

1G, 2G, 3G, 4G, 5G

G?

- G → Generation
- Generation of wireless phone technology

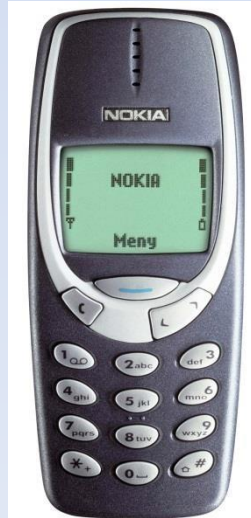
1G

- Frequency: 150MHz / 900MHz
- Bandwidth: Analog telecommunication (30KHz)
- Characteristic: First wireless communication
- Technology: Analog cellular
- Capacity (data rate): 2kbps
- From 1980 to 1990
- Bad voice quality
- Poor battery, cellphones
- Big cellphones
- Better than nothing, at least its wireless and mobile



2G

- Frequency: 1.8GHz (900MHz), digital telecommunication
 - Bandwidth: 900MHz (25MHz)
 - Characteristic: Digital
 - Technology: Digital cellular, GSM
 - Capacity (data rate): 64kbps
 - Why better than 1G?
- From 1991 to 2000
 - Allows txt msg service
 - Signal must be strong or else weak digital signal
 - 2.5G
 - 2G cellular technology with GPRS
 - E-Mails
 - Web browsing
 - Camera phones



3G

- Frequency: 1.6 – 2.0 GHz
 - Bandwidth: 100MHz
 - Characteristic: Digital broadband, increased speed
 - Technology: CDMA, UMTS, EDGE
 - Capacity (data rate): 144kbps – 2Mbps
 - Why better than 2G?
- From 2000 to 2010
 - Called smartphones
 - Video calls
 - Fast communication
 - Mobil TV
 - 3G phones rather expensive



4G

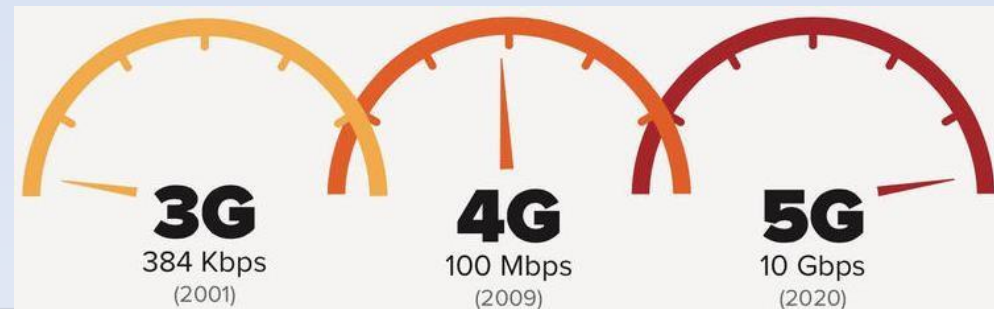
- Frequency: 2 – 8 GHz
- Bandwidth: 100MHz
- Characteristic: High speed, all IP
- Technology: LTE, WiFi
- Capacity (data rate): 100Mbps – 1Gbps
- Why better than 3G?



- From 2010 to today (2020?)
- MAGIC
 - Mobile multimedia
 - Anytime, anywhere
 - Global mobile support
 - Integrated wireless solutions
 - Customized personal service
- Good QoS + high security
- Bigger battery usage

5G

- <https://5g.co.uk/guides/5g-frequencies-in-the-uk-what-you-need-to-know/>
- Capacity (data rate): 1Gbps – ULIMITED?
- Why better than 4G?
- From X (2020?) to Y (2030?)
- High speed and capacity
- Faster data transmission than 4G
- Supports
 - Interactive multimedia
 - Voice streaming
 - Buckle up.. Internett
- More efficient



