

CXO INSIGHTS



# CXO TECH BRIEF FOR TELECOM





# 1. SECTORAL EXEC SUMMARY



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More than 20 years of Telecom and Digital Consulting experience with expertise in Transformation Strategy and Innovation across the entire Telco value chain: service platform transformation, IoT strategy, make or buy strategy for new technology deployment, network and field services optimization, 5G-Edge Computing



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More than 15 years of experience in Telecom consulting, with expertise in deploying and using 5G and IoT in diversified sectors and supporting CSPs: technology strategy, network modeling. He has also worked with industrialists to develop strategies and roadmaps for factory connectivity.

## SECTORAL OVERVIEW WITH A RETROSPECTIVE ON 2020 AND PROJECTIONS FOR 2021

- Telcos are in the spotlight with major investments in optical fiber deployment, increase in 4G coverage and accelerating investments for the 5G roll-out, but are greatly challenged by several players (OTTs, equipment manufacturers, Cloud providers, etc.).
- Telcos can still rely on **their achievements and assets**:
  - **Control over the last mile** by providing paid connectivity services to customers (*30M high-speed access points in France*)
  - **Control over their customer base** through devices like sim cards and internet routers (*~100M SIM cards in France*)
  - **Bundled offers** (mobile, home broadband, entertainment, smart homes, etc.) increasing the ARPU and customer loyalty
- To maintain their leadership across the value chain, Telcos could leverage some **opportunities**:
  - **5G service offerings for B2B**: monetization of new connectivity services (slicing as a service, MEC hosting) and use cases for industry verticals (logistics, autonomous vehicles, healthcare, retail, industry 4.0, etc.). According to a Capgemini Research Institute study, 66% of industrial companies are willing to implement 5G use cases within 2 years of them being available
  - **Diversification of offerings** by adding new services to their bundles or entering new markets (banking, etc.). “We see 5G changing everything about how media is produced and consumed”, CTO, Walt Disney Studios
  - **New technology levers**: take advantage of new technologies (open networks, open RAN, network virtualization, network automation) to drive network cost efficiency
- However, Telcos need to watch out for **potential upcoming threats**:
  - **ARPU stagnation** due to intense competition between CSPs and difficulty to define 5G monetization patterns
  - **Cost increase** due to higher investments in infrastructure security and maintenance and higher cost of energy to supply power to the network
  - **CAPEX hunger** for network deployment (€10 billion of investments in 2019) to develop capabilities and infrastructure (5G, edge computing, fiber, etc.)
  - **Limiting the role of Telcos to mere data pipeline operators** in case of loss of direct contact with end customers due to competition from new players (Cisco, IBM, OTTs, etc.)
  - **Competition with MVNOs** for revenues and customer interfacing (for example, the launch of Google Fi in the US)
  - **Increased competition and partnership opportunities with hyperscalers** (telco cloud, edge computing) and new players in the market



# 1. SECTORAL EXEC SUMMARY

## MAJOR CHALLENGES FOR TELCOS

### Customer Profitability & Loyalty

Service quality and added value (bundles with OTTs for entertainment)

### Technology Partnerships

Partnerships with Cloud providers, OTTs, Banking, etc.

### Flexibility & Agility

Shorter and faster product and service development cycles

### Security

Secure and enhanced communication and network security

### Sustainability

Stable network operations with less energy consumption and use of renewable energy

### Network Optimization

Optimized networks thanks to an effective Make or Buy strategy and the contribution of predictive maintenance, network softwarization, open source and open network technologies

## CONVICTIONS REGARDING THE SECTOR'S KEY TRENDS BASED ON TECH AND SECTOR MATURITY ANALYSIS



- **Mixed Reality** promises a new array of possibilities that can be offered to customers throughout the telecom value chain and experience



- **Edge computing** is paving the way for new collaboration opportunities between stakeholders across the value chain (Telcos, Cloud providers, etc.)



