

BROADBAND CASE STUDY SUCCESS STORIES

THE POWER OF HIGH-SPEED BROADBAND TO
BENEFIT CONSUMERS AND IMPROVE SOCIETY



**WORLD
BROADBAND**
ASSOCIATION

This report analyzes the need for greater broadband investment to support continued socioeconomic growth, the barriers to that investment, and what governments and organizations such as the World Broadband Association (WBBA) can do to eliminate such barriers.



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INTRODUCTION

This report was conceived by the World Broadband Association (WBBA) Improved Marketing working group with the aim of bringing together examples of successful case studies that demonstrate the full potential of high-speed broadband connectivity.

The group worked to identify case studies from members' own experiences, striving to ensure all case studies were appropriate, based on the following parameters:

- Real-life case studies, not potential use cases
- Highly relevant to modern connectivity
- Measurable success

The WBBA has brought together five case studies in this initial report, but the project will not stop here. The WBBA, in partnership with Omdia, now intends to encourage other members to contribute their own case studies with a view to developing a library of best-practice examples.

SUMMARY

For this report, we have examined five disparate case studies from both service providers and equipment vendors, covering both the consumer and enterprise sectors. A broad range of customers and end users are also represented, with the two not necessarily being the same thing.

TABLE 1: OVERVIEW OF FEATURED CASE STUDIES

COMPANY	PRIMARY ROLE	CASE STUDY	MARKETS COVERED	TARGET SECTOR
China Telecom	Service provider	e-Surfing Webcam	China	Consumer
Chorus (New Zealand)	Service provider	Smart city CCTV	New Zealand	Enterprise (local government)
Huawei	Vendor	Fiber to the room (FTTR)	Global	Consumer
Huawei	Vendor	All-optical smart factory	China	Enterprise
Nokia	Vendor	Cutting broadband energy consumption	Global	Service provider

SOURCE: WBBA

The case studies also identified the key expected benefits for their customer or service provider, such as improvements in broadband speed and latency or meeting regulatory or environmental targets. The various expected benefits are summarized in **Table 2**.

TABLE 2: SUMMARY OF EXPECTED BENEFITS BY CASE STUDY

COMPANY	CHINA TELECOM	CHORUS	HUAWEI (FTTR)	HUAWEI (SMART FACTORY)	NOKIA
Service innovation or improvement	✓	✓		✓	
Efficiency and productivity of broadband delivery		✓			✓
Improvement in download speed		✓	✓		
Latency		✓	✓	✓	
Customer satisfaction	✓	✓	✓	✓	
Improved competitive edge over rivals	✓			✓	
Increased revenue/ARPU or market share	✓		✓		
Socioeconomic benefit (enabling community growth through connectivity)	✓				
Environmental benefit (improved sustainability, move to carbon neutral)		✓			✓
Improving or meeting a regulatory or government target/initiative	✓				✓

SOURCE: WBBA

While improvements to business performance such as increased revenue and competitive edge are still of key importance, the importance of benefits such as innovation and efficiency of broadband delivery indicates the broad reach of these case studies.

It is interesting to see that three of our case studies list improvements in latency as a key benefit, while just two cite download speed. This is further evidence of the ongoing shift to improving broadband delivery beyond just speed as consumer and enterprise demands shift.

It is also encouraging to see socioeconomic and environmental benefits appearing, and we expect growth in these areas as consumers demand improved environmental and social credentials.

RECOMMENDATIONS

Based on an analysis of the case studies, the WBBA has drawn several high-level conclusions that could help develop best practice in broadband service delivery:

- **Consider fresh channels for return on investment in fiber resources.** Service providers should consider other revenue channels to maximize the return on expensive fiber investment. In our smart city case study, Chorus was able to use existing fiber-to-the-home (FTTH) infrastructure to connect CCTV at a fraction of the cost of a new network build.
- **Explore bundling opportunities beyond entertainment.** Multiplay operators should think beyond the classic triple/quad-play offerings. Our case studies show China Telecom using connected home offerings and Huawei demonstrating the use of fiber to the room (FTTR) to improve the home broadband user experience.
- **Remember that customers and end users are not necessarily the same.** While the primary concern will clearly be whoever pays the bill, it is worth noting that, particularly in many enterprise scenarios, the end user will be a third party. Good service delivery must consider the needs of both customers and end users, with the ultimate goal of benefiting people's lives and society as a whole.
- **Consider new solutions to old problems.** Wi-Fi repeaters are commonly offered by service providers to improve broadband coverage. But as connectivity demands increase, they will no longer meet consumer needs. New solutions such as FTTR and fresh uses of fiber resource should be considered to meet demand, particularly in enterprise and industrial scenarios.
- **Anticipate future demands.** Solutions such as FTTR and multinet network integration may seem a little extravagant for current consumer needs, but demand for data continues to ramp up. Service providers that begin to offer these kinds of solutions now will likely benefit from first-mover advantage.
- **Learn to engage with new scenarios.** Partnerships are key to service provider offerings, particularly in areas outside the usual operator comfort zones. Our case studies have shown several examples of successful partnerships in areas as diverse as e-cameras, public CCTV, and green energy.
- **Embrace regulatory opportunities.** Regulation can create business opportunities outside the usual areas of broadband coverage and spectrum licensing. Our case studies show several ways service providers and vendors have partnered to meet regulatory demands in both social and enterprise scenarios.
- **Go green.** Environmental credentials such as net zero rating are increasingly becoming a necessity. These credentials need to be built into all future offerings in order to meet both consumer demands and the needs of business partners and regulators.
- **Shout it from the rooftops.** Great examples of business best practice can be powerful marketing tools, both within industry circles and in wider society. Everyone from the consumer to business partners and regulators like to be associated with innovative, forward-thinking companies. If you have a good story, tell it!

CHINA TELECOM: E-SURFING WEBCAM

NAME OF COMPANY/ORGANIZATION	China Telecom
COUNTRIES COVERED IN THIS CASE STUDY	China
DATE OF SUBMISSION	July 2022
AUTHOR	Longjie Xu, Senior Engineer, China Telecom Guqiao Zhu, Senior Engineer, China Telecom
ROLE IN THE BROADBAND ECOSYSTEM	Operator/service provider Infrastructure/networks vendor System integrator

SUMMARY

E-Surfing Webcam is a home security and care product launched by China Telecom in 2019 for home users. The product integrates the functions of real-time monitoring, photographing and video recording, audio calling, motion detection and reporting, IR night vision, and artificial intelligence (AI) service.

