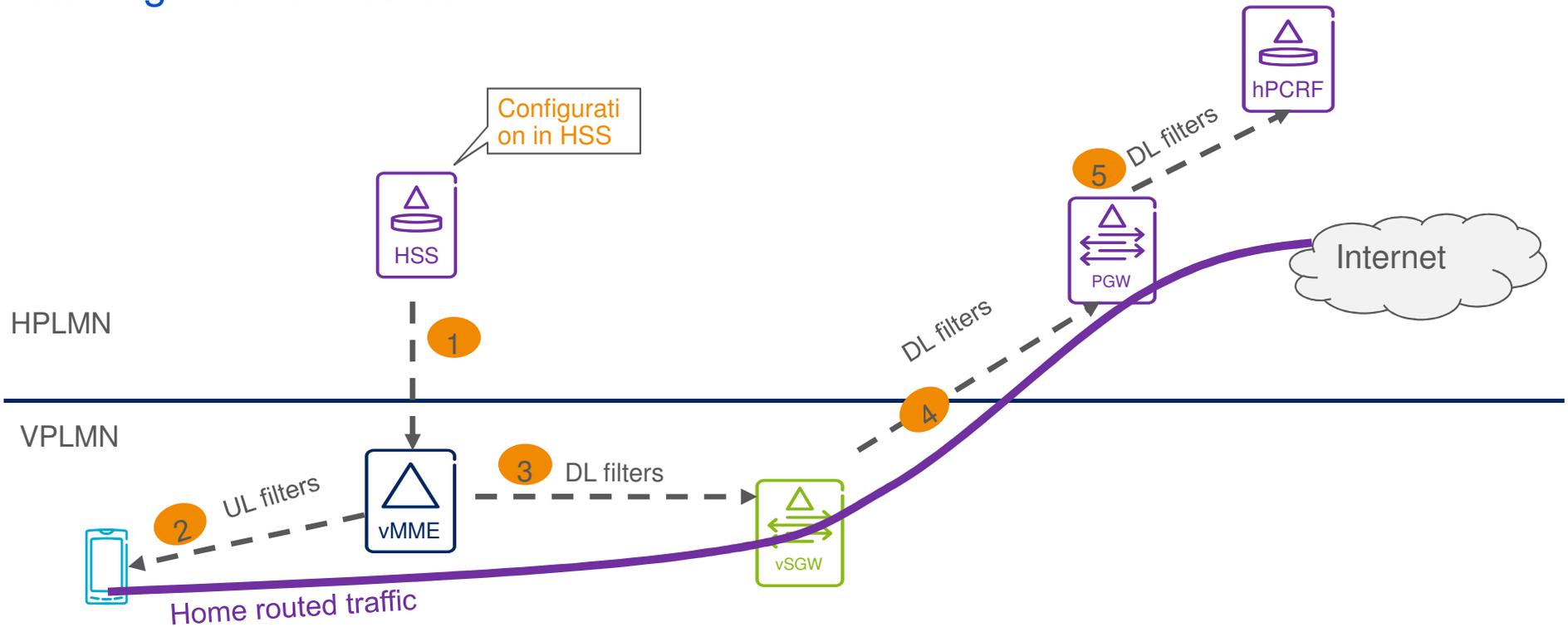
ALTERNATIVE 1 - HSS APPROACH

> Affected scenarios/procedures

- EPS related procedures
 - > Initial Attach
 - > UE Requested PDN Connection Request
 - > Tracking Area Update
 - > Handover
 - > HSS initiated Subscribed QoS modification or new procedure for HSS initiated Subscription Data Change
- 2G/3G connected to SGSN using S4 interface
 - > Attach
 - > RAU
 - > Handover
 - > PDP Context Activation
 - > HSS initiated Subscribed Data Change
- 2G/3G connected to SGSN using Gn interface
 - > Attach
 - > RAU
 - > Handover
 - > PDP Context Activation
 - > HLR initiated Subscribed Data Change
- Mobility between 2G/3G using GnSGSN and LTE
- Interworking scenarios with different Data Off capability, e.g.
 - > Over Gx, PGW supports Data Off Phase 2, while PCRF doesn't
 - > During mobility, the old SGSN/MME supports Data Off Phase 2, while the new SGSN/MME doesn't

