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ZTE TECHNOLOGIES

VIP Voice

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Expert View

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Special Topic

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ZTE FTTx AI Solution: Building a Dual-Wheel AI Strategy of "AI for PON" & "PON for AI"

Full-Lifecycle Light ODN: Advancing Fiber Networks into the AI-Driven ODN Era

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"I see AI as Augmented Intelligence, not Artificial Intelligence."

An Interview with Mr. Inanç Çakiroğlu, CIO of VEON Group

In an era where connectivity meets intelligence, Mr. Inanç Çakiroğlu, VEON Group CIO, explains how Augmented Intelligence is transforming telecoms from traditional networks into digital experience creators. VEON is a global digital operator providing connectivity and digital services across dynamic frontier markets.

As CIO with two decades of experience, how do you see the role of AI in reshaping the telecom industry, and how have you leveraged your rich and diverse expertise to align VEON's growth with these changes?

AI is not just transforming telecom it is redefining what our industry truly is. For many years, we called

Mr. Inanç Çakiroğlu
CIO of VEON Group

ourselves "telecom operators," but that definition no longer fits. Our mission today goes far beyond connecting people through voice or data. We have transitioned into digital experience providers, shaping how people live, work, learn, and interact.

In this transformation, I see AI as Augmented Intelligence, not Artificial Intelligence. AI's role is to enhance human potential, not to replace it. At VEON, we use it to empower people—our customers, our employees, and our partners—with deeper insights, faster decisions, and more personalized digital experiences.

Over my two decades in technology and operations, I've learned that innovation only creates value when it's tied to real-life needs. That's why we integrate AI across our networks to make them more efficient, resilient, and sustainable—from predictive maintenance and traffic optimization to smarter energy management. At the same time, we apply AI to enrich our digital services: finance, education, entertainment, and health—all designed with local context in mind.

Importantly, VEON's approach to AI is inclusive by design. We build AI solutions that reflect the diversity of the people we serve, ensuring linguistic, cultural, and social relevance in every market. From developing local-language large language models to creating AI tutors for education and enterprise assistants for productivity, our goal is to make AI accessible, trusted, and beneficial to all—truly driving digital inclusion and human progress.

VEON unveiled its AI1440 strategy last year, following its DO1440 strategy. What's behind this shift, and how important is the new strategy?

The shift from DO1440 to AI1440 marks a natural evolution in VEON's journey—from enabling digital lifestyles to empowering intelligent ones. DO1440 was about helping our customers live their day in a digital ecosystem—1,440 minutes of connection, convenience, and choice. AI1440 takes that same philosophy and infuses it with intelligence—ensuring that every one of those minutes becomes more personalized, efficient, and meaningful through data and automation.

At its core, AI1440 is not a change of direction, but an acceleration. It's about transforming how our networks, our people, and our services think and respond. We are building systems that learn, adapt, and anticipate—turning data into actionable insights, and insights into better experiences. Whether it's predicting network congestion before it happens or tailoring content recommendations in real time, AI1440 is about creating a living, breathing digital ecosystem that continuously improves itself.

The importance of this shift lies in how it reshapes the relationship between technology and people. It's not about machines taking decisions—it's about augmenting human decision-making at every level, from our engineers in the field to our customers on their smartphones. That's why we call it Augmented Intelligence, not Artificial Intelligence.

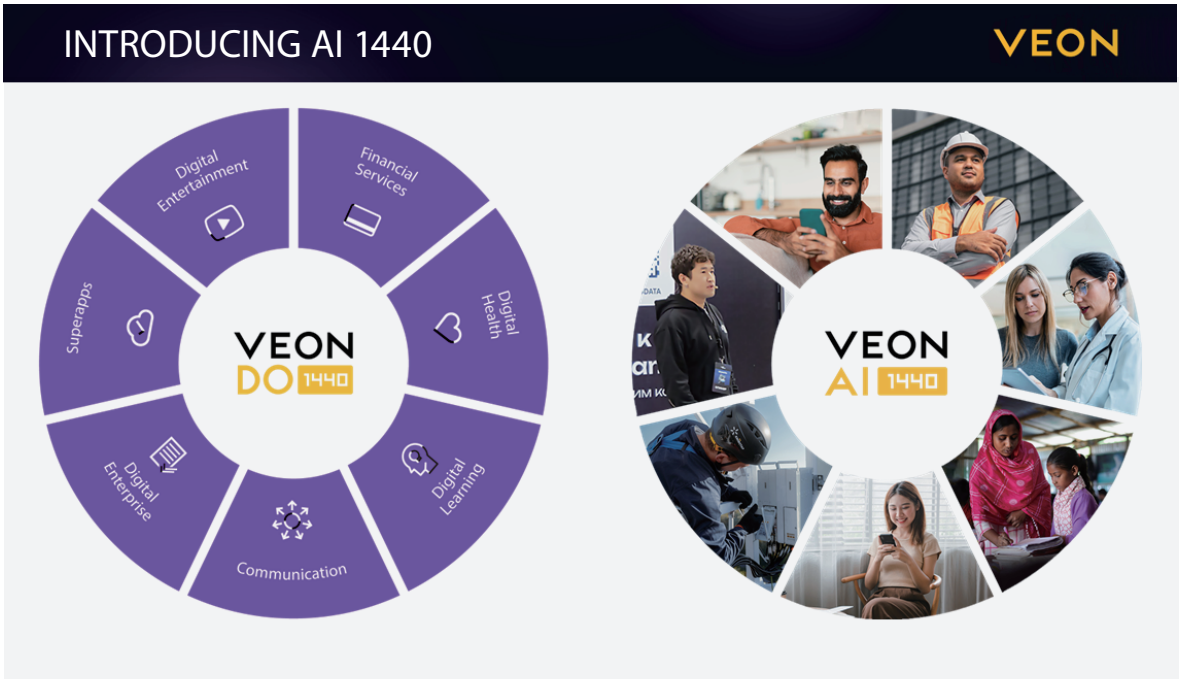
AI1440 prepares VEON for the next decade—where every interaction is intelligent and every customer feels that technology works for them, not the other way around.

What challenges have you encountered in implementing the AI1440 strategy?

AI1440 changes the very definition of what we do. It's no longer just about connecting people but creating intelligent experiences that adapt in real time. This requires rethinking our business from the inside out—from systems to culture.

Another challenge lies in integration. AI doesn't live in isolation; it must work seamlessly across the network, IT, and customer platforms. We've had to modernize legacy systems, build cloud-native architectures, and make our data flows more dynamic and secure.

Then, there's the human element, which is perhaps the most important. AI is powerful, but it doesn't replace human creativity or intuition—it amplifies them. The real task is to make our teams see AI as a partner, not a competitor. We're investing



heavily in upskilling, because as I often say, it's not AI that will replace people—it's people who know how to use AI who will lead the future.

Finally, operating across diverse markets adds another layer of complexity. Each country has its own regulatory, linguistic, and social context. We are ensuring that our AI solutions—such as localized language models—respect cultural nuances and promote inclusion rather than uniformity.

So yes, the challenges are many—technological, organizational, and cultural—but they are the same challenges that make the AI1440 strategy meaningful. They push us to evolve from a traditional telco into a truly digital, intelligent operator.

Given the importance of AI in telecoms, how can telcos strengthen their networks to support AI capabilities and build a resilient infrastructure? What steps has VEON taken in this direction? Also, how can telcos lead the adoption of AI in a responsible and sustainable way?

Building an AI-ready network is not just a technical upgrade—it's a complete re-architecture of how we think about connectivity. At VEON, we see AI and the network as inseparable, two sides of the same transformation. We call it "AI in the network and the network in AI." You can't have one without the other.

To strengthen networks for AI, the first step is to make them intelligent by design—cloud-native, programmable, and data-driven. We've been moving steadily in that direction by modernizing our infrastructure and embedding AI capabilities at every layer of the network. This allows us to predict congestion before it happens, self-optimize performance, and manage power consumption dynamically—all essential for resilience and sustainability.

A great example is our collaboration with ZTE on the Giga City initiative in Kazakhstan, where we deployed advanced Massive MIMO and renewable-powered base stations. These aren't just engineering achievements; they are the foundation for an AI-empowered network that learns from its environment. It's about bringing connectivity to every corner—even to places without an electric grid—and doing so

intelligently and sustainably.

But resilience isn't only about hardware. It's also about people and responsibility. Leading AI responsibly means setting the right example—proving that technology can advance inclusion rather than deepen divides. Our principle is simple: AI should make people better at what they do. If it makes doctors better doctors, teachers better teachers, and engineers better engineers, then we're on the right path.

In the end, a resilient AI-driven infrastructure is not built by machines alone. It's built through a shared vision—where technology, humanity, and sustainability evolve together.

VEON and ZTE have built a trusted, long-term partnership, and the recent launch of Giga City 2.0 in Kazakhstan in August is a major step forward in AI-driven innovation and sustainable connectivity. How do you view this collaboration and the value it brings to Kazakhstan's digital transformation?

The VEON–ZTE partnership is built on trust, innovation, and a shared vision of inclusion—proving that technology must serve people and communities.

Giga City 2.0 in Kazakhstan is a perfect reflection of that. It represents the next stage of digital transformation—where engineering excellence meets social purpose. When I visited the project sites this summer, I saw first-hand what this means in practice. We're not only deploying advanced Massive MIMO infrastructure for higher capacity and AI-driven optimization, but also bringing connectivity to areas that previously had none. Some of these sites operate entirely on solar and wind power, showing that sustainability and innovation can go hand in hand.

What excites me most is the engineering spirit behind this project. At its core, our industry is about solving real-world problems—whether that means ensuring seamless coverage in dense urban areas or delivering reliable service in remote regions without power. Together with ZTE, we turned those challenges into opportunities through smart design and AI integration.

The result is more than just better network performance; it's a step toward a digital Kazakhstan—a country where connectivity, sustainability, and innovation support government ambitions and empower citizens. Giga City 2.0 is not the end goal, but the beginning of a broader transformation. It's a model we can replicate in other VEON markets—a proof that when strong partnerships meet strong purpose, we can truly reshape how nations connect and grow in the AI era.

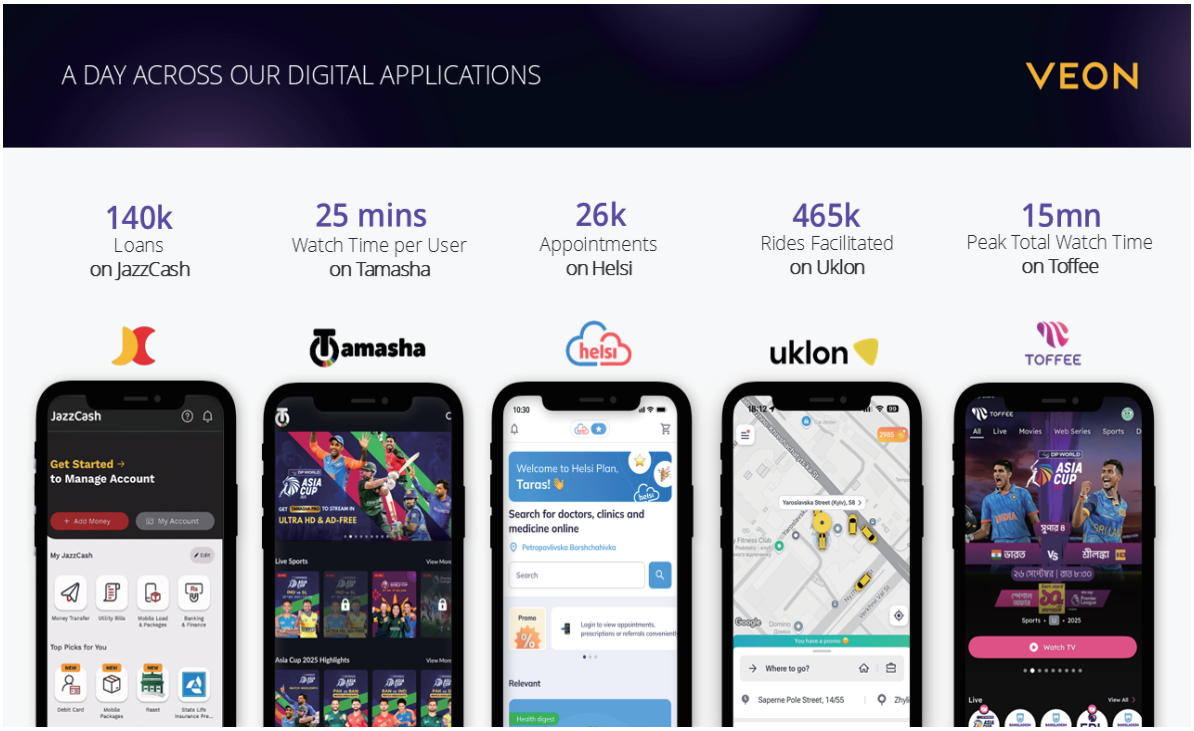
How can telecom companies leverage AI not only to streamline operations, but also to empower their teams and drive business growth?

AI is often seen as a tool for efficiency, but its real value is in amplifying human creativity. At VEON, we use AI to make both our operations and our people smarter—predicting issues, optimizing traffic, and empowering teams with data-driven insight.

By integrating AI-driven tools into daily workflows, we're freeing our employees from repetitive tasks so they can focus on innovation, strategy, and human connection—the things machines can't replace. Our engineers can now use AI-assisted analytics to make faster, data-backed decisions; our marketers can deliver hyper-personalized services; and our customer teams can respond with greater empathy and insight.

This also changes how we view growth. Instead of relying solely on traditional telecom revenues, AI opens new doors—from digital finance and education platforms to localized language services powered by our own large and small language models. These innovations allow us to serve customers not just as subscribers, but as digital citizens of an inclusive ecosystem.

And there's an important human message here: it's not AI that replaces people—it's people who use AI effectively who lead the future. Our goal is to build an organization where every



person has the tools, the confidence, and the curiosity to grow with AI. That's how we transform a telecom company into a truly digital, human-centered enterprise.

Which AI technology do you think will have the biggest impact on the telecom industry in the coming years?

If I had to choose one area of AI that will truly reshape telecom, it would be language intelligence combined with edge AI—what I often refer to as "small language models at the edge."

Large language models have already shown us the power of understanding and generating human-like interactions, but in telecom, we need to go further. We need AI that understands local context—the way people speak, think, and communicate in their own languages. That's why at VEON, we're developing localized AI models, such as the first Kazakh language–based editor app, which already delivers exceptional performance in its market. This isn't just a technical achievement—it's a statement of inclusion. When technology speaks your language, it becomes truly empowering.

Looking ahead, we'll see these models becoming smaller, more efficient, and running closer to the user—at the edge of the network. That's where real-time intelligence will happen: in the devices, in the base stations, and even in local data centers. These small, energy-efficient AI models will allow faster response, stronger privacy, and more personalization—all essential for next-generation digital experiences.

As Mr. Çakiroğlu reminds us, the future of telecom lies not in machines replacing people, but in people empowered by intelligence—a future where technology, inclusion, and human purpose advance hand in hand. Thanks, Inanç! ZTE TECHNOLOGIES

Wi-Fi 7 Technology Evolution and Global Market Analysis

Yang Huan
Fixed Network Product Planning Director, ZTE

The advent of Wi-Fi 7 (802.11be) marks a significant leap forward in global home and enterprise networking, delivering unprecedented performance and transforming user experiences across connected environments. With theoretical bandwidth reaching up to 23 Gbps, ultra-low latency enabled by multi-link operation (MLO), and sophisticated multi-band coordination capabilities, Wi-Fi 7 addresses the growing demand for high-speed, reliable, and low-latency wireless connectivity. Since the certification process officially opened in January 2024, commercial adoption has been accelerating rapidly. According to Omdia, by Q1 2025, approximately 23% of global telecom operators have launched Wi-Fi 7-related products and services to consumers, signaling strong momentum for industry uptake.