Based on the gigabit broadband network, intensive surveillance management platform, and cloud storage provided by China Telecom, the product aims to ease concerns about home safety and security, caring for the elderly, childcare, and so on.

Users can check real-time monitoring/playbacks anywhere and at anytime by using an app called XiaoYiGuanJia along with the surveillance camera, visual doorbell, or other type of terminals. This product may cover a variety of scenarios, such as caring for children or elders, home surveillance, entertaining pets, and event reporting.

KEYWORDS

#webcam #AI #gigabit #broadband #network #platform #cloud storage #homesafety #elderlycare #childcare #surveillance #visual doorbell

MARKET CONTEXT

STATE POLICE AND SECURITY MONITORING

In recent years, the Chinese government has released a series of policies that boosted the rapid development of the security and monitoring industry. The goal of “Safer China, stronger public-security prevention and control systems” is clearly stated by the government, and this offering will facilitate the growth of the surveillance and monitoring industry.

BROADBAND MARKET BECOMING HIGHLY COMPETITIVE AND HOMOGENIZED; OPERATORS UNDER HEAVY COMPETITIVE PRESSURES

As broadband services become more popular and homogenized in China, operators have had to lower their prices or offer discounts in order to attract new users. As a result, ARPU has fallen significantly, and a new product or service was required for China Telecom to differentiate from its rivals. E-Surfing Webcam aims to fulfill the needs of home surveillance and family care. A standardized, cloud-network integrated product, e-Surfing Webcam helps to support the

development of the broadband business in China Telecom's provincial subcompanies (in some practical cases the new broadband user acquisition rate is up to 84.9%).

STRONG DEMAND FOR SURVEILLANCE AND MONITORING FROM BUSINESS USERS

The security and monitoring market has seen rapid, long-lasting development in China in recent years, and its business scope has expanded to many industries. Customers of surveillance and monitoring products include individual families, small and medium-sized enterprises (SMEs), governments, and large industrial customers. Products are widely applied in urban comprehensive management, community management, traffic management, family caring, and home surveillance scenarios.

CONSIDERABLE MARKET POTENTIAL IN SURVEILLANCE

According to the report "Smart Home Surveillance Camera Market Analysis and Forecast," sales of surveillance cameras in China have continuously increased in recent years and are expected to exceed 800 million in 2025. In-depth use of AI technology has gradually become an effective solution in security and other scenarios. Sales of AI cameras in 2019 reached 6.84 million with a year-on-year increase of 147.8% and are expected to reach 34.58 million by 2022 with a CAGR of 71.63%.

EXPECTED BENEFITS TO CUSTOMER / SERVICE PROVIDER

- Service innovation or improvement
- Customer satisfaction
- Improved competitive edge over rivals
- Increased revenue/ARPU or market share
- Socioeconomic benefit (enabling community growth through connectivity)
- Improving or meeting a regulatory or government target/initiative

BUSINESS BENEFITS (SUCCESS KPIS)

CONSUMER BENEFITS

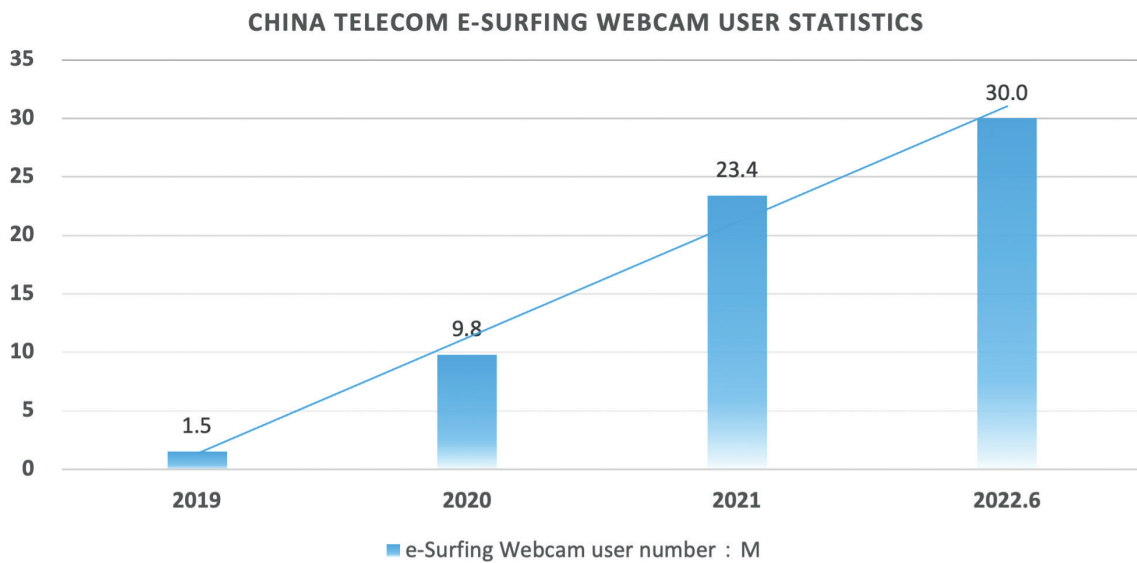
E-Surfing Webcam provides users with safe and convenient intelligent security and value-added services and fulfills users' needs around family safety and caring for children and elders. It helps to improve quality of life and to guarantee the safety of people's property and lives. In addition, the use of e-Surfing Webcam in rural areas helps to popularize the philosophy of the "smart home" and drives the development of "informatization."

With the e-Surfing Webcam platform, the Chinese government's capability for comprehensive management is also improved because it is easier to conduct environmental inspection, disaster monitoring, and so on. The product is also playing an important role during the pandemic and is highly recognized by the government.

BUSINESS BENEFITS

The number of e-Surfing Webcam users has increased rapidly since it was introduced in 2019. As of June 2022, orders for the e-Surfing Webcam playback cloud service exceeded 30 million, and webcams have been sold in 31 provinces and 255,000 villages nationwide.