- The **5G** revolution, via virtualization, enables Telcos to become more agile and adapt to customer demands (B2B, B2C) in real time



- **Quantum Computing** will disrupt the cybersecurity principles. Telcos will have to leverage this technology to secure communications for safety and security purposes



- **IoT and connected objects** enable better monitoring of the entire network to prevent incidents and predict maintenance needs



# 2.1 HOW IS THE VALUE CHAIN DISRUPTED BY TECH?

Design & Build Networks

Operate & Maintain

Customer service

Service catalog



### CHALLENGES

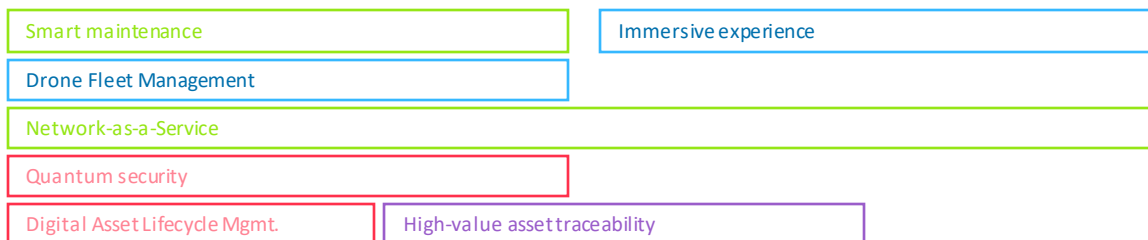
- Infrastructure (core network, antennas, installations, etc.)
- Applications (call, messaging, video)

- Operations system
- Network maintenance
- Customer installations/support

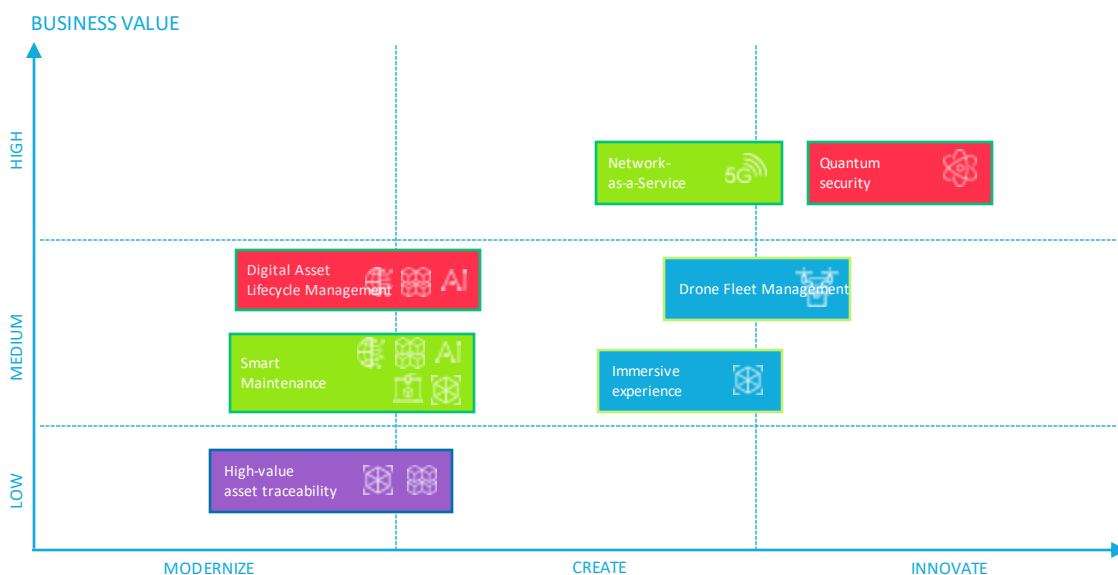
- Customer relationship management (CRM)
- Customer support
- Retail and marketplace management

- Connectivity services
- Entertainment
- B2B services

### TECH USE CASES



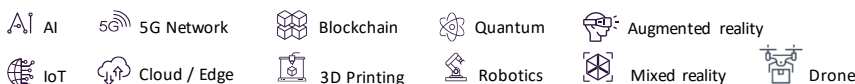
# 2.2 FOCUS ON TECH DELIVERY MATURITY AND BUSINESS VALUE



### Value chain positioning:



Timeframe — Short-term — Medium-term — Long-term





# 3. FOCUS ON VALUE CHAIN BLOCKS ALONG WITH USE CASES



## DESIGN & BUILD NETWORKS



Investments of > \$1 Trillion between 2012-2018 for 4G infrastructure



In India, the average data consumption per month per subscriber rose from 59.62MB in 2013 to nearly 3.2 GB in 2018 after the entry of 4G services



