The Coming Sea-Change in the Home Network

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in association with

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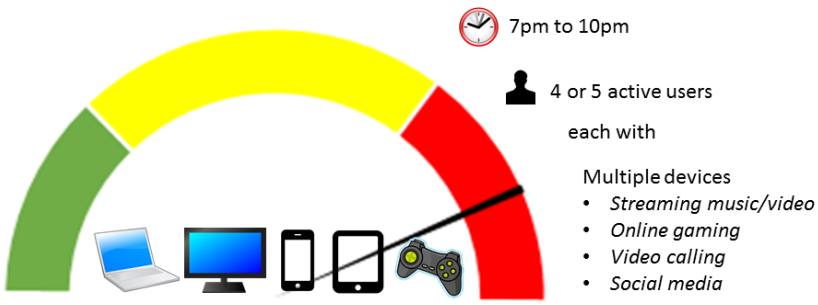
The home router market is entering a period of dramatic upheaval. FeibusTech believes it is a market that is ripe for disruption, for one simple reason: there is a large and widening gap between what most available products offer and what consumers need to keep their networks seamlessly delivering the content and the experiences they want.

Of course, consumers don't typically ask for things like "seamless content delivery" or "effortless network management." They're far more likely to say that they want their networks to just work. Disruptors understand what consumers mean by that. And they are distinguishing themselves in the marketplace by developing products architected to deliver it.

For most consumers, a network that "just works" connects all their devices across every square inch of their home. It is painless to set up. It is secure. It manages itself and fixes itself if it breaks down. And it's quick and easy to personalize the network for your family by adding curfews and blocking content.

Perhaps most importantly, it expertly and imperceptibly manages traffic so that everyone gets the bandwidth they need to do whatever they want on their myriad devices – whether it's stream music and video, comparison shop online or interact on social networks – whenever they want. Especially during the most extreme times, as it is most evenings during what FeibusTech calls the Internet Rush Hour, when everyone hops onto the network at the same time.

The Internet Rush Hour



Source: FeibusTech

These are very challenging expectations for router suppliers to meet, for two reasons. First, demands on the home network are more severe and complex than they were even a few years ago. Secondly, consumers' tolerance for buffering and other blips in performance is lower than ever before, mostly because their expectations have been heavily influenced by the mobile revolution.

The fact is, very few routers now deployed in homes are designed to handle modern network traffic demands. Some consumers have actually begun to seek out new routers, but these forward-looking consumers confront an avalanche of specs and an imposing variety of networking devices. Instead of finding messages that help them choose a product that meets

their needs, they are guided by little more than theoretical bandwidth maximum metrics - poor proxies for judging how well available routers will handle their network traffic.

As a result, consumers often purchase routers with technology ill-suited for their needs. It's hard, however, to fault router manufacturers for any reticence to abandon their proverbial big-number-on-the-box marketing methods. They understand that while lofty bandwidth claims provide no guidance to a router's overall performance, the bigger numbers command premium prices. And they know consumers who lack a better means of judging real-world performance will continue to buy products claiming to provide theoretical big-number bandwidth.

The cost of this unvirtuous cycle, of course, is that many consumers are left dissatisfied with their network performance – and with home Wi-Fi in general. And though many consumers ultimately do buy a new router at the culmination of this disjointed, convoluted shopping process, FeibusTech research suggests that many don't. Frustrated and intimated, they postpone purchasing until their existing router dies.

Real-world example of big-number-on-the-box marketing methods.

Disruptive Simplicity: It Just Works

Now, finally, disruptive suppliers are coming to market with products that meet consumers' needs. What's more, they are marketing their products in a new way. With attractive, innovative new products built around chipsets from Qualcomm Technologies, Inc., newcomers like Eero, Google, Luma and Plume, as well as established network brands like Netgear, are promising networks that just work. These products deliver whole-home connectivity, managed bandwidth, security and consumer-friendly smartphone apps that enable one-finger setup and manageability.

FeibusTech expects this new breed of router, architected using a distributed model of Wi-Fi, will spur market growth as it draws frustrated consumers off the sidelines and into the store to upgrade. As well, the consumer-friendly experience will convince Millennials and other first-time buyers to brave their first home-network installation.

