

Mobile Telco Transformation and its Impact on Business and Technology

Stefan Gärtner

Frankfurt, 07.11.2023

Mobile Business:
Application Design, Applications, Infrastructures and Security
Goethe University – Frankfurt / Main





Name: **Stefan Gärtner**

Age: 55 years

Location: Bonn

Telco Native



Magenta Business Collaboration
Corporate Customers
Digital Business and Transformation



IT Outsourcing and Managed IT Services
Solution Design Complex Deals
Outsourcing Program Execution



Technology Strategies Core Network and Services
Technology Introduction Strategies
3G Greenfield Network Rollouts



Product- and Portfolio Management for Value Added Services
Partnering Programs
IMS Evangelist
Customer Solution Design for Service Layer Solutions



Sales

E-Mail: stefan.gaertner01@telekom.de

Content

- 01** Introduction
- 02** Changes in the Telco Industry
- 03** Transformation of Technology
- 04** Transformation of Organization
- 05** Transformation of Business Models
- 06** 5G & 6G Mobile Networks
- 07** Trends and Outlook

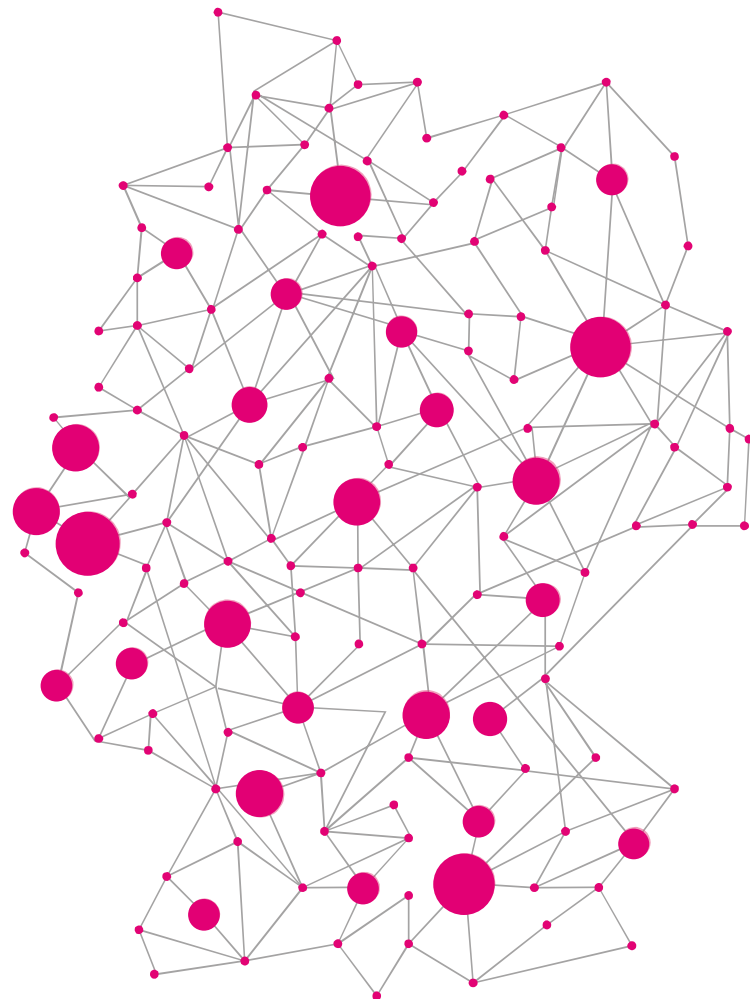


01 Introduction

“If you can't change and innovate fast enough, you get disrupted.”

- Katherine Kostereva, CEO Creatio

German Telecommunications Market

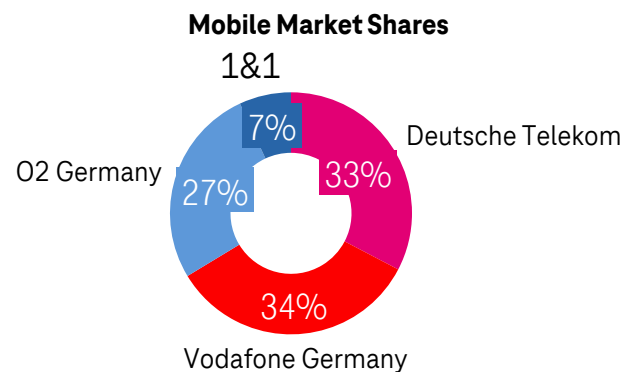


Mobile Network

- 194% mobile penetration
- 2,3% revenue growth
- 9,10 € ARPU

Fixed Network

- 91,8% with fixed broadband*
- 1,5% revenue growth
- 26,30 € ARPU



€ 17.0 Bln

Mobile revenue in 2022

162 Mio

mobile subscriptions

>95%

5G coverage (population)

€ 12.0 Bln

Fixed revenue in 2022

38,6 Mio

broadband subscriptions

* - households

ARPU – Average Revenue per User

Source: Germany: Service Provider Market Report – 2023, OMDIA

Third Era of IT



1st - Mainframes

- Era of mainframe computer
- Centralized data processing and storage with separated terminals for access and shared usage
- Computing became a tool of business
- Enabled automation of operations and early management information

