Latest work in the IETF for SDN and NFV

An overview of the IETF and its work to deliver tools and architectures to support SDN and NFV

Adrian Farrel
Old Dog Consulting
adrian@olddog.co.uk

Overview

- A quick introduction to the IETF
- History of SDN and NFV in the IETF
- Some architectural work
- Preferred technologies
- Current and recent projects
- Why participate in the IETF?
- How to participate at the IETF?

The IETF

- The Internet Engineering Task Force
  - www.ietf.org
- Large
  - 1200 people at face-to-face meetings 3 times a year
  - 2500 people writing documents
  - 6000 people on mailing lists
  - More than 8000 published standards documents
    - Request for Comment (RFC)
- Open
  - Anyone can participate
  - Work is done on mailing lists
  - Network designers, operators, vendors, and researchers
- International
  - Historically main participation from the USA
  - Last meeting (in Chicago, USA)
    - Second largest country represented was China
    - This has been the case for a number of meetings
- Mission Statement:
  "The goal of the IETF is to make the Internet work better"

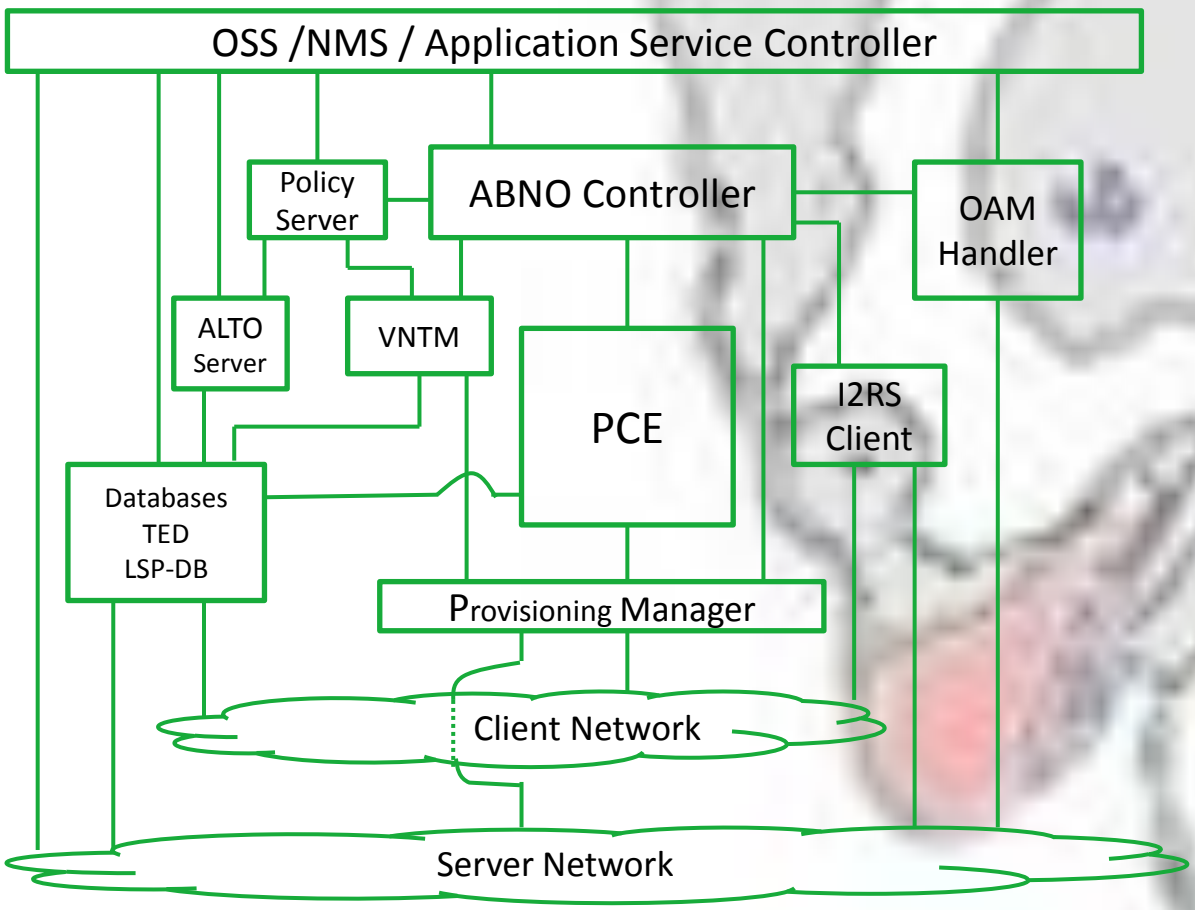
SDN and NFV in the IETF

Architectural Background

- Some high level work
- RFC 7149 Software-Defined Networking: A Perspective from within a Service Provider Environment
- RFC 7426 Software-Defined Networking (SDN): Layers and Architecture Terminology
- RFC 7491 A PCE-Based Architecture for Application-Based Network Operations

Application-Based Network Operations (ABNO – RFC 7491)

- Shows how some of the existing IETF components and protocols can be fitted together to make an SDN system



