

2022 Predictions for Home Networks

A look at what's ahead for Wi-Fi, fixed wireless access, the IoT ecosystem, low-latency services, video services and the services edge – and how advancements in each will transform customer experiences.

By Charles Cheevers / *CommScope*

It's that time of year again, when the broadband industry looks forward to the exciting changes ahead for the connected digital home – and for the technologies that enable new consumer experiences and opportunities for service providers.

Since March 2020, homes' digital connection to the world of information has been critical as the global pandemic persists. It has changed how people work and live, making them increasingly dependent on digital connectivity. Visiting virtual doctor's offices, attending virtual classes, and participating in virtual work meetings are now the norm, and they're all happening at home.

The industry has learned many lessons in the process:

- Improving access to network speeds that support more upstream traffic for videoconferencing, collaborative work-from-home environments and security cameras is important.
- Good Wi-Fi throughout the home is necessary for everyone in a household to access services and to support Wi-Fi-connected smart-home devices.
- The practical measurement of home network performance now includes latency and jitter specifications as consumers understand the tolerances of latency-sensitive applications, such as videoconferencing and cloud gaming.
- Smart-home devices offer many opportunities – in fact, most urban consumers now have 18 to 20 Wi-Fi-connected devices in the home.

- Growing consumption of streamed entertainment with IP video and cloud gaming now accounts for 90 percent of all downstream traffic to the home.
- There's renewed focus on the importance of home network privacy and security, as well as overall access and home network reliability.
- Voice-command smart speakers and smart consoles have new roles in the way people connect with extended family and friends and access services, from music to weather to recipes.
- Service providers and consumers have a shared interest in adding more services to the home to manage, improve and secure their digital lives.

In 2021, consumers bought more technology-based products – so much so that it created a supply-and-demand imbalance that revealed the supply chain's weak links in the availability of silicon wafers and integrated circuits. This imbalance is projected to continue in 2022, and it is expected that new manufacturing capacity will predominantly use new, lower geometry silicon, driving its adoption faster.

In 2021, development of immersive technologies leveraging mixed reality technologies continued, and there were rumors of an even greater push into more ergonomic wearable headsets and glasses for both augmented reality and virtual reality applications to finally make a seismic market breakthrough.

What's in store in 2022 for the connected home and the consumers who live, learn, work and play there? CommScope Home Networks sees the following six technology vectors driving consumer adoption in 2022 and beyond.

PREDICTION NO. 1

Wi-Fi will have three phases in 2022 – Wi-Fi 6, Wi-Fi 6E and Wi-Fi 7 – all at different life cycle phases.

Wi-Fi 6 has shipped in more than 2 billion client systems on chip devices and is beginning to appear in homes. Adoption is gated by consumers churning their devices, or some new must-have application emerging. Today, about 10 percent of home Wi-Fi client devices support Wi-Fi 6, with the last two years showing a faster increase in Wi-Fi 4 or 5 client devices in the home, particularly for Wi-Fi-enabled smart-home devices.

In 2022, more service providers will continue to ship Wi-Fi 6 dual-band concurrent access points as their workhorse device for as much as 75 percent of their installed base by 2025. This provides the best return on investment on capital expenditure regarding performance for the connected home.

With the emergence of unlicensed 6 GHz spectrum, the first service providers will adopt Wi-Fi 6E in 2022, moving to tri-band performance from the gateway or access point (AP) and offering complimentary Wi-Fi 6E mesh capabilities to create the first immediate-use “bookend” applications (in which both ends of the Wi-Fi connection are provided by the service provider) on 6GHz. Other services will be the use of 6GHz to offload 5G dual-SIM, dual-standby smartphone solutions and offer low-latency Gbps speeds to in-room smartphones.

2022 may see the first certification of automated frequency coordination (AFC) solutions for standard power Wi-Fi (36 dBm/4W) in the U.S. In 2021, 14 companies applied to perform AFC functions, and it's expected that first certifications may be completed before the end of 2022 – affording the U.S. the first 4W-capable Wi-Fi solutions.



This year, there will be continued focus on aggregating streaming services to simplify and improve user experience.

2022 will be an exciting time for Wi-Fi solution developers and OEMs, including CommScope's Home Networks team. CommScope will see the first pre-Wi-Fi 7 silicon samples in its labs as a precursor to the exciting potential of Wi-Fi 7's hitting the market in 2023. Expect to see lots of pre-Wi-Fi 7 demonstrations at the Consumer Electronics Show (CES) in January 2023, with early prototypes ahead of 2023 product potentials.

It's often easy to forget that it's not always about the sheer bandwidth of an ever-increasing number of spatial streams in Wi-Fi (Wi-Fi 7 can exceed 20 Gbps from a single AP) but also about the ability to control latency and jitter and to schedule packets into 6GHz OFDMA. This determinism of Wi-Fi 6GHz will be foundational to the growth of immersive technologies and will allow immersive, head-mounted devices to use the high-capacity, low-latency, low-power advantages of Wi-Fi direct at 4 Gbps+.

PREDICTION NO. 2

Fixed wireless access (FWA) C-Band and DOCSIS 4.0 will keep their momentum with passive optical networking (PON) settling

on XGS-PON for its sweet spot.