1941 - 1980



2nd - Personal Computers

- Era of the personal computer
- Small multi-purpose computers
- Accessible to businesses of any size
- Operated directly end user, rather than by an expert or technician
- Uses commercial OS and software
- Enabled large scale industrialization of enterprise IT and mass market computer usage

1980 - 2010



3rd - Cloud and IoT

- Era of cloud computing and Internet of Things (IoT)
- Changes business based on data processing technologies, information and ubiquitous connectivity
- Data stored anywhere in the world and accessed from any device
- Smartphones, IoT devices, wearables, headsets and appliances, industrial machinery

2010 - today



02 Changes in the Telco Industry

“It’s no longer the big beating the small, but the fast beating the slow.”

- Eric Pearson, CIO, IHG

What is transformation?

- **Business Transformation** means making fundamental changes in how business is conducted in order to adapt to changing market environments
- Applies to the organization as a whole or to parts of it
- Caused by internal or external changes
- Target is to stay relevant
- Approaches
 - Increase revenue or market share
 - Improve customer satisfaction
 - Cost efficiency
- Difference compared to improvement efforts
 - Commitment to fundamental change – opposed to incremental changes to processes or products

- **Digital Transformation** is the integration of digital technology into all areas of business - fundamentally changing how an organization operates and delivers value to customers
- Requires organizations to continually challenge the status quo, experiment often, and get comfortable with failure (fast)



Changes in Network Infrastructure Supplier Market

- Past 15 years has seen a significant consolidation of telecommunications infrastructure suppliers
- Driven by faster development cycles and All-IP technologies

Wave 1	Consolidation of established telco suppliers	Merger or collapse of few telco incumbent suppliers		<ul style="list-style-type: none"> • Faster development cycles • Increasing network complexity • Ericsson and Nokia survived
Wave 2	Raise of new players	IT and Chinese suppliers as new Telco competitors		<ul style="list-style-type: none"> • Introduction to All-IP • Expansion of existing product range • Emerging telco supplier from China (Huawei, ZTE)
Wave 3	Cloudification and Big Tech Companies	Hyperscalers and introduction of cloud technologies		<ul style="list-style-type: none"> • Expanding business models of hyperscaler companies • Increased relevance of cloud technologies



03 Transformation of Technology

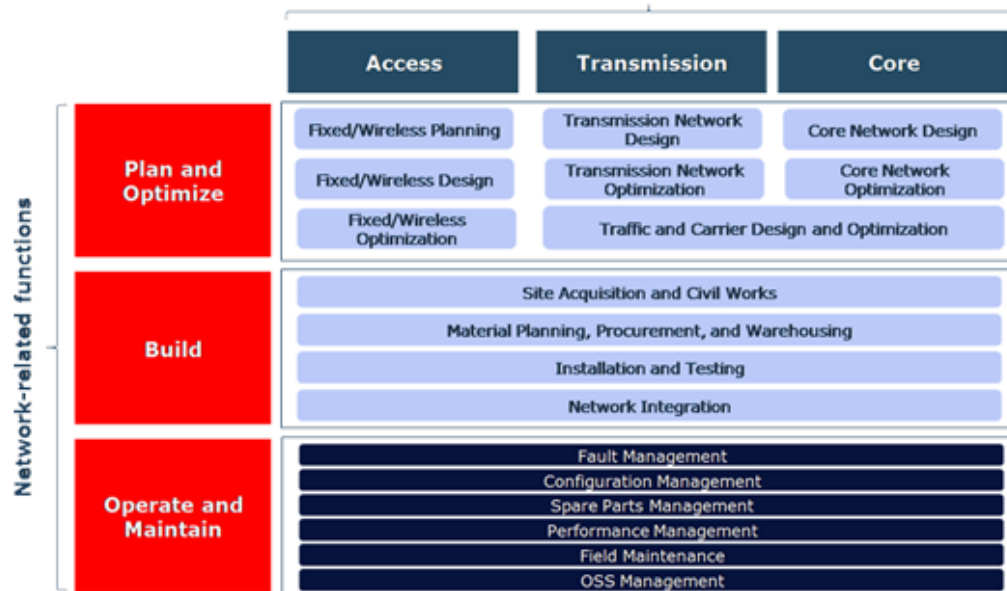
“Clearly, the thing that’s transforming is not the technology - the technology is transforming you.”