YANG and Netconf

- The IETF has select the NETCONF protocol as the next generation configuration protocol
  - RFC 6241
  - A RESTful variant is available in RFC 8040
- The IETF has selected YANG as the data modelling language
  - RFC 7950 (version 1.1 of YANG)
- Many standards bodies and Open Source initiatives have embraced NETCONF/YANG
- In practice, YANG models may be transported in JSON
  - RFC 7951 JSON Encoding of Data Modeled with YANG

IETF SDN Projects

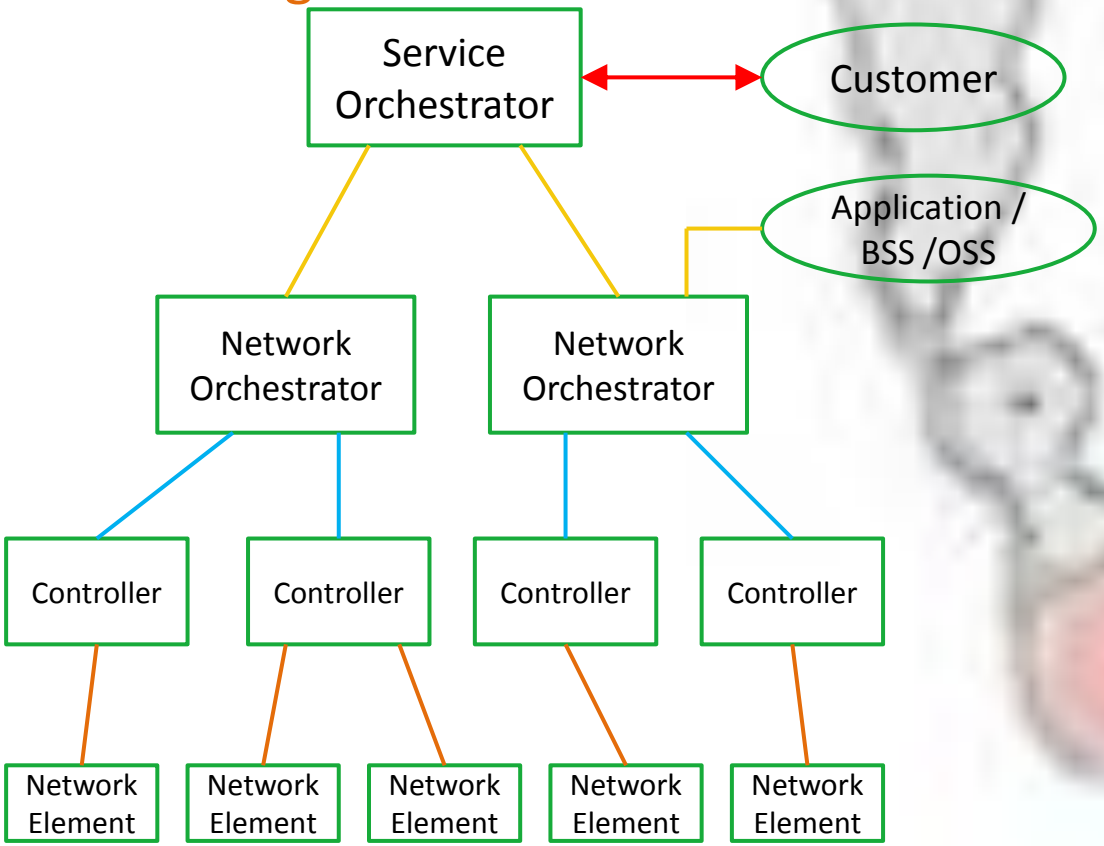
- The IETF is not focussed on a unified SDN architecture
- Instead, the IETF works on specific, tightly focussed problems with an emphasis on protocol specification
- Work is organised into “Working Groups”
  - Each has a charter and milestones
  - Produces Internet-Drafts to become RFCs
  - Works on its own mailing list

A List of SDN-Related Working Groups

- Network Configuration (NETCONF)
- NETCONF Data Modeling Language (NETMOD)
- Path Computation Element (PCE)
  - The PCEP protocol for establishing MPLS LSPs and Segment Routing paths
- Inter-Domain Routing (IDR)
  - BGP-LS, BGP-LU, FlowSpec gather network information and program networks
- Interface to the Routing System (I2RS)
  - To program routing protocols and systems
- L2VPN Service Model (L2SM)
  - Customer-focused SDN
- Simplified Use of Policy Abstractions (SUPA)
- Layer Independent OAM Management in the Multi-Layer Environment (LIME)
- Traffic Engineering Architecture and Signaling (TEAS)
  - Abstraction and Control of Traffic Engineered Networks (ACTN)
- IP Performance Metrics (ippm)
- Many protocol working groups have YANG models
  - BESS, BFD, CCAMP, IDR, ISIS, MPLS, OSPF, PALS, RTGWG

