Solution Brief
Wind River

Wind River and Intel Accelerate Time to Market for Open RAN Solutions

Wind River's customer first, open-source software approach reduces cloud operating system integration time; leverages packet synchronization built into Intel® Ethernet 800 Series Network Adapters for faster container integration.

5G radio access networks (RANs) are composed of a variety of subsystems including network elements such as the baseband unit (BBU) and remote radio head; low level software such as operating system, containers, hardware including servers, Ethernet adapters and more.

All of these elements need to be integrated and validated for best overall system functionality and performance, a process that can take many months. Wind River and Intel are collaborating to accelerate this integration time with a joint working group dedicated to streamlining the integration process to reduce the time it takes to start delivering services, resulting in less deployment risk and more profitable deployments.

With legacy RANs, system integration was a part of the overall solution, which was pre-integrated by the RAN vendor. That was possible because the incumbent vendor provided all the software and hardware within the solution.

Integration in Open vRAN systems is executed differently because these solutions are multivendor by nature, with each software or hardware component potentially coming from a different vendor. Communications services providers (CoSPs) are embracing this disaggregation, as it enables the flexibility to customize Open RAN solutions for diverse deployments.

Multi-vendor integration also introduces new challenges that can delay deployment times, and industry leaders are working to streamline and simplify the process:

- A multi-country Tier 1 CoSP recently published a whitepaper that outlines how its Open RAN vendors can work together to integrate, test, and validate their networks.
- Another European CoSP has established an integration lab and has created an “O-RAN Town” where it can develop and demonstrate its Open RAN integration solutions.
- System integrators have added Open RAN services, and telecom OEMs have also launched new integration programs.

Regardless of how the CoSP integrates its network, managing the time to market is an important aspect of the process. Intel Network Builders ecosystem member Wind River is working closely with Intel to accelerate the time to market for these system integration processes, enabling faster response to customer needs and faster innovation, validation, deployment of new revenue-generating services.

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Wind River Studio Reduces Cloud OS Integration

Wind River Studio is the first cloud-native platform for the development, deployment, operation, and servicing of Open vRAN systems and other mission-critical intelligent edge systems that require security, safety, and reliability. Wind River Studio is architected to deliver digital scale across the full lifecycle through a single pane of glass to accelerate transformative business outcomes.

Wind River Studio delivers an integrated cloud platform that unifies infrastructure, orchestration, and analytics capabilities. This platform enables CoSPs to deploy and manage globally distributed 5G edge networks, including remote servers that process vRAN traffic. The core capabilities of Wind River Studio include:

Cloud Platform: A carrier-grade Kubernetes cloud platform for managing edge cloud infrastructure. Based on the open source StarlingX project, Wind River Studio compiles optimal open-source technology to deploy and manage distributed networks.

Conductor: Comprehensive automation capabilities provide one platform to achieve multi-cloud automation and zero-touch operation. CoSPs can use the app catalog to select applications, deploy them to a carrier-grade cloud platform, and orchestrate the resources needed for the applications at the edge network site. This orchestration allows scalability from a handful of nodes to thousands of nodes in a geographically dispersed, distributed environment.

Analytics: Using machine learning algorithms, Wind River Studio supports effective management of a distributed cloud system by consuming and processing data and producing meaningful insights for decision making. Wind River Studio uses full stack monitoring of the cloud infrastructure cluster to collect, analyze, and visualize cloud behavioral data to improve uptime and optimize operations.

In a vRAN deployment with an Intel architecture compute infrastructure at each site in the network (Figure 1), Wind River Studio offers a single geo-distributed cloud operating multiple, individual distributed clouds with centralized management.

Intel® Ethernet 800 Series Network Adapters Deliver Network Timing Synchronization

Intel Ethernet 800 Series Network Adapters, with enhanced timing capabilities, help CoSPs meet the demanding network timing and synchronization requirements of vRAN deployments, leveraging off-the-shelf IP/Ethernet networks for fronthaul connections with minimal integration impact and maximum flexibility. Intel has worked closely with Wind River to integrate support for these products into Wind River Studio to simplify platform integration and accelerate validation and deployment.

