



COMMERCIAL ENTERPRISE
LINUX FOR MISSION-CRITICAL A&D

DISA OVERVIEW
OCTOBER 2024



WIND RIVER AT A GLANCE

Driving Tomorrow's Technology

- 1 Global leader in delivering software for intelligent connected systems, offering a comprehensive, edge-to-cloud software portfolio
- 2 **Mission-critical systems:** Utilizing advanced technology and expertise to develop, deploy, operate, and maintain reliable, secure, and scalable solutions essential for modern operations.
- 3 2+ Billions Edge Systems Powered by Wind River
- 4 Award-winning support, vast partner ecosystem, and elite professional services
- 5 Silicon Valley based with 1,600+ global employees, 600+ R&D innovators, 250+ sales professionals – driving cutting-edge tech from Alameda HQ



1981

Founded



~1,600

Employees Globally



~1,700

Global Customers



~\$450M

2023 Revenue



20

Countries/Global Presence



2B+

Deployed Edge Devices



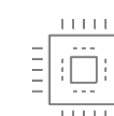
10

Consecutive Years Ranked
As Top Workplace



250+

Ecosystem Partners



#1

Market Share in Edge
Compute OS Platforms

**WIND RIVER IS A TRUSTED LEADER
IN AEROSPACE AND DEFENSE WITH
OVER 600 A&D CUSTOMERS
WORLDWIDE AND MORE THAN
550 SAFETY CERT PROGRAMS
ACROSS SPACE, AIR, LAND,
MARITIME, AND CYBER DOMAINS.**



KEY HIGHLIGHTS



12 years of releasing Yocto Project Linux for embedded systems



10 years of releasing CentOS Linux for enterprise systems for server-based platforms

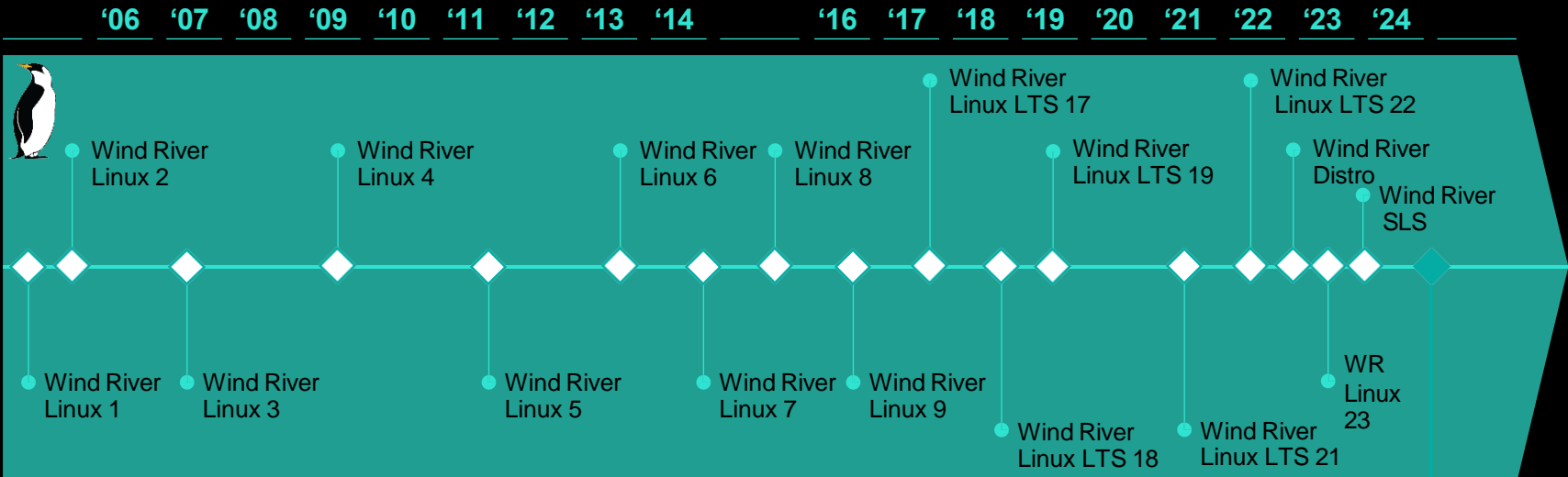


4 years of investment and product release shifting from CentOS to Debian Enterprise Linux

