

Advancing O-RAN Telecommunications in DOD

Government and industry are working together to leverage the capabilities of O-RAN with 5G, while overcoming interoperability and standardization challenges.

The Department of Defense has adopted advanced telecommunication capabilities to support a variety of new technologies including creating private networks for the military, integrating 5G capabilities, improving supply chain logistics and more. Strengthening and innovating communications in DOD programs is critical – and the next step in doing so involves Open Radio Access Networks (O-RAN).

O-RAN creates interoperability and standardization of radio access networks, including a unified interconnection standard for hardware and software from different vendors. Thought leaders from government and industry spoke at a recent [FedInsider webinar](#) to discuss how O-RAN integrates with 5G, the major benefits of this new technology and the lingering O-RAN challenges that must be overcome.

The Federal Drive Behind O-RAN

In 2022, the White House [passed](#) the CHIPS and Science Act of 2022, allotting \$1.5 billion for Public Wireless Supply Chain Innovation, which supports the deployment of open, interoperable and standards-based radio access networks.

One of the benefits of adopting O-RAN is allowing additional vendors into the federal telecommunications ecosystem, said Amanda Toman, director of the Public Wireless Supply Chain Innovation Fund for the National Telecommunications and Information Administration at the Department of

Commerce. This can break up the tech stack being sold to federal customers and allow for open-source solutions.

Still, integrating O-RAN components with existing hardware and software remains a challenge – but Toman is looking to streamline this with available funds. The statutory language includes “seven big picture objectives, most of which are based around promoting the deployment of 5G open interoperable telecom networks, the idea of accelerating the technology development, and allowing for interoperability,” Toman said.

According to Toman, the various challenges include figuring out how to manage a large ecosystem of interoperable multi-vendor solutions, developing standards that enable a multi-vendor ecosystem, and establishing the proper security features for network virtualization.

The desegregated, multivendor and open interface environment of O-RAN does help with meeting warfighters’ needs, said Caroline Chan, vice president and general manager of 5G at Intel Corp, so it’s a technology worth refining despite the challenges.

“If you look at O-RAN, everything we talked about that applies to 5G, also applies to it,” Chan said. For instance, Intel is building a desegregated program to serve the U.S. Marine Corps, which allows for many more participants in a secure supply chain. “Security is built into 5G and O-RAN,” Chan said.

Featured Experts:

■ Dr. Aloizio P. Da Silva

CCI xG Testbed Director,
CCI & Research Faculty at
ECE Dept., Virginia Tech



■ Dr. Arup Bhuyan

Director, Wireless Security,
Institute & Directorate
Fellow, Idaho National
Laboratory



■ Amanda Toman

Director, Public Wireless
Supply Chain Innovation
Fund, NTIA, U.S. Dept.
of Commerce



■ Caroline Chan

VP & GM of 5G,
Intel Corporation



■ Steve Vogelsang

Federal CTO,
Nokia



“NTIA is now doing testing and certification, so it is a huge part of that aspect.”

The Progression of O-RAN

Arupjyoti Bhuyan, director of the Idaho National Laboratory Wireless Security Institute and directorate fellow at the INL, is focused on security and protocols as it pertains to 5G and O-RAN. His team is assessing the threats facing trusted operators of 5G to ensure those threats can’t reach the warfighter or the protected information on devices, and they are assessing the solutions provided on an untrusted network.

In the lab's private 5G network, Bhuyan's team can independently evaluate and assess solutions. "We take a very pragmatic approach on both of those, and all the security work," Bhuyan said. "We focus on the particular aspect of untrusted operators initiating attacks on the 5G device."

This way, the lab creates attack scenarios and tests vulnerabilities in specific environments. Bhuyan and his team can assess the commonalities and differences in O-RAN environments, one of the most evident being O-RAN's segregated components connected via open interfaces.

Creating those open interfaces for components to reside in so that the network is separated in layers, and being able to put that onto open standard hardware, was an original goal with O-RAN, said Steve Vogelsang, federal chief technology officer at Nokia. O-RAN can be implemented in vendor-neutral hardware and on software-defined technology based on open interfaces.

"If we can standardize and make [certain functions] run on standard off-the-shelf Intel processors, we can then deploy that, implement the deployment standard and get back to the use case," Vogelsang said.

Breaking those pieces apart by standardizing the interfaces supports innovation. It also allows different vendors to focus on their unique specialties, Vogelsang said. And as network standards evolve, O-RAN allows for the adoption of new capabilities.

These laboratories and testing centers don't just enable research and innovation, but are also sources for workforce development. "We don't have people who really deeply

understand what components are being segregated in virtual O-RAN networking, how they interact with each other and how to deploy them," said Aloizio P. Da Silva, CCI xG Testbed director and part of the Commonwealth Cyber Initiative and Research faculty at the Bradley Department of Electrical and Computer Engineering at Virginia Tech.

Silva said that the Commonwealth Cyber Initiative has become an O-RAN center, equipped with an open-source environment compliant with O-RAN standards, remote access and the ability to collaborate with industry.

"There, we have been deploying what you call the edge computing capability that is connected with our cloud environment that is located in Washington, D.C. This environment is a perfect environment for people that come to the center to do their tests, as they can deploy their CU in the cloud environment," Silva said. Testbeds help establish solutions and the skills needed for them.

Moving O-RAN Forward

As government and industry work together to evolve telecom with O-RAN, Toman said a big part of the innovation fund's investments will be focused on where it can accelerate the implementation of open architecture solutions. Her team has been actively working with industry to understand what features are needed to make O-RAN a reality, and what performance parity issues stand in the way.

"A couple of big challenges we face are around interoperability and the idea that we don't really have a plug-and-play capability that is enabled," Toman said. There are O-RAN alliance specifications that guide how interoperability should occur, but plug-and-

play can bring multivendor solutions together, drive the capabilities forward, and illicit buy-in from industry, vendors and carriers.

Security is also a top consideration, as with any advanced cloud-based, open software capability. However, "the good thing is that a lot of those problems have been worked on for other domains for a long time, and we have the solutions that came from all that," Bhuyan said.

Ensuring software is secure starts with understanding what is in the software. In open-source libraries, everything becomes visible, and CISA has been working on standardizing that visibility. Other security activities like vulnerability exploitability and risk analysis must also be taken into consideration.

And to move O-RAN forward, Vogelsang said Nokia is working on interoperability, which involves testing, security and interface optimization. "When you have a standard interface, it tends to trail behind the state-of-the-art, and it's hard to get the latest and greatest," Vogelsang said. "That is a challenge we have to figure out how to overcome with O-RAN, getting those open interfaces and implementing them in a way where we can deliver performance."

That potential performance and the other possibilities of O-RAN will be impactful, because O-RAN drives innovation, Chan said. "If you want to get to the point where when we deploy our Marines overseas to protect us, they can safely come home, then we have to deliver this. We have to do this to protect ourselves and future generation," she said.



Hosky Communications Inc.

3811 Massachusetts Avenue, NW
Washington, DC 20016

(202) 237-0300
Info@FedInsider.com
FedInsider.com
Facebook.com/FedInsiderNews
LinkedIn.com/company/FedInsider
[@FedInsider](https://Twitter.com/FedInsider)



Carahsoft

11493 Sunset Hills Road, Suite 100
Reston, VA 20190

(888) 964-7397
5G@Carahsoft.com
Carahsoft.com/Solve/5g
Facebook.com/Carahsoft
LinkedIn.com/company/Carahsoft
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