



5G View of Turkcell as a Digital Operator

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TURKCELL***

ITU Regional Seminar – 5G Implementation in Europe and CIS

3-5 July 2018 - Budapest

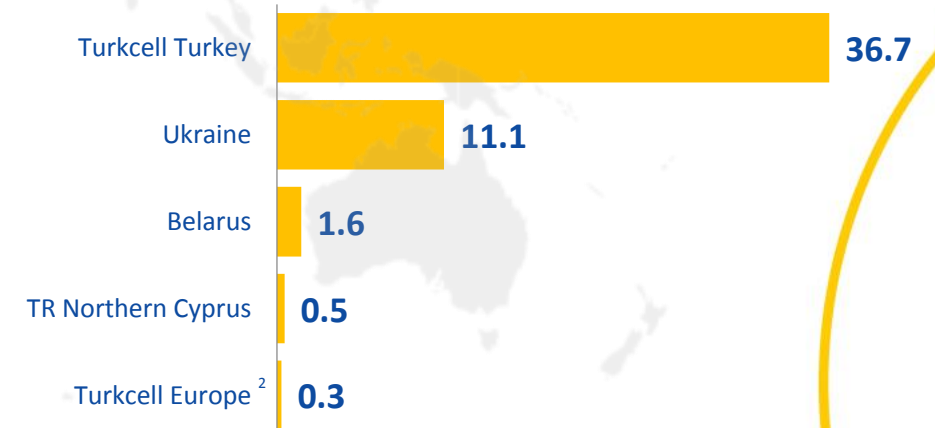
Turkcell Group Snapshot

- **CONVERGED** COMMUNICATION AND DIGITAL SERVICES PLAYER
- **9 COUNTRIES**
- **50.2 MILLION** TURKCELL GROUP SUBSCRIBERS
 - **2.1 MILLION** FIXED SUBSCRIBERS
- LISTED ON NYSE & BORSA ISTANBUL WITH A **\$6.7 BILLION** MARKET CAP¹



TKC
LISTED
NYSE.

SUBSCRIBER BREAKDOWN (m, Q417)



¹As of 04.05.2018

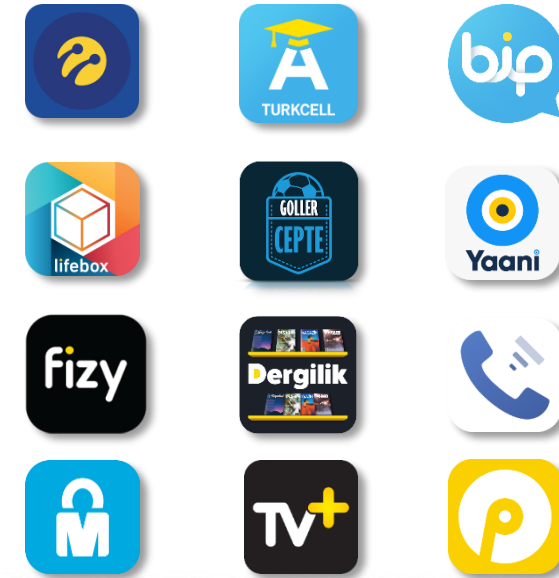
²Turkcell Europe GmbH operates in Germany under a "marketing partnership" agreement with Deutsche Telekom(DT). Its subscribers are owned by DT and are also included in the Turkcell Group subscriber figure

Transforming into the Digital Operator

Network Operator



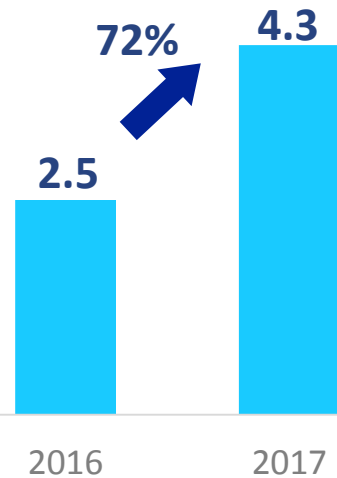
Experience Provider



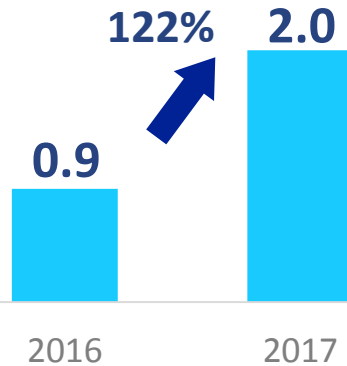
Increasing Demand for Our Services



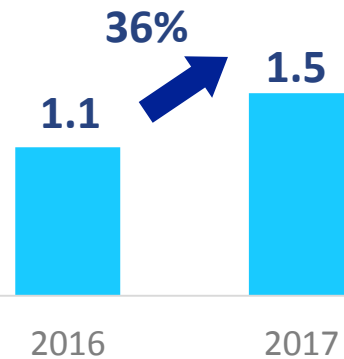
*The Fastest Growing
IM App*
(2B+ msg/month)



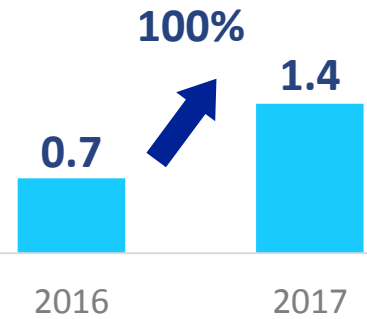
*The Most Known
Music Platform*
(9M songs/day)



*Highest Spontaneous
Awareness*
(75% within population)