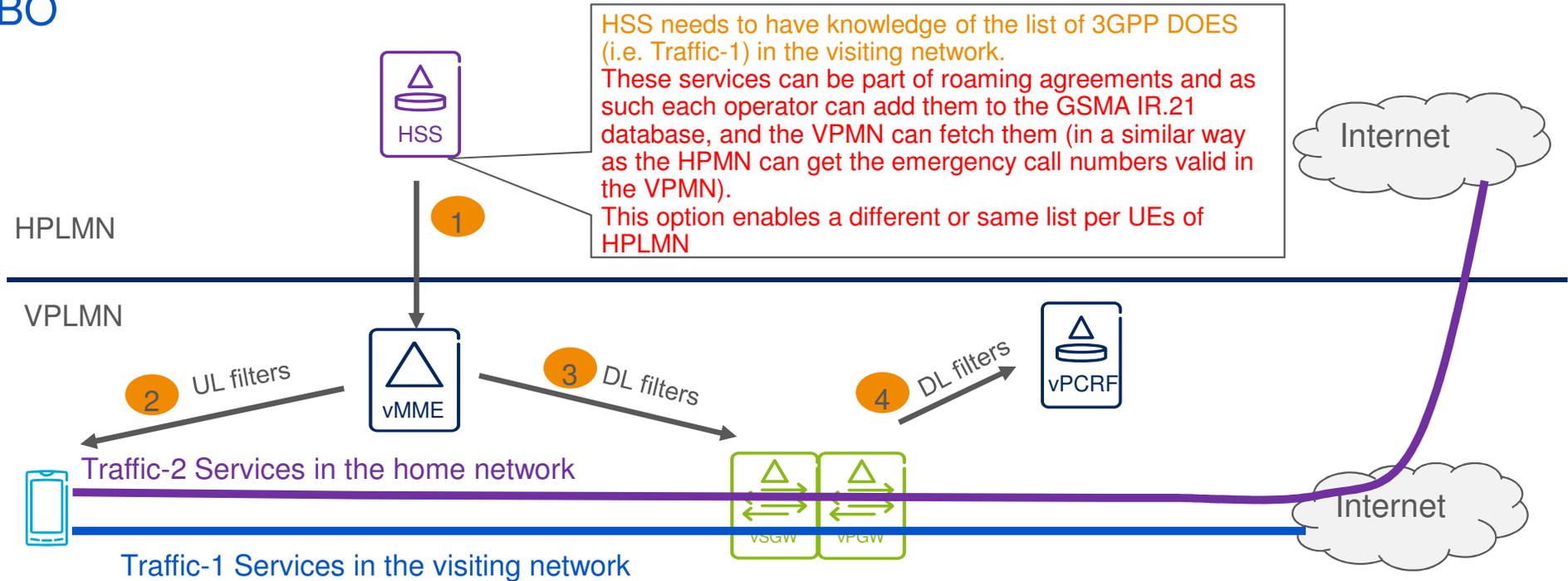
ALT 1 HSS/HLR BASED APPROACH

> Roaming- Home Routed



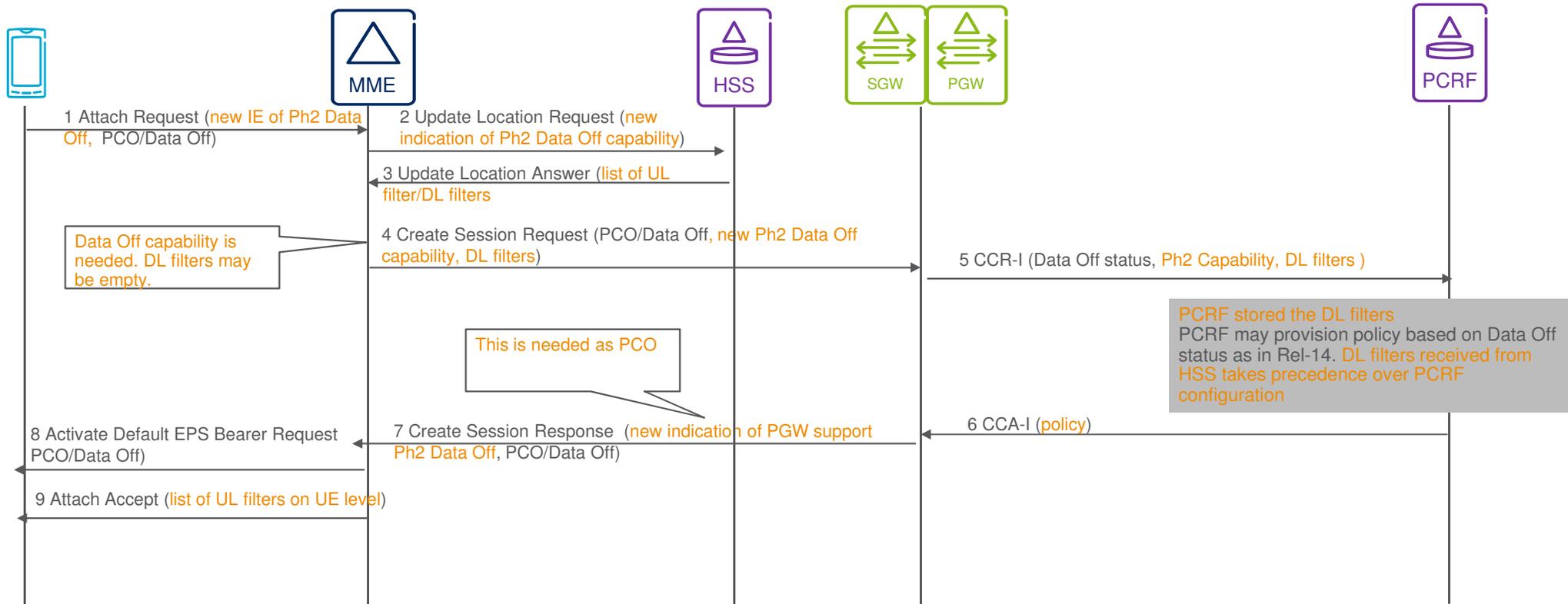
ALT 1 HSS/HLR BASED APPROACH

> LBO



ALT 1 HSS/HLR BASED APPROACH

