CAMPUS NETWORK - ENABLER FOR INDUSTRY 4.0

2021 NOVEMBER

SOÓS GÁBOR, MAGYAR TELEKOM

LIFE IS FOR SHARING.

MOBILE EVOLUTION

PROMISES OF GENERATION „N" IS FULFILLED BY GENERATION „N+1"

1980's | 1990's | 2000's | 2010's | 2020's

IoT

1G
Analogue
Data Rate:
2,4 kbps

2G
GSM, GPRS
Data Rate:
9,6-384 kbps
Latency ~180 ms

3G
UMTS, HSPA
Data Rate:
2 Mbps
Latency: ~50 ms

4G
LTE, LTA-A,
Data Rate:
150, 750 Mbps
Latency: ~20 ms

5G
Data Rate:
1-20 Gbps
1 M UE/km2
Latency: <1ms
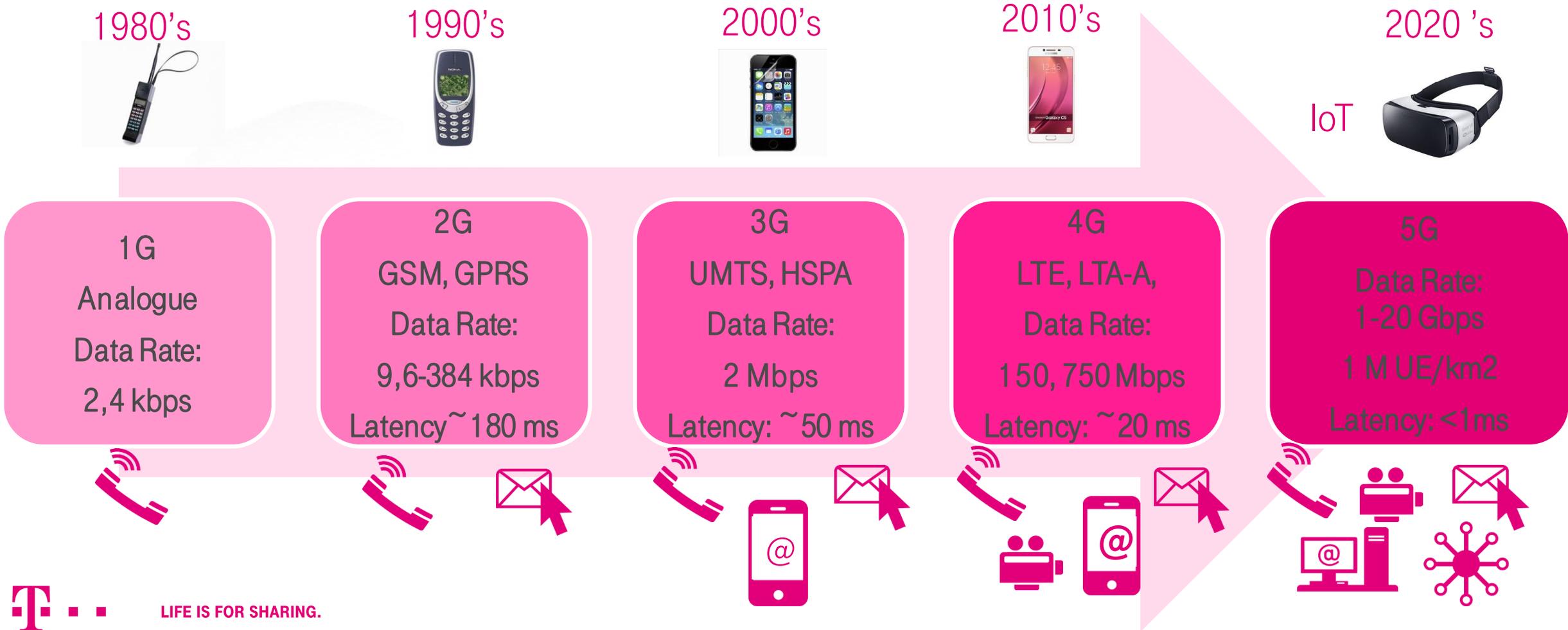
5G - MORE THAN A NEXT STEP

