# Connecting Remote and Critical Assets with Cisco IoT Solutions

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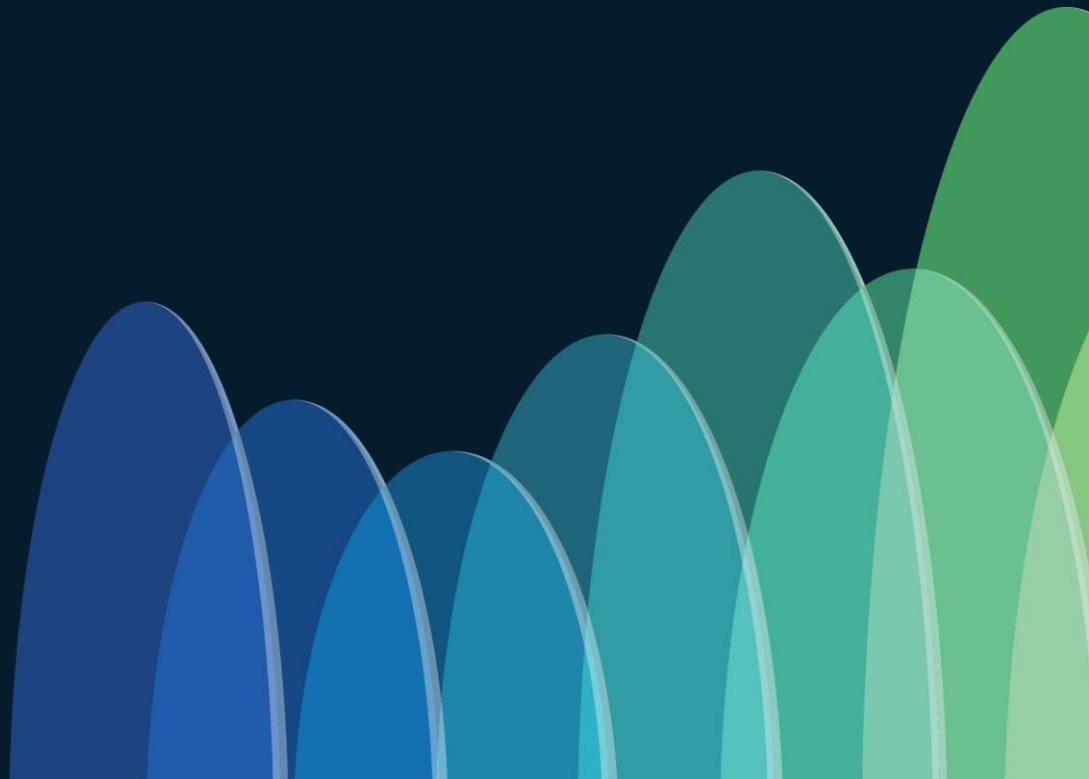
BRKIOT-1126

# Agenda

- Problem Definition
- Routing Platforms
  - Cisco Industrial Router IR1800
  - Cisco Industrial Router IR1101
  - Cisco Industrial Router IR8140
- Cellular Options
- Network Management
- Use Cases

# Problem Definition



# Multidimensional Problem

- To connect remote and critical assets, many factors are to be considered:

| | |
|---|---|
| Private vs. Public Space | Redundancy |
| Bandwidth / Latency | Cost |
| Failover | Security |
| Scalability | and more! |

# Connectivity in Public and Private Places

## Fiber, xDSL, Ethernet

Fiber SFP
(Cisco Optics)


Fiber SFP
(Third Party GPON)

Ethernet
RJ45 – Enterprise Standard
M12 – Industry Standard

# Connectivity in Public and Private Places

## Wi-Fi, Cellular

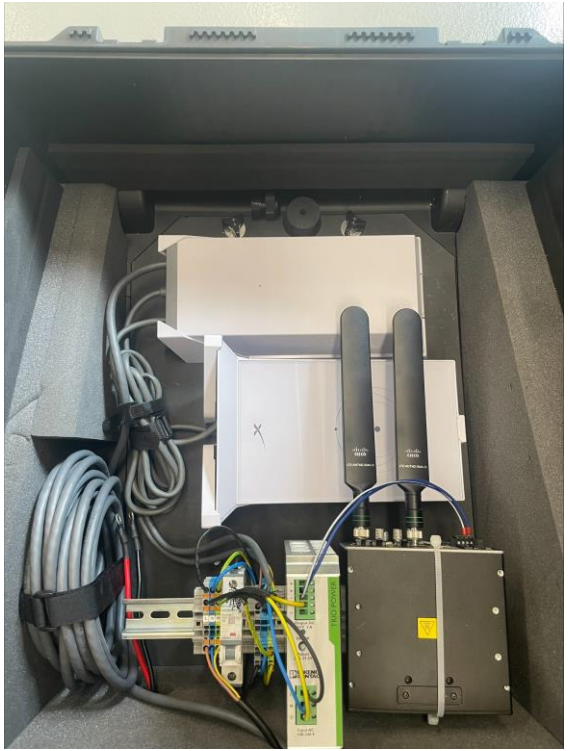

Wi-Fi access using IW9165E in WGB (Client) mode.


LTE / 5G
Pluggable Interface Module (PIM)
Public and Private 5G (SA and NSA)

# Connectivity in Public and Private Places

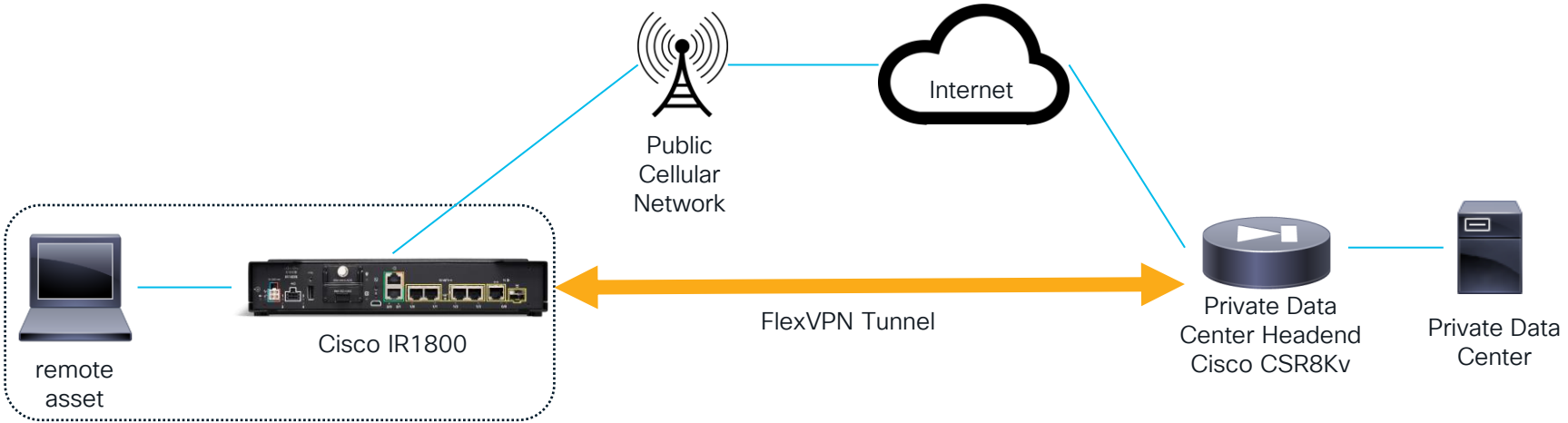
## Low Earth Orbit (LEO) Satellite

- LEO is a two-box solution
- Can be made redundant with Cellular or any other access method
- Example on right: IR1101 with Starlink used in offshore wind turbine



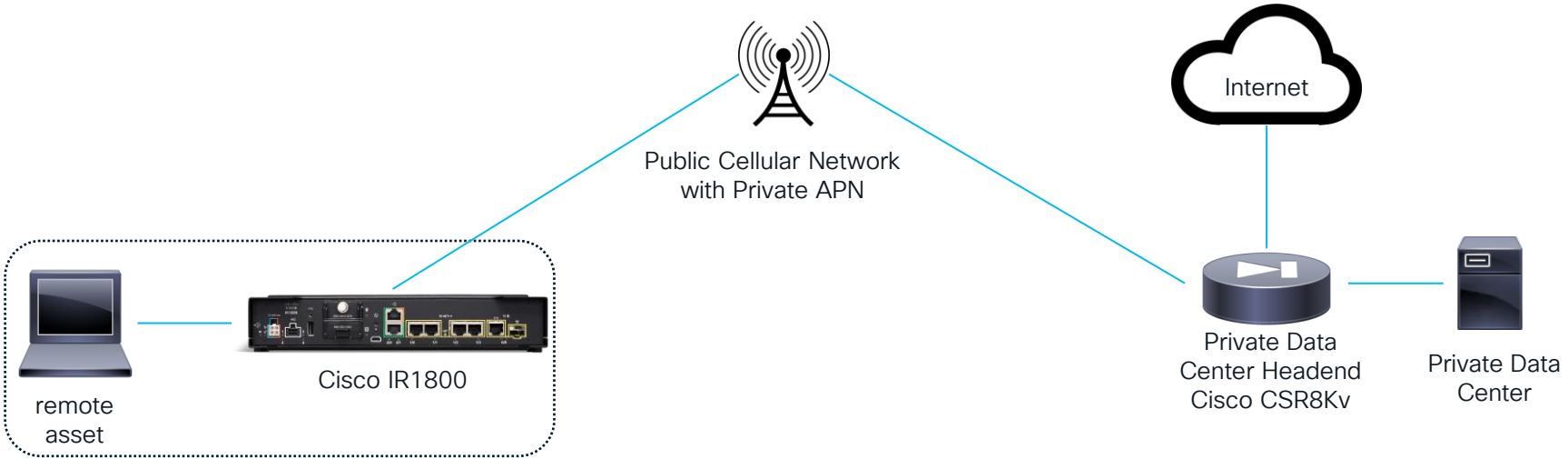
# What are the communication needs?
# Private Network or Data Center

## Option #1 – Public cellular network with VPN overlay



# What are the communication needs?
# Private Network or Data Center

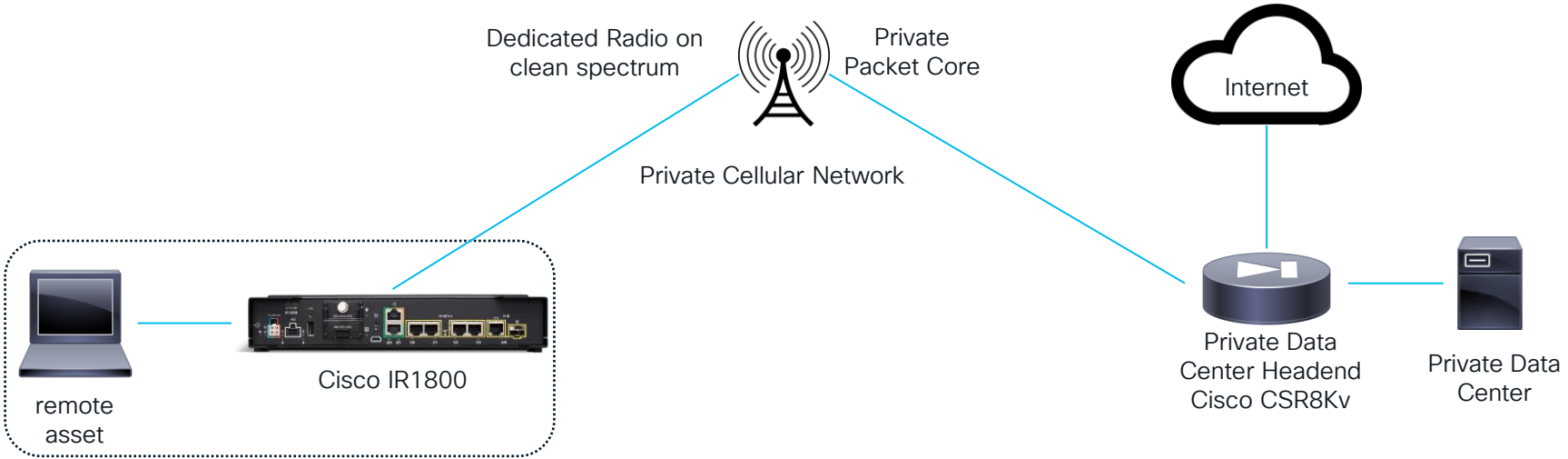
## Option #2 - Public cellular network with private APN




The traffic flows directly from the IR1800, via the mobile network, to the private network where it terminates. This traffic does not travel across the Internet. Internet access is provided and controlled from the private network.

