

F. 5G and AIoT Business Models and Strategies

Chapter #6: Business Opportunities in 5G and AIoT

ET0743
5G and AIoT Applications
Week #14

Learning Objectives

At the end of instruction, the learner should be able to:

- Understand the Key players and their strategies
- Describe case studies of successful 5G and AIoT implementations

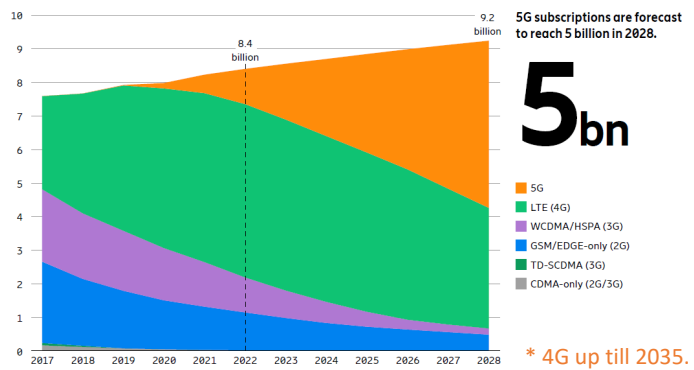
6. Business Opportunities in 5G and AIoT



The advent of 5G technology combined with the proliferation of Artificial Intelligence of Things (AIoT) is set to revolutionize industries, creating vast business opportunities. The unprecedented capabilities of 5G, including ultra-fast speeds, low latency, and the ability to connect millions of devices simultaneously, are empowering AIoT applications to reach their full potential. This chapter explores the various business opportunities emerging from this powerful synergy, highlighting key areas for growth and innovation.

Mobile Subscriptions by Technology

- Around 8.4 billion mobile subscriptions are estimated by the end of 2022, and this figure is projected to increase to around 9.2 billion by the end of 2028
- By the end of 2022, 5G subscriptions are expected to reach 1 billion
- 2023 will bring more 5G smart devices with more capabilities
- 5G devices are expected to evolve with more spectrum aggregation capabilities (4CC DL, 2CC UL and NR-DC) plus improved power efficiency and low-latency capabilities.
- By the end of 2028, 5 billion 5G subscriptions are forecast globally, accounting for 55 percent of all mobile subscriptions.
- Video is expected to account for 80 percent of global mobile network traffic in 2028

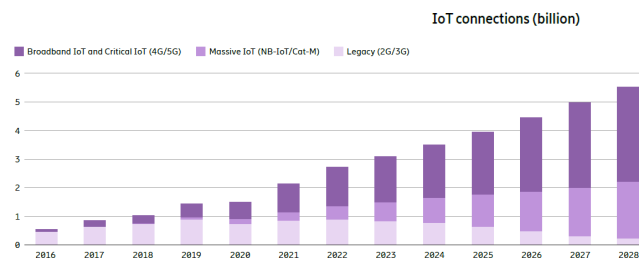


Source: Ericsson Mobility Report- Nov-2022

Cellular IoT Connections by Segment and Technology

- Broadband IoT (4G/5G) connections to dominate by end of 2028
- Almost 60 percent of cellular IoT connections are forecast to be broadband IoT, with 4G connecting the majority.
- North East Asia is the leading region in terms of the number of cellular IoT connections, expected to pass 2 billion connections in 2023

IoT	2022	2028	CAGR
Wide-area IoT	2.9	6.0	13%
Cellular IoT ²	2.7	5.5	12%
Short-range IoT	10.3	28.7	19%
Total	13.2	34.7	18%

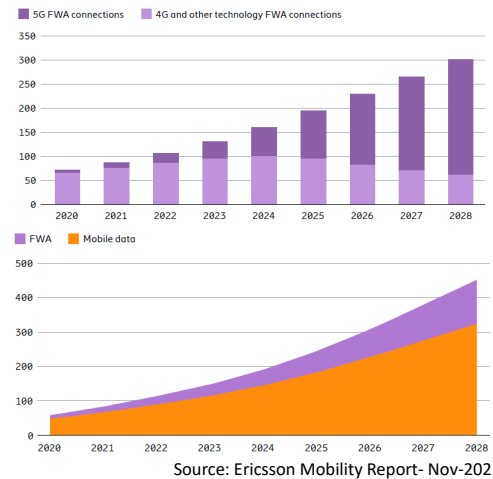


Source: Ericsson Mobility Report- Nov-2022

Fixed Wireless Access, FWA Connections

- Today, 25 percent of service providers apply differential pricing with speed-based tariff plans
- Almost 65 percent are more advanced offerings, involving speed tiers, such as 100 Mbps, 300 Mbps and 500 Mbps
- More than 100 million FWA connections estimated by the end of 2022
- Over 300 million FWA connections by 2028
 - 5G will account for almost 80 percent of FWA connections.

