4G/5G as Key Enabler for e-infrastructure Development

Todor Tashev Senior Director Network and Services Area A1 BG

America Movil – Major Shareholder in A1 Group
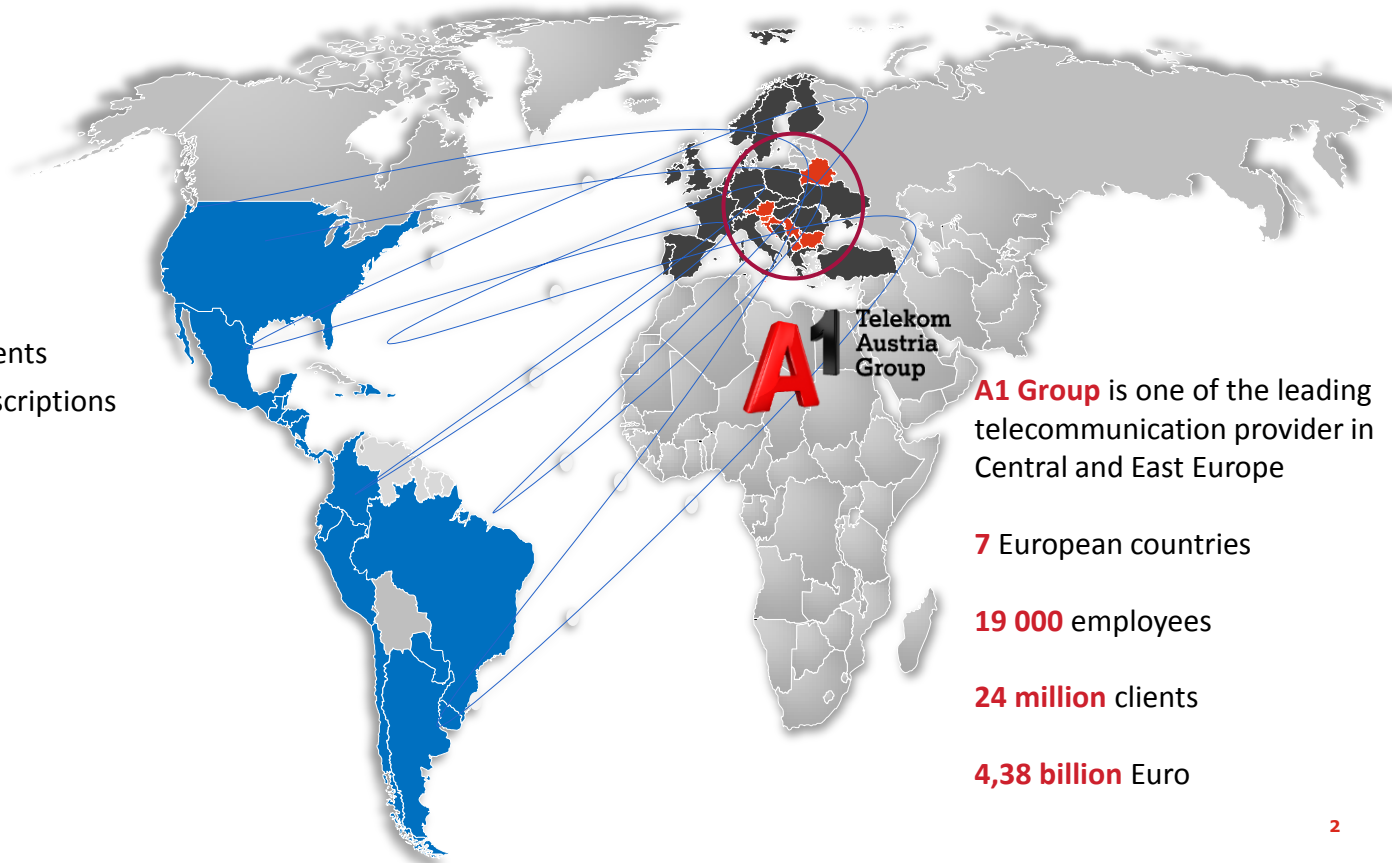
25 Countries

in America and Europe

362 Millions

connected lines:
- **279 million** mobile clients
- **82,8 million** fixed subscriptions (internet and TV)

A1 Group is one of the leading telecommunication provider in Central and East Europe

7 European countries

19 000 employees

24 million clients

4,38 billion Euro

Business Solutions

Digital Services from A1 BG

ICT
SaaS
IaaS
Collocation
System
Integration

Web Services
A1 BG Smart App
Web Presence
VPS Server
PayGo Server

Business Applications
Office 365
Zoho Mail | Docs
Contact Manager
CRM

Security Applications
Ikarus Mail | Web
WiFi | Anti.Virus
Mobile Management

Technology

A1 BG– Technology Leader

2G · 2.5G · 3.5G · 4G · eCall · VoLTE · NB-IoT

First SMS in Bulgaria

HSPA+

4G pilot for corporate clients

4G for everyone and launch of 4,5G

| 1995 | 1999 | 2004 | 2005 | 2009 | 2010 | 2011 | 2012 | 2014 | 2016 | 2017 | 2018 |