> EPS: Initial Attach – simplified flow (see note page for sequence description)



ALT 1 - HSS/HLR BASED APPROACH

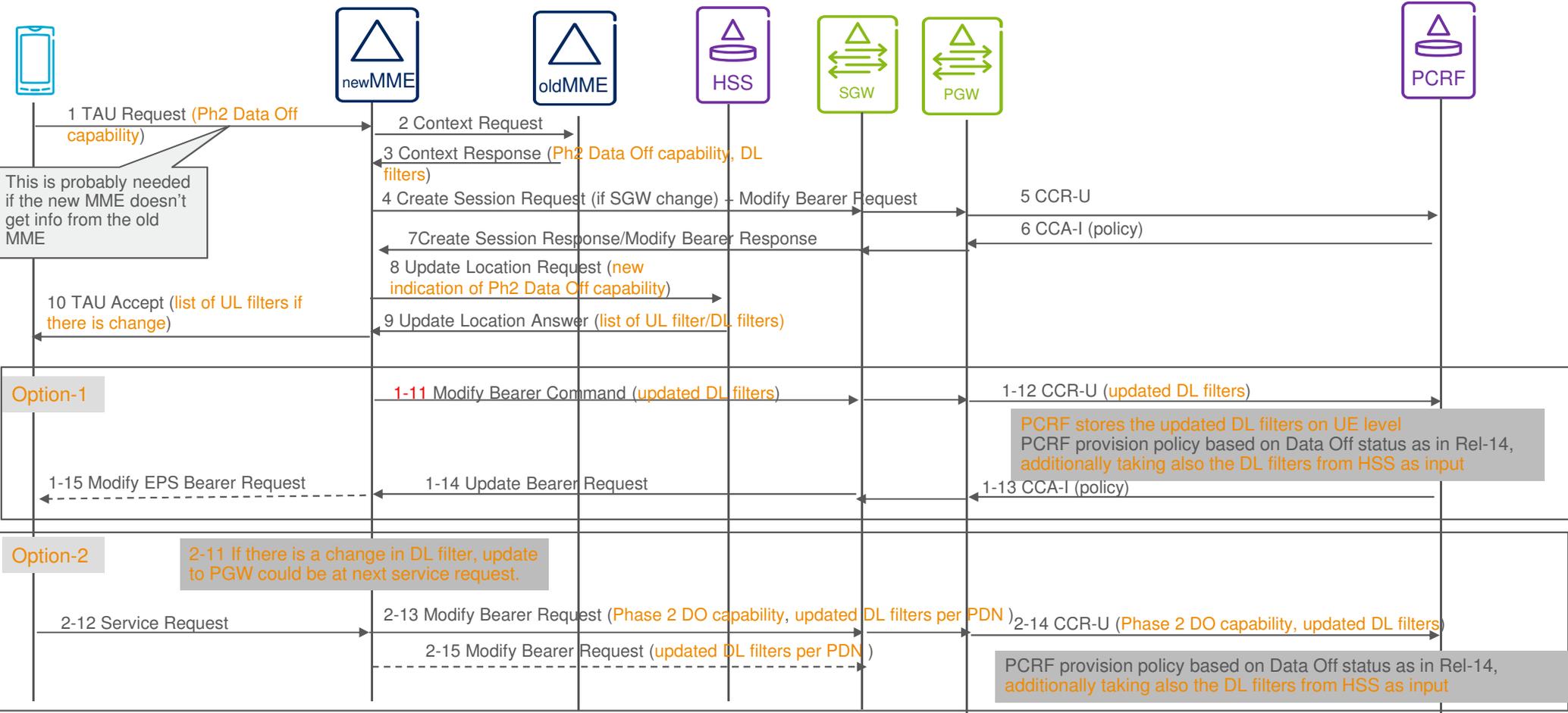
- › EPS: UE Requested PDN Connection Request

