OPEN SOURCE INGREDIENTS FOR SUCCESSFUL OPEN RAN

WNDRVR

STARLINGX

O-RAN ALLIANCE

yocto PROJECT

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Communications service providers (CSPs) are moving toward Open RAN, an industry standard focused on radio access interoperability particularly relevant for 5G. Open source communities play a critical role in developing open source technology implementations according to the Open RAN standard.

Some of the key drivers for this open approach, as stated by CSPs, include:

- The ability to select the best vendor for the specific scenario
- Supply chain resiliency, and avoiding supply chain risk
- The reduction of vendor lock, and the ability to change vendors after day 1
- The introduction of new vendors to the market, increasing competition, innovation, and opportunity

However, Open RAN's open source approach is not as simple as just downloading some code, and it would be naive to think of it as "free." The stakes are much too high, as CSPs need to keep current customers satisfied while introducing new revenue-generating services. Fundamentally, the Open RAN solution needs to work in a production environment with traditional RAN solution parity. And, while Open RAN's open source development approach brings collaboration and innovation, the projects are only as good as their ability to work in the ecosystem context and meet the business demands of service providers.

Wind River® is committed to making Open RAN a success. To that end, we have been strategic about which open source projects we engage in and how. Given that background, this paper will give an overview of Wind River involvement with the Yocto Project, StarlingX, and the O-RAN Alliance.

YOCTO PROJECT

After a long history of providing VxWorks®, a proprietary solution, to the telco market, Wind River cofounded the Yocto Project, an open source collaboration that helps developers create custom Linux-based systems regardless of their hardware architecture. The project provides a flexible set of tools and a space where embedded developers worldwide can share technologies, software stacks, configurations, and best practices that can be used to create tailored Linux images for embedded and IoT devices, or anywhere a customized Linux OS is needed.

Yocto Project Commercial Support

Wind River provides commercial support for the Yocto Project via Wind River Linux. And with Wind River Linux, we count all of the top telecom equipment manufacturers in the world as customers. We have been deployed for years in equipment for 2G, 3G, 4G, and 5G.

This is partly because Wind River Linux was one of the earliest solutions to meet the Linux Foundation's Carrier Grade Linux specifications. Our customers know how important it is to be able to tune the kernel for low-latency performance, especially as CSPs continue to virtualize functions such as the radio access network (RAN) and multi-access edge computing (MEC) at the network edge. Also, Wind River provides constant monitoring of the Common Vulnerabilities and Exposures (CVE) database, NISC, US CERT, and multiple other public and private security lists for potential issues that we can flag and help remediate, as appropriate, to help keep our customers' products secure.

STARLINGX

StarlingX is the leading Kubernetes-based distributed cloud infrastructure open source project, hosted by the OpenInfra Foundation and cofounded by Wind River.

StarlingX includes the Yocto Project real-time kernel and delivers an integrated cloud platform unifying infrastructure, orchestration, and analytics capabilities. This enables CSPs to deploy and manage globally distributed 5G edge networks, including the remote servers that will process vRAN traffic.

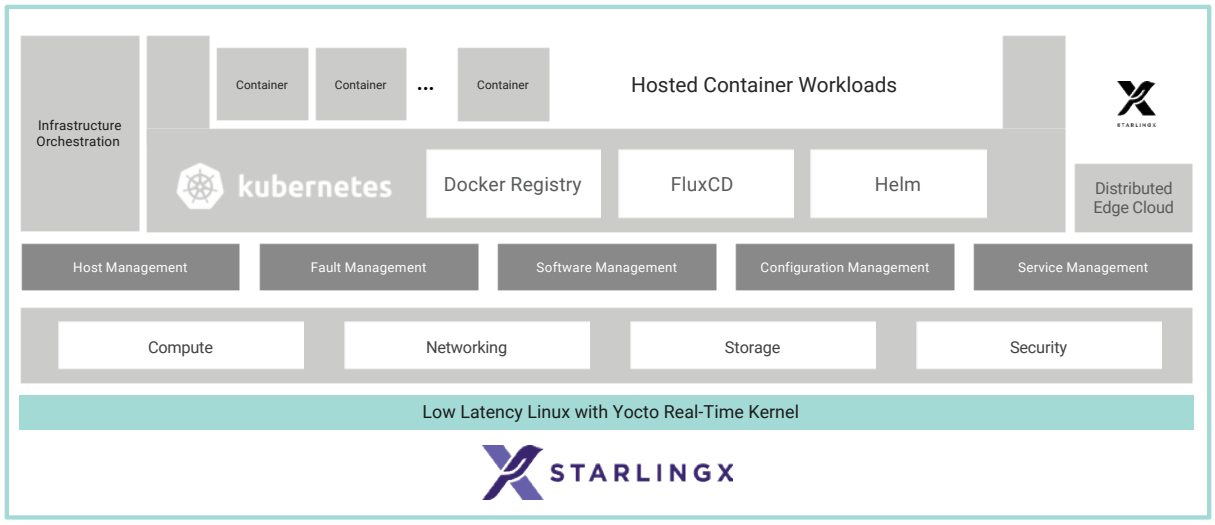

Figure 1. StarlingX: Best-of-breed open source distributed cloud infrastructure

StarlingX Commercial Support

Wind River Studio is commercially supported StarlingX. Wind River takes responsibility for maintaining alignment with upstream, cutting-edge open source code, along with commercial hardening and packaging with carrier grade testing, configurations, and optimization for a production environment. We also take the responsibility to provide complete user documentation. Wind River provides lifecycle management and long-term support, going beyond what is typically expected from the open source community.

