

Swisscom's 5G Status and Future Directions

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Key figures Swisscom

1.5 million
Swisscom TV customers



3.4 million
Ultra-fast broadband
connections



inOne

1.3 million
inOne customers



6.6 million
mobile communications
customers



2 million
All IP customers

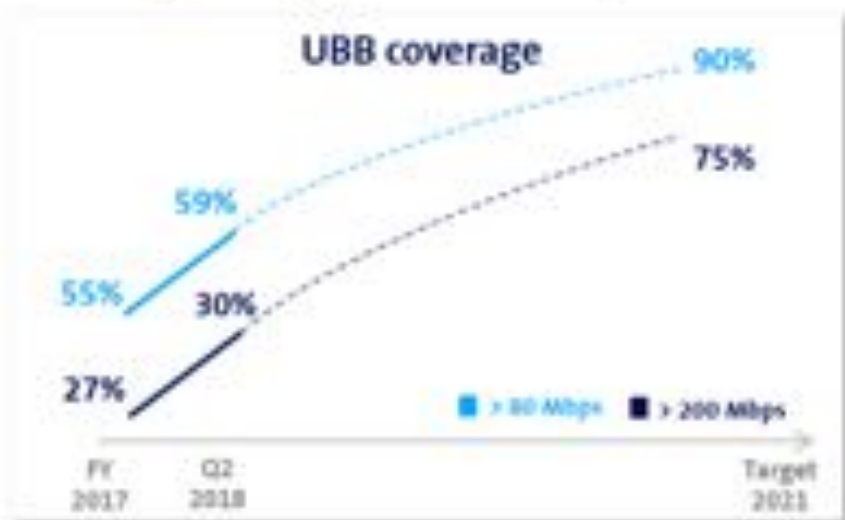


As of December 2017

Current Network

W+ network update

- > Technology mix key in bandwidth expansion



- > Currently ~3.37mn fibre connections o/w 1.39mn FTTH, enabling strong HD (>96%) and UHD (>83%) coverage for Swisscom TV

W- network update



- > 4G+ with speed up to 1 Gbps
- > Download speeds over 800 Mbps are now possible for the 1st time
- > Extending technical lead of Switzerland's best network to offer the best experience with high-definition videos, gaming, virtual reality and lightning-fast surfing
- > Pop coverage: 99% 4G and >80% 4G+

5G Status

- > First 5G call (3GPP NR + vEPC + vIMS) Sept 2018
 - Standards-based 5G network running in small city

- > Use cases
 - FWA tests in rural area based on commercial hybrid access solution
 - Industry 4.0 Use case

- > Frequency Auction in Q1 2019 (700Mhz, 1.4GHz SDL, and 3.5 GHz)

- > More information under <https://www.swisscom.ch/5g/>

Installing the Network



03. September 2018, 11:15



The UE



Example: Fixed Wireless Access for Rural Deployments



Example FWA: Self-Install Router



Example Industry 4.0 use cases

> Real-Time Data



> Location of goods in the factory



> Virtualized Production Machine Computers



> Quality Control through Augmented Reality



Example Industry 4.0 use case with 5G

> Physical

- On-prem IT resources and Off-prem IT Cloud resources
- On-prem and off-prem Telco cloud resources
- On-prem 5G radio equipment

> Slices

- Low-latency slice within factory (very local slice) including some mobile core functionality in on-prem telco cloud
- Mobile phone slice for normal use of mobile phones also in the factory using the nation-wide mobile core