- Toward UE, there is no impact

- Towards SGW/PGW, same impact as in Attach procedure

ALT 1 HSS/HLR BASED APPROACH

> EPS: Tracking Area Update – simplified flow (see note page for sequence description)



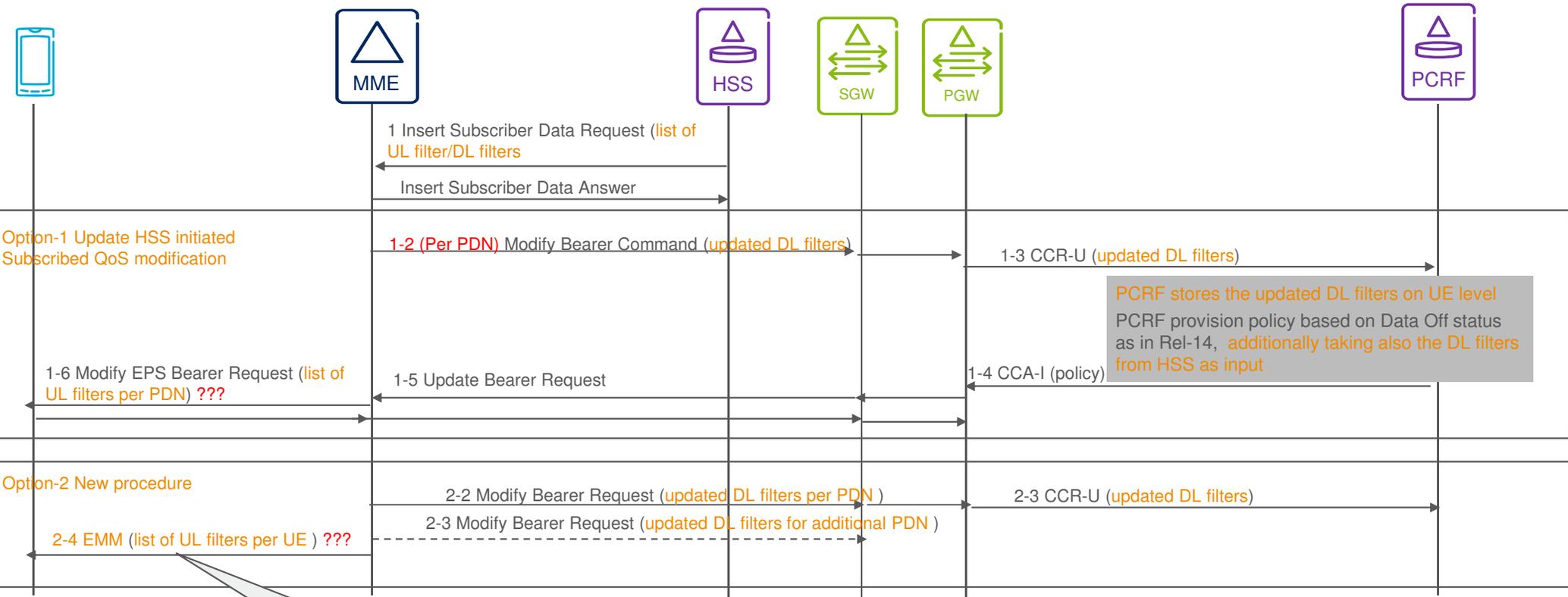
ALT 1 HSS/HLR BASED APPROACH

- › EPS: Handover

- Add UL/DL filters and Phase 2 Data Off capability in Forward Relocation Request

ALT 1 - HSS/HLR BASED APPROACH

EPS: HSS Initiated Subscribed Data Modification - simplified flow (see note page for sequence description)



Option-2 is more aligned with Attach and TAU procedure that UL filters are included per UE.

