Advance AI/ML Training – Telecom Data Analytics

5 days Classroom training programme at - BRBRAITT, Jabalpur - BSNL

Trainer Profile – ISHAN MARWAH

Sales, GTM, Telecom Consultant & Accredited Trainer | 15+ Years of Global Experience

📍 Profile Summary

- Sales, GoTo Market Consultant – ex-QUALCOMM, ex-TEOCO
- Delivered **1150+ training man-days** across APAC, EMEA & North America for **Telcos, OEMs, and Vendors**.
- Expert in **5G / O-RAN / LTE / SON / NFV / SDN / Core Virtualization**.
- Skilled in simplifying complex telecom & AI concepts into structured, high-impact learning programs.
- Strong background in **RAN, OSS, Network Optimization, and Performance Management**.
- Expertise into **AI & ML for Telecom Data Analytics** (predictive modeling, BI dashboards, cloud ML).

📊 Training Portfolio

- **Telecom:** 5G | O-RAN | LTE | Small Cells | DAS | Wi-Fi | OSS/BSS | RF Planning & Optimization
- **AI/ML in Telecom:** Python | SQL | Data Wrangling | Predictive Analytics | BI Tools (PowerBI, Tableau) | Cloud ML (AWS, Azure, GCP)

🎓 Education & Certifications

- **AI Generalist Bootcamp**, Outskill (2024)
- **B.Tech – Electronics & Communication**, Kurukshetra University
- **Accredited LTE Professional**, Aircom International

WiFi Password

- WiFi Password:
  - SSID : 009_5G
  - PWD: brbraitt@12345

- Google Drive:

https://drive.google.com/drive/folders/1HtFS5PSHmnA7PbHFB86O9puc8zxrZYr_?usp=sharing


WHO WANTS TO BE A
TELECOM DATA ANALYST!!
WHY ?

Course Outline

- **Module 1** – Foundation Recap and Telecom Analytics Basics
  - Structured, semi-structured, and unstructured data in telecom with examples
  - Review SQL and Python basics for data collection and cleaning
  - Summarise ETL concepts and role of data pipelines in analytics
  - Visit Telecom predictive Models – Churn, telecom KPIs, and their role in decision making
  - Practical outcomes and use cases – MOPs

- **Module 2** – Advanced Data Engineering & Automation
  - Explain advanced ETL pipeline design and automation.
  - Role of data warehouses and data lakes in telecom
  - Introduce scalable data processing methods for large datasets.
  - Explain importance of data governance, privacy, and compliance
  - Practical outcomes and use cases

Course Outline

- **Module 3** – Advanced Machine Learning in Telecom
  - Differentiate supervised, unsupervised, and semi-supervised learning in ML
  - Explain clustering techniques for customer segmentation and fraud detection.
  - Describe hyperparameter tuning (GridSearch, RandomSearch).
  - Explain model validation methods.
  - Discuss real-world ML challenges in telecom datasets
  - Practical outcomes and use cases

- **Module 4** – Cloud Deployment, NLQ & Prescriptive Analytics
  - Explain deployment of ML models on cloud platforms
  - Describe Natural Language Query (NLQ) and its use in BI dashboards
  - Explain Natural Language Generation (NLG) for automated reporting.
  - Discuss prescriptive analytics for churn reduction, fraud detection, and network optimisation
  - Explain importance of real-time analytics in telecom operations
  - Practical outcomes and use cases

Course Outline

- **Module 5** –Capstone Project & Use cases
  - Summarise advanced data workflows
  - Discuss industry best practices for deployment and monitoring
  - Define role of Senior Data Analyst and career pathways
  - Practical outcomes and use cases

Day 1 to 5 – 13th Oct (Monday) to 17th Oct (Friday)

Period	Plan
1000-1015	Start – Revision of previous day
1015-1130	Daily Agenda
1130-1145	**Coffee / Tea Break**
1145-1330	Daily Agenda
1330-1430	**Lunch**
1430-1600	Daily Agenda
1600-1615	**Coffee / Tea Break**
1615- 1800	Daily Agenda

JOURNEY & OUTCOME

Understand the complete telecom data analytics lifecycle — from data collection and cleaning to visualization, prediction, and decision-making.

Use industry tools such as SQL, Python, PowerBI and cloud ML platforms to build and deploy analytical solutions for solving Telecom problems.

Apply AI/ML models (regression, classification, clustering) for telecom use cases like churn prediction, fraud detection, and network optimization.

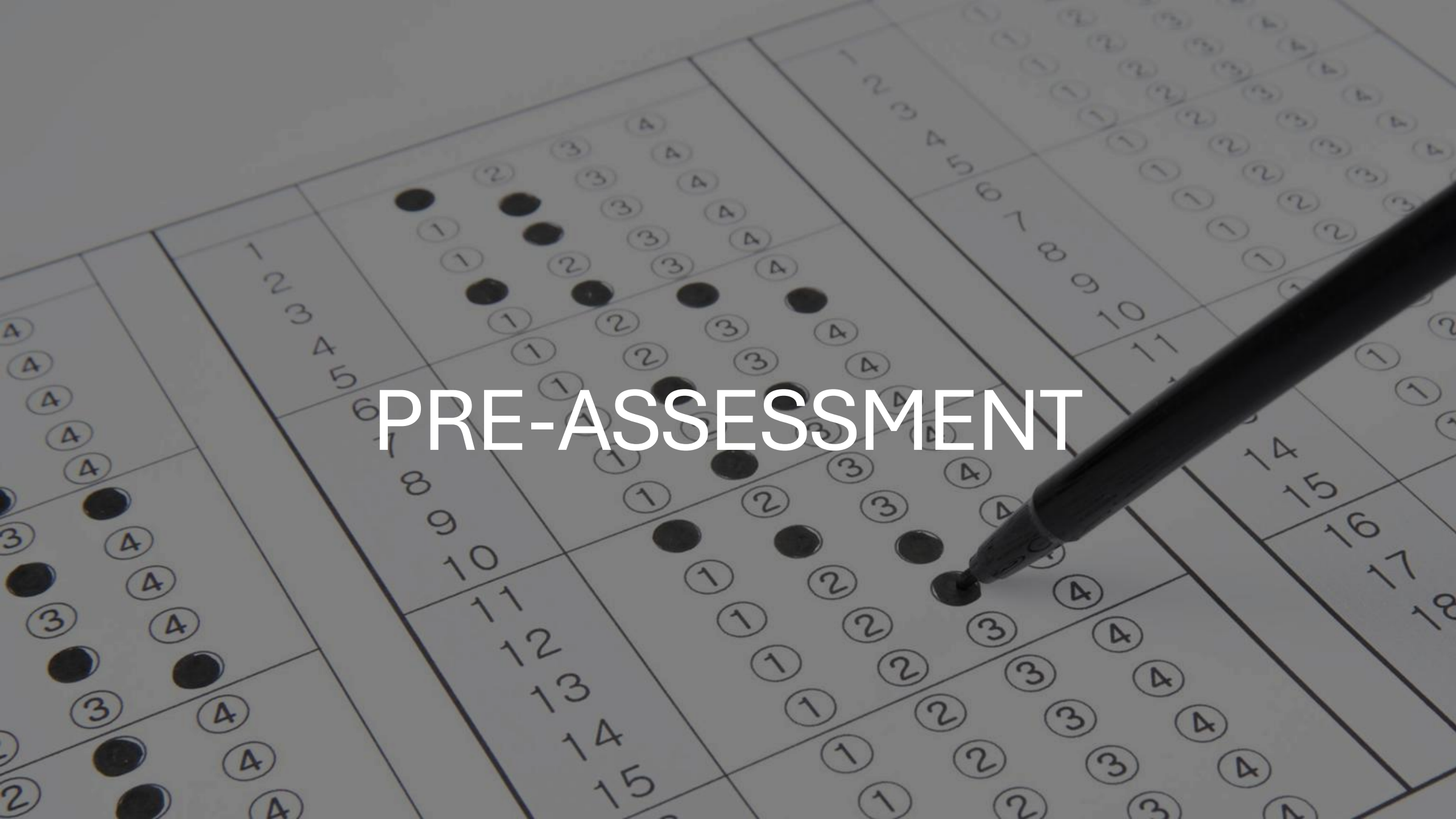
Design automated ETL pipelines and handle large-scale data efficiently and securely.

Create dashboards and prescriptive reports that translate technical insights into clear business recommendations.

Demonstrate readiness for roles such as Telecom Data Analyst, Data Engineer, or ML Associate, capable of supporting real-world telecom analytics and AI projects.

Pre-requisites

S.No	Software	Downlink link	Comments
1	MySql Workbench	https://dev.mysql.com/downloads/installer/	Database layer
2	CSV Editor (Excel/Notepad++)	MS excel or Notepad++ should be available	
3	Anaconda (incl. Python + Juypter notebook)	https://www.anaconda.com/download	Python envirnoment (data & ML libraries will be installed during the classroom)
4	PowerBI Desktop	https://powerbi.microsoft.com/desktop	Visualization
5	Web Browser	Edge / Chrome	Web browsing


PRE-ASSESSMENT

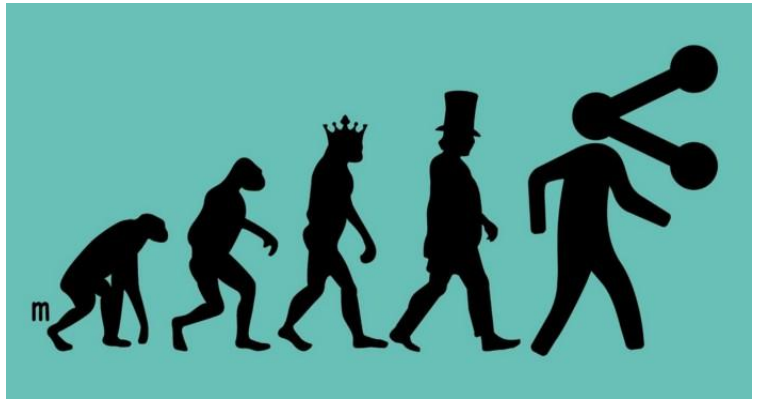
TELECOM & 5G Overview

BONUS SESSION

DIGITAL LANDSCAPE

Let’s talk about Digital Disruption

What Is Digital Disruption?
Digital disruption is a transformation that is caused by emerging digital technologies and business models. These innovative new technologies and models can impact the value of existing products and services offered in the industry.