5G

Real time Economy
Real time Business Solutions
Real time Immersive Media

2G

3G

4G
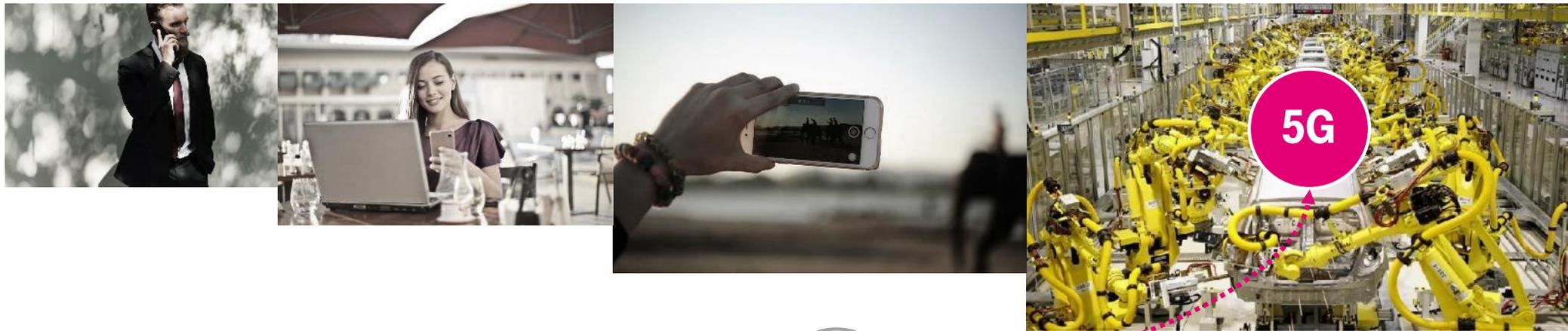
VOICE

WEB, FTP

BROADBAND,
APPLICATION

**REAL TIME,
CONNECT EVERYTHING**

PEOPLE'S NETWORK

A NETWORK OF MACHINES AND „THINGS"

LIFE IS FOR SHARING.

BUSINESS IMPACT OF 5G

Figure 6: 5G-enabled industry digitalization revenues for ICT players, 2026

Energy and utilities

Manufacturing

Public safety

Healthcare

Public transport

Media and entertainment

Automotive

Financial services

Retail

Agriculture

We estimate that 5G-enabled industry digitalization revenues for ICT players will be **USD 1.3 trillion** in 2026.

1%
19%
18%
13%
12%
10%
9%
8%
6%
4%
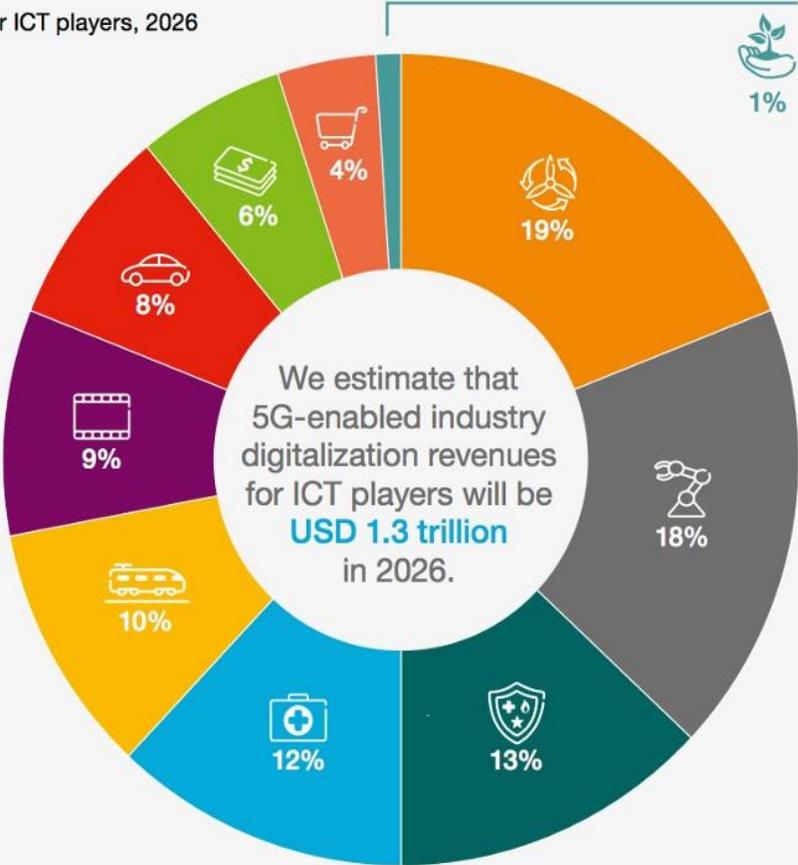
Source: Ericsson and Arthur D. Little, The 5G Business Potential: Second Edition, October 2017

The Internet of Things offers a potential economic impact of $4 trillion to $11 trillion a year in 2025.

Nine settings where value may accrue	Size in 2025, $ trillion[1]
	■ Low estimate ■ High estimate
Factories—eg, operations management, predictive maintenance	1.2–3.7
Cities—eg, public safety and health, traffic control, resource management	0.9–1.7
Human—eg, monitoring and managing illness, improving wellness	0.2–1.6
Retail—eg, self-checkout, layout optimization, smart customer-relationship management	0.4–1.2
Outside—eg, logistics routing, autonomous (self-driving) vehicles, navigation	0.6–0.9
Work sites—eg, operations management, equipment maintenance, health and safety	0.2–0.9
Vehicles—eg, condition-based maintenance, reduced insurance	0.2–0.7
Homes—eg, energy management, safety and security, chore automation	0.2–0.3
Offices—eg, organizational redesign and worker monitoring, augmented reality for training	0.1–0.2

Total $4 trillion–$11 trillion

[1]Adjusted to 2015 dollars; for sized applications only; includes consumer surplus. Numbers do not sum to total, because of rounding.

