

Programmability Webinar Series with DevNet

Session 3: Software Defined Networking & Controllers

Patrick Rockholz, Systems Engineer

Hostess: Kara Sullivan

Jointly presented by DevNet & NetAcad

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Welcome to the 3rd session of the Programmability with Cisco DevNet webinar series

- Use the Q and A panel to ask questions.
- Use the Chat panel to communicate with attendees and panelists.
- A link to a recording of the session will be sent to all registered attendees.
- Please take the feedback survey at the end of the webinar.

The Webinar Series

Date Topic

- Oct'18 Networking with Programmability is Easy
- Oct'18 A Network Engineer in the Programmable Age
- ➔ Nov'18 Software Defined Networking and Controllers
- Jan'19 Adding API Skills to Your Networking Toolbox
- Feb'19 The New Toolbox of a Networking Engineer
- Mar'19 Program Networking Devices using their APIs
- Apr'19 Before, During, and After a Security Attack
- May'19 Play with Linux & Python on Networking Devices
- Jun'19 Automate your Network with a Bot



All Series Details can be Found @ <http://bit.ly/devnet2>

The Webinar Series – Raffle & Certificates

Raffle

- ✓ We will be raffling off a total of 15 Amazon gift cards in the amount of \$25 US dollars at the end of this series.*
- ✓ 10 Amazon gift cards in the amount of \$25 US dollars raffled off to everyone who participates in all of the live sessions
- ✓ 5 Amazon gift cards in the amount of \$25 US dollars raffled off to everyone who participates in all of the sessions by either attending the live sessions or viewing/downloading the recording (can be a combination of the two in this raffle).

* Please note that this is a raffle and not everyone who qualifies will receive a gift card. There will be a total of 15 winners.



Certificate of Participation

- ✓ There will be an opportunity to sign up for a Certificate of Participation at the end of this series.
- ✓ To qualify, you must have participated in all sessions of the series.
- ✓ You can do this by attending the live sessions, viewing the recordings, or a combination of the two.
- ✓ Certificates will not be given out for individual sessions, but for the series as a whole.





DNA-Center and Software Defined Networks

Patrick Rockholz
Systems Engineer
13 November, 2018

 @patrickrockholz



Agenda

- Introduction
- SDN Overview
- DNA-Center Overview
- Summary and Close

Digital Transformation Is Moving IT to the Boardroom



Outperform Your Competition by Mastering Digital

Profit ↗

Revenue ↗

Digital Organizations Embody Digitization

- A organization uses digital technology as a *competitive advantage* for all internal and external operations.

▶ Established Brands are rapidly transforming to a Digital Enterprise to catch up...



▶ Disruptors or New Brands have beat established brands at becoming a Digital Enterprise...



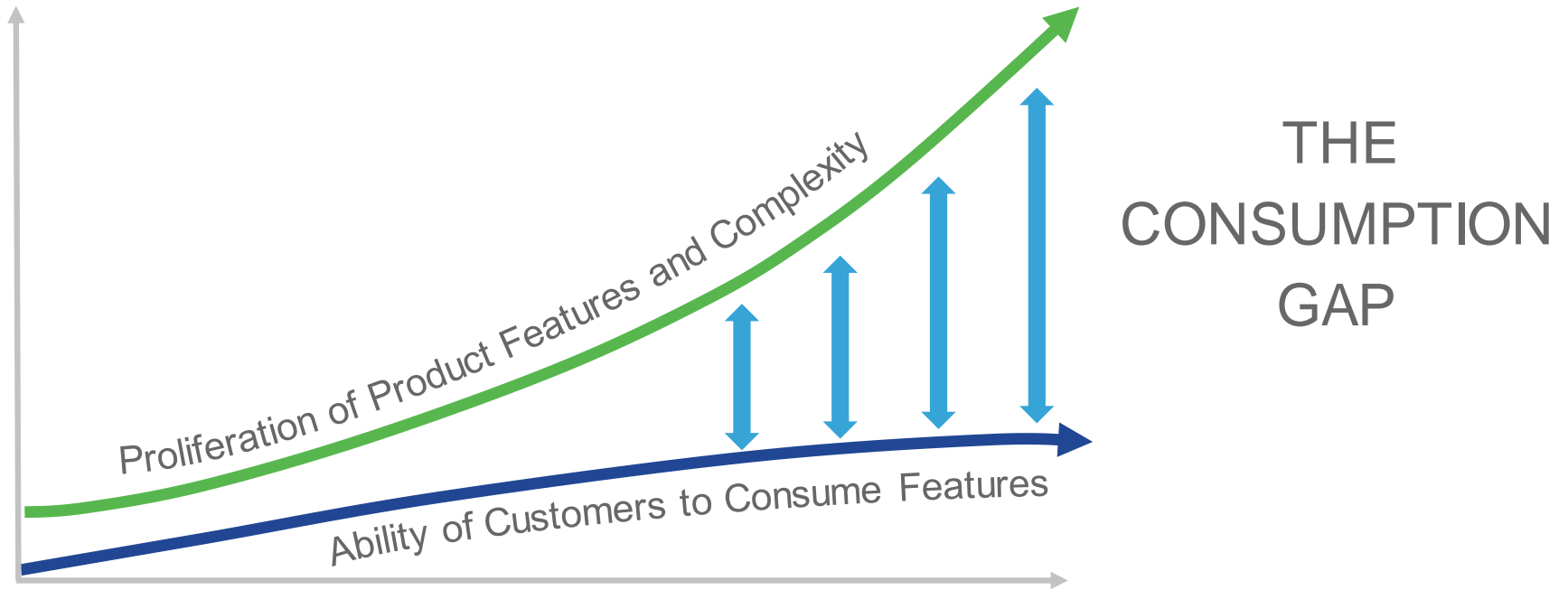
... The Network!

