# Large Enterprises: Who Are They and What Can Huawei Offer?

- A large enterprise is an enterprise that has reached a certain level in terms of annual sales, general assets, and employees, creating influence within it's industry.
- Huawei business development targets include Fortune 500 companies, international enterprises, and regional large enterprises.
- Targeted large enterprise industries include ISPs, manufacturing, commerce, logistics, real estate, etc.

## Huawei Solutions for Large Enterprises

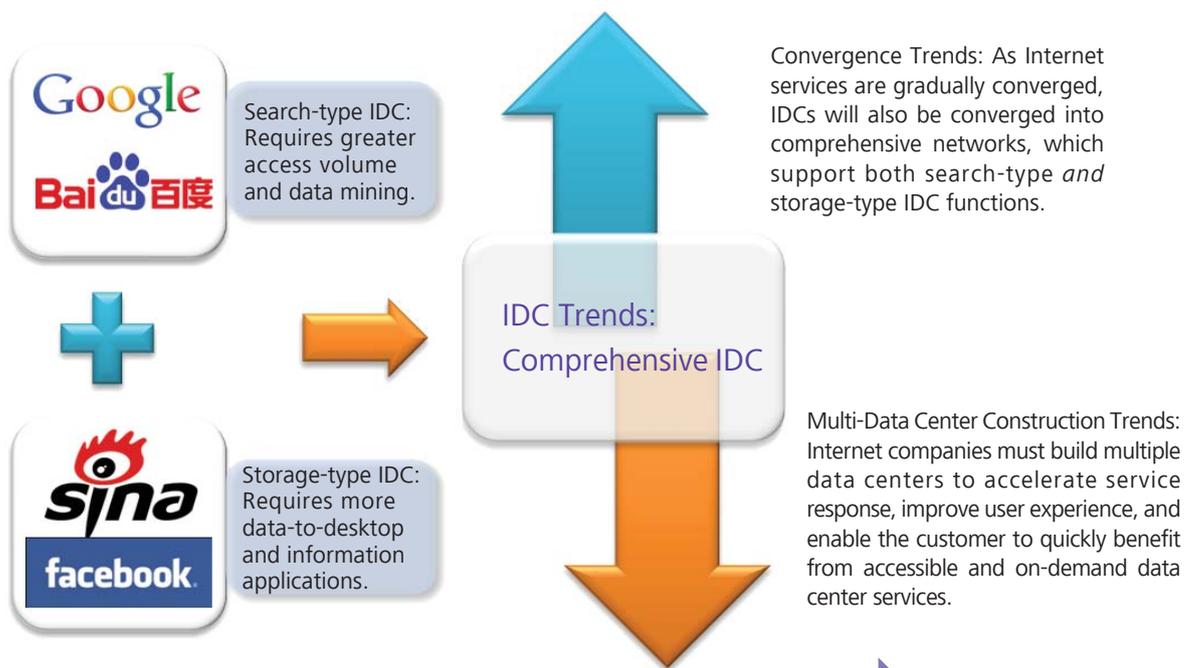| Internet Data Center (IDC) Network Solution | xPON Solution for High-end Residential Areas | Commercial Building Network Solution |
|---|---|---|
| Applicable to broadcasting, multimedia, information, and Internet companies | Applicable to hotels, holiday villages, and high-end residential areas | Applicable to commercial buildings, such as office buildings, enterprise OA buildings, and high-rise apartments |

Based on the needs of the ISP, commerce, and real estate industries, Huawei has unveiled three major solutions: IDC Network Solution, xPON Solution for High-End Residential Areas, and Commercial Building Network Solution. For large enterprises in other industries, horizontal network solutions can be used.
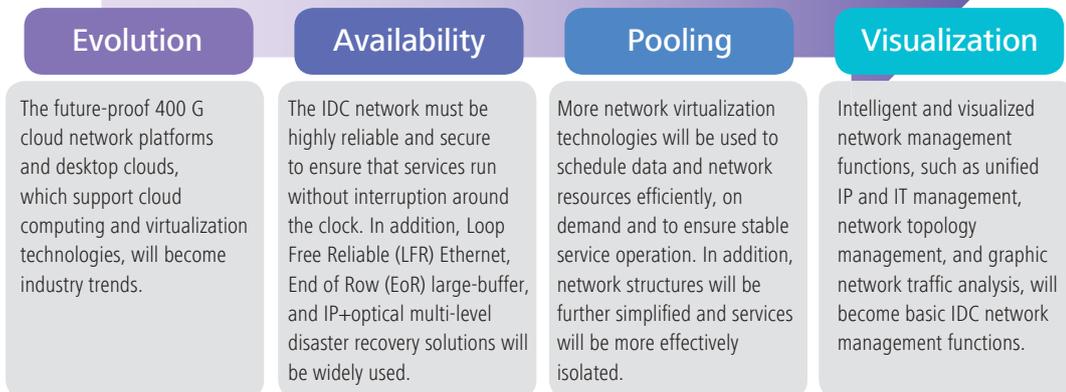
# IDC Network Solution

In the cloud computing era, new services are constantly emerging, resulting in more complex and demanding requirements for the Internet Data Center (IDC). Additionally, as more servers are used in the IDC, internal network interconnection requirements are dramatically increased. Internet companies have varying requirements for scale of access, large Layer 2 needs, Virtual Machine (VM) migration, and network convergence. Based on the service type, the IDC can be classified into either a search-type IDC (represented by Baidu and Google) or a storage-type IDC (exemplified by Facebook and Sina). Search-type data centers have high requirements for inter-server collaborative computing, while storage-type data centers focus on service load-balancing. Currently, IDCs are increasingly converged, featuring unified network functions and structures.

## Industry Trends



Search-type IDC: Requires greater access volume and data mining.

Storage-type IDC: Requires more data-to-desktop and information applications.

IDC Trends: Comprehensive IDC

Convergence Trends: As Internet services are gradually converged, IDCs will also be converged into comprehensive networks, which support both search-type *and* storage-type IDC functions.

Multi-Data Center Construction Trends: Internet companies must build multiple data centers to accelerate service response, improve user experience, and enable the customer to quickly benefit from accessible and on-demand data center services.