Launch of the first 2G network in Bulgaria

Mobile data via GPRS

HSDPA

4G demo in Bulgaria

eCall pilot

First Call

SMS · 3G · 3,5G · 4G · 4,5G · 5G demo
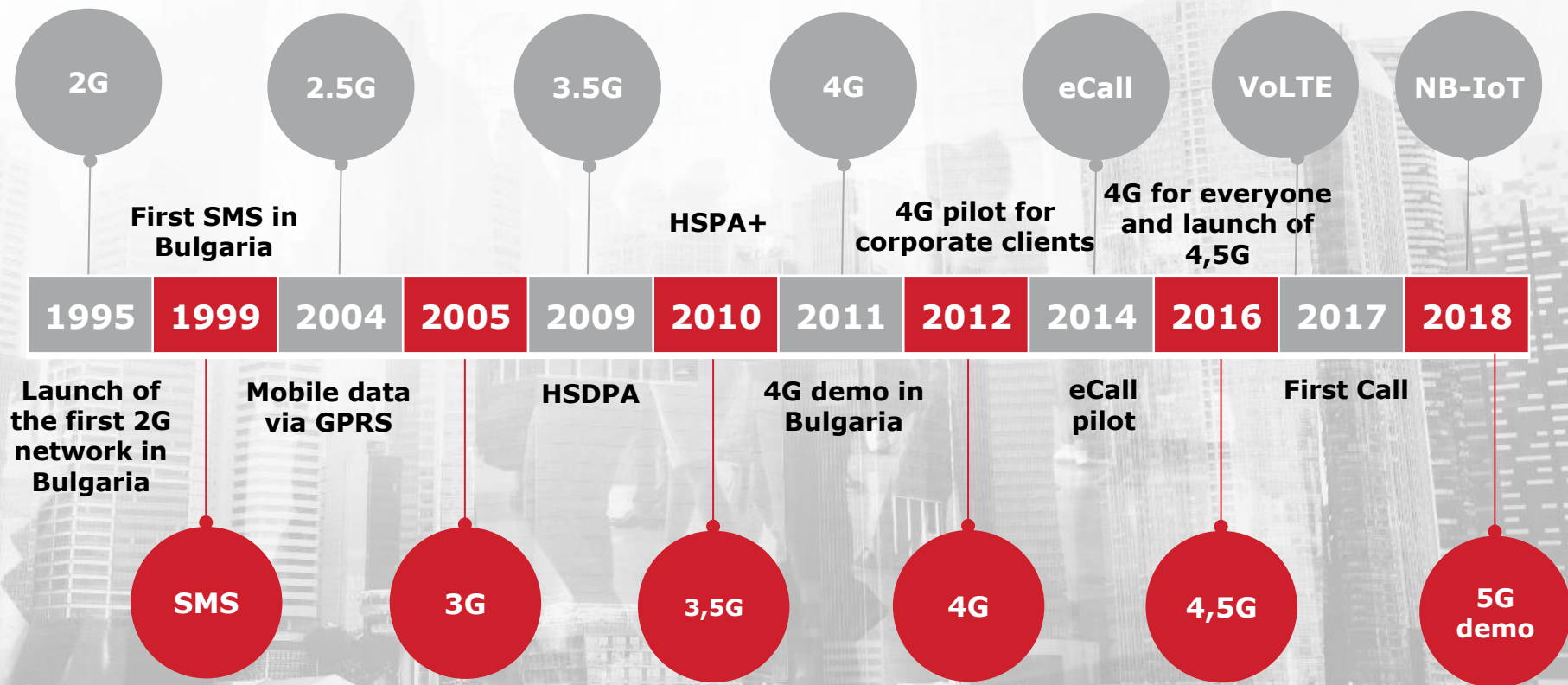
Implemented Technologies Leading to Better Customer Experience