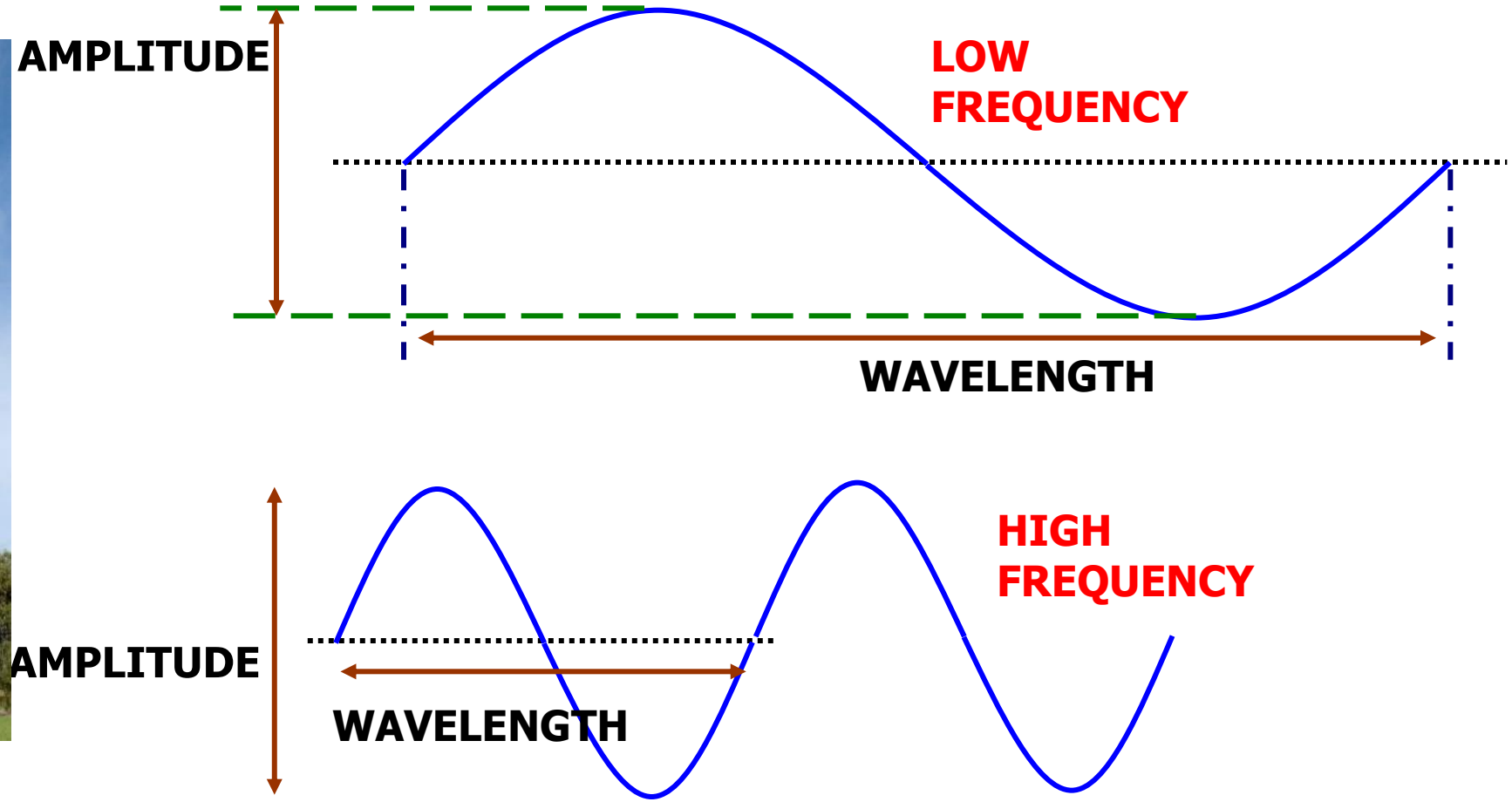


Digital Disruption – ***Happened***, is Happening and is bound to Accelerate

Digital Disruption – ***Happened***, is Happening and is bound to Accelerate

1994 2014 **2024**

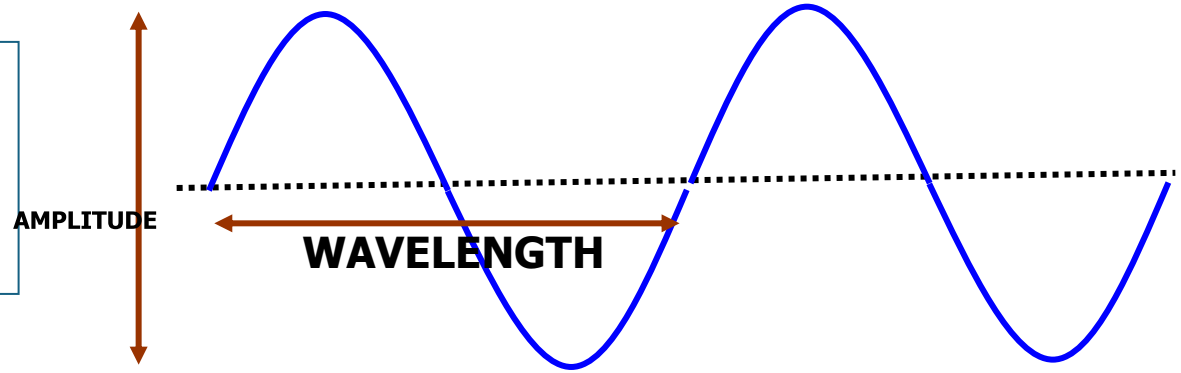
CONNECTIVITY - Frequency and Wavelength

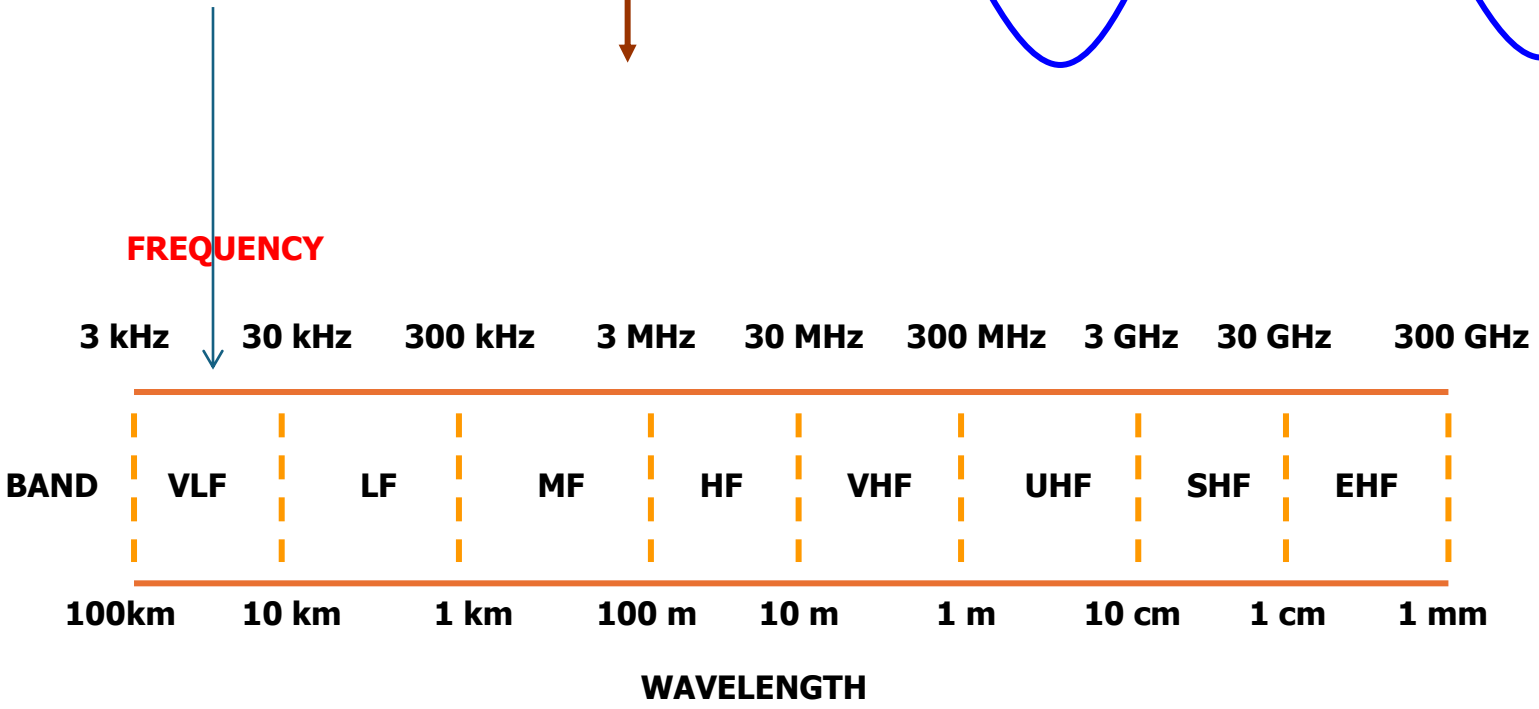


Wavelength decreases and frequency increases

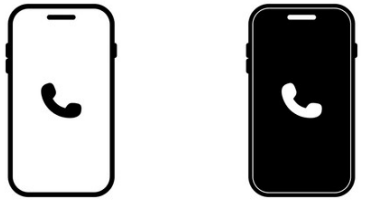
CONNECTIVITY - The Radio Spectrum

