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## **IAFI<sup>1</sup>**

### **FURTHER UPDATES TO WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT NEW REPORT ITU-R M.[IMT-FOR-FWBB-ACCESS]**

#### **Technical and operational feasibility of providing fixed wireless broadband access using IMT technology in mobile service bands identified for IMT**

## **1 Introduction**

During the 51st meeting of Working Party 5D, contributions were provided to advance the working document towards a preliminary draft new Report on the use of IMT technology for fixed wireless broadband access.

## **2 Proposal**

This contribution provides editorial updates and technical clarifications to improve the readability, consistency, and completeness of the current working document. The specific proposed modifications are detailed in the Annexure-1, as attached.

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<sup>1</sup> IAFI is a sector Member of ITU-R. For more details, please see <https://iafi.in>.

## **Annexure-1**

### **Annex 3.8 to Working Party 5D Chair's Report**

#### **WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT NEW REPORT ITU-R M.[IMT-FOR-FWBB-ACCESS]**

### **Technical and operational feasibility of providing fixed wireless broadband access using IMT technology in mobile service bands identified for IMT**

#### **1 Scope**

This report discusses the technical and operational feasibility of using IMT technology for providing wireless broadband access to stationary users. The report describes the expected characteristics of Wireless broadband servicesolutions for using IMT to provide internet access for various scenarios – homes, small-offices building. The Report would also include ability to serve mobile broadband as well as fixed wireless broadband from the same IMT infrastructure. Consideration of IMT for FWA applications in this report is limited to the bands allocated to mobile service and identified for IMT in the Radio Regulations.

#### **2 Background**

The evolution of IMT has enabled new use cases and broadband applications into the marketplace. FWA has emerged as one such use case that offers cost-efficient and reliable consumer and enterprise wireless broadband connectivity, without extensive last-mile infrastructure expenditures and with much shorter deployment times. By using wireless links between fixed points – a nearby tower and an antenna on the customer's premises, IMT-based FWA provides a high bandwidth broadband connection. FWA solutions also address the needs of customers in rural or otherwise underserved communities with minimal or no wired connection for reliable and affordable high-speed internet access. By late 2025, FWA has transitioned from an emerging use case of IMT to a primary driver of IMT-2020 monetization globally. According to a recent study, FWA connections are projected to reach 1.4 billion by 2031, with 90 percent of these being delivered over 5G networks. In major markets like India (in India 11 million FWA customers and almost equal number in urban and rural area) and North America, 5G FWA has become the leading technology for bridging the digital divide, offering a viable alternative to fiber-to-the-home (FTTH) in both urban and rural settings."

### **3 IMT for wireless broadband**

**FWA is a way of providing high-speed wireless broadband connectivity using point-to-multipoint links between fixed points – such as a cell tower and customer home or business, instead of laying fiber-optic or cable lines. Essentially, it is a last-mile method capable of delivering multi-gigabit connectivity speeds with simple self-installation methods that allow for quick deployments. Newer generations of wireless technology such as IMT-Advanced (4G) have improved IMT-based FWA and have expanded coverage mirroring that of existing mobile networks. Advancements in IMT-2020 network technologies have significantly improved the download, upload and latency capabilities of IMT-based FWA services. By leveraging advances in wireless network technologies like IMT-2020, a FWA connection can potentially deliver sustained download speeds of 10 Gbps serving various distances based on the frequency band of operation. Demand for Fixed Wireless Access (FWA) has been increasing with projected growth in both enterprise and consumer areas<sup>2</sup>. FWA devices exhibit different mobility characteristics and traffic compared to existing eMBB-oriented IMT-2020 network architectures. This provides opportunities for solutions that can further improve spectrum efficiency and economies of scale for FWA are essential to ensure the long-term success of the business model. Mobile operators seek to enhance FWA's functionality by optimizing systems, such as physical layer (PHY) optimizations, to better address the needs of FWA users. By optimizing key elements like mobility management, control channel overhead, and other PHY layer enhancements, network capacity could be significantly increased to meet the higher bandwidth demands of fixed users. Mid-band spectrum, which balances data capacity and reliable coverage, and millimeter wave spectrum, which offers greater capacity and lower latency, offer spectral efficiencies that allow wireless providers to offer competitive speeds while minimizing the cost of new tower deployments required for full market coverage. Moreover, the advantages of the mid-band can be effective at extending IMT-2020 FWA networks, particularly into underserved markets like rural communities. The average household now has multiple, high-bandwidth devices operating simultaneously, serving multiple purposes. With IMT-2020 FWA advances, this technology can deliver high-speed broadband connectivity. Given that upgrades to IMT-based FWA service will rely upon the same standards and equipment of IMT-2020 and future mobile network generations, this interoperability makes IMT-based FWA relatively future-proof and scalable. As advanced IMT-2020 technology rolls out with high-band spectrum (e.g.**

