▶ *E-Guide*

What an Impending Marriage of IoT and 5G Means for the Future

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In this E-Guide:

The arrival of 5G promises new architectures for connecting billions of IoT devices. Through a unified IoT and 5G network, developers will be able to access different kinds of network capacities.

However, 5G also introduces a host of new development challenges for practical applications.

In this e-guide, learn what an impending marriage of IoT and 5G means for the future.

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George Lawton, Contributor

5G is an emerging set of cellular technologies, specifications and proposed standards that promise to dramatically improve the speed and responsiveness of wireless networks. One area that will greatly benefit is the internet of things. Touted benefits of 5G for IoT include faster connectivity, lower latency, reduced power consumption, increased reliability and better security models. Other promises of 5G include improving support for new architectures like IoT edge computing and public mesh networks.

Enterprises are looking for ubiquitous connectivity and near-real-time remote diagnostics and management capabilities for mission-critical IoT -- and 5G is here to answer that call.

"5G's low latency, faster transmissions and secure communication will speed up IoT adoption for enterprises," said Nitesh Arora, head of marketing at Cloudleaf Inc., an intelligent-sensor platform.

Kurt Steinhauer, president of Smart Edge, an edge-computing platform, predicted that all facets of industry will be impacted by 5G, especially manufacturing, transportation, healthcare and retail.

Developers will be able to access different kinds of network capabilities provided through a unified IoT and 5G network, said Colin Alexander, director of wireless infrastructure at Arm Limited. Use cases like enhanced mobile broadband will target more efficient broadband

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access to connected homes and mobile devices, whereas massive machine connectivity use cases will support the connectivity of billions of small, non-real-time IoT sensors for a range of connected applications. Another class of uses will cover ultra-reliable low-latency connectivity and target high-value, industrial IoT and vehicle-to-X connectivity that requires a mix of low latency and high reliability.

Don't get distracted by IoT and 5G's promises

In the long run, 5G infrastructure could unify competing wireless standards, said Bruce Collins, director of product management at Cambium Networks Ltd., a wireless infrastructure provider. "It is also adding some confusion in the market today as there are existing private and public solutions being deployed now while 5G is a couple years away from adoption and initial deployments," he added.

5G represents a further splintering or fragmenting of the IoT wireless space. Many existing low-power wide-area technologies -- such as LoRa, Cat M1 and Narrowband IoT -- are being deployed today. "5G, which will only be ratified in 2019, with IoT at a lower priority, can serve as a distraction for operators looking to solve problems today," Collins said.

The key thing for operators to keep in mind as the options proliferate is that the use case is more important than the network technology. Enterprises should focus on identifying a manageable, scalable, secure network that uses the right technique for the right system. "We recommend that enterprises looking to deploy IoT networks start with the application first and then work backwards to the selection of a wireless technology," Collins said.

New architectures for IoT and 5G

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One practical way for IoT developers and enterprise architects to approach 5G adoption is to think about creating different IoT architecture layers relating to sensing, transportation and applications, said Cloudleaf's Arora. 5G technologies will provide a variety of options at the transport layer. The use of software-defined networking tools could help future-proof code built for the sensor and application layers.

Existing mesh networks rely on disparate networks to connect to the internet via proprietary gateways to reduce cost and power requirements, but this also adds complexity. If 5G lives up to its promise, enterprise architects might consider replacing these mesh networks with less complex connections direct to cell phone towers, or by using microcell towers installed indoors. "This should increase bandwidth and resilience," said Saar Yoskovitz, CEO of Augury, an industrial equipment monitoring provider.

Danny Tseng, staff manager of technical marketing at Qualcomm Inc., said multi-hop mesh network capabilities are planned for future 5G specifications that will extend IoT and 5G networks beyond the limits of public infrastructure. This could allow a device that is out of the traditional coverage of a 5G network -- for example, in a basement -- to connect to the network using other 5G devices as a relay.

5G new radio industrial IoT (IIoT) has been proposed as a new standard for industrial apps that could start to roll out in 2021, Tseng said. This could help 5G become the default choice for industrial networking. "The biggest challenge is also having the entire IIoT industry working together to make this happen, but it is making good progress in 3GPP, the standards body responsible for designing the technologies that drive global cellular standards," Tseng said.

'Cloudifying' the network to embrace 5G for IoT

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Current mobile technologies are optimized for downloads. But in most IoT applications, data is generated at the edge of the network and uploaded to the network. Said Ouissal, CEO of Zededa, a distributed cloud infrastructure provider for IoT, said he believes 5G network providers will need to invest more resources to create wide-area mesh networks that allow data to flow between devices for safety and situational awareness applications. The opportunity is to design data traffic routing that is more efficient for edge-to-edge communications.

Today the communication from point A to point B still goes up to the service provider core network and then back down, even if point A and point B are 10 feet apart. "This doesn't work for IoT and strikes at the heart of the new networks' use cases to come," Ouissal said. Data infrastructure providers will need to create networking infrastructure that works more like the cloud than traditional telco networks. If they are successful, this would reduce the burden for IoT developers to think about scaling and provisioning across public networks in the same way that traditional cloud infrastructure reduces concerns about compute and storage infrastructure.

Alex Kubicek, CEO of Understory Inc., a weather data service, said his company is exploring practices like building in caching and edge computing to fall back to if 5G is not available. "Since these solutions are pretty easy to implement, there isn't much cause for concern," he said.