# What are the communication needs?
# Private Network or Data Center

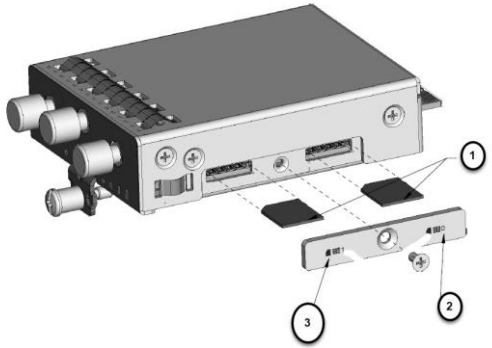
## Option #3 - Private cellular network (Private LTE, Private 5G)



# High Availability or Not ?

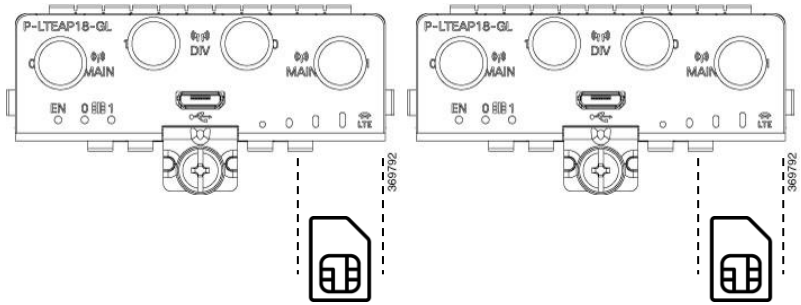
## Low Availability Requirement

- Network can be lost for a few minutes
- Single SIM on public cellular network
- Better: Dual SIM on different providers
- Requires single LTE modem




## High Availability Requirement

- Very difficult to guarantee
- Balance two **active** Cellular providers
- Requires dual LTE modem



# High, Medium or Low Bandwidth ?

## Low Bandwidth

- LTE Cat 4


- ↓ 150 Mbps
- ↑ 50 Mbps

## Medium Bandwidth

- LTE Cat 7


- ↓ up to 300 Mbps
- ↑ 150 Mbps

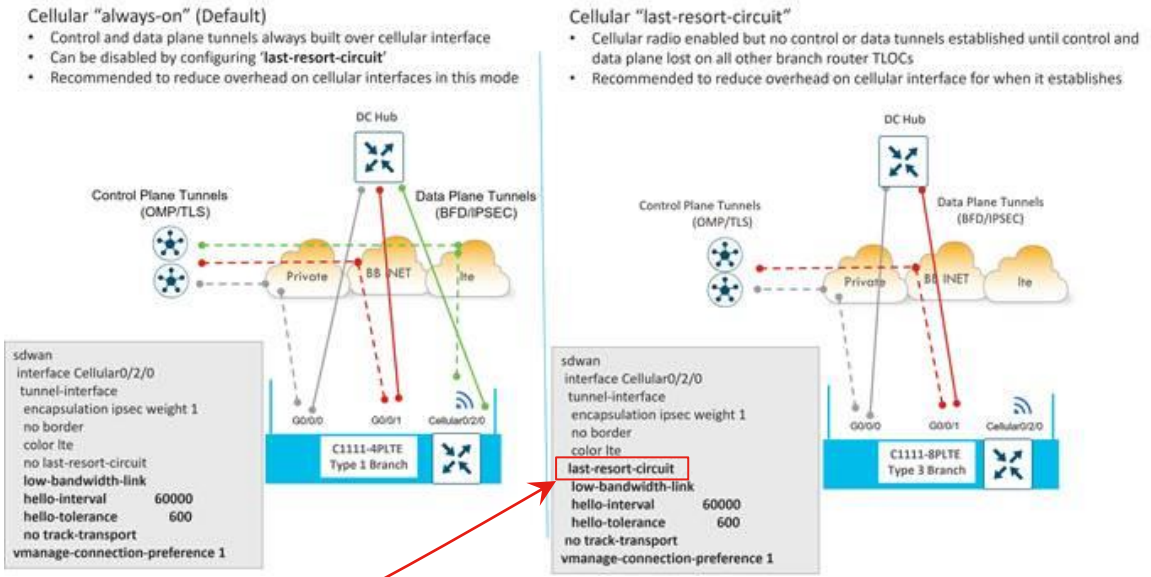
## High Bandwidth

- 5G
- WiFi

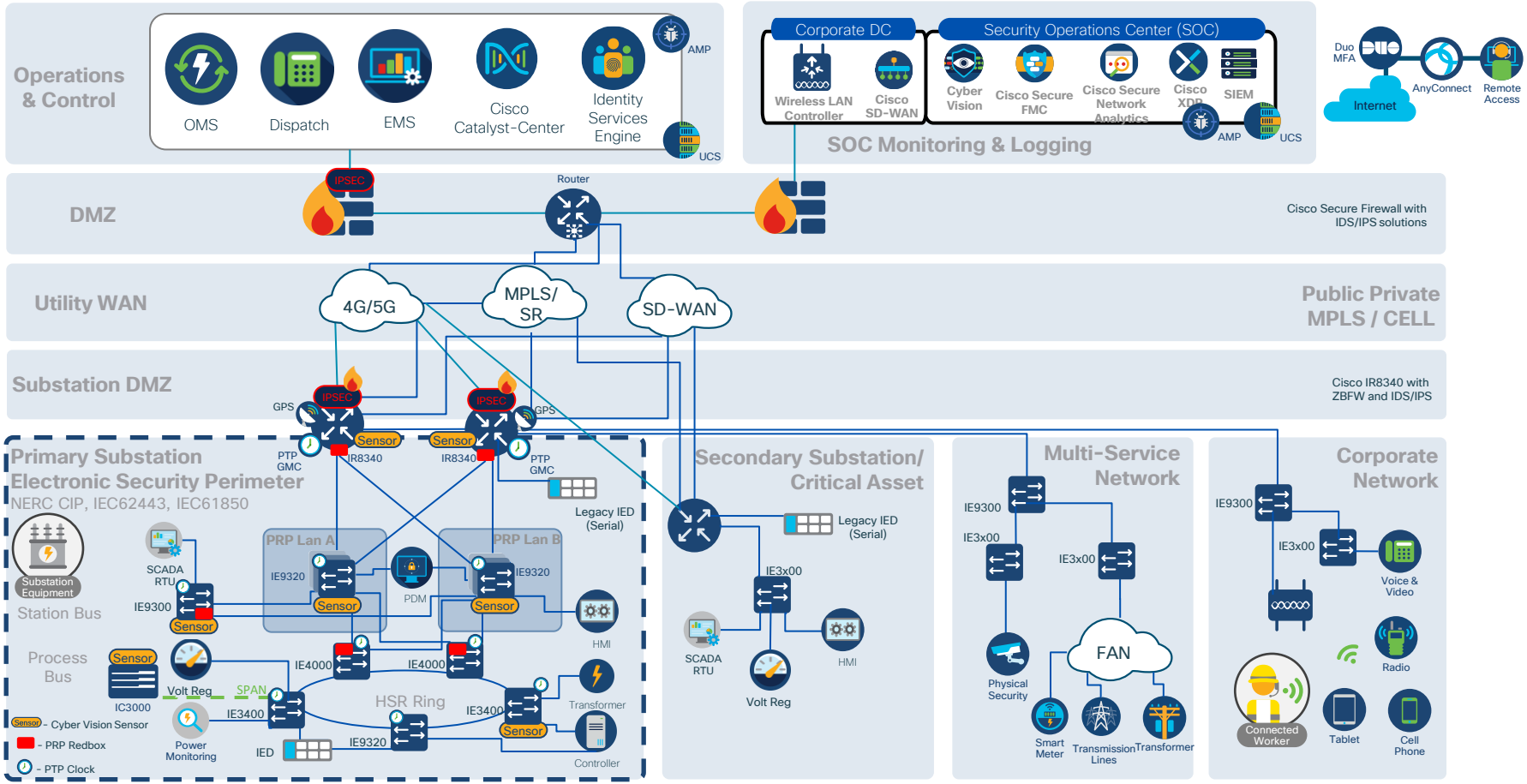
- ↓ 1+ Gbps
- ↑ 660 Mbps

# Multi-Transport Capability

- Mix multiple transports (Cell, MPLS, etc...) to achieve higher availability
- SD-WAN excels at that by leveraging BFD + OMP
- With cellular, use SD-WAN "Last Resort Circuit" which keeps Cellular down until there is not other available transport.

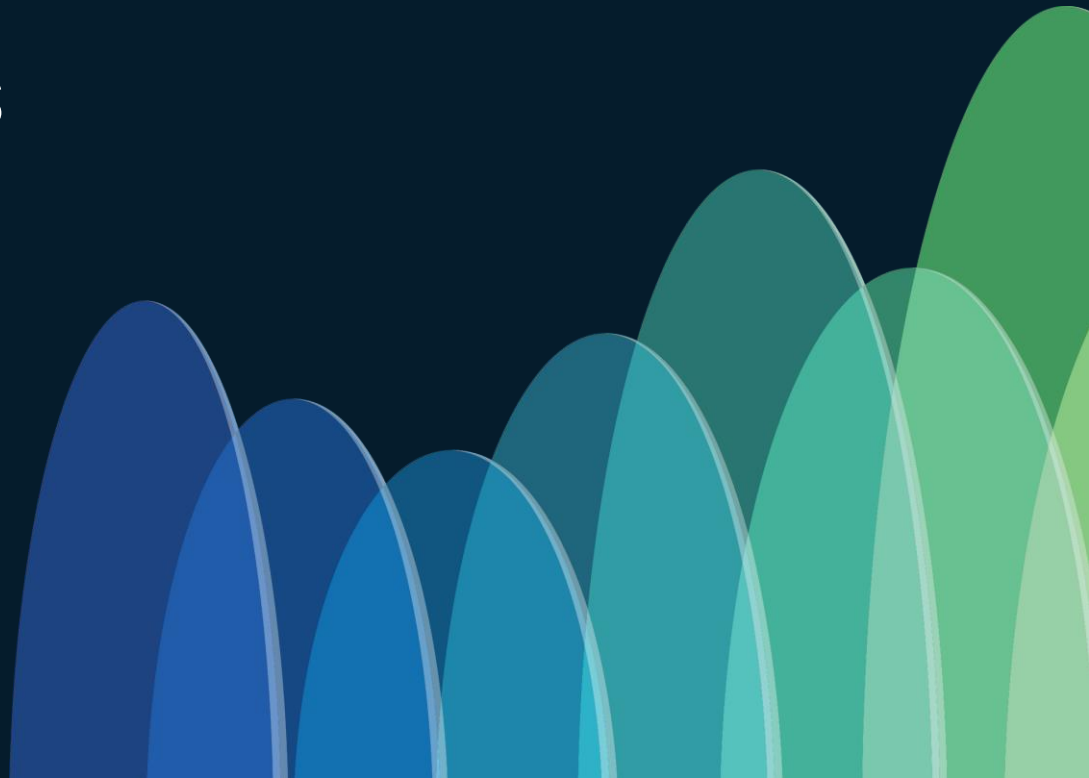


# Example: Substation Automation Architecture



# Filling the Needs

# Cisco Industrial Routers Family



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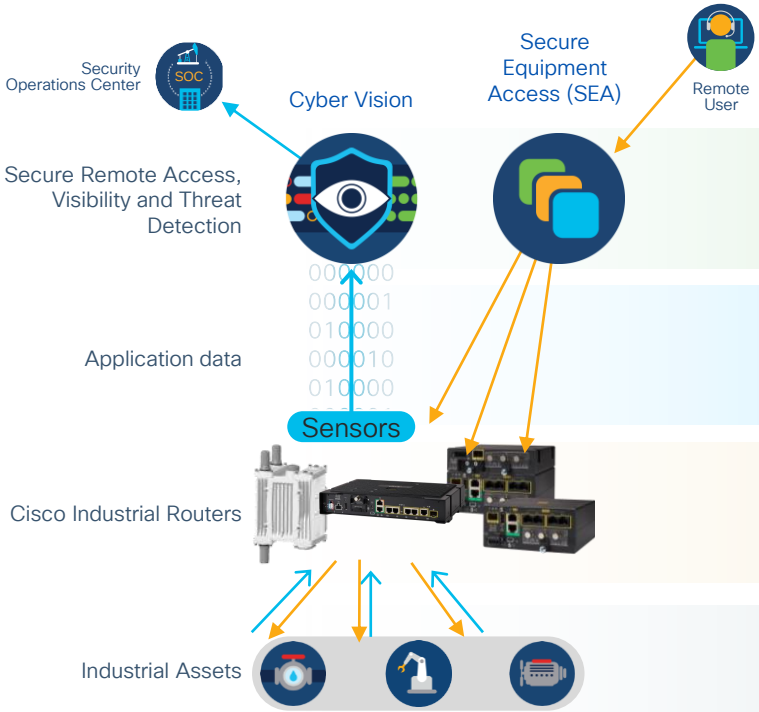
# Unmatched security capabilities