*The Most Recommended
Cloud Service*

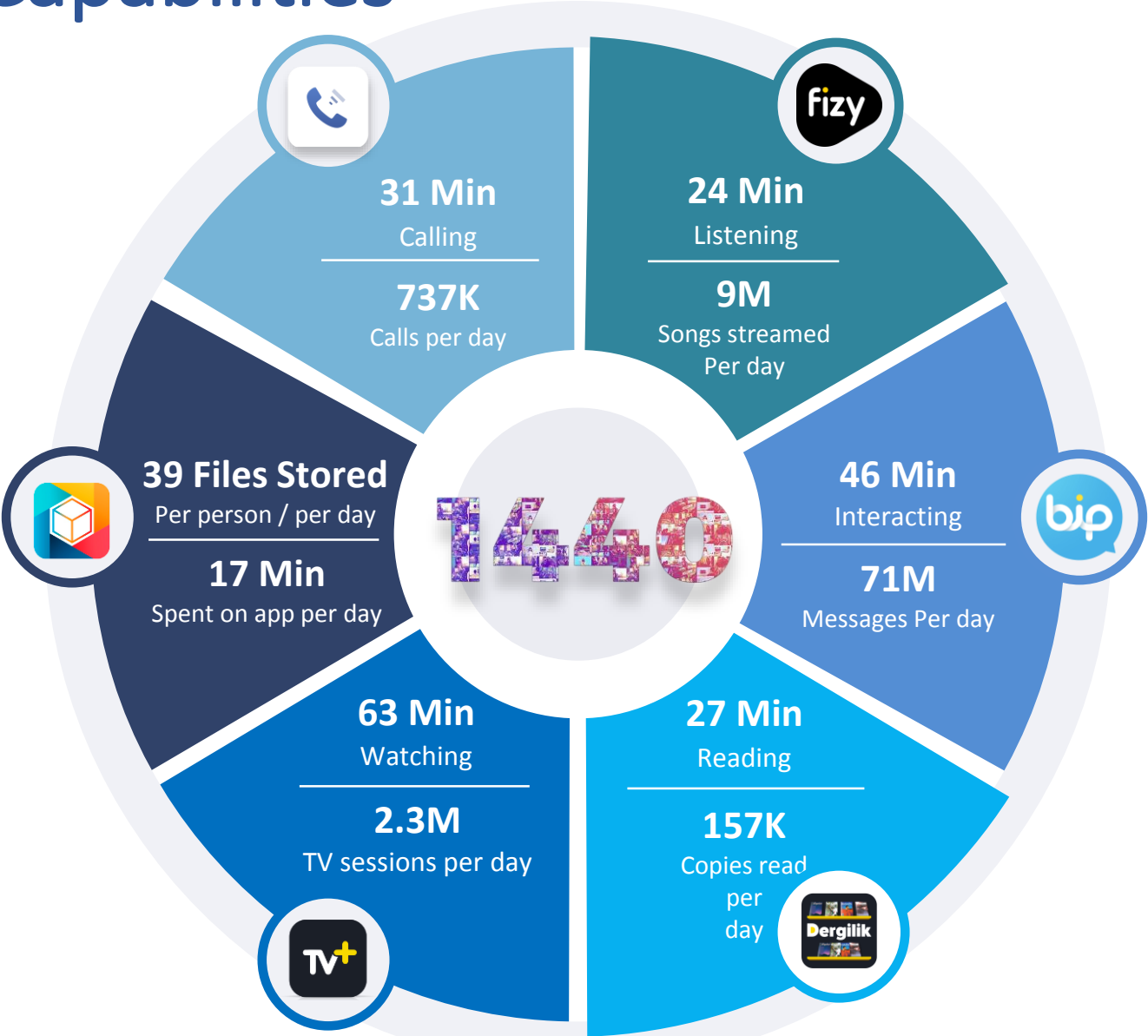


*Based on awareness and usage rates
among the applications measured since
the beginning of the year*

Source: Nielsen

■ Monthly Active Users (Mn)

Enhancing the Digital with Unique Telco Capabilities



86 million core app downloads

- 2nd player in App markets



56% triple-play customers

- 2.9x higher ARPU
- Lower Churn

ITU-T Focus Group: Machine Learning for 5G

Established under **ITU-T Study Group 13** “Future networks, with focus on IMT-2020, cloud computing and trusted network infrastructures”

- Network complexity is massively increased with 5G and beyond technologies
- Softwarization on the other hand provides extreme flexibility in orchestrating the network
- Networks generate a huge amount of data, which contain a wealth of useful information such as location information, mobility and call patterns
- To **improve network performance, enhance user’s experience** and **enable new exciting applications**, new ML methods for big data analytics in communication networks can extract relevant information from the network data while taking into account limited communication resources, and then leverage this knowledge for **autonomic network control** and **management** as well as **service provisioning**
- Focus Group studies **network architectures, interfaces, protocols, algorithms, data formats** to make easy deployment of ML applications on communication networks



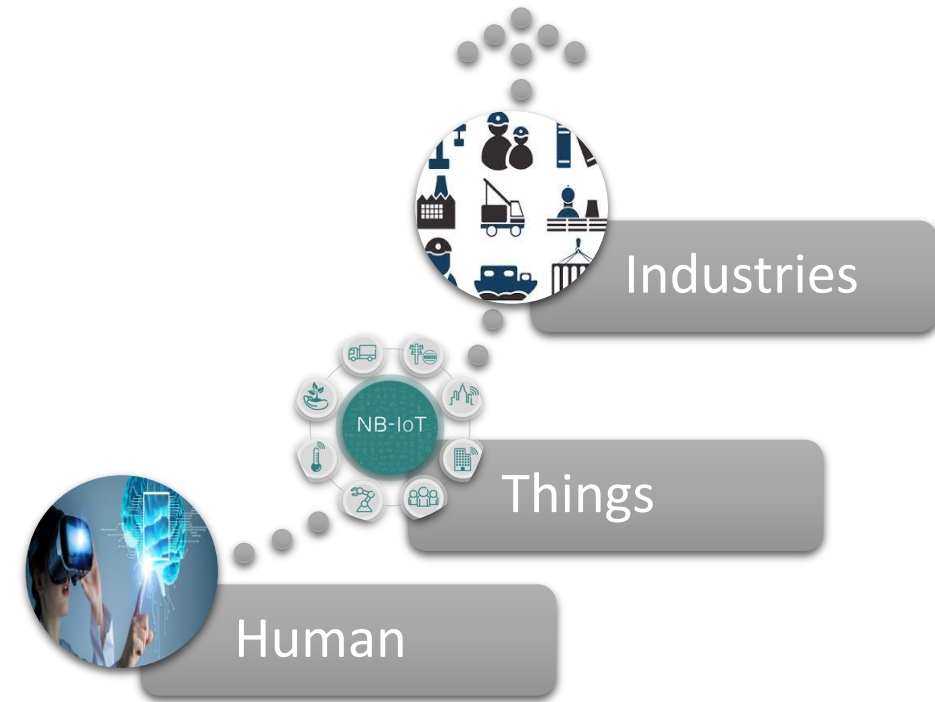
Turkcell's Involvement

Actively participating on FG activities from day one

- Serves as Vice-chair in the FG management
- Active operator in the working groups alongside Vodafone, KT, China Mobile, and China Telecom
- Provides operator point of view in terms of requirements and network architectures for ML applications in communication networks