Fixed-mobile Substitution

- Netbox
- FastMile solution-Dedicated user throughput in LTE networks

M2M

- POS terminals
- ATM machines
- Security
- Sensor data

Real Time Tracking of People, Pets, Vehicles and Goods

NB-IoT Benefits

Improved coverage Up to 20 dB

Reduced energy consumption to reach 10 years battery lifetime

Reduced device price

Reduced device complexity

Avoid impact to existing systems

GSM

WCDMA

LTE

Support massive number of devices
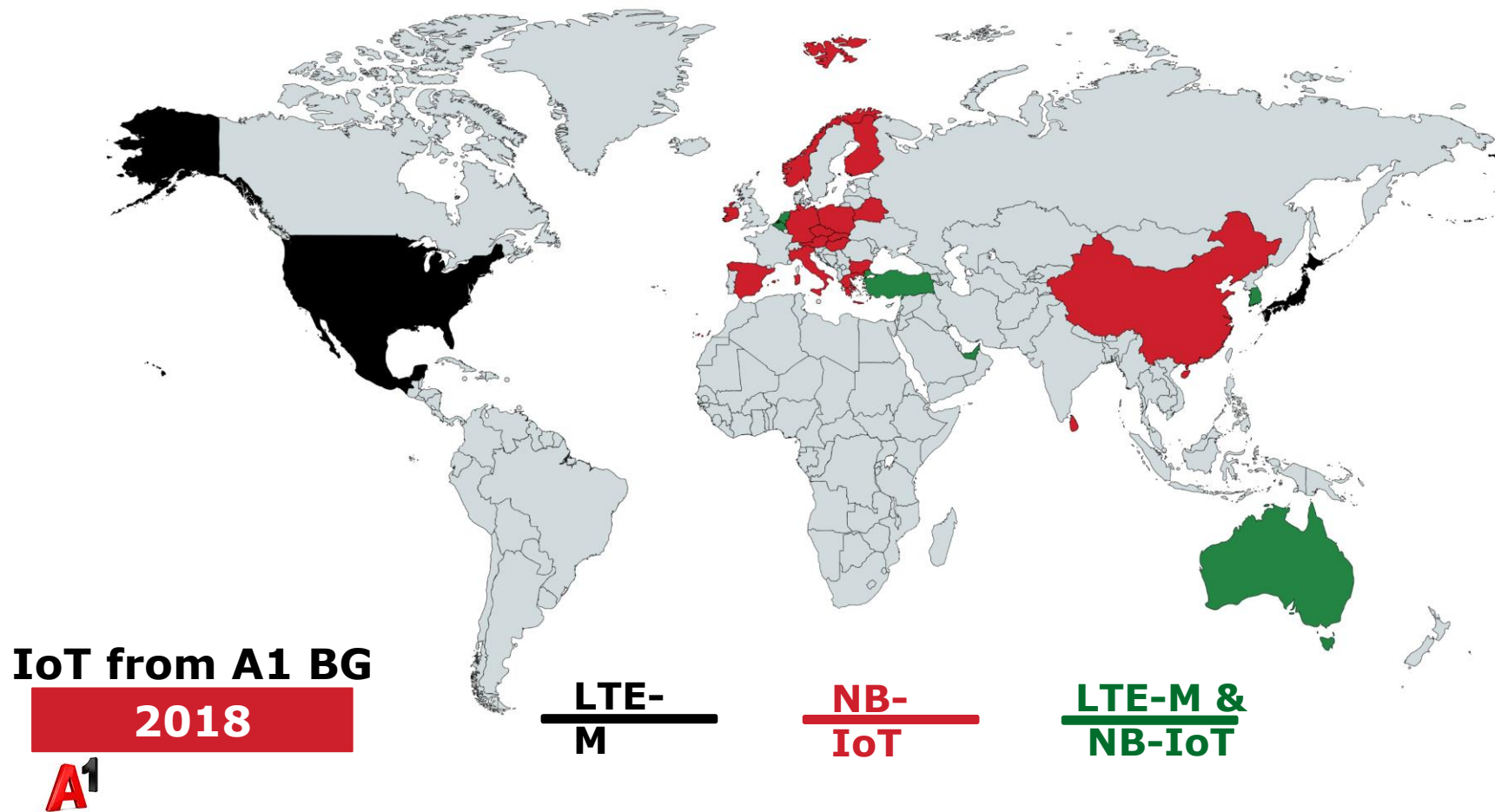
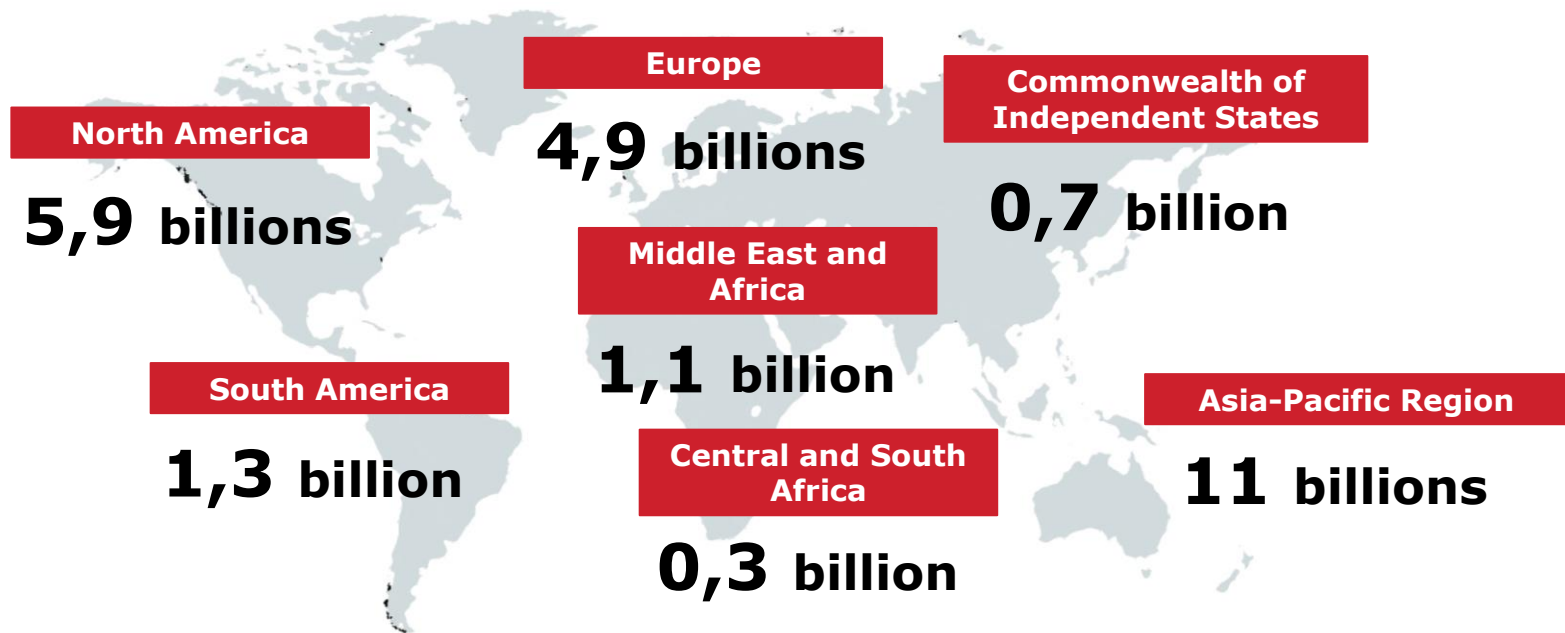**Possible to deliver UL exception report in 10s**

Operate in narrow Spectrum

NB-IoT is A1 BG Choice of Technology

Why Narrow Band IoT			
	NB IoT	**LoRa**	**Sigfox**
Low Device Cost	🟢	🟢	🟢
Extended battery life	🟢	🟢	🟢
Deep Indoor Coverage	🟢	🟢	🟢
Bandwidth	🟢	🟢	🔴
2 Way Communication	🟢	🟠	🟠
3GPP Standards Based	🟢	🔴	🔴
Performance/Latency	🟢	🔴	🔴
Licenced Spectrum	🟢	🔴	🔴
Cellular Security	🟢	🔴	🔴
Quality od Service	🟢	🔴	🔴

