

Destination 5G: industry-leading expert services for the entire journey

NOKIA

5G will be the most comprehensive overhaul of mobile communications since the switch to digital more than two decades ago. Unlike previous generations, 5G is more than just a new radio interface and core network upgrade. It is a fundamental change in network architecture that requires substantial preparation to ensure a smooth implementation and maximum benefits from day one.

Based on Nokia's experience of supporting operators' projects around the world, industry-leading experts from Nokia and Bell Labs Consulting answer five key questions about how operators can best start to manage their transformation to 5G, and when to begin.

## Five questions on 5G – answers from the experts



**Claudio Mattiello**

Service Product Manager,  
Nokia Network Planning and Optimization

Claudio has 26 years' experience in the telecom industry that includes research in the labs of a major Italian operator. At Nokia he has helped to develop processes and tools widely used in the Nokia Network Planning and Optimization engineering community.



**Amit Mukhopadhyay, PhD**

Partner and Head of Wireless Modeling R&D,  
Bell Labs Consulting

Amit has 25 years of experience, providing optimum evolution to next generation technologies for operators around the globe. He currently leads a group of experts in LTE, LTE-A, 5G, IoT, and IMS; his personal expertise also spans fixed access technologies xDSL, FTTx, and HFC.



**Ashok Rudrapatna, PhD**

Principal Consultant and Dept. Head, Next Gen.  
Wireless technology, Bell Labs Consulting

Ashok has three decades of experience in the telecom industry. He has been at the Wireless CTO and Systems Engineering organizations and at Bell labs. He has supported LTE and HSPA work in 3GPP and led teams in developing wireless algorithms. He currently leads a team of consultants on 5G and LTE.

# Q1: 5G is still a few years away, why should operators care about it now?

## **Amit:**

Historically, we have seen new wireless technologies take years of planning, design and implementation. It is a major investment decision. Yet, the rewards of being first to market are huge. Getting to market first with LTE gave North American first-mover operators an extra 6.6 Billion US dollars in revenue over the second mover within five years. The same will be true with 5G, if not more so.

## **Ashok:**

The better prepared you are before the launch of 5G, the higher the probability you will achieve your goals. But this preparation will be entirely different to anything that has gone before because it begins with the setting of business goals, not technology considerations.

Nokia is pro-actively working with several leading operators around the world on the evolution of 5G with planning, design and even field trials. This commitment is necessary not only to ensure a smooth transition at the time of deployment, but also to influence the evolution of standards and the ecosystem to suit their own interests.

## **Claudio:**

With 5G, it is all about the use cases and your business strategy – these are the driving factors and it is important to start planning well in advance. There will be many opportunities to deliver new services, but they all have different needs. Entertainment services like virtual reality will need fast connectivity. Critical communications like autonomously-driving cars will need ultra-low latency, while billions of devices in the Internet of Things will need massive connectivity. We apply our long experience of transformation projects to help operators with the essential planning of which use cases to pursue and how to meet their diverse needs.

The rewards of being first to market are huge. The route to 5G success is to plan the use cases and your business strategy well in advance.

This preparation will be different because it begins with the setting of business goals, not technology considerations.

# Q2: What is the best way to build 5G networks?

## **Claudio:**

The first steps are to assess current assets and spectrum availability to see how they fit the use cases. For example, if entertainment services are a high priority then sports venues could be a possible target. Or if you see augmented reality or online sales as good opportunities, then you could investigate and start planning deployments at shopping malls or large commercial areas.

## **Amit:**

Once the use cases have been assessed and the business model created, the set of parameters for the technology transition will soon start to become clear.

The next step is network transformation, and this is an area in which Nokia has many years of experience and can bring leading expertise to the table. Most operators will run a mix of traditional and cloud-based technology and operations that must work together seamlessly. Traditionally, building networks for next generation technologies starts at the core and we do not expect anything different for 5G. It's important to deploy core network elements that can support either 5G alone or are backwards compatible to support both 4G and 5G technologies.