On the hardware front, Wi-Fi 7 chipsets from leading international semiconductor companies—including Qualcomm, Broadcom, and MediaTek—now cover a full range of throughput requirements, from 3 Gbps to 10 Gbps. This versatility enables manufacturers to cater to diverse market segments, spanning high-end consumer devices, enterprise-grade access points, and IoT ecosystems, while ensuring robust performance and interoperability across the wireless network stack.

To capitalize on Wi-Fi 7 adoption, strategic decisions must address key areas, including commercial deployment trends, chipset supply chain resilience, the impact on the domestic Chinese market, and global market growth forecasts. This report provides a comprehensive analysis of these critical areas, equipping decision-makers with actionable insights to navigate the Wi-Fi 7 landscape. By leveraging these insights, ZTE can strengthen its competitive position and accelerate innovation and adoption of next-generation wireless networking solutions, ultimately shaping the future of connected homes and enterprises worldwide.

Wi-Fi 7 has Entered Large-Scale Commercial Deployment: Evolving Product Specifications

Product Specification Trends: Transition from Premium to Cost-Optimized Solutions

Between 2022 and 2024, the early phase of Wi-Fi 7 commercialization was primarily driven by demand from mature markets such as Western Europe, Japan, and Singapore. During this period, tri-band MIMO configurations (3x3/4x4 for 2.4 GHz, and 4x4 for 5 GHz and 6 GHz) and dual-band 4x4 MIMO configurations

dominated home gateway products, delivering ultra-high bandwidth and stable performance. For home Wi-Fi extenders, the dual-band 2x2 + 4x4 MIMO specification became the common choice, meeting mainstream household coverage requirements.

Starting in 2025, market dynamics and cost control pressures are reshaping the product landscape. Manufacturers are gradually shifting both home gateways and extenders to dual-band 2x2 MIMO solutions. This change reflects a stronger emphasis on affordability while maintaining sufficient performance for most residential use cases. At the same time, Ethernet port specifications are undergoing a notable adjustment: instead of pursuing peak performance with 10 GE, many devices are now reverting to 2.5 GE or GE, achieving a more sustainable balance between capability and cost efficiency.

Differentiated Global Market Strategies: Premium Experience vs. Value Orientation

In high-end markets such as North America, Northern Europe, Japan, and Singapore, consumer spending power and expectations for top-tier connectivity continue to drive demand for tri-band 4x4 MIMO (BE19000) solutions combined with 10 GE ports. These premium configurations are tailored for enterprise-grade applications, advanced gaming, and 8K video streaming, where high bandwidth and ultra-low latency are critical.

Mid-tier Western European markets—including Spain and Italy—favor dual-band 4x4 MIMO (BE7200) devices with 2.5 GE ports, striking an optimal compromise between reliable performance and cost management.

Meanwhile, emerging markets such as China, Eastern Europe, Latin America, and Southeast Asia are increasingly focused on cost-effective solutions. Here, dual-band 2x2 MIMO (BE3600) products paired with GE or 2.5 GE interfaces are becoming the mainstream choice, enabling rapid network equipment penetration and driving continuous technology upgrades at competitive price points. This tiered approach highlights how Wi-Fi 7 specifications evolve in sync with regional economic conditions and consumer needs.

Reshaping of Wi-Fi 7 Chip Supplier Landscape Among Major Operators and the Role of Prpl/RDK-B Open-Source Ecosystems

Under the combined influence of cost pressures and external factors, Tier-1 telecom operators have significantly adjusted their procurement strategies, actively pursuing diversified supply chains to mitigate risks and improve flexibility. Deutsche Telekom took the lead in breaking Broadcom's long-standing dominance in Wi-Fi chip supply by introducing Airoha and MediaTek (MTK) chips into its Orion 6/7 projects. Qualcomm chips also secured wins in the Gemini AP program. Simultaneously, Deutsche Telekom has been promoting the RDK-B open-source operating system across its headquarters and subsidiaries to strengthen technical independence and reduce reliance on a single vendor ecosystem.

Orange (France Télécom) has adopted a differentiated strategy. In its home market, Orange continues to use Broadcom chips to ensure network stability and performance. However, for its overseas branches, Orange has introduced a joint ZTE–MTK solution to diversify its supply chain and reduce costs. At the same time, Orange has actively supported the prpl operating system, exploring new technology ecosystems that could provide greater control and innovation opportunities.

The Vodafone Group has positioned RDK-B as the core of its software ecosystem. Its chip selections tend to favor experienced vendors such as Broadcom, Airoha, and MTK, which already have extensive adaptation experience with RDK-B. However, in regions or subsidiaries where RDK-B deployment is not required, Vodafone allows greater flexibility in chip choices, further enriching supply chain diversity.

As Wi-Fi 7 commercialization accelerates, open-source operating systems like RDK-B and prpl are becoming critical components for operators to build robust network ecosystems. Broadcom, with its strong technical advantages and industry reputation, continues to be a leading player in the Wi-Fi 7 space. However, its relatively higher commercial costs have created opportunities for competition. To consolidate its position, Broadcom is collaborating closely with

Tier-1 operators to develop a "chip + open-source" ecosystem, ensuring tight integration with RDK-B and prpl platforms.

MediaTek is also at the forefront of Wi-Fi 7 innovation, leveraging proactive market strategies and competitive pricing to expand its market presence. Its partnership with Deutsche Telekom has allowed MTK to accumulate valuable RDK-B adaptation experience, while collaborations with Orange enable it to explore prpl-based development.

Leveraging its mature AP product portfolio and an initial deployment of XGS-PON ONTs, Qualcomm is using Wi-Fi 7 to expand into the operator CPE market.

Overall, the Wi-Fi 7 chip market is undergoing significant reshaping. Open-source ecosystems such as RDK-B and prpl are no longer peripheral tools but central elements in operators' strategic planning. By encouraging multi-vendor participation and lowering barriers to integration, these platforms are redefining competitive dynamics, challenging legacy monopolies, and accelerating innovation cycles. As operators continue to balance performance, cost, and independence, the coming years will see a more pluralistic and dynamic Wi-Fi 7 chip supplier landscape.

China's Role in Global Wi-Fi 7 Adoption

The Chinese Wi-Fi 7 market is poised to drive global Wi-Fi 7 adoption, but at a more measured pace. The commercial rollout of Wi-Fi 7 in China is expected to become a major driving force for technology adoption across the Asia-Pacific, Eastern Europe, the Middle East and Africa (MEA), and Latin America. However, unlike the rapid penetration seen during the Wi-Fi 6 era, China will prioritize the promotion of lower-spec AP routers. By leveraging a high cost-performance strategy, Chinese manufacturers aim to open these regional markets first, laying the groundwork for a broader international rollout.

As a result, the global diffusion of Wi-Fi 7 technology will likely proceed more gradually compared to Wi-Fi 6. Large-scale adoption is not anticipated until around 2026, when ecosystem maturity and cost optimization align to support wider deployment.

Moreover, China's explosive growth in Wi-Fi 7 will

be closely tied to the widespread rollout of 2000 Mbps broadband packages by local operators. This backbone infrastructure is essential to fully unleash Wi-Fi 7's capabilities and ensure a seamless user experience. In summary, China will once again serve as a key engine for global Wi-Fi advancement, with its Wi-Fi 7 strategy emphasizing sustainable development, affordability, and phased international expansion—setting the stage for steady but powerful momentum in global Wi-Fi 7 commercialization.

Will Home AI Accelerate Wi-Fi 7 Commercialization?

Short-Term Status

While home AI applications—such as smart home automation and on-device large language models—are on the rise, their impact on accelerating Wi-Fi 7 commercialization remains limited. At present, Wi-Fi 7's core value propositions continue to be its higher data rates and lower latency, rather than AI-specific features. Telecom operators are still in the exploratory stage when it comes to AI-driven use cases, testing business models and deployment scenarios. Furthermore, current Wi-Fi 7 chipsets have not yet integrated neural processing units (NPUs), meaning AI computation power still relies on external modules or companion processors.

Long-Term Outlook

Looking ahead, Qualcomm's plan to integrate NPUs into Wi-Fi 8 chipsets is expected to fundamentally reshape the home networking ecosystem. By combining advanced AI processing with next-generation wireless standards, future solutions will enable more seamless deployment of edge AI models—such as DeepSeek and other on-device large models—directly within home networks. This integration will not only improve the feasibility of running complex AI workloads locally but will also unlock new possibilities for latency-sensitive applications like real-time video analytics, adaptive network optimization, and personalized smart-home services.

In summary, while AI is not yet a decisive factor in driving Wi-Fi 7 adoption, its eventual convergence with Wi-Fi 8 suggests that early planning for AI-network integration will be critical. Operators and vendors who invest now to align AI capabilities with next-generation wireless technologies will be well positioned to capture future opportunities as home AI becomes a central pillar of network innovation.

Conclusion

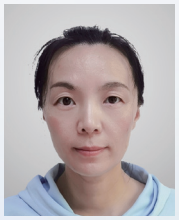
Amid the wave of Wi-Fi 7 technological innovation and market transformation, the global networking ecosystem is undergoing a profound reshaping. From fierce technological competition among chip manufacturers to strategic adjustments in operator procurement policies, every aspect of the industry is intertwined with both opportunities and challenges. Companies like Broadcom, MediaTek, and Qualcomm are leveraging their strengths to secure strategic positions, while equipment vendors such as ZTE are adopting flexible and adaptive approaches to break into competitive markets. Meanwhile, the rise of open-source operating systems like RDK-B and prpl is introducing new dynamics to the competitive landscape, reshaping industry alliances and accelerating innovation.

Although the commercialization of Wi-Fi 7 is progressing at a steadier pace compared with Wi-Fi 6, its enormous potential is already evident. ZTE's fixed-network Wi-Fi 7 CPE shipments are expected to enter a breakthrough growth trajectory, with international sales projected to reach 11.28 million units by 2028. Wi-Fi 7 adoption is set to expand across both home and enterprise scenarios worldwide, ushering in a new era of high-speed, low-latency connectivity.

This evolution represents not only a technical upgrade, but also a coordinated transformation of the broader networking ecosystem—where hardware innovation, open-source platforms, and strategic market planning collectively shape the future of global connectivity. In this context, Wi-Fi 7 stands as a pivotal force, bridging today's networks with tomorrow's intelligent, AI-driven digital experiences. ZTE TECHNOLOGIES

ZTE FTTx AI Solution

Building a Dual-Wheel AI Strategy of "AI for PON" & "PON for AI"



Zhu Zhenghua

Chief Engineer for Fixed Network Product Planning, ZTE

Amid the accelerated global digital transformation, leading international telecom operators are placing increasing emphasis on integrating AI technology into fixed-network FTTx to enhance network quality and optimize operational efficiency. Deutsche Telekom, a European operator, is leveraging AI algorithms for PON port traffic prediction and dynamic bandwidth allocation. Meanwhile, leading Asian operators such as Japan's NTT are utilizing AI to achieve intelligent fault diagnosis, with systems capable of automatically identifying the deterioration trends of optical links and issuing early warnings. These practices demonstrate that AI has become a core means for operators to "improve quality and efficiency" in the

FTTx field, helping them build differentiated advantages in fierce competition.

ZTE is constructing a collaborative system of "AI for PON" and "PON for AI" to empower PON with AI, while enhancing the AI service capabilities of PON networks, thereby promoting the evolution of autonomous networks.

AI for PON: ZTE's FTTx AI Solution Empowering Five Key Areas to Build Autonomous Networks

ZTE has launched a comprehensive FTTx AI solution, which reconstructs network capabilities from five aspects: planning, optimization, maintenance, resources, and operations (Fig. 1). This solution helps operators move toward Level 4 (L4) autonomous networks and achieve core values such as cost reduction, efficiency improvement, quality enhancement, and revenue growth.

Planning First: AI-Driven PON Port Congestion Prediction for More Accurate Investment

Network planning is the starting point of FTTx construction. Traditional planning mostly relies on historical traffic growth trends for linear prediction, which often fails to accurately capture business changes. This can lead to resource misallocation, where some PON ports become congested prematurely while others have low utilization rates.

The core of ZTE's AI solution in the planning phase lies in PON port congestion prediction. This function collects massive amounts of historical data from the live network, including traffic data, user data, service data, and time data. Based on this multi-dimensional data, the ZTE AI engine conducts in-depth training and learning using time-series prediction models such as long short-term memory (LSTM) networks and machine learning algorithms. This enables it to not only identify simple linear growth trends but also capture complex non-linear patterns and periodic characteristics, providing high-precision prediction of PON port utilization for the next one, three, or even six months.

Operators can clearly see which areas and which PON ports will reach their congestion thresholds and when, based on the "network health heatmap" generated by AI prediction. This transforms investment decisions from "passive fire-fighting" to "proactive planning," allowing operators to accurately allocate capacity expansion resources to the areas that need them most.

Dynamic Optimization: Dual Focus on Intelligent Reporting and Green Energy Conservation

Network optimization is a continuous process. ZTE's AI solution in this phase focuses on improving efficiency and reducing green emissions.

- **Intelligent reporting: From "data stacking" to "insight generation"**

Traditional daily and weekly reports require O&M personnel to manually extract data from network

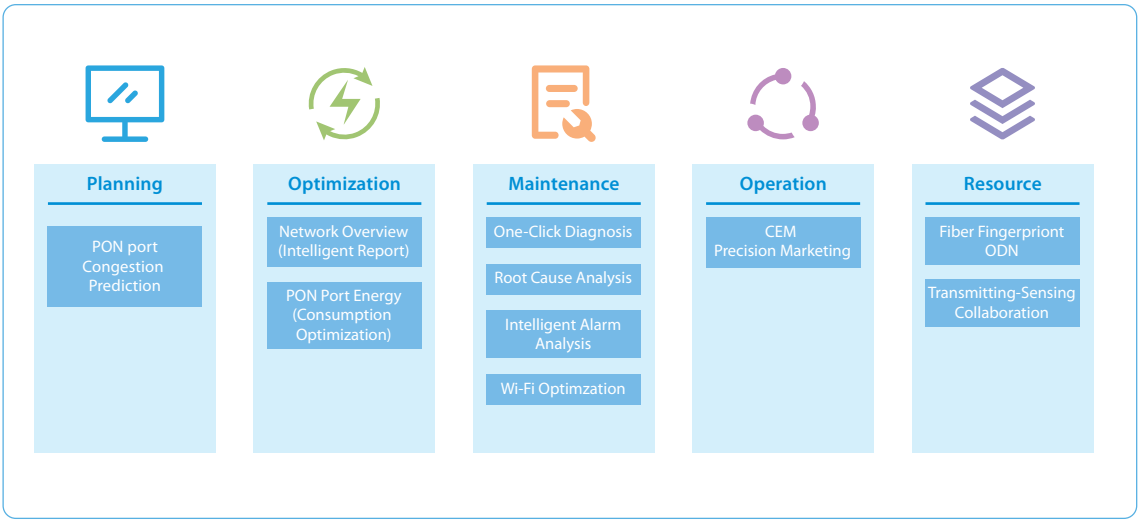


Fig. 1 ZTE FTTx AI solution.

management systems and create spreadsheets. ZTE's intelligent reporting function leverages AI natural language processing (NLP) and data analysis capabilities to achieve several key benefits.

First, it regularly and automatically generates core KPI performance reports, health assessment reports, user development reports, etc.

Second, it enables semantic interaction. O&M personnel only need to input requests such as "Check the peak utilization rate of XX community in the past week" via voice or text. The system can automatically understand the intent, generate results, and push them, greatly improving the efficiency of information acquisition.

Lastly, insight mining is performed as the AI automatically analyzes anomalies, correlates trends, and provides preliminary judgments on "possible causes of a certain indicator abnormality," directly supporting decision-making.

- **PON port energy consumption optimization: Moving toward green networks**

Energy conservation and emission reduction are crucial to operators' social responsibilities and operational costs. ZTE's solution realizes on-demand energy supply through AI. During low-traffic periods (e.g., late at night), the system automatically identifies idle or low-load PON ports and ONUs, and intelligently adjusts them to sleep or low-power modes through AI scheduling algorithms. At the same time, when users have service activation needs, the system can quickly resume operations without user perception.

