Role of WiFi in Broadband Proliferation and use cases

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Meta’s Mission

Give people the power to build community and bring the world closer together

Agenda

- **How the Next Gen of WiFi helps:**
  - In better connecting the campuses and labs
  - Enabling enhanced speeds and low latency networks in areas like:
    - Virtual Reality/Augmented Reality
- **Simulation (research paper)**
- **Practical implementation to show the need for 1200 MHz for Next Generation of WiFi in the 6GHz band**

Importance of WiFi in Digital Connectivity

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- Offices, Schools, teaching hospitals, public places, airports, homes, universities and many other places there can be thousands of users connected through WiFi
- Almost all laptops and tabs have WiFi support
- Connectivity for new Generation of AR/VR device for innovative applications
- Important role in 4G/5G/6G offload and WiFi Calling
- Reduced Power usage (Environmental impact)

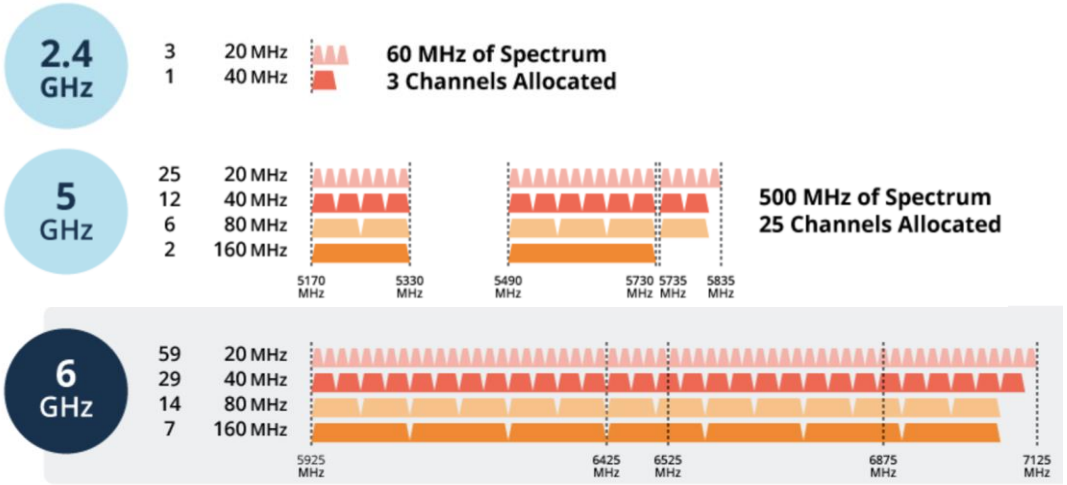
Technology Evolution

IEEE 802 Standard	802.11a	802.11b	802.11g	802.11n	802.11ac	802.11ax	802.11be
Year Released	1999	1999	2003	2009	2014	2021	2023
Bands	5GHz	2.4 GHz	2.4GHz	2.4GHz & 5GHz	2.4GHz & 5GHz	2.4GHz, 5GHz & 6GHz	2.4GHz, 5GHz & 6GHz
Peak Data Rates	54Mbps	11Mbps	54Mbps	600Mbps	3.6Gbps	10-12Gbps	30Gbps

Old Naming Convention	New Naming Convention
802.11b	Wi-Fi 1
802.11a	Wi-Fi 2
802.11g	Wi-Fi 3
802.11n	Wi-Fi 4
802.11ac	Wi-Fi 5
802.11ax	Wi-Fi 6
802.11be	Wi-Fi 7

802.11ax: WiFi 6 and 802.11ax using 6GHz: WiFi 6E
802.11be: WiFi 7 still uses the 6GHz band

6 GHz spectrum is needed to address growth and innovation challenges



- 1200 MHz new greenfield spectrum for Wi-Fi
- Wider channels enable Gigabit capacity
- Wider channels enable lower latency and reduced power
- Only opportunity for new spectrum for Wi-Fi !