Digital Business Demands Application Agility

“...While other components of the IT infrastructure have become more programmable and allow for faster, automated provisioning, installing network circuits is still a painstakingly manual process...”

— Andrew Lerner, Gartner Research

Not As Easy As Just Talking About Digitization



The Enterprises needs to consume IT differently .

Common Trends

Mobile as Primary Access



63%

of traffic will be from mobile devices by 2021

Scale for IoT



2X

IoT devices will be connected to businesses by 2021

Growing Threats



80%

of security breaches occur within the perimeter

Common Challenges



Difficult to Secure

Ever increasing number of users and endpoint types

Increase in complexity to increase scale



Difficult to Integrate and Manage

Multiple steps, user credentials, complex interactions

Multiple touch-points



Slower Issue Resolution

Separate user policies for wired and wireless networks

Unable to find users when troubleshooting

Traditional Networks Cannot Keep Up!

Digital Transformation Requires Network Evolution

Information Era: 2000-2015

Connectivity

with High Reliability

Human Scale

Physical Appliances

Manual Management

Centralized Enterprise and Web Apps



Digital Business Era: 2015+

Platform for

Innovation, Agility, Security

IoT Scale (People, Devices, Things)

Virtualized Services

Automation, Zero Touch, DevOps

Distributed SaaS, Mobile, & M2M Apps

Network as a Platform Considerations

Where to Start?



**FASTER
INNOVATION**
Insights &
Experiences



**REDUCED
COST &
COMPLEXITY**
Automation
& Assurance



LOWER RISK
Security &
Compliance



Digital Business Drivers

Requirement for Dynamic Policy Changes



Traditional network management cannot provide sufficient dynamic management

- Focus has been on Day0/1 automation
- CLI not built for volumes of changes in machine real time

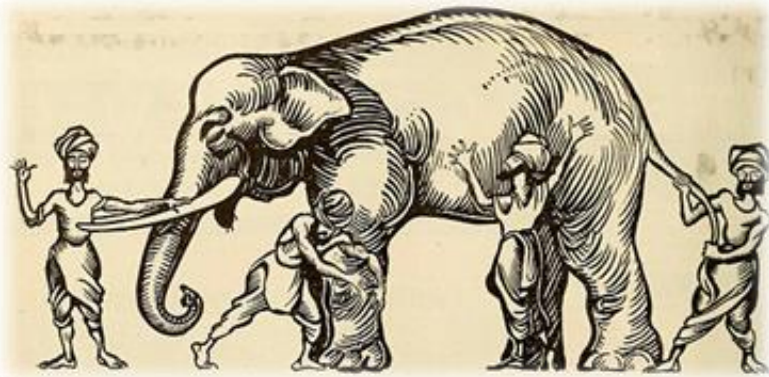
Controller based networking supports dynamic policy change

- Controller allows network to be managed as a system
- Policy management is automated and abstracted

