

TEI-19

Discussion on roaming traffic offloading via home-session breakout

3GPP SA2#160 Ad Hoc-e

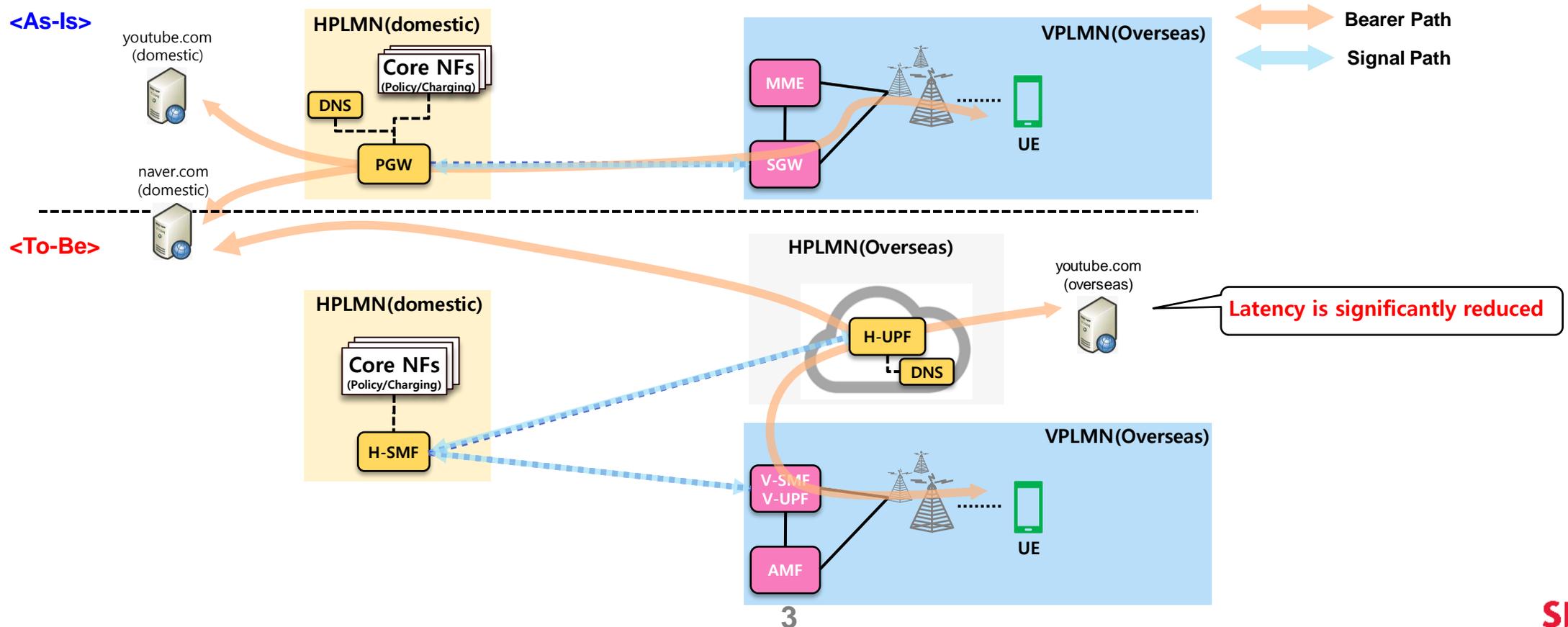
Agenda Item : 30.2

SK Telecom

- There are two types of roaming architectures in 3GPP:
 - local-breakout : it fully utilizes the visited operator network which is not common in live network due to charging and QoS control issues.
 - Home-routed : Home-routed is primarily used in live network but QoS significantly decreases because all data traffic is routed to home operators(physically located within the domestic region), even though application servers(e.g., Youtube) are near the roaming customers.
 - **there is a need for enhancing roaming service to satisfy QoS and control charging/policy in HPLMN.**
- With the advancements in cloud technology, operators can now utilize hyperscaler's overseas regions for deploying 5G Core equipment, eliminating the need to build their own data centers abroad.
- In the past(4G era), PGW had both the Control Plane and User Plane integrated, making it costly and less secure to deploy the Control Plane abroad. However, with the application of CUPS (Control and User Plane Separation) technology, deploying only the User Plane abroad has eliminated the risk of customer information exposure.

