



National Spectrum Consortium: Delivering Innovation

New private 5G network deployed by Federated Wireless at Marine Corps Logistics Base (MCLB) Albany powers prototype smart warehouse, automating critical logistics operations and dramatically improving defense readiness



Objective – Build a high-performance, cost-effective wireless network to support a prototype smart warehouse at Marine Corps Logistics Base (MCLB) Albany. Ensure successful network integration with sensor and robotics systems designed to automate general warehousing tasks including maintenance, repair, and retooling efforts so that military equipment can be processed and returned to field use as quickly and effectively as possible.

- **Investment** – **\$16.2 million**
- **Outcome** – Successful deployment of a private 5G network covering roughly one million square feet of space and offering 40 gigabits per second of total wireless capacity. Applications running on top of the network, including robotics systems automating otherwise manual tasks, have:
 - **Reduced equipment processing time** in some locations from three days to three hours
 - **Decreased manpower required** for repetitive and sometimes dangerous tasks by 55%
 - **Raised inventory accuracy** from 90% to 98%
- **Keys to Success** – The use of CBRS spectrum, which is a band that is shared between the DoD and commercial stakeholders, ensured that Federated Wireless was able to leverage cost-effective, off-the-shelf radio equipment while maintaining security safeguards afforded by a non-commercial, private network configuration.
- **More to the Story** – The smart warehouse project at MCLB Albany successfully transitioned from a prototype contract awarded through the National Spectrum Consortium's (NSC's) Other Transaction Authority (OTA) agreement to a new operations contract funded by the Marine Corps Logistics Command (LOGCOM). Because of the success of the project, officials are exploring opportunities to replicate the solution at additional military installations across the country.

The private 5G network at MCLB is a breakthrough in radio technology made possible through DoD's partnership with the National Spectrum Consortium.

CHALLENGE

The U.S. Marine Corps has placed a high priority on modernizing logistics to improve defense readiness. On military bases, this includes automation of general warehousing operations including maintaining, repairing, and retooling military equipment. The faster equipment is processed, the faster it can be returned to the field.

Warehouse automation, however, requires robust network connectivity. A high-performance network is needed to transmit sensor data and enable communications for machine platforms designed to manage inventory faster and safer than humans.

The Marine Corps Logistics Base (MCLB) in Albany, Georgia previously explored multiple options for boosting network connectivity. Fiber as a last-mile connectivity medium proved impractical to deploy in modern warehouse environments featuring automated mobile devices, while Wi-Fi provided limited performance in any manageable network configuration. In particular, metal materials in the main warehouse and loading areas make for a challenging wireless environment, and to cover the territory effectively with Wi-Fi would have required dozens or even hundreds of wireless access points.

To address automation and network challenges, the Department of Defense (DoD) Office of the Undersecretary of Defense for Research and Engineering (OUSD(R&E)) and partner Naval Information Warfare Center (NIWC) selected MCLB Albany as the site for a new smart warehouse prototyping project. Through the National Spectrum Consortium (NSC), the DoD released several Requests for Prototype Proposals (RPPs), including one for a prototype wireless network on base.

After a thorough solicitation and review process, officials selected a proposal by NSC member Federated Wireless and awarded the company a \$16.2 million contract – enabled by NSC's Other Transaction Authority (OTA) agreement – for private 5G network development. Federated partnered with JMA Wireless for radio equipment, Cisco for networking gear and security products, and Hewlett Packard Enterprise for the 5G network core.

STRATEGY

Federated made two strategic decisions when designing the 5G network for MCLB Albany. First, it developed a private network rather than rely on commercial 5G infrastructure, and second, it chose to build that network using Citizens Broadband Radio Service (CBRS) spectrum. The shared use of the CBRS band between federal and commercial stakeholders meant Federated was able to leverage off-the-shelf radio equipment even while maintaining security safeguards afforded by a non-commercial, private network configuration.

The rural location of MCLB Albany was a factor in the decision to deploy a private network. Commercial 5G coverage is limited in the region and extending it effectively throughout the base would have been difficult and expensive. More importantly, Federated had to meet the security requirements of the base. This meant protecting data sovereignty by walling off network traffic from the public domain.



A key differentiator for private networks is the ability to place new antennas and radios where they will have the most impact. Federated located the mobile core in a centralized data center, and then was able to customize the radio access network (RAN) to ensure all sites had the throughput needed to support high-bandwidth applications.

The ability to use CBRS spectrum was critical to the network design. It kept costs down on the equipment side by leveraging commercial economies of scale, and it provided the flexibility to customize the network deployment to meet both performance and security objectives.

RESULT

The smart warehouse project at MCLB Albany successfully transitioned from a prototype contract to a new operations contract on November 1, 2024.

Following outstanding results from the prototyping phase, the Marine Corps Logistics Command (LOGCOM) awarded subsequent funding to ensure the base would continue to process military vehicles and other equipment at an accelerated rate. Warehouse operations are faster, safer, and more effective than ever before.

The new private 5G network at MCLB Albany provides roughly one million square feet of coverage and offers multiple gigabits per second of total wireless capacity. The connectivity supports autonomous forklifts, digital inventory tracking, remote video streaming, and machines that determine the most compact layout for equipment storage. It has also enabled new approaches for controlled packing and sorting of inventory by small robots that can squeeze into spaces too small or too dangerous for humans.

- In the primary warehouse testbed, the time between equipment arrival and availability for reuse (known as curb-to-shelf time) has dropped from three days to about three hours.
- Manpower requirements have decreased by 55%, and personnel are being transferred to more productive tasks.
- Inventory accuracy has risen from 90% to 98%.

Given the results of the project, the Marine Corps is already looking at opportunities to replicate the smart warehouse approach at additional Marine bases, and at facilities managed by other military services throughout the Department of Defense.

The prototyping effort enabled by DoD's partnership with the National Spectrum Consortium has been an unqualified success, demonstrating how investments in experimentation and innovation can generate long-term operational and security returns.