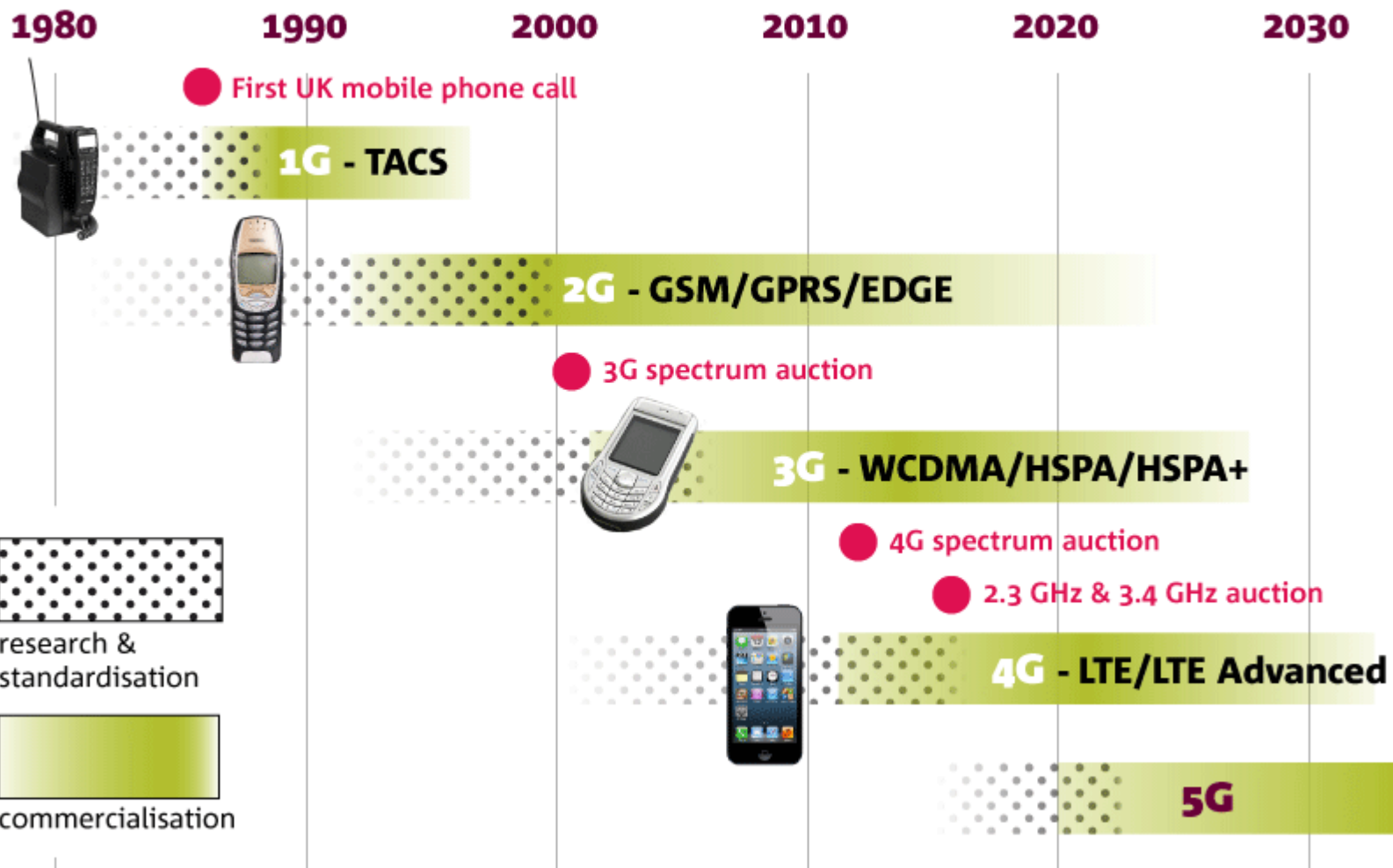
Comparison

	1G	2G	3G	4G	5G
Period	1980 – 1990	1990 – 2000	2000 – 2010	2010 – (2020)	(2020 - 2030)
Bandwidth	150/900MHz	900MHz	100MHz	100MHz	1000x BW pr unit area
Frequency	Analog signal (30 KHz)	1.8GHz (digital)	1.6 – 2.0 GHz	2 – 8 GHz	3 – 300 GHz
Data rate	2kbps	64kbps	144kbps – 2Mbps	100Mbps – 1Gbps	1Gbps <
Characteristic	First wireless communication	Digital	Digital broadband, increased speed	High speed, all IP	
Technology	Analog cellular	Digital cellular (GSM)	CDMA, UMTS, EDGE	LTE, WiFi	WWWW