Countries/Jurisdictions in APAC with allocation for 6 GHz unlicensed use

Australia, Japan, Hong Kong, Macau, Malaysia, New Zealand, Pakistan, Philippines, Singapore, Republic of Korea, Taiwan and Thailand

APAN Members: Australia, Bangladesh, China, Hong Kong, India, Japan, Republic of Korea, Sri Lanka, Malaysia, Nepal, Pakistan, Singapore, Thailand, Taiwan and Vietnam

Worldwide countries representing over 70% of the World GDP have already opened spectrum in the 6 GHz band for unlicensed use

New transformational opportunities of AR/VR

Education

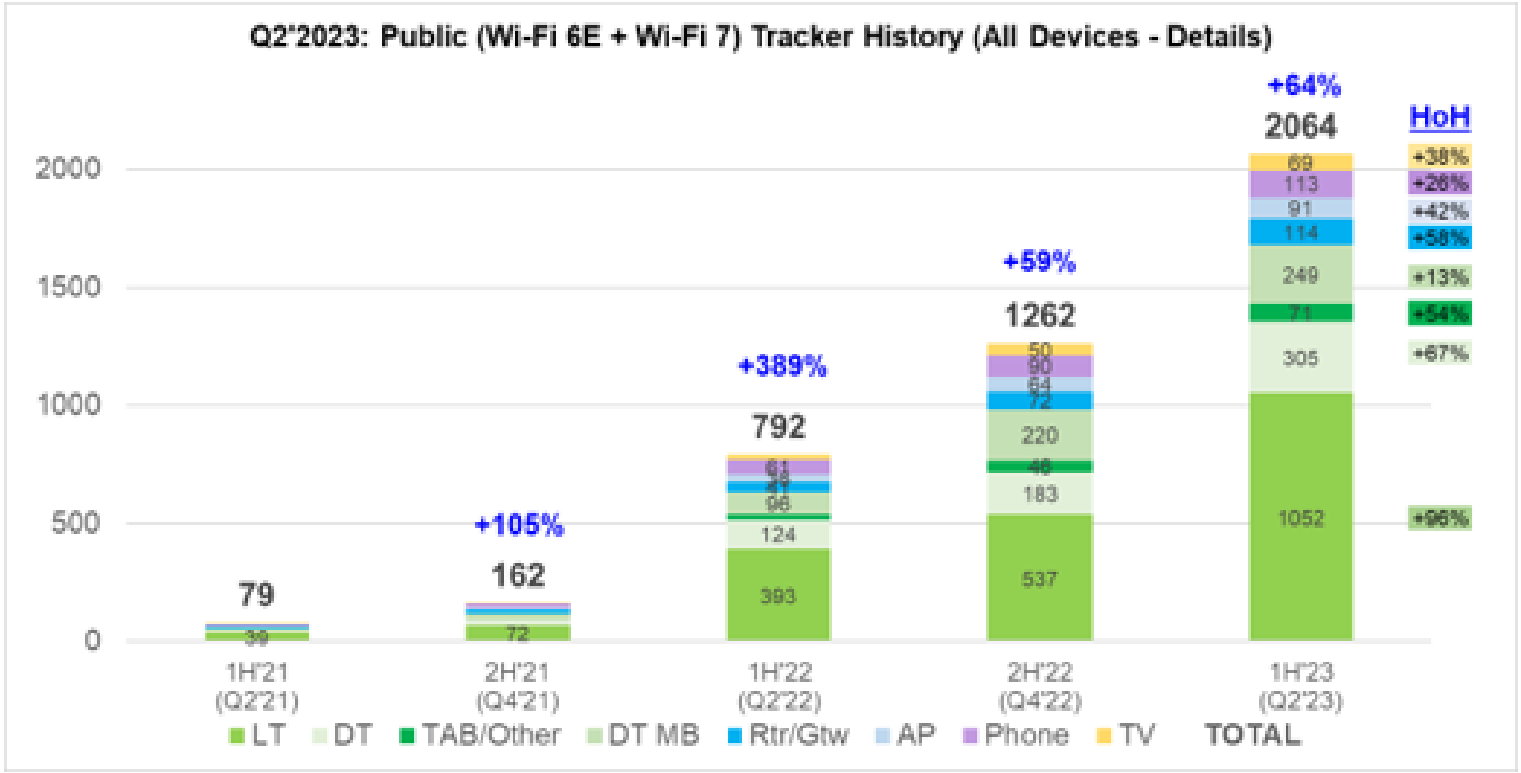
Healthcare

Civic engagement & social good

Customer experience

Walk to Gate 81
In 10 minutes away
754 metres remaining
Google Lens
Explore Uncle Ben's with Inrit
Uncle Ben's
Jasmine Ready
Rice Pouch
Tap for meal ideas and nutrition information.
Running Out Of Stock
Order Pick Time
00 : 05 : 00

