

**India Telecom: FWA – more than just a fling (Part 1 of 3)**

In this second part of the broadband (BB) series, we look at markets globally to gauge FWA adoption and telcos' strategies to drive BB growth. We observe: (1) FTTH (fiber-to-the-home) is the preferred choice for telcos where it is already available, not just due to its high rollout cost but importantly, higher capacity/superior experience; (2) pure-play mobile telcos are more bullish on FWA; (3) most telcos see FWA as an aid to expand BB TAM, used as a stop-gap to upgrade users from copper or to leverage 5G in mobility-light/fiber-dark areas; (4) affordability issue in BB is being addressed through lower-tiered FWA plans and pre-paid FTTH; and (5) FWA saw a surge during Covid, and is now normalizing. FWA should see good traction in India, given low fiberization, BB under-penetration, and 5G capacity. The next part in the series will focus on BB sizing in India.

### Country-wise commentary on fiber and FWA BB strategies around the globe

- **The US:** It is seeing healthy growth in FWA. Telcos slightly vary in strategic priorities. Verizon is bullish on FWA and is seeing ~90% of BB adds on FWA. T-Mobile and AT&T are more bullish on fiber and are working on 'excess capacity model'.
- **The Philippines:** Globe is seeing subs shift from FWA to fiber on the large investments it had made in fiber during Covid. PLDT is also seeing a churn in FWA. Interestingly, a pure-player mobile telco 'Dito' is moving to BB through FWA using 5G.
- **Indonesia:** As is the case with other Southeast Asian markets, BB affordability is addressed through low-priced FWA and pre-paid fiber. However, 5G remains a bottleneck for FWA, as the spectrum is yet to be allocated.
- **Europe:** Due to high fiberization, most European countries have relatively high home BB penetration levels. In countries like Germany, FTTH is the 'endgame' for BB. However, FWA is steadily expanding, with a focus on rural BB connectivity.
- **Australia:** It is seeing healthy adoption of FWA, largely due to the vast and varied geography, making it difficult to fiberize. NBN, which is the state-owned fiber BB network, is seeing some decline due to pricing pressure and rapid expansion of FWA.
- **GCC:** FWA was earlier considered as secondary to fiber. However, more recently, its significance has grown with positioning 5G FWA as a cheaper alternative to fiber. It is being used to upgrade users from 4G FWA or DSL, bridge coverage gap, and position it as an affordable offering vs fiber.
- **South Korea:** Telcos are combining FWA with fiber to offer hybrid solutions, providing high-speed internet over fiber for urban areas and FWA for rural regions. This approach enhances the overall scalability and reliability of BB services.

### FWA appears to be a good fit for India, though FTTH should remain the MVP

We believe India is a good market fit for FWA, especially as low fiberization levels and affordability are constraints for FTTH. Currently, India's BB penetration is at ~14% of total households (HH), which can be increased with FWA (presently ~18% of total BB). FWA's market fit is especially seen Tier-2/3 towns, concurred by TRAI FWA data which alludes to high traction in Category B/C circles. However, in the medium/longer term, we believe that fiber will lead the way in home BB, with (1) improved fiberization levels, given telcos' investments in fiber, (2) capacity constraints, as mobility accelerates 5G usage, and (3) perceptibly better connectivity experience in fiber vs FWA. We see Bharti maintaining its view of FWA being a compliment, not a replacement, to fiber. Jio will likely remain the market leader in FWA, given its head start and greater push.

**Gaurav Malhotra**

Gaurav31.Malhotra@axiscap.in

**Della Desai**

della1.desai@axiscap.in

### The bigger picture: Looking at global FWA trends

The telecom sector is global in nature, meaning, trends are similar globally, albeit with slight lead or lag across geographies. To understand the future of FWA better, we peer into the trends and commentaries made by telcos globally. We have looked at some mature BB markets and growing BB markets to gauge the extent of FWA adoption across countries, and to understand not only user traction and product market-fit but also see how it is being strategically driven by telcos.

Our inferences:

- FWA is a good tool to expand TAM for BB across both developing and developed countries. The urban areas initially drive the adoption of FWA, but it is the semi-urban/rural areas which are usually underserved that present a large latent demand for BB using FWA.
- It is widely accepted that the network experience on fiber is superior to FWA. Thus the latter is mostly positioned as a compliment to fiber (where there is no/little fiberization) and for users with lower data consumption needs.
- Most telcos are selective on where to offer FWA and work on the 'excess capacity' model, i.e. offering FWA in areas where they have excess spectrum capacity and offering fiber where they see no excess capacity now or in the future (either due to high mobility traction or generally lower spectrum hold). In areas where fiber exists, telcos tend to push users to fiber vs FWA.
- FWA is a big push for pure-play mobile players who do not have last-mile fiber. For example, DITO, in the Philippines, which was a pure-play mobile telco, has used FWA to quickly and cost-effectively enter the home BB market. It launched FWA in Oct'24.
- Affordability is a factor that most markets are trying to address in BB. To make BB more accessible for the lower-end users, telcos are introducing FWA and pre-paid offerings in fiber.
- In many markets, including the USA, Latin America, Germany, etc., telcos are trying to switch users from copper lines to fiber. For the remote areas, the upgrade is to FWA and for the rest directly to fiber.
- In some countries like the Philippines, FWA saw a surge, especially during Covid, but the numbers seem to be dropping since. The users are moving from FWA to fiber, with the expanding fiber reach and users' need for a more stable connection.

Overall, fiber seems to be the preferred choice for telcos, primarily due to higher capacity and resultant superior connectivity experience. In some markets, FWA is used to expand BB TAM where no fiber is available yet, either as a stop-gap arrangement to upgrade users from copper to FWA or as a use-case for better utilization of spectrum in mobility-light catchments. Affordability of BB seems to be addressed by either pre-paid options in fiber BB or lower-tired FWA plans.

