



# XR Solution Administrator

*XR Solution Technical Certification Training*

## **Session 1:**

**Training | Knowledge Check | Lab Exercise**

March 2022





# Session 1

- XR Series Hardware
- AirLink® OS Key Features and Layout
- AirLink® Services Including ALMS
- Knowledge Check (Online Quiz)
- Lab Exercise 1





- Differences between XR80 5G and XR80 LTE models
- Differences between XR80 5G Wi-Fi and XR90 5G Wi-Fi
- Antenna requirements for each XR Series router
- Ethernet port capabilities and behavior
- Requirements for Out-of-Band Management to work
- LPWA radio capability and restrictions
- AirLink OS responsiveness compared to ALEOS
- Product label information

# XR SERIES ROUTERS

XR90 | XR80 | XR80 LTE

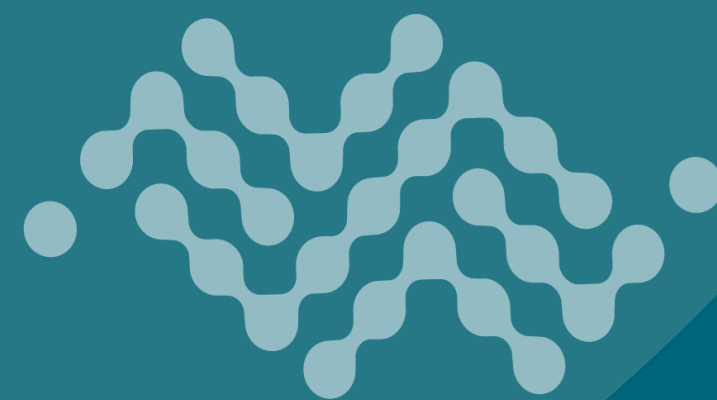
Model Overview

Model Differences

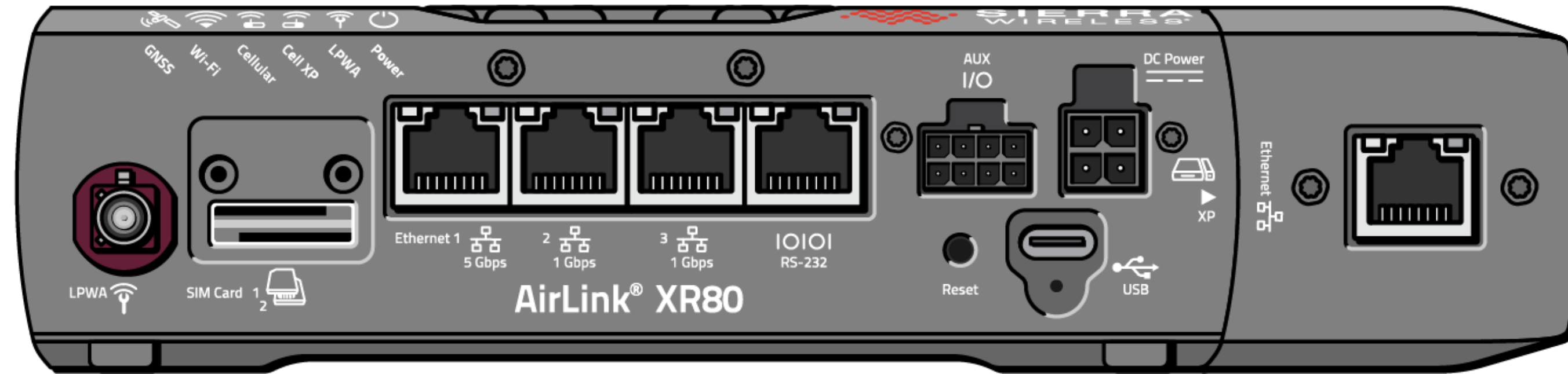
Common Features

Interfaces and Behavior

Antenna Requirements



# XR Series Model Overview



Model	NAM	Global
XR90 5G Wi-Fi	●	●
XR80 5G Wi-Fi	●	●
XR80 LTE Wi-Fi	●	●
XR80 5G	●	●
XR80 LTE	●	●





# Model Differences



Model	Internal Cell	Wi-Fi	Precision Time	Bluetooth	Expansion	Max Ethernet
XR90	--	(2) 5GHz 4x4 (1) 2.4GHz 4x4*	--	BT 4.1**	Up to 2 XP	1 x 5 GbE 4 x 1 GbE
XR80 5G	5G Sub-6 (4G Cat20 fallback)	--	1 x Precision Time Protocol IEEE 1588**	--	Up to 1 XP	1 x 5 GbE 3 x 1 GbE
XR80 5G Wi-Fi		(1) 5GHz 4x4 (1) 5GHz 1x1 (1) 2.4GHz 4x4*				
XR80 LTE Wi-Fi	4G Cat20	--				
XR80 LTE		--				

\*2.4GHz Wi-Fi share 5GHz antennas

\*\*Hardware is present, future software support



# Common Features: Building on the Tradition

**Concurrent 2.4/5GHz  
Wi-Fi 6 Radios**  
with 4x4 MU-MIMO

**FAKRA**  
Color coded and keyed  
quick-connect antenna  
connections



**Balanced High-Speed Interfaces**  
Cellular, Ethernet, Wi-Fi, USB-C

**Software-Defined Networking  
(LAN and WAN)**  
with configurable interfaces

**Quad-core CPU with Data Path  
Acceleration Architecture**  
for VPN processing offload

**GNSS**  
with Dead  
Reckoning and  
Differential GPS  
capability



**Embedded LPWA  
Cellular Radio**  
management traffic  
only (OOBM)

**Serial over RJ45**  
with dual serial console  
operation via breakout  
cable

**XP Cartridge  
Expansion Capability**  
5G Cellular + Ethernet





# Common Features: Carrying on the Tradition



7-36V power supply  
transient protection  
from -600v to +200v



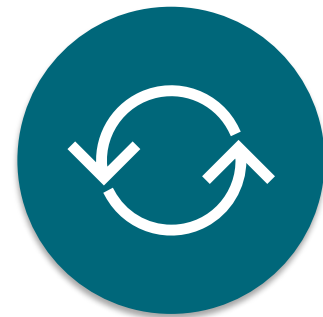
Two configurable  
SIM slots



Rugged gasketed  
design  
*(IP64 even with XP)*



-30°C to +70°C /  
-22°F to +158°F  
operating range



Unrestricted critical  
firmware updates for  
product life



1-year AirLink Services  
included in price



Up to 5 years extended  
warranty with current  
Services subscription



RoHS2, REACH, WEEE,  
Class 1 Div 2



E-Mark  
*(72/245/EEC, 2009/19/EC),  
ISO7637- 2, SAE J1455  
(Shock & Vibration)*



