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HOW SERVICE PROVIDERS CAN OWN THE GIGABIT HOME

SERVICES DRIVING DEMAND FOR GIGABIT SPEEDS
GIGABIT BROADBAND IN THE ACCESS NETWORK
COPING WITH GIGABIT IN THE WIRELESS HOME
OWNING THE GIGABIT SMART HOME AND IOT

Videonet gives platform operators, media groups and channel owners information and analysis that helps them transform themselves for the connected era. We are focused on the push towards any-screen TV, virtualized operations, data-driven advertising, programmatic trading, more HTTP streaming, immersive television and more personalized TV experiences, highlighting trends and best practice in an era of unprecedented disruption and new opportunities. We deliver our insights through a regular newsletter, special reports and webcasts.

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COMMENT

We have seen pushes towards higher speed broadband before but the quest for Gigabit speeds feels different, as if a new chapter is opening in communications - one that is almost certain to result in a rush of innovation. Pernille Erenbjerg, CEO at TDC Group, explained it perfectly when announcing his company's new Gigabit broadband service in May. "We are opening a super highway of digital entertainment services where only the imagination sets the limits, and not the speed."

Gigabit broadband is both a response to, and an enabler for, new services, starting with more concurrent streaming and 4K. It also represents a point of potential disruption for the broadband market. Gigabit speeds will be a competitive differentiator, demanding upgrades to access networks but also to the performance of the Wi-Fi home network, where customers could increasingly be won and lost.

The Gigabit era will also coincide with the emergence of the smart home and the Internet of Things. A key challenge for broadband providers is to maintain primacy in the home when multiple new smart home service providers want to 'move in' and possibly bring their own devices with them. Delivering broadband is nothing like enough; holistic connectivity and QoS management will become important functions.

John Moulding, Editor, Videonet

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INTRODUCTION:
Servicing the gigabit future

By **Charles Cheevers**,
CTO for Customer Premises Equipment, **ARRIS**
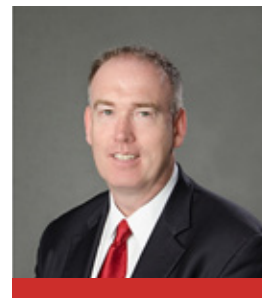
It's the new Holy Grail: the gigabit home network. It'll take us to the new horizon of stunning quality wireless entertainment and all-encompassing home services. Most importantly, the technology to deliver this superfast connectivity is already here. But are the service providers ready to respond?

The purpose of this report is to unearth the challenges of preparing for tomorrow. How do service providers not just navigate the gigabit home, but own it? And with new technologies emerging and changing standards causing an uncertain future, where do providers stand?

It's essential that service providers feel confident enough to satisfy today's consumers. But as there's more than one way to reach gigabit speeds, providers are considering their options, and many are becoming more technology agnostic. DOCSIS 3.1 is the often discussed solution for upscaling broadband speeds but some are looking at fibre as a feasible alternative. An open-minded approach could be beneficial for businesses weighing up the options.

Providers must also take into account the other factors that will present new challenges. As an industry, we're already far beyond the point where 'home entertainment' meant piping in enough bandwidth to service one TV or one PC. Yet there are still remnants of the past that need to reflect changing consumption habits. For instance, where does the equipment live and how should it perform? There might currently only be one router that is meant to serve an entire home. It might not physically be able to do that. And even if it is, it might not be strategically placed to do so in the current home.

The relationship service providers currently have with customers will change. They will now have to factor in various component parts to create a holistic connectivity offering. Whether it is gateways, extenders or connected set-tops, service providers will need to help end users understand the value. And they should also be able to tell the narrative of how the equipment will shape tomorrow's demands.

But this service provider/customer relationship is already under strain. Retail providers are enabling customers to introduce their own equipment to the home. It is equipment that service providers don't have the same amount of visibility or control over, so there are potential tensions. Providers need to consider how they maintain their presence in the home network and stay front of mind from a customer point of view.

Connecting everything

The major game changer in the home isn't 4k streaming or virtual reality gaming - at least not in isolation, anyway. The thing that will really shake things up will be the connecting together of these, and other technologies, all across the home. The challenge then, isn't just the increasing quality of the gadgets we already have, but the arrival of new ones to the home.

The Internet of Things (IoT) is a concept that will have an increasing role in the home. Items in almost every room will talk to each other, and to the home network. This communication will open up new requirements for service providers. Among the many considerations they will have to make is how they deal with the growth in low-power devices. And how do they respond to the resulting network complexity?

Putting customers first

Much of the technology might be new but one age-old premise is still true. Companies succeed when they put forward a service that best serves end users.

Cost will factor into this debate. But it isn't an easy task to install enhanced equipment affordably, especially when factoring in the competition from retail solutions. Could it be that one-size-fits-all products become a thing of the past? It may be that a tiered approach is more suitable to reach all types of users with the right level of service.

And then there's network management. It could remove the headache for users and reduce costs for providers if networks could self-diagnose.

The gigabit home will be the route to helping consumers dive into a more immersive future. Faster and more reliable speeds will help usher in innovative ways to be entertained. They will enable consumers to live their lives augmented, and not hindered, by technology. The challenge for our industry is to make it happen. ●

HOW SERVICE PROVIDERS CAN OWN THE GIGABIT HOME

We are about to enter the Gigabit broadband era and while it will free the imagination of entrepreneurs for smart home and IoT innovations, the immediate demand is for better video experiences in every room. John Moulding investigates the role of service providers beyond delivering more access bandwidth.

Photo: Based on image from iStock/mevans

● INTRODUCTION

We are about to enter a new era in entertainment and communications thanks to Gigabit speed broadband. The migration to all-IP video viewing will be accelerated. Multiscreen viewing around the home will match the broadcast user experience. 4K-everywhere will become realistic. The true promise of virtual reality (VR) television and telepresence can be explored.

That is before we start thinking about the smart home and Internet of Things (IoT). Many of the services and applications associated with the IoT are light users of bandwidth but still need extremely low latency and ultra-reliability. And who knows what ingenious services await.

The CEO of TDC Group, Pernille Erenbjerg, noted the potential for future innovation when announcing the roll-out of Gigabit broadband over a new DOCSIS 3.1 network in Denmark. "We are opening a super highway of digital entertainment services where only the imagination sets the limits, and not the speed," he declared.

Gigabit broadband will become the new benchmark for excellence and a tick-box for early-adopters. It presents a number of challenges to service providers, including cost-effective upgrades to their access networks and ensuring the Wi-Fi home network does not become a bottleneck that frustrates consumers and limits service innovation and so revenue potential.

The Gigabit era will spawn a multitude of companies offering smart home services or IoT applications that need hardware in the ▸▸

home and access to the home network. Most commentators think service providers should try to become the aggregator of such third-party services while also ensuring their home hub is the primary gateway for all broadband-connected functions. They should then use their umbrella view of the home network to become the QoS guarantor, and use their ubiquitous connectivity to present a converged user experience.