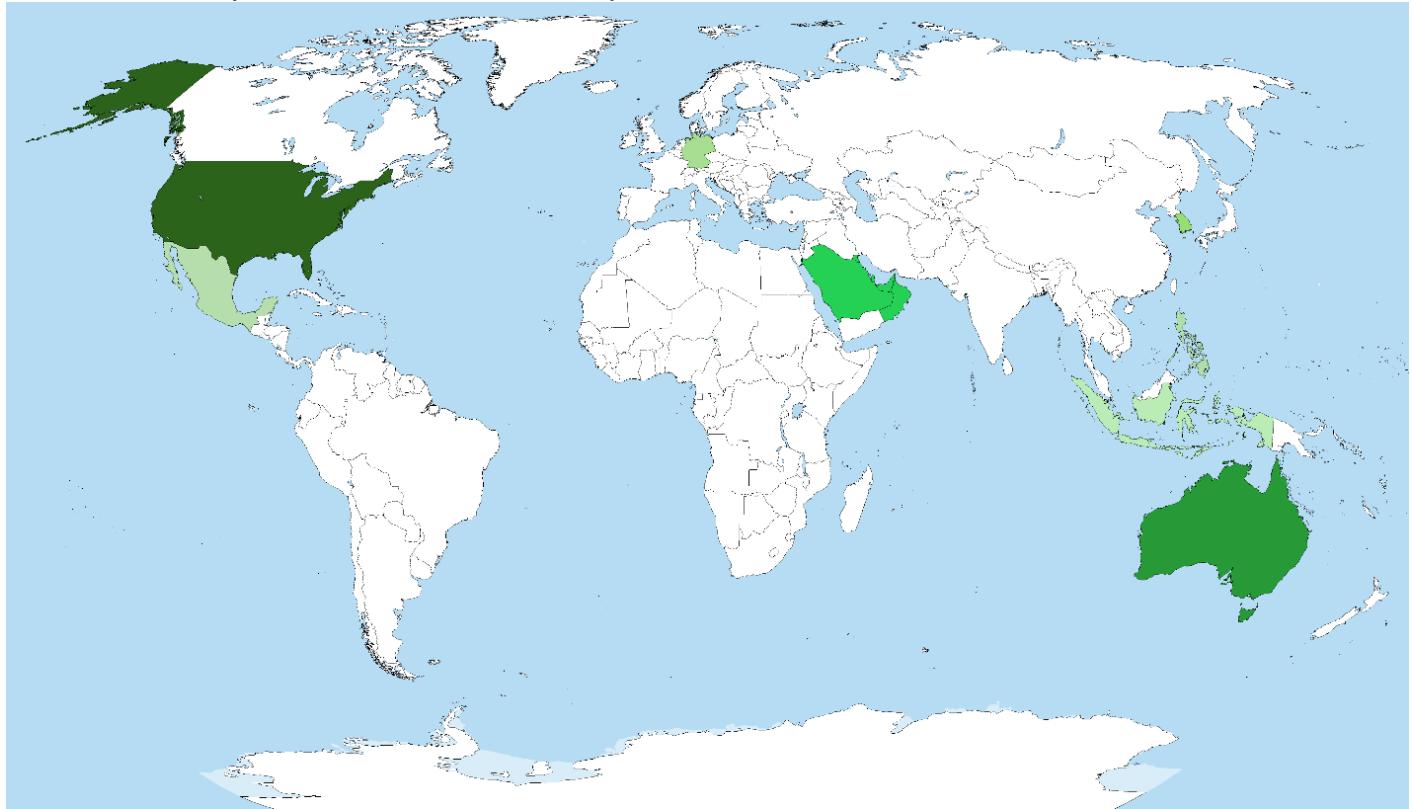
### Global case studies

We have looked at multiple markets globally, including:

- The US
- Mexico
- GCC
- Germany
- Indonesia
- The Philippines
- South Korea
- Australia

Below is the heatmap of the countries that we have analyzed – the darker the color, the more is the operator push/adoption of FWA. We believe that India should see a healthy uptake of FWA as operators use it to push BB penetration. Though, in the medium term, fiber will likely remain the key driver for BB, as is the case globally.

**Exhibit 1: BB heatmap across the countries we have analyzed**



Source: Company, Axis Capital

**Exhibit 2: Commentaries on BB (mainly FWA) – summary from some of the key markets**

Country	Key telco operators	Broad growth nos. in BB (key telcos)	FWA uptake
USA	Verizon, T-Mobile, AT&T	<b>BB:</b> 10-15% YoY <b>Wireline:</b> 2-3% YoY <b>FWA:</b> 40-100%+ YoY	<p>FWA is showing healthy growth in the US. Telcos slightly vary in their strategic priorities.</p> <ul style="list-style-type: none"> <li>Verizon is bullish on FWA and is seeing BB adds mainly on FWA.</li> <li>T-Mobile is more bullish on fiber vs FWA and is working the latter on 'excess capacity model'.</li> <li>AT&amp;T is relatively new in FWA and is not very aggressive in pushing it vs other two players; it believes that fiber has the best experience for high data streaming needs.</li> </ul>
Philippines	Globe Telecom, PLDT	<b>BB:</b> 2-5% YoY <b>Wireline:</b> 7-15% YoY <b>FWA:</b> Degrowing by 5-15% YoY	<p>The general trend observed is migration from FWA to fiber. The BB adds are mainly on fiber across both key telcos (Globe and PLDT). Fiber is preferred over FWA, especially because of experience. To expand the TAM for BB by addressing affordability, telcos are using FWA and pre-paid BB offering. We also notice a pure-play mobile operator 'DITO' venturing into home BB offering through FWA.</p>
Indonesia	Maxis, Telkom Indonesia	<b>BB:</b> 3-12% YoY	<ul style="list-style-type: none"> <li>5G spectrum is a bottleneck; the spectrums are not yet allotted so the telcos cannot go all out on 5G FWA. It does have FWA on 4G.</li> <li>Here too, FWA is being looked at as a proposition to increase BB penetration in the country. It is also positioned as an affordable BB solution to helping BB penetrate deeper.</li> </ul>
Mexico	America Movil	<b>BB:</b> 2-7% YoY	<p>The focus seems to be on upgrading users from copper to fiber, with America Movil (Telcel) expanding fiber footprint. The target for FWA is largely remote/rural areas, as these are untapped and underserved markets. Apart from Movil, Altan Redes, seems to be pushing FWA.</p>
Australia	Optus	<b>BB:</b> Flattish YoY <b>Wireline:</b> -1-3% YoY (degrowth) <b>FWA:</b> 1-9% YoY	<p>FWA seems popular in Australia, especially as the the country is vast, making it difficult to fiberize. In fact, its fiber network (NBN) subs are seen shifting to FWA, indicating high traction. Its home subs base was stable, as growth from FWA was offset by a decline in the NBN base.</p>
Germany	Deutsch Telekom	<b>BB:</b> 1-2% YoY <b>Wireline:</b> 2-8% YoY <b>Non-fiber:</b> degrowing YoY	<p>There is high focus on fiber and upgrading from copper to fiber. FWA is also gaining importance and is currently in the ramp-up phase and is seen as a substitute, especially in rural areas (preferred over satcom).</p>
GCC	e& (Etisalat)	<b>BB:</b> 1-8% YoY	<ul style="list-style-type: none"> <li>FWA was earlier considered secondary to fiber, but more recently, it has assumed more significance, with the positioning of 5G as a cheaper alternative to fiber.</li> <li>5G FWA is used to: (1) upgrade users from 4G FWA or DSL; (2) bridge coverage gap - pureplay mobile operators have used it to enter BB and converged telcos have used it to expand BB offerings in remote areas; and (3) positioned it as an affordable offering with lower-tiered plans with more flexible commitments vs fiber.</li> </ul>
South Korea	SK Telekom, KT Corporation	<b>BB:</b> 1-3% YoY	<ul style="list-style-type: none"> <li>South Korea has seen one of the first to rollouts of 5G globally.</li> <li>Telcos are combining FWA with fiber to offer hybrid solutions, providing high-speed internet over fiber for urban areas and FWA for rural or underserved regions. This approach enhances the overall scalability and reliability of BB services.</li> </ul>

