JUNIPER ROUTING DIRECTOR & ACX7000

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Juniper Networks | Engineering Simplicity

Juniper Paragon

Agenda

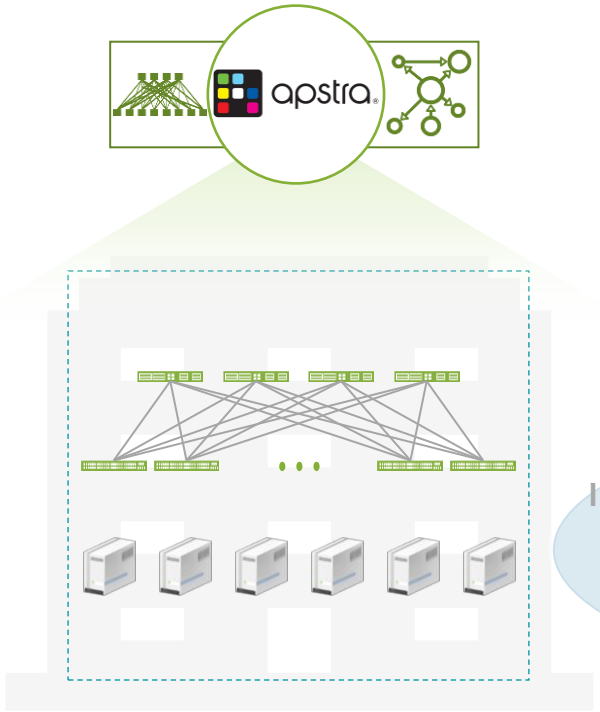
1. Routing Director 소개
2. Proactive Monitoring
3. ACX7000 시리즈 소개
4. Observability Demo
5. Active Assurance Demo
6. AI for Paragon
7. Q&A

JUNIPER NETWORKS

Routing Director 소개

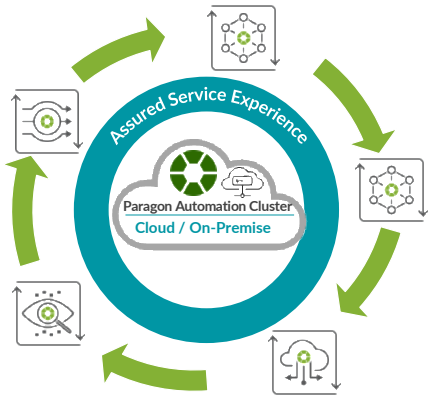
WHAT IS THE PARAGON?

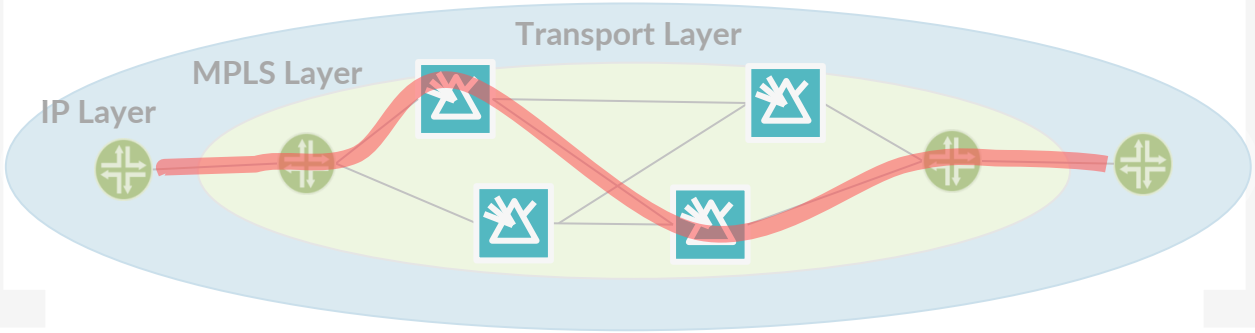
Intent Based SDN



서비스 공급자

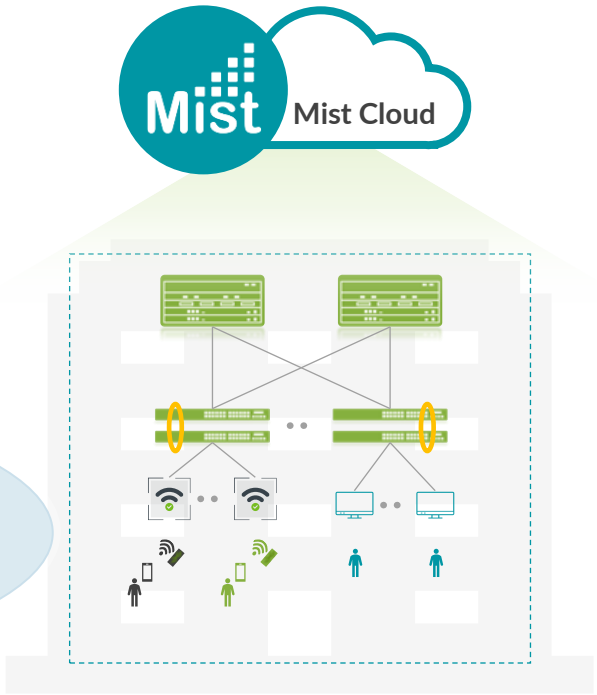
Routing Director





서비스 제공자

A.I Driven Enterprise



서비스 사용자

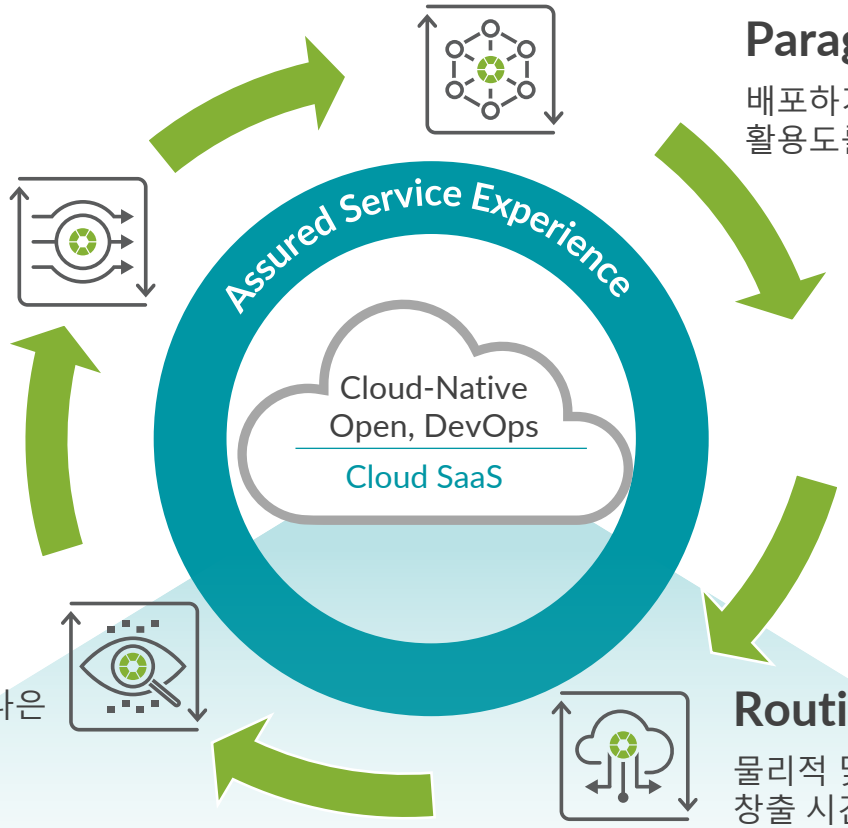
Juniper Paragon Automation powers the WAN

Paragon Pathfinder
(formerly NorthStar)

경로, 슬라이스 생성 및 관리를 단순화, 전송 서비스를 최적화하고 보장.

Paragon Planner (formerly NorthStar Planner)

배포하기 전에 서비스를 계획, 모델링 및 확인, 네트워크 리소스 활용도를 최적화하고 위험을 최소화



ACX Series

Paragon Insights (formerly HealthBot)

예측 분석을 통한 사전 예방적 서비스 보장 더 나은 서비스 품질 경험을 위해 MTTR 감소

Routing Active Testing (formerly Paragon Active Assurance)

물리적 및 가상 네트워크에서 서비스 품질을 적극적으로 확인, 수익 창출 시간을 단축하는 동시에 수리 시간 단축

Open APIs Real time streaming telemetry Active Sensing

Access

Aggregation

Edge cloud

Edge/core

Scalable IP service fabric

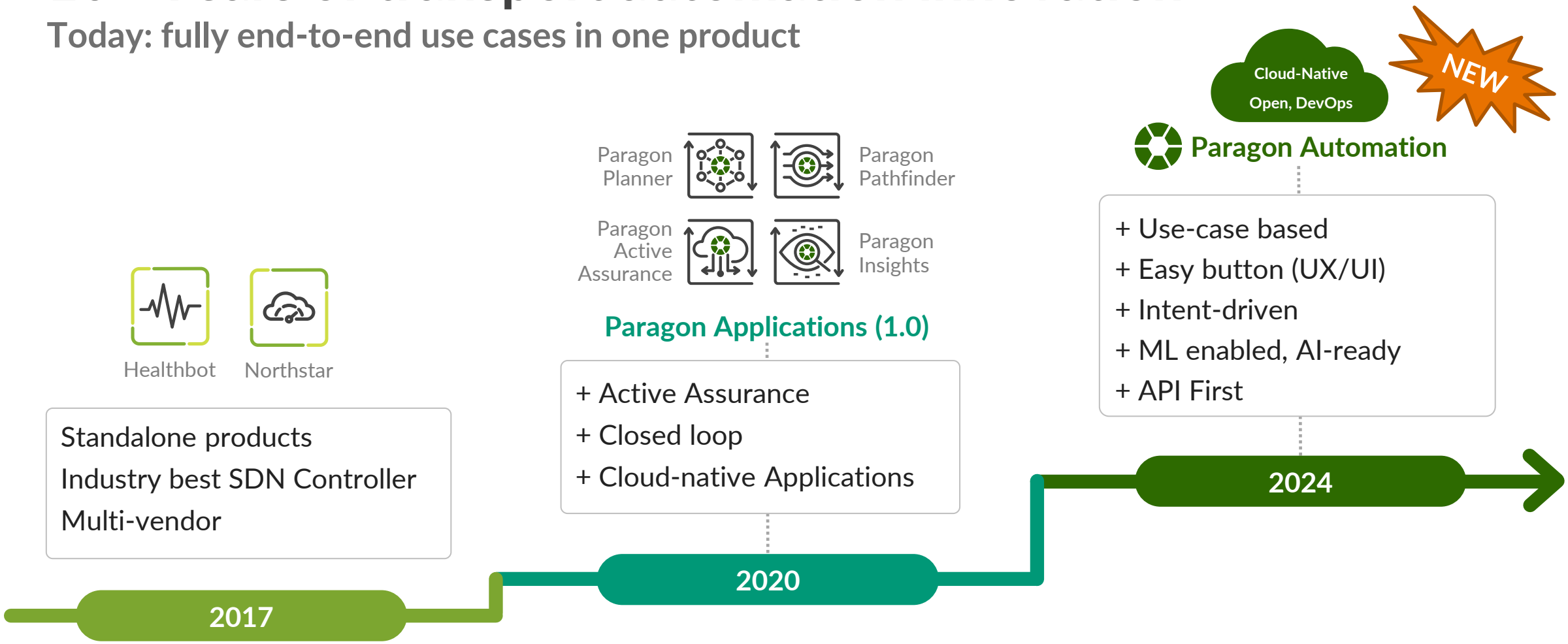
Paragon Automation- All together now

Everything you need for intent-based networking in the WAN

Define & Fulfill Intent	Test & validate Experience	Monitor, diagnose, recommend	Fix/Optimize
서비스 의도를 네트워크 의도로 변환하기 위해 표준 기반 모델링을 활용	실시간 데이터 플레인 측정과 모의 테스트를 텔레메트리와 함께 통합	문제의 근본 원인을 식별하고 조치 권고	복구하기 위한 조치를 자동화하거나 사용자가 할 수 있도록 지원
단순화 및 디자인 가속화	능동 및 수동 품질점검을 통해 블라인드 스팟 제거	자동화된 분석	문제 경감, 업그레이드, 설정 변경 등을 자동화
일관성 및 반복성	의도 반영을 위한 품질점검 설정 자동화	버추얼 어시스턴트 (LLM)를 포함한 개방적이고 확장성있는 API	TCO 및 전력소모를 줄이기 위한 최적화
자동화되고 검증된 배포	모든 홉(hop)을 검증	직관적인 UI	고객이 인지하기 전에 장애, 서비스 불안정, 성능 저하를 감지하고 해결
서비스 품질점검의 자동 활성화			

