NETWORK AUTOMATION & AIOPS

Getting from static to dynamic

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JUNIPER
NETWORKS

Engineering
Simplicity

Why Network Automation?

This is me 10 Years ago

Task Assign
-> Add New QoS Configuration to Core SW and install 10 x Access SW

STEP 1
-> Went on Site(Weekend)

STEP 2
-> Add QoS Configuration
-> Add Vlan to trunk port on all CoreSW <-> AccessSW

STEP 3
-> Configure each Access SW one by one
-> Verify connection after connect uplink to CoreSW

Can you see a problem?

STEP 1
-> Went on Site(Weekend)

Can you see a problem?
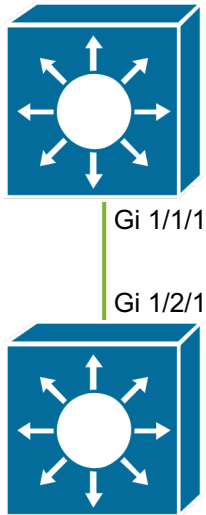
STEP 2
-> Add QoS Configuration
-> Add Vlan to trunk port on all CoreSW <-> AccessSW

```
(config)# class-map voice-interface-2
(config-cmap)# match ip dscp ef
(config-cmap)# exit

(config)# class-map video-interface-2
(config-cmap)# match ip dscp af11
(config-cmap)# exit

(config)# policy-map input-interface-1
(config-pmap)# class voice-interface-1
(config-pmap-c)# set qos-group 10
(config-pmap-c)# exit

(config-pmap)# class video-interface-1
(config-pmap-c)# set qos-group 20

(config-pmap-c)# policy-map input-interface-2
(config-pmap)# class voice-interface-2
(config-pmap-c)# set qos-group 10
(config-pmap-c)# class video-interface-2
(config-pmap-c)# set qos-group 20
(config-pmap-c)# exit
(config-pmap)# exit
```

```
(config)# interface gi 1/1/1
(config)# class-map voice-interface-1
(config-cmap)# match ip precedence 5
(config-cmap)# exit
```

Gi 1/1/1

Gi 1/2/1

Image From
https://www.dreamstime.com/cartoon-network-engineer-checks-server-hardware-composition-professional-flat-female-character-image191756363

Why Network Automation?

STEP 3
-> Configure each Access SW one by one
-> Verify connection after connect uplink to CoreSW

Juniper Business Use Only

STATE OF NETWORK AUTOMATION

NETWORK AUTOMATION

$\neq$

AUTOMATED NETWORKS

There is no "Single Button" and automated everything

From Static to Dynamic

Automation is a *journey* paradigm

Customized and Test the automation Code

Run in Production

success

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EVOLUTION OF NETWORK AUTOMATION

SOME THINGS HAVE CHANGED

... AND SOME THINGS HAVE NOT

TO SCALE-OUT

FROM SCALE-UP

In spite of years of focus on network automation:

- Programmability, APIs and API protocols
- SDN, NFV, virtual networks
- SDKs and toolkits
- Integrations with tooling like Ansible, Puppet, Chef, Salt, etc.

Today's average NetOps work looks like the 1980s

- Still manual route tasks
- Manual work maybe from CLI to GUI, but not yet automating
- Midnight maintenance windows are normal
- Change is the main cause of outage
- People are CLI jockeys / CCIE technicians more than engineers

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THE AUTOMATION PORTFOLIO

IT'S FREE?

Standards-based network interfaces and data-models

netconf   YANG   OPENCONFIG   GRPC   gNMI   REST ...

Automate network provisioning & management

SALTSTACK   CHEF   puppet   ANSIBLE   NITA   PyEZ ...

Simplify network operations / telemetry / API based interactions

JSNAPy   Automation Scripts (op/event/commit/ SNMP)   python   JET   Telemetry (JTI) ...