● THE NEED FOR SPEED

Today the No.1 driver for Gigabit broadband speeds is video-centric entertainment and richer media. Sam Rosen, Managing Director and Vice President, Video, OTT and AR/VR (augmented / virtual reality) at

ABI Research, identifies 4K video and VR in the consumer space and augmented reality in the workforce. "Downloaded services clearly benefit heavily from faster speeds, despite the predominance of streaming," he adds.

The analyst firm CCS Insight has predicted that VR could be one of the most disruptive technologies for a decade, forecasting that more than 12 million virtual reality headsets will be sold next year. "Currently, gaming is the low-hanging fruit for VR devices but video, entertainment and user-generated content will also drive adoption of this technology," the firm says.

In May the Finnish broadband provider DNA announced the launch of its next-generation fibre-optic network (DNA Valokuitu Plus), which will enable speeds of up to 1Gbps. The service is being made

Sam Rosen, ABI Research ▲

available to 300,000 households in the Helsinki region first and will be extended to 600,000 homes within a year. Today it is video entertainment that is driving the upgrade.

DNA says a typical family of four in Finland already has 9-15 devices connected to the network and a spokesman says the figure is increasing. "Simultaneous usage of video services like YouTube, Netflix and our own TV-OTT service, Dna-TV, calls for more capacity."

The highest speed available today with DNA is 350Mbps and the Gigabit service costs little more at EUR 49.90 per month. A spokesman points out: "We aim to provide customers with the best quality-price ratio and differentiate the fixed broadband from the mobile broadband speeds."

DNA is also testing 3Gbps on a live network in Helsinki using DOCSIS 3.1 and has declared that speeds of up to 10Gbps will be possible within just a few years ▶▶

TODAY THE NO.1 DRIVER FOR GIGABIT BROADBAND SPEEDS IS VIDEO-CENTRIC ENTERTAINMENT AND RICHER MEDIA
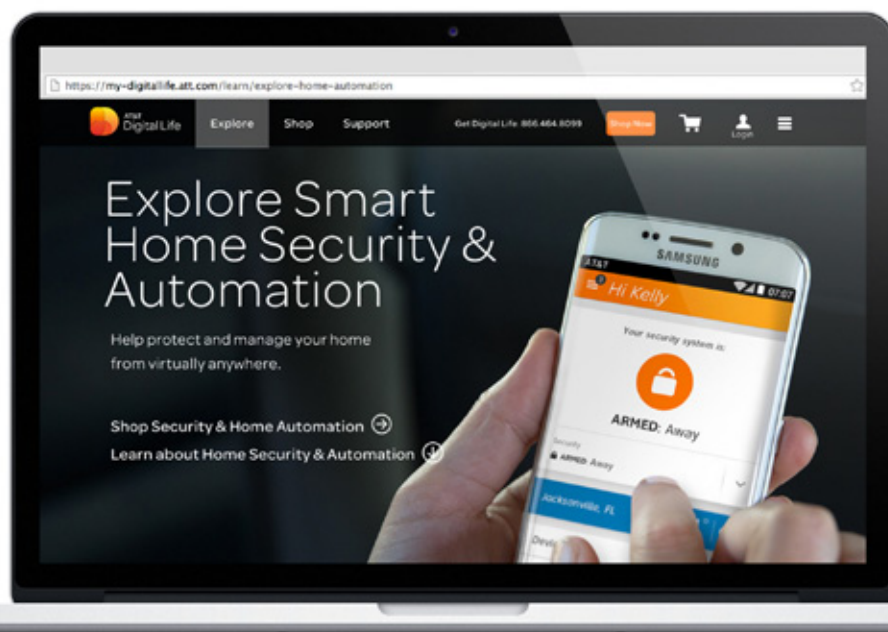
AT&T advertises its Digital Life smart home services ▲

▶▶ using DNA Valokuitu Plus.

In Denmark, TDC started to offer Gigabit broadband on its HFC network in May, using DOCSIS 3.1 with a move from CMTS architecture to a distributed CCAP solution. The service is available to real customers thanks to cooperation with a small antenna association and 15% of customers should be using the new technology this year. The company predicts it will become the first in the world to upgrade an entire cable network for Gigabit speeds, hitting this target (and therefore its 1.4 million homes passed) by the end of 2017.

So what is driving demand for 1Gbps download speeds in Denmark? "Primarily video," says Carsten Bryder, Director of Technology & Capacity at TDC. The average TDC home will do fine with around 100Mbps today, covering television and broadband requirements, but the arrival of 4K/UHD television, accelerated by major live sports events this summer, will drive the demand for higher speeds.

"When you download movies or software like Microsoft Office, the speeds are significantly faster with a 1Gbps connection, so the customer experience is better," Bryder adds. "We plan to offer a 500Mbps upload solution. Lots of users in

The ARRIS VAP4300 wireless extender, as used by Get in Norway ▲

THE ARRIVAL OF 4K/UHD TELEVISION, ACCELERATED BY MAJOR LIVE SPORTS EVENTS THIS SUMMER, WILL DRIVE THE DEMAND FOR HIGHER SPEEDS

Denmark get their broadband via their employer and need cloud solutions for business."

Being responsible for network capacity, Bryder admits that the thought of live streaming of 360 degree VR into the Facebook network makes him sweat! So Gigabit broadband is ▶▶

The trend is towards good-looking operator CPE, like this ARRIS set-top box ▲

"WE WANT TO BUILD A 10-LANE HIGHWAY INTO THE HOUSEHOLD SO NOBODY HAS TO THINK ABOUT CAPACITY ANYMORE"

about future-proofing. "We want to build a 10-lane highway into the household so nobody has to think about capacity anymore," he comments.

Charles Cheevers, CTO for Customer Premises Equipment at ARRIS, whose CCAP-based converged edge router and high-end DOCSIS 3.1 Wi-Fi modems are helping the push to Gigabit speeds, also highlights virtual reality as a driver for future broadband requirements. But the most pressing need is to handle multiple concurrent 4K video streams to different devices in the home, usually over Wi-Fi.

Available 'burst speeds' are particularly important when it comes to improving the user experience, Cheevers notes. This includes downloading media faster. And he warns that one of the current limitations to what consumers can suck from the broadband network – the Wi-Fi ingest capacity of handheld devices – will soon be removed as a new generation of notebooks and tablets, etc., with better antenna technology, penetrate the market. When they become commonplace, inferior in-home Wi-Fi networks will be exposed.