10+ Years of transport automation innovation

Today: fully end-to-end use cases in one product



Juniper Paragon

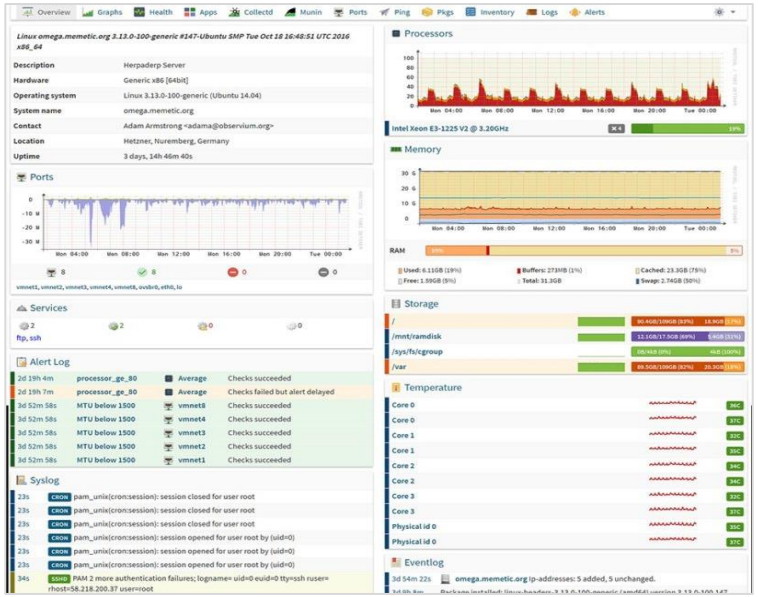
Observability

Curated and prioritized to give you actionable intelligence

ASSURE

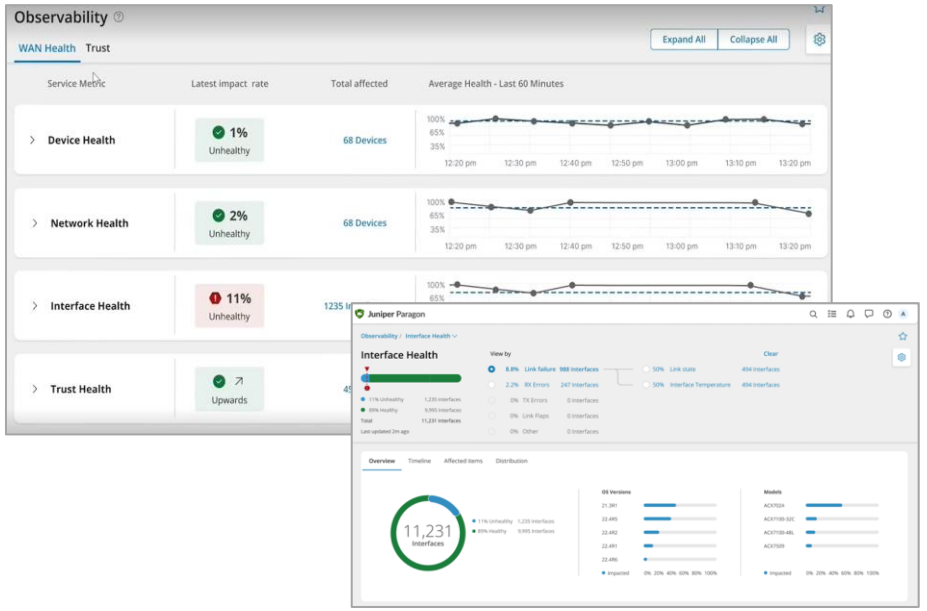
Observability

How it's always been



- x 주요 장비 모니터링
- x 과도한 정보 제공
- x 스크립트, DIY, 룰설정 등을 통한 커스텀 모니터링
- x 고급 기술 필요
- x 문제가 되는 이슈를 놓칠 수 있는 가능성 존재

How it's done with Paragon Automation



- ✓ 장비, 네트워크, 서비스에 대한 모니터링
- ✓ 동작에 포커스를 맞추어 반드시 필요한 상세 정보만 제공
- ✓ AI 기반의 분석
- ✓ 초급자에게 맞추어진 디자인
- ✓ 문제가 되는 이슈를 놓칠 가능성 없음

Juniper Paragon

Network trust & compliance

Continuous monitoring with drill-down from network health to device configs

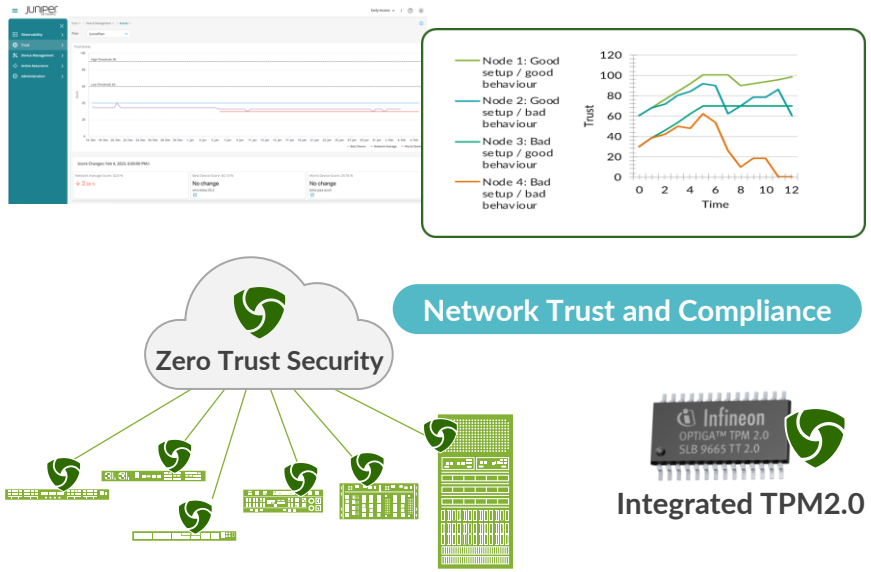
ASSURE

Active Assurance

How it's always been

- x 위조/조작된 장비
- x 잘못된 펌웨어
- x 규정 미준수 장비를 감지하지 못함
- x 문제 발생 이후에 취약점, HW/SW EOL 발견

How it's done with Paragon Automation



- ✓ 위조/조작으로 보호된 하드웨어
- ✓ 안전한 ZTP, HW + SW 증명
- ✓ 자동화된 규정 준수, 취약점 및 무결성 평가
- ✓ 신뢰 측정 -> 개선방안 권고

Juniper Paragon

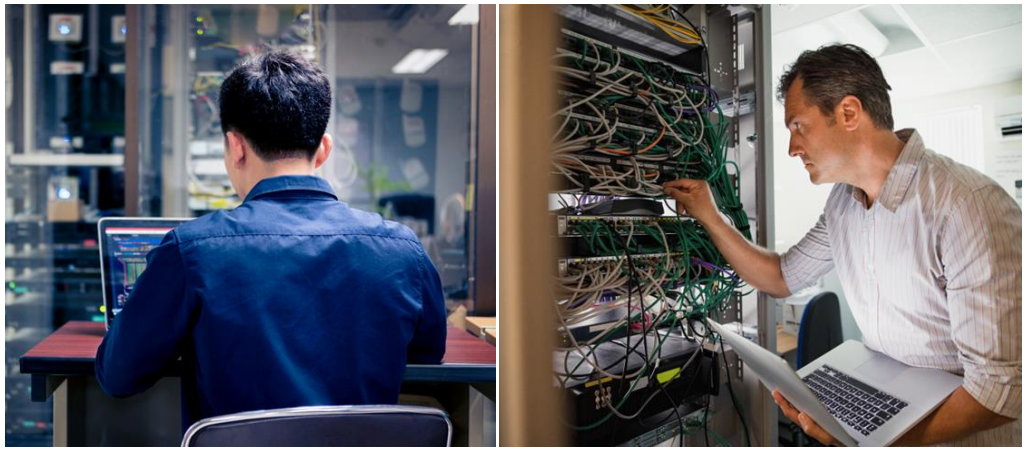
Device onboarding

Faster and easier with guided workflows and verification at every step

ORCHESTRATE

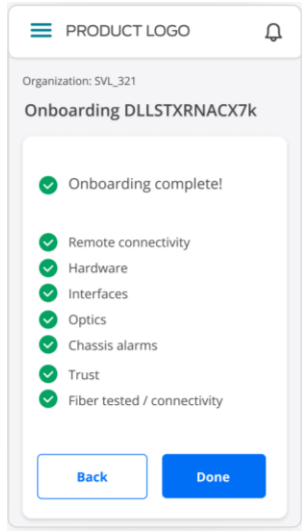
Device onboarding

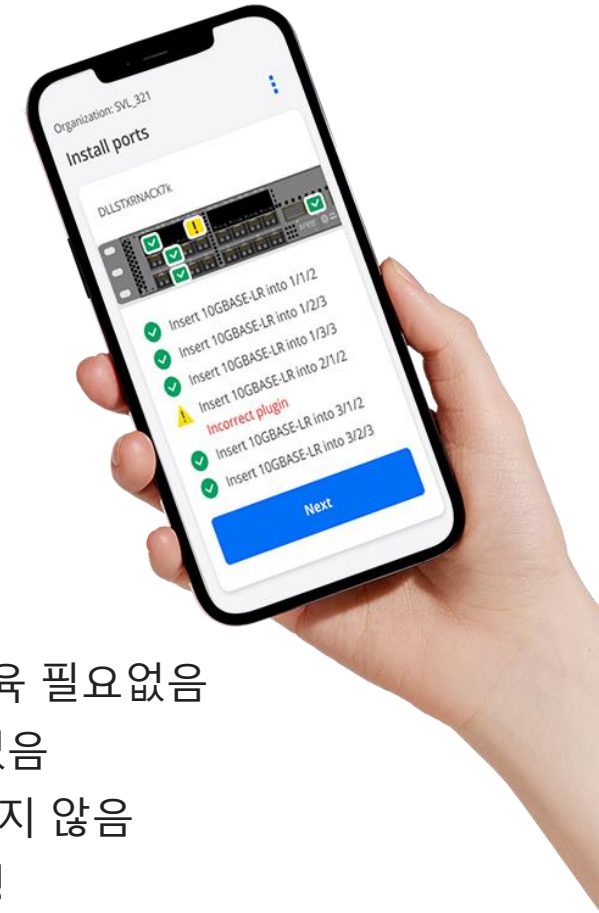
How it's always been



- x 장비당 2~7일 소요
- x 수작업 및 훈련된 직원 필요
- x Human error, noc intervention, use cli. 휴먼에러, NOC 개입, CLI 사용
- x 안전하지 않은 USB/포스트잇(민감정보) 사용
- x ZTP 중단 시 다수의 인원 투입

