
# Ruckus Wired Portfolio Presentation

August 2021

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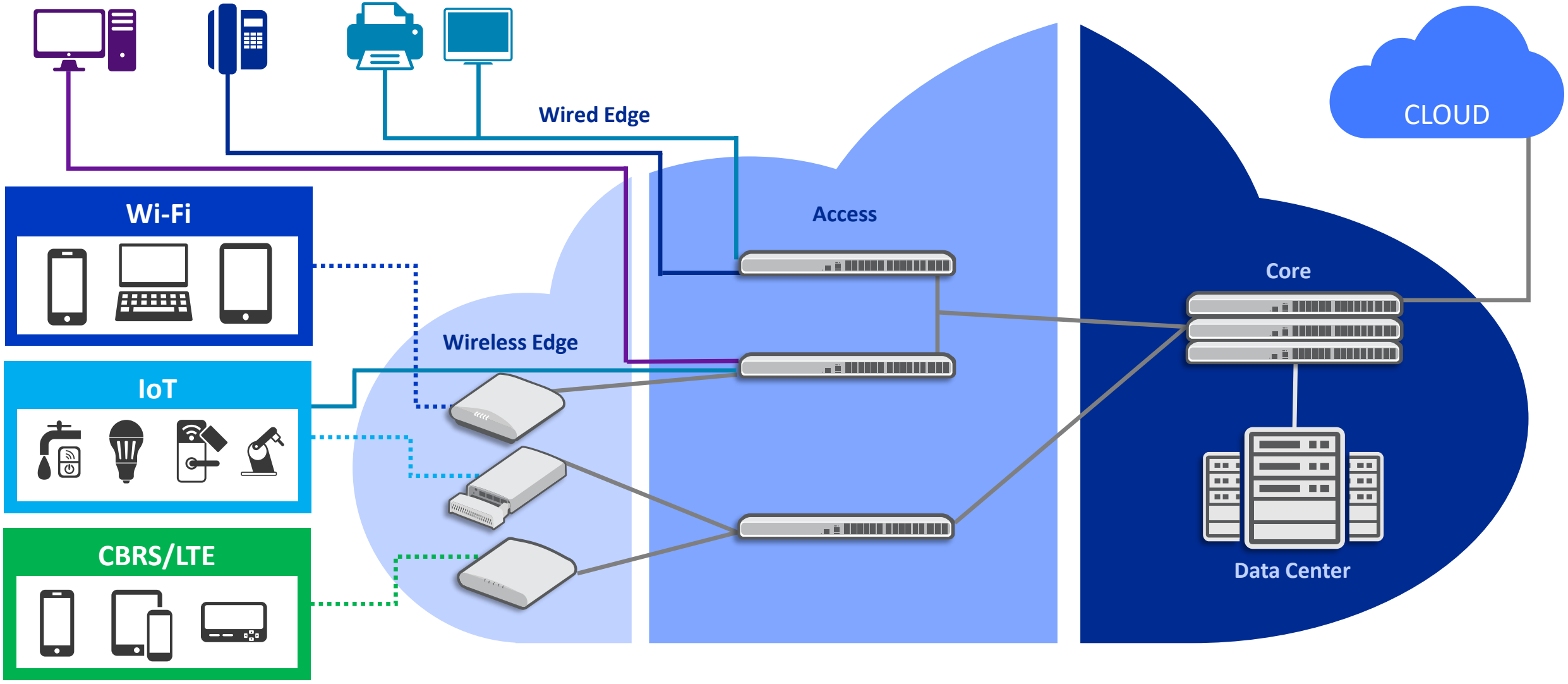
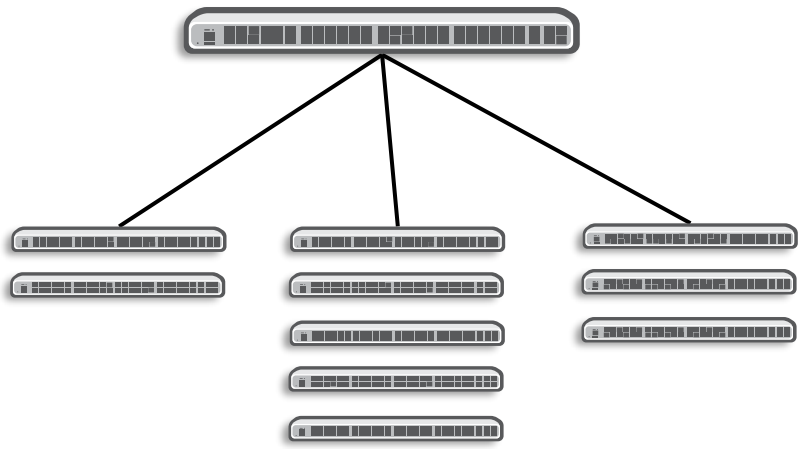
# Ruckus Networks Connects Users

## Network Edge Hardware Portfolio

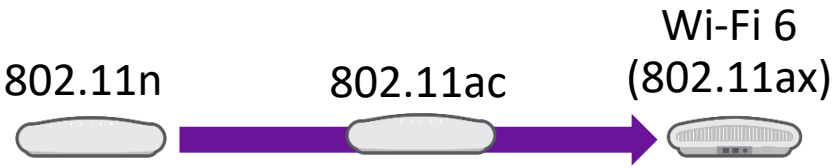
# Ruckus Networks Connects Users & Devices to the Cloud



# Multigigabit Driving Refresh Of Core/Aggregation



| | Existing Campus Infrastructure | Multigigabit Infrastructure |
|---|---|---|
| Core/ Aggregation | 10 GbE | → 25/40/100 GbE |
| Access | 1 GbE | → 2.5/5 GbE |

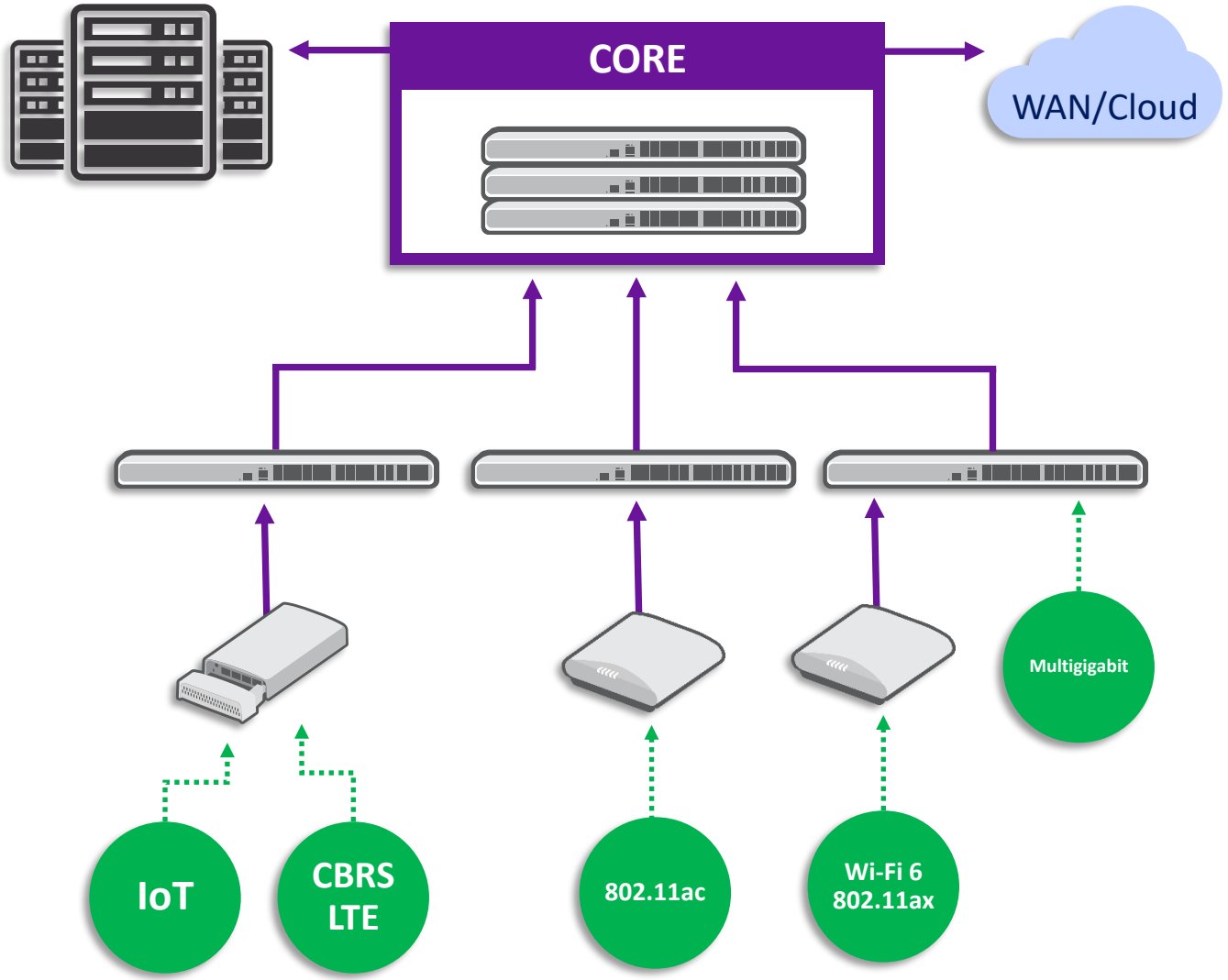


# Trends Driving Enterprise Network Traffic

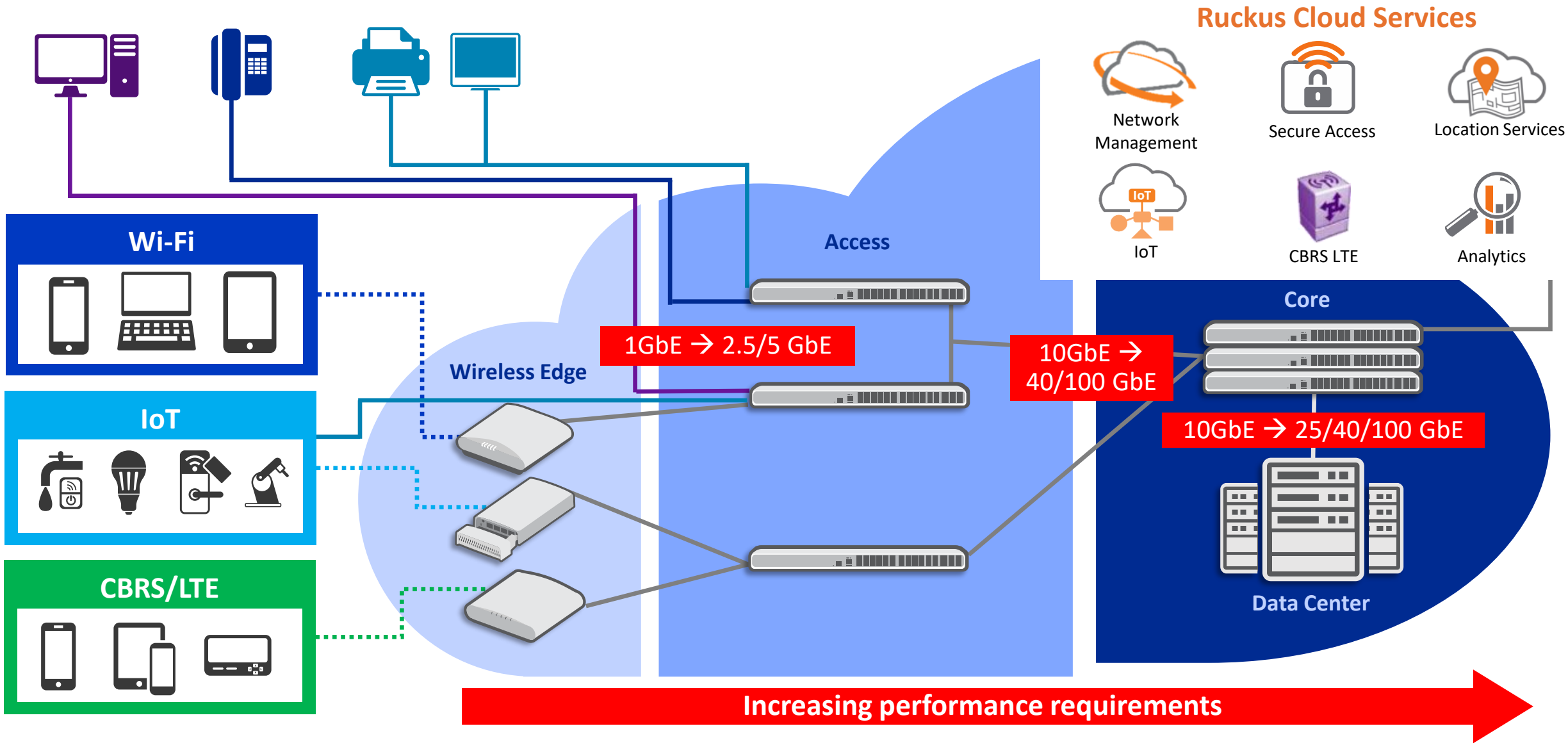
## The Campus Core Is Under Stress

- Rapid increases in Wi-Fi speeds
- CBRS (LTE+5G) backhaul traffic
- IoT devices / Smart Buildings
- 10x Increase in wired edge speeds (Multigigabit/802.3bz)
- Cloud applications and video streaming

## Driving dramatic increase in core traffic



# Ruckus Networks Connects Users & Devices to the Cloud



# Unified Network Management & Control

## A range of options addresses the requirements of organizations of all types and sizes

| Controller-less | Cloud-managed | Controller-managed |
|---|---|---|
|  |  |  |
| *Plug-and-play for smaller deployments* | *Cloud simplicity* | *Scale & flexibility* |
| Ruckus Unleashed | Ruckus Cloud | SmartZone Network Controllers |

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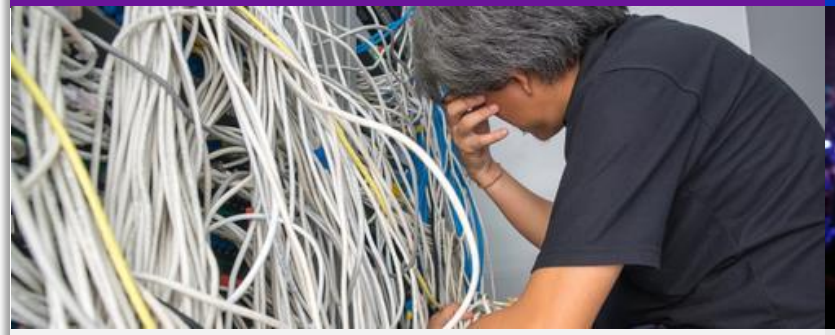
# Ruckus ICX Switches

## Why Ruckus Switches Stand Apart

# IT Challenges With Switching At Network Edge

## Network Complexity



- Increasing burden on IT staff
- More time troubleshooting
- Higher costs to deploy/maintain

## Ever-Growing Network Demand

- Inflexible architectures
- Fixed configurations
- Limited scale

## Integrated Wireless Infrastructure

- Sufficient power and performance
- Managing wired & wireless networks
- Inconsistent security policies

# Ruckus Switching Advantages

## Simpler Networking

- Reduced management touch-points
- Single OS across all switches
- Automated deployment (Zero-Touch)

## Optimized Wireless Underlay for Wi-Fi, LTE, IoT

- Enhanced performance and power
- Unified network management
- Unified security & policy mgt.

## Future-proof Solutions

- Scale-out network architectures
- Flexible deployments
- Upgradeable uplinks

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# Simpler Networking

# Fixed Switches Everywhere

**ICX 7150**
Entry-level Access

**ICX 7250**
Access

**ICX 7550**
Access-Aggregation

**ICX 7650**
Premium Access-Aggregation

**ICX 7750**
Aggregation-Core

**ICX 7850**
Aggregation-Core
Data Center

**SIMPLE**
**FLEXIBLE**
**SCALABLE**

- Purchase only what you need, when you need it
- Expand as needed
- Power and features of chassis
  - With flexibility, simplicity and lower cost of stackables

*"The emergence of high-density fixed form factor switches can reduce or eliminate the need for costlier, oversized chassis-based switches. The move toward FFF switches will help network managers deliver higher-performance networks and reduce footprint, power, cooling and TCO."*

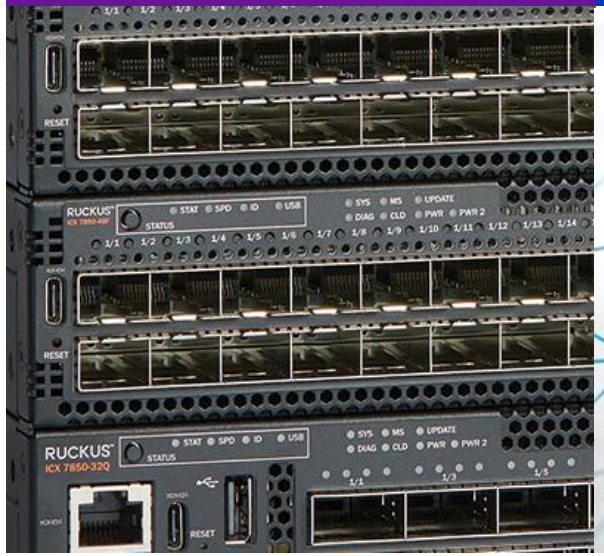
Andrew Lerner, Gartner

# Simpler Networking

- Reduced management touch-points
- Single OS across all switches
- Automated deployment (Zero-Touch)

**Ruckus Technologies That Simplify Networking**

| Advanced Stacking | Campus Fabric | Unified Management: SmartZone or Ruckus Cloud | Flexible Deployment |
|---|---|---|---|

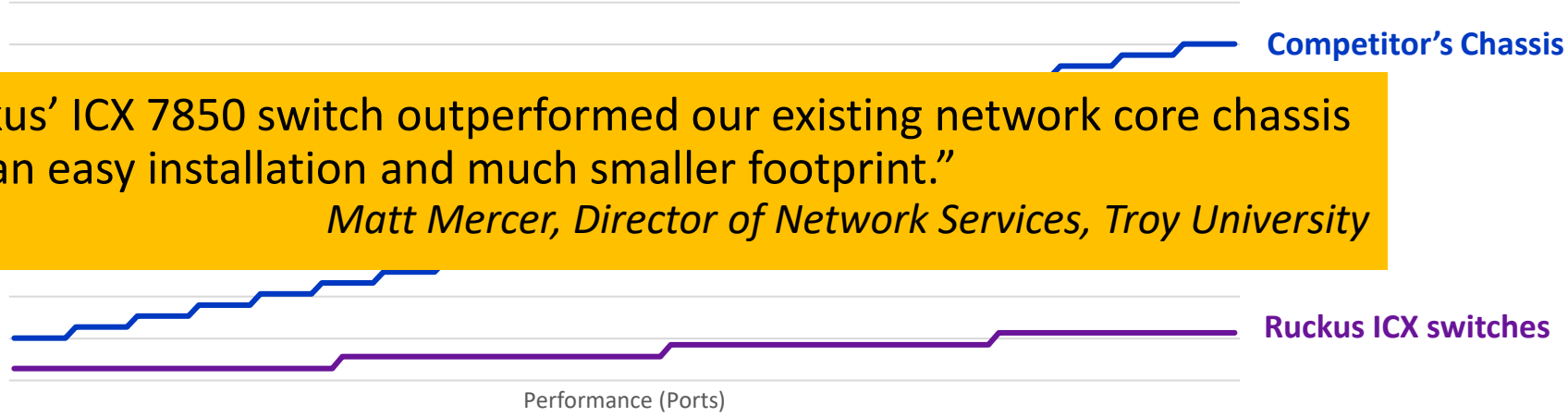




# Scale-up vs. Scale-out

Chassis scale-up

Ruckus scale-out: Pay-as-you-grow




"Ruckus' ICX 7850 switch outperformed our existing network core chassis with an easy installation and much smaller footprint."

*Matt Mercer, Director of Network Services, Troy University*

# Ruckus Distributed Chassis

## Benefits of a Chassis

- Single point of management
- High availability
  - Redundant controllers
  - Hitless software upgrades
  - Hot swappable modules
- Easy upgrades
- High scalability
- High performance

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## Plus the Flexibility of Fixed Form Factor

- Reduced up-front investment
- Buy only what you need
  - No fixed limitations
- Distributed configuration
  - Up to 10km
- Reduced power & cooling
- Flexible deployment: Stand-alone; ToR; Stack; Fabric

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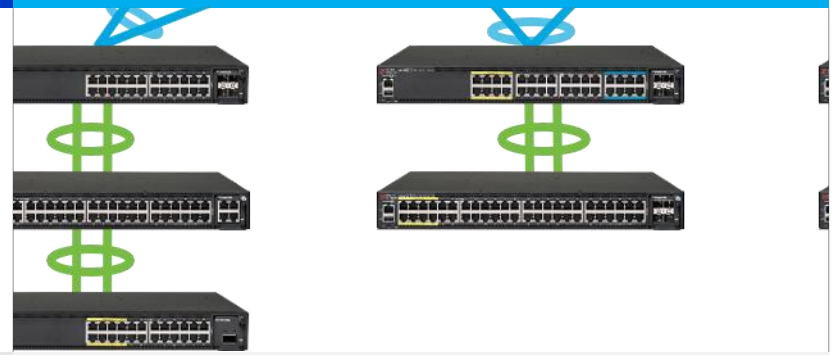
## And Much More…



- Scales to
  - Up to 12 switches per stack
  - UP to 40 switches per fabric
- Simplified management
  - STP-free Layer 2 design
- 75% lower TCO

# Ruckus Simplified Network Management


"Networks should be simple, but only Ruckus got the approach right."

Jim Turner, Network Manager, Chichester High School


"Campus Fabric solution brings a totally different approach. It has cut the time required to troubleshoot and resolve issues by **80%**"

Ilan Schwartz, CIO, The Getter Group


"Because of the ability to stack up to **12** switches in a single stack, as well as this long-distance stacking, we're able to manage each building as a single logical unit"

Dmitry Shevchuk, Network Administrator, Santa Fe College

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# Optimized Wireless Underlay

## Underlay for Wi-Fi, LTE, IoT

# Optimized Wireless Underlay For Wi-Fi/IoT/LTE

## Optimized performance and power

- Multi-Gigabit technology (1/2.5/5/10 GbE) options
- Upstream performance required for aggregation/core
- PoE power to 90W per port (802.3bt)

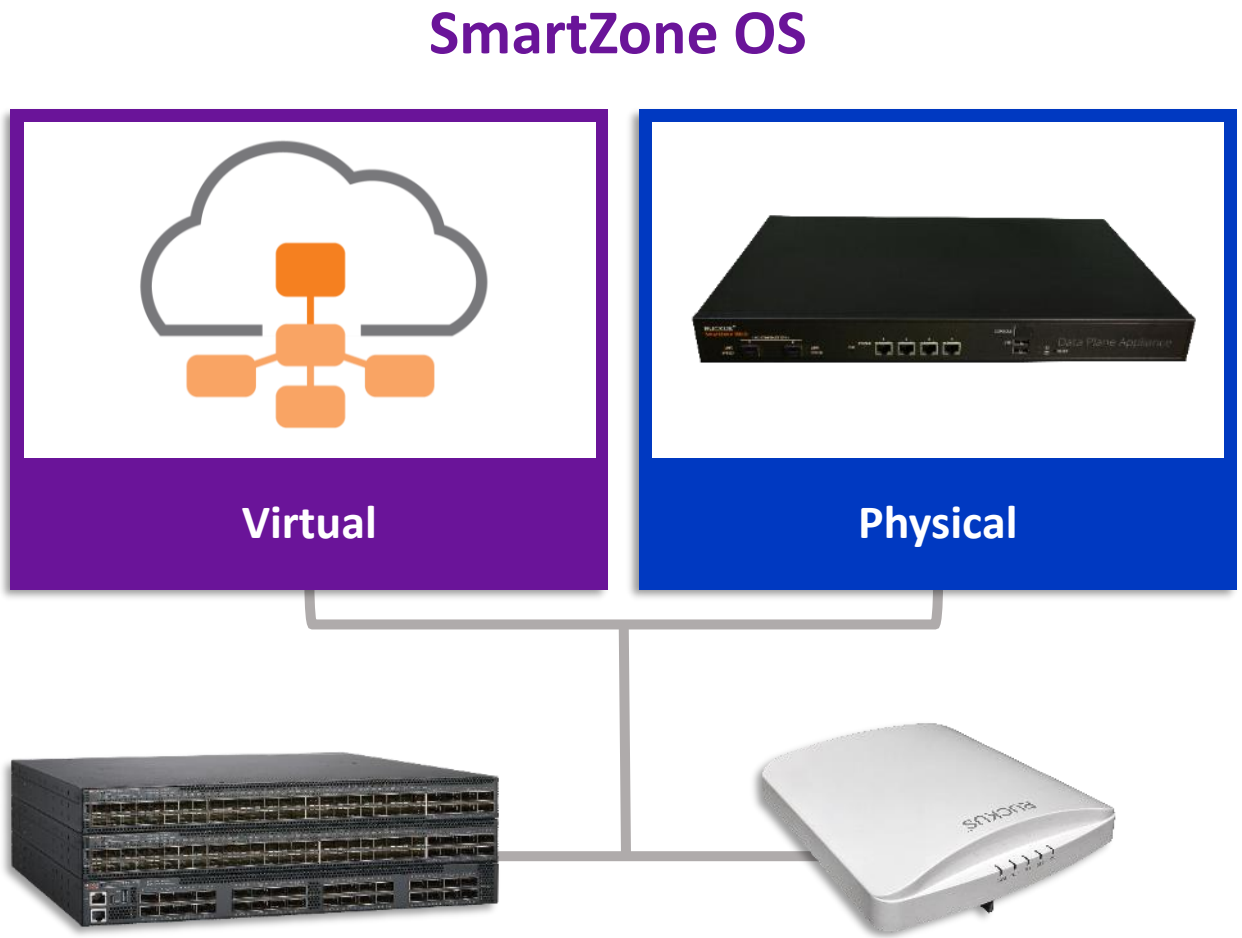
## Unified network management

- Wired/Wireless management in SmartZone

## Unified security & policy mgt.


- On-boarding and Security with Cloudpath

# SmartZone Network Controller




- SmartZone OS powers a family of **network controllers**
- **Unified:** Control and management of Ruckus APs and switches
- **Flexible:** Physical and Virtual Appliances deployment options
- **Scalable:** From midsize organizations to large service providers
- **Extensible:** Custom dashboards and management automation

# Good Wi-Fi Requires a Robust Wired Network


"We needed to invest in our wired network. Our wireless network was experiencing oversubscription; speed, connectivity, and latency issues; and packet loss."

