



Going Gigabit for Gigaband



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SingleFAN 3.0 is Huawei's access network solution for the Gigaband era. It builds broader, faster, and more intelligent access networks so that operators can optimize bandwidth, coverage, and the quality of Gigabit services.



According to Ovum, at least 50 operators were riding the 1 Gbps train by 2015, with Gigabit products commercially available in multiple Asian nations, including Japan, South Korea, Singapore, and Hong Kong. In 2015, Hong Kong's PCCW and Japan's So-net introduced 10 Gbps packages; in May 2015, Chinese carriers began testing Gigabit networks based on 10 Gbps Passive Optical Networks (10G-PON) in small, developed areas of Shanghai, Nanjing, Wuxi, and Chengdu.

SingleFAN 3.0 is designed for the Gigaband era. It can access Gigabit networks through any

medium with the following technologies: Giga Fiber, Giga Copper, Giga Coax, Giga Hybrid, and Giga Wi-Fi.

SingleFAN 3.0 provides All Optical Network (AON) smart service solutions for businesses like Smart Home, AON, and Smart Office. Its quick tools function accelerates network deployment and simplifies operations, helping operators to cut CAPEX and OPEX and boost network efficiency.

Gigabit access through any medium

The development of ultra-broadband access technology for different access media will continue to increase speeds. In the future, Gigabit speeds will be available through optical fiber, cooper wire, coaxial cable, or Wi-Fi.

Giga Fiber

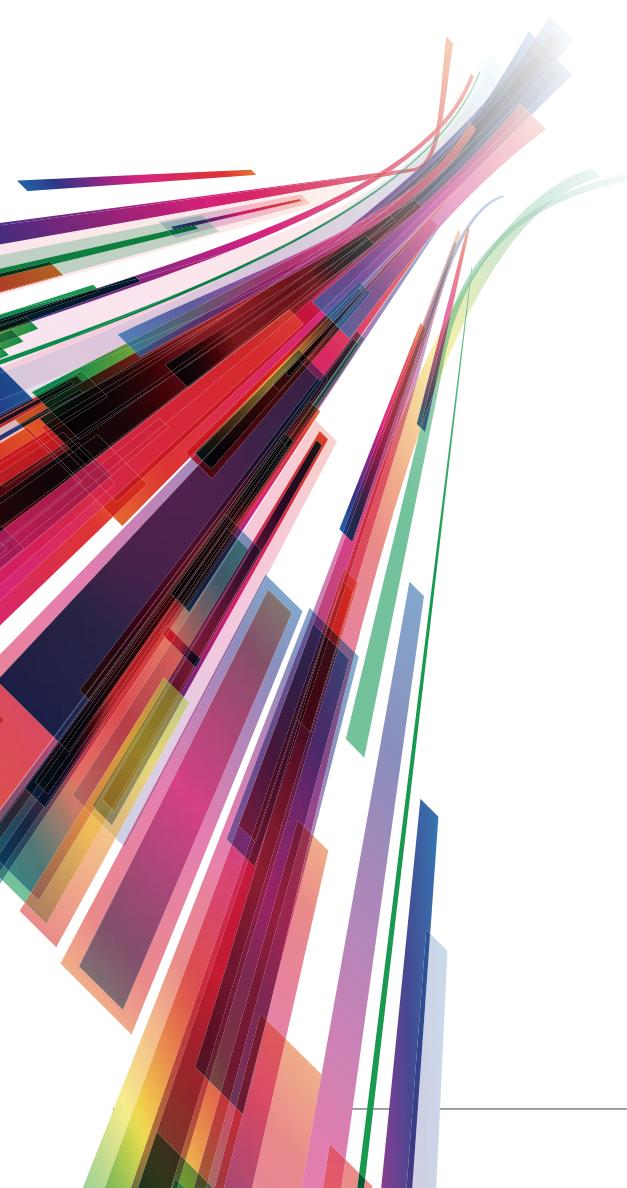
Based on Passive Optical Network (PON) architecture, Fiber to the Home (FTTH) has the unique post-deployment advantage of only requiring upgrades on active equipment, so continual increases in speed are possible.

Giga Copper

Giga Copper allows traditional operators to build ultra-broadband over legacy copper networks, which expedites construction, widens coverage, and accelerates RoI. BT provides a great example of applying this solution.

G.fast has stoked operators' interest in using higher working frequencies to deliver ultra-high access speeds of 500 Mbps to 1 Gbps over short distances of copper wire.