- <https://www.linkedin.com/pulse/evolution-mobile-communication-from-1g-4g-5g-6g-7g-pmp-cfps>

Comparison

Evolution of mobile phone communications



Comparison

EVOLUTION OF THE G



1G

1ST GENERATION
wireless network

- Basic voice service
- Analog-based protocols



2.4 kbps



2G

2ND GENERATION
wireless network

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



64 kbps



3G

3RD GENERATION
wireless network

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



2,000 kbps



4G

4TH GENERATION
wireless network

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



100,000 kbps

THE NEED FOR SPEED *in kilobits per second*

GENERATIONAL GROWTH

~ equivalent to ~



the height of a GRASSHOPPER



the height of a BORDER COLLIE



the height of a 5-STORY BUILDING



the height of BURJ KHALIFA tower in Dubai

WHERE ARE WE HEADING?

2013 FOR THE FIRST TIME EVER MORE THAN ONE

EXABYTE

of data will travel across the global mobile network

EVERY ~ MONTH

10.8
EXABYTES
~ per month ~

2013

2016

1 EXABYTE
~ is equivalent to ~
1 BILLION GIGABYTES

~ or ~



~ downloading the entire ~

STAR WARS

~ SERIES ~

130 MILLION TIMES

WHAT'S DRIVING THIS GROWTH? SMARTPHONE USERS

~ among other things ~

2013



1 in 3

2017



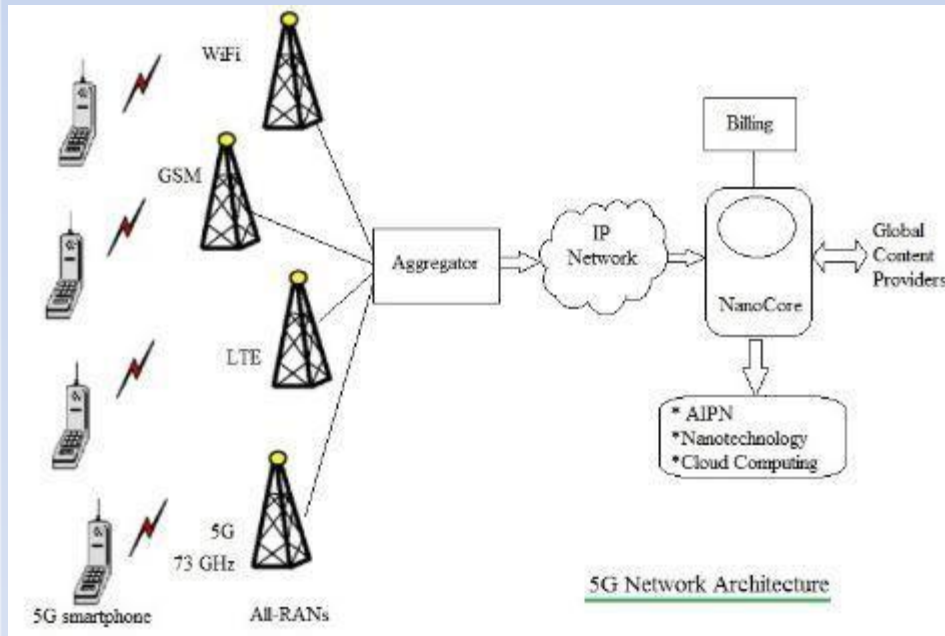
1 in 2

SMARTPHONE
% OF WEBPAGE
VIEWS



Future: 5G? 6G?

- 5G:



- 6G:

- Integrate 5G with satellite network for global coverage
- Ultra fast Internet access
- Smart home/cities

- 7G:

- Space roaming
- World completely wireless