IoT Deployments in Mobile Networks

IoT from A1 BG

2018

LTE-M

NB-IoT

LTE-M & NB-IoT

IoT in 2025

Europe

4,9 billions

North America

5,9 billions

Commonwealth of Independent States

0,7 billion

Middle East and Africa

1,1 billion

South America

1,3 billion

Central and South Africa

0,3 billion

Asia-Pacific Region

11 billions

Total

2025 г. **25,2** billions

Business

13,8 billions

End Customers

11,4 billions

NB-IoT Use Cases

Smart Home

Smart City

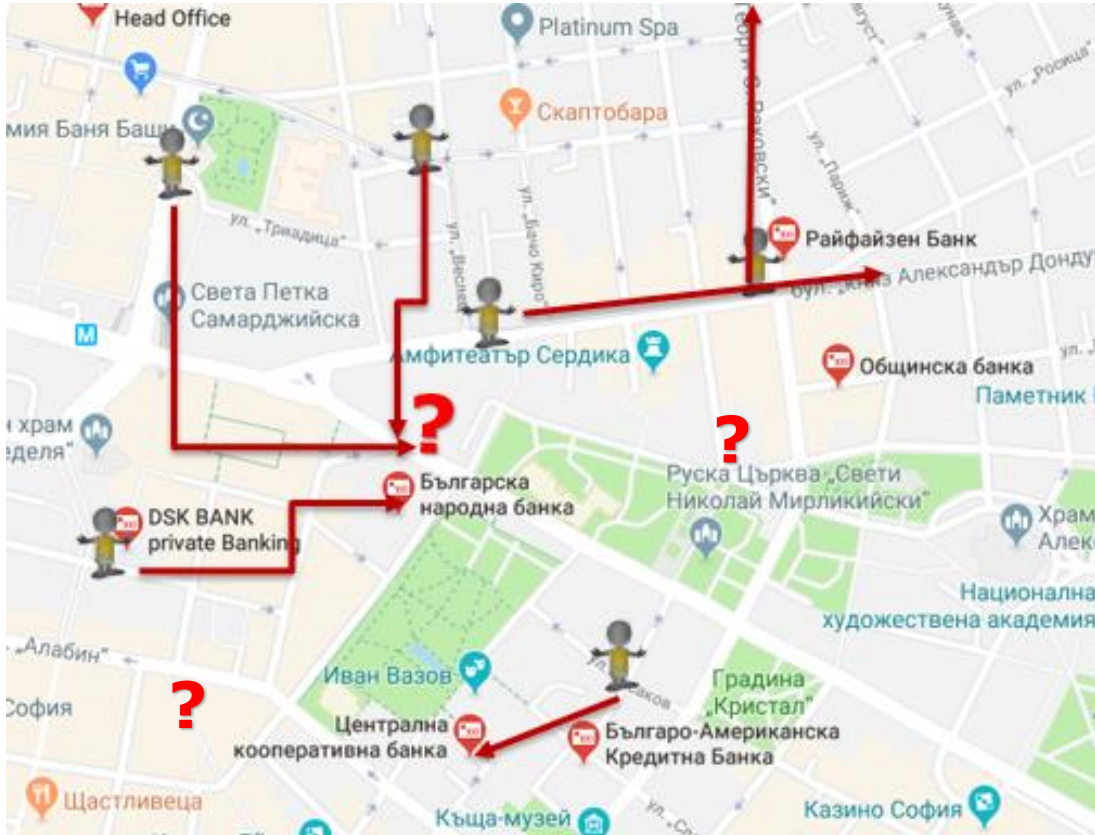**Smart Industy**

Data Analytic

AI

**Automation**

Mobility Insights Use Cases

- ☐ Find the most suitable place for an office/ATM?

- ☐ Why office X is visited so rarely in the last days?

- ☐ Where our clients come from?

- ☐ How long they stay with us?

- ☐ Have they been with our competitors before visiting us?

- ☐ Where do they go after?

- ☐ Is there anyone who passes by?

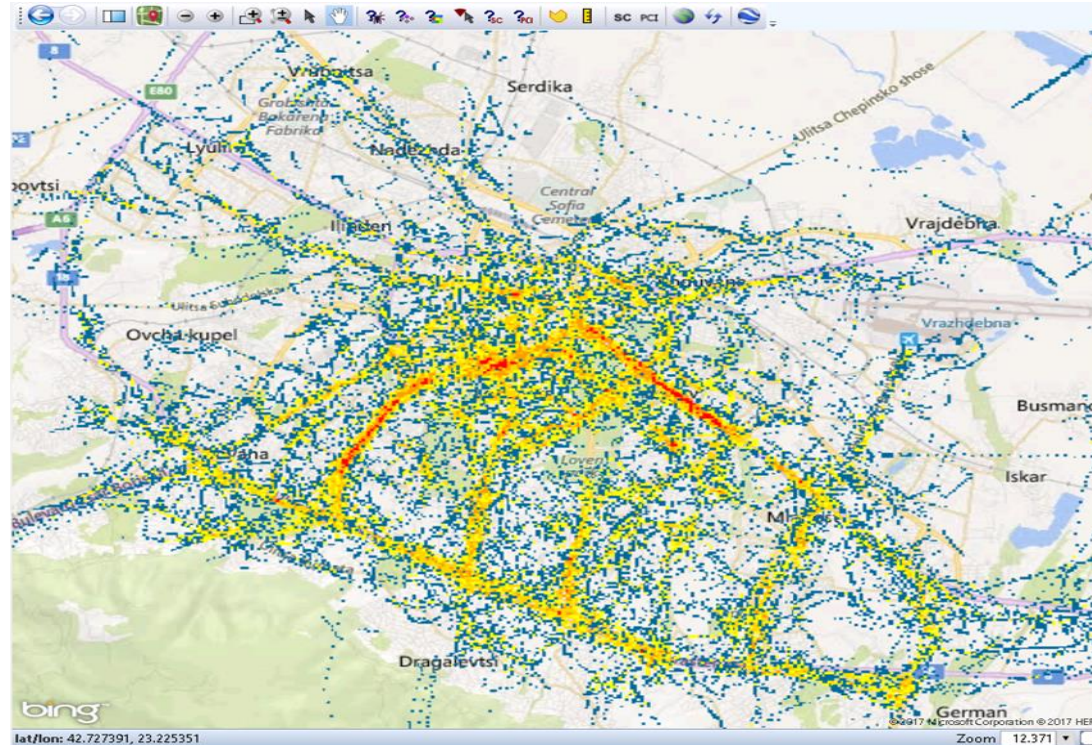- ☐ Are there any foreigners and from which country they are?

