NFV with SDN Service Chaining for Quickest New Revenue

An Infonetics Research Webinar Co-produced with Allot Communications, Dell, and Qosmos

The Webinar Will Begin Shortly
NFV with SDN Service Chaining for Quickest New Revenue

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#servicechaining
Today’s Speakers

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servicechaining
# Agenda

## Market Trends

1. Problems and Challenges
2. New Options and Solutions
3. Deployment Applications
4. Sponsor Approaches
5. Conclusions
6. Audience Q&A

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Real Market: Operators Will Deploy SDN & NFV

- March 2014 Infonetics study
- Interviewed service providers that together control 51% of worldwide telecom capex
  - 52% incumbents
    - 26% competitive
    - 16% independent wireless
    - 6% cable operators
  - 39% from EMEA
    - 32% from Asia
    - 29% from North America

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Operator 2014 NFV Deployment Drivers

- Scale services up or down quickly: 88%
- Use software for quick revenue: 70%
- Use commercial servers, not network equipment: 62%
- Operational efficiencies: 58%
- Multi-tenancy: 48%
- Realtime network optimization: 44%
- Save energy consolidating workloads: 32%
- VNFs from small players: 20%

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Business Revenue Drives Operator NFV

Top 5 Use Cases for NFV Deployment 2014–2015

1. Business vE-CPE

2. Service chaining

3. vIMS core

4. vCDNs

5. vPE

- Many more NFV use case investments in 2014–2015:
  - vNPaaS
  - Consumer home environment (vRGW, vSTB, vFW)
  - Mobile core/EPC, vBNG/vBRAS

- Separately: vE-CPE is top NFV use case for revenue generation

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Service Chaining Basics

Service chaining—on servers in provider network

- Single set of VNFs can serve multiple customers
- Service chain is unique set of services that can be applied to multiple customers
Service Function Chaining (SFC) is Part of NFV MANO

NFV MANO is Service Orchestration, VNF Manager, and VIM

Service Function Chaining happens here

1 EMS per 1 VNF is not efficient

NFV MANO is only an ETSI Architecture: MANO needs definition and APIs

VNFs here

NFVI servers, storage, switches are orchestrated here by OpenStack, etc.

Hypervisors: VMware, Hyper-V, KVM, etc.
NFV Service Chaining

Carrier Requirements

- Telco Grade
- Hybrid (Virtual & Legacy)
- Time to Market
- Reduced Total Cost of Ownership
- Manageability
## Agenda

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#servicechaining
NFV in Reality
The Lego block dilemma

Before

Single Function Appliances
- Proprietary management
- Proprietary Software
- Runtime OS
- Appliance Hardware

Service Silos
- Proprietary management
- Proprietary Software
- Proprietary OS
- Proprietary ASICs

After

Router/
Packet
Gateway
- Proprietary management
- Proprietary Software
- Runtime OS

Courtesy Lego Corporation
NFV in Reality

If all you have is a hammer, every thing looks like a nail – Abraham Maslow*

Plug existing EMS/VNFs into NFV MANO

Service chaining orchestration is tightly coupled with VIM & NFVI

Transposing existing VNFs

- Dynamic service chaining difficult
- EMS/VNF interlock impedes creating revenue-centric service plans
- VIM mostly non-SDN/SDI** centric

Focus on L4-L7 VNFs

- Service chaining focused on infrastructure
- NFVO tightly coupled to VIM, SDN/SDI**
- OSS/BSS systems requires intricate knowledge of the infrastructure

*more info Wikipedia - Law of the instrument, law of the hammer
**SDI = Software Defined Infrastructure
Service Chaining Challenge Before Application-Awareness

Before Application-Awareness:
Video and HTTP traffic go through all service nodes

Inefficient service chaining:
- All traffic is routed through all service nodes
- VMs have to be provisioned for peak traffic
A New Service Is Deployed, Now What?

How does traffic reach the new service chain?

Transparent service requires chaining.

IP connectivity

Service Function Chaining

SF1  SF2  SF3

Management & Orchestration

Parental Control  Video Optimization  Anti Spam
A New Service Is Deployed, Now What?

How does the service chain get only the opt-in relevant traffic intended for it?

Classification should be:
- Subscriber Aware
- Application Aware
- Policy Enabled

Policy | Application Type
--- | ---
Subscriber | Parental Control
Richard | HTTP
George | No

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How does the service chain get only the opt-in relevant traffic intended for it?

IP connectivity

Service Function Chaining

SF1 Parental Control
SF2 Video Optimization
SF3 Anti Spam
VNF scaling requires programmable, subscriber-aware load balancing to maintain subscriber stickiness.

How does SFC manage lifecycle changes in the service chain?