How it's done with Paragon Automation





- ✓ 장비당 10~30분 소요
- ✓ 가이드에 따라 설치, 별도 교육 필요없음
- ✓ 완전한 자동화로 휴먼에러 없음
- ✓ 안전하고 민감정보를 요구하지 않음
- ✓ 설치 후 통합테스트까지 수행

Routing Active Testing

- 실질적인 고객 경험 측정:
  - 실제 고객이 없는 경우에도
  - 서비스 배포 이전에도
  - 제어할 수 없는 도메인에서도
  - 서비스가 복잡하거나 다양하더라도

Proactive Monitoring

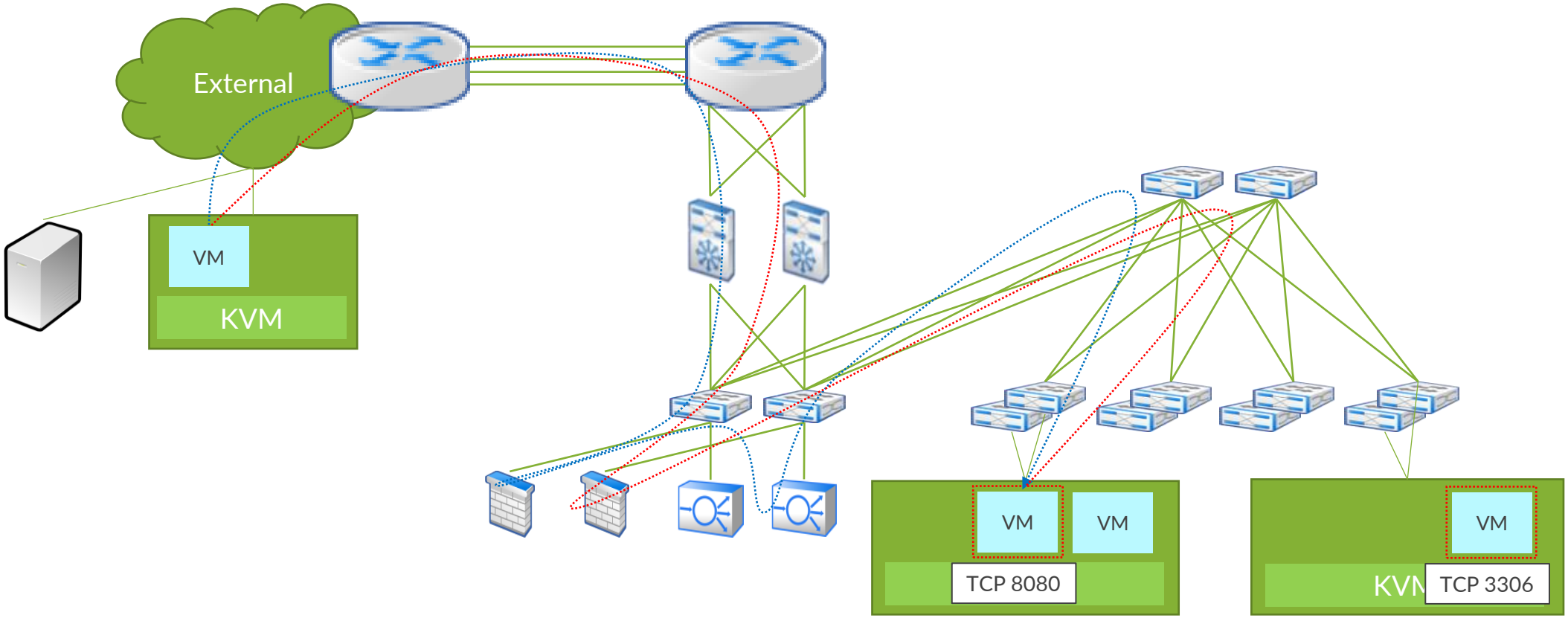
Network Problem is …

60% 의 네트워크 상에 문제는 사용자에 의해 처음 발견되거나 - 아예 리포트 되지 않는다.

Source: Independently conducted survey of 200 US enterprises, requested by Netrounds

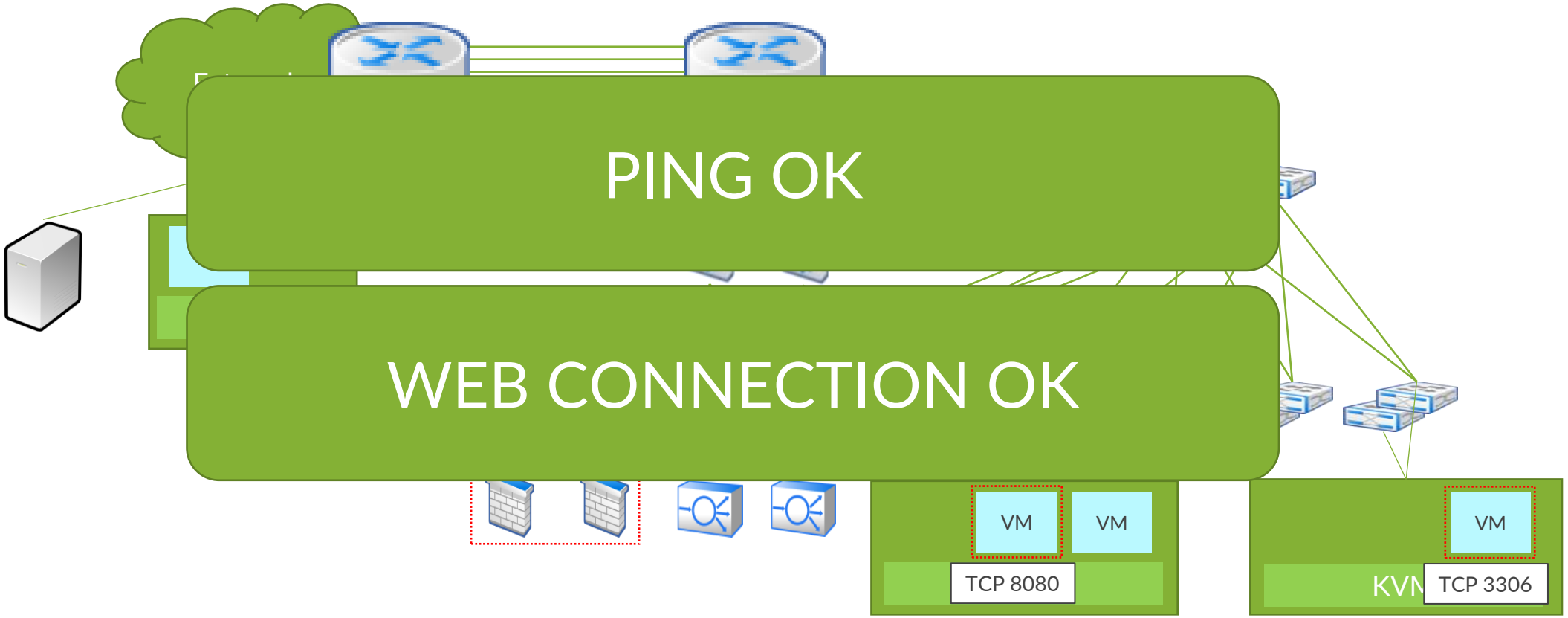
Source : researchgate.net

Network Problem is …



Source : researchgate.net

Network Problem is …



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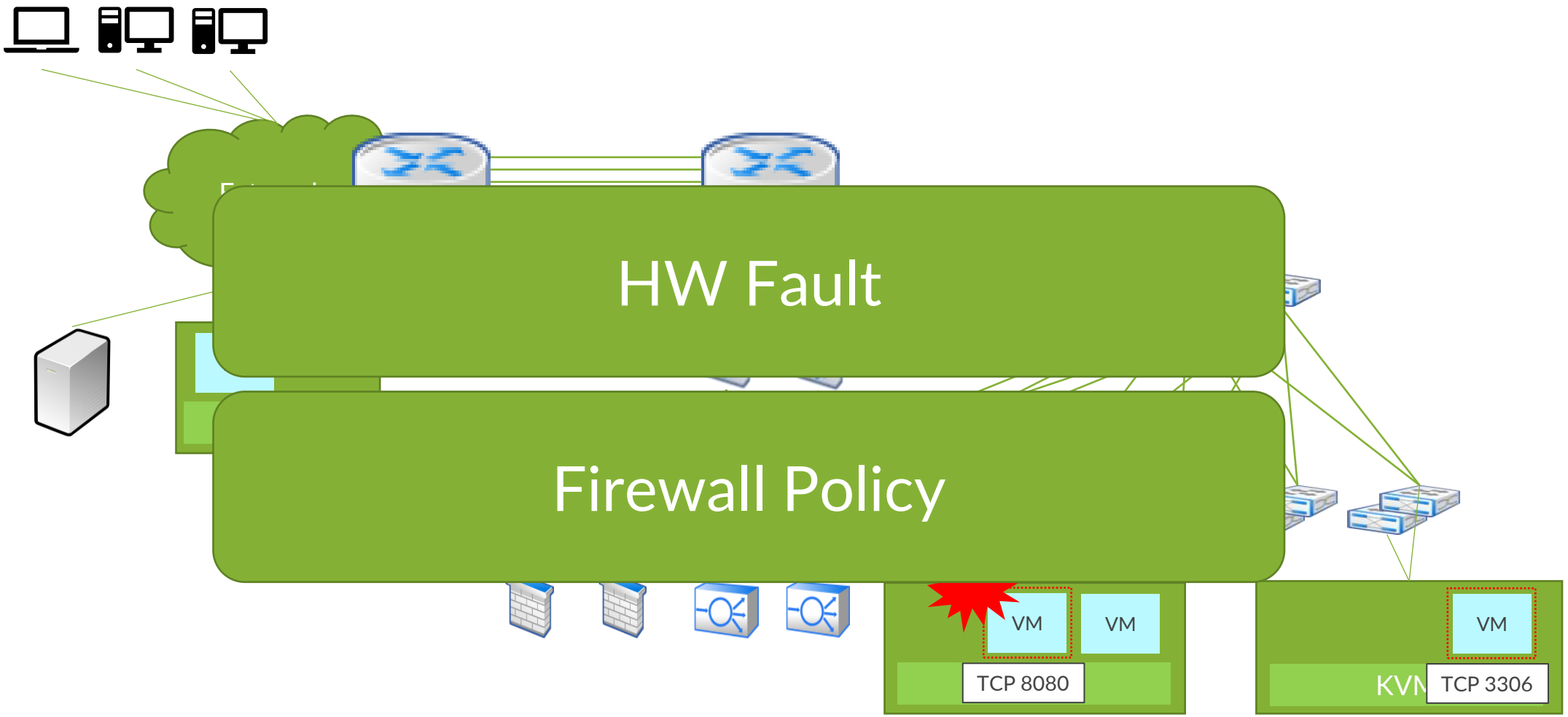
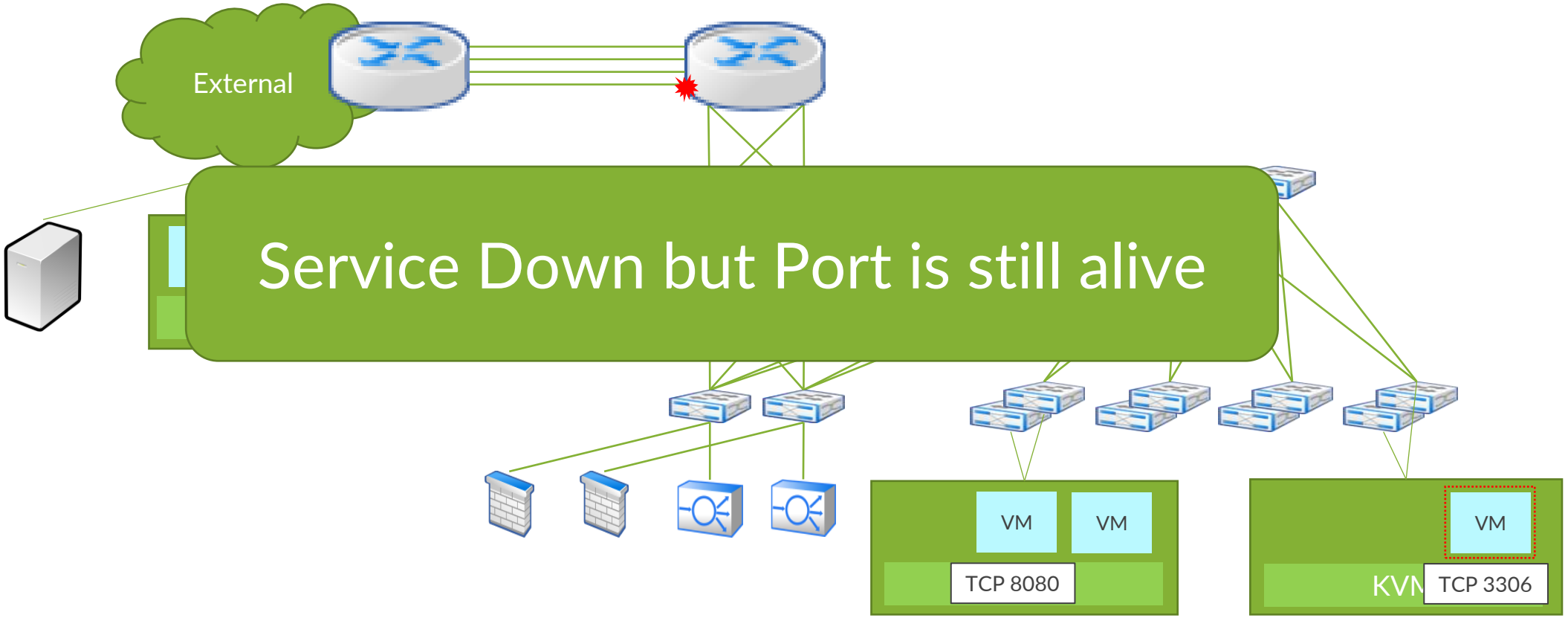
Network Problem is …



