

Collage of Engineering
Communication and Computer
Engineering



Fifth Generation (5G) Mobile network Advantage & Disadvantage

by : Adil Hussain Mohammed

Introduction

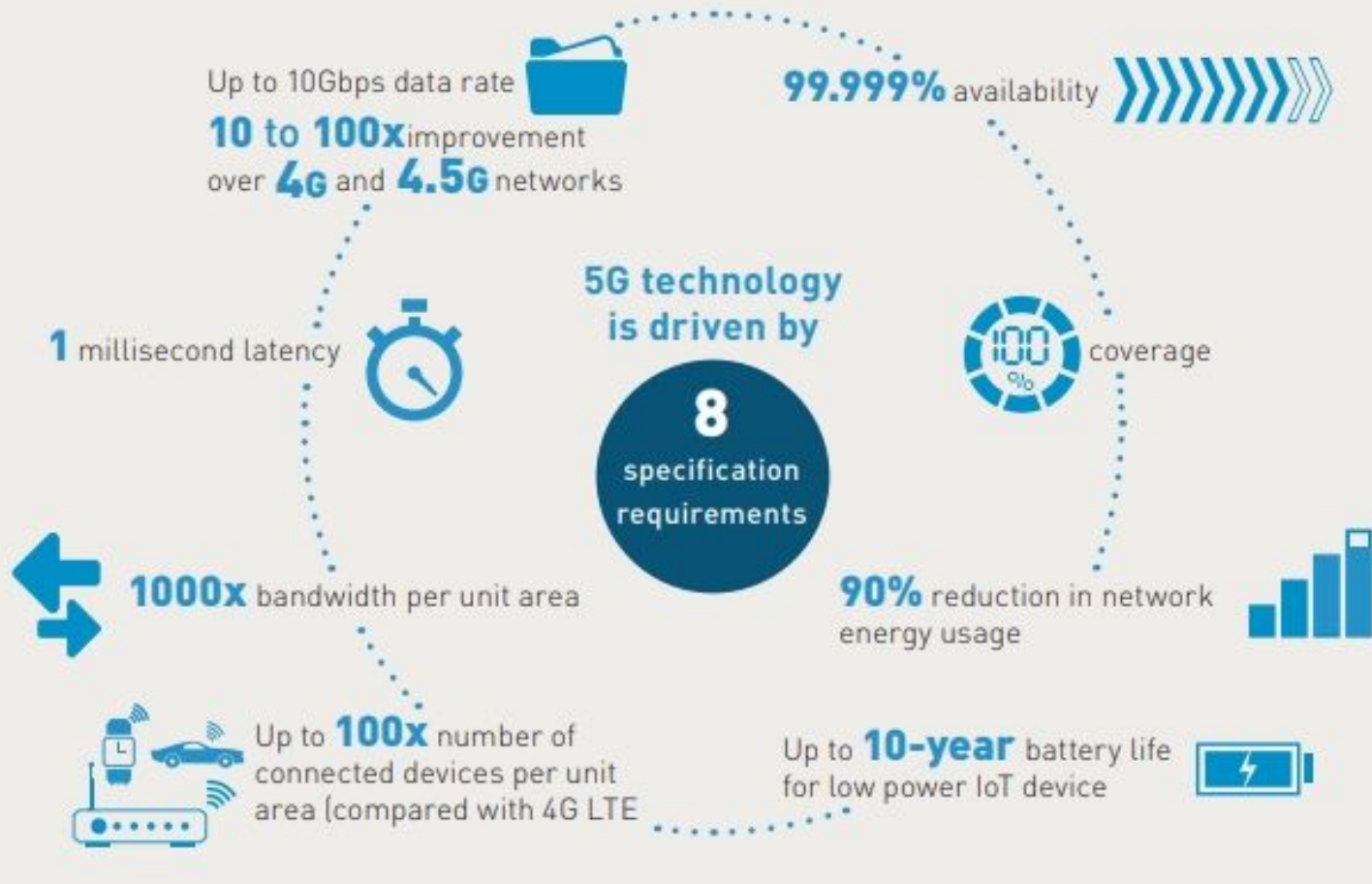
The fifth generation of telecommunications technologies, 5G, is fundamental to achieving a European gigabit society by 2025.

