
cisco Live!
Let's go

The bridge to possible

# Catalyst Powered Smart Buildings

## Beyond PoE Connectivity – watts and whats!

Randeep Singh, Technical Marketing Engineer



cisco Live!

BRKENS-2091

# Agenda

- Sustainability
- Why Smart Buildings?!
- Cisco Smart Buildings Framework
- Catalyst 9000’s and PoE for Smart Buildings
- Catalyst 9000’s Power design options & POE Resiliency
- Power Telemetry and Analytics
- Smart Buildings and Security
- Indoor IoT Services by Catalyst 9000’s
- Real Life Deployment Examples


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# Prominent Net-Zero Pledges



2030



2030



2030




2040




2050




2030



**90% reduction in Scope 1 and 2 GHG emissions by**

**2025***

**30% reduction in Scope 3 emissions**

**2030***

**Net zero GHG emissions across our value chain by**

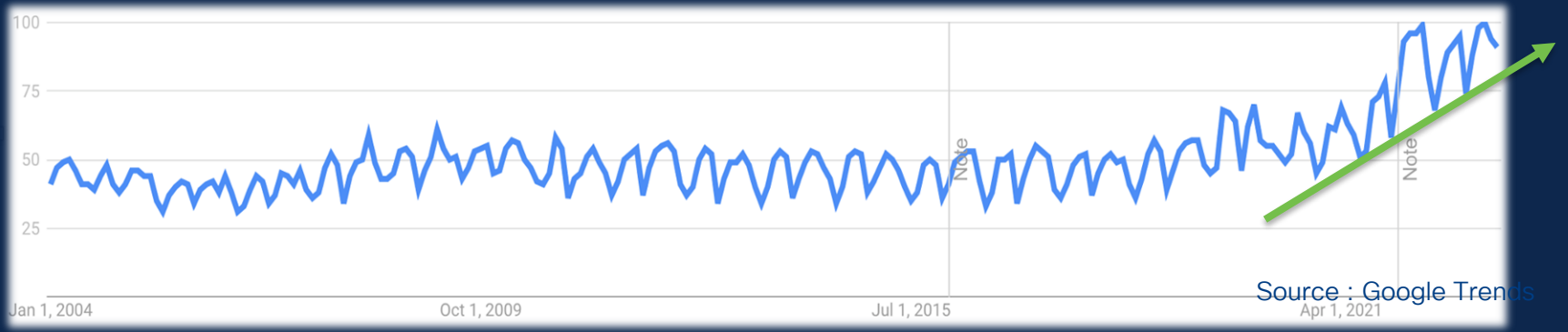
**2040****

More than 5,200 businesses have pledged to cut their greenhouse gas pollution to zero by 2050, or reach “net zero” by canceling out emissions



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# Sustainability over the Time




Source : Google Trends


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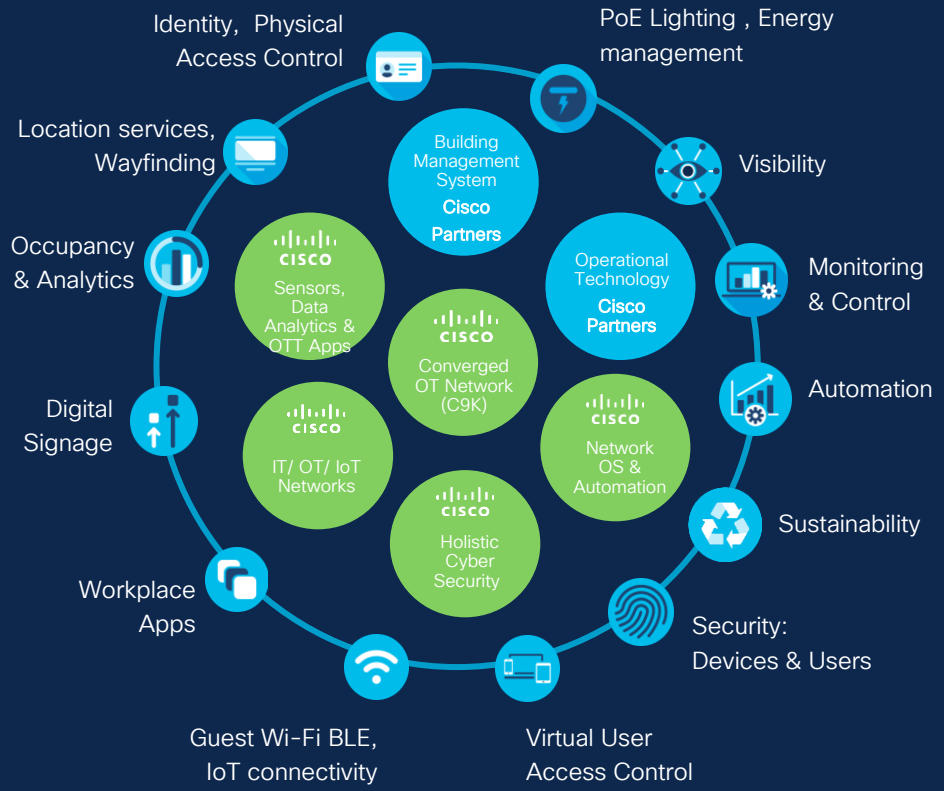
# Cisco Smart Building Technology

Make most out of your network real-time occupancy levels and indoor environmental conditions, easily locate available meeting rooms and collaboration spaces, and more.

Unify and Leverage your existing Cisco Catalyst access points, switches, Meraki access points and cameras, Webex endpoints, third-party wired and wireless IoT sensors, and application partners.

Help enable multiple devices, apps, and use cases from the Cisco Spaces dashboard.

## End-to-End Ecosystem





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# Smart Building

HEALTH & SAFETY

OUTCOMES

REAL ESTATE UTIZATION

ENERGY SAVINGS

OUTCOMES

SECURITY

## Digital Building





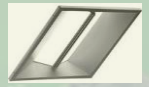


## Digital Ceiling






## Connected Lighting









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# Characteristics of Smart Buildings



## Converged

- Un-Silo Networks & Solutions
- 1 Network - Many outcomes

## Sustainability

- Energy Efficient
- Net-Zero goals
- Lowering Costs

## Future of Workplace

- Enhanced User Experience
- Programmable Real estate



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# Cisco Smart Buildings Framework

Health & Safety

Space Utilization

Sustainability

Trusted Workspaces

Consume

Collect

Control

Connect



Cisco Spaces

Maze Map

IOT Telemetry

IOT GW

Power Analytics

Authentication

Visibility

Segmentation

Wi-Fi 6E

UPOE+

**4th Utility**



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# Connect



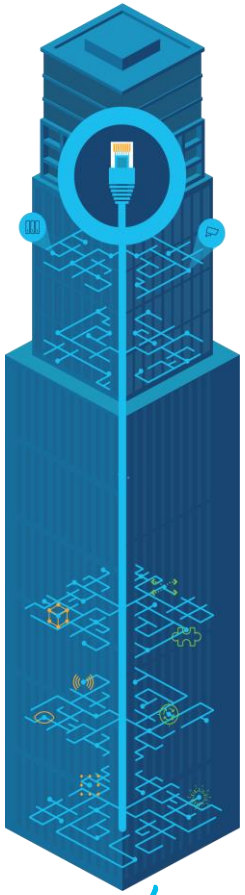
# AC vs LVDC PoE wiring and Materials






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# 90 Watt POE

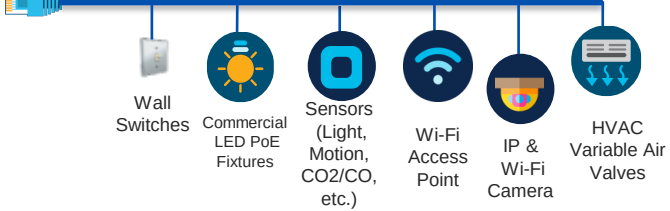




Sustainable

Efficiency

Material Usage




1Penn Closet






POE Displays

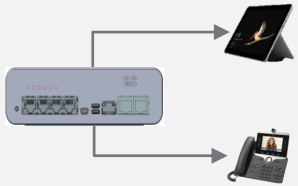


UHD IP Cameras HVAC VAV's

**High Power PoE End-points**



**Daisy-chaining**
(Cost saving with 90W)



**UPOE Pass-through**
(for extended reach 60W)





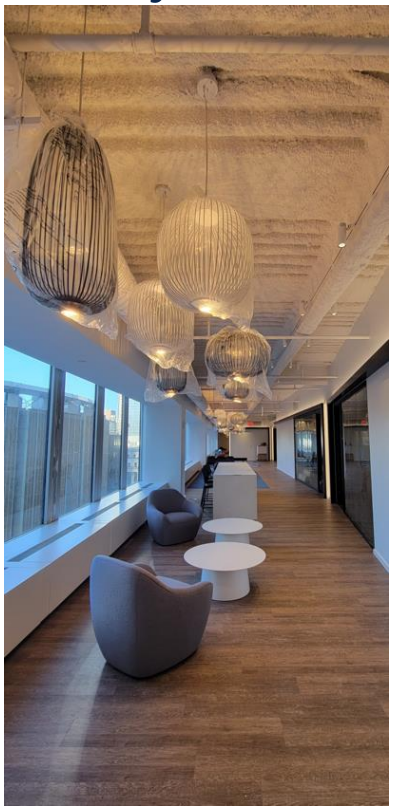
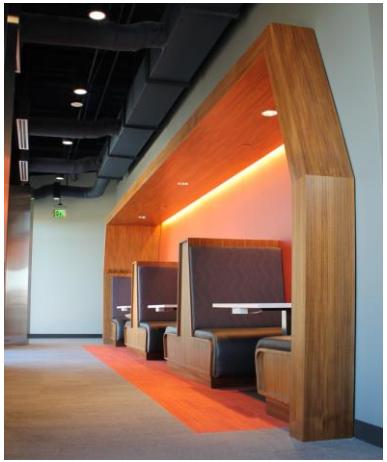
USB-C Power + Data

**USB-C power**
(laptop charging + data)

Significant reduction in “home run” wiring with a >10:1 daisy chain ratio compared to line voltage


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# What are people connecting (via PoE) these days?







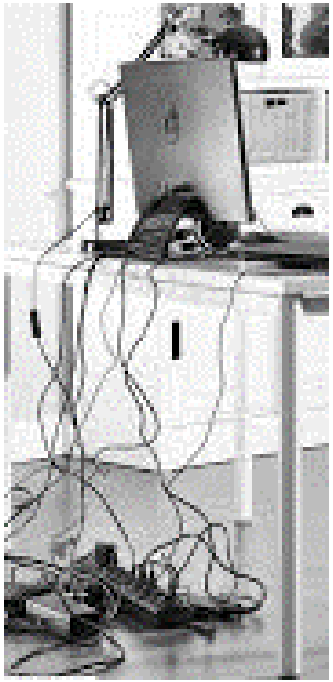




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# Workspace Powered by 90W Cisco UPOE+

Before

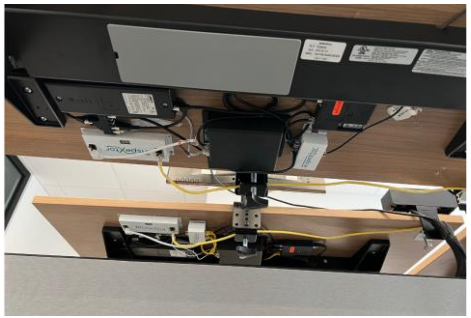


Today & Future




- One Ethernet cable to support 90W PoE
- Automated height adjustable desk
- Embedded Sensors: Occupancy, Temperature, Humidity
- 2 USB-C, 1USB-A port for charging
- Track usage and predictive maintenance based on usage/Error Code





Lower CAPEX by eliminating AC cabling to every desk. Flexibility in workspace design independent of AC outlets


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# Catalyst 9000 90W Portfolio for Smart Buildings

90W
UPOE+

IEEE 802.3bt
Type 1-4

P/FPOE with Stack power

**288** concurrent 90W ports in a stack



C9300-24/48H, 24/48HX



1900W AC PSU

NEW

**36** 90W ports per switch



C9300X-48HX

48/24p x mGig (5G/10G) & **UPOE+** ports



LVDC Power Supply options for C9200 (new), C9300, C9400 Switches

**260** concurrent 90W ports



4-Slot



7-Slot



10-Slot



C9400-LC-48H



C9400-LC-48HN

NEW



SUP2/XL **Perpetual POE Capable**



C9400-LC-48HX

- Cisco StackPower
- PoE HA (P/FPOE)
- PoE Port Priorities
- Spaces IoT Gateway



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# Catalyst 9200CX Compact Switches

## Fanless, completely DC enabled compact portfolio

Shipping



**C9200CX-12T-2X2G**

- 12 x 1G data
- 3 x 1G copper and 2 x SFP+ uplinks
- External power adapter (80W)
- 802.3bt powered (60W)

AC/LVDC/POE Powered

Shipping



**C9200CX-12P-2X2G**



**C9200CX-8P-2X2G**

- 8/12x 1G PoE+
- 2x 1G copper and 2 x SFP+ uplinks
- Internal AC power supply
- 240W PoE power budget

AC/HVDC Powered



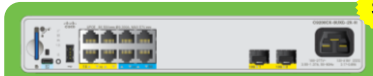
**C9200CX-8UXG-2X**

- 4x mGig/10G + 4x 1G (802.3bt Type 3 Class 6 60W all ports)
- 2x 1/10G SFP+
- Internal AC power supply
- 240W PoE power budget

