THE X-FACTOR
OF A SUCCESSFUL CPE FIBER STRATEGY

Table of contents

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Introduction

The ever-growing release of bandwidth intensive content and applications, the popularity of streaming video services, VR/AR and online gaming consumed by several users in the same household and at the same time, and the growing trend of work from home after the COVID-19 pandemic have challenged the quality of the home broadband experience. Coupled with the emergence of the "Hyper Connected Home" with billions of devices needing a broadband connection to deliver the benefits of the internet of things, the need for speed, low latency, increased security and more bandwidth has never been so critical to deliver these new experiences that people want to enjoy.

With speeds going up to 10Gbps and soon to 25Gbps and beyond, fiber networks and their associated home gateways are a solution to solve all these issues at once. It is not a surprise that this market is now growing at a very fast rate. According to a 2022 report from Dell'Oro*, PON equipment revenue will grow from $9.3bn in 2021 to $13.6bn in 2026, driven largely by XGS-PON deployments in North America, Europe, the Middle East and Africa, and Caribbean and Latin America regions.

*Broadband Access & Home Networking 5-Year Forecast Report

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Introduction

To accelerate this deployment, many fiber network equipment providers propose end-to-end solutions made of head-end and consumer premises equipment (CPE). This ensures full interoperability along the equipment chain and facilitates the launch of new services quickly. But it is also a bottleneck for innovation as it prevents operators for looking at possible alternatives. To thwart this, many CPE vendors who want to gain market shares are therefore fighting a price war to propose cheaper fiber gateways, claiming interoperability with head-end equipment as they carefully follow the BBF247 and TR255 standards. But unfortunately, these standards do not cover all interoperability issues (generating more costs and shifting time to market) and, as we know, innovation rarely coincides with a price war.

In fact, as gigabit speeds become the norm today, people are less and less interested in speed that they consider to be a given. Indeed, paying a monthly fee for a given speed is now well understood by end-users, and those who cannot live without gigabit speeds are now waiting for something else. On the other hand, operators who have massively invested in a new network, therefore generating a new subscriber base, now want to make sure they continue to grow this base and avoid churn to maximize their investments. These operators need a guarantee for their CPE to be able to satisfy new users expectations beyond speed. **This is what we would call peace of mind, and though it is hard to come by in these times of uncertainty, that's exactly what Vantiva offers as a leader in Fiber consumer premises equipment (CPE) for the home.**

That peace of mind comes from several X-factors that empower the fiber gateway to make it robust, reliable and future proof. The next chapter of this document will explain what are these X-Factors and why it is important to consider them as a big part of operators' return on investment.

X-FACTOR #1:
Interoperability

As we stated before, interoperability between head-end and CPE is key to accelerate deployment and to ensure a frictionless launch of new services. In addition, this interoperability gives operators the freedom to choose from multiple vendors. Freed from being locked down to one vendor and their requirements, operators can take advantage of market competitiveness, potential cost savings, and opportunities for growth.

In fact, world class OLT/ONT interoperability is the most complex issue in fiber deployments as there is no standardized certification to ensure the OMCI implementation and compatibility between OLTs and ONTs. To ensure compliance of our products against interoperability standards, Vantiva runs a state-of-the-art Fiber lab that continuously integrates with the latest OLTs solutions. For operators, that means they can ensure the fastest and most cost-effective deployment with the best quality of service.

Vantiva has built a full testing process based on an extensive list of OLT models, firmware and patch versions. A dedicated team of Vantiva experts also performs tests at the customer's lab to make sure it integrates perfectly with their service network. This allows for maximum flexibility and reactivity as interoperability is evaluated live, and software deployment can be immediately launched with the highest level of confidence.

VANTIVA FIBER INTERLOP LAB

A unique test suite server generating additional test cases to the BBF255 and TR147 standards to target 100% interoperability

A portable solution that can be installed in a Custommer's premises

X-FACTOR #1: Interoperability

In testing sessions conducted at customer premises in three countries spanning North America, South America, and Europe, Vantiva test cases achieved a 100% success rate versus 70-80% for competitors.

With interoperability, Vantiva also offers easier, faster deployment and the elimination of bottlenecks, no matter what combination of vendor is chosen and with no restriction. Successful deployments lessen error rates and lower operating expenses down the line.

When inevitable vendor software changes occur, Vantiva enables operators to verify interoperability within the hour, beating the normal test cycle by up to two weeks.

In fact, Vantiva is equipped with the expertise and in-depth knowledge to handle any challenge, including the different approaches to interoperability taken by vendors; their various configurations and software capability requirements; and the processes and testing we use to maximize security, minimize costly backend attacks, and future proof solutions for the home.