JUNIPER NETWORKS
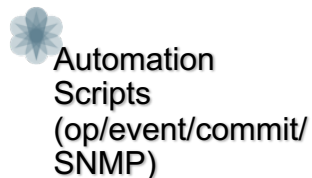
RULE BASED ACTIONS ON NETWORK ELEMENTS

Users can write their own scripts

| Commit Scripts | Op Scripts | Event Scripts | SNMP Scripts |

Junos Script API

The Junos Script API allows access to Junos commands, configuration and state data.
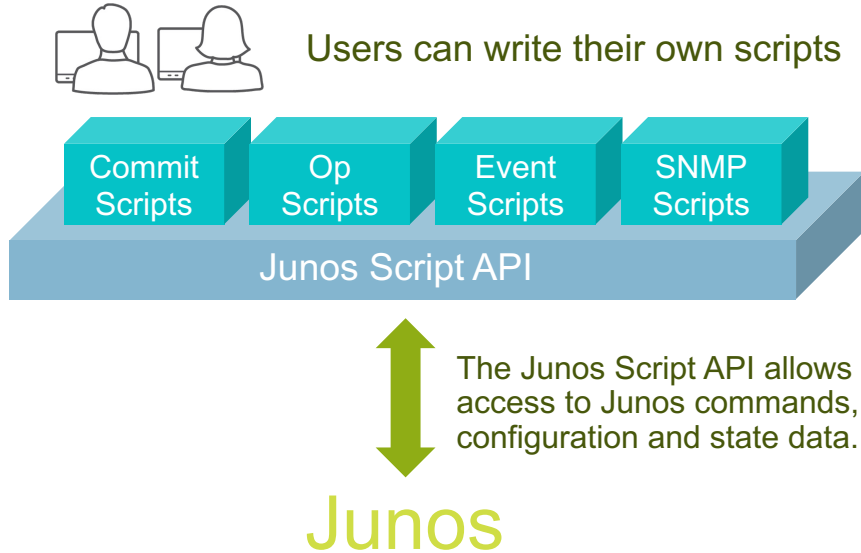
Junos

SLAX & Python (on-box)

Support for SLAX and now Python on-box on JUNOS devices

Write scripts to react to on-box network events

Commit Script: Configuration consistency checks

Operational Scripts: Monitoring and troubleshooting

Event scripts: Event-based triggers

SNMP Scripts: Return Values for OID requests

Juniper support

Supported on all Juniper MX, PTX, QFX (17.1) platforms, ACX* (17.1), EX (17.1), SRX (17.3)
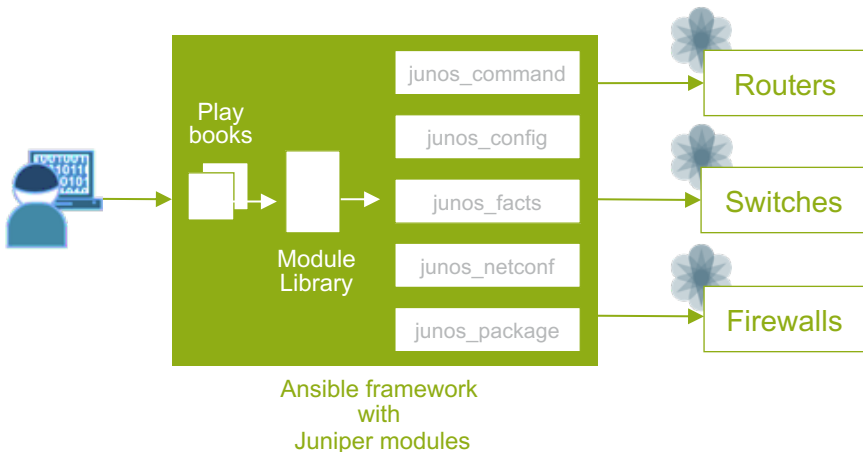
SLAX: pre-JUNOS 7.0 onwards; Python on-box: JUNOS 16.1 onwards for MX

https://github.com/Juniper/junoscriptorium

```
set system scripts language python
```