All of this is achieved without manual intervention, minimizing network energy consumption while ensuring user experience, resulting in a win-win situation for both economic and social benefits.

Intelligent Maintenance: From "Personnel Finding Faults" to "Faults Finding Personnel"

O&M work is central to FTTx costs, and the value of AI in this field is most prominent. ZTE's solution transforms "passive response" maintenance into "proactive prediction and prevention" and "intelligent repair."

- **One-click diagnosis and root cause analysis (RCA):** When users report faults or the system generates alarms, O&M personnel no longer need to conduct step-by-step checks across multiple systems. They only need to enter the user account or device ID, and the AI engine automatically correlates data from all layers, including OLT, PON ports, optical splitters, ONUs, and even home Wi-Fi. Using AI algorithms such as Bayesian networks and decision trees, it locates the most likely root cause (e.g., excessive optical attenuation, ONU hardware failure, or neighbor interference) within minutes and provides repair suggestions, significantly shortening the mean

time to repair (MTTR).

- **Intelligent alarm analysis:** Network management systems generate massive alarms every day, many of which are redundant and correlated. Through alarm compression, association rule mining, and root cause determination, AI condenses thousands of original alarms into several or even one core alarm event, directly pinpointing the essence of the problem. This frees O&M personnel from the burden of "alarm storms" and allows them to focus on key issues.
- **Intelligent Wi-Fi Optimization:** The "last mile" of user experience lies in Wi-Fi. Based on its self-developed ONUs (such as MC intelligent gateways), ZTE's AI solution continuously monitors the quality of the home Wi-Fi environment, including channel interference, signal strength, and the number of connected terminals. AI algorithms automatically analyze this data, intelligently recommend or automatically implement strategies such as optimal channel selection, transmit power adjustment, and Mesh network optimization. This ensures a seamless and high-quality home Wi-Fi experience and reduces complaints caused by poor Wi-Fi performance.

Precision Operations: CEM-Enabled Precision Marketing to Tap into the Data Goldmine

The customer experience management (CEM) system builds a comprehensive user profile. AI models segment users and accurately identify those at the risk of churn and those with value enhancement potential. Potential churn users are those with a history of poor experience and unresolved complaints. Users with value enhancement potential are those whose current packages can no longer meet their high-bandwidth needs and often reach speed bottlenecks.

Based on this analysis, operators can carry out precision marketing: push "e-sports acceleration packages" or higher-tier packages to users with poor gaming experience; recommend gigabit upgrade services to families that frequently watch 4K videos; and proactively provide experience restoration and care packages to potential churn users. This effectively improves user satisfaction (NPS), reduces churn rates, taps into the potential for ARPU growth, and realizes the transformation from "pipe operation" to "value operation."

Digital Resources: Fiber Fingerprint ODN to Achieve Intelligence of "Dumb Resources"

As the physical optical fiber link, optical distribution network (ODN) has long been regarded as a "dumb resource."

AI redefines the digital and intelligent ODN. The AI platform spans the entire ODN construction process, covering the planning, construction, maintenance, and optimization phases.

In the ODN planning phase, pattern training is introduced to identify the optimal path, achieve intelligent obstacle avoidance, conduct one-click on-site surveys, and intelligently produce design drawings. The design output serves as the final resource information.

In the ODN construction phase, standardized inspections, automatic information entry, and automatic acceptance are implemented, enabling intelligent resource visualization.

In the maintenance phase, automatic fault location, real-time network performance monitoring, and proactive O&M improve efficiency.

Finally, in the network optimization phase, comprehensive analysis algorithms are used for AI-driven analysis, network topology is automatically presented and managed visually, and intelligent network optimization guidance is provided.

PON for AI: ZTE Builds an AI-Ready FTTx Network as a Future-Oriented Intelligent Digital Foundation

Through technological innovation and ecological cooperation, ZTE empowers all aspects, from pipelines, platforms, ecology, and R&D to delivery, ensuring that its FTTx network becomes a powerful engine driving AI development.

Building a 50G PON Ultra-Broadband Pipeline to Lay the Foundation for AI Computing

AI applications, such as autonomous driving, industrial Internet, 8K ultra-high-definition video, and the metaverse, have extremely high requirements for network bandwidth, latency, and

> **ZTE will continue to deepen the two-way empowerment of "AI for PON" and "PON for AI," driving a fundamental transformation of networks from passive operation and maintenance to active perception, and from bandwidth provision to experience guarantee.**

connection density. ZTE has proactively deployed 50G PON technology to build an unprecedented "large computing pipeline." Compared with current GPON and 10G PON, 50G PON provides symmetric bandwidth of up to 50 Gbps, millisecond-level latency, and strong multi-service bearing capacity. ZTE's 50G PON solution offers an unobstructed "expressway" for AI training and massive data flows, ensuring the real-time performance, stability, and large capacity required by AI applications. It serves as the core network foundation for building future smart cities and digital societies.

TITAN Platform with Embedded AI: A New Ecosystem for Collaborative Innovation

ZTE TITAN is an integrated system that combines chips, AI algorithms, and platforms, enabling optical networks to "think" and "make decisions" by themselves. By introducing digital twin technology, TITAN can build a digital replica of the network in the virtual space, using AI for simulation predictions, intelligent scheduling, and automated O&M. This not only realizes on-demand allocation of network resources and self-healing prediction of faults but also, more importantly, creates an open platform ecosystem.

Collaborating with Ecosystem Partners to Accelerate Intelligent Network Transformation

The transformation to intelligent networks cannot be accomplished by a single vendor. Therefore, ZTE actively collaborates with global ecosystem partners, including chip suppliers, cloud service providers, industry application developers, and standard organizations. By establishing joint innovation laboratories, promoting the unification of technical standards, and opening API interfaces, ZTE is committed to breaking technical barriers and promoting industrial integration. This collaboration accelerates the evolution from traditional networks to intelligent autonomous networks, ensuring that ZTE's solutions can be seamlessly integrated into the broader digital landscape, providing customers with end-to-end value, and driving the intelligent transformation of industries.

ZTE is making every effort to build an FTTx network oriented toward the AI future by through a comprehensive strategy: using 50G PON as the pipeline, the TITAN intelligent platform as the "brain," an open ecology as the link, and AI-empowered R&D as the engine.

Looking Ahead

With the deep integration of AI technology and optical access networks, FTTx will gradually evolve into a highly autonomous and flexibly intelligent digital infrastructure. ZTE will continue to deepen the two-way empowerment of "AI for PON" and "PON for AI," driving a fundamental transformation of networks from passive operation and maintenance to active perception, and from bandwidth provision to experience guarantee. We look forward to working with global operators and ecosystem partners to jointly build and embark on a new chapter of integration between communications and intelligence. ZTE TECHNOLOGIES

Full-Lifecycle Light ODN: Advancing Fiber Networks into the AI-Driven ODN Era

Yang Yang

Fixed Network Product Planning Director, ZTE

As FTTx network deployment continues to expand, the optical distribution network (ODN), as the "nerve ending" connecting thousands of households, is becoming increasingly prominent. Every year, vast amounts of fiber are deployed, leading to a significant accumulation of resources. Thus, achieving efficient fiber network construction and managing the idle resources in the fiber network has become key to building a competitive optical network.

However, traditional ODNs face multiple challenges throughout the planning, construction, and operation lifecycle. Planning relies on manual surveys that take months, and route design is mostly done manually. Splicing techniques demand high skill levels from technicians. The passive nature of the network makes resource status invisible, while maintenance depends on paper labels and manual records, leading to data inaccuracies, label peeling, and messy patch connections. Resource utilization is low, with over 30% of resources becoming stranded. These pain points of traditional ODNs provide clear guidance for transformation.

As gigabit optical networks expand, operators urgently need to reconstruct ODN management through digitalization. Full-lifecycle Light ODN solution has emerged to meet this need, leveraging AI and the fiber fingerprint technology, which transform the passive "dark" ODN pipeline into a "visualized" network. This solution achieves the "Zero Era" goal of zero-touch planning, zero-threshold construction, zero-blind-spot O&M, and zero-waste resource management.

Zero-Touch Planning: AI-Driven Accurate and Efficient Modeling

Traditional planning bottlenecks involve manual site surveys, which require on-site measurement of building structures, poles, and conduit resources. Data collection cycles can last 4–8 weeks, and design drawings are manually created, making them prone to human errors that may lead to planning deviations. Therefore, an accurate and efficient design is crucial to avoid rework and wasted resources and investment.

The Light ODN intelligent planning solution delivers a "zero-touch planning and design, one-click survey and output" experience. Key technical features include:

- **One-click site survey via app:** ZTE provides an app for collecting and entering site information. Field personnel use mobile devices to capture on-site environments, and AI image recognition automatically extracts key data such as manhole locations and hallway structures, which is then uploaded to the cloud platform in real time. Compared with traditional manual surveying, this system can save 83% of the site surveying time.
- **AI-powered route modeling:** Optimal fiber route plans are automatically generated using deep learning algorithms based on GIS systems and 3D building databases.
- **Dynamic resource scheduling:** Historical traffic growth models are used to predict future bandwidth demand and dynamically adjust the splitting ratio and node density accordingly.

After receiving the survey information, the system uses AI for basic map recognition. Once the

planning and design principles are selected, the system automatically generates a design plan, including coverage area, equipment location, splitter points, and fiber optic routes. Compared with traditional manual design, this system can save 80% of the high-level design (HLD) time.

After the design is completed, the system can directly output all information electronically, including construction drawings, material lists, and engineering workload statistics. It supports multiple output formats and connection with other platforms through a northbound interface, allowing seamless output to third-party platforms. Compared with traditional methods, the output time for construction drawings is reduced by 65%.

This intelligent planning system has already been successfully deployed in several projects. For example, in a project in Germany for a region with 100K users, adopting the ZTE Smart Planning System reduced the design time by 83%, and cut the manpower from 100 person-days to 10 person-days.

Zero-Threshold Construction: Pre-Connectorized Technology and AI Visualization

In traditional construction, fusion splicing requires professional equipment and skilled technicians, and the construction process is time-consuming, with resource record relying on manual operations.

The Light ODN solution introduces several breakthroughs:

- **Pre-connectorized solution:** Use pre-terminated optical cables with connectors pre-installed in the factory, which are plug-and-play on site without the need for fusion splicing.
- **AI image recognition-based data entry:** Construction personnel scan equipment QR codes and take photos of the port connections with their mobile phones. AI automatically identifies connection status and generates a topology diagram, with resource data synchronized with the network management system in real time.
- **Digital twin–enabled visual management:** A 3D digital mirror of the ODN is constructed to monitor key indicators, such as optical cable deployment paths and port occupancy rates, in real time. Integrated with GIS systems, the digital twin displays resource information on maps, visually guiding operations and maintenance. Additionally, intelligent analysis of fiber link resource usage is performed to form resource optimization strategies, which in turn guide network maintenance and expansion, saving time while reducing Opex.

As a result, time to market (TTM) was reduced by 50%, and resource record efficiency improved by 90%.

Zero Blind Spots in O&M: Fiber Monitoring and Hybrid Expert Model

In traditional passive network maintenance, fault localization often requires segmental testing, and manual inspection cannot detect hidden attenuation issues or provide early warnings. Thus, a platform-level monitoring system is introduced for real-time fault diagnosis.

The "Nervous System" of Optical Networks

The eMonitor solution builds an innovative "platform-level" optical network monitoring system that continuously monitors the performance and status of the entire optical network in a centralized, automated manner, 24/7. An optical network "health database" is also established to perform big data analysis on historical test results, enabling proactive O&M.

A complete intelligent process is established for optical network monitoring, including automated test data collection, analysis, and result presentation. This full-process automation reduces fault localization time by 90%, and industry-leading self-developed OTDR testing modules are utilized to achieve meter-level fault localization.

Standard interfaces are provided for integration with GIS systems, enabling logical fault locations to be mapped to physical locations and displayed on maps. Compared to traditional methods, this approach reduces troubleshooting time by 30%.

Application of AI Hybrid Expert Model

An ODN health database is built, integrating over 100,000 fault case characteristics. A large-scale AI hybrid expert model combining AI analytics with expert knowledge analyzes OTDR test data to identify early performance-degrading components and hidden defects such as macro bending and connector contamination, and to generate timely warnings for preventive treatment. Fault localization accuracy reaches within one meter, and repair solutions are automatically generated.

Zero-Waste Resource: Dynamic Topology and AI Optimization

The traditional ODN resource databases are outdated, leading to low resource utilization, with more than 20% of the ports remaining idle, and an inability to dynamically sense changes in network topology. To tackle these issues, a dynamic resource management mechanism is implemented, which includes:

- **Real-time topology awareness:** The fiber fingerprint system automatically updates port connectivity.
- **AI-powered resource scheduling engine:** By dynamically allocating splitter ports using traffic load forecasting, the idle resource activation rate is increased to 95%.
- **Remote segmented acceptance:** Link quality can be verified via fiber fingerprint data during construction, reducing the acceptance cycle by 80%.

Consequently, ODN resource utilization increased by 16%, with annual recovered value from previously stranded resources exceeding tens of millions of RMB.

Industry Practices and Future Evolution

ZTE's Light ODN solution has been deployed in several countries, helping operators rapidly build ODNs while enabling optical network topology visualization and resource management. In the flagship case of China Mobile Anhui, resource management accuracy increased by 30%, fault location precision reached within one meter, and repair time was reduced from hours to minutes.

Building on these achievements, the next-generation Light ODN will be driven by several key technologies. Fiber fingerprint enables real-time detection of dynamic network topology changes through coherent optical signal analysis. A self-optimizing network architecture, powered by AI large models, provides automatic optical power adjustment and dynamic routing optimization to ensure high-quality optical links. Meanwhile, digital twin O&M creates a full-lifecycle digital representation of the ODN to support predictive maintenance decisions. Together, these innovations lay a strong foundation for the continued evolution of Light ODN.

Toward a New Era of Autonomous Optical Networks

Full-lifecycle Light ODN, powered by the closed-loop integration of "AI + fiber fingerprint," has fundamentally resolved the management challenges of passive networks. Its "Four Zeros" characteristics—zero zouch, zero threshold, zero blind spots, zero sunk costs—not only redefine ODN industry standards but also drive optical networks toward self-optimization, self-healing, and self-evolution.

Vendors like ZTE are leading the development of third-generation digital ODN, providing essential support for global operators to build all-optical infrastructure with "zero tolerance for failures."

In the future, Light ODN will integrate advancements in 50G PON, fiber sensing, intelligent analytics, and predictive technologies, further enhanced by AI-driven analytical and forecasting applications. Leveraging breakthroughs and convergence in key technologies—including full-parameter optical network sensing, automatic topology discovery, real-time link monitoring, fault localization, and risk prediction and early warning—Light ODN will accelerate the construction of intelligent, sensing-integrated FTTx networks, ushering in a new paradigm for optical access networks. ZTE TECHNOLOGIES

Fiber Fingerprint Solution: Enabling AI-Driven Passive Resource Management

Yang Yang

Fixed Network Product Planning Director, ZTE

In today's large-scale deployment of fiber-to-the-home (FTTH), the optical distribution network (ODN), as the "last mile" connecting users, has long been trapped in a dilemma of invisible resources, difficult fault localization, and high operation and maintenance costs due to its passive nature.

Transforming ODN Management: From Idle Resources to Intelligent O&M

In traditional ODNs, splitter port information relies on manual recording, with general accuracy below 70%, leading to significant port resource idling or "phantom occupation" (i.e., systems shown as occupied but actually unused). According to operator statistics, port waste caused by distorted resource data reaches as high as 15%-20%. Meanwhile, fiber breaks, weak optical signals, and other faults require hours of manual segment-by-segment troubleshooting, resulting in persistently high customer complaint rates. The lack of accurate data support also hampers network expansion, causing severe redundant construction and negatively impacting operators' return on investment.