### IDC Network Development Trends

| Evolution | Availability | Pooling | Visualization |
|---|---|---|---|
| The future-proof 400 G cloud network platforms and desktop clouds, which support cloud computing and virtualization technologies, will become industry trends. | The IDC network must be highly reliable and secure to ensure that services run without interruption around the clock. In addition, Loop Free Reliable (LFR) Ethernet, End of Row (EoR) large-buffer, and IP+optical multi-level disaster recovery solutions will be widely used. | More network virtualization technologies will be used to schedule data and network resources efficiently, on demand and to ensure stable service operation. In addition, network structures will be further simplified and services will be more effectively isolated. | Intelligent and visualized network management functions, such as unified IP and IT management, network topology management, and graphic network traffic analysis, will become basic IDC network management functions. |

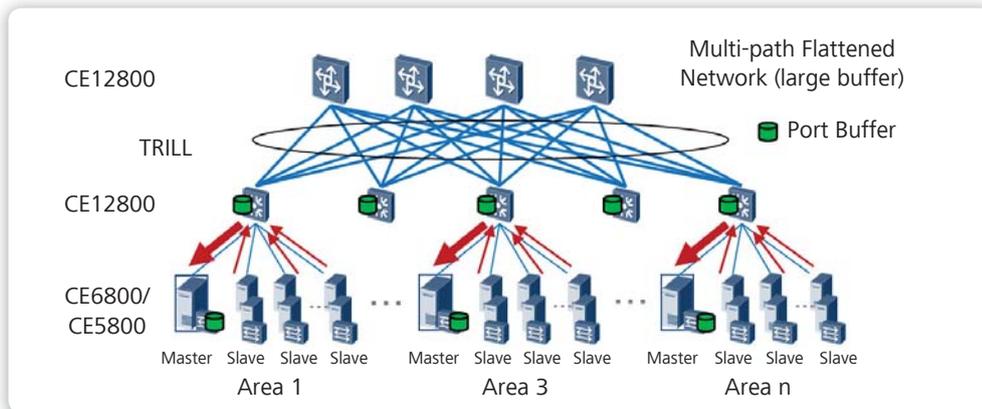# IDC Network Solution

## Solution Overview

The IDC solution includes two versions: (1) Large IDC Solution and (2) Small and Midsize IDC Solution.

These two versions are defined based on the number of servers. A large IDC houses more than 5,000 servers. Due to its size, the large IDC is traditionally divided into different service function areas, which are connected using Layer 3 technologies. As large Layer 2 technologies become more mature, they will become a good option for connecting these service function areas together.

Small and midsize IDCs primarily target a specific service and do not need to define different service function areas. Whether to select a two-layer or three-layer architecture for small and midsize IDCs will be determined by the quantity of servers. For large IDCs, Huawei promotes CE series switches; for small and midsize IDCs, Huawei highlights S series switches.

## Typical Networking Flow

### a) Architecture of the Large IDC Solution



### Solution Highlights

**Area-based Construction:**
Classifies the network into different areas and connects these areas through the core layer.

**Higher Reliability:**
Uses CSS cluster technology inside an area to build a Loop-Free Reliable (LFR) Ethernet network, thereby reducing the possibility of loops and simplifying the network structure. In addition, the solution deploys the TRILL (Transparent Interconnect of Lots of Links) protocol (a large Layer 2 protocol) between areas to build a wider Layer 2 network and support cross-area Virtual Machine (VM) migration.
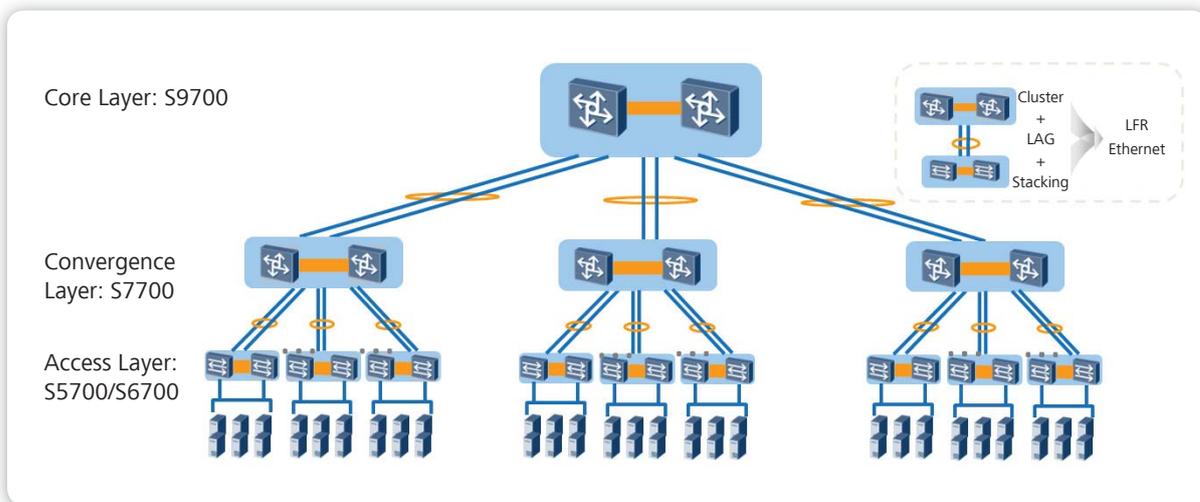
**Large Capacity:**
Leverages the prominent features of the CE12800, such as 48 T forwarding capability, 1 T bandwidth per slot and a larger number of MAC entries, to support more servers.

**Data Center Features:**
Fully uses the prominent features (such as FCoE and one physical device virtualized into multiple devices) of CE series switches to provide a converged and virtual network, thereby reducing investment.

## b) Architecture of the Small and Midsize IDC Solution



Core Layer: S9700

Convergence Layer: S7700

Access Layer: S5700/S6700

Cluster + LAG + Stacking

LFR Ethernet

## Solution Highlights

**Hierarchical Design:**
Defines the network into different layers (core layer+access layer or core layer+convergence layer+access layer) based on the number of users.

**Large Buffer:**
Leverages the high-end S9700 switch, which provides 200 ms buffering capability to guard against traffic congestion.