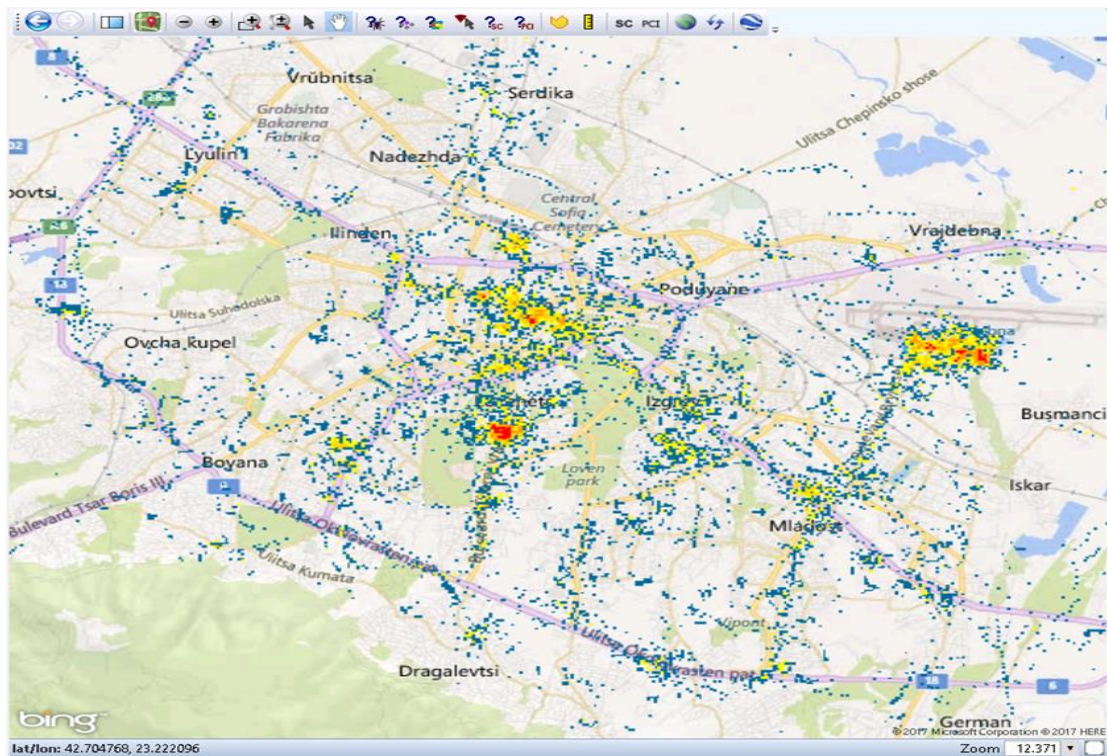# What is My Customer Distribution in Sofia between 07h – 09h?
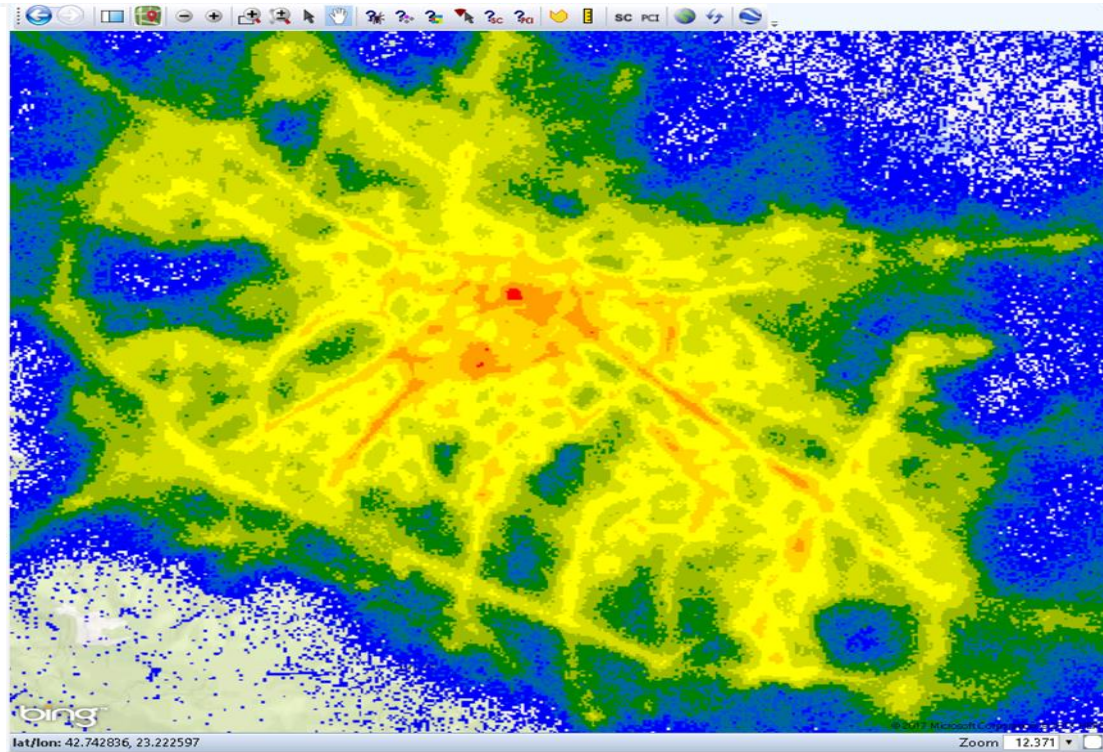