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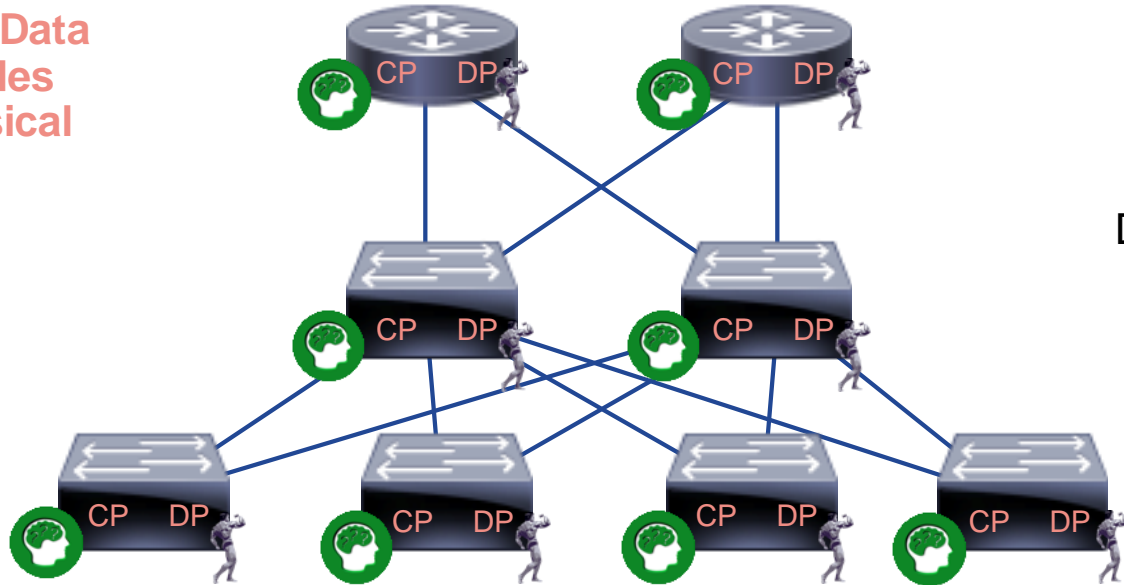
What is Software-Defined Networking (SDN)?



- An approach and architecture in networking where **control and data planes are decoupled** and **intelligence and state are logically centralized**
- Enablement where **underlying network infrastructure is abstracted** from the applications [network virtualization]
- A concept that **leverages programmatic interfaces** to enable external systems to influence network provisioning, control and operations

The Traditional Network...

Control and Data Plane resides within Physical Device



Control Plane (CP)

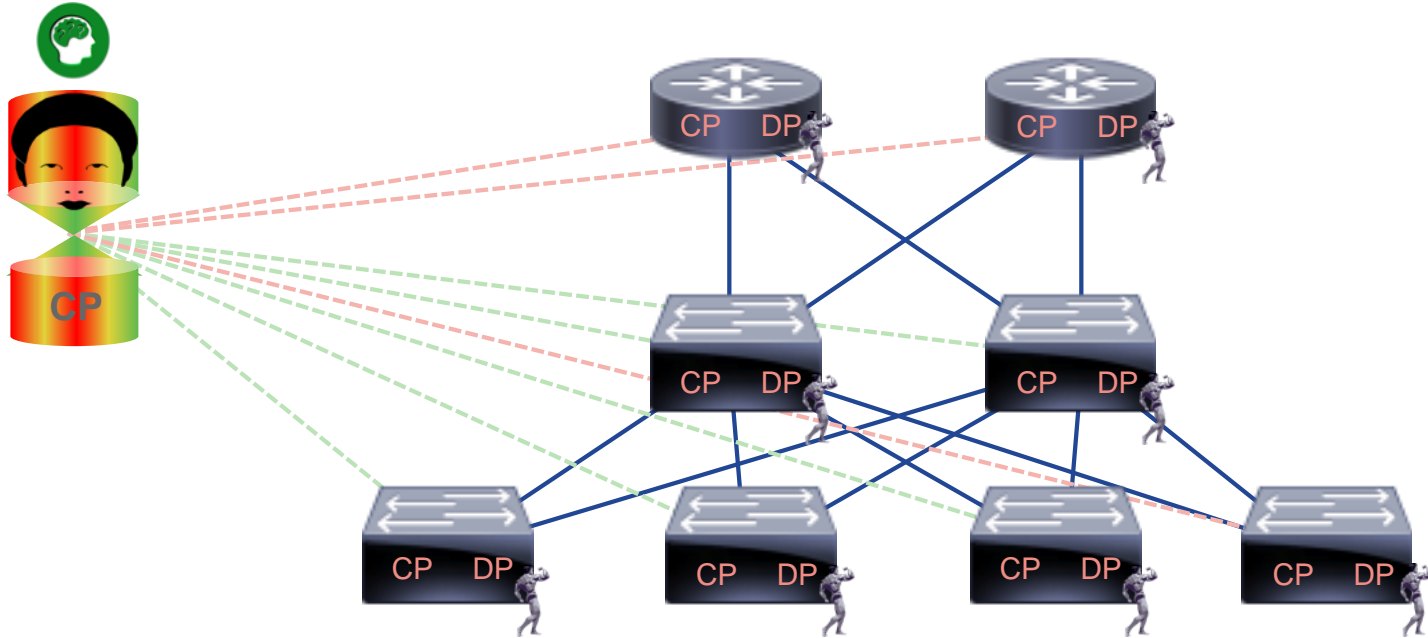


Data Plane (DP)