All told, the interoperability provided by Vantiva gives operators maximum flexibility and the ability to provide the highest quality of uninterrupted service, with a level of confidence – and peace of mind – unmatched in the industry.

X-FACTOR #2:
Open software platforms

Today, operators are moving from access-centric offers (more bandwidth, faster Wi-Fi) to more user-centric scenarios. What additional services can be offered to the customer and how can these services be made available in an easy, reliable and efficient way, is the question every software stack should fundamentally address.

The software solution should evolve to support these scenarios, including the addition of new application for both end-user services and OPEX optimization.

Having this in mind, Vantiva has developed a unique gateway software solution called Homeware that greatly simplifies and accelerates the desired transformation from hardware and technology into solutions. We have achieved this by designing Homeware to be open from the ground up, highly modular, very flexible and hardware agnostic.

Vantiva Homeware for FIBER gateways leverages the OpenWrt open source software and SoC vendor software for the lower layers and is enriched by Vantiva to create a scalable software stack. Homeware's main benefits:

APP READY
- Deploy new services in a modular way to existing firmware using Life Cycle Management, enabling new ARPU creation and a differentiated offer.
- Run the applications in a protected execution environment, without any impact on the core applications of the gateway, improving stability in a complex configuration.
- Deploy new services on existing products, without expensive and time-consuming upgrades

OPEN
- Tap from rich software ecosystems and extensive partner networks to build the applications and services of tomorrow, using a familiar Software Development Kit (SDK) based on OpenWrt and development boards.

SECURE
- Rely on Homeware, a software solution designed right from the start with security in mind throughout the development and validation stages
- Free your mind as Homeware monitors the security of existing deployments as an after-sales services

X-FACTOR #2: Open software platforms

INTEROPERABLE
- Guarantee the best interoperability in all network functions and with all major players on the market (e.g. ACS with TR-69 and USP, IMS, OMA-DM, OMCI, etc.)
- Gain full flexibility with Homeware's support of multiple configurations to deploy the same software in heterogeneous networks and to link it to components from various vendors

PORTABLE
- Choose the right hardware for the job, not the right job for the hardware, to become more cost-effective
- Provide the same experience across multiple access technologies and hardware vendors to streamline the portfolio

Homeware also includes all software features and capabilities that a service provider expects from a quality broadband gateway and even more, as new features are being added on a regular basis.

Vantiva partners with major software players to offer pre-integrated software services enabling new services in the field of Home Automation, Security, Parental Control, Voice Command Services, Video distribution and others.

Homeware offers a proven solution with global footprint to support our customers worldwide. The development team consists of over 200 software engineers located in Europe (Antwerp and Rennes), Asia (Chennai and Beijing) and Americas (Atlanta and Indianapolis). Homeware has been deployed with over 10 million gateways in more than 50 customers from Sydney to São Paulo.

X-FACTOR #3:
Security

Security has always been a priority for CPE vendors, service providers and consumers. Personal data privacy and access to home network devices will always need to be protected against piracy and network attacks.

As the industry progresses to make Fiber gateways the epicentre of service delivery, these devices must implement a high-level of security to protect a complex ecosystem – from broadband to wireless connectivity, to entertainment and IoT services.

SECURING THE HOME GATEWAY
Vantiva fiber gateways embed a bootloader that verifies all data read from flash into RAM before it allows it to execute or before it is used in trusted operations. This verify-in-RAM process is our current "maximum security" solution, but our security process is much broader.

Indeed, our fiber gateways are built with an overall software architecture that includes an end-to-end security mechanism by design: from bootup, firmware upgrade, and gateway configuration to the installation of applications via lifecycle management.

SECURING GATEWAY APPLICATIONS
Our fiber gateways can run several applications that enable new customer services in the areas of data analytics, home automation, roaming and others. These applications can be provided by 3rd party companies or by the operator and they typically require regular updates, independent of the firmware itself. That's why a high level of security must be implemented to protect the core firmware from the applications, making sure the core functionality of the fiber gateway is not affected, in order to ensure service continuity.

SECURING THE HOME NETWORK
The firmware on the fiber gateway has a completely configurable firewall, protecting the home network, the devices and their content from unauthorized remote access.

