

SI Fachgruppe Networks
and Cloud Services

SDN im Data Center

Ciscos Antwort auf neue Anforderungen im Data Center

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Mai 2015

Agenda

- Past and Future DC in networks
- SDN - Software Defined Networking
- Cisco Application Centric Infrastructure

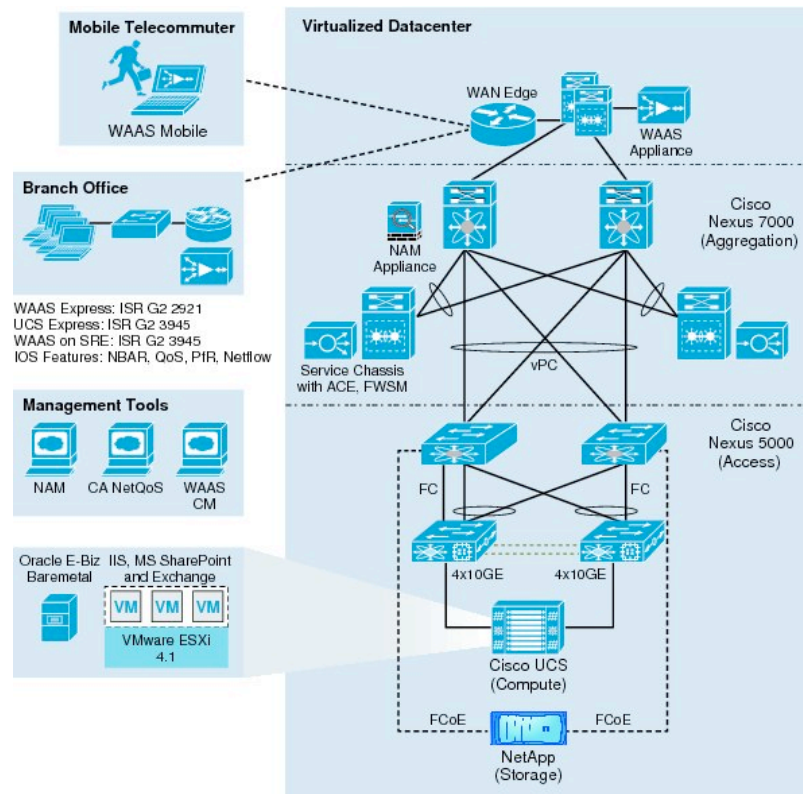
Cisco Data Center Strategy & Vision

Defined by **Applications**. Driven by **Policy**. Delivered as a **Service / Solution**



Past and Future Network Designs

Past Network Designs



- 2-Tier (collapsed) or 3-Tier Network Design
- Routing on Access or Aggregation
- Loop-Free Topology with vPC (MLAG)
- Spanning Tree as a loop prevention

Data Center and Cloud – Top Challenges Business Expectations in the new era



What's "Bi-Modal IT"?

Think
Marathon
Runner

Trait	Mode 1 – Reliable	Mode 2 – Agile
Value	Price for performance	Revenue, brand, customer experience
Objectives	Cost reduction Cost predictability Build to a specification Reliable, secure, well-managed risks	Flexibility and speed Manage uncertainty Validate, learn, pilot Fail fast, fail frequently, fail small
Governance	Plan-driven, approval-based	Empirical, continuous, process-based
Culture	IT-centric, removed from customer	Business-centric, close to customer
Requirements	Predictable and known functionality Performance requirements are known Capacity needs can be predicted	Requirements change frequently Requirements are uncertain Unpredictable capacity needs, scale to demand
Rate of Change	Stable, low-change, incremental change	Rapid and frequent
Sourcing	Mature technology Mature suppliers Long-term deals	Technology may be immature Suppliers may be small or immature Short-term deals
Personality	Linear, step-by-step, slow but steady	Inquisitive, thrives on change
Cycle Times	Long (months)	Short (days, weeks)

Think
Sprinter



Source: Gartner (March 2015)

How Datacenter Networks need to evolve

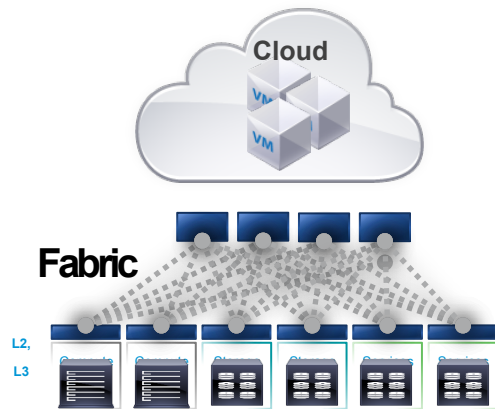
Distributed



- Manual Provisioning
- Limited scaling
- Rack-wide VM mobility

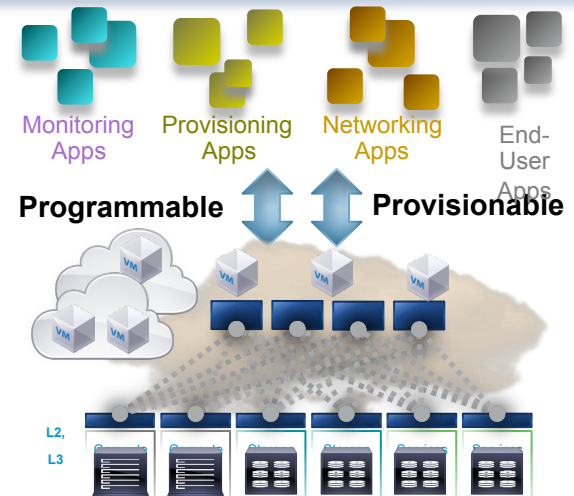


Fabric Based



- Policy-based Provisioning
- Scale Physical and Virtual/Cloud
- DC-wide/Cross-DC VM Mobility

Application Driven

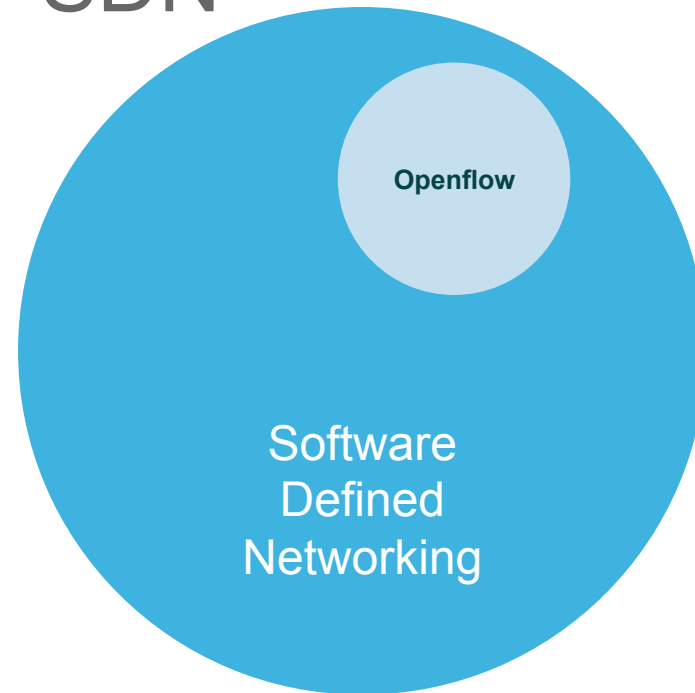


Integrated Fabric and Cloud World of Many Clouds

- Service-centric Provisioning
- Flexible – Anywhere, Anytime
- Cross-cloud VM Mobility