The aim to cover all urban areas, railways and major roads with uninterrupted fifth generation wireless communication can only be achieved by creating a very dense network of antennas and transmitters. In other words, the number of higher frequency base stations and other devices will increase significantly.





 **IOT**
SOLUTIONS
WORLD CONGRESS





1G

1ST GENERATION *wireless network*

- Basic voice service
- Analog-based protocols



2G

2ND GENERATION *wireless network*

- Designed for voice
- Improved coverage and capacity
- First digital standards (GSM, CDMA)



3G

3RD GENERATION *wireless network*

- Designed for voice with some data consideration (multimedia, text, internet)
- First mobile broadband



4G

4TH GENERATION *wireless network*

- Designed primarily for data
- IP-based protocols (LTE)
- True mobile broadband



THE NEED FOR SPEED *in kilobits per second*

2.4 *kbps*

64 *kbps*

2,000 *kbps*

100,000 *kbps*

Electromagnetic Spectrum



AM



FM TV



Radar



TV Remote



Light Bulb



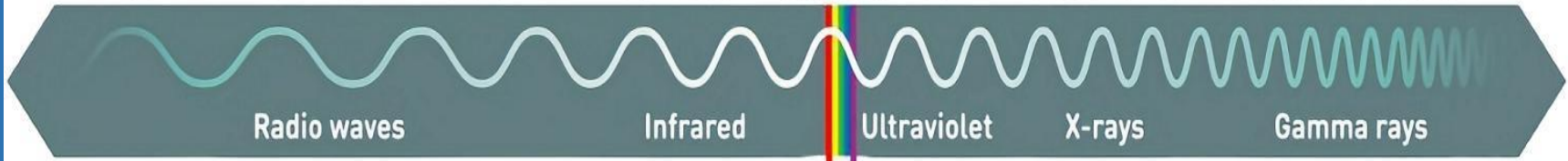
Sun



X-ray machine



Radioactive Elements



Radio waves

Infrared

Ultraviolet

X-rays

Gamma rays

100m

1m

1cm

0.01cm

1000nm

10nm

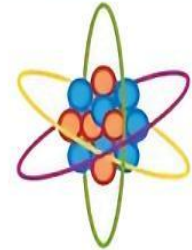
0.01nm

0.0001nm



Building Size

VISIBLE SPECTRUM



Atom Size

Common Radio Bands for Wi-Fi and Mobile

Wi-Fi = 2.4GHz, 5GHz, 6GHz

Mobile (2G – 5G) = 700MHz, 800MHz, 900MHz, 1800MHz, 2.1GHz, 2.3GHz, 2.6GHz, 3-4GHz

NOTE: 5G mostly uses the same bands as existing UK mobile networks above, although in the future it may harness **24-26GHz** or higher (aka – millimeter Waves [mmW]).

The Landscape of 5G

5G will differentiate itself by delivering various improvements:



Decrease in latency:

Delivering latency as low as 1 ms.



Connection density:

Enabling more efficient signaling
for IoT connectivity.



Experienced throughput:

Bringing more uniform, multi-Gbps
peak rates.



Spectrum efficiency:

Achieving even more bits per Hz with
advanced antenna techniques.



Traffic capacity:

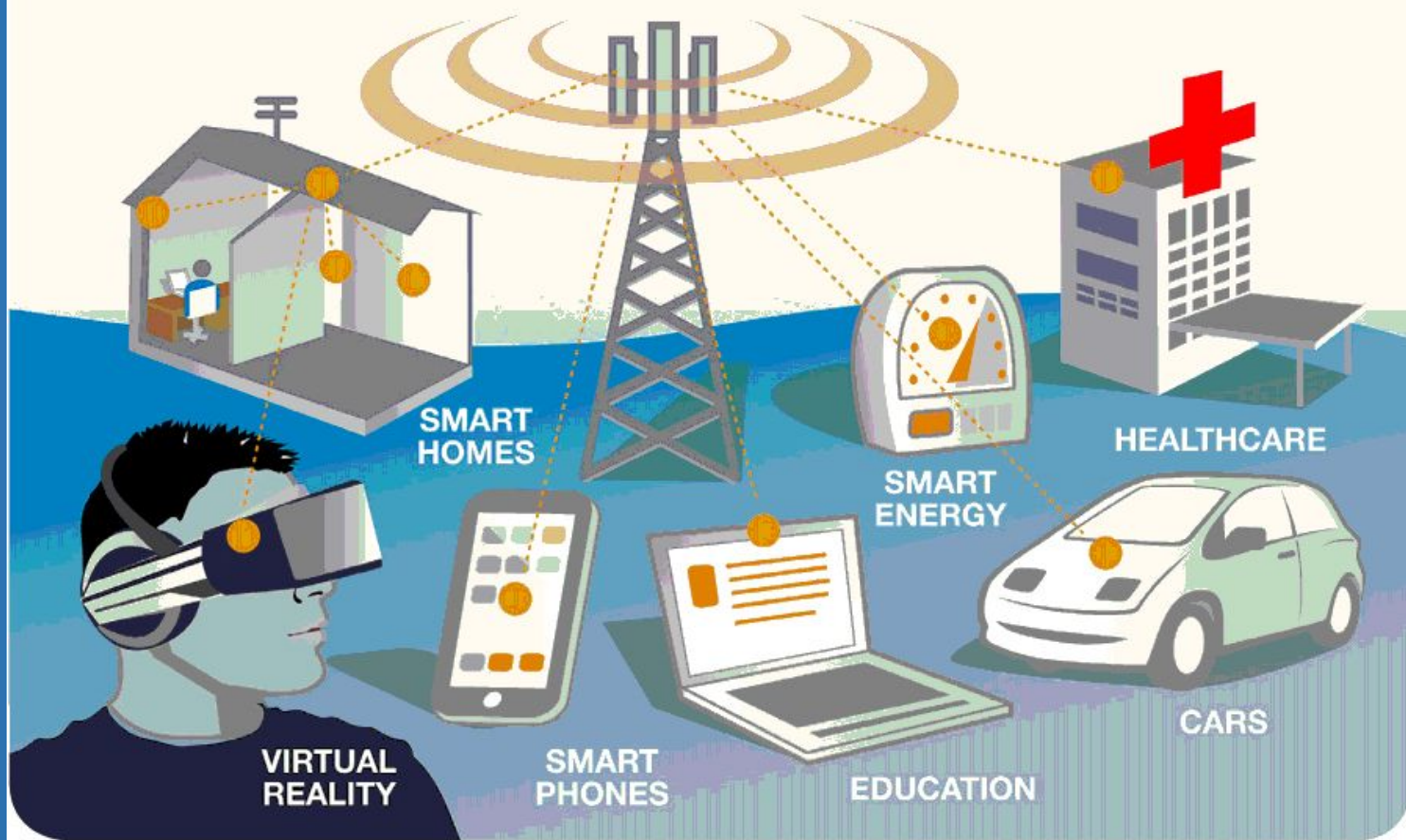
Driving network hyper-densification
with more small cells everywhere.



Network efficiency:

Optimizing network energy consumption
with more efficient processing.

5G CONNECTING THE COMMUNITY



ADVANTAGES OF 5G AND HOW WILL BENEFIT IOT

- **Greater speed in transmissions**

can Speed in transmissions can approach 15 or 20 Gbps. By being able to enjoy a higher speed we access files, programs and remote applications in a totally direct and without waiting. **By intensifying the use of the cloud, all devices (mobile phones, computers, etc.) will depend less on the internal memory** and on the accumulation of data and it won't be necessary to install a large .number of processors on some objects because computing can be done on the cloud

Greater number of connected devices

With 5G the number of devices that can be connected to the network increases greatly, **it will go to millionaire scale per square kilometer.**

All connected devices will have access to instant connections to the internet, which in real time will exchange information with each other. This will favor the IOT.