The G.fast standard was officially published in December 2014. Its first commercial product offered 500 Mbps broadband, and was launched



**Giga Fiber**

Meets NG-PON standards, delivers 10 Gbps symmetric upstream-downstream speeds

**Giga Copper**

Delivers ultra-high access speeds of 500 Mbps to 1 Gbps over short distances of copper wire

**Giga Coax**

DOCSIS 3.0 supports up to 32 channels and shared bandwidth of 1.6 Gbps, while DOCSIS3.1 will support five channels and 10 Gbps in shared bandwidth.

**Giga Wi-Fi**

Next-gen mainstream Wi-Fi standards – 5GHz 802.11ac, theoretically achieving 6.9 Gbps by using higher order MIMO (up to 8x8)

**Giga Hybrid**

Enables more flexible broadband access with three fixed mobile convergence solutions: Hybrid Modem (LTE+VDSL2), Hybrid ONT (LTE+GPON), and Hybrid CPE (LTE+G. Fast)

in the Swiss town of Bibern. BT then ran the first UK commercial trial of the technology in the Cambridgeshire town of Huntington.

As the technology matures, methods such as increased transmit power and enhanced coding efficiency will allow G.fast to be deployed over longer distances of copper cable.

Giga Coax

Cable TV companies face stiff competition from ultra-HD 4K video from OTT providers – the latter must continuously transmit content to users' homes whether they're watching or not. Carrying these signals uses a lot of bandwidth, which was feasible when channels were SD. However, existing spectrum is insufficient to continuously transmit ultra-HD 4K programs. Moreover, one channel can transmit only one program at a time. These limiting factors will push TV to run a video-on-demand model, freeing up spectrum resources on coaxial networks so operators can provide higher bandwidth.

Giga Coax includes Huawei's Distributed Converged Cable Access Platform (D-CCAP) solution, which helps operators implement node splits and upgrade their coaxial networks to Data Over Cable Service Interface Specification (DOCSIS) 3.1. DOCSIS 3.1 is compatible with DOCSIS 3.0 network terminals – current coaxial networks based on DOCSIS 3.0 support up to 32 channels and shared bandwidth of 1.6 Gbps.

Optical node splits will help operators increase bandwidth on optical nodes that supply a large number of users by cutting the number that share bandwidth, which will improve average bandwidth per user. The Danish operator TDC has already lab-tested the solution, and achieved speeds of 800 Mbps. As more spectrum resources are freed up on coaxial networks, the D-CCAP solution will support five channels and 10 Gbps in shared bandwidth in the future.

Giga Hybrid

Giga Hybrid targets carriers with LTE networks, providing FMC capability and more

flexible broadband solutions. The hybrid modem LTE + VDSL2 (Very high-bitrate Digital Subscriber Line 2) is a Giga Hybrid FMC method that binds the bandwidth of both channels, significantly improving user experience in remote areas with low DSL speeds. DT has deployed this solution on a large scale, leading to the award for Greatest Advancement in the Field of Fixed Mobile Convergence at the 2015 Broadband World Forum for its Hybrid Access solution.

Another Giga Hybrid FMC solution is LTE + G-PON hybrid Optical Network Terminal(ONT), which China Mobile has deployed on a large scale. Operators first gain subscribers on their LTE networks and, as numbers increase, deploy fiber where there are enough users. This frees up LTE resources while keeping user-side interfaces and services unchanged.

The third Giga Hybrid solution is LTE + G.fast hybrid CPE (Customer Premise Equipment). Guaranteeing service experience for high-end users and improved customer satisfaction, operators are eyeing this solution as G.fast coverage expands.

Giga Wi-Fi

The popularity of using mobile devices to browse the Internet and watch videos over Wi-Fi means carriers have to ensure indoor and outdoor Wi-Fi performance, coverage, and speeds.

Wi-Fi attenuation through walls requires that 5GHz 802.11ac and G.hn Wi-Fi equipment is used in homes with many large rooms. Running over indoor power lines to extend Wi-Fi signals, the solution allows seamless roaming between rooms, because the SSID of each extender is the same as the main equipment.

With ultra-broadband pipelines in place, an important consideration for operators is how to provide value-added services (VAS) and increase revenue.

Mobile apps on home Wi-Fi networks can also perform self-testing and self-maintenance.

With Gigabit access through any medium, the Giga Wi-Fi solution uses legacy infrastructure to lower construction costs and accelerate deployment.

Smart services for better QoS

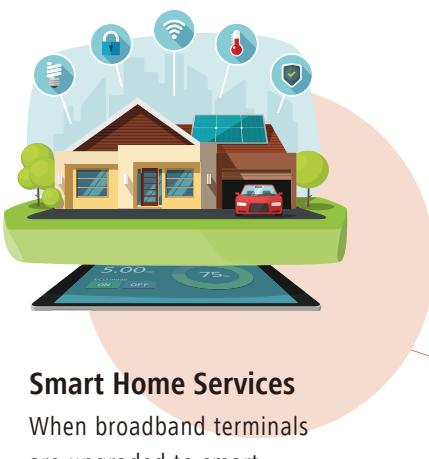
With ultra-broadband pipelines in place, an important consideration for operators is how to provide value-added services (VAS) and increase revenue.