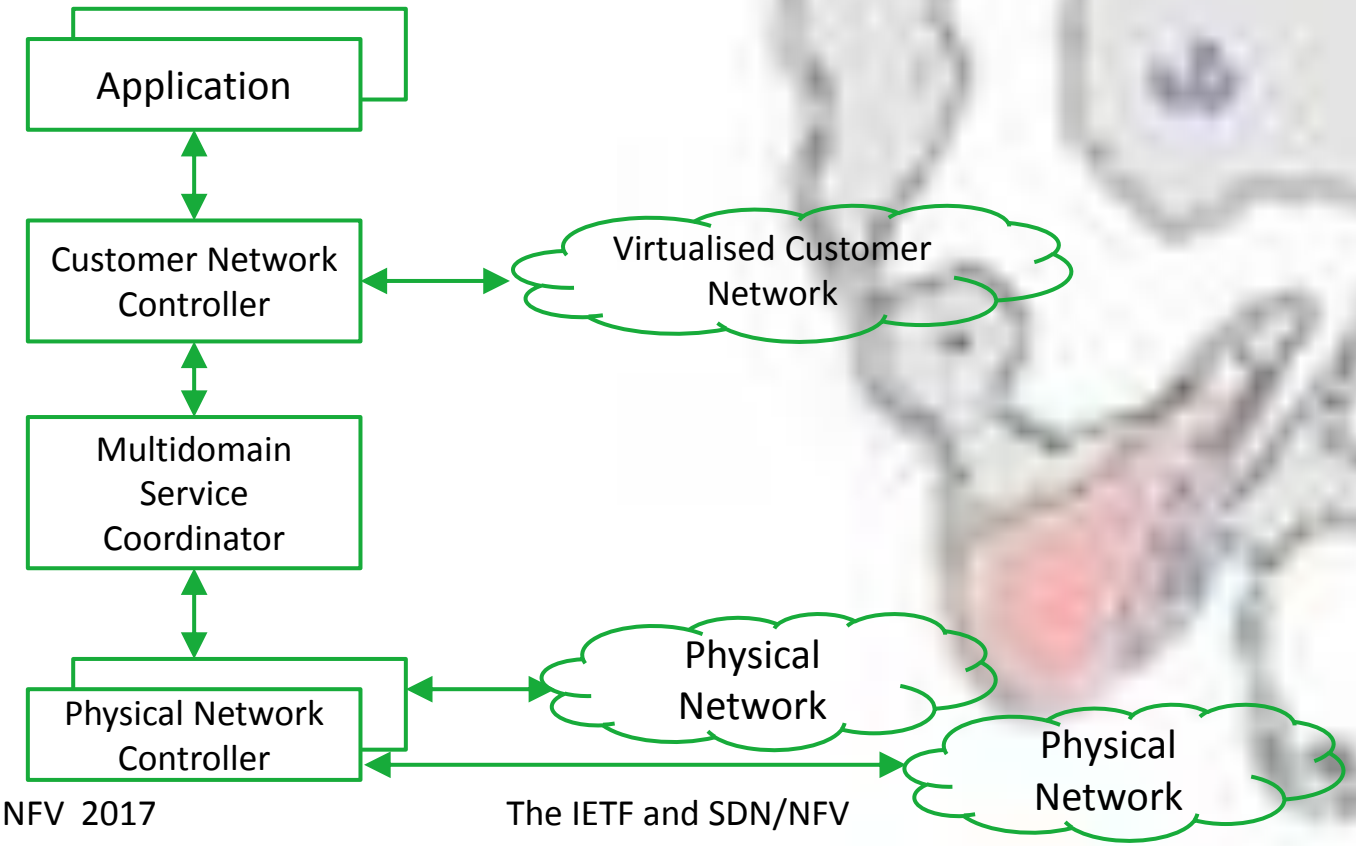
The Service Model Architecture

- Layer 2 VPN and Layer 3 VPN Service Models
- Service Delivery Models
- Network Service Models
- Device Configuration Models



Abstraction and Control of Traffic Engineered Networks (ACTN)

- Creates a virtualised customer network
- Maps down to SDN control of physical networks
- Applicable to “Network Slicing” in 5G applications



IETF NFV Projects

- Network Function Virtualization Research Group (NFVRG)
  - Bring together researchers and grow the community around the world in both academia and industry to explore NFV
- Service Function Chaining (SFC)
  - Architecture and data plane encapsulation for steering packets between service functions
- Source Packet Routing in Networking (SPRING)
  - Source routing of packets between service functions
- BGP Enabled Services (BESS)
  - A BGP-based control plane for service function chaining
- Interface to Network Security Functions (I2NSF)
  - Common interface to operate security service functions

Why Participate in the IETF?

- The IETF is the foremost standards body for the Internet
- If you work in the Internet you need IETF standards (RFCs)
  - Building networks
  - Implementing software or hardware
- If you want to influence what is in the standards, you need to participate

How to Participate in the IETF

- It is easy!
  - There are no barriers to participation
  - You don't have to travel to the meetings
- Start by reading the Internet-Drafts
- Then discuss them on the mailing lists
  - Point out the problems
  - Make the solutions work better
- Bring your new ideas and discuss them
  - Get people to build solutions to your problems
- Come and write code
  - The IETF Hackathon for two days at each IETF meeting
  - Lots of work on OpenSource projects and around SDN

Questions

adrian@olddog.co.uk