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# High Wireless Act

As a next-gen mobile network standard emerges, project teams are making global connections.

**BY MATT ALDERTON**

PORTRAITS BY JON ENOCH

# A mobile infrastructure revolution is coming—and fast.

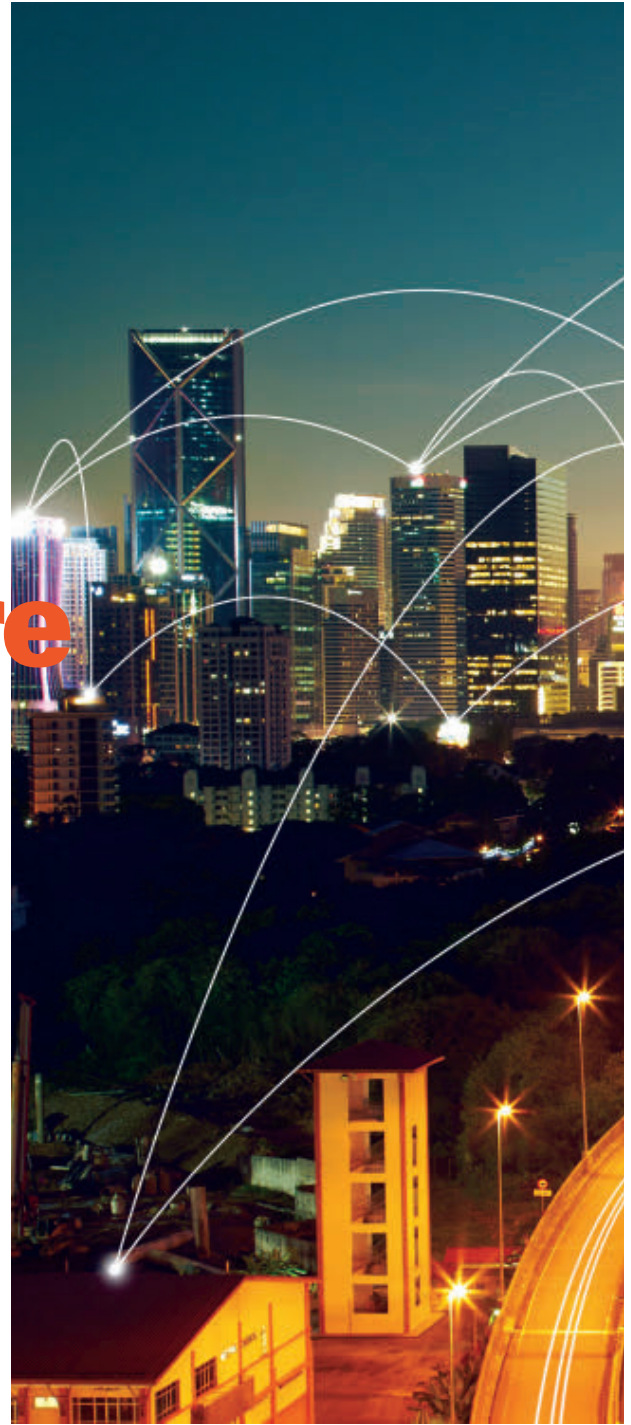
Wireless upgrade projects are underway around the world, promising to deliver more robust networks that act as the backbone for a data-rich future. With the rapid development of the Internet of Things (IoT), 25 billion “things”—including buildings, cars, machines and appliances—are projected to be connected to the internet by 2020. To communicate with their owners and each other, they will need access to reliable new fifth-generation (5G) networks boasting network data speeds 10 to 100 times faster than the fastest existing networks.

How’s this for 5G network project benefits? 5G infrastructure will make it possible to download feature films to smartphones in less than 5 seconds, enable self-driving cars to swerve around obstacles automatically and allow doctors to perform complex surgery remotely using robots.

This hyperconnected future remains well beyond the horizon in most parts of the world, however. Projects to expand 3G and 4G technologies are still needed in many parts of Africa, Asia Pacific and Latin America. These projects not only help people

catch up to global digital norms, they also leave breadcrumbs for teams that someday will complete the 5G future.