X-FACTOR #3: Security

Also, another layer of security is provided by our HERO partner CUJO AI, that is available as part of Vantiva's software offer. It is a multi-solution AI-driven software that analyzes vast amounts of network data and uses proprietary machine learning algorithms to detect and block:

- attempts to access undesirable or illegal content
- malicious actors and threats to all devices connected to the network
- attempts to track online activity
- malicious activity invisible to customers but representing operational threats or service abuse

A SECURITY-FOCUSED DEVELOPMENT PROCESS

Vantiva embraces a rigorous three-step security check during its development to reduce the risk of vulnerabilities:

- During development every code contribution is verified overnight for security breaches; developers are automatically notified.
- During validation before customer acceptance, the complete code is validated by a dedicated security team in both open box via code review and closed box with penetration testing.
- Even when products are delivered, a dedicated team tracks software components and technologies used in the products and continuously checks for security vulnerabilities. At regular intervals, the products are validated by independent 3rd party security labs.

In addition to this, Vantiva has received ISO 27001 certification in cryptographic key production/distribution systems and associated incident response services. These are two critical operational categories for network service providers (NSPs) around the world who have become much more demanding about including stringent security requirements in their requests for proposals for Fiber gateways. Technology providers that are not ISO 27001 certified must prove their compliance separately with the security auditors of each NSP. This introduces significant time, cost and risk into the process. ISO 27001 certification is a strong signal that Vantiva is committed to security and privacy over the long term. This makes it easier for NSPs to verify -- through trusted third parties -- that compliance is in place. This accelerates the time-to-market of new revenue-generating offerings in a risk-adjusted manner.

ISO 27 001 at company level

Integrated home network security apps

Software development including 3 security layers

X-FACTOR #4:
Wi-Fi Performance

For sure fiber networks bring unprecedent speeds to the home via the main gateway **but that can become irrelevant if that fast broadband cannot be distributed effectively to every device and user in the home.** And that's where excellent Wi-Fi performance of the fiber gateway is needed.

Wi-Fi 7 is today the most powerful version of the standard. Vantiva has demonstrated the first carrier-grade Fiber gateway to fully integrate Wi-Fi 7 in 2022, demonstrating the power of this new wireless technology by extending the operating bandwidth range to 320Mhz and featuring 4096 quadrature amplitude modulation or 4K QAM which together rival speeds offered by ethernet cables. Our gateways provide all the advantages of Wi-Fi 7, featuring multi-link operation (MLO) which enables client devices to connect to 2.5, 5 and 6Ghz radios simultaneously. This capability creates multiple links on different bands to simultaneously transmit data packets to improve latency and data throughput. MLO also allows the gateway to provide connectivity without interruption in areas with high interference and congestion.

Vantiva's Wi-Fi 7 Fiber gateways take full advantage of the spectrum made available by the standard, elevating the efficiency of channel utilization by avoiding channels with interference to maximize bandwidth.

Of course, antenna design and location, radio selection, noise reduction and signal path optimization are unique to every design and critical to ensuring that the best performance is achieved. The optimization of these elements are critical and Vantiva goes to extreme lengths through our test facilities to make sure our Wi-Fi design is fully optimized and tested before we actually launch the products.

X-FACTOR #5:
Companion app

Nowadays a good internet connection at home is not a privilege but an essential need. Users are aware of this and look for strong signal strength, wide coverage, and powerful bandwidth in their Wi-Fi home networks. Moreover, Wi-Fi usage is not an invisible user touchpoint anymore. Connecting multiple devices, sharing a network with other members or guests, parental control or timeout rules, security concerns, performance tests are all use cases that make up an NSP's home network offering.

To facilitate this, Vantiva provides the NaviGate companion app which enables end users to monitor and to manage their home Wi-Fi network. Since it is cloud-based, end users can use the companion app in real-time and from anywhere. Not only do they gain visibility into connected devices and can define the internet access rule, but also can control advanced Wi-Fi settings. Operators can use the companion app for their subscribers to opt-in for value-added service.

X-FACTOR #6:
Sustainability

At Vantiva, we actively pursue solutions that create a visible impact. One of our initiatives involves using recycled plastic in our fiber gateway casings, reducing the production of new plastics, and combating the global plastic pollution crisis. For nearly two decades, Vantiva has also been at the forefront of voluntary agreements on power consumption. Our investment in research and development allows us to create Fiber gateways that use less energy without compromising on performance.

Our contribution to a sustainable future is also proven with devices that are smaller in size, minimizing our transport impact by improving container filling methods, and reducing carbon emissions through more efficient shipments.

Furthermore, we have embraced the principles of the circular economy in our product design process by creating products with end-of-life in mind and maximizing material reuse. For instance, we aim to enhance product disassembly and recyclability, enabling the reuse of materials in new products.

For all these efforts, and many more, Vantiva has been awarded by EcoVadis, one of the world's leading CSR rating agencies, the prestigious Platinum Medal, placing us among the top 1% of companies in the communications equipment manufacturing sector, for the second year in a row.