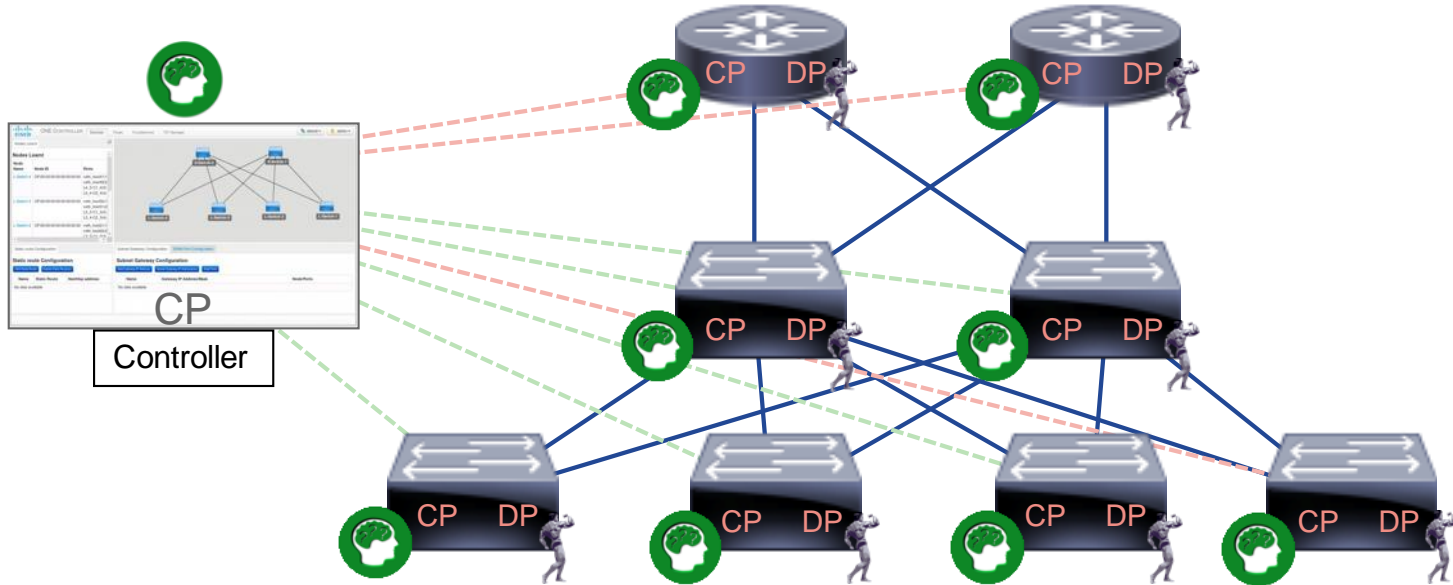
Control plane learns/computes forwarding decisions
Data plane acts on the forwarding decisions

The First Approach...



Control plane becomes centralized
Physical device retains Data plane functions only

The Hybrid Approach...



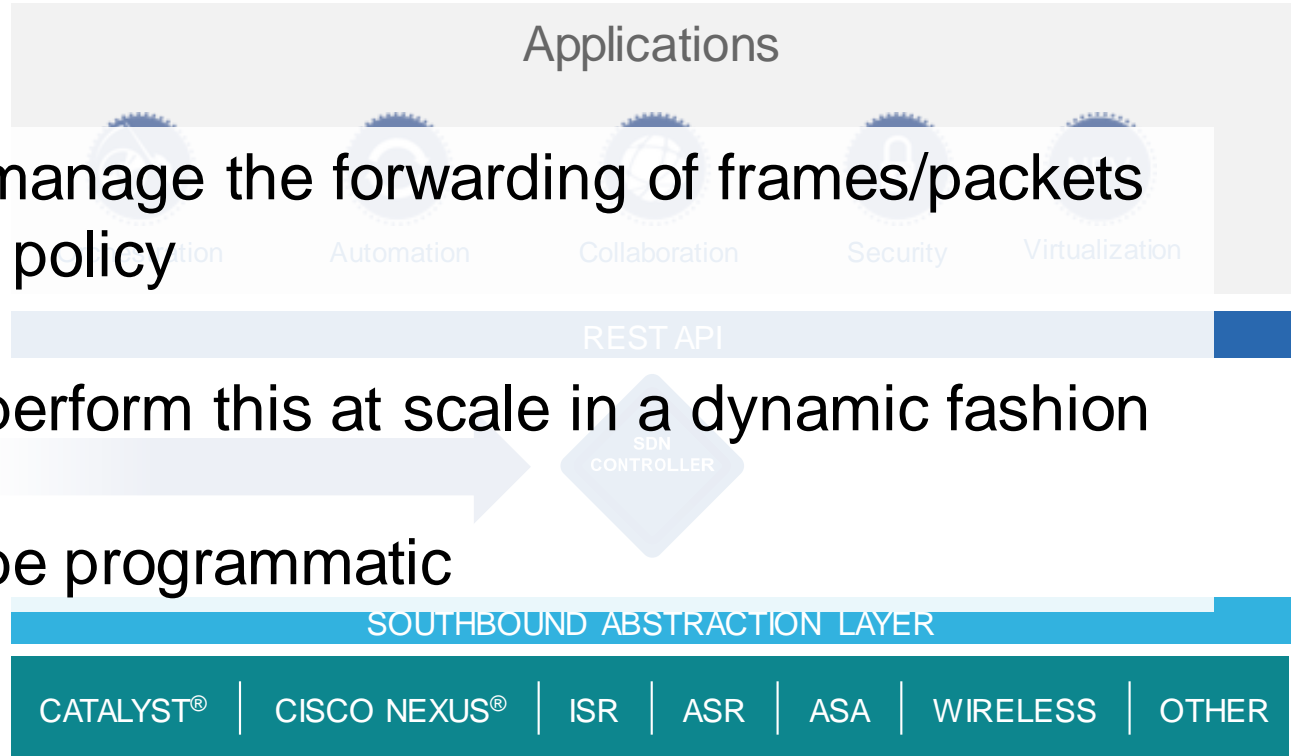
A Controller is centralized and separated from the Physical Device, but devices still retain a localized Control plane intelligence

