ERICSSON

THE 5G BUSINESS POTENTIAL

SECOND EDITION

Industry digitalization and the untapped opportunities for operators

October 2017

THE 5G MARKET POTENTIAL

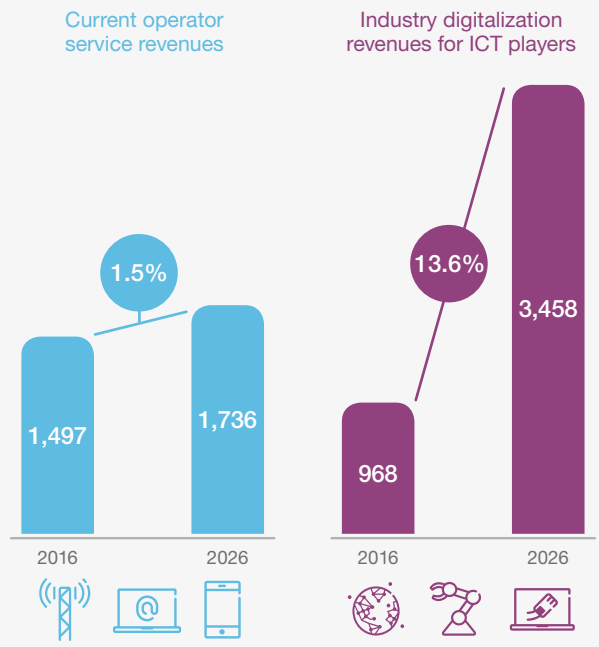
Operators can benefit from an additional 36 percent revenue from 5G-enabled industry digitalization market opportunities by 2026.

In today's world, telecom operators are facing multiple challenges; increasing demands from consumers and tough pricing competition are only a few of the factors causing market stagnation for the industry. Despite high growth in both mobile subscriptions and mobile data traffic, overall mobile service revenue growth has flattened out, compared to the 10 to 15 percent annual growth a decade ago.[1] Operators are struggling to turn the growing usage of mobile data services into greater revenues.

The current average forecast for operator service revenues is expected to increase by 1.5 percent annually from 2016 to 2026 globally. While this offers a steady revenue stream, it is slim when compared to 5G-enabled revenue growth opportunities in industry digitalization.

This report unveils updated 5G industry findings, introducing data from an additional two industries – retail and agriculture – and adding these to the eight key industries in the first edition of the report. Our latest figures back up and build on the fact that in a competitive marketplace, 5G presents huge financial opportunities for operators over the next decade.

Figure 1: Revenue forecast (CAGR 2016–2026, USD billion)



Source: Ericsson and Arthur D. Little

*Industries included: manufacturing, media and entertainment, financial services, public safety, energy and utilities, healthcare, retail, agriculture, automotive, public transport

METHODOLOGY

Ericsson worked closely with Arthur D. Little, a leading international management consultancy firm, conducting interviews, consulting leading market reports and liaising with global and local representatives of Ericsson industry practices, as well as Arthur D. Little experts. A conservative view was taken on the findings in this research report, to deliver an authentic interpretation of the impact 5G will have on future markets. The operator-addressable share of revenue is based on the 2017 Arthur D. Little global telecoms study report, Major Strategic Choices Ahead: Reconfiguring for Value, which is based on 150 industry interviews.

[1] Ericsson Mobile Business Trends, 2015

DIGITAL TRANSFORMATION

As the world becomes ever more digitally and globally connected, industries are experiencing an Information Communication Technology (ICT)-driven transformation. For operators, traditional methods of revenue are slowing; however, the market for industry digitalization is only just beginning.

Digitalization has risen industrywide across the globe, and it is predicted that digital revenue for ICT players will be worth around USD 3.5 trillion by 2026 across the 10 key industries studied.[2] Industry digitalization revenues for ICT players come from adopting or integrating digital technologies into a specific industry.[3]

These industry digitalization revenues are substantial – even today. In fact, revenues reached USD 968 billion in 2016; operators should consider that this young market is already bearing fruit for those who take the opportunity to reap the financial rewards.

Global business trends such as hypercompetition, new customer power and sophistication, the fast-paced change in business ecosystems and disruptive technological advances all affect vertical industries to different extents. Industries are moving towards digitalization for better business outcomes: to increase revenue by better serving their customers, increasing demand, and beating the competition; to decrease costs by increasing productivity and efficiency; and to decrease risk by increasing safety and security.