20 Hz to about 20 kHz, are frequencies that might be considered in the audio range





Backhaul



shutterstock.com · 2475905531

Mobile Handsets

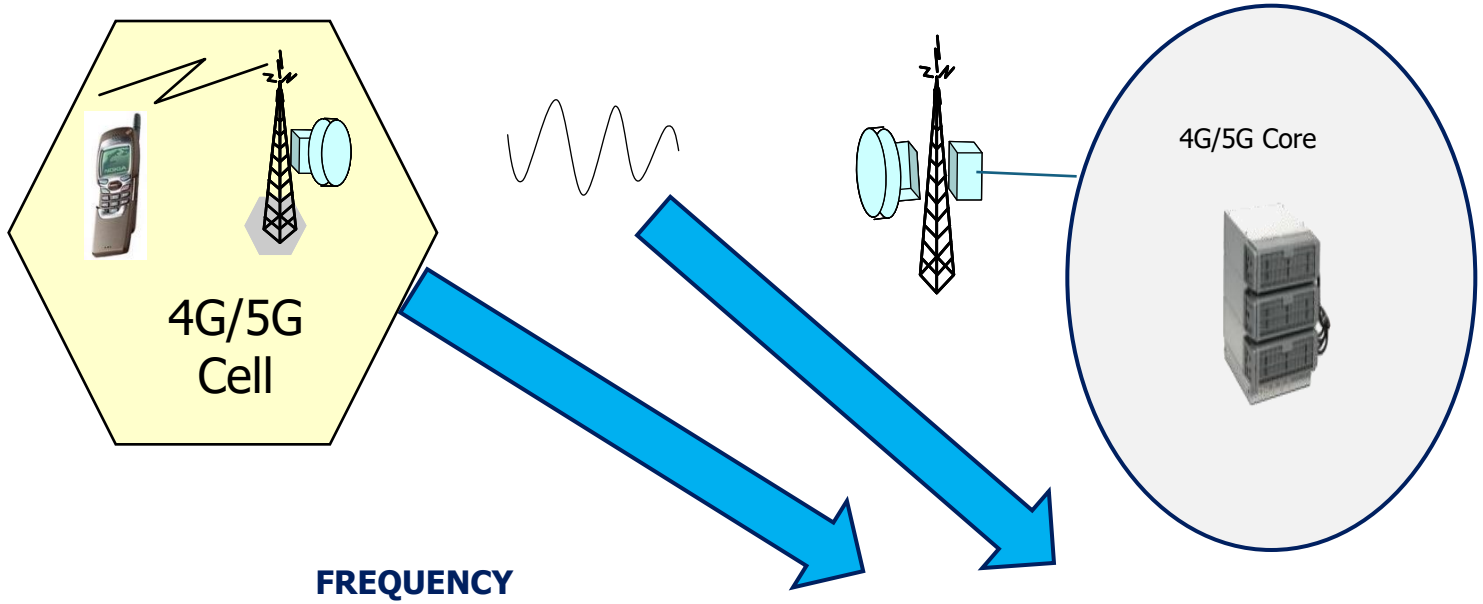
Uses microwave "backhauls" to the core network or it can be E2E fiber

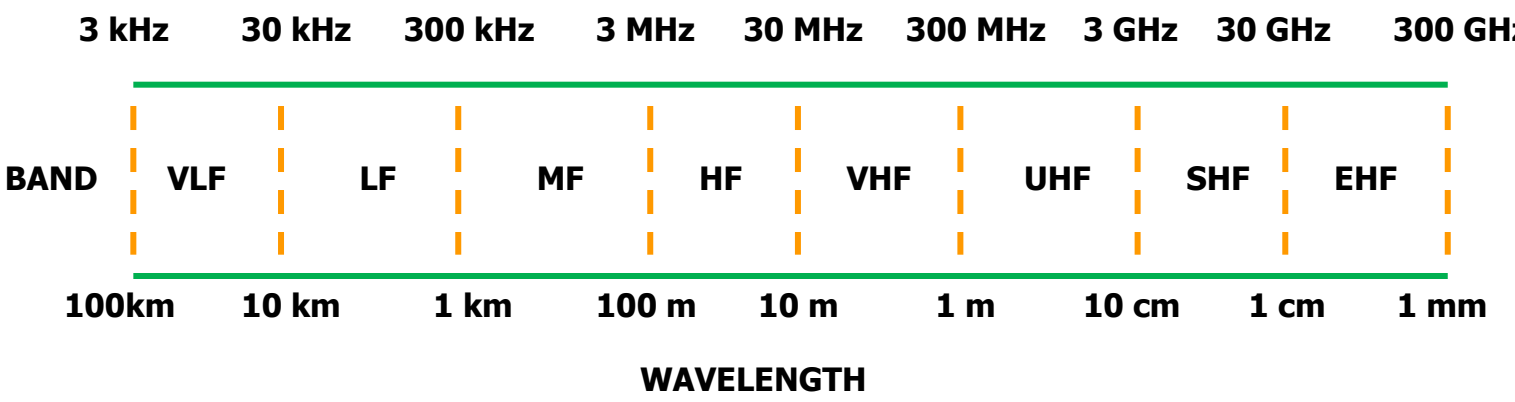
FREQUENCY

3 kHz	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz	3 GHz	30 GHz	300 GHz
BAND	VLF	LF	MF	HF	VHF	UHF	SHF	EHF
100km	10 km	1 km	100 m	10 m	1 m	10 cm	1 cm	1 mm

