Data Center Modernization Webinar

Charles Apdua
ASEAN Data Center vSales Specialist
What Makes Up the SP DC Architecture?

- **Servers**: Physical Hosts and Virtual Workloads
- **Storage**: Array Based as well as locally attached
- **Network**: Data Center Switching – Layer II/Layer III and FC SAN + Security
- **Software**: Control, automation, analytics, security and visibility
What is Enabling SP DC Architecture?

**Virtualization**: Services are being virtualized to optimize OPEX/CAPEX

**Disaggregation**: Distributed datacenter architecture for better speed and latency

**Automation**: Centralized automation and orchestration for operations
There is Nothing “CENTER-ED” About Data Anymore
A new operating model and growth of cloud native apps

There is Nothing “CENTER-ED” About Data Anymore

- Public Cloud
  A new operating model and growth of cloud native apps
- Private Cloud
- Enterprise DC
  This is where we began, and it’s here to stay
- 5G Telco Edge
  New apps are creating new BW demands
- IoT Edge
  Significant amounts of data are being generated remotely which need to be analyzed, processed, and consumed.
- Enterprise Edge
  Data processing needs to be closer to the sources of demand
- Colo

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The DC Needs to go Anywhere the Data is
Living on the edge
The Intersection of Data and Applications

IT organizations are challenged with securing, monitoring and reliably transporting the dispersed data.

- 5G
- IoT
- Next-Gen WAN Edge
- Cloud

Cloud operational approach
No single management point
Complexity of security
DC Switching
Using DC to Transform the SP

*Legacy migration to modern DC future*

- Legacy gear being de-commissioned
- Moving away from hardened single purpose appliances
- Modern DC hardware and software infrastructure
- Transformed to a multi-purpose cloud
- Built for automation
Nov 2013: Cisco Announces ACI
ACI has grown up
The DC network before
Classic modular switching

- Supervisors (1 or 2)
- Fabric Modules (3-5)
- Linecards (Copper, Fiber, 1/10G)

Single chassis (e.g. Nexus 7000)

Up to 18 RUs Scale-up

The DC network now
ACI

- APICs (1, 3 or more)
- SPINE (1 to 6)
- LEAVES (1 to 200 or more*)

Zero-touch L2 VXLAN
No STP

Single VXLAN Network**
Evolution from Nexus 5000 and Nexus 7000

Scale as you need

* > 200 Leaves with MultiPod/Multi-Site
** Other topologies available (e.g. 3-tier, etc.)
Without ACI

- Chaotic IT Operations
- Slower
  Configurations are not standardized and changes not automated (Inconsistencies/errors/delays)
- Less Efficient
  Tribal knowledge, multiple configuration templates, ad-hoc CLI changes, needle-in-a-haystack troubleshooting

With ACI

- Efficient IT Operations
- Simpler
- Faster
  Software defined networking for multi-cloud environments
- Efficient
  Automate repeated tasks and predicative change impact analysis
Without ACI

- Faster
  - IT administrators work at the application level

- Efficient
  - Shared model for deployment and continuous changes through policy automation

- Simpler
  - Many New Applications

- Slower
  - IT administrators work in silos

- Less Efficient
  - No shared deployment model. Resulting in spreadsheets, checklists, scripts, emails, with individual physical and logical network configurations for each app

With ACI

- New Application
- App Requirements

- Many New Applications

- Simple

- Faster
  - IT administrators work at the application level

- Efficient
  - Shared model for deployment and continuous changes through policy automation

- Slower
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Application Centric Infrastructure
The Network Made Simple

Zero Touch Auto Provisioning
With Policy Driven Automation

Any Hypervisor, Any Workload
Physical, Virtual, Containers

Single Central Management
With Integrated Overlay And Full Visibility

ACI
(Central Network Control Plane)

Nexus 9000
(DC Network)
ACI Anywhere

Automation with Consistent Policy

Virtual ACI  ACI On-Premises  Cloud ACI

Edge / Remote DC  Regional/Central Location  Public or Private Cloud

Security Everywhere  Analytics Everywhere  Policy Everywhere

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ACI Anywhere: **Multi Pod**
Single APIC Cluster Extends Network Virtualization, Policy, Services to Multiple PODs

Multicast on IPN needed & Jumbo Frames (<=1550)

<= 50 ms RTT Required
Up to 12 Pods, distributed gateway

Single central management (APIC)
Automated L2 DCI VXLAN extension
ACI Anywhere: Remote Leaf
Connect On-premises To Remote Offices With Nexus 9000 Switches