Patrick Gittisriboongul, Huntington Beach UHSD


"The Ruckus wired and wireless networks really work together. It's incredible to see both networks through a single pane of glass,"

Chris Knowles, District of Mission

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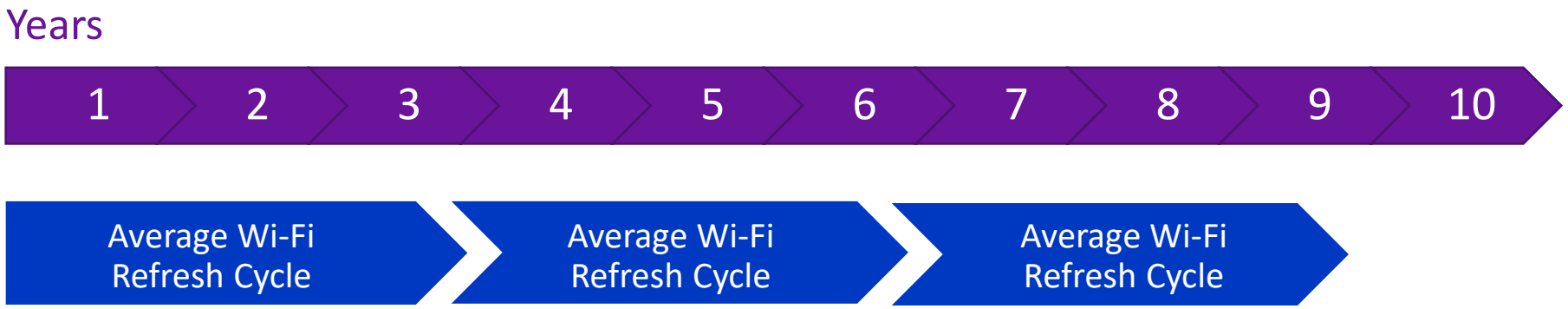
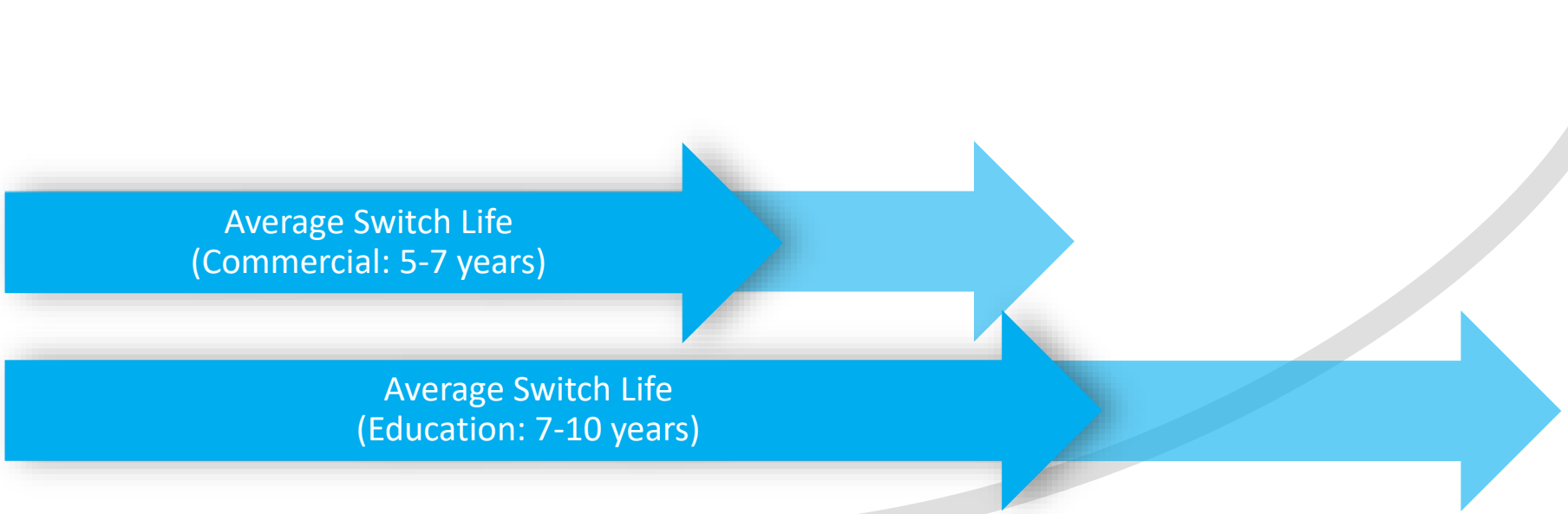
# Future Proof Solutions

# Infrastructure Life

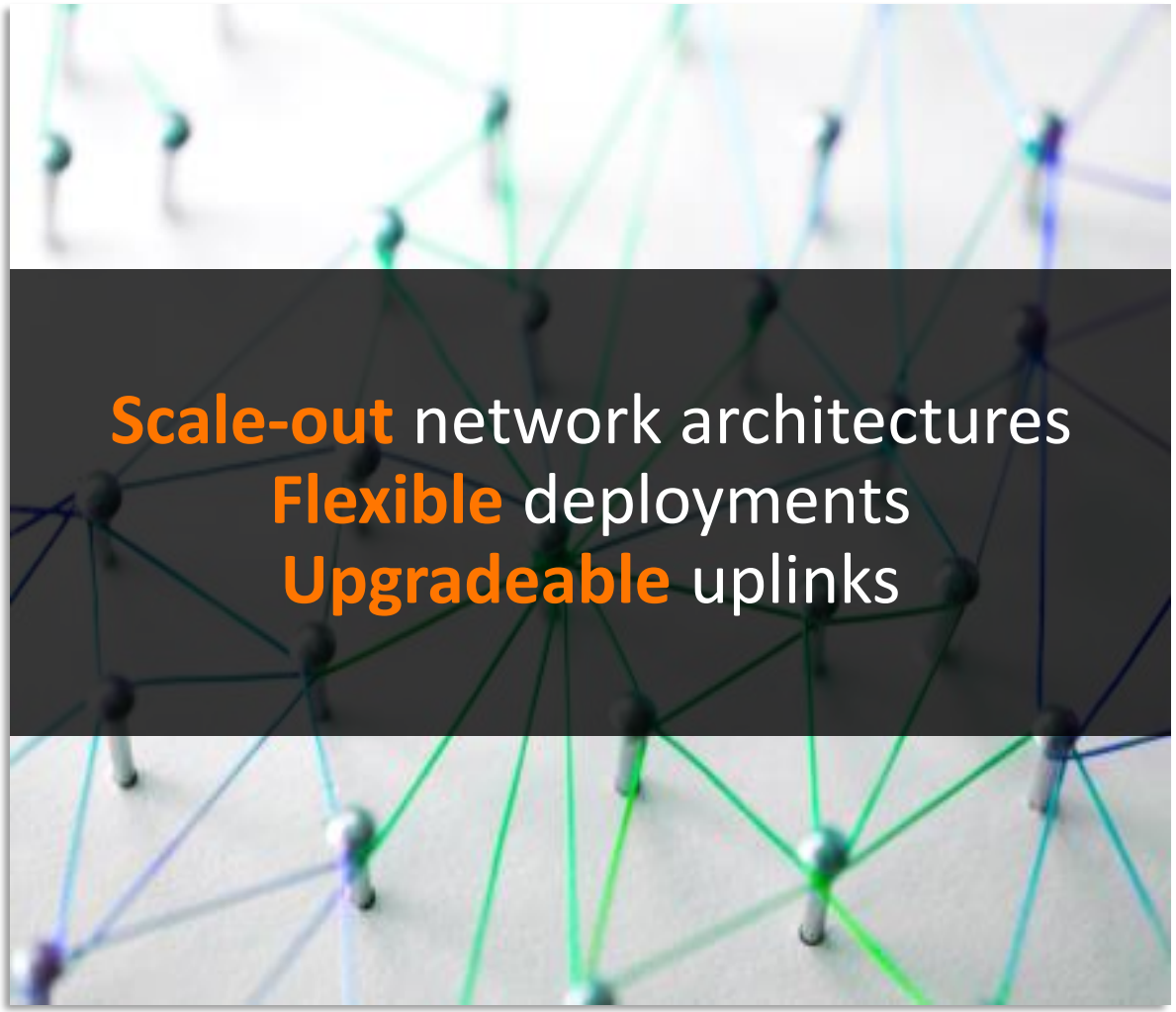



**Increasing Wi-Fi Demands:**

- Number of users
- Number of devices/user
- Faster devices
- Greater data usage



# Future Proof Solutions




# Ruckus Delivers Future Proof Solutions

"We've future-proofed ourselves with the technology, the switches, our reseller, and great support from Ruckus. We've got everything we wanted and more than we expected."

Silver Valley Unified School District

"We wanted a network that would support demands five years into the future."

Albertus Magnus College

"The scalability of the solution ensures that we are always ready to adapt to business growth."

Getter Group

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# REDEFINE CONNECTIVITY

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now meets next

# Unified Network Management & Control

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| Ruckus Unleashed | Ruckus Cloud | SmartZone Network Controllers |

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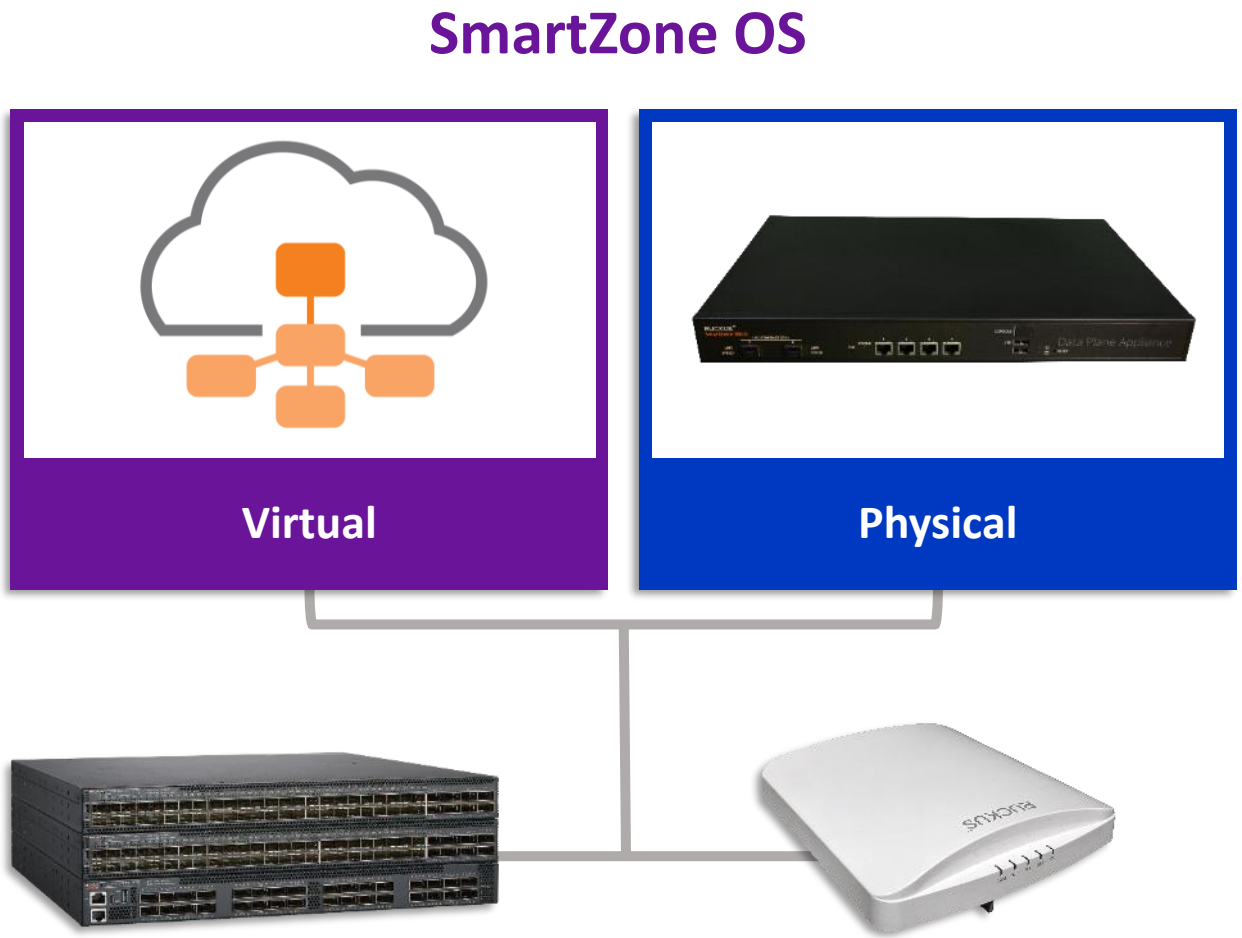
# Unified Management With SmartZone Network Controller

## more details

# SmartZoneOS Functional Overview

| Operation, Administration & Management | Security & Policy | Network Intelligence | Connectivity | Architecture |
|---|---|---|---|---|
|  |  |  |  |  |
| Manage complex LAN/WLAN networks and environments | Ensure network, data and device security | Gain insight into network health, performance and trends | Ensure great network performance for end users | Deployment model alternatives and flexibility |

# SmartZone Network Controller

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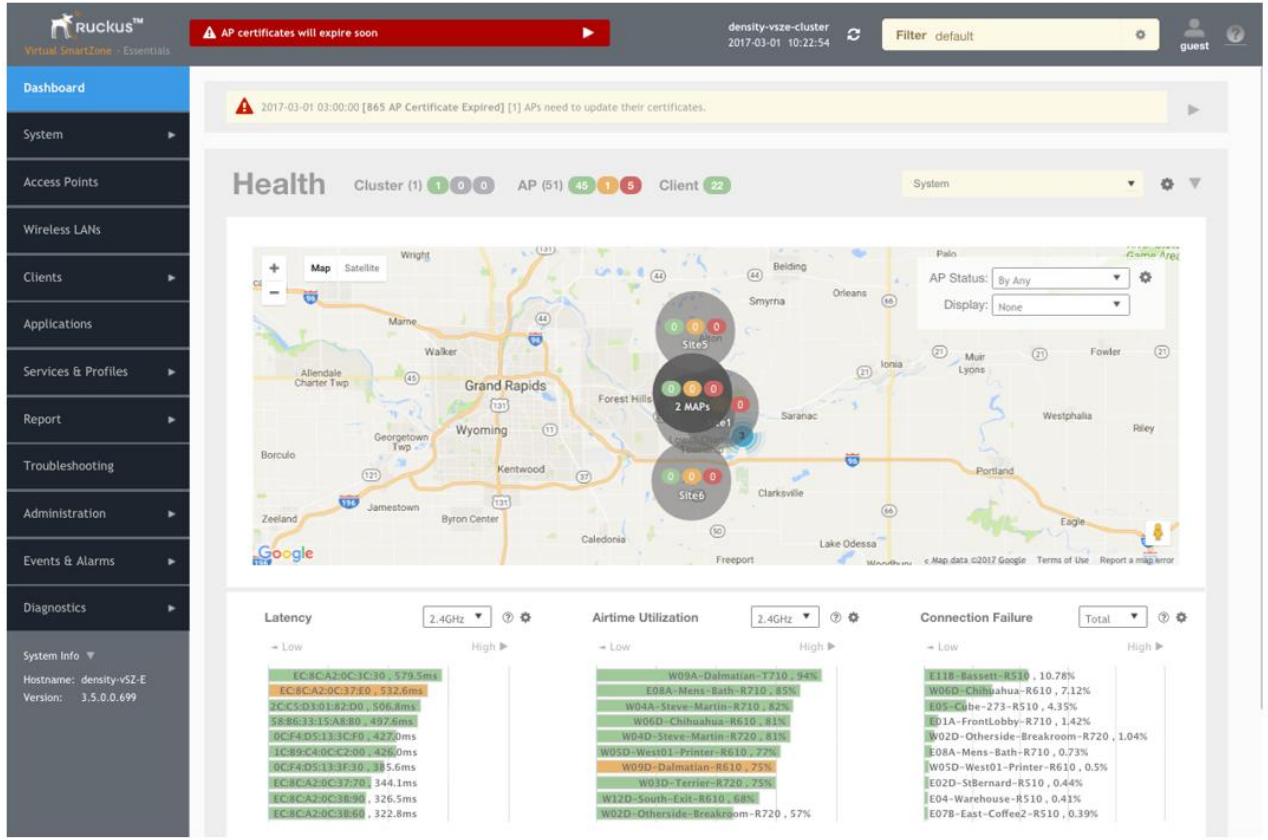
# Streamline Network Operations




Data-rich dashboard

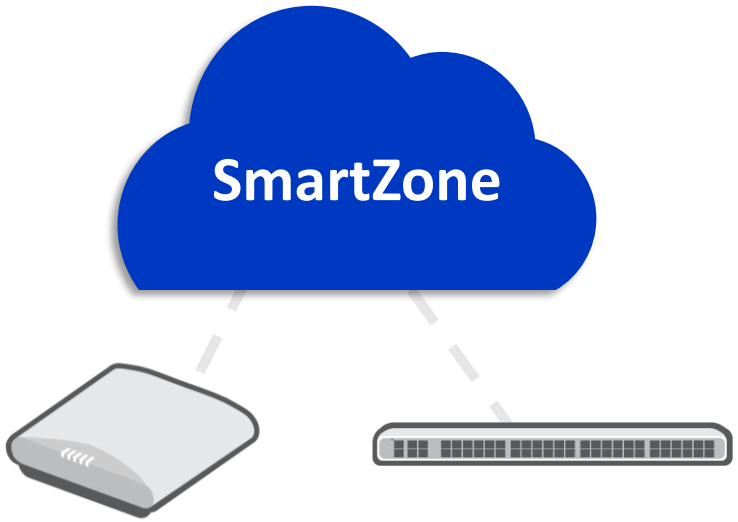
Google and indoor mapping

Health and traffic analytics

Visual troubleshooting

All-in-one

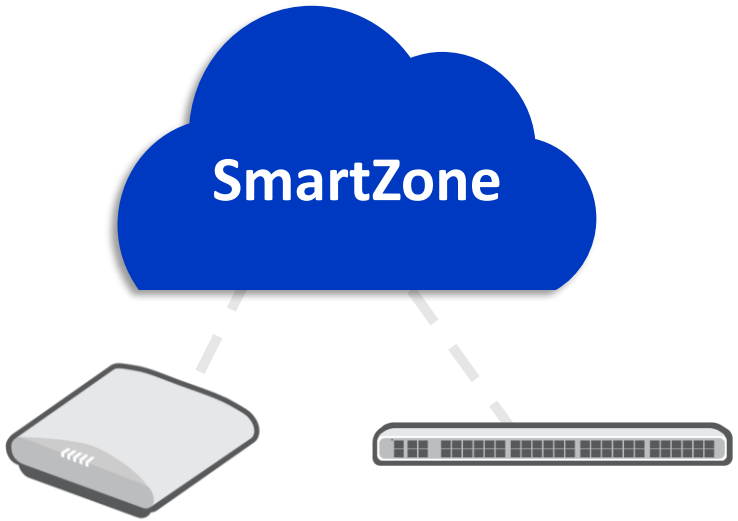
# SmartZone Network Controller

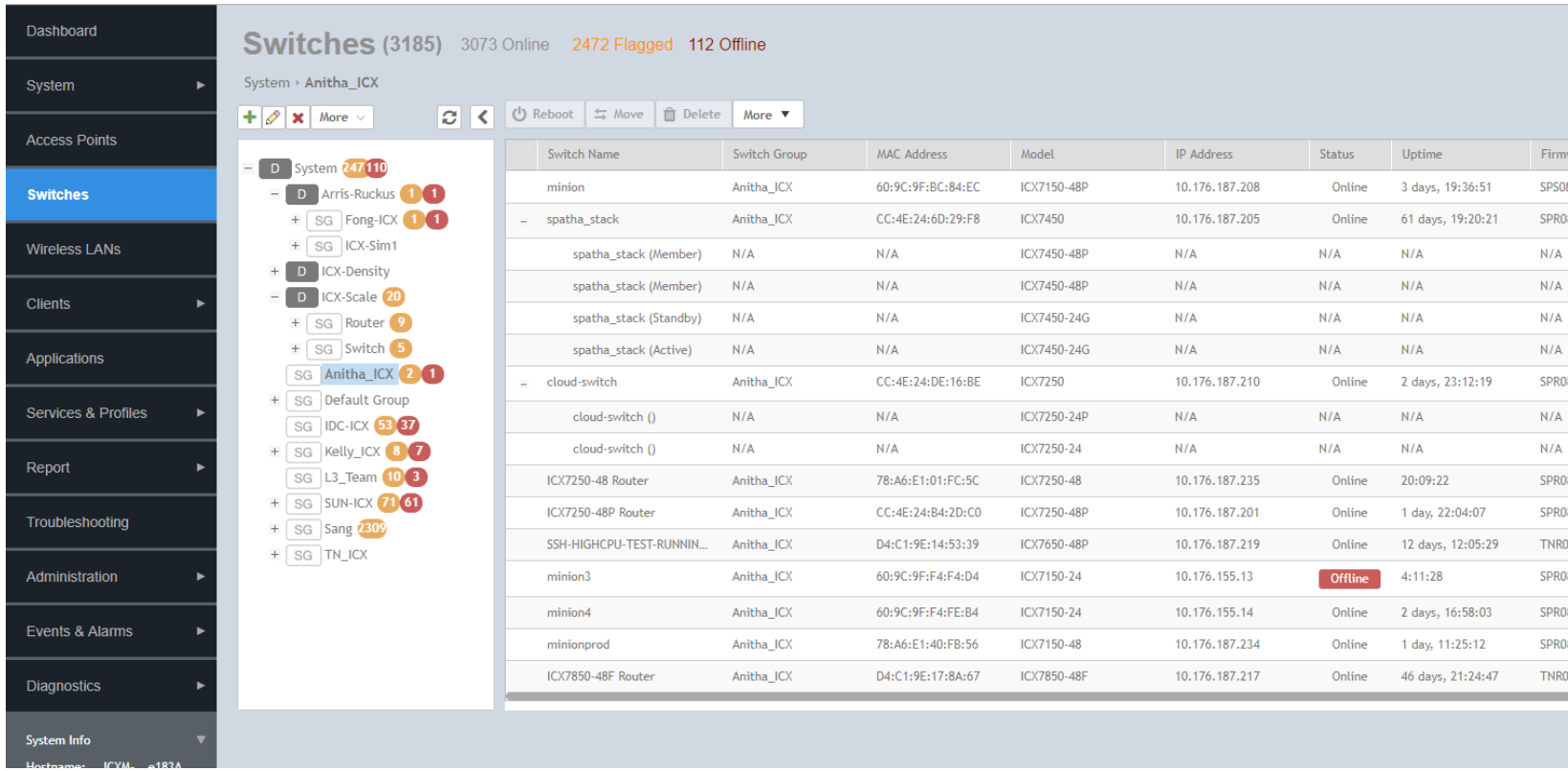



## Centralized management for Wired and Wireless

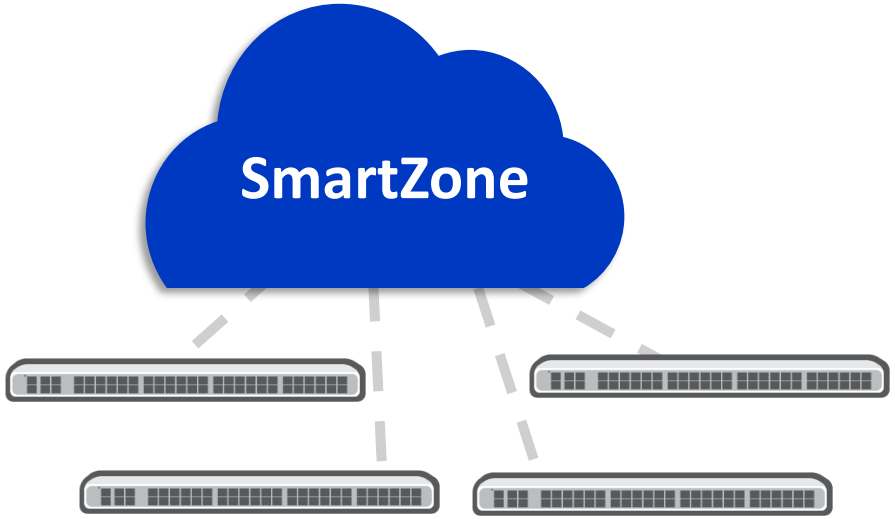
- Consistent user experience
- Supports ICX 7000 switches (no ICX 6000)
- Switch license independent of AP license
  - One license per switch
  - Stack - switch license required for every switch member
- Supported across all SZ models