**Reliability:**
Uses CSS+LAG+iStack technologies to build an LFR network, enhancing ISP network reliability.

# Selected Equipment

| Network Module | Selected Equipment | Description |
|---|---|---|
| S Series Switch | S9700/ S7700 | A core switch that supports CSS technology, 40*10 GE high-density cards, 48*GE, 200 ms buffering, and all-in-one valued-added service cards. |
| | S6700 | A 10 GE TOR switch that provides high-density 48-port 10 GE cards and supports cluster technology. |
| | S5700 | A GE TOR switch that provides high-density 48-port GE cards, supports cluster technology and plug-in cards, and offers 10 GE uplinks. |
| CE Switch (planned TR5 in 2012 Q4) | CE12800 | Supports data center features such as large Layer 2, equipment virtualization, and VM migration. Uses a CLOS orthogonal architecture that supports a maximum capacity of 48 T. Allows for GE, 10 GE, 40 GE and 100 GE evolution and supports a maximum of 288*40 GE and 1152*10 GE to meet the requirements of large IDCs. |
| | CE6800 | A 48-port TOR access switch that supports 10 GE downstream transmission, 40 GE upstream transmission, FCoE, TRILL, and cluster features. |
| | CE5800 | A 48-port TOR access switch that supports GE downstream transmission, 10 GE and 40 GE upstream transmission, TRILL, and cluster features. |

# IDC Network Solution

## Success Stories

**IDC Network for Shanghai Giant Network Technology Co., Ltd.**
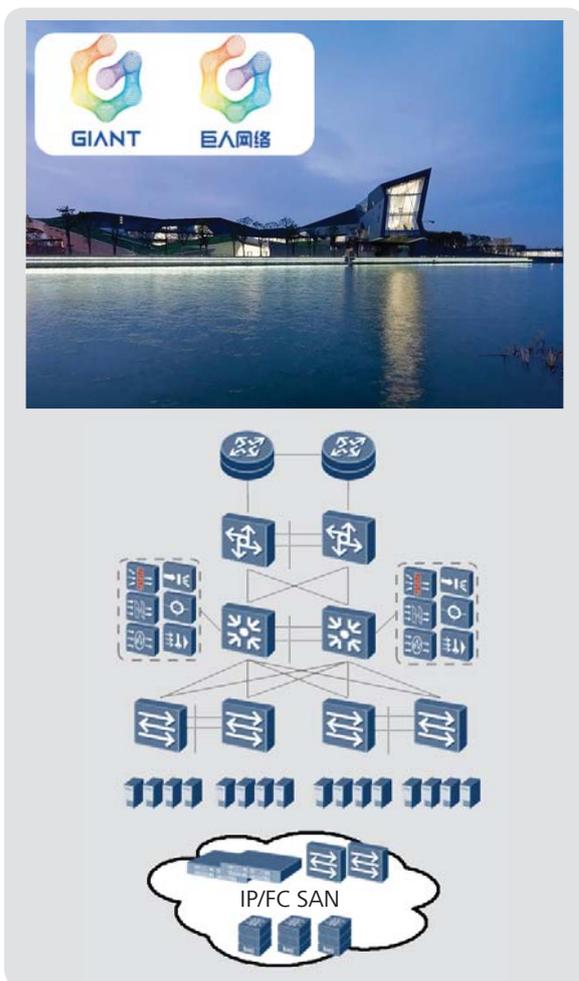


### Project Background

- Shanghai Giant Network Technology Co., Ltd., is a famous interactive entertainment company, which focuses mainly on online games.
- This enterprise wanted to build a high-bandwidth, reliable IDC to support more users and transform into a more appealing game platform in China.
- The company also required easy network management.

### Huawei Solution

- Used stacking technology and S series switches (providing high-density GE/10 GE ports) to offer a large switching capacity for data center services.
- Adopted a high-reliability design for equipment and the entire network to secure services and to ensure service profitability.
- Used an efficient and powerful NMS system to achieve visualized network management and to speed up service provisioning.

### Customer Benefits

- Realized substantial benefits from Huawei's technical service capabilities
- Improved application performance and support for a large number of users, meeting pre-project requirements and expectations

# xPON Solution for High-End Residential Areas

## Industry Requirements

**Characteristics of high-end residential areas, high-end hotels and villas:**

1. Although users may not currently require higher than normal bandwidth, as bandwidth-demanding services such as IPTV, video communications, and online gaming are launched, bandwidth needs will expand.

2. Traditional voice and television service demands are strong; therefore, a unified network is required to support all services.

3. Users in these areas are financially viable and therefore able to pay for services, which means long-term network use. As a result, easy network maintenance is a must.

Fiber to the x (FTTx) solutions are well suited for these scenarios and efficiently support bandwidth-intensive services such as IP data, video and voice services.

Requirements from IP and Traditional Services

Durable and Easy Maintenance

Large-Campus, Low-Density, and High-Bandwidth Network Coverage

Complex Access Scenarios

**High-End Residential Areas**

## Solution Introduction

In response to market demands, Huawei has unveiled an FTTx Campus Solution for high-end residential areas. This solution uses xPON (x version of Passive Optical Networking) and other local access technologies to support a variety of services, such as data communications, conventional voice, conventional television, VoIP, IPTV, and video surveillance.

This FTTx Campus Solution comprises three major solutions: FTTx Solution, FTTC (WLAN+ Camera) Solution and RF Overlay Solution.