SDN – Software Defined Networking

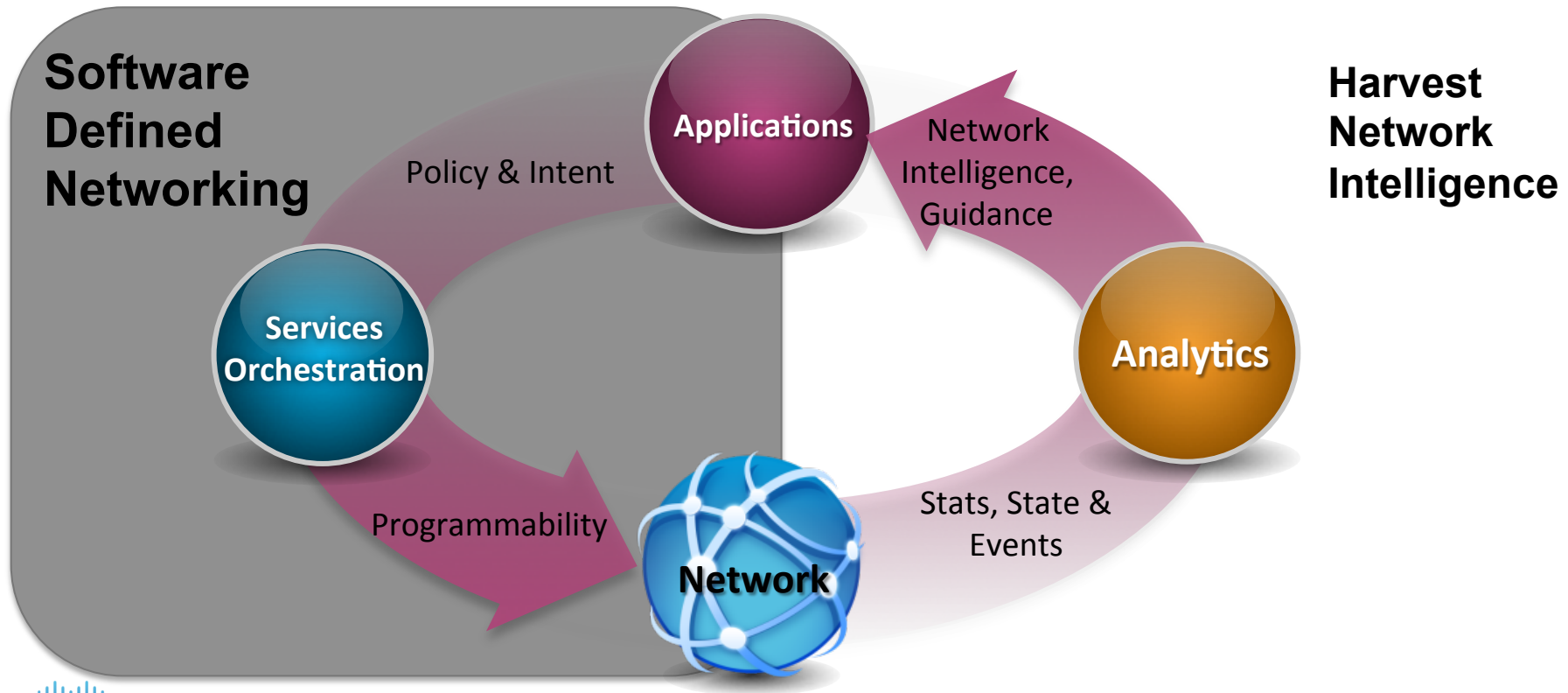
Openflow != SDN



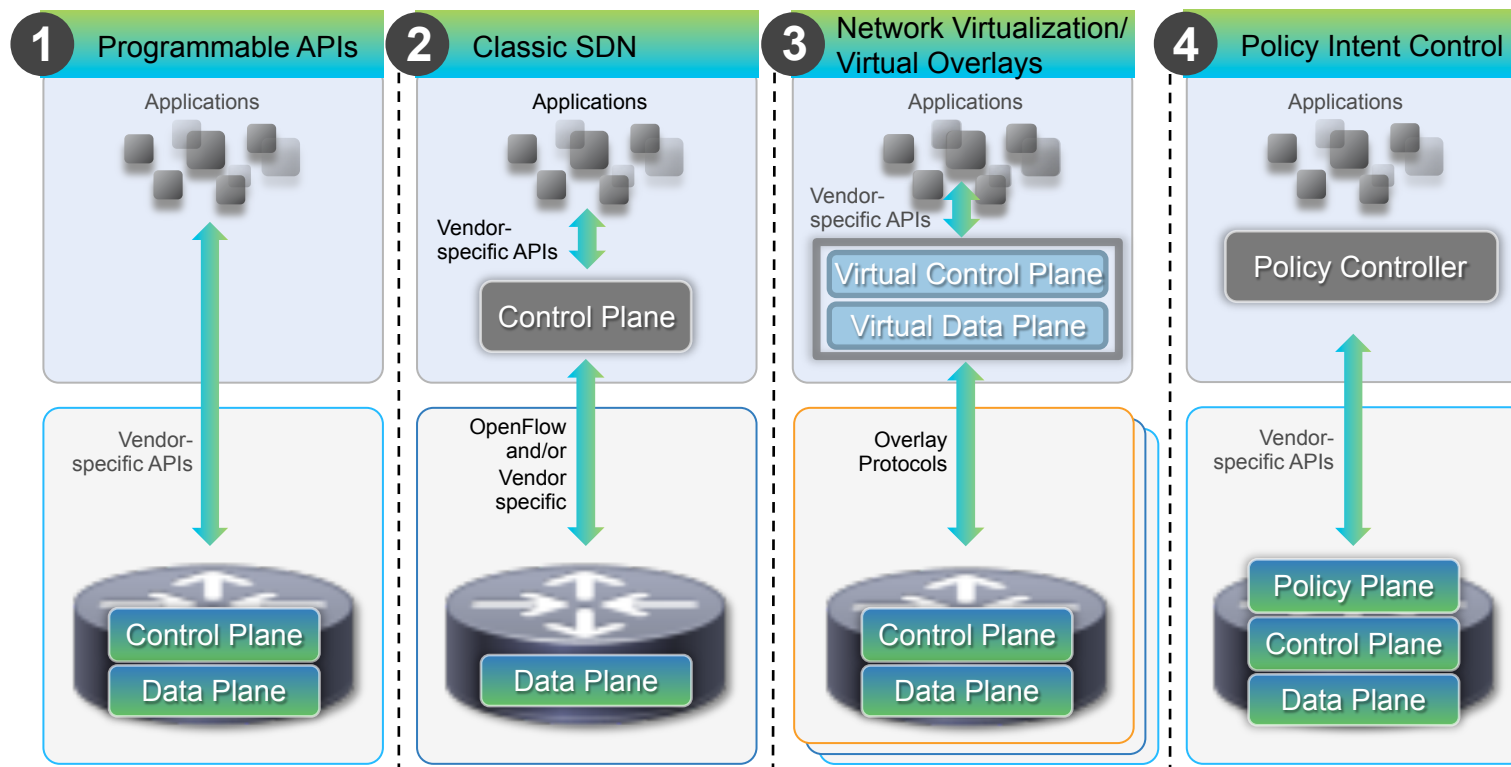
Openflow is just one flavor of SDN

Cisco ONE: Open Network Environment

Leverage Network Value



Network Programmability Models



There are two approaches to Control Systems

IMPERATIVE CONTROL



Baggage handlers follow sequences of simple, basic instructions



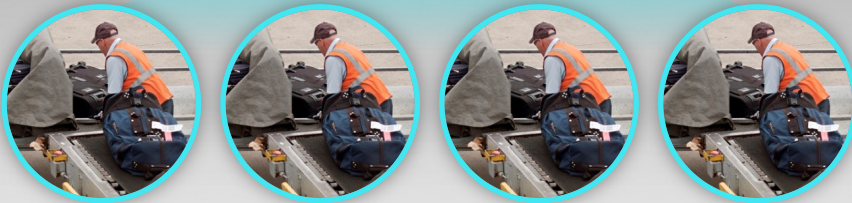
DECLARATIVE CONTROL



Air traffic control tells where to take off from, but not *how* to fly the plane

There are two approaches to Control Systems

IMPERATIVE CONTROL



Baggage handlers follow sequences of simple, basic instructions

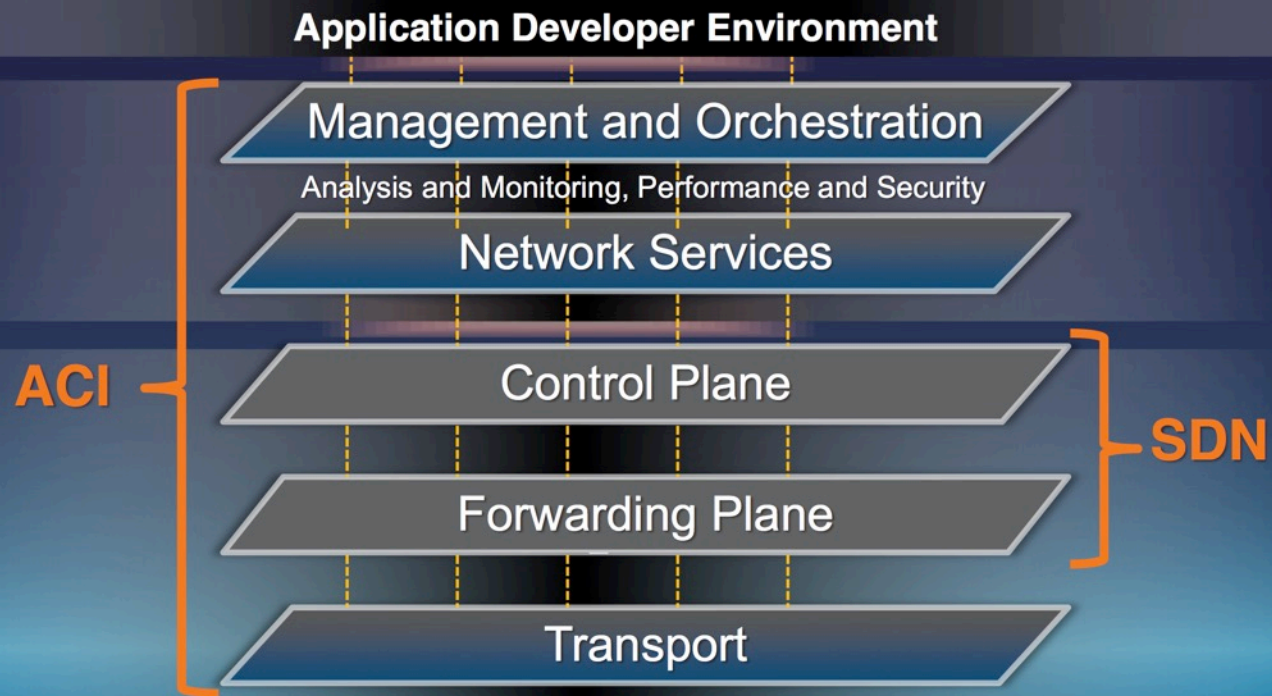


DECLARATIVE CONTROL



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Cisco IT - Functionality Beyond SDN

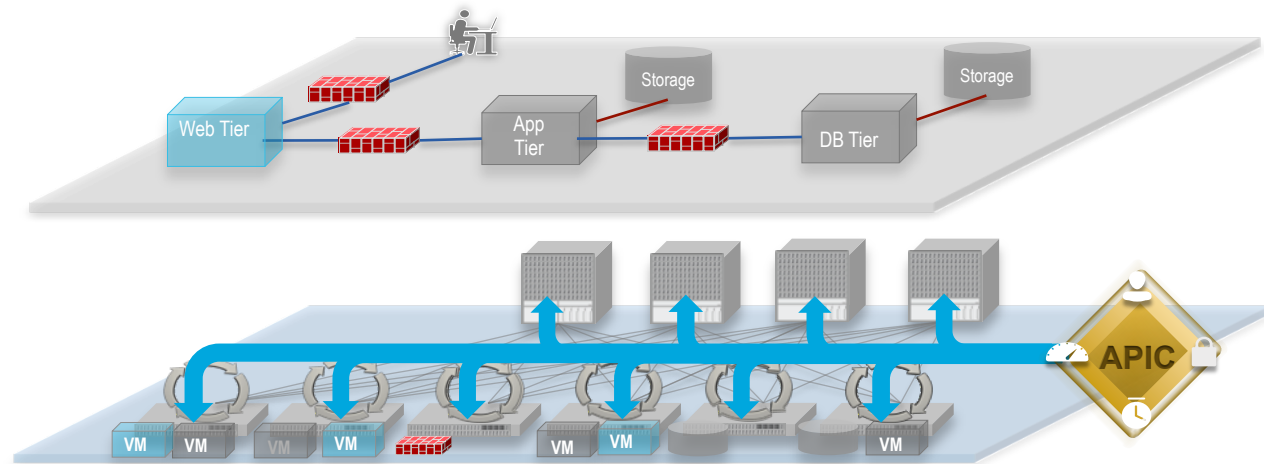


Application Policy Model & Instantiation

Application Policy Model: Defines the application requirements (Application Network Profile)



Policy Instantiation: Each device dynamically instantiates the required changes based on the policies



- All forwarding in the fabric is managed via the Application Network Profile
 - IP addresses are fully portable **anywhere** within the fabric