# Single Console For Wired/Wireless Management

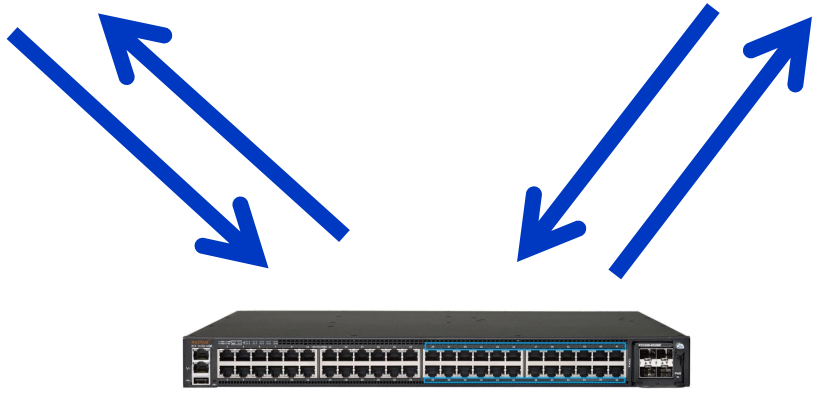


# Automated Deployment – Behind The Scenes

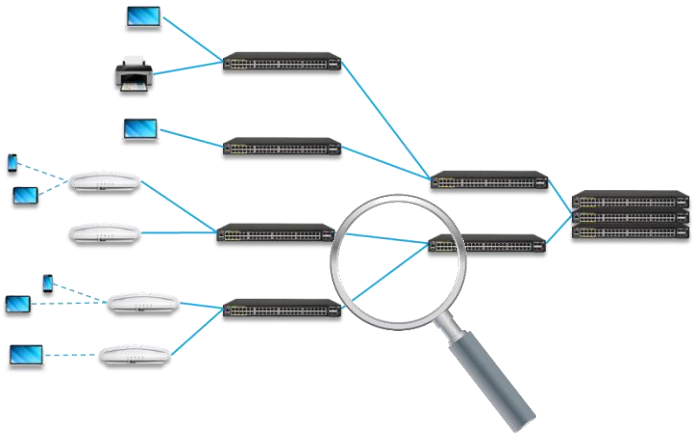


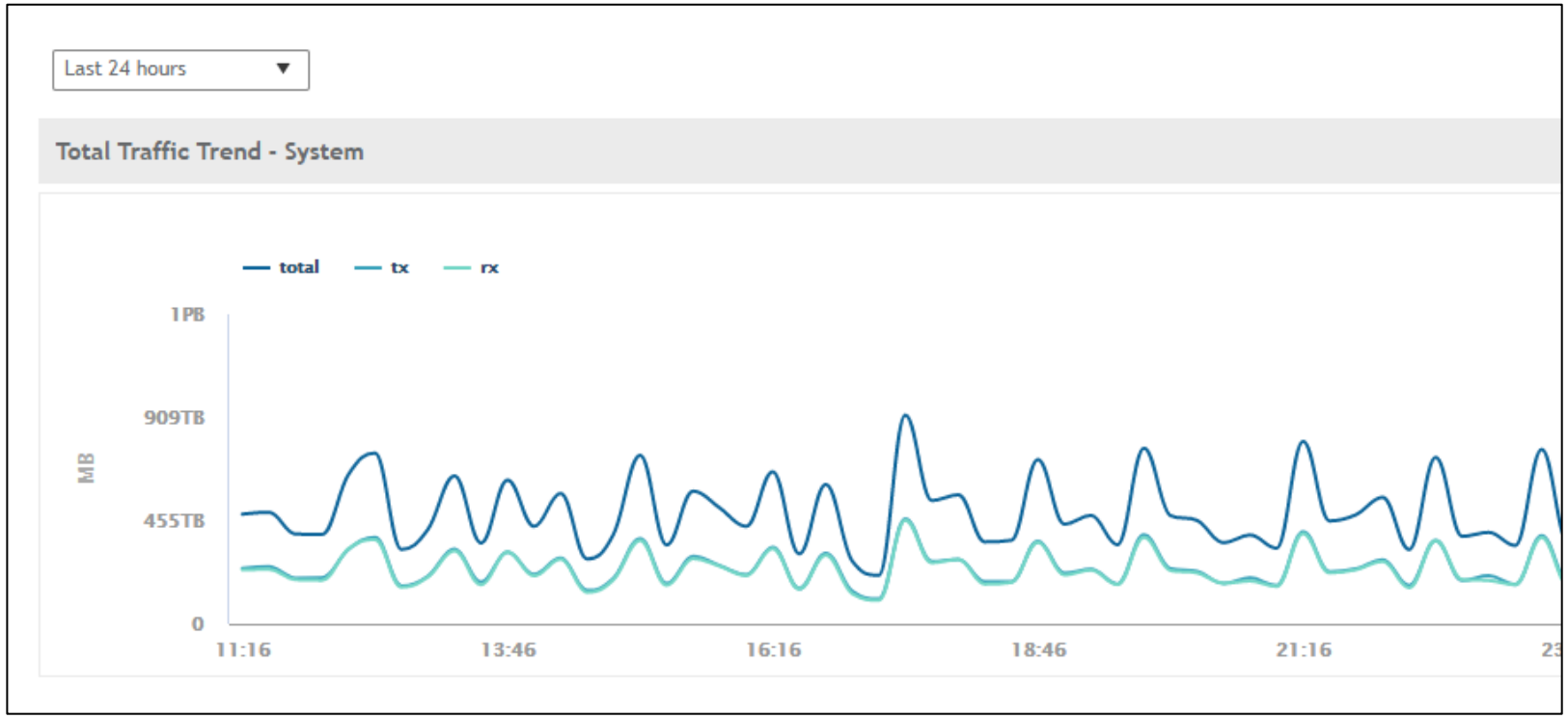


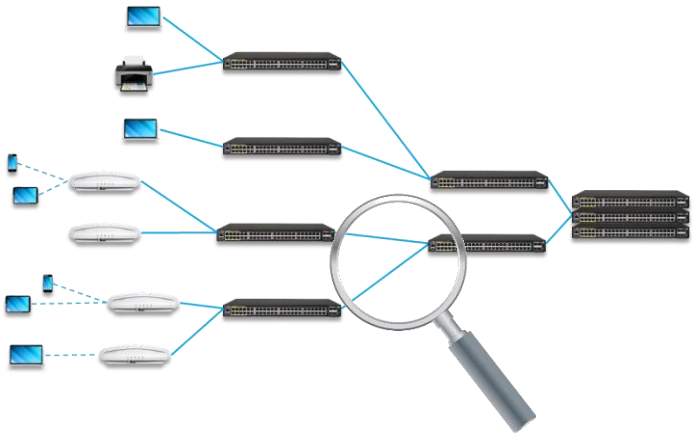
*Must have FastIron 8.0.90a or later*

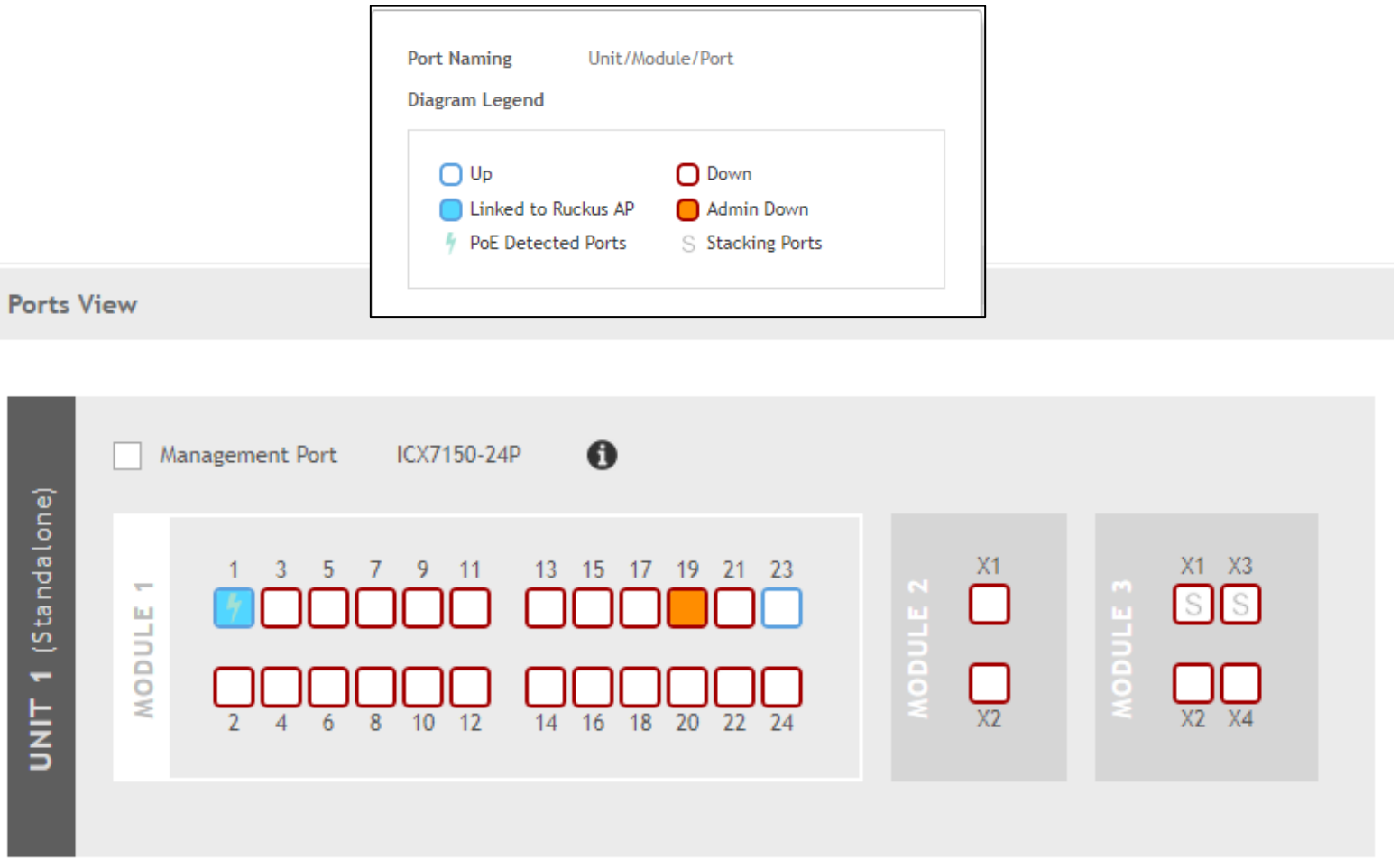
# Monitoring Network Status



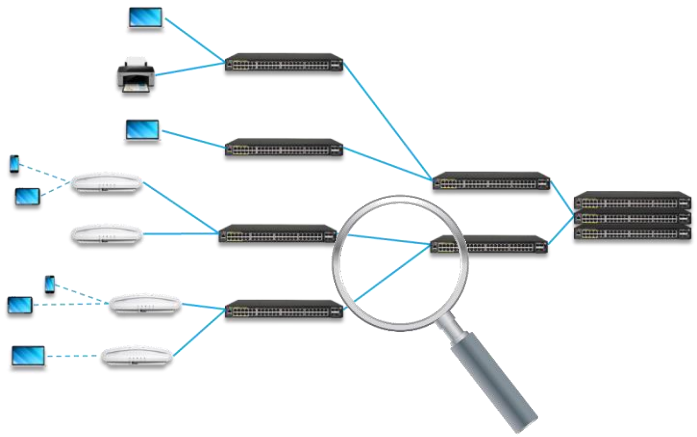


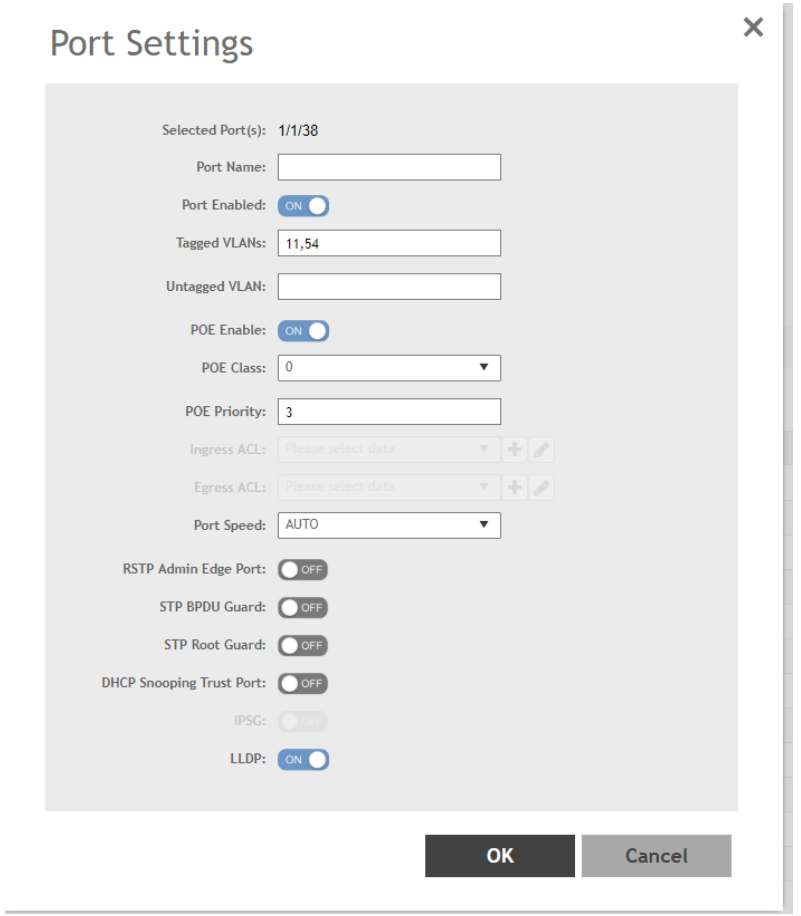
# Monitoring Switch Status



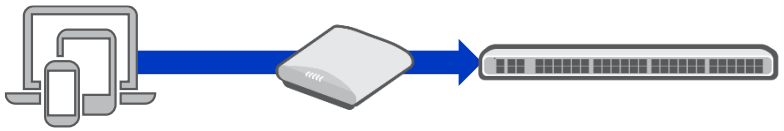


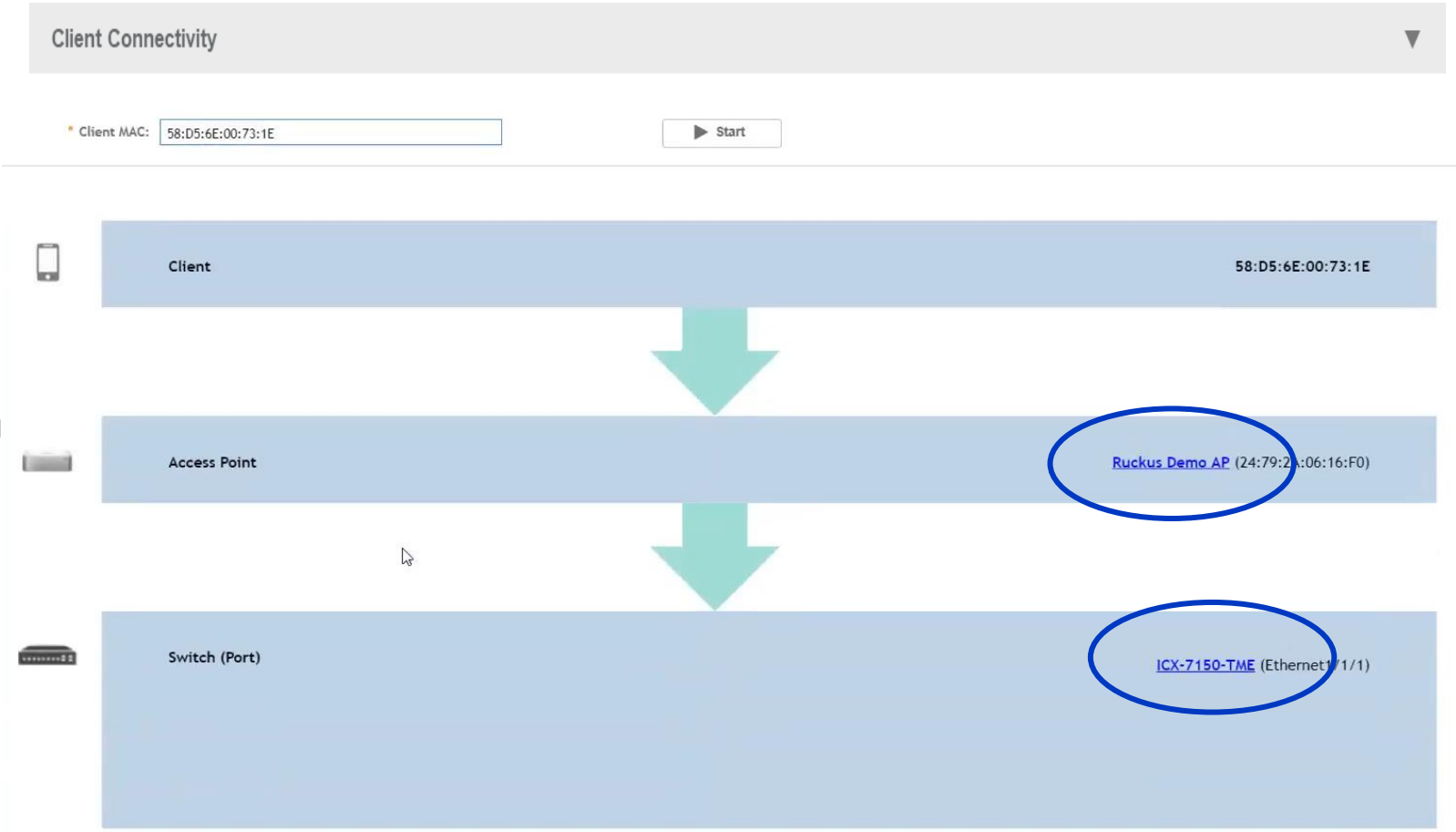
# Maintenance



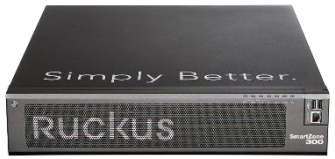


# Troubleshooting

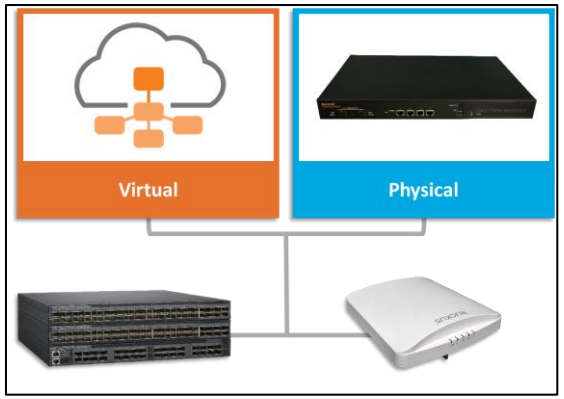
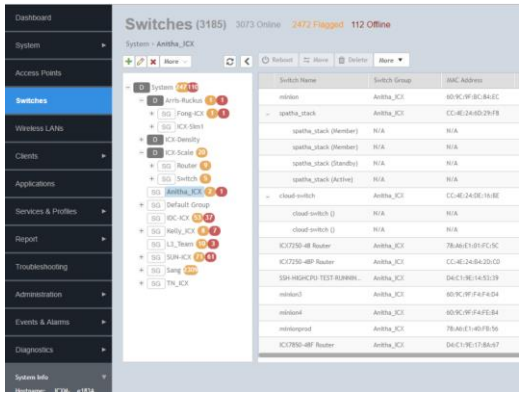
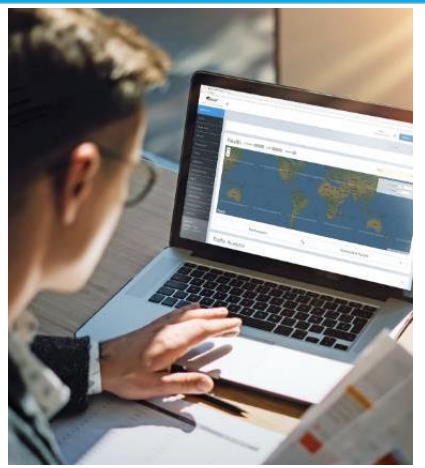




# SmartZone Network Controller Family

| | Appliances | Virtual Appliances |
|---|---|---|
| **Medium Enterprise & Distributed Campus** | **SmartZone 100 (SZ100)**   ***60,000 clients*** *per cluster* *3,000 APs* *600 switches* | **Virtual SmartZone - Essentials (vSZ-E)**  ***60,000 clients*** *per cluster* *3,000 APs* *600 switches* |
| **Operators, ISPs, MSPs, Large Enterprise & Large Campus** | **SmartZone 300 (SZ300)**   ***450,000 clients*** *per cluster* *30,000 APs* *6,000 switches* | **Virtual SmartZone - High Scale (vSZ-H)**  ***450,000 clients*** *per cluster* *30,000 APs* *6,000 switches* |

# SmartZoneOS Differentiators

| Single Element | Consistent Experience | Carrier Grade | Open API |
|---|---|---|---|
|  |  |  |  |
| • Unified Wired & Wireless management<br>• Single pane-of-glass | • Consistent interface for APs and Switches<br>• Discovery, Registration, Zero-Touch Deployment<br>• Management across NAT boundaries | • Scale<br>• Multi-tenancy<br>• High-Availability Clustering | • Customized dashboards<br>• Integration with 3rd-party applications<br>• Automated management |