MIL-STD-810G  
Shock, Thermal shock,  
Vibration, Humidity



EN50155  
*(Rolling Stock)*



# Balancing the Speed In and Out

**Not just high speed 5G Cellular, but multiple WAN and LAN-capable wired and wireless interfaces**

## Dual Radio Cellular

Peak 5G DL  
up to 4.1 Gbps

UL of 660 Mbps

Peak 4G DL of 2 Gbps,  
UL of 210 Mbps

## Wired

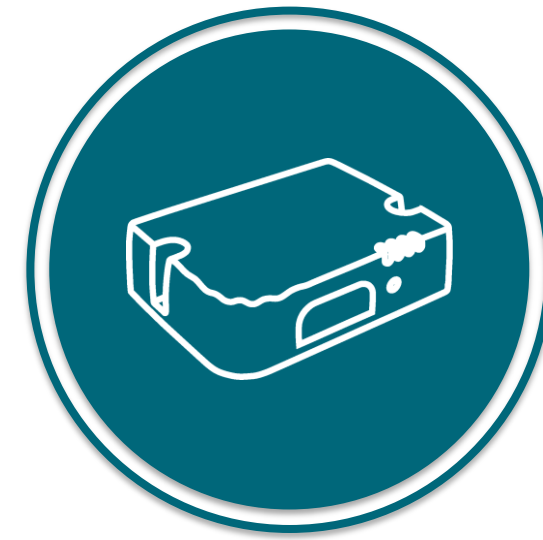
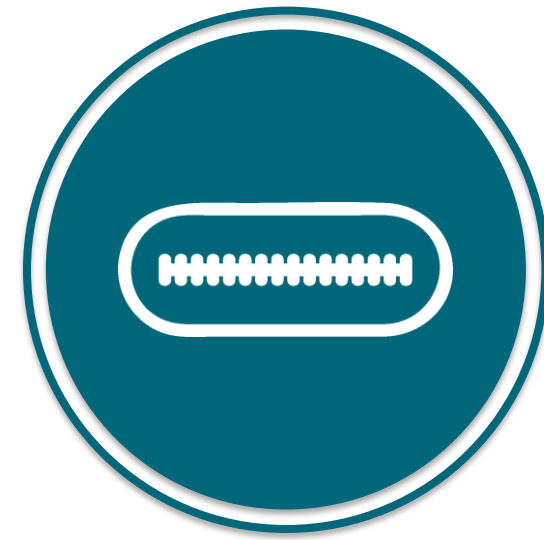
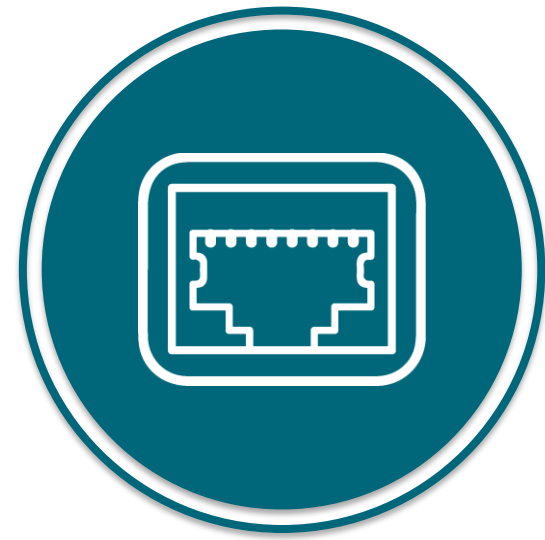
One 5 Gbps Ethernet  
+  
One USB-C 3.2 Gen 1

## Wireless

4x4 MU-MIMO  
Wi-Fi 6  
up to 2.4 Gbps



# Interfaces and Behavior: Network

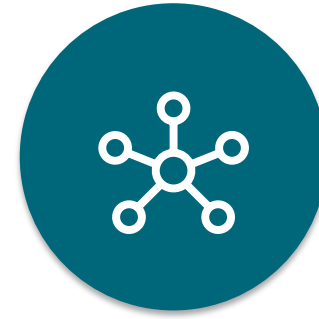




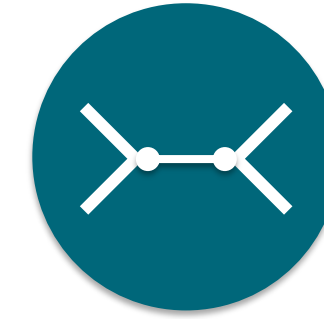
# Interfaces and Behavior: Network



Full IPv4 and IPv6 support with transitional tools



Default IPv4 LAN is set to 192.168.1.0/24



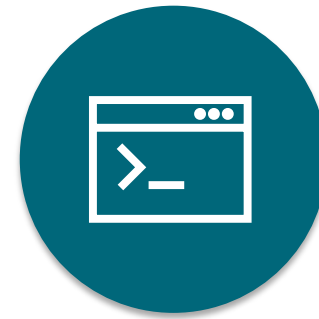
Default Gateway is 192.168.1.1 and DHCP range is 100-200



SDN allows multiple LAN segments assignable to any network interface



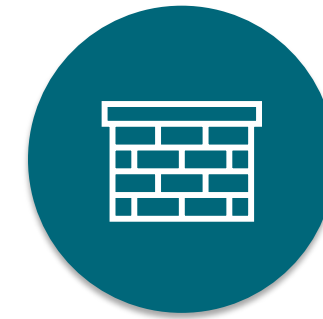
Various options for traffic forwarding



SDN allows dynamic WAN assignment



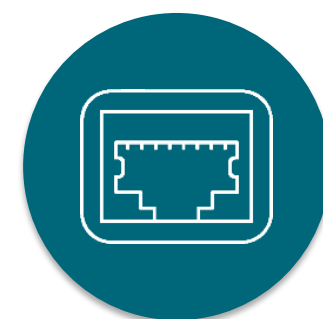
DHCP Reservation and Named Networks and Hosts



Zone-based firewall; all out, all between, none in by default



Default priority (based on WAN zone)



Ethernet (any) > 5 GHz client > 2.4 GHz client > Cell 1 > Cell 2



# Interfaces and Behavior: Wired Interfaces



All Ethernet ports are configurable for LAN or WAN use

-----

Dynamic WAN Auto-detect is default for all Ethernet ports (base and XP)