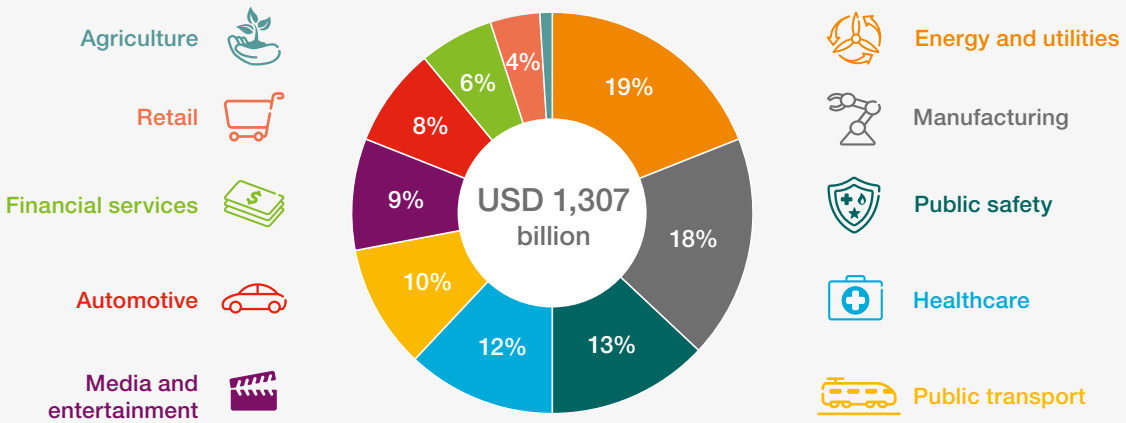
Tomorrow's progress begins today

5G will be a major technology for growing industry digitalization, creating and enhancing industry digitalization use cases such as autonomous driving, remote robotic surgery and augmented reality (AR) support for field maintenance and repair. Globally, the largest opportunity will be seen in the energy and utilities industry, closely followed by the manufacturing and public safety sectors.

Three families of use case scenarios and applications have been identified:

- **Massive machine-type communications** requiring connectivity for millions of devices, typically transmitting a relatively low volume of non-delay-sensitive data (low bandwidth and not latency-critical) via low-cost devices with extended battery life, e.g. asset tracking in a warehouse, a factory, or on a farm; or massive numbers of sensors in cars or other machinery to enable predictive maintenance
- **Critical machine-type communications** for ultra-reliable, resilient, instantaneous connectivity, with stringent requirements for capabilities such as throughput, latency and availability, e.g. remote medical procedures; drones to inspect remote assets; or remote control of machinery in hazardous conditions
- **Enhanced mobile broadband** for mass mobile connectivity, as demand for mobile broadband continues to increase, e.g. enhanced gaming or AR/VR to enhance the shopping experience

Figure 2: 5G-enabled industry digitalization revenues for ICT players, 2026



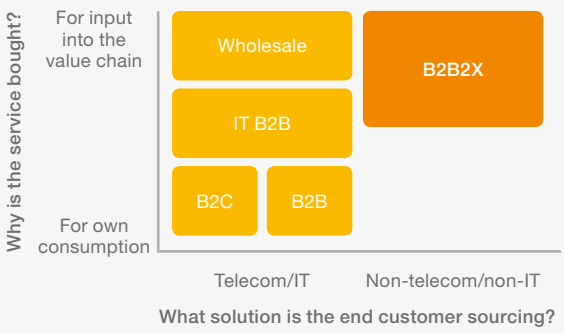
Source: Ericsson and Arthur D. Little

[2] Public safety, manufacturing, financial services, healthcare, energy and utilities, automotive, media and entertainment, public transport, agriculture and retail
[3] In this report, we do not include revenue from the sale of smart objects such as devices, cars, forklifts, or hospital beds

Having gained an understanding of industry digitalization revenues for ICT players, the study delved into the impact of 5G on key industries. Some 400 industry digitalization use cases were assessed and categorized as 5G created, enhanced or independent.[4] Based on this assessment the 5G-enabled revenue potential for ICT players in 2026 is estimated to be USD 1.3 billion.