Source: Company, Axis Capital

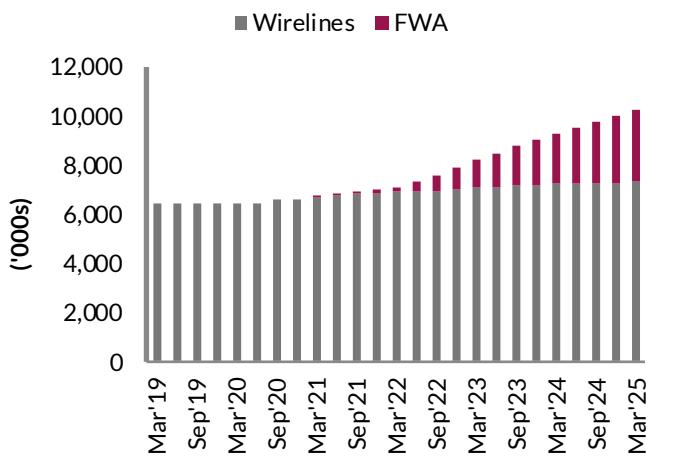
### Summaries across key markets

#### The US

##### Verizon: bullish on FWA – BB adds mainly on FWA

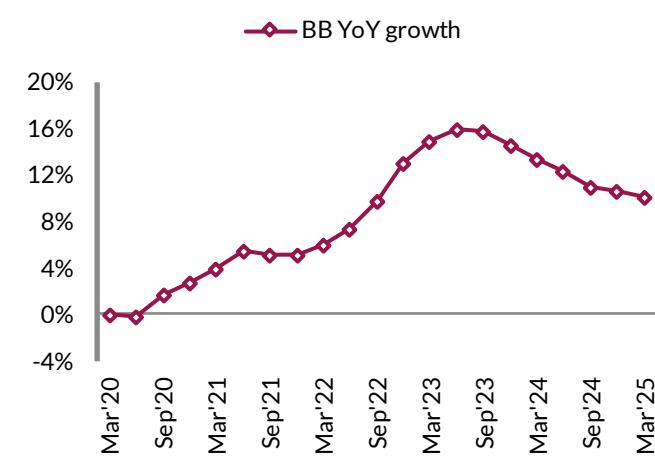
- Very bullish on FWA, a good product-market fit; forms ~30% of total BB subs, sees robust growth (supernormal growth until Mar'24 - post which has come off yet healthy at 40-60% YoY).
- FWA is also seeing healthy adoption on strong demand from the small businesses and enterprises segment. It is also seeing replacement demand where users are modernizing, replacing copper lines with FWA.
- FWA is being positioned as convenience and value for money, while fiber (Fios) is positioned as a reliable, high-quality product that is easy to set up.
- Till 8 mn-9 mn subs on FWA, the base can be managed by C-band rollout (specific portion of the mid-band spectrum – ~3.7-4.2 GHz), currently expanding C-band network to Tier-2/3 (suburban and rural).
- Despite being bullish on FWA, Verizon is also in talks to acquire Frontier Communications (pure-play fiber network provider), highlighting that fiber remains important.

**Exhibit 3: Verizon: Launched 5G FWA in Oct'18, started reporting separately Mar'21 onwards**

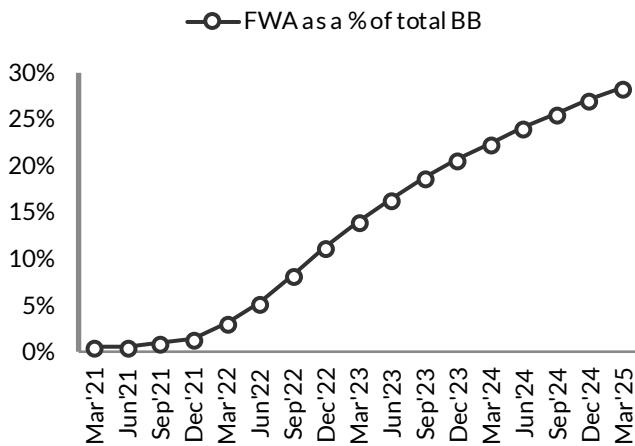


Source: Company, Axis Capital

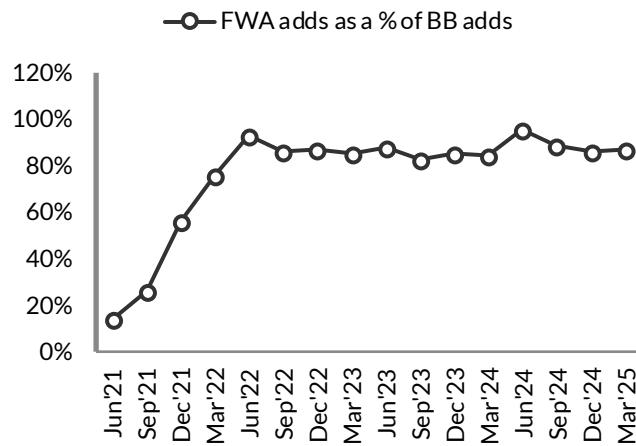
**Exhibit 4: Verizon: BB growth at 10-15% YoY**



Source: Company, Axis Capital

**Exhibit 5: Verizon: FWA subs forms ~30% of the total BB subs**


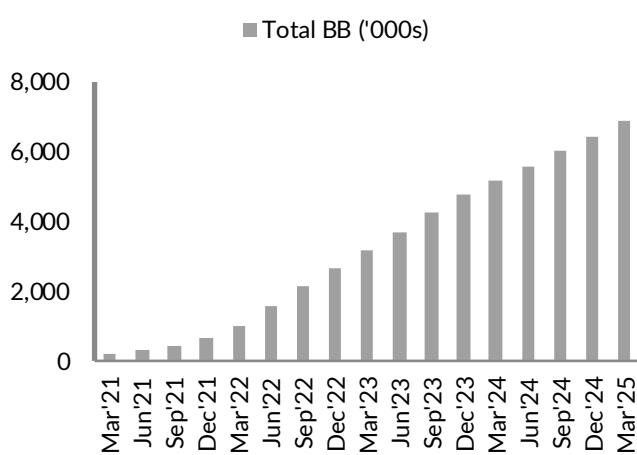
Source: Company, Axis Capital

**Exhibit 6: Verizon: FWA adds forms 85-90% of the BB adds**


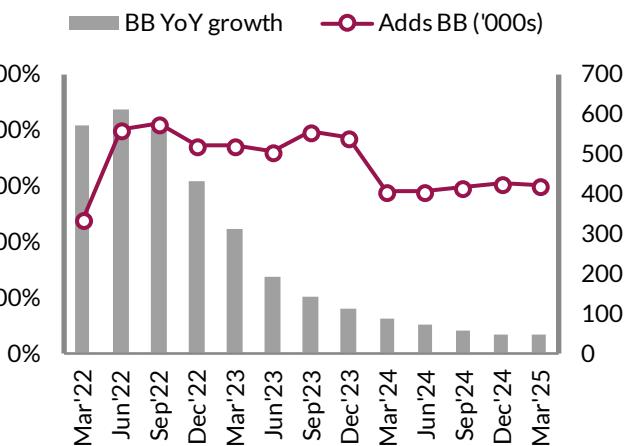
Source: Company, Axis Capital

**T-Mobile: More positive on fiber vs FWA, works on 'excess capacity' model for offering FWA**

- It is more bullish on fiber than FWA and believes returns are superior on fiber.
- The company believes that fiber and FWA are complementary. T-Mobile operates FWA in excess capacity model where it offers FWA in places with excess capacity which will not be consumed now or in the future by normal mobile usage. Where it sees no excess capacity, it moves the area to fiber.
- It has an FWA waitlist (~1 mn subs on the waitlist), which is yet to be approved, basis capacity availability.
- It approves subs for fixed BB, basis current capacity (and what is planned to come) so that sectors/towers are not saturated due to fixed wireless usage.
- Most of its FWA adds come from upgrade from cable/copper wire. T-Mobile gross adds have a higher salience to urban high-quality subscribers. However, it claims that smaller markets and rural areas are also important.
- The company is in talks to acquire Metronet (fiber internet provider) in a JV with KKR.