> Applications

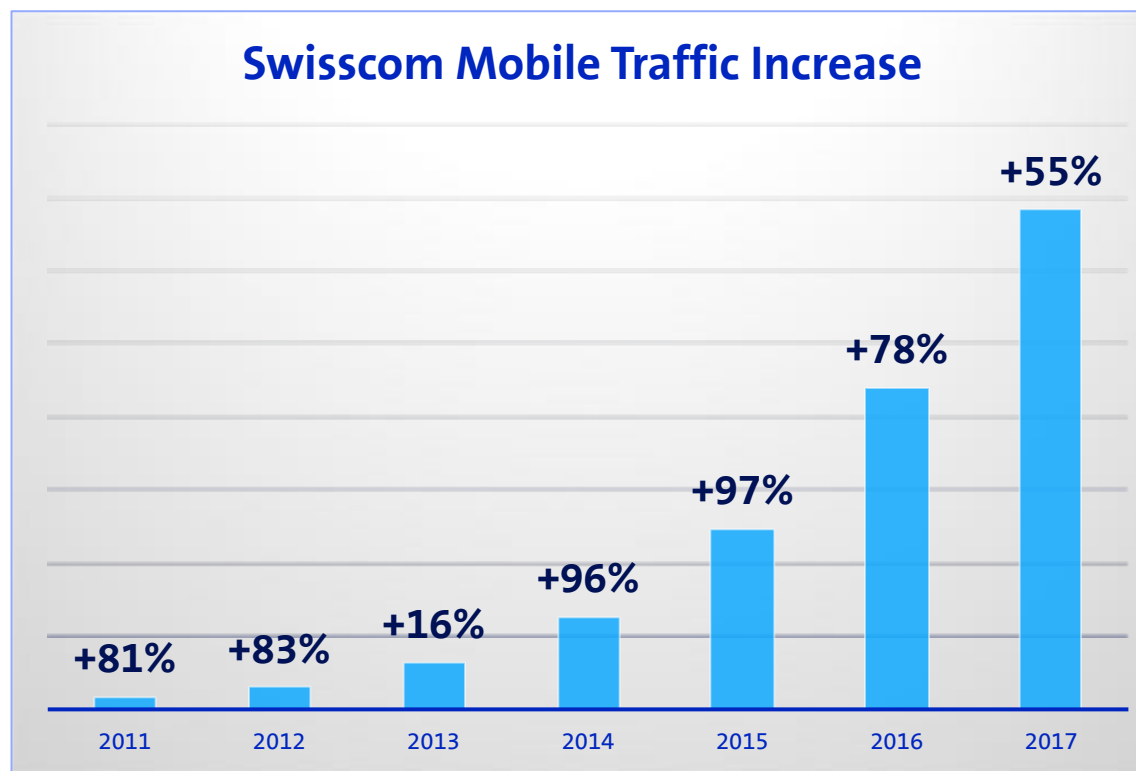
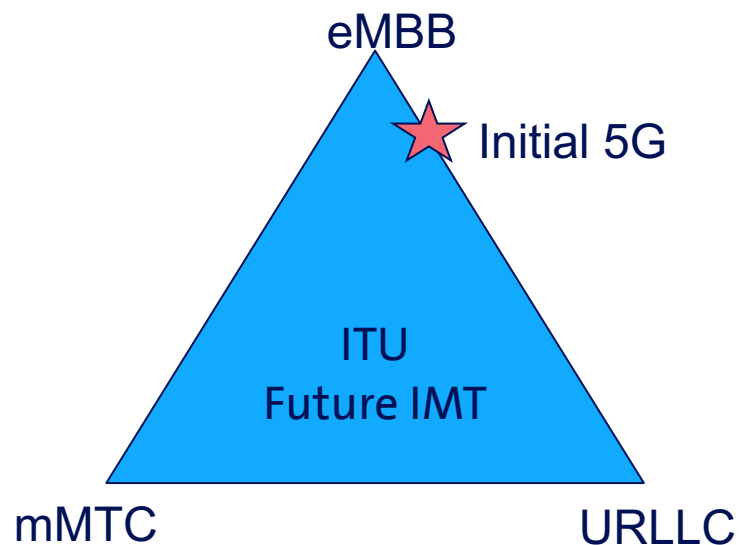
- Integration with legacy customer IT
- New applications build the cloud way hosted off-prem talking to network services

Issues

- > 5G from initial deployment to new business
- > Operational Challenges of 5G
- > Customers
- > Simplification and Automation