Cellular data traffic: +60%/year for the next 4 years



IoT, AR/VR and AI

### New Business Stakes

- Transforming telecom networks and field services in the age of COVID-19 to ensure quality of service and customer satisfaction
- **Short-term response:** Accelerating recovery efforts to manage the field services backlog accumulated during the crisis. Rely on data-driven tools, advanced analytics and predictive modeling improve the planning of logistics
- **Long-term response:** Addressing the structural changes posed by COVID-19: accelerate digital transformation efforts to support new consumption patterns and meet customer expectations in terms of availability, speed, and resilience

### How can tech disrupt business models?

- Leverage data, analytics, artificial intelligence, IoT and AI to improve network and infrastructure management and monitoring, to prevent incidents and predict maintenance needs
- Enhance network agility to address the rapidly changing loads while maintaining the quality of service



## OPERATE & MAINTAIN



65% of industries plan to move to 5G



Vulnerability to change



Mature and proven technologies



AI and Big Data

### New Business Stakes

- 5G is expected to **accelerate industries and services** thanks to enhanced connectivity and low latency
- More industrial operations will rely on **5G and IoT**, which will drastically increase data production and bandwidth consumption
- Today, Telcos are facing a dual challenge: **provide high quality of service while limiting energy consumption**

### How can tech disrupt business models?

- Telcos need to embrace automation to **automatically adjust their infrastructure configurations** (self-organizing network) and **perform real-time and predictive analysis to anticipate network congestion or potential breakdowns and respond as quickly as possible in case of incidents**

### Why it is relevant now?

- The 5G network deployment has begun and the associated emerging use cases and tests are being carried out in the manufacturing sector



## CUSTOMER SERVICE



A 5% reduction in the churn rate can lead to an increase in profitability by 25% to 125%



AI, AR and VR help companies to create innovative customer services



Telcos must develop outstanding offerings, to differentiate from competition



5G, AR and AI

### New Business Stakes

- **Productivity:** Continue to work towards Operational Excellence (quality, cost, energy, etc.) as production is at the heart of the manufacturing value chain, and therefore, stay competitive
- **Resilience:** Following the Covid-19 crisis, manufacturers should develop new practices that enable their factories to be more responsive to change (parts shortage, etc.)
- **How tech can help:** Optimization of production through the deployment of 5G and AI bringing intelligence into production monitoring; developing new resilient production methods thanks to 3D printing
- **Examples of emerging uses cases:**
  - **Productivity use case:** IoT devices installed on machinery and the use of AR smart glasses and other tools supported by a potent 5G network and a cloud-based data management system to increase the reliability of operational activities performed by workers
  - **Resilience use case:** Implement 3D printing capabilities in factories to address the shortage of parts if needed – this use case requires sharing the Digital Twins of the parts, a **highly mature technology**



## 3. FOCUS ON VALUE CHAIN BLOCKS ALONG WITH USE CASES



### SERVICE CATALOG



75% of manufacturing executives see 5G as a key enabler of digital transformation that would reduce the TTM by 40%



5G enables a wide range of services across industries; Telcos need to become Digital Service Providers



The 5G disruption has begun



5G, AI, IoT and Mobile Edge Computing

### New Business Stakes

- Retain customers and remain competitive with the pressure from OTTs and internet-based competitors
- All successful telcos are shifting from their established roles as Communication Service Providers to their new positioning as extended Digital Enablers

### Transformation Maturity

- Telcos have started to diversify and are no longer only MNOs: media and streaming / cybersecurity, network security / e-commerce, banking, mobile payments / IoT / AI / identity management

### How can tech disrupt business models?

- The “hyper-generation of 5G” enables the effective use of technologies for connecting users to their environment (Edge, IoT, Smart Cities and Smart Homes) and brings social value. ICT brings innovation to our lives as intelligent information technology has a great impact on society and industry, and will boost the potential and efficiency of all areas across industries, lifestyles and businesses, both for B2C and B2B