**xPON Solution for High-End Residential Areas**

**FTTX Solution**

**FTTC (WLAN+Camera) Solution**

**RF Overlay Solution**

# xPON Solution for High-End Residential Areas
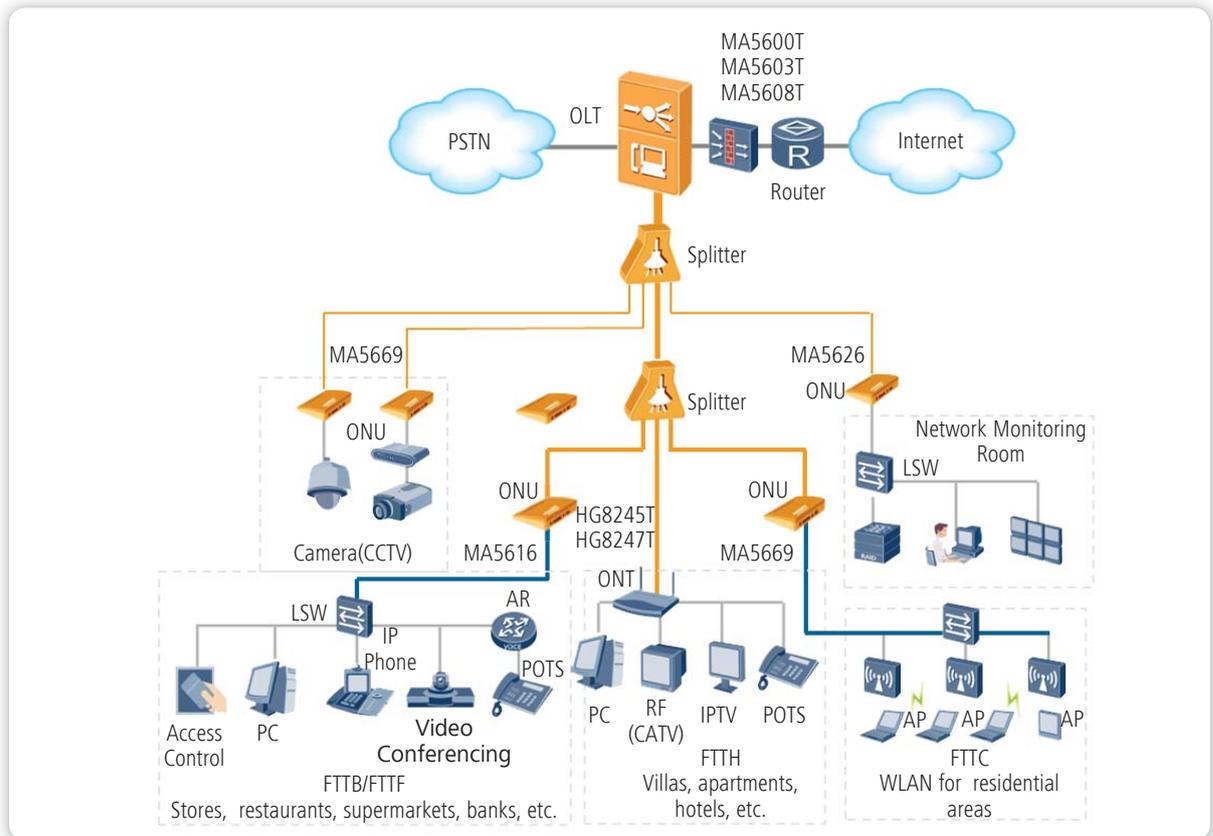
## 1. FTTx Solution

**Solution Overview**

This solution helps build a Point-to-Multipoint (P2MP) Passive Optical Network (PON). The PON network features a high bandwidth of 2.5 Gbit/s to 10 Gbit/s, wide coverage, and long transmission distance. In addition, this network supports comprehensive QoS features and provides multiple protection schemes, efficiently supporting multiple services such as voice, data, and video. The PON network consists of the Optical Line Terminal (OLT), Optical Distribution Network (ODN), and Optical Network Unit (ONU) or Optical Network Terminal (ONT). This solution supports indoor and outdoor scenarios.

Based on different access scenarios, FTTx is classified into Fiber to the Building (FTTB), Fiber to the Home (FTTH), and Fiber to the Curb (FTTC).

**FTTB**

FTTB applies to shopping malls, stores and clubs. By using access devices and AR routers or access switches, FTTB provides high-density optical broadband access and supports multiple services (such as OA, voice, and video conferencing) for Small and Medium Enterprises (SMEs).

**FTTH**

FTTH applies to high-end residential areas, apartments and hotels. It provides not only conventional telephony and television services, but also High-speed Internet (HSI) and triple-play services to households.

**FTTC**

FTTC allows for smooth operation of bandwidth-intensive services, such as video surveillance and Wi-Fi, and it also ensures indoor and outdoor coverage throughout the campus.

## Typical Networking



## Solution Highlights

- Provides full-service access to meet requirements in diverse scenarios.

- Supports unified management of all access equipment and ensures easy and efficient network operation and maintenance through the use of unified NMS and professional fault diagnosis equipment.

- Provides large capacity, high bandwidth, multi-service support, and easy maintenance features (PON is the mainstream construction mode for "last mile" in the industry).

- Supports multiple access technologies and uses passive optical splitters to suit various scenarios.

- Adopts a P2MP PON, which reduces the backbone optical fibers and features strong anti-interference performance and a low fault rate.

# xPON Solution for High-End Residential Areas

## 2. FTTC (WLAN+ Camera) Solution
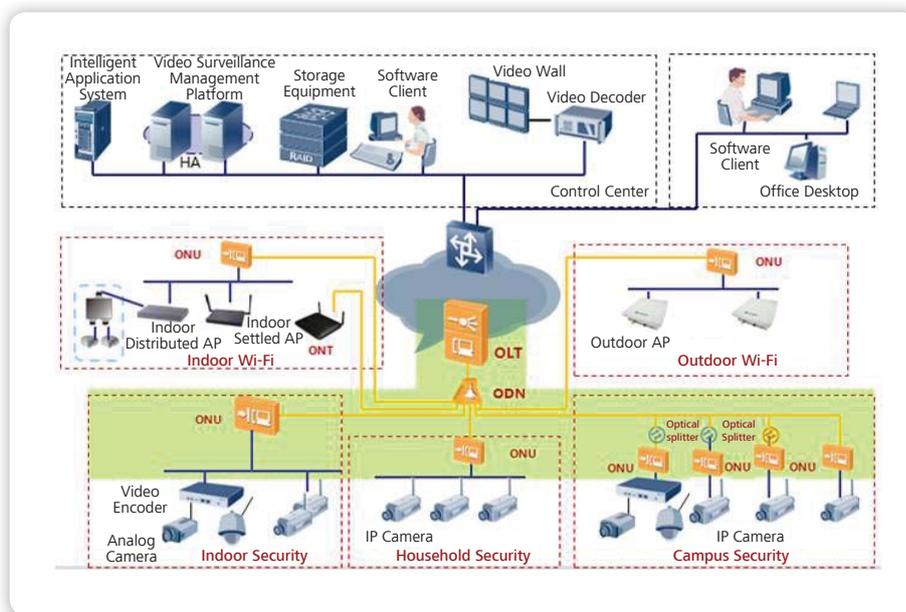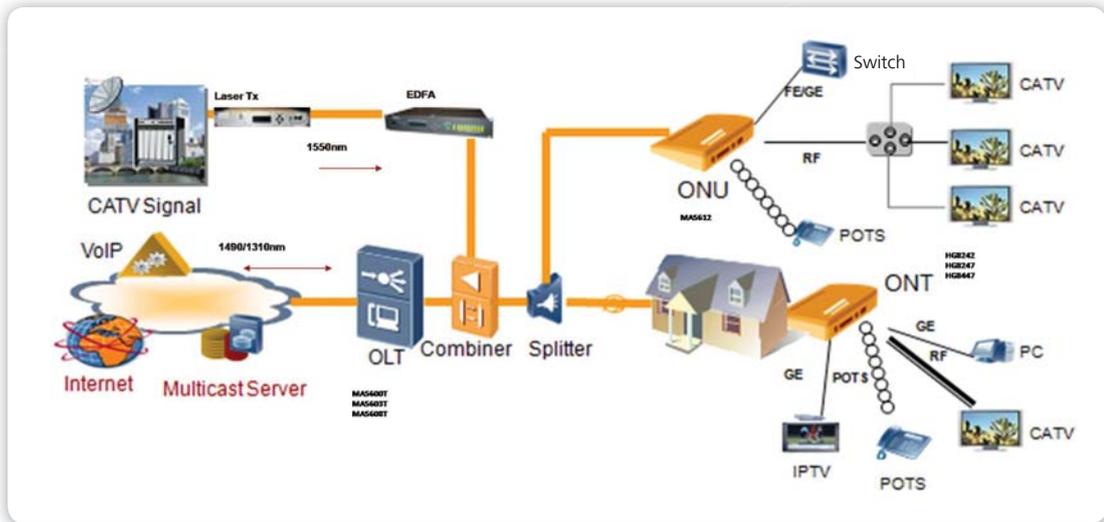
Solution Highlights

