RP-210663

3GPP TSG RAN Meeting #91
Electronic Meeting, March 16 – 26, 2021
Agenda Item: 15

Rel-18 enhancements for Fixed Wireless Access

Huawei, HiSilicon

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5G FWA will play a more important role in Home Broadband than 4G FWA

Typical Services for Home Broadband

Internet Access

~5Mbps

IPTV

~20Mbps

4K/8K HD video

~50Mbps

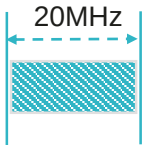
Cloud AR/VR

100Mbps ~ 1Gbps

5G FWA capability matches all Home Broadband services

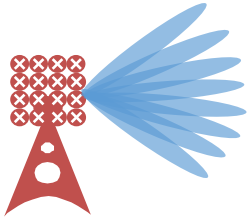
4G FWA only focuses on Internet/IPTV

4T4R/8T8R

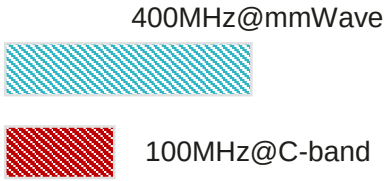


Bandwidth

LTE TDD/FDD
<50Mbps



Massive MIMO



Large Bandwidth

5G NR C-band/mmWave
100Mbps~1Gbps

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FWA will Occupy Plenty of Market for Home Broadband in the Future

Connect the Unconnected

A huge number of households are still without any home broadband, especially in rural areas

Accelerate Broadband Development

European broadband policy

By 2025, access to connectivity offering at least 100 Mbit/s for all European households[1]

[1] Source: European broadband policy, https://ec.europa.eu/digital-single-market/en/broadband-europe

xDSL/Copper cannot meet the requirement

Avg speed of xDSL
<50Mbps

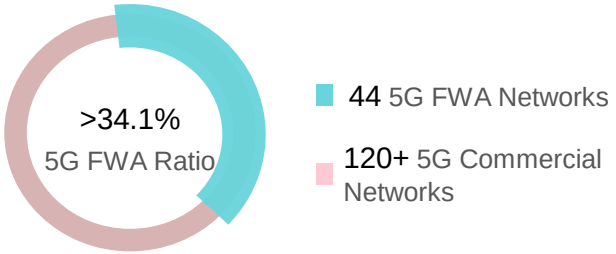
Requirement:
100 Mbps for households

FWA Networks are Worldwide

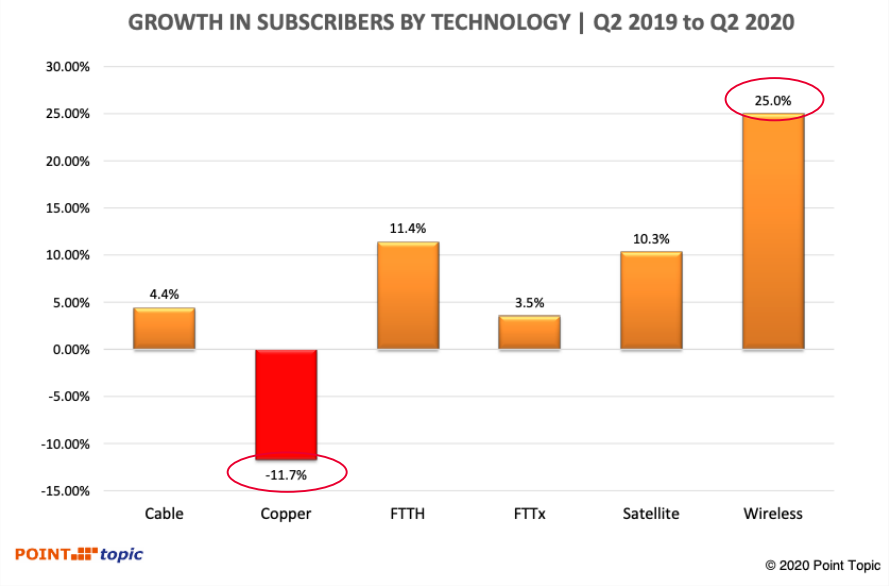
429 operators (more than half of all 5G/LTE operators) in 167 countries/territories offer FWA services using 5G/LTE

Source: "FWA Update November 2020: Global Status", GSA report Nov.2020
https://gsacom.com/paper/fwa-update-november-2020-global-status/

The ratio of 5G FWA has already reached 1/3 of 5G commercial networks until Dec. 2020



Source: "Fixed Wireless Access Forum Meeting #1", GSA Dec.2020
https://gsacom.com/press-release/fixed-wireless-access-forum-meeting-1/



Source: Point Topic, World Fixed Broadband Statistics – Q2 2020
http://point-topic.com/free-analysis/world-fixed-broadband-statistics-q2-2020/

These trends show an expectation that the penetration ratio of FWA will continue increasing, especially in rural and suburban areas.

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FWA Brings Faster Return on Investment for Operators

With 5G, FWA achieves comparable revenue per bit to eMBB

$$\text{Revenue per bit} = \frac{\text{ARPU}}{\text{DOU}}$$

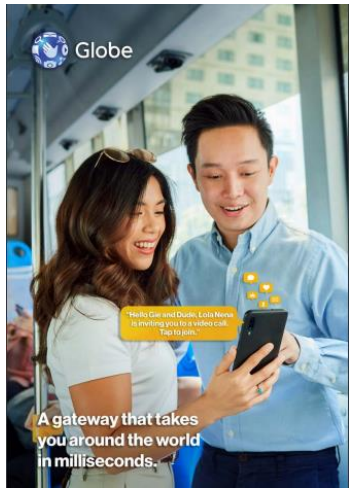
- ARPU: average revenue per user
- DOU: data of usage

Revenue per bit

FWA : (e)MBB

4G era	1 : 3
5G era	1 : 1

Operator can win business growth via 5G FWA



"The year in focus has been special for all of us at Globe, as we launched 5G in June 2019. **This strengthens our service delivery of broadband via fixed wireless access technology."**

"For the Home Broadband business, revenues reached ₱21.7 billion this period, surpassing last year's ₱18.6 billion by 17%, **driven by a rising level of fixed wireless broadband users** reaching close to 1.4 million (up 40% year-on-year)."