## With Firewall built-in, not bolted on



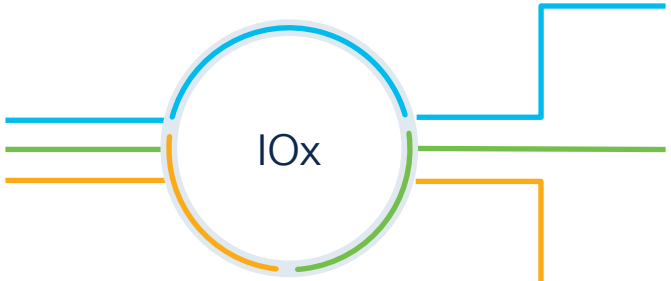

**Managed Security**
Control secure remote access and build OT-aware security policies

**Secured Communications**
Prevent malware intrusions, secure cellular network access, encrypt communications

**Secured Router Hardware**
Prevent hardware from being hacked, connect physical security devices

**Secured Field Assets**
Identify asset vulnerabilities and abnormal process behaviors, isolate devices via micro-segmentation

# Take action at the edge with meaningful insights




**Cisco Secure Equipment Access**
Purpose built remote access solution for industrial environments

**Cisco Edge Intelligence**
Simplifying the edge to multi-cloud data flow

**Cisco Cyber Vision**
**Secure Equipment Access**
Deploy OT security

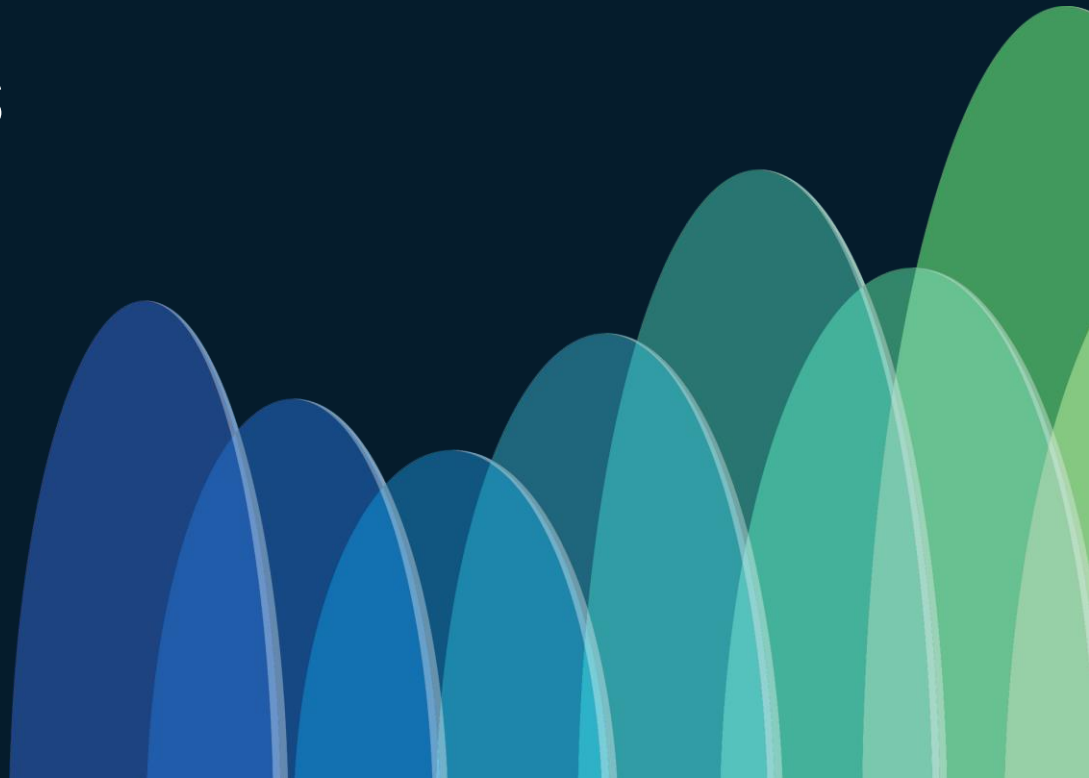
**Customer and 3rd party developed apps**

Powerful platform with built-in Edge Compute and expandable storage → Leverage Cisco IOx framework to develop and run IoT business apps → Use Cisco developed IOx apps or build your own

Reduce bandwidth costs and footprint , improve security , and scale operations

# Filling the Needs

# Cisco Industrial Router IR1800



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# Cisco Catalyst IR1800 Rugged Series Routers

## High performance, modular router for remote assets

- ✓ PoE
- ✓ Gigabit Ethernet ports
- ✓ Dead reckoning GPS
- ✓ Transportation Certified
- ✓ Cisco IOS XE
- ✓ Support for SEA, Cisco Cyber Vision and SD-WAN
- ✓ Verizon Frontline & FirstNet Certification

FIRSTNET. Built with AT&T READY

Wi Fi 6 CERTIFIED

5G

Modular

Cloud or prem managed

Ruggedized

# Two models to meet your needs

## Cisco Catalyst IR1800 Series SKU's

### IR1833

1 GigE Uplink
4 GigE LAN with PoE
2 LTE slots
1 Wi-Fi slot
FRU GPS
4GB Flash, 4GB RAM
600 Mhz ARM CPU

### IR1835

1 GigE Uplink
4 GigE LAN with PoE
2 LTE slots
1 Wi-Fi slot
FRU GPS
Digital IO
8GB Flash, 8GB RAM
1.2 Ghz ARM CPU

FRU = Field Replaceable Unit

# GNSS/GPS on Cisco IR183x

Antenna: must comply with the various frequencies for GNSS (Global Navigation Satellite System)

## Cellular modem-based GNSS/GPS

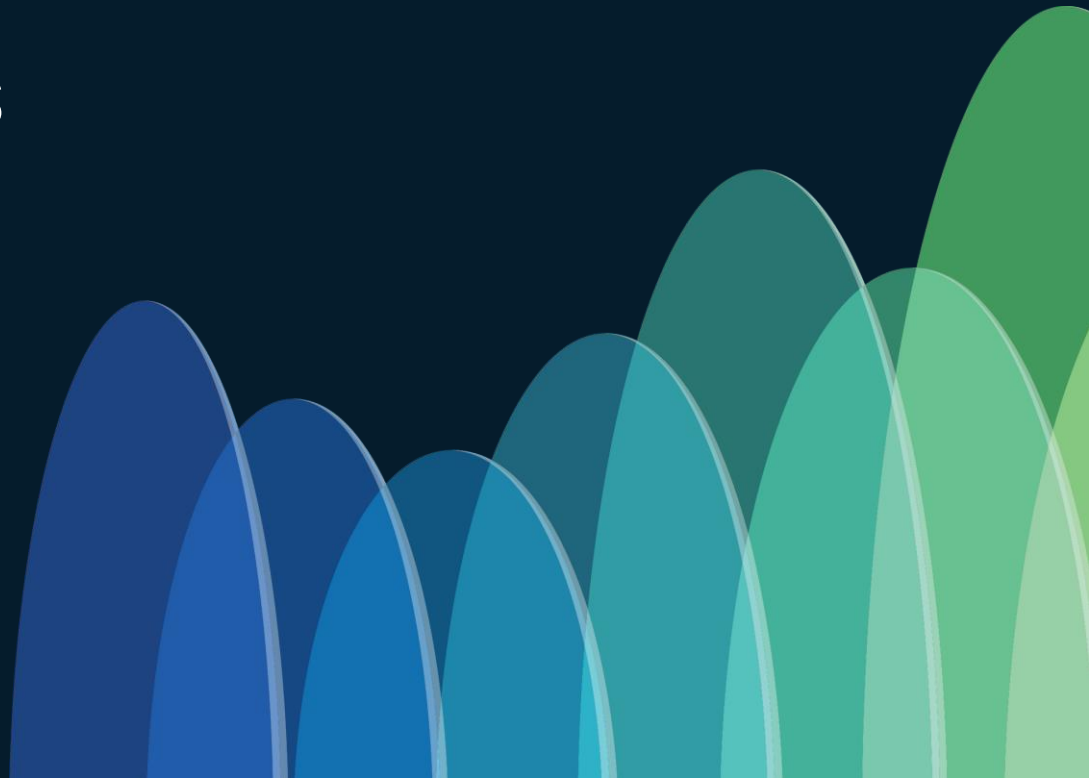
- Can be configured as “standalone” or “MS-based” (Assisted GPS mode using secure Google SUPL service) under Controller Cellular 0/x/0


## IR1800 GNSS/GPS interface

- GNSS module on the IR1835/1833 is a FRU in a dedicated slot with its own GNSS antenna
- Independent of cellular GPS with its own configuration, show commands and Yang model
- GNSS includes GPS (U.S.), Galileo (EU), Glonass (Russia) and Baidou (China) constellation.
- Based on Telit SL869-ADR chipset

# Filling the Needs

# Cisco Industrial Router IR1101



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# Cisco Catalyst IR1100 Rugged Series Router

## Compact, modular router for connecting remote assets

- ✓ Compact
- ✓ Low power consumption[1]
- ✓ Extended temperature[2]
- ✓ Hazardous Location (HazLoc) certified[3]
- ✓ Utility Smart Grid certified[4]
- ✓ AT&T FirstNet Approved
- ✓ Verizon Frontline
- ✓ Cisco IOS XE based
- ✓ Cisco Cyber Vision & Edge Intelligence
- ✓ Cisco SD-WAN


5G

Modular

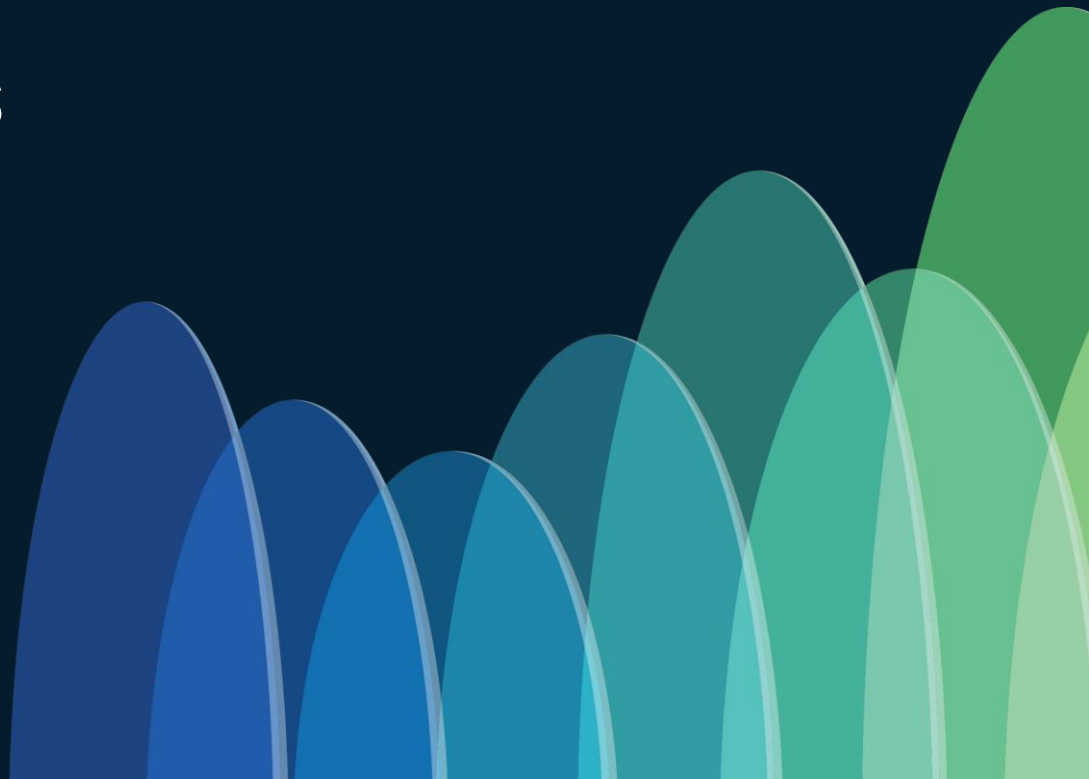
Cloud or on-prem managed

Ruggedized

1: 9.8W typical; 6.6W when idle
2: -40 to +75C in forced air enclosure with 200LFM of air & type tested at +85C for 16hours; -40 to +60C standard operation without airflow
3: ANSI/ISA 12.12.01 (Class 1, Div 2 A-D) & IEC/EN 60079-0 & 15 ATEX certification (Class 1, Zone 2 gas groups IIC)
4: IEC 61850-3 & IEEE 1613

# Filling the Needs

# Cisco Industrial Router IR8140



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# Cisco Catalyst IR8100 Heavy Duty Series Routers

## Heavy duty router for connecting remote outdoor assets

- ✓ IP67 rated
- ✓ Battery backup
- ✓ PoE*
- ✓ Modular: CPU, connectivity, battery, power supply
- ✓ Utility certified, Wi-SUN compliant
- ✓ FirstNet Ready
- ✓ Cisco IOS XE
- ✓ Support for Cyber Vision and Umbrella
- ✓ Cisco SD-WAN