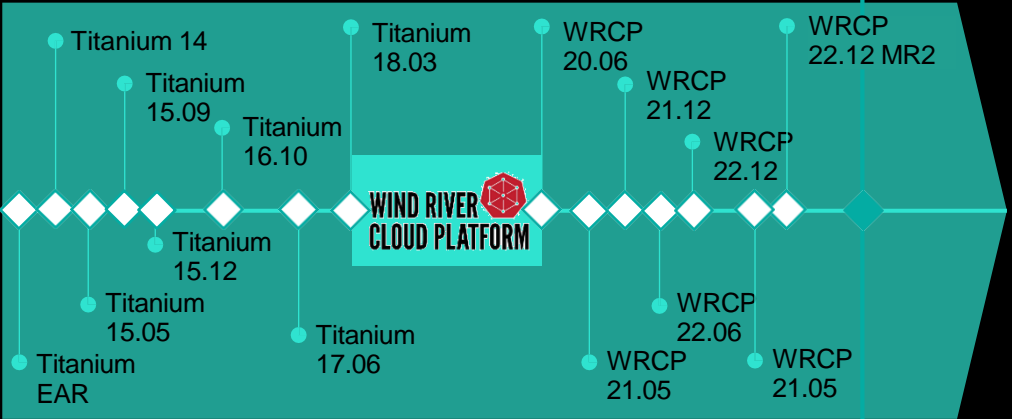
Co-Founder Open-Source



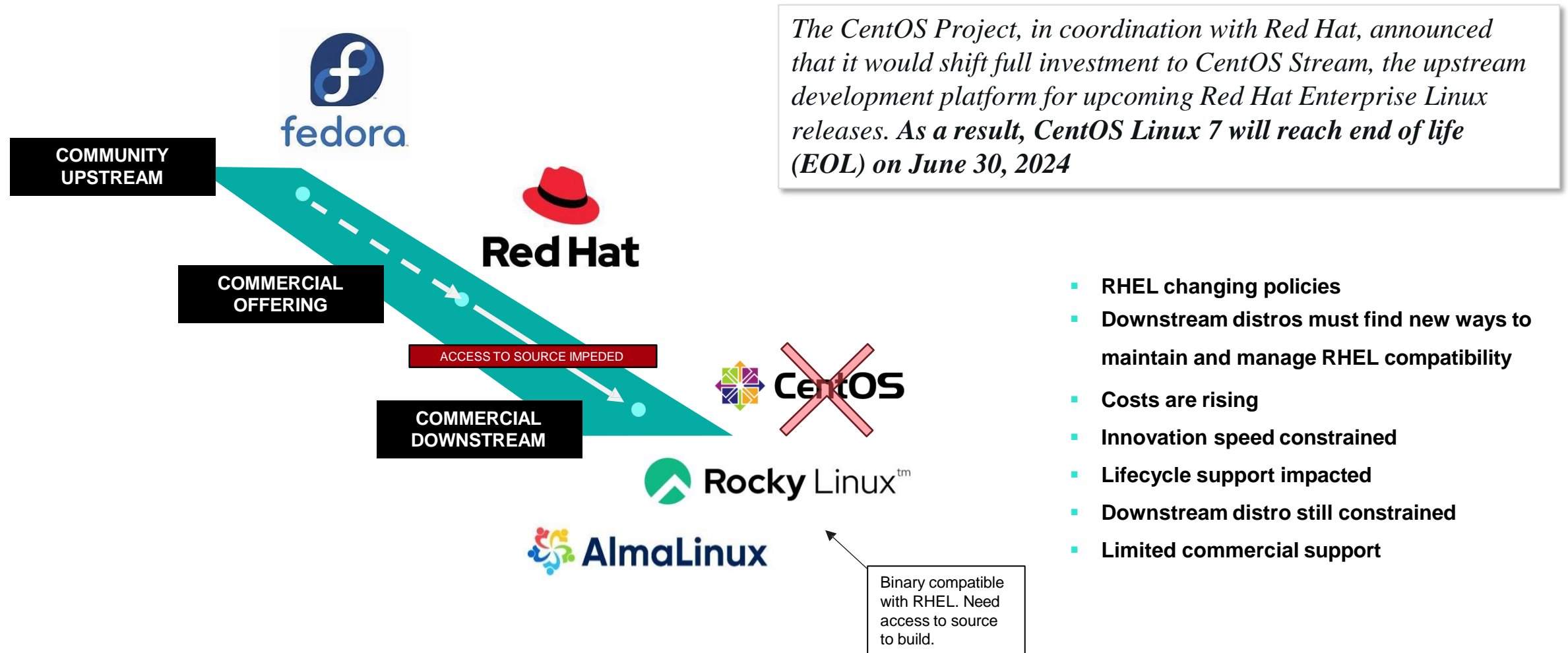
WINDRIVER'S TWO DECADES LEGACY IN LINUX



10+ years
deploying
performance critical
telco workloads

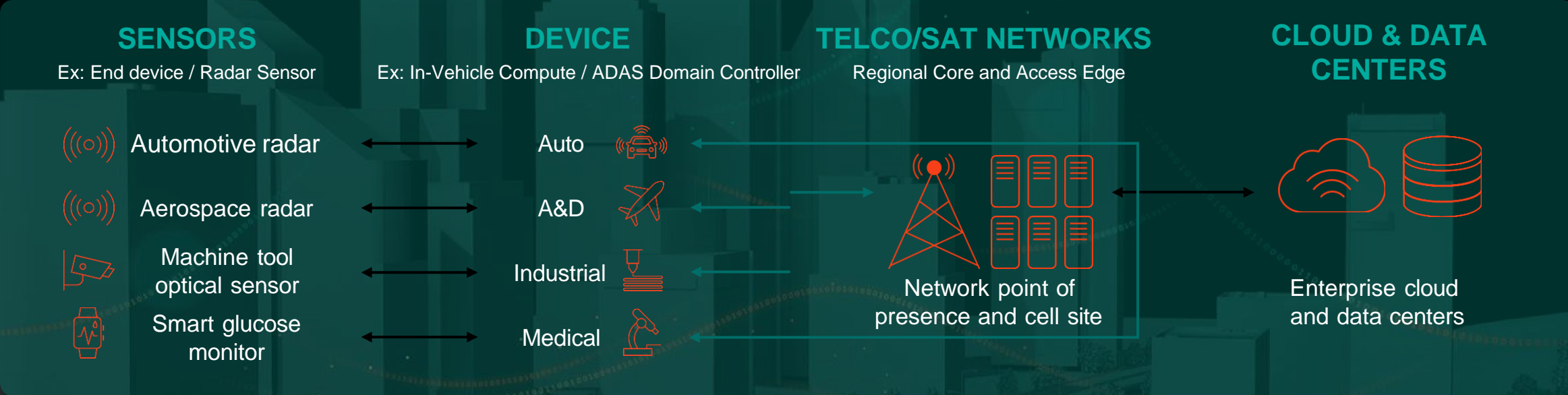
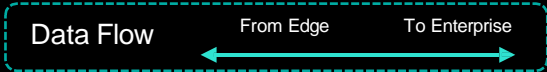


SUPPLIER DISRUPTION UNDERWAY



THE EMERGING INTELLIGENT EDGE

BRIDGING WORLDS: EDGE-TO-ENTERPRISE CONVERGENCE OF OT AND IT SYSTEMS



BY 2025

75%

OF DATA WILL BE PROCESSED AT THE EDGE GLOBALLY, VERSUS 10% IN 2018*

BY 2025

95%

OF NEW DIGITAL WORKLOADS GLOBALLY WILL BE DEPLOYED ON CLOUD-NATIVE PLATFORMS, VERSUS 30% IN 2021*

HOW ELXR FITS IN OUR LINUX OFFERING

CLOUD NATIVE



WIND RIVER CLOUD NATIVE ASSETS

Container base image, lightweight k8s, services and security solutions to ensure growth as customers evolve to cloud native

ENTERPRISE - ELXR SERVER

WIND RIVER ENTERPRISE LINUX – ELXR SERVER

For enterprise-class, non-embedded, mission-critical, real-time IT architecture platforms



EMBEDDED

WIND RIVER LINUX BUILDER

Our historical buildable Linux offering for custom embedded systems
With services, custom content management, and support



WIND RIVER LINUX ELXR EDGE

A **supported binary distribution** for multiple target architectures
Enabling ease of use and frictionless adoption



SERVICES

WIND RIVER STUDIO LINUX SERVICES

CVE mitigation, performance optimization, BSPs and management, lifecycle security and defect management, and more



COMMERCIALIZATION

FLEXIBLE BUSINESS MODELS



SERVICES + SUPPORT