2022 will see spectrum holders begin to exploit their investments in FWA as they seek to claim new broadband subscribers from their wired competitors. Money spent in 2021 in the U.S. on C-Band spectrum will start paying returns in 2022 as it rolls out to provide reliable, high-speed coverage at range aided by massive MIMO technologies.

2022 will be the lab testing year for DOCSIS 4.0, with early silicon and FPGA solutions available to create test vehicles for networks and customer premises equipment (CPE) alike. This testing will work to validate the performance of full duplex DOCSIS and its operationally simpler Extended Spectrum DOCSIS variant. Network upgrades will happen in 2022 ahead of the arrival of the first DOCSIS 4.0 field trials in 2H 2023. DOCSIS 4.0 is expected to begin volume launch of services in 2024.

PON will start to reap returns on the investments made in XGS-PON technologies, with more infrastructure and CPE devices cutting over to XGS-PON silicon in 2022 ahead of higher performance services in from service providers. Though the work to move to 25G PON soon is ongoing, it is

expected that 10 Gbps XGS-PON will entrench in 2022 and be the staple high-speed, low-latency deployment of choice through 2025.

PREDICTION NO. 3

Matter will debut and start to grow to converge the IoT ecosystem.

In 2020, the world was introduced to Connected Home over IP (CHIP) and its aspirations to converge IoT protocols on a single standard IP connection to the applications that would control the plethora of different IoT protocols, physical layers and ecosystems. Just over a year later, CHIP is now called Matter, its first releases came together, and the first applications started to emerge in 2021.

2022 will be the launch year for Matter and will deliver a new hub architecture for IoT devices to connect to their IP-based applications. From a consumer perspective, it will simplify the decisions about which IoT devices will work with each other and will have consumers looking for devices that support Matter for this assured integration.

There will be opportunity for service providers to add value and aggregate IoT services on their Matter-capable devices/hubs.

PREDICTION NO. 4

There will be increased demand for low-latency services.

As networking requirements (both access and home) evolve from simple, raw, topline speeds to include specifications for latency and jitter, consumers will become more educated in their choices. New AR/VR services will establish baselines of latency and jitter performance that will drive consumers to favor service providers that can achieve and maintain these performance metrics.

Technologies solutions, such as those proposed by the Wi-Fi Alliance to tag services for lower-latency treatment on Wi-Fi, as well as access technologies such as low-latency DOCSIS, will allow putting deterministic platforms in place to drive this increase in new services.

High-growth services such as cloud gaming will start the push and will leverage the deterministic, low-latency performance that will be available on Wi-Fi and access networks.

PREDICTION NO. 5

Video services will accelerate.

Streaming services have been a rich source of entertainment, and the investment in new content shows no sign of abating. In 2021, there was a large increase in demand for streamers from service providers to address the streaming-first consumer. The sheer number of streaming providers has increased complexity and frustration for many consumers.

This year, there will be continued focus on aggregating streaming services to simplify and improve user experience. Over the next few years, the traditional tuner-based set-top will be replaced with Android TV and RDK-V based streamers for entry-level services and smart media devices (SMDs) for added-value services.

CES 2022 was awash with new 8K Ultra HD TV platforms and an increasing number of AI-driven immersive video applications. With the emergence of higher resolution video for both 2D and immersive applications, new codecs, such as VVC, will be needed to keep bandwidths down to 50 percent of where they are today. VVC is expected to deliver 8K p120 rates under 50 Mbps. This will require a refresh of streamers and SMDs to catch this improvement in immersion, quality and overall satisfaction. The set-top will feature prominently in 2022 as it races to incorporate:

- New Wi-Fi – 6E and 7
- New codecs – VVC
- New resolutions – 4K to 8K
- New use cases for smart room solutions – BLE5.x
- Far field microphones for voice integration
- Smart assistant integration
- Matter integration.

CommScope Home Networks forecasted these evolutions and has been preparing an answer. The

company's SMDs give service providers a foundation for new services as they continue to drive to be the aggregator of video, IoT, smart assistants and new services, including security, telemedicine and aging in place.

PREDICTION NO. 6

2022 will be the year the services edge moves en masse to the home.

The past two years have seen an industry push to create a new service delivery platform architecture with a view to distributing new services easily. Services such as Wi-Fi management, security and parental controls are on the rise, but typically have been added in monolithic or agent-heavy and proprietary ways.

With the advent of new technologies, such as downloadable application containers (DAC) in the RDK stack and high-level APIs in the prpIOS stack that simplify service additions, the industry is set to leverage these new endpoint-driven orchestrated container solutions to create more applications for the broadband and video planes in consumer homes.

These applications will drive the creation of something akin to an app store for the service provider industry and the common platform for service innovations. The opportunity to access service providers' consumers will attract application and service vendors, who will work to curate an improved overall experience for their customers.

Certainty is hard to find in these rapidly changing times, but CommScope feels that these trends are already in such broad motion that their impact on 2022 and beyond will be significant. We look forward to working with industry bodies, partners and customers in realizing the benefits of these trends in the connected digital home. ❖

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