FIRSTNET. Built with AT&T READY

*PoE only available on IR8140H-P-K9

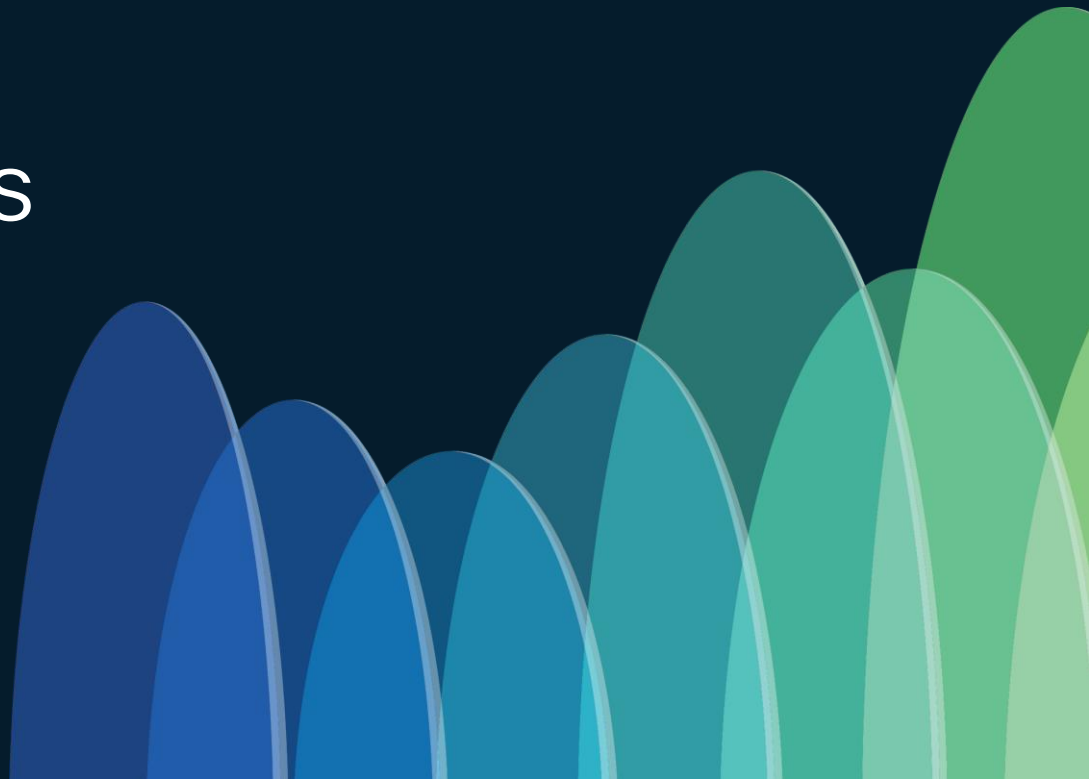
5G

Ultimate in modularity

Cloud or prem managed

Heavy duty for harsh outdoor conditions

# Industrial Routers Cellular Options



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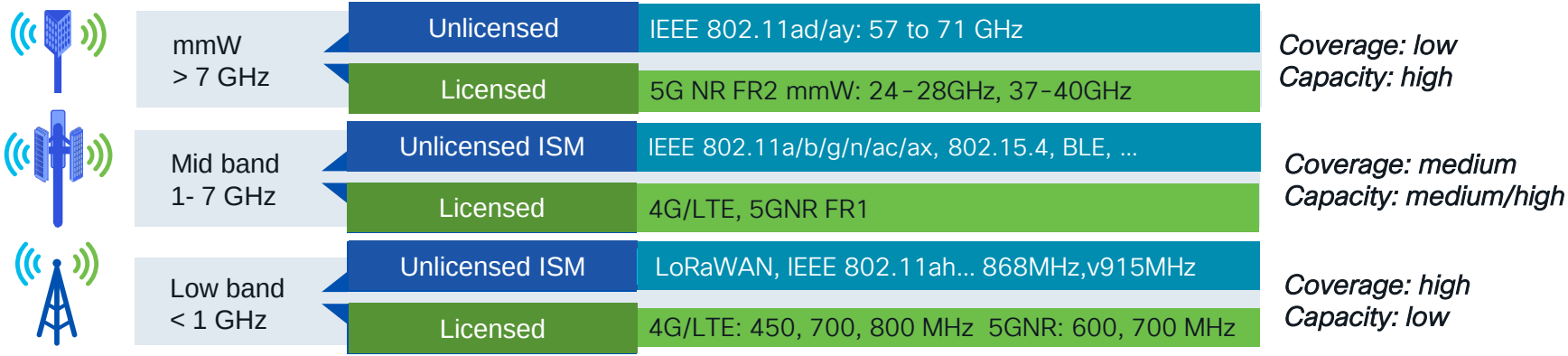
# Wireless Technologies – Spectrum

- Unlicensed: also known as ISM bands, generally free of charge, public, and private infrastructures, but regulated.
  - Different technologies may share the same frequency; co-existence definition in specifications
- Licensed: dedicated to SP (public services) or industries (private, critical infrastructures, i.e. U.S. Firstnet, Anterix, EU 450MHz…), paid license, allocated for several years.
  - Including “Locally Shared License” and “License-exempt Access” models.



# Industrial Routing Cellular Portfolio

## Platforms Supporting LTE/5G Modules

IR1101

IR1800

IR8140

IR8340

Pluggable: Variants supporting LTE CAT4/7 & 5G Sub-6 pluggable interface modules (PIMs)

4G

4G
5G

5G

LTE

CAT 4

150 Mbps DL
50 Mbps UL

P-LTE-US/MNA/VZ/GB

LTE Adv

CAT 7

300 Mbps DL
150 Mbps UL

P-LTEA7-NA/EAL/JP

5G Sub-6 NSA

Sub-6 NSA

3.3 Gbps DL
400 Mbps UL

P-5GS6-GL

5G Sub-6

NEW

Sub-6 SA

4.9 Gbps DL
660 Mbps UL

P-5GS6-R16SA-GL

New PIM

Existent PIM

# Cellular Supported Bands


| 4GLTE | 1 | 2 | 3 | 4 | 5 | 7 | 8 | 11 | 12 | 13 | 14 | 17 | 18 | 19 | 20 | 21 | 25 | 26 | 28 | 29 | 30 | 32 | 34 | 38 | 39 | 40 | 41 | 42 | 43 | 46 | 48 | 66 | 71 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NIM-4G-LTE-GA | ✓ | | ✓ | | | ✓ | ✓ | | | | | | | | ✓ | | | | | | | | | | | | | | | | | | | MC7304 | |
| NIM-4G-LTE-LA | ✓ | | ✓ | | ✓ | ✓ | ✓ | | | | | | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | ✓ | ✓ | ✓ | | | | | | | | LATAM |
| NIM-4G-LTE-NA | | ✓ | | ✓ | ✓ | | | | | | | ✓ | | | | | | | | | | | | | | | | | | | | | MC7354 | North America |
| NIM-4G-LTE-ST | | | | | | | | | | | | | | | | | ✓ | | | | | | | | | | | | | | | | MC7350 | Sprint |
| NIM-4G-LTE-VZ | | | | ✓ | | | | | | ✓ | | | | | | | | | | | | | | | | | | | | | | | MC7350 | Verizon |
| NIM-LTEA-EA | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | | | | ✓ | | ✓ | ✓ | | | ✓ | | | | | | ✓ | | | | | | | MC7455 | Europe, North America |
| NIM-LTEA-LA | ✓ | | ✓ | | ✓ | ✓ | ✓ | | | | | | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | ✓ | ✓ | ✓ | | | | | | | MC7430 | LATAM, APAC, ANZ |
| D-LTE-GB | ✓ | | ✓ | | | ✓ | ✓ | | | | | | | | ✓ | | | | ✓ | | | | | | | | | | | | | | | WP7607-G | Europe |
| D-LTE-AS | ✓ | | ✓ | | ✓ | | ✓ | | | | | | | | | | | | | | | | | | | ✓ | ✓ | | | | | | | WP7608-G | South Africa, India, Indonesia, Malaysia, Philippines, China |
| D-LTE-NA | | ✓ | | ✓ | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | WP7605-G | North America |
| P-LTE-US | | ✓ | | ✓ | ✓ | | | | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | WP7603 | AT&T, T-Mobile |
| P-LTE-GB | ✓ | | ✓ | | | ✓ | ✓ | | | | | | | | ✓ | | | | ✓ | | | | | | | | | | | | | | | WP7607 | Global |
| P-LTE-VZ | | | | ✓ | | | | | | ✓ | | | | | | | | | | | | | | | | | | | | | | | | WP7601 | Verizon |
| P-LTE-IN | ✓ | | ✓ | | ✓ | | ✓ | | | | | | | | | | | | | | | | | | | ✓ | ✓ | | | | | | | WP7608 | India, China |
| P-LTE-JN | ✓ | | ✓ | | | | ✓ | ✓ | | | | | ✓ | ✓ | | ✓ | | | | | | | | | | | | | | | | | | WP7605 | Japan |
| P-LTE-MNA | | ✓ | | ✓ | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | ✓ | | WP7610 | North America |
| P-LTEA-EA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | | | | | ✓ | | ✓ | ✓ | | ✓ | ✓ | | | | | | ✓ | | | | | | | EM7455 | Europe, North America |
| P-LTEA-LA | ✓ | | ✓ | | ✓ | ✓ | ✓ | | | | | | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | | ✓ | ✓ | | | | | | | EM7430 | LATAM, APAC, ANZ |
| P-LTEA7-NA | | ✓ | | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | | | | | ✓ | ✓ | | | | | | | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | EM7411 | North America |
| P-LTEA7-EAL | ✓ | | ✓ | | | ✓ | ✓ | | | | | | | | ✓ | | | | ✓ | | | ✓ | | ✓ | | ✓ | ✓ | ✓ | | | | | | EM7421 | EMEA, APAC, Latin America |
| P-LTEA7-JP | ✓ | | ✓ | | ✓ | | ✓ | | | | | | ✓ | ✓ | | | | | | | | | | | ✓ | | ✓ | ✓ | | | | | | EM7431 | Japan |
| P-LTEAP18-GL | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LM960A18 | Global |
| P-5GS6-GL | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | FN980 | Global |
| P-5GS6-R16SA-GL | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | EM9293 | Global |
| CG418-E | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LM960A18 | Global |
| CG522-E | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | EM9190 | Global |

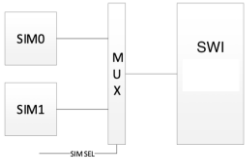
| 5G FR1 | 1 | 2 | 3 | 5 | 7 | 8 | 12 | 13 | 14 | 18 | 20 | 25 | 26 | 28 | 29 | 30 | 38 | 39 | 40 | 41 | 46 | 48 | 66 | 70 | 71 | 75 | 76 | 77 | 78 | 79 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-5GS6-GL | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | ✓ | | | ✓ | | ✓ | ✓ | | ✓ | ✓ | | ✓ | | | ✓ | ✓ | ✓ | FN980 | Global |
| P-5GS6-R16-GL | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | EM9293 | Global |
| CG522-E | ✓ | ✓ | ✓ | ✓ | | | | | | | | | ✓ | ✓ | | | | | | ✓ | | | ✓ | | ✓ | | | ✓ | ✓ | ✓ | EM9190 | Global |

# Dual SIM- for Flexibility

With two SIM cards inserted into one pluggable interface module, the cellular radio still only connects to one active SIM at a time.

By default, the SIM in slot0 is primary SIM. Using IOS-XE CLI the user can make SIM in slot1 as primary.

```
router# configure terminal
router(config)# controller Cellular 0
router(config-controller)#lte sim primary slot 1
```




The team in charge of installation performs site surveys on SIM 0 and SIM 1. Based on the site survey results, your installer will switch to the carrier that is providing the best network experience at that location.

If Primary SIM network connectivity fails, Secondary SIM network connectivity will be established. Switch back to Primary SIM is done.