Zero Touch Auto Discovery of Remote Leaf
<= 300 ms RTT Required Up to 20 Remote Locations
Single central management Automated L2 VXLAN extension
ACI Anywhere: **Multi Site Orchestrator**

Seamlessly Connect Multiple Data Centers At Scale

**Multi-Site Orchestrator**

Data Center 1 (ACI Site 1)

Data Center 2 (ACI Site 2)

IP Network

VXLAN L2 Extension

Local Router

Nexus 9000 (Remote Leaf Network)

**Features:**

- **No Multicast/No Jumbo Frames**
- **Phased Changes (Zones)**
- **<= 1s RTT Required (MSO → APIC)**
- **Up to 12 Sites, distributed gateway**
- **Single central management (MSO)**
- **Automated L2 DCI VXLAN extension**
ACI Anywhere: **ACI Virtual Edge**  
Decoupled From Hypervisor Kernel APIs

- Policy Consistency Across Multiple Hypervisors
- Enable Migration From Legacy To ACI
- Maintain Existing Operational Models
ACI Anywhere: **ACI Virtual Pod**
Extend ACI To Bare-metal Clouds, Remote Data Centers, and Legacy Infrastructure

Virtual Spine/Leaf Functionality w/AVE integration

Up to 64 AVEs per vPod

Single central management
Automated L2 VXLAN extension
ACI Anywhere: **Public Cloud Extensions**
Seamlessly Connect Multiple Data Centers

Discovery & Visibility
Policy Translation
CSR-1Kv/Direct-Connect integration
Single Point Of Orchestration
Operational Consistency

Encrypted

User VPC
Infra VPC

VM
VM
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VM

EPG Web | Contract | EPG APP | Contract | EPG DB
Web SG | SG Rule | APP SG | SG Rule | DB SG

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ACI Anywhere

- Consistent Network and Policy across clouds
- Seamless Workload Migration
- Single Point of Orchestration
- Secure Automated Connectivity
Applications

- Multi Cloud Workload Protection
- Model based Cloud Agnostic Blueprint
- APL
- Azure
- AWS
- Hypervisor-VMware
- Hypervisor-KVM
- Virtual Services and Security

Application Data Networking

- Network Assurance
- Intent based - Logical Networks
- Overlay Networking (Self Programmable)
- Underlay Networking (Self Programmable)
- Switching Hardware
1. NSX-v (vSphere)
2. NSX-T (KVM, Containers..)
3. Overlay in Software (troubleshooting)
4. Bare Metal workload Policy mgmt.?
5. Underlay Network Automation?
Hyperflex
What Is Hyperconvergence?

Traditional Approach – Converged

HCI is an Appliance that incorporates Server – Storage – Network
And layers on SDS Software

HyperConverged

On-Demand
Agile
Efficient
Simple
Scalable
Enterprise Ready
Cost Effective

NO LEGACY STORAGE CONTRACTS

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HyperFlex Product Overview

Enterprise workloads, Validated solutions
- Citrix VDI deployment (XenDesktop and XenApp)
- Microsoft SQL, Exchange, SharePoint etc.
- Oracle & other mission critical apps
- Backup vendor integrations

Integrated Management
- Manage workloads from familiar vCenter, SCVMM, and Kubernetes
- Leverage HX Connect UI (HTML5) for HX management
- Automate HX operations using HX REST API
- Extend workloads to Google Cloud Platform

Vendor-agnostic Virtualization
- VMware vSphere 6.X
- Windows Server 2016 Datacenter
- Cisco Container Platform

Complete Hyperconvergence
- Fully integrated network, compute, storage, and virtualization
- Highly scalable, resilient, scale-out file protocol
- Fully distributed data system, No data locality
The New HyperFlex Edge
The Power of Cloud-Managed Computing

- Lights out, multi-site parallel deployment
- Rapid cluster profile creation and full stack upgrades
- Flexible scalability and investment protection
- Connected TAC Support

Ultra-light 2-node HyperFlex Edge

Customer Leveraging Existing Branch Network

Cloud Witness Service

Three-node cluster quorum without physical 3rd node!
HyperFlex Data Protection
In-built 1-Click Disaster Recovery

- Test Recovery
  - DR Readiness
  - Customize DR Test parameters

- Planned Migration
  - Move VMs across Data Centers / Clusters
  - Re-Protect after Migration

- Unplanned Failover
  - Recovery VMs after Disaster
  - Re-Protect after Recovery

Long Distance Replication
HyperFlex Stretch Cluster
Cloud Scale Data Platform

Power Mission Critical Apps with

Disaster Avoidance | Maximum Uptime | Zero RPO | Automated DR

HX Data Platform

Site-A

Site-B

Synchronous Replication

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# HyperFlex Product Differentiation