-----

All Ethernet ports provide access to Default LAN, out of the box

-----

The left port is 5 Gbps, all other ports are 1 Gbps



USB-C port is on Default LAN and is LAN-configurable

-----

Windows: requires driver install (auto update, optional); OS/X: autodetect

-----

Theoretical max throughput is 5 Gbps

-----

Industry-standard screw-lock support



# Interfaces and Behavior: Cellular

## SIM Slots

Top slot is for radio 1 (INT/XP1),  
bottom slot is for radio 2 (XP/XP2)

-----

SIMs read only at boot time

-----

Slot assignments are configurable

-----

Automated SIM failover supported for  
single-cellular routers (3.0)

## APN Modes

**Automatic:** Look-up based on carrier, uses  
most common (Default)

-----

**Manual:** APN specified

-----

**Manual:** Blank (network assignment if  
network supports)

-----

**Multi:** up to 5 per radio; presents each  
entry as virtual cell

# Interfaces and Behavior: Wi-Fi 6 and Serial



## DBDC Wi-Fi 6

Dual-band dual-concurrent radios; all disabled, set to 20MHz channel width

-----

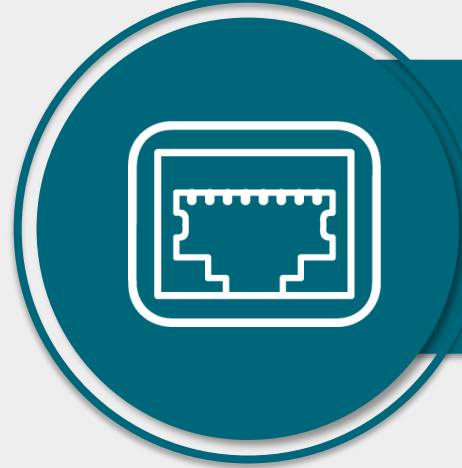
DFS disabled; enabling gives more 80MHz bands but has delay in AP broadcast

-----

Locked to outdoor channels only based on region (changing in 4.0)

-----

Up to 3 SSIDs available per access point



## RS232 Serial

RJ45 port providing single or dual RS232

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Compatible with standard Cisco-compatible light blue console/rollover cable

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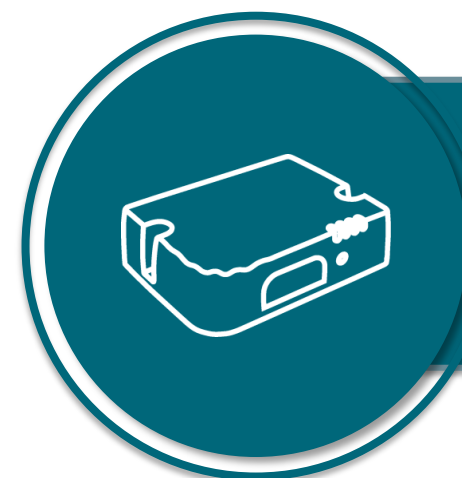
Proprietary cable available for dual-serial (one 4-wire, one 2-wire)

-----

Pinout available in Hardware guide for building customer dual-serial cables as needed



# Interfaces and Behavior: Wi-Fi 6 Details by Model



## XR90

5 GHz are two independent 4x4 radios, each configurable for client or AP (not shared)

-----

2.4 GHz: can operate in “repeater” mode (same channel as 2.4GHz STA) or “timeslice” mode (different channels)

-----

2.4 GHz: map each operation (STA/AP) to specific antenna bank



## XR80

Dual concurrent 2.4/5 GHz use 4 streams

-----

Both radios support shared operation; channel is based on STA/client (“repeater” mode)

-----

Discrete configuration of one each 2.4 and 5 GHz radio

-----

If you are using 5GHz STA mode, you **must** connect an antenna to Wi-Fi 5 connection



# LPWA Radio: Management Traffic Only

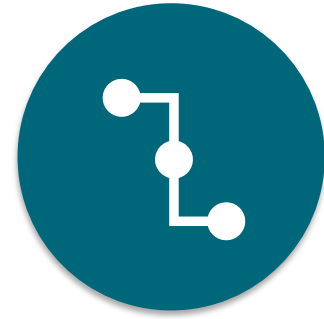


LPWA

Each XR Series router has an internal LPWA radio with 1x1 antenna



# LPWA Radio: Management Traffic Only



Data is limited to LWM2M management traffic to ALMS



Not configurable for user traffic



Limited to low throughput Cat-M1, NB-IoT



Not capable of supporting AirLink OS updates Over-The-Air



Must receive initial activation from ALMS



Requires registration and active Services status



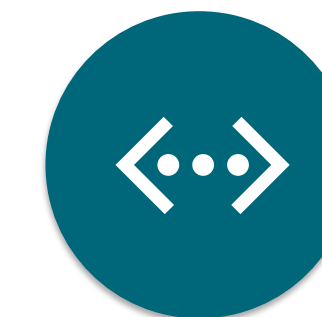
Uses SW connectivity, regional offering details may differ



Internal SIM (not user accessible)

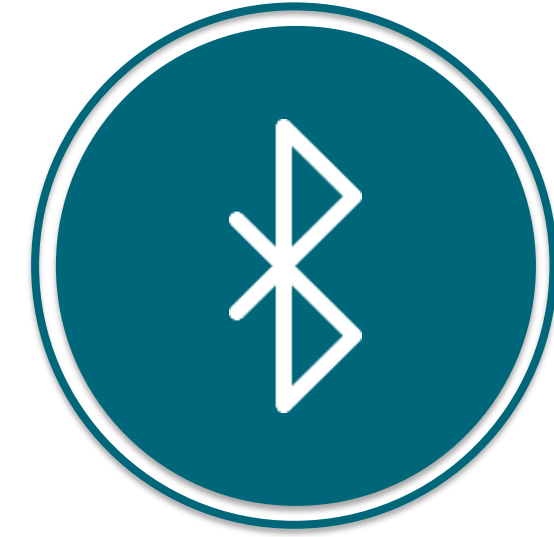


LPWA antenna included in router box



Provides Out-of-band management in case of total WAN loss

# Antenna Requirements





# Antenna Requirements



Cellular

4x4 MIMO each, 600-6000 MHz per cell

Cables must support high frequencies

Use of adapters not supported  
(interference + cable spec)



GNSS

FAKRA Signal Blue C Plug  
(requires HC 9003 jack on cable)