McKinsey&Company | Source: McKinsey Global Institute analysis

CAMPUS NETWORK - BASICS OF INDUSTRY 4.0 ECOSYSTEM

Solution

- New standard and type of communication
- Campus Network is a crucial component of 5G use cases
- Unlimited data consumption
- Dedicated Radio – Core – IP resources for use-case
- QoS for service separation with Service Level Agreement

Goals

- Provide a low latency, high reliability and high speed network
- Helps for further service product specification
- Evaluate e2e integrated but QoS differentiated services

LIFE IS FOR SHARING.

DIVERSE CONNECTIVITY REQUIREMENTS OF LOCAL INDUSTRIAL ECOSYSTEMS WILL BE FULFILLED IN „CAMPUS" AREAS

Factory Floor

Warehouse

Office

Utilities

Outdoor Intralogistics

Security Infrastructure

STANDARD PUBLIC NETWORK COVERS PARTS OF AN INDUSTRY CAMPUS, MAINLY OUTDOOR COVERAGE

Factory Floor

Warehouse

Office

Utilities

Outdoor Intralogistics

Security Infrastructure

1 Public cellular coverage

ADDITIONAL ANTENNA FOR BETTER IN-HOUSE COVERAGE ON CAMPUS, MAINLY FOR SMARTPHONE USAGE
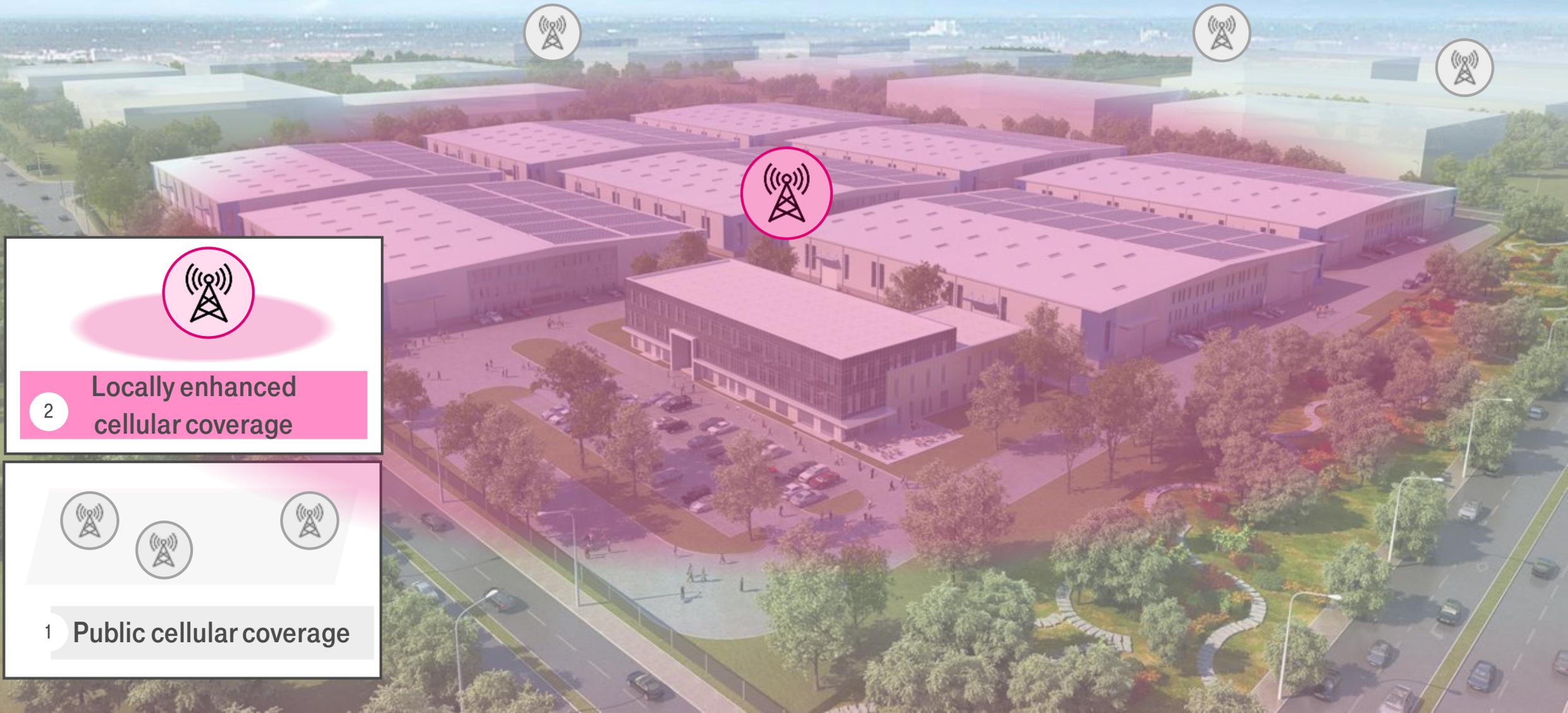
2 Locally enhanced cellular coverage

1 Public cellular coverage

CAMPUS NETWORK FOR INDUSTRY 4.0 MEETS DEMANDS OF CONNECTING MACHINES VIA MOBILE NETWORK
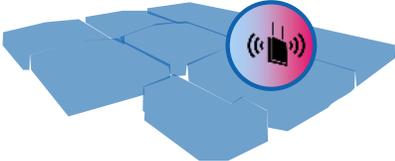
**3** Dedicated private cellular coverage