**Exhibit 7: T-Mobile: launched FWA in Apr'21**


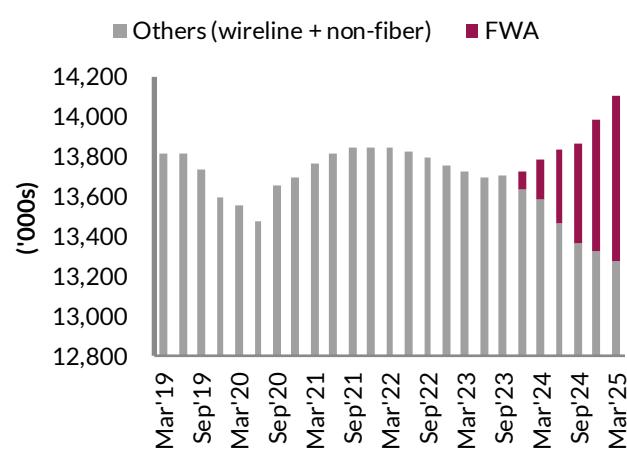
Source: Company, Axis Capital

**Exhibit 8: T-Mobile: BB growth is coming off mostly due to high base during Covid, subs adds largely steady**


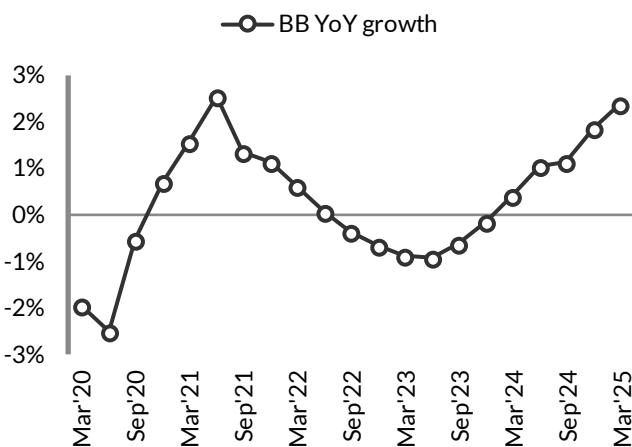
Source: Company, Axis Capital

**AT&T**

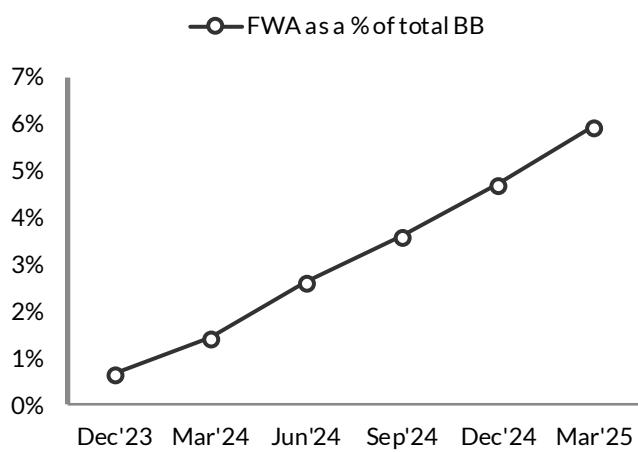
- Relatively new to FWA, which is still in the nascent stages of deployment vs Verizon and T-Mobile.
- AT&T seems bullish on fiber. However, it is seeing encouraging early performance of FWA (~6% of total BB subs) where it is focused on migrating copper-based internet subs to FWA.
- It is investing more in fiber, as the experience is better vs FWA, especially for high data streaming audience like single-family home, etc. AT&T seems keener to target small businesses with FWA where its use cases might be better served by fixed wireless instead of fixed fiber (e.g., a small coffee shop or a pet store).
- It is being selective on where to offer FWA. Its strategy for deployment depends on the catchment data usage and its spectrum availability (e.g., it can do incremental marketing to sell FWA in areas where mobility is low but spectrum position is high).

**Exhibit 9: AT&T: Launched 5G FWA in Aug'23**


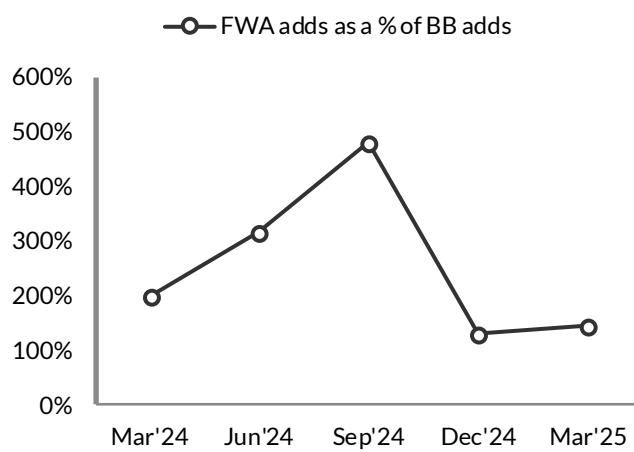
Source: Company, Axis Capital

**Exhibit 10: AT&T: BB growth at 1-3% YoY in the past few quarters; churn in non-fiber/copper offset by adds in fiber/FWA**


Source: Company, Axis Capital

**Exhibit 11: AT&T: FWA subs forms ~6% of the total BB subs**


Source: Company, Axis Capital

**Exhibit 12: AT&T: FWA adds forms 100%+ of the BB adds because there is migration/churn from non-fiber (copper lines)**


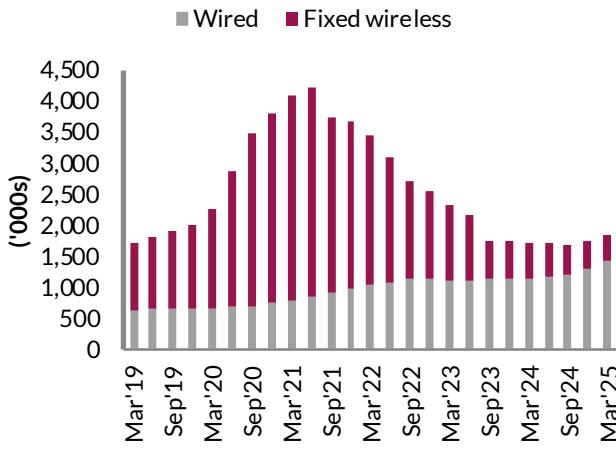
Source: Company, Axis Capital

### The Philippines

#### Globe Telecom

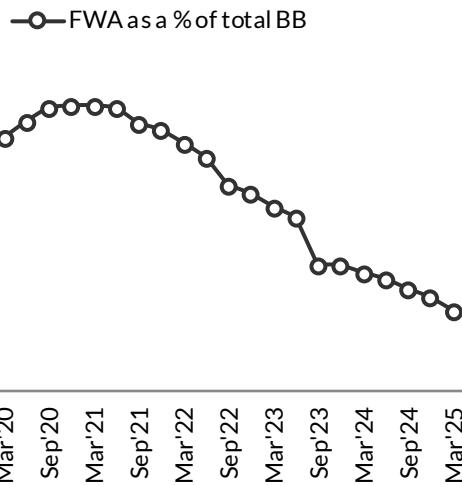
- Seeing healthy growth in fiber, while FWA is degrowing. Globe's current focus is on pre-paid fiber BB to tap into users who need affordability and flexibility in budget.
- We see subs migrating from FWA to fiber connectivity (deemed more stable) after the pandemic induced an FWA pickup. Globe is trying to make BB accessible and affordable through fiber with GFiber Pre-paid (GFP). This proposition helps to expand TAM for BB as it offers affordability and flexibility in BB.
- Thus, its goal is to move subs from fixed wireless to wired pre-paid. There seems to be oversaturation (viz. lower-quality users were acquired on post-paid basis during Covid when FWA was booming) in the post-paid segment, leading to a churn, which is why it introduced pre-paid BB offering to increase TAM.
- Globe also had 4G FWA, which is also seeing a drop. The decline in this segment is being offset by sustained expansion in fiber sub-base.
- FWA is positioned for users with lower data usage.
- It is not very bullish on FWA, but Globe believes there will still be opportunity in the Philippines to get into fixed wireless for basic home BB connection.