International roaming service that deploys UPF at the edge using a public cloud global region

- (1) The UPF(HPLMN) is physically located overseas, while the SMF(HPLMN) is physically located domestically for home-routed roaming.
 - Policy and Charging control is done by HPLMN
 - User traffic is locally break-out near VPLMN for out-bound roamers
- (2) Data latency on global contents provider service is improved, and domestic service is provided at the same level to the present.
- (3) AS-IS : Home-routed roaming architecture and all traffic is routed to domestic area
TO-BE : Home-routed roaming architecture and all traffic is locally break-out



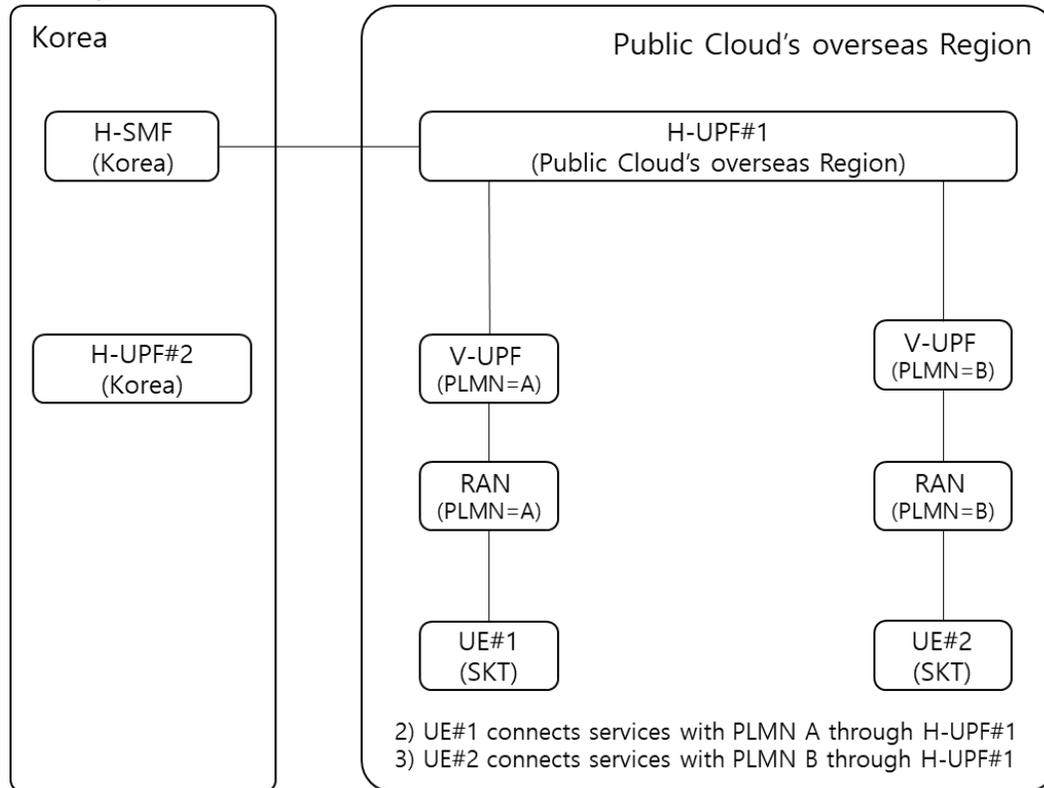
(Req 1) H-SMF should be able to **select H-UPF based on the Serving PLMN** to apply this use-case for each operator

(Req 2) **The DNS address for UE should be delivered from the H-UPF to the UE via H-SMF.** The H-SMF and H-UPF are physically located in different places and may have different network subnets. It is difficult for the H-SMF to manage DNS addresses for all DNS Address near in VPLMN region. Additionally, the UPF can select the optimal DNS address for the UE based on the serving PLMN and the UE's location information.