FWA is a connection that provides primary broadband access through mobile network-enabled customer premises equipment (CPE).

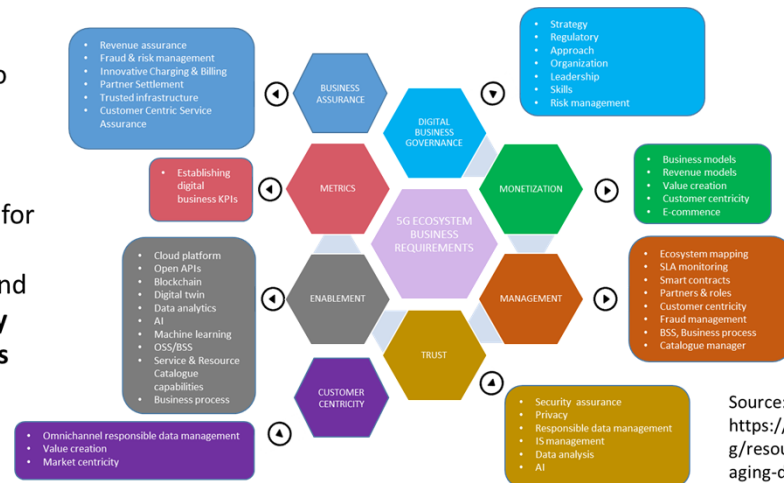


Official (Open)

6.1 Understand the Key Players and their Strategies

Managing Business Opportunities for 5G Digital Ecosystems

- 5G needs to bring **profitable business operations** for service providers and **high quality experiences** for the customers



A digital ecosystem is a network of interconnected digital technologies, platforms, and services that interact with each other to create value for businesses and consumers.

The picture illustrates the various business requirements and elements that are crucial for establishing a successful 5G ecosystem. It uses hexagons and connecting arrows to show how these elements interact and support each other. Here is a simplified explanation of each component:

1. 5G Ecosystem Business Requirements (Central Hexagon):

- This is the core of the diagram and represents the essential needs for a functioning 5G business environment.

2. Business Assurance:

- Ensuring the business remains financially secure by managing revenue, preventing fraud, and maintaining a trustworthy infrastructure.
- Includes innovative billing, partner settlements, and customer-centric service assurance.

3. Digital Business Governance:

- Involves setting the strategy, regulatory compliance, organizational structure, leadership, skills, and risk management to guide the business.

4. Monetization:

- Focuses on how to generate revenue through business models, customer-centric approaches, e-commerce, and creating value.

5. Management:

- Manages the overall 5G ecosystem by mapping out partners and roles, monitoring service level agreements (SLAs), handling smart contracts, and managing fraud.
- Also involves business support systems (BSS) and catalogue management.

6. Trust:

- Ensures security, privacy, and responsible data management. It also involves information system (IS) management, data analysis, and AI.

7. Customer Centricity:

- Puts the customer at the center of the business model, focusing on omnichannel data management, creating value, and ensuring market relevance.

8. Enablement:

- Provides the technical backbone with cloud platforms, open APIs, blockchain, digital twins, data analytics, AI, machine learning, and service/resource catalog capabilities.
- Also involves business process management and operational support systems/business support systems (OSS/BSS).