If secondary SIM network connectivity fails -> Primary SIM Forcing switch back on Primary SIM via WANMon or EEM script Next Reboot

# Force SIM failover from slot 0 to slot 1

- The switch between SIMs can be forced and **takes about 1 minute**

```
ir1835-3#cellular 0/4/0 lte sim activate slot 1
```

```
ir1835-3#cellular 0/4/0 lte sim activate slot 0

*Mar 20 13:05:03.289: %CELLWAN-5-SIM_ACTIVATION: [Cellular0/4/0]: SIM slot 0 is being activated !!
*Mar 20 13:05:06.052: %LINK-3-UPDOWN: Interface Cellular0/4/0, changed state to down
*Mar 20 13:05:07.051: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cellular0/4/0, changed state to down
*Mar 20 13:05:24.506: %CELLWAN-2-MODEM_RADIO: Cellular0/4/0 Modem radio has been turned off
*Mar 20 13:05:25.704: %CELLWAN-2-MODEM_RADIO: Cellular0/4/0 Modem radio has been turned on
*Mar 20 13:05:26.298: %LINK-5-CHANGED: Interface Cellular0/4/0, changed state to administratively down
*Mar 20 13:05:26.304: %LINK-5-CHANGED: Interface Cellular0/4/1, changed state to administratively down
ir1835-3#
*Mar 20 13:05:27.710: %CELLWAN-5-SIM_ACTIVE: [Cellular0/4/0]: SIM slot 0 is Active !!
*Mar 20 13:05:29.704: %LINK-3-UPDOWN: Interface Cellular0/4/0, changed state to down
*Mar 20 13:05:29.708: %LINK-3-UPDOWN: Interface Cellular0/4/1, changed state to down
*Mar 20 13:06:43.588: %LINK-3-UPDOWN: Interface Cellular0/4/0, changed state to up
*Mar 20 13:06:44.588: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cellular0/4/0, changed state to up
```

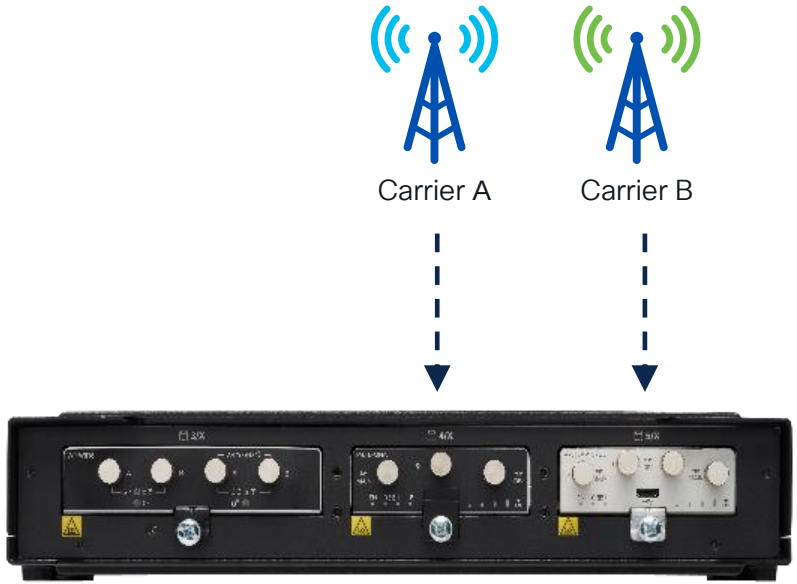
- Combined downtime is: timer 3 + switch 1 = **4 minutes**

# Dual Modem- for WAN Redundancy

## What is it?

DUAL Modem allow you to connect two carriers simultaneously, which provides multiple benefits.

- The WAN redundancy for mission-critical IoT applications allows automatic switch from one carrier to the other to occur in mere seconds.
- Both modems can be active at the same time, allowing for more bandwidth.
- Load balancing done on IP routing
- For SDWAN and data usage optimization



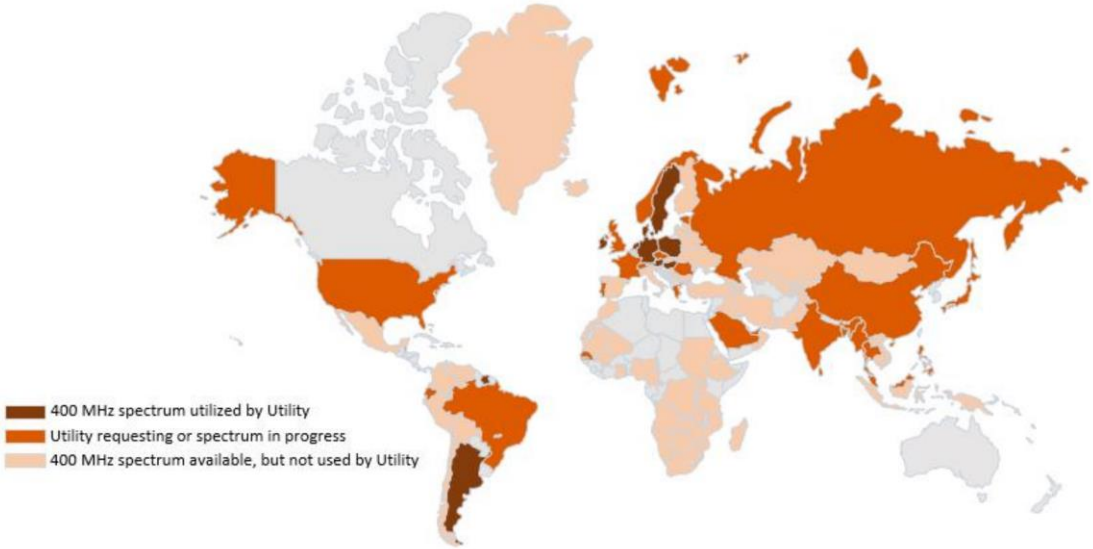
# IOS-XE Dual Modem Configuration
## IR1101 example

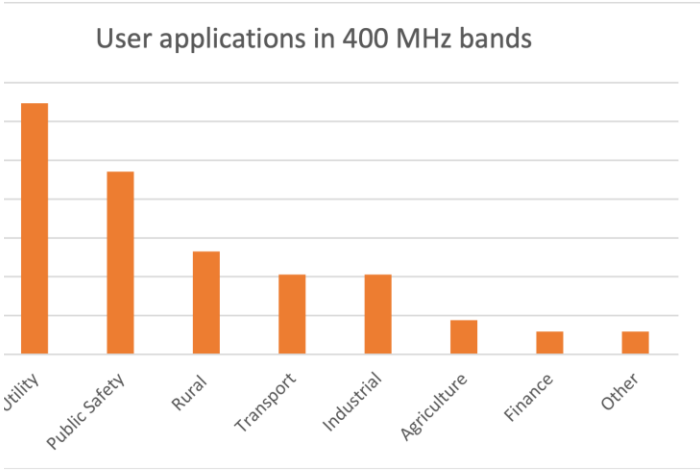
```
interface Cellular0/1/0
 ip address negotiated
 dialer in-band
 dialer watch-group 1
 dialer-group 1
 ipv6 enable
 pulse-time 1
!
interface Cellular0/4/0
 ip address negotiated
 dialer in-band
 dialer idle-timeout 0
 dialer watch-group 2
 dialer-group 2
 ipv6 enable
 pulse-time 1
```

```
dialer-list 1 protocol ip permit
dialer-list 1 protocol ipv6 permit

dialer-list 2 protocol ip permit
dialer-list 2 protocol ipv6 permit


ip route 0.0.0.0 0.0.0.0 Cellular0/1/0

ip route 0.0.0.0 0.0.0.0 Cellular0/4/0 253
```

# LTE 450 Mhz Usage Globally

LTE 450 Mhz connectivity is critical for industries with **distantly spread activities**, like electricity distribution, logistics, transport, seaports and remote, high-security government installations.




Source: Annual Global Update
450 MHz Alliance, December 2023

# P-LTE-450 MHz Cellular Pluggable Module (Cat4)

LTE 450 provides **critical communication** needs in relation to safety and emergency systems and services

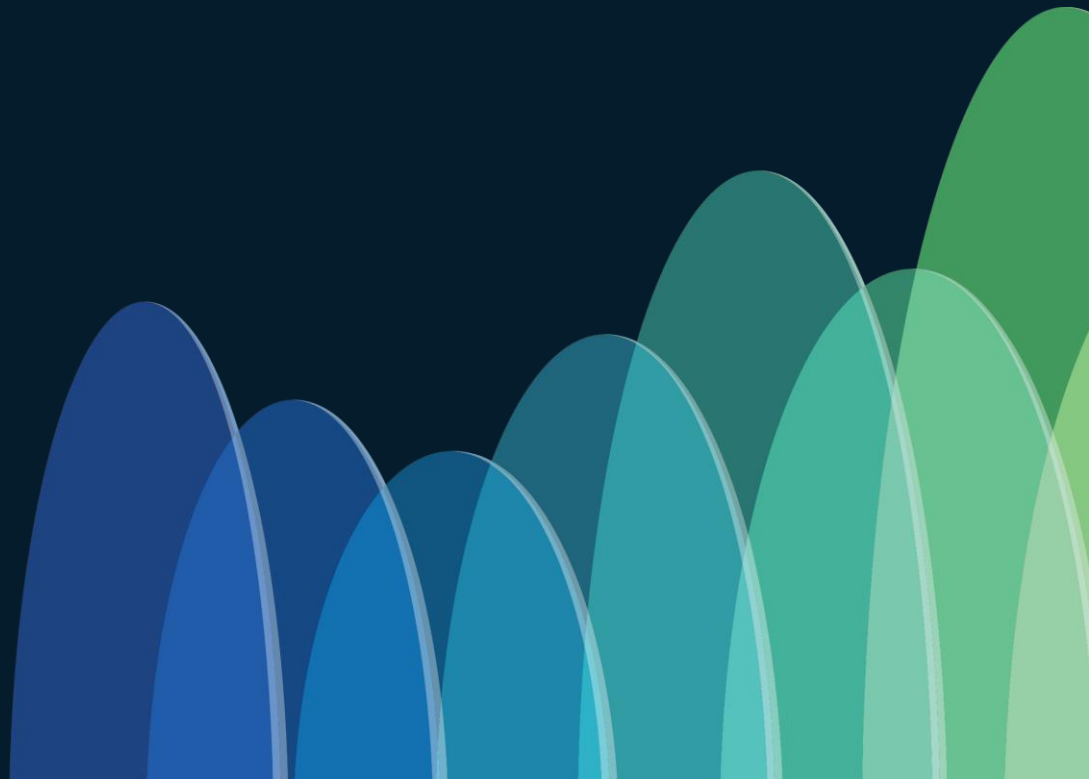
1. LTE Antenna SMA MAIN Connector
2. GPS SMA Connector (currently not in use)
3. LTE Micro USB Console Debug
4. LTE Antenna SMA DIV Connector
5. SIM slot #0



- **Band 31**: UL:452.5-457.5 DL:462.5-467.5
- **Band 72**: UL: 451-456 DL: 461-466
- Channel bandwidth: 1.4 MHz, 3MHz and 5 MHz
- LTE 450MHz alliance https://450alliance.org/

# Network Management

## Overview



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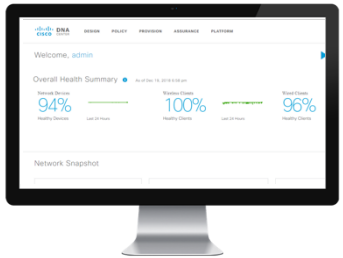
# Management Solutions for IoT Routers Portfolio

Manage by use case & workflow

Enable IT to manage from campus to edge

## IoT FND
Field Network Director

| |
|---|
| OT Focused |
| Select Industrial Routers in FAN (Utility AMI and DA) deployments |
| On-Premise |
| Perpetual and subscription options available |




## Catalyst Center

| |
|---|
| IT Driven |
| Extended Enterprises: Industrial IOT Switches, Wi-Fi and Router |
| On-Premise |
| Up front initial investment for hardware and software |

## Catalyst SD-WAN

| |
|---|
| IT Driven |
| SD-WAN Fabric overlay: Industrial IOT IOS-XE Routers |
| On-Premise or Cloud |
| Subscription based on usage for cloud consumption option |

# Management Solution Deployment and Purchasing

| | IoT FND | Catalyst Center | Catalyst SD-WAN Manager |
|---|---|---|---|
| **Deployment** | | | |
| Cloud | ✗ | ✗ | ✓ |
| On-Premises | ✓ | ✓ | ✓ |
| **IR 1101** | ✓ | ✓ | ✓ |
| **IR1800** | ✓ | ✓ | ✓ |
| **IR8140** | ✓ | ✓ | ✓ |
| **IR 8340** | ✗ | ✓ | ✓ |
| **Purchasing** | | | |
| Subscription<br>Pay as you grow<br>(as opposed to perpetual or fixed term licensing) | ✓ | ✗ | ✓ |
| Up front hardware and software purchases (excl Gateway) | ✓ | ✓ | ✓ |