- Jeanne W. Ross, MIT Sloan’s Center for Information Systems Research

Network Deployment Strategies

- 2G CS / PS mobile networks standardized but mainly “closed” systems
 - Networks supplied by 1 - 3 vendors
 - Multivendor networks required extensive integration and testing
- Operator took mostly end2end responsibility

- Modern fixed and mobile 3G/4G/5G networks are more complex and based
 - Based on All-IP technologies
 - Standards consider multi-vendor interoperability
 - Networks components are mostly based on commercial standard products (COTS)
 - Trend towards software-defined networks with deployment of functionality and capacity on-request
- End2End responsibility for network deployment often with suppliers or as managed service



Shift from Local IP to Cloud - Relevance for Telcos

As Technology to digitize network deployment and operation

- Repackage existing networking capabilities and functions as cloud services (SDN)
- Fast and automated deployment, highly flexible for changing capacity requirements, cost efficient

As Services to generate revenues

- Partnering with Cloud Service Providers (OTTs)
- Bundle telco-native services with cloud services or enrich cloud services with telco capabilities

As Enabler for data driven business

- Advanced data analytics on customers and services to support business growth and company strategy decisions
- But: data privacy and security aspects limits to monetize data analytics for most telcos



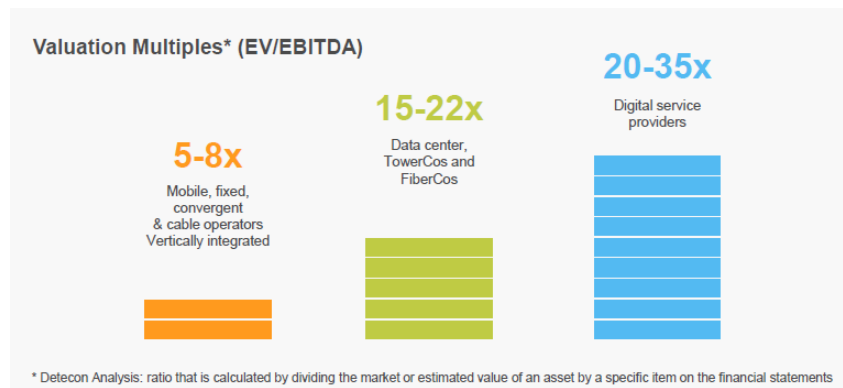
04 Transformation of Organization

“Don’t be fooled by some of the digital transformation buzz out there, digital transformation is a business discipline or company philosophy, not a project.”

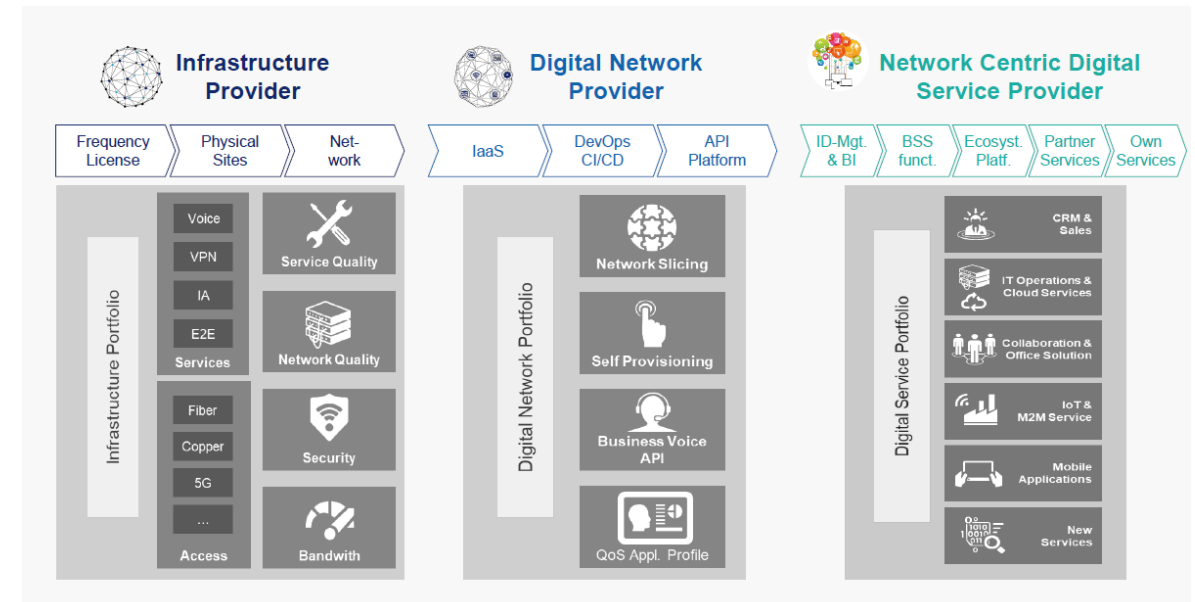
- Katherine Kostereva, CEO Creatio

Changing Markets Requires Telcos to Transform

- Telcos face fundamental and structural challenges
 - Low market growth with connectivity services
 - Large capital investment for 5G, broadband and digitization of networks and processes
 - Declining fixed & broadband business
 - Fast technology evolution and new competition
 - Change of value chain and market models
 - Telecommunications market de-regulation

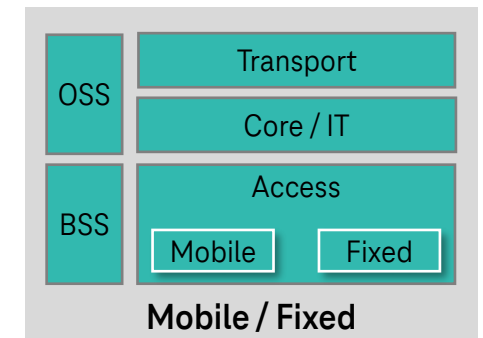
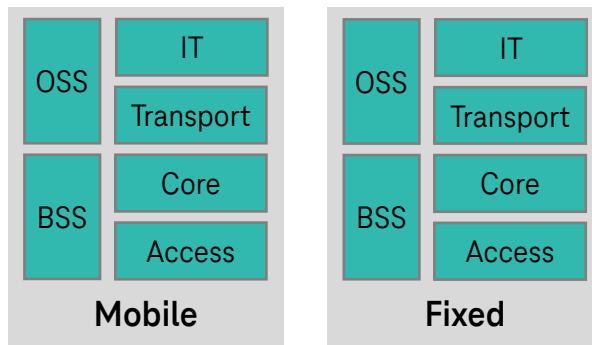