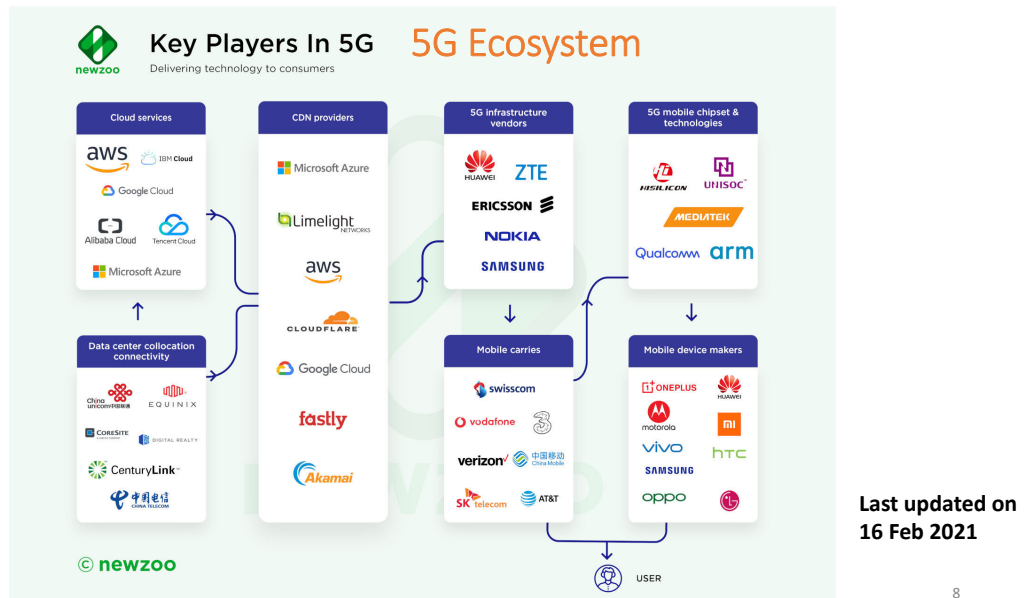
9. Metrics:

- Establishes key performance indicators (KPIs) to measure and track digital business performance.

Each of these components is interconnected, demonstrating how they collectively support a robust 5G ecosystem, driving both technological enablement and business success.

Official (Open)

6.1 Understand the Key Players and their Strategies



[Taken from Source: <https://devopedia.org/5g-ecosystem>]

Without being exhaustive, we note a few players to get a sense of who is involved:

Chipset Vendors: Qualcomm, Samsung, Huawei, MediaTek, Unisoc, Nokia Networks, Intel, Broadcom, etc.

Infrastructure Vendors: Huawei, ZTE, Ericsson, Nokia Networks, Samsung, Cisco, HPE, Dell EMC, etc.

Mobile Device Makers: Apple (iPhone 12), Google (Pixel 5), HTC (mobile hotspot), LG (V50 ThinQ), Samsung (Galaxy 10 5G), Motorola (G 5G Plus), Huawei (Mate 20 X), Nokia (Nokia 8.3), Xiaomi (Mi 10 Pro 5G), OnePlus (OnePlus 8), etc.

Mobile Network Operators: Verizon, AT&T, T-Mobile, Vodafone, SK Telecom, China Mobile, etc.

Standardization Bodies: 3GPP, IETF, ITU, and ETSI.

Regulatory Bodies: Government departments and authorities allocate and auction spectrum for 5G. These include FCC (US), DoT (India), CITC (Saudi Arabia), etc.

Industry Bodies: 5GAA, 5G-PPP, 5G-MoNArch, 5G IA, 5G-ACIA, NGMN Alliance, O-RAN Alliance, IEEE 5G World Forum, 5G Future Forum, ONF, BBF, etc.

Cloud Providers: AWS, Google Cloud, Microsoft Azure, Alibaba Cloud, Tencent Cloud, IBM Cloud, etc.

Data Center Colocation Connectivity Providers: China Unicom, Equinix, CoreSite, Digital Realty, CenturyLink, etc.

CDN Providers: Akamai, Cloudflare, Fastly, Limelight Networks, AWS, Google Cloud, Microsoft Azure, etc.

N.B.: A Content Delivery Network (CDN) is a network of servers that distributes content from an “origin” server throughout the world by caching content close to where each end user is accessing the internet via a web-enabled device.

6.1 Understand the Key Players and their Strategies



Telecommunications Companies:

Verizon: Verizon is leveraging its extensive 5G network to provide enhanced mobile broadband services and edge computing solutions. Their strategy includes partnerships with enterprises to develop custom AIoT applications, such as smart manufacturing and autonomous vehicles.

China Mobile: China Mobile is focusing on expanding its 5G infrastructure across urban and rural areas. They are investing in AIoT applications for smart agriculture, enabling precision farming techniques that optimize resource usage and increase crop yields.

Technology Giants:

Huawei: Huawei is pioneering 5G technology and AIoT integration, offering comprehensive solutions for smart cities, healthcare, and industrial automation. Their strategy involves developing proprietary chips and AI algorithms to enhance the performance and efficiency of their solutions.

Qualcomm: Qualcomm is at the forefront of developing 5G chipsets and AIoT platforms. They are focusing on providing the hardware and software backbone for

connected devices, with a strong emphasis on edge computing to reduce latency and improve real-time data processing.

Cloud Providers:

Amazon Web Services (AWS): AWS is enabling the AIoT ecosystem through its cloud services, offering tools for data storage, processing, and analytics. Their strategy includes collaborations with IoT device manufacturers and AI developers to create scalable and secure solutions for various industries.