With the development of services such as 5G, gigabit optical networks, and industrial internet, demands for high availability, high reliability, and high-quality networks impose new requirements on the evolution of ODNs to the next generation:

- **Precise resource digitization:** Achieve 100% visibility of splitter port status (occupied, idle, phantom occupied) to support efficient resource scheduling;
- **Intelligent and automated O&M:** Achieve meter-level fault location accuracy, reducing fault location time from hours to minutes;
- **Network elasticity and scalability:** Dynamically plan expansion paths based on real-time data to avoid redundant investments.

Facing the urgent demands of global operators for resource digitization, intelligent O&M, and high network elasticity, ZTE has launched the fiber fingerprint solution, leveraging technological innovation to solve the management challenges of passive ODN resources and ushering in a new era of digital and intelligent optical network operations.

ZTE's Fiber Fingerprint Solution: Illuminating the "Dark" ODN

Using comprehensive analytical algorithms for AI analysis, this solution (Fig. 1) automatically visualizes the network topology for efficient management. It accurately guides network optimization, ODN acceptance, and rapid fault localization through precise resource statistics and data analysis.

Architecture : Three-Layer Innovation for Intelligent Passive Networks

- **Fiber fingerprint identification technology**

Passive splitters modulate the characteristics of optical signals, giving each branch distinct optical properties, thereby assigning a unique "digital ID" to every optical path. This enables precise identification of splitter port status (occupied, idle, phantom occupied), improving resource accuracy to 100%.

- **Multi-parameter AI diagnostics engine**

Equipped with a high-sensitivity optical detection unit, the system continuously collects backscattered and Fresnel reflection signals. Combined with AI algorithms, it analyzes optical path loss, weak light distribution, and fault types (e.g., fiber breaks and connector loosening). It builds an optical-path health database, compares and evaluates the health status of optical cables, and achieves meter-level fault localization. It reduces fault localization time by 90% and provides early warnings of potential failures.

- **GIS smart link platform**

Deeply integrated with the Geographic Information System (GIS), it dynamically marks the physical location of fault points and generates "one-click navigation" work orders. Resource status is linked with the map, which visually displays the OLT-splitter-ONU topology. Collaboration efficiency across planning, construction and maintenance is improved by 40%, and O&M manpower costs are reduced by 30%.

Functionality: Full ODN Topology Restoration and Rapid Fault Localization

- **Automatic visualization of ODN topology and digital resource management**

Leveraging the fiber fingerprint solution, the system automatically reconstructs the two-level splitting of PON ports and the ODN-ONU topology. It analyzes and calculates splitter port resource utilization, including occupied, available, and expandable ports, providing guidance for rapid service activation, precise network expansion, and improved resource utilization efficiency.

- **Remote fault diagnosis and proactive O&M closed loop**

The system localizes fault within minutes and integrates GIS mapping to display fault locations, automatically assigning maintenance tasks to the nearest technician. Additionally, AI analyzes historical data to predict degradation trends—such as increased loss caused by connector aging—triggering preventive maintenance. In terms of business assurance, the pilot areas achieved a 60% reduction in complaint rates, and the time required for user service recovery was reduced to under 30 minutes.

Successful Pilots of Fiber Fingerprint Solution Significantly Enhancing Passive Optical Network O&M Efficiency

The fiber fingerprint solution has been successfully piloted at China Mobile Anhui, China Mobile Zhejiang, China Telecom Guangdong, and in

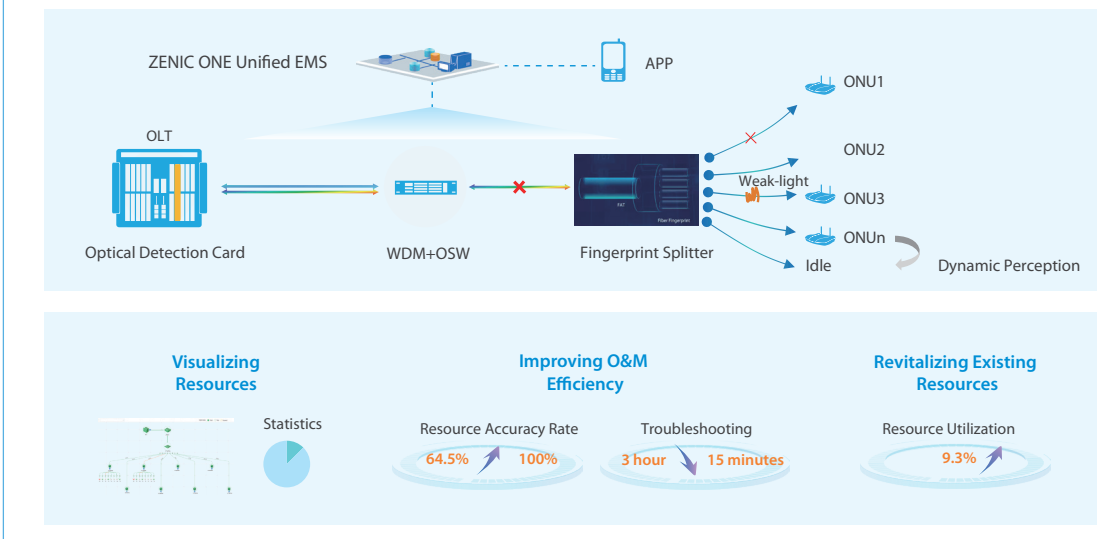


Fig. 1 Fiber fingerprint solution architecture.

> The fiber fingerprint solution upgrades the ODN from a "dark pipeline" to an intelligent sensing layer that underpins end-to-end digital and intelligent O&M.

collaboration with Turkcell.

In June 2024, China Mobile Anhui completed a live network pilot of fiber fingerprint solution, enabling ODN topology visualization and precise resource management, providing a model for the digital and intelligent transformation of home broadband networks. After implementation, ODN port-resource data accuracy improved by approximately 30%, revitalizing around 9.3% of idle resources. During service activation, topology visualization reduced the first-attempt service-activation rejection rate by 90%, improving deployment efficiency and reducing manpower waste. During fault maintenance, real-time fault localization and intelligent fault-type analysis reduced average diagnosis time by 90%, significantly shortening fault resolution time and enhancing customer satisfaction.

In September 2024, Shaoxing Mobile deployed the solution in the Shengshi Mingyuan residential area, achieving over 95% accuracy in resource identification, activating 16.1% of previously invisible ports, and reducing fault localization time by 90%.

In February 2025, the solution moved from pilots in China to its European debut: ZTE and Turkcell jointly launched a pilot in Istanbul that demonstrated precise splitter port state identification, intelligent topology presentation, and high-precision fault localization, offering a new paradigm for idle resource management for global operators.

Industry Value and Future Evolution

The fiber fingerprint solution upgrades the ODN from a "dark pipeline" to an intelligent sensing layer that underpins end-to-end digital and intelligent O&M. It maximizes port utilization, saving CAPEX by 15%-20%, and eliminates O&M blind spots, delivering a fault self-healing rate of more than 90% and a 30% reduction in OPEX. Additionally, service activation time is cut from days to hours.

Looking ahead, evolution will focus on continuous AI algorithm optimization, leveraging deep learning to predict network congestion and expansion hotspots. The solution will also integrate with cloud platforms and align deeply with operators' OSS/BSS systems to enable automatic resource scheduling. Another important trend is energy-saving green design, which leverages passive characteristics to reduce energy consumption, aligning with the "Dual Carbon" strategy.

ZTE's fiber fingerprint solution leverages technological innovation to tackle long-standing challenges in resource management. Through breakthroughs in optical-path identification, AI-based diagnostics, and GIS collaboration, it transforms the ODN from a "cost center" into an "efficiency engine." With the evolution to 5.5G and F5.5G (next-generation fixed networks), the fiber fingerprint ODN will become a cornerstone for building end-to-end autonomous networks, helping operators achieve the ultimate targets of "resource awareness, intelligent operations, and trustworthy networks." ZTE TECHNOLOGIES

ZTE eMonitor Solution: Building the "Nervous System" of the Optical Fiber Network

Luan Tian

Fixed Network Product Planning Manager, ZTE

With the rapid development of FTTH networks in recent years, a massive number of fibers have been deployed as infrastructure. Since fibers are passive, there is no efficient way to test the fiber network. ZTE eMonitor is a dedicated solution for monitoring the optical fiber infrastructure, building a "nervous system" for the optical fiber network. It provides a real-time, accurate fault testing and measurement method without affecting existing services, thus helping build intelligent fiber networks.

Challenges in Optical Network Monitoring

Current optical network monitoring methods can no longer meet the increasing complexity of optical fiber networks, mainly due to the following limitations:

- **Weak monitoring:** There is no unified platform for monitoring the entire optical network topology and optical paths, nor an effective performance warning mechanism, making fault troubleshooting difficult.
- **Low efficiency:** Monitoring and troubleshooting rely heavily on manual operations, resulting in low efficiency and delayed fault recovery.
- **Manual analysis:** The lack of historical operational data requires engineers to manually analyze and determine fault points.
- **Difficult fault localization:** There is no effective way to detect faults in real time. Faults can only be identified through device alarms or customer reports, and traditional methods cannot accurately pinpoint fault locations.

As a result, optical fiber network monitoring and troubleshooting remain highly time-consuming and labor-intensive. There is an urgent need for an automated approach to fiber network fault analysis and localization to improve O&M efficiency and reduce maintenance costs.

ZTE eMonitor Solution

The ZTE eMonitor solution (Fig. 1) consists of both a hardware platform and a software platform.

The hardware platform (eOMU) includes an OTDR module, a fiber switching matrix, and a WDM module. It is deployed between the active equipment and the fiber infrastructure. The OTDR module generates third-party test optical wavelengths, while the WDM module multiplexes these test wavelengths with the service optical wavelengths to test the optical fiber network.

The software platform provides an end-to-end intelligent process for testing optical fiber performance. It collects test data, analyzes types of faults, displays test results via a GUI, and builds a fiber "health database". The platform also interconnects with third-party systems such as the OSS and GIS systems, to generate warning information, dispatch work orders, and display fault locations on the GIS map.

The ZTE eMonitor solution enables real-time testing of the fiber network without affecting existing services, making the whole optical fiber monitoring process intelligent, automated, and digital.

Platform-Based Test System, Realizing Real-Time Fault Monitoring

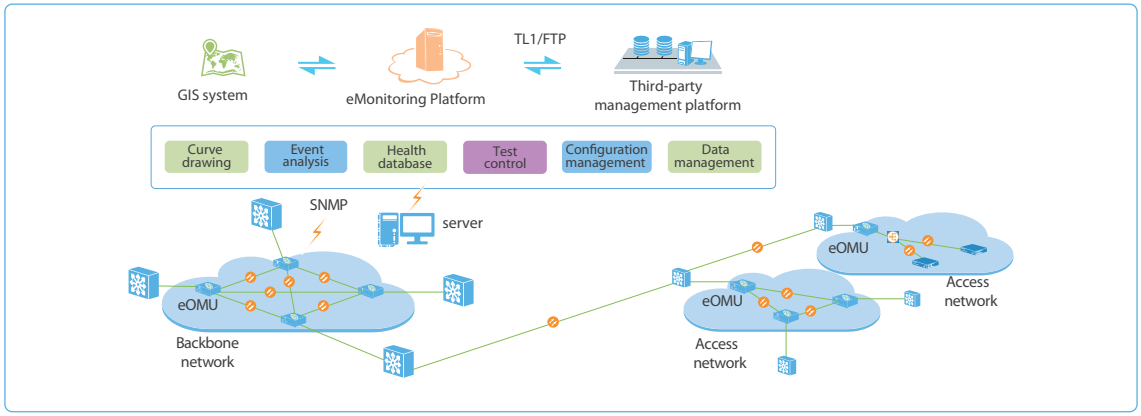


Fig. 1 The eMonitor solution.

Unlike traditional manual handheld OTDR test methods, the solution builds an innovative platform-based test system to monitor the fiber performance 24/7 in an uninterrupted, centralized, and automatic manner, generating warnings in real time and visualizing faults in dark passive optical networks.

Health Database for Intelligent Analysis of Network Performance

By creating a fiber "health database", the solution stores historical fiber network performance data. Through big data-driven intelligent analysis of test results, eMonitor identifies fiber network performance degradation events and generate pre-warnings.

Fully Intelligent Process, Reducing Fault Localization Time by 90%

The solution establishes a fully intelligent process for fiber network monitoring, ensuring that all the steps are implemented automatically. This approach shortens fault localization time by 90% compared with the traditional handheld OTDR test methods. Additionally, it adopts an industry-leading, in-house developed OTDR module to achieve test precision within one meter, greatly improving troubleshooting efficiency and accuracy.

Integration with GIS, Reducing Troubleshooting Time by 30%

The solution provides standard interfaces for integration with GIS systems, mapping physical fault locations based on their logical locations, guiding troubleshooting. It significantly shortens the time required for engineers to locate faults on-site, reducing the entire troubleshooting time by 30%.

Applications

The ZTE eMonitor solution has been widely deployed by operators, such as BTCL in Bangladesh, dstelecom in Portugal, ETB in Colombia, and China Mobile.

In one BTCL project, although the company had achieved more market share and revenues by providing various broadband services to high-end users, it faced increasingly prominent challenges in fiber network maintenance and service guarantee. These challenges included the lack of monitoring methods and end-to-end optical network service assurance systems, inefficient fault localization, and slow response to user complaints. It was urgent for BTCL to build a highly-efficient O&M system to monitor its fiber networks and improve customer satisfaction.

After evaluation, BTCL selected the ZTE eMonitor solution to build an intelligent, unified optical network monitoring platform. This solution helped significantly improve fault localization efficiency, reduce manpower and troubleshooting time, and lower troubleshooting costs. With the real-time warning mechanism of eMonitor, 35% of fiber faults were detected before customer reporting, reducing customer complaints. The fast fault response of eMonitor helped BTCL improve its customer satisfaction index, enhancing its market competitiveness and profitability. ZTE TECHNOLOGIES

ZTE CEM: Proactive Operations from Bandwidth to Experience

Wei Xiu

Fixed Network Product Planning Manager, ZTE

In the digital economy era, customer experience has become a core element of competition among operators. Gartner research shows that 84% of enterprises have achieved significant revenue growth after optimizing customer experience. Excellent experience not only enhances user loyalty and brand reputation but also directly drives business growth. Facing an increasingly saturated broadband market and homogeneous competition, operators are undergoing a strategic transformation from "bandwidth operation" to "experience operation". Systematically managing customer experience has become the key to winning future competition.

Currently, operators generally face the dilemma of "excellent network indicators but poor user perception". User experience data is scattered across different network elements and systems, forming data silos that make collaborative analysis difficult. In addition, traditional operation and maintenance rely on passive responses to user complaints, resulting in low processing efficiency and great difficulty in fault demarcation, which leads to decreased user satisfaction and increased churn risk. With the continuous maturity of artificial intelligence and big data technologies, deeply integrating these technologies into network operation and maintenance to achieve visible, manageable, and operable user experience has become a common demand among operators.

Based on its insights into industry trends, ZTE has launched the customer experience management (CEM) solution based on the ZENIC ONE R20 end-to-end unified O&M platform, with a commitment to help operators build a new experience-centric operational system. The architectural overview is shown in Fig. 1. Through the OLT's built-in A-SA intelligent card, the solution collects user service flow data in real-time, enabling the detection of service data such as transmission rate, delay, retransmission, and packet loss rate, and The data is then uploaded to the CEM platform for unified modeling and intelligent analysis. It provides end-to-end root cause demarcation analysis across home networks, ONUs, ODNs, OLTs to BRAS and content sources, allowing operators to digitally and intelligently manage user experience.

In terms of deployment, the CEM offers significant advantages: the A-SA card is directly embedded in the OLT slot, without requiring additional equipment room space and energy consumption. It supports flexible plug-and-play and elastic scaling. A single card supports 40G traffic analysis and centralized traffic steering for multiple OLTs, offering good scalability and stability.

