Rethinking Broadband Wi-Fi for next era alignment with 6G

We are incrementing in a time of disruptive change

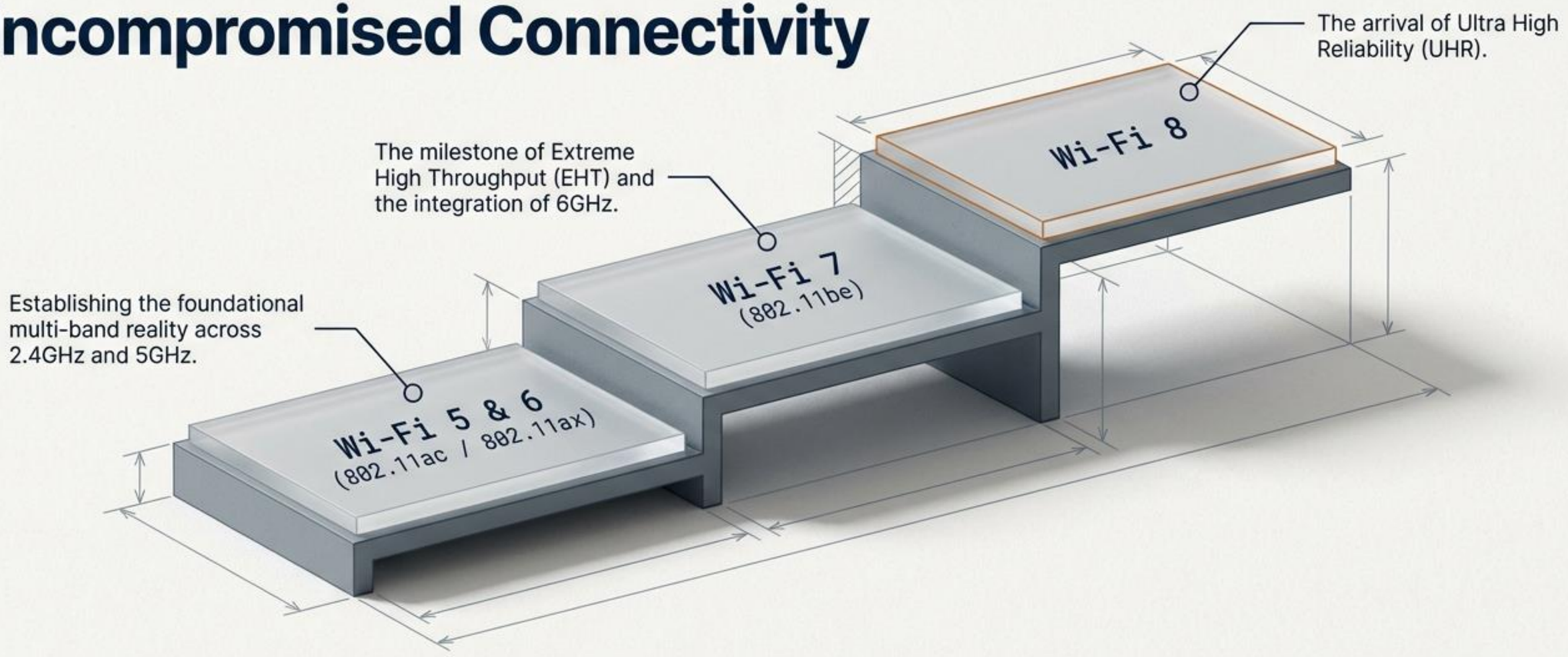
Do we need a fresh look at how we shape the Wi-Fi home

Create some discussion on potential areas of change

Looking for you to help define improvement areas to work

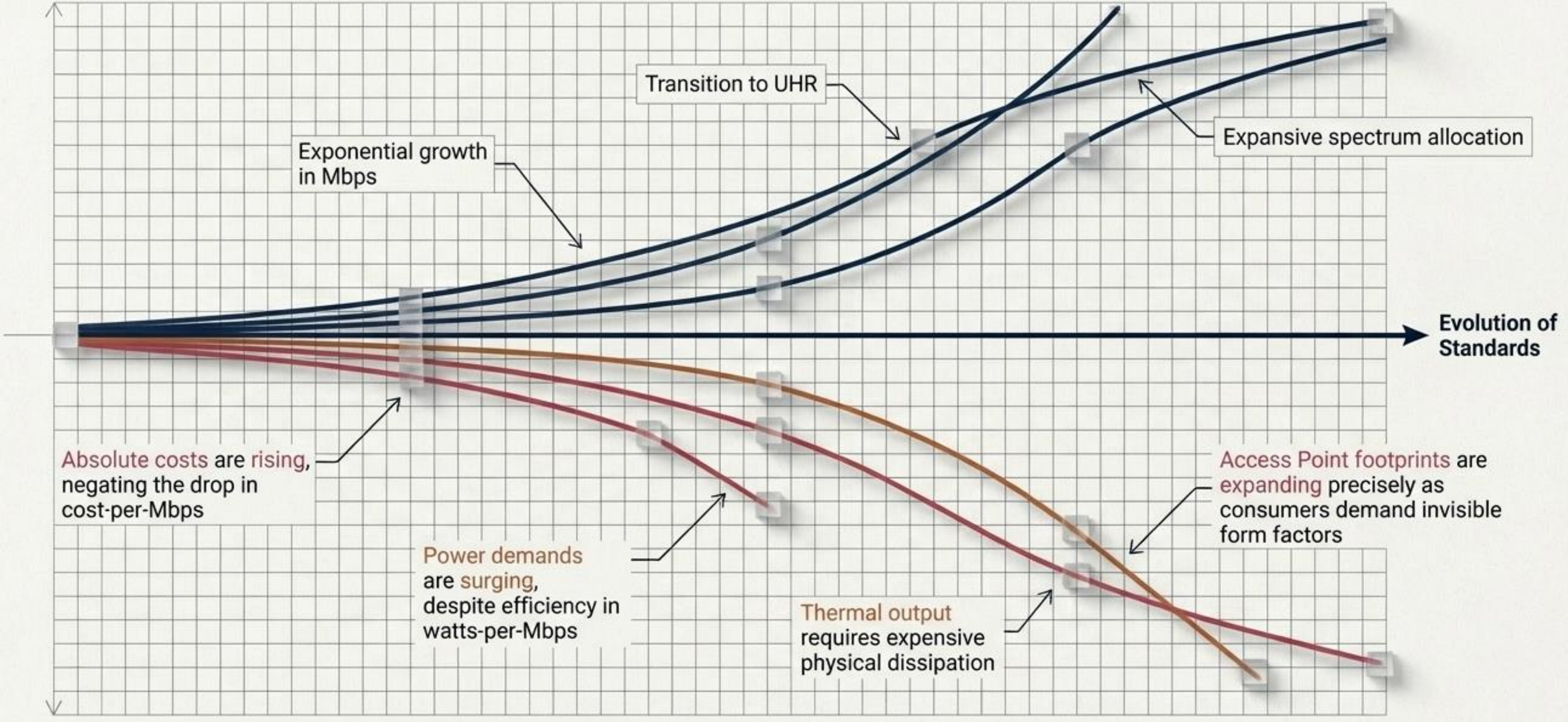
Drive and track progress to next IEEE, WFA and Silicon definitions