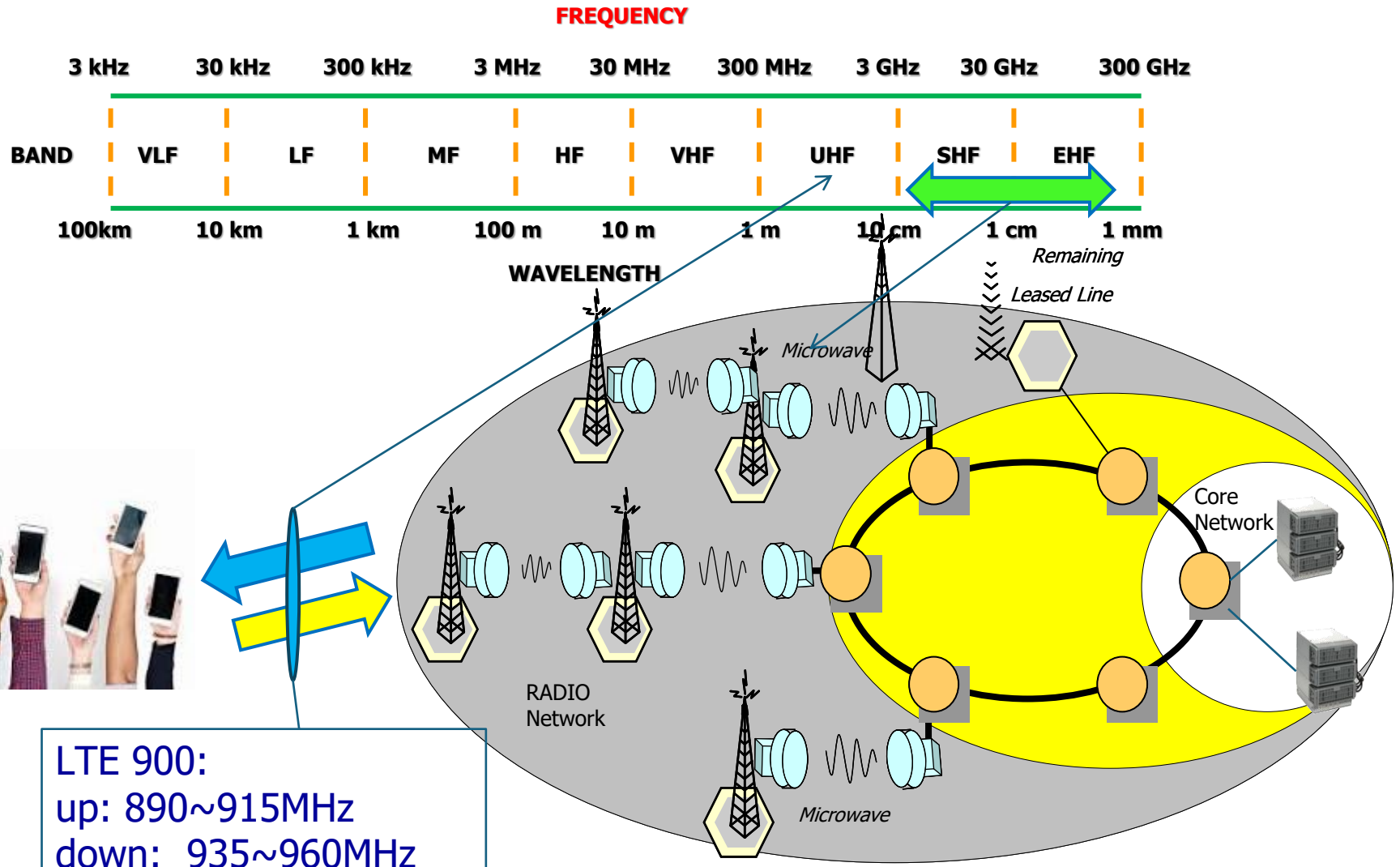
WAVELENGTH

Wireless - RF & Backhaul





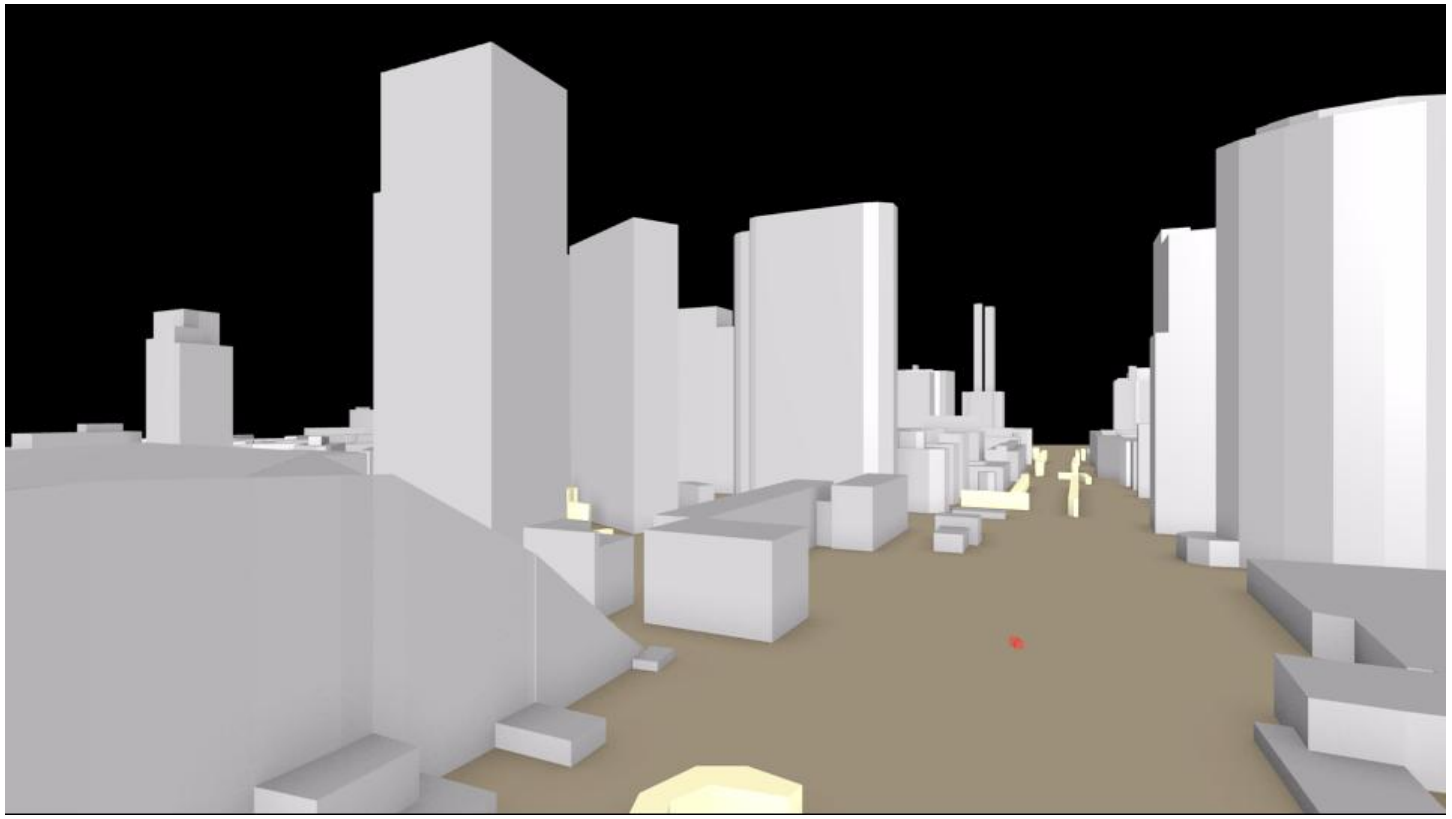
Radio Access Network



LTE 900:
up: 890~915MHz
down: 935~960MHz

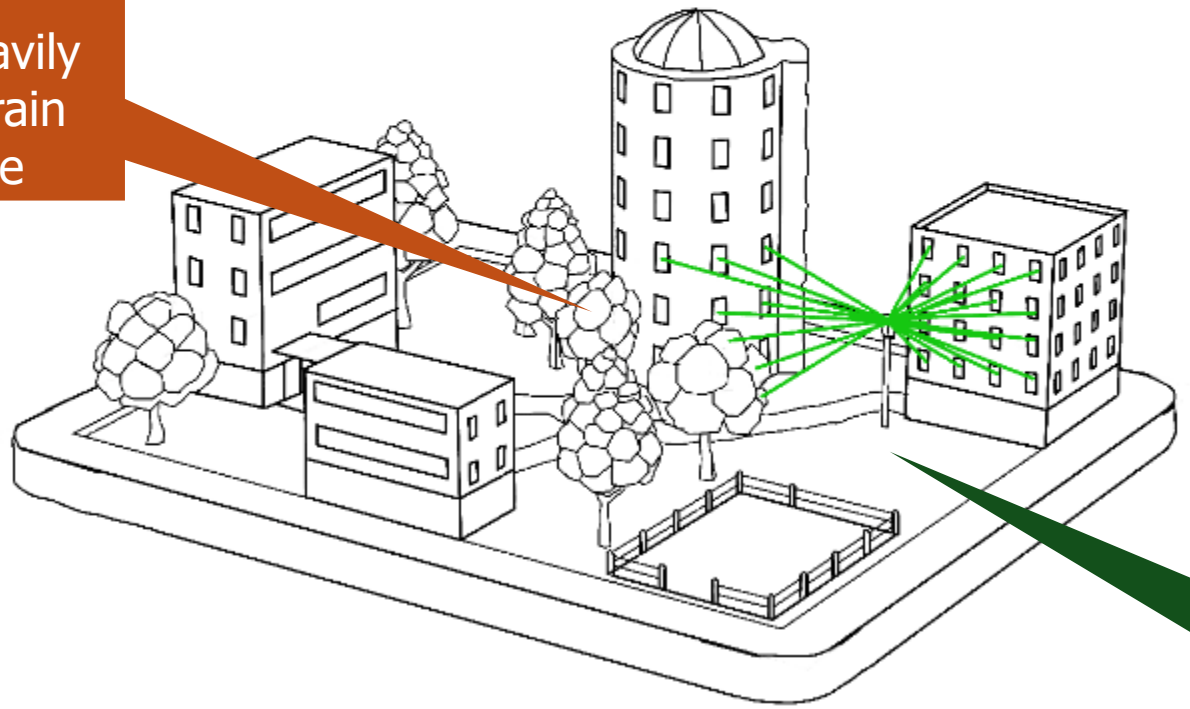
ANTENNA TRANSMIT

- What is seen is the direct signal being transmitted and leaving the antenna in every direction at the same time, effectively taking the shape of a sphere that grows with time.
- As the sphere passes through the camera, the camera is turned back to reveal the great Arch and the sphere reaching it.