“Mobile upgrade projects are critical for a 5G future,” says Kye Prigg, PMP, head of mobile networks, Vodafone UK, Newbury, England. “When it comes to the possibilities with 5G, we are talking about massive data speeds and very low latency. This will put tougher requirements on how the sites are built, the locations of the sites and the







backhaul of infrastructure required to carry and route all this traffic.”

None of these mobile transformations come cheap. With the first 5G trial networks expected to go live this year and full-fledged deployments in the United States slated to follow next year, mobile operators and vendors are expected to invest US\$6 billion alone on 5G network R&D over the next four years. By 2025, the global 5G market could reach US\$247 billion worldwide, according to a 2016 study by ABI Research.

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Source: ABI Research





5G Innovation Centre at the University of Surrey in England

A five-year, £80 million joint venture project between the University of Surrey in Guildford, England and organizations including Fujitsu, Huawei, Samsung, Telefonica and Vodafone will complete a 5G network for Surrey's campus by 2018 and provide a testing ground for future 5G projects. In South Korea, mobile operators SK Telecom, KT and LG Uplus already are working on a US\$1.5 billion project to deploy a nationwide 5G network by 2020. The first phase of the network is scheduled to be ready for the 2018 Winter Olympics in Pyeongchang—and will help put viewers in the

middle of the action. For instance, tiny helmet cameras connected to the 5G network will deliver a live stream of what skiers see when they sweep down slopes.

No matter the type of network to be built, project and program teams face major stakeholder management challenges due to evolving requirements. With the number of users and devices on networks steadily increasing, lessons learned today are crucial for meeting tomorrow's network demands.

"Strong, very well-defined project management processes are critical for the next wave of mobile infrastructure projects," Mr. Prigg says.

## MAKING NEW CONNECTIONS

To deliver on the promises of a 5G world, project and program managers must foster new kinds of collaboration. Building previous network generations primarily was a two-team effort: Mobile service providers worked with phone and tablet makers. But a wider variety of organizations already occupy the IoT space—from automobile to appliance manufacturers—so project managers must be ready to work closely with multiple partners and business units on 5G projects.

## Practitioner Perspectives

Project managers weigh in on the skills and tools needed to build next-gen mobile infrastructure.



"The key word is 'uncertainty.' 5G projects will be very complex and very diverse in nature, so project managers need a very detailed risk management plan that helps them manage uncertainty by monitoring and controlling the small variations that can have a big impact on their project."

—Manuel Salero Coca, PMP, innovation director and service culture program manager, Ericsson, Mexico City, Mexico



"I've been involved in 2G, 3G and 4G projects, and the challenges always come down to people. The technology will get worked out, but the project will still fail if you don't have the right team in place."

—Kye Prigg, PMP, head of mobile networks, Vodafone UK, Newbury, England

IMAGE COURTESY OF UNIVERSITY OF SURREY



“With 5G, there are lots more vendors and lots more stakeholders in different areas, which can make communication very difficult,” says Toshiaki Hattori, PMP, senior engineer, Sangikyo Corp., Yokohama, Japan. “Knowing how to communicate with stakeholders is the most important skill that project managers can develop in this space.”

Manuel Salero Coca, PMP, innovation director and service culture program manager, PMI Global Executive Council member Ericsson, Mexico City, Mexico, agrees. “You have to take a consultative approach and be very open to understanding the dynamics of an industry,” he says. “You have to learn the language of that industry and learn the unique challenges that an industry faces.”

All that starts by meeting with each organization’s technical experts to build knowledge about various devices’ respective technical requirements. For instance, 5G networks will bind autonomous vehicle sensor infrastructure, allowing self-driving cars to determine the shortest travel times and avoid collisions. So project managers must engage automakers, microchip developers and public infrastructure specialists to ensure projects meet technological requirements and strategic objectives.

“When you approach enterprise customers, especially in other industries, the most important thing you need to get from them is what their technical requirements are to enable the services they desire,” says Oluseyi Lala, PMP, manager of internet protocol planning and enterprise solutions at Etisalat Nigeria, Abuja, Nigeria. “Sometimes they are not even sure about the details of what services they want to enable. That’s where they rely on the mobile operator’s expertise to shine more light on what is possible—and that’s where project management helps to tie everything together.”