2 Locally enhanced cellular coverage
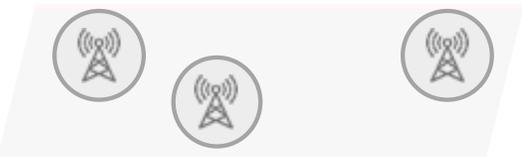
1 Public cellular coverage
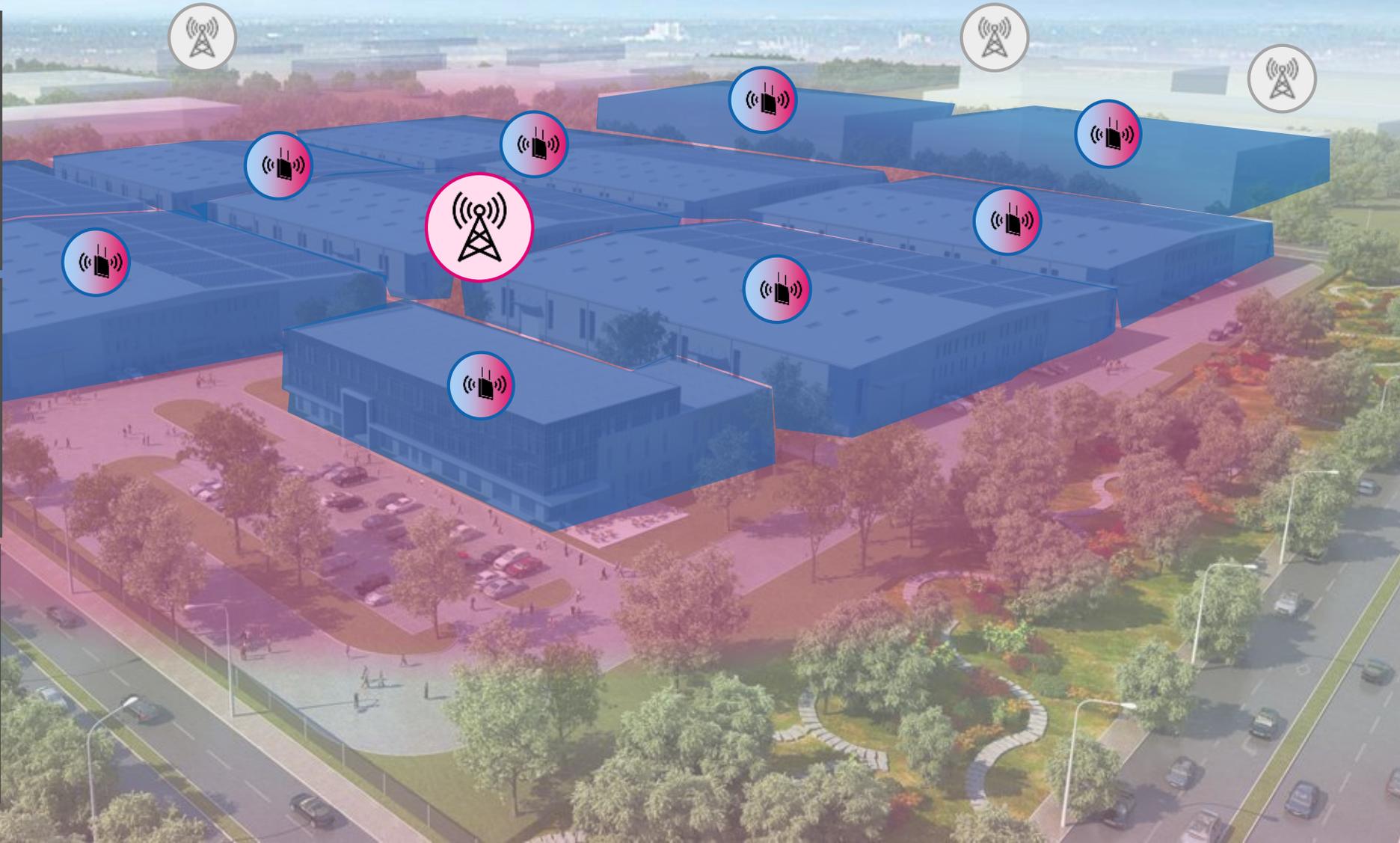
TWO NETWORK LAYERS – PARTED BY DIFFERENT NETWORK IDS – DEDICATED ONSITE CORE NETWORK