AC/HVDC Powered

| Feature Highlights |
|---|
| SD-Access Edge Node (16 VNs) |
| SD-AVC with NBAR2 |
| PNP/Zero-touch provisioning |
| Full Flexible NetFlow |
| Bonjour Service peering |
| AES 256-bit MACsec |
| C9K Grade Programmability |

Shipping



C9200CX-8UXG-2XH

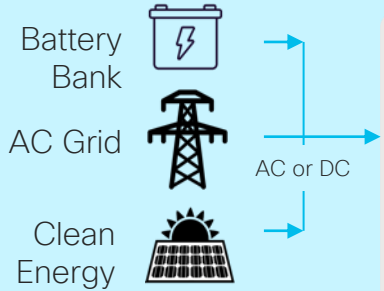


C9200CX-12P-2XGH



C9200CX-8P-2XGH

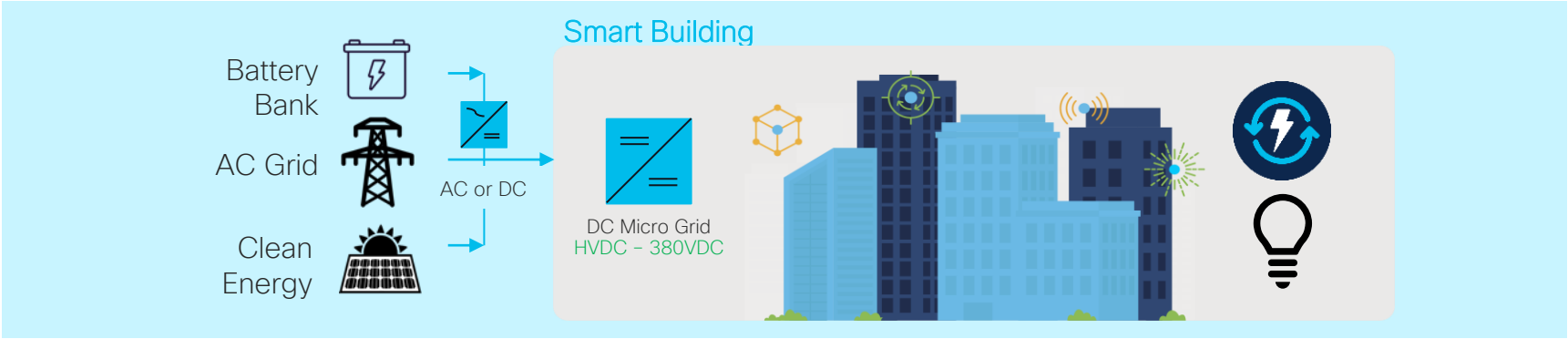
**8 and 12-Port PoE+/UPOE HVDC SKUs**



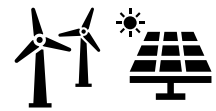


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# High Voltage DC?




Benefits



**Avoids double conversion**. From DC → AC, then AC → DC:

- Production of Wind/Solar power is in DC
- Electrical devices with transistors use DC power



Higher voltage helps reduce conductor material required (less copper) or **improve transition efficiency**:

- Controllability
- Better voltage regulation

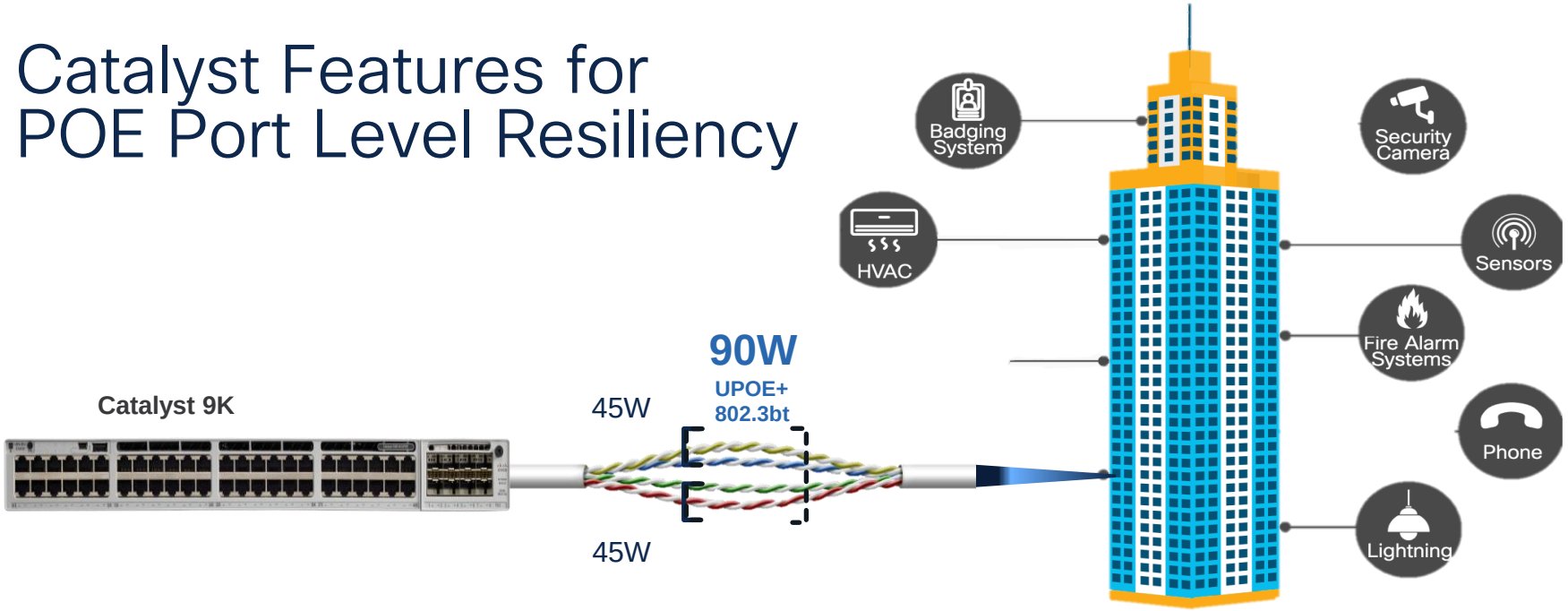


**Considerably lower power losses** compared to 120VAC when transporting over long distances:

- Offshore power needs/Undersea power lines
- Power transmission for longer distances


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# Catalyst Features for POE Port Level Resiliency




## Perpetual POE

- Bypasses IOS control plane boot
- Uninterrupted power to connected to the power sourcing equipment (PSE)

## Fast POE

- Fast Power recovery for PSE on power failures

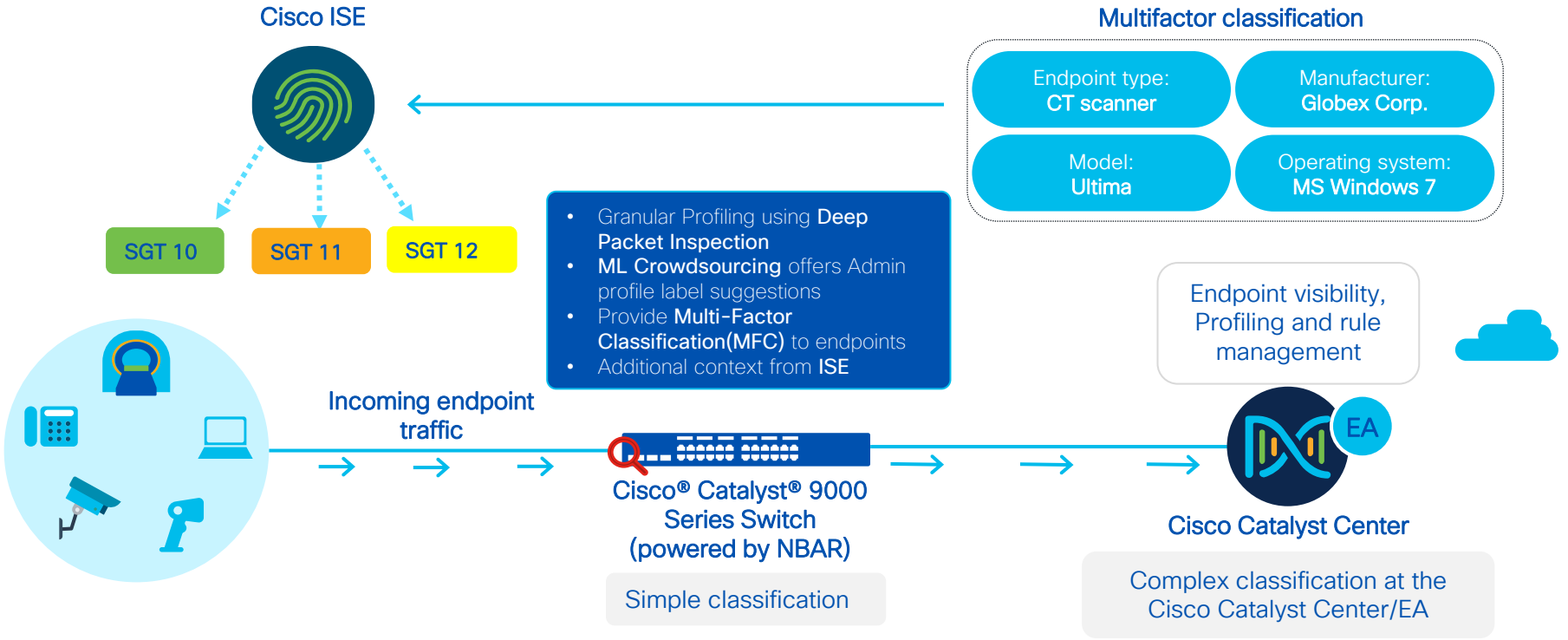
## PoE Port Priority

- Default all Ports on Low Priority
- Interface level Configuration


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# Control

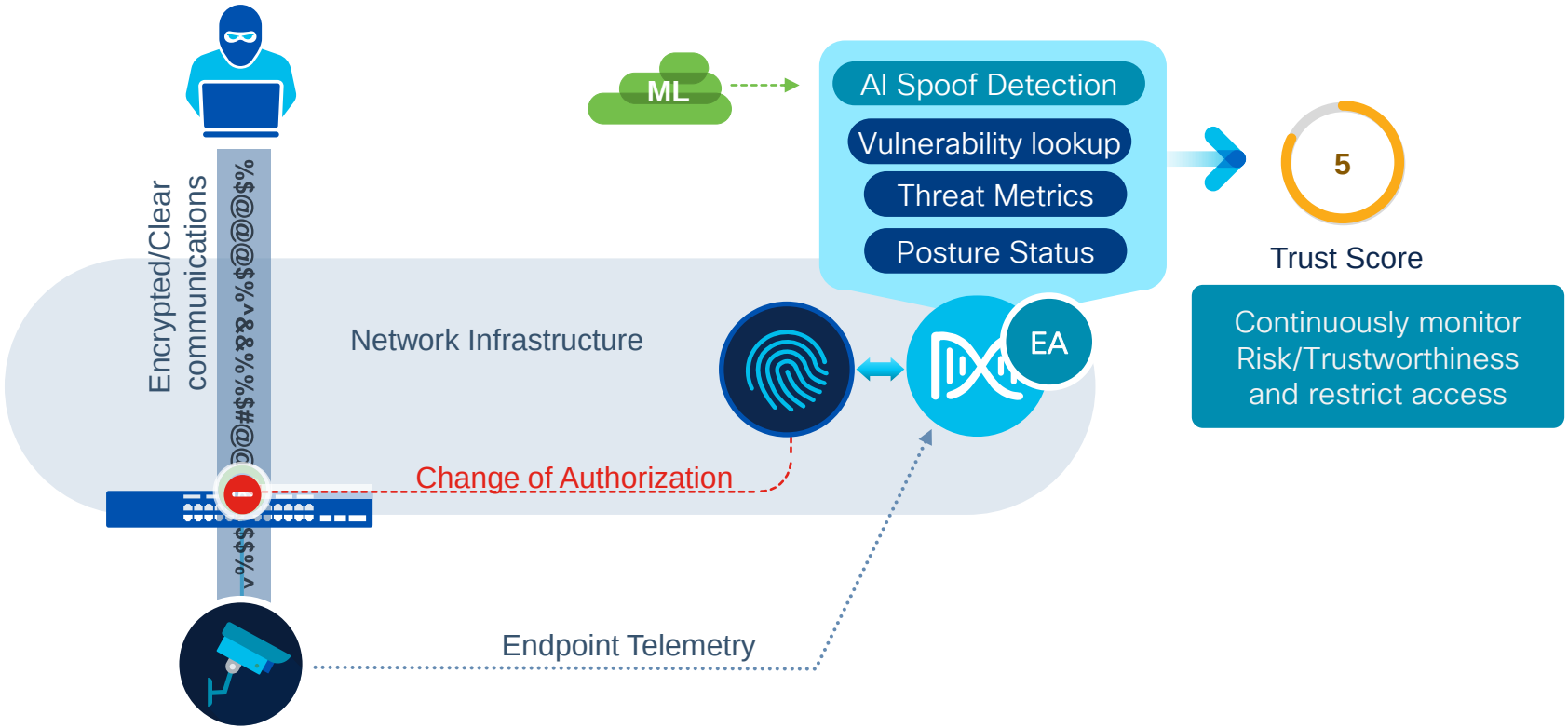
# AI Endpoint Analytics – Fingerprints IT/OT