**Exhibit 13: Globe Telecom: Launched 5G FWA in Jun'19, one of the first markets in SE Asia to do so; it had 4G FWA earlier**



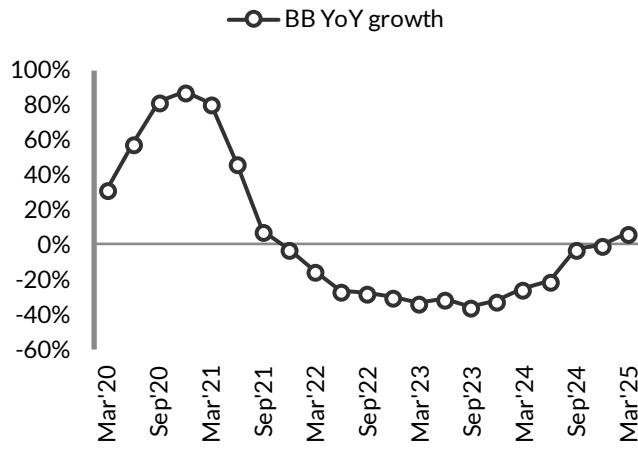
Source: Company, Axis Capital

**Exhibit 15: Globe Telecom: FWA proportion has come off from 81% of BB to ~23% due to migration to fiber (deemed superior); note that Globe had a longer history with FWA due to 4G FWA**



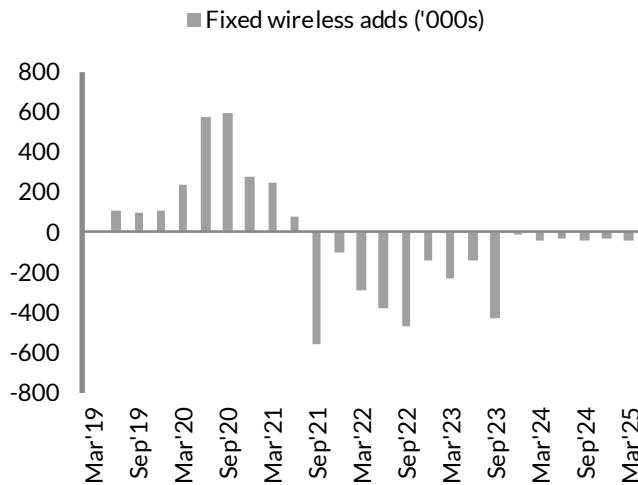
Source: Company, Axis Capital

**Exhibit 14: Globe Telecom: BB show flattish/de-growing trends due to subs loss in fixed wireless**



Source: Company, Axis Capital

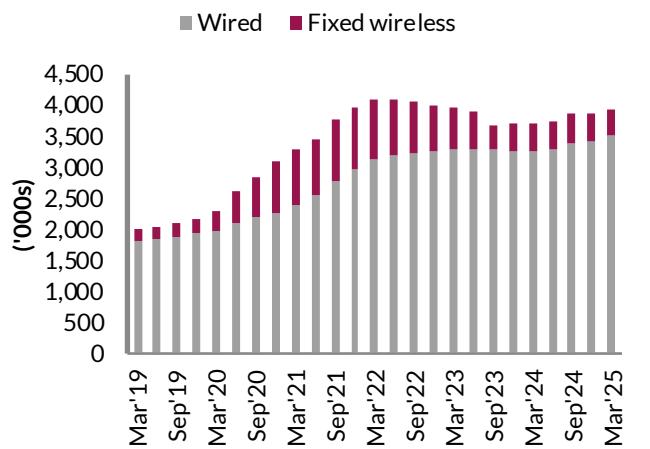
**Exhibit 16: Globe Telecom: FWA adds were high during Covid but came off subsequently as the demand for a stronger network arose**



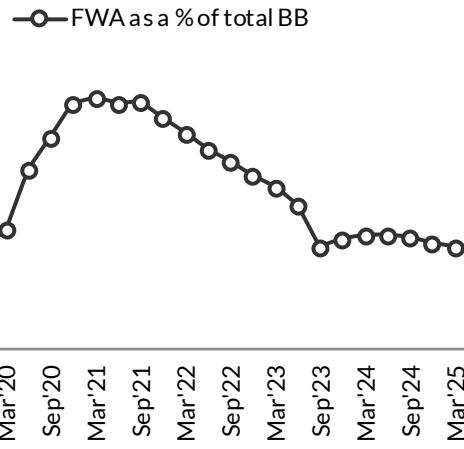
Source: Company, Axis Capital

#### PLDT

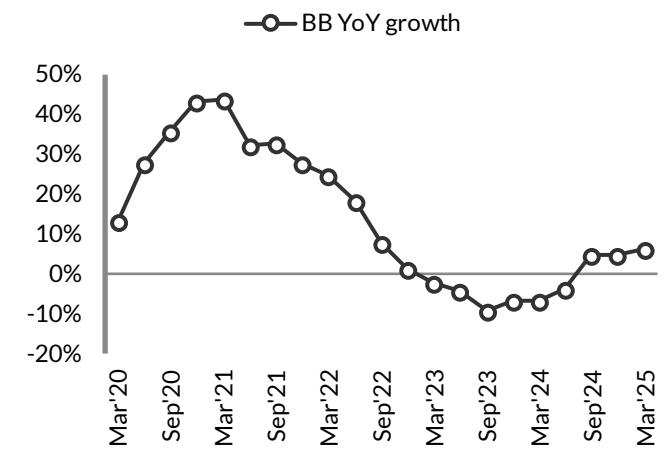
- Fiber forms 92% of its revenues in home services which is growing steadily with accelerating fiber installations. It is also tapping into affordable segment through bundling and seeing strong adoption for new BB products like Fiber Unli-All bundle which is a lower post-paid fiber plan.
- As is the case with Globe Telecom, we see the focus on affordability and increasing TAM. For this, PLDT has fiber plans which cater to a wider range of economic segments enabled by both fixed and wireless networks. It has varied offerings – it has Gigabit Fiber at the higher end, Fiber Unli-All Bundles for mainstream, and prepaid fiber and fixed wireless for low end.
- PLDT is using fixed wireless to broaden the market – enter markets where it does not have a footprint and targets different segments. For example, it is offering fixed wireless in areas without fiber facilities or to serve the lower-end market through fixed wireless pre-paid.