The Relentless Pursuit of Uncompromised Connectivity



We have engineered a reality where speed, spectrum diversity, and absolute reliability coexist. But this performance apex masks an underlying architectural crisis.

The Hidden Tax of the Four-Year Standard Cadence



The Home Gateway Resource Collision

Innovation trajectories have fundamentally decoupled. Wi-Fi elements, compute functionality, and memory architecture are no longer aligned.

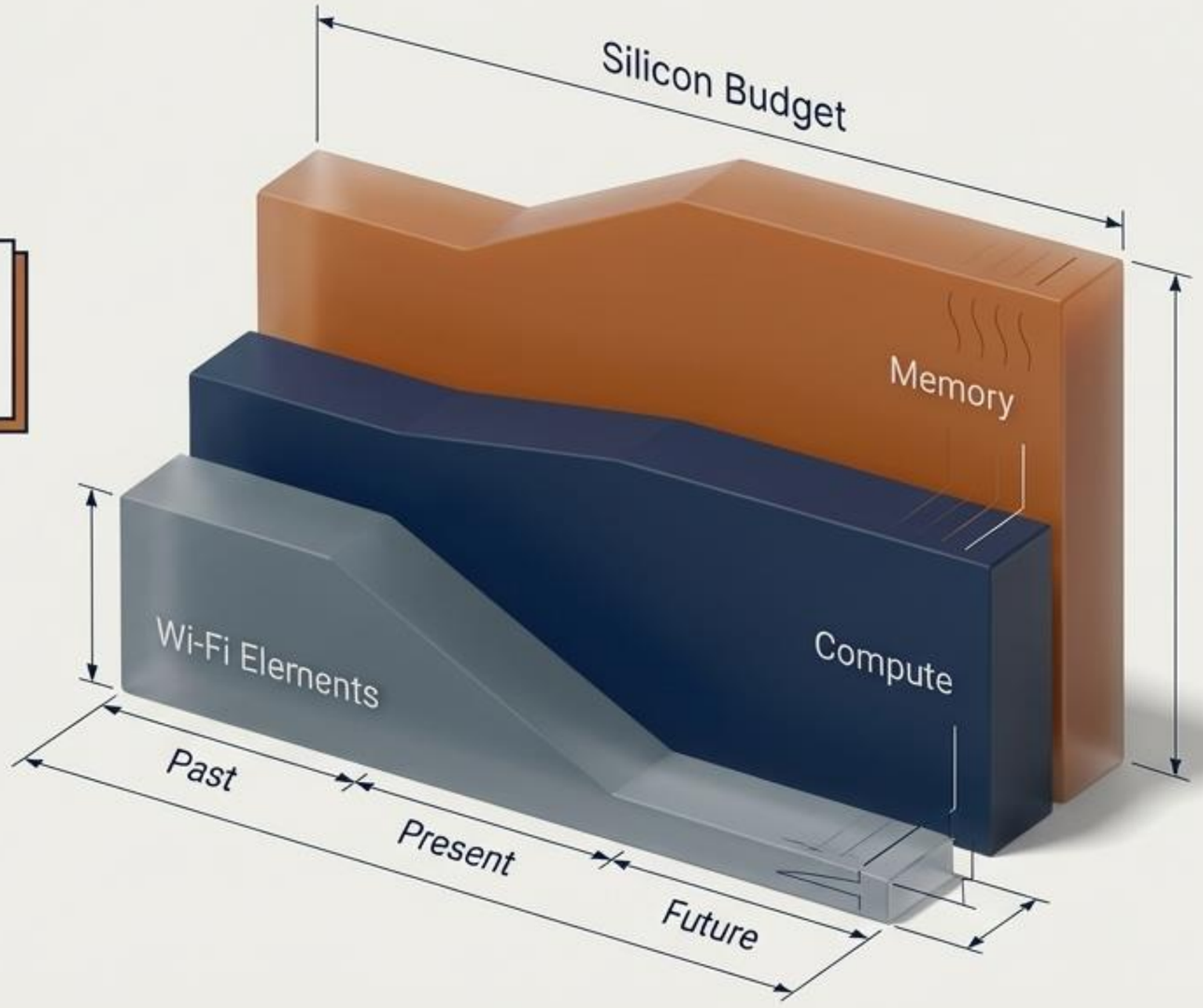
Resource Drivers

Compute

Dictated by Edge AI models, local containerised applications, and WAN redundancy requirements (chasing 6 nines of availability).

Memory

Dictated by the heavy demands of concurrent local AI processing, not routing or radio management.



If the ROI potential of Edge AI dictates the hardware direction, why are we still designing gateways around the radio?