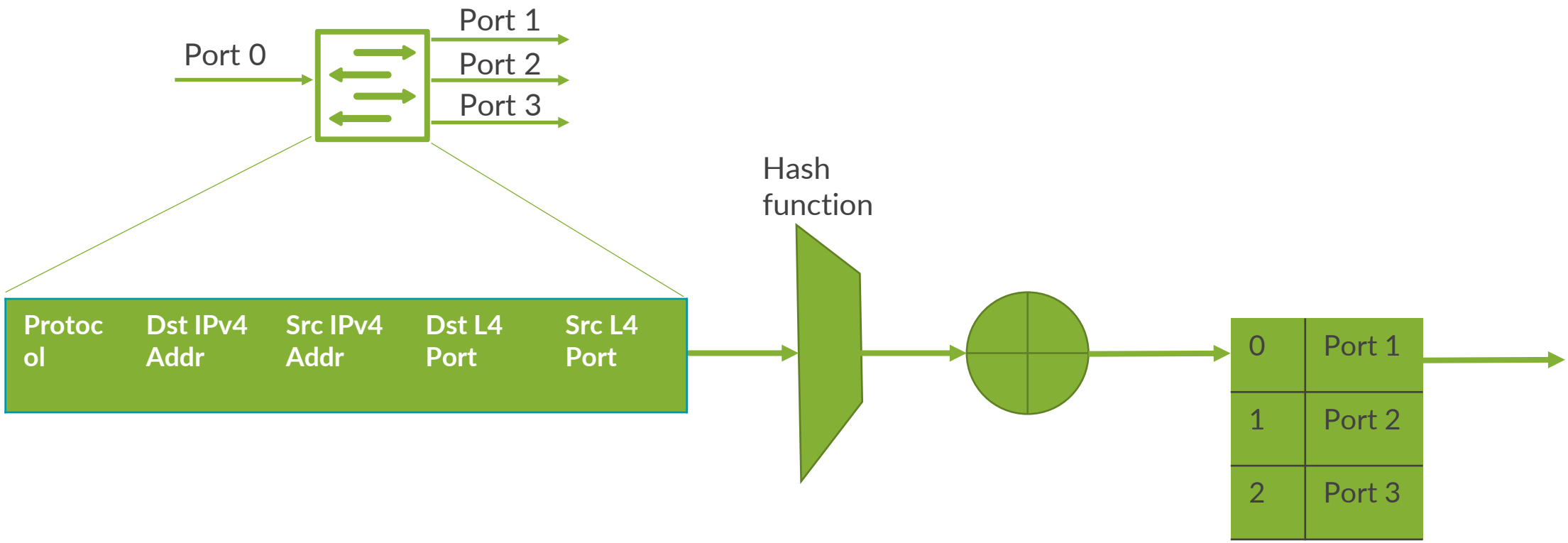
Source : researchgate.net

HW Fault



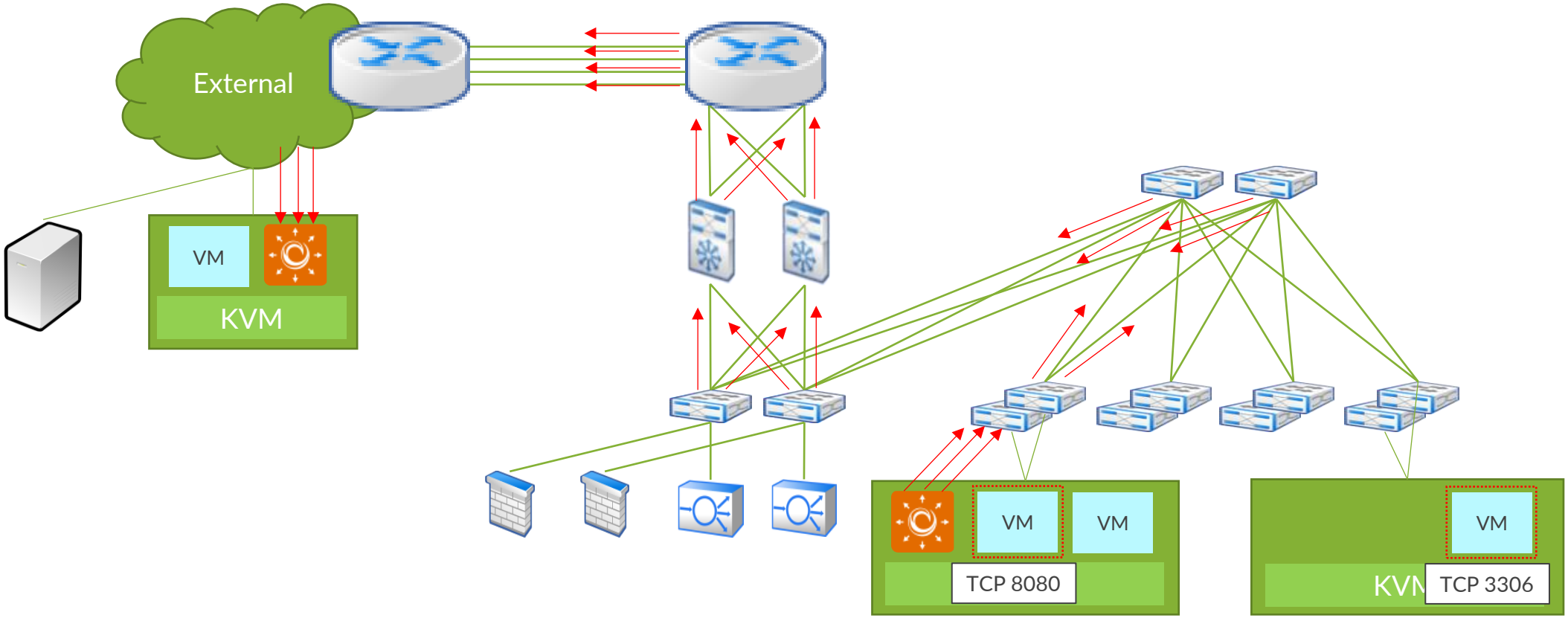
Source : researchgate.net

LOADBALANCING



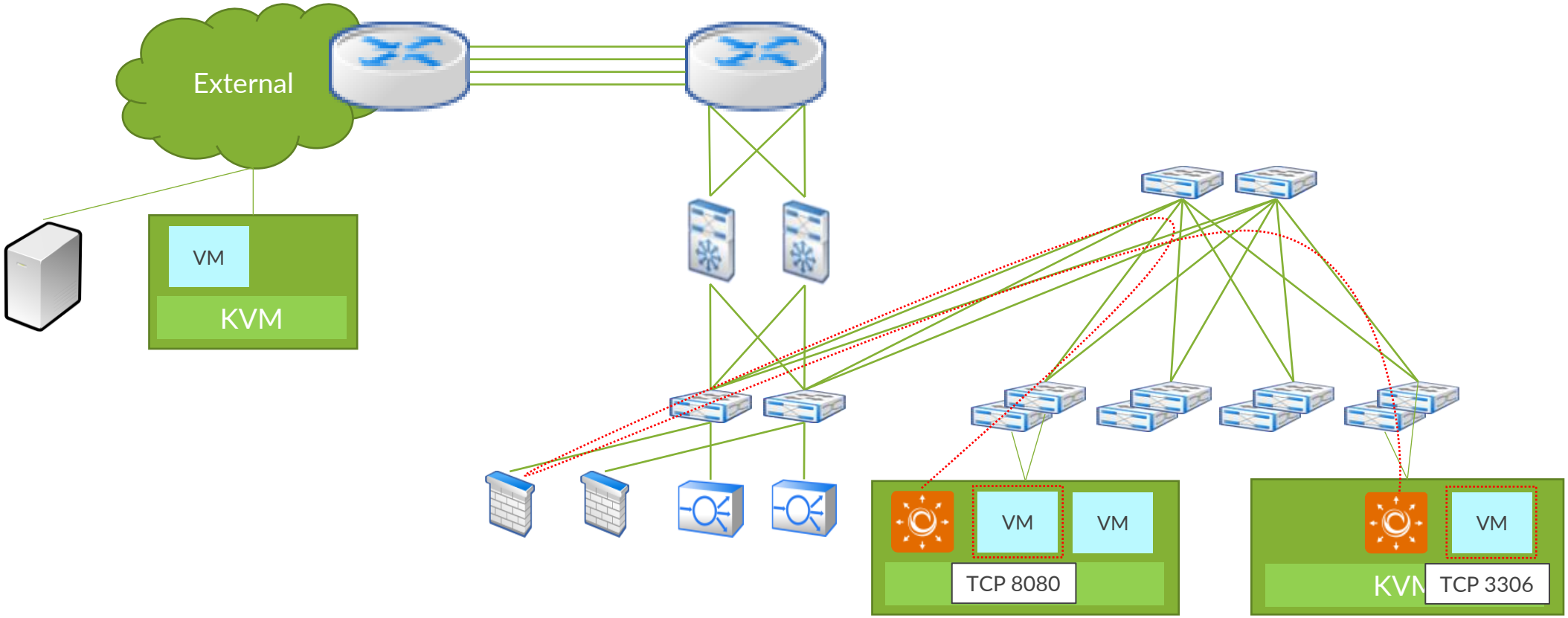
Source : researchgate.net

HW Fault



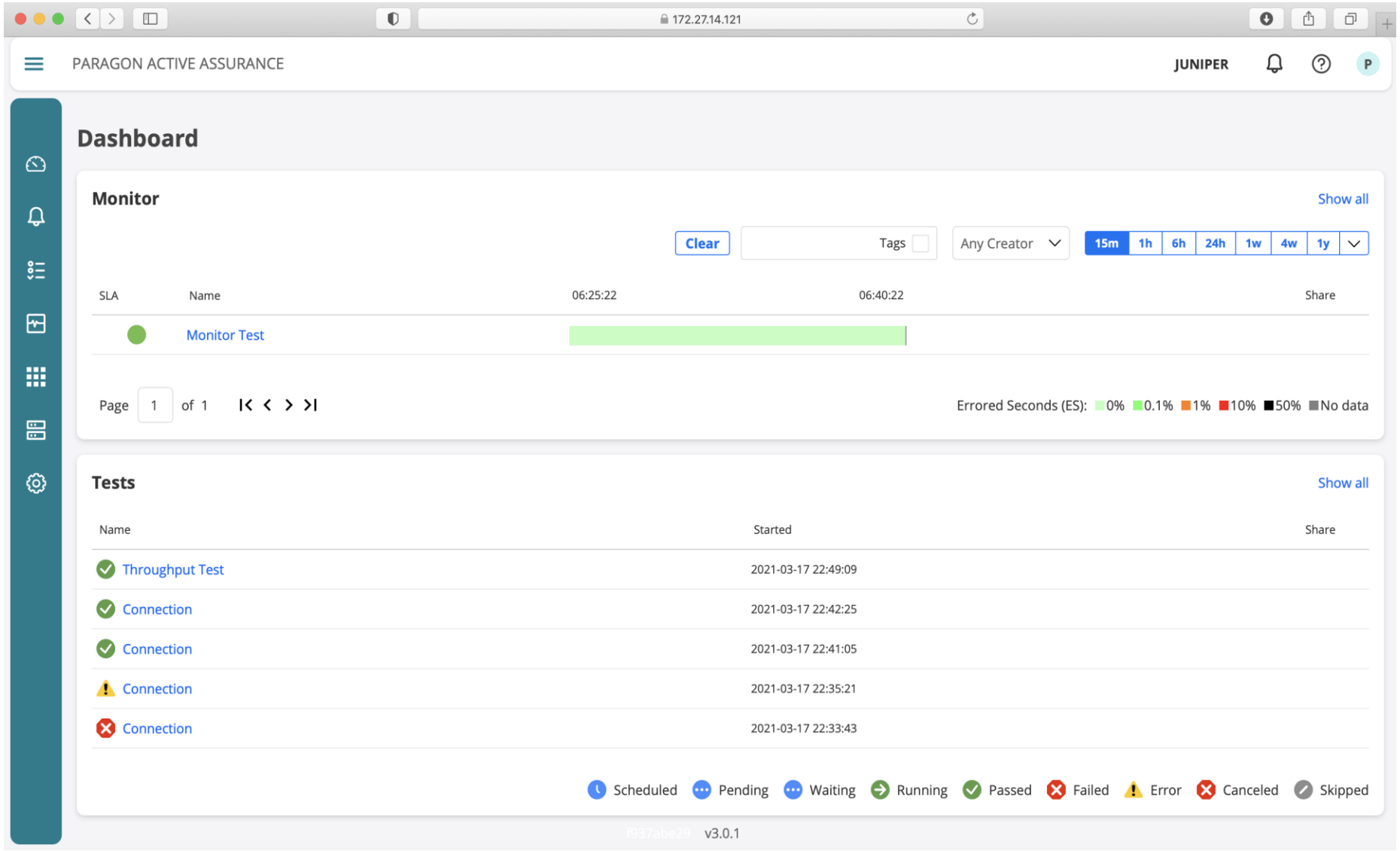
Source : researchgate.net

Firewall Policy

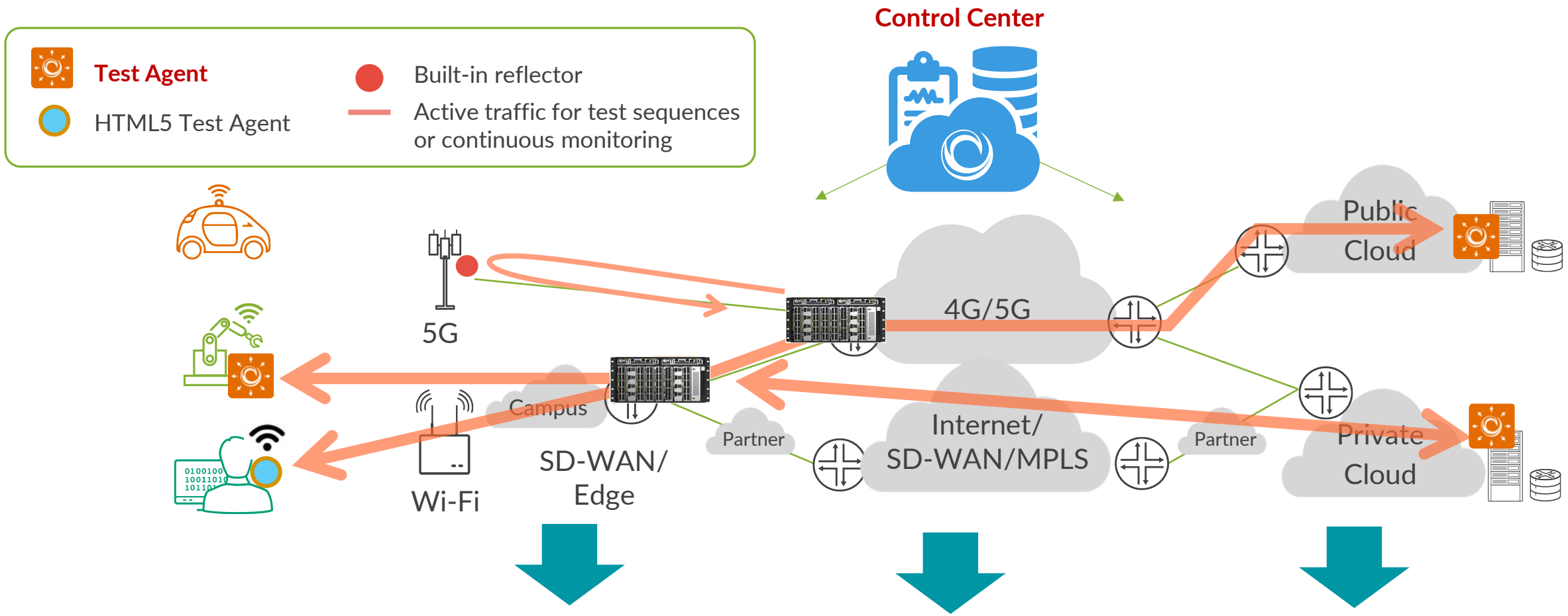


Source : researchgate.net

Active Assurance



Paragon을 사용하여 보장 : 데이터 플레인 상에 Active 트래픽



ACX7000 시리즈

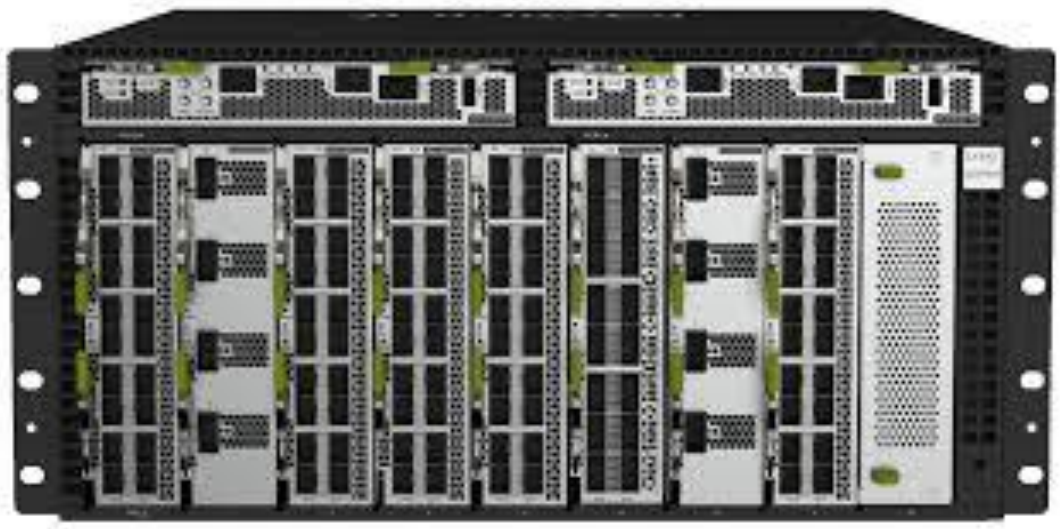
HARDWARE DESIGN

Generative AI

저 지연
고 대역폭
네트워크 패브릭

Sustainable IT

하드웨어의 소형화
저전력



클라우드 메트로 솔루션 ACX7000 개요

클라우드 메트로 솔루션 ACX7000 개요

고성능, 확장성, 유연성이 뛰어난 ACX7000 시리즈

Scalability

- 다양한 포트폴리오 : Fixed Type / Fixed + Modular / Fully Modular
- 다양한 인터페이스 제공 : 1/10/25/50/100/400GbE

Capacity & Scale

- ACX7K 샤시 Jericho2 (J2C) PFE Board
- 4GB HBM 버퍼 메모리

Space Efficient