What is My Customer Distribution in Sofia between 14h – 16h?
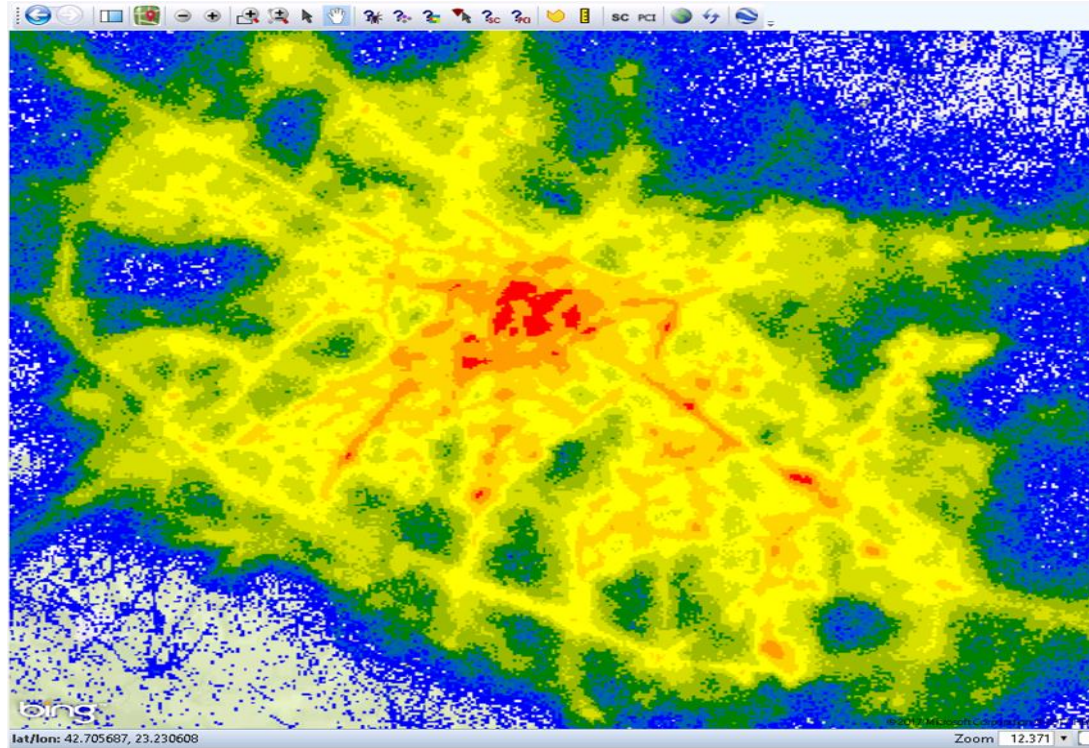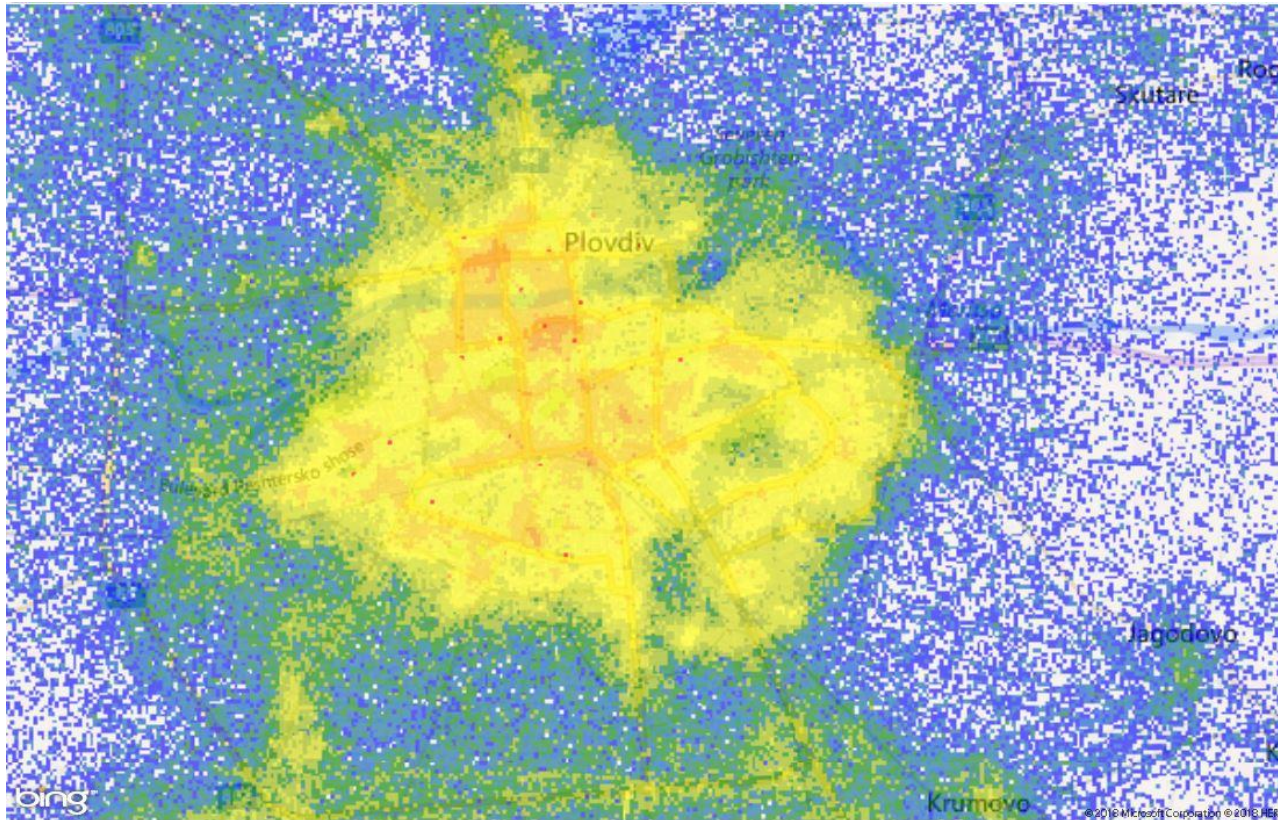
Where iPhones 7 pass by from 08h-09h