Architected to Optimize Across Hardware, Software, Networking and Management.
Integrated Solution with Single Point of Support

<table>
<thead>
<tr>
<th>High Performance &amp; Scalable Data Platform</th>
<th>Enterprise Class Data Services &amp; Storage Optimization</th>
<th>Seamless integration of Converged &amp; Hyperconverged</th>
<th>Independent Scaling of Compute &amp; Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Performing HCI platform</td>
<td>Integrated Dedup &amp; Compression w/ no performance penalty</td>
<td>Investment protection of existing storage and compute investment</td>
<td>Cost optimization through Compute-only node support</td>
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<td>Consistent, Low latency performance</td>
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<td>3X Lower TCO, 3X Higher VM Density, 64 node scale, linear scale out performance</td>
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<td>Deployment Automation &amp; Simplicity</td>
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<td>Out-of-the-box service profiles, install/upgrade automation, automated cluster scaling</td>
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<td>Monitoring, Telemetry, Analytics, Policy, Orchestration, Proactive TAC, HX Cluster management</td>
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</table>

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<tr>
<th>Broad Range Of Supported Workloads</th>
<th>ROBO (Branch, IOT)</th>
<th>VSI (app/web)</th>
<th>VDI (Citrix, Horizon)</th>
<th>Collaboration (UC, HCS)</th>
<th>Databases (Oracle, SQL)</th>
<th>Mission Critical &amp; ERP (SAP)</th>
<th>Analytics (Splunk)</th>
<th>Cloud-Native Apps (Docker, Kubernetes)</th>
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Cisco Intersight

Centralized Cloud-Based Management of the Future

- Telemetry and Analytics
- Policy Based Orchestration
- Secure and Compliant
- API Driven, DevOps Enabled
- Connected TAC

Remotely Deploy & Manage

- HyperFlex with Intersight
  - Ship to sites
  - Connect to Intersight
  - Deploy & manage remotely

- Conventional Infrastructure
  - Ship from Factory
  - Integrate and Configure
  - Stage
  - Ship People and Infra to Sites
  - IT Deploy On-Site

Compatibility (HCL) Check

Recommendations Engine

Next Generation Management
Cisco HyperFlex Multicloud Services

Application Visibility Engine

Cisco AppDynamics

Cisco HyperFlex

Multicloud Infrastructure

Cisco CloudCenter

Microsoft Azure

Google Cloud Platform

Decision Engine

Deployment Engine

Application Modelling

Instrumentation

Hybrid Cloud Management

Workload Placement

Performance

Application Monitoring

Cisco Workload Optimization Manager
## Primary HyperFlex Use Cases

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Desktop Infrastructure</td>
<td>Low upfront costs, Consistent performance, Predictable scaling</td>
</tr>
<tr>
<td>Server Virtualization</td>
<td>Reduce operational complexity, Adaptive scaling, Always-on resiliency</td>
</tr>
<tr>
<td>Test and Development</td>
<td>Agile provisioning, Frequent iterations, Instant cloning and snapshots</td>
</tr>
<tr>
<td>ROBO &amp; Edge</td>
<td>Simple deployment, Centralized management, No &quot;fly-and-fix&quot; missions</td>
</tr>
<tr>
<td>Databases &amp; ERP</td>
<td>Consistent, low-latency, High IOPS, All-flash nodes</td>
</tr>
<tr>
<td>Containers</td>
<td>Simple &amp; seamless customer experience, Enterprise grade container storage</td>
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<tr>
<td></td>
<td>Cloud native development on prem</td>
</tr>
</tbody>
</table>
One Architecture for Operational Simplicity

Unified Computing System

UCS Management

Intersight

IMC Supervisor

UCS Mini

Fourth Gen. UCS

Mainstream Computing

Converged Infrastructure

Hyperconverged Infrastructure

HyperFlex Systems

UCS C240

UCS C3000

Software-Defined Storage

Scale Out

EDGE

CORE DATA CENTER

CLOUD
Tetration Analytics
Actionable Insights across Applications, Security and Infrastructure

Visibility
Baselining
Correlation
Prediction
Automation

Real-Time, Best in Class Visibility
Faster Anomaly Detection
Code to Customer Insights
Prescriptive Guidance
Self Healing, Self Learning

Application Intelligence: AppDynamics | CWOM
Security Intelligence: Stealthwatch
Infrastructure Intelligence: Tetration