- Telco transformation process
 - Physical assets and network (networks, frequencies, ...)
 - Operating model (skills, processes,...)
 - Business models (market, products, customers)
 - Strategy (mission, objectives, stakeholders)



Change of Network Organizations and Processes

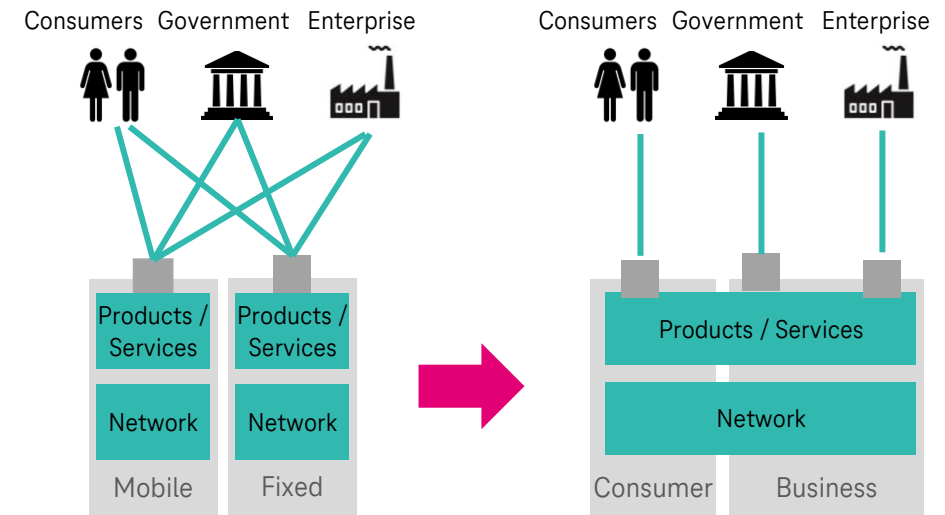
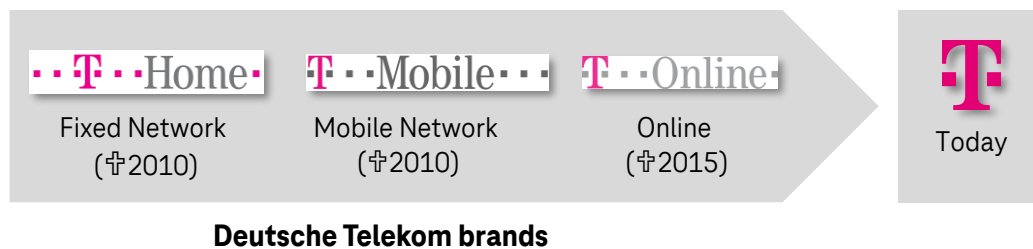
- Traditional telco network organizations follow Plan-Build-Run concepts
- Organized based on technology domains such as mobile access, fixed access, transport, core and IT
 - Results in silo-type organizations
 - Processes and skills optimized for each domain
 - Monolithic (legacy) applications with complex integrations
 - Long planning and deployment cycles, inflexible and expensive evolution
- Shift towards integrated and convergent organizations due to introduction of All-IP technologies and changing customer behavior
- Impact on
 - Common functions and components (Billing, transport, access, O&M,...)
 - Field services & deployment (rollout, software defined networks)
 - Converged products and services
 - Pricing, marketing
- Create networked organizations (horizontal collaboration)



Change towards Go-To-Market Organizations

- Customer experience changes the telcos – because the context has changed
- In the past: Focus on technology and features
- Today: Focus on Customer
- Drivers
 - Customer loyalty
 - Personalized customer experience
 - Growth (absolute and in market share)
 - Convergence of services and technologies
 - Cost optimization

- Restructure business organization around customer and their business & needs
- Growing use of digitization,
- Customer raised their expectations on brands
- Omnichannel customer journeys
 - Each touch point differently per consumer type



Change of Purchasing Strategies

Past: 'Dependence'

- Technical scope on purchasing complete sub-network domains (e.g. RAN, core network, transmission, Billing)
 - Often telco specific requirements
 - Limited flexibility for multivendor strategy due to
 - Telco specific requirements
 - Limited interoperability between network domains
- Results in
 - E2E integration responsibility often with telcos
 - Vendor lock-in or vendor dependence
 - Long development technology cycles (1-2 releases/year)
 - Limited cost optimization options (for supplier and vendor)

Today (and Outlook): 'Diversity'