Digital Journey with 5G



ENHANCE DIGITAL SERVICES
CREATE NEW SERVICES & BUSINESS

5G should be the key for

Capabilities of new use cases and applications

Evolution from the existing networks

Cost efficiency

New Business Areas

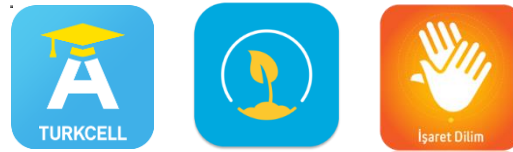
ENERGY & AUTOMOTIVE



Smart home, city, transportation & energy solutions, connected car

- Turkcell Energy
- Technology provider role in «Turkey's Automobile Project»

EDUCATION



Education services to a wide range of customer groups

- Turkcell Academy
- Hello Hope & Sign Language

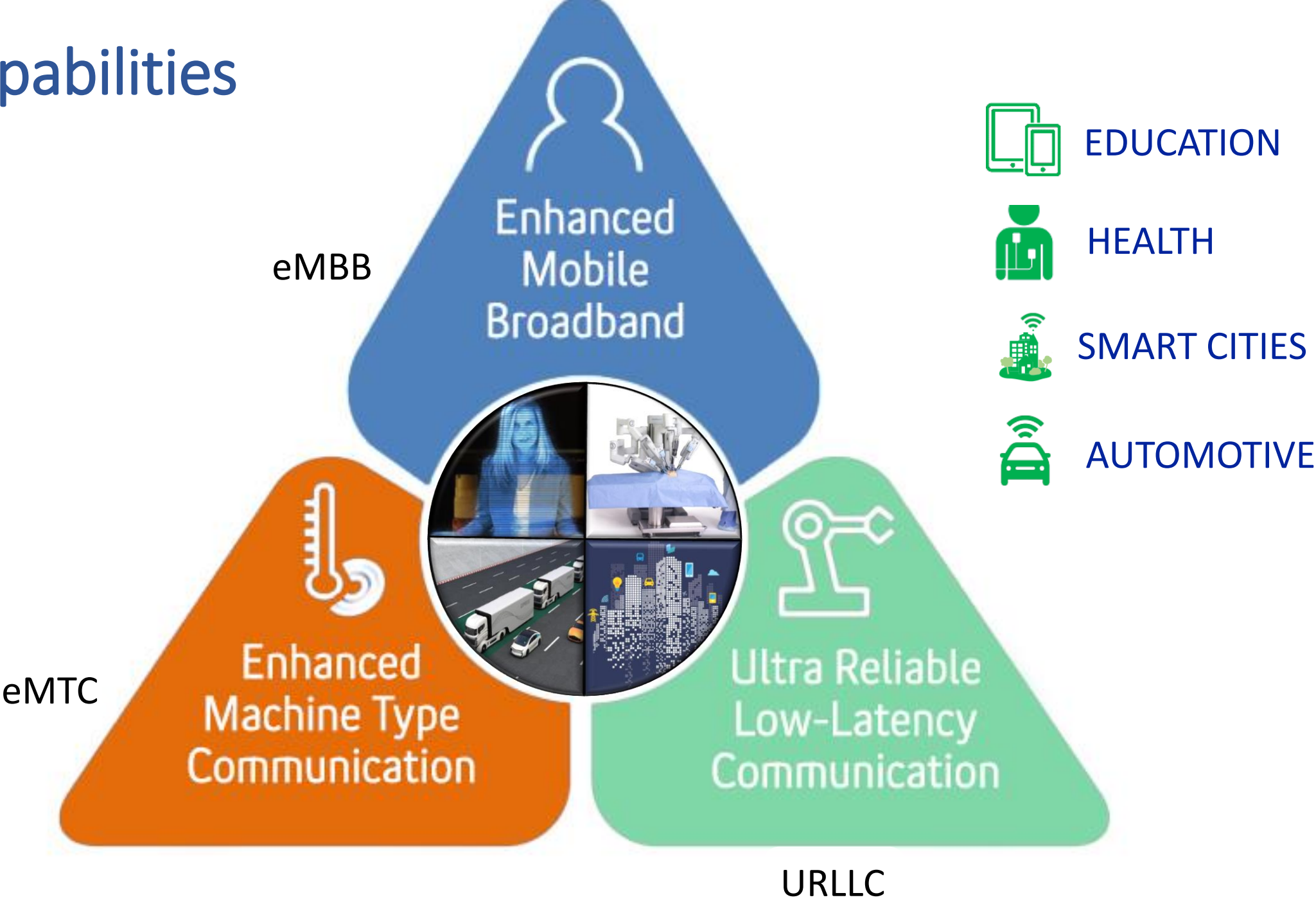
HEALTHCARE



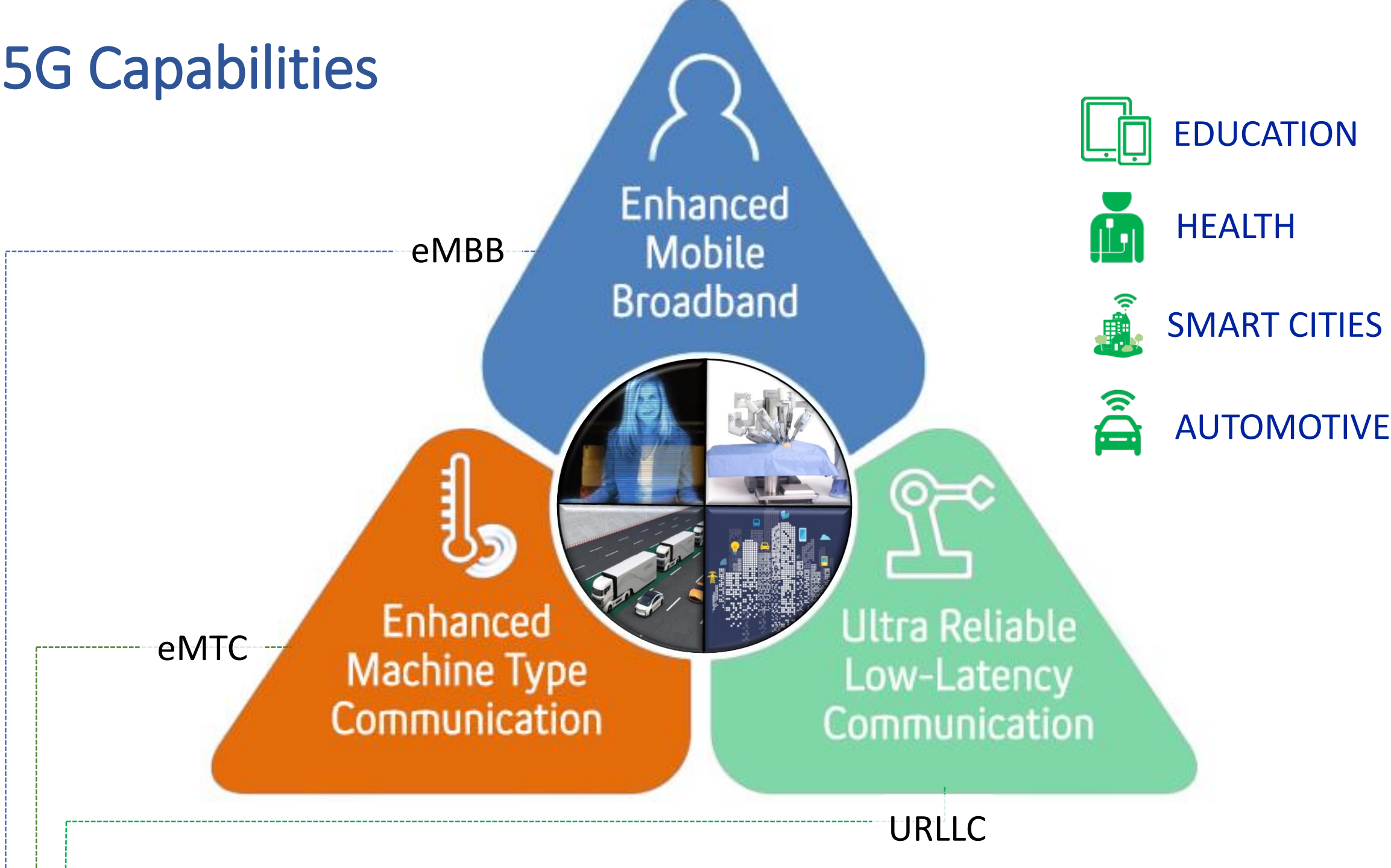
End-to-end «Hospital Information Management Systems»