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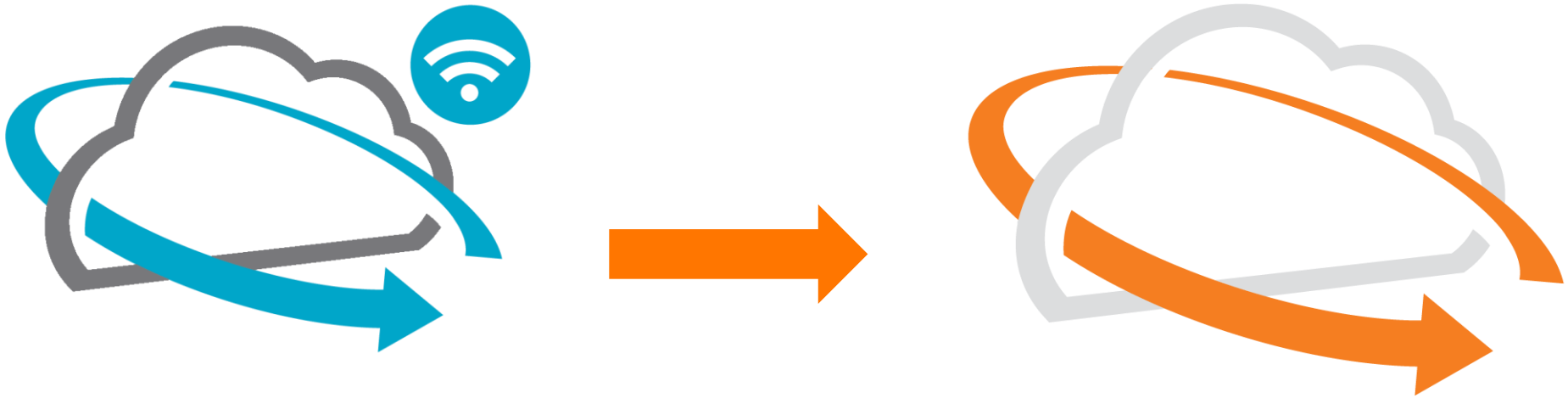
# Unified Management With Ruckus Cloud

# It’s Not Ruckus Cloud Wi-Fi Anymore!



**Ruckus Cloud Wi-Fi** **Ruckus Cloud**

# Ruckus Cloud Delivers…

Simplified management
of your multi-site network

**Subscription includes:**

Management License
- One per AP or Switch

Reporting & Analytics

VAR Dashboard

Native Mobile App

Feature and Security Updates

24x7 Technical Support

**Supports a Wide Range of indoor/outdoor Wi-Fi 6(802.11ax), 802.11ac APs and Switches**

**Full List of Ruckus Cloud supported APs:** www.ruckuswireless.com/cloud-devices

# The IT world is divided into…

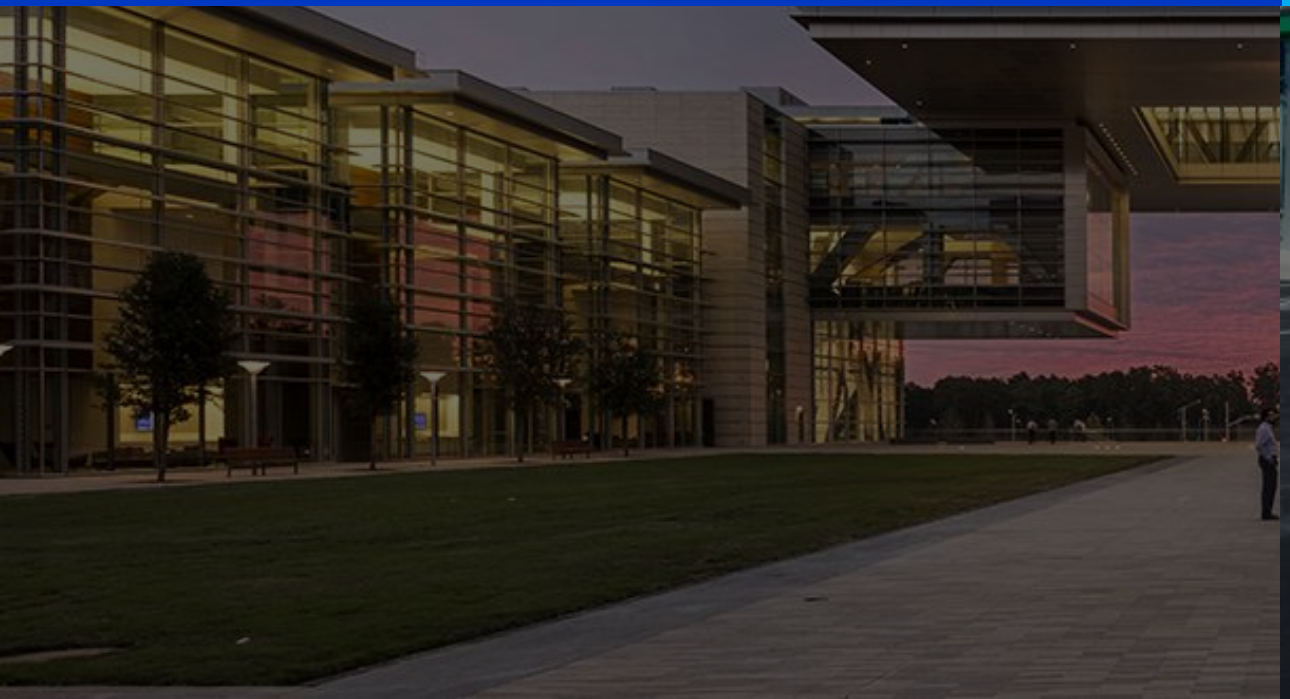
## Large, Specialized IT Organization

**IT staff dedicated solely to managing the network**

## Lean IT Organization

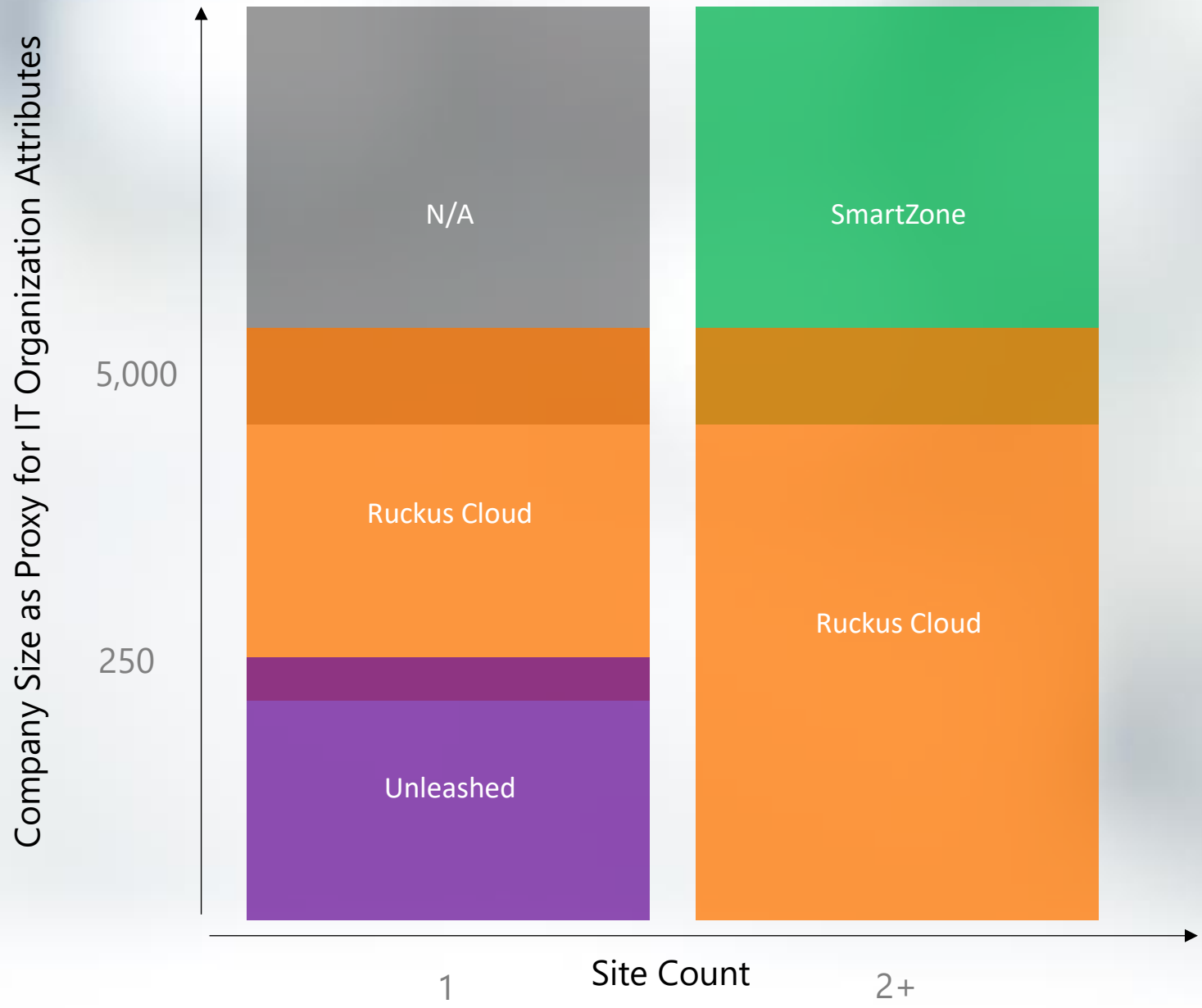
**Few staff with none 100% dedicated to the network**

## Wants: Control



## Wants: Simplicity

# Lead with these architectures



# Cloud-Managed Switch Features at GA

Switch monitoring

Zero-Touch Provisioning and Configuration*

Stacking

Client visibility

Troubleshooting

Mobile App

** Cloud deployment will over-write any existing configuration on the switch*

# ICX Switches With Cloud Management Support

**Aggregation/Core**

**Access**

**ICX 7150***

**ICX 7550**

**ICX 7650**

**ICX 7850**

**Requires ICX FastIron 8.0.90d or later**

** ICX 7150-C08PT to be supported in a future release*

# Switch Management Options

| | SmartZone | Cloud |
|---|---|---|
| Recommended deployment | • Greenfield or Brownfield<br>• Large/Specialized IT – Greater controls | • Greenfield<br>• Lean IT – Simplified IT |
| ICX Platforms | All ICX 7000s | ICX 7150/7550/7650/7850 |
| Deployment options | • On-premise<br>• Private or Public Cloud<br>• Managed by Customer or MSP | • Ruckus Cloud<br>  • Hosted/managed by Ruckus<br>  • VAR management option |
| CLI based config | Allowed | Not Allowed |
| • Monitoring (PoE usage; Traffic stats)<br>• Remote Ping/ Trace Route<br>• Client MAC search wired/wireless<br>• Client visibility | Yes | Yes |
| Zero-Touch Provisioning: Switch on-boarding | Factory default or ICX with config | Factory default |
| • Topology<br>• Custom Alarms<br>• API | Yes* | <Roadmap> |
| Mobile app | No | Yes |

** Topology available in SmartZone 5.2, Q4 2019*

Search...
Dashboard
Venues
Networking Devices
Networks
Switch Configuration
Users
Events
Analytics
Administration

**Alarms**

No Active Alarms

**Venues**

1

**Networking Devices**

Wi-fi 1

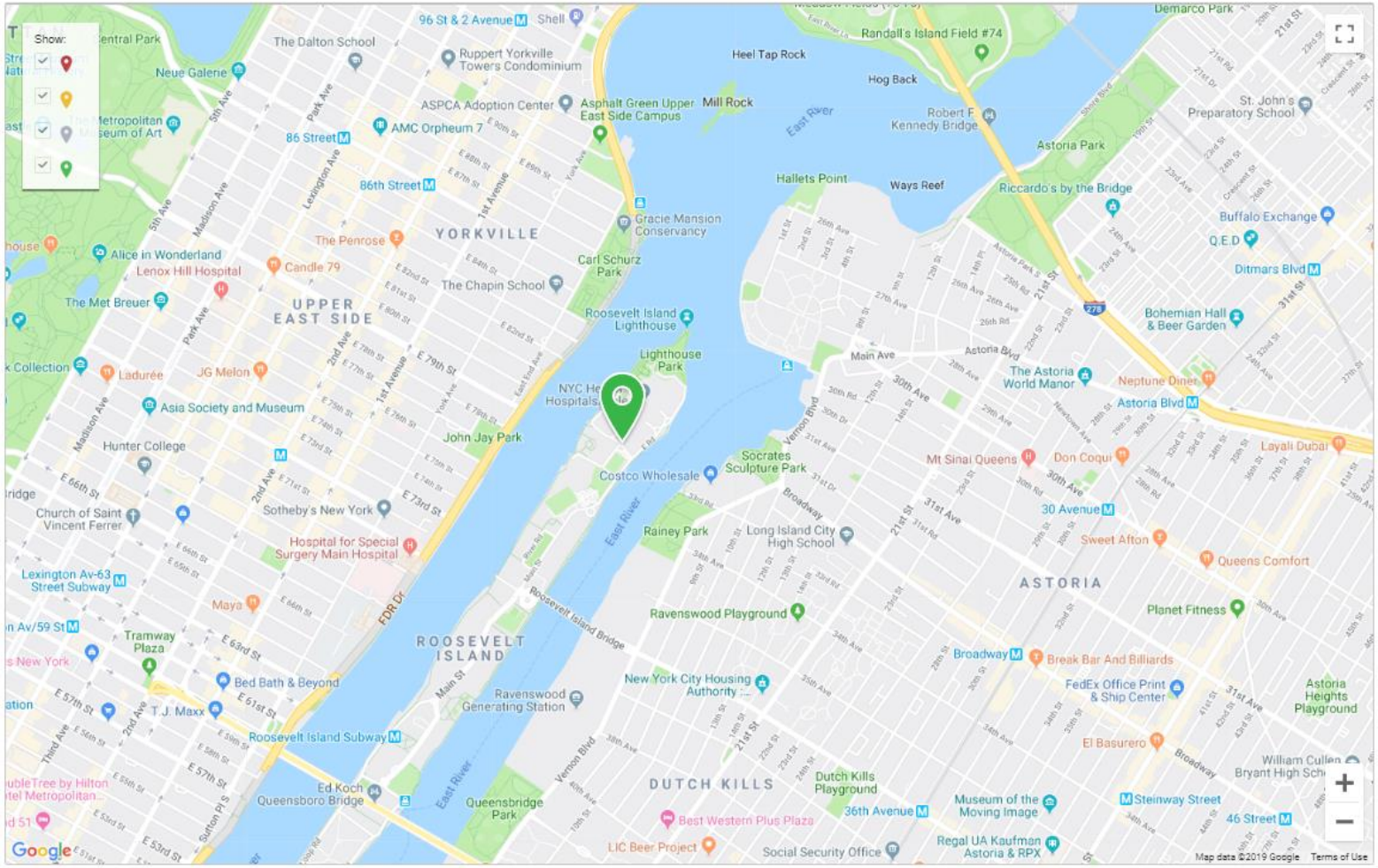
Switch 6

**Clients**

Wi-fi 0

Switch 2

Add Venue
Add Net. Device
Add Network




24 hours | 7 days | 30 days | WiFi

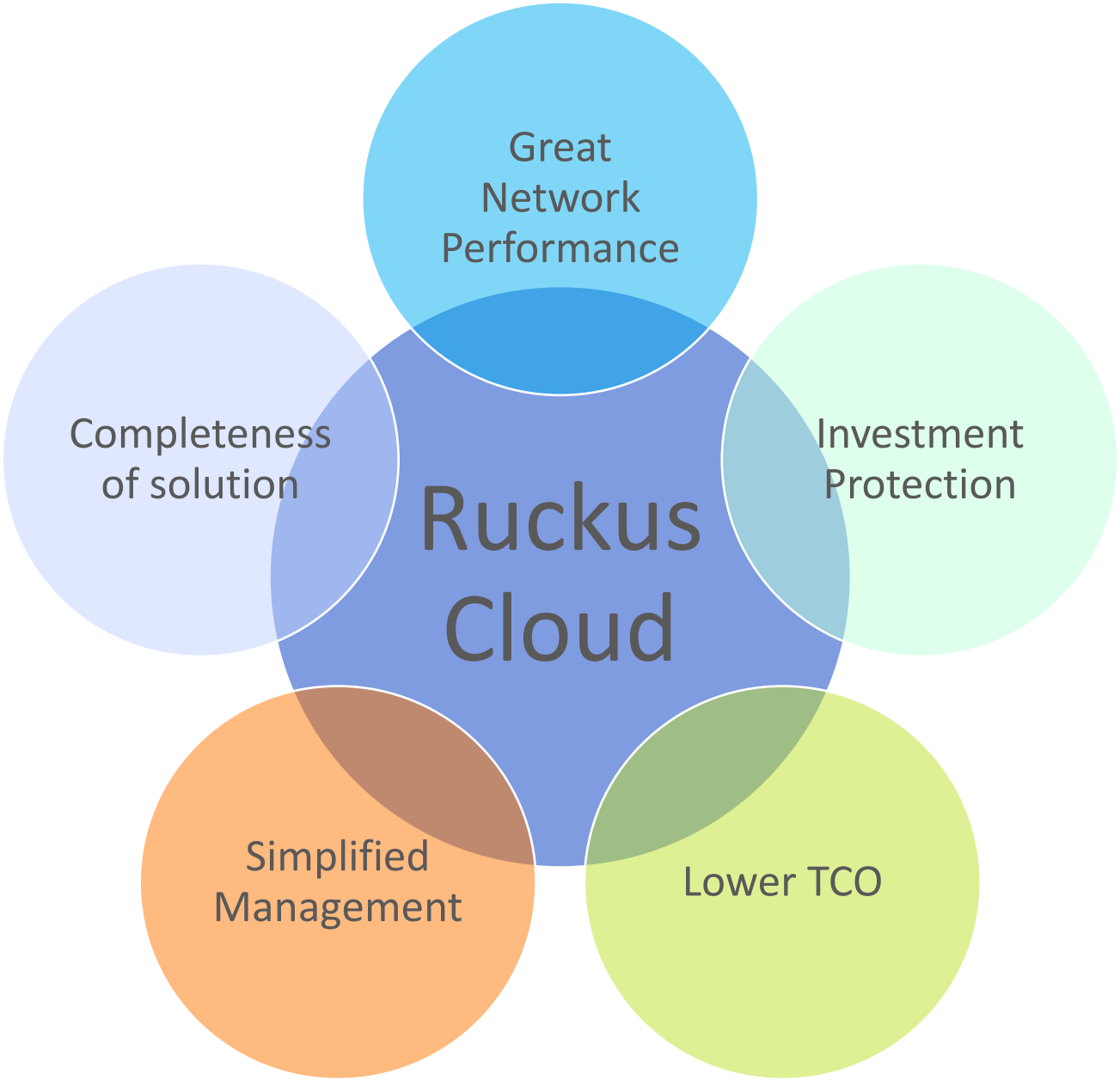
Traffic by usage

No data to display

Clients Count

No data to display

# Why Ruckus Cloud Management for Wired + Wireless?




**No other cloud-managed network solution offers all five benefits in one single solution**

# Ruckus Cloud Licensing

| | 1-Year | 3-Year | 5-Year | 5-Year e-Rate (EDU only) |
|---|---|---|---|---|
| AP | $95 | $190 | $285 | $190 |
| | | | | |
| SWITCH LICENSES | | | | |
| ICX 7150 8-Port Compact (ICX7150-C08P only) | $50 | $100 | $150 | $100 |
| ICX 7150 all other models | $125 | $250 | $375 | $250 |
| ICX 7650 | $450 | $900 | $1350 | $900 |
| ICX 7850 | $960 | $1920 | $2880 | $1920 |

Cloud licenses for switches includes Remote TAC support (RMT)

- No need to purchase switch support
- No need for RMT3 bundles

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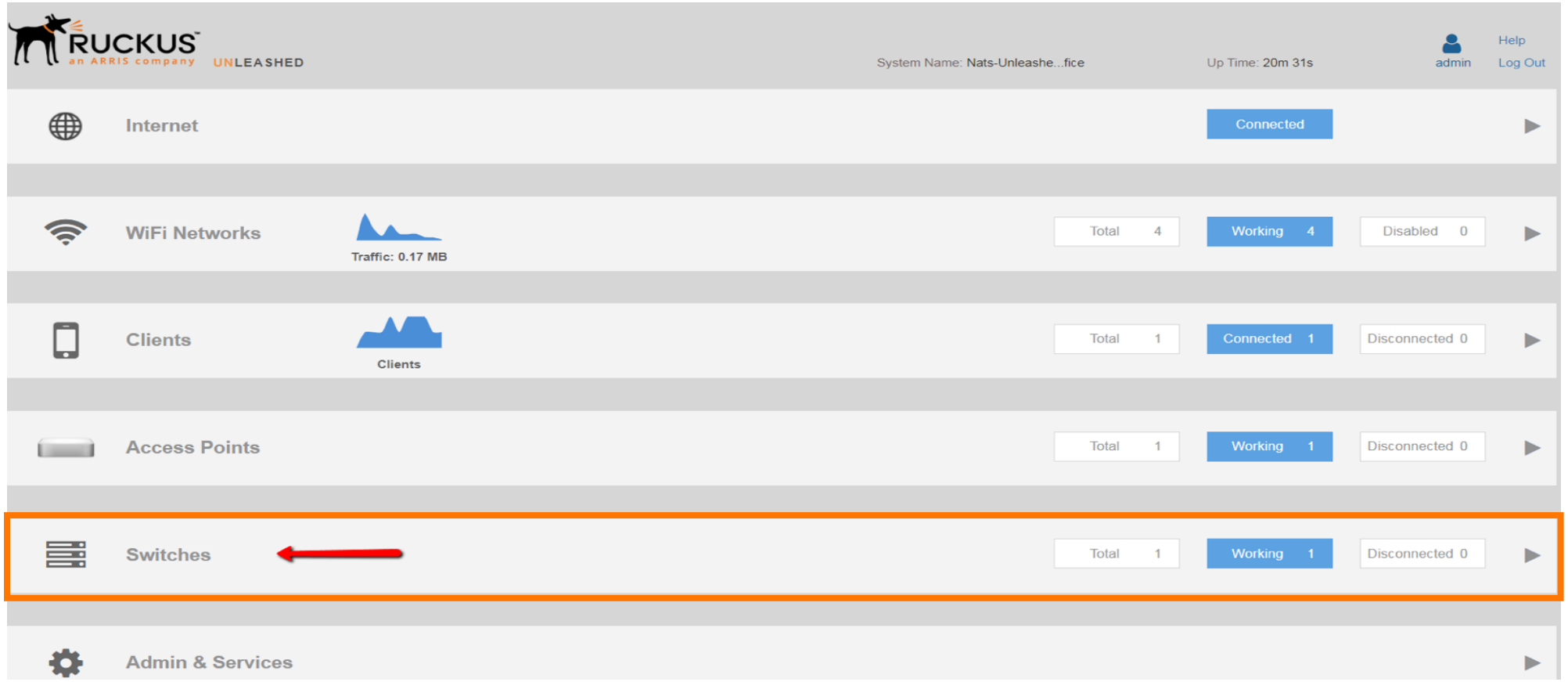
# Unified Management With Ruckus Unleashed

## more details

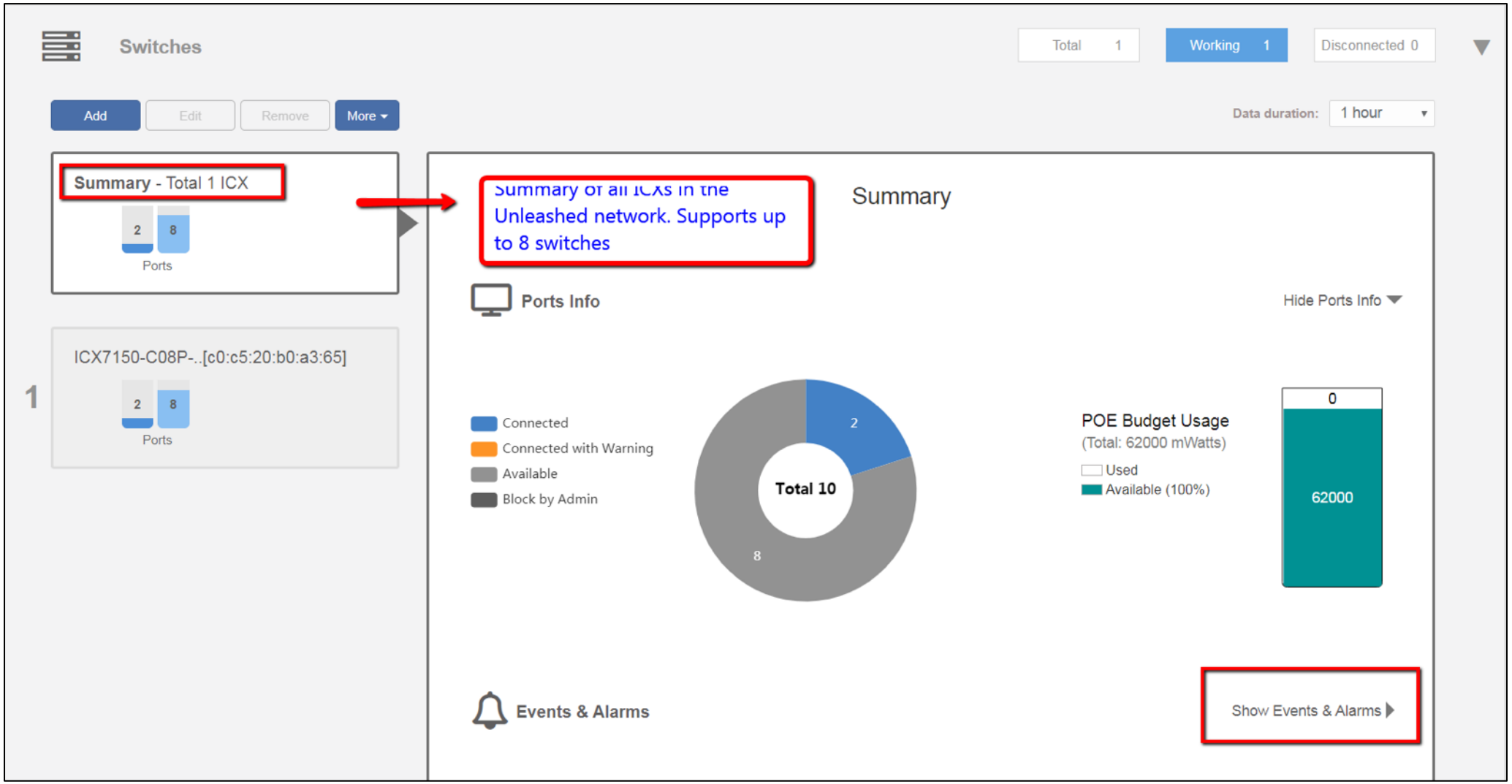
# Unleashed Unified Network Monitoring and Management