 - Security & Forwarding are fully **decoupled** from any physical or virtual network attributes
 - Devices autonomously update the state of the network based on configured policy requirements

What's really different?

Agility

- Network configuration is **dynamically instantiated** on devices
- **System Level** management – no more box by box configuration
- **Day 1** readiness for orchestration integration

Visibility

- **Real-time** application visibility
- **Continuous** latency measurement of all path within the fabric

Simplicity

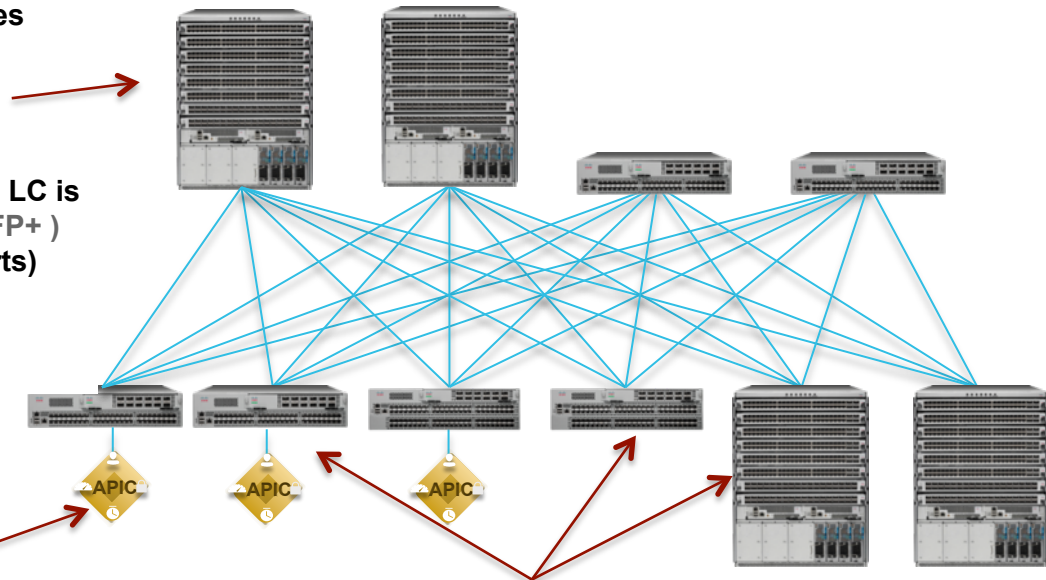
- Security & Forwarding are fully **decoupled** from IP address
- IP addresses are fully portable **anywhere** within the fabric
- **Consistent** policy for virtual and physical workloads
- Easy & flexible integration of Layer 4-7 elements

Cisco Application Centric Infrastructure

ACI Fabric

Fabric Spine Nodes

- 16 Slot Modular*
- 8 Slot Modular
- 4 Slot Modular
- (Modular ACI Spine LC is X9700 36p 40G QSFP+)
- Fixed Spine (36 ports)



APIC Appliances

Fabric Leaf Nodes

- 4, 8 & 16 slot Modular*
- 48 x 1/10 + 12 x 40G
- 96 x 1/10 + 8 x 40G
- Variety of 1 & 2 RU form factors*



* Not all form factors are supported yet, please consult the release notes

Application-Centric Networks

What is an Application as seen by the network?

