Cisco Knowledge Network Webinar
Building the Hybrid Cloud

Presenters:

Jonathan Carmel – Data Center Solution Specialist
Patrick Hemstreet – Data Center Network Sales Specialist
June 6th, 2019
CTO Tareq Amin stated Rakuten Mobile Network (RMN),

“Our vision is to build a network that innovates at the speed of software and scales at the speed of cloud,”

https://www.telecomtv.com/content/mobile/how-rakuten-stole-mwc-s-thunder-34347/
It’s A Hybrid Cloud World Out There

- Evaluating or using public cloud: 85%
- Taken steps towards a hybrid cloud strategy: 87%
- Plan to use multiple clouds: 94%

Source: Cisco Global Cloud Index, Feb-18

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Hybrid Cloud. The Distributed Datacenter
Cloud first is the new reality

% of respondents (n=601)

"Which of the following best describes the primary environment in which your organization's (Workload) will be operated two years from now?"

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Strategic cloud imperatives

IT must adapt faster than ever before

1. Modernizing IT infrastructure
2. Automating & optimizing business operations
3. Automating & optimizing IT operations
4. Transforming customer interactions
5. Transforming employee interactions

Sources: Q2 & Q3, Cisco IT Talent Survey, phone-to-web survey of 600 business and IT executives in the US and Europe (UK, Germany, France, Switzerland); fielded October 2017

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Multicloud challenges facing our customers

- Security and risk management
- Complex deployment and management
- Cloud lock-in and cost control
- Poor app performance and user experience
Cloud first. But where?

Operational Issues:
Control / Mission Criticality

Business Issues:
Data Governance / Regulations/ Sensitivity

Application Issues:
Latency, Data Gravity, Feature Support

#1 Cited inhibitor to
public cloud = security

#1 Cause of repatriation to
private cloud = performance

Good multicloud starts at home
The right private cloud is that middle ground

Service Management
Self-Service Portal, Role-Based Catalog
Private Cloud Arch., Platform Builder, DevOps, LoB, Apps Developer

Cloud Management
Workload Orchestration

Infrastructure Automation and Optimization
Resource Optimization of Cloud and Virtualized Environments
Private Cloud Infrastructure as a Service
Compute, Network, Storage, Converged, Hyperconverged, Containers, Physical and Virtual, Stacked Solutions

Brocade | Citrix | F5 Networks
IBM | Microsoft | NetApp | Pure Storage
Red Hat | VCE | VMware

Rich Ecosystem

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HyperFlex
Platform to Simplify Your Future

Cloud Based Mgmt. Automation
- AI Driven IT Mgmt. (AI Ops)
- Application Performance Monitoring
- Intelligent Workload Placement

Simplified Multicloud Operations
- Multicloud Platform
- Integrated Kubernetes
- HCI Workload Protection and Analytics (Tetration)

Distributed Edge Application Support
- AI Driven Apps and Inferencing
- IoT
- Remote Office/Branch Office (ROBO)
Bringing the cloud experience on-premises

- Pathway to microservices
- Full stack monitoring and security
- Agile resource provisioning
- Packaged workload management
- Easy consumption model

Cisco CloudContainer

AppDynamics

Cisco Workload Optimization Manager

Cisco Cloud Container Platform

Cisco HyperFlex Multicloud Platform

Data Center  Private Cloud  Edge Site

HYPERFLEX Multicloud Platform

Any app. Any cloud. Any scale

- Pathway to microservices
- Full stack monitoring and security
- Agile resource provisioning
- Packaged workload management
- Easy consumption model
## 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>
</tr>
<tr>
<td>Consistent, Low latency performance</td>
<td></td>
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<tr>
<td>3X Lower TCO, 3X Higher VM Density, 64 node scale, linear scale out performance</td>
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<tr>
<td>Deployment Automation &amp; Simplicity</td>
<td>Integrated High Performance Network Fabric</td>
<td>Data Protection, High Availability &amp; Resiliency</td>
<td>Cloud based centralized management</td>
</tr>
<tr>
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<td>Monitoring, Telemetry, Analytics, Policy, Orchestration, Proactive TAC, HX Cluster management</td>
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### Broad Range Of Supported Workloads

