State of the Art Packet and
Optical Networking

ribbon®

Reacting to Change

How 5G is Set to Revolutionise Utilities, and
What Utility Companies Can Do About It

Utility companies – whether electricity, gas, water or sewage – have a tricky path to tread in the next few years. Many are entering, or are in the middle of upgrading their OT networks – trading in their old SDH and SONET systems for modern packet systems. Just as this cycle is coming to an end, already the industry is talking about the next cycle of change – 5G.

But why should utilities care? After all, 5G is a service provider play (think MNOs and CSPs) and has nothing to do with utilities, right? The answer, as usual, is yes and no. Yes, 5G is primarily a service provider play – but only at the moment. In the long term, utilities will come under immense pressure to deploy the same technology. The question is how will they choose to react to this change? Resist it, ignore it, or embrace it?

Change is being forced upon utilities from three directions. Firstly, from industry regulators keen to strengthen, standardize and safeguard markets. Secondly, from governments keen to encourage cleaner, more efficient and higher performing multi-directional networks. And thirdly, from existing technology vendors who no longer see the commercial case for propping up ageing hardware and protocols, and whose roadmaps are often defined by the service provider market.

The truth is, most utility companies have no influence over these three factors, and have to react to, and implement, directives the best way they can. But they do have considerable control over how they react to external change. Some will resist it, while others will not just embrace 5G, but use it to shape and influence the direction of their business for years to come. And let's be categorical, no other technology comes close to offering utility companies the opportunities that 5G does. In fact, 5G may just shake up the status quo as never before. But before we look at the opportunities of rolling out a 5G network across a utility company's critical infrastructure (CI), let's provide some context. CI operators have always needed resilient, robust communications infrastructures to deliver reliable services to customers and for their own internal processes. Many applications and services in this market segment are 'mission-critical' and extremely sensitive to delay, jitter, and latency. They require a high level of availability (over 99.999%) and, in most cases, need to be redundant and secure. If these services fail or malfunction, they can have a huge impact on safety, security, and customer satisfaction.

Today, utilities continue to grapple with four key challenges – many rooted in their need for technology to be proven and field hardened before being deployed in their OT networks. There are plenty of good reasons for this:

1. **Mission-critical infrastructure** – By its very nature, has to be highly reliable and assured. This makes upgrading ageing infrastructure or migrating to new systems a hugely complex process that has to be carefully and intricately managed to minimise outages and downtime – all without impeding demand.

2. **Regulatory compliance is onerous in and of itself** – New infrastructure and the move towards modernized smart distribution systems will only add to this burden – at least temporarily.

3. **Change will require a change of business model** – One that can operate in a new landscape – integrated OT/IT platforms, multi-directional smart systems etc. Ultimately, it will also involve a huge modernization programme.

4. **Security** – Utilities will become more vulnerable because there will be many more points of entry to the system due to smart metering and mobility. Plus, of course, hackers and internal breaches by, for example, disgruntled employees. Add all these together, and it's easy to see why addressing security in this 5G-enabled world will be hugely challenging for any utility company.

In spite of digitalization and service evolution elsewhere, CI market remains structured around a core model of capital assets with operational lifespans of 20 years or more. As such, any technology utility operators adopt has to be mature, secure, and widely available. This means a long technology and serviceability time horizon. In addition, a utility operators' typical rollout time for a new service is five or more years – from planning cycle to feasibility tests to regulatory approval to final deployment and operation.
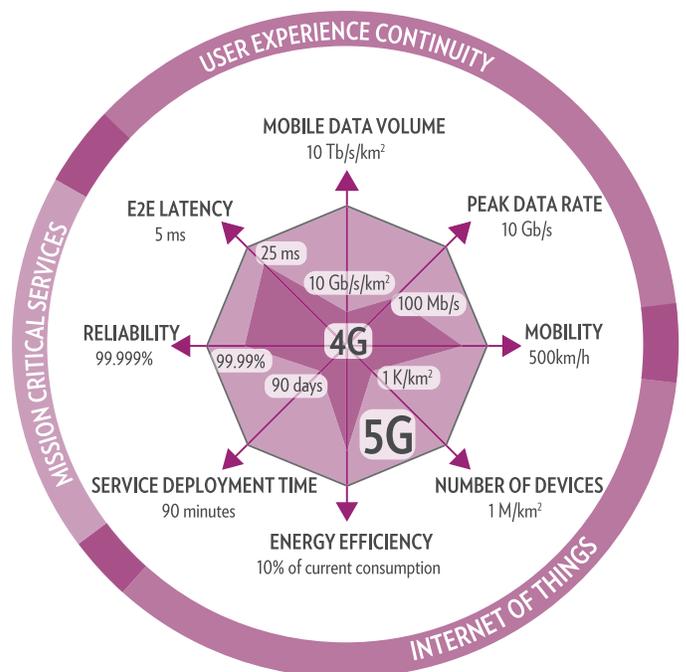
ribbon

What will Define 5G Networks?