SECURITY UPDATES



CLOUD NATIVE /eLxr

SUPPORTED
CONTAINER
BASE IMAGE



LIGHTWEIGHT
KUBERNETES (k8s)



SAFE LINUX



PLAN OF INTENT: Intersect the market shift to **Safe Linux**.
Wind River can deliver safe Linux today via services capabilities.

EMBEDDED

» SOLUTIONS FOR CUSTOM LINUX BUILDS

WIND RIVER
LINUX BUILDER



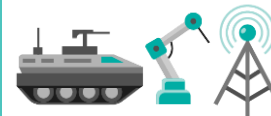
/eLxr Edge PRO



ENTERPRISE

» DEBIAN-BASED ELXR

/eLxr Server PRO



SAFETY

» SAFE LINUX SOLUTIONS

WIND RIVER
SAFE LINUX SERVICES



WIND RIVER STUDIO LINUX SERVICES

ELXR PRO SOLUTIONS

Elevate your eLxr deployments for mission-critical and data-intensive workloads

WINDRVR

Technical analysis
& assessments

Migration and
implementation services

Use case
customizations
and optimizations

Additional security
and certifications

Customer training
(on-site and/or
virtual)

Commercial
Offering



- Performance optimized for latest hardware accelerators
- Support for base OS and cloud native components (k8s, container runtime, container base images)
- Security updates for supported packages
- Reliable support, including 24x7 SLAs, 10 years of CVE support and maintenance

eLxr Server^{PRO}

eLxr Server Pro is ideally suited for customers deploying public cloud, regional data center, near edge, distributed cloud, and intelligent edge implementations.

eLxr Edge^{PRO}

eLxr Edge Pro is ideally suited for customers deploying embedded devices, intelligent edge, on-premise edge, intelligent gateway, and intelligent sensor implementations.