- Shift towards purchasing network components instead of networks or sub-networks
- Focus on open interfaces, interoperability and standards
- Introduce new, innovative suppliers into network
- No dominant supplier per network domain
- Easier to replace components and drive innovation
- Highly competitive
- Centralized purchasing & e-auctions



05 Transformation of Business Models

*“Good design can't fix broken
business models.”*

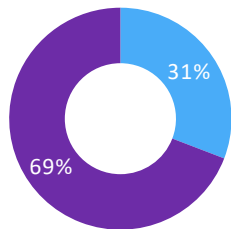
- Jeffrey Veen, VP Products Adobe

Changing Markets and Consumers

Market

- Megatrend of digitization across all industries and markets
- Mobile voice and connectivity is commodity
- Disruption from new OTT entrants
- Paradigm shift towards software focus and software-defined-networks

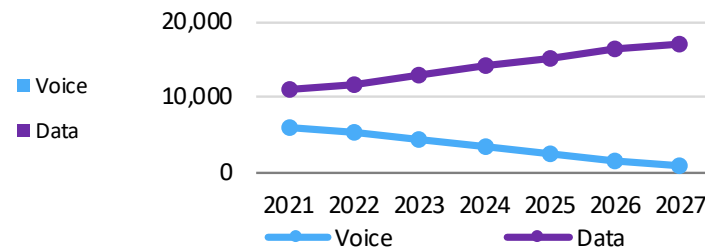
Service revenue by type, 2022



2022 revenue: € 12,033m
Growth vs. 2021: 1.50%

Germany Mobile Market ²⁾

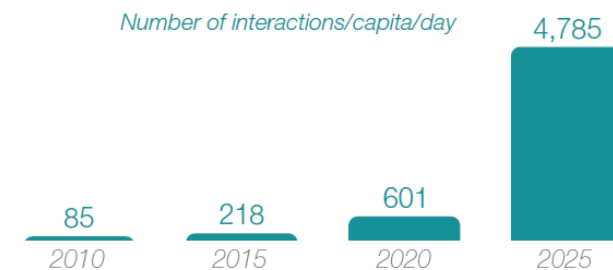
Service revenue (€m)



Consumers

- 62% of under 24-year-olds look at their phone within 15 min of waking up (compared to 36min of overall population) ⁴⁾
- But rapidly ageing population in EU: 25% over 65 years by 2050 (today: 20%) ⁵⁾
- Pay-per-Minutes offerings don't come naturally to the digital native generation; communication and connectivity are just basic needs