Network-Wide Abstractions Simplify the Network

1. Ability to manage the forwarding of frames/packets and apply policy

2. Ability to perform this at scale in a dynamic fashion

3. Ability to be programmatic



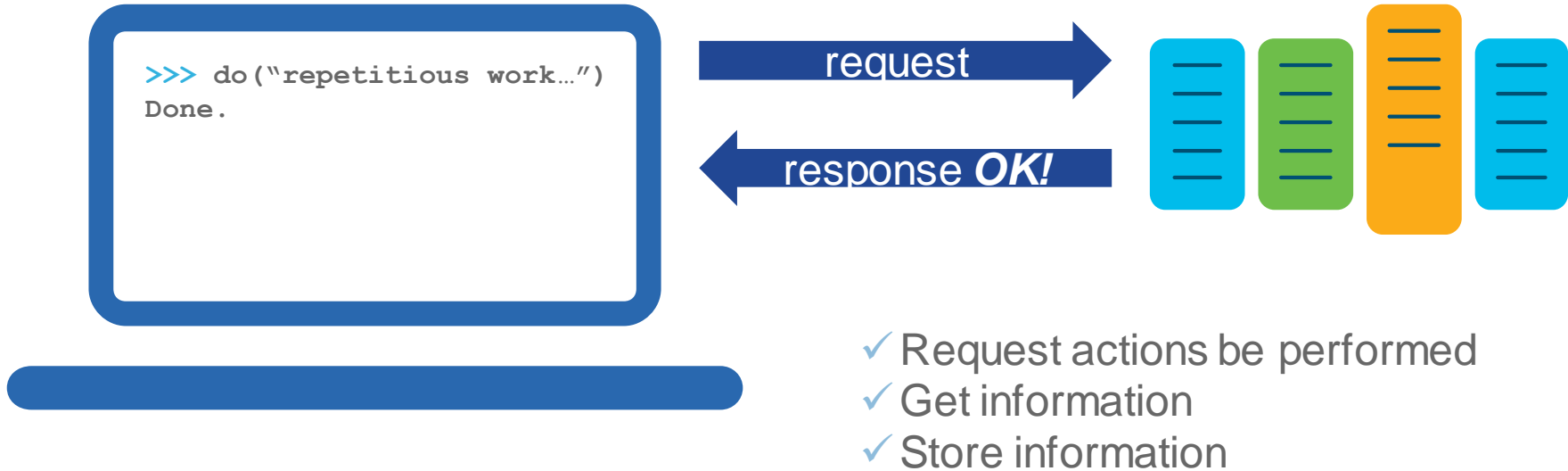
The SDN
Ideal.
Controller as
the Application
Platform

What's an API?

“It's a way for two pieces of software to talk to each other”

Application Programming Interface (API)

The Value-Proposition for APIs



(remember Uber?)

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The Network Intuitive = Intent-based Networking

Digital Business



Mobile



Security



IoT

Business Goals



Insights

Network

Translation

Capture business intent, translate to policies, and check integrity

Activation

Orchestrate policies & configure systems

Assurance

Continuous verification, insights & visibility, and corrective actions

Powered By Intent. Informed by Context.