- ACX7509 9 Slot Fully Modular Chassis : 5RU
- ACX7348/7332 3 Slot Modular Chassis + Fixed : 3RU

Low Power Consumption

- ACX7509 Typical 전력 소비량 : 1500W
- ACX7348 Typical 전력 소비량 : 520W

JUNOS® EVOLVED

61-77% Lower Power Consumption

29-64% More Space Efficient

53-71% Lower TCO

Source: ACG Research TCO Study, 2022

클라우드 메트로 솔루션 ACX7000 개요

지속 가능한 운영

지속 가능한 시스템

ACX7000 Family

*단방향 성능 수치

JUNOS EVOLVED

ACX7020 (TBD)

Fixed, *80Gbps

ACX7024

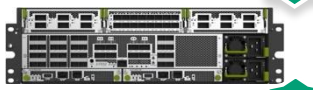

ACX7024X (New)

Fixed, *360Gbps

ACX7100-48L

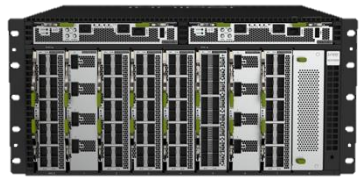

ACX7100-32C

Fixed, *4.8Tbps

ACX7332 (New)


ACX7348 (New)

Fixed + Modular, *2.4Tbps

ACX7509

Fully Modular, *4.8Tbps

지속 가능한 아키텍처

IP Services Fabric

- ✓ Converged + Network Slicing (EVPN, SRv6)
- ✓ Scale Out + Scale Up

\+

내장된 Active Assurance 테스트 에이전트

\+

Zero Trust Security

Juniper Optics

Unified PON


400G ZR/ZR+

(New)

