



Rapid Fault Isolation in Virtualized Networks

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Network Function Virtualization (NFV)

The use of virtualization technology to run traditional networking equipment/software on commodity server platforms

NFV - Taxonomy



Wireless LAN (vWLC)

- Cisco Virtual Wireless LAN Controller
- Cisco Mobility Services Engine



LAN (vDS)

- Cisco Nexus 1000v
- VMware Virtual Distributed Switch



Unified Communications

- Cisco Call Manager
- Microsoft Lync



Wide Area Networking (vRouter)

- Cisco CSR1000v
- Juniper Firefly
- VPN (SSL/IPsec)
 - Juniper Pulse, Cisco EasyVPN



Firewall (vFW)

- Fortinet Fortigate
- Cisco vASA/cSG
- Juniper vSRX (Firefly)



Wide Area Application Services (vWAAS)

- Cisco vWAAS
- Riverbed Virtual Steelhead
- F5 Web Accelerator / WAN Optimization



Load Balancer (vLB)

- F5 Big-IP Local Traffic Manager
- F5 Global Traffic Manager
- A10 SoftAX



Security Services

- F5 Application Security Manager
- F5 Access Policy Manager
- Arbor Networks Peakflow / Pravail suite
- Cisco Identity Services Engine



VoIP (vPBX)

- Cisco Virtual SBC
- Cisco Virtual Call Manager
- Avaya Virtual Communication Manager



NFV Business Benefits

NFV provide value by allowing “Services” and “Hardware” evolve independently

Simplifies Development

- System integration / automation efforts no longer target a specific hardware platform, which in turn lowers IT costs; however, services still benefit from hardware advancements in CPU, Memory, and Storage.

Speeds Deployments

- Faster deployment on multitenant infrastructure as opposed to waiting for vendors to develop multi-tenant applications. NFV's also eliminate the Data Center logistics around Power, Space, and Cooling.

Increases Scalability

- Multiple NFV's instances can scale up to meet individual customer performance requirements while hardware scales horizontally to facilitate service capacity.

Increases Flexibility

- Single-tenant implementations provide flexibility for service customization, control, and visibility per customer.

Increases Stability

- Single-tenant implementation allow for targeted problem resolution to an individual customer without concern of impacting other customers.



NFV Operational Challenges

Resiliency vs. Optimization

- NFV / SDN resiliency functions can be unintentionally circumvented by the infrastructure attempting to optimize itself.

Predictive Analytics

- Performance & Availability, Logs & Unstructured Data, Capacity Consumption are all measured individually and independently. New tools are needed to detect complex issues from multiple symptoms.

Application Visibility

- Application teams become instantly frustrated by their lack of visibility into the underlying virtualization infrastructure. New tools are needed to provide application owners an appropriate level of visibility along with role based access.

Transitional Challenges

- Not all network functions can be economically virtualized and so the NFV must interface to existing physical network elements.

Vendor Licensing

- NFV Licensing impacts Service Creation & Service Consumption by requiring orchestration and continued tracking and maintenance

Monitoring Virtual Infrastructure vs. Monitoring Virtual Services

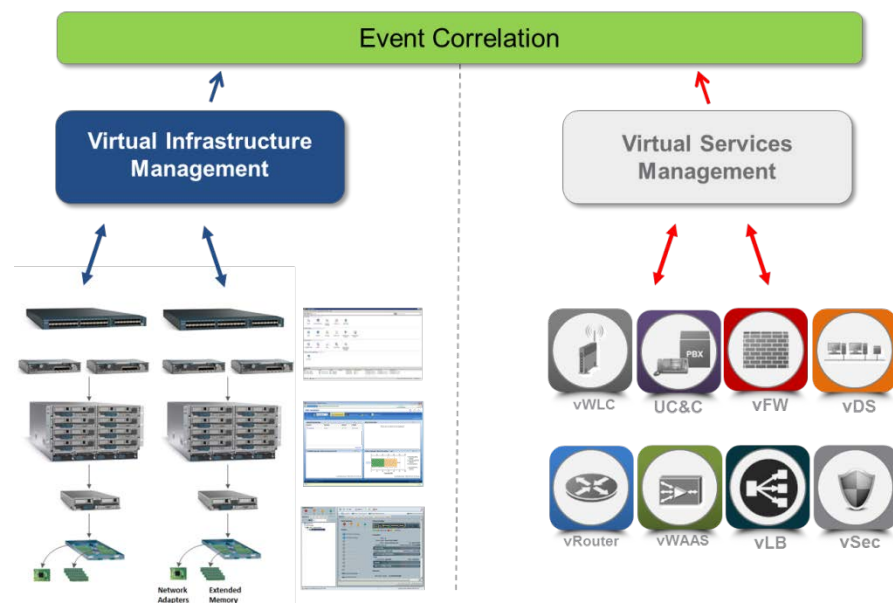
Today

Separate Operational organizations

- Virtual Services Management
- Virtual Infrastructure Management

Virtual Service Management Organizations demand insight into underlying Infrastructure.

