GSM-R

Milestones of Huawei GSM-R

Early in 2002 Huawei started to engage in GSM-R R&D, three years later Huawei won the first GSM-R commercial project DaQin freight railway in China, next year, Huawei released the Industry first GSM-R Soft-Switch Core-Network for GSM-R, in 2008 Huawei released the unique GSM-R distributed base station, in the same year Huawei won the First Prize of National Award for Science and Technology'. In 2009 Huawei received EIRENE compliance certificate from Lloyd’s register (European Notified Body). In 2010 TÜV Rheinland and Testhouse DB-Systel confirmed Huawei EIRENE compliance in an extensive IOT campaign performed between Funkwerk CabRadio equipment and Huawei’s GSM-R system. In the same year, Huawei won a further 1455km of GSM-R track in Australia. At the beginning of this year, Huawei won contract with deutsche Bahn Systel in Germany.

In 2011 Huawei has announced successful migration from R99 Core to R4 Softswitch on the Daqin railway line (690 km). As per the issued press-release, full rail operation was maintained throughout the upgrade.

In China new orders won by Huawei consisting of extensions to the Hada, TaiZhongYin, and Jingjiu GSM-R lines.

In the figure below, the network reliability provided by Huawei GSM-R solutions has been illustrated. Redundancy for each network element from the core network to Base station system can be realized. Single point of failure can be avoided and high reliability ensured.

Huawei Digital Railway Solution

E2E GSM-R Solution

Huawei is getting more and more recognition from railway customers all across the world thanks to the highlights of Huawei railway telecommunication solutions:

- Stable and innovative GSM-R, unified public/GSM-R platform strategy and leading position for public platform
- Industry first GSM-R soft-switch Core-Network (reliability enhanced)
- First GSM-R distributed BTS (easy radio planning)
- Verified high speed technology (Shanghai maglev 430km/h)
- Smooth evolution to LTE for rail (evolution to LTE for Railways)
- BSC Duo-location solution, MSC Dual-homing solution (high reliability)

In the figure below, the performance improvement of Huawei GSM-R solution has been illustrated. ATCA platform improves performance compare with CPCI platform. Only 4 typical configurations reduces difficulty of network management and maintainability.

Evolution for LTE

Supports the smooth evolution to LTE by only updating software.

Special for railway

Deploy all CN NE in single cabinet for the subscribers of GSM-R is not that big as the public network.

Performance improvement

ATCA platform improves performance compare with CPCI platform.

Maintainability promotion

Reducing the hardware and network transmission, only 4 typical configurations reduces difficulty of network management and maintainability.

Evolution for LTE

Supports the smooth evolution to LTE by only updating software.

2012

- 10000km of Huawei GSM-R coverage all over the world — 2012.Q2
- Complete IOT test with NGN and Kapsch in DB Lab
- Award of Turkey EKB Railway.

2011

- First ETCS L2/ETCS L3 project operation — Guangzhou-Shenzhen Line
- Award of GSM-R Sochi line (ETCS L2) in Russia
- Contract award Hong Kong GSM-R (ETCS L2)
- Spain ADIF GSM-R evolution
- Industry First: operational GSM-R from R99 to R4 IP migrated
- TÜV certification
- Contract with UGL, Australia
- Lloyd’s certification
- Shanghai Maglev: high speed performance in 430km/h
- Industry First: GSM-R Soft-switch Core-Network
- R&D commenced — 2002.H1

2010

2009

2007

2006

2002

HLR: 1+1 Redundancy
MSC Server: Dual-Homing
MGW: Mini A-Flex SGSN Pool / GGSN Pool
BSC: Duo-Location Mini A –Flex
BTS: Dual-Coverage Ring Networking
Certification

Huawei GSM-R products are developed according to the EIRENE specifications strictly, and can meet all the functions and service requirements defined in EIRENE specification. Meanwhile, Huawei is actively participating to the GSM-R standardization work, and share research results with those companies participating in such groups like ETSI.

As early as 2005, Huawei consistently focused on IOT campaigns with vendors well known in the GSM-R market. Most recently DB-Systel has started using Huawei’s GSM-R solution to conduct product and interoperability testing for its own purposes to examine interaction between Huawei’s system architectures with GSM-R networks already deployed by DB-Systel.

In May, 2009, Huawei received EIRENE compliancy certificate from Lloyd’s register (European notified body)

‘In terms of functions, all GSM-R-specific functions are achieved and all functions comply with the EIRENE specifications. ’The network interfaces and signaling messages of the GSM-R system comply with the related 3GPP protocols.’