Paragon Automation

\+

AI-Enabled

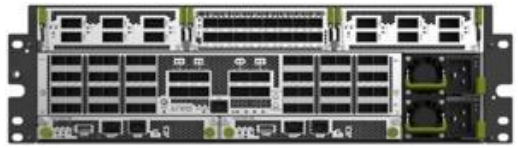
\+

Cloud-native by Design

클라우드 메트로 솔루션 ACX7000 개요

고성능, 확장성, 유연성

메트로 엑세스 & 어그리게이션



ACX7348

클라우드 메트로 어그리게이션 환경에 적합, 최대 4Tbps NIF 용량

ACX7024

클라우드 메트로 어그리게이션 환경에 적합, 최대 1Tbps NIF 용량

ACX7020

클라우드 메트로 엑세스 환경에 적합, 약 100Gbps NIF 용량

서비스 엣지 확장

ACX7332

대규모 비즈니스 VPN 및 분산형 BNG 서비스에 적합한 라우터

ACX7024X

소규모 비즈니스 VPN 및 분산형 BNG 서비스에 적합한 라우터

Spine / Leaf 어그리게이션 패브릭

ACX7100-48L

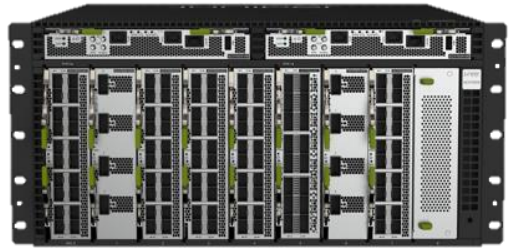
10-50G 클라우드 메트로 어그리게이션 환경 + 데이터센터 Deep 버퍼 LEAF, 최대 4Tbps NIF 용량

ACX7100-32C

100G 클라우드 메트로 어그리게이션 환경 + 데이터센터 Deep 버퍼 SPINE, 최대 4Tbps NIF 용량

APSTRA Support

고집적 멀티 서비스 엣지 라우터



ACX7509

린 에지(lean edge)를 위한 설계,

최저 전력 및 TCO를 위한

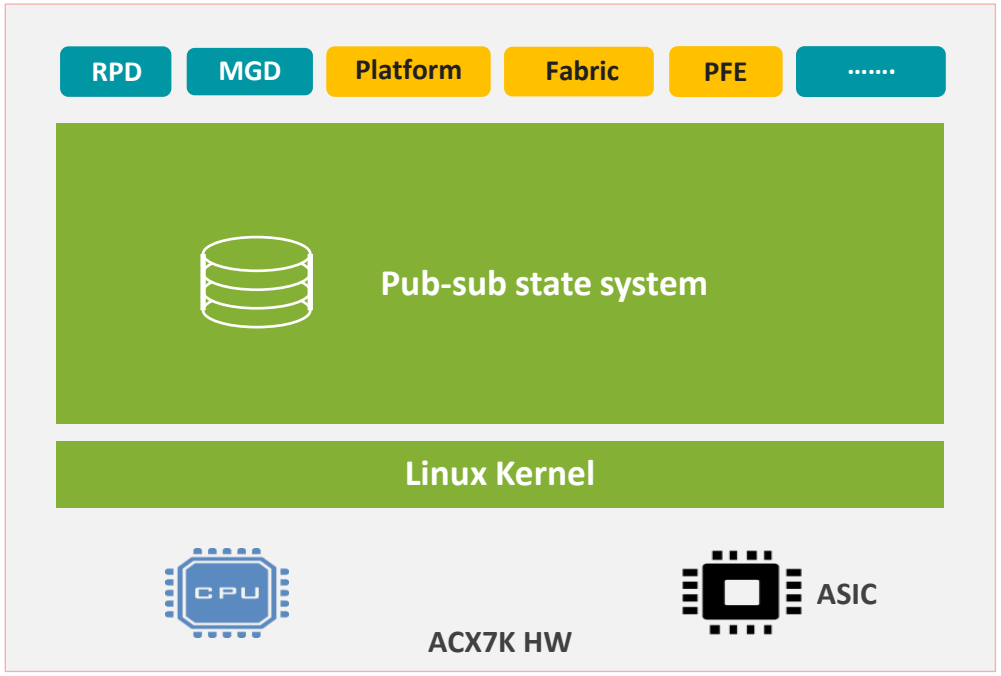
중앙 집중 방식의 포워딩

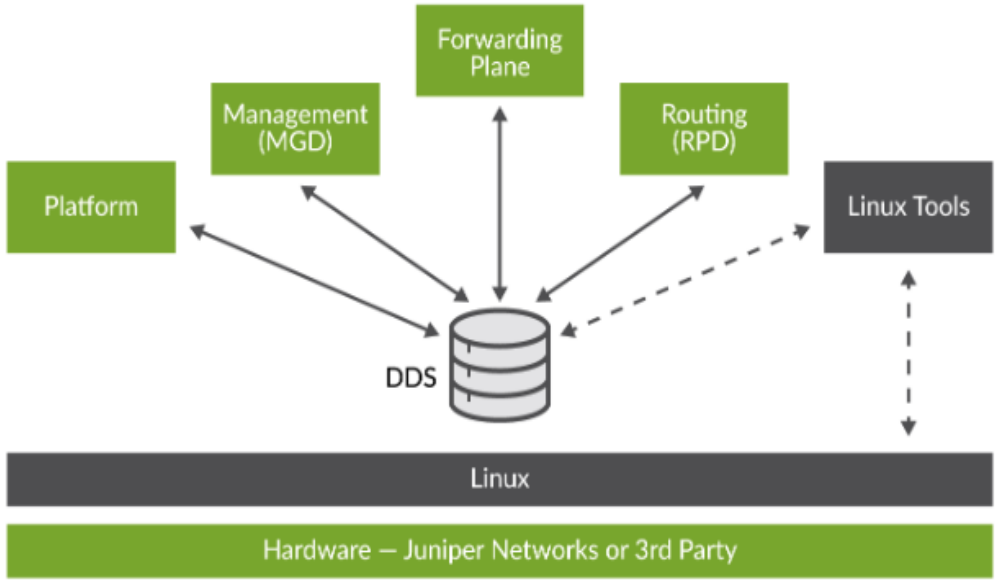
향후 25T NIF capacity with 2nd Gen FEB

JUNOS EVOLVED

JUNOS EVO 소프트웨어 개요

- JUNOS Evolved (EVO) : 확장 가능한 분산 시스템을 위한 차세대 운영체제 *CLI 및 사용자 인터페이스 등 기존의 JUNOS 에서 제공하는 것과 동일 합니다.
- JUNOS EVO 는 커널 간의 결합을 제거하고 시스템을 분산시켜 개방성, 유연성, 안정성, 일관성 향상
- 기존 JUNOS 는 FreeBSD 운영체제에서 실행되는 반면, JUNOS EVO 는 Native 리눅스 시스템에서 실행되어 다양한 리눅스 도구 활용 가능
- 분산 데이터스토어(DDS) 를 통해 모든 상태 정보 저장하고 관리 각 애플리케이션 간 통신을 위해 게시 – 구독형 모델 (Publish – Subscribe)