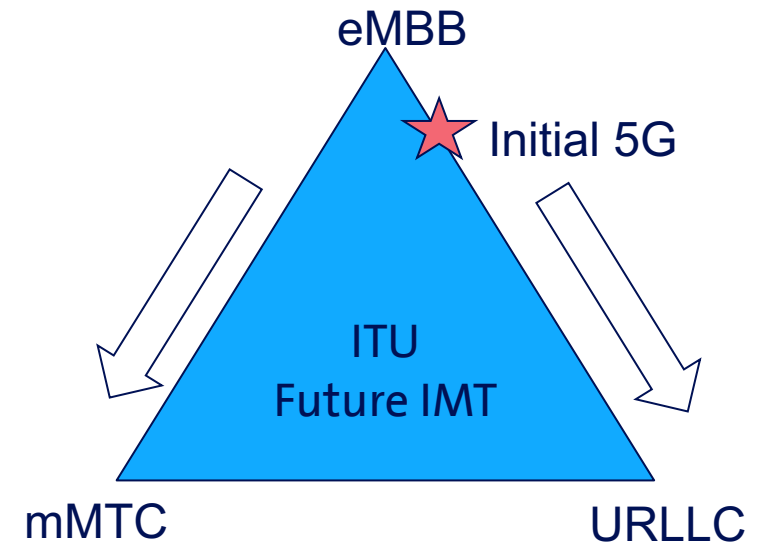
Initial 5G

- > More of the the same
- > Tackling the traffic growth
- > IoT through LTE or other technologies



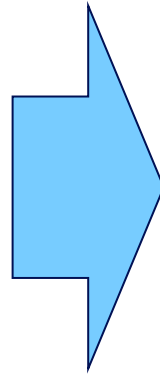
New Businesses

- › B2B and B2B2C services
 - Reliability as a Service
 - Operation as a service
 - ICT as a Service
 - Solutions stitched from various components
 - Replacing Dedicated Networks
- › Leverage new 5G capabilities
 - Radio features for ultra-reliable and low latency
 - Slicing for resource separation and service isolation
- › Willingness to pay extra for those features?