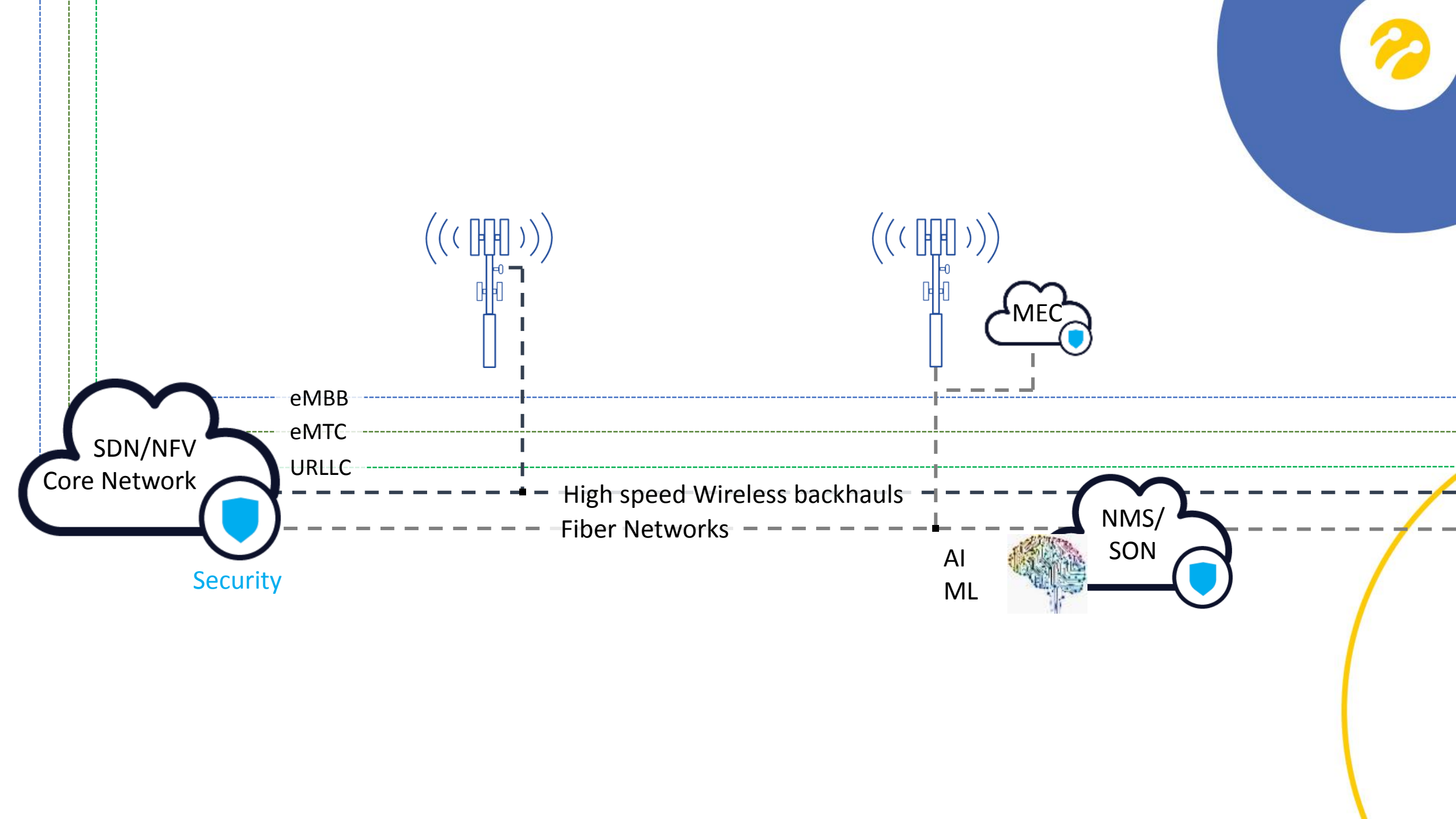
- Leader in terms of # of beds
- Strong pipeline