Public Network

local path

Onsite Public and Dedicated Private Mobile Data Network

Public network

Private network

Dedicated Core Network and Edge Cloud
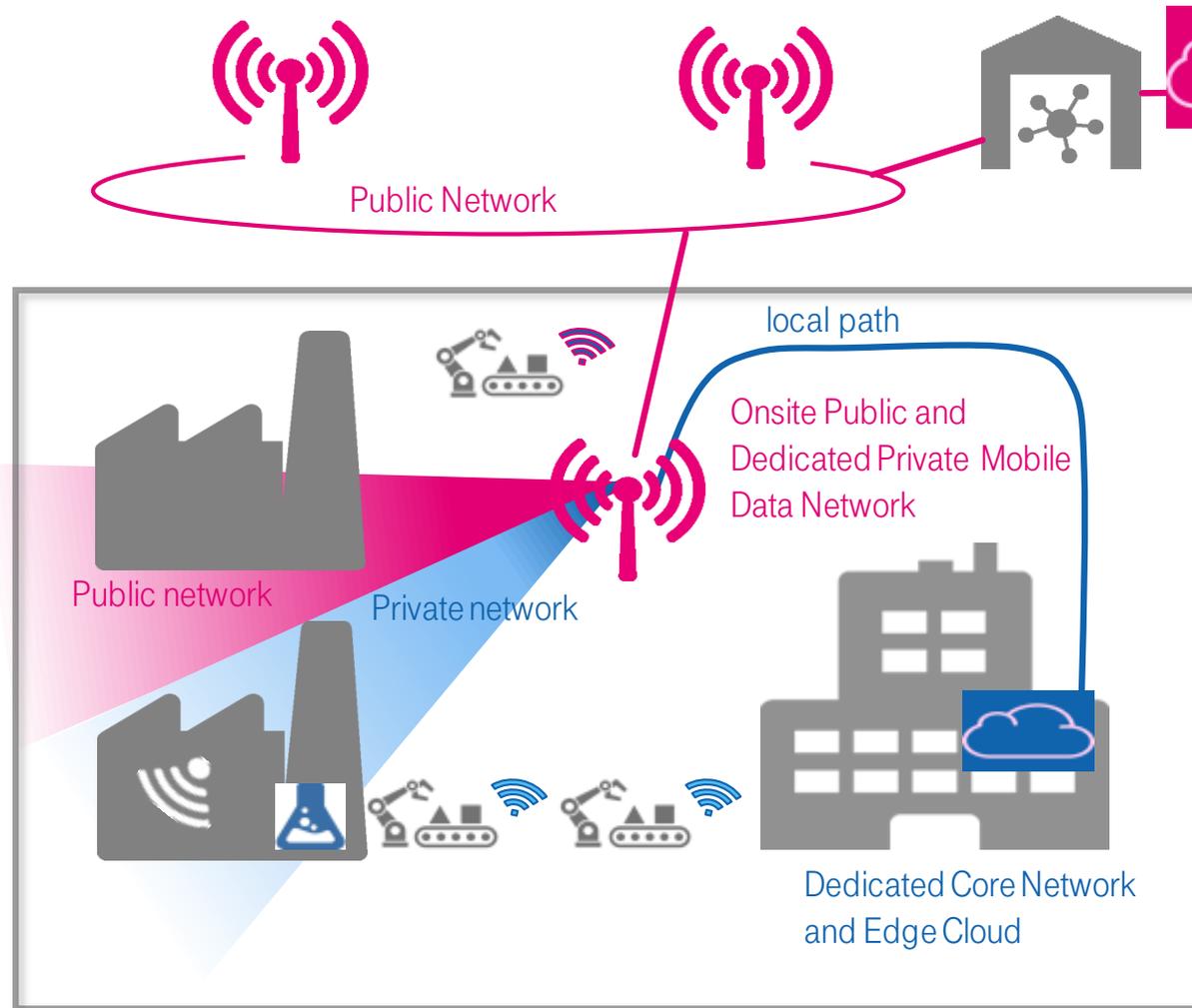
- Dedicated RAN (Radio Access Network) for the Campus

- Combined radio layer with guaranteed resources and dedicated network ID (PLMN ID)

- Private Core Network to keep traffic local and achieve high customer autonomy in combination with edge cloud on campus

- Network-as-a-Service offering matches the customer demand and understanding of a private network

TRAFFIC FLOW OF HUMANS

Number of Bytes in one session

Number of packets in one session

⬇ Download

⬆ Upload

T·· · · ·
LIFE IS FOR SHARING.