- Adopts multi-level optical splitting to fully utilize optical resources and achieve wide coverage of the access network.

- Uses passive optical splitters that do not need power supply or maintenance, have a low fault rate, and are free from ambient interference.

- Supports POE to transmit data packets while supplying power to cameras and APs through Category 5 cables.

# 3. Radio Frequency (RF) Overlay Solution

## Solution Overview

This solution uses optical transceivers to modulate CATV RF signals into optical signals and transmit them over the PON network. This solution can leverage the FTTH Optical Distribution Network (ODN) network to build an all-optical access network. The RF network provides broadcasting and video services, while the PON network is used for interactive services.



## Solution Highlights

- Seamlessly interconnects the broadcasting television network and the Internet and uses the newly built FTTH network to transmit CATV signals to end users.
- Uses the newly built FTTH network to provide multiple services, such as Internet access, VoIP, and VoD services.
- Provides a unified access platform for data services and previous CATV services (these two services do not affect each other), which facilitates future upgrade from CATV to IPTV.

# xPON Solution for High-end Residential Areas

## Selected Equipment

| Equipment Type | Product |
|---|---|
| OLT | MA5600T: large-capacity OLT for 8 K ONU/ONT access<br>MA5603T: medium-capacity OLT for 6 K ONU/ONT access<br>MA5608T: small-capacity OLT for 2 K ONU/ONT access |
| ONU | Multi-service Processing: MA5616<br>Enterprise Office: MA5620 and MA5626<br>Three-Network Convergence: MA5612<br>Simplified Edition for Enterprises (indoor and outdoor): MA5628<br>Outdoor Integrated: MA5669<br>Industry Level: MA5621 |
| ONT | Bridging ONT: HG8010<br>Bridging+Voice ONT: HG8110, HG8240, and HG8242<br>Gateway ONT: HG8245, HG8247, and HG8447 |
| AC | Standalone AC: AC6605 |
| AP | Indoor: AP6010DN<br>Outdoor: AP6610DN |

# Success Stories

## FTTH Project for Burj Khalifa

### Project Background
- Burj Khalifa is the tallest man-made structure in the world, at 829.84 meters. It contains 1,044 deluxe apartments and houses the world's first Armani Hotel with 160 guest rooms and suites. Due to Burj Khalifa's uniqueness and top-class position, customers have stringent requirements for multimedia communications service.
- Burj Khalifa wanted to build a network for diverse scenarios/services with large-bandwidth and high-density access.

### Huawei Solution
- Provided 100 Mbit/s ultra-broadband services through FTTH.
- Designed different service levels and provided differentiated quality services as well as unique services, such as customization of targeted advertisements and programs.

### Customer Benefits
- Higher quality, more reliable, and full-service ultra-broadband experience
- Differentiated services (triple play service for individual users; VPN/leased line service for common commercial users; P2P service for VIP customers)

# xPON Solution for High-end Residential Areas

## Success Stories

### GPON Project for Hangzhou Legend City

#### Project Background

- The Legend City is currently the largest building complex in Hangzhou and the first high-end building complex in Zhejiang Province. It is a complex of high-quality office buildings, city view apartments, internationalized commercial apartments, internationalized hotels, and high class stores.

- The customer required a network solution able to provide ultra-broadband access and carry both traditional and VoIP services.

#### Huawei Solution

- The OLT (MA5680T) in the core equipment room provides Internet access and voice services for the entire building complex. It is connected downstream to the UA5000 (which uses GPON for upstream transmission) for voice service access through UA5000's POTS ports, and also to the MA5626 for data service access. The OLT also implements FTTH for ultra-broadband services.

#### Customer Benefits

- High-quality, highly reliable and full-service experience (including ultra-broadband and voice services)

- Lower network maintenance costs using a unified platform to carry data and voice services

# Success Stories

## Iusacell FTTH Project

### Project Background

- Facing fierce competition in the local access network markets, Iusacell needed its network to carry more services.
- The video service had become mission-critical for Iusacell to increase market share.
- To fulfill future FMC services, an ultra-broadband platform was urgently required.

### Huawei Solution

- Provided a unified FTTH platform for television, His, and VoIP services.
- Provided an integrated voice solution (IPTV+RF overlay/FTTH) for different application scenarios.
- Designed ODN sites in a professional way to accelerate FTTH deployment.