Community
Derivative

eLxr Project: An open-source derivative of Debian



Upstream
first



Low
footprint



Performance-
optimized



Real-time
kernel



Security-
hardened



WINDRVR

ENTERPRISE-GRADE LINUX

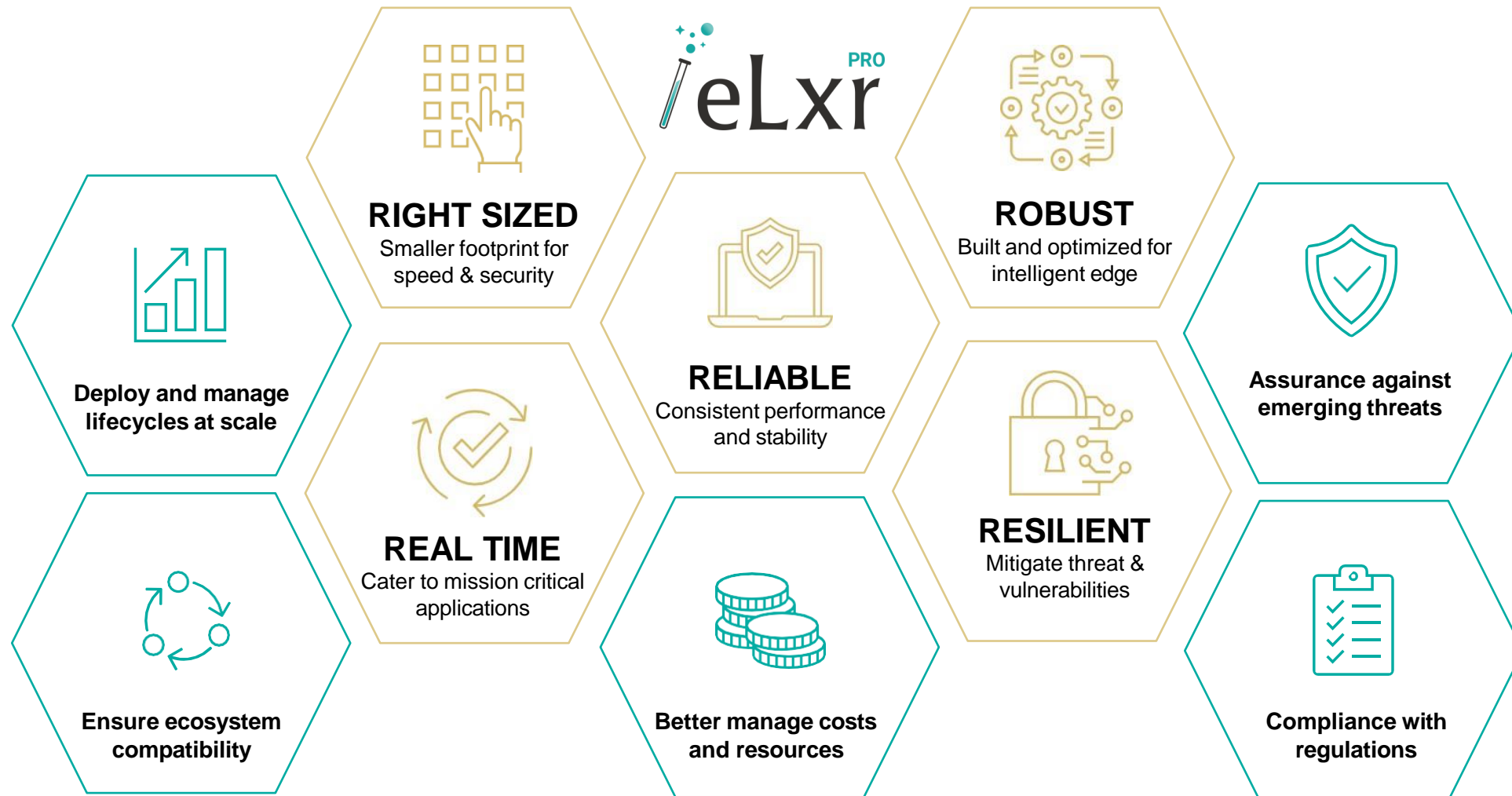
EDGE TO ENTERPRISE



Enterprise-Grade Linux
Distribution
for **Edge to Enterprise**
deployments

- Debian compatible
- Upstream first
- Low-footprint
- Performance-optimized
- Real-time kernel
- Security-hardened
- <https://eLxr.org>

LONG-TERM SUPPORT & SERVICES FROM EDGE TO ENTERPRISE



Commercial Enterprise
Linux **Solution**
for the **Cloud-to-Edge**
Continuum

- Solution on top of the open-source distro
- Inherits all technical attributes of eLxr binary
- Adds access to private repositories for custom workloads
- Cloud-native components and deliverables
- Reliable global support, with 24/7 option
- Pro-active monitoring, notification & remediation for CVEs