Cisco DNA Center

Central network management system

Complete network management system

- Single pane of glass for all devices
- End-to-end health information in real time
- Granular visibility
- Simplified workflows

Automation for provisioning

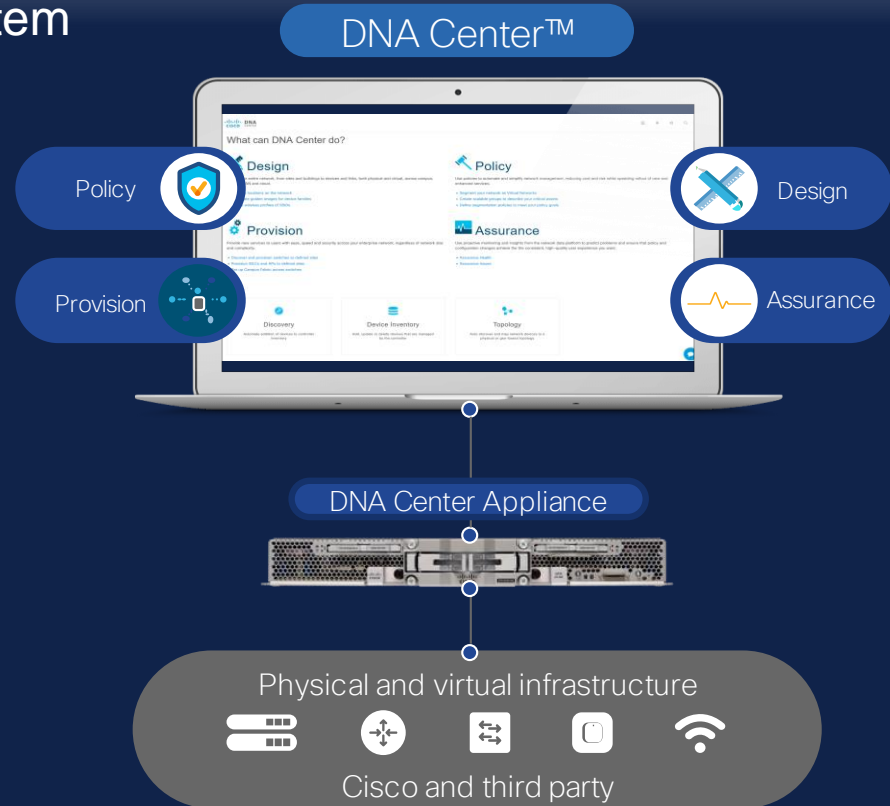
- Zero-touch deployment
- Device lifecycle management
- Policy enforcement

Analytics for assurance

- Verify intent of network settings
- Proactively resolve issues
- Reduce time spent troubleshooting

Platform for extensibility

- Integrate APIs with third-party solutions
- Integrate and customize ServiceNow
- Evolve operational tools and processes

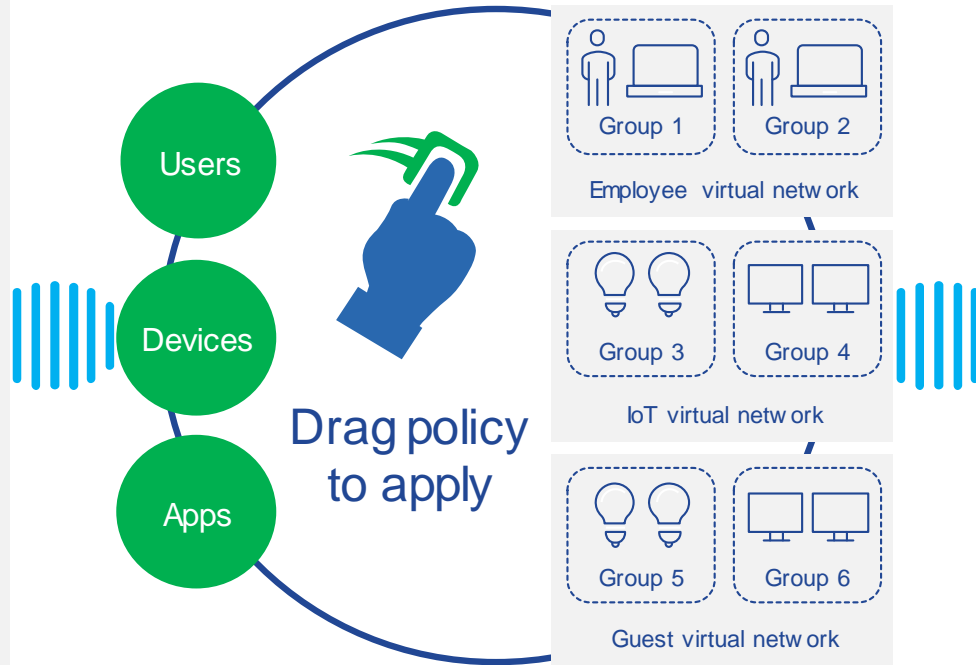


Network provisioning simplified

Fast and secure onboarding of devices and users

Before

- VLAN and IP address based
- Create IP-based access control lists for access policy
- Deal with policy violations and errors manually



Now

- No VLAN or subnet dependency for segmentation and access control
- Define one consistent policy
- Policy follows identity