The newest adapters in the Intel Ethernet 800 Series product family, the Intel Ethernet Network Adapter E810-CQDA2T and Intel Ethernet Network Adapter E810-XXVDA4T, include hardware enhancements that deliver increased network timing accuracy and synchronization capabilities for 5G vRAN solutions:

- Support for IEEE 1588 Precision Time Protocol (1588 PTP) and synchronous Ethernet (SyncE).
- An optional, integrated GNSS receiver with support for frequency, phase, and time-of-day synchronization with global navigation satellite systems, including GPS, Galileo, GLONASS, BeiDou, and QZSS.
- Extended holdover capabilities to maintain timing accuracy for up to four hours when the source timing signal is lost.

Other key technologies in the Intel Ethernet 800 Series Network Adapter family include:

- Dynamic Device Personalization (DDP) enables customizable packet filtering for more efficient packet processing.
- Application Device Queues (ADQ) filters traffic into a dedicated set of queues for key workloads, for greater predictability at scale.

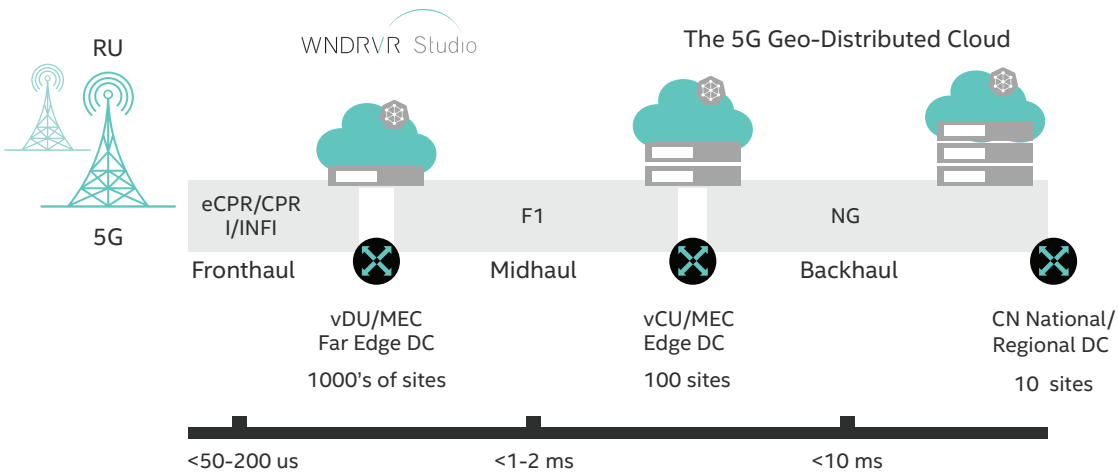

Figure 1. Wind River Studio Cloud Platform deployed as a single geo-distributed cloud.

Reducing Open vRAN Integration Times

Figure 2 shows the various stages that go into integrating Open vRAN base stations based on the experience of the Intel and Wind River team. As shown in this chart, the integration process can take up to 10 months.