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# Trust Analytics – Continuous Validation of “Trust”

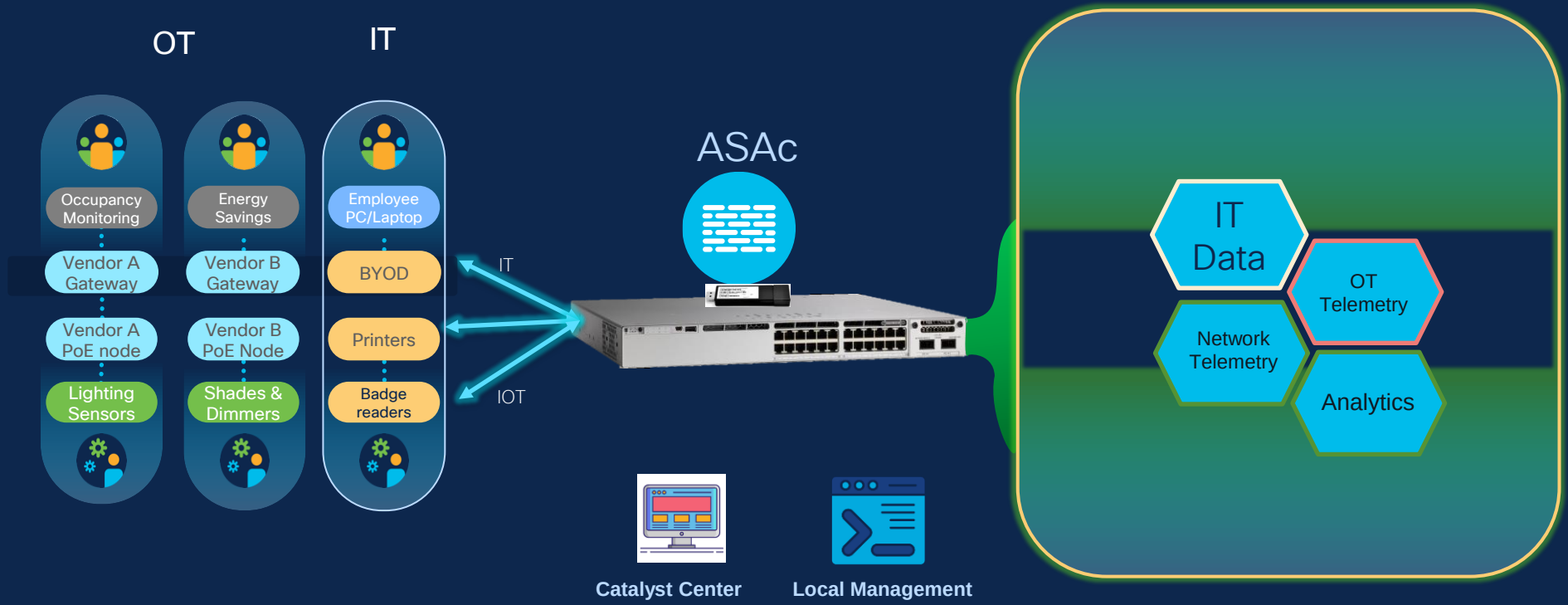




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Scale Limit | High TCO | Stateless | Centralized

Compliance | Granular access controls | Stateful | Decentralized

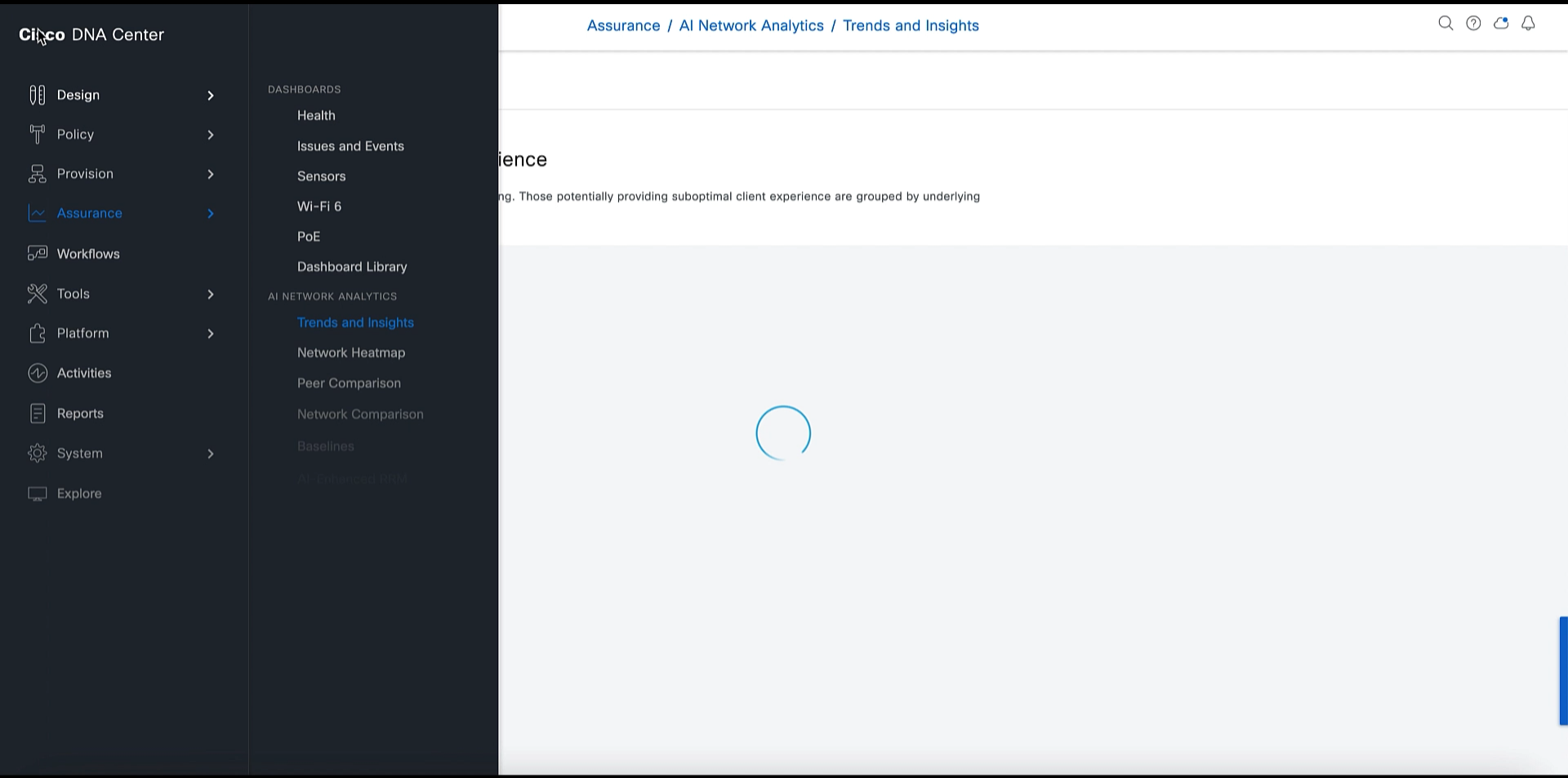



Note : USB SSD required to host ASAc



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# Demo

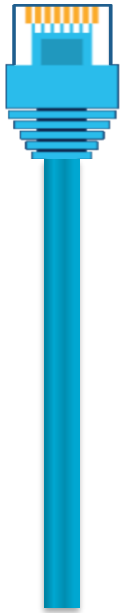

Cisco DNA Center
Design
Policy
Provision
Assurance
Workflows
Tools
Platform
Activities
Reports
System
Explore
DASHBOARDS
Health
Issues and Events
Sensors
Wi-Fi 6
PoE
Dashboard Library
AI NETWORK ANALYTICS
Trends and Insights
Network Heatmap
Peer Comparison
Network Comparison
Baselines
AI-Enhanced RRM
Assurance / AI Network Analytics / Trends and Insights
ience
ng. Those potentially providing suboptimal client experience are grouped by underlying

# Collect

# What's on the Wire?

+

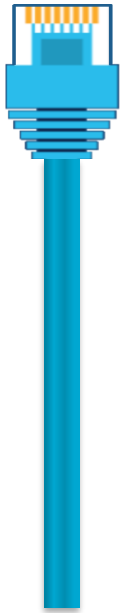
# What’s in the Wire?




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# What's on the Wire?

What’s in the Wire?

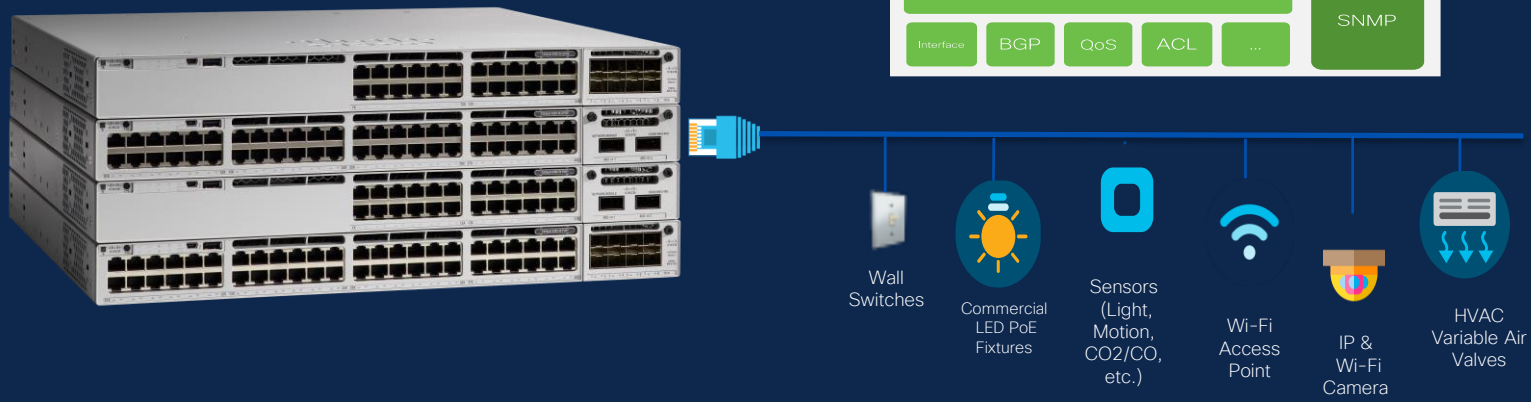



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# Model Drive Power Telemetry

Dial In: Collector establishes a connection to the device then subscribes to telemetry (pub/sub)

Dial Out: Telemetry is pushed from the device to the collector based off configuration (push)



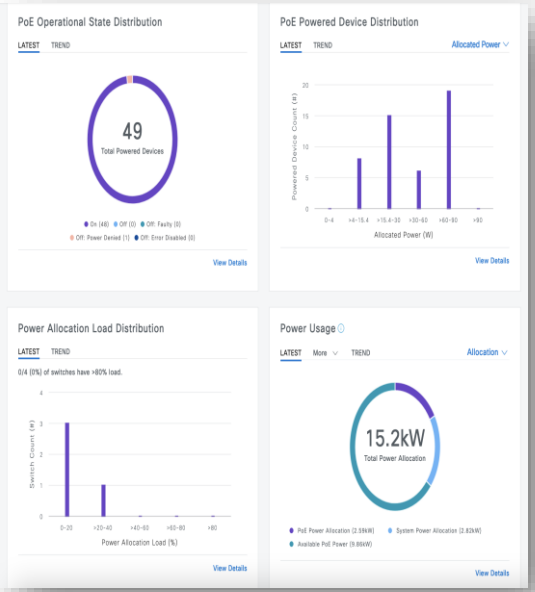

https://github.com/YangModels/yang/blob/main/vendor/cisco/xe/1791/Cisco-IOS-XE-poe-oper.yang


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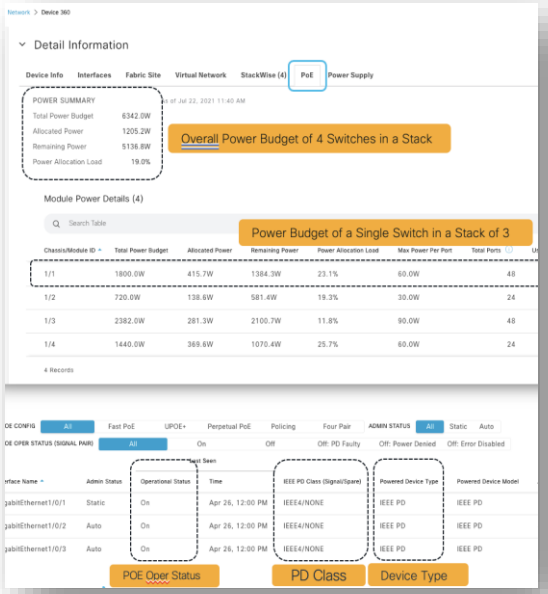
# Cisco Catalyst Center POE Dashboards & Insights