- ROBO (Branch, IOT)
- VSI (app/web)
- VDI (Citrix, Horizon)
- Collaboration (UC, HCS)
- Databases (Oracle, SQL)
- Mission Critical & ERP (SAP)
- Analytics (Splunk)
- Cloud-Native Apps (Docker, Kubernetes)
Supporting your Ecosystem Anywhere

<table>
<thead>
<tr>
<th>Enterprise Apps</th>
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<tbody>
<tr>
<td>Citrix</td>
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<tr>
<td>Microsoft</td>
</tr>
<tr>
<td>VMware</td>
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<tr>
<td>Oracle</td>
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<tr>
<td>SAP</td>
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<tr>
<td>Oracle HANA</td>
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<tr>
<td>XenDesktop</td>
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<td>SIEBEL</td>
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<tr>
<td>Oracle E-Business Suite</td>
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<tr>
<td>PeopleSoft</td>
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<tr>
<td>Splunk</td>
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<tr>
<td>Episys</td>
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<tr>
<td>Salesforce</td>
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<td>Microsoft SharePoint</td>
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<tr>
<td>Dell</td>
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<tr>
<td>IBM</td>
</tr>
<tr>
<td>VMware vCenter</td>
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<tr>
<td>Oracle NetSuite</td>
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<tr>
<td>Microsoft Exchange</td>
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<tr>
<td>Citrix Webex</td>
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<table>
<thead>
<tr>
<th>Hybrid/Multicloud</th>
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<tbody>
<tr>
<td>Google Cloud</td>
</tr>
<tr>
<td>Amazon Web Services</td>
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<tr>
<td>Microsoft Azure</td>
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<tr>
<td>Cisco Cloud Center</td>
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<tr>
<td>AppDynamics</td>
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<tr>
<td>Cisco Workload Optimization Manager</td>
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<tr>
<th>Containers / Cloud Native Apps</th>
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<tbody>
<tr>
<td>Google Cloud Platform</td>
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<tr>
<td>OpenShift</td>
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<tr>
<td>Kubernetes</td>
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<tr>
<td>Docker</td>
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<tr>
<td>Cisco Container Platform</td>
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<tr>
<th>Intelligent Management (AI Ops)</th>
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<tbody>
<tr>
<td>Citrix Cloud</td>
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<tr>
<td>Turbonomic</td>
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<tr>
<td>Citrix Entelligence</td>
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<tr>
<td>OpenVINO</td>
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<tr>
<td>Skymind</td>
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<tr>
<td>Anaconda</td>
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<tr>
<td>Nvidia</td>
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End-to-End Modernization Today
Game Changing Results

3x Lower Latency vs Competitive HCI\(^1\)
50% Improvement in ERP Response Time\(^5\)
30% More Performance for Mission Critical Apps\(^4\)
91% Downtime Reduction\(^1\)

50% Lower Cost of Operations\(^2\)
80% Savings vs. 3-tier Infrastructure\(^1\)
75% Management time savings\(^3\)
51% Savings vs. Public Cloud Over 3 years\(^2\)

3500+ Customers Are Saying:

\(^1\): 2019 ESG, Mission-critical Workload Performance Testing of Cisco HyperFlex All-NVMe with Intel Optane SSD on the Cisco Unified Computing System Platform (UCS)
\(^2\): 2019, IDC Business Value of Improved Performance and Agility with Cisco HyperFlex
\(^3\): See back up slides for sources from customers
Unlocking the power of data at the edge

**Enterprise and Telco Edge**
- Cisco HyperFlex Hybrid
- Cisco HyperFlex Edge

**Edge Computing and IoT**
- Cisco HyperFlex Edge
- Cisco UCS C-Series

**Content Delivery**
- Cisco UCS S3260 Storage Server

**Backup/Archive/Recover**
- Cisco S3260/C240
- Veeam, Commvault, Cohesity......
New Intel Technology
NEXT INTEL® XEON® SCALABLE PROCESSOR

CASCADE LAKE
WITH INTEL® OPTANE™ DC PERSISTENT MEMORY

- Leadership Performance
- Optimized Cache Hierarchy
- Higher Frequencies
- Support For Intel® OPTANE™ DC Persistent Memory
- Security Mitigations
- Optimized Frameworks & Libraries
Raw Component Performance Comparison
INTEL® OPTANE™ DC PERSISTENT MEMORY