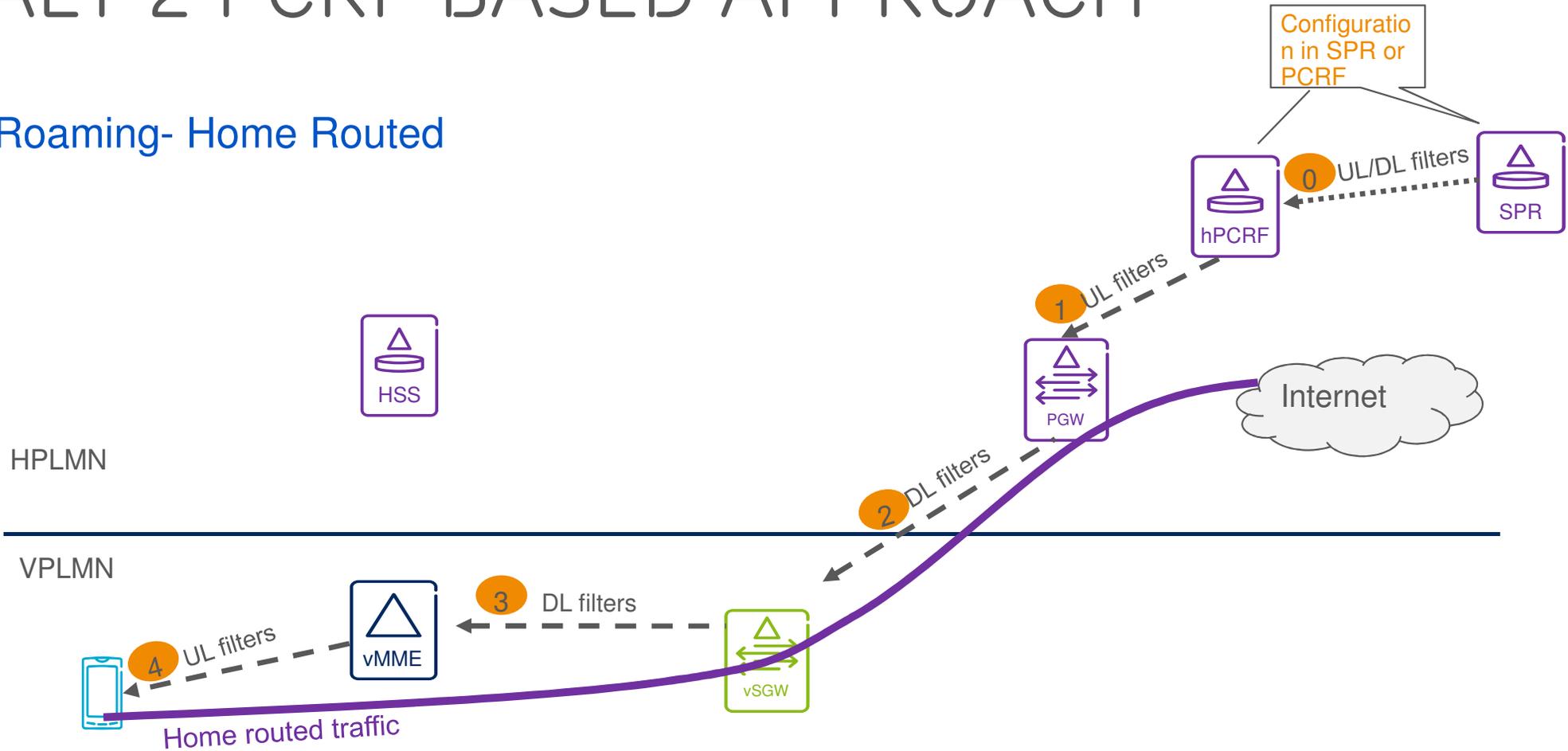
ALT 1 – HSS/HLR BASED APPROACH

› Summary

- Extensive impact on existing procedures and scenarios
- New procedure may be needed e.g. during HSS Initiated Subscribed Data Change on list of 3GPP DOES
- The interworking scenario with different Data Off capability adds more complexity
- Impact on HSS
- Impact on HLR if 2G/3G connected to SGSN using Gn interface is required
- Impact on the visiting network
- The list of filters in HSS need to take precedence over the PCRF configuration, this is not aligned with other subscription data handling that the PCRF has the final decision.