Which are the hot spots visited by foreigners in the morning

What is My Customer Distribution in Plovdiv between 07h – 09h?

What is My Customer Distribution in Plovdiv between 14h – 16h?

Market Drivers for 5G

Unlimited experience

>10 Gbps
peak data rates

100 Mbps
whenever needed

Early adaptors

10 000
x more traffic

Extreme Mobile Broadband

10-100
x more devices

5G

<1 ms
radio latency

M2M
ultra low cost

Massive machine communication

Critical machine communication

10 years
on battery

For everything

Instant action

Ultra reliability
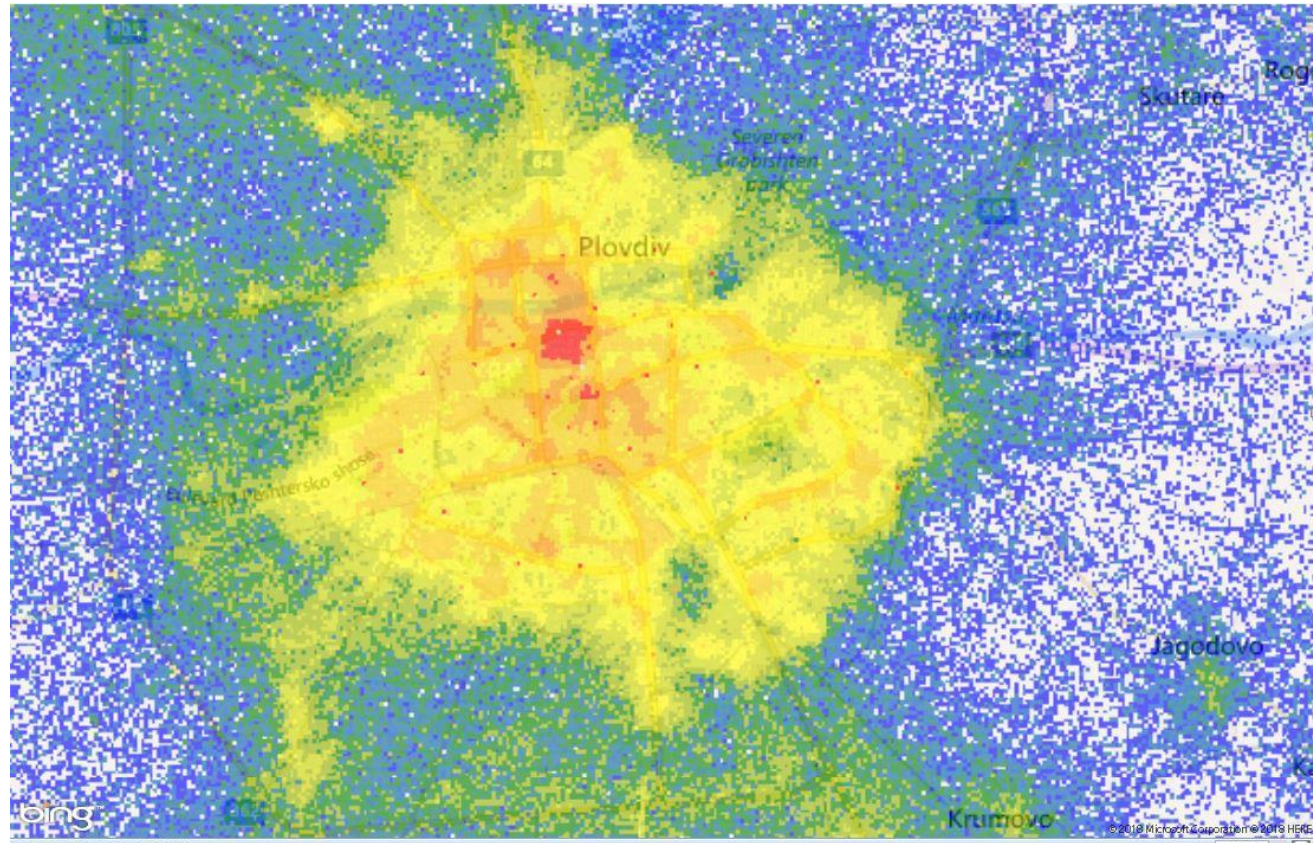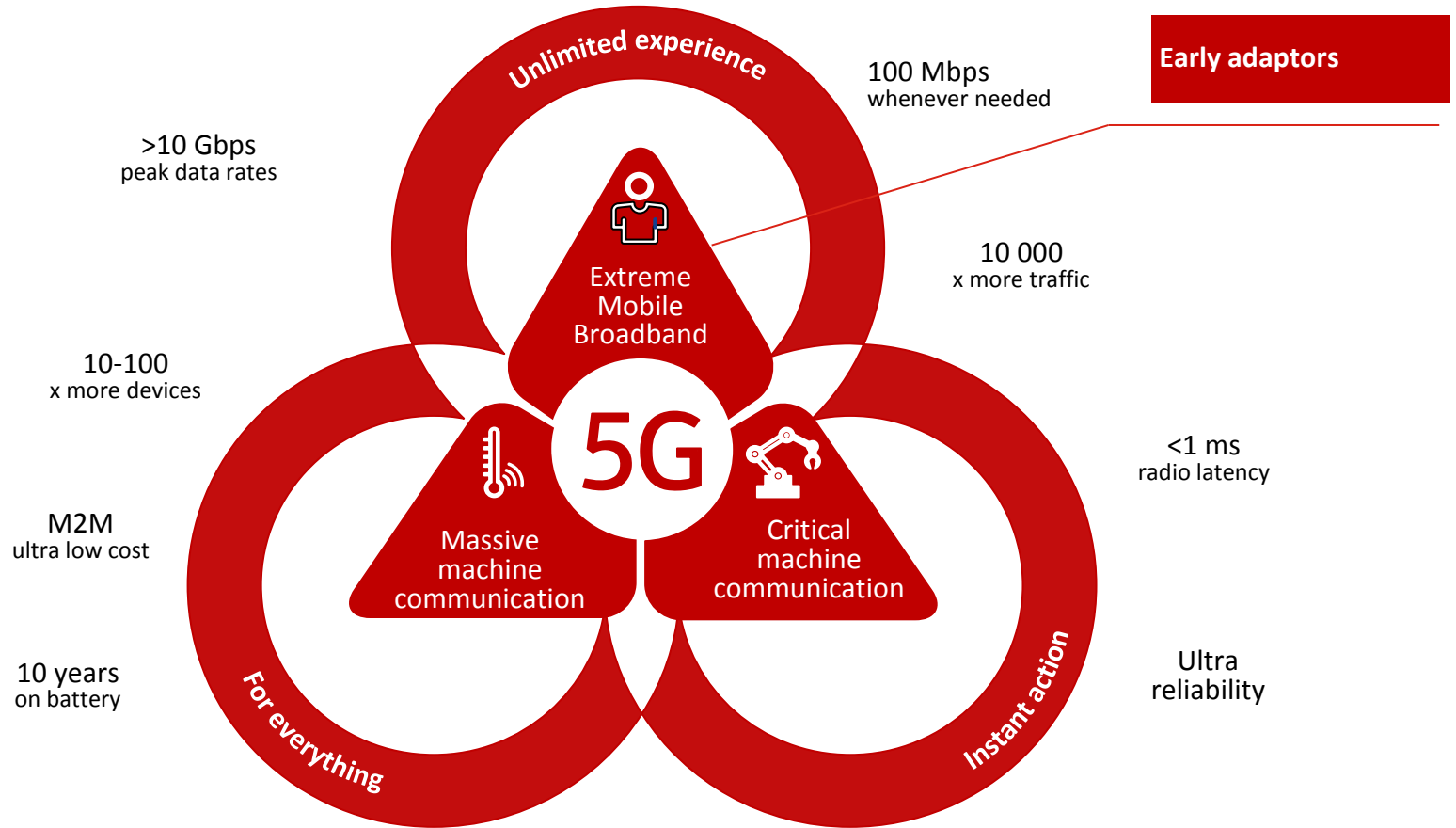
Main Streams for 5G Implementation

BROADBAND EXPERIENCE EVERYWHERE, ANYTIME

Broadband access in crowded areas, Broadband access in public transport, Event platform

