

Thoughts on the SDN/NFV Reliability

Chandru Mirchandani, PhD
IEEE SRPSDVE Study Group Meeting
10/29/14

Background

- Service Providers for communication networks are defined by:
 - How good they are
- What does ‘Good’ mean?
 - Reliable
 - Dependable
 - Cost Effective

Reliable

- The term *reliable* connotes different attributes for different domains and services
 - In the cyber world one would consider a good service to be accurate in the quality of data being interchanged (“I can rely on the data”)
 - In law enforcement one would consider the speed and response of the networks (“I can get the data in time”)
 - In the medical world one considers speed and accuracy (“Good information in a timely manner”)

Reliability

- In terms of quality, timeliness, and service availability
 - Quality
 - How much of the data was altered in the delivery from source to sink
 - How much data was lost in delivery from source to sink
 - Timeliness
 - Message or data rate
 - Availability
 - Service is up when needed
 - Minimal downtime

Dependable

- Another facet of ‘good’ systems is fault tolerance..... achieve some design goal with the added attribute of not failing in doing so
 - *Dependability*: One definition of dependability is the quality of the service provided by the system (i.e. it will provide a reliability of R , be available over $A\%$ of the time, will have a safety rating well over the specifications and so on). These other requirements then are measures of how good the quality is and hence can be used to quantify the quality

Dependability

In terms of:

- Reliability
 - Perform over the operational time of the system
- Availability
 - Available to perform its function at any instant of time
- Maintainability
 - How quickly the fault is detected and repaired
- Safety
 - Gracefully fail without harm to other system or persons
- Performability
 - Allow graceful degradation whereby the fault tolerant ability prevents catastrophic failures through compensatory performance hits

Cost Effective

- Any system can achieve 'good' system capabilities, if:
 - Money is no problem
 - Schedule is no problem
 - However, reality impels us to be cost-effective
 - Reliability of the service
 - Dependability of the service
- Within budget and schedule to meet the needs

Solution

- Standard for data quality
- Standard for data transmission
- Standard for data protocols

Which leads to standards for equipment.....

Some Options

Software Defined Networks (Prayson Pate, March 2013)

- Allow network devices to be programmable, and
- Allow control by a central element

Leads to:

- Separation of control and data forwarding functions
- Centralization of control
- Ability to program the behavior of the network using well-defined
- interfaces

Network Functions Virtualization(Prayson Pate, March 2013)

- Uses virtualization to consolidate network equipment types onto standard high volume servers, switches and storage
- Located in Data-Centres, Network Nodes and in the end-user premises

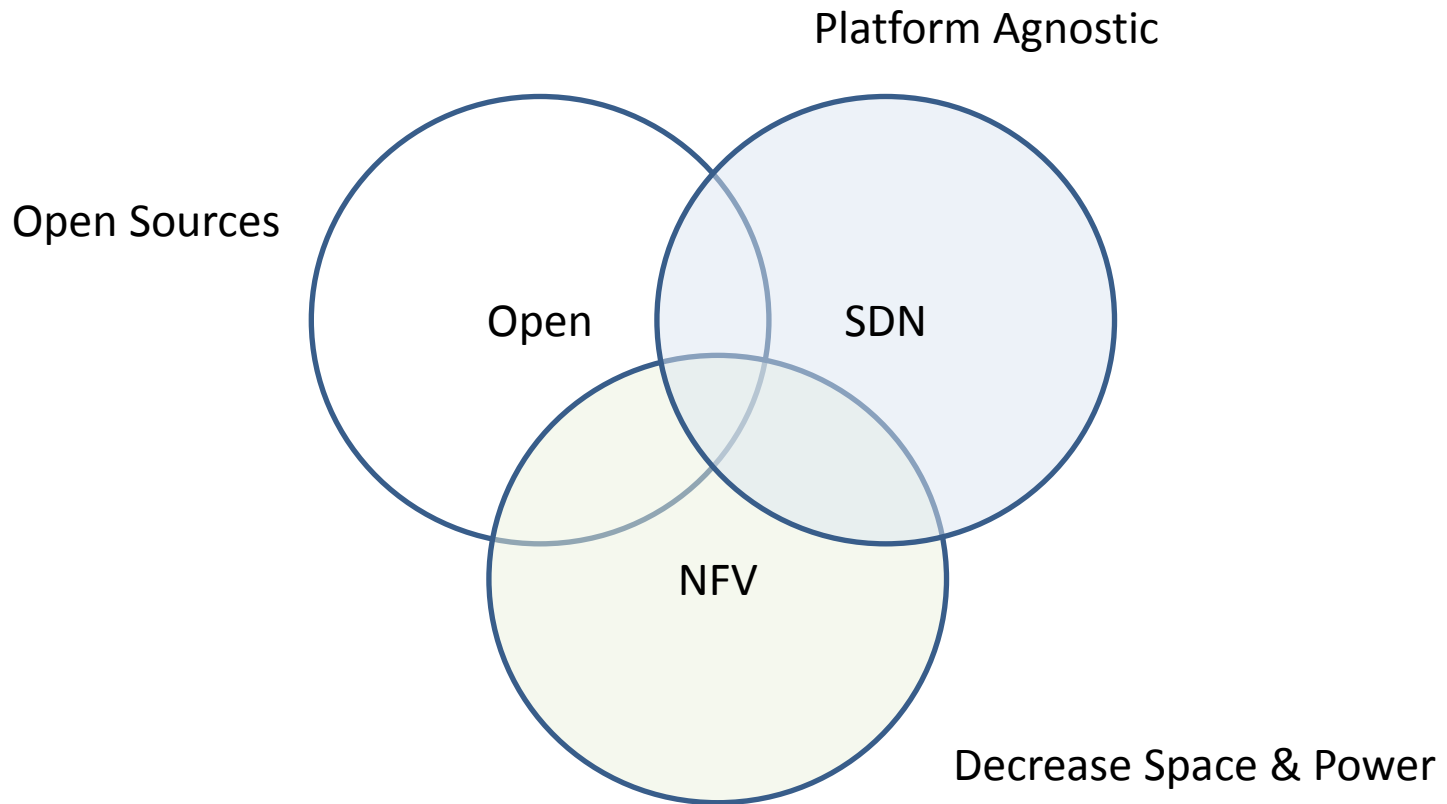
Where:

- Data plane packet processing with
- control plane function in fixed and mobile network infrastructures

Comparisons

- Separation of the control and data
 - Enhances performance
 - Simplifies compatibility with existing infrastructure
 - Facilitates operation and maintenance procedures
- NFV can support SDN
 - Provides infrastructure upon which the SDN software can be run
- Commonality of NFV aligns closely with the SDN
 - Uses commodity servers and switches

Combination of NFV & SDN



Other Factors

- Equipment Reliability Analysis
- Software and Control Reliability Analysis
- People-ware effects