Development of Digital Services

Today

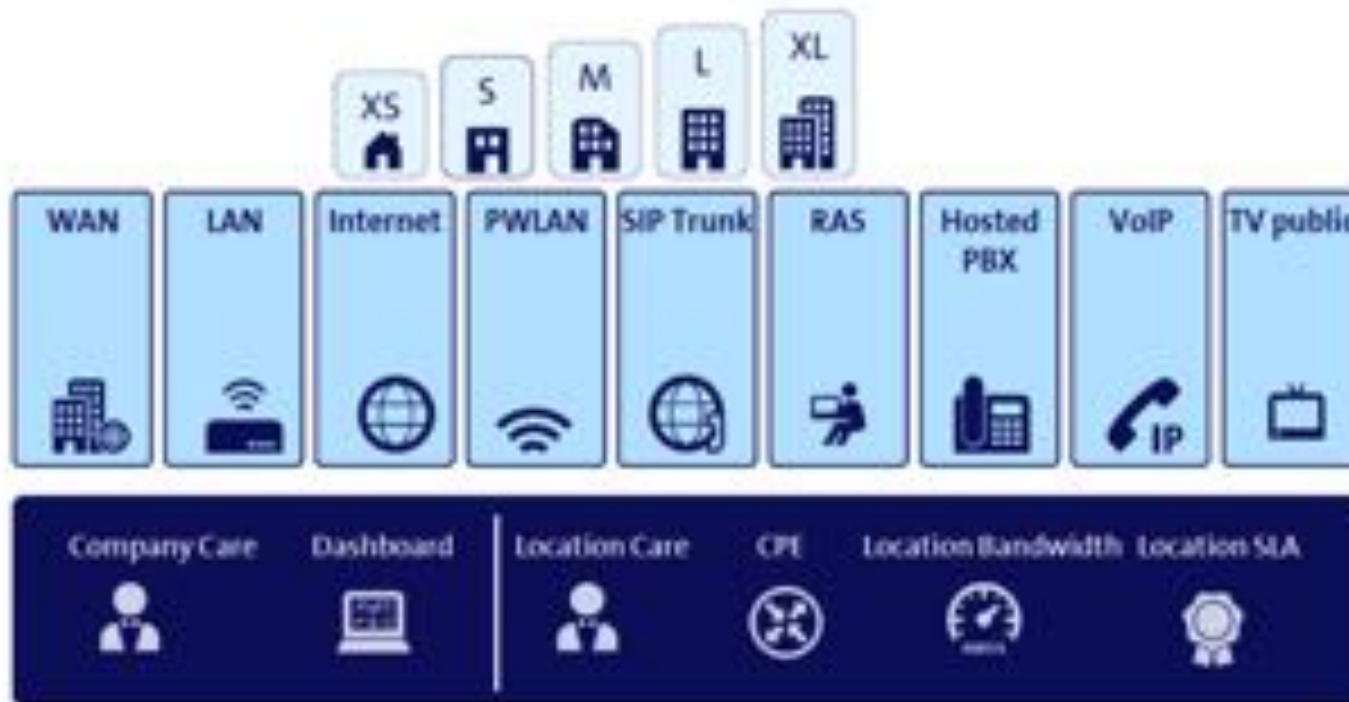
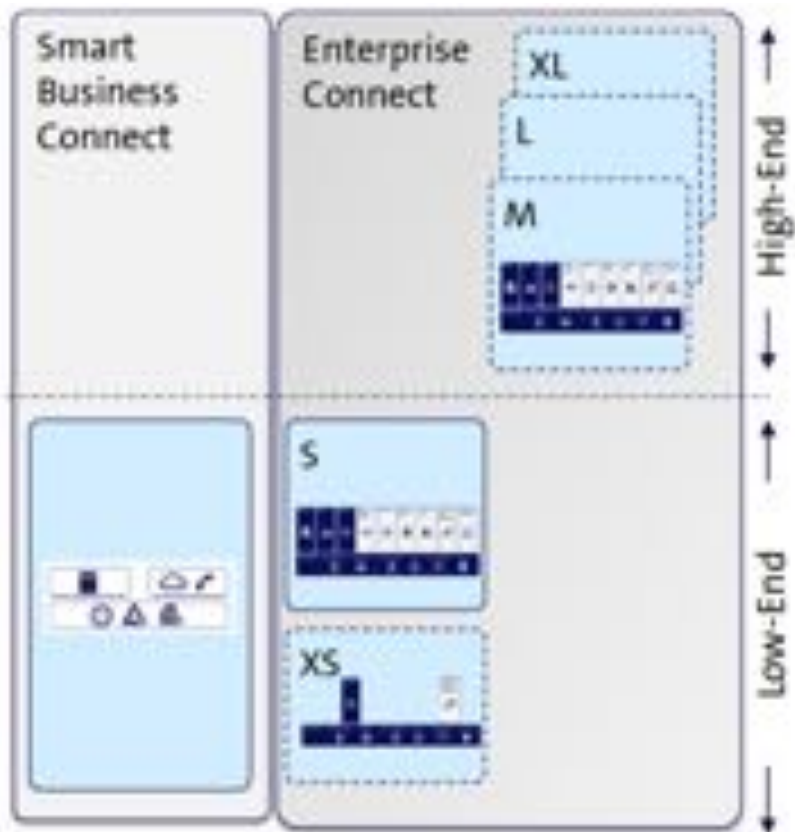