### Customer Benefits

- Shortened deployment through the use of automatic network configuration and PnP installation
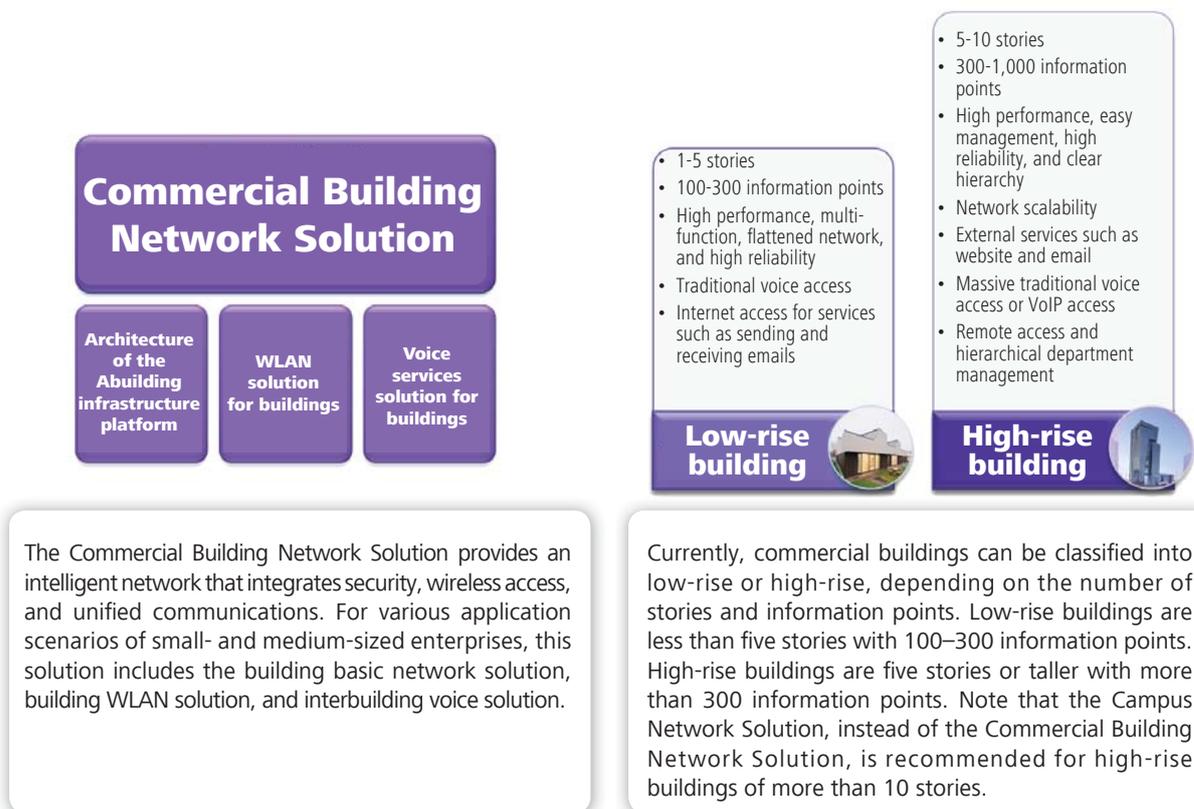- Slashed OPEX with unified management and powerful ONT OAM
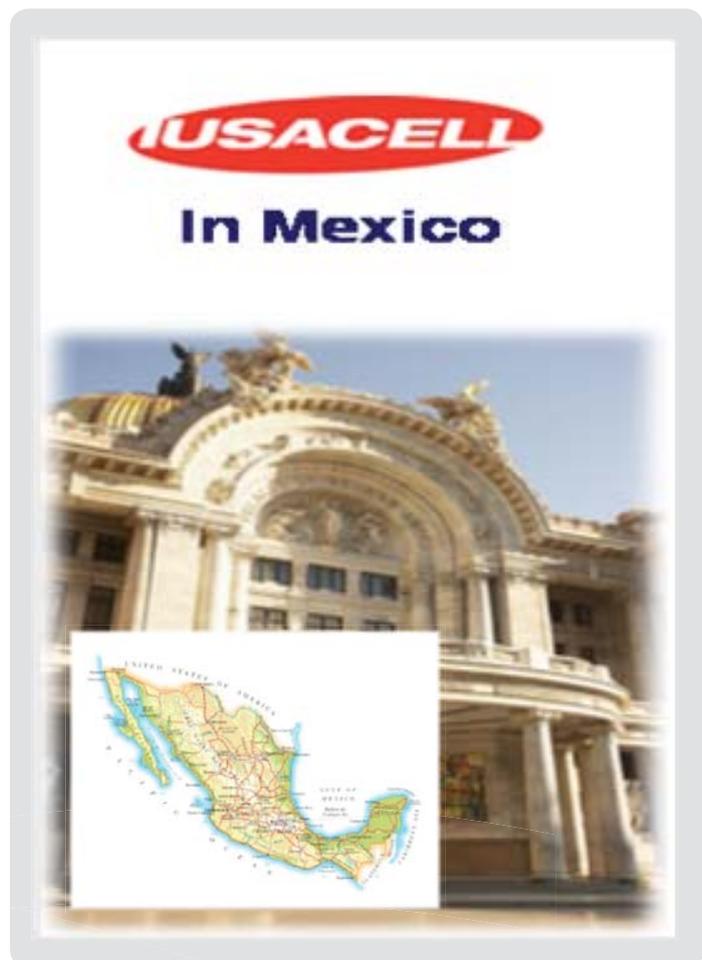
# Commercial Building Network Solution

## Industry Requirements

## Solution Overview

**Commercial Building Network Solution**

**Architecture of the Abuilding infrastructure platform**

**WLAN solution for buildings**

**Voice services solution for buildings**

- 1-5 stories
- 100-300 information points
- High performance, multi-function, flattened network, and high reliability
- Traditional voice access
- Internet access for services such as sending and receiving emails

**Low-rise building**

- 5-10 stories
- 300-1,000 information points
- High performance, easy management, high reliability, and clear hierarchy
- Network scalability
- External services such as website and email
- Massive traditional voice access or VoIP access
- Remote access and hierarchical department management

**High-rise building**

The Commercial Building Network Solution provides an intelligent network that integrates security, wireless access, and unified communications. For various application scenarios of small- and medium-sized enterprises, this solution includes the building basic network solution, building WLAN solution, and interbuilding voice solution.