Cisco Catalyst Center Assurance provides actionable data for all POE Elements

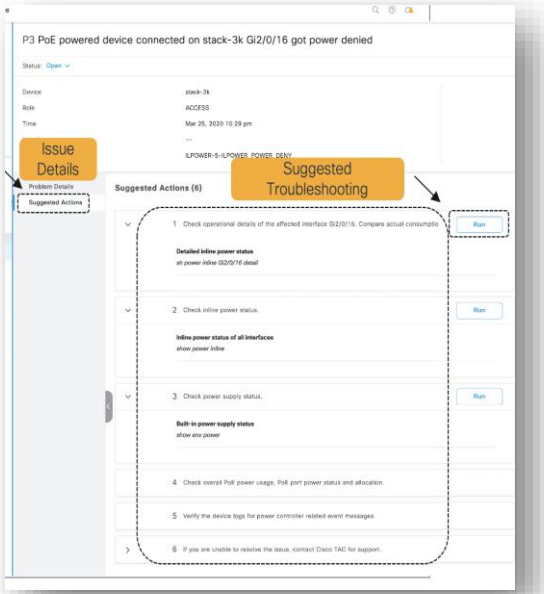
## 1 PoE/Power Widgets




## 2 Switch/Stack/Port Insights



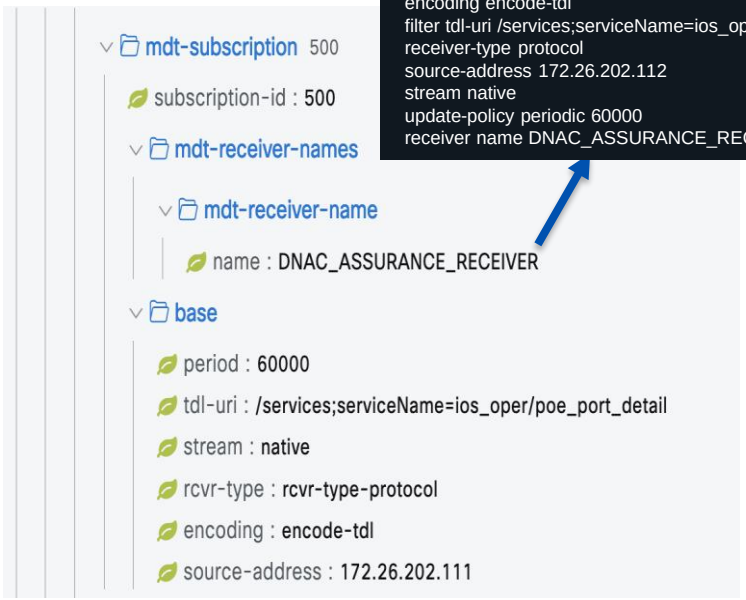

## 3 Automated Troubleshooting



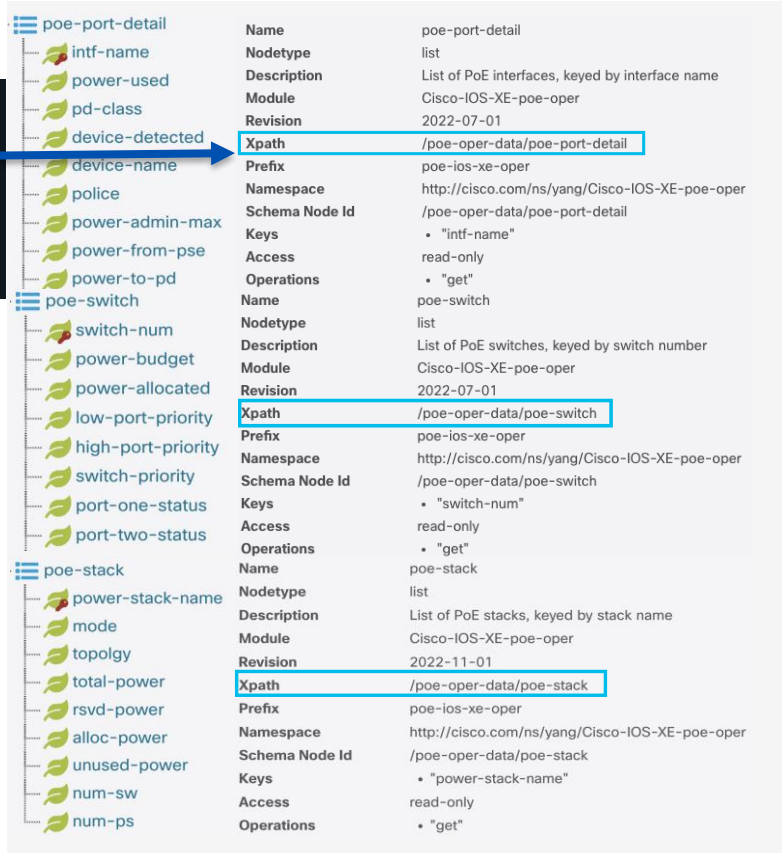



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# Catalyst Center enabling Power Telemetry



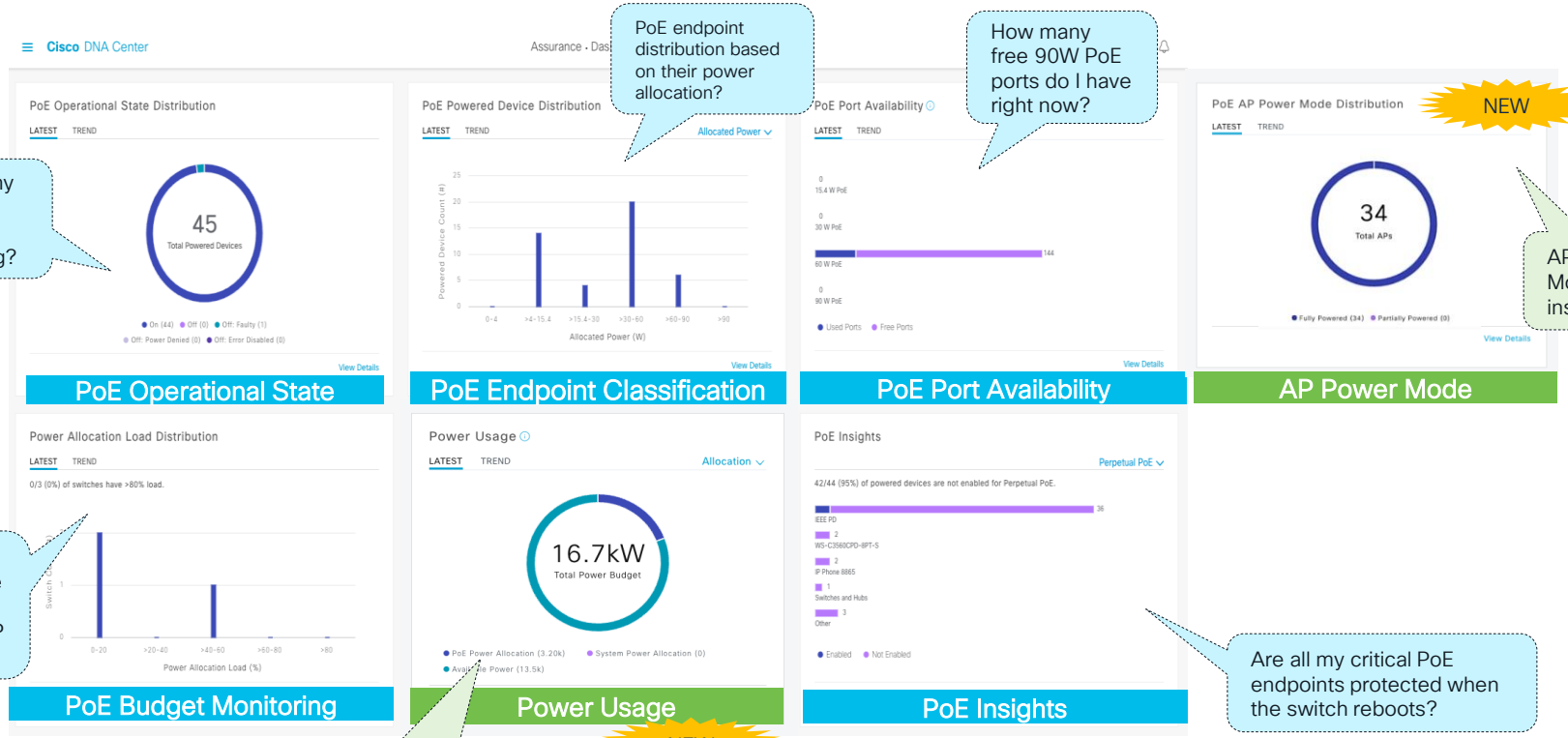

```
SB-Salone2-C9348HXN# show run | b subscription 500
telemetry ietf subscription 500
 encoding encode-tdl
 filter tdl-uri /services;serviceName=ios_oper/poe_port_detail
 receiver-type protocol
 source-address 172.26.202.112
 stream native
 update-policy periodic 60000
 receiver name DNAC_ASSURANCE_RECEIVER
```





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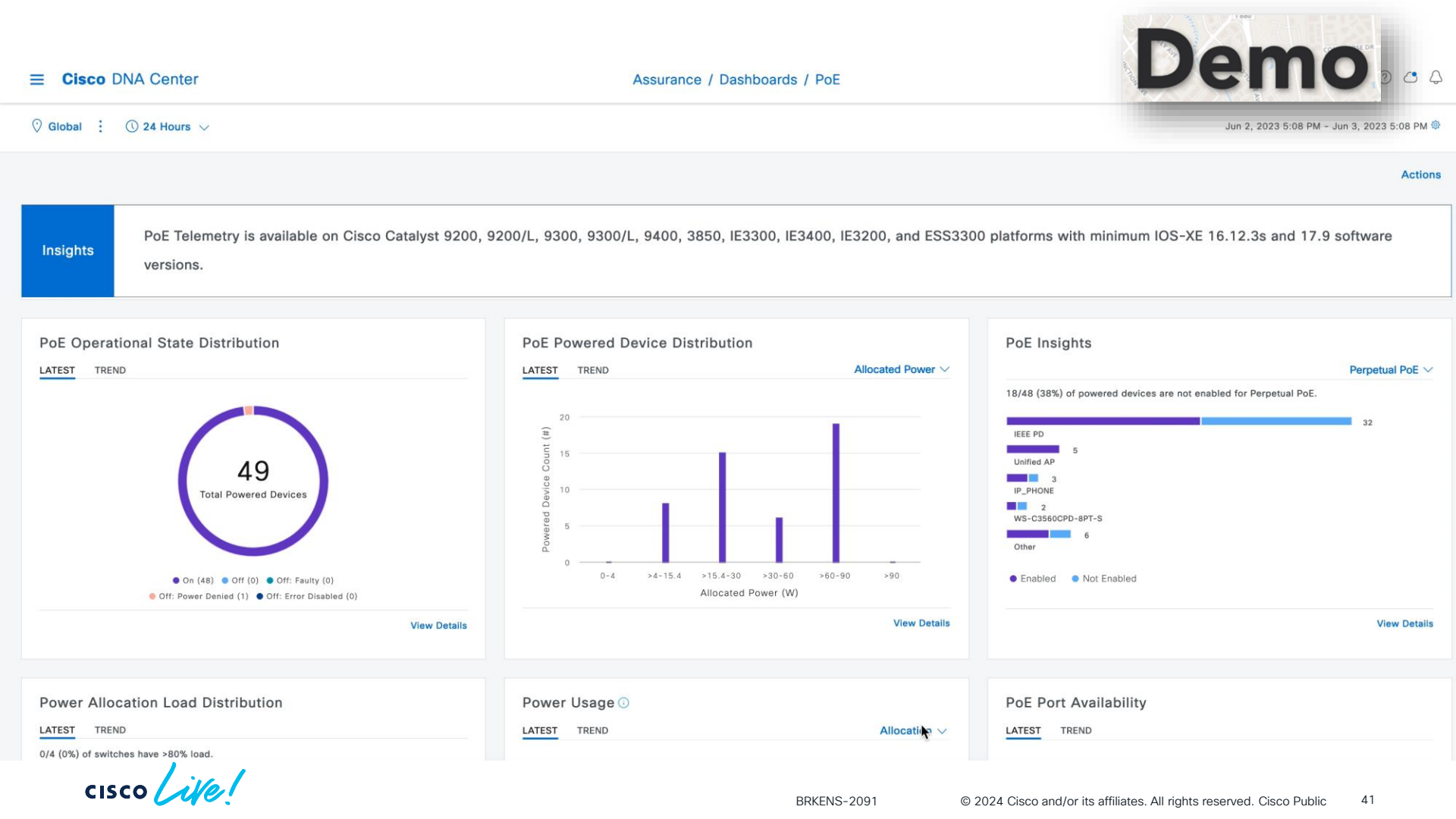
# Catalyst Center Telemetry into Dashboard





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# Demo





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# Power Telemetry at Cisco Spaces

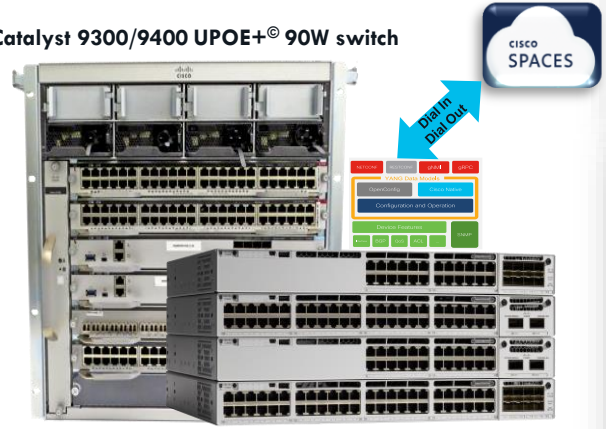
**Cisco Spaces Energy Utiiiztion**

- Cloud Based Power Analytics
- POE and System Power Telemetry
- Smart PDU's
- Accessible Dashboards to IT and Building Management