Through the CEM system, operators can form a closed-loop experience management process—monitoring, analysis, rectification, and verification. Built on enhanced installation and maintenance skills and optimized marketing strategies, it achieves dual improvements in user satisfaction and operational efficiency.

Real-Time Service Perception and Proactive Identification of Low QoE Users

With the help of AI and big data analysis, the CEM system can identify more than 18,000 types of content sources and perform real-time perception and quantitative evaluation of user service

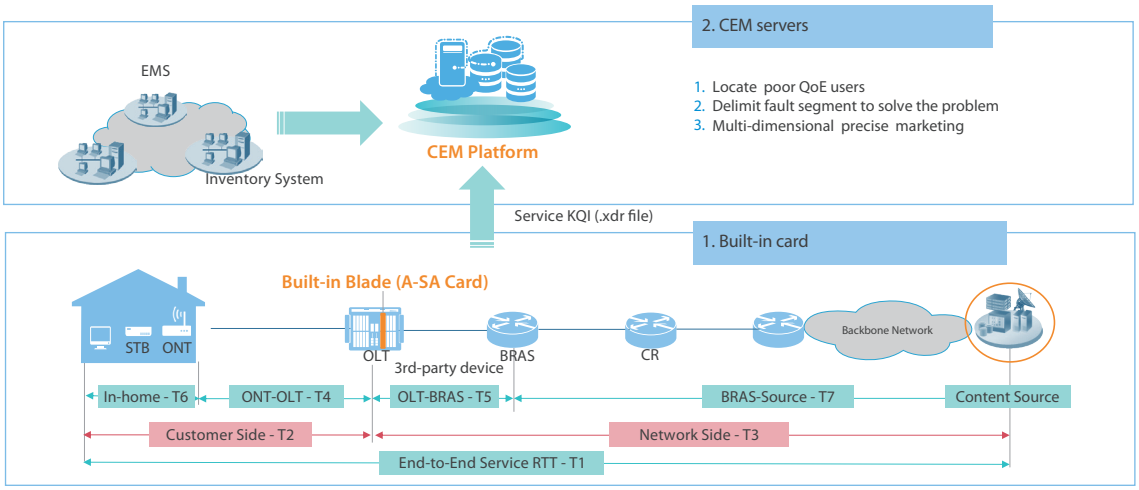


Fig. 1 CEM solution architecture overview.

experience, achieving an accuracy rate of 85%. The system automatically generates a list of low quality of experience (QoE) users, supporting operators to carry out outbound care or on-site rectification, transforming "passive response" to "proactive optimization". This significantly improves user satisfaction and network stickiness, reducing churn risk.

Since 2021, China Mobile Tianjin has deployed about 150 A-SA intelligent cards on a large scale in multiple regions, covering 450,000 users, and has carried out proactive low QoE rectification based on CEM. After the rectification, its group user satisfaction ranking jumped from 28th to 10th among 33 provinces nationwide, and the churn rate had decreased by 15% year-on-year by 2024.

Rapid Complaint Demarcation and Improved O&M Efficiency

In response to user complaints, the CEM system supports 24/7 service quality backtracking and end-to-end root cause analysis to achieve accurate demarcation of fault segments. It shortens the traditional localization process, which typically takes more than four hours, to within 10 minutes, increasing efficiency by 96%, significantly reducing fault repair time while enhancing user perception.

In 2024, China Telecom Guizhou deployed more than 60 A-SA intelligent cards in places such as Dafang and Weining, covering nearly 100,000 household users. Low-QoE work orders are received through the "Yilian Zhikong" WeChat mini-program, achieving accurate dispatching and on-site rectification. After half a year, the user complaint rate decreased significantly and satisfaction continued to rise.

Accurate User Profiling to Power Differentiated, Precise Marketing

The CEM system builds AI-powered user profiles from multiple dimensions such as service type, traffic characteristics, and experience quality, and automatically generates user tags and value ratings. With these accurate user profiles, operators can identify potential users of various value-added services (such as FTTR, game acceleration, live streaming, private lines, etc.), achieving precise marketing and moving away from the inefficient traditional "wide-net casting" model. This significantly improves the marketing success rate and ARPU.

During the promotion of FTTR services, China Unicom Henan accurately identified target users through more than 1,400 A-SA cards deployed in more than 100 towns across the province. In Jiaozuo, the marketing success rate increased significantly from 3% to 32%, a more than 10-fold increase, which effectively supported the large-scale promotion of FTTR packages and the growth of ARPU.

With "data-driven, AI-empowered, and closed-loop operation" at its core, the ZTE CEM solution drives operators to transform from "network-based operation" to "experience-based operation". In the future, ZTE will continue to deepen the integration of CEM with emerging technologies such as generative AI to achieve more intelligent customer intent recognition and service recommendations, helping operators build a visible, manageable, and operable experience management system, thereby laying the foundation for their long-term competitiveness in the digital economy. ZTE TECHNOLOGIES

Advance 50G PON and Develop a 10-Gigabit All-Optical Network

Wang Xinsheng

Chief Engineer of Fixed Network Product Planning, ZTE

Amid the rapid evolution and iterative advancement of communication technologies, the global demand for network bandwidth continues to grow at an explosive rate. Since the official release of the XGS-PON standard in 2016, which laid the foundation for the large-scale application of 10G PON technology, ITU-T has initiated research on the next-generation PON technology, aiming to making early arrangements for the future development of networks.

50G PON is the Next Evolution After 10G PON

In 2018, ITU-T determined 50G PON as the technological direction after 10G PON and released the 50G PON standard in September 2021. This not only marks the transition of 50G PON technology from a concept to standardization but also lays a crucial foundation for its commercial implementation and large-scale promotion.

50G PON technology is an inevitable outcome driven by the continuous evolution of network service demands and communication technologies. On one hand, the development of new services, especially video services, has led to increasingly higher user requirements for network bandwidth and transmission latency. On the other hand, the digital transformation of government and enterprise sectors is accelerating, and the application scale of scenarios such as telemedicine, industrial intelligent manufacturing, and intelligent security continues to expand—these scenarios not only have ultra-high demands for network bandwidth, but also place higher requirements on network determinism (including latency, jitter, and packet loss rate).

10G PON technology can hardly meet these growing demands, and its performance bottlenecks have gradually become apparent, making the emergence of 50G PON a natural response. With a bandwidth five times that of 10G PON, it provides stable and reliable network support for various high-bandwidth, low-latency services, meeting the application needs of a broader range of scenarios. At the same time, 50G PON supports smooth migration from 10G PON, ensuring maximization of operators' existing network investments, reducing upgrade costs and risks, and injecting new vitality into the digital economy.

Standardization, Characteristics and Application Scenarios of 50G PON

Standardization

ITU-T has made significant contributions to the standardization of 50G PON (Fig. 1). Under the leadership of ITU-T, the G.9804.x series of standards has been successively released and refined, laying a solid standard foundation for the large-scale commercialization of 50G PON. It specifies that 50G PON supports 50 Gbit/s downstream with flexible upstream options of 12.5 Gbit/s, 25 Gbit/s, and 50 Gbit/s based on actual needs.

Compatibility is a core consideration in the design of 50G PON standard. To this end, the 50G PON standard fully takes into account compatibility with previous-generation technologies. By introducing a third upstream wavelength, it enables the coexistence and smooth evolution of three generations of technologies: GPON/EPON, XG(S)-PON/10G-EPON, and 50G PON, significantly reducing the cost and difficulty of network upgrades for operators.

In addition, maintaining the ODN unchanged during the upgrade and evolution process is another key industry concern. This is because ODN accounts

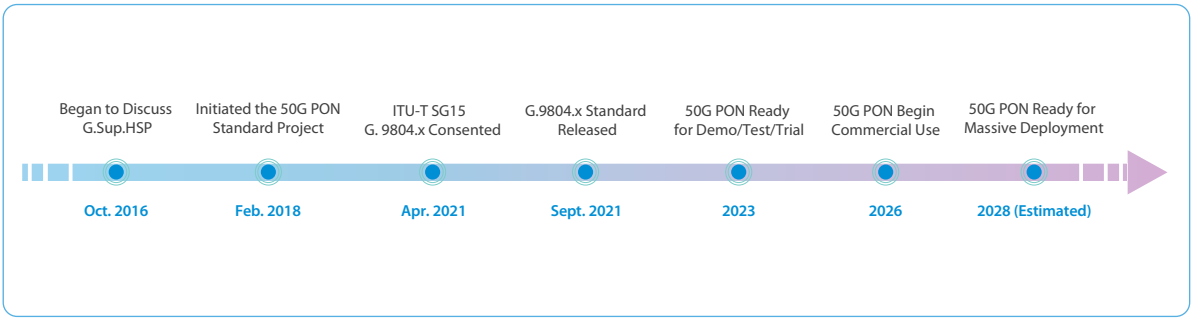


Fig. 1 The development of 50G PON standard.

for a relatively high proportion of the cost in FTTx network construction, and adjustments are difficult once deployed. Therefore, meeting the optical power budget of already-deployed networks is a basic requirement.

Key Technologies

50G PON continues to adopt the point-to-multipoint (P2MP) topology of TDM-PON, consistent with that of GPON/EPON and 10G PON. This topology offers advantages such as low cost, easy maintenance, and strong scalability, effectively reducing the costs of network construction and operation. Meanwhile, 50G PON realizes bidirectional transmission over a single fiber through WDM technology, which improves network transmission efficiency while making full use of existing fiber resources. To achieve higher performance indicators and meet service requirements of high bandwidth, low latency, and high reliability, 50G PON has made multi-dimensional breakthroughs in core technology fields, providing solid support for realizing its technical advantages.

- **Optical interface indicators**

In terms of optical interface indicators, the 50 Gbit/s optical interface adopts the OMA-TDEC parameter system, breaking the limitations of traditional optical interface parameter systems, where indicators such as transmit optical power, extinction ratio, and TDEC are independent of each other and set with fixed values. It allows mutual compensation among transmit optical power, extinction ratio, and TDEC indicators of optical modules, ensuring stable signal transmission and improving network reliability and transmission quality.

- **Receiver sensitivity**

50G PON has introduced digital signal processing (DSP) equalization technology, which processes received signals in real time, compensates for distortions and aberrations generated during signal transmission, and thereby significantly improving receiver sensitivity. To maximize the effectiveness of DSP equalization, the transimpedance amplifier (TIA) and limiting amplifier (LA) need to abandon the traditional limiting amplification mode and adopt a linear amplification design. The linear amplification design can more accurately restore the signal waveform, avoid signal distortion caused by limiting amplification, and provide a higher-quality signal source for DSP equalization. Consequently, the linear burst laser diode driver (LDD), TIA, LA, and burst-mode clock and data recovery (BCDR) circuits have become key chips for 50G PON burst-mode transceivers. They can effectively offset signal attenuation and interference in complex transmission environments, significantly improve reception quality, and ensure that 50G PON maintains stable performance in high-speed transmission scenarios.

- **Error correction technology**

For error correction, 50G PON adopts low-density parity-check (LDPC) codes. Compared to traditional error correction solutions, LDPC offers stronger error correction capabilities. It can achieve error-free transmission under lower signal-to-noise ratio conditions, significantly improving receiver sensitivity and reducing the bit error rate during signal transmission. At the same time, 50G PON deeply integrates LDPC with DSP technology to enable soft-decision LDPC decoding. Soft-decision LDPC uses the soft information of signals (such as signal amplitude and phase) for error correction,

providing higher error correction efficiency and accuracy compared to traditional hard-decision error correction. This further reduces the data bit error rate, ensuring data accuracy in high-speed transmission scenarios and providing strong support for various services with extremely high data reliability requirements.

Application Scenarios

- **Smart home**

With its high bandwidth and low latency, 50G PON offers users an unprecedented immersive experience. As smart home devices rapidly gain popularity, a large number of smart devices are being densely connected to home networks. These devices generate massive data traffic during operation, placing higher demands on network bandwidth and stability. Leveraging its ultra-large bandwidth advantage, 50G PON can easily carry the massive data generated by concurrent operation of multiple devices, effectively avoiding network congestion, ensuring the smooth operation of various smart devices, and providing a solid network foundation for the full-scale implementation of smart home. It supports the seamless operation of home services—such as online gaming, naked-eye 3D, VR/AR, and cloud storage (NAS)—with instant loading and no lag.

- **Enterprise campus**

The network performance requirements in government and enterprise sectors are much higher than in residential settings, and 50G PON's performance advantages are fully unleashed in these sectors, making it a key enabler of their digital transformation. In enterprise office scenarios, 50G PON + Wi-Fi 7 provides ultra-high-bandwidth network connectivity, meeting the concurrent usage of new terminals such as mixed reality (MR) devices. Typical application scenarios include enterprise office, virtual conferences, telemedicine, and intelligent manufacturing.

- **10-Gigabit smart city infrastructure**

50G PON can also provide core network support for the construction of urban digital infrastructure, facilitating the development of smart cities. With its advantages of large bandwidth and high reliability, 50G PON can easily carry massive data, enabling functions such as intelligent control of lighting equipment, real-time monitoring and scheduling of traffic flow, real-time analysis of environmental data and early warning, and efficient backhaul of 5G signals. It helps transform urban management toward greater intelligence and efficiency, improving urban operational efficiency and residents' quality of life. Meanwhile, 50G PON provides high-security private network services, meeting stringent network security and stability requirements of government departments, financial institutions, and other entities.

In recent years, the industry has continued to explore the application scenarios of 50G PON and conducted pilot projects in homes, campuses, factories, parks, commercial buildings, and for 5G small cell backhaul, with expectations for its adaptation to more application scenarios.

ZTE Continues to Innovate in 50G PON Products and Solutions

Standardization Contributions: Deeply Engaging in and Leading Development

As a member of ITU-T and other standardization organizations, ZTE actively participates in and promotes the formulation and refinement of 50G PON-related standards. The company has submitted over 80 50G PON standard proposals, covering key technical fields such as physical layer parameters, low latency, and forward error correction (FEC), many of which have been adopted by standardization organizations.

Technological Innovations: Multidimensional Performance Breakthroughs

In optical modules, ZTE has focused on meeting the key requirements for 50G PON OLT optical modules—specifically the SFP-DD GPON, XG(S)-PON, and 50G PON tri-generational Combo optical modules—through research and innovation in module layout and power consumption reduction. By optimizing the structural layout, the integration of DSP and optical modules has been enhanced, resulting in a 30% size reduction, which facilitates easier deployment in existing network equipment. To reduce power consumption, advanced circuit design

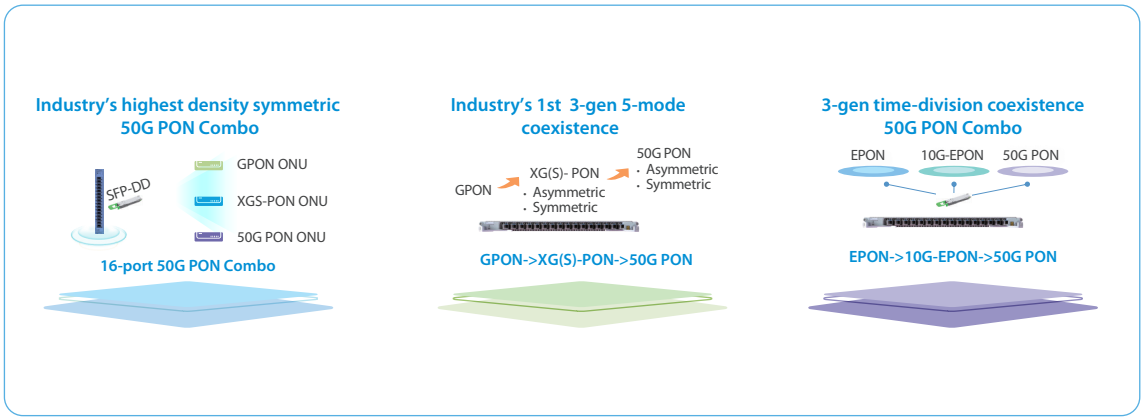


Fig. 2 ZTE's innovations in 50G PON.

and material technologies have been adopted to meet the 32 dB optical power budget requirement. This has reduced the optical module's power consumption by 40%, improving energy efficiency and lowering operators' operational costs.