Currently, commercial buildings can be classified into low-rise or high-rise, depending on the number of stories and information points. Low-rise buildings are less than five stories with 100–300 information points. High-rise buildings are five stories or taller with more than 300 information points. Note that the Campus Network Solution, instead of the Commercial Building Network Solution, is recommended for high-rise buildings of more than 10 stories.

## Solution Product Configurations

|  | Internet Egress | Aggregation Switch | Access Switch | Estimated Cost (CNY) |
|---|---|---|---|---|
| Low-Rise Building | AR2200 | S5700 | S3700 | 35,000 to 100,000 |
| High-Rise Building | AR3200 | S7700 | S5700 | 50,000 to 200,000 |

# Commercial Building Network Solution

## 1. Building Basic Network Solution

### Solution Overview

#### Basic Network Solution for Low-Rise Buildings

- A typical low-rise building has 100–300 information points.

- This solution uses middle-range switches as the central network switching platform and central convergence point, low-end switches for service and terminal access and AR routers as egress routers for the entire network. The AR routers integrate basic firewall functions to protect the system boundary security and also function as PBXs to provide VoIP and traditional voice services. This solution requires only a simplified network management tool.

#### Basic Network Solution for High-Rise Buildings

- A typical high-rise building has 300–1,000 information points.

- This solution uses function-rich AR routers as egress routers and deploys professional firewalls. The AR routers' high-density voice boards support massive traditional voice service access.

- This solution uses S7700s for core convergence. Integrated with AC functions, the S7700s are easy to maintain and failure potential is minimized. The S5700s are stacked at the convergence layer, simplifying configurations and improving network performance and reliability.

- This solution requires a professional network management tool.

### Typical Networking
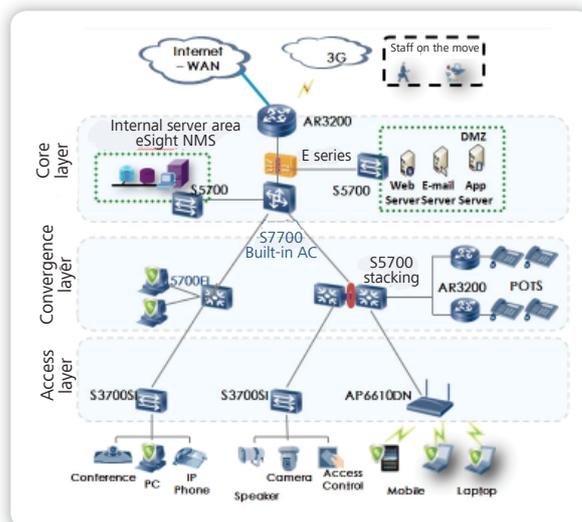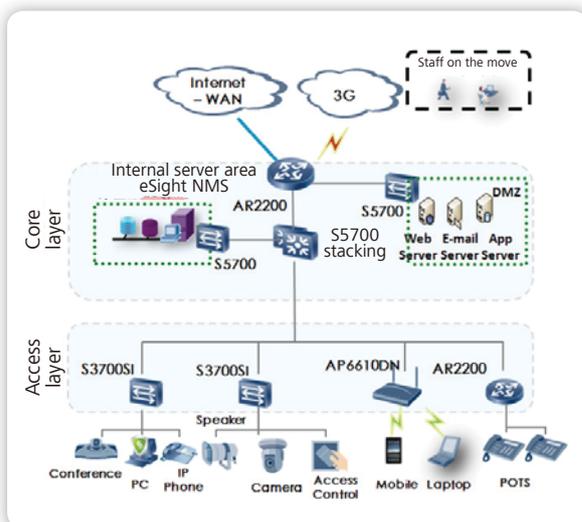
## Solution Highlights

- **Integration of voice, security, and wireless access**: Function-rich AR routers provide built-in PBX functions for traditional and VoIP voice services and built-in firewall and AC functions for network security and wireless access.
- **Scalability**: A flexible network structure allows future expansion of voice and wireless services, protecting customer investment.

- **Easy maintenance**: The network is flattened. The NMS can manage IP and IT devices in a unified manner, with no need to assign a dedicated IT engineer.
- **Clear area division**: Departments are physically isolated or logically isolated by VLANs, ensuring service security and facilitating troubleshooting.
- **High reliability**: The core aggregation devices are stacked, and AR routers use redundancy backup for 3G links.

## Selected Equipment

| Equipment Type | Product |
|---|---|
| Core Switch | S7700 (for high-rise buildings) |
| Aggregation switch | S5700 (for high-rise buildings) and S3700 (for low-rise buildings) |
| Access Switch | S3700 |
| Egress Router | AR2200 (for low-rise buildings) and AR3200 (for high-rise buildings) |

# Commercial Building Network Solution

## 2. Building WLAN Solution

This solution uses AC-capable AR egress routers and S7700 series switches, PoE-capable S3700 and S5700 series switches, and various wireless APs for unified control and management of wired/wireless users and is therefore adaptable to different scenarios. This solution supports multiple WAN upstream modes (for example, 3G) and achieves flexible wired/wireless access.
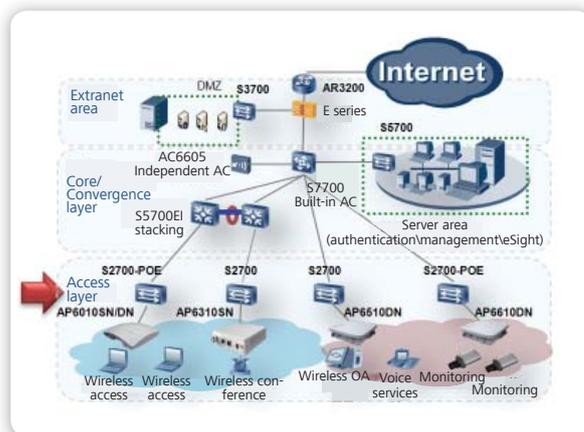


### Solution Highlights

• Provides the 802.11n network, compatible with existing 802.11 a/b/g users.

• Supports a maximum rate of 450 Mbit/s for a single frequency and 900 Mbit/s for dual frequencies (by 2012 Q4) and provides products with the world's best radio frequency, strong anti-interference, and extensive coverage.

• Provides intelligent Layer 2 isolation technology and MAC-address-based packet forwarding to avoid broadcast storm and supports IP source guard, Dynamic Host Configuration Protocol (DHCP) snooping, and DAI in local forwarding mode for a perfect balance of performance and security.