**IOS-XE Model Driven Telemetry**

- Enhanced visibility
- Provisioned by Cisco Spaces
- Dial-out Steaming telemetry

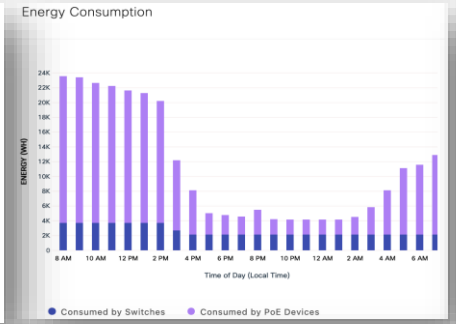
**Catalyst 9300/9400 UPOE+© 90W switch**

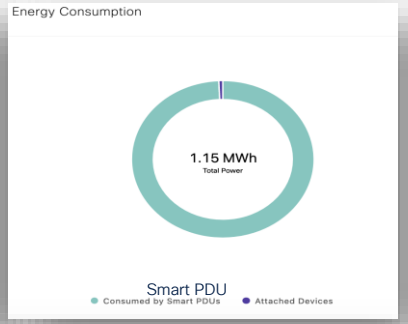


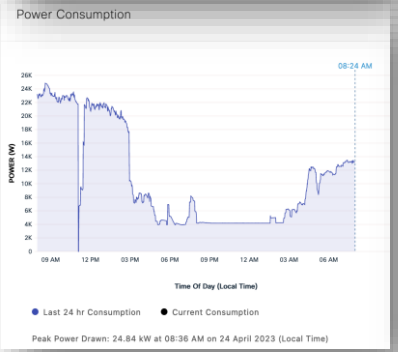

New

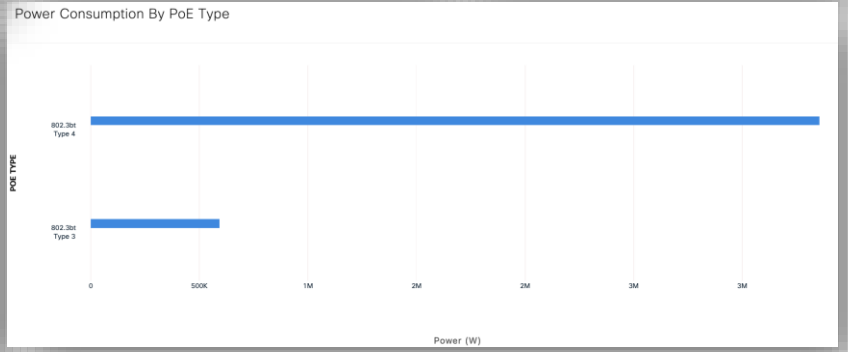
## Energy Utilization

Get Energy Analytics, Trends & Insights for Network Devices in your Buildings.




Requires Catalyst Advantage License


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# Demo




CISCO SPACES

Digitization Stats

3
3 Locations

88
88 Access Points

9,113,382
9.1 Million Location Updates

264,000
264K Square Foot

48,938
48.9K Visits

SEE Apps

Enhance your customer experience using these Apps available in your SEE subscription

Show/Hide Apps

Behavior Metrics
Gold standard performance metrics for physical spaces

ACT FEATURES
Right Now
Real time metrics

BETA
Camera Metrics
Metrics derived from Meraki Camera Data

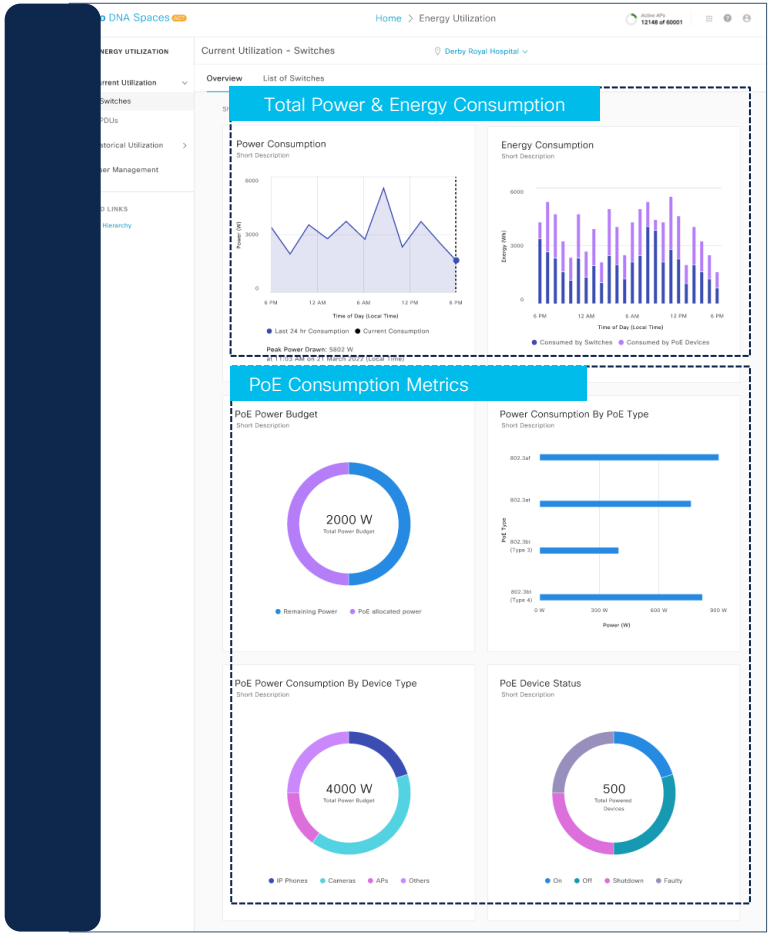
BETA
Energy Utilization
Get Energy Analytics, Trends & Insights for Network Devices in your Buildings.

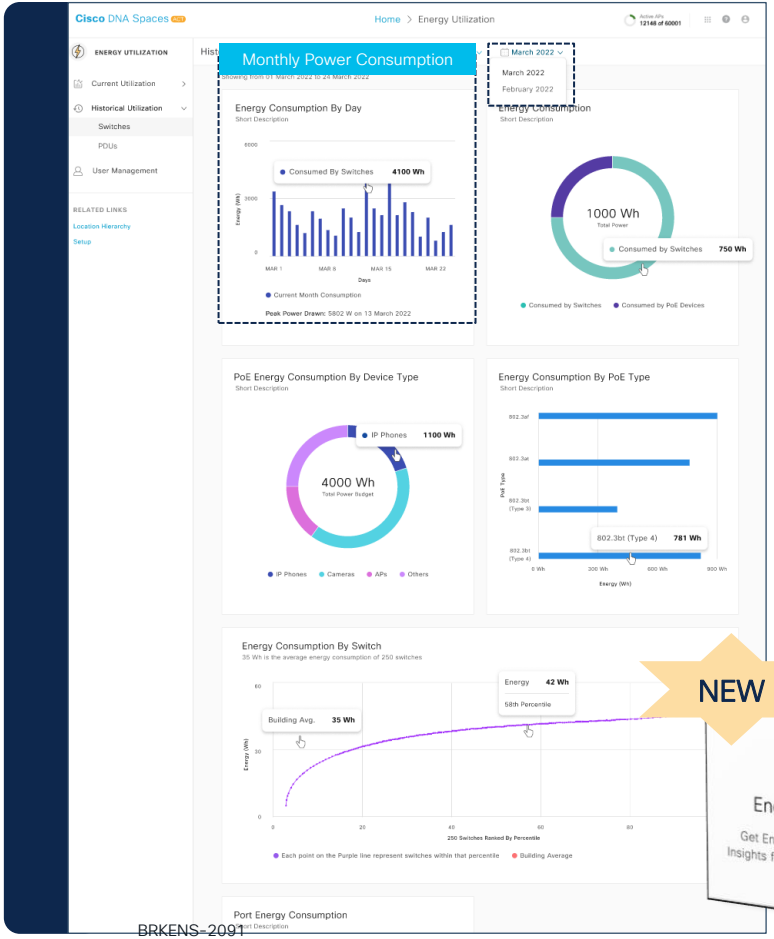
ACT FEATURES EXTEND FEATURES

BETA ACT FEATURES


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# Switch Power & Energy Utilization – Cisco Spaces & C9K




NEW

Energy Utilization

Get Energy Analytics, Trends & Insights for Network Devices in your Buildings.

# Power Analytics with BYOD

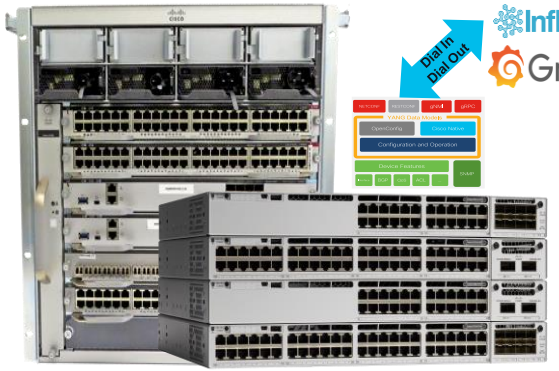
**IOS-XE Model Driven Telemetry**

- Enhanced visibility
- YANG Data Models
- Configurable with Open-source tools

**Open-source analytics**

- Extendable Timelines
- Customizable Dashboards
- Customizable Graphs

Catalyst 9300/9400 UPOE+© 90W switch



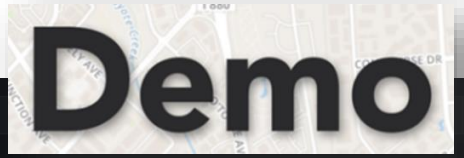





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# Demo

# What are we looking at here?





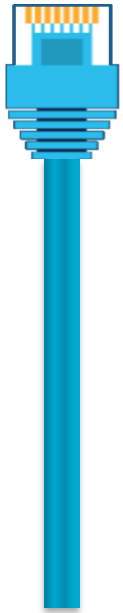





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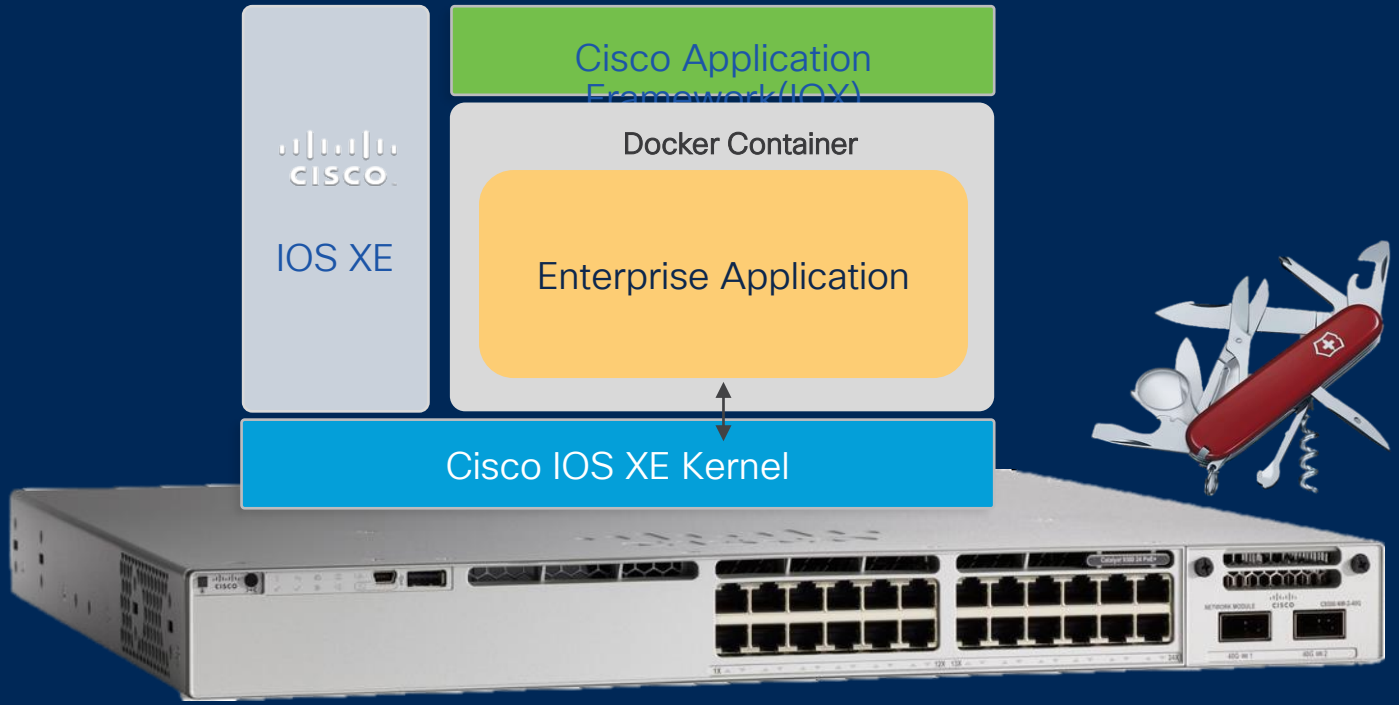
What's on the Wire?