Microsoft Azure: Azure is providing a robust platform for AIoT applications, emphasizing interoperability and integration with existing IT infrastructure. Their approach includes offering pre-built AI models and IoT solutions to accelerate deployment and reduce time-to-market.

AI and IoT Specialists:

IBM: IBM is leveraging its expertise in AI and IoT to offer end-to-end solutions for industries such as healthcare, automotive, and energy. Their strategy focuses on using AI to derive actionable insights from IoT data, enhancing operational efficiency and enabling predictive maintenance.

Siemens: Siemens is integrating AIoT in its industrial automation solutions, driving the Industry 4.0 revolution. Their approach includes developing smart sensors and edge devices that can process data locally, reducing the need for centralized computing resources.

6.2 Case Studies of Successful 5G and AIoT Implementations



<https://youtu.be/enYXUldC2xg>

Smart Cities:

Barcelona: The city of Barcelona has implemented a comprehensive smart city framework utilizing 5G and AIoT technologies. Smart lighting systems automatically adjust brightness based on pedestrian traffic, while smart waste management solutions optimize collection routes, significantly reducing operational costs and environmental impact.

Industrial IoT (IIoT):

Siemens' Amberg Plant: Siemens has transformed its Amberg plant into a smart factory using 5G and AIoT. The plant features fully automated production lines where AI algorithms optimize processes in real-time. This has led to a 75% increase in productivity and a 30% reduction in material waste.

Healthcare: (N.B. We have seen the clip before; we will just iterate here again as a successful case study.)

5G-Enabled Remote Surgery: In China, a surgeon performed a remote operation using 5G technology, showcasing the potential of low-latency connections in healthcare. AIoT devices monitored the patient's vitals in real-time, providing the surgeon with critical information to ensure a successful procedure.

Smart Homes and Buildings:

Amazon Alexa: Amazon has integrated AIoT with its Alexa devices to create smart home environments. Users can control various appliances through voice commands, enhancing convenience and energy efficiency. For instance, smart thermostats can learn user preferences and adjust temperatures automatically, reducing energy consumption.

6.2 Case Studies of Successful 5G and AIoT Implementations



<https://youtu.be/rsMEMNh9ejw?si=5YROi1g3Wvtj6Nn->

Smart Cities:

Barcelona: The city of Barcelona has implemented a comprehensive smart city framework utilizing 5G and AIoT technologies. Smart lighting systems automatically adjust brightness based on pedestrian traffic, while smart waste management solutions optimize collection routes, significantly reducing operational costs and environmental impact.

Industrial IoT (IIoT):

Siemens' Amberg Plant: Siemens has transformed its Amberg plant into a smart factory using 5G and AIoT. The plant features fully automated production lines where AI algorithms optimize processes in real-time. This has led to a 75% increase in productivity and a 30% reduction in material waste.

Healthcare: (N.B. We have seen the clip before; we will just iterate here again as a successful case study.)

5G-Enabled Remote Surgery: In China, a surgeon performed a remote operation using 5G technology, showcasing the potential of low-latency connections in healthcare. AIoT devices monitored the patient's vitals in real-time, providing the surgeon with critical information to ensure a successful procedure.

Smart Homes and Buildings:

Amazon Alexa: Amazon has integrated AIoT with its Alexa devices to create smart home environments. Users can control various appliances through voice commands, enhancing convenience and energy efficiency. For instance, smart thermostats can learn user preferences and adjust temperatures automatically, reducing energy consumption.

6.2 Case Studies of Successful 5G and AIoT Implementations



https://youtu.be/HTKsKpL4jJ4?si=hXQIBotfMx3_OuZl

Smart Cities:

Barcelona: The city of Barcelona has implemented a comprehensive smart city framework utilizing 5G and AIoT technologies. Smart lighting systems automatically adjust brightness based on pedestrian traffic, while smart waste management solutions optimize collection routes, significantly reducing operational costs and environmental impact.

Industrial IoT (IIoT):

Siemens' Amberg Plant: Siemens has transformed its Amberg plant into a smart factory using 5G and AIoT. The plant features fully automated production lines where AI algorithms optimize processes in real-time. This has led to a 75% increase in productivity and a 30% reduction in material waste.