## Selected Equipment

| Network Module | Selected Equipment |
|---|---|
| AC | AC6605 |
| | AR3200/AR2200, S7700 (integrated with an AC board) |
| AP | AP6010 SN (single frequency), AP6010DN (dual-frequency), AP7110 DN (3 x 3MIMO dual-frequency 900 Mbit/s 11n AP), AP6310 SN (indoor 11n AP), AP6510 DN (outdoor dual-frequency 11n AP) and AP6610 DN (full-specification outdoor dual-frequency 11n AP) |
| | AR1200/AR200 |

# 3. Interbuilding Voice Solution

## Typical Networking



Commercial building A (HQ)  Commercial building B
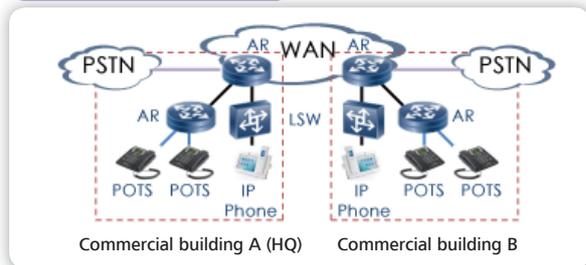
## Solution Overview

This solution uses an AR router (includes the functions of an IP PBX) as the egress router for a building. IP phones are connected to the PoE ports of S3700/S5700 switches. An AR router high-density voice board provides a maximum of 256 Plain Old Telephone Service (POTS) ports for large-scale analog voice service access.

## Solution Highlights

- Provides One Number Link You (ONLY), paging and call transfer services (by AR).
- Provides 3G backup and local survival for branches to improve service reliability (by AR functioning as the enterprise voice gateway).
- Allows services to be carried over the IP network, saving toll communication costs.

# Success Stories

## Long Wish Hotel Network Project
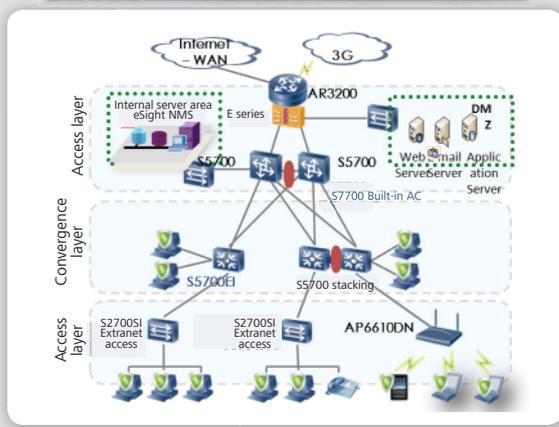
### Project Background

- Long Wish Hotel International, with an investment of more than CNY3 billion, is a five-star, modern hotel with super-standard rooms.
- Due to expanding services, the hotel needed to provide sufficient bandwidth for diversified services, such OA, multimedia conferencing, high-speed Internet access, digital television on demand, and video surveillance.

### Huawei Solution

- Deployed four networks (operation network, hotel room network, hotel room control board, and digital television on demand network), each using the S7700 as the core device; used S5700 as the access device for the hotel room network and S2700 for the other three.
- Employed enhanced Ethernet protocols from the S7700 at the core layer to the S5700/S2700 at the access layer, ensuring hitless service switching.

### Customer Benefits

- Shortened network rollout to meet multi-service requirements
- Exceptional service experience through the use of Huawei's function-rich X7 all-series switches

# Success Stories

## Office Network Project for Beijing Zhongye Building

### Project Background

- The office network of Zhongye Building for Patent Examination Cooperation Center of SIPO involved two parts: intranet and extranet. They were physically isolated and connected separately to the SIPO intranet and extranet.

- The office network needed to cover 1,800 information points and be scalable for future service expansion.

- Wireless coverage was required for all stories to achieve mobile office operation.

### Huawei Solution

- Deployed function-rich switches (redundancy configuration of key modules and hot-swappable, integrated service modules) in the intranet.

- Used special software for 110 APs to ensure wireless coverage in the building.

- Used 10 GE optical fiber to connect two core switches, preventing key node failures.

### Customer Benefits

- Higher work efficiency with efficient, ubiquitous, and integrated wired/wireless access

- No service interruption due to full-redundancy design

- Shortened network rollout to accelerate the customer's multi-service footprint and protect their investment



## Arqiva Arqnet Enterprise Access Project



### Project Background

- Arqiva, the communications infrastructure and media services company, operates at the heart of the broadcast, satellite and mobile communications markets. Customers include major broadcasters such as the BBC, BSkyB and independent radio groups

- Aqriva required a high-performance integrated CPE for government, mobile and enterprise user access.

### Huawei Solution

- Provided AR G3, an integrated CPE. The function-rich (high-speed Internet access, high-performance LAN switching, embedded voice service, Wi-Fi/3G/4G wireless access, and abundant interfaces) AR G3 simplifies network design, accelerates service launch, and better protects customer investment.

### Customer Benefits

- Cost-savings through the use of an all-in-one (Internet access, LAN switching, VPN, and security) Customer Premises Equipment (CPE)

- Industry-leading performance and scalability with the use of the multi-core CPU and non-blocking switching architecture

- Accelerated multi-service footprint and maximized return on investment (ROI)

# Commercial Building Network Solution

## Success Stories

**Transnational Communications Project for China CTDI Engineering Corporation**

### Project Background

- China CTDI Engineering Corporation (CTDI) is headquartered in Chongqing, China. Headquarters originally communicated with the branch in Laos through the international line, but this was expensive and voice functions were limited. To achieve highly efficient and cost-effective transnational communication, CTDI decided to purchase new devices.

### Huawei Solution

- Deployed AR2240 as an IP-PBX in the headquarters and AR1220V as an IP-PBX in Laos branch and deployed SIP trunks over the Internet for VoIP services between headquarters and branch.
- Added boards and IP phones to meet the growing demands.

### Customer Benefits

- Extensive services, including voice conference, voice mailbox, IVR, call waiting, call transfer, call forwarding, secretary, and remote office
- Slashed costs (saving more than 90 percent) for transnational communications
- Secure communications based on industry-leading VPN/IPSec and adaptable to poor network environment using HQoS