- More than just a VM or Server
- It's the End Points of the Application
- +
- The Application's L2 – L7 Network Policies
- +
- The Relationship between these End Points and their Policies

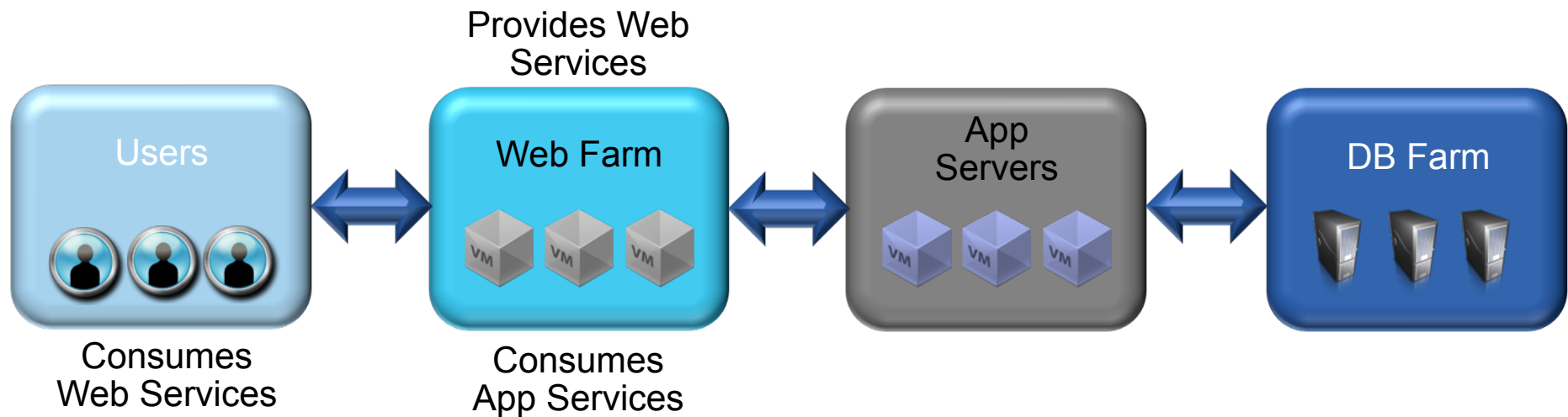
Application Network Profile

application-centric network policy

Defining Application Logic Through Policy

Application Communication

Application communication can be defined as who is allowed to talk to whom.



Defining Application Logic Through policy

Contracts for Policy

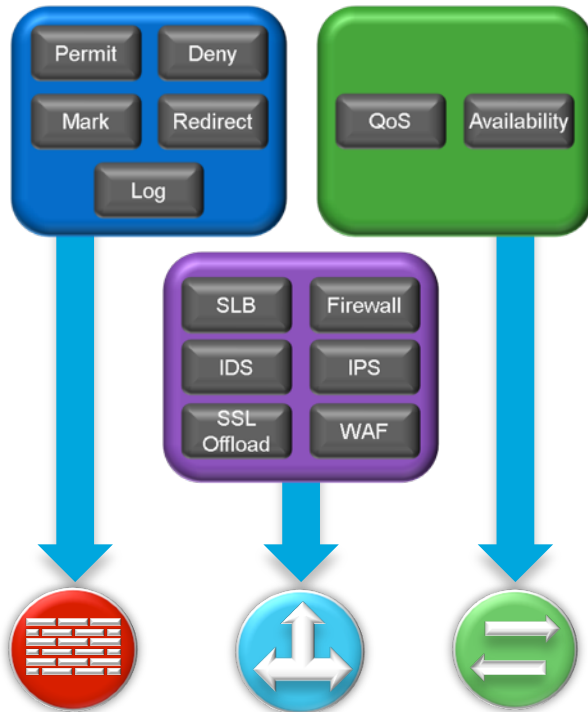


Contracts are used to define relationships.

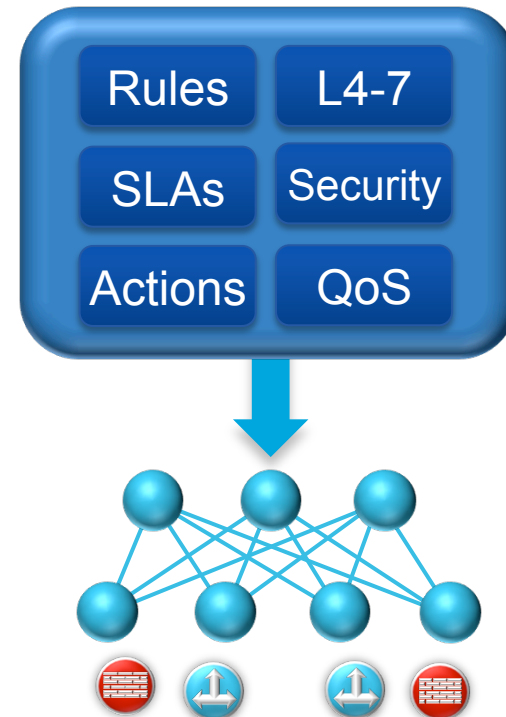
Defining Application Logic Through policy