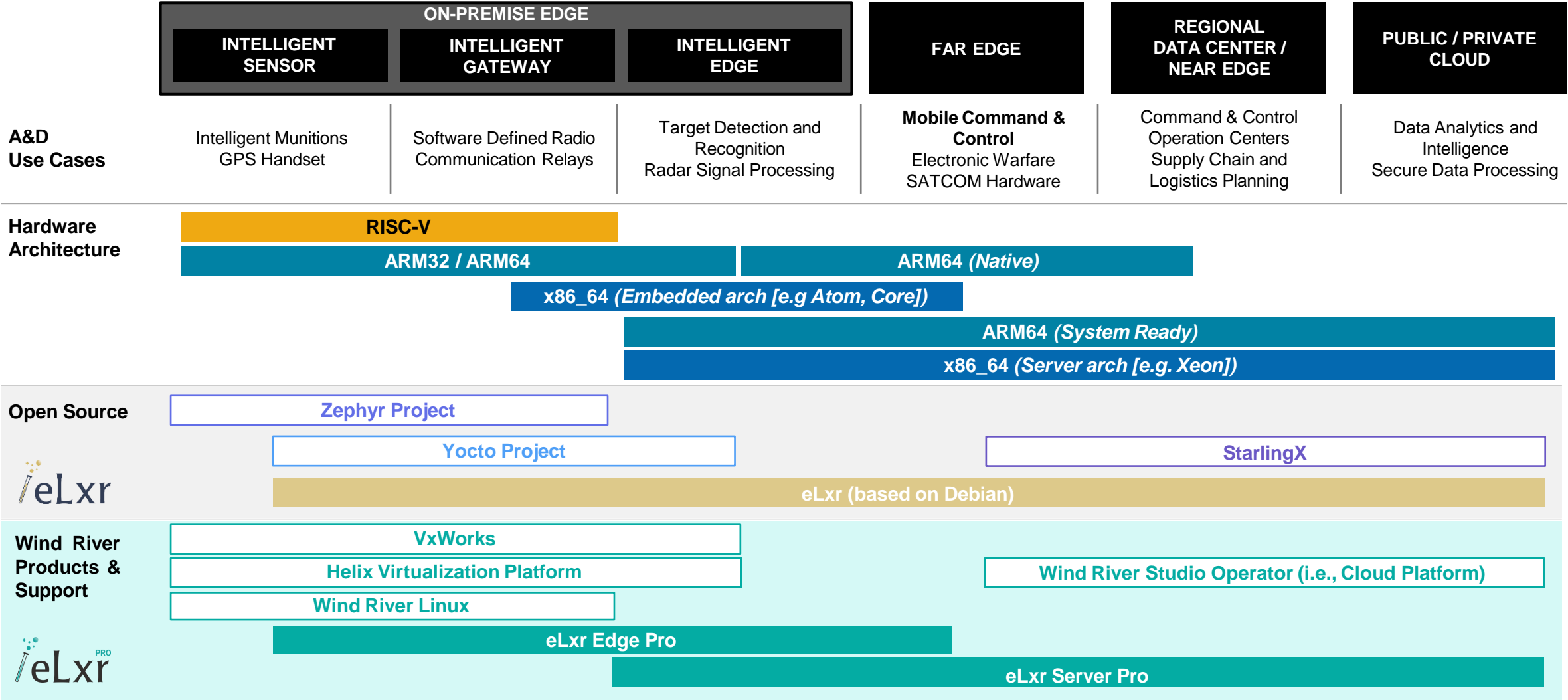
- + Migration
- + Customizations
- + Certifications
- + Training

WR PORTFOLIO SUPPORT & PRODUCTS

SPANS EDGE TO ENTERPRISE

Open Source Project

Commercial Support



USE CASE: MOBILE COMMAND & CONTROL

Uninterrupted Mission-Critical Operations

- Guaranteed Uptime
- Regular Updates & Maintenance
- Optionality for Support (i.e., standard 9x5 or priority 24x7)

Enhanced Security & Compliance

- **Certified Security (i.e., STIG, FIPS 140-3, and FIPS 140-2) – details follow**
- Access to Global Security Experts

Optimized Performance & Efficiency:

- High Performance for mission critical workloads
- Deterministic processing
- Minimal Footprint for low attack surface



ELXR PRO

SECURITY CERTIFICATIONS & COMPLIANCE

In progress

In roadmap

1

STIG

Implementation guides to configure and secure operating systems according to DISA standards

Approved STIG tailored to the eLxR OS derived from the General Purpose OS (GPOS) security technical implementation guide

2

FIPS 140-2

Superseded standard for protection of sensitive data and cryptographic operations

Short-term stop gap to provide a rebranded, FIPS compliant OpenSSL version based on 3.0.8

3

FIPS 140-3

Current standard for protection of sensitive data and cryptographic operations

Planning to certify kernel, OpenSSL, gnuTLS, libgcrypt, and NSS on hardware platforms

4

NIAP

Common Criteria (CC) verification based on applicable protection profile(s)

General purpose OS protection profile, SSH, and TLS application profiles

5

FEDRAMP

Standard approach to security assessment, authorization, and continuous monitoring for cloud products and services

Ensure secure cloud computing in federal agencies for AWS GovCloud, Azure, and other CSP offerings