CHINA TELECOM' E-SURFING WEBCAM SALES HAVE RISEN RAPIDLY



SOURCE: CHINA TELECOM

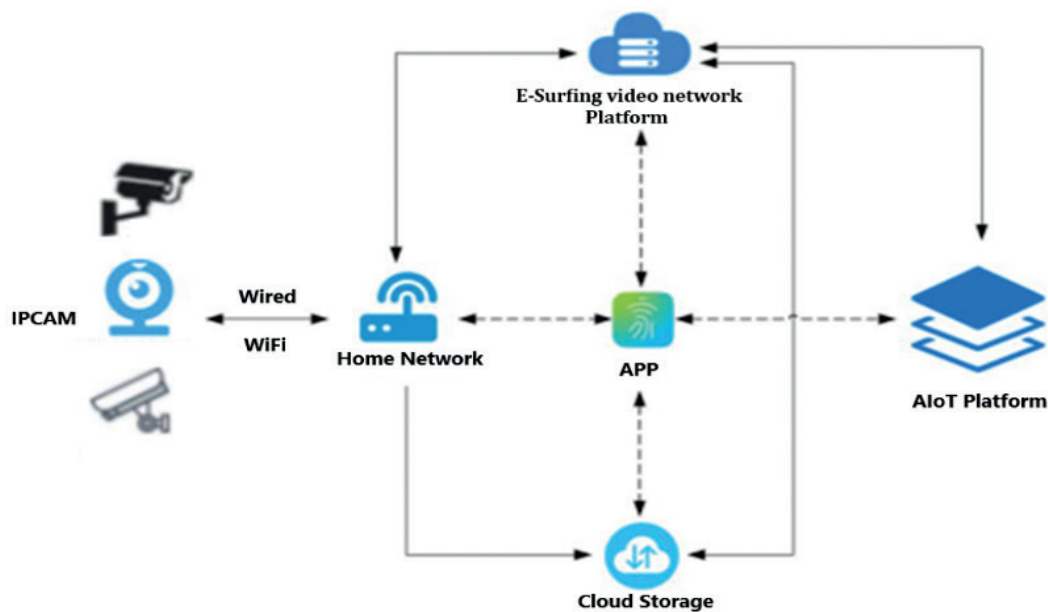
Along with the large-scale development of e-Surfing Webcam business across the nation, broadband services, installation and maintenance services, hardware products, Webcam playback cloud services, and cloud resource services are all boosted and form a community of shared interests. Revenue from e-Surfing products increased from CNY2bn in 2020 to CNY5bn in 2021 and is expected to reach CNY10bn in 2022. It is also expected that revenue from product sales in 2022 will be over CNY3.5bn, and in some provinces more than 50% of new broadband users will be acquired. E-Surfing Webcam contributes an average of about CNY8 to broadband user ARPU growth.

SOLUTION OR INNOVATION: FURTHER DETAILS

To promote the e-Surfing Webcam business and standardize terminal capabilities, China Telecom has released a series of technical specifications for partners, such as the “White Paper for Smart Home Terminal requirements (IPCam),” “White Paper for Smart Home Terminal requirements (visual doorbell).” These specifications regulate the capability requirements of China Telecom’s customized terminals, such as functions, technical parameters, product quality, and interfaces.

China Telecom has also innovatively developed a standardized video terminal software development kit (SDK), which is open to cooperating manufacturers. The SDK is integrated into the terminal, which significantly shortens the development cycle time of the terminal and reduces development costs. The SDK supports multiple types of terminal access, fills the capability gap between different terminal manufacturers, breaks industry barriers, and promotes the rapid expansion of business and hence the provision of standard video surveillance products.

NETWORK TOPOLOGY OF E-SURFING WEBCAM



SOURCE: CHINA TELECOM

As mentioned above, the needs of different industries and scenarios can be fulfilled. The capability of digital governance in society will be improved.

BUSINESS MODEL INNOVATION

HOW THE INITIATIVE WILL BE MONETIZED

China Telecom intensively purchases webcams, visual doorbells, and other terminals from vendors and connects the terminals to unified platforms and applications. By doing so, China Telecom successfully creates a standard service and allows its broadband users to subscribe and pay monthly based on their needs. This is a change to the original method of surveillance project implementation and charging and gives users more flexibility to choose the services that fit their needs. Customer satisfaction has improved and costs are reduced, because China Telecom has a stronger capability in operation and maintenance, a better network infrastructure, and more marketing channels.

IMPLICATIONS FOR WIDER BUSINESS MODEL

China Telecom is now working on building an open platform for AI applications and developers. Third-party partners will be able to upload their AI applications to the platform, and users of e-Surfing Webcam will be able to subscribe to those AI services based on their needs. Revenue and profits will be shared among China Telecom and partners and vendors.

LINKS TO FURTHER INFORMATION

[From “governance” to “Intelligence”, e-Surfing Webcam’s contributions to the development of smart urban](#) (Chinese language)

[China Telecom’s e-Surfing video network connection users exceeded 30 million](#) (Chinese language)

[China Telecom’s e-Surfing Webcam helped pandemic prevention & control in Guangdong](#) (Chinese language)

[Safer data, reliable e-Surfing Webcam](#) (Chinese language)

[Three major use cases of China Telecom’s e-Surfing Webcam during the pandemic](#) (Chinese language)

CHORUS: ENABLING SMART TRANSPORT WITH FIBER BROADBAND

NAME OF COMPANY/ORGANIZATION	Chorus
COUNTRIES COVERED IN THIS CASE STUDY	New Zealand
DATE OF SUBMISSION	July 2022
AUTHOR	Kurt Rodgers, Network Strategy Manager, Chorus
ROLE IN THE BROADBAND ECOSYSTEM	Infrastructure/networks vendor Content provider Application developer Device manufacturer System integrator Other (transit providers, cloud enablers, internet exchangers, etc.)

SUMMARY

Leveraging a mass-market broadband network to enable a smart transport network achieved a great outcome for New Zealand's largest city. Auckland Transport has more than 3,000 CCTV cameras monitoring roads, superhighways, bus lanes, ferries, and train stations, and they need high-bandwidth connectivity that is consistent, reliable, and cost effective. While fiber is well known for being the best technology, traditional business-grade point-to-point fiber services were seen as being too expensive. To fully meet the needs of smart cities, Chorus developed a bespoke product based on Gigabit Passive Optical Network (Smart Locations SFP50) at a more attractive price point.