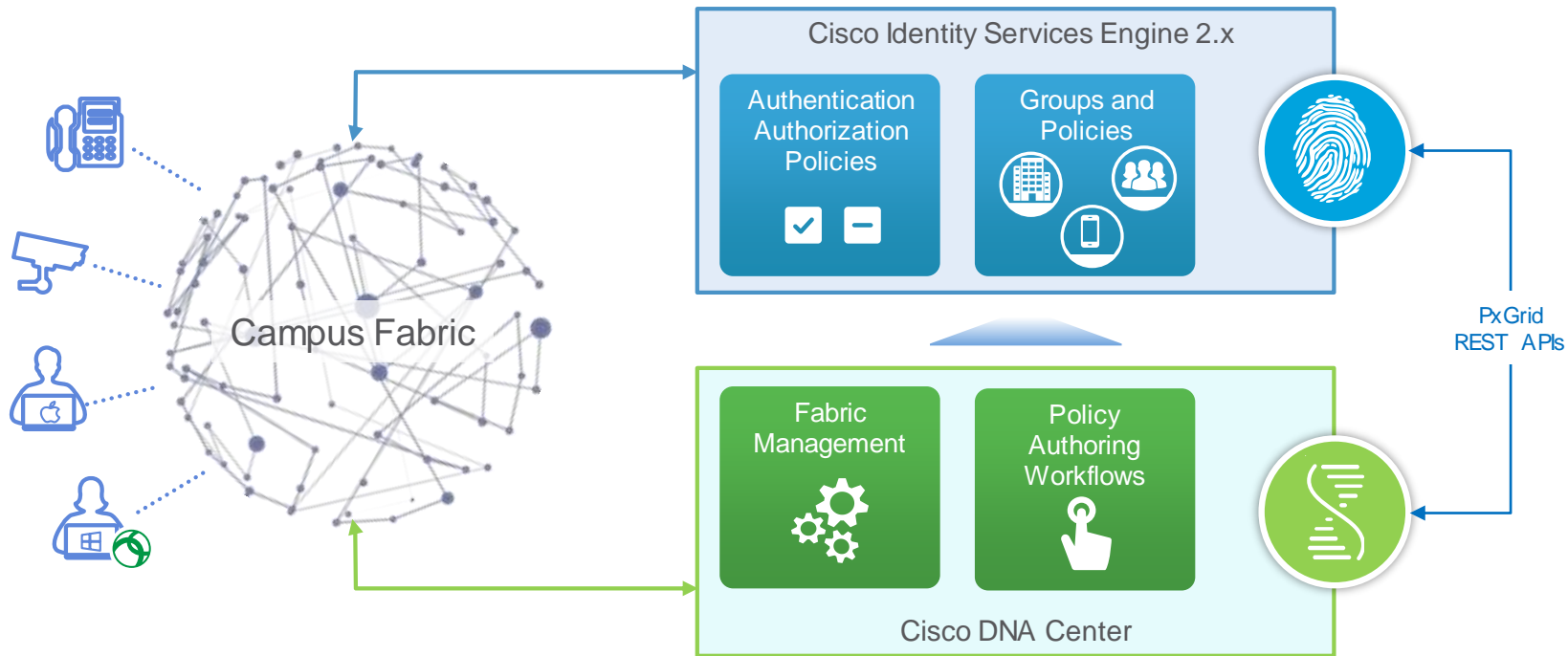
Completely automated

Group-based policy

Policy follows identity

ISE and DNA Center integration

Identity and Policy Automation



The cost of troubleshooting

Typical troubleshooting issues for an enterprise network with 800 users (wired and wireless)

Issue / task	DNA Center™	Traditional CLI	Savings	Occurrences per week	Hours saved per week	Days saved per year
Traceroute	Instantaneous	6 minutes	6 minutes	25	2.5 hours	15
Slow onboarding	2 minutes	17 minutes	15 minutes	20	5 hours	30
Device RPA failure	Instantaneous	20 minutes	20 minutes	6	2 hours	12
Radio channel analysis	5 minutes	25 minutes	20 minutes	6	2 hours	12
Issue replication	5 minutes	65 minutes	60 minutes	2	2 hours	12
Site visit	Not required	180 minutes	180 minutes	0.5	1.5 hours	9
Total:					15 hours	90



What would you do with 90 extra productive days per year?