U.S. mobile provider Verizon Wireless is connecting all the dots to build the world’s first 5G network, the first phase of which will debut by 2017. In April, the organization pledged to spend US\$300 million on a six-year project to install 800 miles (1,287 kilometers) of fiber-optic cable to connect cell towers in Boston, Massachusetts, USA, where the 5G network will debut in phases, with other major U.S. cities to follow. To ensure the network thrives from the start, Verizon has collaborated with other U.S. tech giants on trials that identify risks and opportunities. For instance, 5G tests at an Intel lab in the state of Oregon have helped Verizon determine how weather



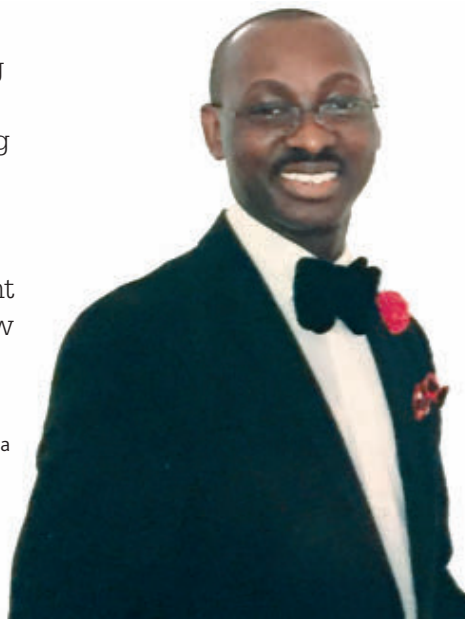
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Japan



“Demand planning well in advance is the key to ensuring the right expertise is available for a 5G project. Generally, it is not straightforward to find the right competency, especially for new technologies, so appropriate time should be invested.”

—Atiq ur Rehman, PMP, project director, Nokia Networks, Dubai, United Arab Emirates



“As mobile operators evolve from 2G to 3G, from 3G to 4G and, eventually, from 4G to 5G, there’s a need to have a lessons-learned document that details all the challenges you faced on previous projects and how you resolved them. This can be used to enhance the learning abilities and knowledge to avoid previous mistakes.”

—Oluseyi Lala, PMP, manager of internet protocol planning and enterprise solutions, Etisalat Nigeria, Abuja, Nigeria



**“All of the network technologies have some things in common, so when you are deploying new infrastructure you can learn from a previous project.”**

—Dalton Gordillo, Nokia Networks, Buenos Aires, Argentina



and atmospheric conditions can impact 5G performance. Sharing such results with other stakeholders, such as device manufacturers, helps teams fine-tune their launch plans, Mr. Prigg says.

“Communication is everything, and it can fall to pieces very easily unless you get the message across to all stakeholders in a way that’s clear and easy to understand,” Mr. Prigg says. “For example, I can rattle off a million technical abbreviations and the stakeholders won’t necessarily understand any of them. So when you translate requirements and objectives, you really need to pare it back and keep it simple.”

#### **NETWORK UNKNOWNNS**

Whether project managers are delivering 3G, 4G or 5G capabilities, risk management is at the center of mobile network upgrade projects. No one likes dropped calls, but in a 5G environment—in which wireless service interruptions could potentially cause self-driving vehicle crashes—the stakes are even higher.

Although that nightmare scenario is a few years off, global 5G network standards are currently being developed. In Europe, for instance, Ericsson is leading the European Union’s €8 million METIS-II research project, which aims to establish a spectrum roadmap and overall radio system design for 5G technology. Arriving at a global industry consensus isn’t exactly simple; project managers must track results as different stakeholders—from mobile service providers to device manufacturers—test and evaluate various concepts and spectrum guidelines. It can be painstaking work.

“All stakeholders must agree on a common way forward on standardization before finalizing network architecture,” says Atiq ur Rehman, PMP, project director, Nokia Networks, Dubai, United Arab Emirates. “The project manager’s role becomes critical in this stage to ensure everyone clearly understands topology and architecture. If there are any conflicts, he or she should ensure resolution before moving forward. Design flaws

have a very high cost, so project managers should preferably seek sign-off from every major stakeholder involved to ensure common understanding.”