TRAFFIC FLOW OF MACHINES
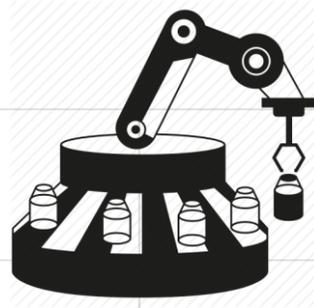
Download

Upload

Number of Bytes
in one session
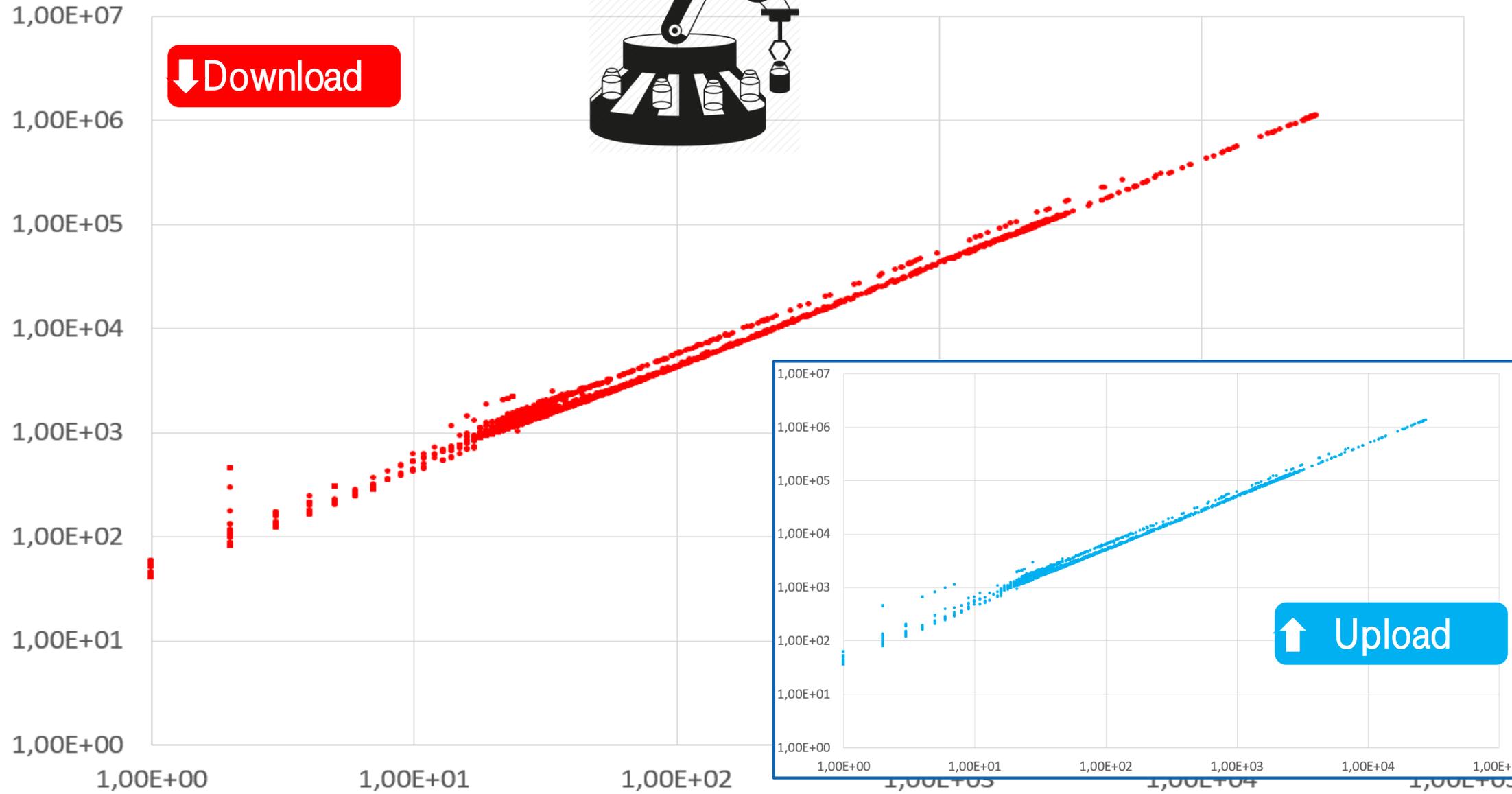
Number of packets in one session

LIFE IS FOR SHARING.

PACKET SIZE DISTRIBUTION – N USER, Y SEC, DOWNLOAD

Human

Machine

Number of packets [pcs]

Packet size [Byte]