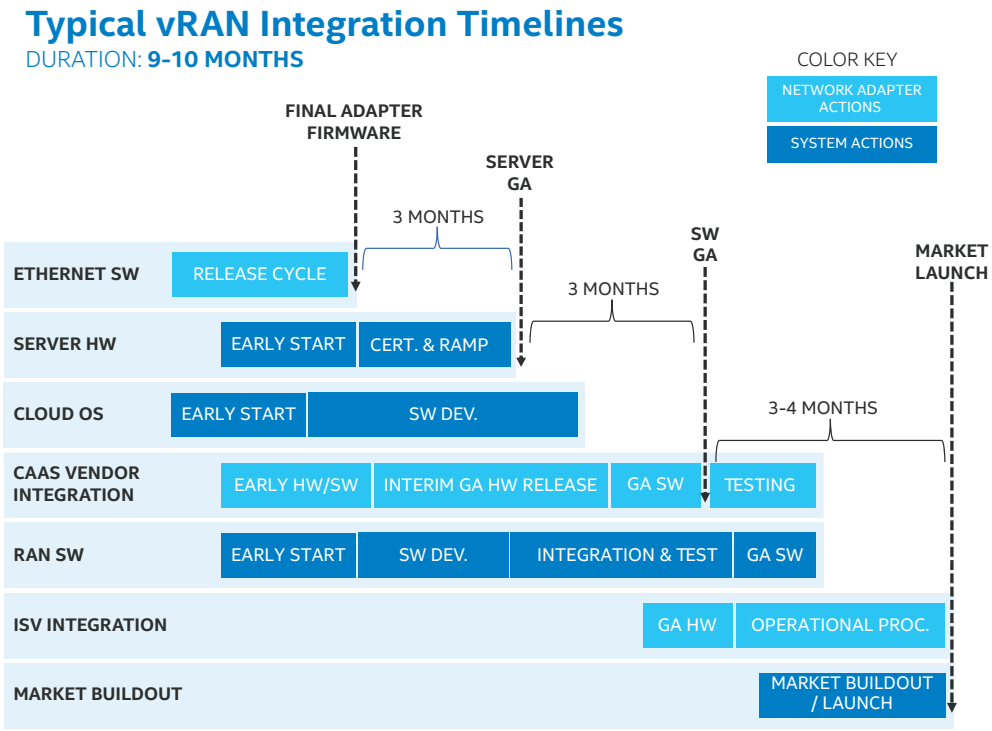

Figure 2. Typical vRAN integration timelines.

Wind River and Intel are working together to decrease this duration by combining the cloud OS integration and the network adapter stages of the containers as a service (CAAS) integration. As shown in Figure 3, this approach can significantly reduce CAAS integration time vs. the typical timeline.

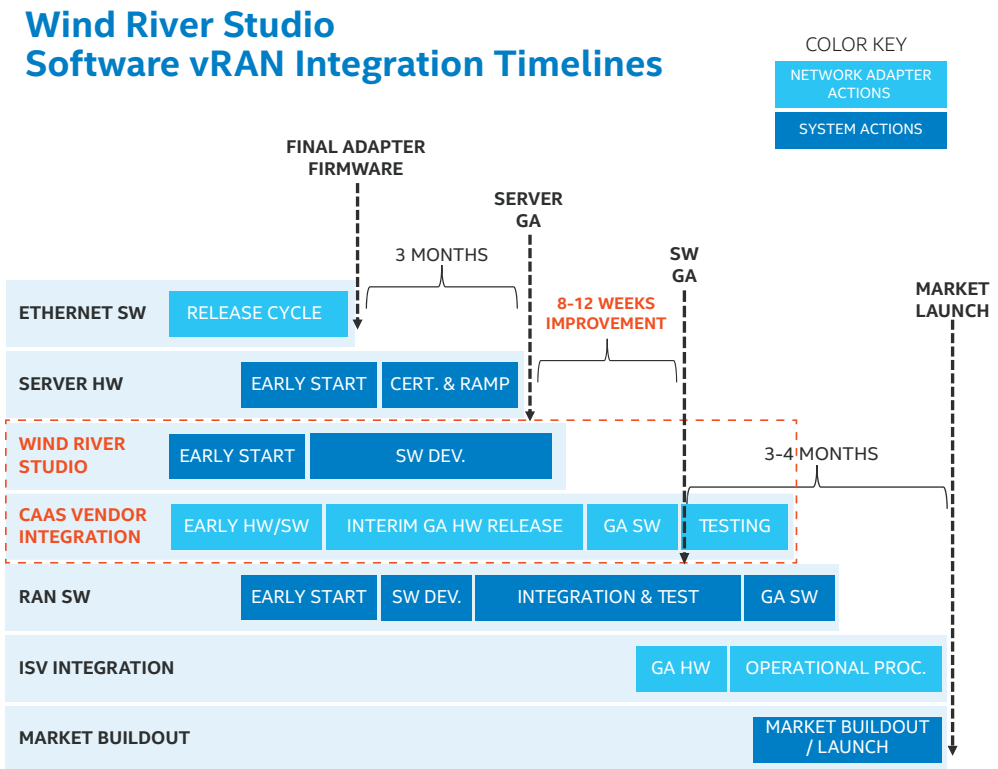

Figure 3. Wind River Studio Cloud Platform vRAN integration timelines.