Cheevers highlights newspaper apps as another place where the user experience can be vastly improved. "Some newspapers today are loading their web pages with such

Carsten Bryder, TDC ▲

high resolution photos that even with 100Mbps broadband and good Wi-Fi you still have to watch them rendering on the screen."
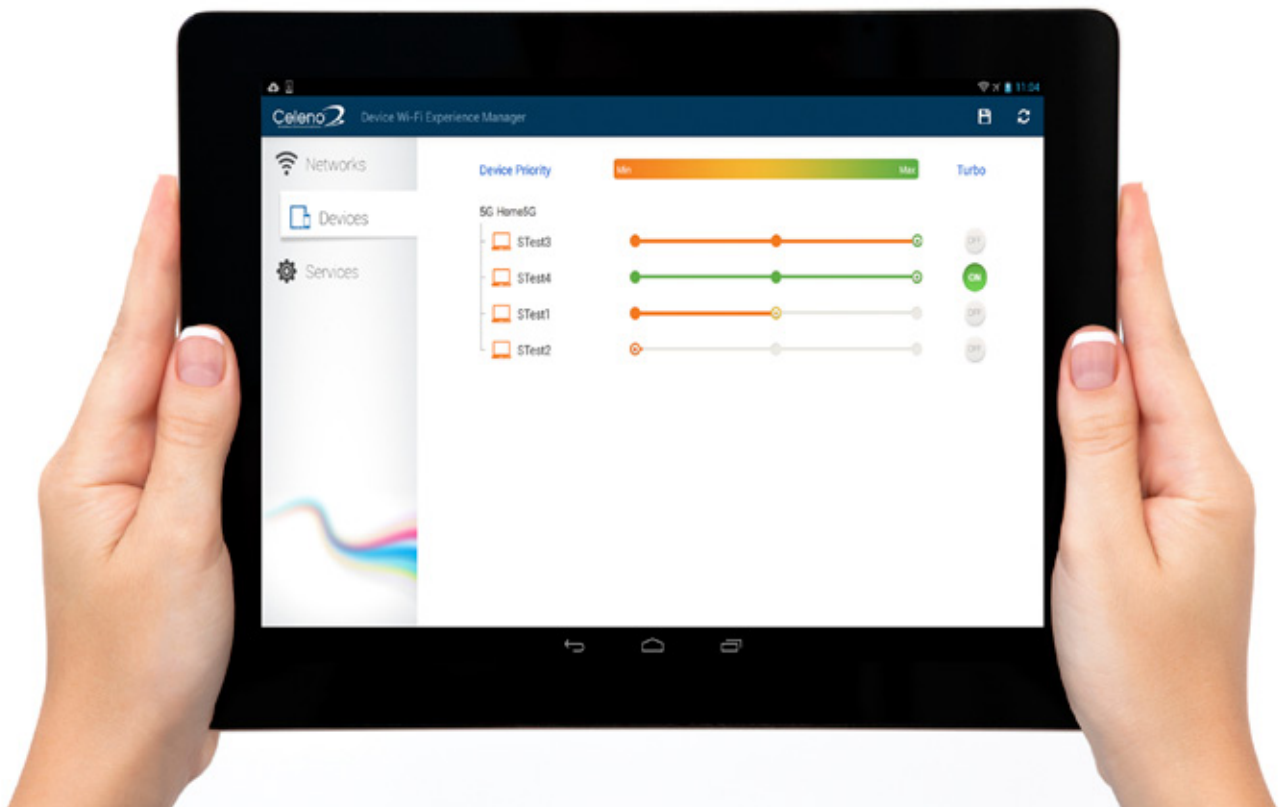
Celeno demonstrates Wi-Fi device management ▲

Comcast is using fibre and DOCSIS 3.1 for ultra high speeds into the home ▲

THE IOT STRETCHES BEYOND THE HOME AND THAT ENHANCED NETWORK CAPACITY IS MORE ABOUT ENABLING SERVICES LIKE SMART ROADWAYS AND EHEALTH THAN CONSUMER SERVICES

▶▶ When it comes to the IoT at home, CCTV security monitoring is one of few applications that demands high bandwidth today. A spokesman at DNA says the main challenge in this market is handling tens of different devices at the same time. But Rosen at ABI Research notes that the

IoT stretches beyond the home and that enhanced network capacity is more about enabling services like smart roadways and eHealth than consumer services.

● GIGABIT TO THE HOME

Broadband providers are becoming increasingly technology-agnostic when it comes to the access network, using any means necessary to be competitive. According to Sam Rosen: "IP technologies are taking over on every part of the network… Operators now look at delivering a mix of fibre, copper, coax, cellular and satellite technologies to deliver services… Upgrading networks with new technologies, like with G.fast over copper, needs to be evaluated for their service life and business case against the cost of deploying fibre networks."

Steve Davidson, Cable Marketing and Corporate Affairs at Nokia, provider of network hardware and services, says one cable customer in Europe, which operates a small network, has opted for EPON (fibre-to-the-home) rather than DOCSIS 3.1 over HFC as its next-generation access solution. "DOCSIS is not a 'no-brainer' anymore; there can be a business case for going to fibre," he ▶▶

Multiscreen TV is one of the drivers for higher speed broadband. Photo shows the Comcast X1 family ▲
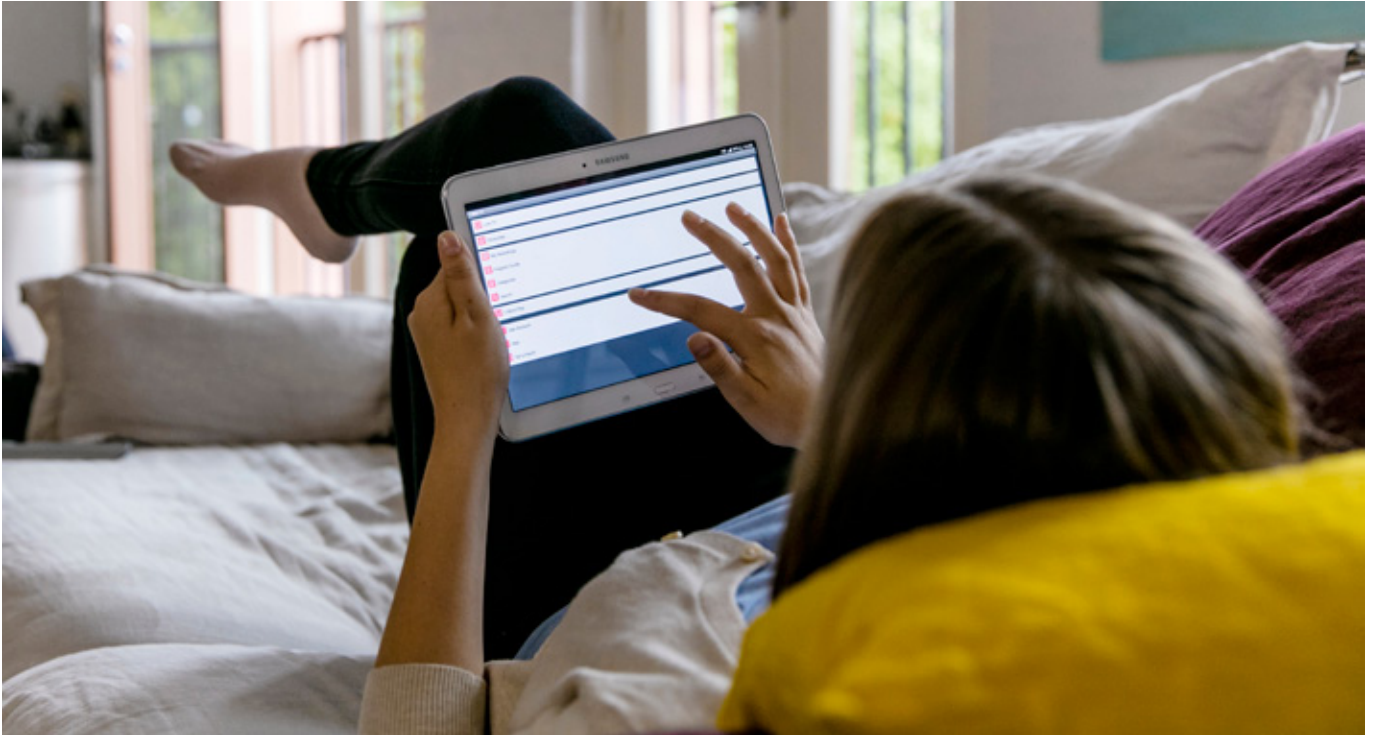
A typical family of four in Finland already has 9-15 devices connected to the network (Photo: DNA) ▲