**Exhibit 17: PLDT: Launched 5G FWA in ~2019**


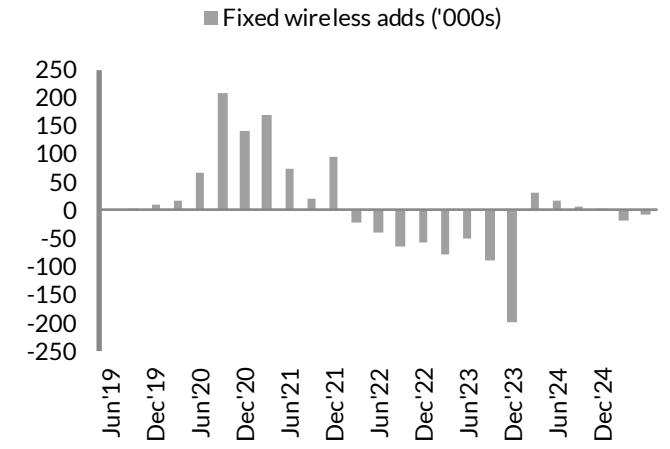
Source: Company, Axis Capital

**Exhibit 19: PLDT: FWA proportion has come off from 27% of BB to ~11% due to migration to fiber (deemed superior); note that Globe had a longer history with FWA due to 4G FWA**


Source: Company, Axis Capital

**Exhibit 18: PLDT: BB shows flattish/de-growing trends due to subs loss in fixed wireless**


Source: Company, Axis Capital

**Exhibit 20: PLDT: FWA adds were high during Covid but came off subsequently as the demand for a stronger network arose**


Source: Company, Axis Capital

## Germany

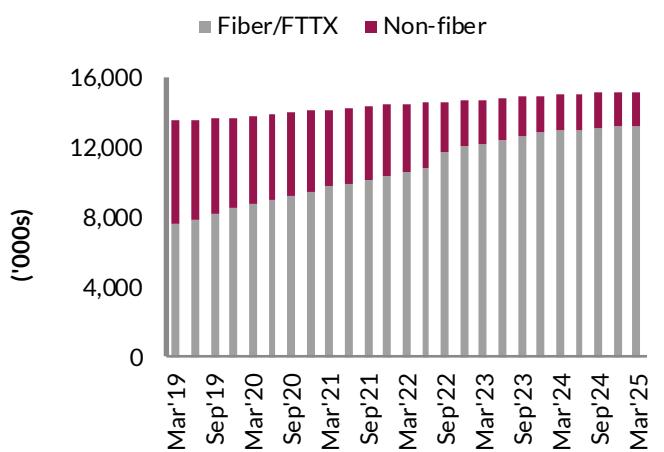
### Deutsche Telekom (DT)

- Fiber is the endgame here and is core to Deutsche Telekom due to its long-term scalability. Fixed wireless is also important and is currently being used to expand its footprint. It is driving fiber and fixed wireless push in rural areas. Cables/satellite is not the focus currently.
- The German BB market is mature and lately has been seeing some churn towards overbuilders and a commercially aggressive (read as aggressive on pricing) – Vodafone. Deutsche Telekom, on the other hand, is focusing on premiumization and value (quality-

oriented strategy) over volume, especially in BB, vs peers and believes in a 'more for more' strategy. It also focusses on convergence and upselling.

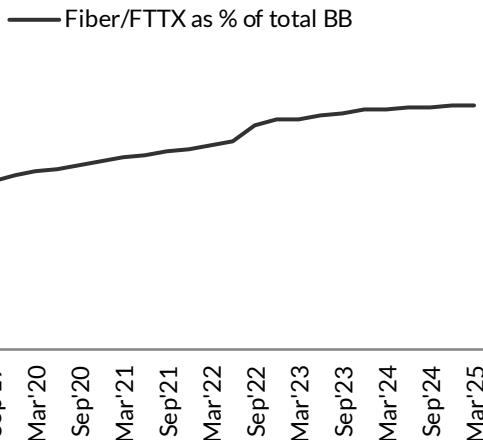
- DT prefers FWA to satcom currently and sees FWA as a substitute in rural areas instead of satcom as it is currently expanding its 5G network in those areas.
- Fiber infra utilization is high, and DT wants it to go beyond 20% utilization. Across Europe, DT is at ~34%. Therefore, it plans to continue with monetizing its fiber network.
- Switching from copper to fiber in Germany is a longer-term focus vs other countries, as copper switch-off is only possible in areas where FTTH is fully available.
- DT also has operations in the US (via T-Mobile) and has a similar view to T-Mobile. In the long term when mobile demand is high, fiber will be deployed. DT (through T-Mobile) in the US has also formed a JV with EQT's Infrastructure VI fund to acquire Lumos which is an FTTH platform. It has also (through T-Mobile) invested in a stake in Metronet.

**Exhibit 21: Deutsch Telekom: launched 5G FWA in 2023 with an offering called 'Hybrid 5G'**



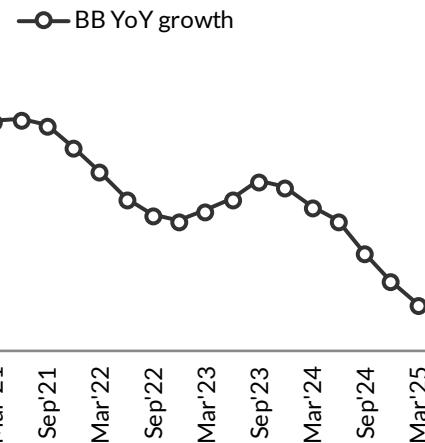
Source: Company, Axis Capital; Note: Here, Fiber/FTTX includes all FTTx accesses (e.g. fiber to the home, fiber to the curb, vectoring, etc).

**Exhibit 23: Deutsch Telekom: Fiber/FTTX proportions rise as telco migrates copper users to FTTX**



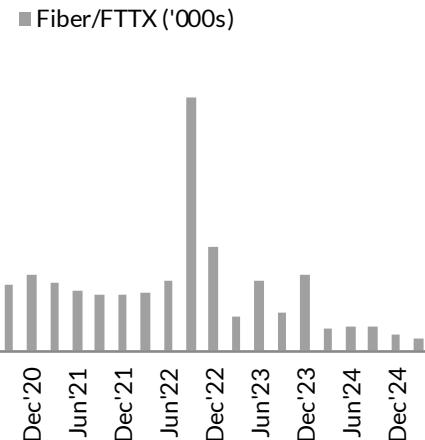
Source: Company, Axis Capital; Note: Here, Fiber/FTTX includes all FTTx accesses (e.g. fiber to the home, fiber to the curb, vectoring, etc).

**Exhibit 22: Deutsch Telekom: Germany has a relatively mature BB market and is seeing churn in non-fiber on high competition, thus shows relatively flattish YoY BB growth**



Source: Company, Axis Capital

**Exhibit 24: Deutsch Telekom: Sees a decline in fiber/FTTX adds, as it sees high churn in non-fiber and high competition in BB**

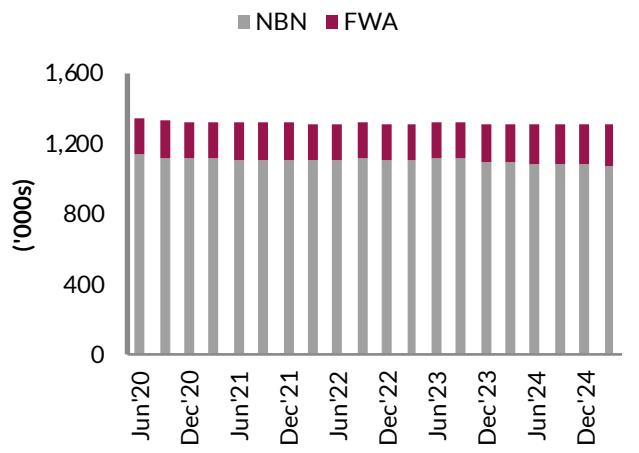


Source: Company, Axis Capital; Note: Here, Fiber/FTTX includes all FTTx accesses (e.g. fiber to the home, fiber to the curb, vectoring, etc).