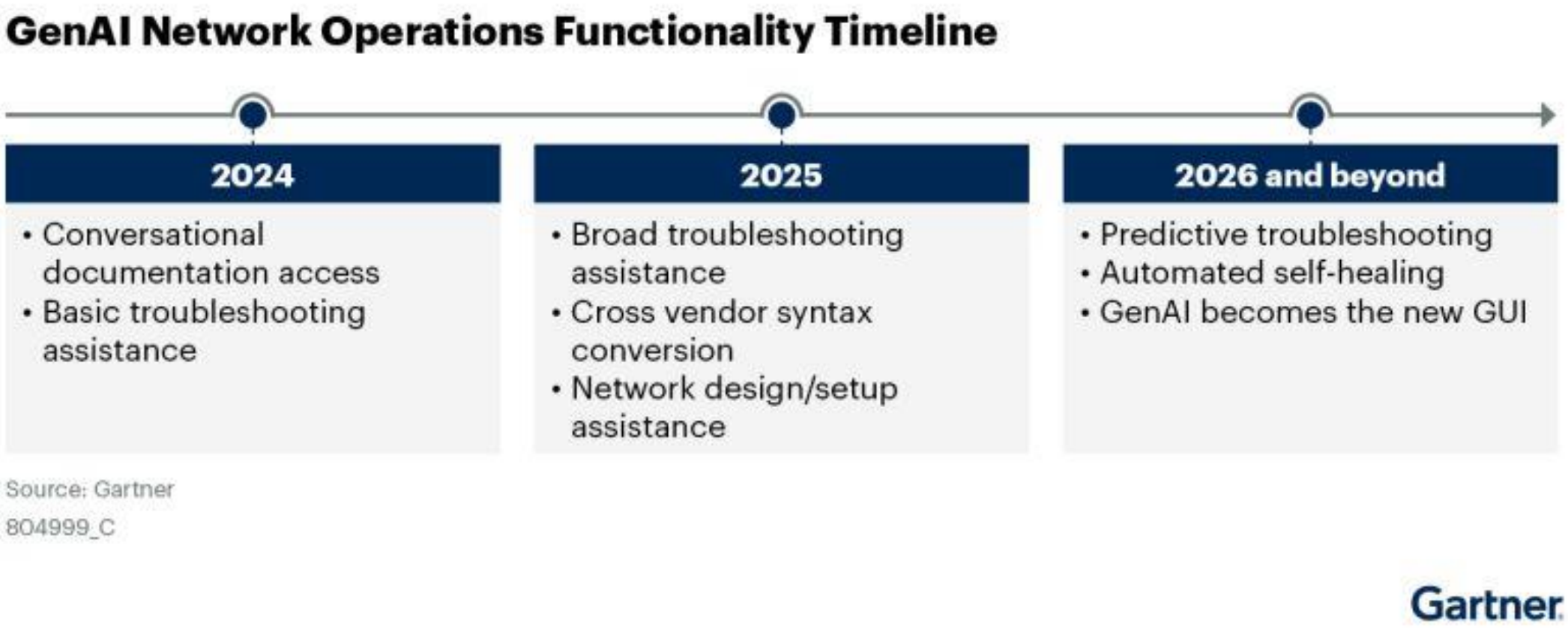


Observability Demo

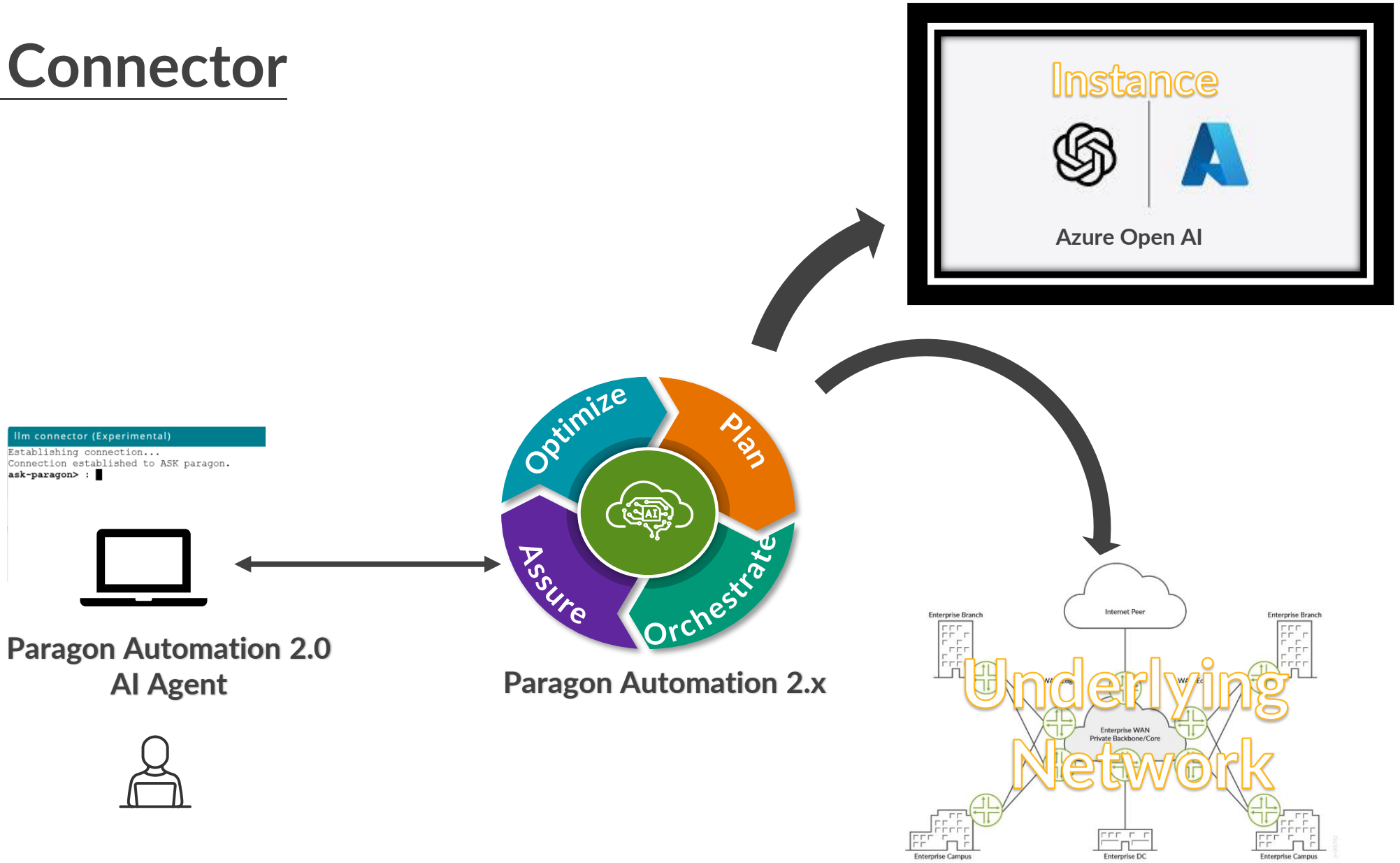
Active Assurance Demo

AI For Paragon

GenAI Timeline for Networking



LLM Connector



SVL-acx7024-09-dc

OVERVIEW | INVENTORY

Status Ready to Install

Tech Support | View Documentation

- Identity & Location — Healthy
- Remote Management
- Hardware — Urgent Action Needed
- Interfaces — Healthy
- Software — Action Needed
- Configuration — Action Needed
- Routing and MPLS — Healthy
- Connectivity — thy

How about answering questions about **MY NETWORK, SERVICES, ISSUES?**

Juniper Paragon

Troubleshoot Devices

Troubleshoot Devices

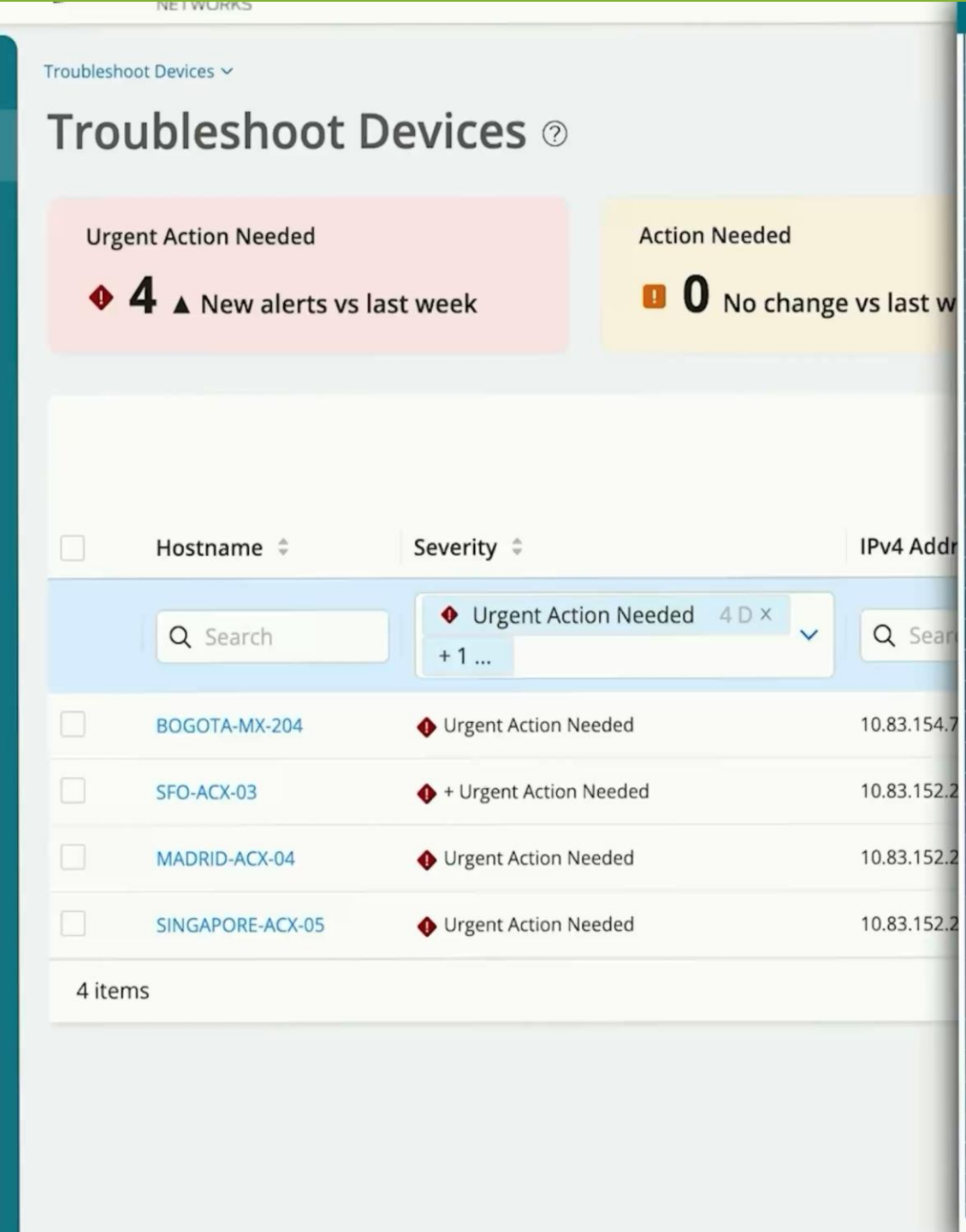
Urgent Action Needed	Action Needed	Connected	Disconnected
4 ▲ New alerts vs last week	0 No change vs last week	4	0

Export More

Hostname	Severity	IPv4 Address	Model	Serial Number	OS Version	Site
Search	Urgent Action Needed 4 D × + 1 ...	Search	Search	Search	Search	Select
BOGOTA-MX-204	Urgent Action Needed	10.83.154.7	MX204	GK509	23.2R2.18	BOGOTA
SFO-ACX-03	+ Urgent Action Needed	10.83.152.250	ACX7024	FL4722AN0052	23.4R1.10-EVO	SFO
MADRID-ACX-04	Urgent Action Needed	10.83.152.251	ACX7024	FL4722AN0082	23.4R1.10-EVO	MADRID
SINGAPORE-ACX-05	Urgent Action Needed	10.83.152.252	ACX7024	FL4722AN0120	23.4R1.10-EVO	SINGAPORE

4 items

Display 15 1



ASK PARAGON

- Critical RPM threshold
- High RPM threshold
- Low threshold
- Measurement
- Fan state color
- PSM (Power Supply Module) power usage
- PSM temperature
- PSM power usage state color

FPC (Flexible PIC Concentrator)

- CPU, memory state, temperature
- PFE (Packet Forwarding Engine) discards
- NPU (Network Processing Unit) resource
- PFE pipe stats
- FPC state color

System Health

- NTP synchronization status
- System CPU, memory utilization
- NTP sync color
- Routing engine CPU utilization color

Interfaces

- IFL (Logical Interface) state
- Interface FEC, CRC, framing errors
- Interface in/out errors, traffic state, flaps
- Optical signal loss, FEC, TX/RX power
- Interface physical interface traffic
- Interface link state color

This collection of KPIs spans across various domains such as EVPN, BFD sessions, system health, hardware components, interfaces, and more. Each KPI is focused on monitoring the health, performance, and efficiency of network infrastructure and services.

Does it understand **CONFIGURATIONS on my network?**

Juniper Paragon

Instances

Service Instances

Service Instances

Name	Customer	Service Design	Design Version
sales	AKME	l3vpn	0.5.43

1 items

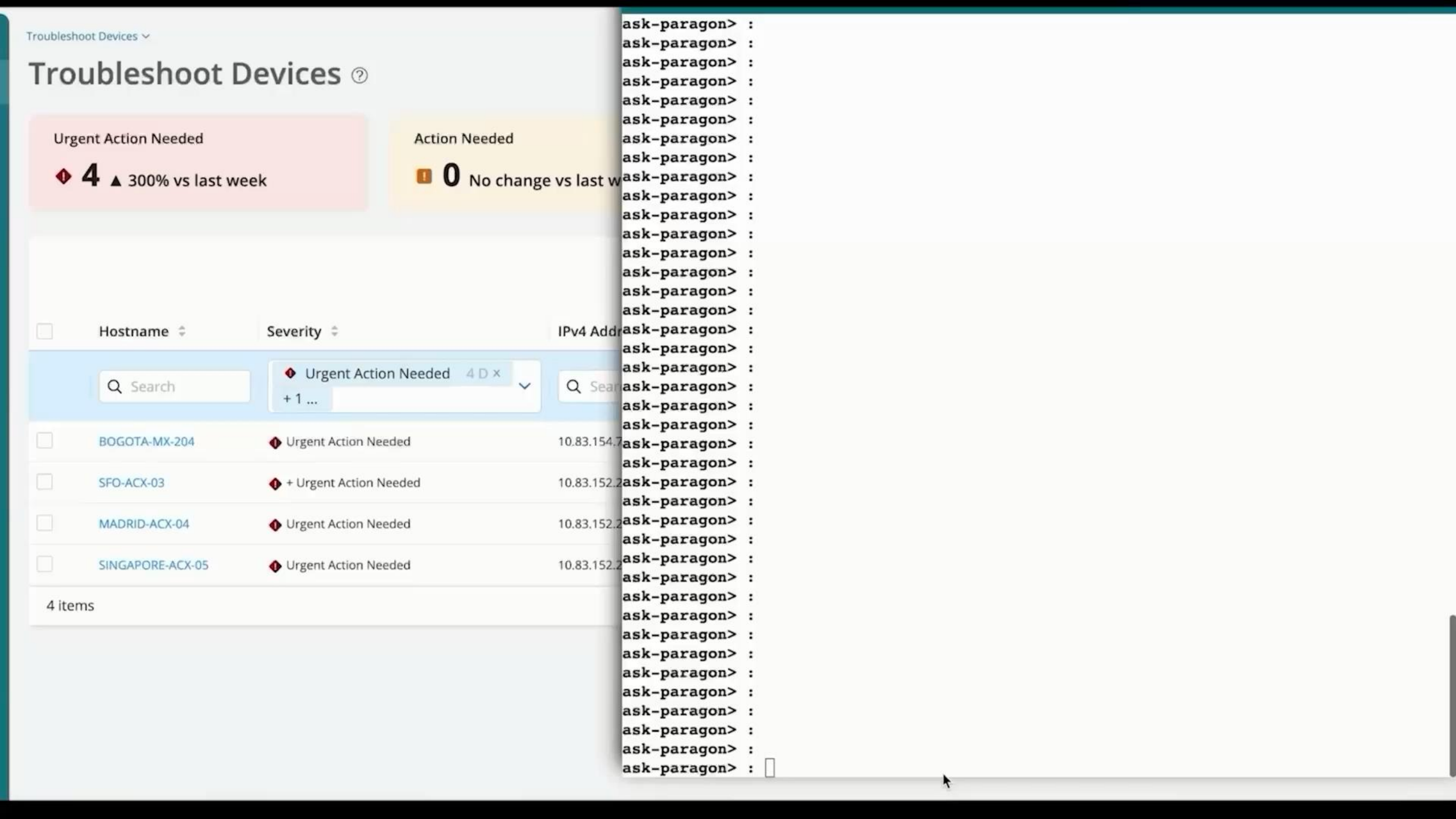
```
Using http://10.99.178.76:8000/ as PAPI URL
Using http://10.108.204.47:12000/ as API aggregator URL
Using http://10.106.140.23:9000/ as Insights config-server URL
Using http://10.99.65.158:9000/ as Insights api-server URL
Using http://10.96.219.8:11000/ as Foghorn config management service URL
Using http://10.108.31.162:80/rpc/v1/execute as octalk rpc
Welcome to Ask Paragon. Send a message or type /? for help
Conversation history is being reorded in the file:  /root/ask-paragon/logs/20240626-0
1643_9839_logfile.log
ask-paragon> :
ask-paragon> :
ask-paragon> : list my vpns
```