SMART VEHICLES, TRANSPORT & INFRASTRUCTURE

Smart infrastructures, Connected bus-stops, Connected trucks, Connected cars

MEDIA EVERYWHERE

Live TV at scale, On-demand anything, Mobile for In-home TV, Accelerating emerging markets, Ultimate video quality anywhere – 4K, 8K, HDR, HFR
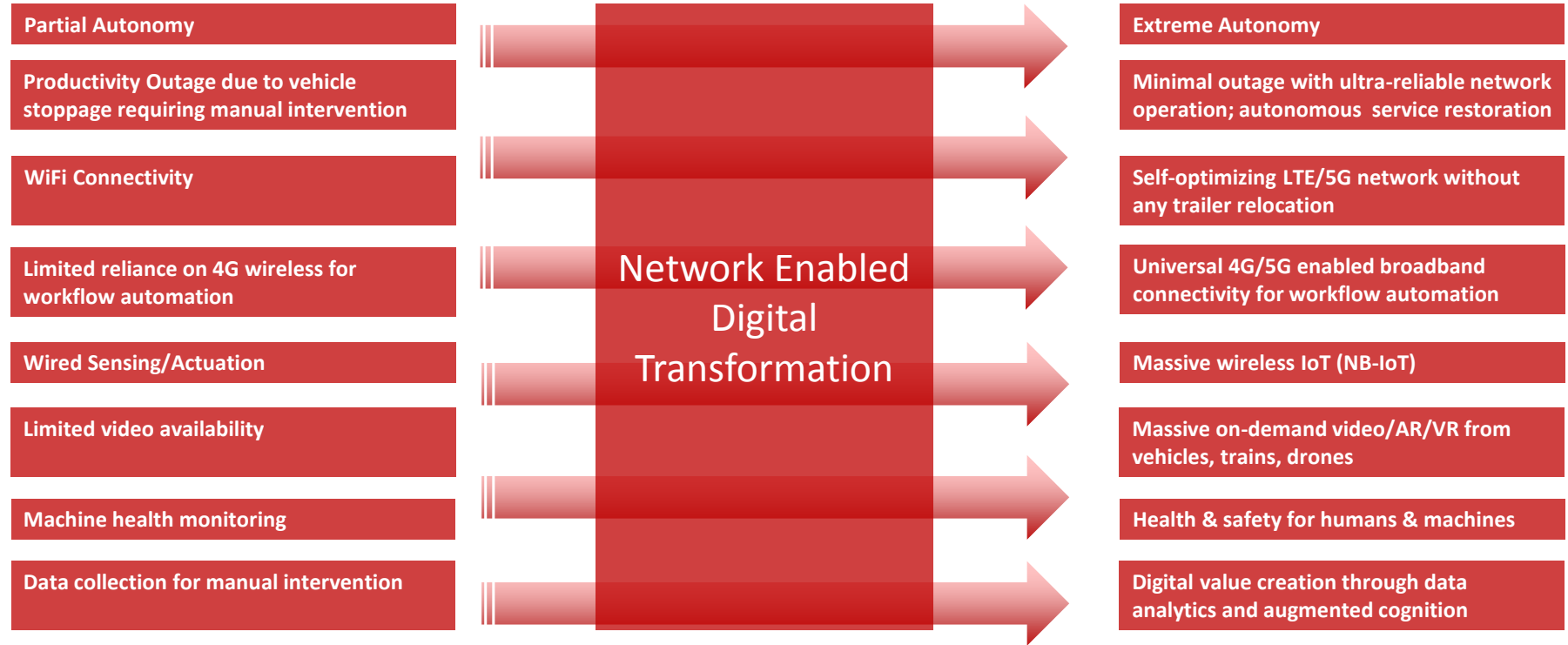
CRITICAL CONTROL OF REMOTE DEVICES

Remote control of heavy machineries, Factory automation, Real-time monitoring of plant / process conditions, Smart grids, Remote surgery

INTERACTION HUMAN-IOT

Immersive augmented reality, Immersive gaming, Surveillance Tactile internet, Smart biker-helmets, Smart houses, Child monitoring, Smart shipping

Main Streams for 5G Implementation

Partial Autonomy		Extreme Autonomy
Productivity Outage due to vehicle stoppage requiring manual intervention		Minimal outage with ultra-reliable network operation; autonomous service restoration
WiFi Connectivity		Self-optimizing LTE/5G network without any trailer relocation
Limited reliance on 4G wireless for workflow automation	**Network Enabled Digital Transformation**	Universal 4G/5G enabled broadband connectivity for workflow automation
Wired Sensing/Actuation		Massive wireless IoT (NB-IoT)
Limited video availability		Massive on-demand video/AR/VR from vehicles, trains, drones
Machine health monitoring		Health & safety for humans & machines
Data collection for manual intervention		Digital value creation through data analytics and augmented cognition

A1

Private Networks Enable Enterprise Transformation

Three innovative technologies that are key to the digital transformation

Broadband Mobility

Automation

Analytic & Cloud Computing
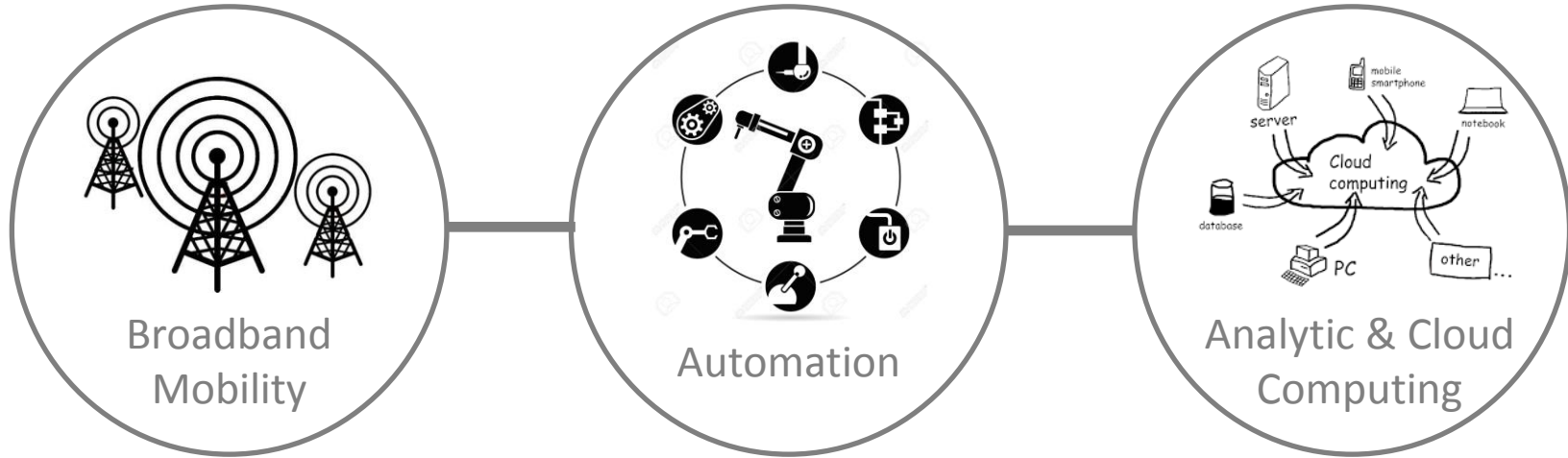
Energy Management

360° Video Surveillance

Health & Safety

Autonomous Driving

Geolocation

Eco-monitoring

Dispatch Systems

Predictive Analytics and Control

Customer Experience Management, Real Time analytics, end to end security and services