## **Ashok:**

Transitioning to the telco cloud is a very important step that will mean new software platforms being implemented. Training is also key. Your staff must be equipped with new software skills to enable them to deploy and run new operational modes and technologies involving the telco cloud. And finally it's vital to get the right operational processes and technology tools in place.

Getting the transition process right will avoid wasted investments and deliver an early competitive advantage.

The next step is network transformation to support the use cases. Getting the transition right is critical to avoid delays and wasted investments.

# Q3: What are the key technology challenges that must be addressed?



## **Ashok:**

Network elements that are implemented in the telco cloud environment must enable the key concept of network slicing, in which services can be configured to different needs using the same underlying infrastructure.

Secondly, 5G will be very demanding in terms of transport network capabilities, both in terms of capacity and resiliency. Our experience of multiple projects shows how crucial it is that the right transport network is in place before the radio access network can realize its full potential.

Last, but certainly not least, will be the deployment of the radio access network. A key challenge will be the densification of sites. In order to deliver the high throughput targets, we expect 5G to use higher spectrum bands. This will result in smaller cell sizes and thus more sites to cover a given a geographical area.

## **Claudio:**

How to optimize the network is another major area that must be tackled and which will be challenging because of the sheer complexity of 5G networks. Based on our experience of working with the world's leading operators on many 5G projects, we know that the solution is to apply both a conventional network optimization process, as well as a customer experience approach. This work needs to start from the end users and assess how their quality propagates along the network. This will be challenging as cloud-based networks will behave much more dynamically.

It's also important to ensure that putting network functions into the cloud will deliver the required performance parameters for the chosen use cases, such as throughput and latency.

Network slicing, site densification and network optimization are some of the major challenges. Cloud-based technologies can deliver the necessary performance.

# Q4: How does Nokia help operators to manage the transformation to 5G?

## **Claudio:**

Using our experience of working with operators globally, we have identified the most effective 5G transformation paths. Our broad range of services help operators create a clear vision of their future 5G business and help them take the right decisions at the right time. Nokia is focused on simplifying the complex transformation to 5G by taking a step-by-step approach tailored to the needs of each operator.

This begins with our 5G Acceleration Services that help to build a solid business case by creating a strategy for transformation of the operator's network, operations and business, supported by a detailed investment analysis to support decision-making.

The next stage is to plan the network and its operation. We help you to prepare for the impact that 5G will have on your network architecture, particularly to ensure your radio network can meet the performance needs of the use cases.

A third set of services addresses the planning and execution of your transformation strategy, supported by a range of deployment and care services.

## **Amit:**

We provide support from beginning to end. Throughout the transition, the focus is always on the operator's business cases. At every step, we will work with you to examine multiple scenarios, with all technology options costed and analyzed. This enables objective decision-making to ensure the right investments for 5G.

We offer unique tailored transformation paths to 5G, driven by use cases and business opportunity, to make technology serve the opportunity. Our expertise is focused on helping you use the infrastructure that will best meet your business needs, regardless of vendor. We apply a business-led consulting approach that benefits from our research and development work at Nokia Bell Labs, as well as our experience of and involvement in the 5G standardization process. Our services give the widest possible view of all possibilities.

Nokia 5G Acceleration Services provides a step-by-step approach tailored to each operator and its business case.

# Q5: What are the benefits of Nokia 5G services?

## Ashok:

Our services experts are not only highly experienced but have access to advanced tools to help them deliver a logical, step-by-step approach for all services from consulting to care.

The benefit is a faster implementation with the highest quality. For example, by implementing automation we can achieve up to 70 percent faster deployment of some activities, such as configuration management.