Q2'2023: 6 GHz Wi-Fi 6E/Wi-Fi 7 Product Model Momentum



6GHz Device Footprint Growth Led by Personal Computing Devices

Wi-Fi 6E/7 Products (A brief list)

Laptop PCs (72+)

- Dell
  - Alienware X15
  - Alienware X17
  - Latitude 5320
  - Latitude 5420
  - Latitude 5421
  - Latitude 5430 Rugged
  - Latitude 5520
  - Latitude 5521
  - Latitude 7330 Rugged Extreme
  - Latitude 9420
  - Precision 3560
  - Precision 3561
  - Precision 7560
  - Precision 7760
- HP
  - Omen 16
  - Omen 16
  - Omen 17
  - Spectre x360 16 (EVO)
- Lenovo
  - ThinkPad P1 G4
  - ThinkPad P15 G2
  - ThinkPad P15s G2
  - ThinkPad P17 G2
  - ThinkPad T14 G2
  - ThinkPad T14s G2
  - ThinkPad T15 G2
  - ThinkPad T15g G2
  - ThinkPad X1 Extreme G4
  - ThinkPad X13 G2
- LG
  - UltraGear 17G90Q
- ZEBRA
  - ET80 12" 2in1
  - ET85 12" Tablet
- FRAMEWORK
  - ET80 12" 2in1

- MSI
  - Creator 15 (10th Gen)
  - Creator 15 (11th Gen)
  - Creator 17
  - Creator M16
  - Creator Z16
  - Delta 15 (AMD)
  - GE66 (10th Gen)
  - GE66 (11th Gen)
  - GE66 (12th Gen)
  - GE76 (10th Gen)
  - GE76 (11th Gen)
  - GE76 (12th Gen)
  - GL66 (11th Gen)
  - GL76 (11th Gen)
  - GP66 (11th Gen)
  - GP76 (11th Gen)
  - GP76 (12th Gen)
  - GS66 (10th Gen)
  - GS66 (11th Gen)
  - GS66 (12th Gen)
  - GS76 (11th Gen)
  - GS77 (12th Gen)
  - Prestige 14 EVO
  - Prestige 15
  - Summit E13 Flip EVO
  - Summit E16 Flip EVO
  - WE76
  - WS66
  - WS76
- Razer
  - Blade 14
  - Blade 15 Advanced (10th Gen)
  - Blade 15 Advanced (11th Gen)
  - Blade 17 (11th)
  - Blade Pro 17 (10th Gen)
  - Blade Pro 17 (11th Gen)
- Samsung
  - Galaxy Book Odyssey
  - Galaxy Book Pro 13
  - Galaxy Book Pro 15
  - Galaxy Book Pro 360 13
  - Galaxy Book Pro 360 15

Desktop PCs (18+)

- MSI
  - Aegis RS 11th
  - Creator P50
  - MAG Codex 5 11th
  - MAG Codex X5 11th
  - MAG Codex X5 12th
  - MAG Infinite 11th
  - MAG Infinite S3 11th
  - MEG Aegis Ti5 11th
  - MEG Aegis Ti5 12th
  - MEG Infinite X 11th
  - MEG Trident X 12th
  - MPG Trident 3 11th
  - MPG Trident AS 11th
- Asus
  - ExpertCenter AIO E5
- Intel
  - NUC 11 Extreme
  - NUC 11 Enthusiast
- Acer
  - Predator Orion 7000 (12th Gen)

Desktop PC MBs (25+)

- MSI
- Gigabyte
- Asus
- Asrock

Many more to come…

Wi-Fi 6E/7 Products Exponentially! (A brief list)

Routers (24)