Japanese carrier NTT DoCoMo is well-versed in the challenges of establishing new mobile standards. Although the organization won’t introduce the country’s first 5G network until the 2020 Summer Olympics in Tokyo, Japan, it began collaborating with other global vendors in 2014 to develop network standards and identify risks. Now, with 13 vendors, the collaboration will help the NTT DoCoMo team deliver a 5G system aligned with the latest standards for use during the games.

5G projects launched or conceived in a pre-standards environment require project managers who are versed in change management, Mr. Prigg says. “Change management is very important in the early phases of projects because you’re dealing with something that’s constantly evolving,” he says. “Understanding on a daily basis how the software is changing and how the hardware iterations are coming together is critical.”

Agile project management techniques are one way to mitigate risks and manage scope change, says Jiang Long, PMP, senior engineer, Syniverse, Campbell, California, USA. Mr. Long recommends taking a phased approach to mobile infrastructure implementation, with a single, clear deliverable executed in each project phase. “Phasing the project means dividing your project into smaller subphases to make it more simple,” he says. “It’s very hard to execute everything in only one phase; it’s impossible in a competitive and changing environment.”

#### **CROSSING BRIDGES**

The good news is that lessons learned on 5G projects will be applied for years to come. Telecommunications network architecture typically changes in a modular and incremental fashion from one generation to the next, allowing most project lessons to be universally applied, says Mr. Lala.

“The evolution from 2G to 3G involved only a

# Talent Upgrade

Project managers rebuild Iraq's mobile infrastructure—and nurture skills development.

**I**raq has learned the hard way that war is hell on infrastructure. As it rebuilds roads, bridges, power lines and water systems, the country also must overhaul its mobile infrastructure. So Nokia Networks completed a two-year, US\$40 million project in 2014 to launch third-generation (3G) mobile internet service nationwide.

Building a 3G network in a war-torn country presented obvious risks. (First and foremost: the constant threat of violence from insurgent forces.) But a fundamental obstacle was developing and training technical and project management talent for a project scattered over 12 cities, says project manager Atiq ur Rehman, PMP, project director, Nokia Networks, Dubai, United Arab Emirates.

"A major challenge in a country like Iraq, with an extreme security situation, is having enough on-the-ground competent local resources to ensure we could meet the rollout volume," Mr. Rehman says. "So I prepared a detailed risk mitigation plan which included extensive trainings to Iraqi resources, sending key resources abroad to other similar technology projects for exposure and introducing new suppliers to be cost-effective."

The project required the team to replace existing telecom infrastructure, so it relied on lessons learned from Nokia's experience in deploying networks in volatile environments, he says. That meant training local talent rather than importing experienced workers. To get local workers up to speed, Nokia pro-



vided technical training at Nokia facilities around the world. The organization also provided on-the-job training at other projects to facilitate knowledge transfer. Teaching talent technical and project skills was easier than teaching experienced talent how to navigate risks that were unique to Iraq, Mr. Rehman says.

For instance, local talent was already familiar with the country's topography. As Iraqi citizens, they were more easily able to clear customs at the airport, transport equipment and supplies through dangerous regions and get through security checkpoints or gain access to restricted sites, he says.

"It is of utmost importance to spend time analyzing the local environment and requirements before the start of the project," Mr. Rehman says. "That should be followed up by building a strong team that can cope with the local environment."

To ensure security risks wouldn't disrupt the schedule, the project team completed as much work as possible in a controlled indoor environment. "In light of the security situation, and to minimize hardware issues on-site during integration of network elements, we introduced a process called pre-commissioning," Mr. Rehman says. "The team verified equipment health inside the warehouse before it left. Any hardware issues were fixed on the spot and then handed over to the team for delivery to the site. With this mechanism, we were able to improve quality and expedite rollout."

Ultimately, the project team completed rollout and testing of Iraq's rebuilt 3G network on time, and the mobile operator launched the network on 1 January 2015, delivering high-speed internet access to citizens eager to stay connected.