Policy Model Comparison

Current Policy Definition

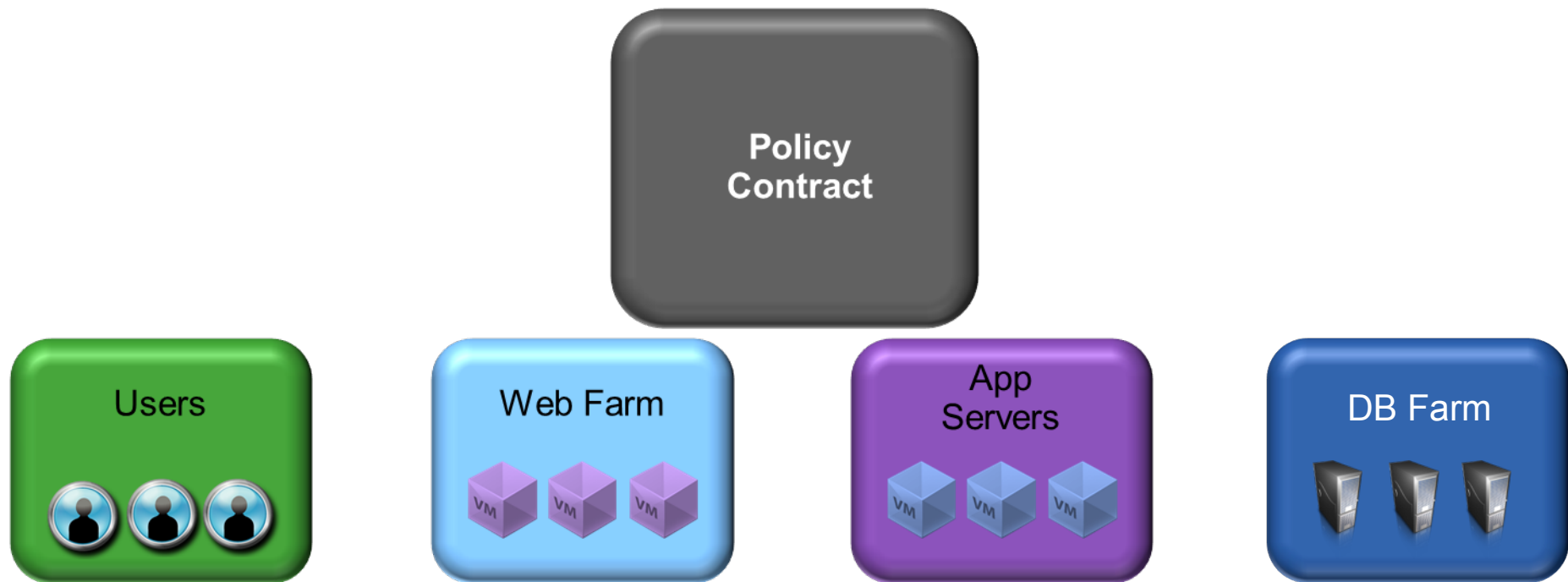


Policy Based on Contracts



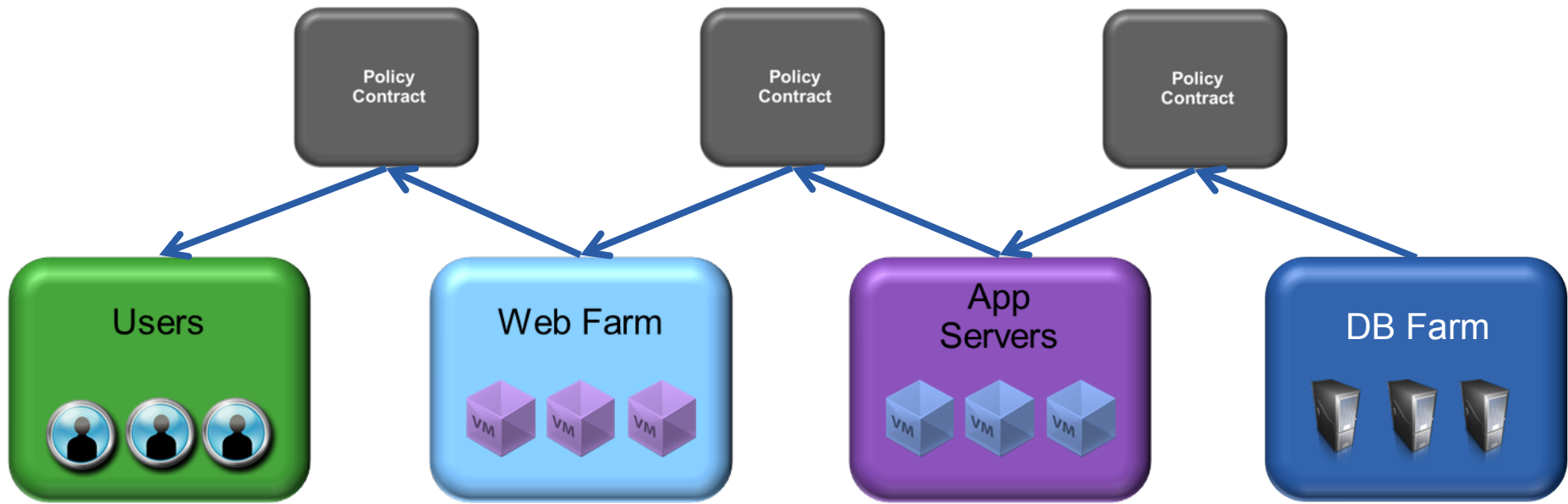
Defining Application Logic Through policy