> *FeibusTech believes that those companies involved in the home router marketplace could be markedly more profitable and faster-growing if they developed and marketed products aimed squarely at solving the home networking problems consumers face today.*

Qualcomm deserves a tip of the hat for being the only platform provider to recognize the sea-change in network traffic and consumer demands, and being first to address them with more intelligent Wi-Fi chipsets and features. The wireless communications powerhouse has leveraged its pioneering work in cellular technology to improve Wi-Fi coverage, simplicity and performance. Rather than investing in technologies that boost theoretical peak bandwidths at the expense of real-world experiences, Qualcomm repeatedly is first to market with leading-edge technologies loaded with features designed to deliver what consumers want.

Many of the new-breed products are sold as packs of two or more routers that team up to blanket homes with coverage, a feature enabled by Qualcomm chipsets. But even installations in smaller homes that can be adequately covered by standalone routers will benefit greatly from simpler network setup and better management capabilities.

This FeibusTech Market Brief is designed to give manufacturers, retailers and etailers a better understanding of the rapidly-evolving home router market, what consumers are really looking for and how best to fulfill consumers' home-networking needs.

Today's Home Network Demand Profile

The Wi-Fi router market is ripe for disruption because the lion's share of routers in use are unprepared to handle the demands of the modern home network.

Indeed, network demand has changed dramatically since most folks bought their current router. Of course, households have far more devices than they did. And the devices exchange far more data than they did. But it's more than that. Today's data is more challenging to deliver. And consumers' expectations for network performance are much higher.

In the early days, router suppliers focused on supplying a single device – historically a laptop computer – with the highest data throughput possible for a given distance. That served the market well, as households with Wi-Fi typically had only one or two wireless devices on the network.

As the internet matured, so too did the appetite for online data in the home. The number of devices per household began to grow, and new Wi-Fi standards were developed to support the spike in wireless data demand. Few devices, however, were streaming data in real-time, so consumers would tolerate slight delays and disruptions. As a result, continuing to develop networking products that delivered the highest throughput for a single device at the greatest distance continued to be an effective strategy for manufacturers to design, manufacture, and market their products.

Change began to accelerate in 2006, both for overall data consumption and with regard to a user's expectation for managing that data on their network. The first game consoles with built-in Wi-Fi began shipping. Consoles like the Nintendo Wii and the high-end PlayStation 3 were the first devices to routinely demand real-time data flow over Wi-Fi. This began a trend that continues today, both in terms of the raw number of connected devices in the home, as well as the exponentially higher amount of data sent to each device.

With the introduction and rapid proliferation of smartphones starting in 2007, and tablets in 2012, consumer expectations for all consumer electronics began to skew toward a "mobile-first" view of the world – app-driven UI, easy onboarding, seamless transitions between networks, anywhere access, and anytime usage.

Evolving Market

The ensuing years saw great changes. In 2012, the typical home network for a family of four had blossomed to seven connected devices (Source: GSMA): two laptops, two smartphones, a printer, a tablet and a game console. But even then, the console was the only device that put any real-time demands on the network. According to Comscore, the most common tablet activity at the time was reading. And while people were starting to watch more video on their mobile devices, they were primarily downloading content rather than streaming it.

2011

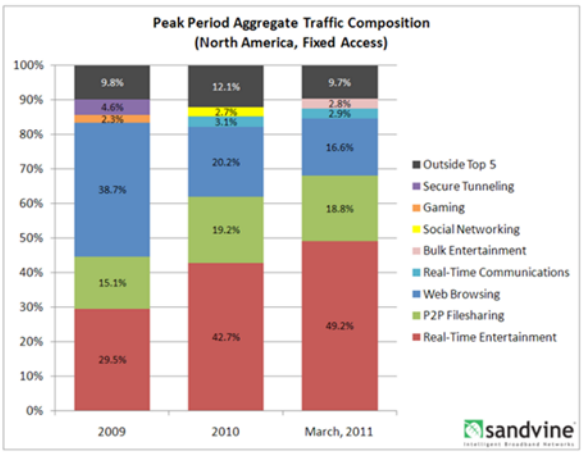


Figure 1 - Peak Period Aggregate Traffic Composition - North America, Fixed Access