While Wind River is committed to open source development, with everything developed or contributed upstream, we are driven by our "customer first" approach. This means that our priority is to deliver timely product capabilities to our Studio customers. When our customers' requirements can't be fully supported by StarlingX project timing, Wind River assumes the responsibility of bridging the gap, offering a solution to our customers and then working everything back upstream.

O-RAN ALLIANCE

The last element is the community that provides the context of the ecosystem. Open source technology is only as good as its application to a certain use case. In the case of Open RAN, there is a great deal of interdependence between multiple pieces of technology. Wind River is committed to working with the industry to advance O-RAN and make it viable reality. Therefore we participate in the O-RAN Alliance in three key areas:

1. At the highest level is our involvement with and contribution toward shaping the standard. Contributing our years of experience in enabling high-performance and high-reliability infrastructure for telecom, plus our field experience from real-life 5G vRAN and O-RAN deployment at scale, we provide a unique perspective and feedback loop that is valuable to the community.

2. In the O-RAN Software Community, we lead and contribute to the INF (Infrastructure) project. Wind River is focused on the creation of an open source "O-Cloud" solution, a reference development platform comprising a collection of physical infrastructure nodes that can host the relevant O-RAN functions, the supporting software components, and the appropriate management and orchestration functions. By contributing StarlingX as the software infrastructure layer to the project, we have successfully delivered six releases of a 100% open source O-Cloud aligned to O-RAN Alliance working group specifications.

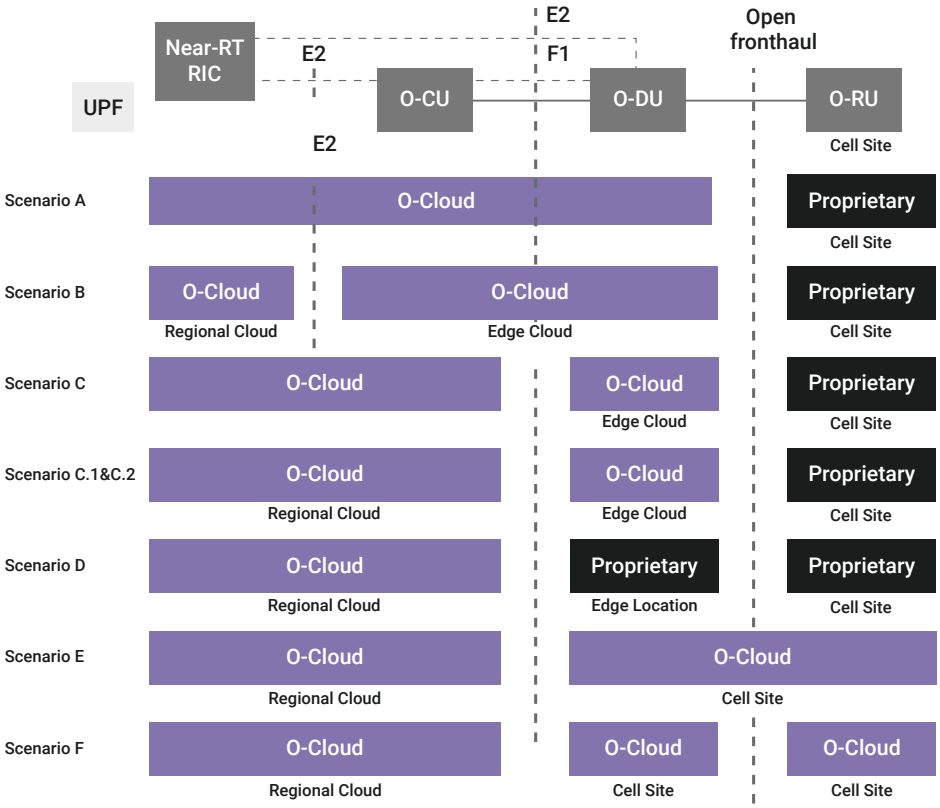

Figure 2. StarlingX: The de facto O-Cloud software infrastucture

3. We are consistently involved in the joint TIP (Test & Integration Project Group) and O-RAN Plugfest, which promotes interoperability and solves industry challenges through integration and testing. Recent projects include a multi-vendor Open vRAN demonstration with NTT Docomo, Fujitsu, and NVIDIA that showed how a system can be energy efficient. We've also demonstrated orchestration with the O-RAN O2 interface and other multi-vendor demonstrations with ATT, China Mobile, China Unicom, and Dish.

While open source technology and communities will play an important role in the success of Open RAN, there is a considerable investment to ensure that success. The right technology must meet the right requirements, open source must be managed appropriately, and the technology needs to deliver within the context of the use case.

Wind River has many years of experience successfully contributing to, influencing, and enabling success through open source initiatives. Our experience with open source technology and the open source community, plus our decades-long history of delivering solutions to the telecommunications industry, make us uniquely qualified to ensure success with Open RAN.

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