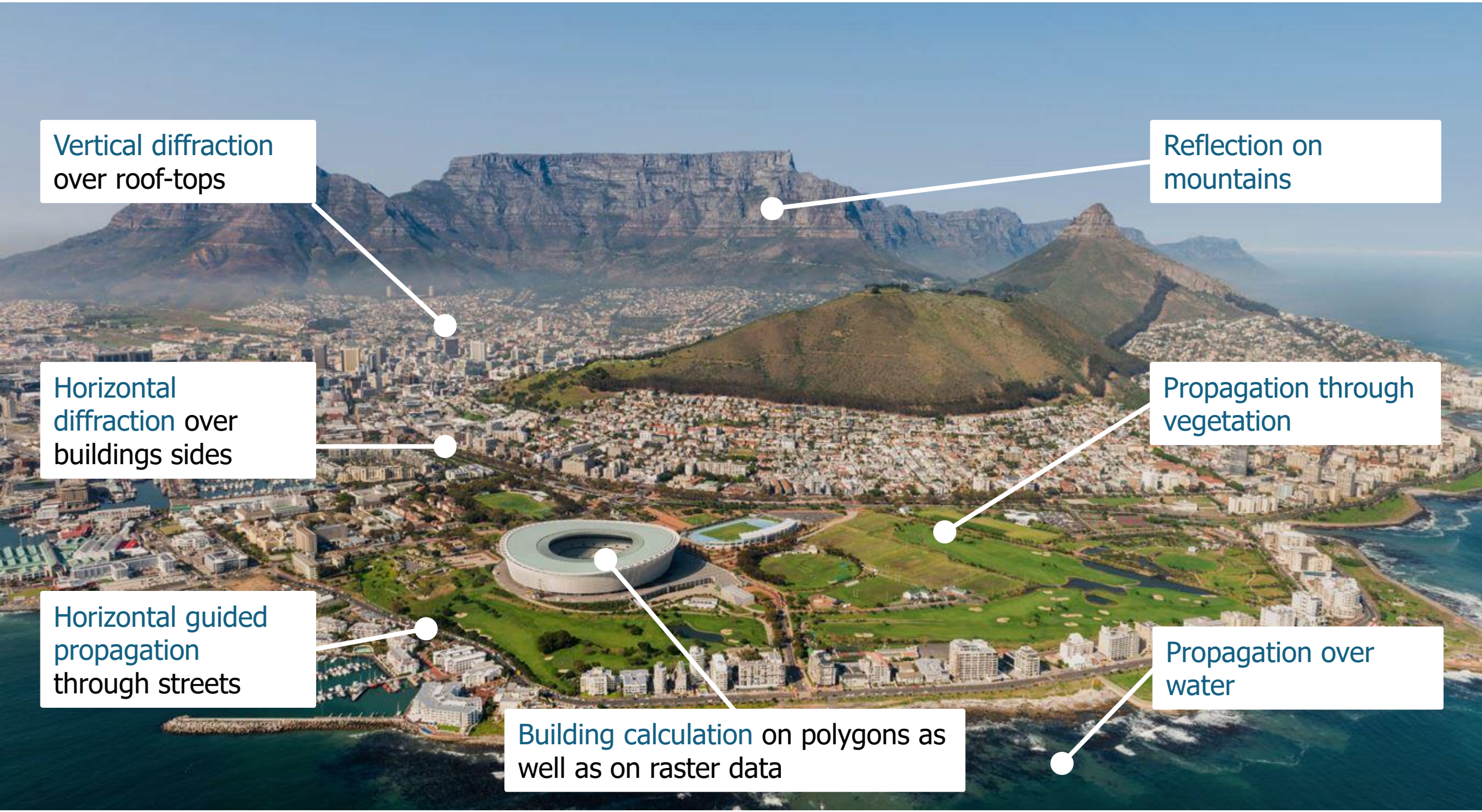


WIRELESS Signal Propagation

Signal is attenuated heavily by buildings, rain and moisture



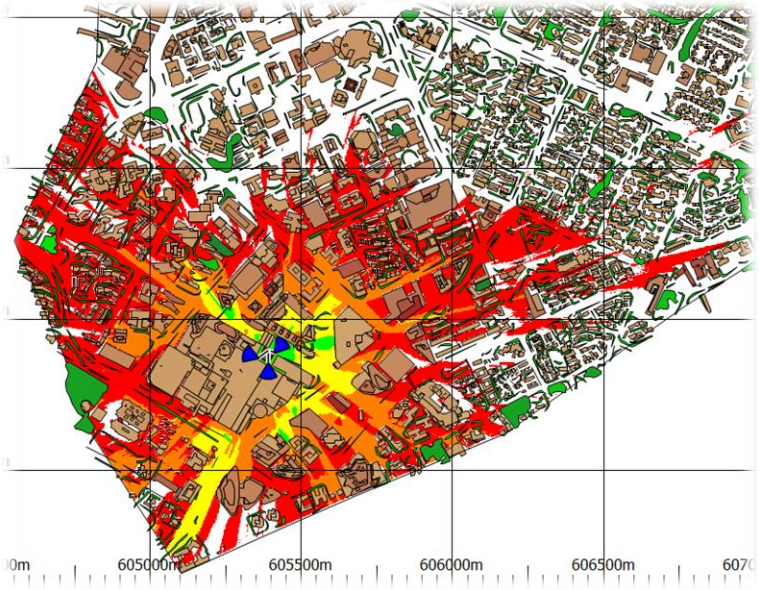
Line of Sight (LoS) between transmitter and receiver is critical


Vertical diffraction over roof-tops
Reflection on mountains
Horizontal diffraction over buildings sides
Propagation through vegetation
Horizontal guided propagation through streets
Propagation over water
Building calculation on polygons as well as on raster data

5G Coverage – 700 Mhz vs 3.5 GHz

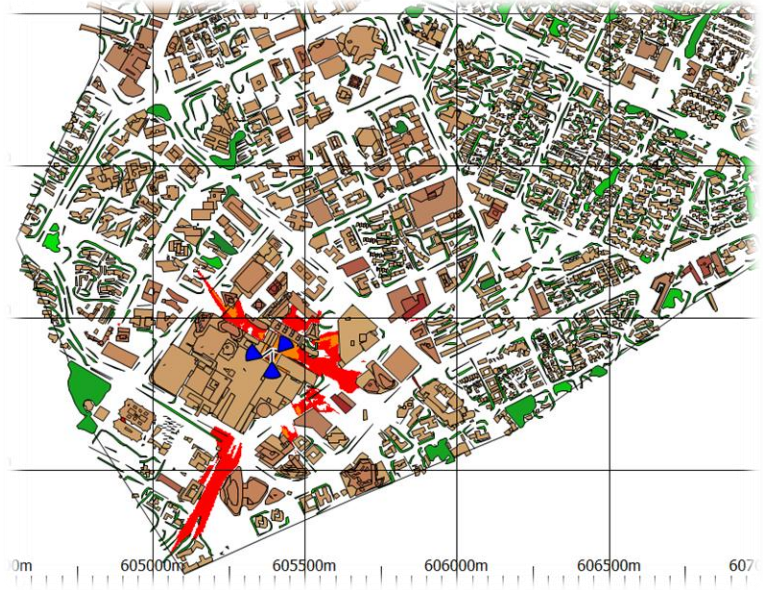
- Outdoor coverage plot 700 MHz (low band) vs 3.5 GHz (mid band)

700 MHz

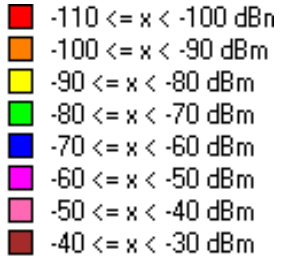


Total 2D View area (km²):	7.261
Covered area(km²):	1.065
Covered area(%):	14.669%

3.5 GHz



Total 2D View area (km²):	7.261
Covered area(km²):	0.070
Covered area(%):	0.961%



~15 times lower foot print in terms of covered area using 28 GHz band!

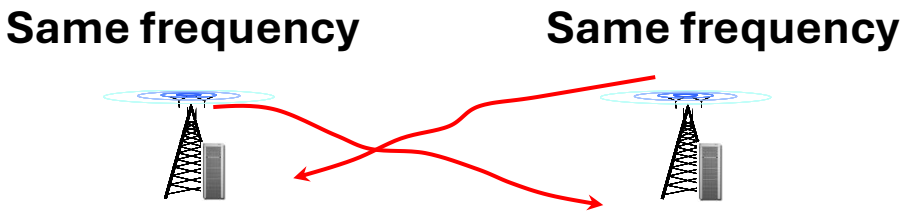
* mmWave 30 GHz to 300 GHz => wavelength 10 mm –to 1 mm

Interference

Interference in cellular networks is one of the most common problems in the radio access network (RAN).

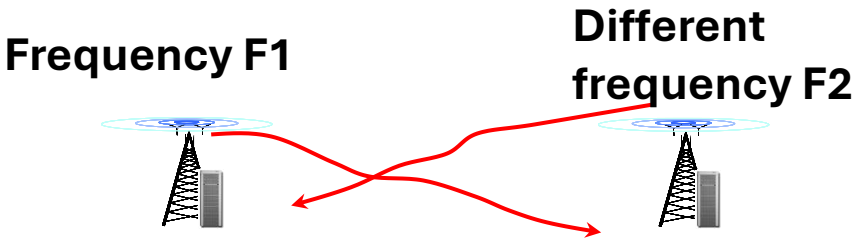
What is Interference?

Anything at the same frequency at the same time



High interference between the cells

To reduce levels of Interference we have more frequencies. Frequency Planning



High interference between the cells

What is 5G ?

Evolution of cellular technologies ~ 10 years

Mobile voice communication

1G

1980s

Analog voice

AMPS, NMT, TACS

Efficient voice to reach billions

2G

1990s

Digital voice

D-AMPS, GSM, IS-95 (CDMA)

Focus shifts to mobile data

3G

2000s

Wireless Internet

CDMA2000/EV-DO WCDMA/HSPA+,

Mobile broadband and emerging expansion

4G

2010s

Mobile broadband

LTE, LTE Advanced, Gigabit LTE

A unified future-proof platform

2020s

Wireless Edge

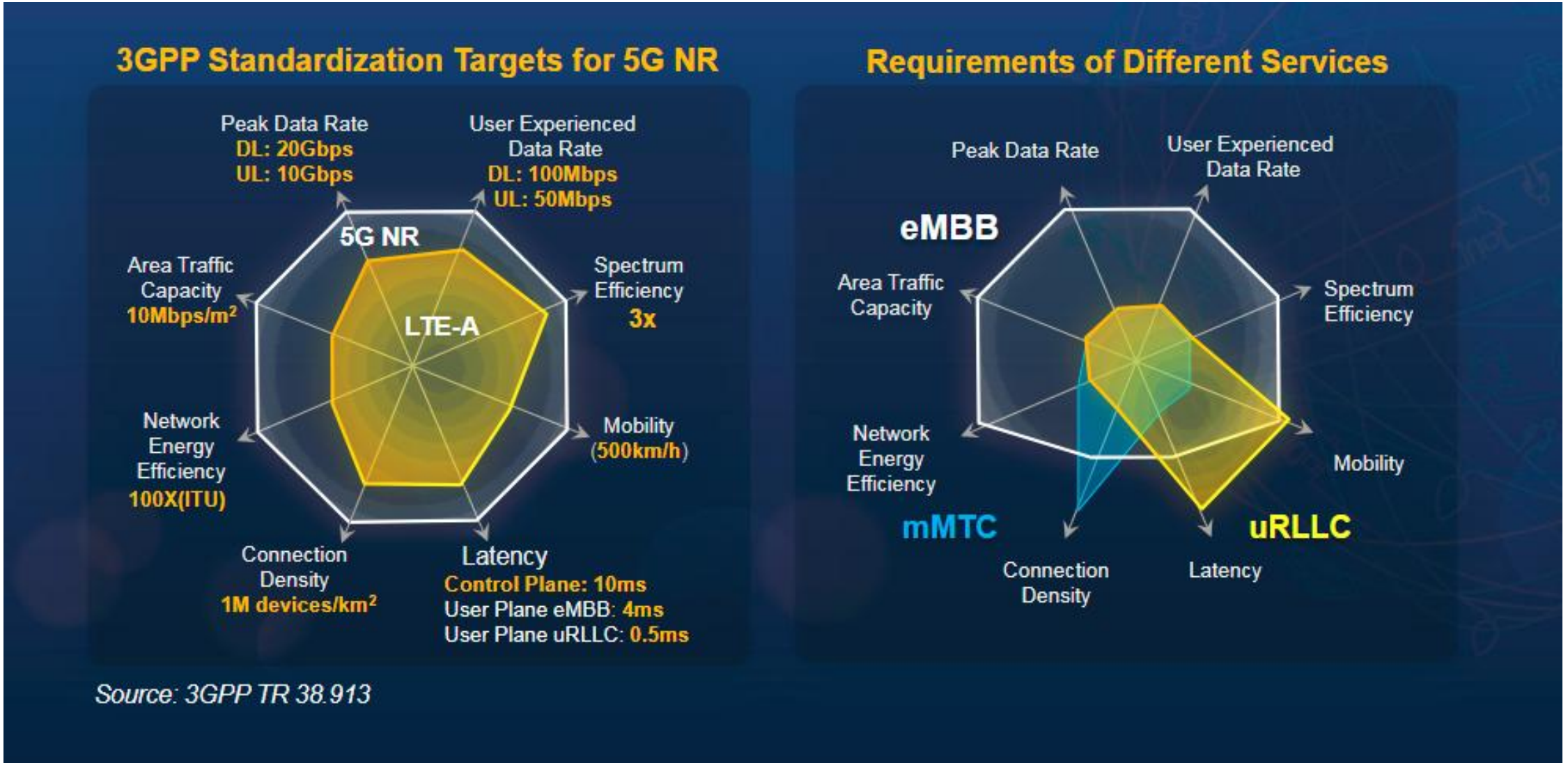
5G New Radio (NR)