In chips, ZTE has actively invested in the R&D of key chips for 50G PON burst-mode transceivers, such as linear burst LDD, TIA, LA, and BCDR, improving their performance and stability for complex deployment scenarios. Additionally, the effective integration of LDPC error correction technology with DSP has further enhanced the system's receiver sensitivity and data transmission accuracy, providing comprehensive guarantees for the performance of 50G PON in practical applications.

Industry Cooperation: Advancing Pilots to Support Commercialization

ZTE actively promotes industry cooperation in 50G PON and the maturation of the industrial chain. It has conducted 50G PON-related testing and pilot/commercial trials with over 60 customers, covering scenarios such as homes, enterprise parks, campuses, factories, and 5G backhaul.

As a pioneer in 50G PON, ZTE firmly adheres to the 50G PON technology direction and continues to innovate. It has launched a series of solutions, including the industry's first precision 50G PON prototype, the first 50G PON + Wi-Fi 7 ONU, the first three-generation five-mode 50G PON Combo, the first 8-port symmetric triple-speed 50G PON Combo solution, the industry's highest-density 16-port symmetric 50G PON Combo, and the first 50G PON three-generation time-division coexistence solution. These solutions support the smooth evolution of existing networks to 50G PON. Meanwhile, ZTE provides a full range of end-to-end OLT and ONU products, leading the industry's 50G PON development. Fig. 2 shows some of ZTE's innovations in 50G PON.

50G PON Outlook: Ushering in the New Era of 10-Gigabit All-Optical Networks

The PON technology has gone through a decade of evolution and commercialization. In the past 2-3 years, the focus has been on refining standards, achieving technological breakthroughs, exploring scenarios and improving the industrial chain of 50G PON. With breakthroughs in ASIC technology, 50G PON is expected to enter official commercial use in 2026, and step into the large-scale commercialization by 2028. The international market is expected to lag 2-3 years behind the Chinese market in commercialization.

As 50G PON continues to evolve, its application scenarios are being actively explored. In home scenarios, 50G PON will be deeply integrated with education and healthcare, supporting online education, gaming, high-definition interaction, and remote health monitoring In government and enterprise sectors, it will empower smart factories, digital finance, and promote the digital transformation of industries. In the construction of 10-Gigabit all-optical cities, 50G PON will facilitate the development of fields such as smart transportation and smart energy, contributing to a more comprehensive digital city system. ZTE TECHNOLOGIES

Light FTTx Deployment: Empowering ISPs to Build Ultra-Simple, Agile Networks

Wen Ping

Fixed Network Product Planning Manager, ZTE

Compared with major operators, ISPs often adopt an asset-light operation model, leasing pipelines, optical cables and even network equipment from major operators to enter the market quickly. But as their business grows, this model shows clear limitations—network quality depends on partners, cost optimization is limited, and it is challenging to provide differentiated services. With intensifying competition and escalating user demand for high bandwidth, ISPs urgently need to shift from "leasing" to "self-building" and develop independent, controllable FTTx networks. A light deployment solution is essential to overcome constraints in capital, manpower, and efficiency.

As ISPs shift from leased to self-built networks, they face three key challenges. First, limited capital forces small and mid-sized providers to tightly control spending on equipment, equipment room leasing, and labor while still accelerating deployment to shorten the ROI cycle. Second, small teams must handle planning, construction, and O&M, and traditional FTTx—with its complex cabling and manual configuration—significantly increases their workload. Finally, with rising demand for gigabit broadband and low-latency services, ISPs must build networks faster and more cost-effectively to stay competitive.

ZTE Light FTTx Deployment Solution: A Game-Changer for ISPs

ZTE light FTTx deployment solution (Fig. 1), built on three pillars—light OLT equipment, light ODN deployment, and light O&M—provides ISPs with a solution featuring low-cost investment, high-efficiency delivery, and intelligent O&M, enabling the shift from "resource dependence" to "independent control."

Light OLT Equipment

- **Ultra-simple deployment to break space constraints**

ZTE's lightweight OLT equipment reduces weight and volume by over 80% compared to traditional models. It supports installation in third-party cabinets or co-location with mobile base stations, enabling flexible deployment. ZTE also provides an outdoor integrated OLT that supports pole-mounted installation and is equipped with power supply and battery modules that suit various power supply environments, eliminating the need for equipment room leasing.

- **Green energy efficiency**

ZTE OLT adopts highly integrated chips, line card-level power optimization mechanisms, and efficient heat dissipation design. Its average PON port power consumption is 26.7% lower than the EU's CoC V9 standard, reducing operational costs.

- **Open compatibility for smooth upgrades**

The equipment features excellent compatibility, supporting interconnection with ONUs from over 20 mainstream suppliers. Meanwhile, ZTE's Any-PON solution supports GPON/XG PON/XGS PON/XG PON Combo/XGS PON Combo (five-mode integration), enabling smooth evolution on demand and protecting existing investments.

Light ODN Deployment

- **Pre-terminated technology to significantly improve construction efficiency**

Factory-prefabricated fiber distribution boxes

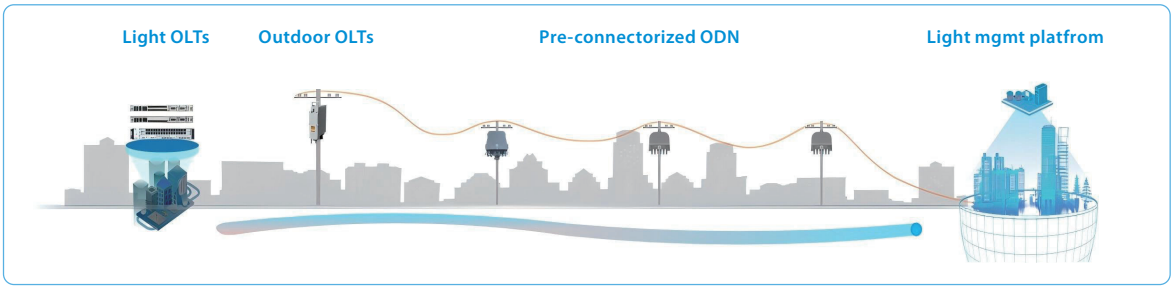


Fig. 1 ZTE's end-to-end light FTTx deployment solution.

(ODBs) and plug-and-play optical cables eliminate on-site fusion splicing and cover-opening during installation. This reduces the ODB deployment time from 60 minutes to 10 minutes and reduces the manpower from two technicians to one—improving construction efficiency by six times.

- **Full-process digitalization**

By scanning the QR code on ODN materials with a mobile app, port information is automatically associated and uploaded to the cloud. Combined with GIS maps, this enables visual optical path topology. O&M personnels can check optical cable routes, port status, and material serial numbers in real time, reducing fault location time by 90%.

- **Elastic architecture for on-demand expansion**

Pre-connectorized optical cables can be deployed on demand, allowing ISPs to invest in phases based on user density and avoiding resource idleness caused by over-construction in the early stage.

Light O&M

- **Ultra-simple network management platform and cloud-based deployment**

The solution supports a lightweight NMS or cloud-based SaaS services, eliminating the need for purchasing dedicated servers and reducing IT infrastructure costs. A unified interface enables end-to-end O&M management for OLT, ONU, and ODN.

- **Zero-touch provisioning**

The OLT automatically performs configuration upon power-on, eliminating on-site debugging. User-side ONUs also automatically register, authenticate, and configure once online, enabling plug-and-play. The new service activation time is reduced from 48 hours to minutes, cutting human intervention by 80%.

- **AI-driven proactive O&M**

Based on AI analysis of optical line and optical module performance data, potential issues such as weak optical signals and module risks are proactively predicted, and repair recommendations are generated accordingly. This reduces optical network failure rates by 70% and user complaint rates by 50%.

Light FTTx Solution: Accelerating Linknet's FTTH Transformation

Indonesian operator Linknet was transitioning its HFC network to FTTH but faced two major challenges: a tight budget that made it difficult to afford the high investment required by traditional FTTH and a small O&M team burdened with heavy service provisioning and network O&M workloads. To address these challenges, ZTE offered the Light FTTx solution, featuring pole-mounted lightweight OLTs (C610/C610z) to reduce site rental costs, along with pre-connectorized ODNs and an intelligent management system to simplify construction and O&M.

The solutions has delivered three key benefits:

- **Significant cost optimization:** Compared with traditional CO OLT deployments, network construction costs dropped by 30%, and annual OPEX decreased by USD 1.83 million, easing budget pressure.
- **Significantly shortened delivery cycle:** Network construction efficiency increased by 55.3%, with the ODB deployment time reduced from 60 minutes to 10 minutes. If the transformation of the entire 2.4-million-line HFC network is completed, the overall cycle can be shortened by at least 12 months, giving Linknet a first-mover advantage.
- **Reduced O&M workload:** Fault location time decreased by 90% and manual intervention by 80%, allowing a small O&M team to support large-scale network operations and focus on improving service quality.

In the era driven by both 5G and gigabit optical networks, operator competitiveness has shifted from resource scale to agile services. Light FTTx networks fully alleviate the capital pressure and human resource bottlenecks of ISPs, allowing them to focus more on high-quality, agile services. ZTE TECHNOLOGIES

Contextualized Smart Care: A New Avenue for Carriers' Value-Added Services

Wang Lili

Marketing Manager for Fixed Network Product Security, ZTE

In the third decade of the 21st century, the global digital landscape is being reshaped by rapidly advancing network technologies—5G, offering wide coverage, 1 ms ultra-low latency and 10 Gbps peak rates, alongside Wi-Fi 7, promising theoretical speeds of 46 Gbps+ and enhanced multi-device processing. These advancements lay a solid foundation for data-intensive, real-time applications. Meanwhile, national digital strategies (e.g., China's "Digital China", EU's "Digital Strategy for Europe") are accelerating transformation, with smart home evolving from a niche market to the mainstream as consumers increasingly seek more convenient, secure and personalized experiences.

Against this backdrop, telecom operators are at a turning point. The saturated fixed broadband market sees shrinking profit margins due to price wars and homogeneous services. Expanding innovative value-added services has become critical, with intelligent home care standing out due to its connection to users' essential needs.

This has redefined home security. Traditional post-event video surveillance is replaced by modern intelligent care solutions that integrate property monitoring, elderly/child companionship, smart home connectivity, and real-time alerts. For instance, cameras can detect break-ins, elderly falls or children's return, triggering lights or alarms automatically. Shifting from "passive monitoring" to "active care", these solutions evolve into a comprehensive lifestyle service that addresses the upgraded demands of modern families.

Global Smart Care Market: Scale Expansion and Operator Layout

The global intelligent care market is growing explosively, driven by tech innovation and evolving user needs. According to Omdia's data, global home security product shipments (excluding China) are expected to hit 230 million units by 2025, with home surveillance cameras accounting for 50 million units, or 21% of the market. Notably, home surveillance camera shipments are forecast to grow at a compound annual growth rate (CAGR) of 8%-10% between 2025 and 2030, pointing to a tens-of-billions-dollar market.

Key growth drivers include the expanding global aging population (1 in 6 people over 60 by 2030, according to the WHO), which is boosting demand for remote elderly monitoring via smart cameras. Additionally, rising numbers of urban single-person households are increasing home security needs; and post-pandemic remote work and flexible lifestyles are fueling reliance on smart home devices.

Telecom operators are capitalizing on this potential—over 90% of mainstream global operators now offer home care solutions through integrated "hardware + service" packages bundled with broadband, 5G, or fixed-line services. For example, Verizon's "Smart Home Security" combines AI cameras with 5G, while AT&T uses subscriptions for cloud/AI features to generate recurring revenue.

Operators value this opportunity for three key benefits: enhanced user stickiness (with solutions tied to hardware/cloud reducing churn compared to basic broadband); a 15%-20% higher ARPU (per 2024 survey, as users pay for value-added security and

convenience); and the ability to position themselves as "digital life partners," building long-term user relationships and capturing broader smart home opportunities.

Industry Challenges: Balancing Computing Power, Cost, and User Experience

The intelligent care market, while full of opportunities, brings significant challenges to operators.

The top challenge is surging computing power demand driven by diversified scenarios and upgraded user experience. Scenarios have expanded beyond basic indoor monitoring to include indoor/outdoor dual-mode surveillance, multi-camera collaboration, and cross-device linkage (e.g., cameras integrated with smart locks/thermostats), all of which require massive data processing—outdoor cameras handle variable light (sunlight, rain, night), while multi-camera systems need real-time synchronization and unified analysis. Users also demand a higher-quality experience: low-latency live viewing (ideally ≤200 ms for emergency response), 24/7 cloud storage, HD playback, and AI alerts, further straining computing resources.

This creates a dilemma: deploying high-performance hardware at the terminals hikes device costs, raising TCO for users and hindering market penetration; offloading all tasks to the cloud drives up operators' infrastructure costs (e.g. servers, energy, maintenance), eroding margins, and potentially causing latency that degrades user experience.

Another key challenge is ensuring AI accuracy and reliability. False alarms (caused by swaying leaves, insects, or lighting changes) are a major pain point—65% of users who abandoned solutions cited this (2023 survey). Reducing false alarms needs advanced AI algorithms and large training datasets, increasing computing and R&D costs. Additionally, data security and privacy are critical: cameras collect sensitive data (e.g., living habits, home layouts), forcing operators to invest heavily in encryption and compliance to gain trust, which adds operational complexity.

ZTE's AI Scenario-Based Solution: End-Cloud Collaboration

In response to these industry challenges, ZTE has launched an AI-driven, scenario-based smart care solution built on an end-cloud collaboration architecture (Fig. 1). This solution leverages ZTE's decades of expertise in network infrastructure, AI technology, and smart home integration to strike a balance between computing power, cost, and user experience, providing operators with a powerful tool to seize the intelligent care market opportunity.

Core Architecture: End-Cloud Collaboration

ZTE's solution is built on an innovative end-cloud collaboration architecture that allocates computing tasks between IP cameras (terminals) and the cloud based on their respective strengths.

At the terminal, ZTE's IP cameras feature lightweight AI chips and edge computing, enabling them to handle basic data collection and real-time tasks like HD video capture, motion detection, and initial feature recognition—ensuring low-latency

Fig. 1 Architecture of ZTE's smart home care solution.

responses (e.g., instant local alerts for motion) and offering local SD card storage as backup during network outages.

On the cloud side, the intelligent care platform uses large-scale servers, advanced AI models, and distributed computing to process complex tasks like deep behavior analysis, multi-camera data fusion, and long-term storage. Offloading complexity to the cloud cuts terminal hardware costs by 30% compared to fully terminal-based solutions and enables remote management for operators (device monitoring, firmware updates, and user account control).

This model also addresses data security: it uses encrypted terminal-cloud transmission, complies with global regulations such as GDPR and China's Personal Information Protection Law to give users control over their data, and supports local processing to keep data on-device.

Key AI Technology Highlights

ZTE's solution stands out for its advanced AI capabilities, which are integrated into both terminal and cloud components to deliver accurate, reliable, and user-friendly intelligent care services. The core AI technologies include AI detection and alarm, enabling the system to identify risks and respond proactively.