Controller-less Plug & Play Solution Targeted at Smaller Deployments

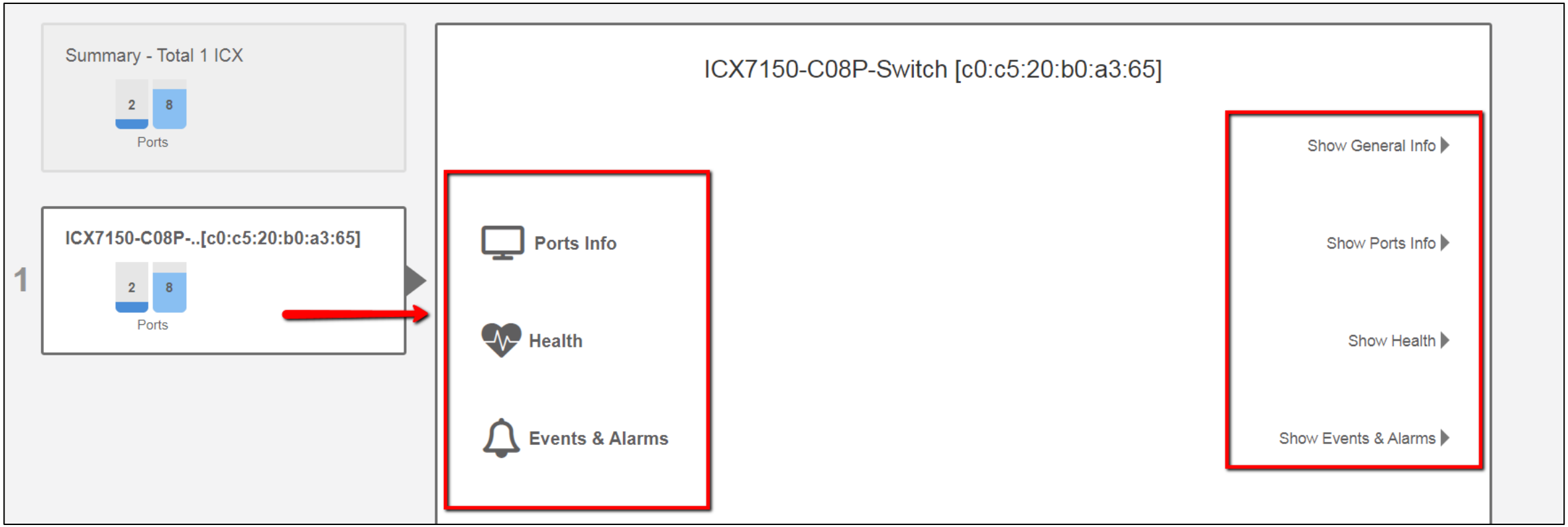
Up to 8 Switches Max per Unleashed network



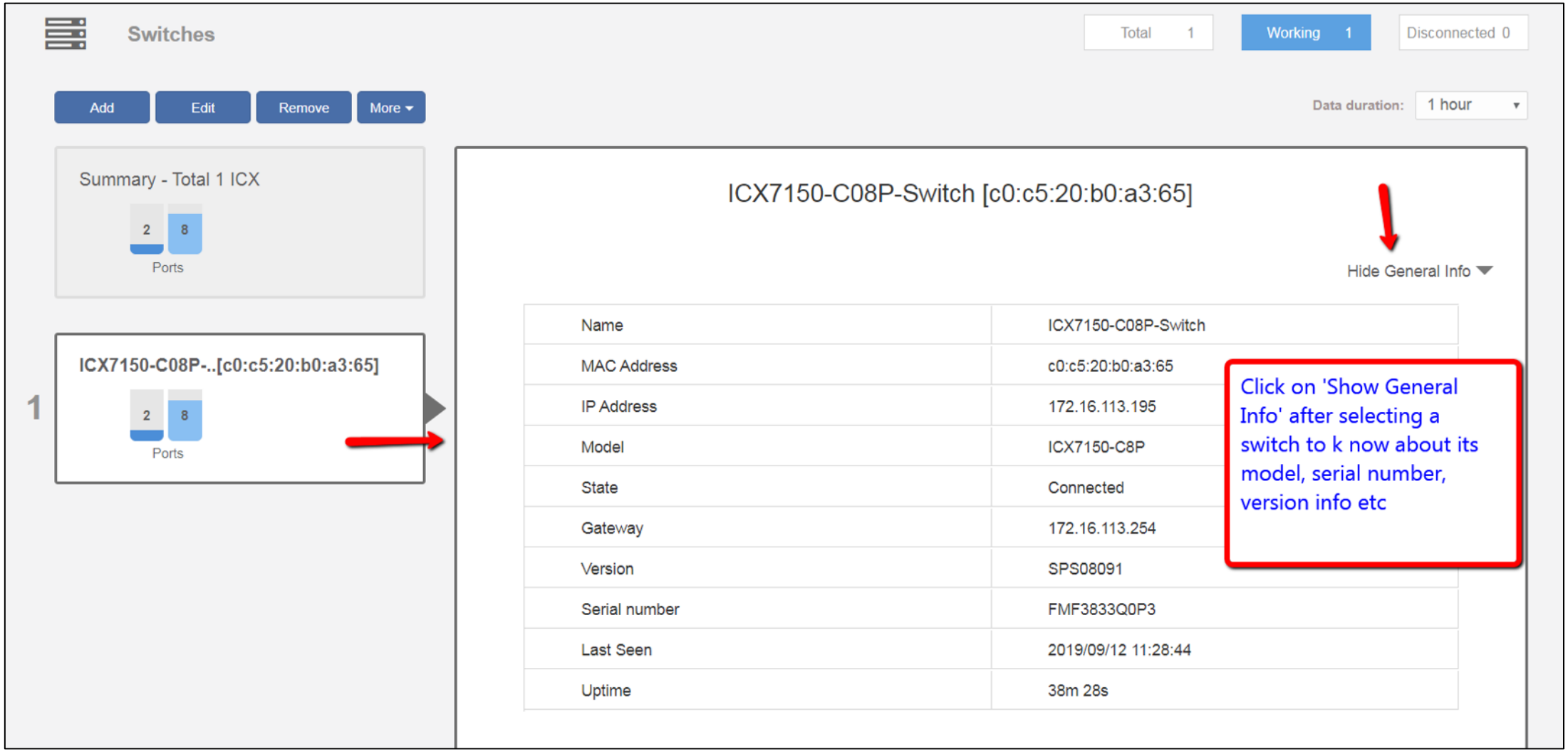
# Summary of Switches Connected



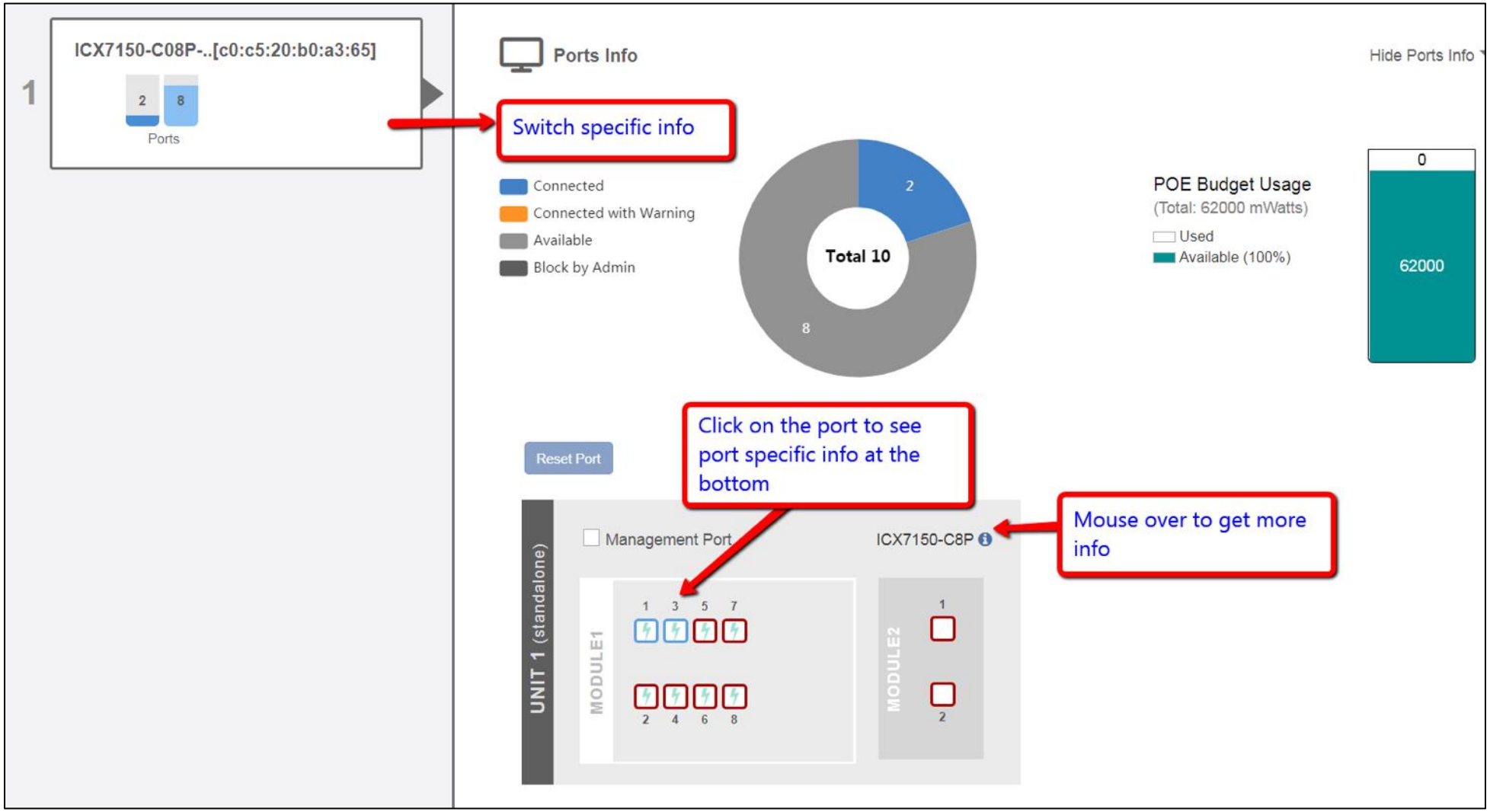
# Switch Information



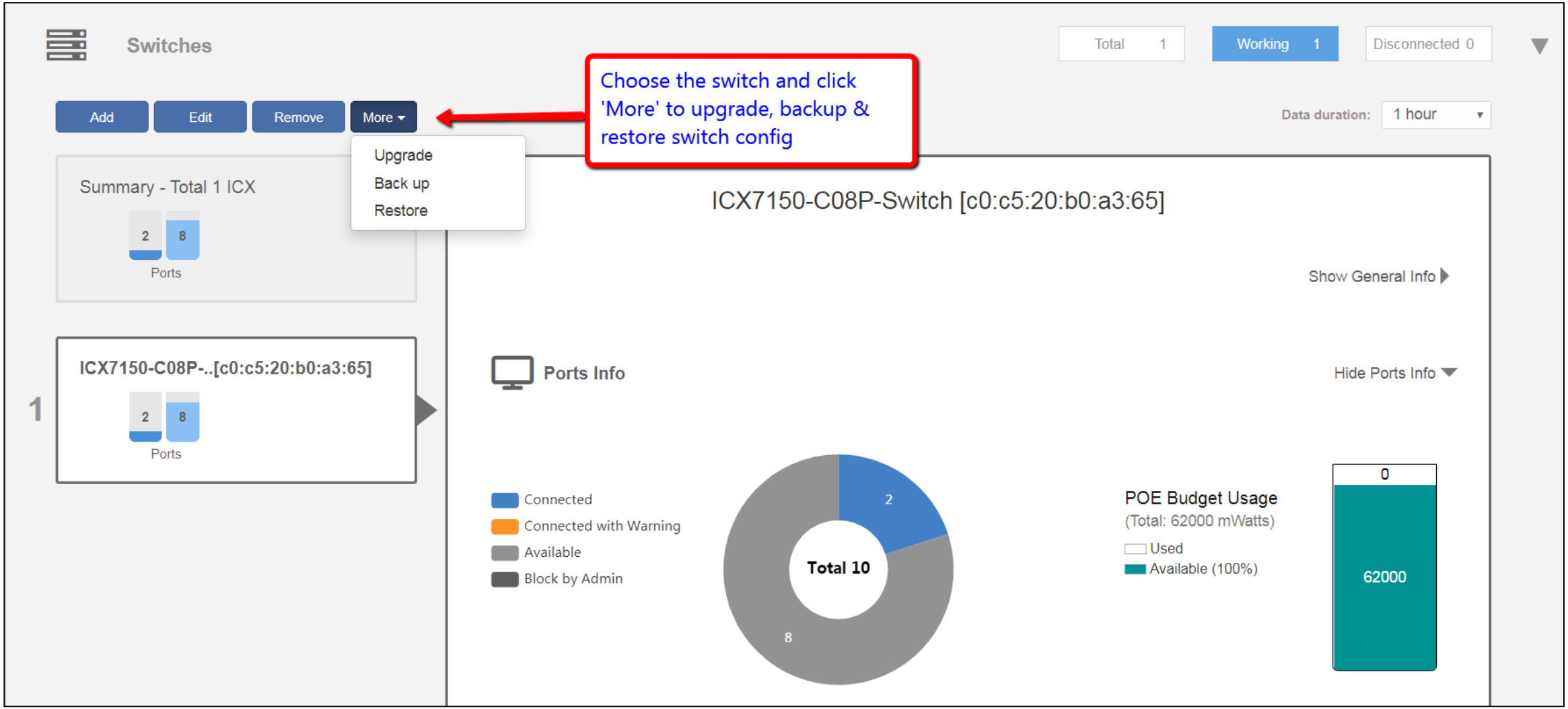
# More Switch Information



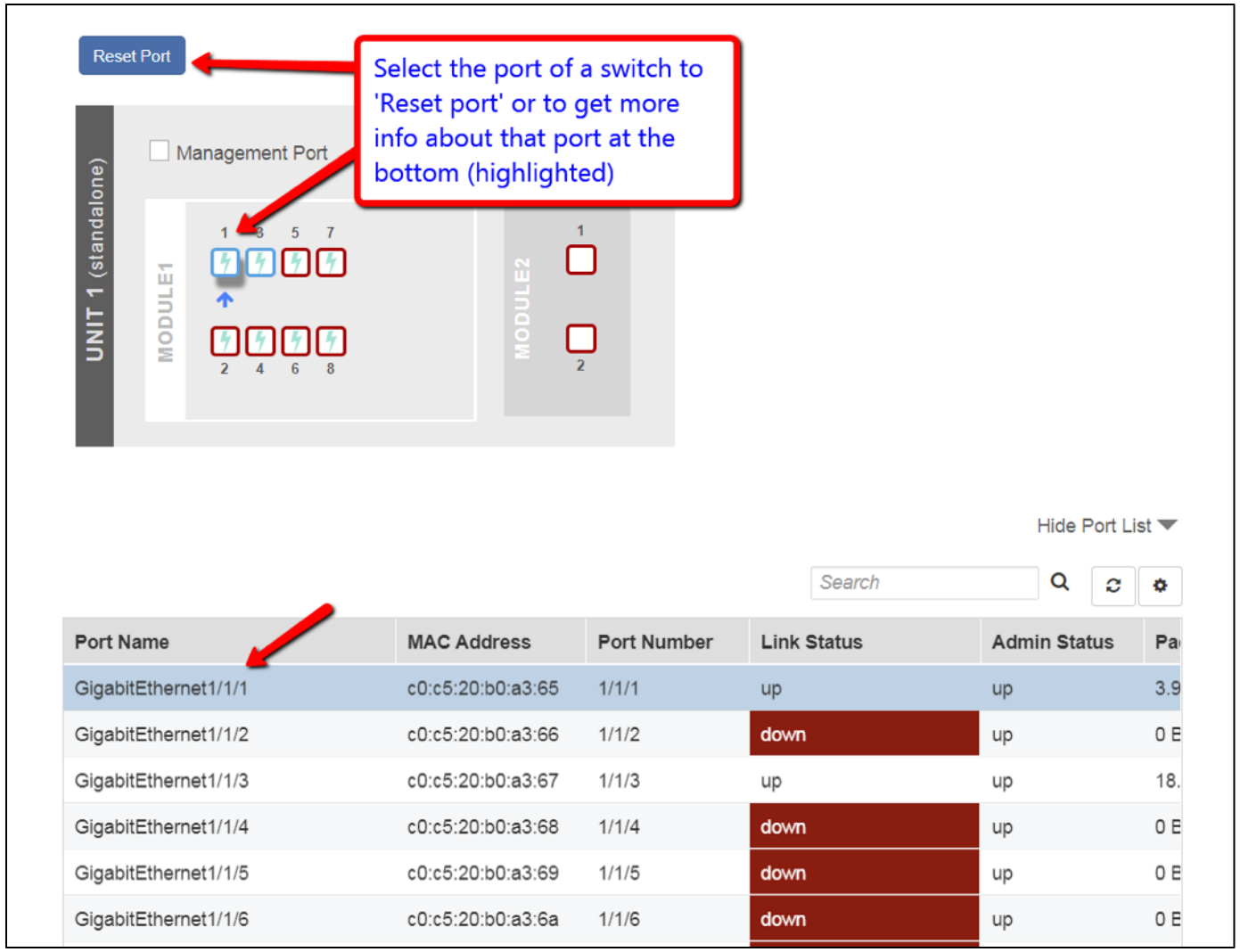
# More Switch Information



# Upgrade, Backup & Restore Switch



# Enable/Disable Switch Port




| Port Name | MAC Address | Port Number | Link Status | Admin Status | Pa |
|---|---|---|---|---|---|
| GigabitEthernet1/1/1 | c0:c5:20:b0:a3:65 | 1/1/1 | up | up | 3.9 |
| GigabitEthernet1/1/2 | c0:c5:20:b0:a3:66 | 1/1/2 | down | up | 0 E |
| GigabitEthernet1/1/3 | c0:c5:20:b0:a3:67 | 1/1/3 | up | up | 18. |
| GigabitEthernet1/1/4 | c0:c5:20:b0:a3:68 | 1/1/4 | down | up | 0 E |
| GigabitEthernet1/1/5 | c0:c5:20:b0:a3:69 | 1/1/5 | down | up | 0 E |
| GigabitEthernet1/1/6 | c0:c5:20:b0:a3:6a | 1/1/6 | down | up | 0 E |

# Supported ICX Switches

- Ruckus Unleashed supports all Ruckus ICX 7000 switches
- Requires FastIron firmware 8.0.90 or later
- Supports up to 8 switches per Unleashed network

| | Suggested Access Switches | | |
|---|---|---|---|
| | **1-2 APs** | **3-4 APs** | **5+ APs** |
| **Wi-Fi 5 APs** | **ICX 7150-C08P** | **ICX 7150-C12P** | **ICX 7150-24P/ -48PF** |
| **Wi-Fi 6 APs** | **ICX 7150-C10ZP** | **ICX 7150-C10ZP** | **ICX 7150-48ZP** |

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# ICX Product Portfolio

# Ruckus ICX Switch Portfolio

**Aggregation/Core**

**Access**

## ICX 7150 Z-Series
Multigigabit Entry-Level Access

## ICX 7150
Entry-Level Access

## ICX 7250
Access

## ICX 7550
Access-Aggregation

## ICX 7650
Premium
Access-Aggregation

## ICX 7750
Aggregation-Core

## ICX 7850
Premium Aggregation-Core

**Optical Modules and Cables**

# Ruckus ICX **Access** Switches

| | ICX 7650<br>ICX 7650 Z-Series | ICX 7550 | ICX 7150<br>Z-Series | ICX 7250 | ICX 7150 |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| **Positioning** | **Top-of-the-Line**<br>• Top performance<br>• 2.5/5/10GbE Multigig<br>• 90W/port PoE | **Midrange**<br>• 100G uplinks / Modular<br>• 2.5/5/10GbE Multigig<br>• 90W/port PoE | **Affordable Multigig**<br>• 2.5GbE Multigig<br>• 90W/port PoE | **Access Workhorse**<br>• Good performance | **Basic Access**<br>• Great value-for-the-money |
| **Uplink/Stacking** | 2 x 100 GbE<br>or 2 x 40 GbE | 3 x 40/100 GbE<br>or 4 x 10 GbE | 8 x 10 GbE | 8 x 10 GbE | 4 x 10GbE |
| **Multigigabit** | 2.5/5/10 GbE | 2.5/5/10 GbE | 2.5 GbE | - | - |
| **Hot-Swap PSU & Fans** | Yes | Yes | Yes | External only | - |

*See ICX Family Datasheet for full feature comparison*

# Ruckus **Compact** Switches

| | ICX 7150-C10ZP<br>Compact Multigig | ICX 7150-C12P<br>Mid-Range Compact | ICX 7150-C08P<br>Entry-Level Compact L2 GigE | ICX 7150-C08PT<br>Extended Temperature Compact L2 GigE |
|---|---|---|---|---|
| |  |  |  |  |
| **When/Where to sell** | Wi-Fi 6 AP's<br>High-end Workstations | Most out-of-closet uses<br>Wi-Fi 5 AP's | Limited capabilities<br>If price is #1 criteria | Locations without<br>Temperature controls |
| **Multigigabit (2.5/5/10 GbE)** | ✓ | | | |
| **PoE/PoE+** | ✓<br>up to 90W/port | ✓ | ✓ | ✓ |
| **PoE Budget** | 240W | 124W | 62W | 62W |
| **Managed by SmartZone or Ruckus Cloud** | ✓ | ✓ | ✓ | ✓* |
| **Silent Operation (Fanless)** | ✓ | ✓ | ✓ | ✓ |
| **ICX 7150 family features: Stacking; Upgradeable 1/10GbE uplinks** | ✓ | ✓ | Not stackable, L2 only<br>1 GbE only | Not stackable, L2 only<br>1 GbE only |
| **List Price** | **$3200** | **$1000** | **$835** | **$2365** |

* Ruckus Cloud management support in a future software release

# Ruckus **Multigigabit** Switches

| | **ICX 7650-48ZP**<br>**Premium Multigig** | **ICX 7550-24/48ZP**<br>**Midrange Multigig** | **ICX 7150-C10ZP**<br>**Compact Multigig** | **ICX 7150-48ZP**<br>**Entry-level Multigig** |
|---|---|---|---|---|
| |  |  |  |  |
| **When/Where to sell** | **Premium Wi-Fi 6 and Future-Proofing** | **Wi-Fi 6 and Future-Proofing** | **Small deployments Out-of-closet** | **Affordable option for Wi-Fi 5/6** |
| **2.5/5/10 GbE for Wi-Fi 6 & Future-Proof** | ✓ 24 ports | ✓ 12/12 ports | ✓ 2 ports | |
| **2.5 GbE for Wi-Fi 5/6** | | ✓ 12/36 ports | ✓ 8 ports | ✓ 16 ports |
| **90W PoE for High-end AP's, Lighting, displays, etc.** | ✓ 24 ports | ✓ 24/48 Ports | ✓ 4 ports + 6 ports w/PoE Overdrive* | ✓ 16 ports |
| **List Price** | $15,875 | $8,500 | $3200 | $6150 |