Interaction of average connected person anywhere in the world ³⁾

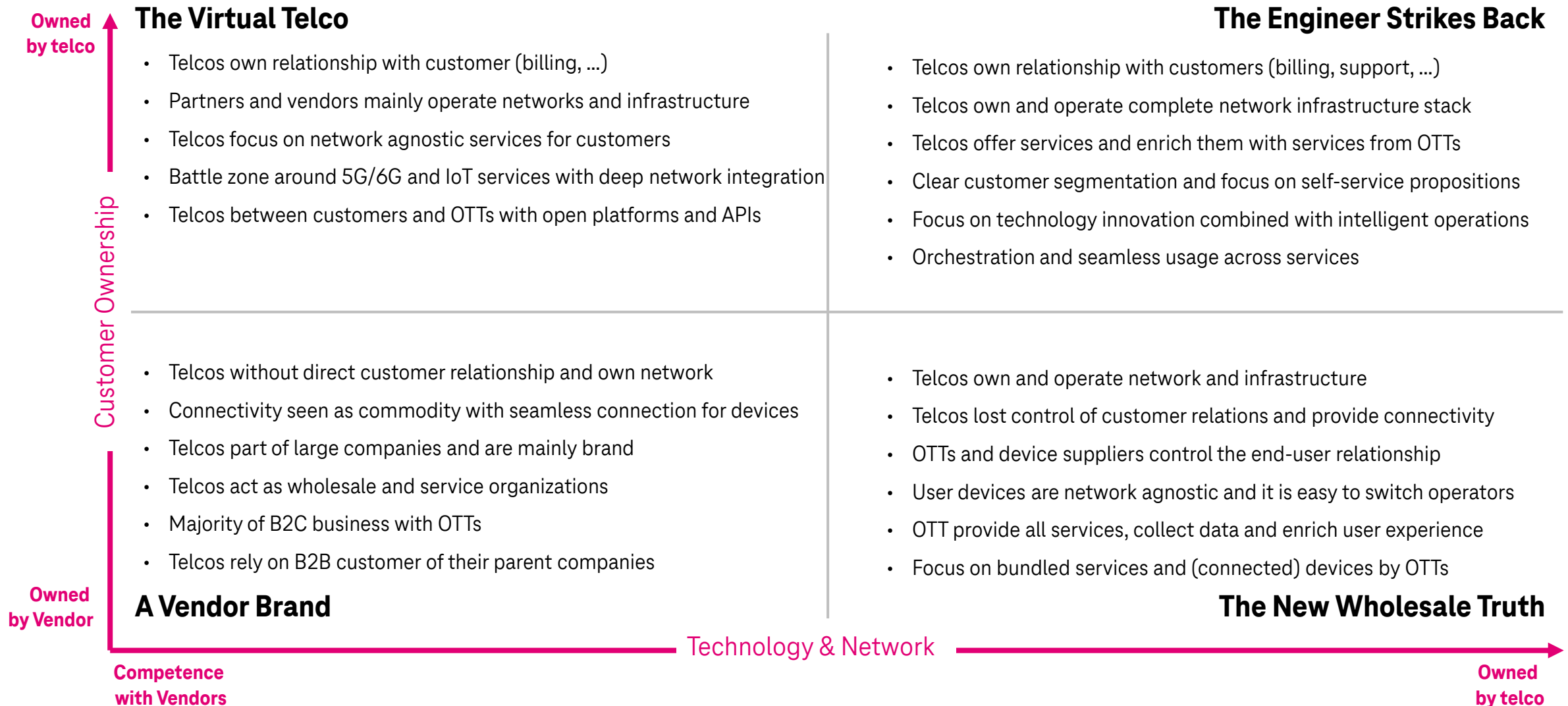


1) [Transforming the telecom value chain](#), Kearny
 3) Data Age 2025, 2017, IDC

2) Germany: Service Provider Market Report 2023, Omdia

4) The future of the Telco business model, Deloitte, 2017 5) The Connected Consumer 2030, Vodafone 2022

Operator Business Model Scenarios



Source: The future of the telco business model, Deloitte, 2017

SDN – Software Defined Network OTT – Over-the-Top Providers (e.g. Microsoft, Google, Amazon,...)

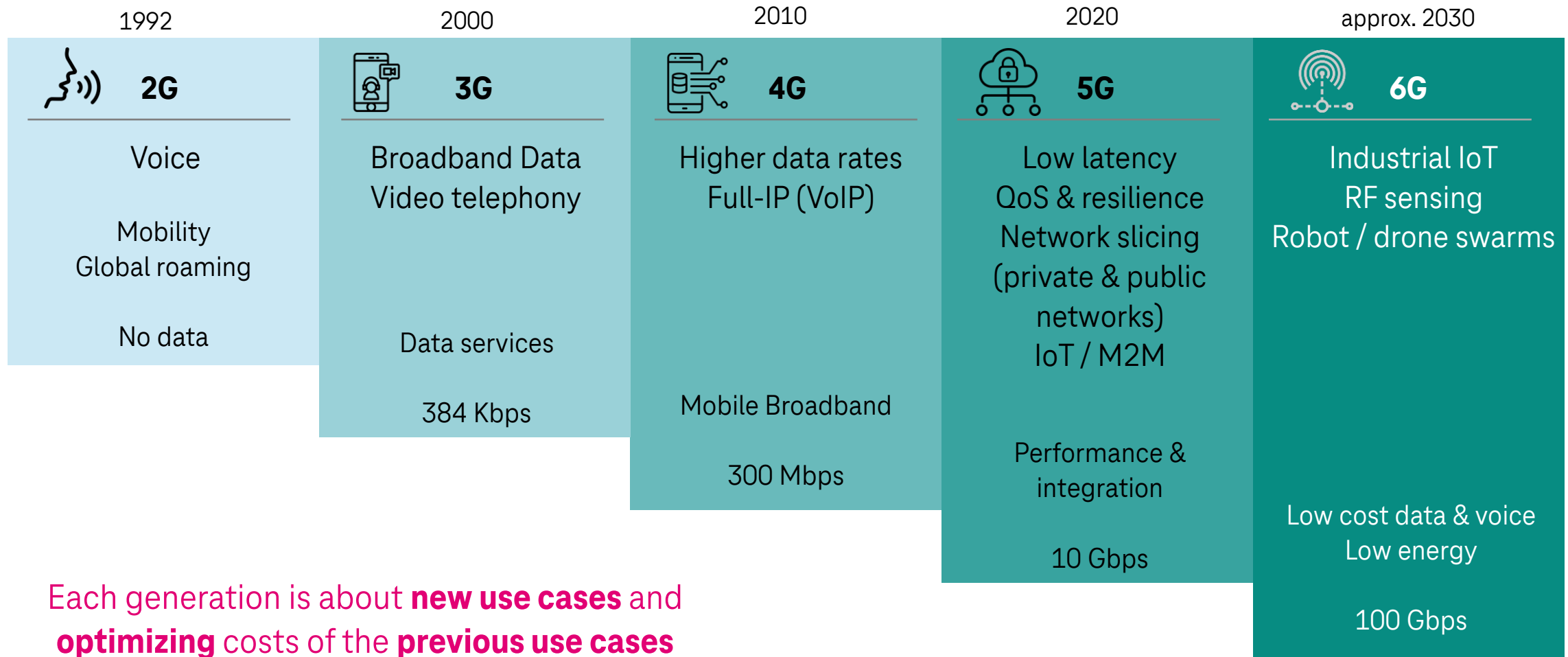


06 5G & 6G Networks

“One of the factors that I believe is the biggest obstacle to transformation is the fear of cannibalization.”