Defining Provider Consumer Relationships

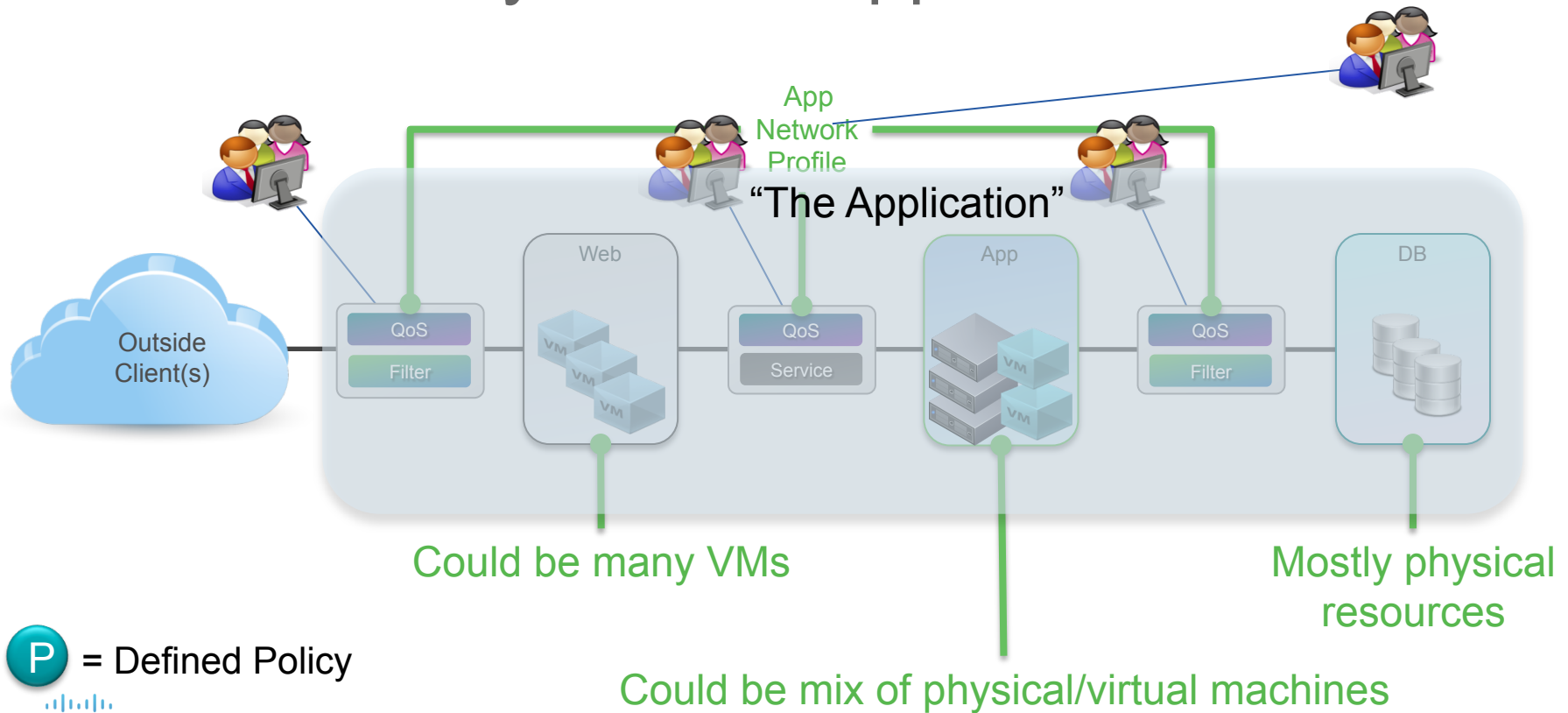


Defining Application Logic Through policy

Defining Provider Consumer Relationships



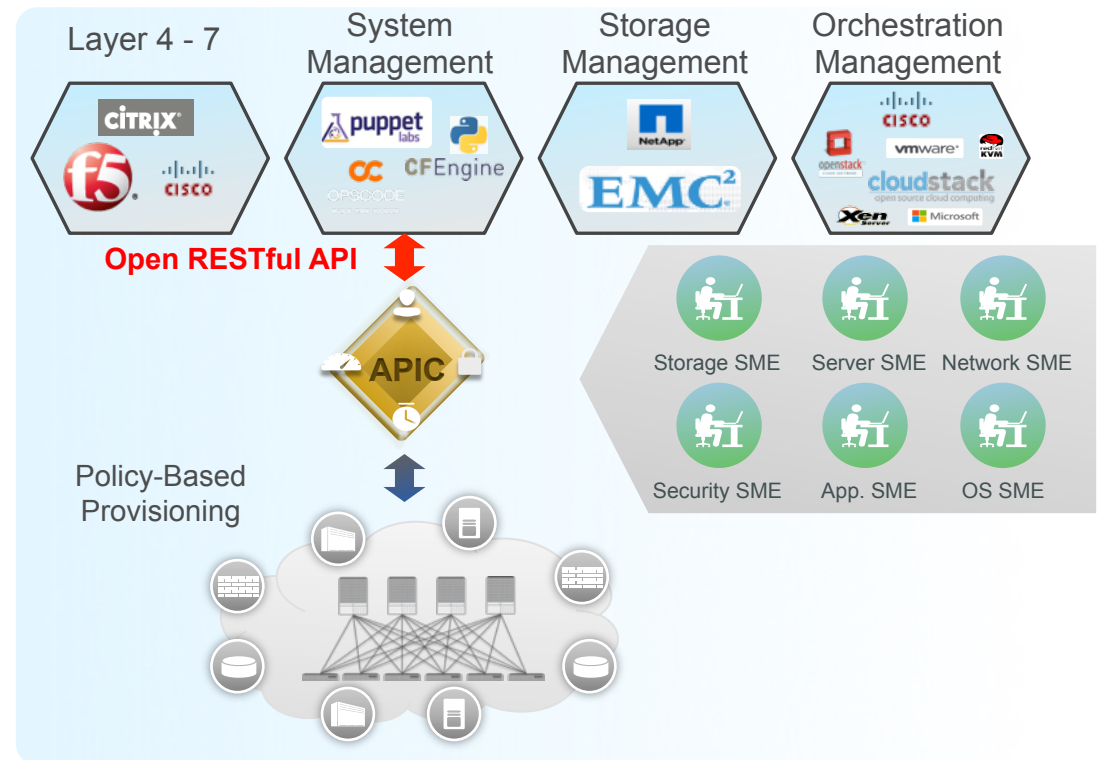
ACI and Today's 3-Tier applications



Application Policy Infrastructure Controller

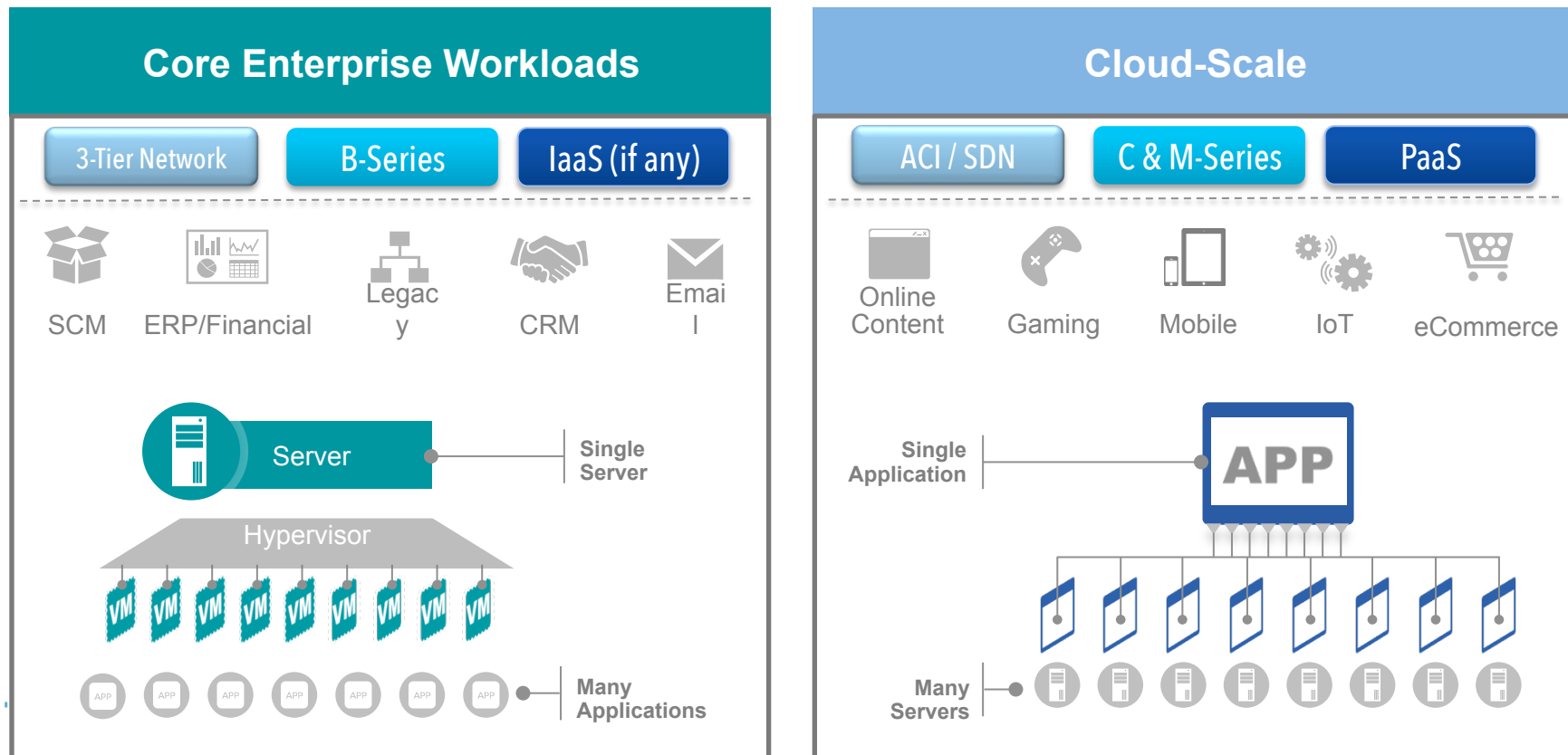
Centralized Automation and Fabric Management

- Data Model based declarative provisioning
- Application, Topology Monitoring, & Troubleshooting
- 3rd party Integration (L4-L7 Services, Storage, Compute, WAN, ...)
- **APIC is not in the data path**



Ex. 1: Applications & Software development

Monolithic Apps versus Cloud App with Distributed Data



Ex. 2: Applications & Network

ACI is the foundation for any application type and Complements, Enhances and/or Replaces Any Other SDN Offering

ORACLE

SAP

hadoop

Microsoft Exchange

docker

vmware

Microsoft

redhat

Software Overlay Solution

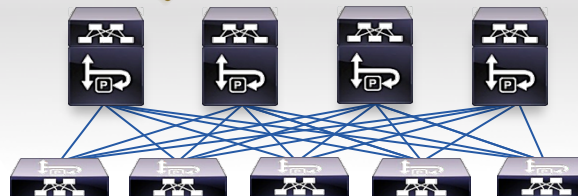
Bare Metal Applications

AND / OR
Virtualized Applications

Optional
(yet not needed)
Software Overlay



ACI Fabric



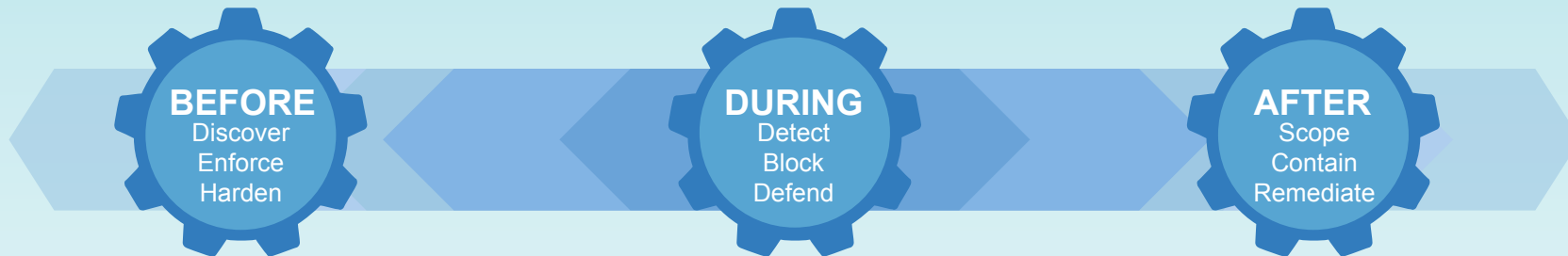
just another application!