KEYWORDS

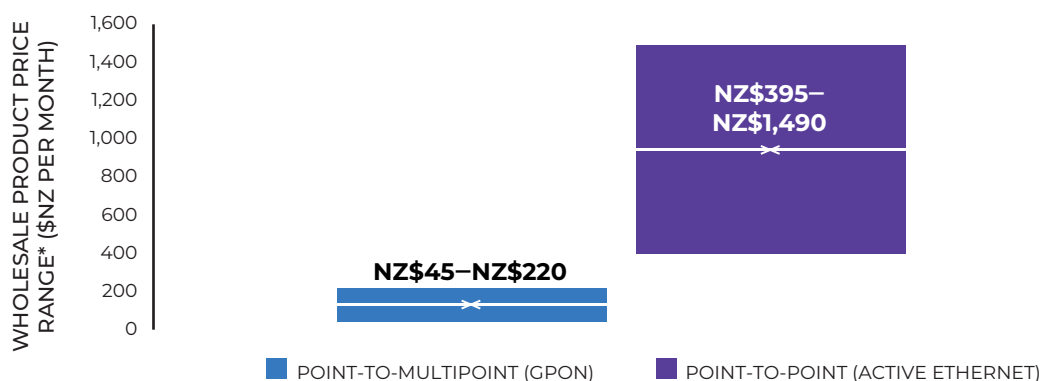
#fixed #fiber #fibre #FTTH #networks #smartcities

MARKET CONTEXT

Transport and utility infrastructure in New Zealand's major cities has traditionally used wireless connectivity for telemetry applications and copper connectivity when higher levels of reliability were required. Fiber was typically only used for data centers of large hub sites because the installation and ongoing costs were quite high. As cities look to improve safety and efficiency, video has become more and more common. Ultra-high-quality video, available in real time and always available 24/7, has massively increased the connectivity requirement. Delivering high-quality connectivity to those types of outdoor locations has some significant physical challenges including limited space, weather-proofing, power consumption, and cooling.

Over the last decade, Chorus has rolled out a GPON-based fiber network to cover 100% of homes and businesses within many of New Zealand's major cities. This ubiquitous coverage—literally every street has fiber—opened up the opportunity to think differently about smart city connectivity. Because the fiber was already nearby, the installation costs were minimal. The point-to-multipoint architecture of GPON enabled the service to be priced at a much lower level than point-to-point fiber. To solve the physical challenges, an SFP-ONT (small form-factor optical network terminal) was used. This meant no extra cabinets, enclosures, power supplies, or cables were needed: it simply plugged straight into the customer's equipment.

FIBER NETWORK ARCHITECTURE: COST COMPARISON



Note: *Price range based on bandwidth, class of service, VLAN, and other feature options.

SOURCE: CHORUS, OMDIA

EXPECTED BENEFITS TO CUSTOMER / SERVICE PROVIDER

- Service innovation or improvement
- Efficiency and productivity of broadband delivery
- Improvement in download speed
- Latency
- Customer satisfaction
- Environmental benefit (improved sustainability, move to carbon neutral)

The benefit to end customers is that the quality, reliability, and cost of their connectivity is no longer a barrier to how they operate their smart city infrastructure. The ubiquitous geographic coverage of fiber within the city allows them to roll out their CCTV infrastructure wherever they want, and they do not need to incur the extra cost and complexity of integrating and managing multiple technologies with different performance characteristics. The future-proof nature of fiber (it is easy to increase the service bandwidth) means customers can safely plan for future innovations without the risk of having to swap out their connectivity to meet new and emerging needs.

The benefit to Chorus is the proof that fiber is the best connectivity option, not just for homes and businesses but also for city councils, utilities, and transport authorities. It has opened up a new market segment for growing fiber-service volumes without significant additional investment, because the fiber infrastructure has already been deployed to serve homes and businesses.

There are also environmental benefits to this solution. Fiber is known as a low-emission technology, so using fiber for Auckland's CCTV infrastructure does not compromise the council's plans to reduce emissions.

SOLUTION OR INNOVATION: FURTHER DETAILS

The Smart Locations SFP50 product specification is as follows:

- Downstream speed: 50Mbps
- Upstream speed: 50Mbps
- Bitstream service model: Access-EVPL
- MTU: 2,000 bytes
- MAC addresses: 16
- UNI: SFP electrical connector
- Power: Supplied by host customer premises equipment

LINKS TO FURTHER INFORMATION

[Chorus Smart Location product page](#)
[Chorus Smart Location SFP product video](#)
[Chorus Smart Location Case Study video](#)

HUAWEI: IMPROVING THE HOME BROADBAND USER EXPERIENCE WITH FIBER TO THE ROOM

NAME OF COMPANY/ORGANIZATION	Huawei
COUNTRIES COVERED IN THIS CASE STUDY	Global
DATE OF SUBMISSION	July 2022
AUTHOR	Zou Qidong (Crest Zou)
ROLE IN THE BROADBAND ECOSYSTEM	Infrastructure/networks vendor

SUMMARY

In recent years, 4K/8K video, cloud virtual reality (VR), online education, online office, live video, and other services have gradually become popular, and connecting various terminals via Wi-Fi has become the norm, but the lack of Wi-Fi bandwidth and poor coverage has led to frequent video and game lag and poor business experience. For this purpose, Huawei launched a fiber-to-the-room (FTTR) solution to help operators extend bandwidth to rooms without loss of speed, achieve full-house gigabit Wi-Fi coverage, and improve user experience.