explains.

Comcast illustrates this pragmatism. Last year the company launched its fibre-based residential service called Gigabit Pro, offering symmetrical 2Gbps speeds. This is now available to 18 million homes

Lior Weiss, Celeno ▲

COMCAST DOCSIS 3.1 TRIALLISTS INCLUDE HOBBYISTS LIKE PHOTOGRAPHERS, VIDEOGRAPHERS AND GAMERS

across the U.S. Anyone living within one-third of a mile of a fibre termination point on the HFC network can request a survey to see if FTTH is viable. But for most customers that final link will be achieved using DOCSIS 3.1 over coax.

DOCSIS 3.1 does not require any changes to the cabling so will be ubiquitous and Comcast expects to scale very quickly once it gets moving. In the customer premise Comcast provides the XB6 Gigabit Home Gateway, a DOCSIS 3.1 device that uses shared-source RDK-B software. This includes a Wi-Fi router capable of delivering Gigabit wireless speeds, IP video technology and integrated home automation and security capabilities.

Comcast is running beta trials of Gigabit broadband using DOCSIS

3.1 in Atlanta and Nashville and users are characterised as early adopting, tech-savvy consumers who like to 'play' with the latest technology. They tend to use the latest software and Internet experiences. They include hobbyists like photographers, videographers and gamers. They include people who like the best of everything, whether it is their apartment, car or broadband. The Gigabit speeds are considered especially relevant to multi-generational households.

Kamalini Ganguly, Senior Analyst, Service Provider & Markets at Ovum (the telecoms, IT media and entertainment intelligence firm), reckons the real Comcast target for FTTH is business customers. "Businesses typically require symmetrical bandwidth more than

"DOCSIS 3.1 WILL BE THE PRIMARY MEANS OF DELIVERING GIGABIT SPEEDS FOR QUITE SOME TIME"

consumers and will require sustainable Gigabit speeds, both of which are better served by FTTH compared with DOCSIS 3.1." She thinks the FTTH deployment also provided a faster competitive response to telcos like AT&T and Google, who were rolling out Gigabit services on FTTH to consumers.

Despite the FTTH offer, DOCSIS 3.1 will be the dominant access technology for Comcast in its quest to deliver ultra-fast broadband. Ganguly says this will be the case for the cable industry generally. "DOCSIS 3.1 will be the primary means of delivering Gigabit speeds for quite some time. It is typically cheaper due to the re-use of existing infrastructure, which means there is no need for digging. Typically it enables a faster response to competitors

offering Gigabit speed tiers."

ABI Research (the market intelligence company) forecasts that there will be approximately 9 million broadband subscribers using DOCSIS 3.1 equipment by 2017. That represents slightly more than 1% of total fixed broadband subscriptions worldwide.

In Europe one of the main challenges in the access network will be achieving Gigabit speeds across the 'last 50 metres' in apartment buildings. DNA is using building Ethernet networks where available, or harnessing the in-building coax. MoCA is tackling this problem with its new MoCA Access specification, which will support 1Gbps immediately and later 2.5Gbps throughput. The target is to have MoCA Access standardised by mid-2017.

Charles Cheevers, ARRIS ▲

Helge Tiainen, Chairman of the MoCA Access Work Group, says the target market is telcos and fibre providers who need to deliver Gigabit speeds between the fibre termination point in the building and the individual apartments. Installing ▶▶

DNA's fibre-optic broadband network will enable speeds of up to 1Gbps to 600,000 homes within a year ▲

▶▶ CAT 6 Ethernet would require too many people to agree to it, and take too long. A cable operator choosing DOCSIS 3.1 as its next-generation access network will not need MoCA Access.

Rob Gelphman, Vice President Marketing and Member Relations at MoCA, says: "We are leveraging the performance and reliability of MoCA. Operators with MDU deployments have asked for this. There is a huge market opportunity and the market is now."

The MoCA standards group also recently published the specification for MoCA 2.5, which can provide 2.5Gbps over in-house coax. "This is significant because it will allow existing wired homes to have a 2.5Gbps backbone for adding additional Wi-Fi and IoT access points or hubs, and to be able to pull Gigabit speeds deeper into Wi-Fi extenders

THE TARGET MARKET FOR MOCA ACCESS IS TELCOS AND FIBRE PROVIDERS WHO NEED GIGABIT SPEEDS BETWEEN THE FIBRE TERMINATION POINT IN A BUILDING AND THE APARTMENTS

throughout the home," Cheevers explains. "This is particularly important for operators who want to claim Gigabit speeds everywhere in the home.

"Furthermore, the MoCA 3.0 spec that is underway looks to expand this capacity to 10Gbps, leveraging any clean-up investment in home MoCA."

It is possible to achieve 1Gbps downstream broadband speeds on cable using DOCSIS 3.0 but as Cornel Ciocirlan, CTO for EMEA at ARRIS,

points out, the roadmap leads firmly towards DOCSIS 3.1. An all-DOCSIS 3.1 network will keep a cable operator competitive for at least the next eight years, providing a 10Gbps pipe for cable operators to use for managed video and broadband services. Ciocirlan predicts that the average industry broadband speeds will only 'break' DOCSIS 3.1 in around 2023-2025. New technologies that ARRIS is pioneering, such as extended-spectrum DOCSIS, will allow DOCSIS to be competitive even beyond 2025, he ▶▶

The Gear VR, powered by Oculus, which enables virtual reality experiences using a smartphone ▲