- Ganesh Ayyar, CEO Mphasis

Mobile Network Generations



Each generation is about **new use cases** and **optimizing** costs of the **previous use cases**

New Services and Market Models for Telcos with 5G – Key Benefits for Enterprises

5G Benefits

- Higher data speeds (10 Gbps), ultra low latency (<10ms), massive network capacity (1 M IoT devices/km²)
- Extended coverage (indoor), extreme mobility (500km/h)
- Reliability, power efficiency, increased availability, security, quality of service (QoS), edge computing, network slicing

Outlook

- 5G in 2026 ¹⁾
- 60% global population coverage
- 50% of global mobile traffic
- 3,5 B subscriptions
- 27 B connected IoT devices



Enhanced Broadband

Remote control of infrastructure, vehicles, and medical procedures, Immersive experiences (VR, XR, AR)

AI, Machine Learning



Massive IoT

Low cost devices
High volume /density IoT
Edge Computing



Mission Critical Services

Traffic, healthcare,
Hybrid public & private networks
Enterprise verticals



Dual Networks Usage

Public and enterprise networks within same coverage and with dedicated QoS
Enterprise verticals
Industrial automation

¹⁾ This is 5G, Ericsson, 2021

5G Use Cases: Ericsson Smart Factory

Use Case:

**Ericsson
5G Smart Factory**

Video Link:

https://www.youtube.com/watch?v=p_JPZsRGK10

5G Use Cases: Mining

SIMS

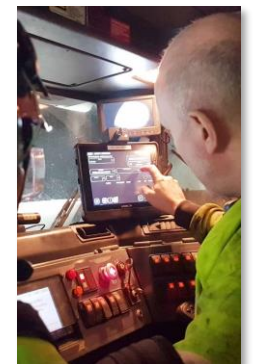
(Sustainable Intelligent Mining Systems)

Project to verify and apply new technologies and solutions for the mining industry

Collaboration between LKAB, K+S, KGHM, ... Sweden, Finland, Germany, Poland

Robotics in Mining

- Autonomous drone and vehicles for inspection activities
- Assisted driving for remote operation
- Robotizing the Charger for explosives
- Augmented Reality for Robotics



Ground Control & Communication

- Close range emergency data communication
- Precision positioning of mobile equipment
- Automated real time process control
- Maintenance reporting from mobile machines.
- Performance Assessment.

5G Use Cases: Mining

Use Case:

China

Intelligent Mining with 5G

Video Link:

<https://www.youtube.com/watch?v=iczYxj84oYY>

5G Use Cases: Building Construction



Use Case:
South Korea
Building Construction

Video Link:

<https://www.youtube.com/watch?v=N2SGHjlyrF8>

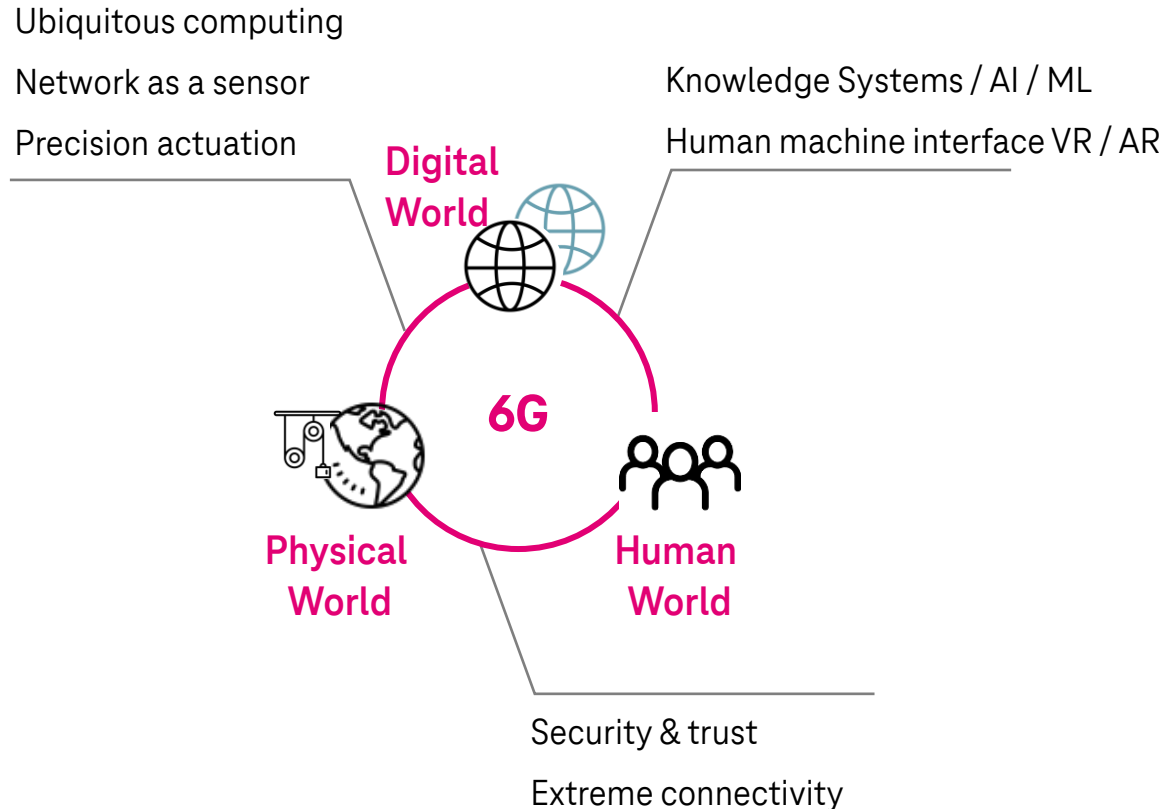
and oil refineries are just a few of the sectors that are benefiting from 5G private networks.