Results of Operations (₱ Mn)	31-Dec 2019	31-Dec 2018	YoY Change (%)
Operating Revenues	**166,660**	151,173	10%
Service Revenues	**149,010**	132,875	12%
Mobile[1]	**111,767**	99,531	12%
Home Broadband[2]	**21,747**	18,606	17%
Corporate Data[3]	**12,828**	11,762	9%
Fixed Line Voice[4]	**2,668**	2,977	-10%
Non-Service Revenues	**17,650**	**18,297**	**-4%**

Source: Globe Integrated report 2019 (https://www.globe.com.ph/about-us/sustainability/2019.html#gref)

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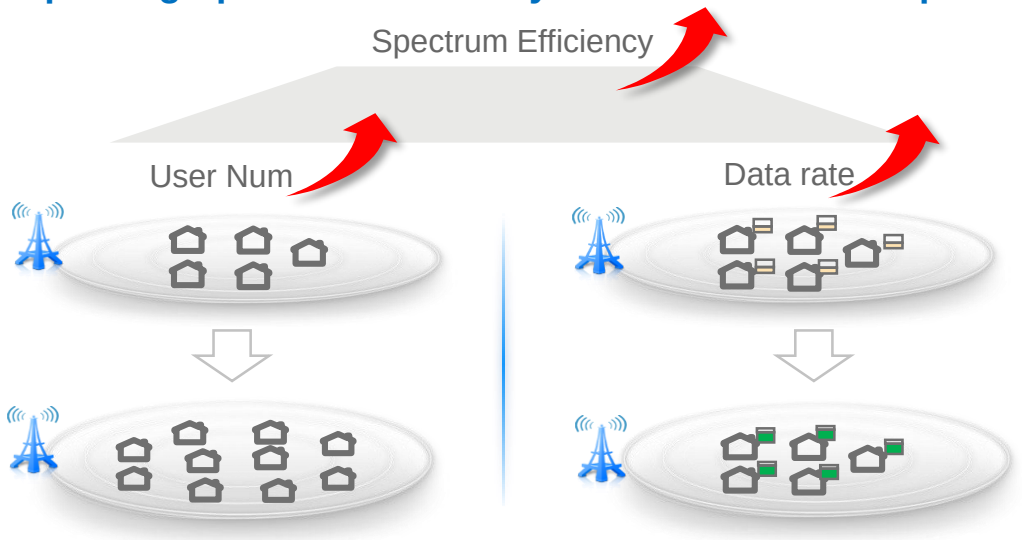
Spectrum Efficiency is Essential for long-term value in FWA

Improving Spectrum Efficiency to increase revenue per bit



More subscriber contributes revenue increase

To improve UE experience

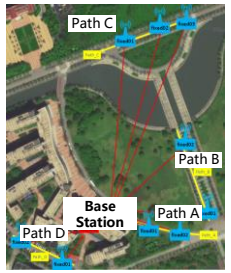
Potential enhancements for Rel-18 FWA

- To utilize the stationary channel
  - Ultra low DMRS overhead
- To handle interference for FWA
  - Network Assisted Interference Cancelation
- More capable CPE
  - More SU-MIMO layers
  - High power UE

FWA Scenario Characteristic

Stationary CPE experiences slow varying channel

Test Scenario

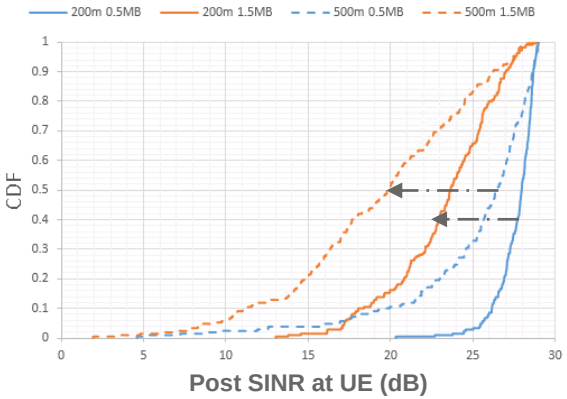


BS Height: 17 m	UE Height: 1.8m
Path A	LOS, surrounded by trees, moving cars and pedestrian
Path B	LOS, surrounded by trees and a few pedestrian
Path C	LOS, surrounded by a lot of moving cars and pedestrian
Path D	NLOS • Point 1: Sheltered by trees • Point 2: Sheltered by buildings and surrounded by a lot of pedestrian

	Doppler Spread (Hz)			
	Path A	Path B	Path C	RoutD
Point 1	0.90	0.45	0.90	1.27
Point 2	0.60	1.19	1.00	1.17

- With 3.5GHz carrier frequency, the typical value of Doppler spread for stationary UE is about **1 Hz**

High DOU results in severe interference



Parameter	Value	
Layout	7 sites, 3 sector per site	
ISD	200m	500m
Carrier frequency	4GHz	
Duplex	TDD: DDDSU	
BS antenna	64Tx64Rx	
UE antenna	2Tx4Rx	
UE distribution	10 UEs per sector	
Traffic model	FTP model with packet size 0.5Mbytes and 1.5Mbytes	

- 3X DOU will reduce the median SINR for more than 5dB

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Thank you.

Bring digital to every person, home and organization for a fully connected, intelligent world.

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