AUTOMATED NETWORK & PROVISIONING MANAGEMENT

Consistent and compliant network-operations

Play books

Module Library

junos_command

junos_config

junos_facts

junos_netconf

junos_package

Routers

Switches

Firewalls

Ansible framework
with
Juniper modules

ANSIBLE

Agent-less approach, Easy to deploy

Uses YAML 'playbooks' to define automation tasks

Works by pushing 'Ansible modules' to devices
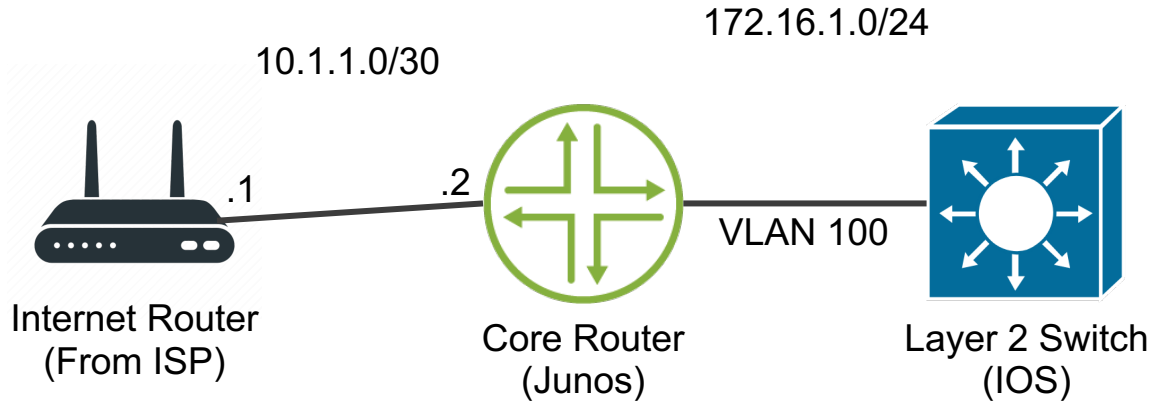
Supports workflow engine

Juniper support

Supported on all Juniper platforms, JUNOS 12.3 onwards

Enhanced capabilities using Ansible modules for Juniper.

Ansible Core: https://www.ansible.com/ansible-juniper, Ansible Galaxy: https://galaxy.ansible.com/Juniper/junos/

DEMO WITH ANSIBLE

Demo Topology

10.1.1.0/30

172.16.1.0/24

.1   .2

VLAN 100

Internet Router
(From ISP)

Core Router
(Junos)
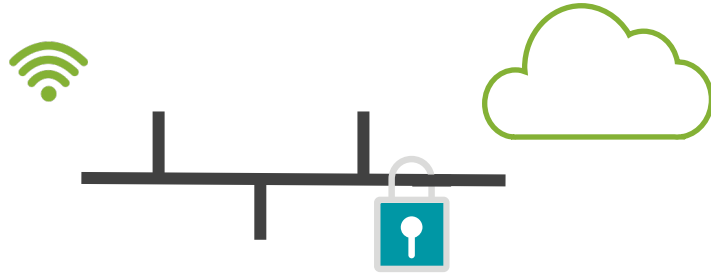
Layer 2 Switch
(IOS)

AIOPS For Network Engineer

Why AI?

From building better networks...

...to making networking better.

AI enables IT to deliver better user and client experiences with automated operations

Non-Juniper

Where Does AI Make a difference?

Complexity

?

Experience for:
Operations? Endpoints? Security?

DATA CENTER and CLOUD

CAMPUS and BRANCH

- Consistent workloads
- Controlled environment
- Known connectivity
- Experience defined at the level of aggregate service

- Diverse devices
- Bad actors and unknown people and devices
- Diverse and hybrid connectivity
- Experience defined at the level of every user | endpoint

Predictable & Uniform

Unpredictable & Variable

DIVERSE INFRASTRUCTURE leads to DIVERSE OPERATIONS
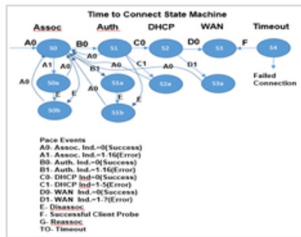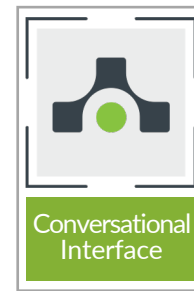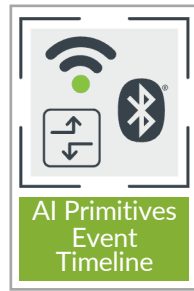
AI for IT