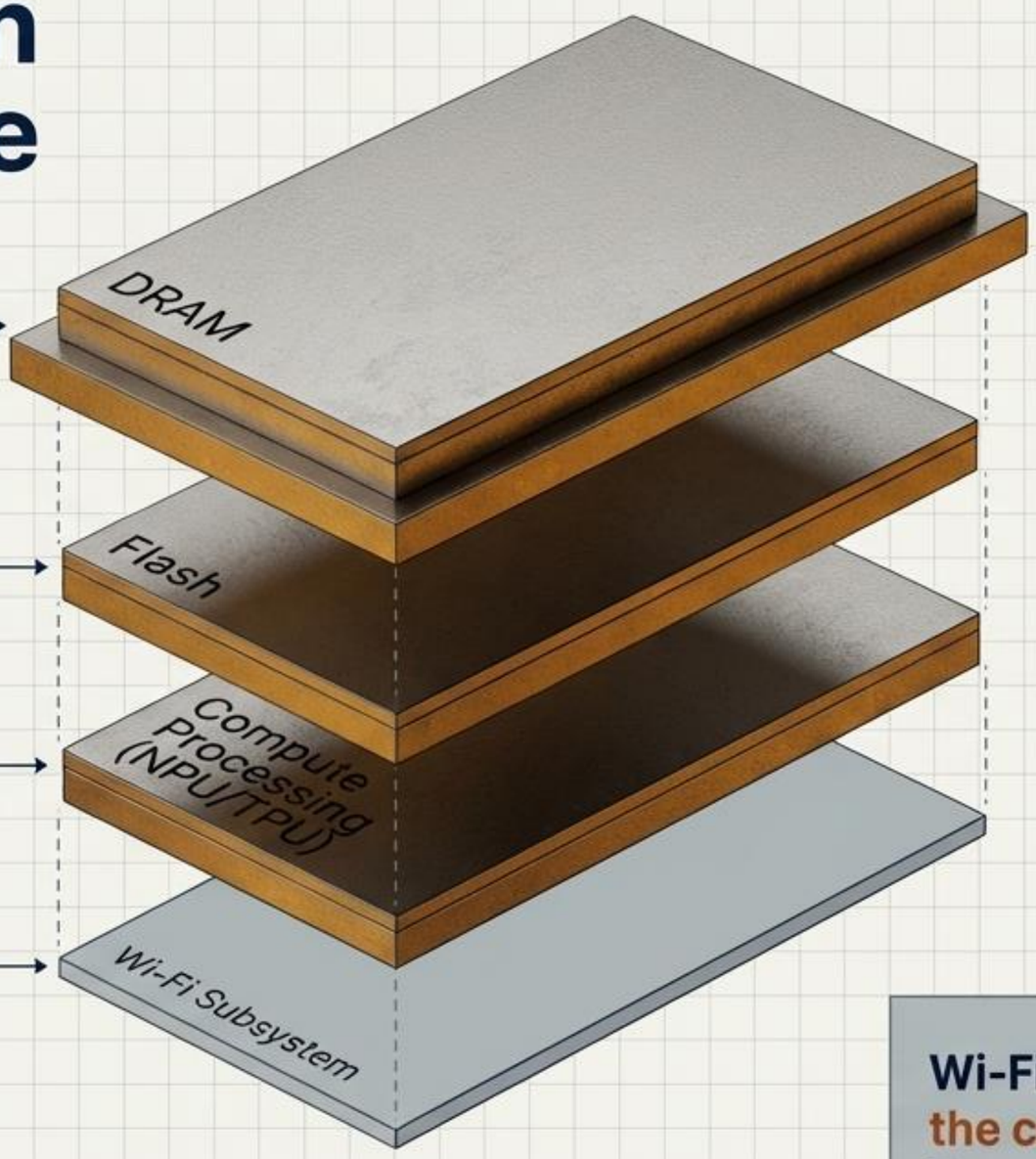
Inside the Modern Workload Pipeline

DRAM Layer: Hosting concurrent AI models and local applications to ensure local data privacy (video, audio, telemetry inferred at the edge).

Flash Layer: Supporting AI memory and maintaining the behavioural history and potential Soul.md of the home.

Compute Processing: Token-per-second performance now dictates silicon cost and selection.

Wi-Fi Subsystem: Now 90%+ controlled purely at the MAC layer.



Wi-Fi 8 and 9 do not drive the cost factors of the Broadband Gateway.

The Death of the Monolithic Gateway

1. WAN Device: Fibre ONT paired with 5G backup and integrated power redundancy.

2. The Home Server: Dedicated Edge AI, compute, application hosting, and the primary routing stack with independent power backup.