- Application teams are instantly frustrated by their lack of visibility into the underlying virtualization infrastructure.
- Cost prohibitive to perform themselves as organization must invest in duplicate tools and licenses.
- Event Correlation layer added above both systems but requires high degree of customization / development.

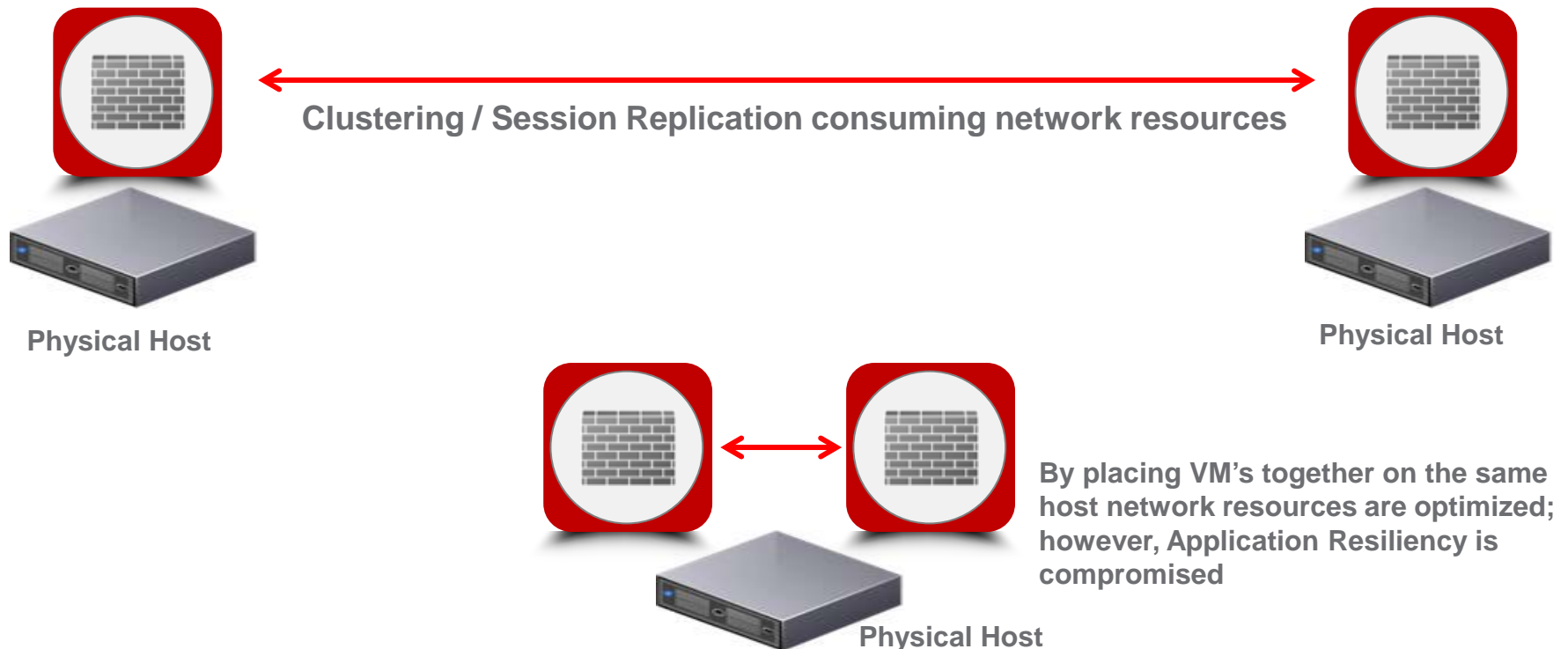


Infrastructure vs Application Performance

Infrastructure and Application Architects need to work together

Resiliency vs. Optimization:

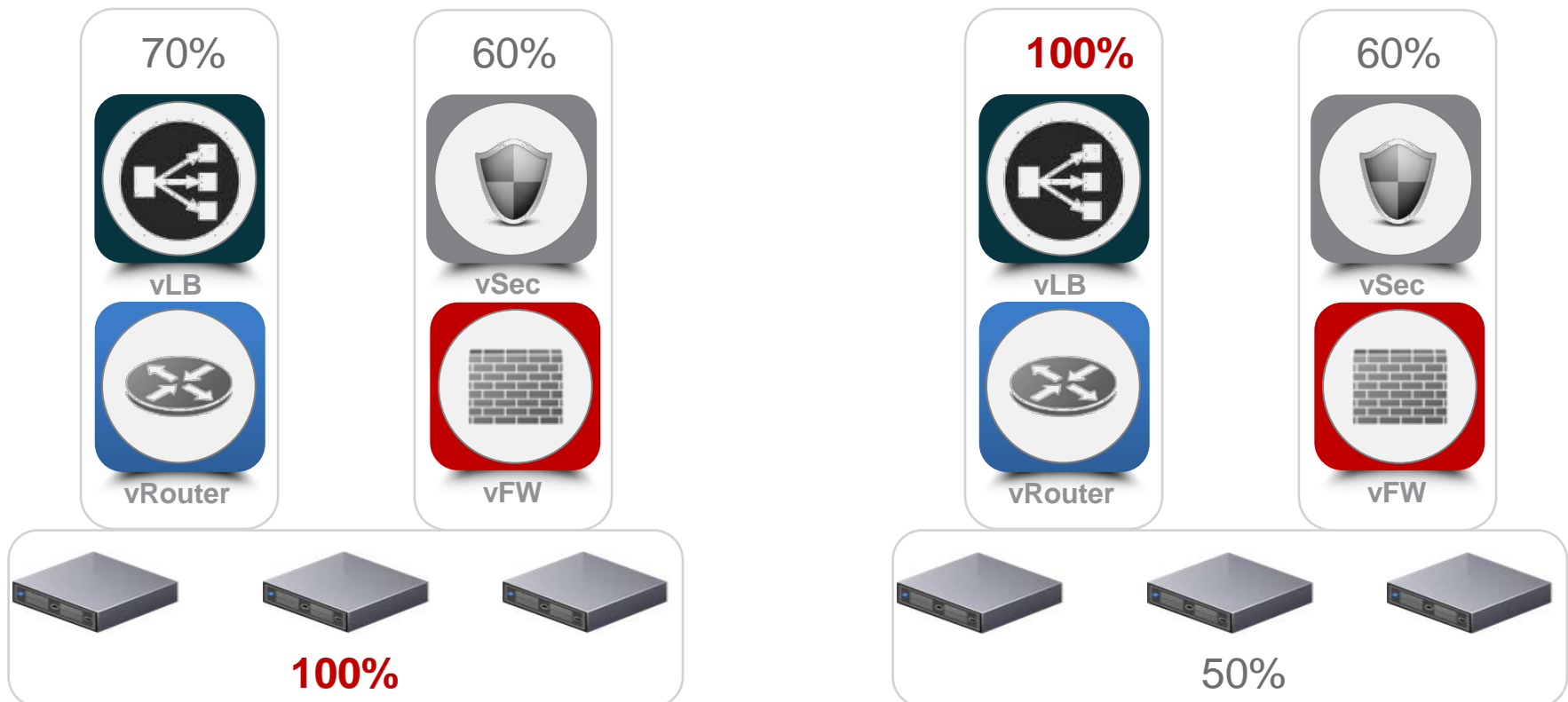
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Infrastructure vs Application Performance

Management & Monitoring tools:

- Rapid Fault isolation requires tools to provide visibility into both the Virtualization infrastructure, as well as, the Application.
- Operational teams need to understand if performance problems are related to underlying Virtualization infrastructure or if the Application Performance has simply reached contractual limitations of what the customer purchased.



Monitoring Virtual Infrastructure vs. Monitoring Virtual Services

Tomorrow

Common view for all Operational Organizations of both infrastructure and service components and how they interrelate.

- **Top to bottom view:** Resource constrained Cluster (1) contains (Hosts X,Y,Z) which impacts Virtual Machines (A, B, C)
- **Bottom to top view:** Datastore (4) is out of storage resources, which impacts Virtual Machines (A, B,C) on Hosts (X,Y, Z) in Cluster (1).
- SDN / Network analytic tools are still in their infancy