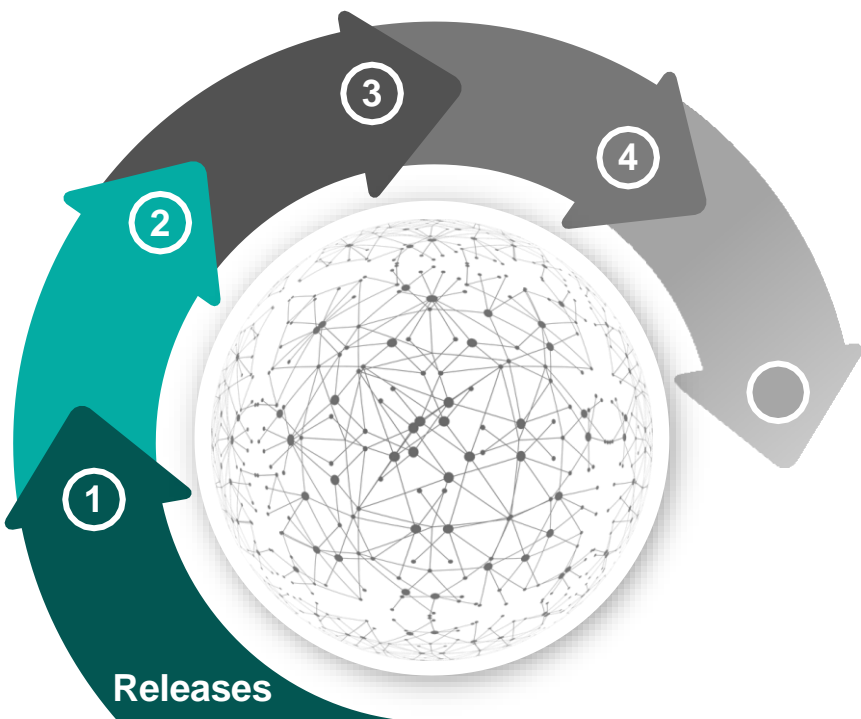
SECURITY CERTIFICATIONS

OVERVIEW

CERTIFICATION	DESCRIPTION	TECHNICAL DETAILS
FIPS 140-2	Superseded standard for protection of sensitive data and cryptographic operations	Short-term stop gap to provide a rebranded, FIPS compliant OpenSSL version based on 3.0.8
FIPS 140-3	Current standard for protection of sensitive data and cryptographic operations	
Kernel	Kernel module crypto + entropy source validation (ESV)	Kernel crypto APIs + validated entropy source
OpenSSL	OpenSSL user space library and command line tools	General purpose crypto library
gnuTLS	gnuTLS user space library	Secure communications library for network protocols (e.g. TLS)
libgcrypt	gcrypt user space library	General purpose library based on GnuPG
NSS	Network security services user space library	Security library for security protocols (e.g. TLS), crypto graphic operations, certificate + key management, PKCS #11
NIAP	Common Criteria (CC) verification based on applicable protection profile(s)	General purpose OS protection profile, SSH, and TLS application profiles
STIG	Implementation guides to configure and secure applications and operating systems according to DISA standards	Approved STIG tailored to the eLxr OS derived from the General Purpose OS (GPOS) security technical implementation guide

FOR CUSTOMERS

- **In general, plan is to submit certification artifacts by 2025,** however, we are subject to CMVP government processes that conduct final validation
 - Once submitted, package is searchable on CMVP website
- If customers are curious, high-level overview pages have been provided
 - At this time, we're in the planning phase (or Step 1) for all certifications



1 Open Source Foundation

Debian-based Operating System

Target applications:

- Intelligent Edge
- Network Far Edge
- Remote Data Center

Features:

- Commercial support for 5000+ Debian packages
- General Purpose + RT Kernels
- QAT + OpenVino acceleration

Hardware supported:

- Intel Core + Xeon

Launched Jul '24 at DebConf

2 Enabling Cloud Native

Containerized workload

orchestration & execution support

Target applications:

- Public Cloud
- CaaS + Virtualization

Features:

- Optimized container execution
- Secure container base images
- Scalable orchestration
- Virtualization support
- Cloud service provider integration
- Security certification kickoff

New release this week!