5G



Example: Enterprise Connect

Virtual Connectivity Services: self-care and on-demand

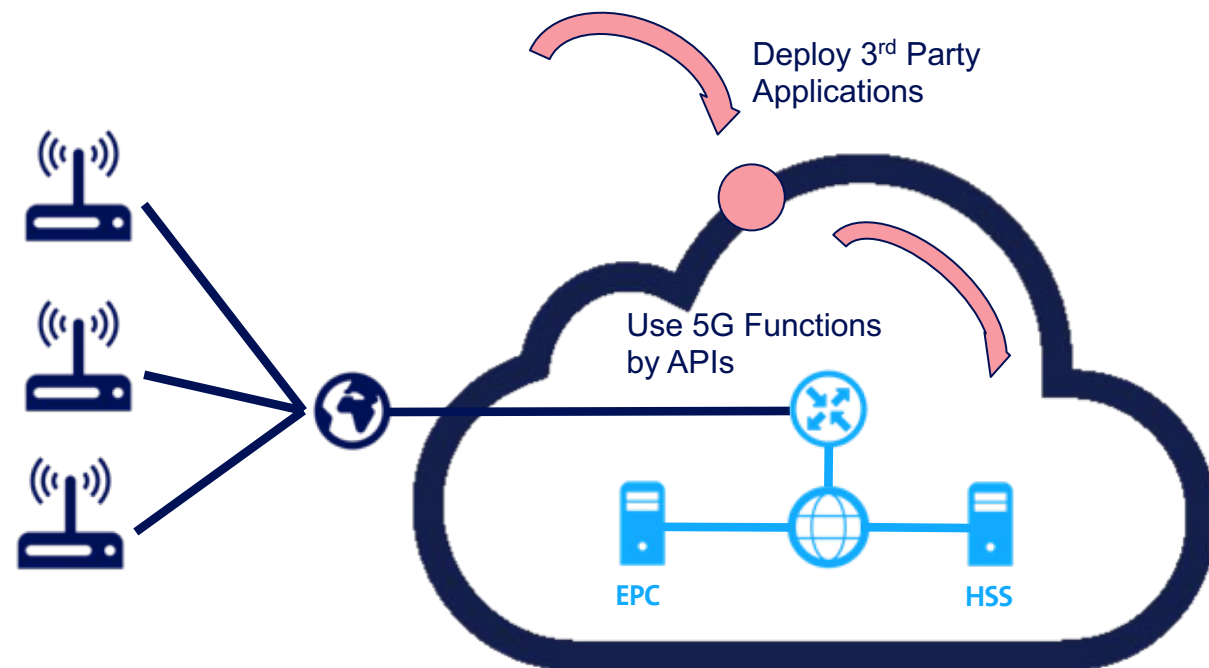


SMB Customer Experience

ENT Customer Experience

The 5G ICT platform technology for a large set of digital services

- > 3rd party applications using functionality 5G ICT platform
 - API access to various functions of the network
- > Cloud-native 5G software architectures of Telco functions and applications
- > Common Platform Services
 - More than resources provided by the platform
 - Operations as a service for third parties
 - Access to Operator assets (network, IT, and OSS/BSS)
- > Mix of Network and IT work loads
- > Massively Decomposed Applications/VNFs



Operational Challenges of 5G

> Initial 5G

- Indoor coverage
- Measurement of electromagnetic radiation for new technologies, e.g. beamforming
- Benefits of higher-degree MIMO is deployment scenarios dependent (reflection)
- Regulation for Electro-Magnetic Emissions