Figure 3: The B2B2X model

To succeed in B2B2X opportunities, operators will need to focus their organization's engagement, operation and production models



Establishing a new identity

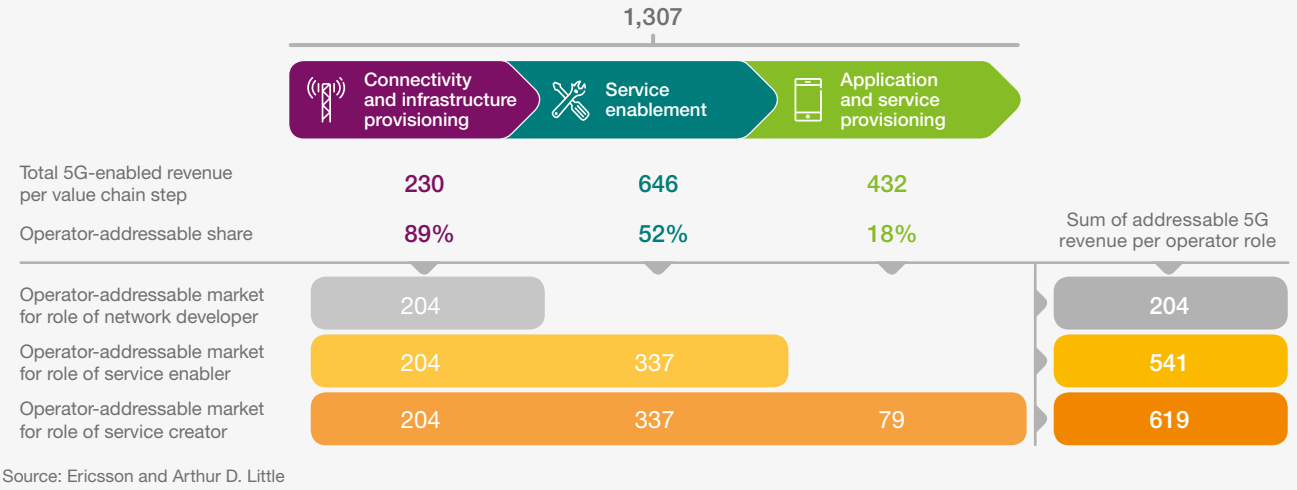
One of the objectives of this report was to determine potential revenue growth for operators based on the role of the operator in the industry digitalization value chain. While operators may still profit from focusing on one of the steps in the value chain, they could achieve much larger growth if they embrace every step. Using 5G to solve the key challenges in digitalization for industries (such as manufacturing and automotive), operators can become more than network developers, addressing additional revenue streams by becoming service enablers or even service creators (see Figure 4, page 5). Today, there is already a mix of operator positions in the value chain.

Digitalization of industry-specific business processes generates a vast opportunity for operators assisting their customers from various vertical industries with new strategic direction. This B2B2X model represents a market where the operator provides a solution (e.g. connected car capabilities) for a vertical industry customer (e.g. an automotive OEM) which provides the solution to an end user (e.g. a consumer). In other words, the end customer ("X") is sourcing a non-ICT solution, in which the operator's solution is embedded or integrated into the value proposition. Vertical industries outside the ICT sector may not have the necessary experience to provide the solution by themselves. Although operators have the capabilities and technological advantage to offer such ICT services, they will need to focus their organization's engagement, operation and production models to succeed in these B2B2X opportunities.

[4] Some of the use cases can be catered for with current 4G technologies, while others require 5G network capabilities. "5G created" means those use cases requiring 5G; "5G enhanced" use cases are those that can employ other technologies such as 4G but are improved by utilizing 5G; while "5G independent" use cases do not need 5G and many of them can be done today

THE 5G VALUE CHAIN

Figure 4: Total 5G-enabled revenue (2026, USD billion)