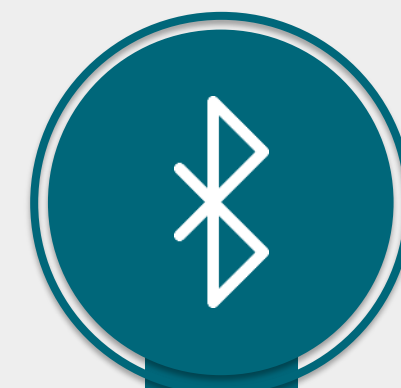
Cables must be low-loss



Wi-Fi

XR80: requires 4x4 MIMO 2.4/5 GHz  
plus 1x1 5GHz (5 total)

XR90: requires two 4x4 MIMO 2.4/5  
GHz (8 total)



Bluetooth

XR90 only: 2.4 GHz element with  
FAKRA Water Blue Z unkeyed (any  
FAKRA jack)

Can use any 2.4GHz Wi-Fi antenna

# FAKRA Connector Summary



Antenna	FAKRA Color	Key	Requires jack	XR90	XR80	XP
Cellular	Claret-Violet	D	HA9004 jack	-	4	4
Wi-Fi	Beige	I	HV 1001 jack	8	5	-
GNSS	Signal Blue	C	HC 9003 jack	1	1	-
Bluetooth	Water Blue	Z	RAL 5021 jack	1	-	-

Not including LPWA antenna, which has same connector as other Cellular but is provided with base unit



# When can I get by with less antennas?

**My customer wants to use existing antennas, or use less than all the available connections to save money if they don't need all the speed**

## Cellular

You can't

It's not just about throughput; some channels use 3+4 as primary connections

## Wi-Fi XR80

If never using 5GHz STA (Client) mode, you can skip Wi-Fi 5

If not max throughput requirement

## Wi-Fi XR90

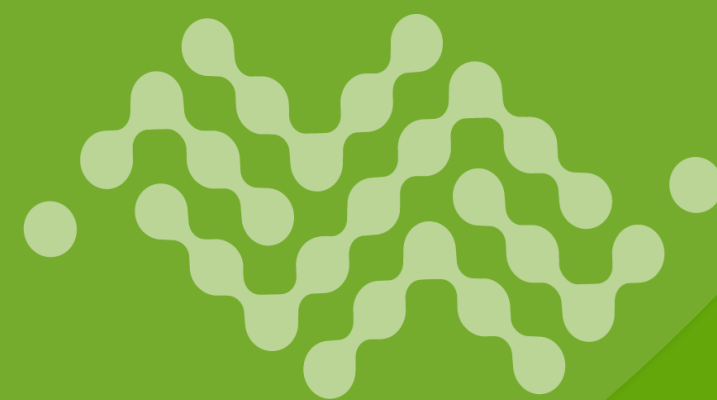
You can't

2.4 and 5GHz are shared, but MIMO order is reversed so even dual-band 2x2 requires all 4

# AIRLINK OS

Key Features

AirLink OS Layout





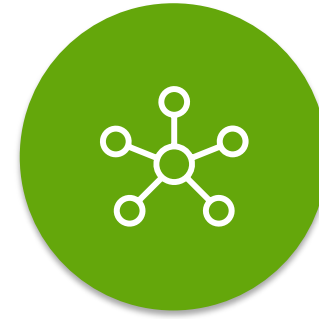
# Key Features of AirLink OS



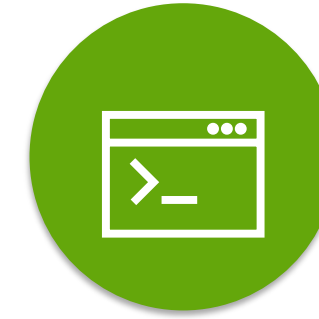
# Key Features of AirLink OS



Reboots only required for SIM-related changes



Dynamic WAN auto-detect



Software-defined networking (SDN): LAN and WAN



Multi-APN support



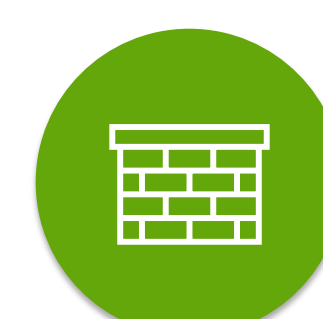
Full IPv6 support and typical controls and tools



Enhanced troubleshooting tools and logging



Enhanced reporting behavior to ALMS cloud management



User management and audit log



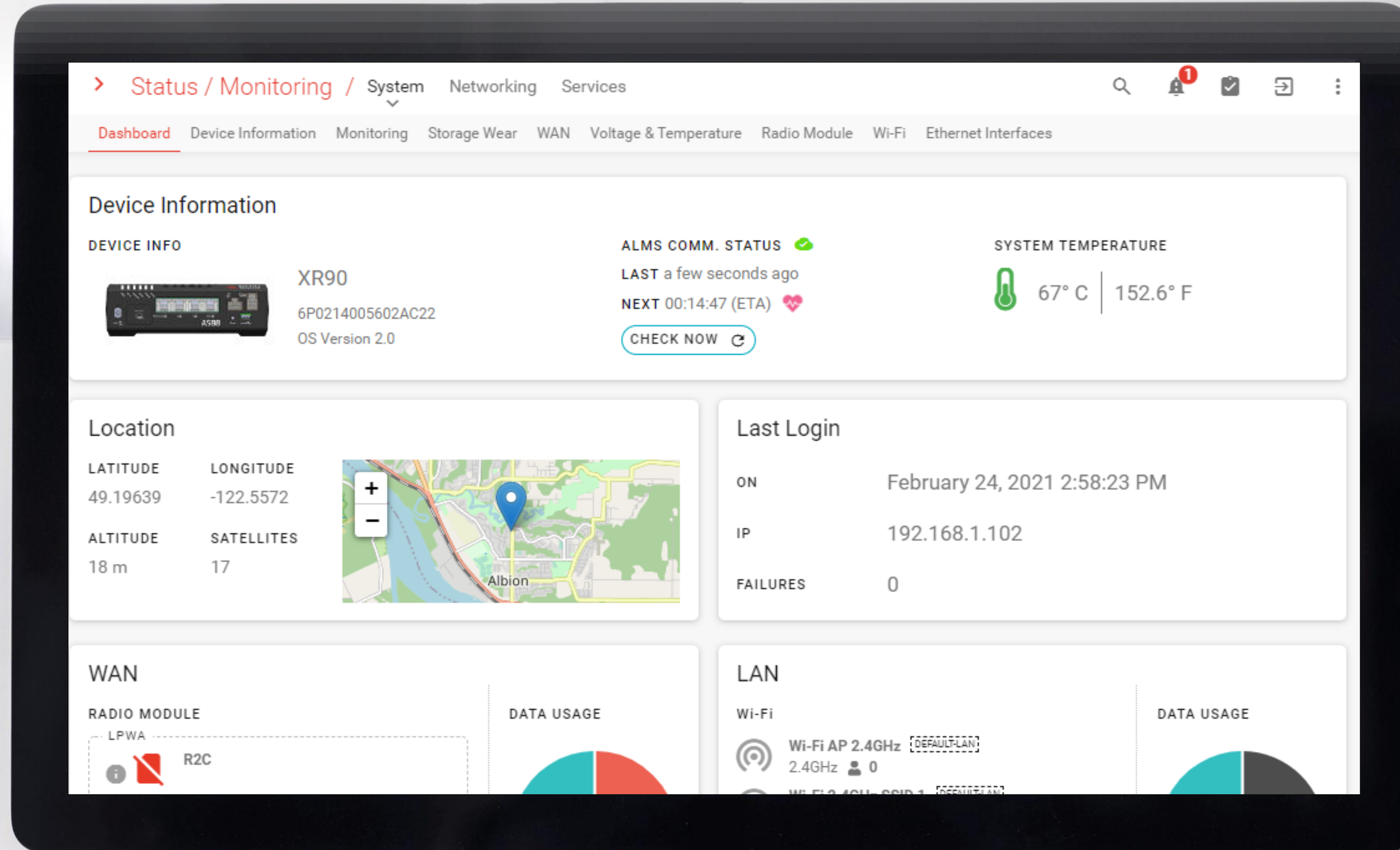
Improved upgrade behavior and new backout capability



