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Building a 5G private network

7 factors for a successful deployment

The advanced real-time solutions enabled by a private 5G network have the unique potential to drive major productivity gains. To better understand the possibilities and key considerations for deployment, we sought an opportunity to experiment and gain real experience. A recent launch in a smart warehouse led us to uncover these seven key factors to help guide 5G implementation.

01 Network design

Interoperability among diverse vendors due to open interfaces enables flexibility and best-of-breed deployments

Open architectures provide flexibility in selecting vendors. In this case, the team was able to readily adapt and overcome supply chain issues, swapping in an alternative edge compute server when their original choice was unavailable.

Vendor diversity and innovation call for strong integration and program management to keep all the moving pieces in step. A strong systems integrator can combine best-of-breed products, services, and capabilities without the complexity of managing multiple parties.

02 User equipment (UE)

Considering options for 5G-enabled UE

A number of UE options are currently available for application deployments on private 5G networks. A greater range of options at better price points is likely to be available soon.

As we await 5G ecosystem maturity, some of the current UE supporting enterprise applications might require workarounds. For this project, we retrofitted existing devices and sensors for security cameras, mobile robots, and forklifts with dongles that converted USB to 5G wireless connections.

03 Spectrum selection

Assessing use case needs informs network configuration and spectrum selection

Unlicensed spectrum allows any enterprise to deploy private cellular more quickly and inexpensively than for prior generations of wireless technology.

New licensed spectrum options are coming onto the market. Emerging business models are also allowing organizations to negotiate retransmissions agreements.

Certain use cases may require multiple spectrum bands, including both unlicensed and licensed, and corresponding multi-band radios. In this case, the team required tri-band radios with 5G and backward LTE compatibility to accommodate legacy network elements and user equipment.

When using licensed spectrum, allow time to negotiate retransmission agreements with the carrier to ensure all parties adhere to the FCC's license requirements.

04 Backhaul

Identifying potential weak links in legacy infrastructure

It is crucial to consider that the entire chain is only as strong as its weakest link, which may not be directly associated with the private network.

Leveraging existing infrastructure may require material modifications to LAN network elements, such as intermediate distribution frames and main distribution frames.

It is also important to understand day-to-day operational connectivity in shared facilities to avoid disruptions to critical applications as a result of new traffic on a shared network element.

05 Cybersecurity

Balancing new security concerns with performance needs

Private networks create an opportunity to deploy zero-trust architectures that continually monitor networks and authenticate users to detect and mitigate unauthorized intrusion.

Hybrid cloud/MEC systems—in which some vendor applications reside in the cloud while others stay on-premise on the MEC—can balance security with network performance requirements, but they also expand the network's security perimeter.

06 RAN intelligent controller (RIC)

Immaturity of open RIC and RIC-based xApps

OEMs that decide to interface with a RAN Intelligent Controller will accelerate application and ecosystem development (RIC helps optimize RAN operations and supports applications and use cases that interact with the RAN, like location tracking, mobility management, network slicing, authentication, and interference management). This involves developing and making their APIs available to third-party developers, who can then write new applications that can interact with the RAN (xApps).

Deloitte experimented with applications that utilized the RIC. Enterprises, however, should recognize that few OEMs have opened these APIs and XApps remain relatively immature and unexplored.

07 Network operations

Ongoing management requires a new knowledge base

Nonproduction networks built for testing or proof-of-concept that use carrier-owned spectrum may be subject to operation requirements. Examples are 911 capabilities and carrier visibility, in addition to FCC and other mandates. The operational plan should factor in the level of effort of adhering to these requirements.

Operational rigor should align with strategic imperatives. For mission-critical applications, a high degree of rigor may be necessary (real-time monitoring, spares onsite, available break/fix personnel, etc.) to support high performance. On the other hand, an experimental network may not justify the costs of maintaining a high degree of operational support.

Starting to experiment with private cellular now would allow you to gain exposure to new technologies and capabilities. On this project, experimentation pushed the enterprise to work through any deployment and cyber security considerations early. As the 5G ecosystem continues to mature, it will enable enterprises to take a crawl-walk-run approach. Today, organizations are gaining exposure to new technology and then continuing to embed new use-cases and seek large-scale transformation.

By taking into account these critical factors, our team delivered an end-to-end 5G edge computing solution that led to major efficiencies. **Read the full case study** for a detailed look at how we built this private 5G network—and the remarkable results.

What role will advanced connectivity play in your organization's future?

Get in touch with our 5G team to start exploring.