### Why it is relevant now?

- Catalog-driven orchestration acts as an important catalyst for their new role of Digital Enablers

**Associated emerging use cases** (illustrative ideas, see the next page for more details)

- Immersive Experience, Network as a Service, Drone Fleet Management





# 4. FOCUS ON USE CASES AND ASSOCIATED TECHNOLOGIES

## SMART MAINTENANCE



DESIGN & BUILD NETWORKS



OPERATE & MAINTAIN

- Emerging technologies are assets that operators need to leverage for real-time monitoring and predictive analysis, to perform root cause analysis, define proactive maintenance, avoid potentially damaging breakdowns and adjust network configurations to optimize power consumption.
- To do this, operators can use:
  - IoT and 5G: first, detect anomalies across sensitive assets thanks to the IoT devices deployed (for example, sensors) on them. Then, take care of these anomalies through real-time analysis of the data generated by these IoT devices, with no latency thanks to 5G connectivity
  - AI / Machine Learning: automatically adjust infrastructure configurations through defined patterns, thanks to data retrieved through IoT devices and analyzed with AI and Machine Learning techniques
  - Blockchain: make Telco / third-party relationships more reliable by preventing fraud (no show of installation agents/ customer dishonesty)
  - 3D Printing enables quick production of maintenance spare parts to accelerate operations
- The French start-up Amiral Technologies** equips industrial machines and installations with various sensors to monitor temperature, humidity or vibrations, to detect potential failures in advance and anticipate their impact on users.
- Coupled with real-time analysis and insights from the data of previous breakdowns leveraged through machine learning technology, the company provides indicators to detect potential failures in advance and thereby trigger repairs in a proactive way.



### Market and technorationale:

- Orange is preparing to deploy intelligent telephone poles equipped with sensors (wind speed, vibration etc.) and inclinometers that transmit data in real time. An operational monitoring platform can automatically detect leaning angles that are higher than desired
- Nokia launched AVA 5G Cognitive operations, to help CSPs gain insights to meet commitments for massively scaled 5G networks. To do so, Nokia provides an end-to-end service based on AI to create insights, predict events and automate response to reduce the risk of network and service failures

### TECHNOLOGIES



IOT



EDGE COMPUTING



3D PRINTING



DRONES

5G

### Why now

- 5G deployment has begun
- Tests based on 5G technology carried out worldwide by various industries

### Key success factors:

- Installation of IoT devices within the infrastructure
- Data storage capacity and analysis

## DIGITAL ASSET LIFECYCLE MANAGEMENT



DESIGN & BUILD NETWORKS



OPERATE & MAINTAIN

- Digital asset lifecycle management (DALM) enables CSPs to have a complete 360° view of their network components and assets, which in turn gives them greater control over the complete asset lifecycle and its various dimensions: engineering, maintenance, operations, inspection, equipment, intervention, security and cost control. Thus, Digital Twins can be designed as digital mirrors of assets to improve efficiency and control costs using:
  - IoT: connect, control and collect data about the state of assets regularly
  - AI: leverage advanced analytics enabled by machine learning to optimize Digital Twin capabilities
  - 5G: connect all IoT devices covering telco assets
  - Blockchain: maintain a secure and immutable ledger recording all the operations on assets
- The use of DALM helps shorten the design and conception phases by up to 30%, increase productivity by up to 30% and reduce the network lifecycle costs by 10%

**Infovista** has developed a digital twin solution for Telcos to simplify the management of network assets, improving performance and optimizing CAPEX



### Market and technorationale:

- Infovista's solution **VistaInsight Avatar** can be leveraged by CSPs for Digital Asset Lifecycle Management

### TECHNOLOGIES



QUANTUM

### Why now

- Mature technologies enabling Digital Twin capabilities for design and predictive maintenance

### Key success factors:

- Installation of IoT devices within the infrastructure
- Implement widely across the whole network



# 4. FOCUS ON USE CASES AND ASSOCIATED TECHNOLOGIES

## QUANTUM SECURITY: QUANTUM KEY DISTRIBUTION



DESIGN & BUILD NETWORKS



OPERATE & MAINTAIN

- The emergence of Quantum Computing raises security concerns given that it may be able to break today's best encryption keys. As a result, data that needs to be secure for the next 10 years must be quantum-proof today.
- Quantum Key Distribution (QKD) is the instantaneous high security transmission of security keys in quantum states that can detect eavesdropping / interception. QKD enables the two communicating parties to detect the presence of any third party trying to intercept the key.
- The encryption security that quantum key distribution uses is based on the foundations of quantum mechanics, in contrast to traditional public key cryptography which relies on the computational execution complexity of mathematical functions. QKD has provable security based on information theory and forward secrecy.