Ex.3: Security - FirePOWER & ACI


Automated Security with Advanced Protection

ATTACK CONTINUUM

Consistent Protection for ANY Workload, 24 x 7



 Group Policy based Segmentation, Isolation

 Granular Application Visibility & Control

 Automated Security Service Insertion (NGIPS, NGFW)

 Superior Visibility & Threat Detection

 Micro-Segmentation for Quarantine

 Advanced Malware Protection & Remediation

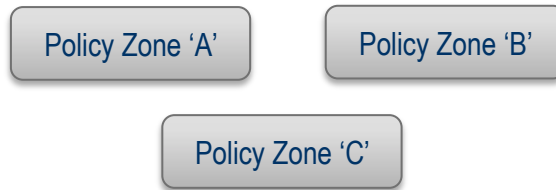


The Road to ACI (I)

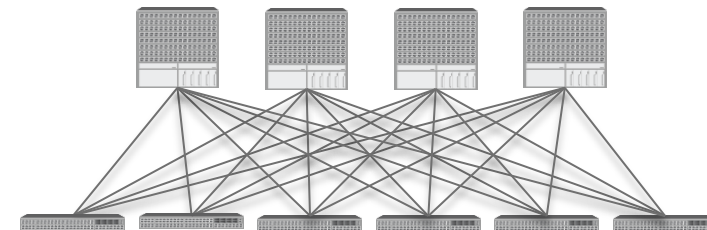
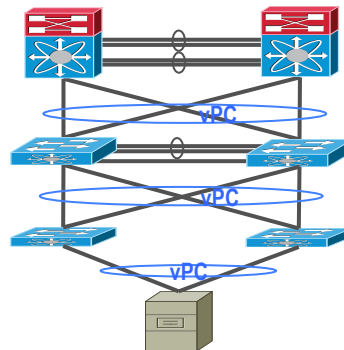
Operations Evolution



Policy Evolution

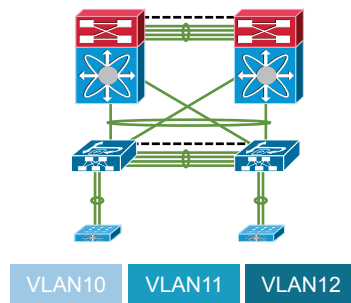


Component Evolution



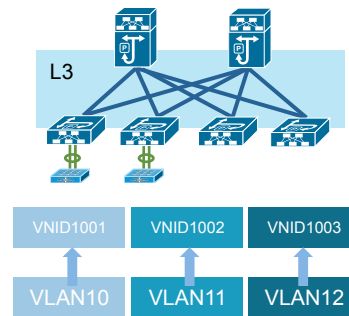
The Road to ACI (II)

Investment Protection with vPC



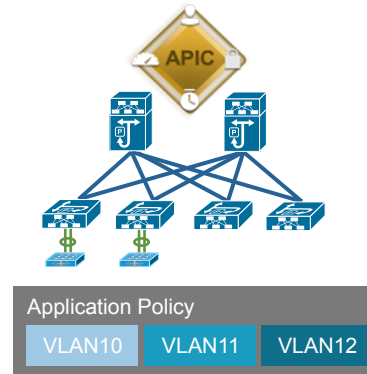
- Investment in Nexus 9000 Platform
- Prepared to be ready to switch to ACI

Standalone VXLAN Fabric



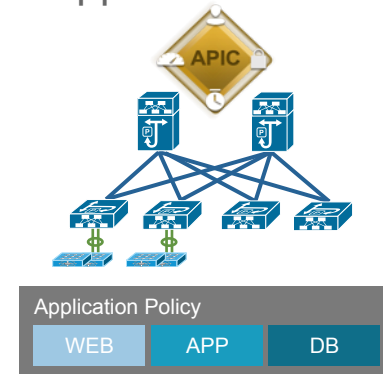
- Modern L3 routed Fabric with VXLAN
- Use Device-Specific API's

ACI Fabric "Network Mode"



- Centralized Management through APIC
- Still use your existing Zone-Based Security Design

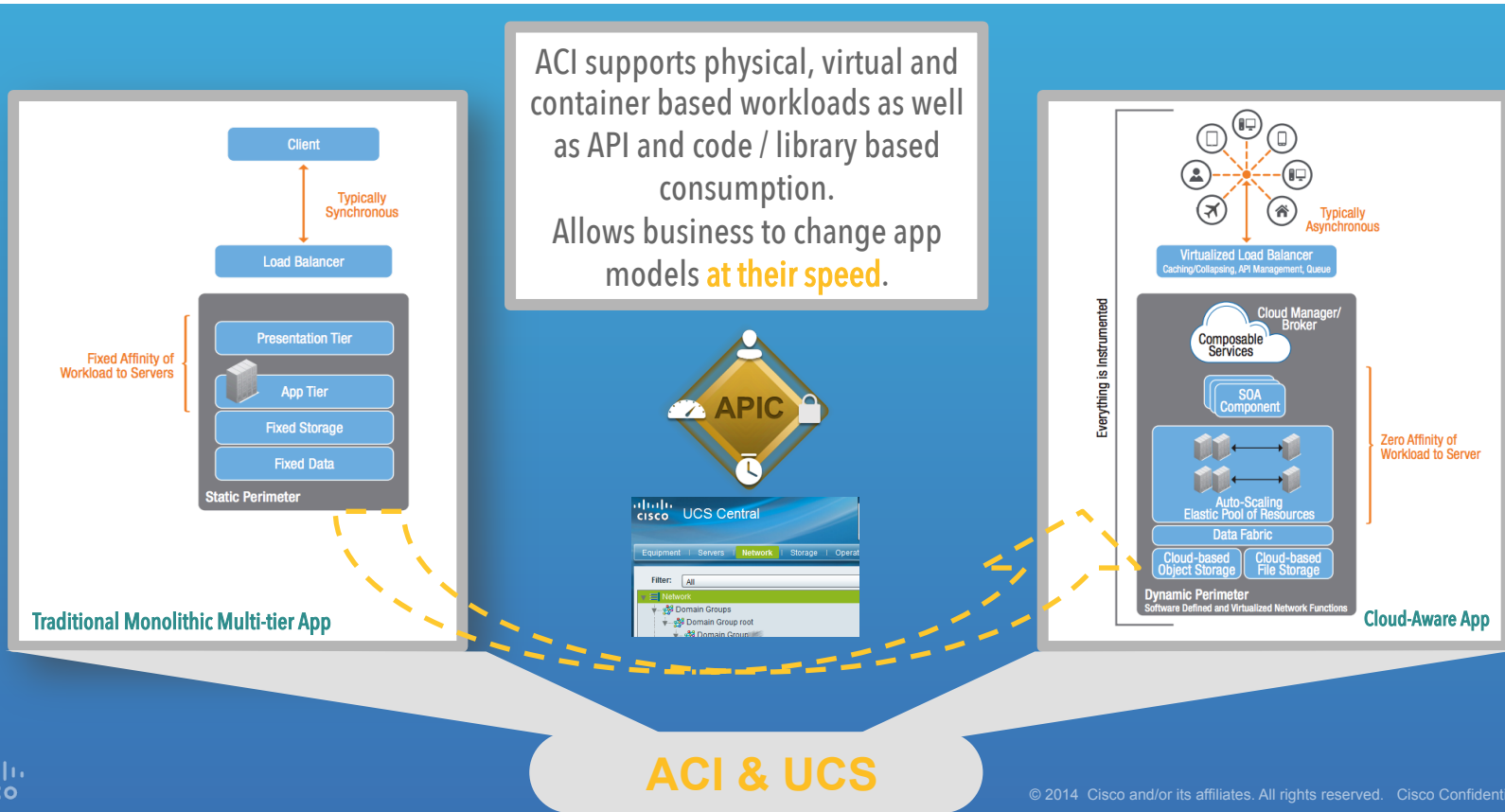
ACI Fabric "Application Mode"