LIFE IS FOR SHARING.
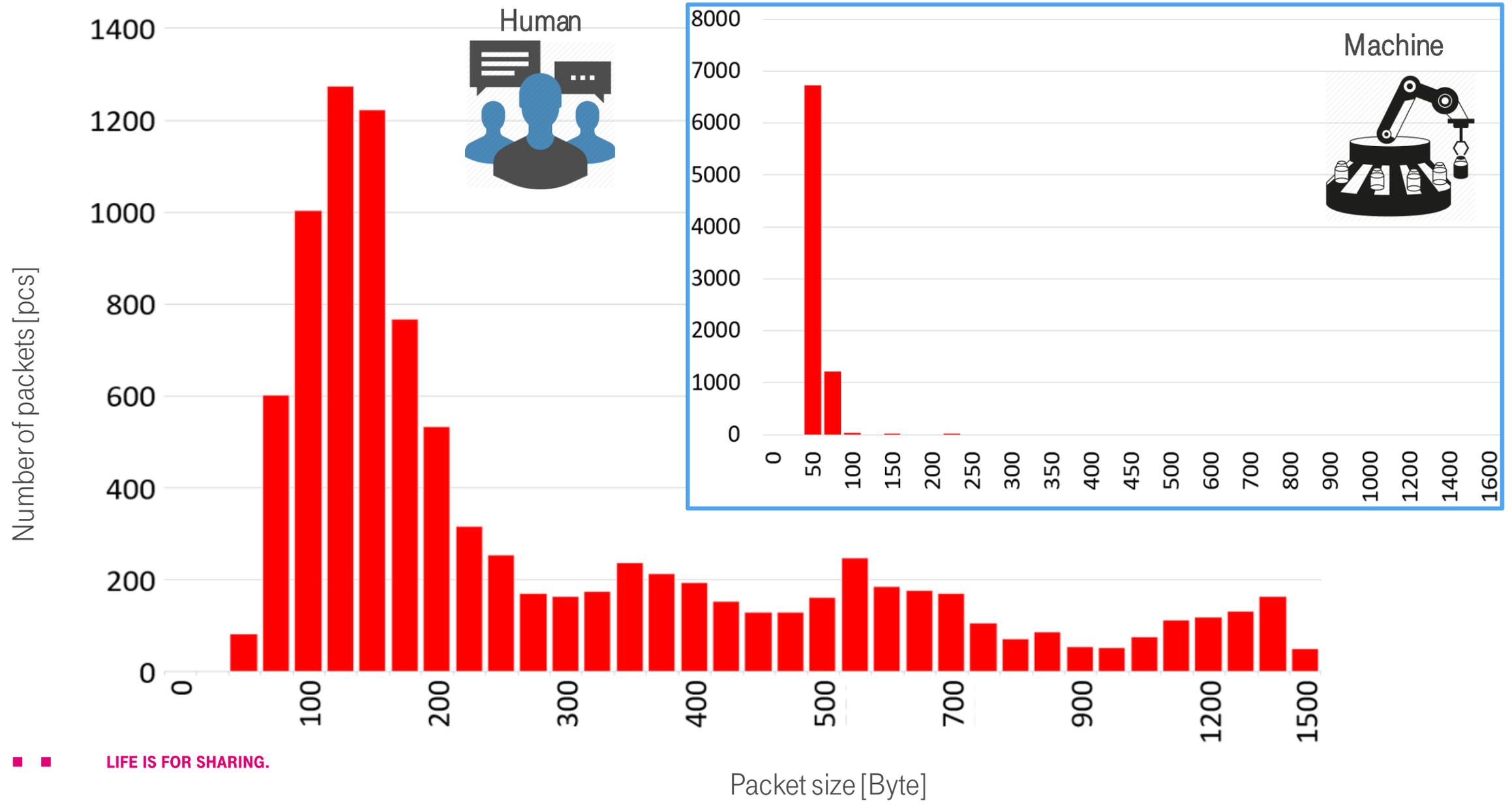
PACKET SIZE DISTRIBUTION – N USER, Y SEC, UPLOAD
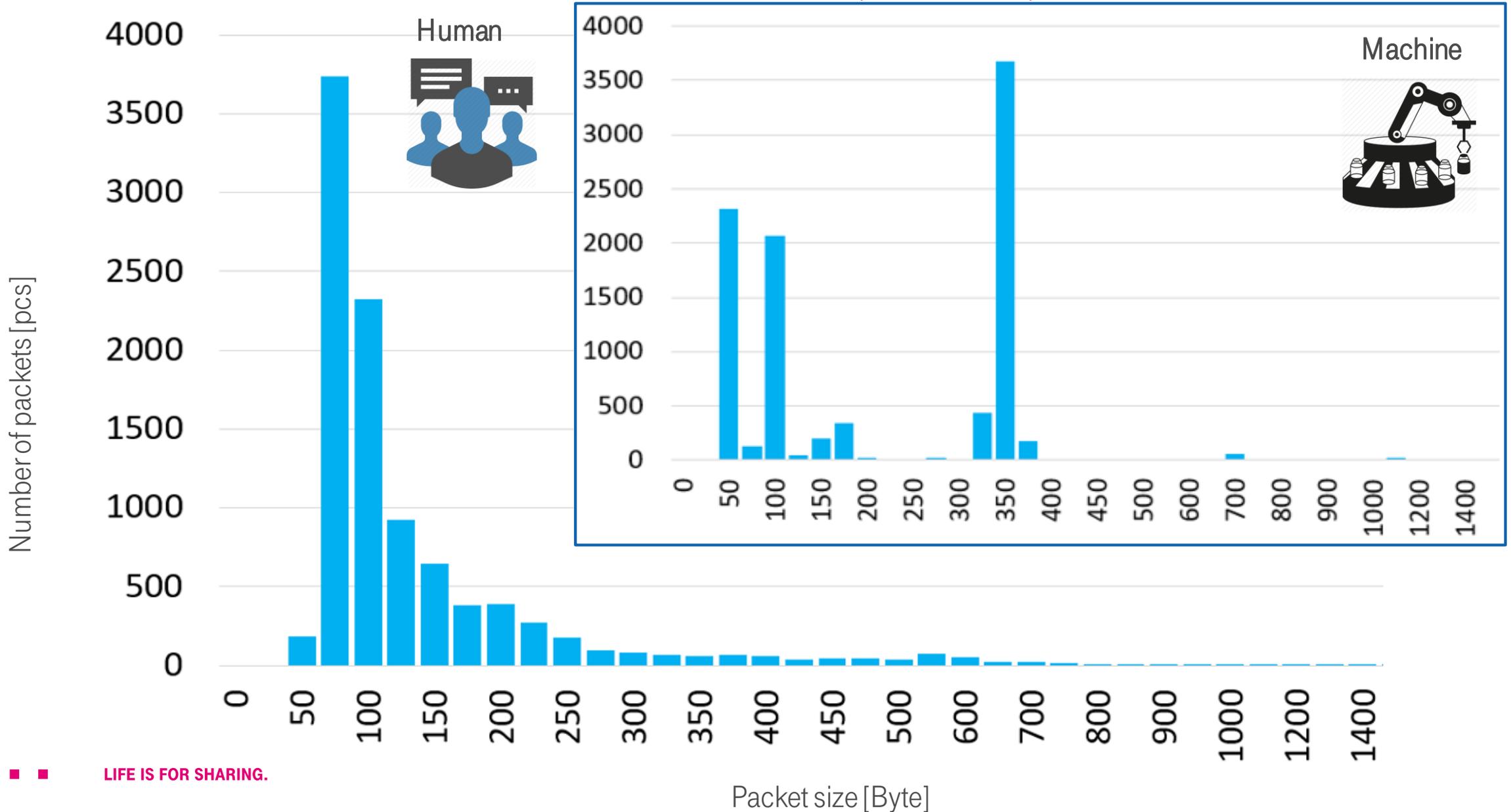
PRIVATE 5G CAMPUS – NO STRINGS ATTACHED