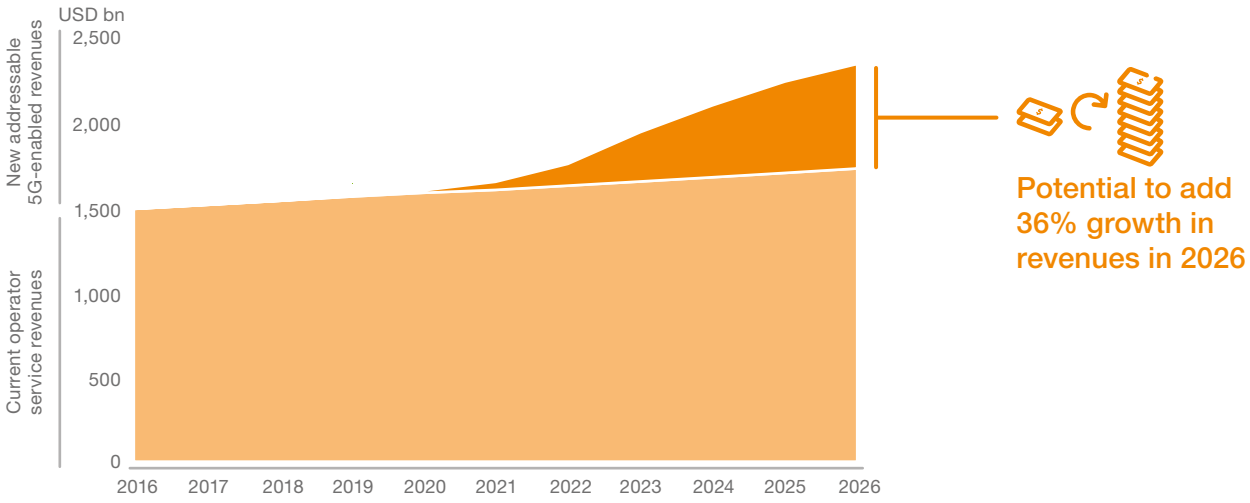
Source: Ericsson and Arthur D. Little

Based on the 10 industries examined in the study, the graph above illustrates the potential revenue for operators addressing industry digitalization with 5G in 2026.

The three main roles for the operator when it comes to generating revenue through 5G industry digitalization have been identified as follows:

- **Network developers** excel in operating network infrastructure, including access, core and transport, and apply powerful IT enablers to support consumers and businesses with uniquely tailored connectivity solutions that maximize the power of digital
- **Service enablers**, in addition to empowering connectivity, provide digital platforms on which businesses can easily configure and integrate value-enhancing digital capabilities into their business processes in highly automated ways
- **Service creators** create new digital services, build innovative businesses and collaborate beyond telecoms to set up new digital value systems, in addition to providing digital platforms and infrastructure services

Figure 5: Current and 5G-addressable revenues (global)