Quarterly feature release schedule



# Navigating the User Interface: Better But Different



# Navigating the User Interface: Navigation Tools



Quickly find settings and values, navigate to sections

Left and top Menu panels

Search function

The screenshot displays the XR Solution Administrator web interface. At the top, there is a breadcrumb navigation path: > Status / Monitoring / System Networking Services. Below this is a secondary menu with options: Dashboard, Device Information, Monitoring, Storage Wear, WAN, Voltage & Temperature, Radio Module, Wi-Fi, and Ethernet Interfaces. The main content area is titled 'Device Information' and includes a 'DEVICE INFO' section with a device image, model 'XR90', serial number '6P0214005602AC22', and OS version 'OS Version 2.0'. To the right, there are status indicators for 'ALMS COMM. STATUS' (green checkmark) and 'SYSTEM TEMPERATURE' (67° C | 152.6° F). Below these are sections for 'Location' (with latitude, longitude, altitude, and satellite count) and a map of Albion. Other sections include 'Last Login' (ON, IP, FAILURES) and 'WAN'/'LAN' sections with radio module and Wi-Fi details. A search icon is visible in the top right corner of the interface.

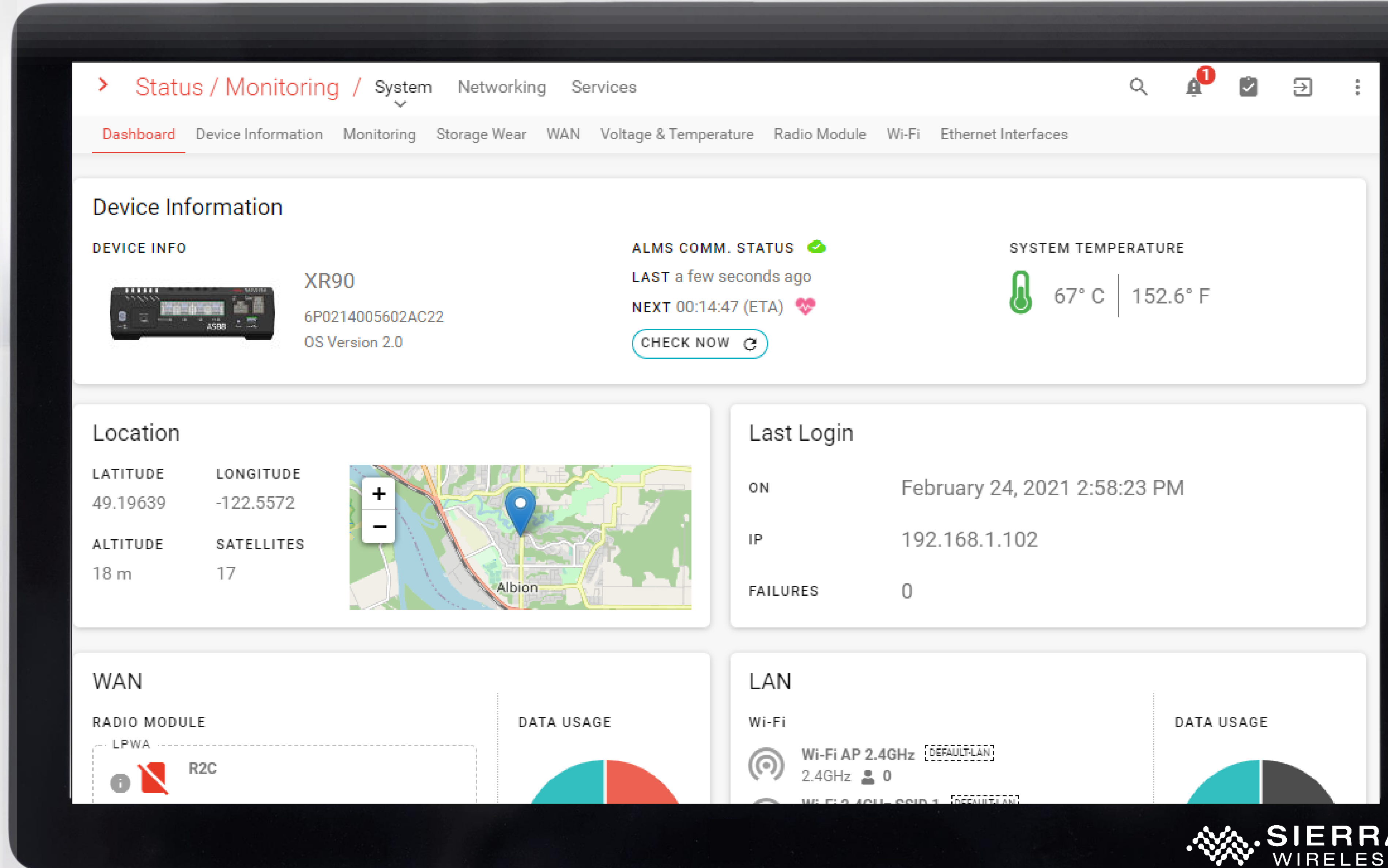


# Navigating the User Interface: Modern and Elegant



Different layout and operation

It does so much more!