3. The Wi-Fi AP: Stripped of heavy compute. Minimal memory. Designed exclusively to run the Wi-Fi MAC and Radio.

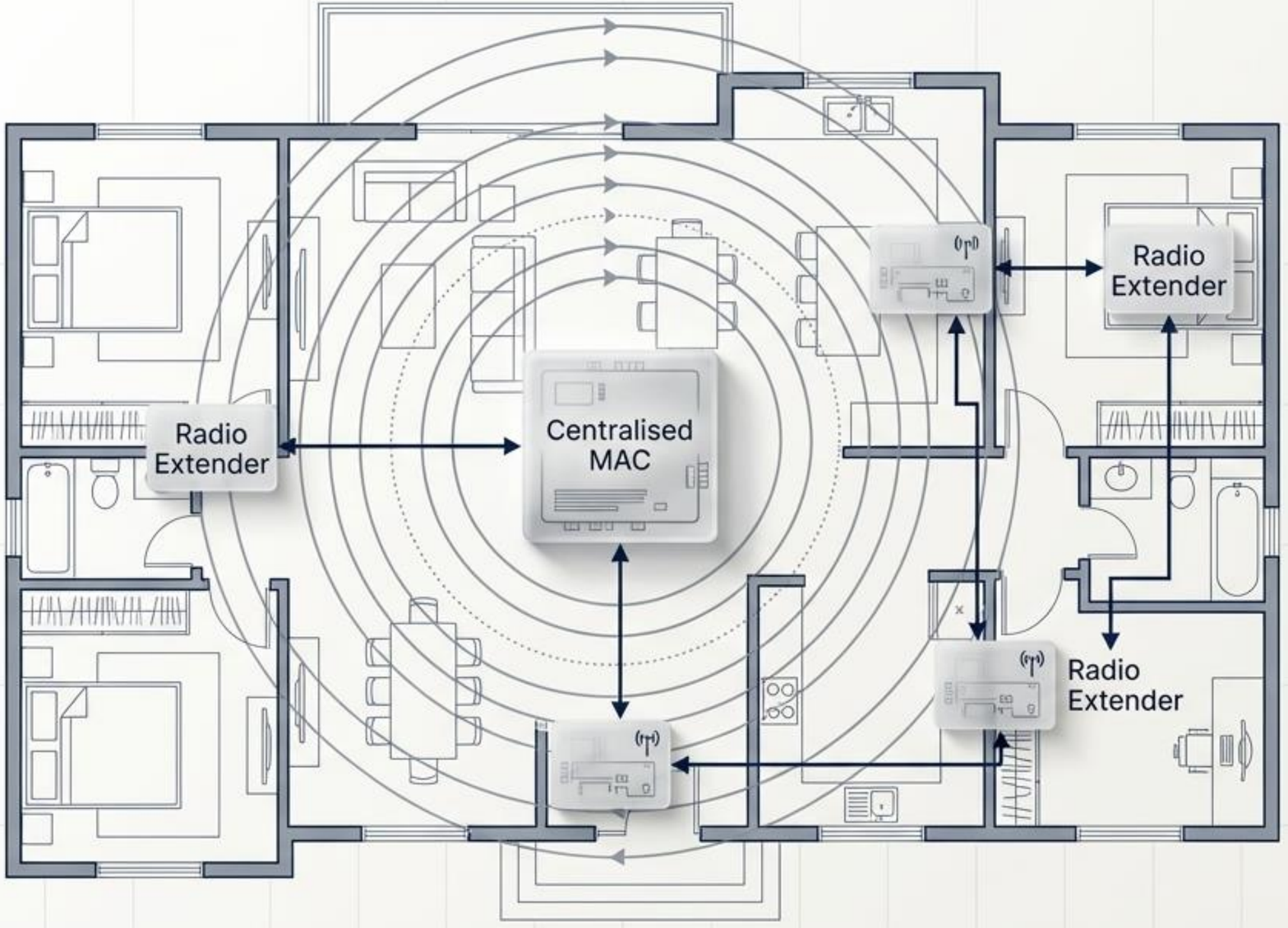
The All-in-One Gateway

3-Box Disaggregated Solution

Architectural Diagnostic: Monolith vs. Disaggregation

The Gateway Evolution Matrix		
	Traditional Monolithic GW	**Disaggregated 3-Box Solution**
Cost Allocation	Compromised, shared silicon budget	**Optimised, dedicated budgets per function**
Point of Failure	Single node vulnerability	**Isolated redundancy**
Edge AI Capability	Constrained by thermal limits of the AP	**Uncapped, isolated server cooling**
Wi-Fi Extensibility	Requires fully duplicated heavy APs	**Low-cost, lightweight radio drops**
WAN Redundancy	Limited to single interface	**True 6 nines via dedicated Fibre/5G node**

The O-RAN-ification of the Home Network



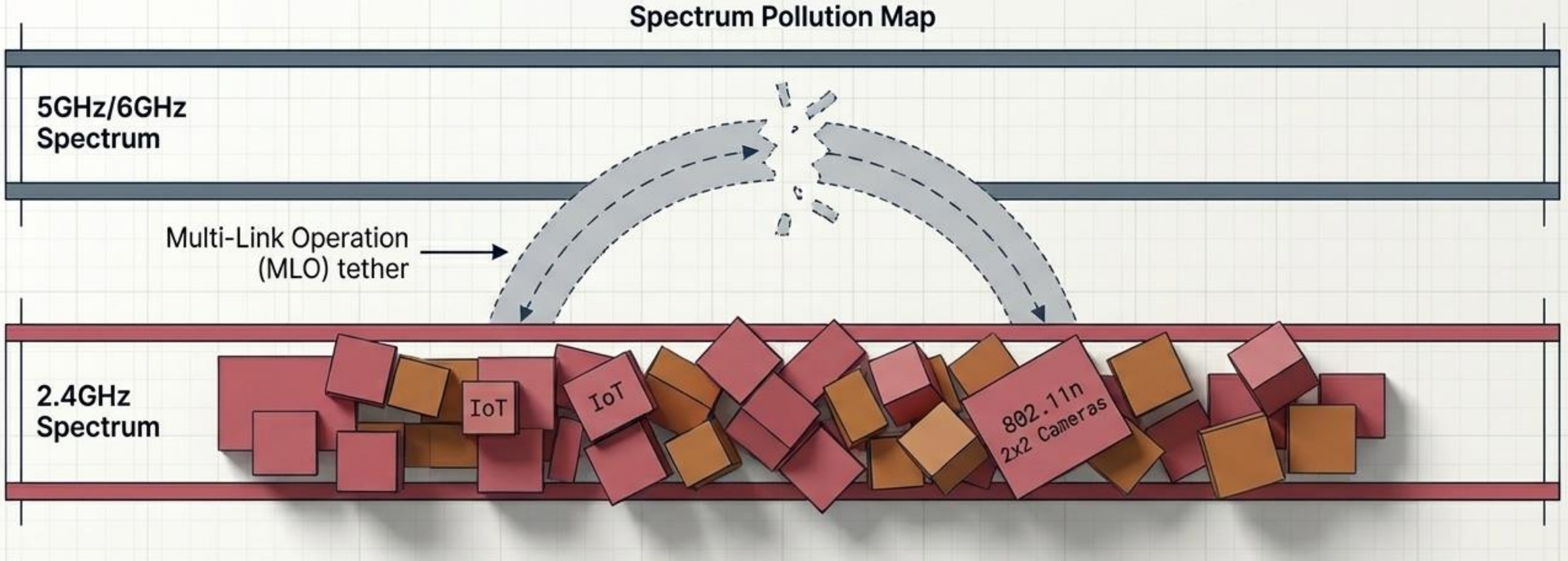
The Mechanism

- A single MAC controls the entire home domain.
- Adding an extender no longer adds a competing router; it simply adds a Radio Unit (RU) to the existing MAC domain.

The Benefits

- Drastically lower cost for Wi-Fi extender devices.
- Mesh networks in every room become financially viable.
- Centralised control eliminates collisions, elevating reliability.
- Timing control governs radio transmission, offloading synchronisation overhead.

The 2.4GHz Pollution Crisis



The Problem

Low-cost IoT devices and legacy cameras are generating massive noise on the 2.4GHz band.

