Gap Analysis on Network Virtualization Activities

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Objectives

- Provide an overview and survey of the efforts around virtualization at the IETF/IRTF
  - Special focus on NFV and SDN
  - Example use case: mobile networks
- Mapped to the most relevant efforts taking place outside IETF:
  - ETSI NFV ISG
  - ETSI MEC ISG
  - ONF

Background: Software Defined Networking

- Splits control and data plane, pushing the intelligence to a central controller
  - ONF – OpenFlow
  - IETF – FORCES
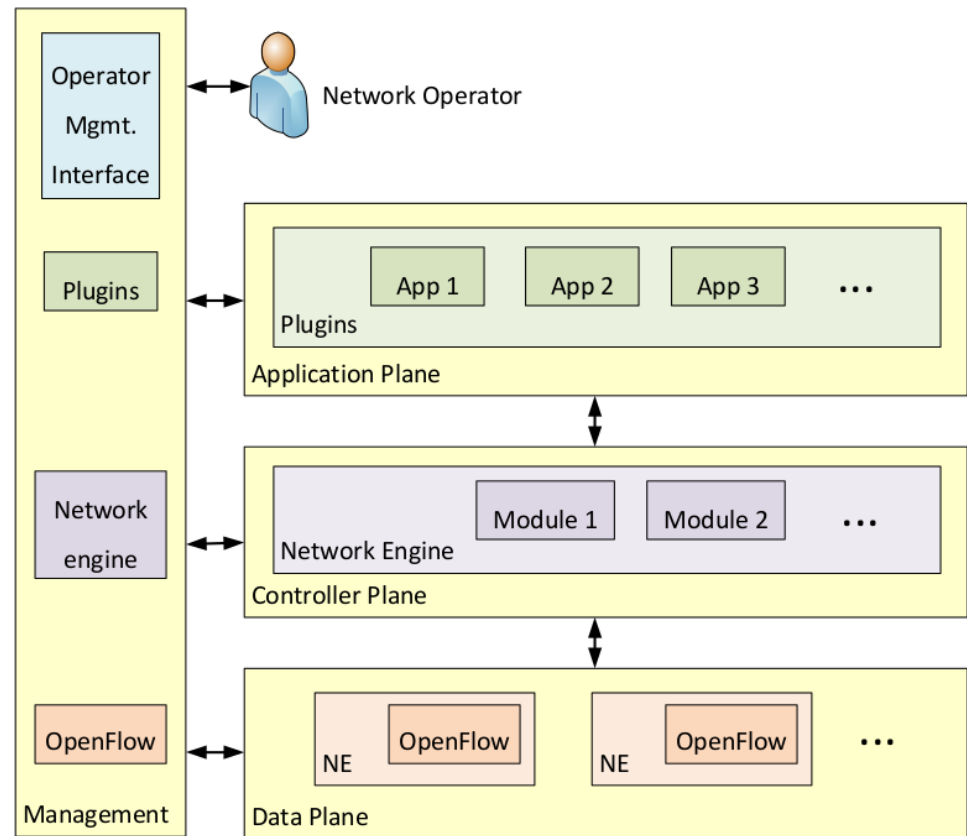
ONF framework architecture

Background: ETSI initiatives

- Network Function Virtualisation
  - ETSI ISG NFV is working since 2012
  - Evolves quasi-standard IT virtualization technology
  - Consolidates network equipment into industry standard high volume servers, switches and storage

- Mobile Edge Computing
  - ETSI ISG MEC recently formed (end of 2014)
  - Focused on enabling the Mobile Network Edge as an application presence platform close to the clients

IETF/IRTF initiatives and gaps (I)

- SFC WG
  - Working on an architecture for service function chaining
    - Problem statement
    - Architecture document
    - service-level data plane encapsulation format
    - Requirements for conveying information between control or management elements and SFC implementation points
  - Gaps
    - Management and configuration of SFC components related to the support of Service Function Chaining put on hold
    - Redundancy and reliability mechanisms out of scope

IETF/IRTF initiatives and gaps (II)

- NVO3 WG
  - Developing protocols that enable network virtualization overlays within large Data Center (DC) environments
    - Assumes an underlying physical Layer 3 (IP) fabric on which multiple tenant networks are virtualized on top (i.e. overlays).
  - Gaps
    - Very DC specific. Explore whether mechanisms defined can be used outside the DC (mobile NFV)
- DMM WG
  - Looking at mobility solutions that optimize routes
  - Gaps
    - How to run an EPC control plane in an NFV environment
    - No mapping between the generic protocol semantics and the config commands of the network elements

IETF/IRTF initiatives and gaps (III)

- **I2RS WG**
  - Developing a high-level architecture that describes the basic building-blocks to access the routing system through a set of protocol-based control or management interfaces
  - Gaps
    - Integration/extension of I2RS with network virtualisation to provide a smoother SDN environment

- **BESS WG**
  - Defining, specifying, and extending network services based on BGP
  - Gaps
    - Integration of BGP-enabled VPN solutions with SFC could be relevant for mobile network virtualisation

IETF/IRTF initiatives and gaps (IV)

- VNFpool BoF
  - Working on grouping Virtual Network Function (VNF) into pools to improve resilience, provide better scale-out and scale-in characteristics, implement stateful failover among VNF members of a pool, etc.
  - Currently on hold... could provide reliability features needed by SFC

IETF/IRTF initiatives and gaps (V)

- TEAS WG
  - Network virtualization facilitates effective sharing (or 'slicing') of physical infrastructure by representing resources and topologies via abstractions
  - Abstraction and Control of Transport Networks (ACTN) intends to define methods and capabilities for the deployment and operation of transport network resources
  - Gaps
    - Several ACTN use cases relevant to NFV: control of multi-tenant mobile backhaul transport networks, mobile virtual network operation, etc, can be influenced by the location of the network functions
    - A control architecture allowing for inter-operation of NFV and transport network (e.g., for combined optimization) is one relevant area for research

IETF/IRTF initiatives and gaps (VI)

- SDNRG
  - Working on classifying SDN models, including definitions and taxonomies
  - Studying complexity, scalability and applicability of the SDN model
  - Working on network description languages (and associated tools), abstractions and interfaces
  - Investigating the verification of correct operation of network or node function

IETF/IRTF initiatives and gaps (VII)

- NFVRG
  - Looking at NFV research topics
  - Near term work items
    - Policy based Resource Management
    - Analytics for Visibility and Orchestration
    - Virtual Network Function (VNF) Performance Modelling to facilitate transition to NFV
    - Security and Service Verification

Next steps

- The I-D can help identifying new work on network virtualization that needs to be done in IETF/IRTF
  - Linking work items with other relevant SDOs
- May be used to drive new work at IETF/IRTF

- GOAL: help the NFV RG scoping its work, and also the one done at the IETF on virtualization