# Navigating the User Interface: Intelligently Segmented



Status and Monitoring first, including the Dashboard

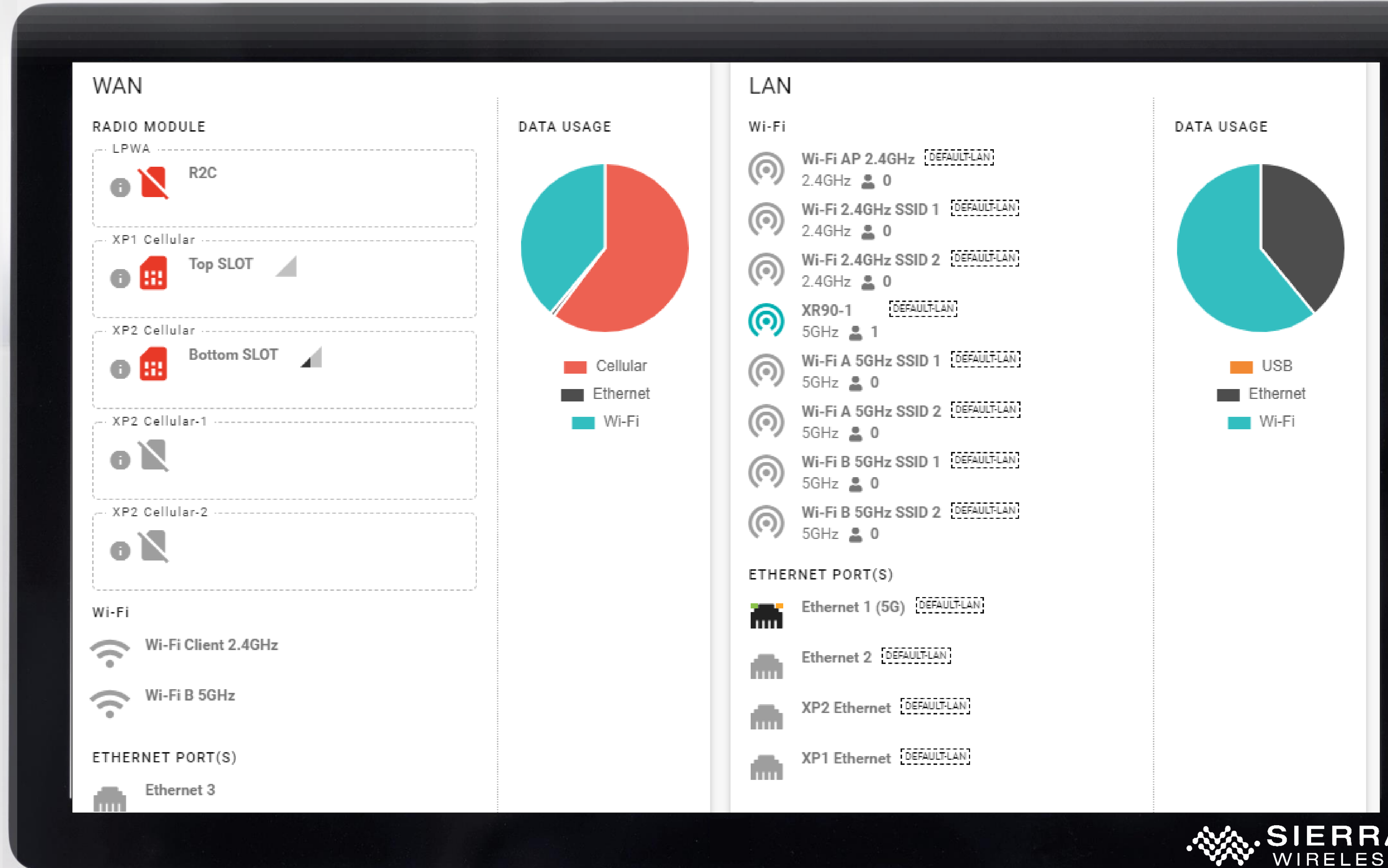
The screenshot displays the 'Status / Monitoring / System' page in the XR Solution Administrator. The navigation bar includes 'Dashboard', 'Device Information', 'Monitoring', 'Storage Wear', 'WAN', 'Voltage & Temperature', 'Radio Module', 'Wi-Fi', and 'Ethernet Interfaces'. The main content area is divided into several sections:

- Device Information:** Shows 'DEVICE INFO' for an XR90 device (6P0214005602AC22, OS Version 2.0). It also displays 'ALMS COMM. STATUS' as 'LAST a few seconds ago' with a 'NEXT 00:14:47 (ETA)' and a 'CHECK NOW' button. 'SYSTEM TEMPERATURE' is shown as 67° C | 152.6° F.
- Location:** Provides coordinates (LATITUDE: 49.19639, LONGITUDE: -122.5572) and altitude (18 m). A map shows the location near Albion with 17 satellites visible.
- Last Login:** Shows the device was last logged in on February 24, 2021 at 2:58:23 PM, with IP address 192.168.1.102 and 0 failures.
- WAN:** Shows the 'RADIO MODULE' as LPWA R2C and a 'DATA USAGE' pie chart.
- LAN:** Shows 'Wi-Fi' settings for 'Wi-Fi AP 2.4GHz' (2.4GHz, 0 users) and another 'DATA USAGE' pie chart.



# Navigating the User Interface: Intelligently Segmented

Then  
Communications



The screenshot displays the 'Then Communications' section of the XR Solution Administrator interface, divided into three main panels: WAN, LAN, and Data Usage.