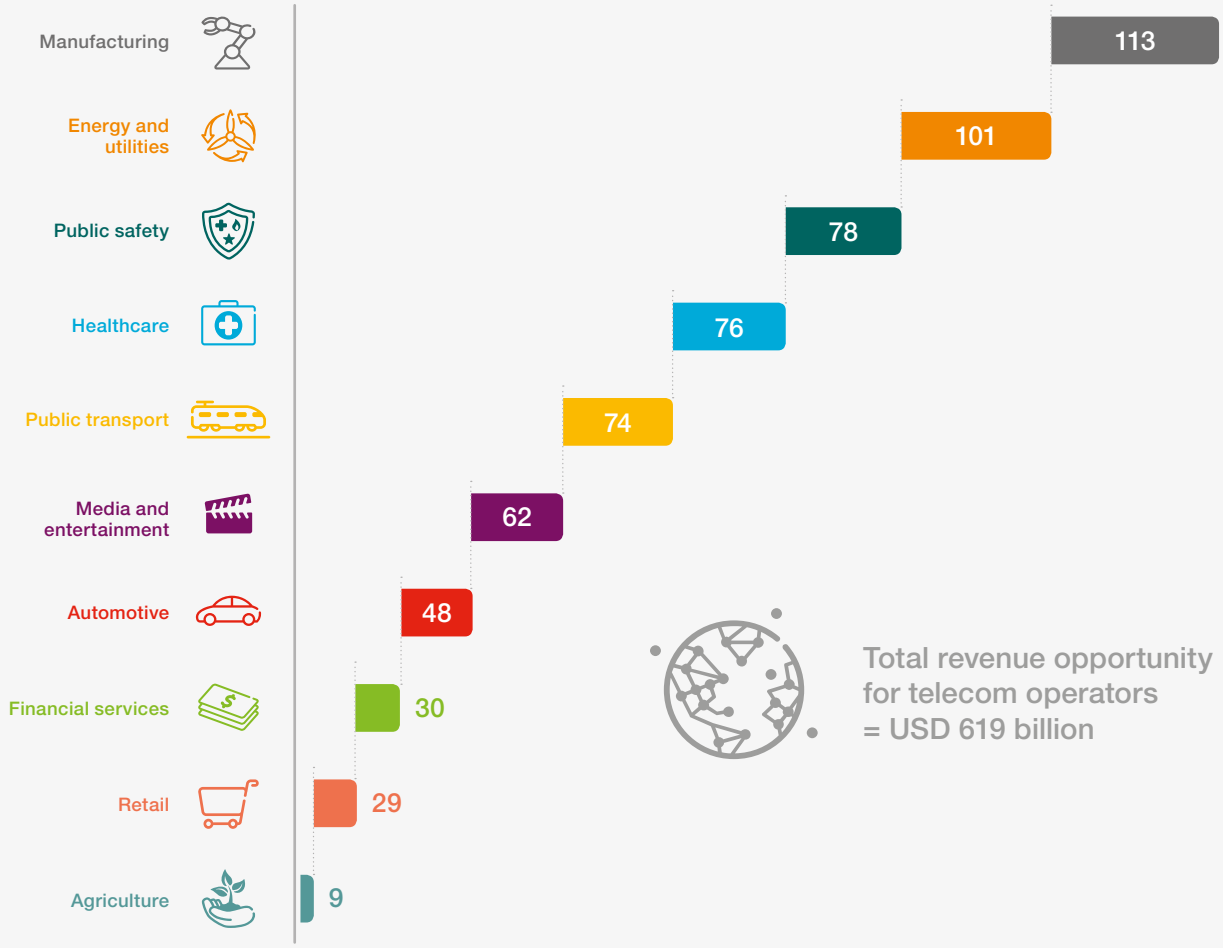


Source: Ericsson and Arthur D. Little

In 2026, there will be an anticipated USD 619 billion revenue opportunity for telecom operators addressing industry digitalization with 5G technology. The largest opportunity for operator-addressable 5G-related revenues will be in the manufacturing and energy and utilities sectors.

As mentioned on page 2, the forecast annual growth for current operator service revenues leading up to 2026 is 1.5 percent. As 5G becomes increasingly integral to industrial businesses, there is a clear rise in the opportunity for new 5G-enabled revenues for operators. In fact, it is predicted that, by addressing 10 key industries, there is a market potential of 36 percent revenue growth globally by 2026. To capture this growth, operators need to take on all three roles in the value chain. Investments in 5G networks (e.g. 5G radio and 5G core), business development, go-to-market models and organizational adaptation are also required.

Figure 6: 2026 split per industry (global, USD billion)



KEY INDUSTRY TRENDS

Each of the 10 key industries identified face numerous challenges due to industry trends, which could be addressed with the adoption of 5G digitalization.

MANUFACTURING

- Hypercompetition with no sustainable competitive advantages
- Increasing volatility from business cycles and product lifecycles
- Smart factory advancing from developments in the Internet of Things and automation

HEALTHCARE

- Increasing consumer attention on wellbeing
- Increasing cost to fit with social demographic changes
- Increasing demand on quality, patient safety and data storage
- Changing consumer behavior, freedom of choice and alternative service providers

MEDIA AND ENTERTAINMENT

- Shifting consumer role as a co-creator of media content
- Increasingly interactive and immersive forms of entertainment
- Expansion of digital content through new platforms and new market players (OTT and VOD)
- Ecosystem complexity

FINANCIAL SERVICES

- Disruption from Fintech (technology used to support financial services) due to online payments, e-wallets, etc.
- Changing customer relations with online/mobile transactions and customized financial solutions
- Structural changes – state involvement, protectionism and fiscal measures

PUBLIC SAFETY

- Growing public surveillance with video surveillance and wearable cameras
- Cyber-attacks – global integration and the digital economy
- Engaged and connected citizens – Internet of Things in public safety

AUTOMOTIVE

- Autonomous driving and a connected traveler with telematics
- Car sharing and changing commuter habits
- Electric mobility with decreasing battery costs and a green agenda
- Digital enterprise and connected supply chain
- Digital vehicle ecosystem

PUBLIC TRANSPORT

- Infotainment on the move
- Urbanization and intermodality
- Environmental awareness – CO_2 emissions and public spaces
- Urban lifestyle and growing expectations on public transport

ENERGY AND UTILITIES

- Electrification and renewable energy generation
- New decentralized business models
- Structural shifts with increasingly retiring assets
- Political and societal push for sustainable energy systems

AGRICULTURE

- Increasing use of technology in smart farming
- Changing agricultural techniques
- Changing consumer awareness and political requirements e.g. food transparency
- Changing farming structure, such as vertical integration

RETAIL

- Seamless e-commerce and omnichannel
- Increasing use of big data analytics and personalization
- Unique in-store experience such as AR/VR
- Smart logistics and in-store operational optimization

THE INDUSTRY EFFECT

The manufacturing industry: Production line robotics

Manufacturing is one industry identified from the study that shows a strong market potential for ICT players when addressing 5G industry digitalization. The challenge for manufacturers is to increase productivity, efficiency and flexibility and to enable greater personalization of products and services.