2015

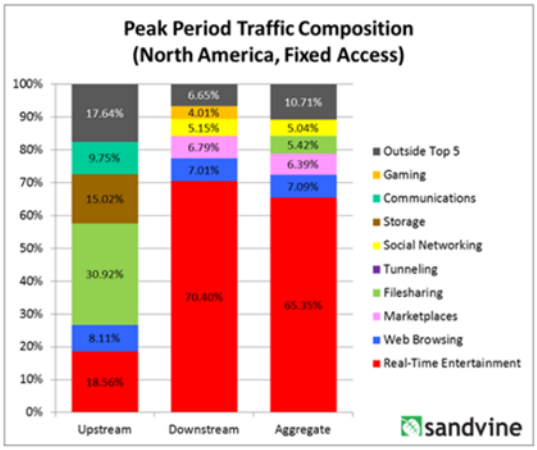


Figure 1 - Peak Period Traffic Composition - North America, Fixed Access

That's no longer true. Streaming-media from services like YouTube and Hulu has exploded. The number of Netflix subscriptions for DVDs by mail, for example, has shrunk to less than a third of what it was in 2011, while video streaming subscriptions have more than doubled. Not only are more people consuming streaming media. They're also doing it on far more devices. The GSMA forecasts that by next year, the same home network will total 24 devices - more than three times the number in 2012. And this workload is not a home-device driven phenomenon – in 2015, for the first time, more mobile content – that is, content consumed on mobile devices – was delivered over Wi-Fi networks versus cellular networks.

During what FeibusTech calls the "Internet Rush Hour" – after dinner on weeknights, from roughly 7pm to 10pm – it is not unusual for a household of four to have seven or eight devices streaming real-time content simultaneously. That puts demands on the network that most routers weren't designed to handle.

In short, the network traffic load has become much more difficult to manage, and consumers' willingness to manage the complexity has dissipated. They expect their home networks to behave more like their cellular service, which is fast enough and smart enough to provide the bandwidth they need wherever and whenever they want it.

Device Ownership of a Typical Family of Four, 2012, 2017, 2022

2012	2017	2022
2 smartphones	4 smartphones	4 smartphones
2 laptops/computers	2 laptops	2 laptops
1 tablet	2 tablets	2 tablets
1 DSL/Cable/Fibre/Wifi Modem	1 connected television	3 connected television
1 printer/scanner	2 connected set-top boxes	3 connected set-top boxes
1 game console	1 network attached storage	2 eReaders
	2 eReaders	1 printer/scanner
	1 printer/scanner	1 smart metre
	1 game console	3 connected stereo systems
	1 smart metre	1 digital camera
	2 connected stereo systems	1 energy consumption display
	1 energy consumption display	2 connected cars
	1 internet connected car	7 smart light bulbs
	1 pair of connected sport shoes	3 connected sport devices
	1 pay as you drive device	5 internet connected power sockets
	1 network attached storage	1 weight scale
		1 eHealth device
		2 pay as you drive devices
		1 intelligent thermostat
		1 network attached storage
		4 home automation sensors

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Your Router is a Stop Sign

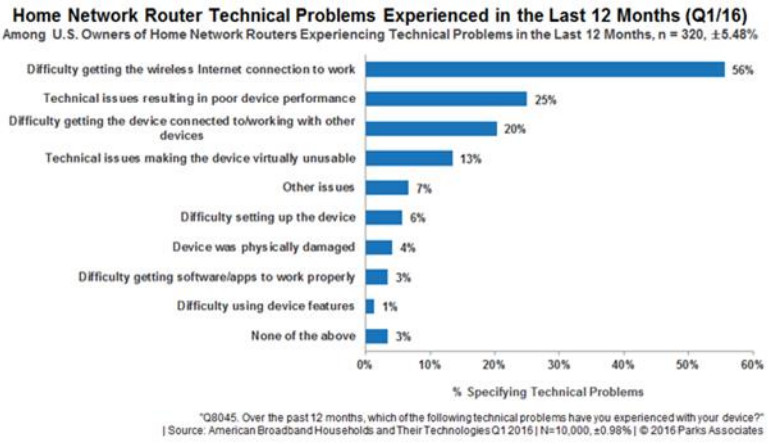
In city traffic terms, home routers today aren't much more sophisticated than four-way stop signs at an intersection. They allow for the network to cycle through demands for data in turn. That scheme works fine for traditional computing tasks with a few devices. But it is not an effective way of dealing with real-time traffic.

Router vendors have been adding fast lanes to handle real-time traffic for some time now. But most installed home routers today are ill-prepared to meet the demands of today's home network, where they must balance complex and divergent demands for bandwidth from different devices in different areas of the home.

What Consumers Want

Many consumers understand that their routers are not meeting their needs. Maybe Wi-Fi coverage doesn't reach the kid's hang-out area. Or maybe Netflix buffers incessantly on the TV in the master bedroom if the kids are streaming social-media content on their smartphones.

Consumers have had a rocky relationship with their home routers. Many units have never been able to reach some rooms or deliver enough bandwidth to others. That was an annoyance when they were first installed a few years ago.