A good place to start is ultra-HD 4K streaming video. VAS has enabled the industry to provide triple-play offerings on a large scale. One carrier can give voice, broadband, and video services to users, increasing revenue and customer stickiness.

Another possibility is smart home services, an area where service providers have unique strengths, such as Apple and Google with smartphones and mobile OS, and Haier and Sony with home appliances.

Operators have the edge in network equipment, terminals, and broadband subscriber base. They can provide smart home services through broadband terminals upgraded to smart terminals, which then serve as home control and communications centers without requiring additional equipment.

Wireless protocols such as Wi-Fi, Bluetooth,



Smart Home Services

When broadband terminals are upgraded to smart terminals, they can serve as home control and communications centers.



Video Services

A good place to start is ultra-HD 4K streaming video. Video services help increase operators' revenue and customer stickiness.

and ZigBee let smart terminals and home appliances communicate, and deliver services like home monitoring, security, and appliance control via smart phone apps and the network server. Operators can offer more powerful network security and virtual storage functions through integration with network equipment.

Smart home services are still in their infancy, with operators and equipment providers still exploring the service package types and business models that might differentiate them, and which users would pay for. A few operators like Telefonica, Beltelecom, and China Unicom Sichuan have already started to run pilots for smart home services.

Two other interesting developments are Passive Optical LAN (POL) in all optical network (AON) business parks and smart offices. In AON parks, PON uses less space and power than Ethernet Category 5 cables, and provides higher bandwidth. PON also uses optical splitters to allow point-to-multipoint Fiber to the Desktop (FTTD).

Previously, cloudified office services

ran data flows between traditional network neighbourhoods. Now, traffic flows up and down the cloud, which best suits PON as a traffic aggregation technology.

AONs provide full-service, large-scale solutions like voice, broadband, and video for organizations like hotels, enterprises, and school campuses. Smart office solutions provide businesses with services such as remote monitoring on smartphones, Wi-Fi clock-in, intelligent traffic analysis, and Wi-Fi portal ads. These utilize the synergy between smart terminals, Wi-Fi networks, sensors, and cameras, giving SMEs smarter VAS.

Efficiency gains with quick tools

Huawei has partnered with a trencher manufacturer to provide a customizable automatic excavation service that helps operators lay fiber and deploy optical networks faster. With pre-connected optic boxes and modular expansion units, the solution helps lowers costs



Smart Office

provides businesses with services such as remote monitoring on smartphones, Wi-Fi clock-in, intelligent traffic analysis, and Wi-Fi portal ads.



POL in AON

provides POL-based full-service, large-scale solutions like voice, broadband, and video for organizations like hotels, enterprises, and school campuses.

because fusion splicing is unnecessary.

An embedded Optical Time Domain Reflectometer (eOTDR) precisely finds network faults by monitoring the attenuation of reflected optical signals in real time, helping operators quickly resolve problems and restore services.

For copper networks, a copper line pre-assessment system measures attainable bandwidth through line parameters and cross talk. This lets operators advertise the actual bandwidth of their services, increasing satisfaction and minimizing complaints.

For video services, the built-in Video Mean Opinion Score (vMOS) function evaluates and monitors video streaming quality in real time to quickly identify any problems.

A great gig with SingleFAN 3.0

At the dawn of the Gigaband era,

Already deployed in ultra - broadband markets around the world, Huawei's SingleFAN 3.0 access network solution fully delivers the bandwidth and service requirements of the Gigaband era.

Huawei has launched its multi-faceted SingleFAN 3.0 access network solution with smart services for homes, AON campuses, and offices. The solution helps businesses build AONs and provides tools to accelerate network deployment, simplify network O&M, cut CAPEX and OPEX, and boost network efficiency.

SingleFAN 3.0 provides high-capacity, convergent Optical Line Terminals (OLT) for remote equipment in a variety of scenarios, including FTTC, Fiber-to-the-Building (FTTB), FTTD, D-CCAP, and FTTH.

To reduce O&M costs, OLT reduces the number of switch rooms, and

provides pipeline wholesale and virtual operations for different service operators on the same hardware platform.

SingleFAN 3.0 supports the auto-discovery and auto-configuration of remote devices with centralized management and unified system-wide architecture and software, meeting requirements for new services like 4K Ultra-HD TV, Smart Home, AON, and Smart Office.

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