5G Capabilities

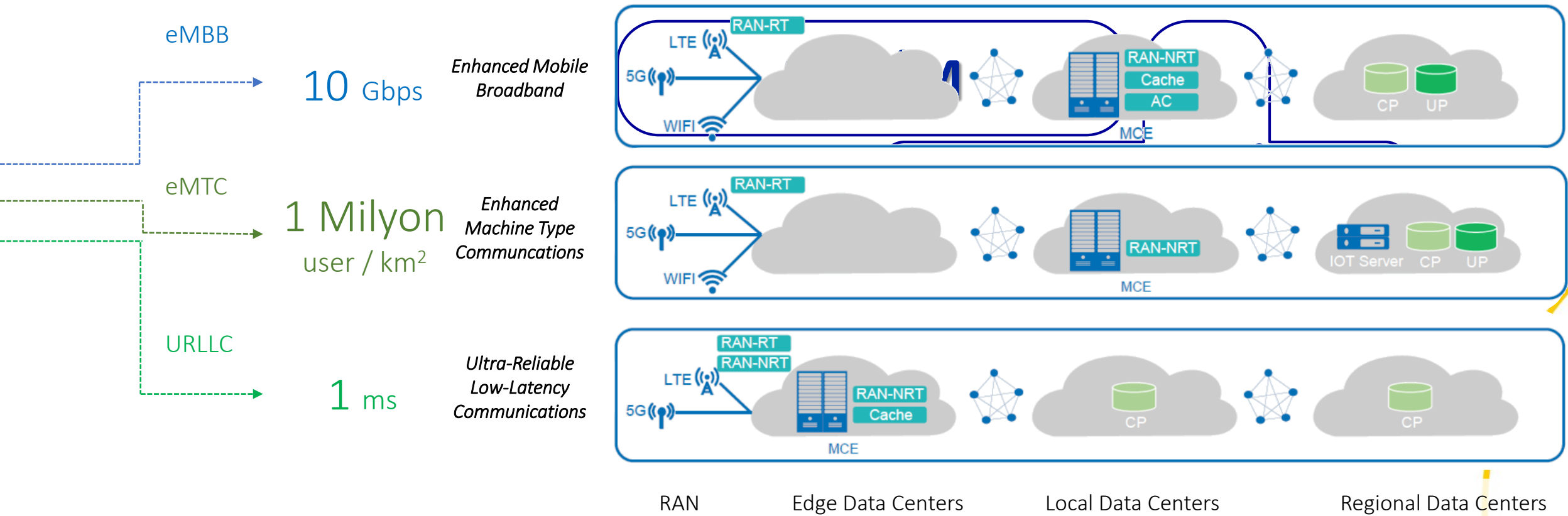


5G Capabilities

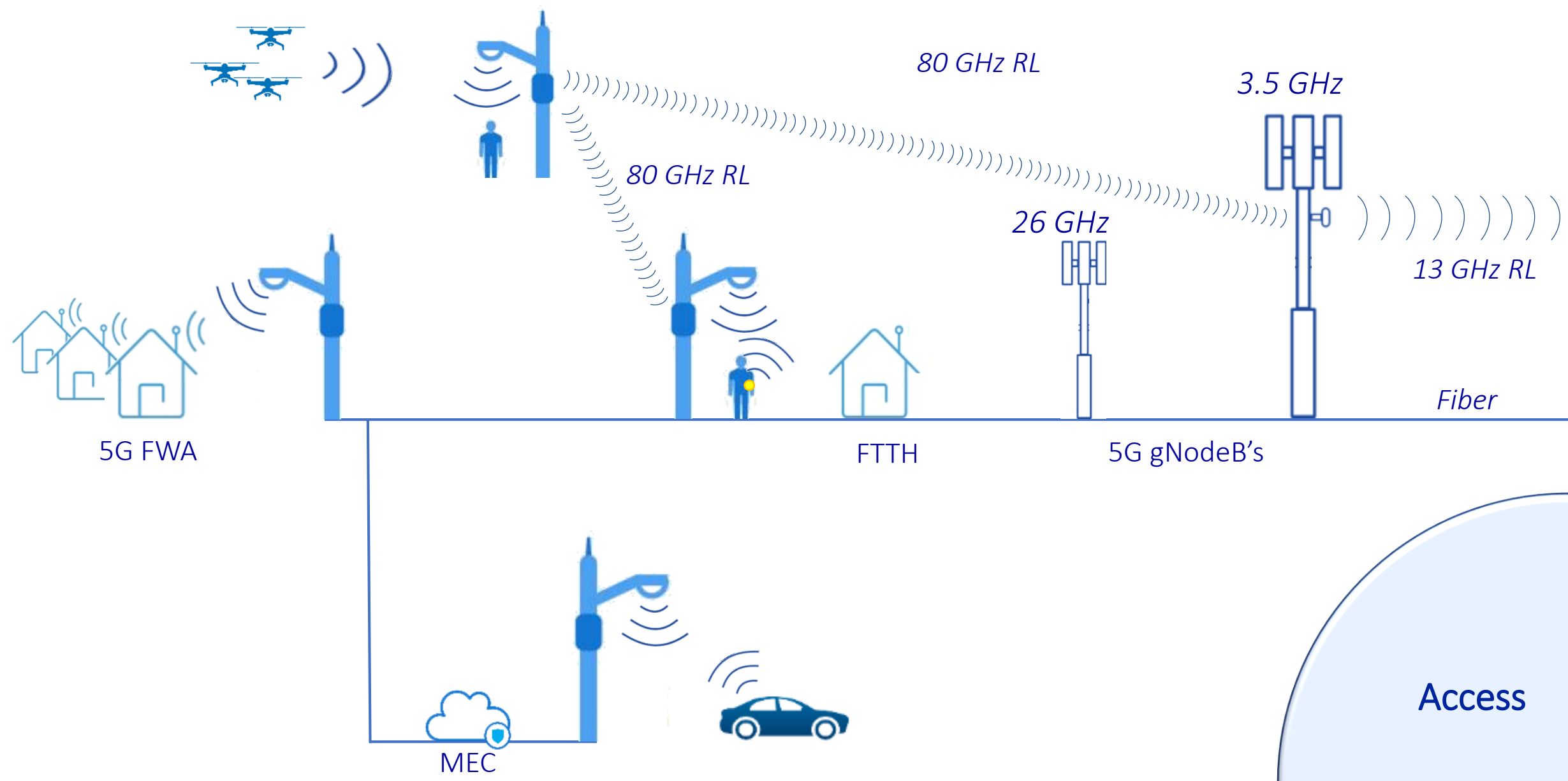


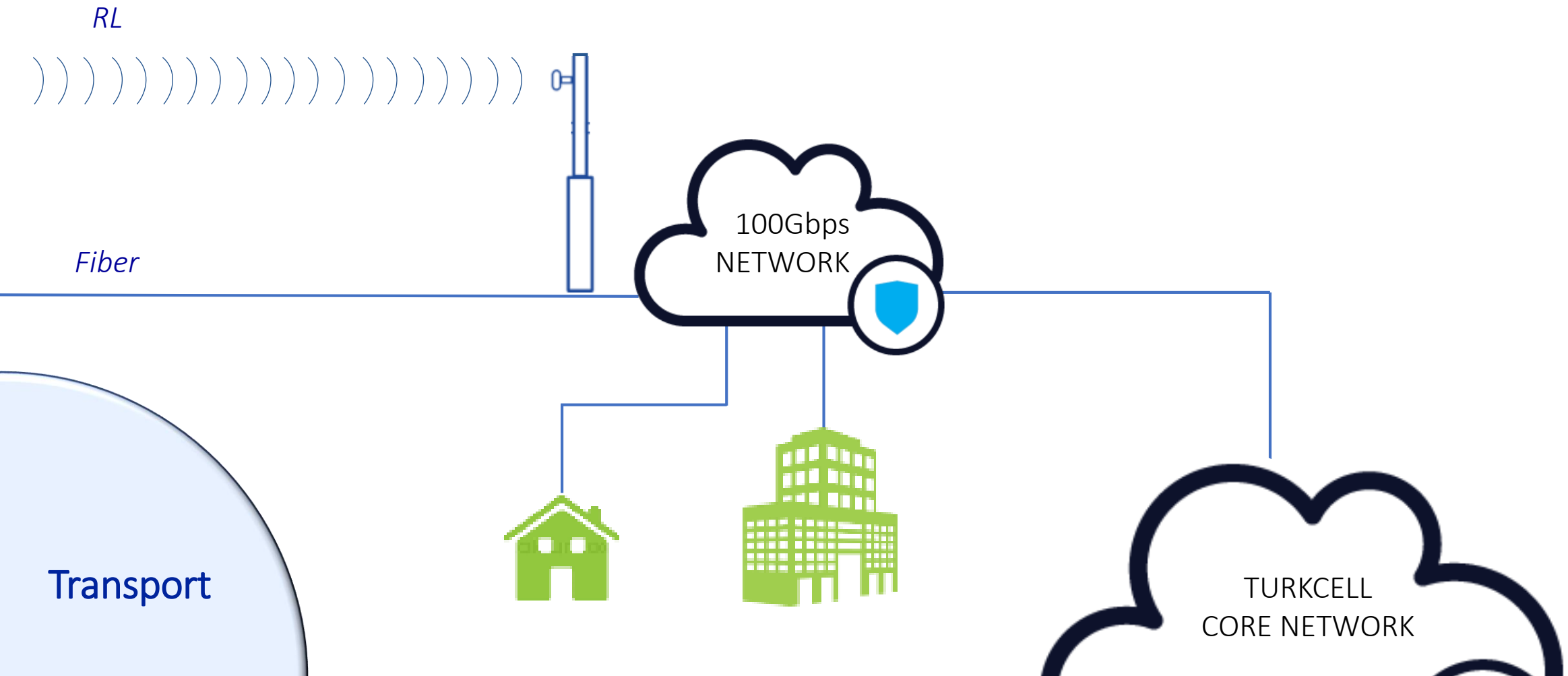


5G KPI's



Turkcell 5G Architecture





Core

TURKCELL
CORE NETWORK



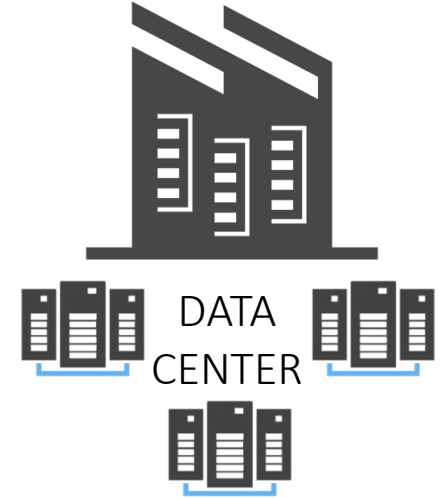
SDN/NFV
CORE