ALT 2 PCRF BASED APPROACH

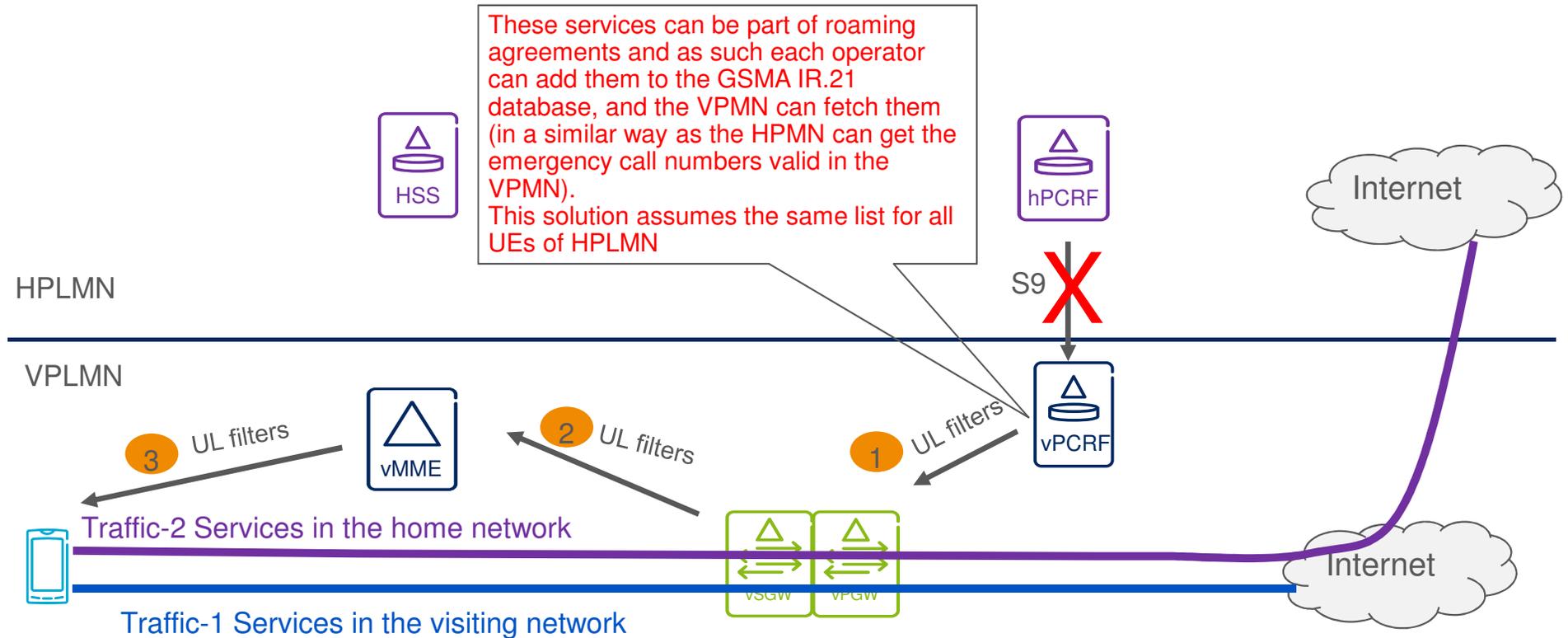
> Roaming- Home Routed



ALT 2 PCRF-BASED APPROACH

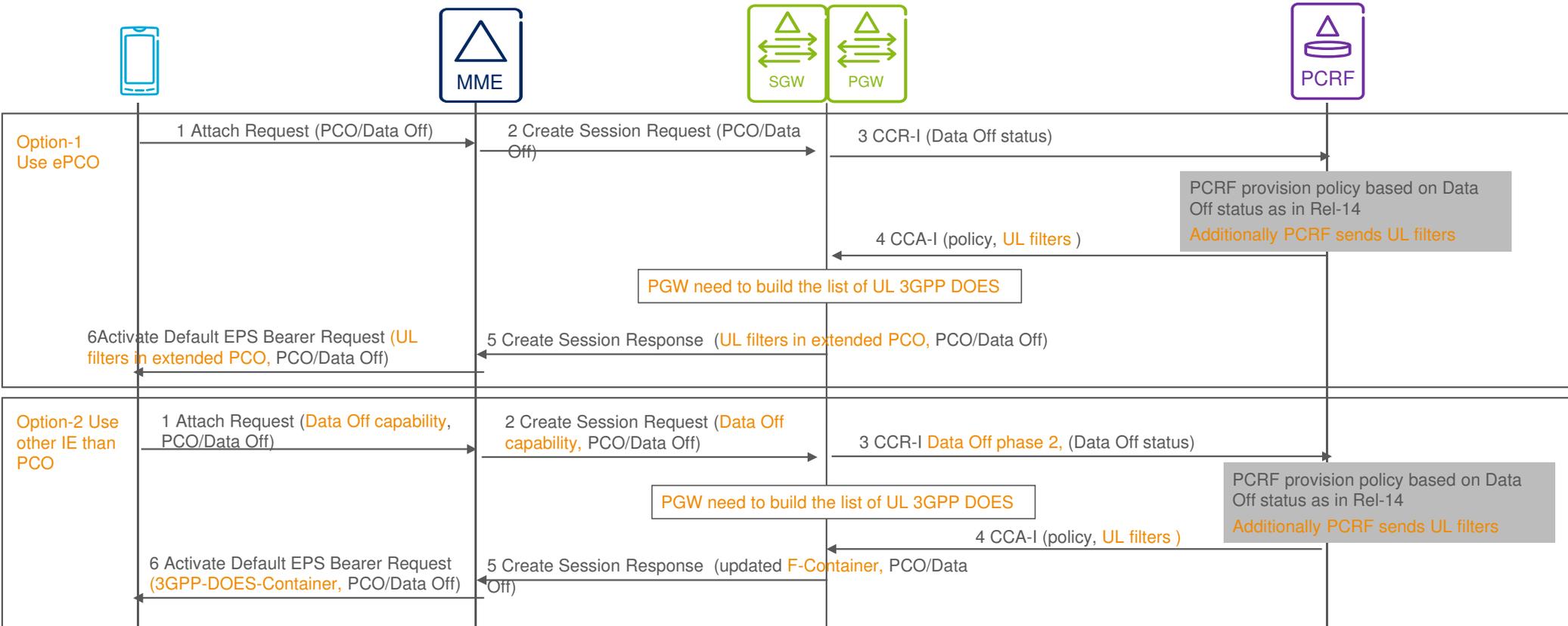
> LBO – NO S9 interface

- vPCRF needs to know the list of 3GPP DOES for the HPLMN, i.e. Traffic-2



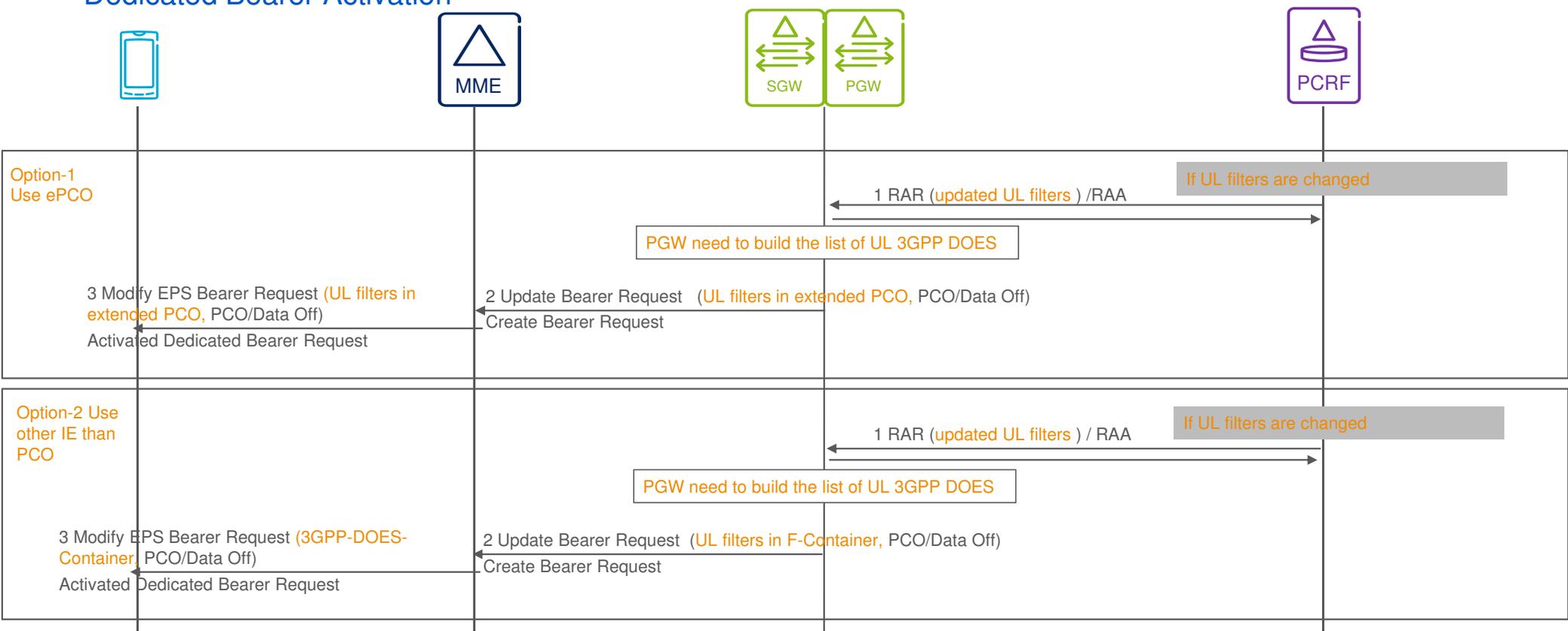
ALT 2 - PCRF-BASED APPROACH

- > Affected EPS procedures - simplified flow (see note page for sequence description)
 - Attach
 - UE requested PDN connectivity Request



ALT 2 PCRF-BASED APPROACH

- > Affected EPS procedures:
 - PCRF/PGW initiated Update Bearer Request
 - Dedicated Bearer Activation



ALT 2 PCRF-BASED APPROACH

- › 2G/3G connected to SGSN using **S4** interface, Affected procedures
 - PDP Context Activation
 - › Create Session Response and Activate PDP Context Accept, or
 - › Activate PDP Context Request, Create Session Request, Create Session Response and Activate PDP Context Accept
 - PGW initiated Bearer update