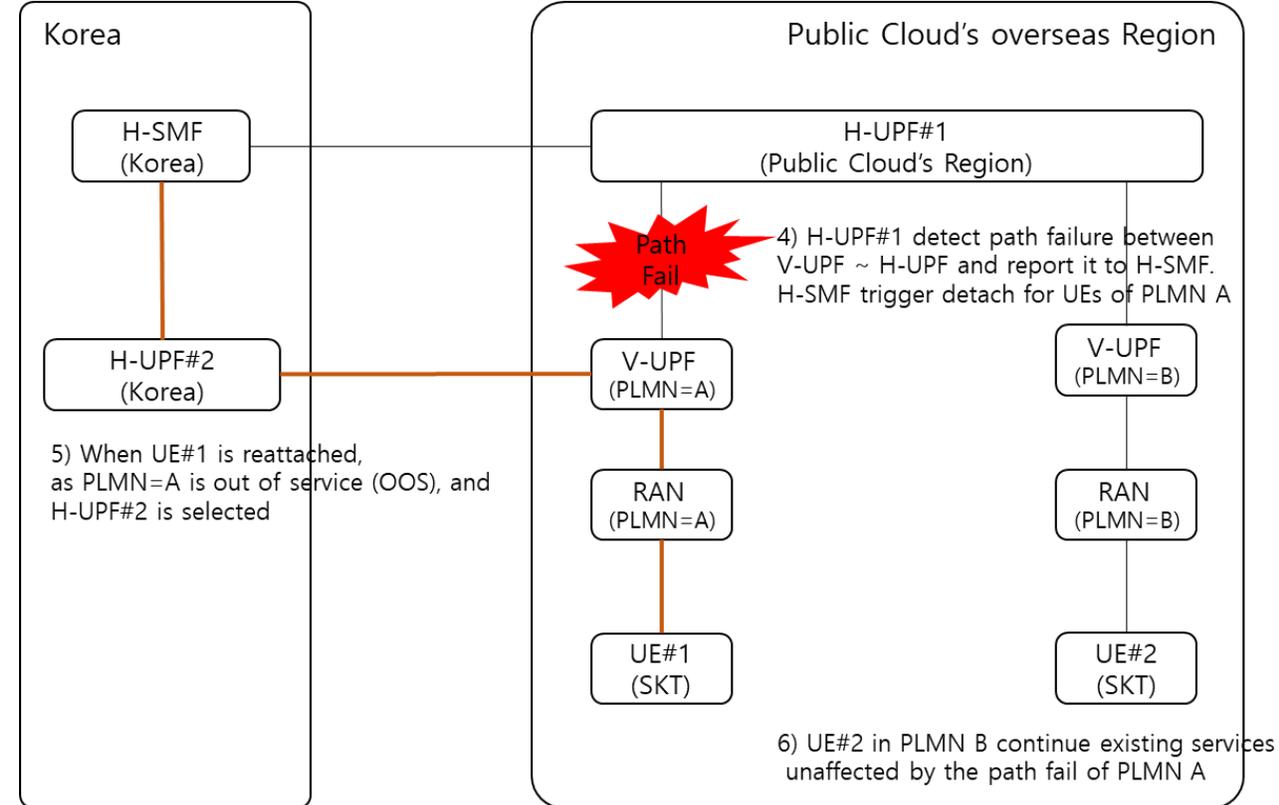
(Req 3) The interworking between H-UPF and V-UPF can also use VPN for security purposes. Depending on the use of VPN, additional Security Protocol Headers (e.g. Ipsec) may be required. To prevent unnecessary fragmentation, **UE should be able to adjust the MTU size based on the V-UPF or Serving PLMN.**

(Req 4) H-UPF is connected to multiple V-UPFs, and network disconnections may occur only in certain VPLMNs. **When a network disconnection is detected, the corresponding VPLMN should revert to the conventionally used home-routed roaming service to minimize UE impact.** Additionally, the V-UPFs that are not affected by the failure should not experience any service impact.

- 1) H-SMF Configuration Information
 a) H-UPF#1(Public Cloud's overseas Region) : A,B Serving PLMN for selection factor
 b) H-UPF#2(Korea) : configure as backup UPF which is used when H-UPF#1 failure



[Status before path failure between V-SMF ~ H-UPF]



[Status after path failure of PLMN A]

- WT 1: Specify reference architecture for supporting edge computing via HR with HSBO roaming scenarios.
- WT 2: Specify UP path management for supporting HR with HSBO roaming. How to select a proper local H-UPF deployed in the visited country. How to select and provision a proper remote site UP-related configuration information (e.g., information for EASDF/DNS server or link MTU size) for HR-HSBO within the visited country.
- WT 3: How to handle the user plane path failure of the HR-HSBO session. Specify how to trigger change of H-PSA UPF by reselecting H-UPF in the home country and replacing the H-EASDF/DNS server in the visited country with the DNS server valid for the conventional HR PDU Session.