--From the Lloyds Test Report

In August 2010, Huawei got TUV Rheinland, Funkwerk Huawei certification.

Success story

Huawei today is telecom supplier to Railways across four continents (Europe, China, Australia and Africa)

Some of our Rail customers are:
- Australia, see details right
- Belgium, SNCB-holding Syntigo
- China, MoR
- Germany, DB-Systel
- Morocco, ONCF
- Romania, CFR
- Spain, ADIF
- Tunisia, SNCF
- More than 48% market share in China

Huawei’s GSM-R system is currently used in DB Systel’s test laboratory to examine future-oriented network architectures for GSM-R.

Story 1: GSM-R Service for Australia

Huawei has been selected as technology supplier for one of Australia’s digital train radio system projects. It will replace existing analogue radio network and offer greater coverage and functionality than the current analogue system. Huawei GSM-R Duo-location BSC, MSC dual-homing, DBS3900 and much other functionality will be applied in Australia. Furthermore the network was designed in a way to enable the customer to smoothly upgrade to ETCS L2.

Story 2: German Railways, DB-Systel

DB-Systel, subsidiary of Deutsche Bahn and one of the leading providers of ICT services in Germany, has tasked Huawei in December 2009 with the delivery of a state-of-the-art IP-based GSM Railway (GSM-R) lab system from Huawei.

In early 2010 Huawei delivered a GSM-R MSC R4 IP core, BSC as well as BTS and Distributed BTS equipment which has been installed and put in service in DB-Systel’s GSM-R test floor. In March 2010 a first GSM-R call on Huawei’s GSM-R equipment has been established in DB-Systel’s GSM-R labs.

Story 3: DaQin line - The First Commercial GSM-R Application over GPRS now upgraded to IP-core

The DaQin Railway project was Huawei’s first GSM-R commercial application and connects city of Datong with Qinhuangdao. The line stretches through complicated and hilly terrain with over 30 tunnels throughout the total length of 690km of high quality GSM-R radio coverage. Huawei technologies have been selected as the sole telecoms supplier for this rail project. In January 2011 the successful migration of the Daqin railway line from a legacy, 3GPP R99 platform to a 3GPP R4 platform has been completed. The migration process was designed and carried out by Huawei so that full rail operation of the Daqin line could be maintained throughout the migration. The successful migration of the Daqin GSM-R network represents an important milestone for GSM-R network operators all around the world. This project demonstrates that even GSM-R networks with the highest demands on reliability and high volumes of rail traffic can be migrated while full rail operation is maintained. The DaQin line is one of the most important transportation routes through mainland China and due to its importance the GSM-R system has been designed to provide co-located double layer radio coverage throughout the whole line. The line is equipped with Huawei’s GPRS solution for Train number, Train pull-in forecast information transmission, Dispatcher command, Train stop information transmission and Train end information transmission data services on board the train. The Daqin access network is a combination of macro BTS and repeaters. For the in tunnel design a leaky feeder solution has been selected whereby the remainder of the network is covered using conventional antenna design.
LTE for rail

Current Communication Service Requirements for Railway Industry

With the rapid development of railway transport, simple voice and constraint data services can not satisfy the high-speed data requirements both from train operators and from passengers. For train operators, a more efficient way to guarantee train operational safety and on-board security is becoming more and more important. Services such as on-board broadband video-service are beyond the reach of GSM-R but are readily available on Huawei’s LTE solution. For the passengers, many people are enthusiastic about using mobile broadband services while on the move with laptops, mobile phones and cloud computing devices. Many business travelers today have the ability to connect to their work space from outside the office. Continue working while travelling allows travel time to be converted into productive working hours. With the understanding of rail operational demands as well as rail passenger communication demands, Huawei’s LTE solution is designed to provide broadband services that are far exceeding capabilities of standard GSM-R. Video surveillance solutions implemented on-board, along the track or on platforms help to further improve railway services and customer satisfaction by allowing centralized security staff to monitor situations on individual trains. At the same time the system can be configured to deliver broadband wireless connectivity to passengers allowing them to access up to date travel information, access internet services during the trip or watch real-time TV. With its wide portfolio, Huawei is the right partner for railways to pull all these technologies together into one smart railway solution allowing railways to focus on passenger needs and railway operational demands.

