NFV what is there for 3GPP?

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Qualcomm Incorporated

What is Network Function Virtualization (NFV)?

- NFV provides virtualization technology to network infrastructure by moving most network functions to software components that can run on industry standard high volume servers and preferably off the shelf hardware components.

- A virtualized network function may consist of one or more virtual machines running different software and processes

- For future CN, NFV enables:
  - “Centralizing” network functions/processing to reduce operator OPEX/CAPEX
  - Deployment of services individually as separate virtualized network functions, i.e., a service-wise modular CN
  - Hosting network functions in different places to enable different types of deployment architectures
  - Co-hosting CN functions traditionally defined in separate nodes to enable lower latency and higher CN performance where needed

Key Drivers

- Dynamic carrier network capacity growth
- Faster Service Deployment
- Capex/Opex reduction
- Flexible traffic/service management
  - Treat multiple traffic streams with variable policy and charging profiles
- Easier and flexible integration between current and future radio technologies
- Optimize network for services
  - E.g. create different CN instances for same operator to optimize specific service delivery
- Minimize architectural impact for radio evolution
  - Enable changes and addition of SW modules to support new access
  - Enable to distribute the functionality where needed, e.g. depending on the model (residential, enterprise, small venue wrt large coverage area)

Use Case: Small Cells

- Localized core to reduce signalling load for area of dense small cell deployment
  - “dynamic relocation/expansion” of functionality (processing available in many places, instances of functionality for C-plane and U-plane created as needed or their capacity increased)
  - Focus both on CN and RAN

Use Case: New Markets and Models

- Enterprise market
  - Enable large enterprises to act as an MVNO using MNO functionality in a simpler way than today (e.g. distributed IMS)

- Multi-tenancy
  - Enable each MNO to use its own spectrum through a common small cell infrastructure with multiple virtual CN
    - Common “small cell box”, an MNO leases “capacity” installing its own RAN/CN virtual instance to provide services
  - Virtualize the current network sharing in a more dynamic way (i.e. use the spectrum of one of the MNO to provide services for other MNOs)

Use Case: Virtual IMS

- Virtual IMS core components can run on general purpose hardware
  - Call Session Control Functions (CSCFs), Home Subscriber Server (HSS), Application Servers, Media Gateway Controller Function (MGCF), Policy and Charging Rules Function (PCRF) are non-real time servers with standardized interfaces and functions
  - Media Gateways include media transport and transcoding functions, may also be implemented in the cloud, extra care must be taken for latency and availability.

- Virtual access and transport networks are a separable problem from IMS core
  - IMS supports fixed and mobile access networks, including LTE, WCDMA, EV-DO, WLAN, DSL, DOCSIS.

Security impacts need to be investigated

- Security impact, especially from a point of view of control plane functionality. SA3 may indeed have to perform an in depth security analysis
  - Need to consider intersection between NFV and security assurance for infrastructure nodes that led to SA3 work on SECAM (TR 33.916)

Standards Activities

- Avoid long studies in architecture groups that lead to nothing, until use cases and requirements are made clear
- Define use cases and verify whether existing architecture and procedures still apply
  - Identify whether standards need to be modified to facilitate NFV
- 3GPP also needs to identify whether
  - there are specific methodologies for defining the standard that enable a more NFV friendly type of implementation or if the current practices are good enough
- Security aspects need to be analyzed

Proposal for 3GPP work

- If potential architecture work is foreseen, start in rel.13 in SA1 in order to identify use cases
- Ensure SA1 completes before moving work to stage-2 groups
- Implementation methodology (e.g. 900series TR) can also be considered

Thank you

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