Goldman Sachs has teamed up with QCWare Corp, a start-up based in Palo Alto, California, to explore how the nascent technology could be used to speed up financial calculations and artificial-intelligence-based decision-making.

## DRONE FLEET MANAGEMENT



DESIGN & BUILD NETWORKS



OPERATE & MAINTAIN

Companies have started using drones to transform their operations and perform tasks in a more efficient way, which would be challenging for humans, thereby saving costs and time. Drones bring more to the table than enhanced physical abilities. They also bring a broader range of applications for business: maintenance monitoring, asset inventory and management, network planning and implementation, relieving network congestion, etc.

- **3 main drone-centric use cases:**
  - **Network planning and optimization:** drones support planning and implementation, identifying dead or weak spots in cellular networks
  - **Relieving network congestion:** in cases where network congestions arise during natural disasters or big events, when the available network may not be sufficient to meet the elevated demand, drones can be deployed to overcome the congestion. These drones are tethered but offer much higher altitude than cell towers
  - **Drones-in-a-box:** Drones-in-a-box will live at tower sites and autonomously conduct missions in their vicinity, including tower inspections. They will then return to their towers, where they can recharge their batteries while waiting for their next assignment
- **UAVIA Robotics Platform** bridges the gap between IoT and drones, empowering industries with real-time aerial inspections and surveillance from anywhere, anytime.
  - Mission scheduling, collaborative operations, instant analytics and data archiving: the UAVIA Robotics Platform redefines how drones leverage your daily industrial site operations
  - Leverage in-flight data analytics through UAVIA's edge-computing architecture and combine them with post-flight analytics to boost your insights



### Market and technorationale:

- SK Telecom has been using Quantum Key Distribution to protect its 5G Networks since March 2019
- SK Telecom confirmed that the system immediately detects and prevents data leakage when hackers interfere with quantum channels to steal or peek at information



### Market and technorationale:

- AT&T has developed an all-weather flying COW ("Cells on wings") that helps field technicians and first responders. This "Flying COW" has the capability to hover above harsh conditions and remote terrain to keep first responders connected when other options aren't viable
- T-Mobile (a subsidiary of Deutsche Telekom) started using drones to conduct antenna inspections as early as 2015

TECHNOLOGIES



QUANTUM

### Why now

- Data security needs to be ensured today so that your data remains safe in the next few years

### Key success factors:

- Infrastructure (optic fiber) for widespread use
- Awareness of threats

TECHNOLOGIES



EDGE COMPUTING



5G



DRONES



IOT

### Why now

- Reduced maintenance costs
- Increased probability of climate disasters (save human lives in these scenarios)

### Key success factors:

- Development of drone technologies
- Edge implementation
- Interconnected and open IT systems





# 4. FOCUS ON USE CASES AND ASSOCIATED TECHNOLOGIES

## IMMERSIVE EXPERIENCE



CUSTOMER SERVICE



SERVICE CATALOG

- Immersive technologies are evolving thanks to 5G. Latency is expected to be below 5 ms; this makes network latency virtually non-existent.
- 5G will enable us to step into a high-resolution 3D world, where we shall experience a new sense of wonder. 5G breathes life into extended reality (XR) technologies, such as virtual reality and augmented reality.
- The major benefit that 5G brings to virtual reality is that connectivity will be more secure and stable. At present, virtual reality and augmented reality apps can be interrupted due to network performance. 5G would mean that networks can operate with as well as process many more devices at the same time.
- Customer relationships are changing dramatically as CX becomes a differentiator. Brands have recognized the game-changing abilities of introducing AR into their pre-sales, point of sale and post-sale support operations. Via a smartphone, AR enhances practical elements of personalized marketing, sales and technical support, by extending content and interaction abilities, and providing value that goes way beyond simple novelty.
- Telecom offerings could head in this direction. Some bundled offerings could include an immersive experience by giving, for example, a virtual reality headset.
- **Ringotel** has developed an all-in-one customer messaging and team collaboration solution, which enables businesses to connect with customers across any channel and work with their teams via voice, video and messaging.