# What’s in the Wire?




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# Catalyst 9000 Application Hosting for IOT

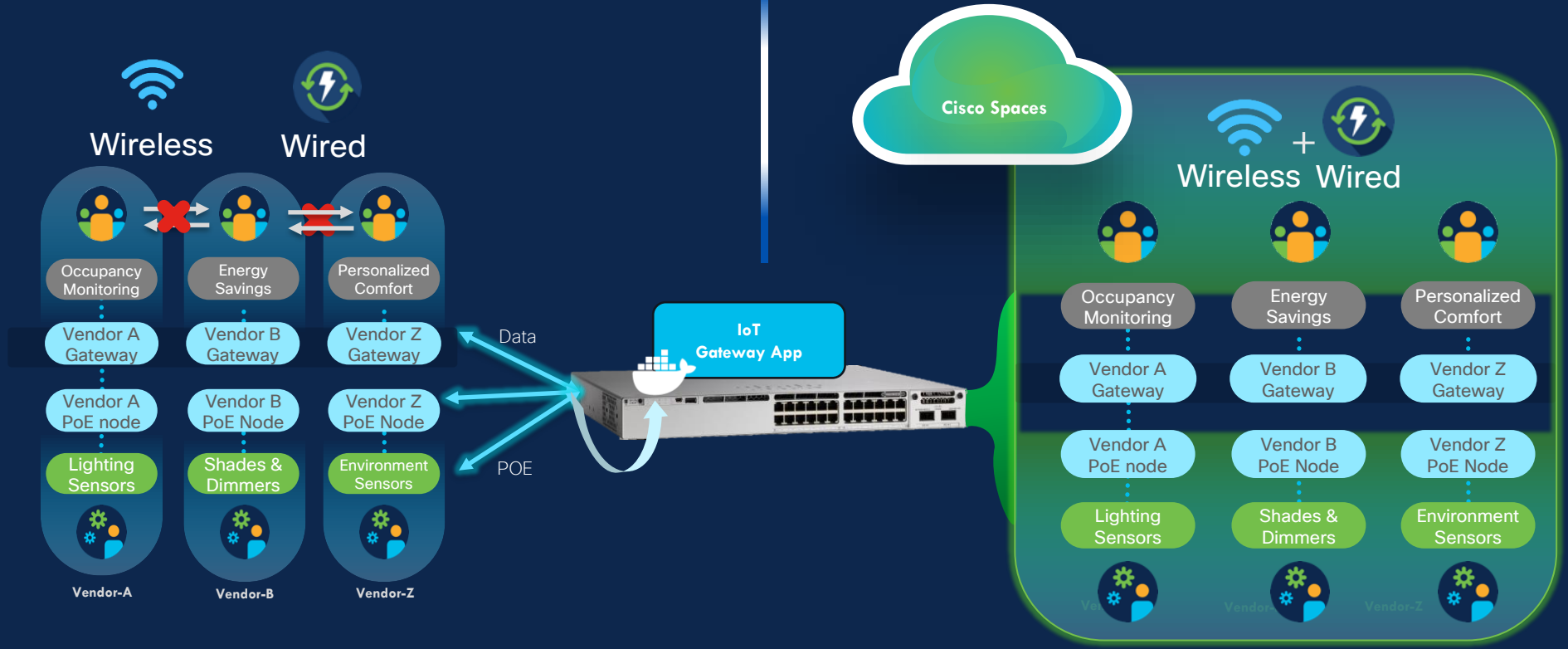




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Fragmented | Scale Limited | High TCO | Limited Outcomes

Converged | Extensible | Programmable | Expanded Outcomes

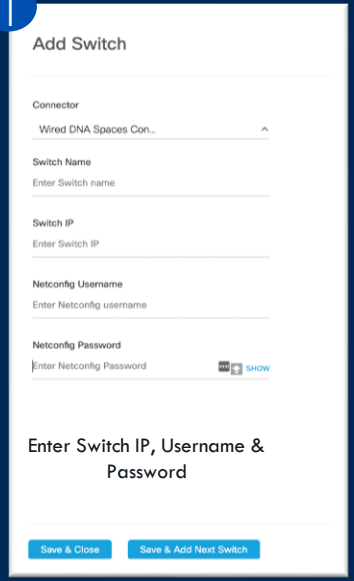




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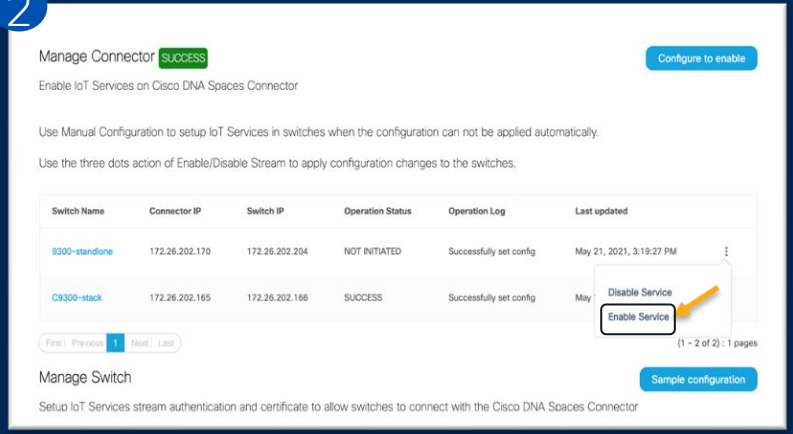
# Wired IoT Gateway - Provisioning

1




Enter Switch IP, Username & Password

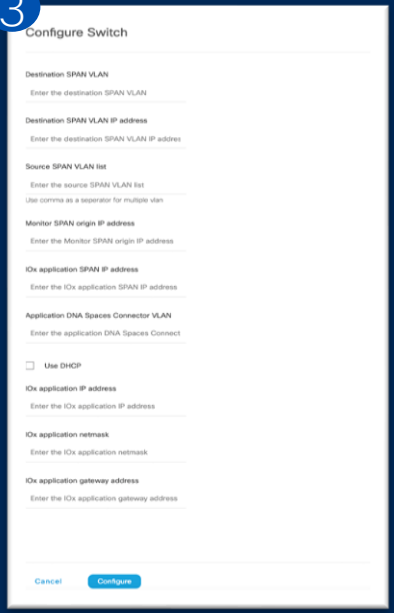
2




Cisco DNA Spaces IoT Gateway

- Hosted as a docker container
- 1 VCPU, 1GB RAM
- Life cycle management via Spaces Connector

3






Available on Catalyst 9000 series UPOE/UPOE+ switches
Catalyst® 9300/L and Catalyst 9400

Cisco Spaces Extend License bundled with Catalyst Advantage


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# IOT Telemetry – gleaned by IOT GW App on C9K


{"recordUid":"event-4de38b1b"
"recordTimestamp":1685590448040,
"spacesTenantId":"spaces-tenant-25a063c6"
"spacesTenantName":"IOT Wired Demo"
"partnerTenantId":"iotwireddemo"
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"iotTelemetry":{"deviceInfo":{"deviceType":"IOT_WIRED_DEVICE"
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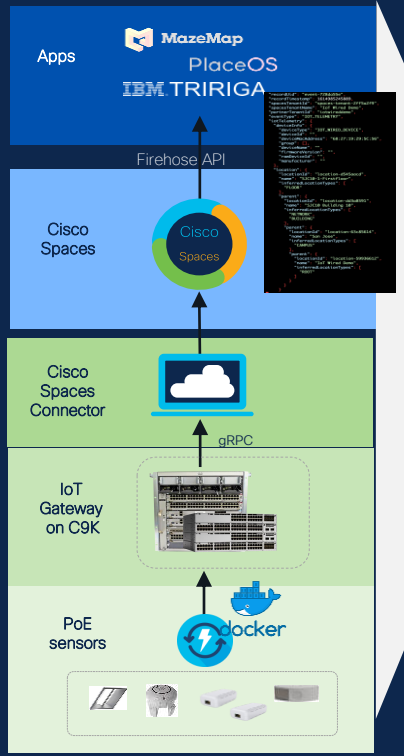


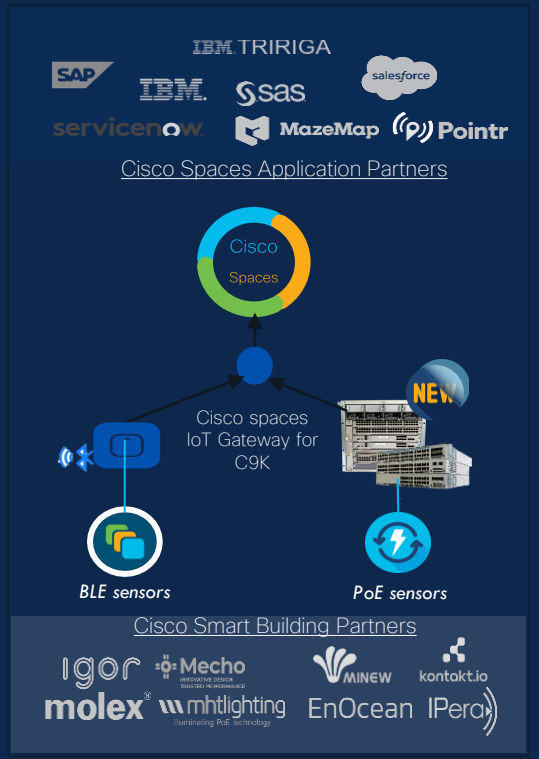
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# Indoor IOT services by Catalyst 9000

## Democratizing Enterprise IoT

ARCHITECTURE



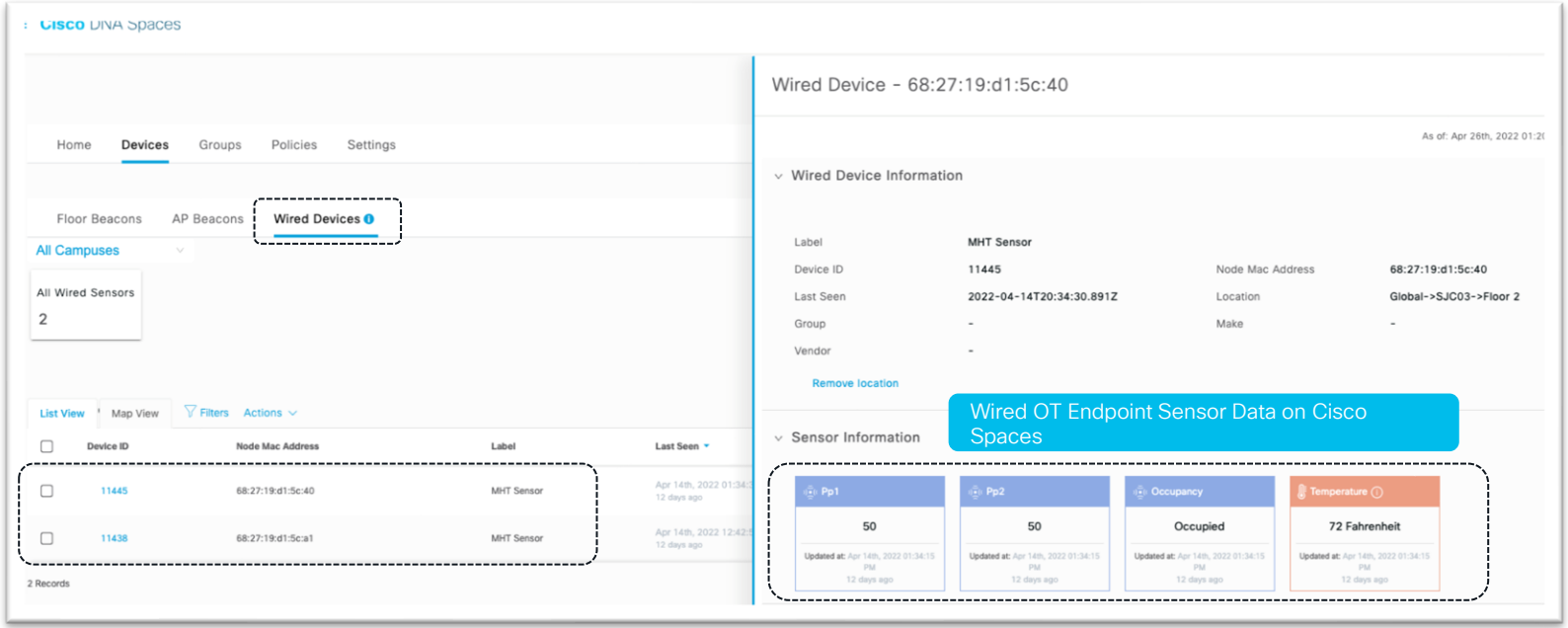

OUTCOMES

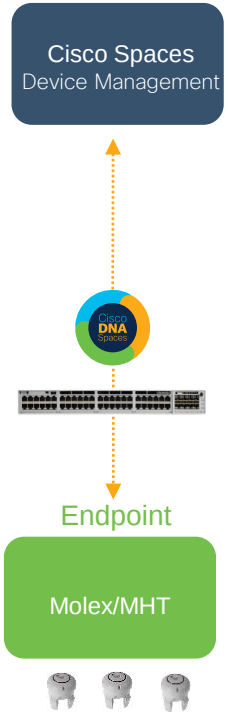




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# Occupancy & Environmental Monitoring
## IOT Telemetry at cloud