Plenty and affordable Memory
128, 256, 512GB

High performance storage (latency, bandwidth, QoS, endurance)

Application managed memory

DDDR4 pin compatible

More and extended VMs
Targeting > 1.2X VM at cost parity†

Capacity for In-Memory Database at near-DRAM performance

Super-fast storage
Targeting > 3X NVMe performance

Larger memory pools
Up to 3TB (not including DRAM)

PROVIDES LOWER AND CONSISTENT LATENCY WITH MORE CAPACITY PER DOLLAR

† Not all VM's are same and pending on usage and application, the results may differ.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit http://www.intel.com/performance.
Intel persistent memory target use cases

- **CLOUD & VMS**
  - Extended VM Memory Capacity
  - More VM’s and Containers per System
  - OS Memory Extension

- **DATABASE**
  - In-Memory Database
  - DB Caching Tiers with Higher Capacity
  - Logging
  - RDMA Replication

- **STORAGE**
  - Super-fast Storage
  - Meta-data Management
  - Write Buffers
  - Caching Layers

- **HPC**
  - Larger Memory
  - Check-pointing
  - PMoF
  - File System Swap

- **ANALYTICS**
  - Off-Heap Memory
  - Real Time Analytics
  - Emerging Analytics Platforms
  - Machine Learning Analytics

- **COMMS**
  - NFVi
  - Cognitive Networking
  - Content Delivery Network (CDN)

= Initial Launch Application Targets
It’s all about the applications
Workloads that manage themselves

**Workload Optimization Manager**

**Dynamic Workload Optimization**
Automatically allocate resources to the workloads that need them the most,

**Increase infrastructure efficiency**
Automatically maximize workload density and resource utilization, minimizing

**Workload Management**
Automatically place, size, and move workloads while always maintaining
Keeping up with the pace of business

Cisco Cloud Center

Putting you in control of your multicloud
- Agile workload deployments
- Increased control, avoid cloud lock-in

IT as a strategic business enabler

Workload performance monitoring
- Real time visibility into app performance
- Optimized end user experience

AppDynamics
It’s multicloud that delivers

- **58%** faster network provisioning
  - Reduced time
  - Cisco ACI
  - IDC: Cisco IT

- **51%** lower cost than public cloud
  - 3-year cost savings
  - Cisco HyperFlex Multicloud
  - IDC: Expert ROI spotlight

- **25%** faster business transactions
  - Better app performance
  - AppDynamics
  - IDC: Expert ROI spotlight

- **40 minutes**
  - App deployments from 4–6 months to 40 min.
  - Cisco CloudCenter
  - IDC: Expert ROI spotlight
Extending policy into the multicloud
Business Requirements driving change

**Consumer Simplicity**
Technology has enhanced how we shop, bank, and vacation - all from our phones or laptops.

**Cloud Advantage**
It’s not just about cost and agility anymore, business innovation is the competitive advantage.

**Apps on-prem & cloud**
New generation of cloud, container, virtual workloads move around fast and go where the resources reside

**IT Ops Complexity**
Data Centers have to deliver with no room for error or downtime to support these innovations.

**Multicloud Hurdles**
Security, compliance, migration, cost control, performance, lock-in, skills gaps...

**Wide Attack Surface**
Compromised security posture due to inconsistent policies and not enough resources to focus on malware and breaches

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The DC Needs to go Anywhere the Data is, as does security and policy
Application and traffic evolution—Data Center Modernization

- Many legacy applications are monolithic and self contained.
- Legacy networks were designed for North South traffic.
- Companies are modernizing apps which means breaking up legacy applications into multi-tiered and micro services. (East West)
- Containers and micro services will continue this trend.
- Many hypervisors, bare metal, containers, how to handle this?
Secure Hybrid Data Center with ACI

The challenge in building large data center fabrics, whether it’s Facebook’s or other large data centers, is that it must scale as one logical, high-performance entity. This requires the ability to plug in modular elements and be able to “scale-out” in rapid fashions as new resources and networking elements are needed.

• ACI is managed, monitored and configured as a high performance, highly scalable system.

• Single pain of glass either as a single system or multiple DC’s, cloud(s), etc. (APIC/MSO)

• Scale up or down-capacity through leafs and bandwidth through spines.