KEYWORDS

#FTTR #Wi-Fi #gigabit #experience #latency #bandwidth #coverage

MARKET CONTEXT

The continuous improvement of fiber access and other network infrastructure provides a solid foundation for the prosperity of internet services. At the same time, innovative service applications are emerging one after another, which imposes higher requirements on network bandwidth, coverage, and roaming. This drives users to have higher requirements from their home broadband experience. However, the survey found that many home broadband capabilities were not fully developed. The main causes are as follows:

- **Wi-Fi bandwidth is insufficient.** Because of the backward networking medium, the Wi-Fi cannot bear large bandwidth, resulting in an uneven broadband experience.
- **Wi-Fi coverage is incomplete.** Optical fiber is usually connected to the information box or living room. Wi-Fi performance degrades notably when it penetrates walls and the signal is attenuated: 80% of homes can only provide 80% coverage.
- **Roaming handover is not intelligent.** Multiple Wi-Fi hotspots cannot be intelligently switched between.

As a result, services such as video calls and floor-cleaning robots are frequently interrupted. All these factors have combined and restricted the user's ultimate online experience. How to build a high-speed, stable, user-friendly, and easy-to-manage home network is a common question among users and carriers.

EXPECTED BENEFITS TO CUSTOMER / SERVICE PROVIDER

- Improvement in download speed
- Latency
- Customer satisfaction
- Increased revenue/ARPU or market share

BUSINESS BENEFITS (SUCCESS KPIS)

FTTR BECOMES AN IMPORTANT DRIVING FORCE FOR GROWTH OF HOME BROADBAND SERVICE

In recent years, with the tremendous development of fiber to the home, the home broadband services of various carriers have become fiercely competitive. Currently, the content of home broadband services tends to be homogeneous. The broadband access mode, rate, package, and price are similar. In most cases, the price of a broadband package becomes a decisive factor in the subscriber's purchase decision, which is not conducive to an increase in ARPU. The emergence of FTTR sets a new benchmark for home broadband services, helps operators build differentiated competitive advantages in home broadband services, and increases market share. In addition, FTTR provides a reliable network foundation for the continuous evolution of innovative home services and facilitates the smooth implementation of new services.

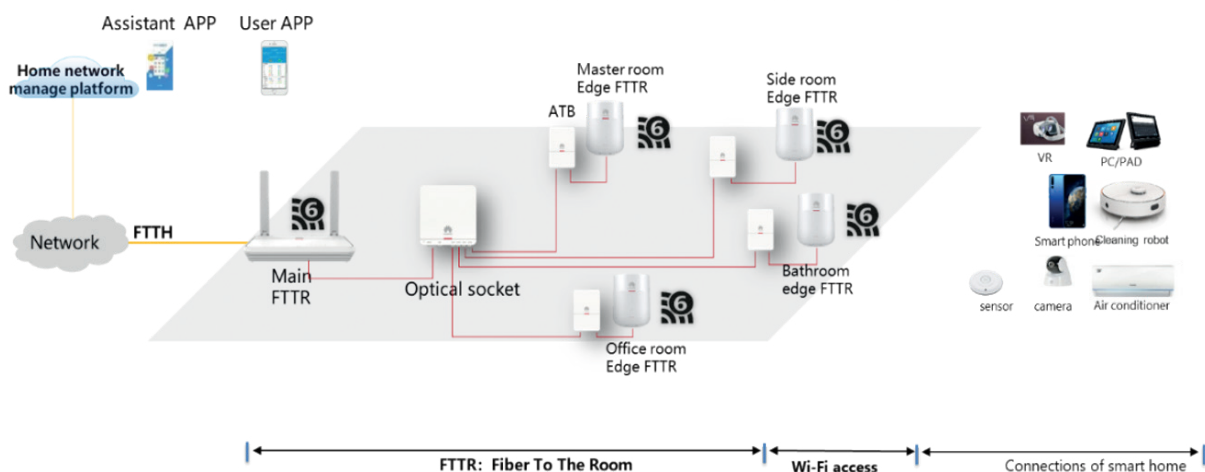
FTTR BUILDS USER EXPERIENCE ADVANTAGES FOR HOME BROADBAND SERVICES

FTTR adapts to the trend of "gigabit to the home" and transforms it into "true gigabit to the room." The subscribed-to bandwidth is equal to the measured Wi-Fi bandwidth, providing high-quality internet access experience with seamless roaming. Home networks can be operated and managed by carriers. These are capabilities that cannot be provided by current home broadband services and are important to ensure user experience. Operators can build up commercial competitive advantages based on FTTR's technical advantages.

SOLUTION OR INNOVATION: FURTHER DETAILS

The FTTR solution is based on optical-fiber networking. The FTTR main optical modem is deployed in the home distribution box or home center. The main optical modem is used as the core to construct a home optical network. The FTTR master optical modem connects to the optical line terminal (OLT) upward and to multiple slave optical modems downward through optical fiber. The slave optical modem supports gigabit Ethernet ports and Wi-Fi 6 and brings optical fiber into each room to provide synergized wireline and wireless true gigabit network coverage for each room.

HUAWEI'S FTTR NETWORK ARCHITECTURE



SOURCE: HUAWEI

In addition, a transparent optical fiber is specially designed, taking the convenience and efficiency of FTTR construction and the aesthetics of indoor decoration into consideration. The transparent optical fiber is self-contained with adhesive and can be quickly routed and implemented using special construction tools. After construction, the transparent optical fiber can be integrated with the interior decoration, making it almost imperceptible to users.

CONCLUSION

FTTR has advantages, such as ultra-gigabit bandwidth, full-house coverage, and seamless roaming, that can always ensure the ultimate experience for application services such as 4K/8K video, cloud VR, online education, and home office, and it provides a solid foundation for future innovative application services. With its obvious advantages, FTTR will become a key proof point that promotes the growth of carriers' on-premises services.

LINKS TO FURTHER INFORMATION

[Understand FTTR network solutions](#)

[FTTR Deployment Consideration \(China Unicom\)](#)

[FTTR is expected to disruptively transform home broadband experience](#)

HUAWEI: EXPLORING THE F5G-BASED ALL-OPTICAL SMART FACTORY

NAME OF COMPANY/ORGANIZATION	Huawei
COUNTRIES COVERED IN THIS CASE STUDY	China
DATE OF SUBMISSION	January 2022
AUTHOR	Zou Qidong (Crest Zou)
ROLE IN THE BROADBAND ECOSYSTEM	Carrier / service provider Infrastructure/networks vendor

SUMMARY

Small and medium-sized enterprises are in urgent need of digital transformation, but their technical capabilities are weak. Carriers need to provide reliable and low-cost network solutions to help enterprises implement digital transformation. This case study explores the potential of the F5G-based all-optical smart factory and the role of industrial optical networks in the mechanical manufacturing industry.