# Want more Network Management?

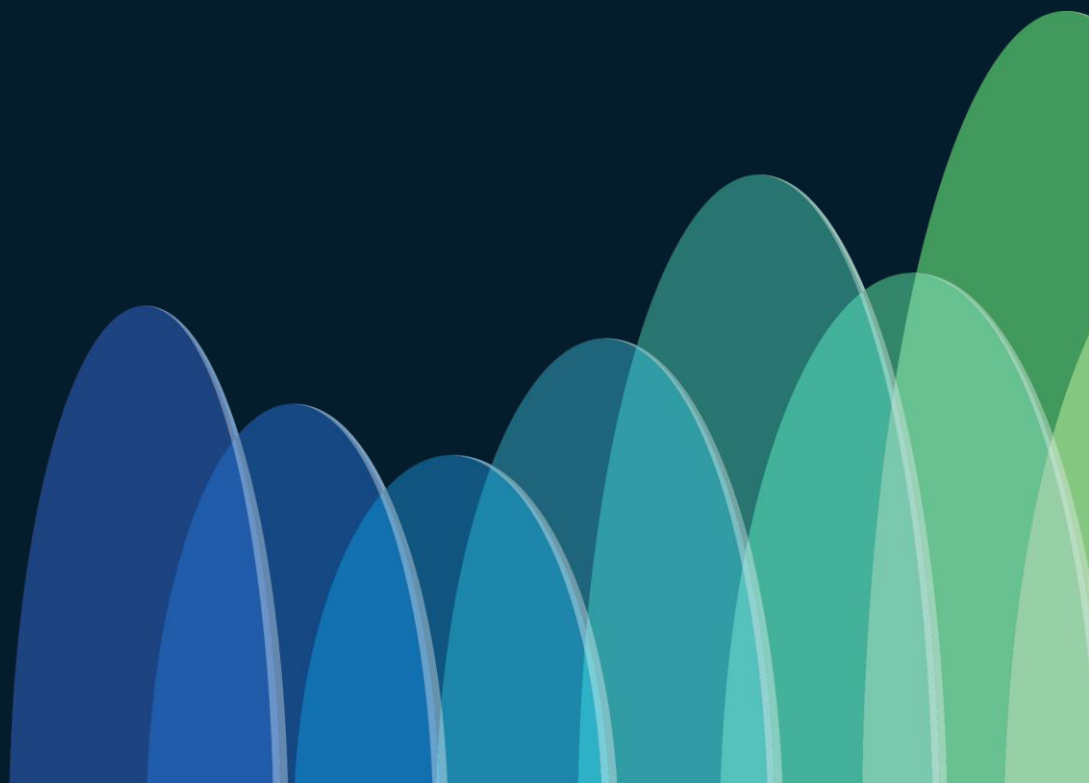
**Converge IT and OT Networks with Cisco Catalyst Center: In-Depth look into Industrial Networks (BRKIOT-2362)**
Wednesday February 12th 17:00 – 18:30

**Cisco Catalyst SD-WAN Fundamentals (CISCOU-2030)**
Thursday, Feb 13th 9:30 – 10:00

**Cisco Catalyst SD-WAN: Configuration, Provisioning, and Operations Demystified (IBOENT-2187)**
Thursday, Feb 13th 15:00 – 16:30

# Network Management & Security

## With SD-WAN | SD-Routing



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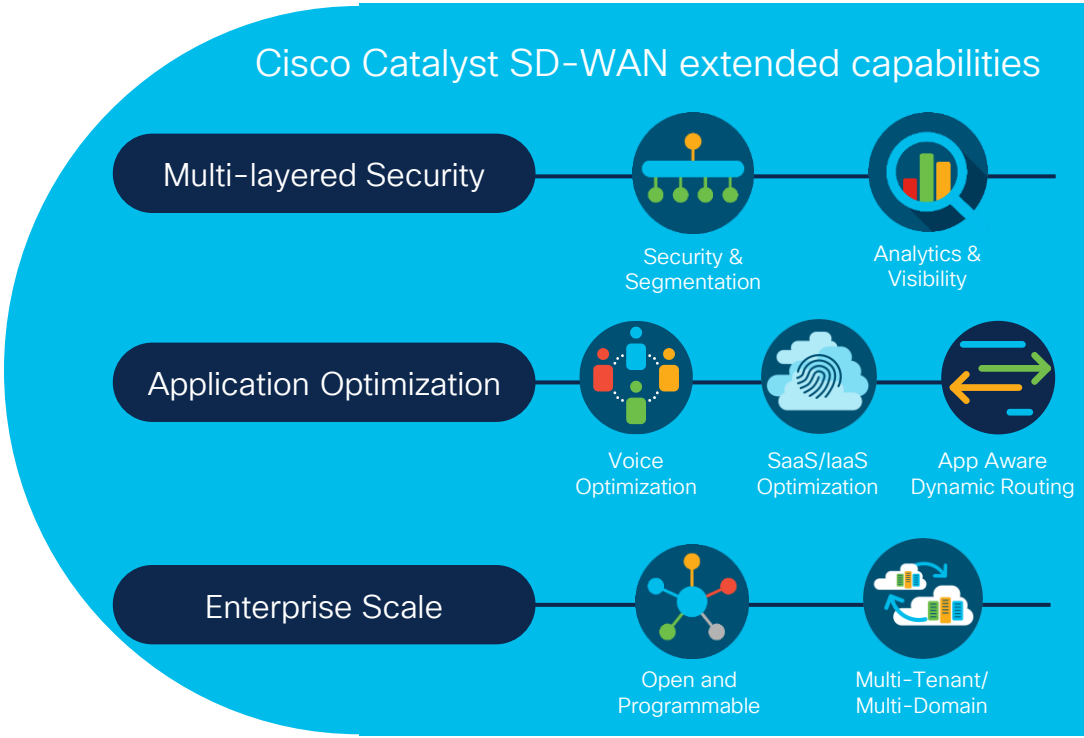
# Cisco Catalyst SD-WAN: Powered by Viptela

## Summary of Basic SD-WAN Capabilities*

- Circuit Load Balancing
- Direct Internet Access
- Centralized Management & Orchestration
- Circuit Cost Savings




*Gartner Critical Capabilities for WAN Edge Infrastructure, December 2018

# Cisco Catalyst SD-WAN is a Market Leader across all Metrics

- #1 in Market share with IDC, Dell 'Oro and Gartner
- 30,000+ customers across Viptela & Meraki
- Widely deployed across Fortune 2000
- 70% of Fortune 100 Companies

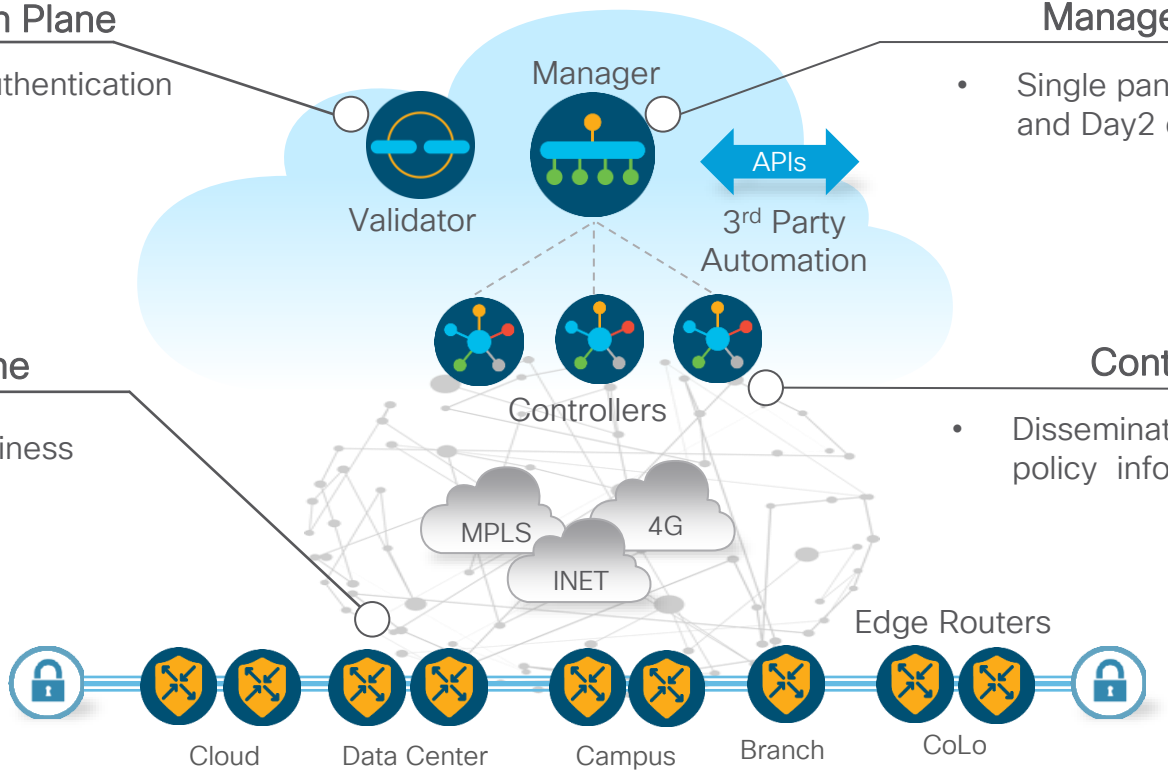
# Cisco Catalyst SD-WAN Architecture

## Orchestration Plane

- First point of authentication

## Management Plane

- Single pane of glass for Day0, Day1 and Day2 operations




## Data Plane

- Implements business intent policies

## Control Plane

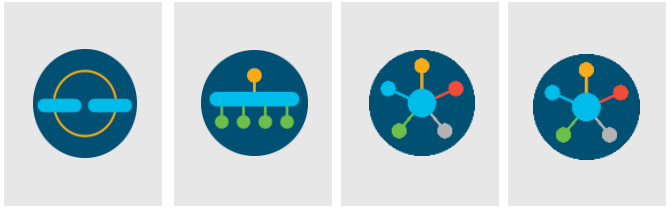
- Disseminates control plane and policy information between Edges

**Most Comprehensive SD-WAN Solution in the Market**

# Controller Deployment Methodology

## On-Premise

Validator Manager Controller Controller

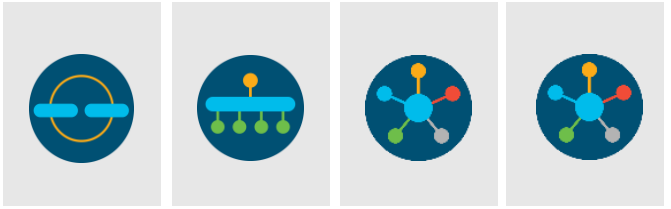


ESXi or KVM

Physical Servers

## Cisco or MSP/Customer Hosted

Validator Manager Controller Controller



AWS or Azure

Certified Cloud (PCI, SOC2/ISO/C5)*

Gov. Cloud (FedRAMP)*

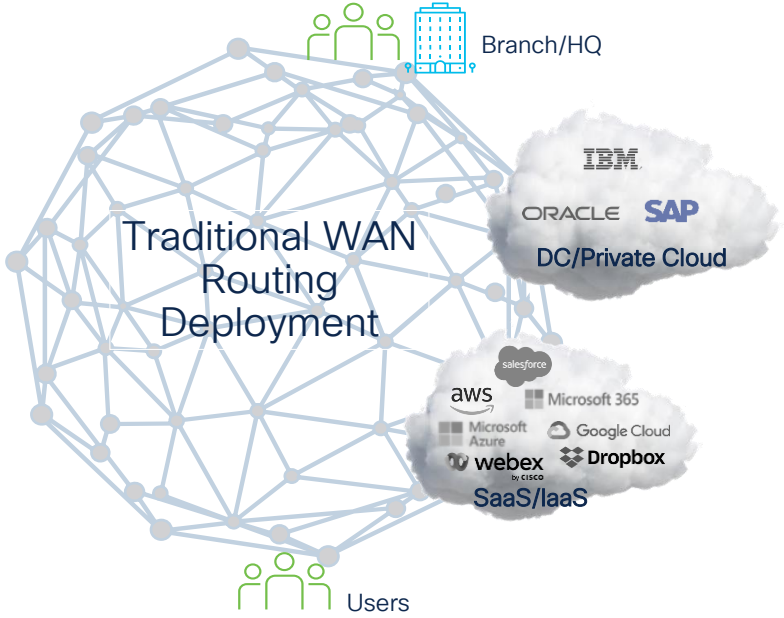
VM

*Only Cisco hosted

# Introducing SD-Routing

## Transform the platform experience

Catalyst SD-WAN Manager




Simplicity and Agility | OpEx Reduction | Future-Ready WAN | Multi-layered Security