DNA VALOKUITU PLUS

Nopeampi ja toimintavarmempi verkko

Yli 600 000 kotitaloutta verkossa

GIGALUOKAN NOPEUDET KOTIIN ASTI
Optimaalinen sisä- ja liityntäverkko
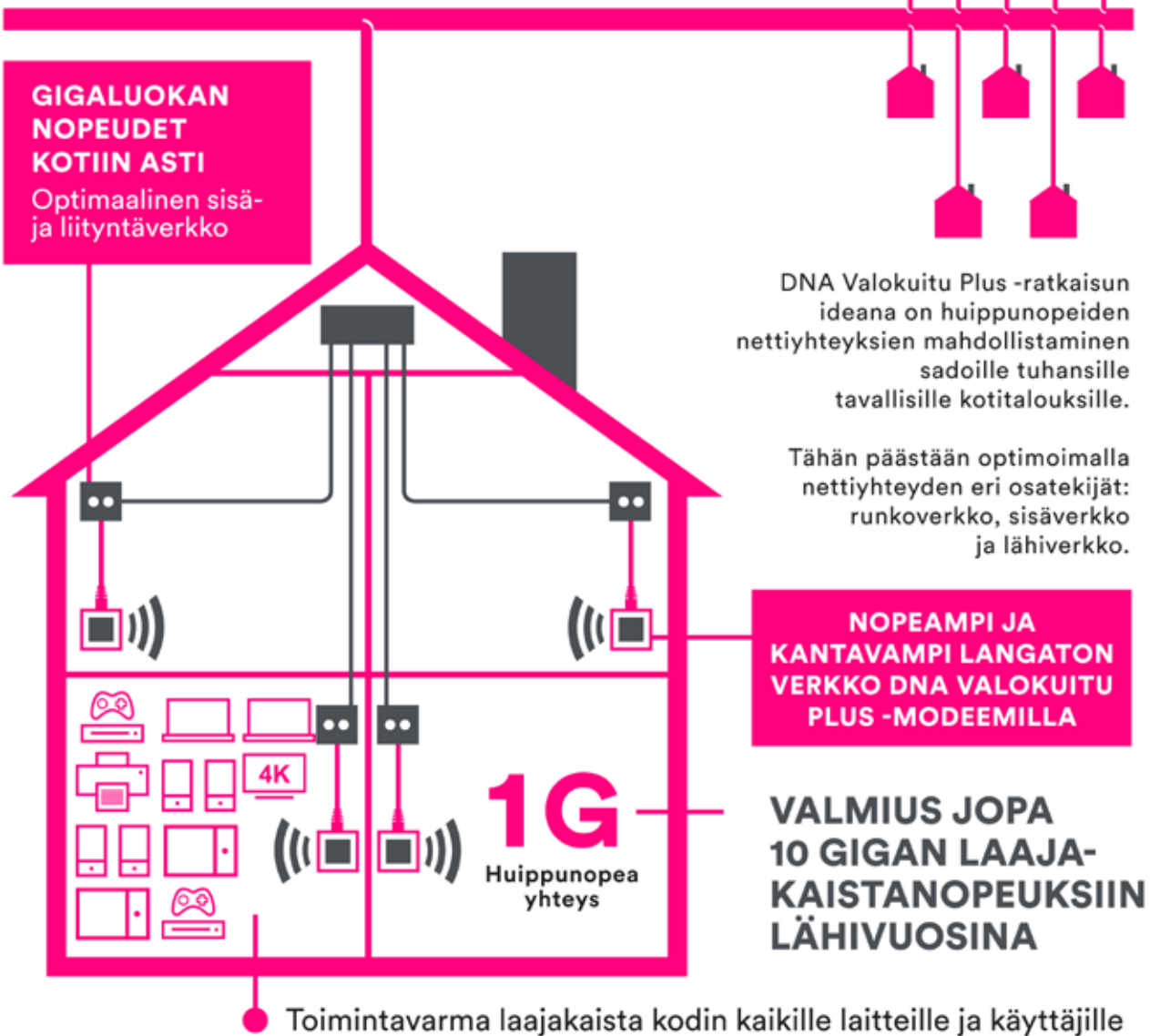
DNA Valokuitu Plus -ratkaisun ideana on huippunopeiden nettiyhteyksien mahdollistaminen sadoille tuhansille tavallisille kotitalouksille.

Tähän päästään optimoimalla nettiyhteyden eri osatekijät: runkoverkko, sisäverkko ja lähiverkko.

NOPEAMPI JA KANTAVAMPI LANGATON VERKKO DNA VALOKUITU PLUS -MODEEMILLA

1G Huippunopea yhteys

VALMIUS JOPA 10 GIGAN LAAJA-KAISTANOPEUKSIIN LÄHIVUOSINA

Toimintavarma laajakaista kodin kaikille laitteille ja käyttäjille

It's in Finnish but you get the idea, as DNA shows how it will deliver Gigabit speeds, and why ▲

adds.

ARRIS enables operators to deploy DOCSIS 3.1 and Gigabit speeds with its E6000 Converged Edge Router, which is based on the Converged Cable Access Platform (CCAP) specification. Customers include Comcast, Liberty Global, Telstra, TURKSAT and SK Broadband. Altice is the latest service provider to deploy the E6000, revealing in March that it would use the technology to deliver Gibabit broadband to homes in France (with SFR), the Dominican Republic (with Orange-Tricom) and the U.S. (at Suddenlink Communications).

DOCSIS 3.1 will certainly be enough to cope with all-IP video on cable networks, which Ciocirlan expects to become a reality at some ▶▶

Cornel Ciocirlan, ARRIS ▲

give telcos the kind of ubiquitous Gigabit speeds (over copper) that will allow them to compete with DOCIS 3.1. "This promises telcos with short loop lengths up to Gigabit speeds without necessarily getting fibre to the door," she explains. "But the technology is still new. We are aware of deployments but not services so we do not know whether G.fast-enabled services are living up to the promise of Gigbabit speeds, or close to Gigabit speeds, at a reasonable cost. But we should know within a year or so."

● GIGABIT AROUND THE HOME

When announcing the new DNA Gigabit service, Mikko Saarentaus, Head of Broadband Business at DNA, identified the final networking challenge that faces operators. "Another bottleneck at homes is the wireless LAN, which often squanders the majority of the connection speed. Giga-class speeds require more efficient and higher capacity modems that enable ultra-fast speeds even wirelessly," he declared.

Customers of DNA Valokuitu Plus are being given a modem with 802.11 ac Wi-Fi and 3x3 technology that is 3-5 times faster than the previous router model. 3x3 MIMO multi-input, multi-output (MIMO) technology means a router can handle three transmit and three receive streams at the same time. "The device ensures better service and works much better with all the connected devices in the home simultaneously. ▶▶

▶▶ operators within the next 3-5 years. The migration to all-IP video will generally start with VOD before encompassing long-tail linear channels and finally the most popular linear channels. CCAP, the emergence of multicast ABR streaming and the increasing volume of unicasting are making the move to all-IP video over cable easier.

The requirement for operators to support the large population of DVB-C set-top boxes already deployed is the only barrier to all-IP video on cable networks, according to ARRIS.

ABI Research also views ultra-broadband as the road to all-IP video. "Thinking ahead, enhanced deployments of ultra-broadband networks could pave the way for cable operators to migrate to a pure IPTV over the DOCSIS network, abandoning legacy broadcast QAM technology," the company stated in January.