**WAN Panel:**

- RADIO MODULE:**
  - LPWA: R2C (Status: Disabled)
  - XP1 Cellular: Top SLOT (Status: Enabled)
  - XP2 Cellular: Bottom SLOT (Status: Enabled)
  - XP2 Cellular-1 (Status: Disabled)
  - XP2 Cellular-2 (Status: Disabled)
- Wi-Fi:**
  - Wi-Fi Client 2.4GHz
  - Wi-Fi B 5GHz
- ETHERNET PORT(S):**
  - Ethernet 3

**LAN Panel:**

- Wi-Fi:**
  - Wi-Fi AP 2.4GHz [DEFAULT-LAN] (2.4GHz, 0 users)
  - Wi-Fi 2.4GHz SSID 1 [DEFAULT-LAN] (2.4GHz, 0 users)
  - Wi-Fi 2.4GHz SSID 2 [DEFAULT-LAN] (2.4GHz, 0 users)
  - XR90-1 [DEFAULT-LAN] (5GHz, 1 user)
  - Wi-Fi A 5GHz SSID 1 [DEFAULT-LAN] (5GHz, 0 users)
  - Wi-Fi A 5GHz SSID 2 [DEFAULT-LAN] (5GHz, 0 users)
  - Wi-Fi B 5GHz SSID 1 [DEFAULT-LAN] (5GHz, 0 users)
  - Wi-Fi B 5GHz SSID 2 [DEFAULT-LAN] (5GHz, 0 users)
- ETHERNET PORT(S):**
  - Ethernet 1 (5G) [DEFAULT-LAN]
  - Ethernet 2 [DEFAULT-LAN]
  - XP2 Ethernet [DEFAULT-LAN]
  - XP1 Ethernet [DEFAULT-LAN]

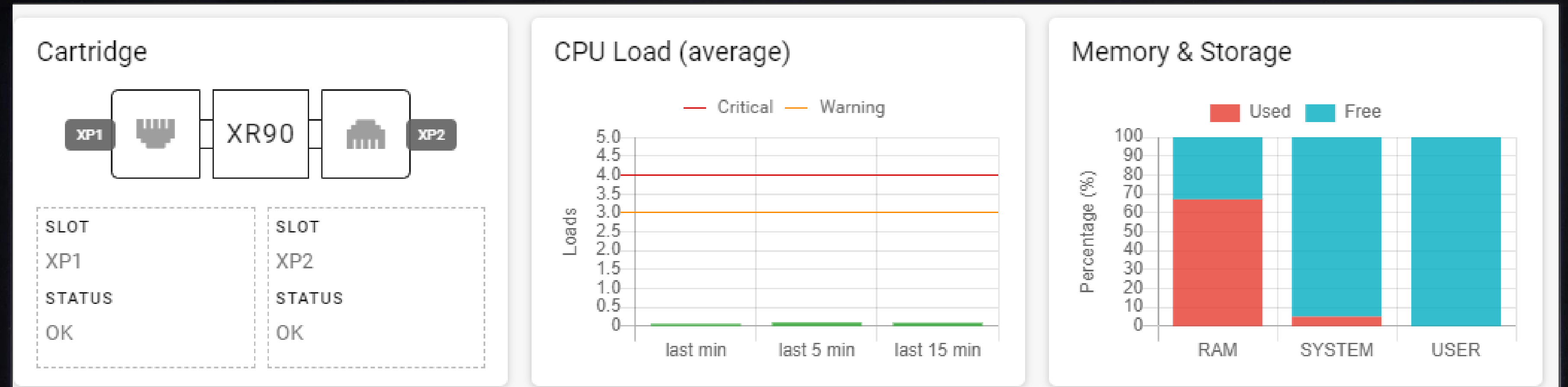
**Data Usage Panels:**

- WAN Data Usage:** A pie chart showing Cellular (red) and Wi-Fi (teal) usage. Cellular is the largest segment.
- LAN Data Usage:** A pie chart showing USB (orange), Ethernet (black), and Wi-Fi (teal) usage. Wi-Fi is the largest segment.

# Navigating the User Interface: Intelligently Segmented



And finally, device systems and management





# Dashboard and Status

A lot of information, in layers

- WAN Link states
- LAN interfaces and users
- Network states
- Location status
- Management status

The screenshot displays the XR Solution Administrator dashboard for a device named XR90. The interface is organized into several sections:

- Device Information:** Shows device ID (XR90), MAC address (6P0214005602AC22), and OS Version (2.0). It includes an "ALMS COMM. STATUS" section indicating the last communication was "a few seconds ago" and the next is at "00:14:47 (ETA)". A "CHECK NOW" button is present.
- SYSTEM TEMPERATURE:** Displays a temperature of 67° C (152.6° F).
- Location:** Provides coordinates (Latitude: 49.19639, Longitude: -122.5572), altitude (18 m), and satellite count (17). A map shows the location near Albion.
- Last Login:** Shows the user is "ON" since February 24, 2021, at 2:58:23 PM, with IP address 192.168.1.102 and 0 failures.
- WAN:** Details the radio module (LPWA R2C) and cellular status for XP1 (Top SLOT) and XP2 (Bottom SLOT, Cellular-1, Cellular-2). It also shows Wi-Fi client status for 2.4GHz and 5GHz.
- ETHERNET PORT(S):** Lists Ethernet 1 (5G), Ethernet 2, XP2 Ethernet, and XP1 Ethernet.
- USB PORT(S):** Shows USBNet status.
- DATA USAGE:** A pie chart shows usage for Cellular (red), Ethernet (black), and Wi-Fi (teal).
- ETHERNET PORT(S) DATA USAGE:** Another pie chart shows usage for USB (orange), Ethernet (black), and Wi-Fi (teal).
- Bottom Row:** Includes "Cartridge" status, "CPU Load (average)" with a progress bar, and "Memory & Storage" with a progress bar.