5G technologies can help to address these key trends and challenges and make a significant impact. One key example is enabling and enhancing critical control of production line robotics.

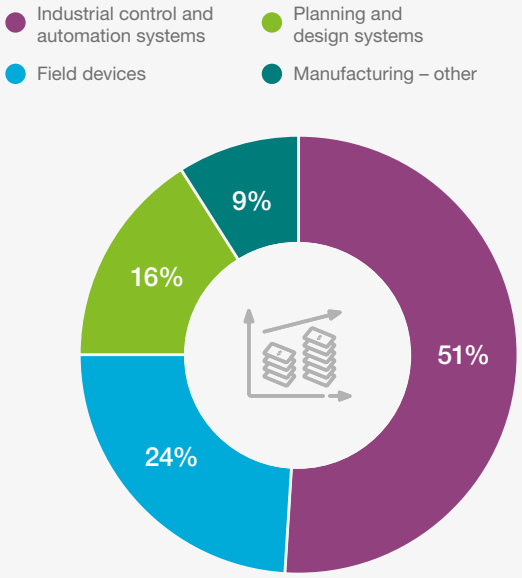
Critical control of production line robotics includes tethered or untethered robots that are controlled, monitored, and can be reconfigured remotely. This technology could be used in factory floor production, reconfiguration and layout changes, real-time analysis and even to steer a robot's movement from a remote location.

5G plays a major role in connecting production line robotics by providing high-performance mobile services such as:

- Connectivity for robotics, removing the need for fiber tethering
- Quick reactions to discrepancies, helping to avoid damaging expensive components
- Live remote monitoring of video streams from robotics
- Low latency-enabled remote control applications

The technology in such a scenario has an estimated potential opex saving of 15 to 20 percent, and helps production operations become more flexible, efficient, safer and cheaper to maintain.

Figure 7: Operator-addressable use case categories for manufacturing, 2026



Industrial control and automation systems

Automation and control of robots and factories and smart logistics systems.
Use case examples:

- Remote control of robots – Over mobile network
- Automated warehouse vehicles – Intelligent wireless communication solution for warehouses. Monitoring system reads data to understand the operational status and traveling routes of the vehicles, and provides the fault alarm and current status of materials

Planning and design systems

Simulation of factory process and training support.
Use case examples:

- AR support in training, maintenance, construction and repair – Give workers instructions, enabling them to perform tasks easier, increase safety and facilitate smoother maintenance
- Connected operational intelligence – Combine, analyze and deliver insights from disparate and diverse silos of assets, operators and enterprise systems into unified real-time visibility of key performance indicators for increased operational performance and improved decision making

Field devices

Applications to gather and monitor data.
Use case examples:

- Real-time product monitoring – Monitoring of performance, quality variations, interactions by operators and changing factors in the environment
- Intelligent video surveillance – Integration of multiple video feeds and use of video recognition algorithms to efficiently detect threats

Manufacturing – other

Manufacturing technologies and data capturing from goods.
Use case examples:

- 3D printing – Processes used to create a 3D object in which layers of material are formed under computer control to create an object of almost any shape or geometry, produced using digital data from a 3D model
- Identification and tracking of goods in end-to-end value chain – Easily locate and monitor key inventory (e.g. raw materials, final products, parts and containers) to optimize logistics, maintain inventory levels, prevent quality issues and detect theft

Source: Ericsson and Arthur D. Little

The use of 5G technology in smart factories offers extensive benefits to manufacturing processes. Connected cameras and sensing devices can, for example, provide feedback to control centers enabling skilled staff to control and steer manufacturing remotely, resulting in increased safety, productivity and flexibility.

5G can also support predictive maintenance for robots, which leverages advanced analytics solutions to analyze and predict faults and potential threats before they occur.