 - › Update Bearer Request (see EPS “PCRF/PGW initiated Update Bearer Request” procedure) and Modify PDP Context Request
- › 2G/3G connected to SGSN using **Gn** interface, Affected procedures
 - › PDP Context Activation
 - Activate PDP Context Response, or
 - Activate PDP Context Request, Create PDP Context Request, Create PDP Context Response and Activate PDP Context Response
 - GGSN/PGW initiated PDP Context update
 - › Update PDP context Request and Modify PDP Context Request are impacted

ALT 2 PCRF-BASED APPROACH

> Summary

- **Prerequisite:** PCRF is always available when per PLMN based list of 3GPP DOES is required.
- Existing procedure can be reused with some enhancement
 - > If Option-1 Using extended PCO is chosen, the level of impact is much less than the HSS based approach, e.g. no impact on HLR/HSS, no impact on visiting network
 - > If Option-2 is chosen, the level of impact is still less than HSS based approach

COMPARISON BETWEEN ALT 1 AND 2

Alt 1 HLR/HSS based approach

> Pros

- Useful if per subscription list is required (in LBO case)

> Cons

- Extensive impact on the existing procedures
- New procedure may be necessary (e.g. EMM)
- Impact on HSS
- Impact on HLR if 2G/3G is required
- Different logic in PCC

e.g. for QoS, PCRF takes precedence over HSS

However, for the list of 3GPP DOES, it's required that HSS takes precedence over PCRF

Alt 2 PCRF based approach

> Pros

- Much less impact
- Impact on HLR/HSS can be avoided
- Impact on visiting network may be avoided depending on the option to choose
- The PCC logic is consistent for different parameters e.g. QoS and list of 3GPP DOES
- The logic over GTP and NAS is more straightforward

> Cons

- PCRF must be deployed if PLMN based list is needed, otherwise, PGW has to handle per PLMN based list.

RECOMMENDATION

- › PCRF-based approach is recommended
 - It provides exactly the same capabilities as the HSS based approach
 - Less complexity and implementation cost, and
 - More backward compatible with Release 14