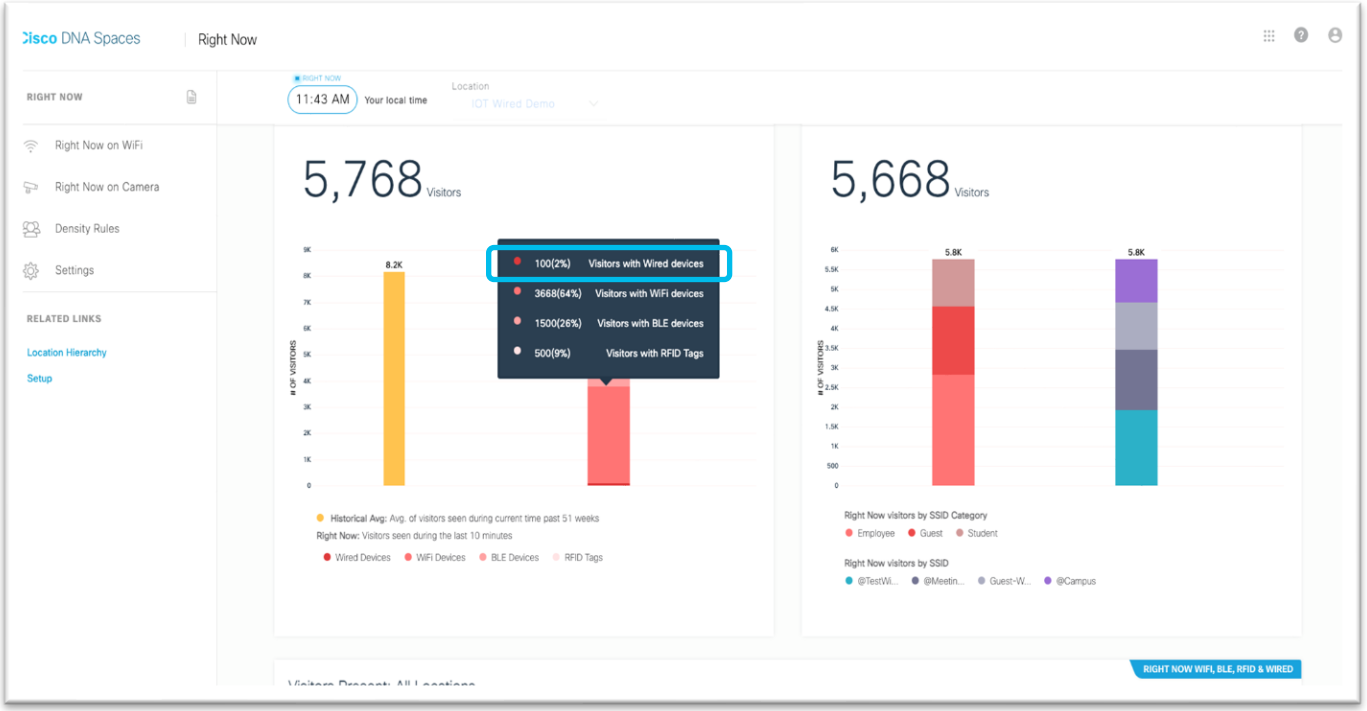


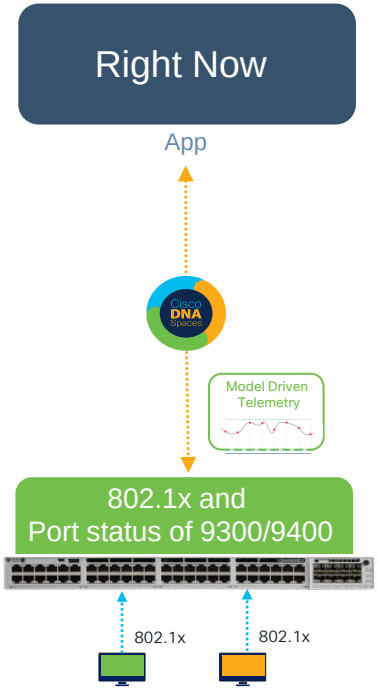





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# Indoor IoT Services – People Counting



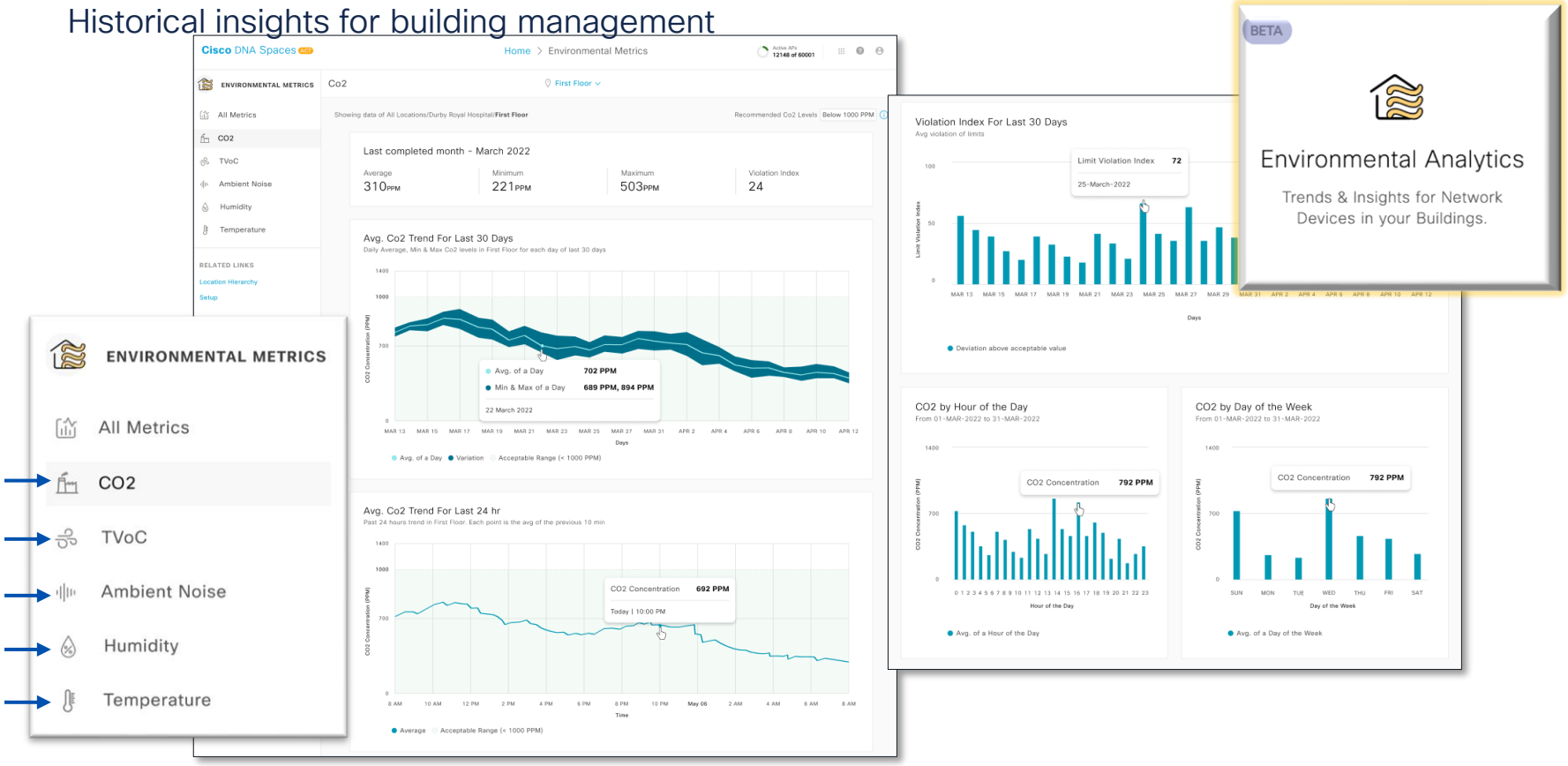





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# Environmental Metrics – Cisco Spaces & C9K

## Historical insights for building management





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# Demo: Consume


MazeMap
Indoor Maps
&
Navigation
Demo

# Smart Workspaces enabled by Catalyst Indoor IOT Services




# Demo


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# Smart Buildings
# Real Life Deployments



# One Penn Plaza – Design Strategy and Outcomes



## Smart Building Framework

- *Connect*
  - ✓ Catalyst 9K 90W switches and APs
- *Configure*
  - ✓ Meraki surveillance cameras
  - ✓ WEBEX room kits, deskpros
  - ✓ Molex & Igor PoE lights/sensors
  - ✓ Mecho & Somfy shade control
  - ✓ Delta VAV HVAC control
  - ✓ Smart energy metering PDU
  - ✓ 90W USB-C dongles
  - ✓ 90W connected desks
- *Control*
  - ✓ Cisco SDA endpoint analytics and PoE Assurance
- *Consume*
  - ✓ Cisco Cisco Spaces workspace application

## Cisco on Cisco







## Business outcomes

| | |
|---|---|
| LEED Building Alignment | ✓ |
| WELL Building Alignment | ✓ |
| Consistent End User Experience | ✓ |
| Touchless Room Control | ✓ |
| Integrated Base Building Control | ✓ |
| People Count and Density Monitoring | ✓ |
| People Count Data to BMS | ✓ |
| Air Quality Monitoring and Display | ✓ |
| IT Ops Model Reinvention | ✓ |
| USB-C Adoption | ✓ |
| Low Voltage Connected Desk | ✓ |
| Flexible Technology Swap Out | ✓ |

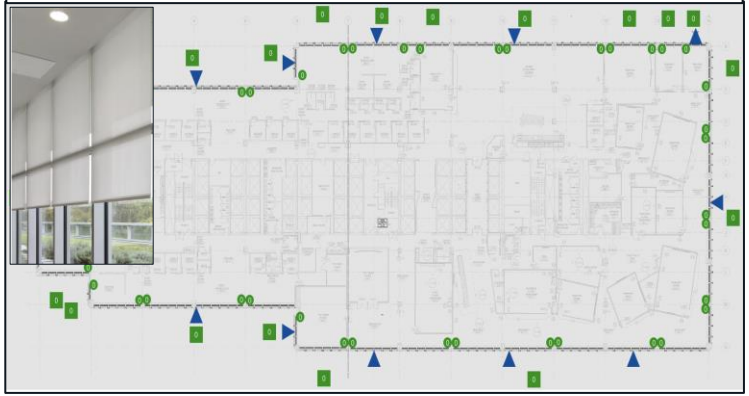
54,000 sq. ft. Midtown Manhattan, Talent and Collaboration Center, 100% Hybrid


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## Molex & IGOR Lighting and ENV Sensors



## Mecho SolarTrac & Somfy Shade Motors



## Teknion POE Connected Desks





Cisco Penn 1

## Delta Controls POE VAV Controls



ABM Systems BMS



DVC-V322POE (7)



O3 Room Controller (2)

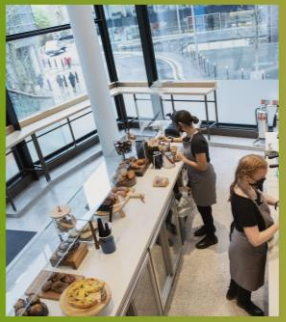


eZNTW Thermostats (7)

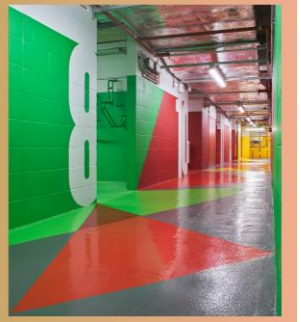


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# From Breaking Ground to Ground-Breaking









22 BISHOPSGATE

## A smart space for smart businesses




- A customer experience led design
- Converged IT/ OT/ IoT-Network
- Predictive maintenance for the systems saved c.£400,000 in 2021

- BMS, HVAC, CCTV
- Security & access control
- Fire & Safety systems
- Energy management
- Smart blinds

- Visibility & Intelligence
- Automation & Control
- Holistic Cyber Security
- Simplicity & Flexibility
- Efficiency & Experience


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# Catalyst 9K at the foundation of Smart building designs

## Customer success from across the globe

| | LARSEN & TOUBRO  | NORFOLK SOUTHERN  | Aviators ACADEMY FOR INTERNATIONAL EDUCATION |
|---|---|---|---|
| Challenges | • Energy savings for green building initiatives<br>• Optimize facility operation cost<br>• Secure a converged IT/OT infrastructure | • Reduced management overhead for IoT infrastructure<br>• Single policy for IT/OT security<br>• Sustainable building operations | • The school needed to reconfigure classrooms on the fly<br>• Safe power for students for uninterrupted learning |
| Solution | • Catalyst 9K PoE Switches, Access points, Cisco catalyst center, ISE for 1M sq.ft. space<br>• Cloud analytics using Azure IoT platform | • Catalyst 9K PoE switches, access points, Cisco Catalyst center, ISE<br>• Phunware mobile application using C9K telemetry | • Dense 90W UPOE+ to USB-C conversion for student devices<br>• A 3rd party USB-C dongle for 65W of USB-C power and 1G of data |
| Business outcomes | • Capital savings and reduced cost of operations.<br>• Returned 4K employees during the pandemic<br>• Awarded Gold band of LEED certification | • PoE low voltage lowered energy cost<br>• Superior occupant experience, smart parking, significant man hours saved | • The school was able to get 70% of their students back in person<br>• New outcomes such as desk occupancy and density threshold monitoring. |
| | *Digital blueprint for all smart buildings* | *DNA architecture for Smart buildings* | *Safe powering for return to school* |