Reach out to WNDRV R

✓ Support

packages & vulnerabilities

✓ Services

migration & implementation

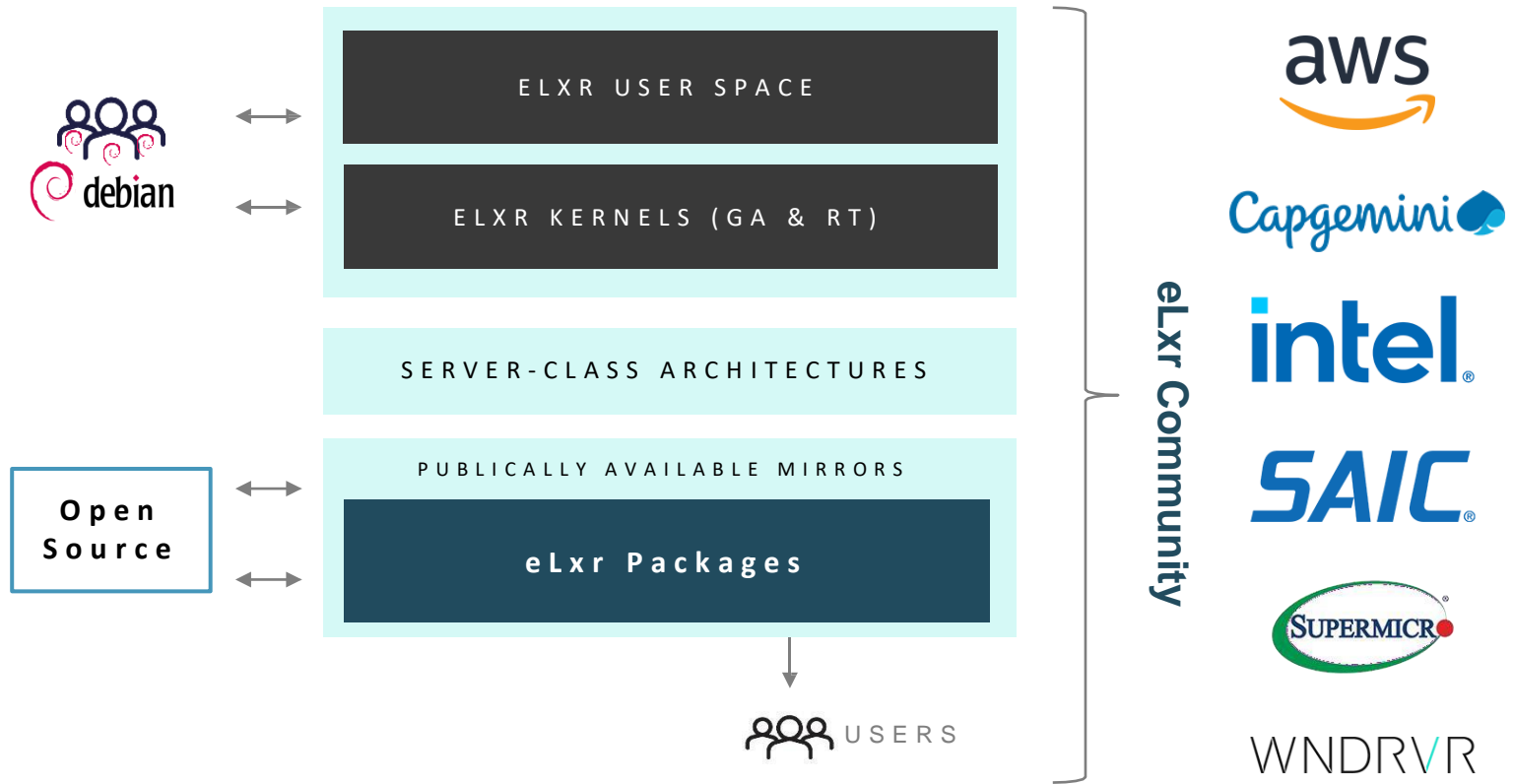
✓ Security

certifications & compliance



JOIN ELXR PROJECT

BE PART OF THE COMMUNITY



Join eLxr Today!



Open Source Debian Derivative

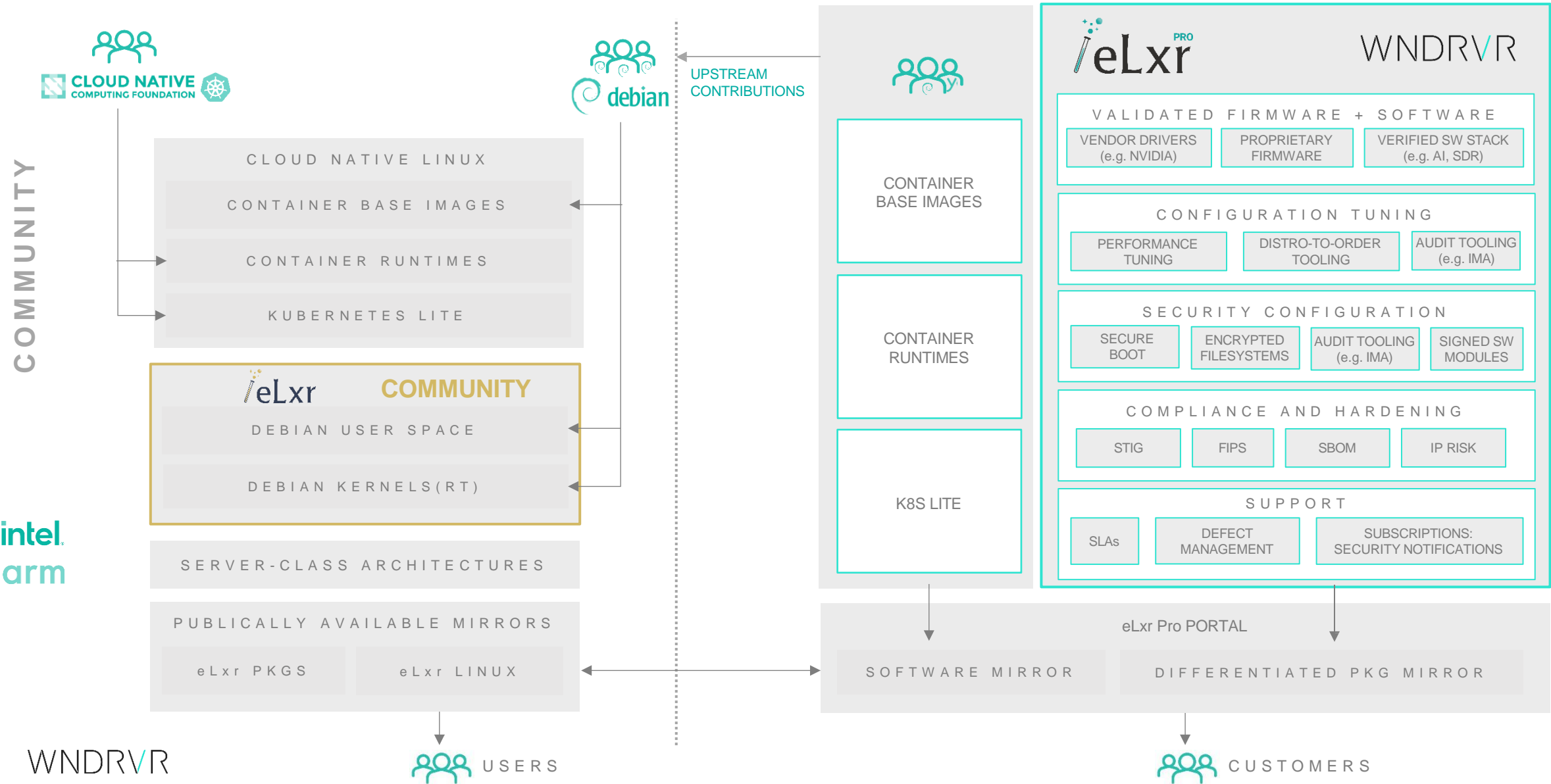
-  **eLxr**
-  Upstream-first methodology
-  Architected for low footprint
-  Performance optimized
-  Real-time kernel
-  Reduces security attack surface