- **Area alarm:** Using intelligent boundary recognition technology, the system allows users to define polygonal alert zones and adapt to different environments through multi-level sensitivity adjustment. It accurately distinguishes between real intrusions and interfering factors such as animals or light changes. Once an abnormality is detected, it immediately triggers an audio-visual alarm and pushes a notification to the user terminal, forming a complete protection loop. Ideal for perimeter protection and key area monitoring, it ensures the safety of critical areas while minimizing false alarms.
- **Line-crossing alarm:** Based on advanced video analysis algorithms, this feature supports flexible configuration of the positions and detection directions of virtual warning lines. Anti-interference algorithms effectively eliminate false triggers from environmental factors like swaying tree leaves and flying insects, generating alarms only when real targets cross the warning lines, making it suitable for access control and restricted area control.
- **Loitering detection:** Leveraging intelligent behavior analysis algorithms, the system accurately identifies abnormal loitering in specific areas. Users can customize time thresholds for triggering alarms, while the system evaluates movement trajectories and dwell duration to distinguish between normal stays from suspicious loitering.
- **People counting:** Employing high-precision detection algorithms, the system accurately counts people based on head and shoulder features without duplication. It supports generating time-based passenger flow analysis reports, providing data for operational decision-making in venues like cafes and retail stores.

Beyond security, ZTE's solution caters to users' emotional needs through the "Time Snapshot" feature, powered by cloud-side AI video analysis and editing technology. Traditional home cameras record hours of footage, requiring users to sift through lengthy videos to find meaningful moments—such as a baby's smile, a pet's playful antics, or a family gathering. Time Snapshot can edit the stored video of the day and condense it into a short video of less than 60 seconds.

The feature has been well received, especially among working parents who often miss family moments due to busy schedules. A 2024 ZTE survey showed that 82% of users rated Time Snapshot as "very useful" or "extremely useful," greatly improving overall satisfaction with the solution.

Scenario-Specific Applications: From Home Care to Child Safety

ZTE's solution is not a one-size-fits-all product but a flexible platform that can be tailored to diverse scenarios. By working closely with operators, ZTE has developed targeted solutions for different user groups and regions, achieving remarkable success in real-world applications.

Home Care Scenarios: Precisely Matching Needs to Boost Operators' Value-Added Services

In Guizhou Province, ZTE has assisted local operators in focusing on high-frequency and essential home demands, delving into scenario-specific needs and launching AI camera integrated packages. With AI technology at their core, these packages expand applications in home scenarios, covering functions such as elderly and child care, time snapshots, and home security.

Tailored packages are offered for different family scenarios:

- **Urban package:** Designed for urban single-person households, pet owners, children staying home alone, and baby crying monitoring, the urban package is available for 174 RMB/month on a 24-month term.
- **Rural package:** Targeting rural areas where there are many left-behind elderly, who lack care due to their children working in cities, the rural package is provided at 145 RMB/month on a 24-month term. This package includes SIM cards, broadband, and data plans, fully meeting families' daily internet needs.

Child Safety Scenarios: Comprehensive Protection to Reassure Parents

In the Guangxi Zhuang Autonomous Region, ZTE has supported local operators in launching scenario-driven child protection services, focusing on safety protection in high-frequency activity areas for children, such as schools and parks.

By deploying video surveillance equipment and integrating advanced image processing technologies like area analysis and motion detection, the following capabilities are achieved:

- **Suspicious behavior recognition:** Accurately detecting unauthorized personnel entering specific areas or abnormal behaviors.
- **Real-time alert response:** Once risks are identified, the video networking platform immediately pushes alert information to parents, including details such as time, location, and risk description.

These capabilities not only enhance children's safety but also give parents peace of mind, knowing their children are in a secure environment.

ZTE, an industry leader in fixed network terminal products, is committed to consolidating foundational capabilities and strengthening technological innovation. The company will deepen its exploration of scenario-based video applications, accelerate the technological accumulation of video and AI capability components, while deepening cooperation across diverse fields such as households, businesses, communities, rural areas, and industries to create a new digitalized landscape. ZTE TECHNOLOGIES

ZTE SmartView: Redefining the Central Hub of Smart Home

Ji Guofeng

STB Product Marketing Manager, ZTE

The smart home is undergoing a profound transformation—from isolated devices to a human-centric, seamlessly connected, and intelligently collaborative ecosystem. Leading this shift is ZTE with its groundbreaking innovation, the ZTE SmartView. As the "beating heart" of the modern home, this next-generation smart terminal integrates entertainment, communication, security, and control into a single device.

SmartView features an 8-inch IPS HD touchscreen, dual-band Wi-Fi for stable high-speed connectivity, and professional-grade neodymium speakers paired with a large acoustic cavity and advanced audio algorithms.

At its core, SmartView adopts an innovative five-in-one design that combines a set-top box, high-fidelity speaker, touchscreen, HD camera, and fixed telephone functionality. This integrated design goes beyond traditional set-top boxes, offering robust computing power and intelligent control capabilities.

Four Pillars: Reshaping Key Home Scenarios

The true excellence of ZTE SmartView lies in how it systematically constructs four major smart gateways, profoundly reshaping key home application scenarios:

- **Entertainment Gateway**

Pre-loaded with a vast library of quality OTT content, the device supports advanced video decoding standards like H.265/VP9, and can output 4K Ultra HD via HDMI for dual-screen interaction. The powerful 1.2 TOPS NPU supports innovative scenarios like motion-sensing games and interactive fitness, while the intelligent voice assistant powered by Google's Gemini large language model delivers a highly personalized entertainment experience.

- **Communication Gateway**

The built-in 2-megapixel front camera supports HD video calls. Innovatively, the device supports assignment of an independent phone number, allowing direct video calls to/from landlines or mobile phones. With voice wake-up and hands-free calling, it provides a convenient way for family members to stay connected.

- **Security Gateway:**

The ZTE SmartView supports smart linkage with devices like smart doorbells and surveillance cameras, enabling visitor intercom, real-time viewing of children's rooms, and monitoring for anomalies outside the front door. When away from home, users can view footage remotely via a mobile app, supported by cloud video playback for comprehensive home security.

- **Smart Control Gateway**

As the "brain" of the smart home, it fully supports Wi-Fi, Bluetooth, and Zigbee protocols, allowing seamless connection and centralized control of various smart devices. Combined with a highly sensitive dual-microphone array, users can directly manage air conditioners, lights, curtains, TVs, and more via voice commands.

Strategic Value: Enabling Operators to Lead the Smart Home Era

For telecom operators, ZTE SmartView is not just a hardware product, but a strategic platform that enables them to capture the high ground in the smart home market and drive sustainable growth.

By leveraging this platform, operators can bundle offerings such as high-value OTT content, security cloud storage, advanced AI assistant capabilities, and smart-home control services, creating diverse packages that increase ARPU. As SmartView becomes an essential household interaction hub, operators can strengthen core user relationships, cross-sell smart devices, and lay the foundation for future IoT

application deployment. Meanwhile, built-in AI capabilities—such as the LLM-powered voice assistant and NPU—enable data-driven service models.

Successful Practice

ZTE SmartView has successfully supported a Chinese operator in achieving large-scale commercialization, becoming a key enabler in implementing the operator's smart home strategy. It has deeply customized and integrated over 12 of the operator's core services, achieving "1-driving-N" service aggregation and increasing user engagement:

The device integrates popular streaming content, video calls, and connects with "Security Cloud Storage" for smart doorbells and cameras, creating a complete security solution. It also incorporates "Cloud Disk" for convenient family content storage and sharing. Acting as a unified entry point, SmartView effectively drives the synergistic development of the operator's value-added services, significantly enhancing platform value and user stickiness.

This successful implementation fully demonstrates SmartView's strategic value as a smart home hub, providing a replicable business model for global operators.

Future Outlook

ZTE SmartView's evolution roadmap focuses on technological innovation and ecosystem expansion. One direction is a computing-power upgrade to support more complex AI applications, real-time rendering, and multi-user interactive games. In addition, it will have enhanced AI capabilities , including the introduction of an English AI voice assistant capable of multilingual natural conversations, and—empowered by AI models—will further optimize automated smart scenarios, provide personalized lifestyle suggestions, and manage energy consumption, enabling "proactive intelligence" for the home.

Future iterations will also feature hardware innovations, such as the integration of a 360-degree panoramic camera for comprehensive home monitoring. The roadmap also emphasizes the evolution of SmartView's ecosystem, with a commitment to building a more open partner ecosystem. By integrating vertical services like health, education, and shopping, SmartView will become a super entry point connecting users to a wide range of digital services and continuously creating value.

ZTE SmartView is a visionary platform that unifies the entry points for home entertainment, video calls, security, and smart control. It represents a significant leap forward, empowering operators to explore new markets, increase revenue, and deliver an unparalleled, integrated smart life experience. By consolidating these critical functions into a single device, ZTE is shaping the future of the smart home, making the connected home more accessible, more powerful, and closer to the heart of our daily lives than ever before. ZTE TECHNOLOGIES

AI Empowers Gigabit Broadband, Ushering in a New Era of Smart Home

Chen Qiuji

Fixed Network Product Planning Manager, ZTE

Amid the rapid global digital transformation, the growing adoption of fiber to the home (FTTH) has significantly reshaped residential network infrastructure. Gigabit broadband is increasingly becoming a standard feature in modern households, providing the foundational bandwidth required for data-intensive applications. However, this expansion comes with considerable challenges for network operators: user growth has plateaued, ARPU remains under pressure, and services are becoming increasingly homogenized. In this intensified competition, a new strategic direction is essential. The integration of AI with gigabit broadband is emerging as a decisive factor, facilitating a shift from conventional connectivity to intelligent, value-added services and marking the beginning of a new chapter for smart home.

From "Connection" to "Experience": AI Reshaping Home Network Services

Traditional broadband services have centered around the concept of "connection," with service quality measured solely by bandwidth and network stability. Driven by AI, home network services are undergoing a systematic transformation—from "passive response" to "proactive service." This shift is chiefly manifested in the areas of connectivity, business, and service.

With network connectivity no longer an issue, users are increasingly seeking autonomy in their networks. Through the deployment of AI algorithms, home networks can proactively detect device types, locations, and business requirements, dynamically optimizing channel allocation, bandwidth management, and antenna strategies to enable seamless roaming, interference avoidance, and fault self-healing. Whether for multi-user online 4K/8K streaming, low-latency cloud gaming, or remote office scenarios, smooth and stable network performance is assured.

Network services are tailored to diverse individual needs. Leveraging large language models and user profiling capabilities, operators can provide personalized service recommendations and closed-loop solutions for different family members. Examples include customized educational content filtering for children, health monitoring and emergency calling for the elderly, and dedicated office channels for professionals, thereby realizing "personalized strategies" for each user and substantially enhancing user engagement and satisfaction.

Network operation and maintenance is shifting from passive response to proactive management. Real-time monitoring of various terminals, connections, and business indicators enables the prediction of potential risks and the implementation of automated remediation. For instance, when latency fluctuations are detected in gaming, an acceleration mode can be automatically activated; when storage anomalies are detected, early warnings and repair suggestions can be issued in advance. The operating model for home networks is thus transitioning from a reactive "firefighting" approach to a "preventive" approach focused on prediction, intervention, and optimization.

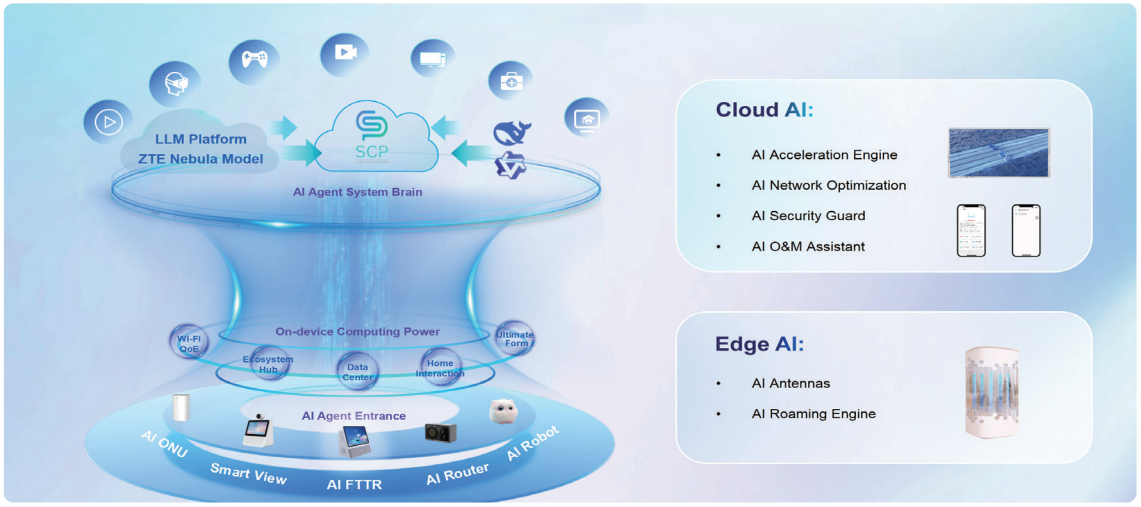


Fig. 1 Smart connectivity redefined: edge-cloud synergy with AI innovations.

End-Cloud Synergy: A Digital Foundation for Smart Home Broadband

The realization of intelligent home networks requires more than isolated technological advancements; it necessitates the construction of an integrated collaborative system that spans the endpoints, cloud, and network. The "end-cloud synergy" proposed by ZTE (Fig. 1) has emerged as the mainstream technological pathway for driving the deployment of AI-powered home broadband in the industry.

This architecture is centered around the concept of "cloud-based training with edge inference." On the cloud side, AI platforms such as ZTE's Nebula Telecom Large Model are leveraged to perform data training, model optimization, and strategy generation to address complex scenarios. At the endpoint, AI chips and lightweight algorithms are embedded to enable millisecond-level local response and closed-loop business processes. The synergy between the cloud and endpoints not only ensures the precision of intelligent decision-making, but also meets the stringent low-latency requirements of real-time services.

Edge AI is pivotal for achieving optimal performance. In practical applications, for instance, "AI smart antennas" can detect terminal signal strength and movement trajectories in real time, enabling microsecond-level adjustments to antenna arrays and beam directions. The "AI roaming engine," relying on collaborative scheduling algorithms, achieves seamless, packet loss-free switching between multiple access points (APs), thereby completely solving latency and interruption issues encountered when moving between rooms.

Cloud-based AI, meanwhile, is fundamental to enabling globally intelligent services, particularly in upgrading business and operational aspects. For example, "business-level acceleration" uses deep learning to identify service types—such as video conferencing, online gaming, or IoT device communications—in real time and dynamically implements virtual channel strategies to prioritize critical services and reduce latency. The "AI maintenance assistant," integrating large language models such as DeepSeek, supports multimodal interaction via voice, image, and other formats, rapidly responds to user inquiries like "weak Wi-Fi signal" or "game lag," thereby doubling operational efficiency and significantly reducing complaint rates.

Diversified AI Terminals: Building a Human-Centric Intelligent Ecosystem

As the direct interface between users and services, the intelligence of terminal devices fundamentally determines the limit of the user experience. ZTE has introduced a series of AI-powered terminals that redefine the "role" of devices within the home environment. Users can select product types according to their preferences,

transforming traditional functional hardware into "family intelligent agents."

The AI FTTR device integrates Wi-Fi 7 with lightweight NAS technology to create a "private intelligent data center" for households. Its AI-driven photo album enables automatic classification and organization of images, and even supports semantic searches such as "find last year's family photo at the seaside," greatly enhancing the efficiency of digital content management within the home.

The AI FTTR Pro, an upgraded version, is the industry's first FTTR device equipped with a display screen. It consolidates six major functions—network management, smart home control, voice assistant, multimedia entertainment, security monitoring, and local storage—thus becoming the true "central intelligent hub" of the entire residence.

The AI Smart View terminal is positioned as a "lifestyle service aggregation platform," integrating device control, content playback, child monitoring, and wellness services. Notably, it introduces an innovative "scenario-based e-commerce" model, which recommends local lifestyle services or products based on user habits, thereby opening up new monetization avenues for operators.

Home terminals are no longer isolated entities; instead, they leverage network connectivity and AI capabilities to enable data sharing and service collaboration. Collectively, they build an intelligent home ecosystem centered on user needs and capable of continuous evolution.