# SD-WAN vs SD-Routing

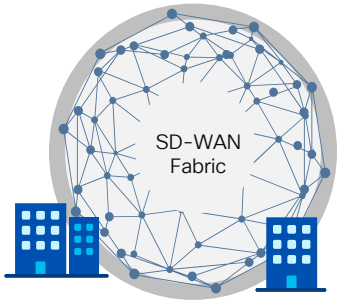
## Architecture Components

### SD-WAN deployment

*SD-WAN Validator*
*Previously vBond*

*SD-WAN Manager*
*Previously vManage*

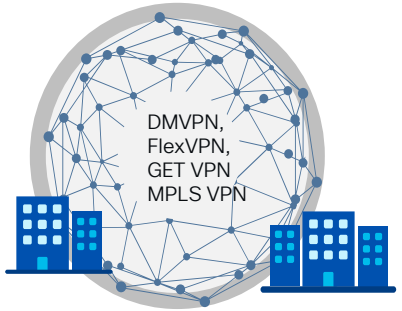
*SD-WAN Controller*
*Previously vSmart*




### SD-Routing deployment

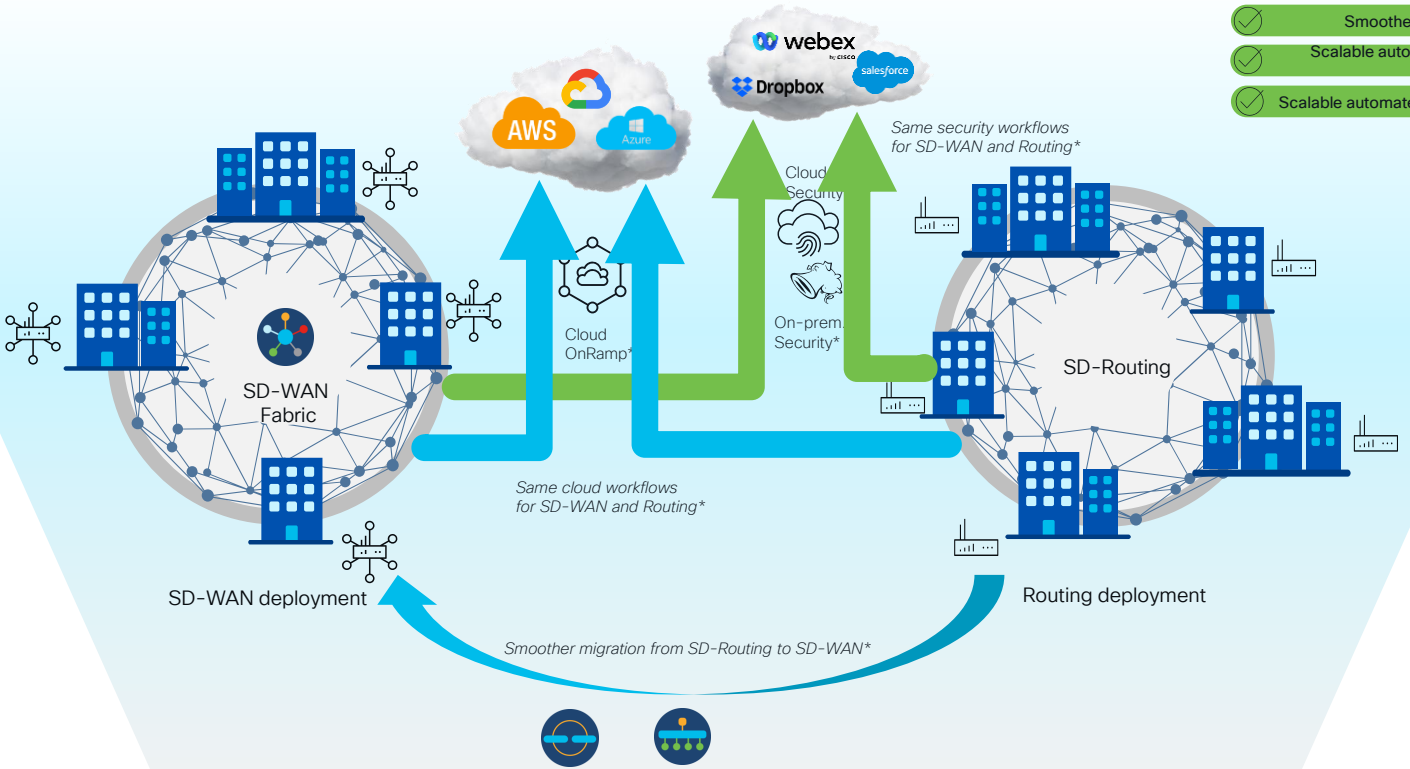
*SD-WAN Validator*
*Previously vBond*

*SD-WAN Manager*
*Previously vManage*



# Unified Management for your WAN

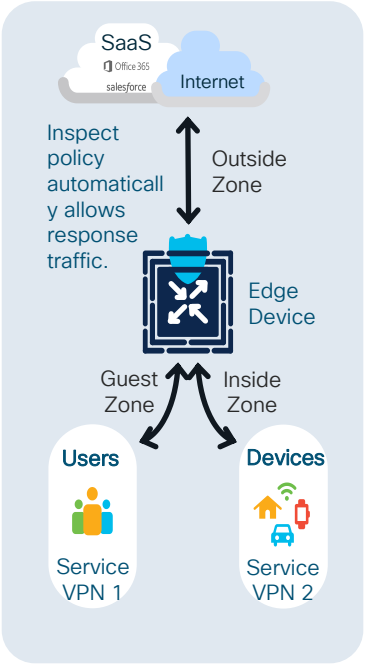
- Unified management for SD-WAN and Routing
- Smoother SD-WAN migration*
- Scalable automated security integration for Routing*
- Scalable automated cloud integration for Routing*



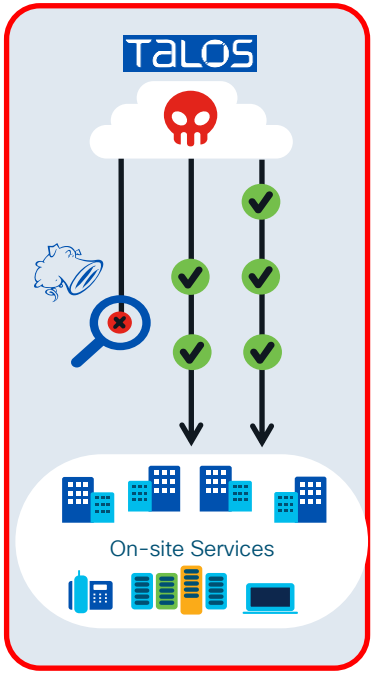

* On Roadmap for Routing. Fully supported with SD-WAN today.

# SD-WAN (UTD) Security Capabilities on the IR1835

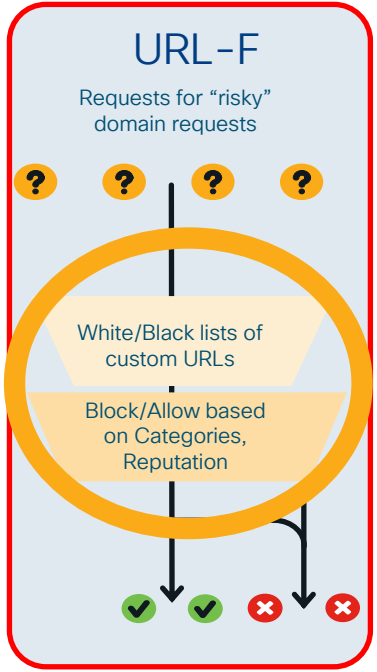
Ent. Firewall App Aware



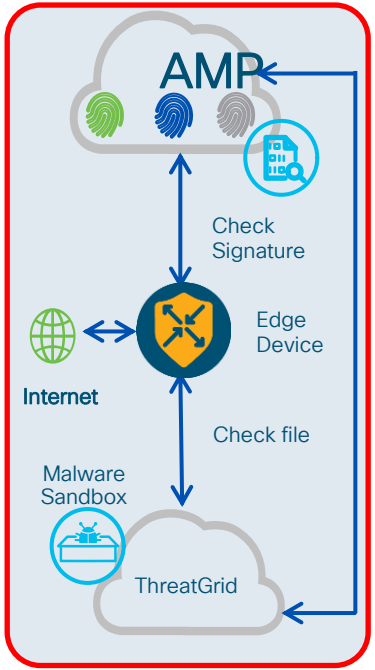

Intrusion Prevention




URL Filtering




Advanced Malware Protection



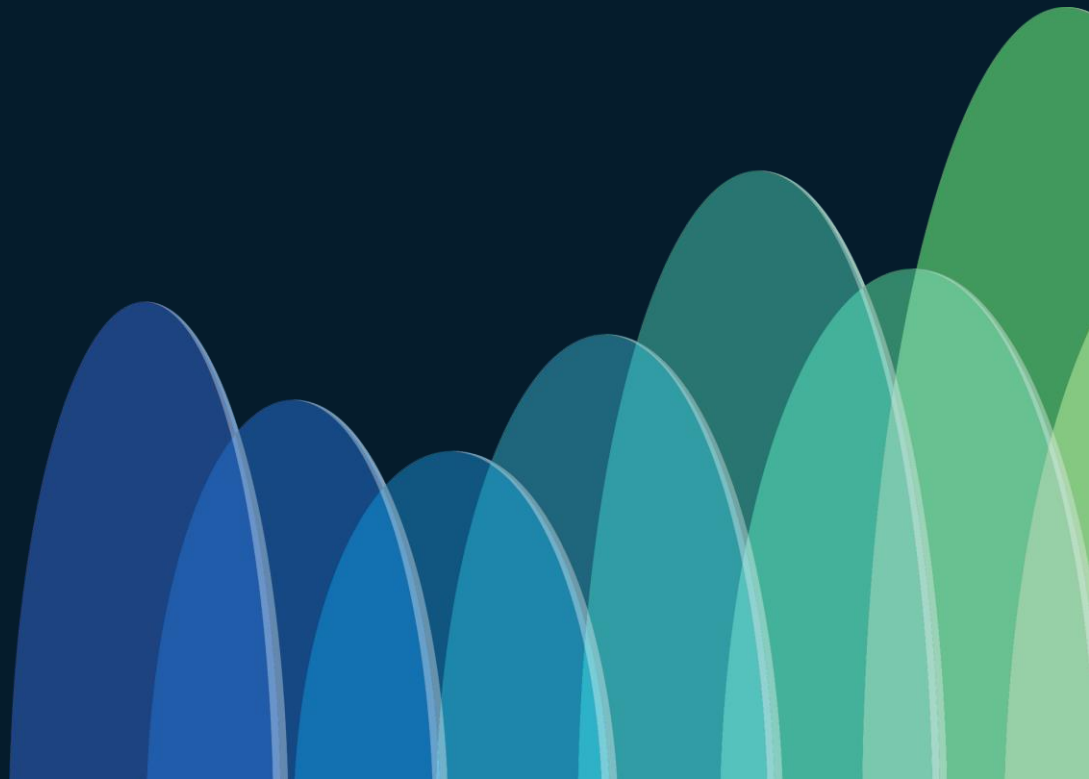

DNS/web-layer security

# Want more Industrial Security?

**"Future-Proofing Industrial Networks for Cybersecurity and AI" (PSOIOT-1017)**

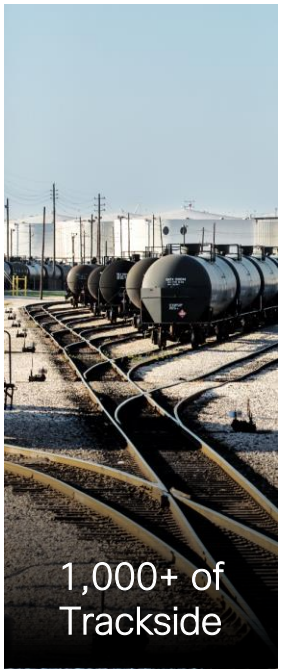
Thursday 13th February 16:00 – 16:30

# Use Cases



# Extended Enterprise

## Trackside / ATM / Oil & Gas






## Customer Profile

Cisco enterprise customer wanting to leverage its existing infra to manage assets in non-carpeted areas / harsh environments

Managing remotely located assets at scale

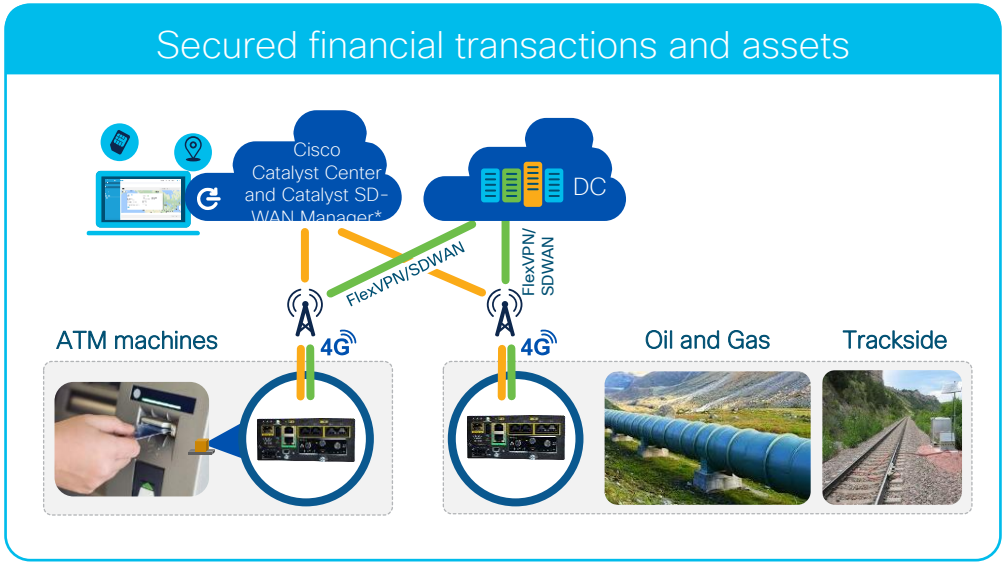
## Challenges

- Lack of visibility to remote assets.
- Manageability of large-scale deployments.
- Securely connecting remote assets in harsh environments.

