5G-Datacenter Interconnection Use Case

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Extending Edge or Cloud Datacenters to 5G Devices

- Computing mobility is a driver:
  - Offloading VMs from 5G devices to DC servers (e.g. to save battery).
  - Transferring VMs from DC servers to 5G devices (e.g. to reduce latency or increase autonomy).
  - Use cases can include edge-assisted industrial IoT, V2X and Fog applications.

- 5G/Datacenter integration can enable transparent mobility of VMs between 5G devices and datacenter servers.
  - It can simplify the design of some distributed applications, by effectively extending edge datacenters to include 5G devices.

A New Use Case Involving 5G

- We can describe a new use case for datacenter protocols
  - Where a datacenter network operator would use 5G devices in a way similar to datacenter servers.
  - The NVE can be internal to the 5G device, or external, e.g. at the edge of the 5G system.
    - In our initial draft, we selected this last options, to leverage the 5GLAN feature.

- Why did we propose to use an external NVE?
  - This is just an initial take on 5G-DC integration
  - Also, 5GLAN is a new feature that already integrates LAN connectivity in the 5G system
    - It provides IP or Ethernet LAN connectivity between a 5G device and another 5G device or external wireless/wired device
    - Compared to an internal NVE solution, this enables a more efficient usage of the air interface, and leverages 5G user and device authentication, session continuity support, fine-grained QoS.
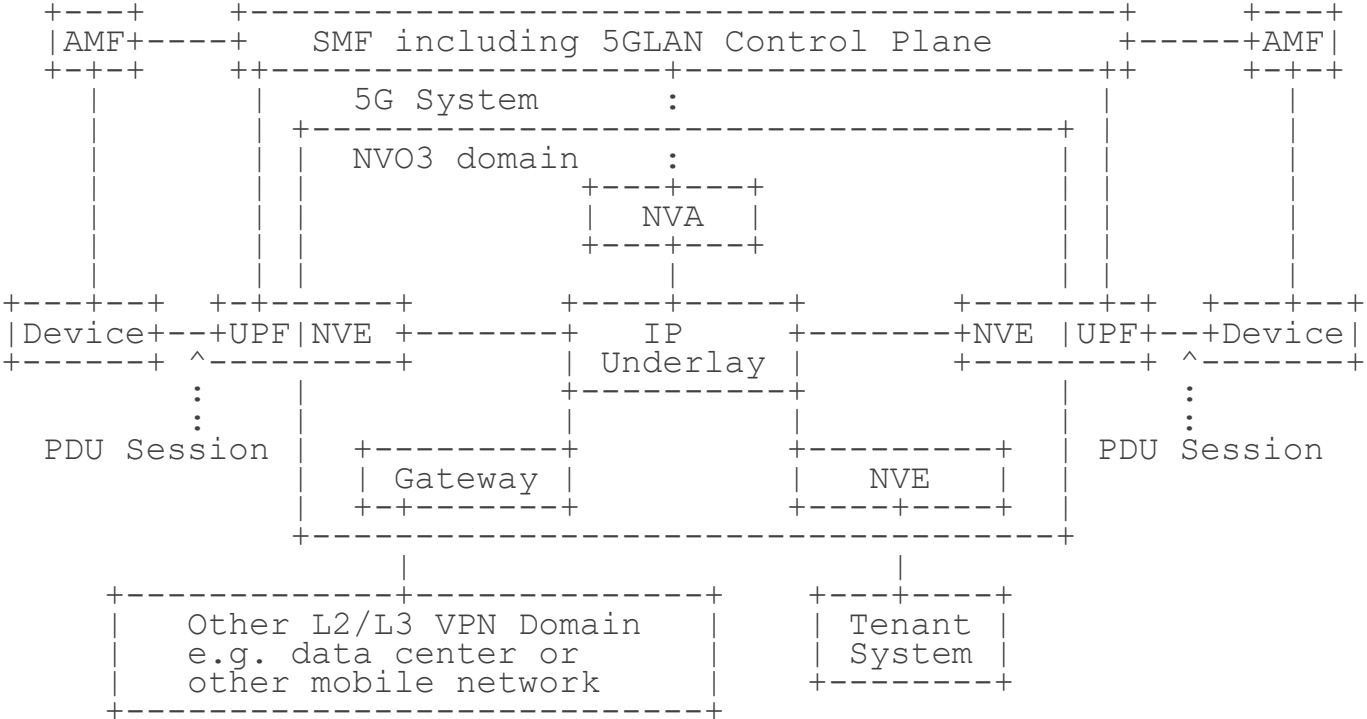
5G/Datacenter Interconnection Architecture

```
+---+      +----------------------------------------------+      +---+
|AMF+----+    SMF including 5GLAN Control Plane    +-----+AMF|
+-+-+      ++------------------------+-------------------++      +-+-+
  |         |    5G System           :                   |        |
  |         |  +---------------------:----------------+   |        |
  |         |  | NVO3 domain         :                |   |        |
  |         |  |              +---+---+                |   |        |
  |         |  |              | NVA  |                 |   |        |
  |         |  |              +---+---+                |   |        |
  |         |  |                  |                    |   |        |
+---+--+  +-+-+-----+         +---+-----+         +------+-+  +---+--+
|Device+--+UPF|NVE +-------+    IP       +-------+NVE |UPF+--+Device|
+------+ ^--------+       | Underlay |              +--------+ ^-------+
   :       |               +----------+               |        :
   :       |               |          |               |        :
PDU Session |    +---------+          +---------+    | PDU Session
   |         | | Gateway |          |   NVE   | |
   |         | +-+-------+          +---+----+ |
   +--------------------------+------------------------+
                 |                        |
   +-------------+------------+     +---+----+
   | Other L2/L3 VPN Domain  |     | Tenant |
   | e.g. data center or     |     | System |
   | other mobile network    |     +--------+
   +-------------------------+

       Figure 2: 5GLAN Network Interconnected with a NVO3 Domain
```

Major Features of 5G/Datacenter Interconnection

- L2 or L3 connectivity between VMs on 5G devices and DC servers

- Hot VM migration support

- End device mobility support
  - From the NVO3 domain this may be similar to hot VM migration

- Other features may include QoS, Access Control, etc.

Next Steps

- We are looking for a community interested in 5G-datacenter interconnection. Is this an interesting use case for the NVO3 WG?

  - Is it useful to extend datacenter networks to include 5G devices?

- Please provide feedback on the proposed approach or any alternatives.