KEYWORDS

#F5G #all-optical network #industrial optical network

MARKET CONTEXT

The mechanical processing industry in China has a rapid technological development level, which belongs to the labor-intensive industry of technology and capital. As a basic domestic industry, the mechanical processing industry is on an ascending development path with the continuing development of the economy. China's manufacturing industry is in a transition period of structural adjustment and industrial upgrading. The domestic handmade machinery industry will gradually withdraw from the market, and instead stamping and numerical control will see better development.

With the development of world-famous multinational manufacturing enterprises, China's position as the world's manufacturing center and a consumer power is becoming more and more prominent, the technology is continuously advancing, and the economy is continuously developing: the demand for mechanically processed structural parts in various fields will be constantly increasing.

ENTERPRISE REQUIREMENTS

The digital transformation of Guangdong Chuangxing Precision Manufacturing Co., Ltd. faces the following network pain points:

- **Complex network topology, difficulty of capacity expansion, and unreliability:** The original network is self-built switch networking. The network topology is complex, the network cable routing is disordered, and network storms are prone to occur. In addition, the construction cost is high, and bandwidth evolution is difficult.
- **Frequent equipment damage:** The original network uses common commercial switches, which are prone to fault and burnout. The network is interrupted because of frequent equipment faults in the factory.
- **Poor Wi-Fi experience:** Because of interference in the factory, the Wi-Fi experience was poor and roaming was unavailable. The factory has abandoned Wi-Fi.

DEMANDS FOR INTELLIGENT PRODUCTION TRANSFORMATION FROM CHUANGXING

- **Automated guided vehicle (AGV) logistics:** Sheet metal materials are transferred by AGV trolleys instead of manual logistics to realize logistics automation and intelligence. Wi-Fi is required.
- **Mobile quality inspection:** It is difficult to move sheet metal parts, and quality inspection is performed through a quality inspection pad to improve its efficiency.
- **Workshop intelligence:** Realize an automatic warehouse sorting center and automatic production scheduling. In the future, the plan is to introduce intelligent applications such as machine vision in the workshop to facilitate network evolution and reduce engineering construction requirements. Meanwhile, the production network needs to be reliable.
- **Manufacturing visualization:** The production status is displayed on a large screen. The current production and processing status and equipment running status can be displayed in real time, making the production and processing process visible.

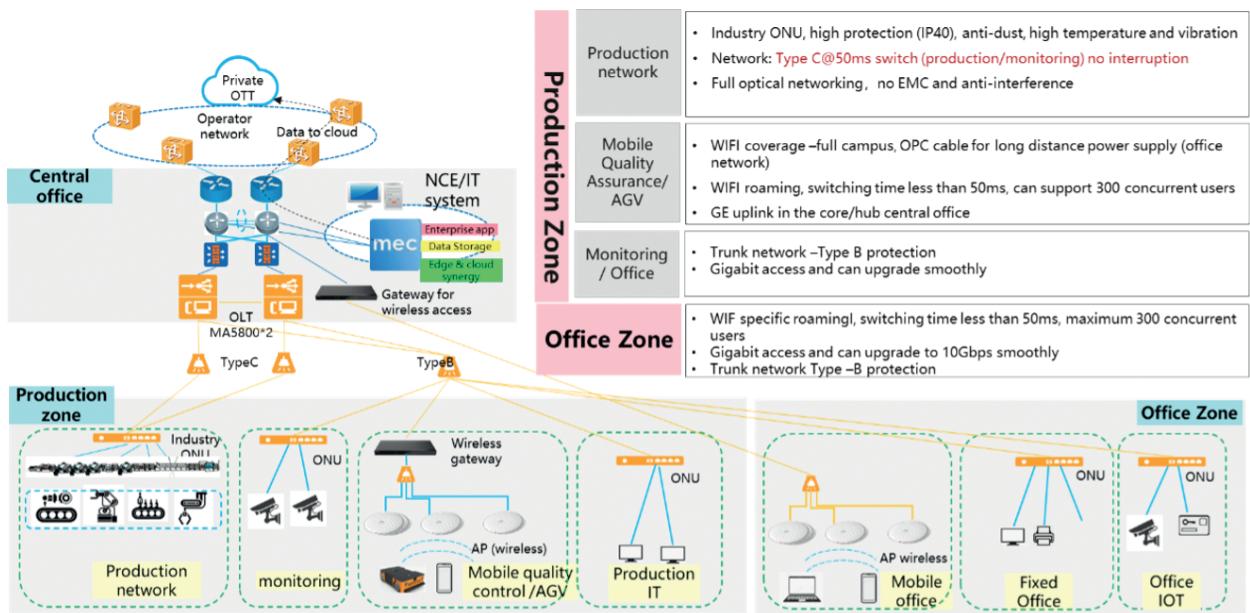
EXPECTED BENEFITS TO CUSTOMER / SERVICE PROVIDER

- Service innovation or improvement
- Latency
- Customer satisfaction
- Improved competitive edge over rivals

NETWORK RECONSTRUCTION TECHNICAL SOLUTION

Huawei's F5G industrial optical network solution is used to provide network solutions for the entire manufacturing campus, including the production network, office network, monitoring network, and wireless access network.

HUAWEI'S INNOVATION SOLUTION FOR THE PRODUCTION ZONE



SOURCE: HUAWEI

MOBILE ACCESS SOLUTION

Huawei's all-optical Wi-Fi solution is used for intelligent logistics and mobile quality inspection. This solution ensures seamless Wi-Fi coverage in the entire factory area. Long-distance optical-electrical composite cables provide a remote power supply, shortening the construction period by 40%. The roaming switchover time is less than 50ms. Three hundred concurrent online users are supported. The backbone network is protected by Type B. It can ensure smooth operation of AGV logistics without interruption.