# Extended Enterprise **Solution**

Catalyst IR1101

Catalyst IR1800




## 3 Key Benefits

- IoT Routers provide high availability and connectivity in remote locations with multi-access technology
- Easy to provision and scalable solutions with common management platform such as Catalyst Center
- Extend enterprise level security to harsh environments with extensive compliance certifications


DUKE ENERGY

# Substation Automation

## Challenge

- Update legacy SCADA system and scale network to support growing number of telemetry devices
- NERC CIP security compliance requirements
- Security Visibility

## Solution

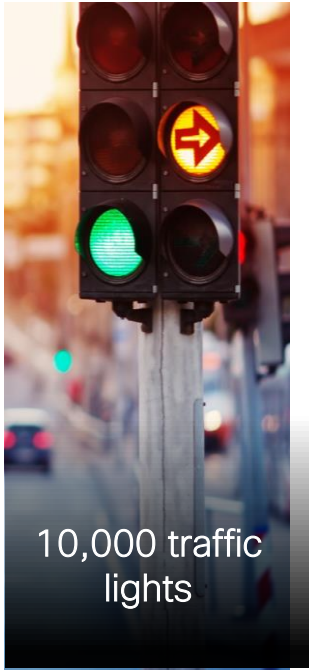
Extend IP infrastructure to substations and support utility applications with a multi-layer, end-to-end grid security architecture

## Result

Flexible platform for cross-company applications with improved security and visibility into substation operations with remote diagnostics

# Roadways and intersections






## Customer Profile

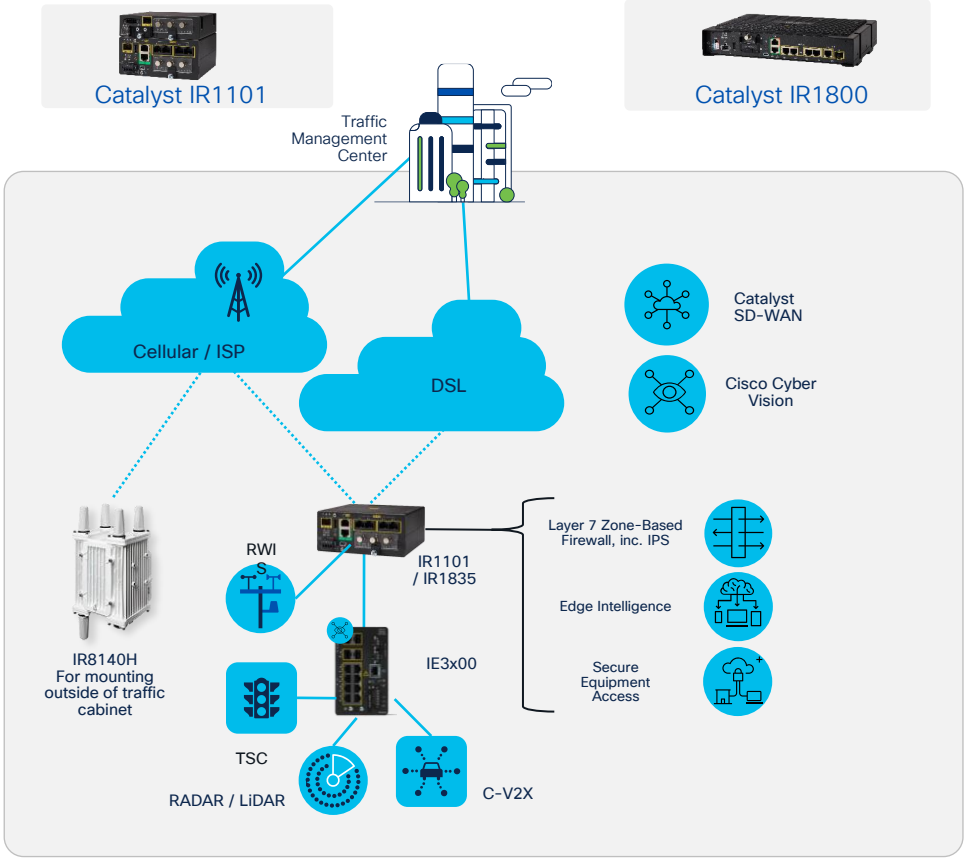
DoT's connecting thousands of traffic lights, video surveillance for improving congestion and public safety

Managing remotely located assets at scale

## Challenges

- Lack of visibility into traffic and congestion in real-time
- Unable to detect and observe accident conditions
- Unable to capture driving violations

# Roadways & intersections




## 3 Key Benefits

- Deploy for complex roadside uses. Supports legacy and multi-access technologies
- Ease of management with cloud and on-premise platforms
- Ruggedized for extreme conditions

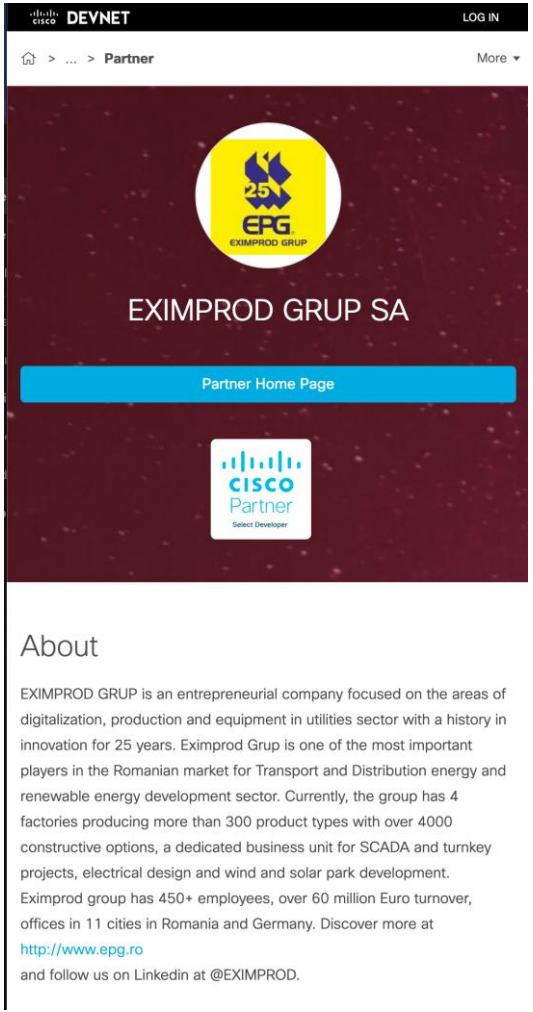
# Partner Example: Eximprod ESS200 vRTU on IOx

Eximprod ES200 is a software-defined Remote Terminal Unit (vRTU) solution, running on Cisco IOx that enables multiple use cases in Utility Markets, especially Energy Distribution.

Multi-protocol implementation IEC 61850, DNP3.0, Modbus, etc. it is vendor-agnostic allowing SCADA connectivity for any vendor to a central SCADA system using IEC 60870-5-104.

"Connected Utilities Virtual RTU Implementation Guide" CVD :
https://www.cisco.com/c/en/us/td/docs/solutions/Verticals/Utilities/FAN/Virtual-RTU/IG/CU-VRTU-IG/CU-VRTU-IG.html

Cisco DEVNET Site:
https://developer.cisco.com/ecosystem/cpp/partners/153291/



# Want more use cases?

**"Creative and Unusual Use Case Ideas for Industrial Networking Devices" (BRKIOT-2808)**

Wednesday Feb 12th 09:30 - 10:30

Thursday Feb 13th 12:00 - 13:00

# Key Takeaways

- The Industrial Routing Products can cover most of your needs
- Feature set including redundant cellular uplinks, and multiple transports
- All IOS-XE capabilities that you know and like
- Managed autonomously, or with SD-WAN, FND or Catalyst Center. Choice is yours!

# Webex App

## Questions?

Use the Webex app to chat with the speaker after the session

## How

1. Find this session in the Cisco Events mobile app
2. Click “Join the Discussion”
3. Install the Webex app or go directly to the Webex space
4. Enter messages/questions in the Webex space

## Webex spaces will be moderated by the speaker until February 28, 2025.

# Fill Out Your Session Surveys


Participants who fill out a minimum of 4 session surveys and the overall event survey will get a unique Cisco Live t-shirt.

(from 11:30 on Thursday, while supplies last)

All surveys can be taken in the Cisco Events mobile app or by logging in to the Session Catalog and clicking the ‘Participant Dashboard’

Content Catalog

# Continue your education

- Visit the Cisco Showcase for related demos
- Book your one-on-one Meet the Engineer meeting
- Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs
- Visit the On-Demand Library for more sessions at ciscolive.com/on-demand. Sessions from this event will be available from March 3.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Thank you
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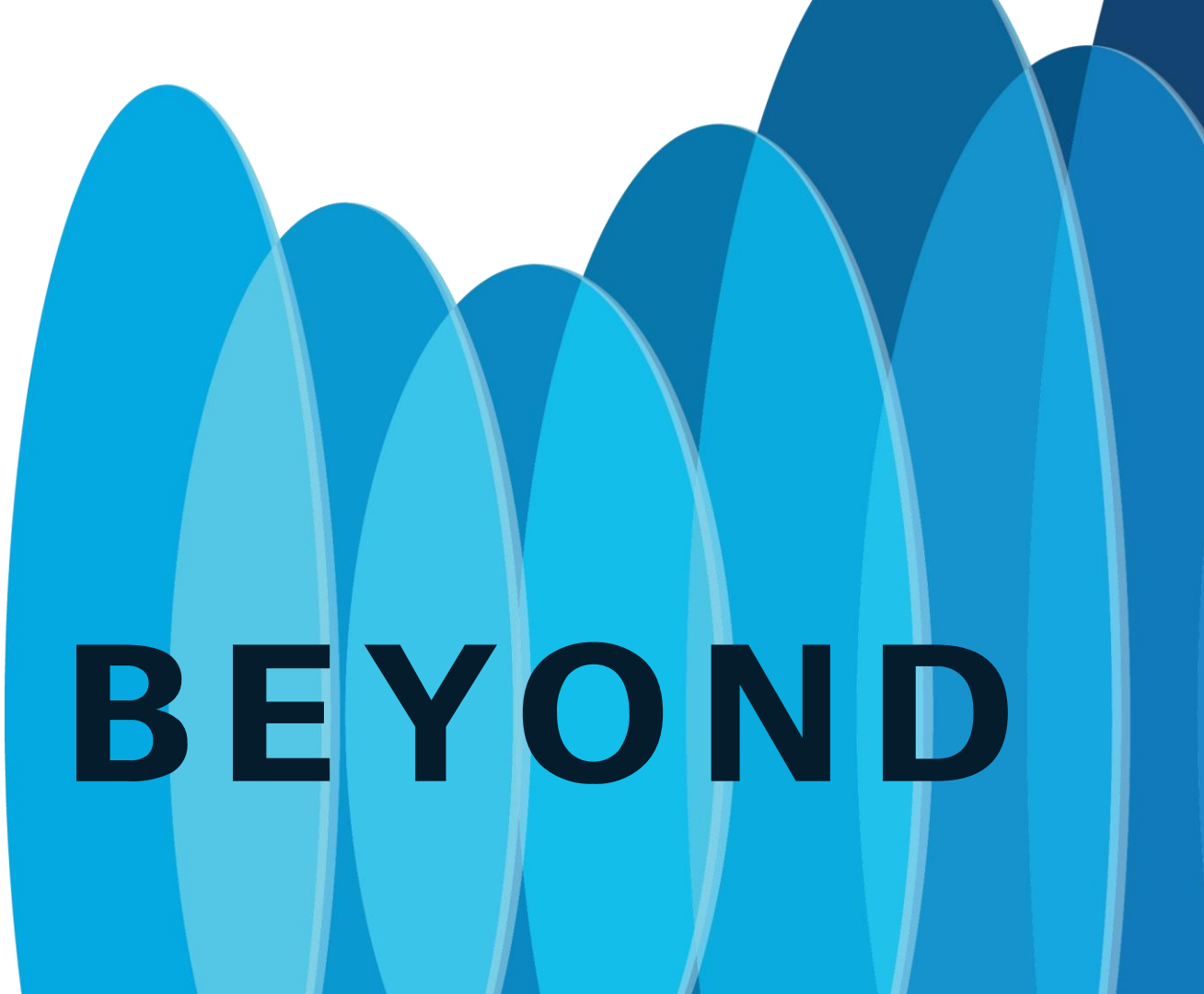

# GO BEYOND