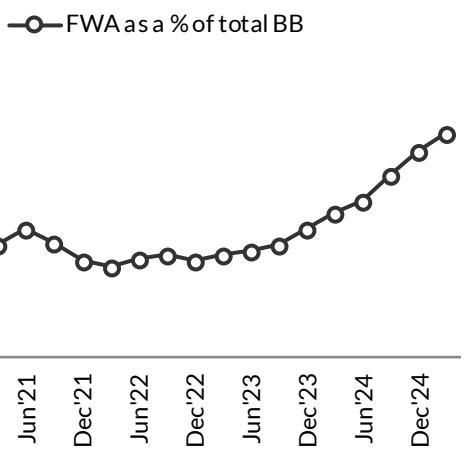
## Australia

### Optus

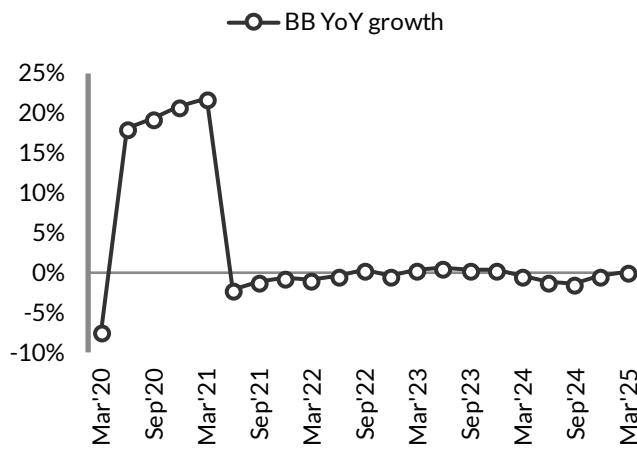
- FWA seems popular in Australia, as seen in the growing share of FWA as % of total BB and ACCC's Internet Activity report (Australian Competition and Consumer Commission).
- Home customer base is stable, as growth in FWA is offset by a decline in the NBN base.
- There seems to be high competition in FWA (especially in 2023), leading to higher price competition, evidenced in lower FWA revenues. However, FWA uptake remains healthy as 5G continues to grow.
- Optus recently signed a new MVNO agreement with Aussie BB. It provides Aussie BB the opportunity to offer Optus's wholesale network experience (including full access to Optus's mobile network, 5G, fixed wireless access, and mobile back-up services) to all of its consumers, enterprise, and government customers, especially in the regional areas.

**Exhibit 25: Optus: Launched 5G FWA in 2019**


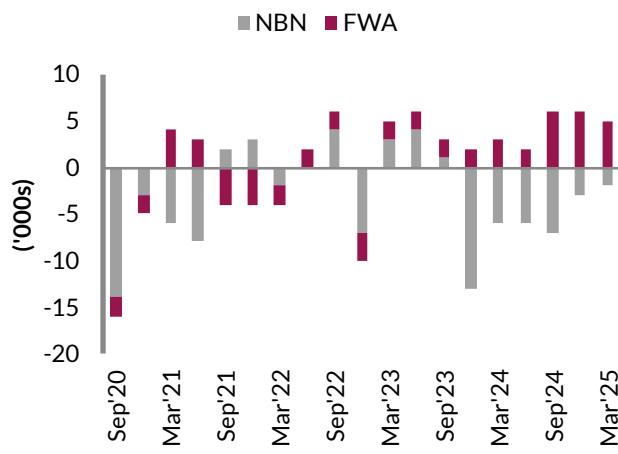
Source: Company, Axis Capital

**Exhibit 27: Optus: FWA proportion has inched up from ~15% to ~18%, largely on churn in NBN**


Source: Company, Axis Capital

**Exhibit 26: Optus: BB show degrowth in NBN**


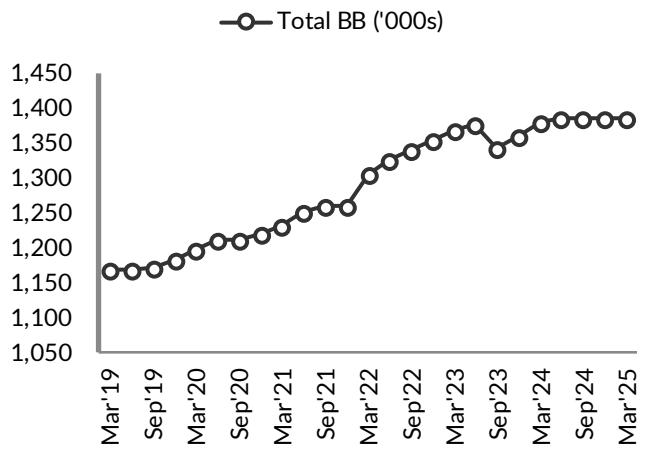
Source: Company, Axis Capital

**Exhibit 28: Optus: FWA adds offset the losses scene in NBN**


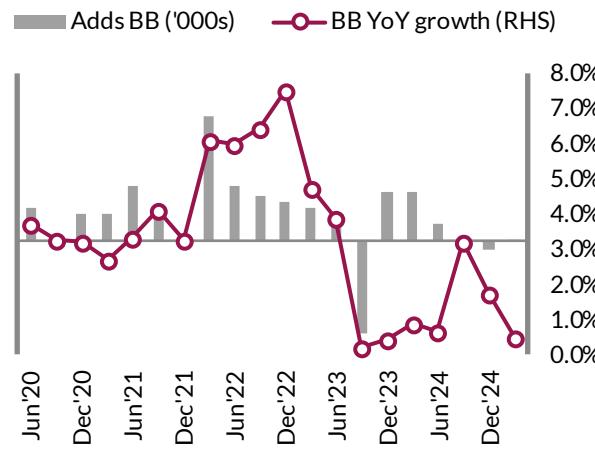
Source: Company, Axis Capital

**GCC**

- Gulf was one of the early adopters of 4G/5G FWA; it also has 4G FWA since 2021. 5G FWA in the Middle East has aided the affordability and reach aspect of BB, making it more accessible to the broader population.
- FWA has traditionally been considered secondary to fiber, but its significance has grown with the positioning of 5G as a cheaper alternative to fiber, particularly in areas of low coverage. It also saw accelerated growth as the telcos shifted from data-capped plans to unlimited data plans.
- Earlier, telcos focused on expanding fiber as part of transitioning from old technologies like DSL and viewed FWA as a secondary offering. However, in larger countries where fiber rollout was slower (e.g., Oman), telcos realized the potential of 5G FWA to penetrate BB market deeper. Thus, both FWA and fiber are being pushed – telcos are offering FWA and actively promoting fiber.
- 5G FWA is used to: (1) upgrade users from 4G FWA or DSL; (2) bridge coverage gap – pure-play mobile operators have used it to enter BB and converged telcos have used it to expand BB offerings in remote areas; and (3) positioned it as an affordable offering with lower-tiered plans with more flexible commitments vs fiber.