It is anticipated that a common home will have a hundred connected devices sending and receiving information in real time. If we think of industrial plants we would speak of thousands of connected devices.

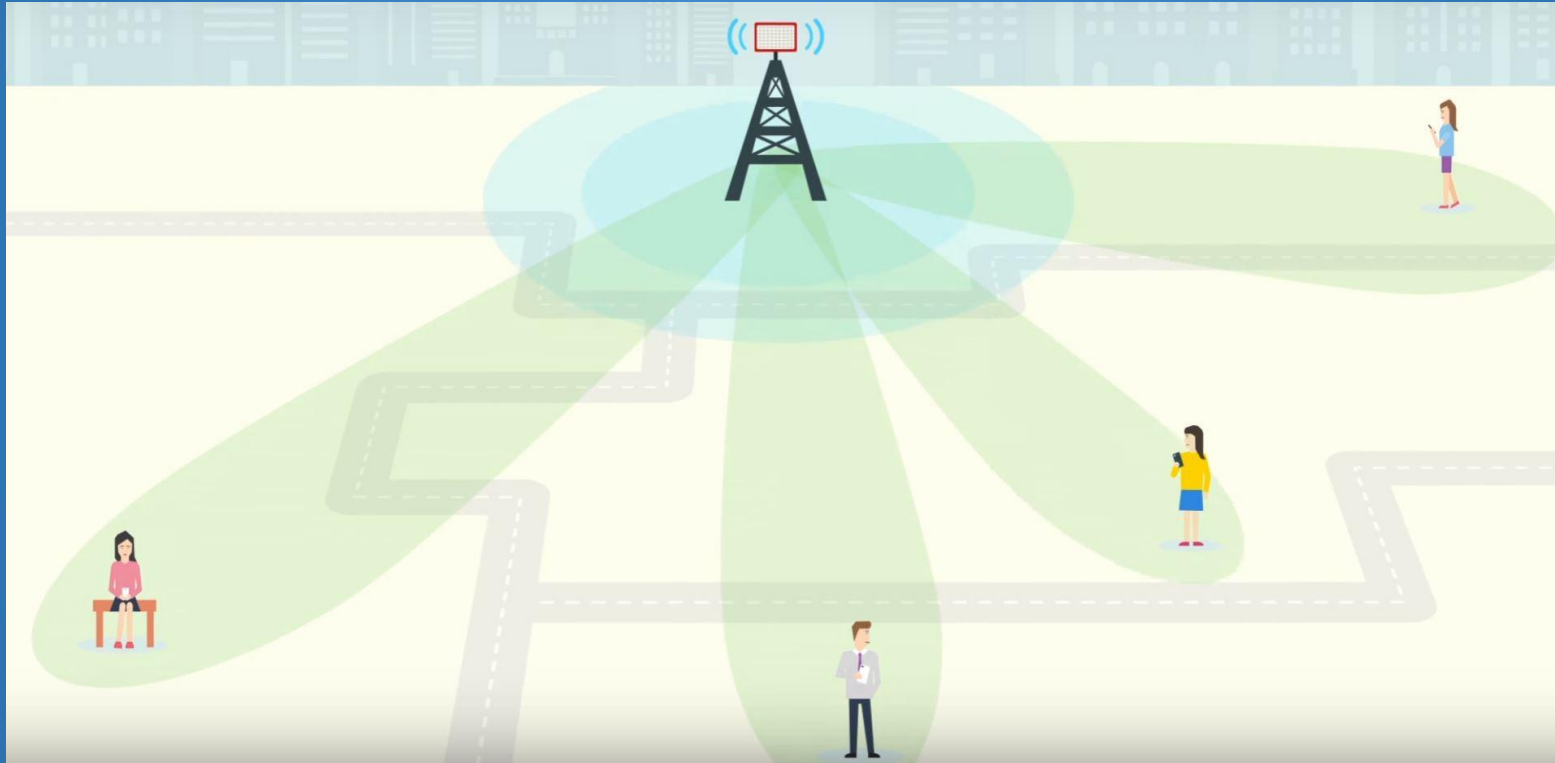
This greater number of connected devices will allow the **smart cities** and the **autonomous car.**