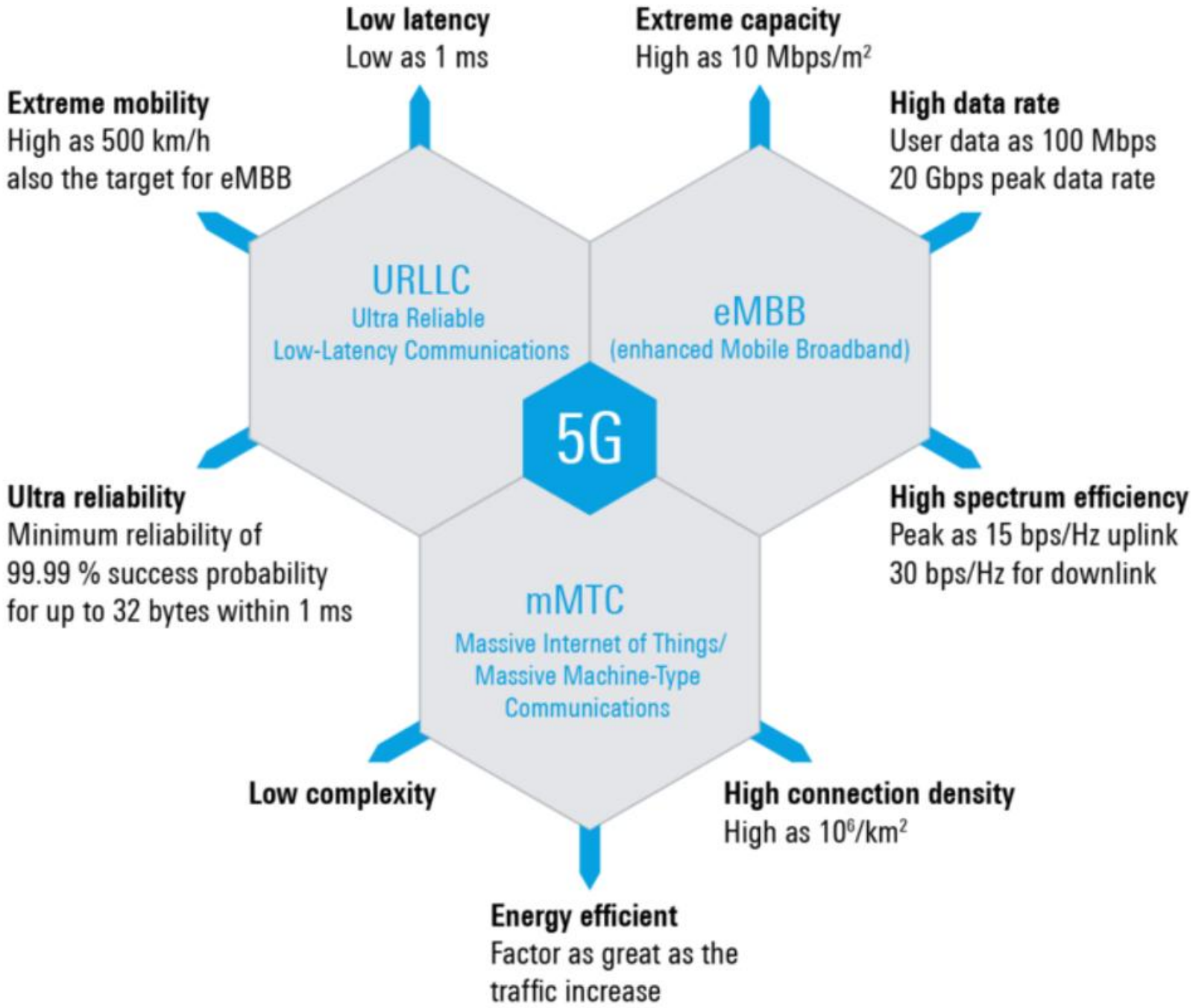
Its fundamental shift in thinking and 5G aims to make it possible. Revolutionary & Evolutionary mix bag

IT & Telecom in true sense merging to create digital society

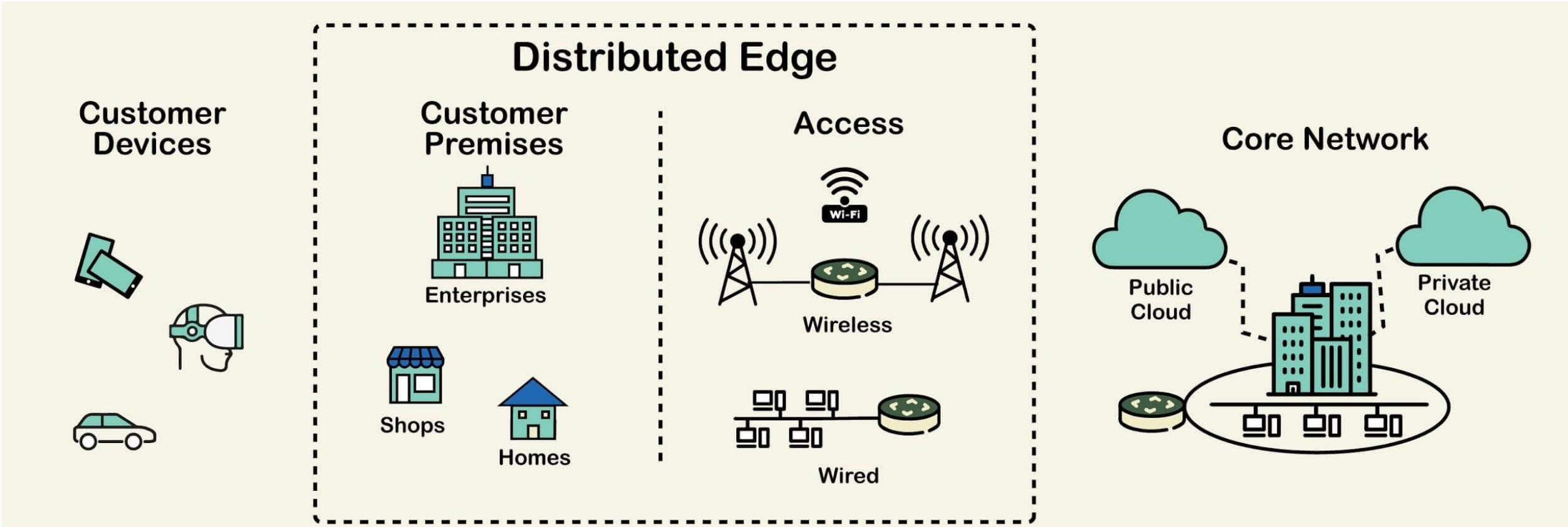
Courtesy - Qualcomm

IMT2020 Vision and 3GPP Interpretation




Low latency
Low as 1 ms
Extreme capacity
High as 10 Mbps/m²
Extreme mobility
High as 500 km/h
also the target for eMBB
High data rate
User data as 100 Mbps
20 Gbps peak data rate
URLLC
Ultra Reliable
Low-Latency Communications
eMBB
(enhanced Mobile Broadband)
5G
Ultra reliability
Minimum reliability of
99.99 % success probability
for up to 32 bytes within 1 ms
High spectrum efficiency
Peak as 15 bps/Hz uplink
30 bps/Hz for downlink
mMTC
Massive Internet of Things/
Massive Machine-Type
Communications
Low complexity
High connection density
High as 10⁶/km²
Energy efficient
Factor as great as the
traffic increase