***All: Managed by SmartZone, Stack to 12 units, Stack ISSU***

** Up to 45W/port for Ruckus AP's*

# Ruckus ICX Aggregation/Core Switches

| | ICX 7850 -32Q/-48F/-48FS | ICX 7750-26Q/-48F | ICX 7650-48F | ICX 7550-24F ICX 7550-48F | ICX 7150-24F |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| **Positioning** | **Large Core/ Data Center** High density 10/25/40/100 GbE | **Large Aggregation/ Medium Core** High density 10/40 GbE | **Medium Aggregation** 1/10 GbE | **Small Aggregation** 1/10GbE | **Small Aggregation Fiber Access** 1GbE |
| **Downlinks** | 32 x 100GbE* or 48 x 1/10/25 GbE | 26 x 40 GbE** or 48 x 10GbE | 24 x 10GbE and 24 x 1GbE | 24 x 1/10GbE or 36 x 1GbE + 12 1/10GbE | 24 x 1GbE |
| **Uplinks / Stacking** | 40/100 GbE | 1/10/40 GbE | 10/40/100 GbE | 10/40/100 GbE | 1/10 GbE |
| **Switching Capacity** | 6.4 Tbps | 2.56 Tbps | 1.13 Tbps | 1.02 Tbps | 132 Gbps |
| **L3 Routing Features** | Best | Best | Better | Good | Good |

** 10/25 GbE breakout cables available*

*** 10 GbE breakout cables available*

# Ruckus ICX Switches – Limited Lifetime Warranty

**Limited Lifetime Warranty included with all ICX 7000 switches***

**As long as the original purchaser owns and uses equipment**

**Hardware warranty:**

- Includes power supplies and fans
- NBD advanced replacements

**Software warranty – lifetime software maintenance updates**

**Access to online support portal**

**Technical support:**

- 90 days, 8x5 telephone support included with ICX 7850, 7750, ICX 7650, ICX 7450, ICX 7150
  - 3 years, 24x7 phone support option available (RMT3 SKUs)
- 3 years, 24x7 telephone support included with ICX 7250

* ICX 7150-C08PT includes 13-Month Hardware Warranty

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# ICX Switches

# Ruckus ICX 7150 Switch Family

*Entry-level Layer 2/3 Stackable Campus Switches With Premium Capabilities*

| Compact Switches | Stackable 24-/48-Port | Entry-Level Multigigabit | Fiber Access |
|---|---|---|---|
|  |  |  |  |
| **Office/Classroom/Retail Out-of-Closet** | **Connectivity for AP's, computers, other devices** | **High performance network edge** | **Entry-Level Fiber Access & Aggregation** |
| • Compact form-factor<br>• PoE/PoE+/90W<br>• Silent operation<br>• Up to 2 x 10GbE uplinks | • IDF closet or out-of-closet<br>• Good coverage and performance<br>• Up to 4 x 10GbE uplinks | • Connections up to 2.5GbE<br>• Up to 8 x 10GbE uplinks<br>• Hot-swap power and fans<br>• Up to 1480W PoE | • Fiber-to-the-room<br>• Small aggregation<br>• Up to 4 x 10GbE uplinks |

# ICX 7150 Switch Raises the Bar For Entry-level Stackables

1RU models

- 24-port and 48-port
- PoE+ and non-PoE

4x 1/10 GbE uplink/stacking ports (8x1/10GbE Z-Series)

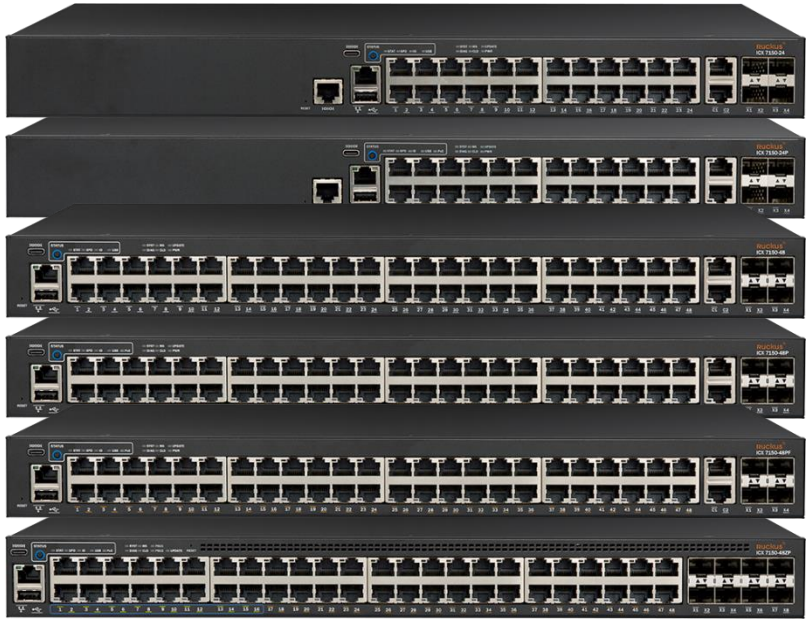
Highest PoE+ budget in this class (up to 1480W)

Silent operation

- Compact and non-PoE: Fanless
- 24-/48-port PoE+: Fanless mode

Base Layer 3 included (Static and RIP)

Layer 3 License (OSPF, VRRP, PIM, PBR)



# ICX 7150 Compact Switches

*Extend switching beyond the wiring closet*

| | ICX 7150-C10ZP<br>**Compact Multigig** | ICX 7150-C12P<br>**Mid-Range Compact L3 10GbE** | ICX 7150-C08P<br>**Entry-Level Compact L2 GigE** | ICX 7150-C08PT<br>**Extended Temperature Compact L2 GigE** |
|---|---|---|---|---|
| |  |  |  |  |
| 2.5/5/10GbE + 90W PoE | 2 | - | - | - |
| 2.5GbE + 90W PoE | 2 | - | - | - |
| 2.5GbE + PoE+/PoE Overdrive* | 6 | - | - | - |
| 1 GbE + PoE+ | - | 12 | 8 | 8 |
| 1GbE RJ45 Uplink | - | 2 | - | - |
| SFP/SFP+ Uplink | 2 (1/10GbE) | 2 (1/10GbE) | 2 (1GbE only) | 2 (1GbE only) |
| PoE Budget (max) | 240W | 124W | 62W | 62W |
| Operating Temperature Range | 0° to 40°C | 0° to 40°C | 0° to 40°C | -40° to 65°C |
| Management Interface Ports | OOB Management, USB Console, Serial Console, Status Button, USB External Storage | OOB Management, USB Console, Serial Console, Status Button, USB External Storage | USB Console, Status Button | USB Console, Status Button |
| Features | Same as ICX 7150 family | Same as ICX 7150 family | Same As ICX 7150 family, except: **L2 only (no L3), No stacking** | Same As ICX 7150 family, except: **L2 only (no L3), No stacking** |
| MSRP (Base System) | $3,200 | $1,000 | $835 | $2,365 |

All Compact Switches:
- Small form factor—fanless design
- Integrated power supply
- PoE+ for VoIP, cameras, wireless APs
- Kensington lock

** Up to 45W/port for Ruckus AP's*

# Ruckus ICX 7150 Z-Series Switch (ICX 7150-48ZP)

*First entry-level Multigigabit Ethernet switch*

2.5 Gigabit Ethernet technology

- 16x 100/1000Mbps/2.5GbE ports
- 32x 10/100/1000Mbps ports

Redundant, load-sharing, hot-swap power supplies and fans

PoE+ & PoH* (90W) with up to 1480W PoE budget

Stacks with ICX 7150 family

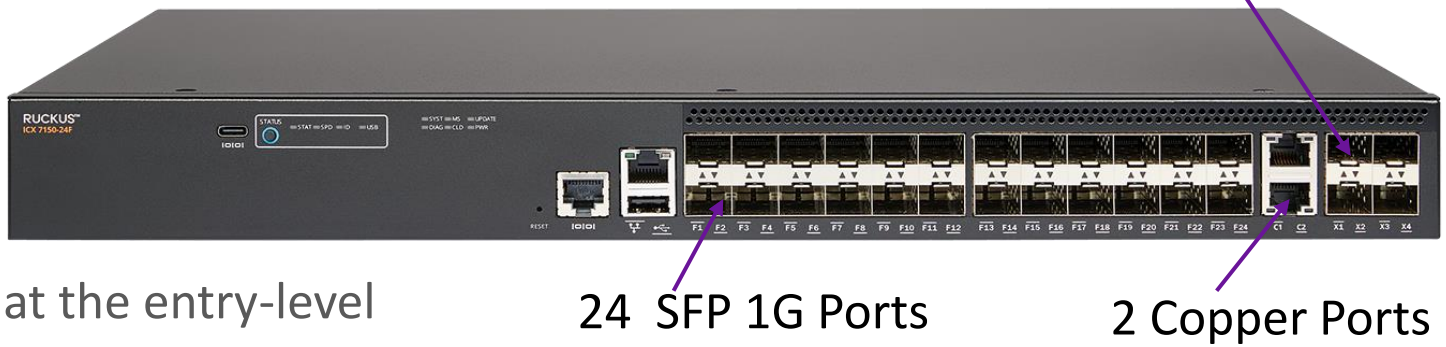
- Up to 8x 10GbE uplinks
- Doubles the stacking bandwidth

** IEEE 802.3bt-ready*

# ICX 7150-24F Fiber Access Switch

## Entry-level 24x 1G SFP ports

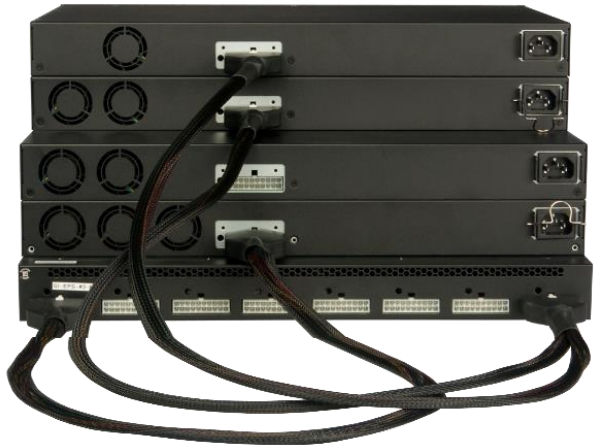
- Stacks with ICX 7150 family
- 4x SFP+ 10GbE uplinks (with license)
- L2/L3 capabilities (RIP, OSPF)




## Benefits Highlight

- Extend the family of ICX fiber switches at the entry-level
- First entry level enterprise-class fiber switch
- Enables fiber to the room deployment as an access switch.
- Effectively competes with PON solutions

# ICX 7250 Switches – Access “Workhorse”



Ultimate price-performance access switch

- 24/48-port
- PoE+ and non-PoE

High-performance scalability

- 8×10 GbE uplink/stacking ports

Future-proof functionality

- 1 GbE → 10 GbE
- Layer 3 features
- EEE

Advanced external power supply

- Redundant system power
- Incremental PoE power

# ICX 7450 Switches

Enterprise stackable switch delivers premium capabilities and ultimate flexibility

- Five models
  - 24-port and 48-port
  - PoE/PoE+ and non-PoE
  - 48-port SFP Fiber
- Flexible uplinks/stacking options
  - 40GbE
  - 10GbE
  - 1GbE
- PoE+ and 90W PoH (IEEE 802.3bt)
- IPsec and MACsec encryption
- EEE
- High-capacity AC/DC power options (up to 1,000 W)
- Reversible front-to-back or back-to-front airflow

Optimum high availability

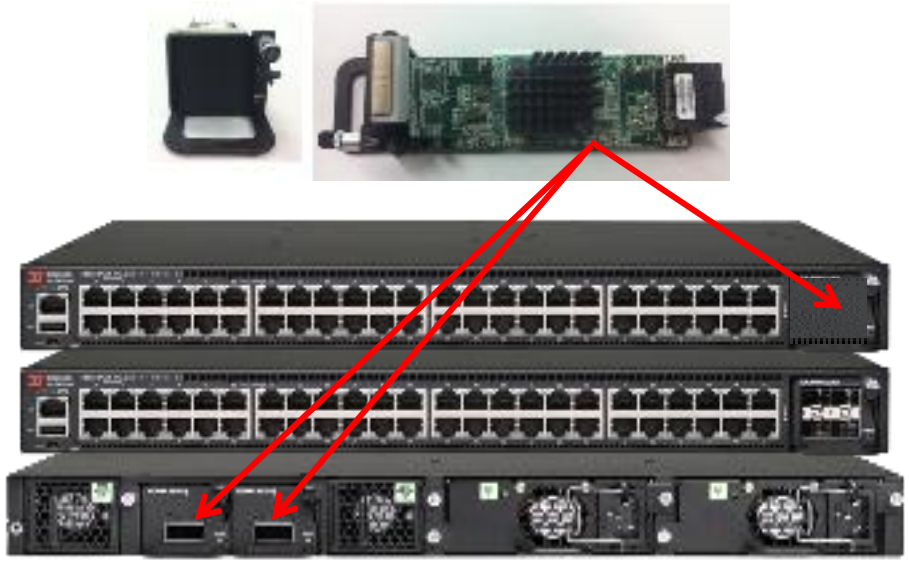
- Redundant, hot-swappable, power supplies and fans

# ICX 7450 Optional Interface Modules

| | ICX7400-1X40Q | ICX7400-4X10GF | ICX7400-4X10GC | ICX7400-4X1GF |
|---|---|---|---|---|
| |  |  |  |  |
| **Bandwidth** | 80Gbps | 80Gbps | 80Gbps | 8Gbps |
| **Port Type** | 1x40GE QSFP+ | 4x10GE SFP+ | 4x10GE RJ-45 | 4x1GE SFP |
| **Module Slot** | Front (24) or Rear (24/48) | Front or Rear | Front or Rear | Front only |
| **Function** | Stacking (rear), Uplink | Stacking (front) Uplink with MACsec LRM optic support | Uplink | Uplink |

# ICX 7450 IPsec VPN Modules

- Hardware assisted AES-128, AES-256 and IKEv2 encryption
- Up to 100 IPsec tunnels per module (8.0.70)
- 10Gbps total throughput, max 10G per tunnel
- Multiple modules per stack for redundancy (1 active per stack)
- FIPS certification and Suite-B compliant
- Interoperates with any standard IPsec implementation
- PKI for key management
- Rich feature set
  - IPv4, IPv6, OSPF, BGP, QoS, PBR, VRF, NAT traversal, ACL and Jumbo frames supported

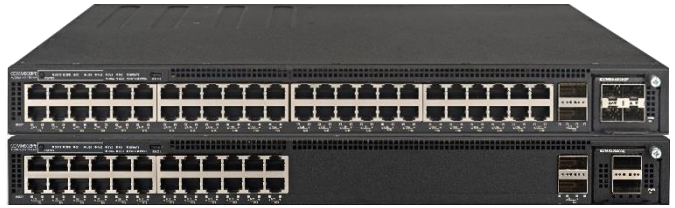


# ICX 7550 Midrange Access & Entry-level Aggregation

NEW

Gigabit

Gigabit POE



Multigigabit

1/10G Fiber

Uplink Stacking 40 / 100 Gbps

Multigig Ethernet 2.5 / 5 / 10 Gbps

High-Power PoE Up to 90W

SmartZone, Unleashed or Cloud Managed

**Broadest portfolio of media, speeds and PoE, pay as you grow scalability**

# ICX 7550 Switch Family

| Gigabit | Gigabit PoE | Mid-Range Multi-Gigabit | Fiber Aggregation/ToR |
|---|---|---|---|
|  |  |  |  |
| **Connectivity for computers, printers, etc. Small DC ToR** | **Connectivity for non-wifi6 APs other PoE devices** | **Connectivity for wifi6 APs larger PoE devices** | **1/10G Fiber Aggregation/Core** |
| • Standard 1G connectivity<br>• Campus wiring closet<br>• ToR 1G switch<br>• Resilient design<br>• Uplink options up to 4 x 40G | • Traditional POE Ethernet<br>• Campus wiring closet<br>• Large PoE budget<br>• Uplink options up to 4 x 40G | • 2.5/5/10G multi-gigabit Ethernet<br>• High power PoE 90W 802.3bt<br>• Large PoE budget<br>• Uplink options up to 3 x 100G | • Small Campus Core<br>• Campus aggregation<br>• 24 x 10G version<br>• Up to 2 x 100G uplinks |

Mix and match any combination in a unified stack

# ICX 7650 Switches

## Premium Access Switches

ICX7650-48ZP (Z-Series)
- 24 x 2.5/5/10 GbE w/ PoE+/802.3bt*
- 24 x 1 GbE w/ PoE+

ICX7650-48P
- 48 x 1 GbE w/ PoE+
- (8 ports include 802.3bt*)

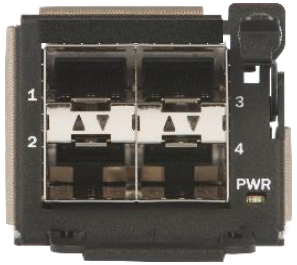
## Medium Aggregation/Core Switch

ICX7650-48F
- 24 x 10GbE (SFP+) Fiber
- 24 x 1GbE (SFP) Fiber

Features:
- 100G or 40GbE uplink/stacking ports (rear)
- Plus optional uplink module (front):
  - 4x 10GbE or 2x 40GbE or 1x 100GbE
- Dual Hot-swap power supplies and fans
- Layer 3 services (comparable to ICX 7750)
- LRM Optics for legacy fiber deployments
- 256bit MACsec on 10G SFP+ ports
- Campus Fabric CB

** IEEE 802.3bt (90 Watts) - Compatible with 60W PoE++*

# ICX 7650 Optional Interface Modules

| | ICX7650-1x100GQ | ICX7650-2x40GQ | ICX7650-4x10GF |
|---|---|---|---|
| |  |  |  |
| **Port Type** | 1 × 40/100G QSFP28 | 2 x 40G QSFP+ | 4 × 10G SFP+ |
| **Module Slot** | Front | Front | Front |
| **Function** | Uplink | Uplink | Uplink |
| **Bandwidth** | 100 Gbps | 80 Gbps | 40 Gbps |

# ICX 7650 Switch Review

The Ruckus ICX 7650 switch, comes loaded with extra features and capacity that can help colleges stay relevant and supportive of new technology as it advances.

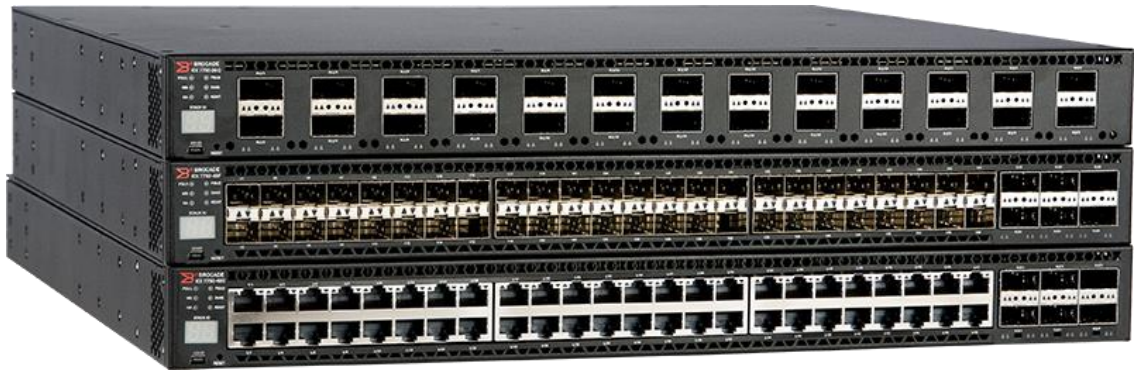
The idea is to have the ICX support today's technology, the next generation's and the one after that.

John Breeden II
EdTech Magazine
August 2018

https://edtechmagazine.com/higher/article/2018/08/ruckus-icx-7650-48zp-switch-helps-future-proof-your-network

# ICX 7750 Switches

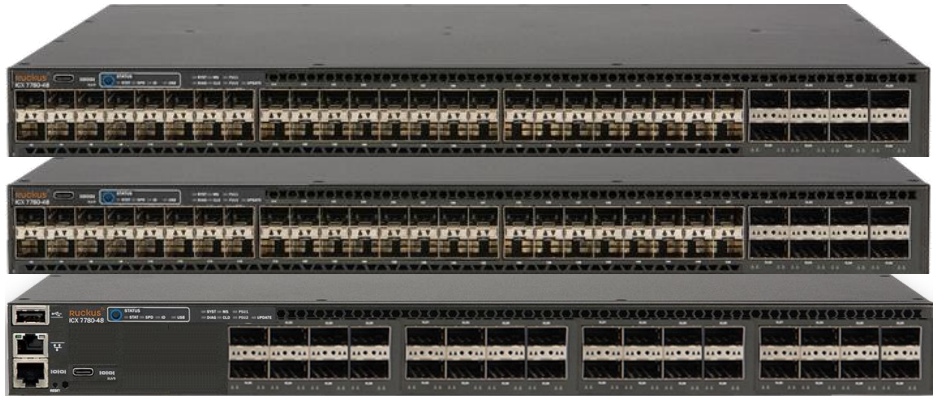
High-performance distributed chassis system



- High-density:
  - 32 x40GbE
  - 48 x10GbE (96 x10GbE with breakout cables)
- Up to 12×40 GbE uplinks/stacking ports
- Chassis performance (5.76 Tbps aggregated stacking bandwidth)
- Full IPv4 and IPv6 routing support, includes BGP and VRF
- Extended operating temp (up to 50°C)

# ICX 7850 Switches

## High-density Aggregation/Core For 100 GbE Edge-to-Core Networks



- High-performance connectivity for:
  - Campus network core and aggregation
  - Data Center connections
- Industry-leading port density:
  - 32 x 100 GbE (128 x10/25 GbE with breakout cables)
  - 48 x 10/25 GbE
- Up to 6 x 100 GbE uplinks/stacking ports
- Up to 6.4 Tbps switching capacity
- Chassis performance (9.6 Tbps aggregated stacking bandwidth)
- Distributed stacking
  - Up to 12 units
  - Up to 10km

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# Introducing the Extended Temperature Compact Switch

## ICX7150-C08PT

# Opening New Deployment Scenarios

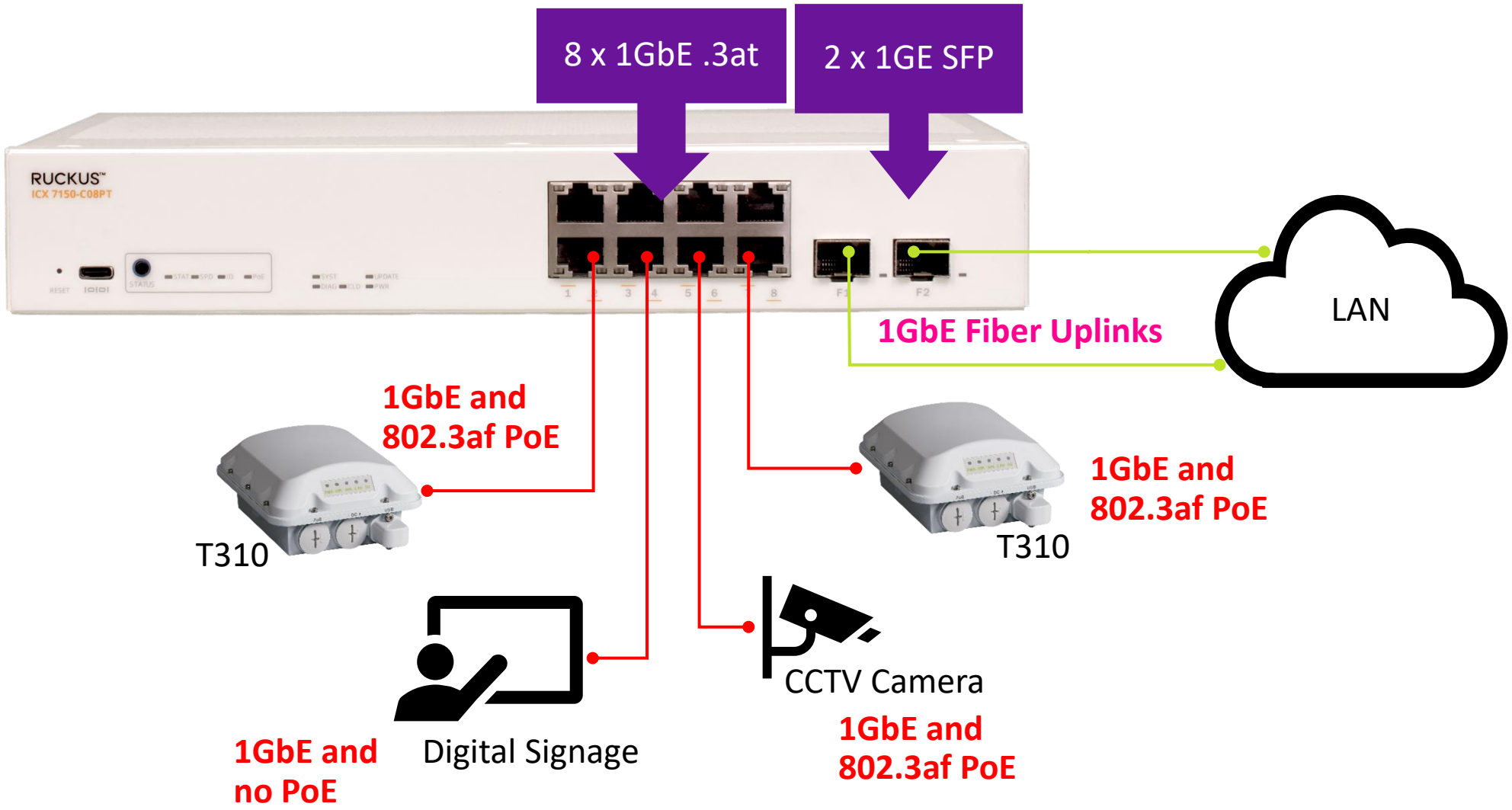
**Target Use Cases:**

- Indoor Location Without Temperature Control
- Outdoor Location in Enclosure / Cabinet
- Outdoor APs backhaul