Value Reconstruction and Model Innovation: A New Path to Sustainable Growth

The advent of AI-powered home broadband not only enhances user experience but also reshapes the value chain of the home broadband industry. Operators can leverage this transformation to shift strategically from "broadband management" to "value operations," thereby establishing new models for sustainable growth.

Breaking Homogeneous Competition and Enhancing User Loyalty

In traditional broadband markets, users tend to switch providers based primarily on price. However, differentiated services enabled by AI home broadband—such as game acceleration, dedicated remote working channels, and intelligent care—motivate users to remain for the superior experience rather than mere pricing. The irreplaceable nature of these services significantly increases user loyalty and effectively reduces churn rates.

Driving ARPU and the Second Growth Curve

Operators can transition from simple "bandwidth sales" to "service operations" by offering value-added, subscription-based services such as AI cloud storage, intelligent photo album memberships, or e-sports acceleration packages. This creates a recurring revenue structure for sustainable income. Furthermore, AI-driven analytics can precisely recommend scenario-based bundles, such as "home office packages" or "elderly health packages," allowing operators to mine user value, increase conversion rates, and improve average revenue per user.

Building Ecosystem Advantage for Market Leadership

By integrating AI terminals as entry points, networks as foundational platforms, and cloud-based AI as the central capability, operators are able to orchestrate a closed-loop smart home ecosystem comprised of hardware, connectivity, and applications. This not only establishes long-term competitive advantages but also enables operators to compete effectively with the open market.

The integration of AI with gigabit home networks marks an industry-scale elevation from "connection" to "intelligent home." This evolution endows household networks with perception, reasoning, and communication capabilities, aligning them to meet the demands of future digital lifestyles centered around people and driven by scenarios. For users, it constitutes a leap in quality of life; for operators, it represents an opportunity to overcome growth limitations and achieve sustainable development.

With the ongoing convergence of "connectivity + computing power + AI," smart home is entering a new phase characterized by pervasive and proactive intelligence. The future has arrived: Only by embracing change and accelerating innovation can operators carve out new frontiers in the rapidly expanding home broadband market. ZTE TECHNOLOGIES

A New Tech Benchmark in Tibet: The First All-Optical Hospital on the Snowy Plateau

Li Haibin

Fixed Network Product Planning Director, ZTE

Baqen County, located in Nagqu City, Tibet Autonomous Region, sits on the upper reaches of the Nu River and the southern foothills of the Tanggula Mountains. With an average altitude exceeding 4,500 meters, it stands among one of China's highest prefecture-level cities by elevation. The region is characterized by extreme cold, thin air, and harsh natural conditions that pose severe challenges to daily life and medical services for local residents. As Baqen County serves as a crucial link between Nagqu and Qamdo and between parts of Tibet and Qinghai, improving its infrastructure, particularly medical facilities, is vital for regional development and public well-being.

The People's Hospital of Baqen County is the only comprehensive hospital in the area, shouldering the critical responsibility of providing medical services for approximately 56,000 permanent residents and a large floating population. However, prior to 2024, outdated and inadequate network facilities became an invisible shackle, severely constraining the efficiency and quality of healthcare delivery and hindering its ability to meet modern diagnostic and treatment demands. A transformation was urgently needed.

The Past Predicament: "No Usable Network" Hindering Lifesaving Efforts

Before the deployment of the all-optical network, the network situation in the old campus of the People's Hospital of Baqen County was dire. Significant blind spots in network coverage existed within the hospital premises, with only a very few departments having network access. Even in covered areas, issues of low bandwidth and unstable speeds were prominent, frequently causing disruptions in basic processes like payment processing, medical insurance settlements, and document printing. This led to excessively long waiting times for patients and dissatisfaction among both patients and healthcare providers.

More critically, the aging network equipment suffered from frequent failures, and maintenance responses were slow. During critical moments requiring emergency treatment, such as multi-departmental urgent consultations or impromptu medical meetings, the lack of a reliable network made efficient remote communication impossible. Medical staff often had to resort to the

most traditional method—spreading messages on foot, racing against time across the high-altitude terrain to save precious moments for rescue operations. The lag in network connectivity directly impacted medical safety and life-saving efforts.

The Solution: Building a "Lifeline Skyroad" with All-Optical Network Technology

To thoroughly address this critical challenge, in 2024, during the construction of the new campus of the People's Hospital of Baqen County, Nagqu Unicom and ZTE collaborated closely to innovatively introduce the industry-leading FTTR-B All-Optical Campus Network solution. The goal was to create the first high-altitude all-optical hospital on the snowy plateau, setting a new benchmark in healthcare.

The FTTR-B solution extends optical fiber directly to every ward, operating room, imaging reading room, and office area, achieving seamless, comprehensive coverage for both wired and wireless Wi-Fi networks throughout the hospital. Optical fiber inherently offers advantages such as vast bandwidth, strong anti-interference capabilities, and long transmission distances, laying a solid physical foundation for a high-speed, stable network experience.

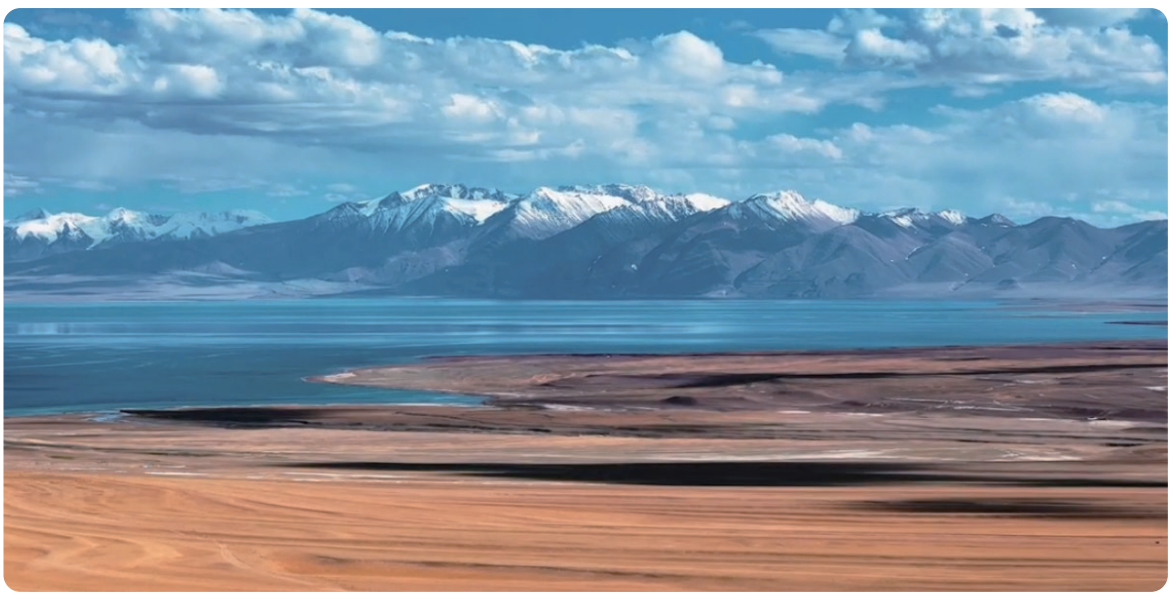
Following deployment, tasks like retrieving high-definition medical images and handling electronic medical records became fluid for doctors, significantly enhancing diagnostic and treatment efficiency. Patients and their families can now smoothly access the network within the hospital premises, conveniently complete medical procedures, and even make video calls while waiting, alleviating anxiety in an unfamiliar environment.

The Technological Core: A Simplified, Intelligent, and Secure Network Engine

At the heart of this construction is the industry-leading, high-capacity, fully converged FTTR-B main gateway provided by ZTE. A standout feature is its highly integrated design, which consolidates six functions into one unit: router, switch, firewall, optical line terminal (OLT), wireless access controller (AC), and internet protocol private branch exchange (IP-PBX).

This "six-in-one" design delivers multiple benefits:

- **Simplified Architecture:** Just two main gateways can separately handle both the hospital's internal network (for dedicated medical systems like HIS, PACS) and external network (for internet access) services. This ensures effective network isolation, safeguarding critical medical data security while dramatically reducing equipment footprint and cable complexity.
- **High Capacity:** A single main gateway supports



> The establishment of the all-optical hospital in Baqen County, at an average altitude of 4,500 meters, is a "lifeline skyroad" paved with technology.

high-concurrency access for up to 1,200 terminals, laying a solid foundation for the future introduction of more IoT devices and mobile medical terminals, supporting the hospital's long-term digital and intelligent transformation.

- **Energy Efficiency:** The high level of integration eliminates the need for numerous separate chassis, boards, and power modules, leading to significantly lower overall energy consumption compared to traditional networking solutions, aligning with green construction principles.

The network adopts a flat, two-tier architecture of "main gateway + subordinate gateways," simplifying the network hierarchy, reducing potential failure points, decreasing transmission latency, and enhancing reliability. Furthermore, the ZENIC ONE intelligent campus network management system from ZTE supports automatic device activation and service provisioning, along with intelligent network analysis and fault diagnosis capabilities. This greatly simplifies operational maintenance, ensuring stable, 24/7 network operation.

A Paradigm Shift from "Medical Aid to Tibet" to "Technology-Driven Tibet Development"

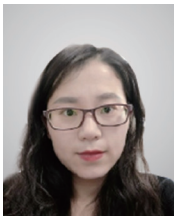
The completion of the all-optical network at the People's Hospital of Baqen County goes far beyond a simple IT upgrade—it directly enhances both the patient experience and the diagnostic efficiency of medical staff, addressing the pressing issue of "difficult access to healthcare." More importantly, it enables high-quality remote medical consultations to become routine, successfully bringing high-quality medical resources from thousands of miles away to the plateau, effectively improving local medical service standards and providing the plateau's residents with a more reliable "medical backbone."

This project also sets a successful example for "technology-assisted Tibet." It transcends traditional aid based solely on funds and materials. By introducing cutting-edge technology and building advanced infrastructure, it enhances the endogenous development capacity of the assisted area, facilitating a crucial shift from "blood transfusion" to "blood generation." This model offers significant reference value for infrastructure construction in Tibet and other remote regions.

With the opening of National Highway 317, Baqen County's connectivity is increasingly strengthened. The all-optical hospital, as a key piece of modern infrastructure, not only improves local quality of life but also injects new vitality into regional development. Looking ahead, this all-optical network provides a solid foundation for expanding areas like telemedicine, integrated medical community informatization, and health big data applications, continuously empowering the healthcare sector on the snowy plateau.

The establishment of the all-optical hospital in Baqen County, at an average altitude of 4,500 meters, is a "lifeline skyroad" paved with technology. It vividly demonstrates how "digital economy pathfinders" can use innovative technological solutions to bridge geographical divides, empower various industries, and bring the fruits of development and the warmth of technology to every household. This hospital not only fortifies the health defenses of the plateau's residents but also illuminates the path forward for remote areas advancing towards modernization through digitalization. ZTE TECHNOLOGIES

AIS's Innovative FTTR Deployment: Leading Thailand's All-Optical Transformation for Smart Living



Zhao Jing

Marketing Director for Fixed Network FTTR Solution, ZTE

As global digitalization accelerates, Thailand's fixed broadband market has reached a highly mature stage. In 2023, household broadband penetration reached 52.5%, FTTH adoption rate exceeded 95%, and user growth became saturated. Competition has shifted from a multi-player landscape to an emerging duopoly, while ARPU continues to decline. At this critical point, leading operator AIS has taken the lead by launching FTTR solutions through technological innovation, driving high-quality growth in its home broadband business and achieving contrarian ARPU growth. As of July 2025, AIS FTTR home subscribers exceeded 37,000, with an average monthly increase of nearly 3,000 users, setting a benchmark for industry transformation and highlighting new trends in smart home living.

Why Did AIS Choose FTTR for Strategic Transformation?

As Thailand's fixed broadband market enters its mature phase, user growth has peaked, and competition is concentrating among leading operators. The continuous decline in ARPU creates an urgent need for new pathways to growth. Although technologies like 10G-PON were once seen as the direction for broadband upgrades, their commercialization is hampered by a lack of high-demand application scenarios. Meanwhile, Mesh Wi-Fi, based on multi-AP networking, rapidly gained popularity with households starting in 2019. Building on this, FTTR—with its fully optical, seamless roaming capability, higher bandwidth, better latency, and increased stability—has emerged as the preferred choice for enhancing the in-home network experience.

Recognizing this trend, AIS swiftly adjusted its strategy, shifting from "growth driven by price competition" to "growth driven by user value." Instead of relying solely on aggressive pricing to capture market share, AIS now focuses on technological innovation and differentiated services to deliver superior user experiences, achieving sustained ARPU growth and further strengthening its leadership position within the industry.

How Does AIS Operate Its Innovative Products to Boost FTTR Awareness?

AIS understands that efficient marketing is essential for enabling a healthy industry cycle for innovative technologies. Thus, AIS has adopted a progressive and multi-dimensional market strategy to comprehensively drive the rollout of its innovative FTTR products:

- **Multi-Channel Promotion**

  Firstly, AIS has launched a dedicated FTTR section

▲ *FTTR empowers AIS: redefining all-optical boundaries.*

in a prominent position on its official website, using differentiated packages to highlight key advantages such as "whole-home gigabit" and "seamless connectivity," which challenge conventional broadband perceptions. In addition, AIS releases promotional videos on YouTube and major social platforms, using content such as user unboxing and celebrity demos to widely showcase the superior "gigabit-to-every-room" FTTR experience.

Moreover, AIS integrates offline service centers, advertising, and speed-test zones, offering users the chance to experience next-generation FTTR services firsthand and strengthen brand awareness.

- **Attractive Differentiated Services**

In terms of package design, AIS has introduced flexible FTTR bundles tailored to the diverse needs of users, raising the overall service threshold and targeting high-value customer segments. In the initial phase, FTTR focused on the "Home FibreLAN" brand, promising "gigabit access to every room," launching exclusive Wi-Fi 6 FTTR devices, and providing 1 Gbps symmetric broadband service. Compared to traditional Mesh APs, FTTR users enjoy waived installation fees, device rental fees, and service activation fees, dramatically lowering barriers to adoption. With two-year contracts and reasonable monthly fees, ARPU has been significantly increased.

Currently, AIS has further upgraded FTTR packages to "Home FibreLAN PLUS," offering users complimentary value-added benefits including ATV video, 20 GB of mobile data, and unlimited Super Wi-Fi, fully leveraging the advantages of being an integrated operator to enhance user stickiness and satisfaction.

- **Professional Installation and Maintenance Team**

To guarantee premium user experiences, AIS has established a professional FTTR installation and maintenance team, providing one-stop services including on-site surveying, network planning, standardized wiring installation, and speed testing verification before residents move in. This ensures the efficient and worry-free delivery for every household.

Outstanding Results of AIS's FTTR Strategy

"Whole-home gigabit, smart living" has become the new benchmark for household broadband in Thailand, continuously optimizing AIS's broadband revenue structure. Technological upgrades not only improve user satisfaction and network loyalty, but also create new business value for AIS. FTTR targets the top 10 high-value user segments, and as of July 2025, the number of FTTR users surpassed 37,000, with a sales success rate of 87.9% and an annual growth rate reaching 5.8 times. Compared with Mesh AP packages, each new FTTR user brings approximately $5.08 additional monthly ARPU.

This successful experience has been extended to the small and medium-sized enterprise market, with AIS innovatively launching the "Office FibreLAN" all-optical business solution. By utilizing a unified fiber-optic network architecture, this solution provides gigabit high-speed access to every office space, simplifying network operations while creating a seamless digital workspace.

AIS's innovative FTTR deployment provides a model for operators to shift from scale-driven to value-driven growth. Through technological innovation, targeted marketing, and differentiated services, AIS has made FTTR a key driver of ARPU and user stickiness. As technologies such as Wi-Fi 7, AI, and smart home integration continue to advance, FTTR is expected to become the foundation of the digital home and support operators in achieving higher-quality growth. ZTE TECHNOLOGIES

ZTE

To lead in connectivity and intelligent computing, enabling communication and trust everywhere