SDN, SD-WAN, NEV, VNF – I’m confused!

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Introduction to Coevolve

Coevolve was established in 2014 to help drive enterprise adoption of next-generation networking technologies such as SD-WAN. We currently provide services to global enterprises in more than 42 countries on six continents.

Our services:
- Professional services and ongoing management services in a range of network-related practice areas
- Integrate best of breed vendors and services for our clients

Our target market:
- We work directly with enterprise clients and as a specialist partner sitting behind channel partners playing a pivotal role in the SD-WAN ecosystem
- Key industry verticals: Professional Services, Manufacturing, Technology, Engineering, Construction, Mining, Logistics, Retail

Our team:
- Experienced team based in US, Australia, Singapore & Malaysia
- Extensive global contractor network
- Enterprise network experience gained at global service providers, integrators, consulting firms, vendors, analysts

Our Practice Areas

- Cloud Services Integration
- Next-Generation Networks (SDN / SD-WAN)
- Global Vendor Management
- Network & Application Performance
- WAN Optimization
- Unified Communications
- Mobility
- Security
- Internet of Things
ABCs of SDN – where do we start?

**SDN**

**What does the acronym stand for?**

**SDN**

**What does it mean?**

Separating the **control and data planes** to create centrally-controlled, programmable networks

**SD-WAN**

**What does the acronym stand for?**

**SD-WAN**

**What does it mean?**

Loosely applying SDN concepts to the WAN to create a **centrally-controlled overlay network** that intelligently uses a variety of infrastructure options

**NFV / VNF**

**What does the acronym stand for?**

**NFV / VNF**

**What does it mean?**

A Virtual Network Function is a **virtualized task** formerly performed on proprietary, dedicated hardware. NFV is the practice of utilizing VNFs
What does SDN actually mean?

Traditional networks – without SDN

Device Config

Device Config

Device Config

Reporting

Configuration

Device

Device

Device

IP interface Ethernet0/1
ip address 123.456.321.33 255.255.255.248
no ip directed-broadcast
no cdp enable
ip classless
ip route 0.0.0.0 0.0.0.0
ip route 123.456.321.40 255.255.255.248
ip http server
logging 123.456.321.3
access-list 102 deny ip 123.456.321.0 0.0.0.248 any
access-list 102 deny ip host 255.255.255.255 any

SDN-based networks

Application Layer

Business Applications

Reporting

Threshold Alerts

SLA Tracking

Capacity Planning

Control Plane

API

Network Services

Service Templates

API

Data Plane

Programmable Interface
(OpenFlow, proprietary)

Infrastructure Layer

Programmable Interface
(OpenFlow, proprietary)
Why separating the control and data planes matters

1. Transitions the architecture from being **device-centric** to **network-centric**

2. Creates the ability to **program** the network

3. Enables significant improvements in **control** and **visibility**

4. **Simplifies** the network – even as traffic flows become more complex

5. Facilitates the creation of **services** within the network

6. Establishes a framework to **virtualize** components of the network
SDN is constantly in the news – but very little enterprise focus
Heard much about SD-WAN recently?

SD-WAN has quickly emerged as an easily accessible application of SDN that is relevant for the enterprise, not just in very large scale / carrier-like environments.

- More than **$500M in VC funding** in last 5 years
- More than **25 vendors** now claim to have SD-WAN products
- Existing vendors have **reinvented themselves** to focus on SD-WAN
- Several vendors claim deployments **in excess of 50,000 units**

Source: Google Trends
SD-WAN: Overlay networks

Overlay

Branch office

Data center

Branch office

Infrastructure ("Underlay")

Branch office

Internet

MPLS

• Fiber
• Ethernet
• Broadband
• TDM
• 4G
• Satellite
• WiMAX
• Microwave
What’s driving enterprise interest in SD-WAN?

Many SD-WAN benefits come from better packaging! It’s not all new. We hear the following drivers on a regular basis:

1. **Cost savings** from the ability to use low-cost Internet circuits for enterprise WAN
2. **Simplified, secure branch office connectivity** over any (and all) transport types
3. **No manual VPN** key / certificate / IP address management
4. **Transport agnostic**, with the ability to **intelligently use circuits simultaneously** without traditional PBR / ACLs / object tracking complexity
5. **Application-layer policies** and forwarding decisions
6. **Centralized configuration and management** of entire WAN
7. **Detailed insights** into path performance, application usage, top talkers, etc.
VNFs and service chaining

- Deep Packet Inspection engine
- Traffic from LAN
- Traffic forwarded with no VNF
- Forwarding engine

- Internet MPLS Overlay

- Centrally-defined policy applied
- Any traffic matching policy will be automatically pushed to the VNF
- Non-matching traffic bypasses VNF

Security policy

VNF integrated using Service Chaining – next-gen firewall

Traffic from LAN

Forwarding engine

Internet MPLS Overlay
Old vs. new world of networking

- **Switch**
  - Programmable, high port density whitebox appliance

- **Router**
  - Programmable software image running on dedicated or virtual edge hardware

- **Firewall / WANOp**
  - Virtual Network Function integrated using service chaining

- **Netflow / IPFIX**
  - Network-wide reporting data extracted from control plane using API calls

- **SNMP alerts**
  - Network-wide alert data pushed from control plane using API based on a variety of thresholds and conditions

- **Network-based QoS**
  - Business policies implemented through control plane and real-time communication between devices
Conclusion

• SDN is driving significant changes in how networks are architected, managed and updated

• “True” SDN deployments have mostly been in carrier or very large enterprise environments where there is a return on the engineering investment

• SD-WAN has seen a rapid increase in enterprise adoption but is only loosely related to the textbook definition of SDN; it is delivering a different set of benefits in many cases

• Virtualization in the network is long overdue – it is one of the last components of the IT stack to see this change

• Network-based services will become increasingly sophisticated as enterprises adopt more SD-WAN at the edge, combined with other NFVs for common functions
Thank you

Read our CTO’s latest posts on NetworkWorld: networkworld.com/author/Ciaran-Roche

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