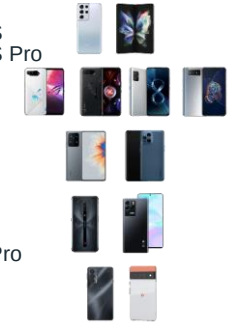
- Asus
  - ROG GT-AXE1100
  - ZenWiFi ET8 (Mesh)
  - ZenWiFi Pro ET12 (Mesh)
- Netgear
  - Nighthawk RAXE450
  - Nighthawk RAXE500
  - Orbi AXE1100 (Mesh)
- Linksys
  - Atlas Max 6E AXE8400 (Mesh)
  - Hydra Pro 6E AXE6600 (Mesh)
- TP-Link
  - Archer AX206
  - Archer AX96
  - Archer AXE200 Omni
  - Deco X76 (Mesh)
  - Deco X96 (Mesh)
- Zinwell
  - AX11000
  - AX5400
  - AX7800
- Comcast
  - xFi Advanced Gateway
  - XB8 Gateway
- Verizon
  - Triband Wi-Fi 6E Router
- Juniper
  - AP-45
  - AP34
- Cisco
  - Catalyst 9136
  - Meraki MR57
- Eero
  - Eero Pro 6E

Access Points (11)

- Aruba
  - AP-635
- Extreme Networks
  - AP4000
- Calix
  - GigaSpire BLAST U6E
  - GigaSpire BLAST U6HE
  - GigaSpire BLAST U6ME
  - GigaSpire BLAST U8XE
- Airspan
  - Mimosa C6X
- Arista
  - C-360
- Juniper Networks
  - AP34
  - AP45
- Huawei
  - AirEngine 6761-22T

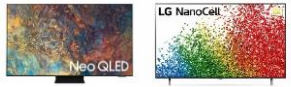
Smartphones (19)

- Samsung
  - Galaxy S21 Ultra
  - Galaxy Z Fold 3
  - GS22 Plus/Ultra
- Asus
  - ROG Phone 5S
  - ROG Phone 5S Pro
  - ZenFone 8
  - ZenFone 8 Flip
- Xiaomi
  - Mi Mix 4
- Oppo
  - Find X3 Pro
- Nubia
  - RedMagic 6
  - RedMagic 6S Pro
- ZTE
  - Axon 30 Ultra
- Motorola:
  - Edge 20, X30, and S30; G200
- Google:
  - Pixel 6 / 6 Pro



Smart TVs (5)

- Samsung
  - Neo QLED 8K
- LG
  - OLED, QNED, NanoCell

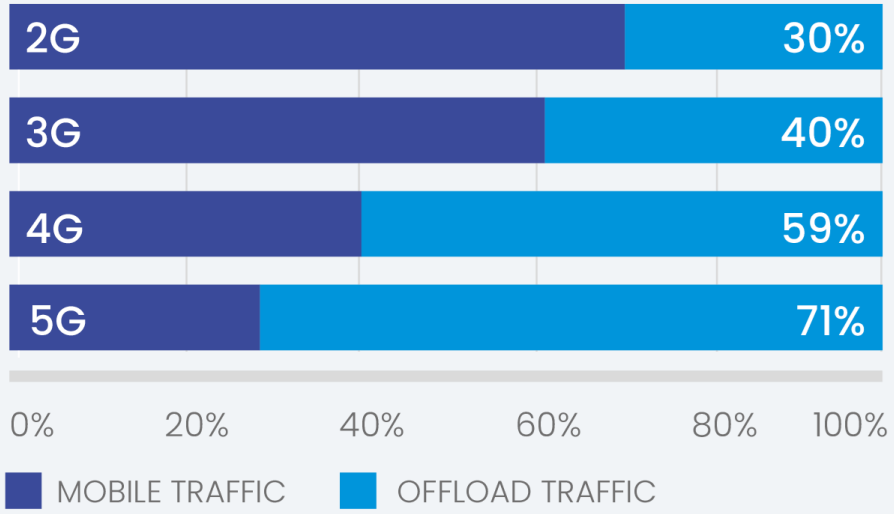


Many more to come…

IMT and WiFi can work together

Myth: 5G and WiFi 6E are competing technologies.
Reality: 5G and WiFi 6E are complementary technologies

*Today, Wi-Fi supports the offload of 54% of mobile data traffic and this is set to grow to about 70% with 5G (source: Cisco VNI).