# AIRLINK SERVICES AND ALMS

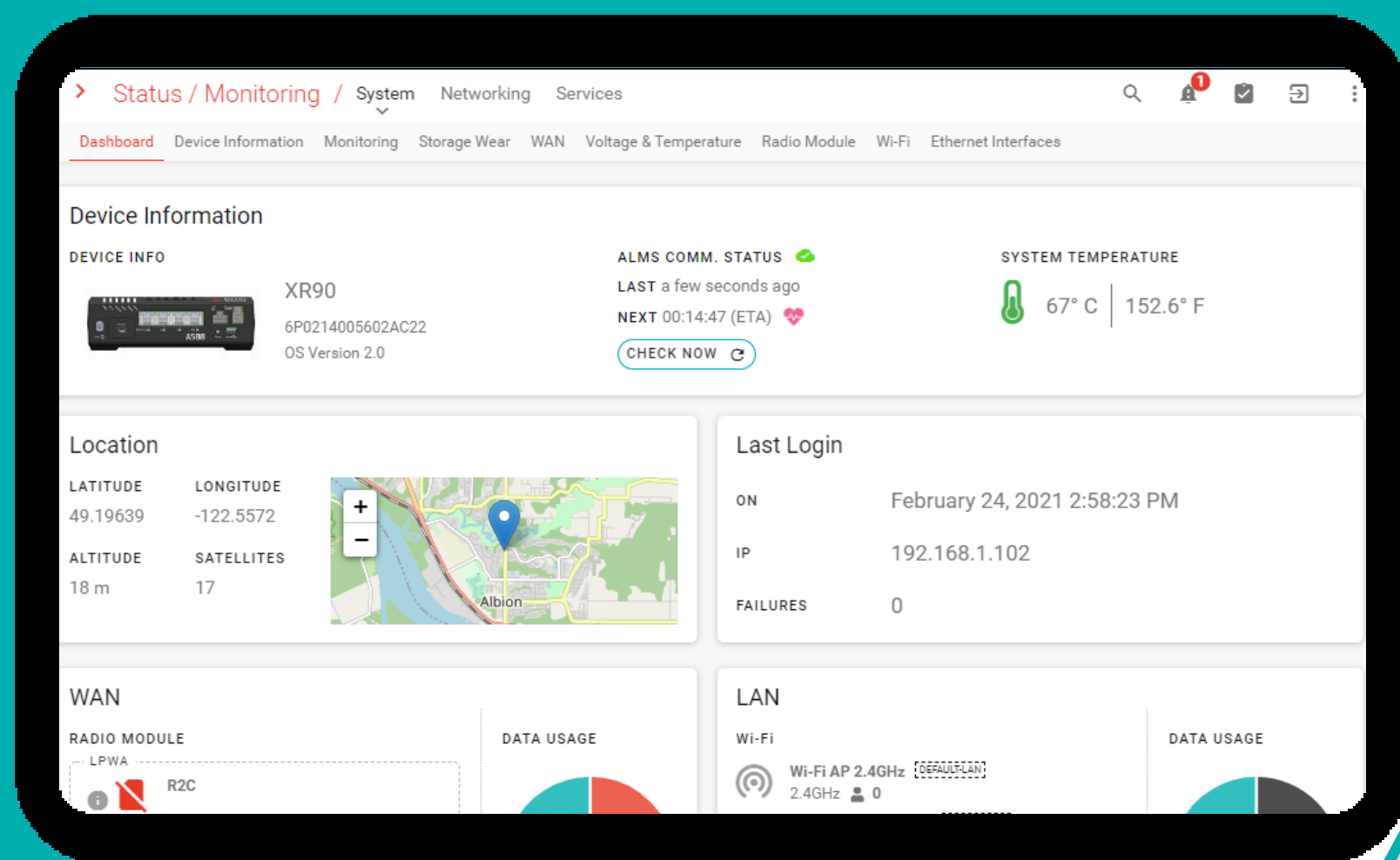
Strengthening the  
End-to-End Security  
Registration Code





# Strengthening the End-to-End Solution

Network devices need to be maintained



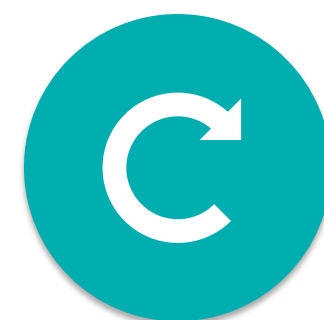
Subscription-based maintenance model ensures no device is left behind



Product solution includes the first year of AirLink Services



Regulatory landscape and customer dedication to security; carrier pressure



Many organizations and certification authorities mandate devices updates



Secure cloud-based service is the right tool



Sierra Wireless prioritizes security in the cloud and data residency

# AirLink Services Registration Code

The router label information is continuing to evolve

**Default Password**  
FYI: the only place it is printed



**Registration Code**  
for AirLink Services  
registration

**The Serial Number  
and Radio IMEIs**  
**XR80**, IMEIs for both the LPWA  
radio and 5G radio  
**XR90**, IMEI for the LPWA radio



# Using the QR code



Scan the image with your smartphone

On bottom label of the router  
Unique, even more than before

One way to access Service  
registration information



Next session will  
explore more in-depth  
the best workflow  
around registering  
devices for AirLink  
Services

# Thinking Outside the Label

Router registration information is found on the label, but that requires opening every box and capturing a QR code or multiple bar codes.



Some information is restricted from certain locations for security purposes

Data	Bottom of Router	Outside of Box	ASN File
Default Password	Yes	No	No
Registration Code	Yes	No	Yes
Serial Number	Yes	Yes	Yes



Sierra Wireless sends registration information to distribution partners and is available for Resellers



Request registration information from your distributor to enable a more automated workflow



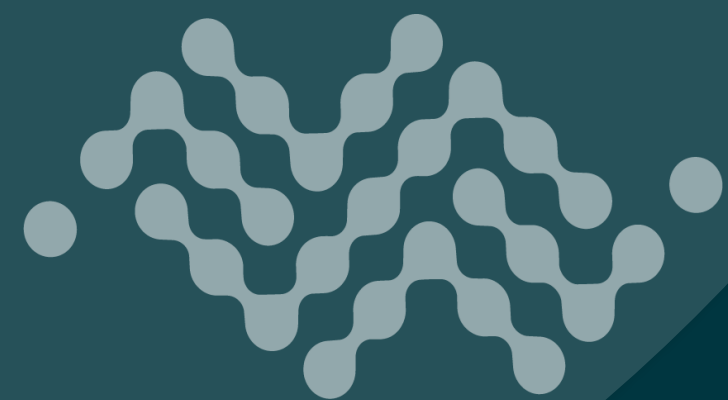
# WHAT'S NEXT

Knowledge Check

Online quiz

Lab Exercise #1 and Submission

Next Week: AirLink OS



- Differences between XR80 5G and XR80 LTE models
- Differences between XR80 5G Wi-Fi and XR90 5G Wi-Fi
- Antenna requirements for each XR Series router
- Ethernet port capabilities and behavior
- Requirements for Out-of-Band Management to work
- LPWA radio capability and restrictions
- AirLink OS responsiveness compared to ALEOS
- Product label information



# Taking the Online Quiz

As part of the certification program, you are required to demonstrate mastery of requirements to work with the XR Series of routers



Complete the online quiz with >80% prior to the start of the next session



You do not need to complete the lab exercise prior to taking the quiz, because it is based on the presentation content



# Introduction to Lab Exercise #1



## The lab exercise covers:

- Guided inquiry into confirming device status
- Examining link quality indicators
- Examining link capability indicators
- New and improved troubleshooting tools
- Setting up some basic device parameters

## Also:

- Creating an ALMS “Gen 2” account (if not already done)
- Registering your XR Series router for AirLink Premium/Complete for XR80 (including ALMS)





**END OF SESSION 1**

Thank you!

