Network Functions Virtualization (NFV) & Software Defined-WAN



Virtualization & Software Defined Network







AT&T keynote at Open Network Summit

"By 2020, we plan to virtualize and control over 75 percent of our network using this new software-defined architecture to meet the growing demands of data and video-hungry users."



John Donovan , CEO – AT&T Communications



Network Demand







Gartner believes







6.4B connected things will be in use worldwide this year, which is up 30% from 2015





Traditional Network Device



- closed & complex vendor specific architecture
- expensive network operation

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Router Architecture





Software Defined Network (SDN) concepts



- Open
- Simple
- Scalable
- Secure
- Agile
- More Reliable
- Flexible
- Cost effective



transform closed architecture ...

• independent, distributed systems and applications







OpenFlow



"whitebox switch"



Network Functions



Switch







Network Functions





Virtualization concepts

HW vs. SW



virtualization in commodity HW



cloud vs. premise based





NFV - Network Functions Virtualization

download App from App store



download VNF from Catalogue on Demand





NFV at AT&T





Transformation to NFV



AT&T FlexWare device





AT&T FlexWare device architecture





Service Chaining (inside AT&T FlexWare device)





YANG + NetConf (configuration of NFV)



- YANG abstraction between customer function and network implementation.
- NETCONF is a standard device configurations protocol Control plane remains in forwarding layer, accommodates distributed networks



AT&T ECOMP – Network OS

Enhanced Control, Orchestration, Management & Policy







ECOMP (ONAP)



AT&T

SD-WAN (Software Defined WAN)

... is a specific application of software-defined networking (SDN) technology applied to WAN connections, which are used to connect enterprise networks – including branch offices and data centers – over large geographic distances





DMPO – Dynamic Multipath Optimization

- automatic link monitoring, autodetection of provider and auto-configuration of link characteristics, routing and QOS settings
- Ondemand, Per-packet link steering based on the measured performance metric, intelligent application learning, business priority of the application, and link cost
- Delivers sub-second protection to improve application availability
- Remediates link degradation through forward error correction, activating jitter buffering and synthetic packet production.







Internet-based SD-WAN





SD-WAN over FlexWare





SD-WAN orchestrator

Ionitor	Monitor Edges > New York Store 1 (Connected)	
Edges Network Services Alerts Events	Overview QoE Links Applications Sources Destinations Business Priority Past 12 Hours Tue Oct 6, 2:39 now <	
configure		
est & Troubleshoot eports dministration	VeloCloud Enhancements	VeloCloud Quality Scores 9.68
View Edge Configuration Events from this Edge	MPLS	() 7.94
Remote Actions	Cable	2.35
	7. Sep 8. Sep 9. Sep 10. Sep 11. Sep 12. Sep 13. Sep 14. Sep 15. Sep 16. Sep Before: Displays the link readiness for traffic based on the actual measured jitter, latency & packet-loss. After: Displays the quality of experience for this edge after VeloCloud optimizations have been applied.	50