**Exhibit 29: Etisalat UAE: Launched FWA in 2021**


Source: Company, Axis Capital

**Exhibit 30: Etisalat UAE: BB adds saw a boost with FWA**


Source: Company, Axis Capital

## Mexico

### America Movil

- No active mention of FWA/fixed wireless. The trends mostly include upgrading customers to fiber (from copper) as it tries to grow fiber network in Mexico (greenfield and brownfield). Nearly 90% of BB subs are on fiber.
- Working with different satcom providers like Starlink and OneWeb to roll out satcom. However, satcom is likely to be offered in rural areas where it is more expensive to roll out fiber or use FWA.

## Indonesia

- 5G spectrum is a bottleneck, as the spectrum has not yet fully reached potential and remains limited. Thus, the telcos cannot go all out on 5G FWA. However, there is FWA on 4G.
- Indonesia's government plans to auction 1.4 GHz spectrum for fiber/FWA services. However, it is yet to see a rollout, explaining the relative delay in a full-fledged 5G FWA launch.
- Here too, FWA is seen as a proposition to increase BB penetration in the country. It is also positioned as an affordable BB solution to help BB penetrate deeper.

## FWA – leading the way to improved 5G capacity utilization

The enterprise business was likely to be one of the key drivers of 5G around the time of its launch, as the digitization of enterprises scaled up. Edge-computing and IoT were expected to usher in a wave of opportunities for SA 5G for use-cases like autonomous vehicles, AR/VR, manufacturing and energy sectors, telemedicine/biotechnology, etc. However, the enterprise use-cases have not yet become mainstream. Meanwhile, operators have incurred billions on rolling out 5G network.

FWA, on the other hand, has become a major driver of 5G network utilization. FWA has existed for some time, even during 4G, but did not gain momentum until the 5G launch. This is because the primary constraint was bandwidth availability, given the significantly higher data usage on BB network compared to mobile devices. The launch of 5G, which provides 10x-100x more capacity and higher data throughput rates than 4G, has given the necessary impetus for FWA to now become a mainstream service.

FWA is a win-win for telcos and subscribers. From an operator perspective, it is capex-light, helps improve network utilization, and reduces time to market vs fiber BB. From a consumer perspective, they get BB access, which may not have been possible in some cases on fiber due to commercial considerations or difficulty in getting right-of-way for rolling fiber network.

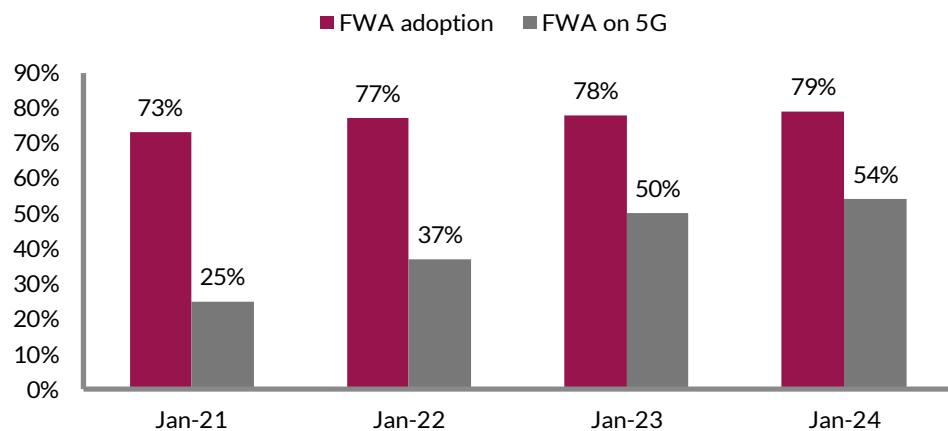
### 5G FWA is an attractive offering by operators and comes with multiple benefits

- 5G improves the network capacity manifold. Telcos can thus improve their network utilization by offering both mobility and BB services on the same network.
- The fiber build-out is not only costly but requires upfront investments by first rolling out the last-mile fiber for home passes and then waiting for subscribers to activate the service. The conversion from home pass to actual activation of the service also happens with a lag and that too is not certain, as the general conversion rate is 30-40%. FWA is capital-efficient and reduces operators' time to market.
- The mmWave spectrum may have limited coverage (mmWave cells are generally configured to support cell ranges of up to about 600 m) but can help operators with its high capacity and throughput compared to the mid-band spectrum. It is therefore optimal for providing high-speed (can reach gigabit speeds), low-latency, and high-capacity services in specific use-cases such as airports, stadiums, factories, etc.
- FWA also helps to target enterprises, as operators can bundle fixed and FWA for enterprises, though standalone FWA itself will be sufficient for most SMEs.

### The case against FWA

- FWA data consumption can be significantly higher than mobile data traffic. Therefore, the network can get filled much faster than expected. This is the reason some operators like T-Mobile and AT&T work on the excess capacity model, i.e. they deploy FWA where they see mobile data consumption will still spare availability of surplus capacity.
- In India, specifically, the already-low data tariffs and high data allowances could pose a hurdle for FWA. We believe that while mobile plans already come with high data allowances, BB's data needs are significantly higher and will not be fulfilled by using mobile allowances in many cases.

### Global FWA trends

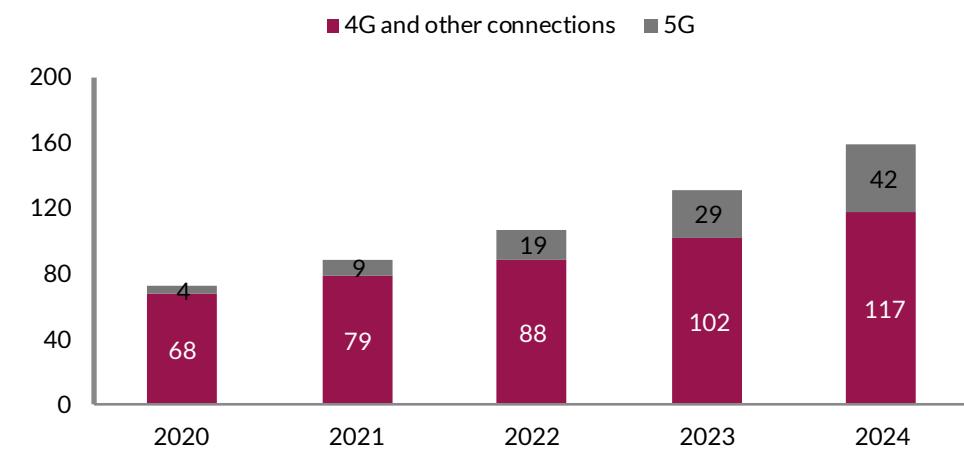
**Exhibit 31: FWA adoption by telcos**


Source: Axis Capital, Ericsson

**Exhibit 32: Region-wise FWA adoption**

	N America	Western Europe	Central and Eastern Europe	Middle East and Africa	Asia Pacific	Latin America
FWA adoption	100%	94%	85%	83%	65%	53%
FWA on 5G	89%	78%	46%	43%	66%	22%

Source: Company, Ericsson

**Exhibit 33: Global FWA subscriber trends (mn)**


Source: Axis Capital, Ericsson

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