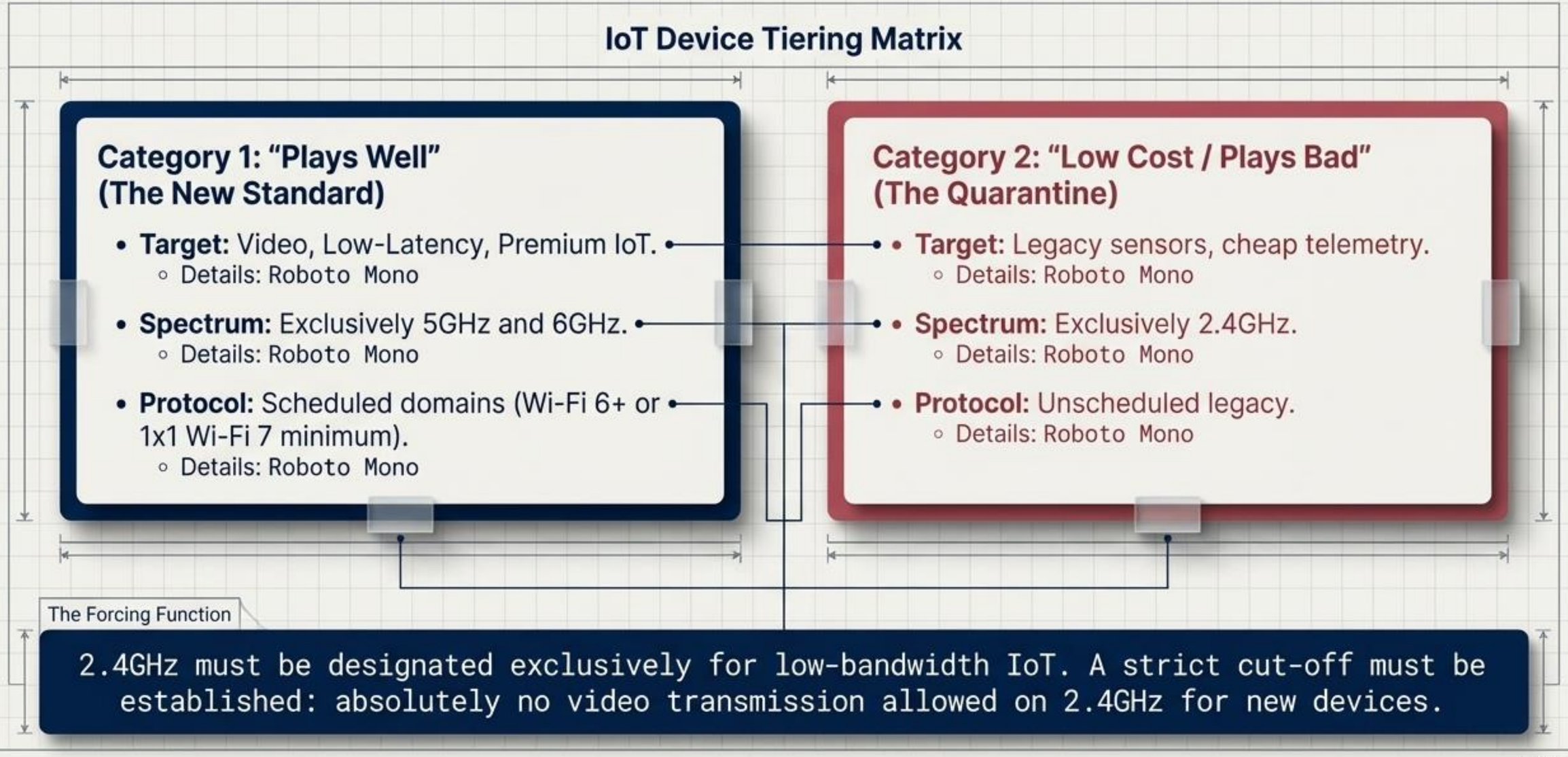
The Impact

Primary services that fall back to 2.4GHz, or attempt to leverage it via MLO, are severely degraded by unscheduled, long-range 802.11n traffic.

The Provocation

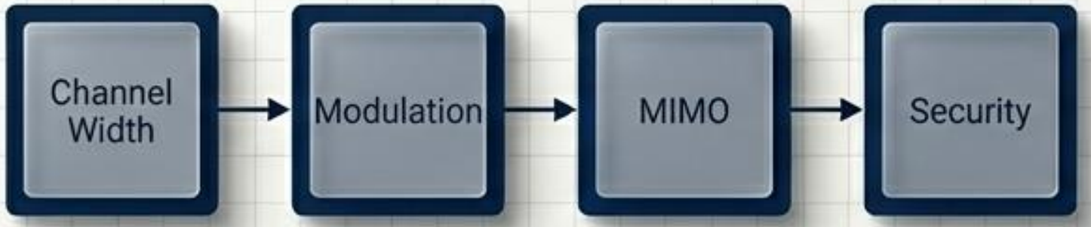
Optimising spectrum use is now more critical than simply chasing more spectrum.