The emerging 5G mobile services and technologies are a huge leap forward compared to even the best 4G mobile networks. 5G is set to provide a much more robust platform for numerous new (and legacy) services and applications for utility operators. Release 15 of the 3GPP has defined the 5G network as being able to support three key service types:

1 **eMBB** – enhanced mobile broadband provides the platform for a completely new user experience (UX). One that achieves peak data rates of up to 10 Gbps and an average of 50 Mbps everywhere in reach of the 5G network. eMBB will support broadband services for 100 x the number of end users, and for speeds of up to 500 km/h.

2 **mMTC** – massive machine-type communications will require 1,000 x more bandwidth than 4G/LTE in any given area. Not only will it support millions of dispersed sensors, it will also offer extended battery life and guaranteed communications at less frequent intervals.

3 **uRLLC** – ultra-reliable low-latency communications and cMTC (critical machine-type communications) will be used for mission-critical applications, where guaranteed, end-to-end latency of up to 10 milliseconds is essential. Resilience and availability are also essential for mission-critical applications and services, with at least 99.999% reliability required.

Supporting the ecosystem requires several 5G-technology building blocks. Namely, network slicing, virtualization, programmable networks, network resilience, and mobile-access edge computing (MEC). Key to allow for such a wide variety of requirements, network slicing provides:

- Dynamic allocation of capabilities and capacity only where and when needed, on the same shared infrastructure

- Control and user-plane separation for independent scaling

- Business-driven slice creation and governance, optimized for specific services and customer scenarios.

And of course, there's the matter of security. Which is not optional. It's a broad subject and includes, but isn't limited to, cybersecurity, physical security, privacy, and liability of different stakeholders. Security is a major concern for utility companies, and a key component in the success of Internet of Things (IoT) and Industrial IoT (IIoT) deployment.

USER EXPERIENCE CONTINUITY

MOBILE DATA VOLUME
10 Tb/s/km^2

E2E LATENCY
5 ms

PEAK DATA RATE
10 Gb/s

MISSION CRITICAL SERVICES

25 ms

10 Gb/s/km^2

100 Mb/s

RELIABILITY
99.999%

99.99%

4G

MOBILITY
500km/h

90 days

1 K/km^2

5G

SERVICE DEPLOYMENT TIME
90 minutes

NUMBER OF DEVICES
1 M/km^2

ENERGY EFFICIENCY
10% of current consumption

INTERNET OF THINGS

ribbon

1. Better Internal Connectivity and Processes:

The energy grid as an example, but the below could just as well be any grid (gas & oil, water, etc.)