• Like UCS service profiles, ACI Application Network Profiles help reduce config errors that could lead to security issues—Policy is contained in the application profile.
Spine Leaf Architecture
Application discovery and dependency mapping with Tetration

Cisco Tetration application segmentation
Policy recommendation

Public cloud

Private cloud

On-premise

Cisco Tetration™

Application workspaces

Application segmentation policy

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Application mapping-(Application Network Profiles)
Consistent Policy Everywhere

• ANPs (Application Network Profiles), contain end point groups, contracts and filters between end point groups.

• Contracts between end point groups provide security (ACI’s) and allow for service chaining like firewalls, load balancing, etc.

• This is how ACI builds out VxLANs.

• ACI Anywhere provides consistent policy enforcement no matter where the workload is.

• ACI is secure, multi-site, multi-tier and multi-tenant.

• Supports VMware, KVM, MSFT, bare metal, and containers.

• Less space, power, cooling and operational costs than previous solutions.
Why ACI is the best SDN solution in the market?

ACI provides a single point of management for a physical and/or virtual fabric.

It has built in multi-tenancy, distributed switching, distributed routing, and distributed security policy capabilities that can easily be extended to multiple physical locations and public clouds.
Why ACI is the best SDN solution in the market?

Out of the box ACI provides centralized:

- Zero touch automated switch discovery, provisioning, and replacement. Topology views, and endpoint visibility, for the entire fabric on prem. and off.
- Secure multi tenancy.
- True micro segmentation for physical and virtual workloads, without the need of external devices or software, using a white list model. Physical or virtual FWs can be used for full NGFW requirements if the customer wants it.
- Service insertion with physical and virtual appliances
- Integration with bare metal workloads, VMW ESXi, MSFT Hyper-V, OpenStack, Red Hat RHEV, Containers. (Kubernetes, OpenShift, Cloud Foundry)
- ACI Anywhere architecture for management and visibility of on prem, as well as remote virtual and physical leafs, and native integration with public clouds.
ACI Anywhere: On-Prem Connectivity To AWS
VPC With Direct Connect + VPN

Site A, B etc
On-Premises

DX Location
BGP EVPN Control Plane
VXLAN TUNNEL (DATA PLANE)
OVERLAY

Public Cloud
Site B

User VPC-1
AWS Instances

User VPC-2
AWS Instances

Infra VPC

AWS Region

ACI 4.1

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Nexus Full Stack Subscription-Option
Accelerate innovation and enhance the value of the network

Access to the latest and greatest software and hardware innovations with refresh cycles of 3/5 years

Benefits

- Offered in a single subscription invoice
- Same terms for Hardware + Software + Support
- Consistent product refresh cycle
- Predictable access to product innovations

Orderable: With ACI/NXOS and Nexus 9300
Only available in US now.

Please contact your Account team or Partner for more details on how to get started.
## Cost reduction and ROI
Cisco IT benefits after Cisco ACI Implementation

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Projected</th>
<th>Actual</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater Business Agility</td>
<td>58%</td>
<td>67%*</td>
<td>Reduce Network Provisioning</td>
</tr>
<tr>
<td>Lower Capital Expenses</td>
<td>25%</td>
<td>67%</td>
<td>Reduce Network CAPEX</td>
</tr>
<tr>
<td>Reduced Costs/Complexity</td>
<td>21%</td>
<td>**</td>
<td>Reduce Network Management Cost</td>
</tr>
<tr>
<td>Lower Operating Cost</td>
<td>45%</td>
<td>91%</td>
<td>Reduce Network Power and Cooling Costs</td>
</tr>
<tr>
<td>Increase Data Center Space</td>
<td>19%</td>
<td>66%</td>
<td>Reduce Network Footprint</td>
</tr>
<tr>
<td>Resource Optimization</td>
<td>12%</td>
<td>20%</td>
<td>Optimize Infrastructure</td>
</tr>
</tbody>
</table>

*excluding ACC self-service
**on target for projected
Achieve automation, security, mobility, and visibility, required for successful digital transformation, through tighter full stack integration.
The Cisco difference

1. Simplification
   Delivering the multicloud that never was

2. Transformational
   The have-it-all multicloud experience

3. Expert Services
   Accelerating your multicloud transformation
Thank You.