Message	list my vpns
Response (20.0s)	• Running: get_vpns() Running: • get_customers() • get_vpns() • Running: get_service_instances(customer_ids=['171aab6e-2d96-11ef-b53b-… '2b05fd7a-2d96-11ef-b830-9e7b06da58d0', '853a7e25-2edb-11ef-b53b-82bdd05df89d', 'eec1b03c-2edc-11ef-b53b-82bdd05df89d', 'bdb409b0-32a4-11ef-b830-9e7b06da58d0']) **Design ID Instance ID VPN Name** l3vpn sales bdb409b0-sales

```
ask-paragon> :
```

Can you help me to **MIGRATE from CISCO?**

Juniper Paragon


Troubleshoot Devices
Troubleshoot Devices
Urgent Action Needed
4 ▲ 300% vs last week
Action Needed
0 No change vs last w
Hostname
Severity
IPv4 Addr
Search
Urgent Action Needed 4 D ×
+ 1 ...
BOGOTA-MX-204
Urgent Action Needed
10.83.154.7
SFO-ACX-03
+ Urgent Action Needed
10.83.152.2
MADRID-ACX-04
Urgent Action Needed
10.83.152.2
SINGAPORE-ACX-05
Urgent Action Needed
10.83.152.2
4 items
ask-paragon> :

Does it have to
USE Cloud?

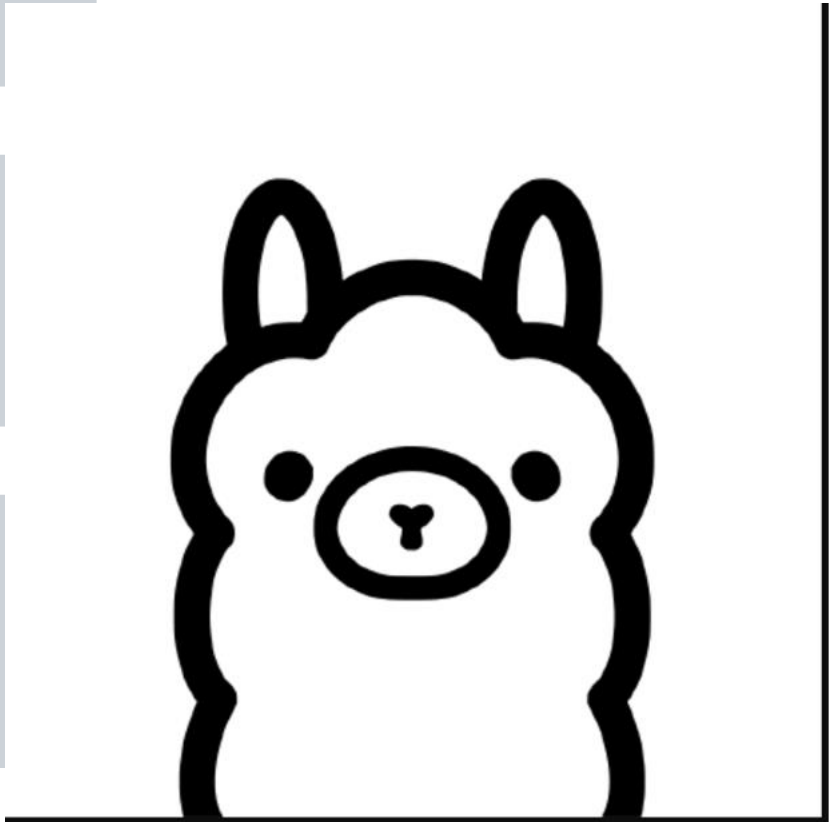
Juniper Paragon

Support of Llama models in LLM Connector

Llama models are offline models. The customer can bring it up on their internal server without sending any data out from their network

Llama models deployed via Ollama can be configured for LLM Connector.

Tested with Llama 3.1 : 8b, 70b, 405b



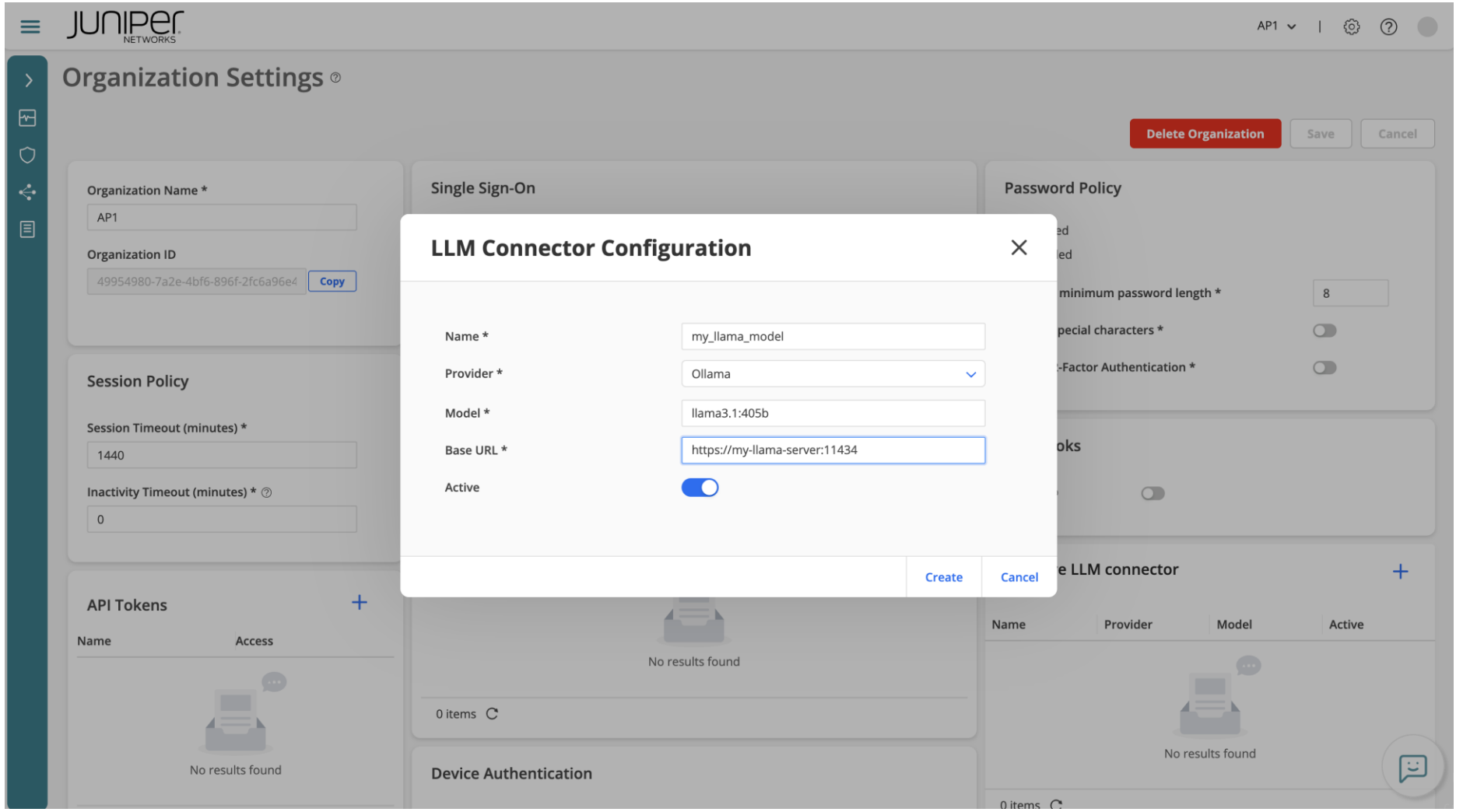
Suggested LLM Models for LLM Connector

For 2.3.0 release,

- The suggested Llama model is **llama3.1:405b**
- The suggested LLM model is **gpt-4** and **gpt-4o**

Category / Benchmark	Llama 3.1 405B	Nemotron 4 340B Instruct	GPT-4 (0125)	GPT-4 Omni	Claude 3.5 Sonnet
General MMLU (0-shot, CoT)	88.6	78.7 (non-CoT)	85.4	**88.7**	88.3
MMLU PRO (5-shot, CoT)	73.3	62.7	64.8	74.0	**77.0**
IFEval	**88.6**	85.1	84.3	85.6	88.0
Code HumanEval (0-shot)	89.0	73.2	86.6	90.2	**92.0**
MBPP EvalPlus (base) (0-shot)	88.6	72.8	83.6	87.8	**90.5**
Math GSM8K (8-shot, CoT)	**96.8**	92.3 (0-shot)	94.2	96.1	96.4 (0-shot)
MATH (0-shot, CoT)	73.8	41.1	64.5	**76.6**	71.1
Reasoning ARC Challenge (0-shot)	**96.9**	94.6	96.4	96.7	96.7
GPQA (0-shot, CoT)	51.1	-	41.4	53.6	**59.4**
Tool use BFCL	88.5	86.5	88.3	80.5	**90.2**
Nexus	**58.7**	-	50.3	56.1	45.7
Long context ZeroSCROLLS/QuALITY	**95.2**	-	**95.2**	90.5	90.5
InfiniteBench/En.MC	**83.4**	-	72.1	82.5	-
NIH/Multi-needle	98.1	-	**100.0**	**100.0**	90.8
Multilingual Multilingual MGSM (0-shot)	**91.6**	-	85.9	90.5	**91.6**

Configuring a sample Llama model in UI:




Thank you
JUNIPER NETWORKS
Engineering
Simplicity