Utilities currently deploy a wide range of communications networks and technologies for their distribution network (also called Field Area Network: FAN). Networks differ greatly as there are a huge number of devices providing direct connectivity between user, the distribution network and sensors. Achieving this direct connectivity means current networks use all sorts of technologies including UHF, VHF and wireless systems to connect the meters to the aggregation and data centres. They also use 3G and LTE to connect sensors to monitor the network, plus the demand-response centres and SCADA servers.
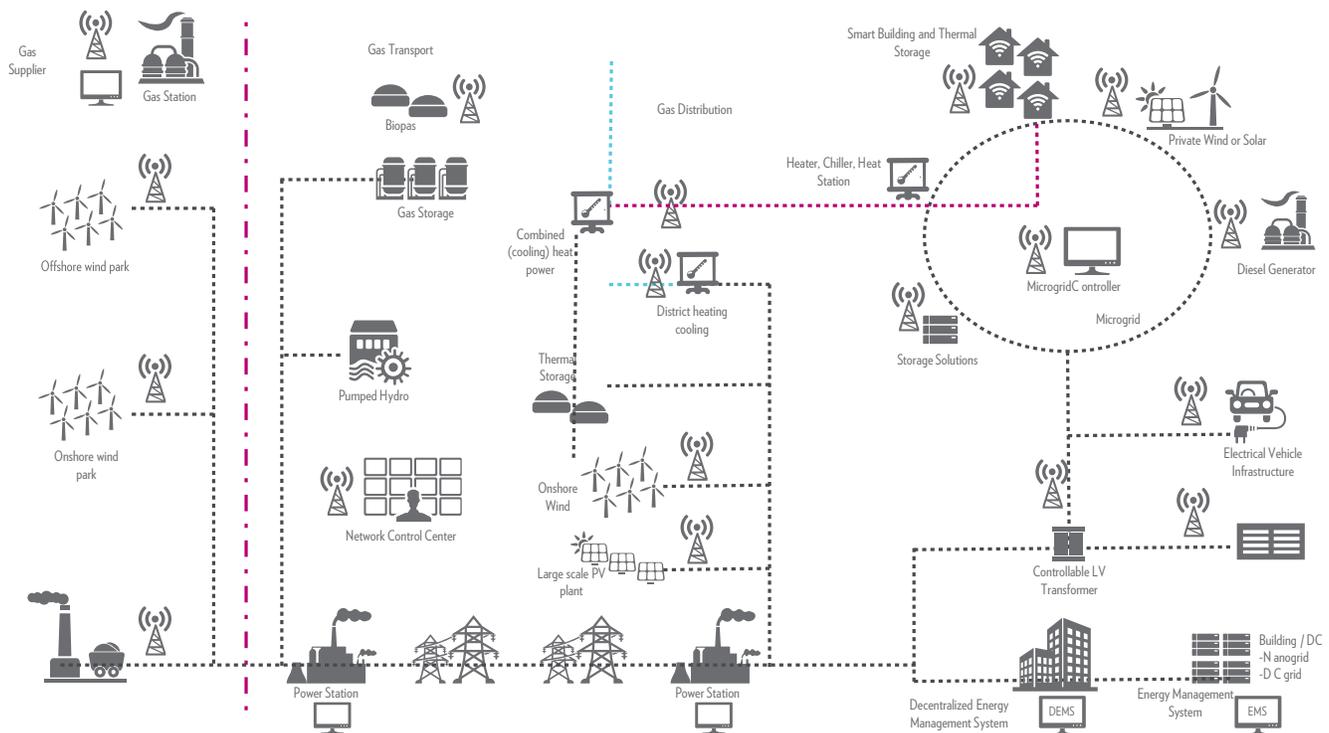
Generation:

- DER
- Asset management
- Performance management

Transmission:

- DER
- Asset management
- Smart grid
- Performance management

Distribution:

- DER
- Asset management
- Smart grid
- Smart meters-CX
- Performance management
- Micro-grids
- Storage

ribbon

However, it's possible (on paper, at least) to replace all of these different technologies currently required with 5G only. Plus, there are other compelling commercial reasons why a shift to 5G makes sense:

- 5G technology will be extremely reliable compared to existing networks, so it minimises maintenance and improves network availability.

- The field data networks and access networks can be simplified, by using a single set of devices and technologies.

- It offers more scalability, because 5G takes into account the IoT and IIoT and the huge number of devices that will be connected to the network.

- It's a foundation for modernizing utilites.

- Its built-in cyber security features take into account technologies like slicing and encryption, so it provides a much higher level of security.

- And more…

5G provides a network alternative that covers and supports a complex ecosystem. One that's expected to become even more complex in the next decade. Large utilities will require extensive network infrastructure upgrades to support their applications, including 5G-ready backhaul and fronthaul platforms.

In other words, 5G networks will have the potential to support a variety of CI connectivity needs. Proponents suggest that pricing, security, and Quality of Service (QoS) will be vastly more attractive than earlier cellular generations.

2. New Revenue Generation Potential

CI operators are deploying record amounts of fiber across their territories. Before, this was to build basic networks for their own use rather than as potential money spinners. However, fiber today is affordable enough to allow CI operators to lay more capacity than they'll ever need. What can they do with their spare capacity? Sell it on to wholesalers, service providers, traditional network operators or anyone else who might want to take advantage of someone else's fiber-laying investment.

And 5G will require every bit of fiber available because of the network densification required. Put another way, as 5G comes to market that fiber and 5G-ready network owned by the CI operator may present a very attractive revenue opportunity.

ribbon

Use Case for Smart Cities and Utelcos

Utilities are strategically positioned and equipped to become a utility telecommunications service provider (Utelco). They have the key building blocks to become a significant player in the telecoms market:

- **Right of way** – they are authorized to lay fibers across the geographical reach of their operations.

- **Infrastructure** – utilities can use the same infrastructure and equipment (fibers, towers, switches/routers, transmission equipment etc.) that support their own operations (which is, in most cases, underutilized) to develop a telecoms business. Plus, utilities have established business to business (B2B) and business to consumer (B2C) relationships and have billing and customer services in place.

- **Knowledge** – they already have the know-how and ability to build, operate and maintain a telecoms network, acquired while planning and managing the network for the utilities internal services.

- **Regulation** – in several countries, utilities are allowed to offer telecom services, especially if their region of operation includes rural and remote places with limited telecoms services available.