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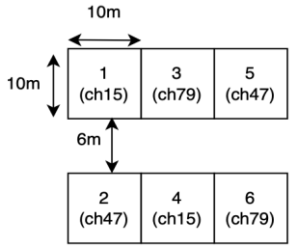
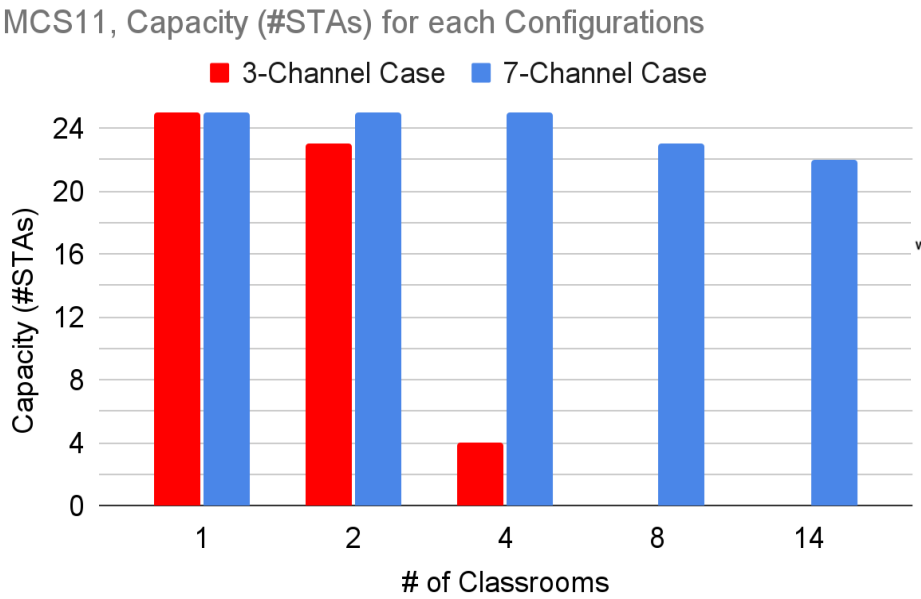
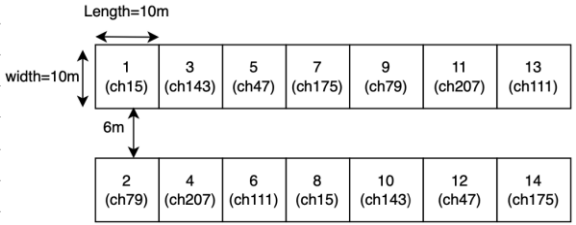
Why 1200 MHz for WiFi?

3-Channel (500 MHz) Case vs 7-Channel (1200 MHz) Case







Conclusion: In a multiple user VR scenario like a school environment, 500 MHz will not be able to support enough number of users

Facebook Proprietary - Confidential

Full Paper: https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9994727

Practical Demonstration of the need for the full 1200 MHz band

- Partial deployment of 6 GHz Wi-Fi Pilot using a CNMI's, Rama Hospital, Bangkok, Thailand classroom network
- Uses 2 active APs operating in 2.4 GHz, 5 GHz, 6 GHz (lower 500 MHz), and 6 GHz (full 1200 MHz)
- Wi-Fi network traffic generated by laptops and VR headsets

Demo Overview

- The demo showcased dense deployment and VR use cases by highlighting the benefits of having the entire 1200 MHz of the spectrum in the 6 GHz band for unlicensed use
- Exhibited the deployment issues resulting due to co-channel and adjacent channel interference when ONLY 3 channels with 160 MHz bandwidth are available in the lower 500 MHz spectrum as against 7 channels in the entire 1200 MHz spectrum in the 6 GHz band
- Total of several laptops streaming 4K videos and one VR headset
- Demo was shown to Dr. Sarana, Chairman NBTC and others and he said it is now clear that we need the whole 1200 MHZ band

Throughput Plot
Latency Plot
8K Video
(Future use case
for Hospital)
Clinical Anato
Course
(RAID204)

Thank you

Play the video: CLICK HERE

Detailed workshop will be conducted on October 24. 2024 in Rama Hospital Bangkok. Please contact ismailshah@meta.com if you would like to attend

For more information, please visit

Link