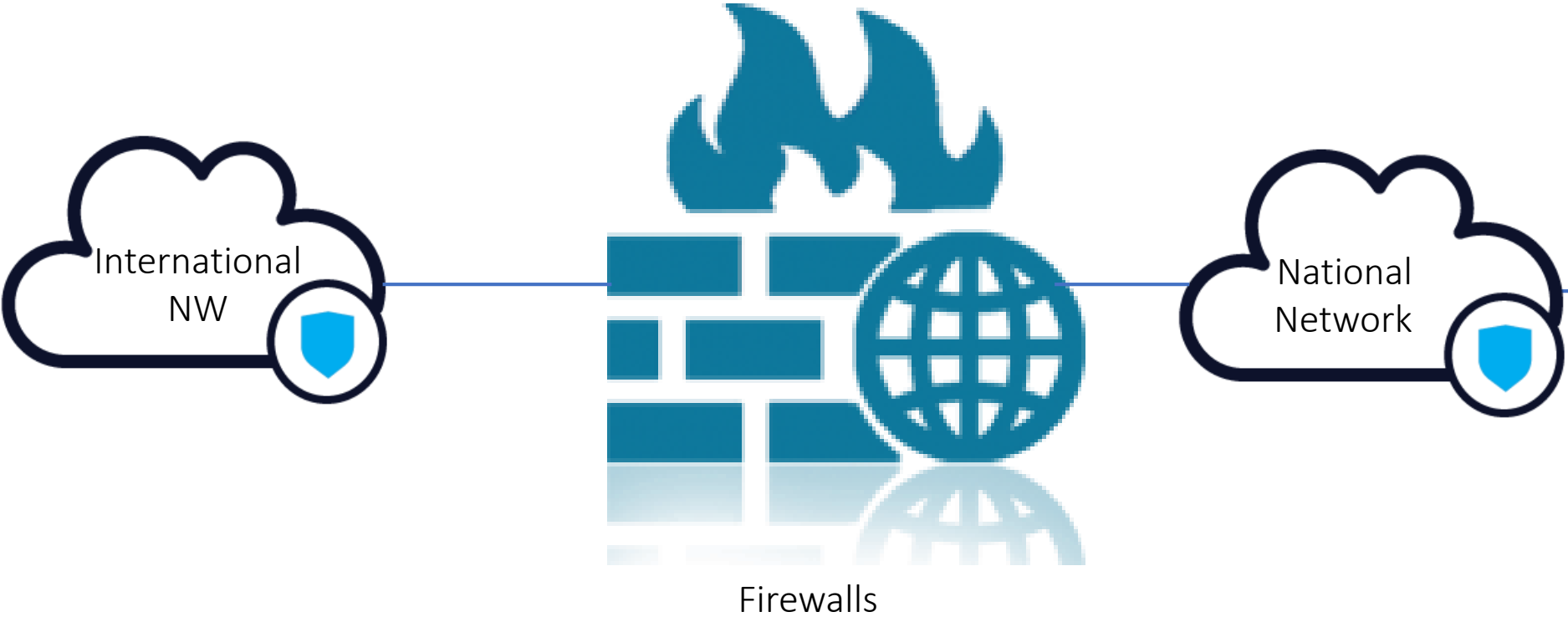


CMP

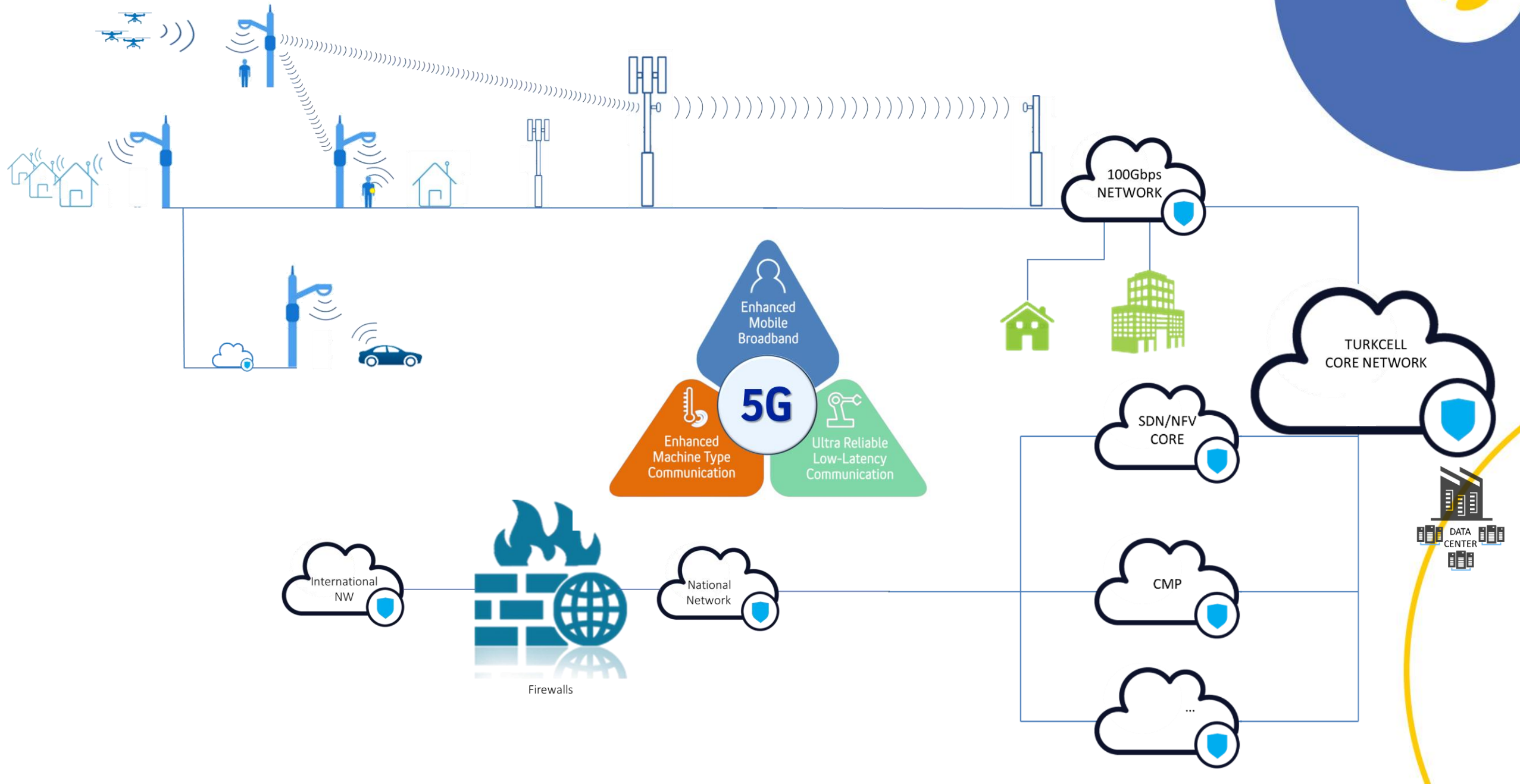


NMS





Turkcell 5G Architecture



Turkcell 5G Demo and Trials

January 11, 2017


24.7 Gbps

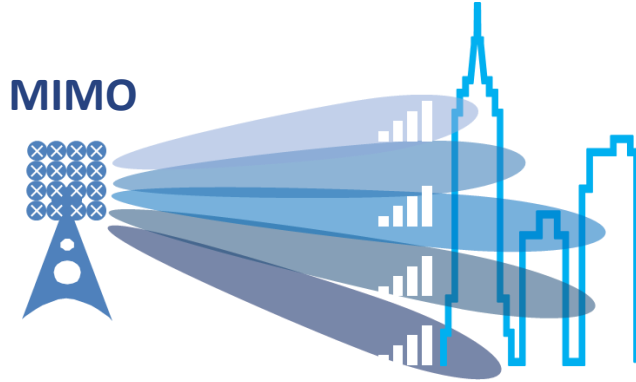


June 15, 2017


70.97 Gbps



Massive MIMO



1st deployment in Turkey & Region