- **Finance** – in many countries, special financial packages are offered to utilities adopting a Utelco business model.

Once these building blocks are in place, many utility operational networking teams will evolve from being self-contained working groups to being a competitive, revenue-generating telecoms operation.

One clear use case where a utility may benefit from investing in 5G technologies is by wholesaling them to smart cities. Here too, 5G network infrastructure and technologies can support the whole range of smart city applications, such as:

Smart parking – connecting sensors and appliances throughout public parking places

Broadband multi-play services for residential and business customers (video, internet, voice and data)

Safe city – CCTV and traffic control systems connectivity

Smart lighting

Broadband internet access in all public areas

Smart water and electricity services

Connectivity for public offices, schools, nurseries and clinics

And much more …

ribbon

A Utelco can choose from various business models to provide a range of revenue-generating telecom services:

Facilities wholesaler – co-locating services or selling 'dark' fiber to other carriers, including unmanaged hosting services and provisioning of location for equipment owned by other carriers.

CoC (Carrier of Carriers) – leasing bandwidth and/or network slices (eMBB, URLLC or mMTC) to MNOs (mobile network operators).

Retail – providing managed services to business and residential customers, such as triple or quad-play services (cable, internet, voice etc.). Since they own the infrastructure and equipment, they have full control of assets and network operations.

Each of these business models requires different levels of investment and involves different levels of complexity. Becoming a CoC Utelco is probably the most convenient way to enter the market because you're dealing with a limited (yet selective) number of customers.

	Facilities	CoC	Retail
Customers	SPs, ISPs	SPs, ISPs, large Enterprises	Enterprises, residential
Services	Dark fiber, collocation	Leased lines	Triple play
Organization	Internal department	Daughter company	Independent company
Network	Leverage existing	Expand beyond internal requirements	Extend coverage to customer premise
Complexity	Low	Medium	High
Investments	$	$$	$$$

ribbon

Hand-in-hand Into the Future

Whichever business model you adopt, it's essential to work with the right partner. The telecoms sector is full of cautionary tales of broken promises and soured partnerships. We recommend taking into account the following:

- **Experience** – look for a proven track record in utilities. In other words, companies who have already helped utilities with one wave of network modernization.

- **Assured service delivery for mission critical services** – across the full lifecycle of network operations, including slicing, connectivity services and virtualization. And look beyond the services you need right now. Do they specialize in other areas that may prove useful or beneficial in future?

- **Ability to scale** – opt for a single interface to operate and manage the network from end-to-end, along with the ability to scale to extend the network.

- **Finding a partner** – that offers solutions with a range of products that can be flexibly deployed anywhere in the network – whether that's in street cabinets or remote locations or in the Head Office.

- **Security** – make sure any partner has a good handle on network security – both physical and cyber.

Final Thoughts

5G will revolutionise the utilities sector. How you react to it, will determine how much you benefit from this incredible opportunity. Will you avoid it like the plague, or embrace it as a path to growth? Once you decide, you'll need to choose what type of player you'd like to be.

Will you utilize 5G capabilities for your own use primarily, or will you wholesale these new capabilities to others? Either way, you will need to choose where you want to play, and which business model to adopt based on which customers you want to attract. Then, you'll need to choose the right partner, and with them plan a gradual evolution strategy to reach these customers. By gradual evolution, we mean being able to link investment with actual revenues. No utility wants to invest in an infrastructure that is, ultimately, under-utilized.

If security and mission-critical requirements are to be met, utilities should look for scalable and future-proof infrastructure solutions. Ones which meet existing and future internal requirements, but which can grow to meet future business Utelco targets. Elasticity, multi-service, and support of advanced 5G backhaul capacities and technologies will enable them to serve a variety of customers, and introduce new services quickly, thereby winning market share faster.

Besides competitive pricing, Utelcos can make more of their key assets of reliability and strict performance requirements by offering high-service levels. To achieve all this, utilities should team up with technological and equipment partners whose proven track record incorporates the support of both operation and service provider networks.

Contact us to find out how Ribbon can help you build your 5G opportunity at rbbn.com

ribbon

About Ribbon

Ribbon Communications (Nasdaq: RBBN), which recently merged with ECI Telecom Group, delivers global communications software and network solutions to service providers, enterprises and critical infrastructure sectors. We engage deeply with our customers, helping them modernize their networks for improved competitive positioning and business outcomes in today's smart, always-on and data-hungry world. Our innovative, end-to-end solutions portfolio delivers unparalleled scale, performance, and agility, including core to edge IP solutions, UCaaS/CPaaS cloud offers, leading-edge software security and analytics tools, as well as packet and optical networking leveraging ECI's Elastic Network technology.