5G Use Cases: Deep Media Interaction



- AR, HD video assistant require higher bandwidth, so by using 5G network connection operators can easily contact a professor to get the deep interaction easily and more efficiently. Through the 5G network, the connection between operators and operation objects (mechanical equipment) as well as manufacturing execution control system of factory intelligent center, this could enable manufacturing data, images and human travel to depth interaction.
- Key operations need the particular technicians to operate but the operation environment is dangerous, so it is difficult for technical personnel to operate in close. Through the 5G network, remote operation is highly required, so media quality interaction needs to be more distinct.

Outlook: 6G Networks



Characteristics

- Ultrahigh speed: 100 Gbps
- Ultralow latency: microseconds
- Ultraconnectivity: > 10 Mio. devices / km²
- Ultramobility: > 1 000 km/h
- Ultra reliable communications
- Device free networked sensing
- Airborne wireless network: non-terrestrial communication
- Zero energy devices
- Native AI/ML radio network and service management



07 Trends

*“To improve is to change,
so to be perfect is to have
changed often.”*

- Winston Churchill

Trends and Innovations towards Telco 2030: Who will be the Customers of Telcos



Seniors

1.4bn

people over 60yrs in 2030... vs. to 901mn in 2015
(UN, 2015)



Very digital natives

1.3bn

youth in the age of 15-24yrs in 2030... vs. to 1.2bn in 2015
(UN, 2015)



Asian

53%

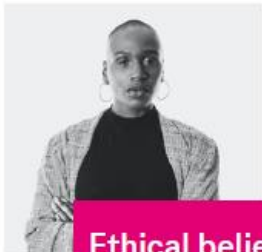
Of worldwide GDP (PPP) will come from Asia... vs. 42% today
(IMF, Statista, 2019)



Urbans

60.4%

of global population will live in urban areas... vs. to 54% in 2015
(Statista, 2018)



Ethical believer

64%

of consumers buy based on beliefs, values & lifestyle in 2018... vs. to 51% in 2017
(Edelman, 2018)



Fragmentation

Segment of One

in 2030... compared to 10 Sinus milieus today... vs. to 3-estate system in the middle ages
(Sinus-Institut, 2020)



Lost in space/
Querdenker

10%

of US Republicans trust Mass Media in 2020... vs. 52% in 1998... vs. 73% of Democrats in 2020
(Gallup, 2020)



Segment of robots

20mn

robots across the whole globe 2030... vs. 2mn in 2021
(Oxford Economics, 2021)

Trends for Telco 2030: Paradigm Shifts in the B2C Business

Connectivity will be like oxygen ... everywhere & embedded



Leading Infrastructure & best networks remains highly relevant

Product & services will be personalized, context-aware & interconnected



People won't buy networks but best connectivity experience: Simple, intuitive & context aware

Battlefield "attention": #service growing & new attitude ("I do what I want")



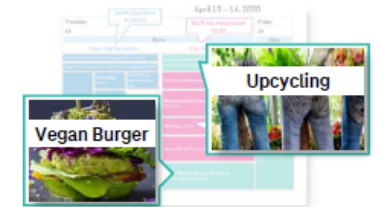
Staying on top of peoples' mind by making best networks tangible ... even though being like oxygen

Services will be aggregated & curated to manage massive complexity



Opportunity for Telcos to leverage digital reach & customer intimacy for "curate" bespoke digital service portfolio

Corporates' responsibility & sustainability as #1 purchase criteria



ESG as social norm, also for telco services & operations: From ESG as hygiene factor to ESG as differentiator

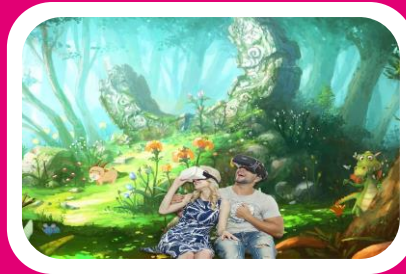
Mega-Trend Clusters

Multi Cloud



Edge Computing
Multi Cloud Networking
SD-Cloud Interconnect
Sovereignty Initiatives

Metaverse



Metaverse
AR / MR
Digital Twins
Web3 / DLT

Generative AI



Generative AI / LLM
Bots as Customers
AI Regulations
AI as critical infrastructure

Enterprise Network Disruption



Zero trust networking
Enhanced Internet
Enterprise network virtualization

Changing Macroeconomic Climate



Globalization slowdown
Inflation
China as rising power
Regulatory autarky
Economic recession
Social unrest

Vision:

**Ericsson
Internet of Senses**

Video Link:

<https://www.youtube.com/watch?v=wCRvyZzn-io>



***“Let’s go invent tomorrow
instead of worrying about
what happened yesterday.”***

— Steve Jobs, former CEO Apple

Thank you.