Cross-Domain ITOA
Policy Discovery – What talks to what and how

<table>
<thead>
<tr>
<th>Priority</th>
<th>Action</th>
<th>Consumer</th>
<th>Provider</th>
<th>Services</th>
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</thead>
<tbody>
<tr>
<td>100</td>
<td>ALLOW</td>
<td>Default:Labs:RTP:Pod06</td>
<td>haproxy</td>
<td>TCP: 3306</td>
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<tr>
<td>100</td>
<td>ALLOW</td>
<td>Default:Labs:RTP:Pod04</td>
<td>haproxy</td>
<td>TCP: 3306</td>
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<tr>
<td>100</td>
<td>ALLOW</td>
<td>Default:Labs:RTP:Pod11</td>
<td>nfs</td>
<td>TCP: 2049</td>
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<tr>
<td>100</td>
<td>ALLOW</td>
<td>Default:Labs:RTP:Pod06</td>
<td>nfs</td>
<td>TCP: 2049</td>
</tr>
<tr>
<td>100</td>
<td>ALLOW</td>
<td>Default:Labs:RTP:Pod04</td>
<td>nfs</td>
<td>TCP: 2049</td>
</tr>
<tr>
<td>100</td>
<td>ALLOW</td>
<td>Default:Labs:RTP:Pod14</td>
<td>nfs</td>
<td>TCP: 2049</td>
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<td>100</td>
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<td>haproxy</td>
<td>TCP: 3306</td>
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<td>100</td>
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<td>Default:Labs:RTP:Pod02</td>
<td>haproxy</td>
<td>TCP: 2049</td>
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<td>100</td>
<td>ALLOW</td>
<td>Default:Labs:RTP:Pod02</td>
<td>percona-db</td>
<td>TCP: 4567</td>
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<tr>
<td>100</td>
<td>ALLOW</td>
<td>nfs</td>
<td>Sensor VIP</td>
<td>TCP: 443</td>
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<tr>
<td>100</td>
<td>ALLOW</td>
<td>haproxy</td>
<td>Collectors</td>
<td>TCP: 5640</td>
</tr>
</tbody>
</table>
Use Cases for Tetration

**Workload Discovery**
- Discover workload dependencies while making applications "hybrid cloud ready"

**Network Insights**
- Gain performance insights per application in real time with historical references

**Workload Protection**
- Secure workloads with portable policies across any cloud, any floor tile, any OS

- "ADM"
- "NPMD"
- "CWP"

Network and Operations Buying Centers
Security Buying Center
# Cisco Tetration: Deployment options

## Hardware options

<table>
<thead>
<tr>
<th>Cisco Tetration platform (large form factor)</th>
<th>Cisco Tetration-M (small form factor)</th>
<th>Cisco Tettation as a Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Suitable for deployments of more than 5000 workloads</td>
<td>• Suitable for deployments of less than 5,000 workloads</td>
<td>• Software deployed on Cisco Cloud</td>
</tr>
<tr>
<td>• Built-in redundancy</td>
<td></td>
<td>• 100% Cisco managed, up to 25,000 workloads</td>
</tr>
<tr>
<td>• Scales to up to 25,000 workloads</td>
<td></td>
<td>• No VPN required</td>
</tr>
<tr>
<td>Includes:</td>
<td>Includes:</td>
<td></td>
</tr>
<tr>
<td>• 36 Cisco UCS® C220</td>
<td></td>
<td><img src="image" alt="Amazon Web Services" /></td>
</tr>
<tr>
<td>• 3 Cisco Nexus® 9300</td>
<td></td>
<td><img src="image" alt="Microsoft Azure" /></td>
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</table>

## Software/Service Option

<table>
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<tr>
<th>Cisco Tetration SW Only</th>
<th>Cisco Tettation Cloud Deployment</th>
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<tbody>
<tr>
<td>• Software deployed on VMW</td>
<td>• Software deployed in public cloud</td>
</tr>
<tr>
<td>• Suitable for deployments of less than 1000 workloads</td>
<td>• Suitable for deployments of less than 1000 workloads</td>
</tr>
<tr>
<td>• Generic HW requirements</td>
<td>• Public cloud instance owned by customer</td>
</tr>
</tbody>
</table>

## Public cloud

- Cisco Tettation Cloud Deployment
  - Software deployed in public cloud
  - Suitable for deployments of less than 1000 workloads
  - Public cloud instance owned by customer
Cisco Tetration software-as-a-service option

Cisco Tetration™ SaaS

- Software-as-a-service model: No need to purchase, install and manage hardware or software
- Fully managed and operated by Cisco
- Suitable for commercial customers and SaaS-first/SaaS-only customers
- Flexible pricing model; lower barrier to entry
- Quick turn up
- Scales to up to 25,000 workloads

Software subscription license based on number of workloads; available in 1-, 3- and 5-year terms