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<sup>2</sup> Tefficient FWA Tracker 2024, <https://tefficient.com/analysis/tefficients-fwa-tracker/>

**above 10 GHz), will have 10 to 100 times more capacity than IMT-Advanced (4G), allowing for increasingly higher –and potentially symmetrical– download and upload speeds. Additionally, future IMT-2020-enabled FWA services will provide ultra-reliable service with under 10 millisecond latencies that are critical to many emerging 5G use cases. Advancements in IMT-2020 Advanced (3GPP Release 18/19) have introduced Lower-layer Triggered Mobility (LTM) and MIMO enhancements specifically tailored for Fixed Wireless Access (FWA). These features enable near-zero-interruption handovers and simultaneous multi-panel uplink transmissions, allowing FWA Customer Premise Equipment (CPE) to support up to 8 antenna ports in the uplink. This significantly boosts capacity for 'uplink-heavy' modern applications, such as AI-driven content creation and real-time cloud collaboration, ensuring FWA remains a robust alternative to fiber.**

#### **4 Technical features of IMT enabling FWA**

Even though FWA is not new, IMT-2020 has allowed for significant improvements to the quality of IMT-based FWA services.

- Network. In legacy network architecture, capital and operational expenditures are largely driven by the deployment of radio access networks (RAN). Network function virtualization (NFV) and software-defined networking (SDN) enable improved RAN economics and network optimization, by enabling **Virtualised RAN (vRAN)** and **Open RAN** architectures. By leveraging these IMT-2020 network innovations, operators can achieve better economics by virtualizing RAN to flexibly manage download and upload capacity based on real-time user requirements. When integrated with 5G-Advanced improvements in **spectral efficiency** and **Massive MIMO beamforming**, these virtualized networks allow operators to optimize hardware utilization, reduce 'per-bit' costs, and maximize overall network performance."
- Potential air interface optimization for better spectrum efficiency.
- MNO selectable RAN signalling and protocols optimized to support fixed wireless access deployment.
- Support for link adaptation, channel estimation, and RRM schemes that leverage the unique characteristics of FWA user profiles (mobility, usage pattern etc).
- Device capabilities tailored for FWA.– – RAN architecture options.

IMT Beamforming and beam management for coverage - FWA can use **High-Gain Narrow Beams**, much narrower beams than mobile because the location is fixed.

- Multi-user MIMO - **8-Layer DL / 4-to-8-Layer UL MIMO**: Maximizing spatial multiplexing for high-density housing.– Network Slicing.
- Consumer Premise Equipment (CPE) with enhanced capabilities such as higher number of Rx/Tx elements, HPUE, signalling optimization, multi-band and Carrier Aggregation support.
- Indoor and Outdoor Equipment. Outdoor CPE are often deployed on a wall or roof of the premises (usually by professional installation), to ensure Line-of-Sight (LoS) or near-LoS. Indoor CPE are placed in the premises at a location that customer determines

it can obtain the best signal. As a result, indoor CPEs allow for cost-efficient and quick deployments, and it is widely preferred by the operators.

- CPEs with integrated signalling optimization; self-aligning antennas and improved beam forming that reduce the need for professional installation while improving link robustness and built-in diagnostic tools that guide users via mobile apps to the "sweet spot" in their home, bridging the performance gap between indoor and outdoor deployments.

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## 5 Operational and deployment features

Since IMT-based FWA uses point-to-multipoint radio links to connect network access units (AUs) with consumer premise equipment (CPEs) installed in homes and businesses, new subscribers can be granted broadband access through simple self-installation methods, instead of requiring time-intensive traditional installations.

### 5.1 Rural and underserved communities

High-speed broadband connectivity has become increasingly important to unlock economic opportunities, quality education, access to healthcare and civic participation. A stable video stream is integral to many of these connectivity use cases and requires a high-speed broadband connection at home. In rural areas, however, such bandwidth is often much harder to come by. Fixed Wireless Access (FWA), powered by IMT technology, offers a robust, high-speed connectivity option that can serve these unserved and underserved areas.

### 5.2 Cost advantage of FWA

In rural and remote regions where the cost of laying fiber is quite expensive, due to low population density, IMT-powered provides a high-capacity alternative.

### 5.3 Rapid scalability

By leveraging existing macro-cell sites and wide-area coverage bands, FWA can bridge the "Digital Divide" far more quickly than fiber, delivering "fiber-like" experiences to previously un-served and under-served populations.

**Fixed Wireless Access (FWA) offers a distinct advantage over wired systems by reducing deployment times from months to days. Its support for subscriber self-installation eliminates professional site visits, significantly lowering costs. Moreover, FWA's cost-effectiveness scales with distance and terrain complexity, making it a superior, scalable solution for rural and underserved areas**

Summary

TBD