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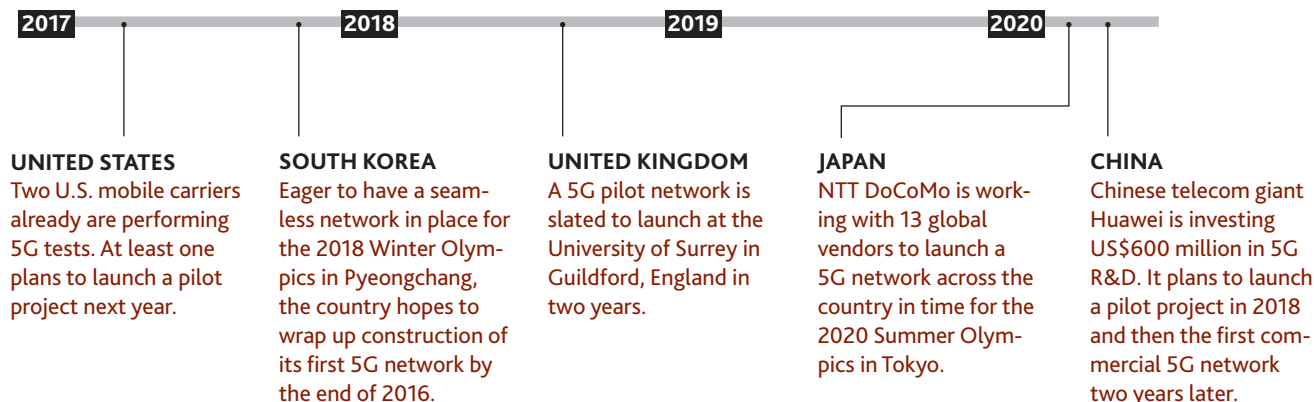
A man with a goatee, wearing a dark suit jacket over a white button-down shirt, is seated at a white table. His hands are clasped together on the table. He is looking directly at the camera with a slight smile. The background features a modern building with a glass facade and a distinctive orange-colored section, situated behind a body of water. Lush green trees and foliage are visible to the left and behind the building. The sky is overcast with grey clouds.

**"Strong, very well-defined project management processes are critical for the next wave of mobile infrastructure projects."**

—Kye Prigg, PMP

## Blazing Fast

5G is on the way. The current network standard in many parts of the world, 4G, will start to seem old-fashioned as early adopters around the globe sponsor projects to deliver dramatic upgrades.



couple of tweaks and changes in the technology. Same thing from 3G to 4G. 5G will just be a further evolution,” he says. “The fundamentals don’t really change that much, so there is an opportunity to gain lessons learned from previous deployments to ensure future deployments are more successful.”

One clear lesson: Mobile operators that move too quickly risk sacrificing quality. That ultimately could erode their market share if deployments go wrong, Mr. Lala says. “It doesn’t really make sense to be the first to roll out if you don’t do it very well because competition will seize on the opportunity,” he says. “A balance is necessary. Your time to deliver the project should be fast, but you must also realize the required quality.”

Taking a deliberate approach can help achieve the right balance, says Dalton Gordillo, technical project manager, Nokia Networks, Buenos Aires, Argentina. It’s a lesson learned he applied on a six-month packet core 4G LTE network project that completed in November 2015. His team had to upgrade core equipment in Argentina, Paraguay and Uruguay for a mobile operator without causing noticeable service outages for mobile users. Although the project encountered several setbacks because of mistakes by Nokia and the mobile operator, such as failure to meet internal deadlines for equipment configuration, it ultimately was com-

pleted on time because the project team had set conservative goals at the beginning.

“We didn’t experience any significant delay in the delivery of the project because we set aside reserve time to use in case we needed extra time,” Mr. Gordillo says. “We planned ahead in case we ran into those kinds of issues.”

In developing countries, 3G and 4G upgrade projects are a preamble to 5G projects. They will allow network providers to lean on resources that can be tapped from one rollout to the next, such as lessons-learned documentation, meeting minutes, engineering diagrams and, most importantly, talent. That’s already happening on 4G projects across Latin America and Africa, where project teams are utilizing information, tools and resources gained on recent 3G projects.

Only from previous deployments has Mr. Gordillo learned that laboratory testing and pilot projects are critical early steps on mobile upgrade projects. “In Argentina and other countries, Nokia performs acceptance testing on new equipment in laboratories as much as possible, which helps us prevent outages when we enter the production environment,” he says. “All of the network technologies have some things in common, so when you are deploying new infrastructure you can learn from a previous project.” **PM**

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