> Reliable 5G network deployments

- Reliability being part of an SLA
- Different planning required

> Energy usage is very high

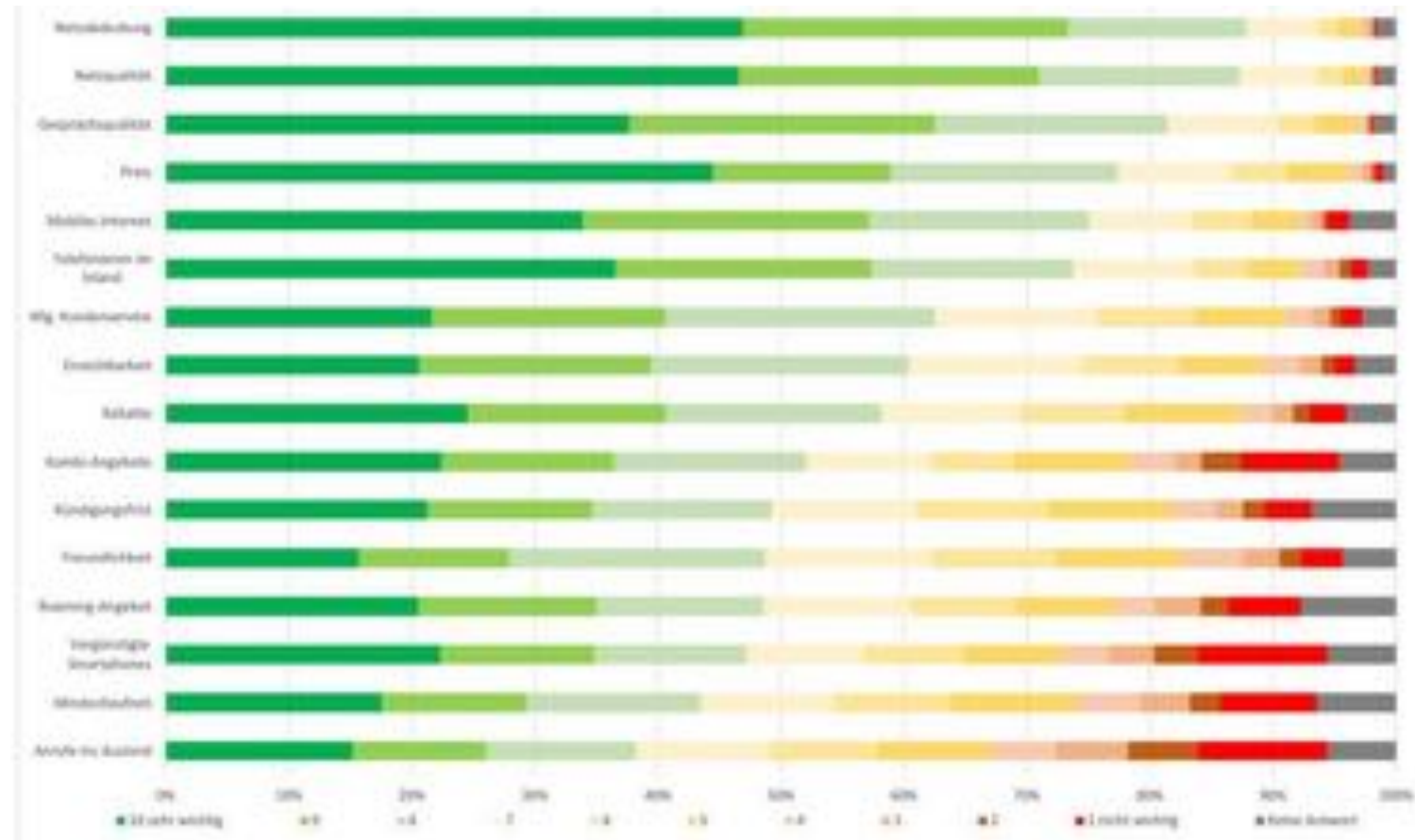
> End-to-end Orchestration

- Managing the Edge, Core, and Software
- Large amount of different software components make management difficult

How to keep the Consumers happy?

Decision making for Mobile contract in Switzerland

- Coverage
- Network Quality
- Voice Quality
- Cost



OPEX reduction through Simplification and Automation



No POTS anymore



Converged Offers



Automation



Lonely phone booth (makes 1.4 CHF per year)

Fully Automated Operations

- > Self-serve
 - Depends on the level of complexity
- > Self-Configuring
 - Infrastructure as Code (software-defined X)
- > Self-Healing
 - Failures are the default
- > Self-Optimizing
 - Auto-Scaling
- > Self-protecting
 - Most urgently needed



Summary

- > First small network available to learn about the new technology
- > First experiments with new businesses (Industry 4.0, FWA, special networks)
- > Issues
 - Operational Issues
 - Lower OPEX
 - Customer Satisfaction
 - New business creation

Thank you

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