Network slicing

The 5G also allows to implement virtual networks (network slicing), **create subnets, in order to provide connectivity more adjusted to specific needs.**

The creation of subnetworks will give specific characteristics to a part of the network, being a programmable network and will allow to prioritize connections, as could be the emergencies in front of other users, applying for example different latencies or prioritizing them in the connection to the network so that they can't be affected by possible overloads of the mobile network.

Efficient RF power management



The main **features of the fifth generation** **,computer** are

- ULSI technology
- Development of true artificial intelligence
- Development of Natural language processing
- Advancement in Parallel Processing
- Advancement in Superconductor technology
- More user-friendly interfaces with multimedia features

.Availability of very powerful and compact computers at cheaper rates •

.The fifth generation computers will use super large scale integrated chips •

.They will have artificial intelligence •

.They will be able to recognize image and graphs •

Fifth generation computer aims to be able to solve the highly complex problem including •

.decision making, logical reasoning

.They will be able to use more than one CPU for faster processing speed •

.Fifth generation computers are intended to work with natural language •

- These computers are much faster than other generation computers.
- It is easier to repair these computers.
- These computers are much smaller in size than other generation computers
- They are portable and easy to handle.
- Development of true artificial intelligence.
- Advancement in Parallel Processing.
- Advancement in Superconductor technology

Disadvantage of 5G

- They tend to be sophisticated and complex tools.
- They can give more power to companies to watch what you are doing and even allow them to infect your computer.

- **1. OBSTRUCTIONS CAN IMPACT CONNECTIVITY**

The range of 5G connectivity is not great as the frequency waves are only able to travel a short distance. Added to this setback is the fact that 5G frequency is interrupted by physical obstructions such as trees, towers, walls and buildings. The obtrusions will either block, disrupt or absorb the high-frequency signals. To counter this setback, the telecom industry is extending existing cell towers to increase the broadcast distance.

- **2. INITIAL COSTS FOR ROLLOUT ARE HIGH**

The costs related to the development of 5G infrastructure or adaptations to existing cellular infrastructure will be high. This amount will be further compounded by the ongoing maintenance costs needed to ensure the high-speed connectivity, and it's likely the customers will bare the brunt of these big price tags. Cellular operators are looking to minimise these costs by exploring alternative options in the form of network sharing.

3. LIMITATIONS OF RURAL ACCESS

While 5G might bring about real connectivity for the predominantly urban areas, those living in the rural settings will not necessarily benefit from the connection. As it stands, many remote areas countrywide are not able to access any form of cellular connectivity. The 5G carriers are going to target big cities with larger populations, eventually working their way into the outer areas, but it's not likely this will be happening any time soon. As a result, only some of the population will benefit from 5G communication.

4. BATTERY DRAIN ON DEVICES

When it comes to cellular devices connected to 5G, it seems the batteries are not able to operate for a significant period of time. The battery technology needs to advance to allow for this enhanced connectivity, where a single charge will power a cellphone for a full day. Alongside depleted batteries, users are reporting that cellphones are getting increasingly hot when operating on 5G.

5. UPLOAD SPEEDS DON'T MATCH DOWNLOAD SPEEDS

The download speeds of 5G technology are incredibly high, in some cases up to 1.9Gbps. However, the upload speeds are rarely more than 100Mbps, which is not quite as incredible as initially touted. In relation to existing mobile connectivity, however, the upload speeds are higher than being seen with 4G LTE.

6. DETRACTING FROM THE AESTHETICS

The erection of more cellphone towers, or extension of existing cellphone towers, is not welcomed by most communities because they are seen to diminish the overall look and feel of an area. With 5G, there is going to be a need for increased infrastructure development, which won't necessarily be seen as a good thing for local residents.