SCALABLE SOLUTION FOR INDUSTRIAL CUSTOMERS READY FOR MARKETING

TELEKOM DATA CENTER

SIM AUC

OaM, OSS, Monitoring

Control data link over public 4G network

CUSTOMER AREA

Core network

Use-case services

4G/5G radio

< Mobilszolgáltatók

Automatikus választás
A telefon választhatja ki a legjobb mobilhálózatot önnek. Ha ezt kikapcsolja, választhat a rendelkezésre álló hálózatok közül.

Hálózatkeresés

Elérhető hálózatok

999-30

Telekom HU

Digi.Mobil HU

vodafone HU

Telenor HU

Private network availability

User data

Control data

5G

lte

Power

5G Radio part

4G Radio part

Router

Packet core

APP server

LIFE IS FOR SHARING.

15
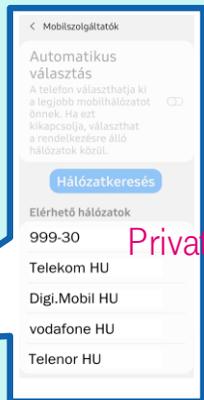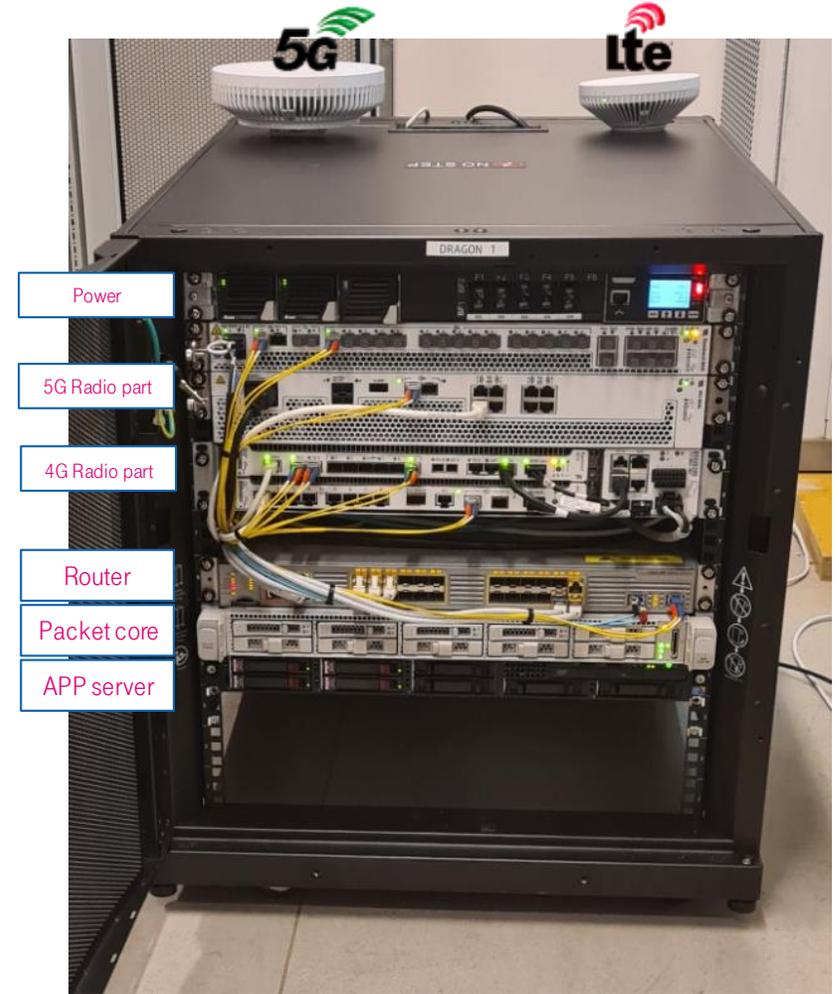
5G CAMPUS – STABLE LOW LATENCY FOR CRITICAL INDUSTRY

Measured round-trip time distribution

Q&A

GABOR.SOOS@TELEKOM.HU