Enforcing Spectrum Quarantine

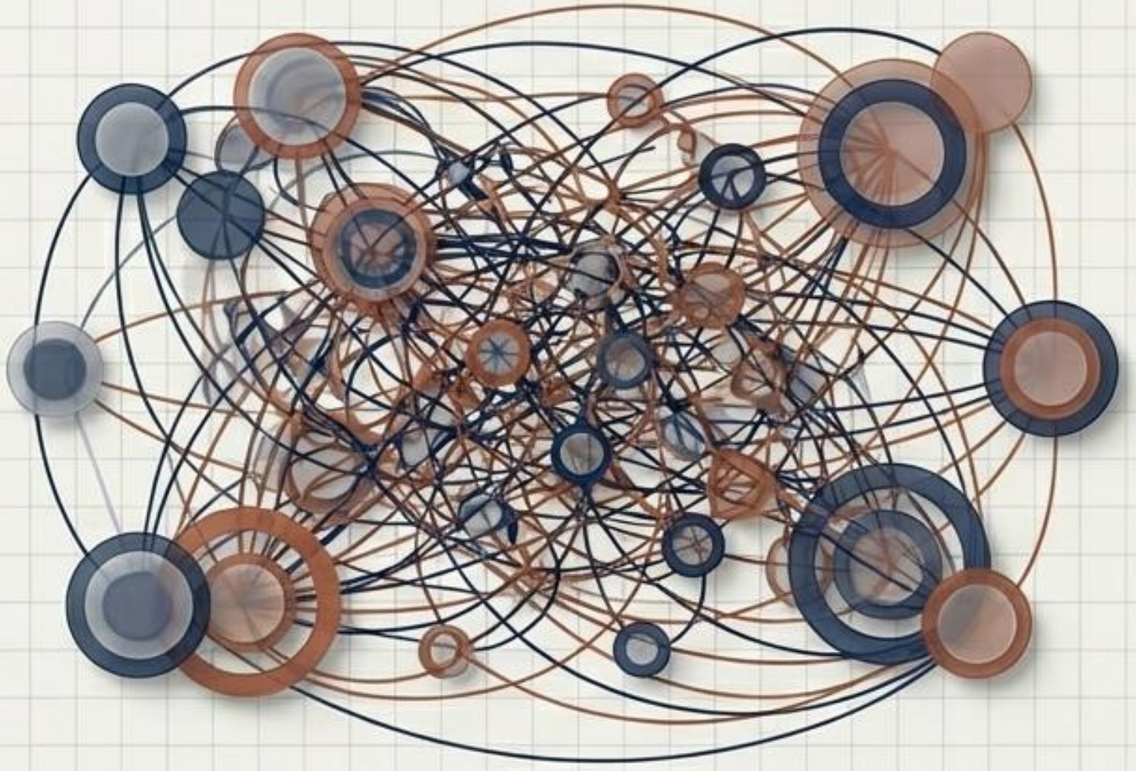


The Impenetrable Complexity of Wi-Fi 8

Wi-Fi 5 Parameter Flow



Wi-Fi 8 Parameter Correlation



The Reality

Wi-Fi 8 features are too complex to visualise, let alone manually configure. Features risk going unused due to implementation friction.

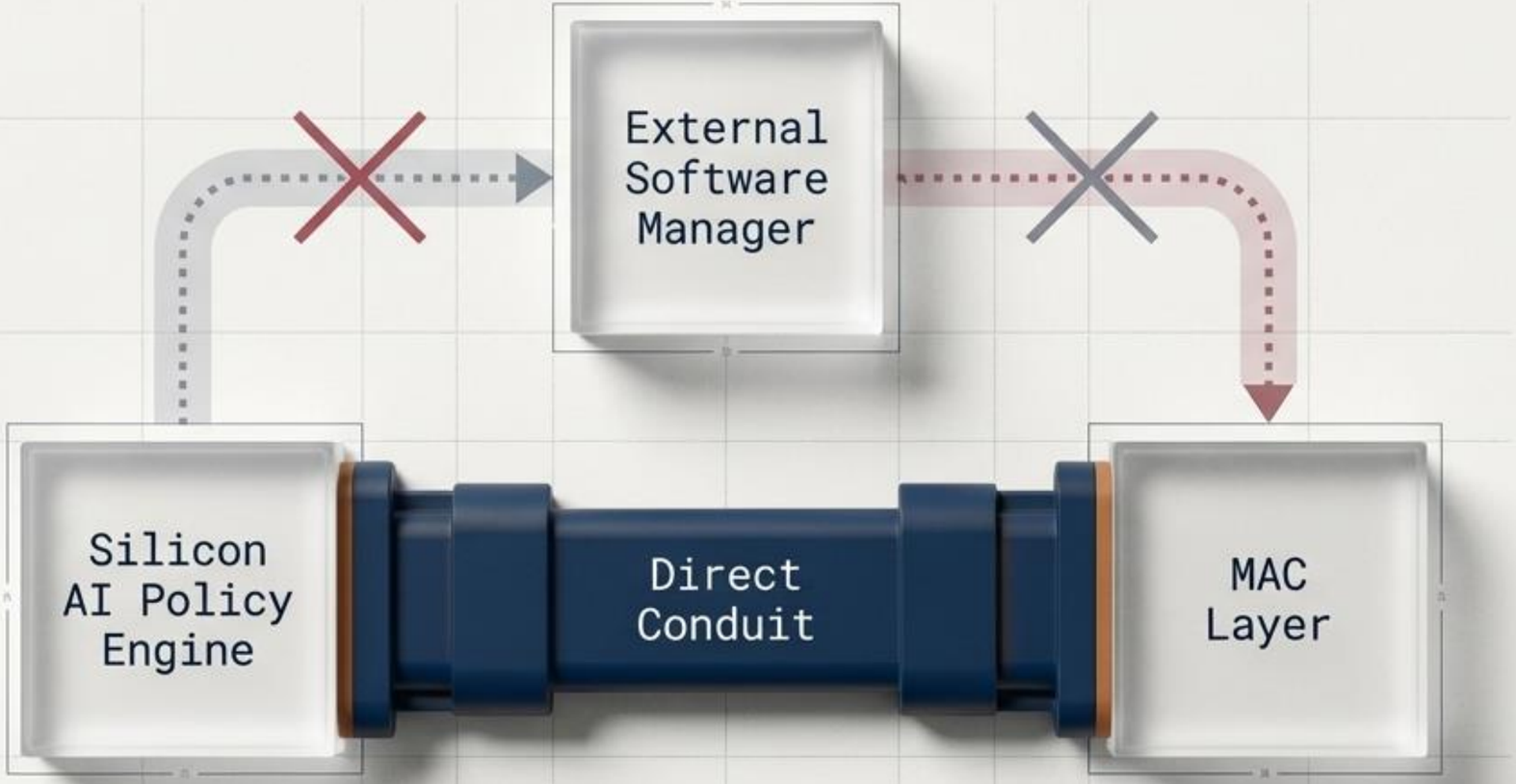
The Variables

Coordinated Spatial Reuse, Coordinated Beamforming, Per Spatial Stream Modulation, Seamless Mobility Domains, AP Time Synchro.

The Consequence

Debugging the correlation across spectrum, spatial reuse, and legacy/scheduled clients is now impossible for human engineers.