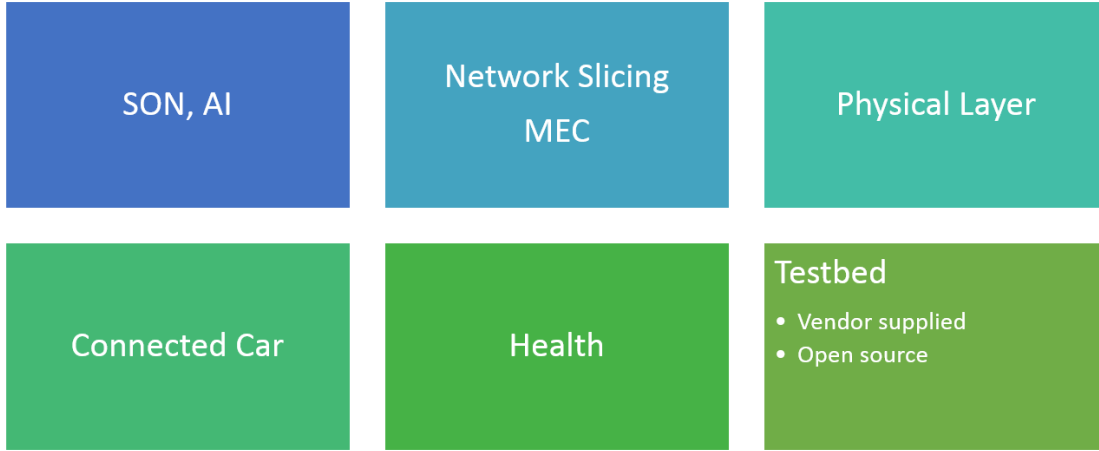
5G Valley Open Test Bed



- Initiated by the government to accelerate 5G activities
- Major universities (ODTU, Bilkent, Hacettepe) involved
- All mobile operators involved
- 3 University campus and City hospital with 7000+ inpatient capacity to be covered by the 5G service in Ankara