Service Function Chaining

IP connectivity

Management & Orchestration

- SF1: Anti Spam
- SF2: Video Optimization
- SF3: Parental Control
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Create New Revenue by Optimizing Service Chaining

With Application-Awareness: HTTP and video traffic each only go through relevant service nodes

- With a application-aware network infrastructure, network traffic can be routed intelligently, in the right sequence and only to relevant service nodes

- This intelligence:
  - Enables service automation
  - Optimizes usage of infrastructure
  - Enables new types of differentiated service combinations to generate new revenue
Application-Aware Service Chaining, Based on Standards

Management & orchestration

Control plane

Data plane

Service Clients

SFC Application

Orchestrator

SFC SDN Controller

SFC SDN Controller

OpenFlow-Enabled Service Functions

Non-OpenFlow Service Functions

Traffic Source

Classifier

SF Forwarder (OF-Switch)

Traffic Destination

Classifier

SF Forwarder (OF-Switch)

IP/ Security

FW

IDS

IPS

NAT

QoS

Load Balancer

VPN

WOC

Cache

Traffic

Service Clients

Non-OpenFlow Service Functions

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WOC

Cache
No Need to Re-invent the Wheel…

Reuse existing 3GPP APIs promoted by both IETF and 3GPP

3GPP: PCRF is the policy generator for traffic steering policy

TDF handles Classification and Steering

draft-ietf-sfc-use-case-mobility-01
Service Function Chaining Model

SFC Controller

- PCRF (policy)
- Orchestrator (inventory)
- Chain Orchestrator

SF1
- Node 1
- Node 2

SF2
- Node 1
- Node 2

SF3
- Node 1
- Node 2
- Node 3
- Node 4

GGSN/P GW

Gi

Classifier
SFF (+LB)

[TDF/vTDF]

SFC Encapsulation interface
SFPa (SF1->SF2->SF3)
SFPb (SF1->SF2)
Example for traffic flow on SFP2

No SFC Encapsulation interface
NFV ‘Revenue-Centric Chaining’ w/SDN

2 Service-Chains: Revenue-Centric & SDN/Infrastructure-Centric

Revenue Focused NFV

Revenue Chaining
1. Focus on VNF-FG
2. Use VNPaaS API for NFVI interface
3. Enforce Service Policies

Isolate Infrastructure Chaining from Revenue Chaining

NFVI SDN/Infrastructure Chaining
1. Focus on multi-location SDN Fabric (3GPP-PCRF/TDF, SFC/TDF, …)
2. Integrate w/NFVI to deliver VNPaaS
3. Deliver VNPaaS w/ DevOps API

Bonus: Ease Deployment w/Starter Kits

- Service chaining focused on infrastructure
- NFVO tightly coupled to VIM, SDN/SDI
- OSS/BSS systems requires intricate knowledge of the infrastructure
Real Case Deployment Tier 1 Carrier

- L7 Application-Aware Steering
- L2/L3 Transparent
- Steer to Service Chain
- Application-aware service chain assignment
- Load balancer function
- Service failure protection
- Integrates with PCC

Diagram:

- PCRF
- SD
- TDF
- Parental Control
- Video Optimization

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POC Architecture for Tier 1 Carrier

1. Service on-boarding, vTDF programmed
2. Traffic steered per policy
3. Analytics and Monitoring
4. Scaling, vTDF programmed
5. High Availability managed by vTDF
Standards-Based Service Chaining

Management & orchestration

Control plane

Data plane

Service Clients

SFC Application

Orchestrator

SFC SDN Controller

SFC SDN Controller

OpenFlow-Enabled Service Functions

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Traffic
Standards-Based MANO: Defining Dynamic Forwarding Graphs (ETSI VNF FGs)
Standards-Based Control Plane: Provisioning Switches (OpenFlow)
Standards-Based Data Plane: Defining Data Paths (IETF)
NFV Solution Deployment Use Cases at Tier1/Tier2 PoCs

1. vIMS: Virtual IP Multimedia Subsystem
2. vEPC: Evolved Packet Core
3. VS-SC: Virtual Services, Service Chaining
4. OMB: Optimized Mobile Broadband
5. vCPE: Consumer (Home) Premise Equipment
6. vE-CPE: Virtual Enterprise-Customer Premise Equipment
7. vPE: Virtual Provider Edge, Service Anchor Point.
Service Chaining Solution
vPE and vE-CPE Solution
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Service Delivery Principles

- Unified Intelligent Data Plane
- Visibility
- Programmable
- Data Plane Orchestration
- Policy Centric
Solutions that Address the Challenges

Goal: Fast Time to Market and Reduced TCO

**CHALLENGES**
- Harmonize Old and New Services
- Dynamic Service Deployment
- Targeted Service Enablement
- Match Business Needs

**SOLUTIONS**
- Dynamic Steering
- Integrate with Orchestrator
- Intelligent data plane
- Policy Centric
- 3GPP

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Example of a Scenario: Delivering HD Video Service Pack

Qosmos classifies all traffic at application level

Qosmos classifies all traffic at application level

Traffic classification and tagging, forwarding of HD video into defined chain

HD

Classifier

Traffic Source

SF Forwarder (OF-Switch)

Video opt

Sec GW

SFC SDN Controller

Configuration of rules in classifier and switches

Cache

QoS

Qosmos classifies all traffic at application level

CRM

Service/Product catalog
Contract Management
Fulfillment / inventory

Allocation of resources (classifier, video opt, caching)

Subscriber request

1

2

3

4
Revenue Focused NFV
Seek multi-location SDN Platform with Infrastructure Chaining…
…that delivers VNPaaS with a DevOps API + Enables Revenue Chaining

Salient Features
- HA Compute and Controller Nodes
- Non-blocking multi-location Virtual Fabric
- Purpose-built Pay-as-you-grow design

- VXLAN overlay w/HW offload support
- Auto built cabling w/element/fabric provisioning, management, and monitoring
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SDN and NFV are part of all operators’ plans

Service chaining helps with new revenue streams

Intelligent, application-aware service chaining is more efficient

Standards are being defined at a fast pace
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