**Target Verticals:**

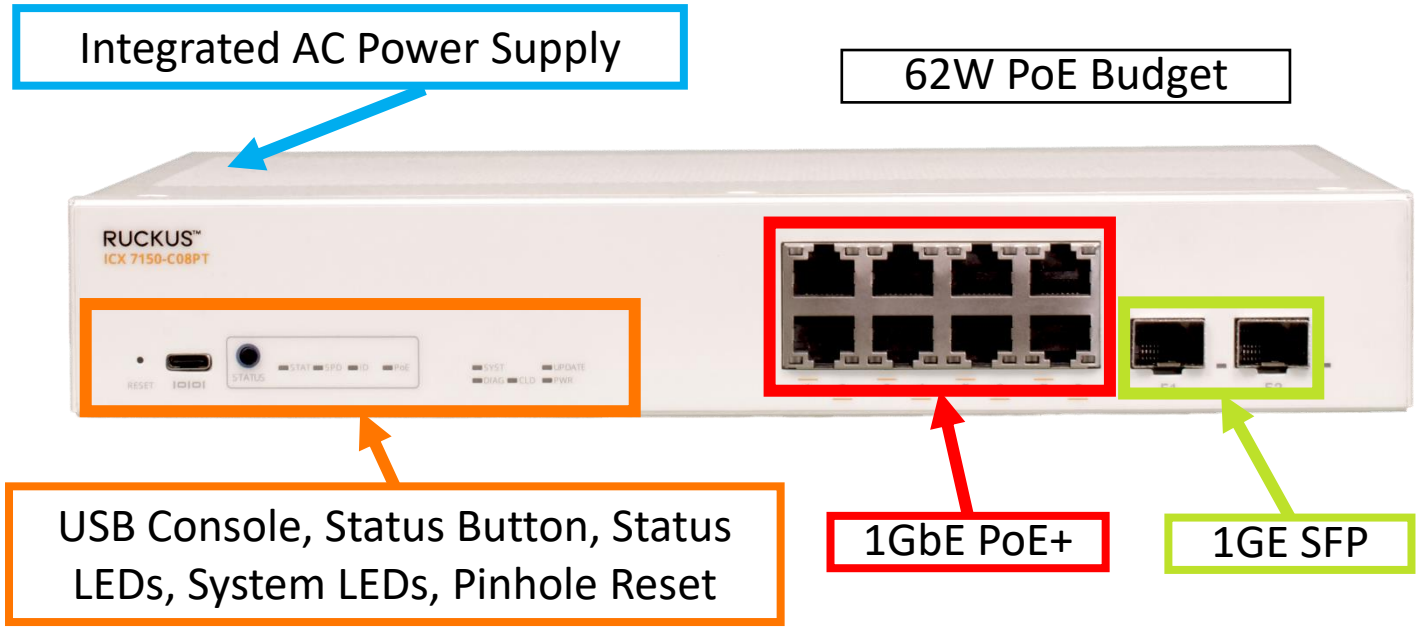
- Smart Cities
- Service Providers
- Education
- Hospitality
- MDU

# ICX7150-C08PT: Sample Use Case



# ICX7150-C08PT: Extended Temperature Compact Switch

- Compact switch form factor
- Fanless
- Operating Temperature: **-40° to 65°C**
- 8 x 1GE PoE/PoE+ ports
- 2 x 1GE SFP port, No stacking
- 62W PoE budget
- Integrated AC Power Supply
- Mounting: Desktop, Wall, Rack, DIN Rail
- IP30 rating




# What IP30 Means

- The ICX 7150-C08PT is not an outdoor switch (not IP67 like the outdoor APs)
- Not waterproof
- Not Dust proof
- Need an enclosure for outside deployment
- Enclosures available from CommScope

CommScope BUDI Enclosure

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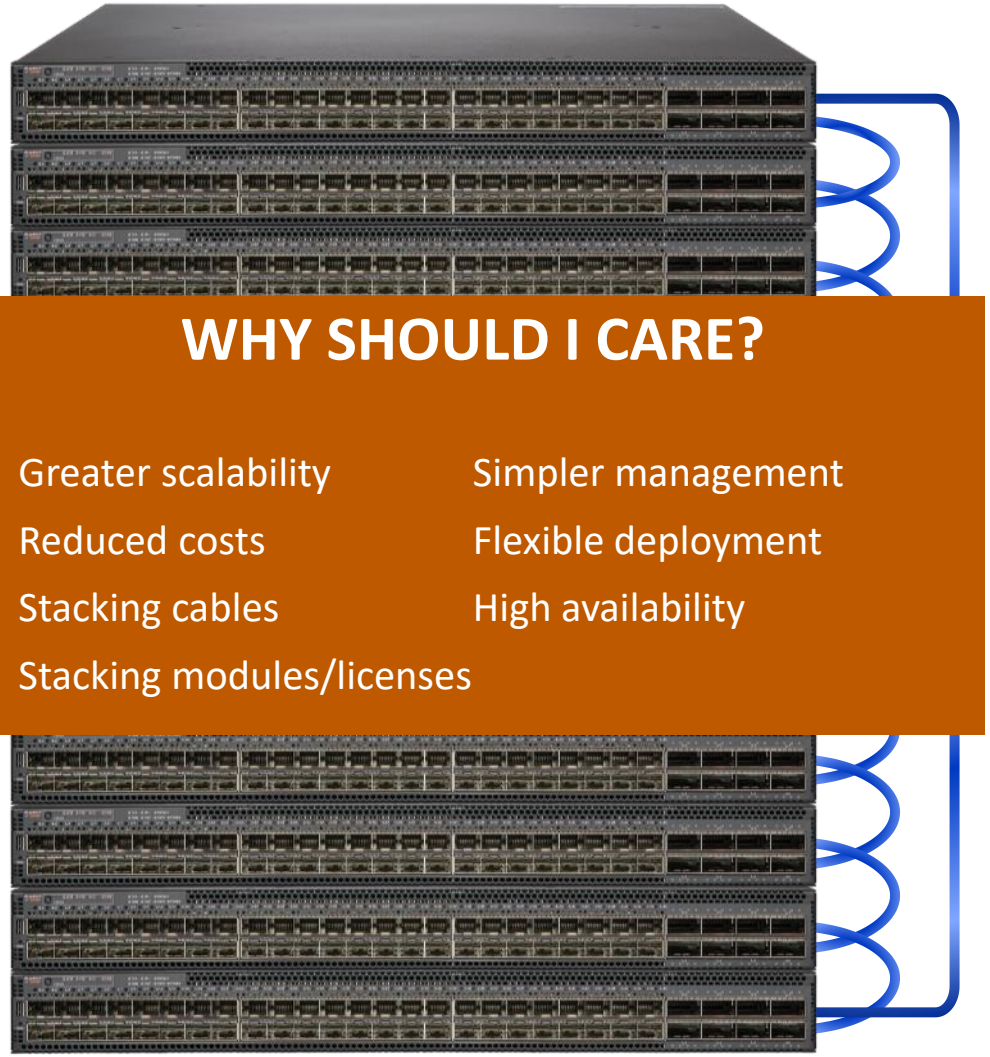
# Ruckus Technologies

## More Technical/Architectural Details

# ICX Stacking Advantages Simplify Management



## WHY SHOULD I CARE?

Greater scalability
Reduced costs
Stacking cables
Stacking modules/licenses
Simpler management
Flexible deployment
High availability

Standard Ethernet cables (not proprietary)

Long-distance stacking—Up to 10 km

Up to 12 units per stack

In Service Software Upgrade (ISSU)

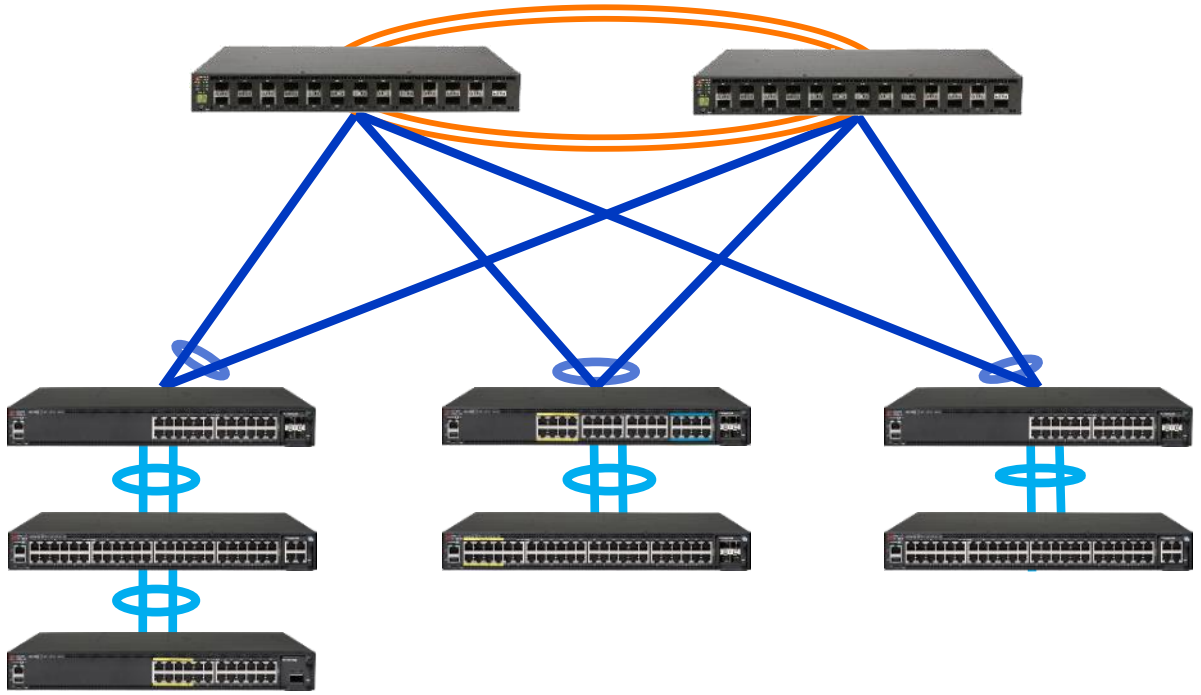
Hitless failover of management

“Built-in” every switch%

- Dual-mode stacking/uplink ports
- No license add-on required

# Ruckus Campus Fabric

- Campus Fabric
  - ICX 7750/7650*: “Fabric Controller”
  - ICX 7450/7250/7150: “Port Extenders”
- Scalable
  - Add switches as needed
- Centralized management & control
  - Single logical domain (1 IP address)
- Simplified management
  - Zero Touch Deployment
  - Automatic maintenance
- Policy & feature inheritance



** Campus Fabric will be supported on the ICX 7850 in a future software release*

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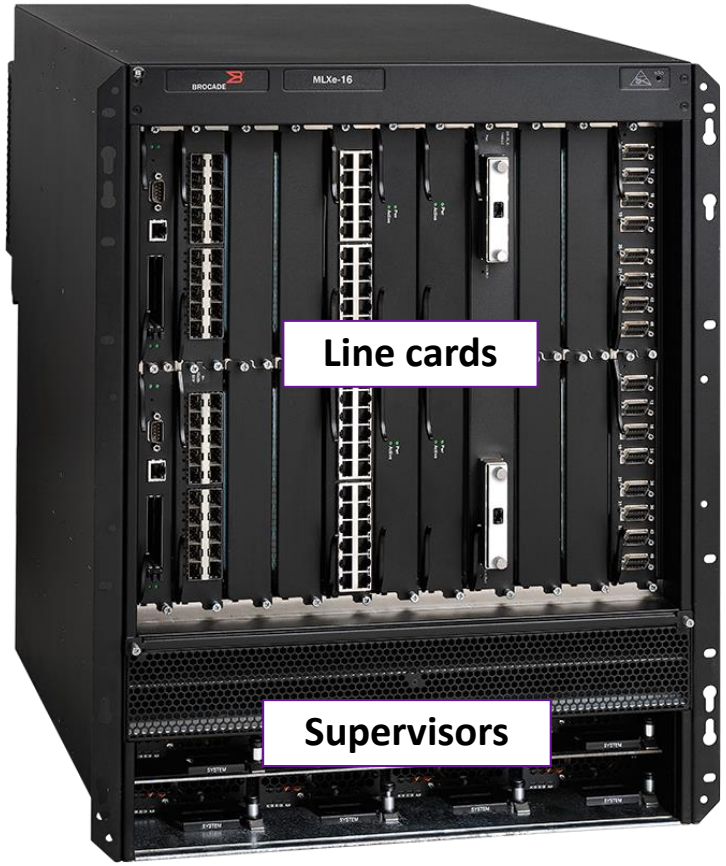
# Distributed Chassis Architecture View

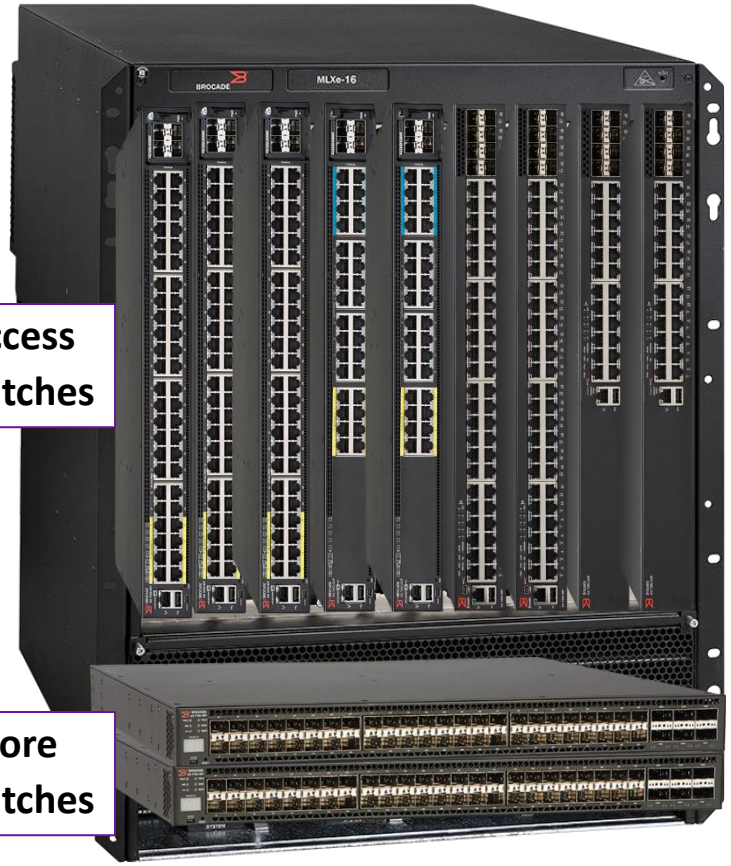
## Simple, Scalable, Flexible Deployments with Fixed Form Factor Switches

# Traditional Campus Chassis



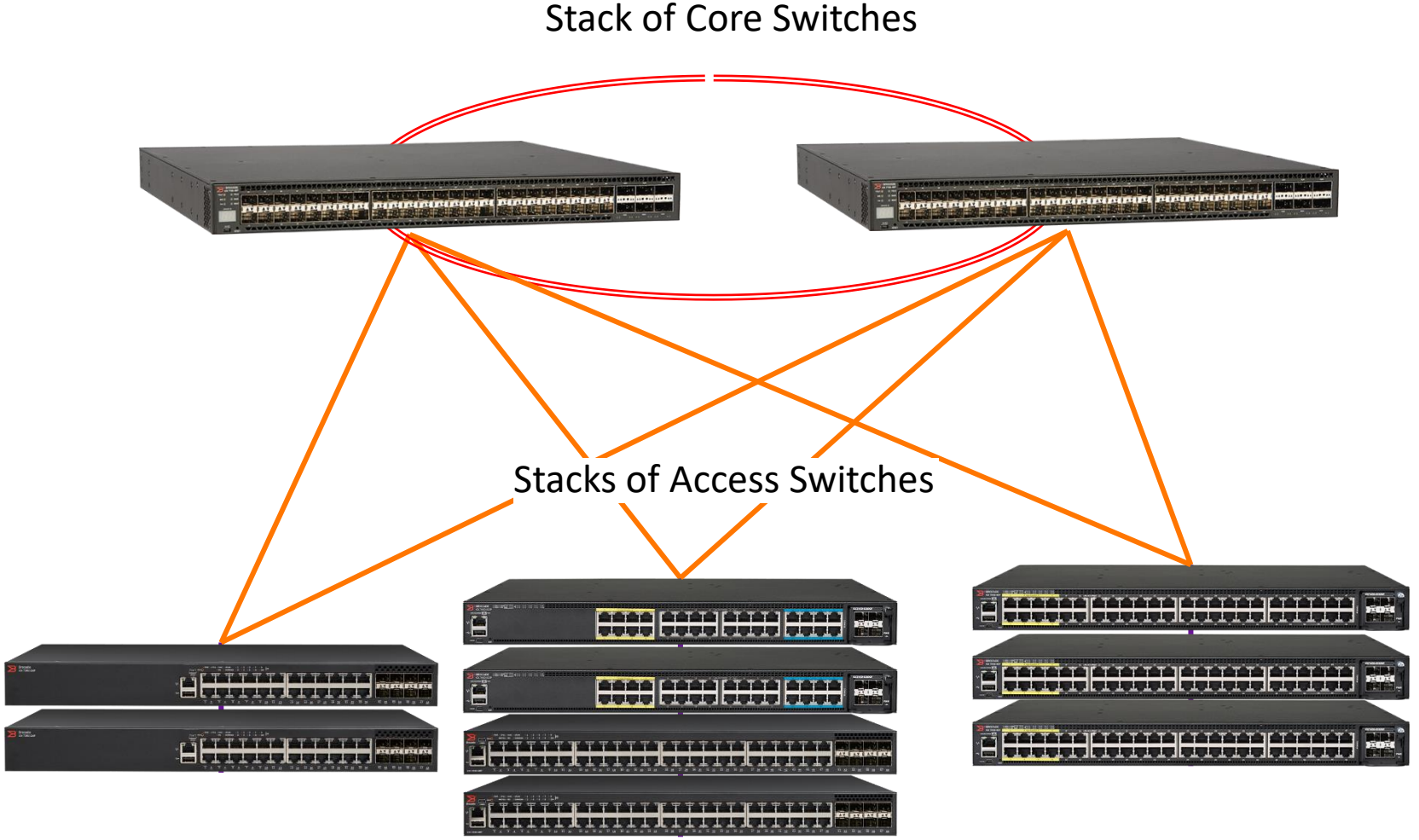

- Single point of management
- High availability
  - Redundant controllers
  - Hitless software upgrades
  - Hot swappable modules
- Easy upgrades
- High scalability
- High performance

# Ruckus ICX Switches Deliver Comparable Features



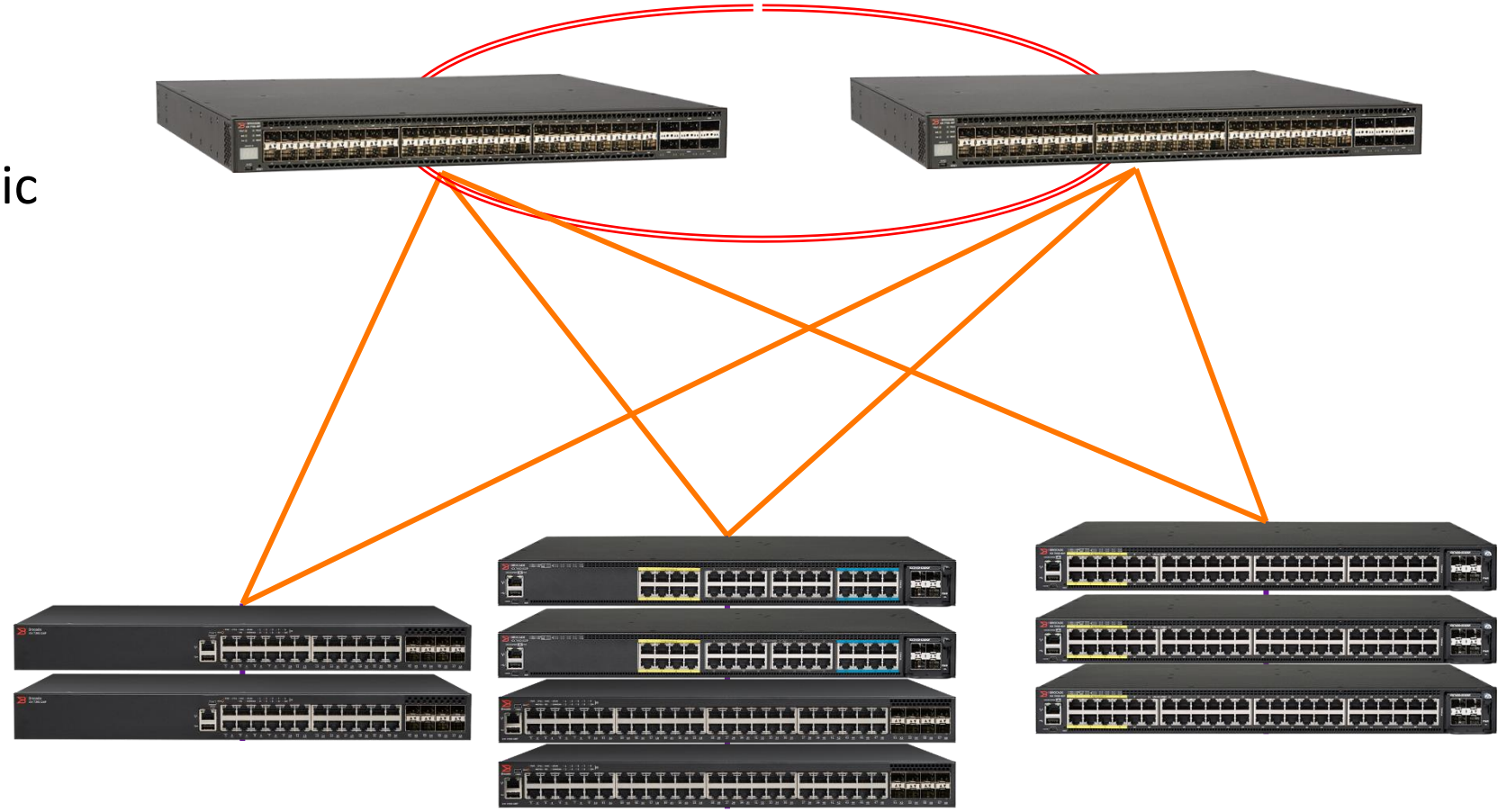

- Single point of management
- High availability
  - Redundant controllers
  - Hitless software upgrades
  - Hot swappable modules
- Easy upgrades
- High scalability
- High performance