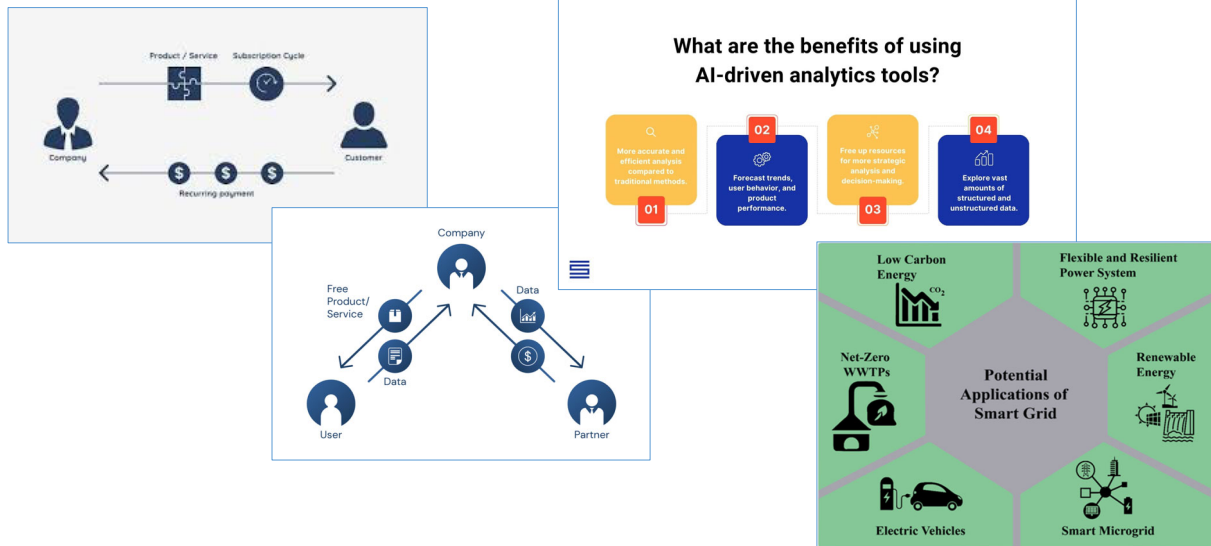
Healthcare: (N.B. We have seen the clip before; we will just iterate here again as a successful case study.)

5G-Enabled Remote Surgery: In China, a surgeon performed a remote operation using 5G technology, showcasing the potential of low-latency connections in healthcare. AIoT devices monitored the patient's vitals in real-time, providing the surgeon with critical information to ensure a successful procedure.

Smart Homes and Buildings:

Amazon Alexa: Amazon has integrated AIoT with its Alexa devices to create smart home environments. Users can control various appliances through voice commands, enhancing convenience and energy efficiency. For instance, smart thermostats can learn user preferences and adjust temperatures automatically, reducing energy consumption.

Emerging Business Models and Strategies



The emergence of 5G and AIoT technologies is revolutionizing business models and strategies across industries. Companies are leveraging 5G's high-speed, low-latency capabilities to enable a new wave of digital services and experiences, while AIoT combines artificial intelligence with the Internet of Things to create smarter, more efficient systems. Innovative business models are focusing on service-oriented approaches, offering recurring revenue streams through 'as a service' offerings and transforming traditional product-centric operations into customer-centric solutions. These advancements are fostering new levels of automation, real-time decision-making, and enhanced asset monitoring, ultimately driving the future of smart, connected enterprises. Some emerging business models and strategies seen are:

Subscription-Based Models:

- Companies are adopting subscription-based models for their 5G and AIoT services. For example, smart home solutions may include a monthly fee that covers hardware, software, and maintenance, providing a steady revenue stream and ongoing customer engagement.

Data Monetization:

- Businesses are monetizing data collected from AIoT devices by offering insights and

analytics services to other companies. For instance, agricultural companies can sell data on soil health and crop conditions to farmers, enabling data-driven decision-making.

AI-Driven Analytics:

- AIoT devices are enabling real-time data analysis and predictive analytics, providing businesses with actionable insights. This is particularly valuable in industries like manufacturing, where predictive maintenance can prevent costly downtime and improve operational efficiency.

Sustainability and Green Technologies:

- There is a growing emphasis on developing sustainable AIoT solutions that reduce energy consumption and carbon footprint. For example, smart grids can optimize energy distribution and storage, supporting the integration of renewable energy sources and reducing reliance on fossil fuels.

Conclusion:

The convergence of 5G and AIoT is unlocking unprecedented business opportunities across various sectors. By understanding the key players and their strategies, and learning from successful implementations, businesses can capitalize on this technological revolution to drive innovation, efficiency, and growth. As the ecosystem continues to evolve, staying ahead of emerging trends and adopting flexible, data-driven business models will be crucial for success.