Ganguly at Ovum says we will soon know whether G.fast is going to

"DEPLOYMENTS OF ULTRA-BROADBAND NETWORKS COULD PAVE THE WAY FOR PURE IPTV OVER DOCSIS, WITH CABLE ABANDONING LEGACY BROADCAST QAM TECHNOLOGY"

Rob Gelphman, MoCA ▲

The number of those increased very rapidly," a spokesman explains.

More use of the relatively quiet 5 GHz spectrum will improve Wi-Fi performance in the medium-term, as newer client devices penetrate the market. But to enable Gigabit speeds Europe will have to move from a model that is dominated by single wireless access points (APs) to one where there are multiple access points in homes, Charles Cheevers believes.

This would generally mean a primary Wi-Fi gateway that also has a wired extension (using Powerline or MoCA) to a Wi-Fi extender that also transmits and receives from end devices. A simple formula is that in an average European house measuring 1,200 square feet you will need an extender if signals have to go through more than two brick walls. The Norwegian broadband and content provider Get is one company using the extender model to optimise home Wi-Fi.

Installing the primary Wi-Fi gateway near the middle of a home

and software, agrees that we are moving into a multi-AP world in a bid to achieve Gigabit speeds. "We believe that the inherent physical limits of wireless challenges the delivery of the theoretical peak speeds of Wi-Fi standards to every corner of the house. Therefore, a multi-AP approach is a more robust home networking architecture if you want to deliver multi-Gigabit speeds to the edge of the home."

He adds: "As the hunger for speedier connections increases and more Pay TV set-top boxes are moving over Wi-Fi, the single access point model will hit its limit in many homes. Based on our studies, between 25% to 50% of homes will require two or more APs to deliver Pay TV over Wi-Fi to multiple televisions alongside a Gbps data service."

It is not enough to focus on the physics alone, however. Celeno is pioneering smarter Wi-Fi with software products like its OptimisAIR airtime management technology and the ControlAIR multi-AP controller. Weiss says software is a very impor-

Margaret Ranken, Machina Research ▲

network will significantly improve the overall throughput and speed of the network."

Telling Wi-Fi clients which access point they should lock to, and on which frequency, are two important management functions. Another could be prioritising services, like giving pay-per-view on the living room priority over YouTube on the iPad.

Celeno enables Wi-Fi capacity to be allocated between multiple virtual management networks (SSIDs) and this means you can effectively isolate different services, like a 4K video service, smart home services and a public access home hotspot. The company envisages use-cases where a SSID is allocated exclusively to a managed set-top box, while another SSID is open to unmanaged private devices.

"Potentially there could be others for a guest network and smart home applications," says Weiss. "The service provider will be able to manage capacity to these individual ▶▶

"MULTIPLE ACCESS POINTS PROVIDE A MORE ROBUST HOME NETWORKING ARCHITECTURE IF YOU WANT TO DELIVER MULTI-GIGABIT SPEEDS TO THE EDGE OF THE HOME."

also improves Wi-Fi performance but has proved near-impossible in Europe. Shipping boxes with retail-standard aesthetics might help. In the meantime, antenna diversity can project Wi-Fi signals into the home from the corner of a room and is considered a cost-effective improvement.

Lior Weiss, VP Marketing and Business Development at Celeno, which provides Wi-Fi chips

tant factor in Wi-Fi improvements, like coordinating the different access points.

He points out that a typical client device decides for itself which access point to associate with in order to receive data. But this scheme may not work for a multi-AP home network. "Clients do not have visibility into the overall network requirements and the current use of the access points so moving this intelligence to the

SERVICE PROVIDERS CAN MARKET A 'PREMIUM WI-FI' OFFER BUT FIRST THEY NEED A CLEAR UNDERSTANDING OF HOME NETWORK QOS

▶▶ sub-networks with the appropriate QoS setting for each. This tool will enable an upgraded user experience and even the capability to create new service tiers to enable new revenues streams for the operator."

Service providers can market a 'premium Wi-Fi' offer but to do this they need a clear understanding of home network QoS and the ability to make proactive interventions to solve issues and pre-empt customer calls. And if it becomes obvious that the current Wi-Fi architecture is inadequate and a Wi-Fi extender would significantly improve performance, there should be a mechanism to go to the customer with this proposal.

Cheevers at ARRIS warns that you need to get the Wi-Fi physics right before allowing software

management to make its contribution. "You should always have the chance to reach 1Gbps without any software, relying on just the physics, and then add the software solutions," he advises. He points to the ARRIS Touchstone CM8200 DOCSIS 3.1 modem, which supports 5 Gbps downstream and 2 Gbps upstream.

Lionel Gremeau, Product Marketing Management Director at SoftAtHome, which provides a unified software platform for gateways and set-top-boxes, acknowledges that there will be a premium for supporting wireless Gigabit speeds. "The main cost is the Wi-Fi chipset capable of doing [802.]11ac at Gigabit speeds with 4x4 antennas, compared to a Wi-Fi chipset that would support only [802.]11n or 3x3 antennas

Lionel Gremeau, SoftAtHome ▲

at a much lower price.

"You will also need to have the right level of software support on the box to properly manage this power and the associated QoS," he explains. ▶▶

Virtual reality with Oculus. VR could be a big bandwidth hog in future ▲

"WI-FI HAS SHIFTED FROM A CONSUMER PROBLEM TO A SERVICE PROVIDER PROBLEM IN MANY GEOGRAPHIES"

▶▶ If a service provider wants to prevent churn, or stop customers from spending EUR 200 in retail for an advanced Wi-Fi gateway, they will have to put their hands in their pockets. As Sam Rosen (ABI Research) observes, "Wi-Fi has shifted from a consumer problem to a service provider problem in many geographies. Consumer expectations of connectivity throughout their whole home is a measure of the reliability of the service provider offering."

Improved Wi-Fi could generate a revenue stream, and not just indirect benefits like reduced churn. "There is a belief among a significant number of our customers that you can charge more for a better Wi-Fi experience in the next 2-5 years," Charles Cheevers at ARRIS reveals. "In Europe some operators believe they can get at least a quarter of their customers to pay for a premium Wi-Fi experience.

"Customers also believe that Wi-Fi can be used to attract new customers, because people value it so much and because of the services that are coming, like virtual reality, that will demand more from it."

● OWNING THE SMART HOME

John Kendall, Principal Analyst, Connected Home & Smart Home at IHS Technology, confirms that current smart home offerings require only low power wireless solutions, in general. "They require a platform to unify them rather than higher bandwidth," he adds.

It seems that the smart home / IoT opportunity for service providers is not selling bandwidth, but selling an experience, certainly for ▶▶

SoftAtHome illustrates what it thinks the home will look like in the IoT era ▲

the foreseeable future. That could mean providing the gateway that aggregates different services and applications, and it could mean managing the QoS on the home network. It could also mean carrying out the professional installs.