BUSINESS BENEFITS (SUCCESS KPIS)

BUSINESS BENEFITS

The F5G industrial optical network features high reliability, low cost for all-optical cabling, and simplified P2MP two-layer architecture, which effectively solves the existing pain points of enterprises:

- **Solve the difficulties of traditional networks:** The industrial optical network solution can effectively solve the equipment damage caused by strong and weak electric connections and electromagnetic interference caused by electric welding.
- **Easy capacity expansion:** The workshop's requirement for flexible manufacturing capabilities requires a change in the interconnection of machinery. The original network reserved access points, and the network cable cost is high. After the industrial optical network products are adopted, the P2MP architecture of this solution allows the network access points to be changed or expanded at will, effectively solving the flexible manufacturing problem.
- **Multinetwork integration:** The industrial optical network solution effectively connects the data silos in each production process. Different networks are isolated by slice, achieving one-network management. This lays the network foundation for digital intelligent manufacturing.

- **Reliable and deterministic:** The industrial optical network fundamentally solves the network storm problem. The traditional network has many cables and a complex topology, effectively ensuring zero interruption of production services.
- **Simplified deployment:** All-optical cabling is used for fixed devices and optical-electrical composite cables are used for mobile devices, reducing the deployment period by 40% and the overall deployment cost by 50%.

SOCIETAL BENEFITS

The industrial optical network uses Passive Optical Network (PON) technology with independent intellectual property rights, which can completely replace the traditional switch network. The industrial optical network has the following social benefits:

- **Low network construction costs and easy evolution:** Fibers replace copper lines for environmental protection. In addition, the network construction costs and 30-year service life of fibers can meet the requirements of future network evolution and avoid repeated investment.
- **Energy saving and low-carbon environment friendly:** The energy consumption of industrial optical networks is one-third that of traditional switches. This greatly reduces network power consumption and enterprises' energy consumption.

CONCLUSION

After the digital transformation, the enterprise improves the quality and enhances the efficiency of its operations, and the production value of the labor, materials, and corresponding production is greatly improved.

This case study makes full use of the dividends unleashed by the industrial internet and builds an open and shared digital network. The equipment, data, technology, management, market, and other production factors are fully interconnected. Finally, the factory is developing to digital intelligence. This case study has been built as a benchmark project and has been promoted in the industry.

The economic benefits of digital transformation in this case study can drive the intelligent transformation of the industry; drive related industries such as AGV, automated warehousing, and manufacturing execution system (MES); build an industry ecosystem; and help manufacturing enterprises carry out digital transformation.

EXTRA INFORMATION ABOUT THIS CASE STUDY

Foshan Chuangxing Experimental Bureau has been released at the All Alliance Conference and has been highly recognized by the Foshan municipal government and the industry. As a result of this project, the industry has signed several projects, which will drive the transformation of the entire manufacturing industry.

LINKS TO FURTHER INFORMATION

[Official website of Guangdong Chuangxing Precision Manufacturing Co., Ltd. \(Chinese language\)](#)

NOKIA: CUTTING BROADBAND NETWORK EQUIPMENT ENERGY CONSUMPTION TO MEET SUSTAINABILITY TARGETS

NAME OF COMPANY/ORGANIZATION	Nokia
COUNTRIES COVERED IN THIS CASE STUDY	Global
DATE OF SUBMISSION	June 2022
AUTHOR	Eric Festraets, Strategic Marketing Director Fixed Networks, Nokia
ROLE IN THE BROADBAND ECOSYSTEM	Infrastructure/networks vendor

SUMMARY

Investing in power-efficient network technologies can significantly reduce the carbon footprint of broadband access networks. Network operators should consider accelerating the phase-out of copper, selecting the most power-efficient network equipment, and upgrading Passive Optical Network (PON) networks to XGS-PON or 25G PON to increase the bits delivered per watt consumed. To this end, Nokia developed a new chipset that brings power savings of more than 50% in the broadband network and helps operators to meet their emissions goals with growing usage and increasing penetration of broadband.

KEYWORDS

#fixed #sustainability #fiber #FTTH #networks #opex #carbon emission #PON #quality of life #energy #chip #ASIC

MARKET CONTEXT

Climate change is the greatest challenge of our time, and every organization has a role to play in minimizing the carbon footprint of its activities. The ICT industry today accounts for more than 2% of global greenhouse gas (GHG) emissions, approximately the same as all air traffic. However, ICT helps consumers, businesses, and other industries become more sustainable. Digitalization in general and broadband in particular contribute by cutting transportation, creating gains in productivity, and boosting economic growth for individuals, countries, cities, and society as a whole. So despite its own carbon footprint, ICT actually has a sevenfold net positive effect on emissions, reducing global CO₂ emissions by up to 15%. Nevertheless, network operators must continue to reduce the emissions created by their own activities.

EXPECTED BENEFITS TO CUSTOMER / SERVICE PROVIDER

- Efficiency and productivity of broadband delivery
- Environmental benefit (improved sustainability, move to carbon neutral)
- Improving or meeting a regulatory or government target/initiative

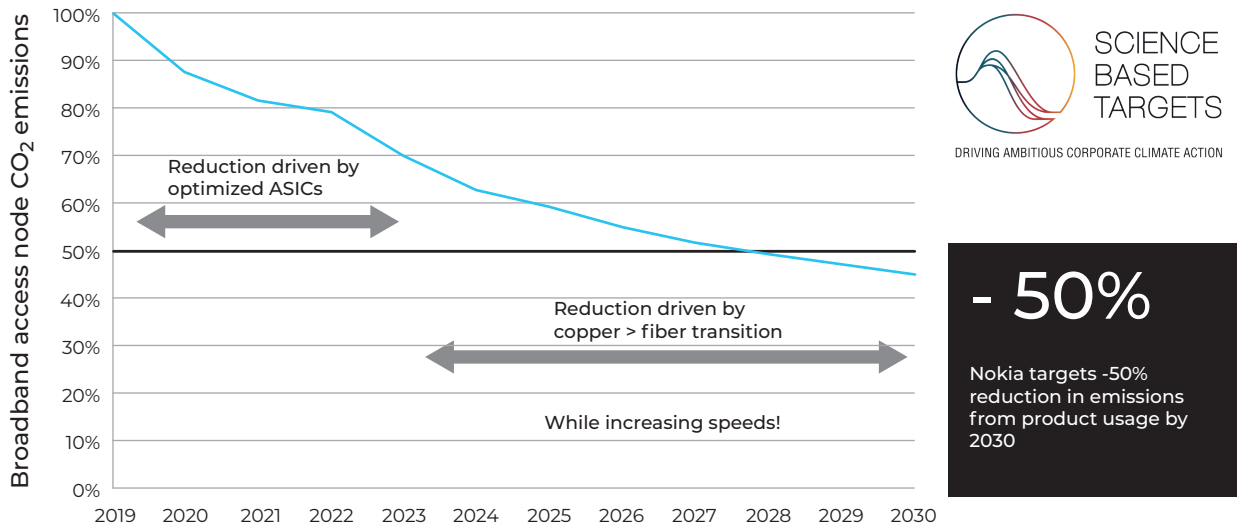
BUSINESS BENEFITS (SUCCESS KPIS)