CoSPs can face significant lead times when a cloud OS vendor is incorporating requested feature updates, as open-source software vendors must upstream or submit their changes back to the open-source community for review. Often these changes are further modified by other engineers in the community and must be reintegrated into the official release and then reintegrated with the other software and hardware in an Open vRAN network. This process can take weeks or months depending on the size of the community and on the quantity of the changes (Figure 4).

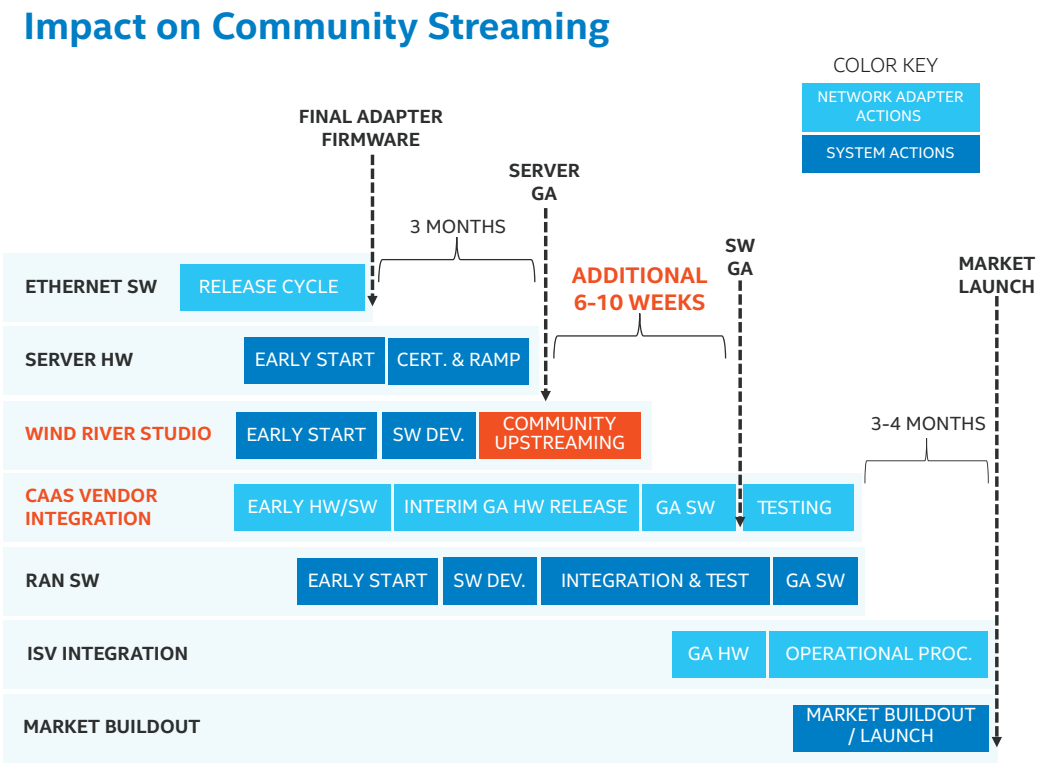

Figure 4. Integration timeline including open-source community upstreaming.

Wind River applies a "customer first" approach, meaning Wind River assumes the responsibility for getting the commercial instantiation into the open-source stream. Instead of waiting weeks or months to get a feature accepted by the community, Wind River's priority is to get the required features to the customer first. They are then able to contribute the changes to the open-source project without impacting commercial deployments.

And, because support for Intel Ethernet 800 Series Network Adapters is integrated in the Wind River Studio Cloud Platform, the CAAS integration process for them remains faster than a typical Open RAN integration. This enables CoSPs to more rapidly transition to new features and provides the flexibility to adapt to new opportunities and changing market conditions.

Conclusion

With Open vRAN, system integration has been disaggregated and opened to a variety of vendors and processes that can add value to a mobile network deployment. Managing the system integration process to meet time-to-market objectives is an important factor for success. Wind River Studio offers customers a solution that delivers features sooner for faster system integration, while also maintaining a healthy OSV. When used together with Intel Ethernet 800 Series Network Adapters the Open vRAN solution integration time can be reduced even further.

Learn More

Wind River Studio

Intel® Ethernet 800 Series for Communications: Performance for Communications Workloads