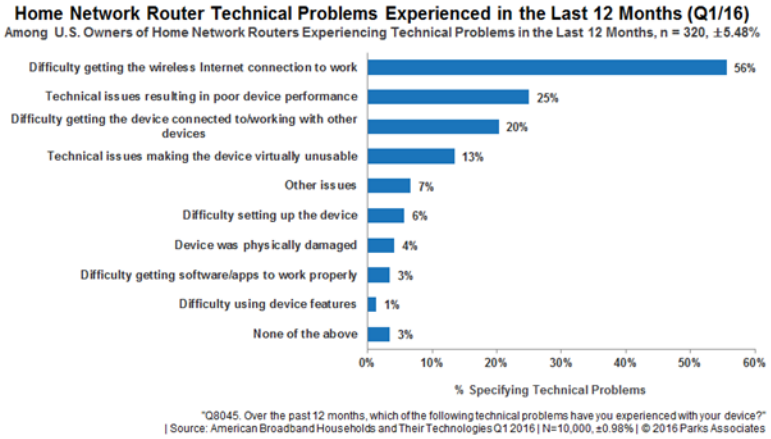
But over the years, as family members depended more and more on the home network for social interaction, entertainment and information, performance issues have become increasingly intolerable.

Although the need may be evident, many consumers are hesitant to get a new router. According to Parks Associates, less than 10 percent of US households with broadband intend to buy a router in the next 12 months.

It is hard to fault consumers for their hesitation, because buying a router is not a pleasant experience. For one thing, it's difficult to select the right product, because the specs on the outside of router boxes don't directly relate to the problems they are trying to solve. The units aren't visually appealing, so there isn't any aesthetic draw to the products.

Possibly the biggest impediment to repeat purchases is that the devices are notoriously difficult to set up. And when performance is poor, there isn't a clear-cut remediation path.

According to Parks Associates, far and away the most common technical problem – at 56 percent of all complaints – is just making a successful wireless internet connection. Solving issues related in poor performance is second, with 25 percent of all support calls.



First and foremost, consumers expect a network to deliver data-intense content to multiple screens – simultaneously – to the far corners of the home. They don't want to troubleshoot the router's advanced connectivity features. Instead they expect the router to manage traffic flow, keep the network secure, and heal itself without requiring any intervention. They want to bring it home, plug it in, download and app, set a password and be done. They want their devices to connect on the first try, no matter what frequency or protocol they use.

This is the profile of the network that just works – and the capability that router suppliers must meet.

Qualcomm's Role in Delivering the Network that Just Works

Qualcomm understands how to expand the role of the router to support new capabilities that meet the demands of the modern home network. The company is a wireless innovator that complements its pioneering Wi-Fi expertise with vast experience developing 4G and 5G technology to help cellular carriers tame mushrooming demand for cellular bandwidth.

Qualcomm subscribes to the vision of the modern network, as described in this paper. To help make that vision a reality, it recommends focusing on three simple steps:

- Ensure commitment to the standards-based connectivity technologies that raise the underlying capacity and density capabilities of the network. This is the critical foundation upon which all innovation in the networking industry is based. Qualcomm is a leading participant in the standards bodies spanning most major connectivity technologies and its business model is focused on the funding of R&D to translate emerging standards into products even before ratification of those standards.
- Define an innovation path above and beyond the standards that is aligned with the evolving demand profile of the modern network. This includes the development of technologies like MU-MIMO and its Wi-Fi SON suite of advanced intelligence features, which enable the network to manage, heal and secure itself.
- Drive these technologies into the market, and frame the value in language that consumers can understand.

Qualcomm has consistently been the first chipset supplier to add the latest features to help future-proof consumers' router investment. For example, Qualcomm was the first router chipset supplier to supply MU-MIMO technology, which is a key component of the second wave of the 802.11ac specification. Electronics manufacturers are adding MU-MIMO to everything from smartphones and laptops to game consoles and smart TVs. Consumers who opt for routers with MU-MIMO will notice a big jump in Wi-Fi performance when they replace older devices with ones that have the new technology.

Disruptive suppliers are coming to market with products that leverage Qualcomm's technology to deliver what consumers want: home routers that supply whole-home connectivity, managed bandwidth, security and simple, intuitive network management apps.

FeibusTech expects these attractive new routers will entice frustrated consumers to upgrade. As well, the enticing experience will attract Millennials and other first-time buyers to set up home networks. The disruptive suppliers – as well as established vendors who pivot to address the new market reality – will profit in the upgrade cycle.

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