## NETWORK AS A SERVICE



CUSTOMER SERVICE



SERVICE CATALOG



DESIGN & BUILD NETWORKS



OPERATE & MAINTAIN

- Virtualization and “Softwarization” brought by 5G will enable telcos to develop network-as-a-service:
  - 5G enables BSS / OSS convergence and agility. Thus, Telcos will be able to offer on-demand and SLA-based network capabilities:
    - Fully digital omni-channel customer experience for B2B, B2B2C and B2C
    - Product catalog transformation
    - Automated and digital contract signing (contract, invoicing/billing, policy management)
    - Real-time service monitoring and orchestration
    - SLA and QoS monitoring and assurance
- Thanks to the deeper integration of Telco capabilities (network, BSS / OSS, front-end), a network-as-a-service offering can be provided to customers:
  - E2E digital experience
  - Accelerated TTM (few minutes instead of weeks)
  - Real-time monitoring and availability of services
- Furthermore, monetization of 5G depends on BSS / OSS flexibility for offer personalization and adapting services to customers

Part of telecom revenues depend on ‘roaming’ revenues and reconciliation of roaming data among different operators. These kinds of operations need a trusted third party to track the operations and certify the transactions:

- **Blockchain:** acting as a secure digital ledger, Blockchain solutions can be leveraged for the reconciliation of roaming charges between operators to accelerate the process and prevent fraud

MARKET

TECHNO

IMPACT

### Market and techno rationale:

- Vodafone has created a QR code to access a 3D voucher with Augmented Reality to increase customer engagement
- Telecom Egypt and Ericsson did a showcase 5G immersive sports experience for Egyptian Soccer fans

MARKET

TECHNO

IMPACT

### Market and techno rationale:

- **Deutsche Telekom, T-Mobile US, Telefonica and Orange** leveraged a **Hyperledger Fabric** blockchain for automating the settlement of inter-carrier roaming charges and associated costs

TECHNOLOGIES



EDGE COMPUTING



5G

Why now



MIXED REALITY

- To enable businesses to connect more with customers and attract new ones
- To speed up product design and development

### Key success factors:

- Development of immersive experience technologies

TECHNOLOGIES



EDGE COMPUTING



5G



BLOCKCHAIN

### Key success factors:

- Ever-increasing connectivity needs in verticals (B2B)
- No-roaming charges in Europe
- Dependency on the OSS / BSS modernization
- There is a need for complete E2E integration



## 4. FOCUS ON USE CASES AND ASSOCIATED TECHNOLOGIES

### HIGH-VALUE ASSET TRACKING



CUSTOMER SERVICE



OPERATE & MAINTAIN

Telcos need to have a quick, real-time and reliable tracking solution for their high-value equipment and devices to reduce loss and damages. They need end-to-end traceability for their valuable assets along with accountabilities throughout the equipment value chain to prevent the loss of devices due to lack of information during transit.

- **IoT:**
  - Sensitive assets are equipped with sophisticated IoT devices (low energy, different parameters, small in size)
  - The ability to gather and analyze a growing amount of data in real time and with low latency (thanks to 5G connectivity)
  - Thanks to IoT, data analysis and 5G, high-value assets can be tracked in real time
- **Blockchain:** acting as a centralized secure transaction ledger, Blockchain solutions can be used to save all the operations during the life cycle of the high-value asset (delivery, transit, etc.)
- **OriginTrail** is an ecosystem dedicated to making global supply chains work together by enabling universal, collaborative and trusted data exchange



### Market and technorationale:

- **Walmart** leverages blockchain to track fresh goods from end to end (2.2 seconds to track the entire value chain instead of 7 days)

TECHNOLOGIES



IOT



BLOCKCHAIN

### Why now

- Development of sophisticated sensors and IoT
- Ability to gather and analyze data on the edge
- Ability to connect IoT devices at a lesser cost



## SOURCES

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