Nokia joined the Science Based Targets (SBT) initiative and is now targeting a 50% cut in emissions across its value chain between 2019 and 2030. SBTs give companies a clearly defined pathway to take action on how much and how quickly they need to reduce their GHG emissions in line with the 1.5°C scenario.

Achieving this target requires efficiency improvements in network power consumption, continuously driving for more data bits per kilowatt of power. As part of this commitment, Nokia and other industry players report product energy consumption according to the European Commission's Code of Conduct for Broadband Communication Equipment. The code sets the (maximum) electricity consumption for fixed broadband equipment sold in the EU and manufactured or procured by participating service providers, network operators, and equipment and component manufacturers.

All this has the cumulative effect of advances in technology on power consumption as shown in the figure below.

NOKIA TARGETS A 50% EMISSIONS CUT



SOURCE: NOKIA

In the first few years reductions are driven by the introduction of optimized, energy-efficient chipsets and then by the transition from copper to fiber. Nokia’s forecasts predict that it will be able to reach a 50% reduction through the SBT initiative.

Note that this graph shows absolute values, and Nokia takes into account that across this decade it will deliver higher speeds to more people. XGS-PON and 25G PON will gradually overtake GPON. The blue line shows that the explosion in demand for data does not automatically lead to a massive increase in power consumption. Overall, since 2007, broadband power consumption has been reduced by 38%, while speeds have increased by a factor of 64.

SOLUTION OR INNOVATION: FURTHER DETAILS

The power consumption and hence the carbon emissions of a broadband network are primarily dictated by the chipsets used in network equipment. Nokia has developed an optimized system on a chip (SOC) that now resides in all its network nodes. This chipset enables line cards for fiber and copper broadband with higher port densities and higher throughput per watt. In turn, this leads to smaller nodes, which occupy less space, use less power, and can be passively cooled (up to operating temperatures of 65°C). When installed in street cabinets, they require less grid protection equipment, smaller power supplies, and only “heatwave days” fan ventilation backup. Nokia also has integrated energy-saving features, such as powering down unused optical modules (which is better than just switching the laser off per port, saving up to 1.5W for GPON)

and improved intelligent fan tray control algorithms to reduce energy consumption and cooling when not required.

This brings power savings of more than 50% in fixed broadband networks and helps operators to meet their emissions goals. Nokia is already shipping broadband solutions with this chipset to more than 150 operators.

The second path for operators to reduce emissions is the transition from copper to fiber broadband networks. Future-proof scalability and higher capacity make full-fiber networks the most energy-efficient solution. Replacing copper-based DSL connections with full fiber to the home (FTTH) breaks the link between bandwidth demand and power consumption. VDSL requires many more active components in the network than PON and so consumes more power. But when the far greater bandwidth of GPON in comparison with VDSL is considered, the net gain is a 12-fold improvement in bits delivered per watt consumed. XGS-PON takes this even further, delivering five times the bandwidth of GPON for only twice the power consumption, with another positive impact on the energy efficiency.

CONCLUSION

As broadband enables consumers and businesses to reduce their own carbon footprint, the more people who are connected to high-speed broadband, the better it is for the planet. Most fixed broadband operators are in the process of upgrading older copper and cable networks to deep fiber or full FTTH networks. Accelerating these projects will accelerate the savings in power consumption and GHG emissions. Selecting the most power-efficient equipment in these network upgrades will also contribute significantly to meeting sustainability targets. Finally, successive generations of PON technology—XGS-PON and 25G PON—further improve the bits delivered per watt consumed: accelerating PON network upgrades will further enhance the sustainability of a broadband network.

LINKS TO FURTHER INFORMATION

[Science Based Targets](#)

[Code of Conduct for Broadband Communication Equipment](#)

[Sustainability: how Nokia is helping broadband meet the 1.5°C target](#)

[Why it's vital to strive for Broadband Zero](#)

[Broadband Zero - Delivering the benefits of broadband while minimizing environmental impact](#)

THE ROLE OF THE WBBA: SUPPORTING FURTHER INVESTMENT

The aim of the World Broadband Association (WBBA) is to help to bridge the digital divide, bringing together broadband industry stakeholders to maximize the social and economic benefits of equality of broadband access as outlined in this report. The WBBA aims to bring influence to bear through discussion, education, and promotion.

Given the priorities of service providers, as highlighted in the WBBA Thought Leadership Survey, areas where the WBBA is looking to specifically support service providers and the wider broadband industry are as follows:

- Set out the importance of greater broadband investment, not just for the good of the service provider but for countries as a whole.
- Promote regulatory, legislative, and public relations agendas that help advance the interests of members through WBBA publications and live events, highlighting best-practice business models from around the world to remove any lack of understanding at boardroom level.
- Through thought leadership, media activity, and live events, continue to make the case for what governments need to recognize and do to close the industry innovation, socioeconomic, and environmental benefits gaps through infrastructure investment.
- Work with stakeholder partners to understand and promote the potential of future applications that will bring new benefits to broadband customers and to wider society.
- Develop and highlight best-practice investment models that show the true return on investment of a full-fiber rollout to both private companies and government organizations.
- Champion the needs of WBBA members to highlight barriers to future investment, creating a platform to enable open discussion between different types of stakeholders to encourage greater cooperation and new partnerships.



Join the World Broadband Association

We encourage your feedback and would welcome the chance to discuss with you how you can benefit from, and contribute to, the success of the WBBA. Please submit enquiries for free membership via <https://worldbroadbandassociation.com/>