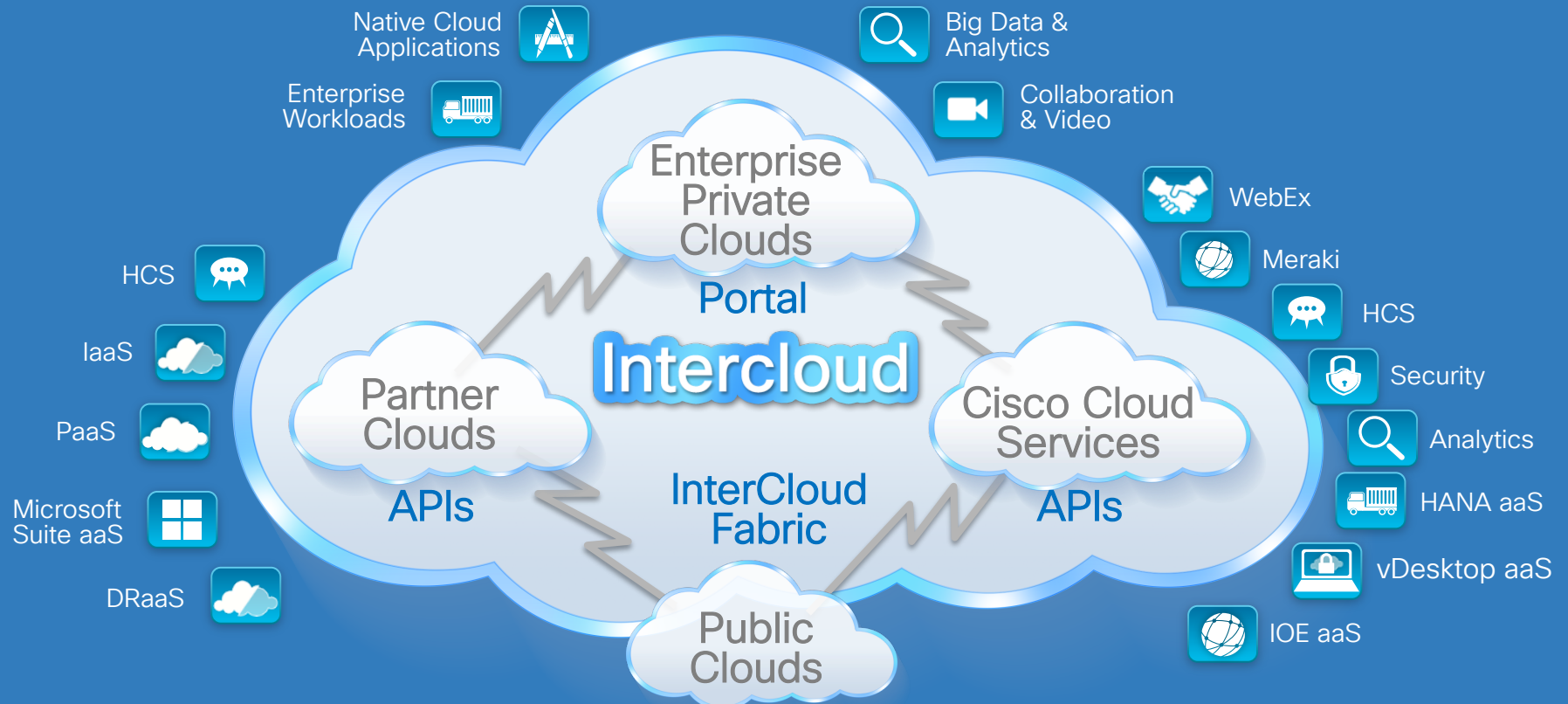
- Start to migrate single Applications into separated Application Network Policies
- Full ACI Benefits

Summary & Outlook

ACI & UCS are **unique as the foundation** for the App market transition

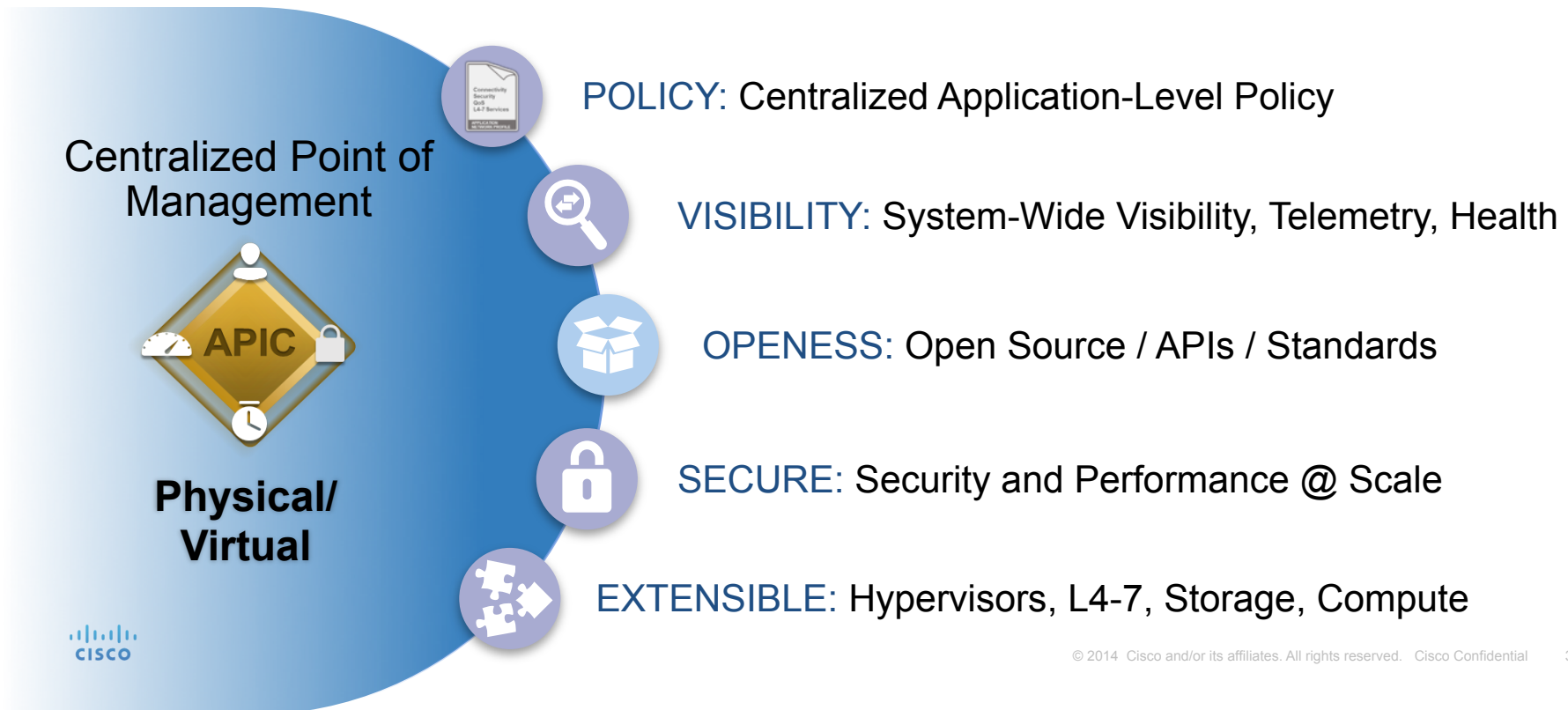


What We're Doing - Expanding Our Cloud Portfolio



Application Centric Infrastructure

Embracing SDN and Going Beyond





CISCO

TOMORROW starts here.

Resources

Additional resources

- Cisco Application Centric Infrastructure
<http://www.cisco.com/web/go/aci>
- Cisco ACI Ecosystem
<http://www.cisco.com/web/go/aciecosystem>
- SDN for dummies (eBook)
<http://www.cisco.com/web/go/sdnfordummies>