# Distributed Chassis Comprised of Stacked ICX Switches

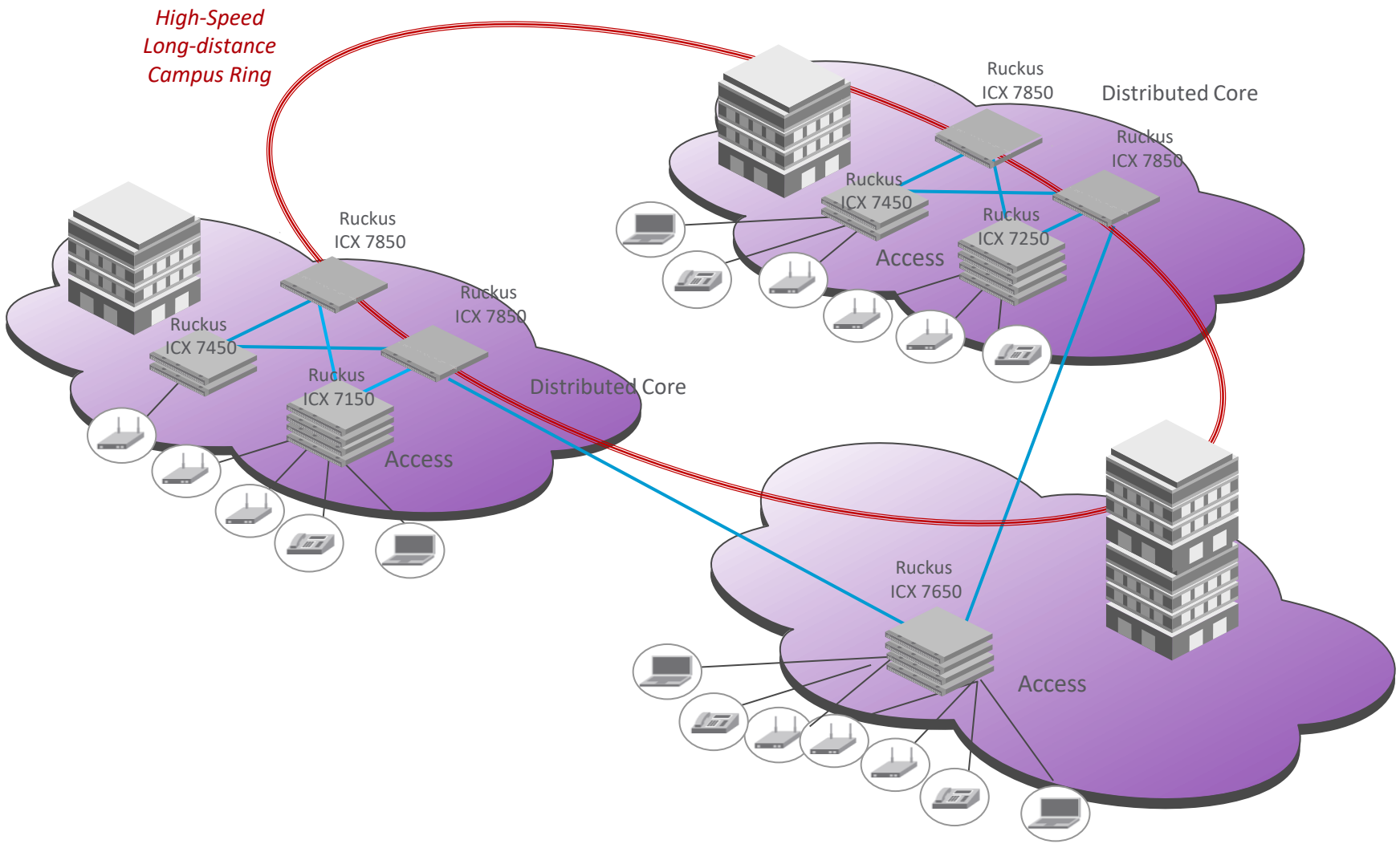



# Distributed Chassis – Flexibility of Fixed Form Factor

- Reduced up-front investment
- Pay-as-you-Grow
- Flexible deployment:
  - Stand-alone, Stack, Fabric
- Distributed configuration
- Reduced power and cooling



# Distributed Chassis Deployment Across The Campus



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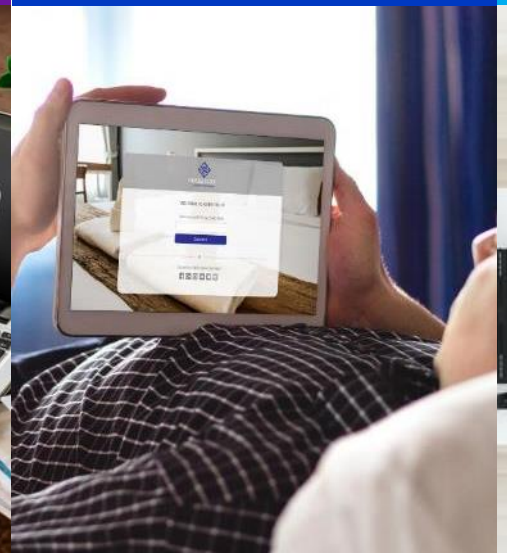
# Unified Security and Policy Management

## Ruckus Cloudpath

# Unified Security and Policy Management

**Software/SaaS that delivers secure network access for any user, and any device, on any network**

| Increases Security For Network, Devices and Users | Streamlines On-Boarding and Network Authentication | Policy-based Control Over Resources Users Can Address | Visibility and Control over Devices on the Network | Reduces Helpdesk Tickets |
|---|---|---|---|---|
|  |  |  |  |  |

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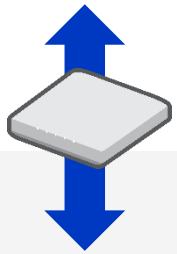
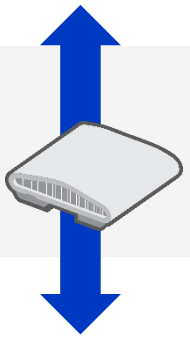
# Power

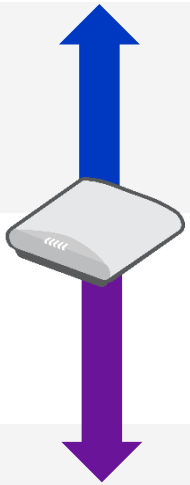
## Power-over-Ethernet Technologies

# High-Performance Devices Are High-Powered

| Standard | Power at Switch | 802.11a/n | 802.11ac | Wi-Fi 6 (802.11ax) and beyond | Other Powered Devices |
|---|---|---|---|---|---|
| PoE 802.3af | 15W | | | | |
| PoE+ 802.3at | 30W | | | | |
| PoE++ 802.3bt | 60W (4-pair) | | | | |
| High-Power 802.3bt | 90W (4-pair) | | | | |

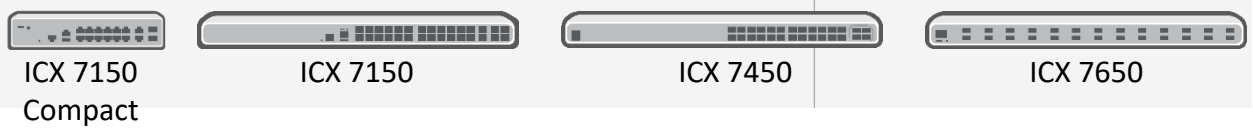






# Only Ruckus Delivers Power To Spare

| Standard | Power at Switch | Other Vendors | Ruckus |
|---|---|---|---|
| PoE 802.3af | 15W | | |
| PoE+ 802.3at | 30W | | |
| PoE++ 802.3bt | 60W (4-pair) | Max 60W | |
| High-Power 802.3bt | 90W* (4-pair) | | Max 90W |




** Up to 45W/port over 2-pair exclusively for Ruckus AP's*

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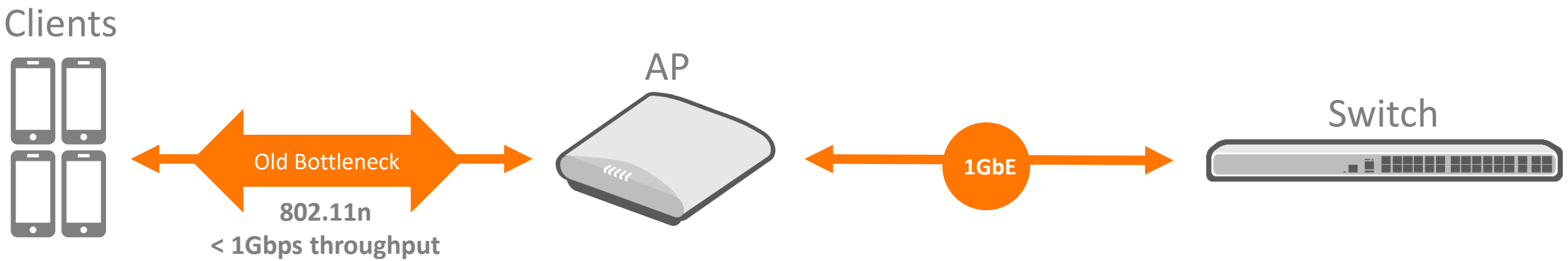
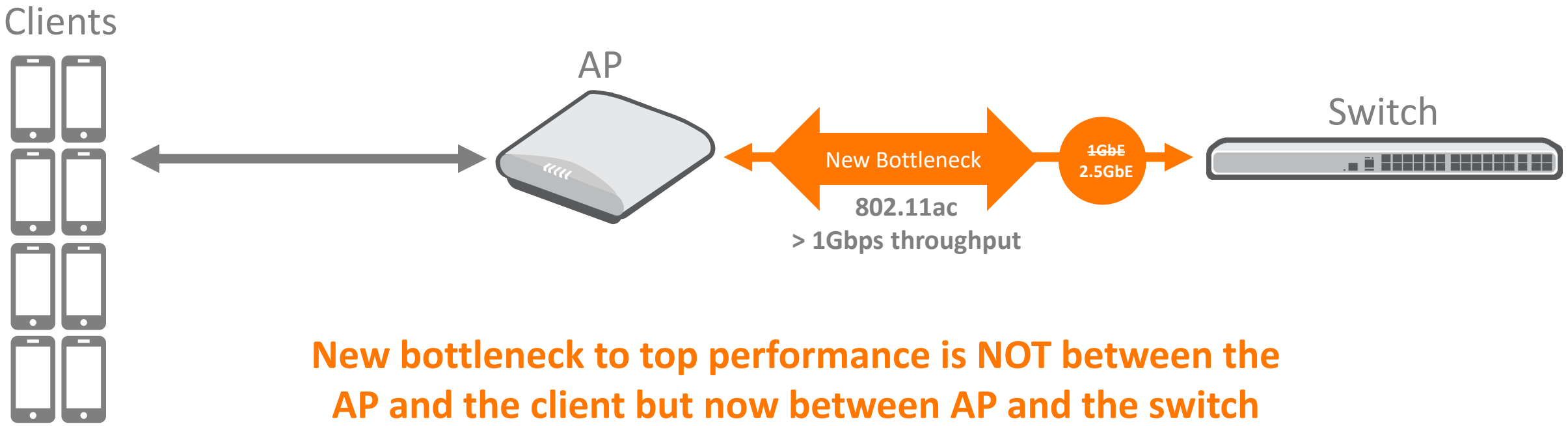
# Multigigabit Technologies

# ‘Bottleneck’ Has Shifted in the Access Layer

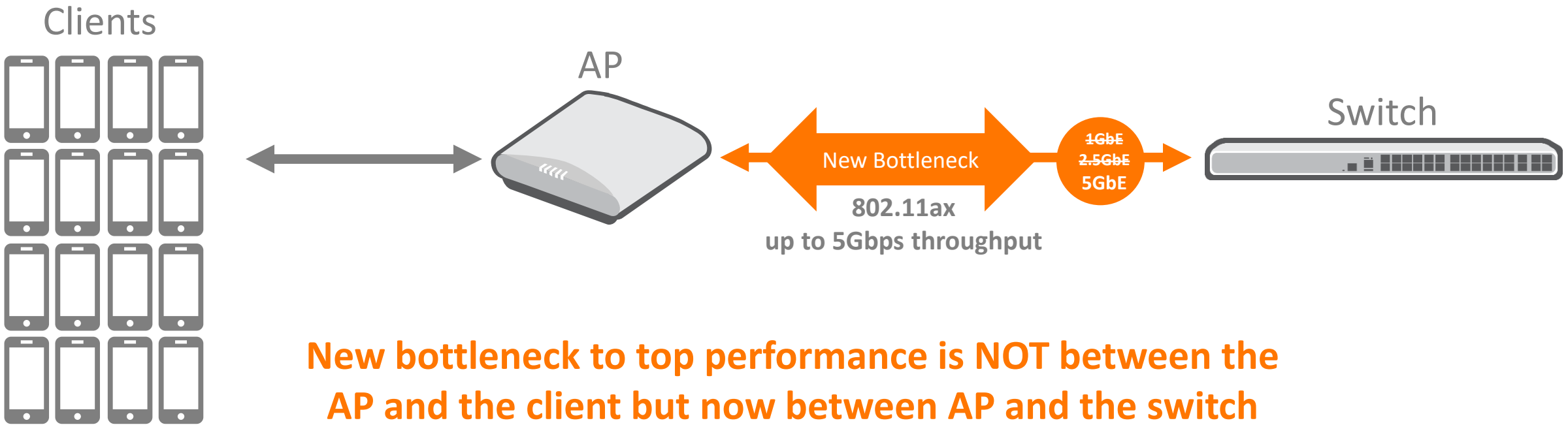


# ‘Bottleneck’ Has Shifted in the Access Layer




**New bottleneck to top performance is NOT between the AP and the client but now between AP and the switch**

# ‘Bottleneck’ Has Shifted in the Access Layer




**New bottleneck to top performance is NOT between the AP and the client but now between AP and the switch**

It’s time to upgrade **beyond 1Gbps connections**

Note:
-802.11ac Wave 2 comprised nearly 100% of AP shipments in 2018 - Dell ‘Oro
-Dual 1GbE can solve this problem but at the expense of two cable runs, and two switch ports

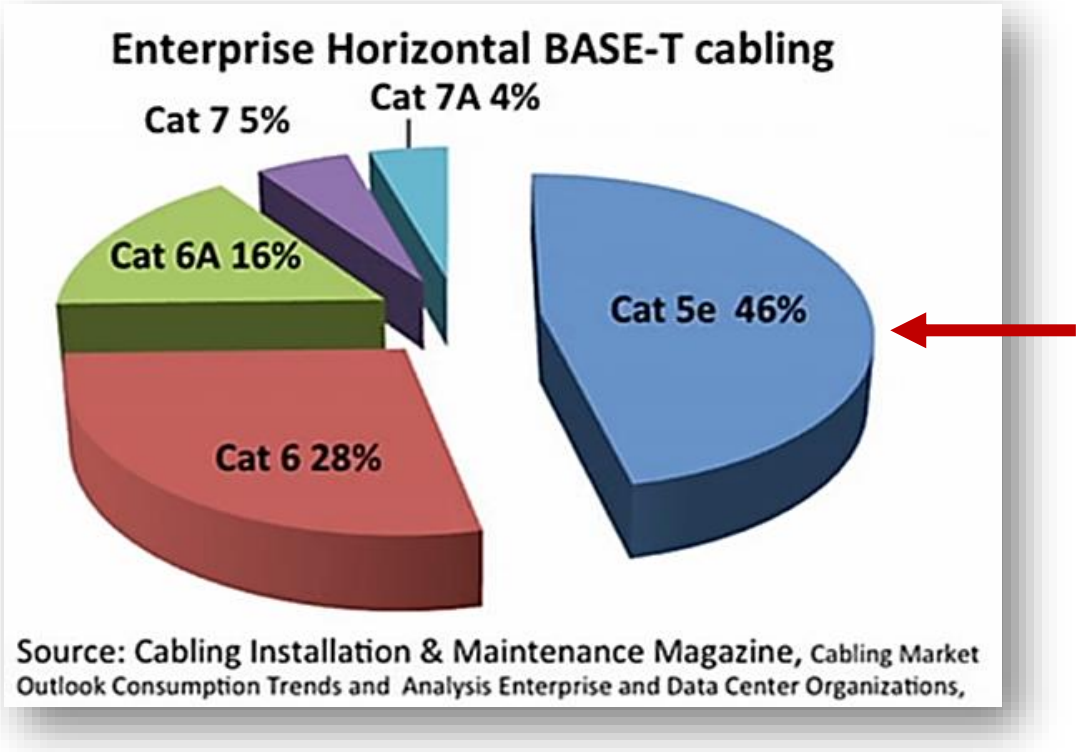
# Multi-gigabit Ethernet Over Copper Wiring

## New IEEE 802.3bz (2016) standard

- 2.5GbE and 5GbE Ethernet
- Better performance over twisted pair

| Standard | Transfer speed | Cable req. 100 m |
|---|---|---|
| 1000BASE-T | 1 Gbps | Cat 5e |
| 2.5GBASE-T | 2.5 Gbps | Cat 5e |
| 5GBASE-T | 5 Gbps | Cat 6 |
| 10GBASE-T | 10 Gbps | Cat 6A |

## Existing cabling may limit performance



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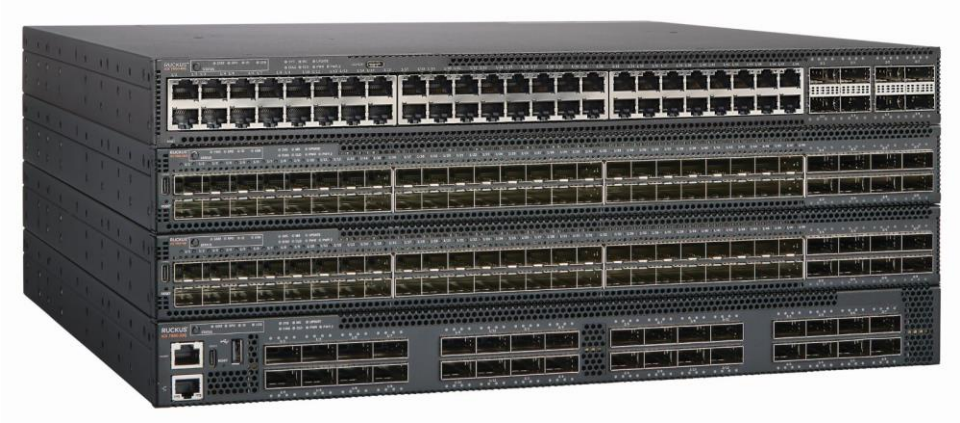
# ICX 7850 Core/Aggregation Switch

## Delivers 100GbE Edge-to-Core Solution for the Multi-gigabit Campus Network

# Ruckus ICX 7850 Switch Family

## High-density aggregation switch for 100 GbE Edge-to-Core Networks



**Scalability**
- High density 100 GbE
- Stack up to 76.8 Tbps switching capacity

**Security**
- Link level encryption
- Data confidentiality & Integrity

**Flexibility**
- Virtual chassis
- Multiple deployment models

# ICX 7850 Switch Family

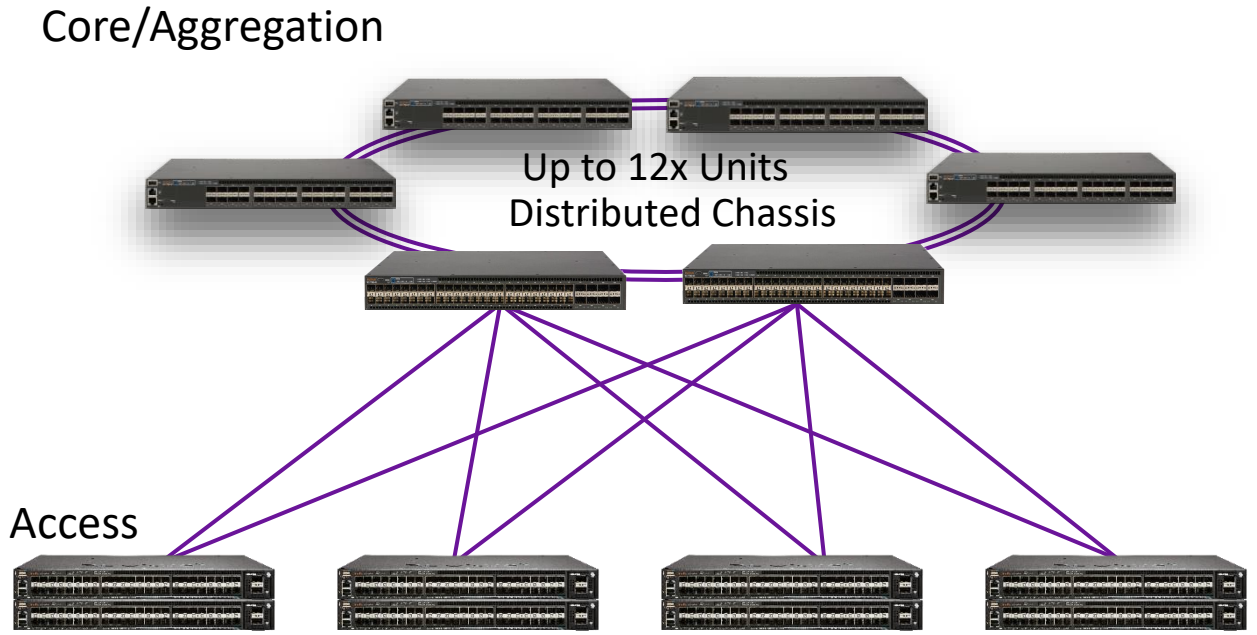
| | ICX 7850-32Q | ICX 7850-48FS | ICX 7850-48F | ICX 7850-48C |
|---|---|---|---|---|
| |  |  |  |  |
| **Positioning** | High Density 40/100GbE<br>Premier Core | 1/10GbE Aggregation<br>MACsec 256, LRM Optics | 1/10/25GbE Aggregation | 1/10 GbE Copper<br>TOR |
| **Use Case(s)** | Large Core<br>Data Center Spine | Secure Aggregation<br>Legacy Fiber OM1/OM2 | Medium Core, Agg<br>Data Center Leaf | Data Center Leaf<br>10Gbps Copper Agg<br>Workstation Interconnect |
| **Audience/ Target Market** | Enterprise<br>Traditional Ruckus Verticals*<br>Small/Medium datacenter | Enterprise<br>Traditional Ruckus Verticals*<br>Federal, MSO/CSP | Enterprise<br>Traditional Ruckus Verticals*<br>Small/Medium datacenter TOR | Enterprise<br>Traditional Ruckus Verticals*<br>Small/Medium datacenter TOR |

** Education, Hospitality/MDU, Federal-State-Local Govt, Public Venues, Retail*

**Don’t forget optics and support!**

# Enterprise Network Simplification With Fixed Switches

- Collapsed core/aggregation
  - 3-Tier → 2-Tier
  - Campus like Datacenter Spine & Leaf
- Cost-effective
  - No need to over-buy
  - Linear scaling
  - Re-use existing fiber




"Ruckus' ICX 7850 switch outperformed our existing network core chassis with an easy installation and much smaller footprint."

*Matt Mercer, Director of Network Services, Troy University*

# ICX 7850 For Enterprise Core

| Campus Core | |
|---|---|
| **Use Case(s)** | • Core for 100GbE Campus network<br>• Underlay for Multi-gigabit (11ax/LTE/IoT) |
| **Audience/ Target Market** | • Enterprise, Higher Ed, Federal, Large K-12 districts |
| **Why do I care? Why I need it?** | • Support growth (Wi-Fi, LTE, IoT)<br>• Next Gen (802.11ax) underlay<br>• Secure L2 infrastructure |
| **Key attributes** | • 32x 40/100GbE<br>• 8x 40/100GbE Stacking/Uplink<br>• -48FS supports [OM1/OM2] fiber (LRM)<br>• MACsec (Federal) |

# ICX 7850 For Enterprise Data Centers

| Enterprise Data Center | |
|---|---|
| **Use Case(s)** | • Leaf/Spine datacenter architecture<br>• Complement Campus Network deployments |
| **Audience/ Target Market** | • Small/Medium datacenter (up to 12 racks)<br>• SME/Higher Ed |
| **Why do I care? Why I need it?** | • Performance/Scalability/Futureproofing<br>• TCO |
| **Key attributes** | • 48x 1/10/25GbE(Server connections)<br>• 8x 40/100GbE Stacking/Uplink<br>• MACSec (Federal) |

# ICX 7850 For Service Providers

| Service Provider | |
|---|---|
| **Use Case(s)** | • Managed services |
| **Audience/ Target Market** | • Managed Service Providers (MSPs) |
| **Why do I care? Why I need it?** | • Support growth (Wi-Fi, LTE, IoT)<br>• Next Gen (802.11ax) underlay<br>• Secure L2 infrastructure |
| **Key attributes** | • 48x 1/10GbE<br>• 8x 40/100GbE Stacking/Uplink<br>• MACSec |