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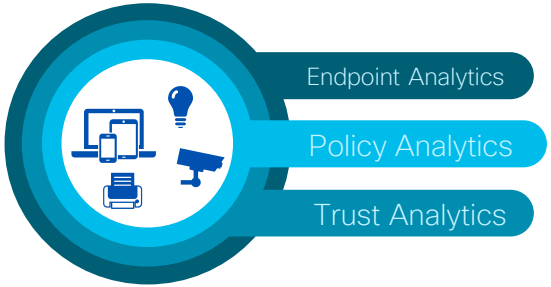
# Summary



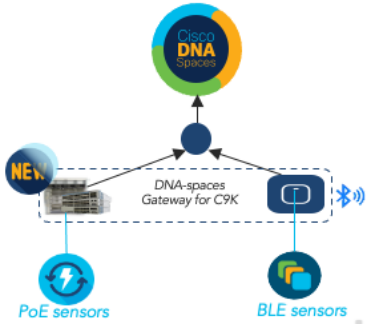
802.3bt Type 4 (90W)
P/FPoE, Port Priorities




PoE & Power Analytics




AI Endpoint & Trust Analytics




Cisco Spaces IoT Gateway



Smart Workspaces




Expanded IoT Ecosystem

## Catalyst 9K Networks enabling Smart Building Outcomes


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# All Around the World with Smart Buildings

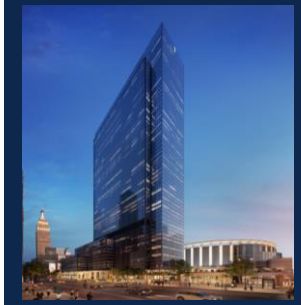
## Cisco Office | Singapore




### Retrofit Existing Space

- Leverage existing ports and Wi-Fi
- Upgrade to PoE switching infrastructure
- Add Endpoints: Cisco + Partners
- Maximum real estate utilization

## Penn1 | New York







Penn 1
VR Experience

### Tenant Build-Out

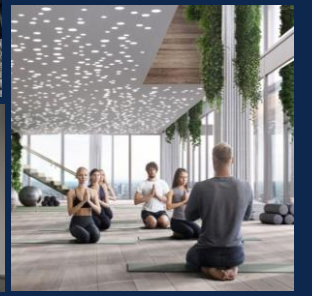
- Converge building OT environment
- Reduced power consumption and costs
- Improved user experience
- Data and insights

## 22 Bishops Gate | London









### New Build

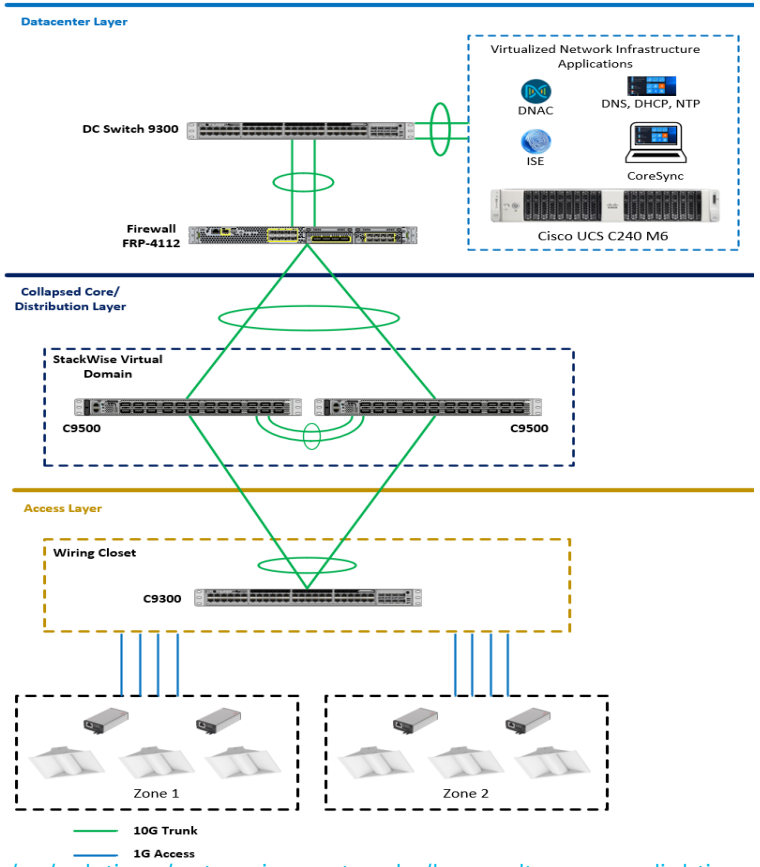
- Smart BMS, HVAC, CCTV
- Converged IT, OT and energy management
- Visibility and automation drives power efficiency
- Reduce CapEx and OpEx


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# Low-Voltage PoE Lighting Design Guide

NEW

- Completely Low voltage PoE lighting focused design guide published on cisco.com
- Design based on Molex PoE lighting solution
- Realtime deployment lessons based on 1penn and various smart building deployments.

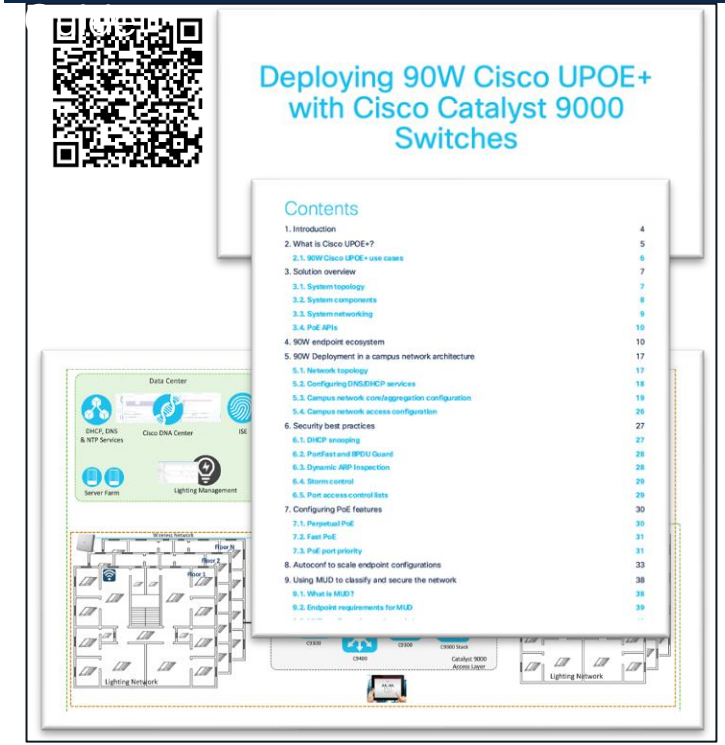



https://www.cisco.com/c/en/us/solutions/enterprise-networks/low-voltage-poe-lighting-dg.html


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# Cisco Smart Buildings Useful Resources

## Catalyst 9K 90W Deployment




## C9K Smart Buildings Miercom






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# Cisco Smart Buildings Useful Resources


Cisco Smart Buildings Landing Page


Smart Buildings Technologies Guide


Cisco Catalyst 9000 Switches eBook (rev.3)


Cisco Catalyst 9300 Series Data Sheet


Cisco Catalyst 9400 Series Datasheet


Cisco UPOE+ IOT Whitepaper


Cisco Smart Buildings Portfolio Explorer


Cisco Smart Buildings Tech Field Day Session


Cisco Smart Buildings Implementation Guide

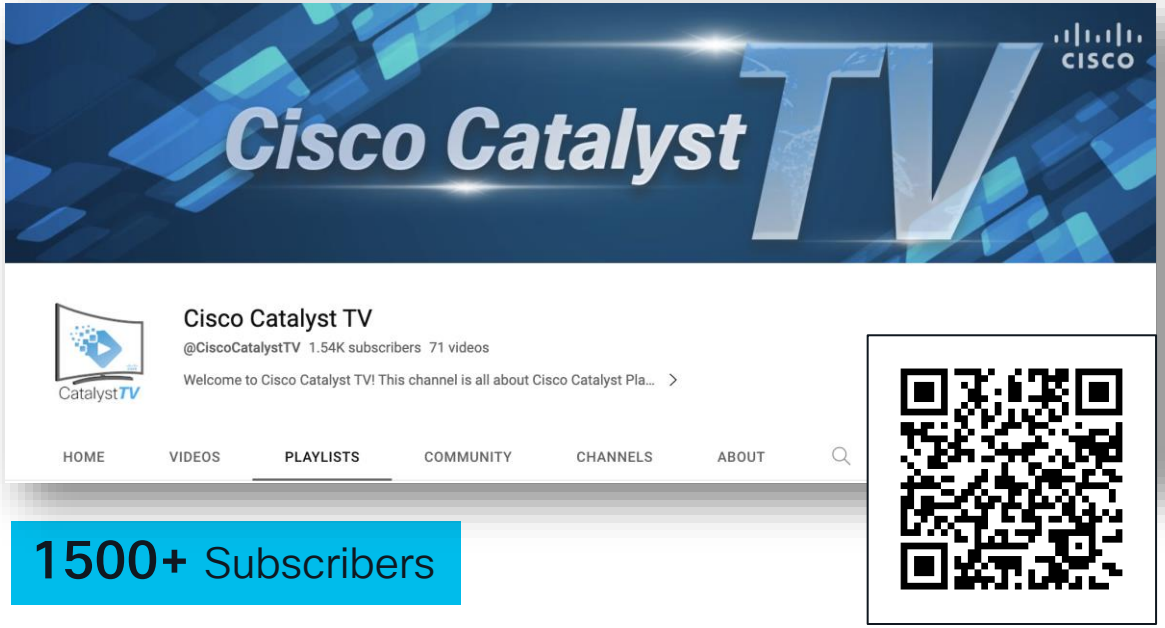
NEW

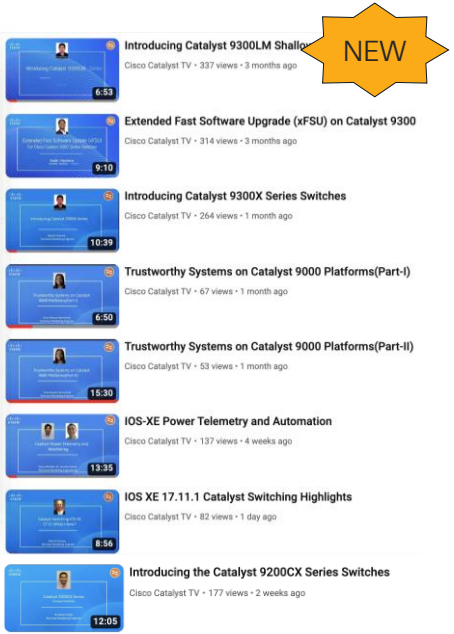

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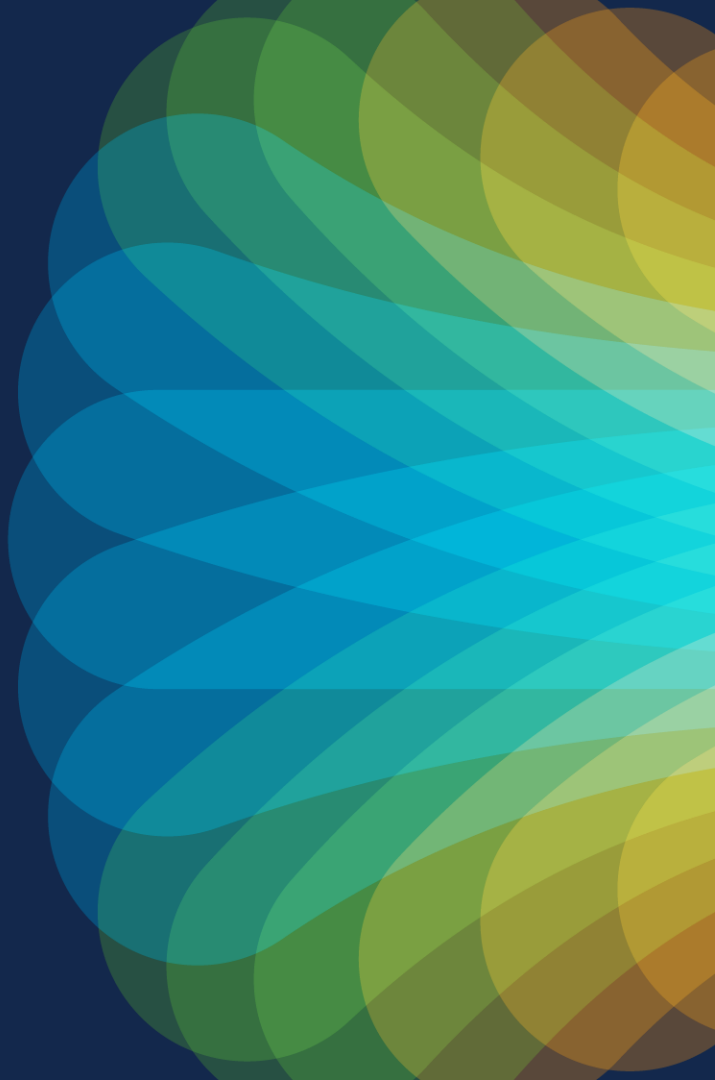

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The bridge to possible

# Thank you



cisco Live!


cisco Live!
Let's go