THANK YOU!



eLxr Distribution & eLxr Pro



OVERVIEW ELXR

FEATURES & FUNCTIONALITY

Details follow

Post-Installation	User Applications (i.e., isolated, non-containers)	Containers, Cloud-Native, & Orchestration	<i>Details in Enablement</i> e.g., QAT, OpenVino, etc.	<i>Details in Cloud Native</i> e.g., Base Container Images, Kubernetes, Runtime Support, etc.		
	Package Libraries		Total Packages support: ~10K	<i>Package Search on eLxr.org – Not Live</i>		
	Kernel		General Purpose (Edge & Server) RT Kernel (Server Only)			
	Hardware Supported – <i>for full list of BSPs, refer here</i>		Edge: i.MX8, x86_64 (Atom) Server: x86_64 (Xeon, Core)			
Features	Security	Performance	Virtualization	Hyperscalers	Enterprise Integrations	<i>For key functionality details, including support, refer to details in:</i> <ul style="list-style-type: none">• Security features & certifications• Performance Benchmarking• Virtualization• Cloud Service Providers (CSPs)• Enterprise Integrations
	ISO Image					Latest available ISO images available for download on eLxr.org
Pre-Installation	Package Mirror (Repository)					eLxr mirror on AWS S3 provides access to necessary files and updates
	Build CI / CD Pipeline		Automated & Manual Testing			eLxr GitLab infrastructure includes CI/CD, test suite, tools and more
	Architecture, Workflows & Technical Documentation					Public Documentation Internal Documentation (to be published)

CASE STUDY

MIGRATING FROM CENTOS TO DEBIAN

The Wind River Cloud Platform and StarlingX Migration from CentOS to Debian Linux

SITUATION

Wind River Cloud and StarlingX received notice of CentOS end of life as of June 2024

- Code updates no longer available upstream
- Open-source distro required
- Ubuntu CaaS Layer/K8S too large







SOLUTION


- Enable Debian package build tools and generate ISO based Debian
- Port all customized user space packages (for OS and Telco), aligning Debian, using the Debian build tools.
- Incorporate ostree technology to speed up installation, patching, and deployment
- Integrate, test, validate supported deployments
- Provide an automated CentOS → Debian upgrade path

RESULTS

- | | | |
|---|---|--|
| ✓ Deployment capability from the Data Center to the Edge | ✓ Community-based innovation | ✓ Regularly updated with CVE fixes |
| ✓ Debian derivative software open sourced and freely available | ✓ Debian + distro packages are cloud-native and cloud-optimized | ✓ CaaS Layer/K8S UBI w/ Google Distroless only 20Mb – energy efficient, minimal footprint |

OPERATING SYSTEM CHARACTERIZATION

	 RHEL (9.3)	 Ubuntu (22.04)	 Rocky (9.3)	 eLxr Pro
Total packages ¹	412	427	376	214
Memory Footprint	869 MB	735 MB	739 MB	485 MB
Image Size	~0.9 GB	~2.1 GB	~1.7 GB	~0.3 GB
Boot Time (sec) ^{4,5}	26 sec	32 sec	23 sec	16 sec



- ✓ **Fewer** number of packages & vulnerabilities
- ✓ **Smaller** resource footprint
- ✓ **Faster** boot time

1 – Base installation of operating system
2 – Vulnerabilities reported by Trivy on 4/22/24
3 – Unfixed vulnerabilities not supported in [Trivy](#)
4 – Measured from warm reboot to console login
5 – Install conducted on Hardware: Super Micro E300 (SYS-E300-9A-16CN8TP), Intel Atom C3958 2.0GHz 16Core, 32768MB of RAM, 2400MHz

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