This remarkable recognition reflects our dedication to sustainable practices across all assessed categories.
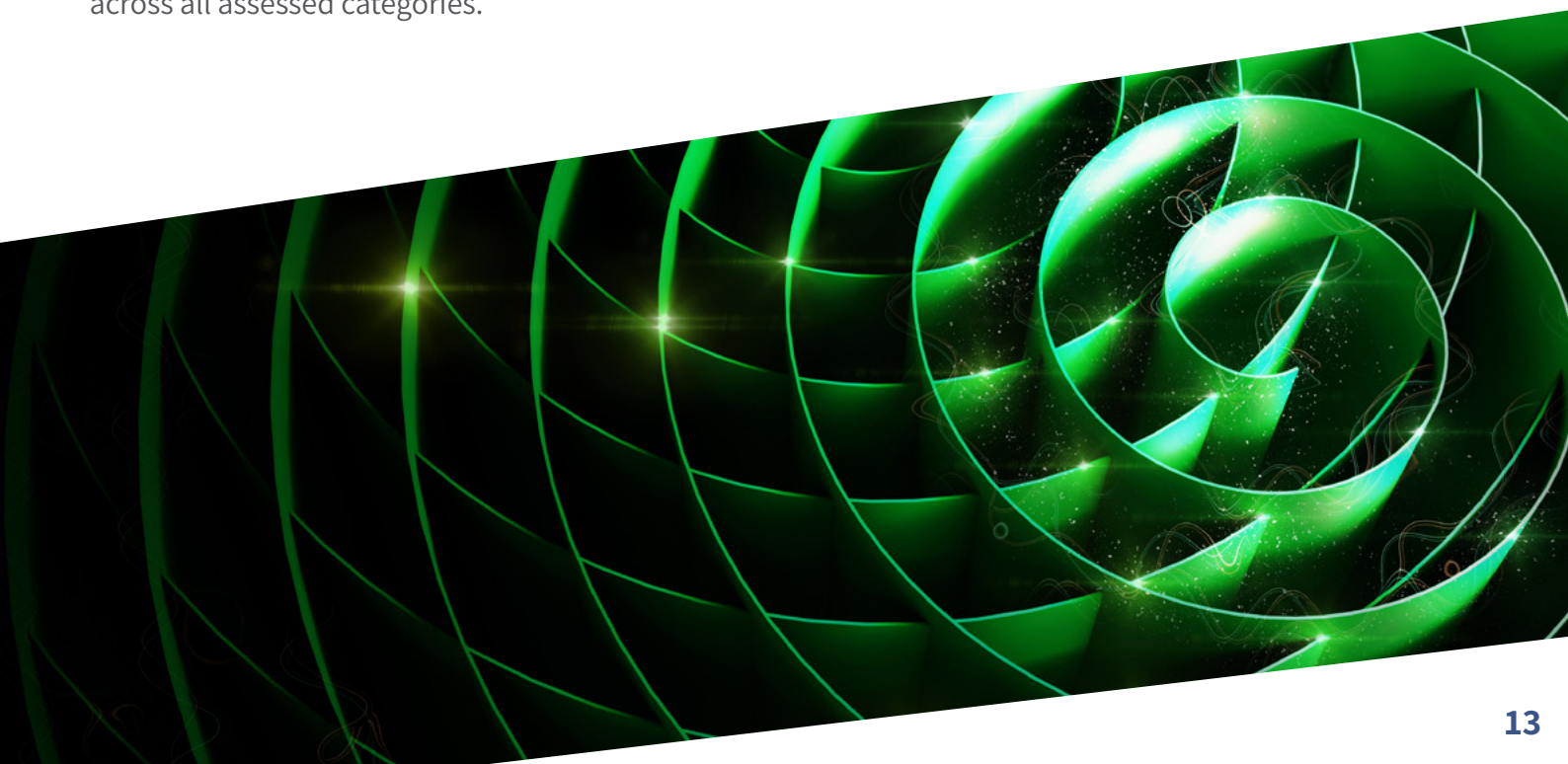
Conclusion

The ability to deliver Gigabit speeds to the home is becoming "normal", with operators having more options for equipment selection and customers having more choices on delivery methods. Operators will need to compete on features beyond speed.

Vantiva can bring peace of mind to both the operator and the customer through the capabilities embedded in our fiber devices.

- Interoperability with multiple OLTs at product launch and beyond
- Open SDKs that enable both local third-party application software integration and cloud software applications
- Product security at the device level and for customer's networking activity
- Whole Home Wi-Fi performance with Vantiva's detail to hardware design and the Wi-Fi delivery ecosystem
- Companion application to facilitate the setup and management of the gateway
- Sustainable products