Margaret Ranken, Principal Analyst at Machina Research, which provides strategic market intelligence on the Internet of Things, says there is a danger that the smart home becomes a burden to service providers if all they get is more traffic on their pipes. "I do not think the pipe is what matters here. If you are going to have a comprehensive smart home hub that connects the heating and doors and windows, that is a challenging self-install. Some fire alarms will need professional installation. So the field force that a service provider has [installers and engineers] and the customer relationship are what

"I DO NOT THINK THE PIPE IS WHAT MATTERS WITH IOT; THE FIELD FORCE AND CUSTOMER RELATIONSHIP ARE WHAT MATTERS"

matters."

She adds: "People will want to buy different products from different vendors and hope that they talk to each other. The role of providing the central hub for the smart home is still up for grabs."

In January Machina Research published its latest Strategy Report called 'IoT Platforms Best Practices' and stated that it is not the feature-sets and functionality of the platform that offer the key differentiator but factors like support and a robust partner, systems integration and developer ecosystem. A focus on the customer will also be a key

differentiator.

Charles Cheevers (ARRIS) believes the broadband operator can become the entity that aggregates third-party services and presents them to the customer, even if they can also be accessed through independent apps. This kind of 'onboarding' should mean a better consumer experience, and minimise the number of devices in the home.

There is also an argument that the service provider is best placed to have an overall view of everything that happens in the home, and therefore to help different subsystems communicate with each other, ▶▶

Everyday life is going to start demanding more from access and home networks (Photo: ARRIS) ▲

The TDC data centre ▲

THE BROADBAND OPERATOR CAN BECOME THE ENTITY THAT AGGREGATES THIRD-PARTY SERVICES AND PRESENTS THEM TO THE CUSTOMER

▶▶ leading to a unified user experience.

SoftAtHome's Lionel Gremeau provides some examples. "Cameras can be seamlessly integrated into the LAN with the right QoS already configured in the operator home gateway. Users can access camera streams from the operator's television UI to monitor their entrances or see that their babies are sleeping well…The home gateway detects that my son is back home, indicated when his mobile phone Wi-Fi has been seen or a Bluetooth Low Energy tag is detected."

Operators can use open software platforms within their home gateway to enable the integration of third-party IoT devices, which Gremeau views as a great opportunity. "This will lead towards aggregated services whose total value will be greater than the sum of their parts," he argues. "This will usher in new revenues for operators, as well as increase customer satisfaction and reduce churn."

The research firm Gartner says cable, Internet and alarm companies and mobile phone operating system providers are actively creating platforms and ecosystems in an attempt to break into the IoT gateway market. "We predict that the most successful will develop a system that seamlessly integrates with nearly any vendor's IoT application and is relatively painless to the homeowner. A system that locks homeowners into one specific operating system limits their opportunity."

Cheevers says service providers must break through siloes and deliver a converged experience. "The opportunity for the operator is to do this better than Google or Amazon could. You need to leverage service provider connectivity."

Having the 'global' view of the Gigabit home means service providers can take up the role of the QoE ▶▶

The ARRIS Touchstone TG3462 telephony and Wi-Fi gateway ▲

"THE SMART HOME AND IOT WILL BECOME PART OF THE ALL-IMPORTANT FIFTH PLAY"

guarantor. Corrado Rocca is Executive VP, Product Management & Development at ADB, a company that provides set-top box and broadband customer premise equipment and software. He points out: "Operators control the entry point into the house and have the ability to look around it in a way that companies like Google cannot."

He notes how his customers can use standard protocols to access data on devices that are on the home network and establish a unified view of QoS. "The ability to provide QoS monitoring and management will become more relevant in a world with more devices," he states. "And if you introduce services like [connected] health then they become critical services."

Rocca thinks it is important that service providers convey the value of this QoS management to their customers. It may then be possible to monetise the function, like charging a few EURO per month for a 'Geek Squad' of trouble-shooters. And he reminds us that video, with its higher bandwidth requirements, will be one of the services that needs QoS management.

Rosen at ABI Research thinks there is another way to monetise QoE management. "There is the expectation that for some IoT services with special requirements, the [IoT] service provider will pay for carriage along with higher QoS guarantees measured in latency, throughput and low error tolerance thresholds," he says.

The Smart Home and IoT may not bring lots of value to service providers immediately, admits Gremeau at SoftAtHome. "It may just appear to be a medium for gadgets," he adds. "But it will become part of
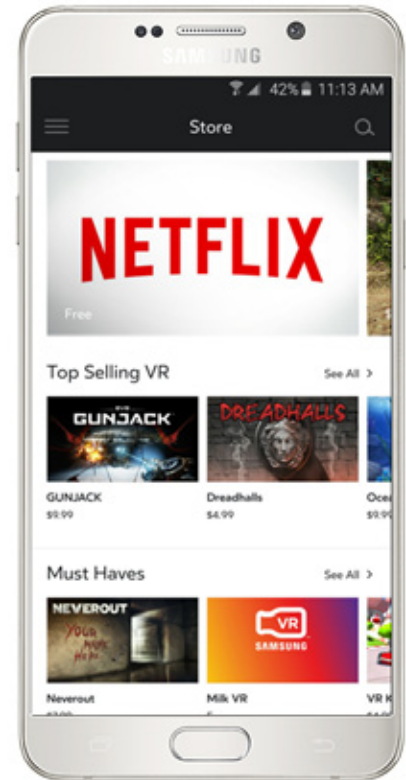

VR is out there (Pic: Oculus) ▲

the all-important fifth play that enables new use-cases to be introduced, some of which will be revenue generating."

When it comes to wireless connectivity for the IoT, the focus is on ultra reliability and low-latency, rather than bandwidth and that could mean a role for cellular networks. If you are offering eHealth services, it is critical that the hub can connect with someone who may have fallen, and is now immobile in the corner of a house. The stronger the wireless coverage (of whatever kind), the longer batteries in remote IoT devices should last, too.