Non-Juniper

Can you detect & fix issues before users notice?
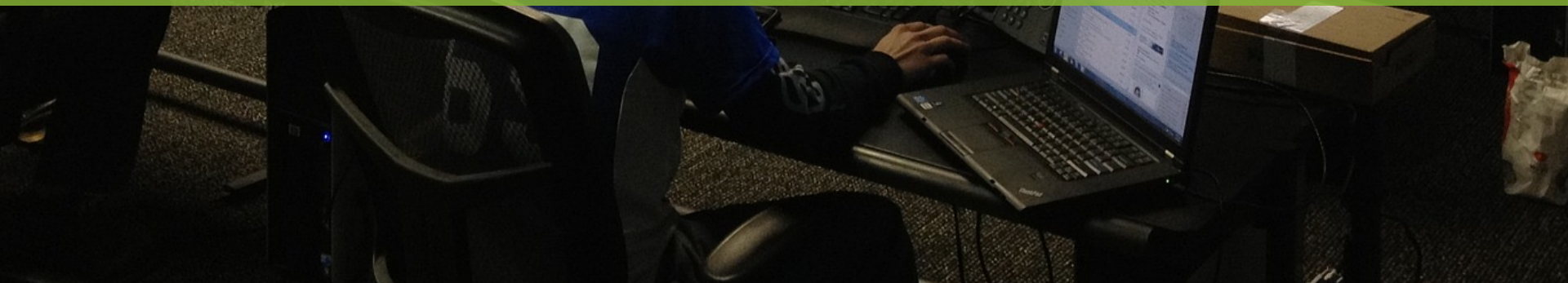
The Journey to an AI in Enterprise Networking

Modern Cloud Stack and Security

Data → AI Primitives Event Timeline → Data Science Toolbox → Conversational Interface → Self Driving Action Framework

Client\3rd party\WAN\Wired\Wireless

Non-Juniper
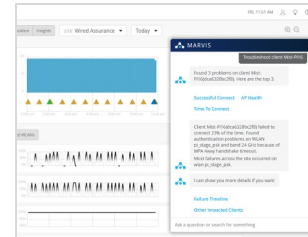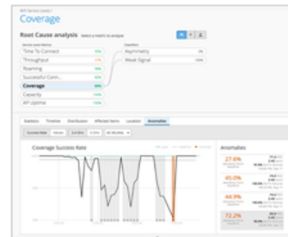
How do we define AI?

Understands user intent with NLP
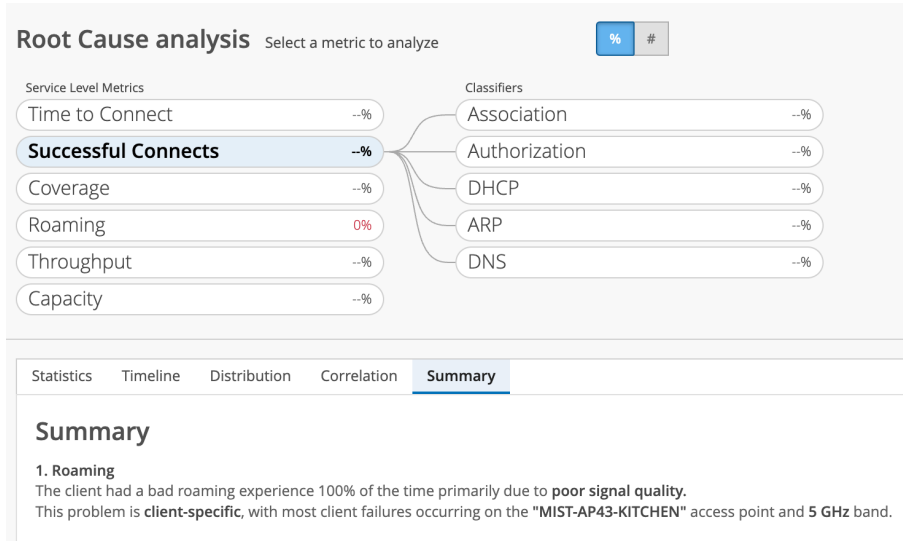
Understands how "strings" of "things" are tied together

DEMO WITH AIOPS

CHALLENGES THE AI!! 1ST ROUND

iTechPursuits.com
Technology for Life

iPhone Connected To WIFI But No Internet:
How To fix.

Picture From :
https://itechpursuits.com/iphone-ipad/iphone-connected-to-wifi-but-no-internet-how-to-fix-it/

CHALLENGES THE AI!! 2ND ROUND

Picture From :
https://www.badosoft.com/knowledgebase/what-causes-zoom-call-lag-and-one-easy-way-to-fix-it.php

THANK YOU

JUNIPER NETWORKS | Engineering Simplicity