The Obsolescence of External Management



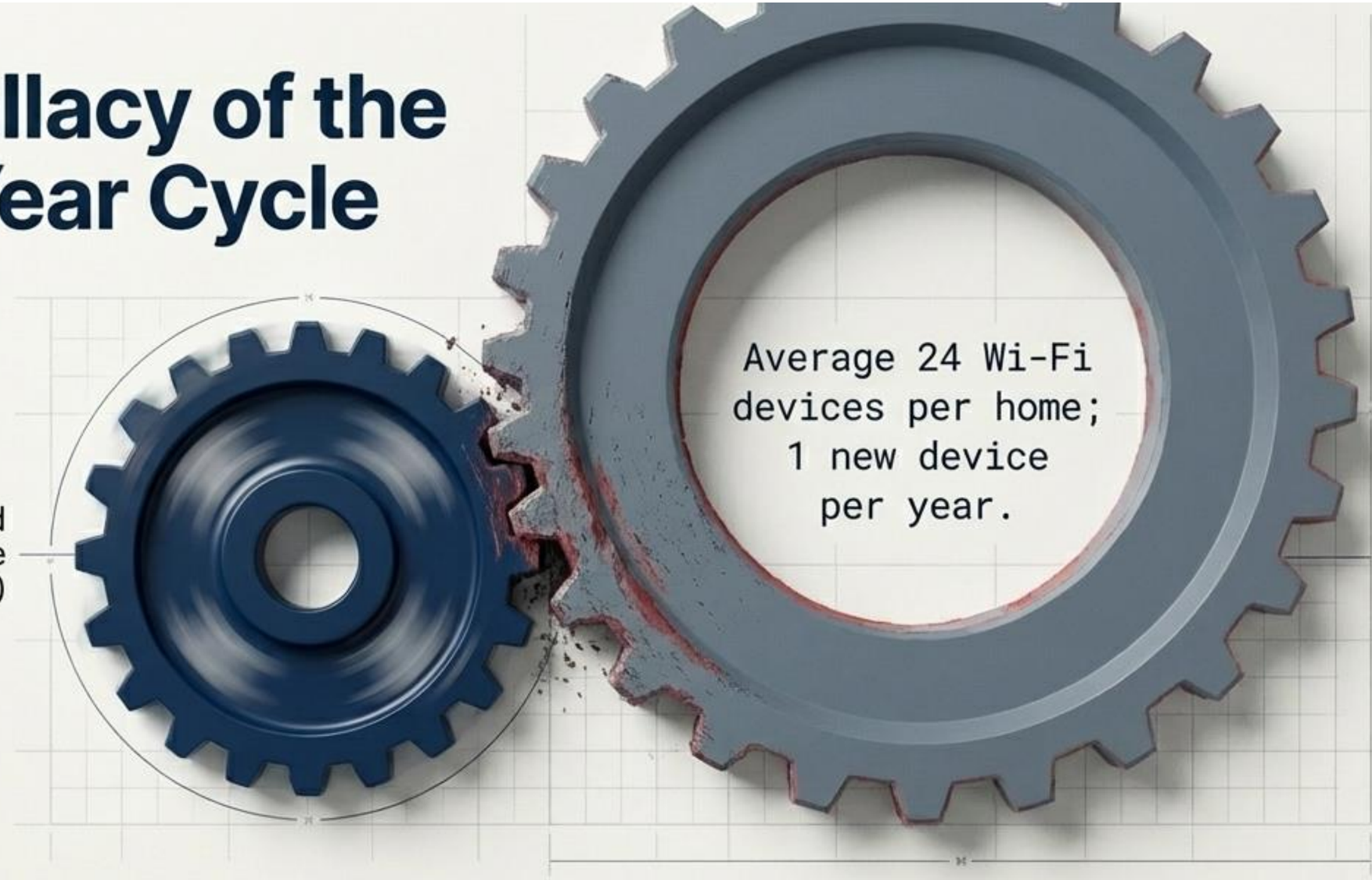
The Shift

Because Wi-Fi 8 complexities are inextricably tied to microsecond timing, scheduling, and spatial reuse, the MAC itself must drive the solution.

The Impact on the Ecosystem

- External software companies building traditional Wi-Fi Management solutions are becoming irrelevant.
- Silicon providers must now integrate AI directly to manage policy, mesh coordination, and automated debugging.
- External inputs are reduced to high-level policy shaping, not active management.

The Fallacy of the Four-Year Cycle



The Friction Point

Standards release on a strict 4-year schedule, but client-side adoption lags severely.

