ngFWA's Unique Level of Appendix A Compliance

The NTIA's June '25 BEAD update highlights the significant potential utility of tapping the large amount of mid-band (primarily 6 GHz) spectrum reserved for free, unlicensed operation in the US. The NTIA believes this potential can be reached by systems that meet specific technical and operational requirements to address the interference and capacity constraints that hindered unlicensed fixed wireless (ULFW) networks as a class in the past.

The vast majority of legacy ULFW systems from all vendors in the market today are based on WiFi chipsets (see endnote on page 3). While many of the ULFW radio vendors attempt to improve the characteristics of their systems by writing custom firmware, the basic capabilities of the available WiFi silicon, particularly in the physical layer, limit their ability to implement many of the features needed for high-performance, reliable operation.

The summary below shows the extent to which Tarana next-generation fixed wireless access (ngFWA) systems employ the mitigation strategies outlined in Appendix A for common ULFW performance concerns—namely interference, capacity limits, and challenges with measurability and predictability. For contrast, we have also included comparisons with WiFi chipset-based systems modified for FWA. The insights are drawn from the technical underpinnings of each approach along with the real-world experience of Tarana's large and active nationwide service provider community.

Mitigating Interference	**ngFWA**	**WiFi**
Beamforming at base radios	●	◑
Beamforming at remote radios	●	○
Active null-forming	●	○
Interference mitigation technology	●	○
Advanced NLoS capabilities	●	○
Reserved base capacity	●	◔
Conservative link budgets	●	◑
Supporting Network Capability		
≥ 5 Mbps simultaneous to all BSLs	●	○

Support Levels: Full ●
Partial ◑
None ○

And the comparative assessment in more detail . . .

Mitigation Approach	ngFWA Support	WiFi Technology Support
Active beamforming at base radio	Yes — adapting 5,000 times per second with high precision; enables resilient performance despite motion and obstructions in the communication channel (e.g. trees and buildings)	Yes — with slow adaptation (~10 refinements per second) and coarse placement; very susceptible to motion and obstructions.
Active beamforming at remote radio	Yes, as above	No in most implementations, very low efficacy when attempted.
Active null-forming	Yes, adapting 5,000 times per second, with deep, precise nulls placed adaptively at both base and remote radios, in both directions	No
Other interference mitigation technology	(1) Real-time burst interference cancellation, capable of ignoring interference even when the signal is up to 10,000x stronger than the signal of interest — delivers steady performance in noisy environments (2) Interference-aware base node (BN) actively avoids persistent interference	No — a significant technology gap that drives performance degradation as radio interference levels rise over time
Advanced non-line-of-sight capabilities	Yes — high-precision digital multipath integration, with typically 1000x improvement over baseline faded signal combination	No
Reserved base capacity	Yes, with up to 6.4 Gbps capacity per sector. Superior spectral efficiency keeps sector capacity high even with high subscriber counts.	Difficult - with severe limitations by significantly limiting subscriber counts per access point and tower thereby increasing self-interference, and network failure points.

Mitigation Approach	ngFWA Support	WiFi Technology Support
Conservative link budgets	Yes, but less necessary given ample gains from advanced digital beamforming and nulling techniques noted above	Yes — by limiting range and constraining links to clear LoS, which reduces reliability and maintainability through increased network complexity
Best practices in minimum signal strength for speed, latency requirements	Yes. Signal management well demonstrated for supporting hundreds of Mbps/sec with <10 ms latency on average, in dynamic NLoS channels	Yes, achieved by limiting operation to small numbers of clean, stable, LoS channels and small numbers of subscribers
≥ 5 Mbps simultaneous capacity	Yes. Even at 100 subs per sector capacity >5–10x the required 5 Mbps	No. Impossible to affirm as interference mitigation cannot maintain performance in even moderately noisy environments, common in ULFW.
Adherence to manufacturer's stated best practices (e.g. # of and bandwidth per subscriber)	Yes — demonstrated support of up to 200 subscribers per sector across a wide range of operator practices and site circumstances	Yes, but a small fraction of ngFWA subscriber counts per sector and average speeds

Note that most of the chipsets powering unlicensed-band systems from Cambium (ePMP), Mimosa, and Ubiquiti (Wave) are based on off-the-shelf WiFi (a.k.a. IEEE 802.11 in the industry jargon) technology, designed for best-efforts, shared service delivery in noisy, free-for-all spectrum. It is difficult to achieve short- and long-term reliability with WiFi-based outdoor radios given their very limited ability to adapt to the constantly-changing communication-channel circumstances that are common in the application.

Definitions	
Active Beam-Forming	Continuously adjusting and directing radio signals in precise directions to enhance transmission and/or avoid interference
Active Null-Forming	Continuously adjusting antennas to ignore signals from certain directions – like muting talkers that are not of interest
Multipath Integration	Receiving multiple reflections or diffractions of the same signal and recombining them to strengthen and improve reliability of the signal
802.11	The IEEE standard that defines WiFi, the most common chipset used for legacy FWA