High Level Network Architecture



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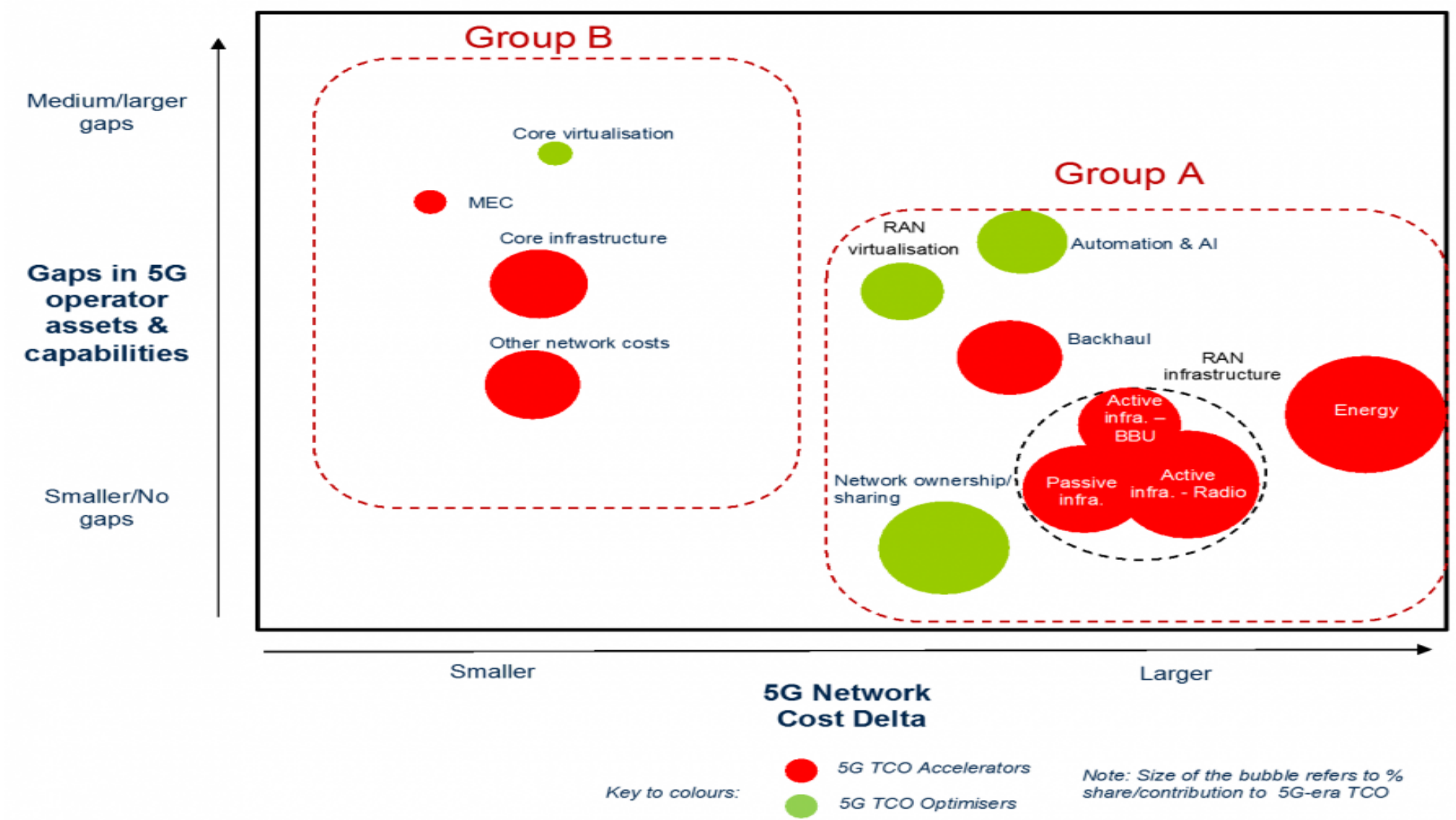
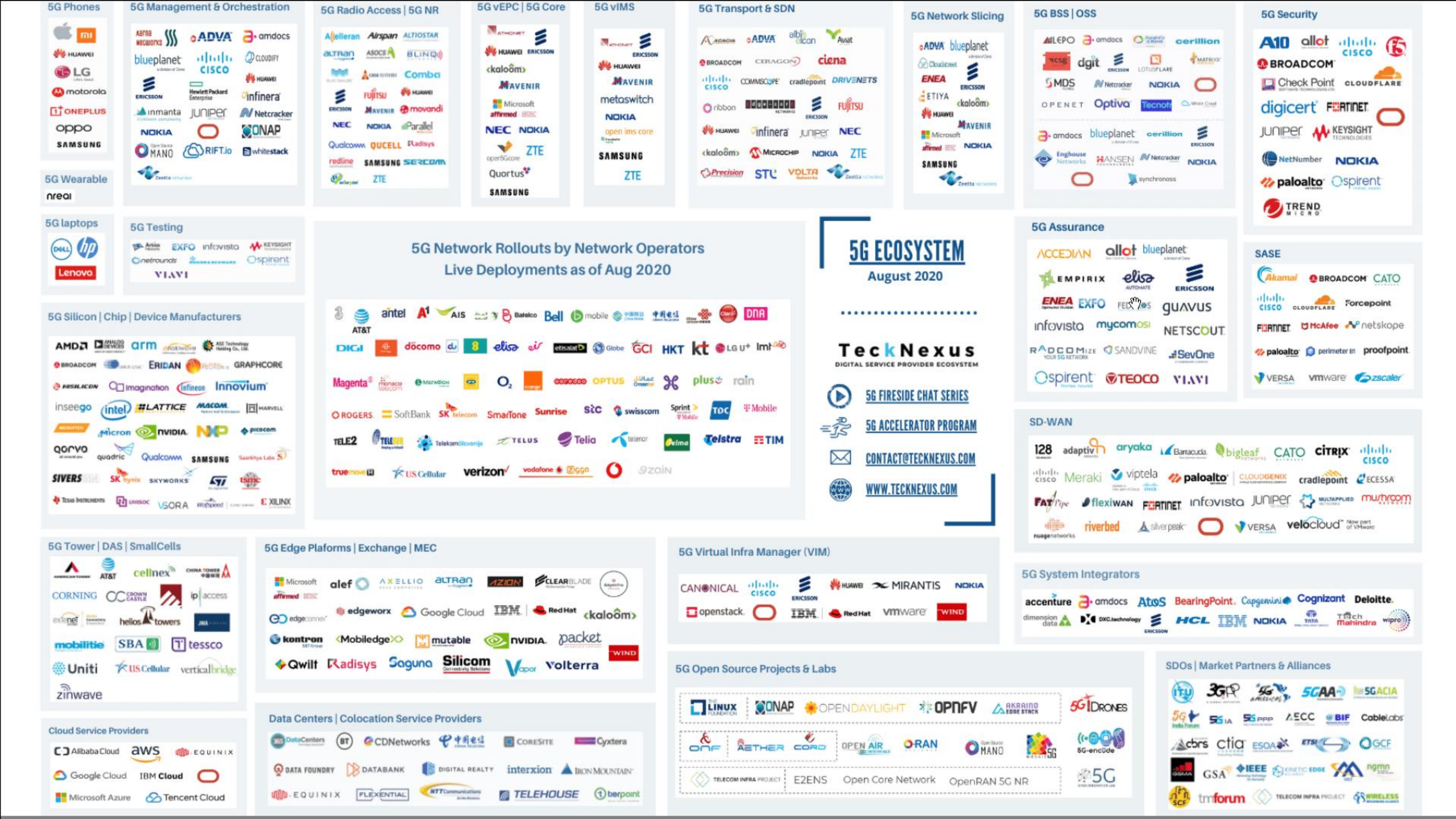
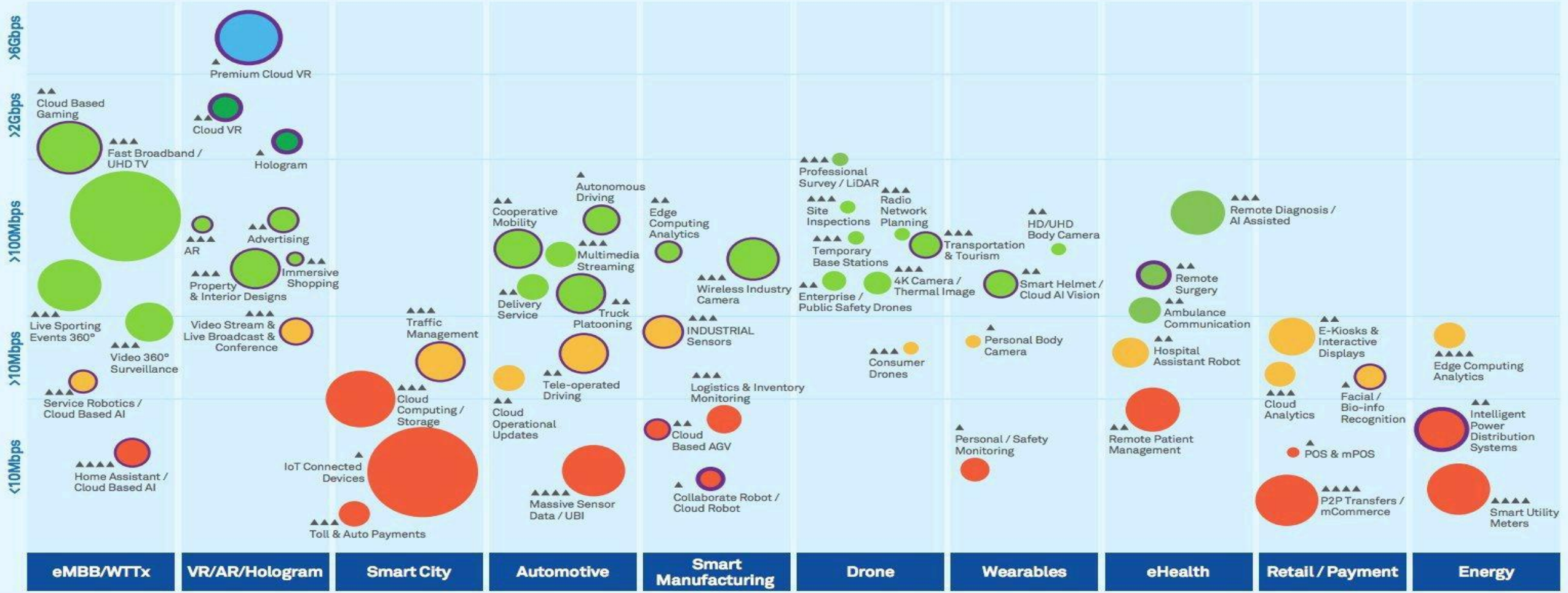
5G Deployment cost




5G Phones
5G Management & Orchestration
5G Radio Access | 5G NR
5G vEPC | 5G Core
5G vIMS
5G Transport & SDN
5G Network Slicing
5G BSS | OSS
5G Security
5G Wearable
5G laptops
5G Testing
5G Network Rollouts by Network Operators
Live Deployments as of Aug 2020
5G ECOSYSTEM
August 2020
TeckNexus
DIGITAL SERVICE PROVIDER ECOSYSTEM
5G FIRESIDE CHAT SERIES
5G ACCELERATOR PROGRAM
CONTACT@TECKNEXUS.COM
WWW.TECKNEXUS.COM
5G Assurance
SASE
5G Silicon | Chip | Device Manufacturers
SD-WAN
5G Tower | DAS | SmallCells
5G Edge Plaforms | Exchange | MEC
5G Virtual Infra Manager (VIM)
5G System Integrators
Cloud Service Providers
Data Centers | Colocation Service Providers
5G Open Source Projects & Labs
SDOs | Market Partners & Alliances

5G Applications Market Potential & Readiness Matrix

Connectivity & Value Added Services Opportunity



Index Definitions

2020 Readiness for 5G Index

1. Prototype ▲
2. Early Adopter ▲▲
3. Price Reduction ▲▲▲
4. Feature Enhanced ▲▲▲▲
5. Mature Application ▲▲▲▲▲

2025 Market Potential Index

$ < 5 Billion → $ 125+ billion

Latency Requirement Index

- Low latency required (<50 ms)
- Very low latency (<10 ms)

Bandwidth Requirement Index

- Low: <10 Mbps
- 11 to 99 Mbps
- Med: 100M to 1Gbps
- 2 to 5 Gbps
- High: 6 to 10 Gbps

NEOM نيوم

COGNITIVE CITIES IN NEOM

Creating a system that understands you and adapts to your changing needs anywhere in NEOM.