## Claudio:

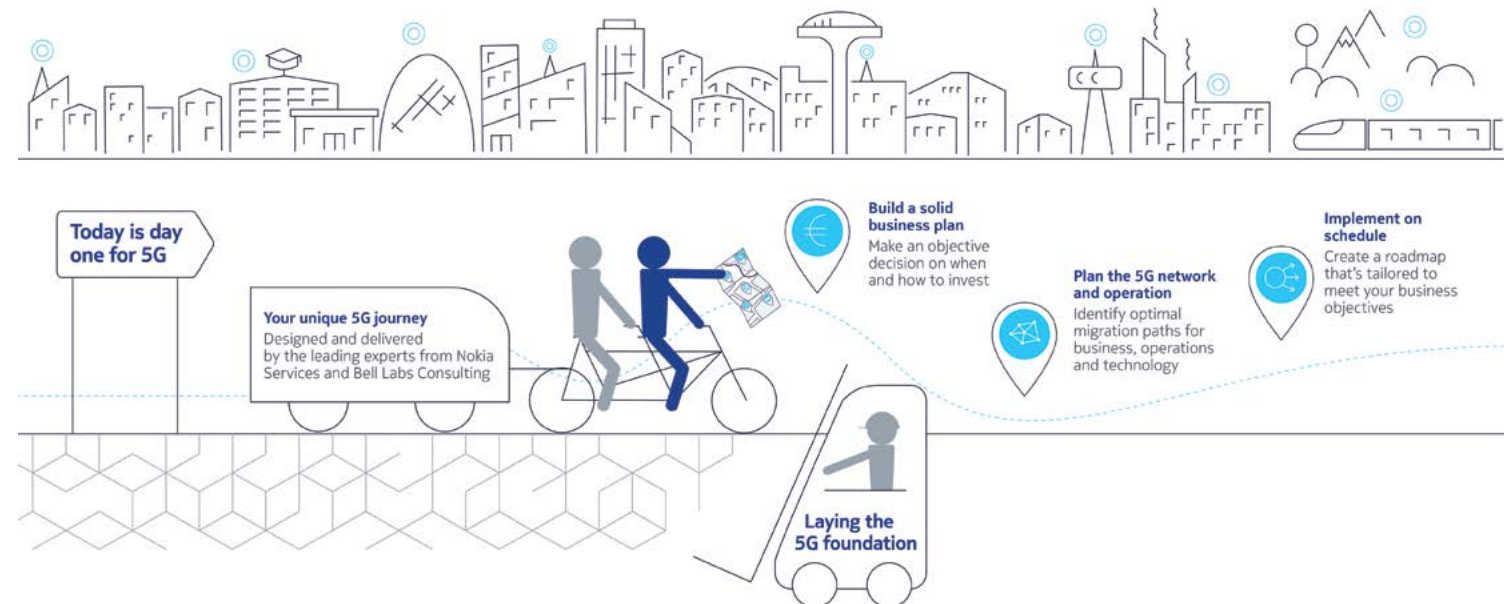
Some recent cases illustrate the types of project that operators are benefiting from today. For example, the accurate selection of sites depends on radio propagation models, especially when we are entering new domains like the higher Gigahertz frequencies that will be used by 5G. Simulating

propagation is essential to help operators use the frequencies in the most effective way and this depends on a deep knowledge of the technologies involved.

In another instance, an operator wanted to explore the role of automation, which is very important for 5G to deal with network

complexity. We helped the operator to understand the impact of self-organizing network (SON) and how it interacts with other tools they use. We worked with the operator to create and implement a robust transformation plan that included changes to the way its personnel organize their work to gain the maximum benefits from SON.

**Nokia services can help operators transition to 5G.**  
Find out more at <https://networks.nokia.com/services/5g-services>



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Nokia is a global leader in the technologies that connect people and things. Powered by the innovation of Bell Labs and Nokia Technologies, the company is at the forefront of creating and licensing the technologies that are increasingly at the heart of our connected lives.

With state-of-the-art software, hardware and services for any type of network, Nokia is uniquely positioned to help communication service providers, governments, and large enterprises deliver on the promise of 5G, the Cloud and the Internet of Things. **<http://nokia.com>**

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