The retail industry: Tomorrow's virtual world

Retail is another industry that is projected to be transformed by 5G. Consumers' shopping experiences can be enhanced by way of AR/VR, which allows them to test products in a virtual world, access product information and visualize products in their homes. The use of AR/VR will be enabled by 5G's high-speed in-store connectivity, allowing rich content delivery. 5G's low latency also enables mobile AR/VR applications that prevent nausea. By 2020, worldwide spending on AR/VR for retail showcasing is projected to reach approximately USD 59 billion.

Figure 8: AR/VR for shopping experiences

Challenges in retail

- Increasing customer expectations for a unique, personalized shopping experience, with customized products and offerings
- Increasing cost of retail space driving a move away from significant in-store stock to storing in central warehouses
- Trend towards omnichannel retail: retailers need to offer complete flexibility in sales channels
- E-commerce expansion has led to demand from customers to be able to conveniently shop from home

AR/VR for shopping experiences represents the potential to capture value from these challenges

AR/VR shopping experience capabilities

- High speed in-store connectivity for rich content delivery
- Low latency enabling mobile AR/VR applications that do not cause nausea
- Continuously secured and reliable connection for seamless shopping experience

How 5G supports these capabilities

Peak data rate: High peak data rate enables AR/VR applications to run smoothly without delays

Latency: Avoid motion sickness related to AR/VR

Connection density: High connection density if many are using application in one area, e.g. a large mall or city center

Position accuracy: Need to know position and orientation of device in real time for AR overlay as user moves and changes direction

Battery life: 5G will require less energy for the connection allowing AR/VR applications to run longer

Reliability: Continuously secured and reliable connection

The energy and utilities industry: Real-time monitoring

The energy and utilities industry is second only to manufacturing in its operator-addressable revenue potential. The lion's share of the opportunity is to be found in the smart grid area.

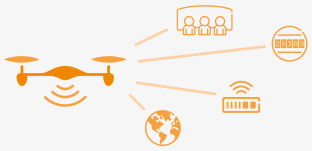
An interesting future use case for the energy and utilities industry is that of drones being controlled remotely to monitor and/or maintain transmission or production assets, generating a 30 percent cost reduction potential compared to sending humans into the field. This will lead to increased safety for workers, improved grid uptime and reduced costs.

5G's capacity, reliability and security supports use cases such as smart robots, enabling them to be controlled remotely

Figure 9: Drone monitoring

Challenges in energy and utilities

- Production and transmission assets are **often located in remote locations** (at sea, in rural areas, etc.)
- Power companies are increasingly monitoring **not only power stations but also the transmission and distribution grid**
- Utility companies are at risk of being **fined by authorities** when power outages occur
- Increased share of renewables means **more producing units over a larger area** that often is more remote



Drone field service and monitoring will address these challenges with great effect

Drone monitoring capabilities

- Providing connectivity to the drone enabling real-time transfer of information (video, sensor data, etc.) back to the control center
- Enabling long-range and flexible remote control of drones (that today often are being controlled over local Wi-Fi networks)

How 5G supports these capabilities

Peak data rate: High throughput capacity is needed to transfer high definition video

Mobility speed: Needed for remote control of very fast drones

Latency: Low latency is critical for live remote control applications

Availability: Connection downtime must be minimal for live remote control of drones

Reliability: Packet loss must be minimal for live remote control of drones

Connection density: When drones are used in an area with a lot of people, e.g. a music festival

Position accuracy: Critical for live remote control of drones

What does this mean for me?

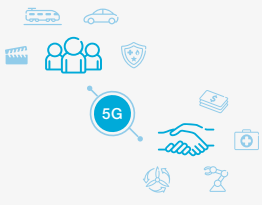
For more information on the benefits 5G will offer by addressing key industries' digitalization and where it fits into your business and country, contact your Ericsson representative or visit: https://www.ericsson.com/en/networks/topics/create-your-5g-business-now

KEY FINDINGS

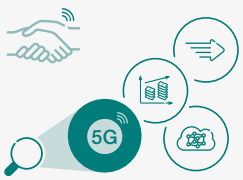
Industry digitalization investments are growing and generating revenue for ICT players worth an estimated USD 3.5 trillion by 2026

Operators can benefit from an additional 36 percent revenue from 5G-enabled market opportunities by 2026

5G has the potential to deliver unparalleled benefits to society and businesses



The time is now to start creating a 5G business



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