CONNECT

Build the foundations: 5G, Fiber, wireless solutions

COMPUTE

Access and process data: cloud, edge computing

CONTEXTUALIZE

Utilize data where and when it's needed: IoT and data storage

5G HIGHLIGHTS

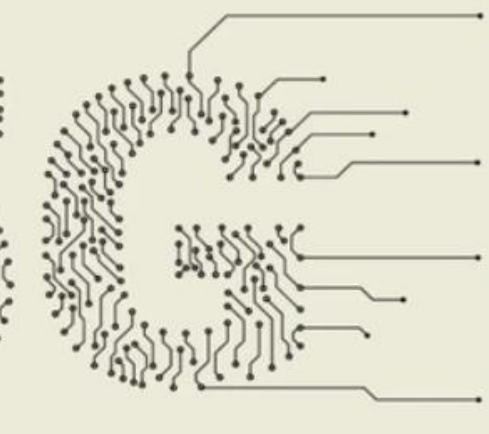
Higher
Than 10x (4G)

Latest
Technology

Faster
Than 4G by 10x

More
Reliable than any technology

Less
Power usage



NEOM WITH 5G

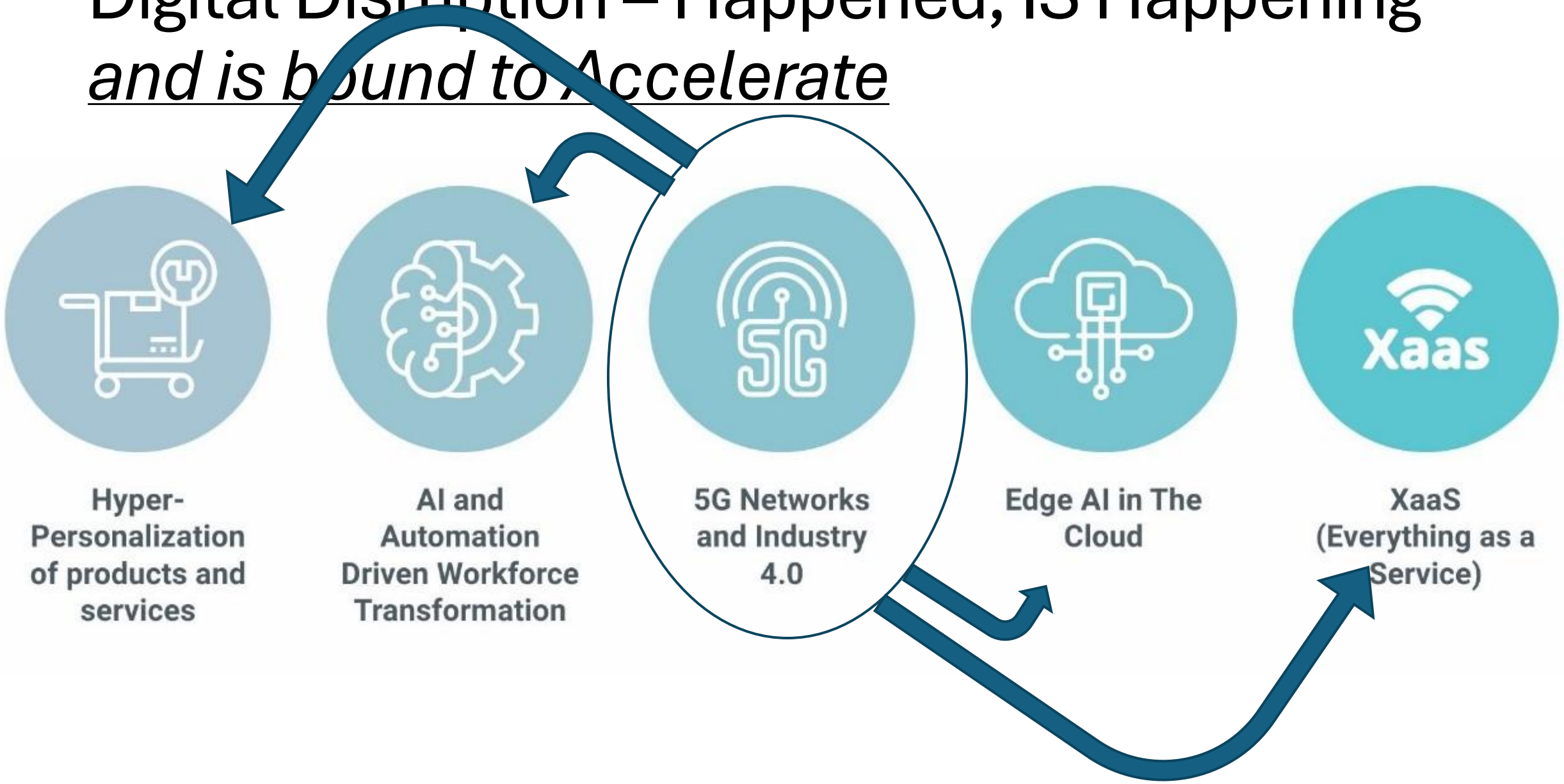
Digital Air
Covering and benefiting all NEOM residents

Connectivity
Everyone and everything is connected

Cognitive Cities
Predictive NOT reactive

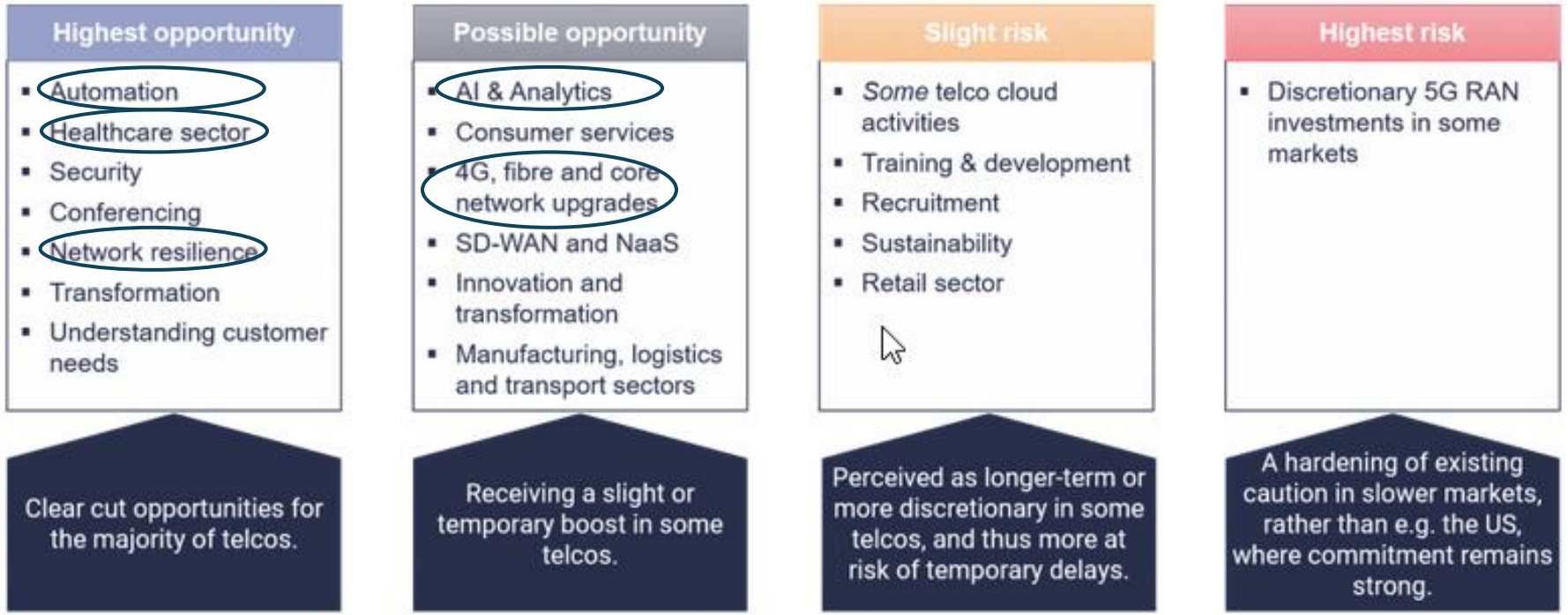
Today's Future
Applying future technology today

Digital Disruption – Happened, IS Happening *and is bound to Accelerate*



Digital Disruption

A relative view of how respondents perceived the outlook for telcos in different business areas and verticals



Thank YOU

By ISHAN MARWAH - +91 97178 56777 - Ishan Marwah | LinkedIn