Academics, researchers, start-ups etc... can utilize 5G Valley Open testbed for R&D tests for 5G and beyond technologies

Turkcell 5G R&D



Horizon 2020
European Union funding
for Research & Innovation



From SON to AI and Machine Learning



**BEST SON
Award**



Most Advanced SON



Patented



340K Daily Action



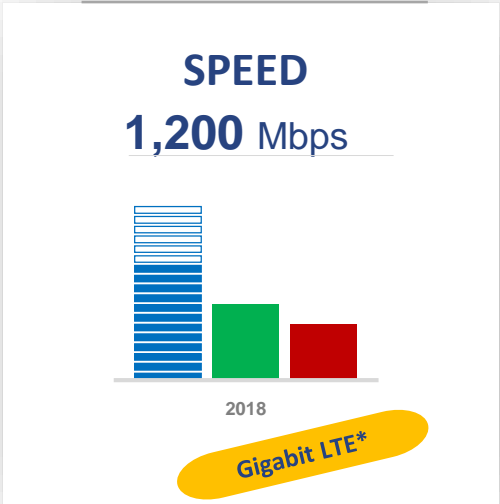
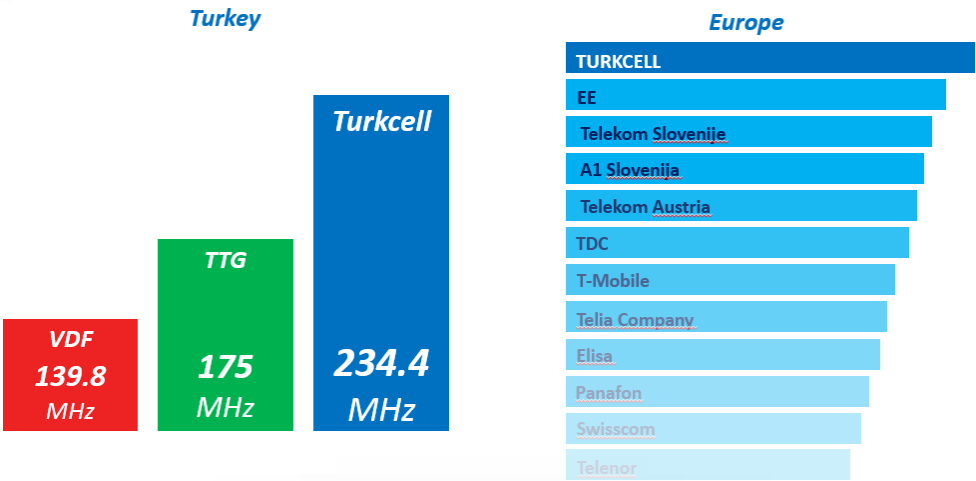
Zero Fault



5G Readiness => AI, Machine Learning

5G Use Case: FWA

THE WIDEST SPECTRUM

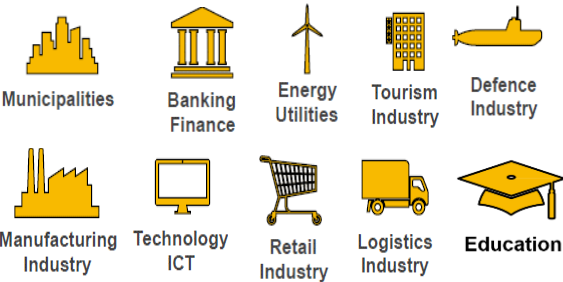


<https://gsacom.com/paper/progress-gigabit-lte-networks-2/>

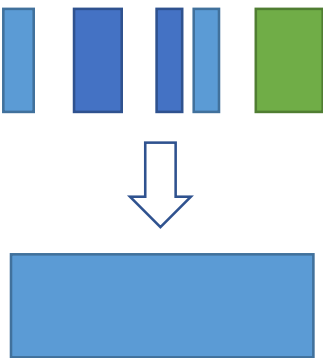
Fastest Terminal

TURKCELL
TURKCELL'LE BAĞLAN HAYATA

Summary – 5G Requirements



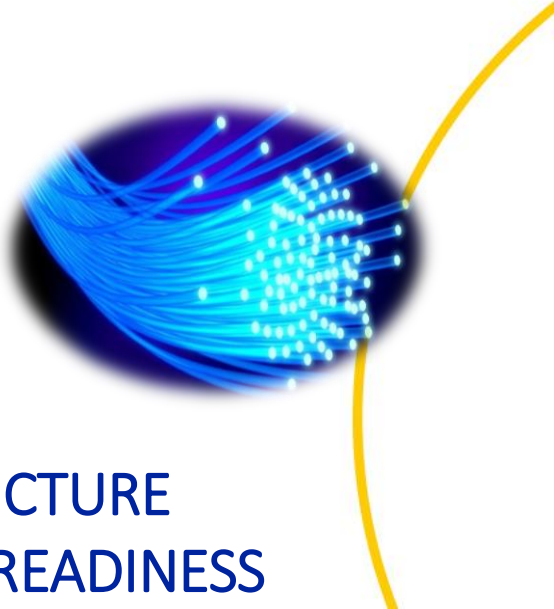
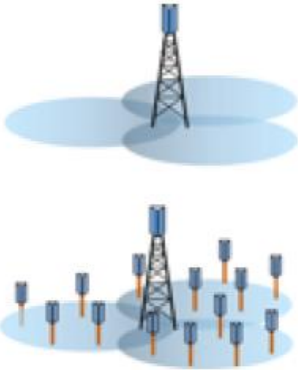
BUSINESS MODELS,
CAPACITY NEEDS



SPECTRUM AVAILIABILITY
& FEASIBILITY



5G SMART PHONES
IOT DEVICES



INFRASTRUCTURE
TECHNOLOGY READINESS



Thank you