When designing their gateways, service providers can cover most of the future IoT wireless requirements by supporting a handful of protocols and ▶▶
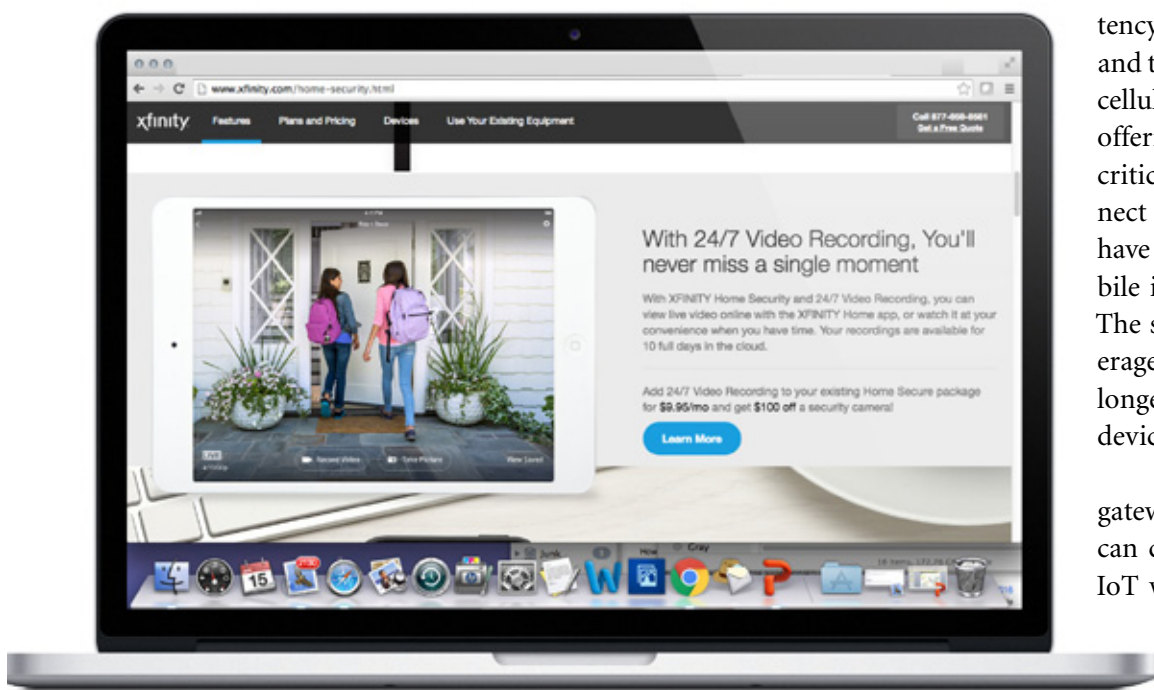
Comcast advertises the benefits of security-focused smart home services ▲

IF A RETAIL ROUTER SITS DOWNSTREAM OF THE SERVICE PROVIDER GATEWAY AND PERFORMS THE NAT FUNCTION, THE OPERATOR LOSES ITS CLEAR VIEW OF END DEVICES

▶▶ technologies, like Bluetooth Low Energy, Zigbee and Thread.

● READY FOR THE GIGABIT ERA

The mobile industry knows what it feels like to have device makers and OS providers take control of the user experience, as Google and Apple did. But cellular networks are more important to consumers than ever, largely because of smartphones. Fixed line providers should be hoping for the best of both worlds – delivering high value broadband and

being responsible for at least some of the user experience.

The presence of third-party retail routers inside the Gigabit home cannot be avoided entirely, but operators should try to limit the reasons why customers feel they need to purchase an additional Wi-Fi router, ensuring the operator keeps direct connectivity to devices in the home. Charles Cheevers notes that if a retail router sits downstream of the service provider gateway and performs the NAT (network address translation) function then the operator loses its clear view of end devices that are being served, interfering with their ability to perform analytics. "You

Helge Tiainen, MoCA Access Work Group ▲

want to be the first hub that all the end devices see," he suggests. "This is essential for operators to be able to provide new services such as IoT and smart B2B2C services such as home automation, health or energy ▶▶

Video services including 4K everywhere will be key drivers for Gigabit speeds (Photo: TDC) ▲

Service providers have the brand reputation and trust to play a key role in the future connected home ▲

"OPERATORS ARE REALISING THAT THE VALUE OF THEIR CUSTOMER RELATIONSHIP DOES NOT STOP AT THE WALL"

▸▸ management."

Lionel Gremeau (SoftAtHome) also considers it a problem if other (third-party) devices perform routing or management roles for applications on the home network. "Retail devices can create big headaches for the network and in the end, the user will blame the operator for any bad connectivity," he declares.

He says it is in the interests of the operator to provide sufficient performance and capacity on their own home gateway to remove the attraction of retail devices. He warns that a failure to invest in customer premise equipment will position the operator as a dumb pipe. And yes, operators

can afford the combination of good-looks and performance to ensure their own gateways can fight off retail competition, he says, pointing to the latest Orange residential gateway, the Livebox 4, as an example.

Speaking at ANGA COM recently, where the dominant theme for the show was Gigabit broadband and the Gigabit home, Steve Heeb, President and General Manager of RDK Management, noted that RDK-B will make it easier for service providers to diversify the kind of broadband gateways and routers they offer to consumers, including high-end gateways for more demanding customers. This could be important if there is

more competition to perform gateway functions.

RDK-B is the shared source software platform for broadband devices, designed to encourage SoC innovation, more device competition and ultimately more and faster service innovation. Broadband device 'agility' is now an opportunity for service providers, Heeb believes.

"They have a huge opportunity to provide a router or gateway with advanced services, like being a Web companion that you can talk to and which will schedule your appointments." These are features seen on the Amazon Echo wireless speaker.

Depending on the country, there will be a subset of broadband subscribers who are willing to pay for a good-looking device with advanced services on it, Heeb confirms. "This is an opportunity for operators to keep customers happy and potentially sell them new services."

Referring to the possibility that consumers may use third-party ▸▸

The widely deployed E6000 Converged Edge Router from ARRIS ▲

"WHILE WIDESPREAD ADOPTION OF GIGABIT SPEEDS HAS YET TO OCCUR, IT HAS BECOME A DIFFERENTIATOR IN THE MARKET"

▶▶ retail routers, like the OnHub from Google, Kendall at IHS Technology says there will always be users who buy their own equipment, but operator investment in CPE will continue to push the envelope.

He thinks the customer relationship is at the heart of how you win the Gigabit home, and talks about a partnership with consumers. "Having recognised that consumers measure the value of their broadband subscription by their Wi-Fi throughput, operators are offering more technologically advanced consumer premise equipment. Operators are realising that the value of their customer relationship does not stop at the wall, but exists in the home network itself," he comments.

Kendall observes that broadband offers are not widely adopted yet, "but that does not mean there is no demand in the market." He says take-up of the ultra-fast broadband services will be driven mainly by video in the near-term, including 4K video. "At some point, Gigabit broadband will become the standard home broadband subscription, but the looming question is when?"

It may be a nascent market but Gigabit broadband is already changing consumer perceptions and therefore service provider marketing. Kendall explains: "Currently, operators view Gigabit tiers of service as a premium offering, with a corresponding price tag. It can, however, be leveraged as a powerful marketing tool to sell higher subscription tiers, resulting in higher ARPUs, while looking towards a time when Gigabit speeds will become normal.

"While consumers have not, by and large, begun subscribing to Gigabit tiers of service, Gigabit speeds are currently a very important marketing tool. The offering itself has tremendous upsell and churn possibilities for operators. So while widespread adoption has yet to occur, it has in a way become a differentiator in the market."

Charles Cheevers at ARRIS emphasises: "User experience is key to growing customers and the uptake of new services and this needs to be built on burst-level Gigabit capacity, both to the home and in the home. 87% of all devices now connect on Wi-Fi in the home and the Wi-Fi network needs to match the capability of the multi-Gigabit DOCSIS 3.1 network for best user experience.

"We are seeing the first true commercial VR services coming and it is an application that only works when the user believes what they see and that what they are immersed in is real. To achieve reality, the network-to-eye needs to deliver Gigabit speed at ultra-low latency. This can be achieved on DOCSIS 3.1 and future generations and must be achieved over home wireless connections too." ■