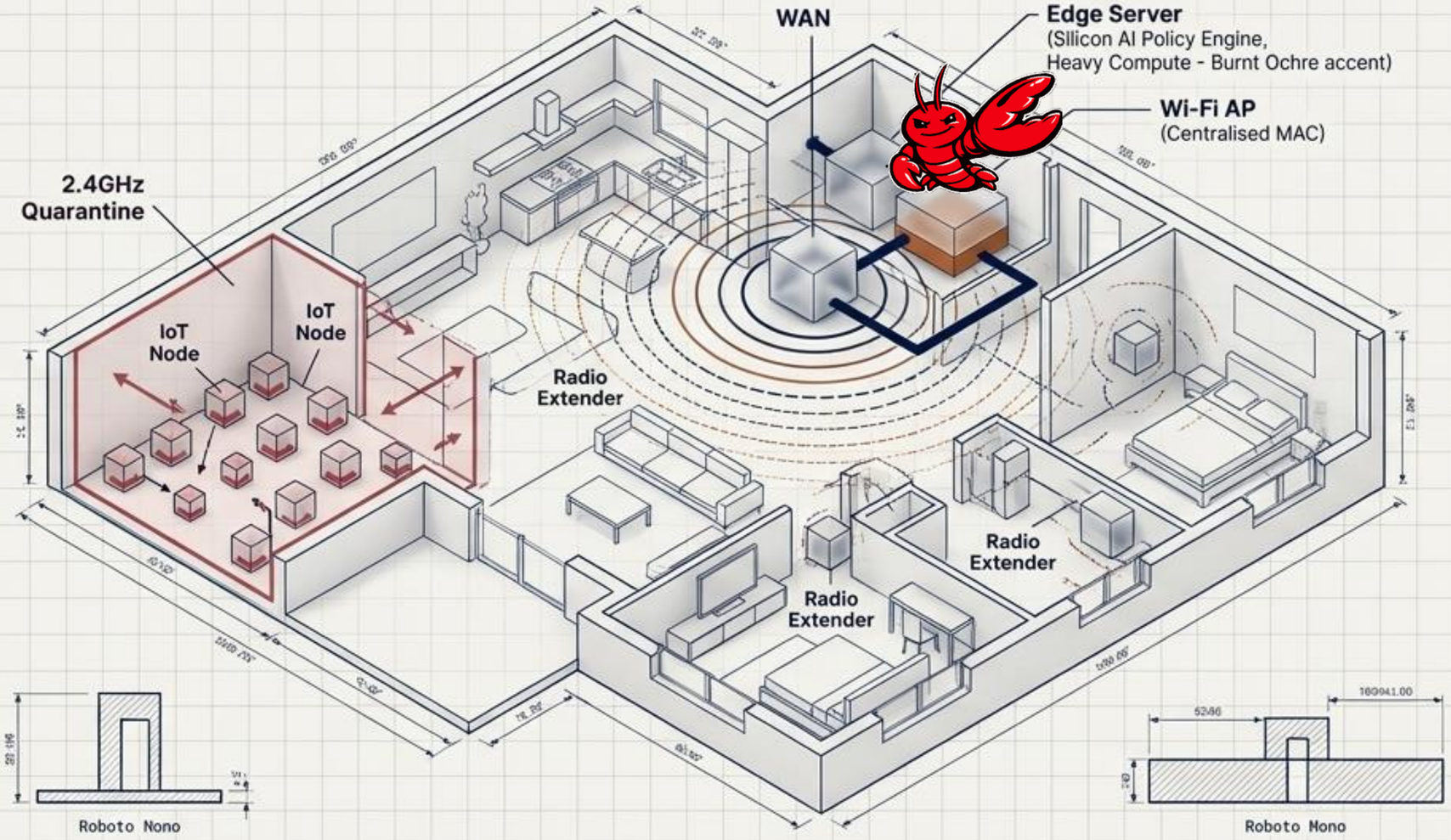
The ROI Gap

Wi-Fi is rarely the highlighted value proposition in smartphone sales. A home may see only a single next-generation Wi-Fi device added an entire year after a standard launches.

The Strategic Question

Are silicon providers, AP manufacturers, and service providers truly extracting synchronised value from this speed of release?

The Wi-Fi 8/9 Strategic Blueprint: The Home Network of 2028



The Integrated Solution

Quarantine Enables Performance

Locking unscheduled IoT to 2.4GHz clears the path for a flawless 6GHz primary mesh.

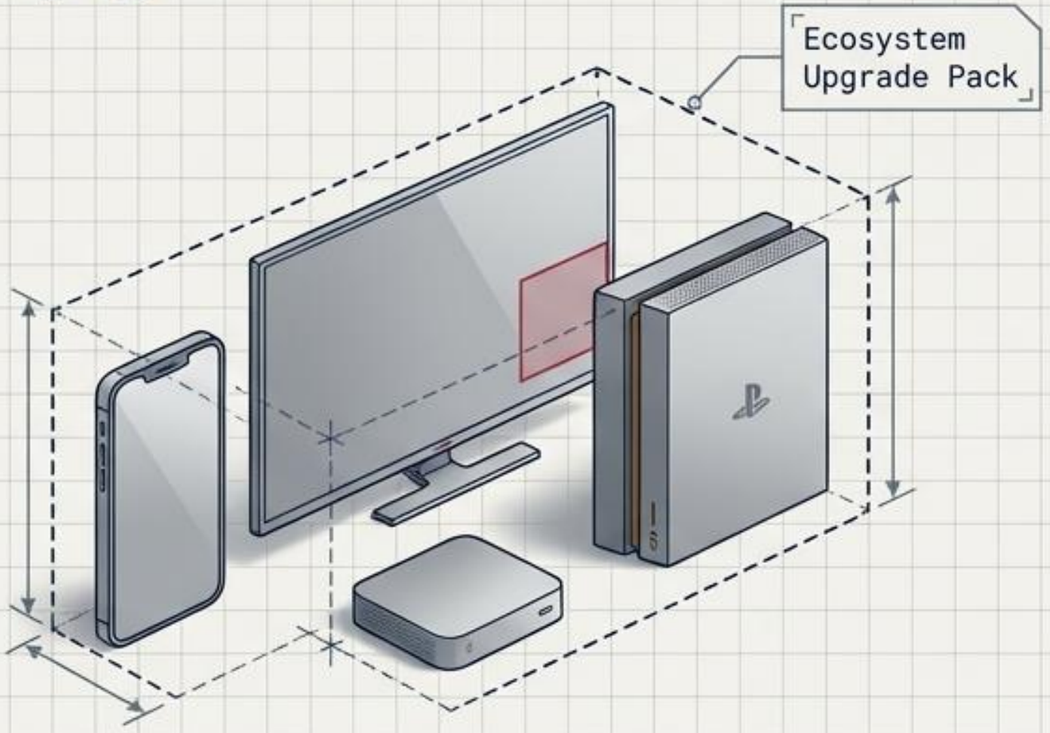
Disaggregation Enables AI

Moving heavy compute to a dedicated Edge Server allows advanced AI to monitor and debug the impenetrable complexity of Wi-Fi 8 in real-time.

O-RAN Architecture Drives Scale

Centralising the MAC reduces the cost of extending the 6GHz mesh, achieving ultimate reliability without exponential hardware costs.

Forcing the Ecosystem Upgrade



The Strategy

Incremental, one-device-at-a-time adoption will not yield an ROI for Wi-Fi 8. **Service Providers must initiate a 'Big Bang' marketing approach.**

The Tactics

- **Ecosystem Upgrade Packs:** Subsidised bundles replacing smartphones, STBs, Smart TVs, and cameras simultaneously to fully activate the new scheduling domains.
- **Strategic Partnerships:** Co-marketing deals with major gaming consoles and future AI-driven devices that demand ultra-low latency.
- **Financial Engineering:** Deploying layaway plans and targeted incentives to accelerate the churn out of legacy 2.4GHz and Wi-Fi 5 hardware.

Final Takeaway

Differentiation requires disruption. To monetise the Wi-Fi 8 era, we must engineer the market's adoption cadence just as aggressively as we engineer the silicon.

Can we get your inputs for guiding the Broadband Wi-Fi path

Architecting the Disaggregated Network

Confronting the hardware, spectrum, and cost paradox of the Wi-Fi 8 and 9 eras.