Cisco DNA Assurance

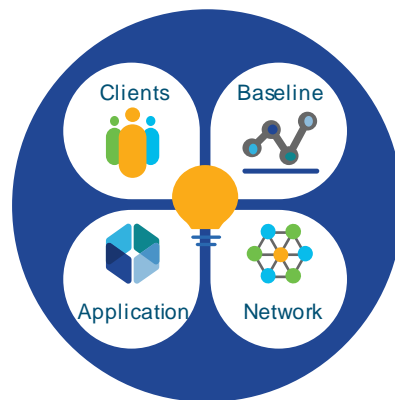
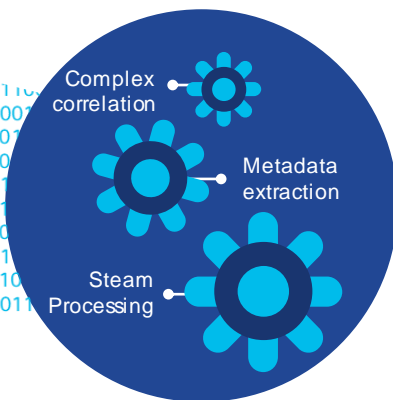
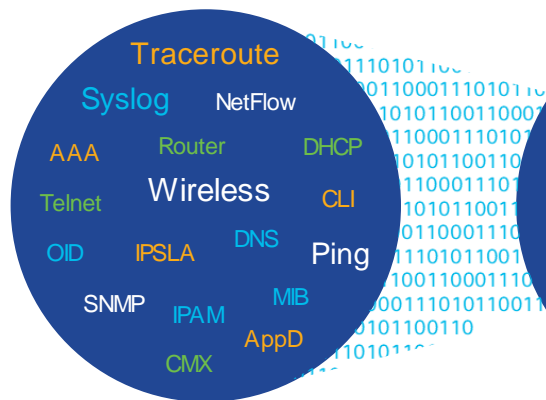
From network data to business insights

Network telemetry
contextual data

Complex event
processing

Correlated insights

Suggested
remediation



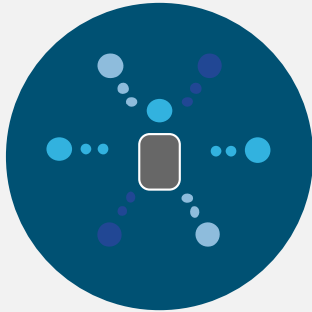
Everything as a sensor

Over 150 actionable insights

Clients | Applications | Wireless | Switching | Routing

DNA Center Platform

Open Platform



- API Catalog
- 3rd party SDK
- Process Adapters

Partner Ecosystem



- Partner Integrated Solutions

Developer Enablement



- Developer's DevNet Portal

Demo



Welcome, cisco

[Learn about DNA Center](#)

Overall Health Summary ! As of Nov 7, 2018 7:24 pm



[View Overall Health](#)

Network Snapshot

Sites

As of Nov 7, 2018 7:25 PM

5

DNS Servers : 1
NTP Servers : 0

[Add Sites](#)

Network Devices

As of November 7, 2018 7:25 PM

33

Unclaimed : 0
Unprovisioned : 24
Unreachable : 1

[Find New Devices](#)

Application Policies

As of Nov 7, 2018 07:25:57 PM

0

Successful Deploys : 0
Errored Deploys : 0

[Add New Policy](#)

Make a Wish

Agenda

- Introduction
- SDN Overview
- DNA-Center Overview
- **Summary and Close**

What have we learned?

- The problems we are trying to solve with SDN/DNA-Center
- A brief history of SDN
- Cisco's solution to the traditional networking approach

Resources and Starting Points

- DNA-Center Sandbox
<https://sandboxdnac.cisco.com> - username=devnetuser, password=Cisco123!
- DNA-Center @ CCO: <https://www.cisco.com/c/en/us/products/cloud-systems-management/dna-center/index.html>
- DNA-Center @ DevNet: <https://developer.cisco.com/dnacenter/>
- DNA Application Experience (Whitepaper)
 - <https://www.cisco.com/c/dam/en/us/products/collateral/cloud-systems-management/dna-center/white-paper-c11-740966.pdf>

CiscoLive

SOLDGT-1000 – Cisco DNA Center Platform

BRKNMS-3005 – DNA Center – Network Automation easy, fast, reliable for everyone

Cisco YouTube - <https://www.youtube.com/watch?v=aavOXHm5YHQ>

DNA Software Demo Series - <https://www.cisco.com/c/en/us/solutions/enterprise-networks/dna-software-series.html>

Questions?



Want to learn more about the DevNet community?

The image shows a browser window displaying the Cisco DevNet website. A white box highlights the URL <http://bit.ly/devnetcommunity> in the address bar, with a red arrow and the number 1 pointing to it. In the top right corner of the website, there are buttons for "SIGN UP FREE" and "LOG IN", with a red arrow and the number 2 pointing to the "LOG IN" button. A modal window titled "DEVNET" is open in the center, listing several login options: "Login with Github", "Login with Google", "Login with Facebook", "Login with a Cisco ID", "Login with Webex Teams", and "Login with Cisco NetAcad". The "Login with Cisco NetAcad" option is highlighted with a red dashed border, and a red arrow with the number 3 points to it. The background of the website shows the "Cisco Networking Academy" header and a large image of graduates.

Make sure to login with your
Cisco NetAcad Login
at step 3!