Huawei eWBB LTE solution permits railways to establish high speed broadband data connections on board the train. As for GSM-R, LTE based eWBB includes specifically designed algorithms to deliver superior Quality of Service at highest train speeds. Huawei’s solution has been tested at speeds of 430km/h on Shanghai’s Maglev line.

Based on LTE technology, Huawei’s solution spectral efficiency, with 20MHz, 2 × 2 MIMO configuration is unique in the rail market. The downlink and uplink speed can be modified according to user demands reaching speeds of up to 100Mbps.

Huawei E2E eWBB Solution Can Satisfy Customer Requirements

Huawei eWBB LTE solution permits railways to establish high speed broadband data connections on board the train. As for GSM-R, LTE based eWBB includes specifically designed algorithms to deliver superior Quality of Service at highest train speeds. Huawei’s solution has been tested at speeds of 430km/h on Shanghai’s Maglev line.

Based on LTE technology, Huawei’s solution spectral efficiency, with 20MHz, 2 × 2 MIMO configuration is unique in the rail market. The downlink and uplink speed can be modified according to user demands reaching speeds of up to 100Mbps.

With its flat network architecture eWBB is a cost efficient solution delivering shortest bit transfer delays. Overall reliability of the system is carrier grade with additional options to further improve overall system reliability by implementing geographical redundancies. A wide range of frequency bands are supported for eWBB and flexible bandwidth configurations allow custom specific frequency situations. Today, Huawei’s eWBB solution is considered the most advanced rail telecommunication solution merging synergies between GSM-R operation, non safety critical rail operational voice and data services and passenger communication.

Huawei eWBB LTE solution can support broadband service

<table>
<thead>
<tr>
<th>Standard GSM-R Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
</tr>
<tr>
<td>ETCS</td>
</tr>
<tr>
<td>Shunting</td>
</tr>
<tr>
<td>RBC</td>
</tr>
<tr>
<td>Internet Services</td>
</tr>
<tr>
<td>Inside Carriage</td>
</tr>
<tr>
<td>HD TV</td>
</tr>
<tr>
<td>Track &amp; Carriage monitoring</td>
</tr>
<tr>
<td>Video Surveillance</td>
</tr>
</tbody>
</table>

Broadband, High Speed, Reliable and Tailored

- **Broadband**
  - DL 100Mbps, UL 50Mbps @20MHz
  - LTE to support standard GSM-R function
  - Multimedia PTT, Video surveillance, HRC

- **High Speed**
  - Correct Doppler frequency offset up to 450km/h
  - Verified in Shanghai Maglev train in 430km/h

- **Tailored**
  - Redundancy for reliability
  - Multiple Frequency Bands (Hz): 700MHz/800MHz/850MHz/900MHz/1.0GHz/1.8GHz/2.1GHz/2.6GHz (FDD)
  - 1.8GHz/2.3GHz/2.6GHz/3.5GHz/3.7GHz/5GHz/8GHz (TDD)
  - Flexible bandwidth configuration (1.4/2/5/10/15/20MHz), TDD or FDD transmission mode
Trackside & Carriage Inside Video Surveillance

CCTV cameras installed along the track provide video feeds from trackside, platforms or specific hot spots such as level crossings. This information is fed into centralized control centers, stored in Huawei’s data cloud solution, processed by our video analysis software and transmitted via eWBB into the train or played back for analysis. This implementation allows ground based staff to have visibility well ahead of the train. In connection with eWBB, cameras can also be installed inside the carriage allowing surveillance inside the coach through centralized ground based staff or mobile security units along the line. Huawei’s CCTV solution allows real-time video analysis and storage of video streams in Huawei’s Data Centre solution for post incident analysis.

Huawei eWBB LTE HRC Solution

Huawei High-speed Railway broadband wireless communication system, HRC is a further example of how eWBB can improve railway communications. HRC is an advanced mobile communication system delivering multiple data and voice services on board the train. Thanks to the outstanding mobile data performance of LTE, HRC maintains a continuous high data throughput between trackside radio stations and vehicles running at speeds of 350km/h or above. The quality of HRC data connections can be compared to services connected to your computer’s Ethernet port from your cable DSL or optical network operator.

430KMH High-speed Mobility, Multiple-mode Radio Access, and Average Throughputs Up to 20Mbps@20MHz

Redundancy for High Reliability

Board Level Redundancy

One RRU can be connected with two LBBP (LTE Baseband Processing) boards working in a local redundancy mode. In case functions on one LBBP board fail, services are automatically provided through the redundant board. Huawei’s eCNS600 main board supports 1+1 standby mode ensuring highest reliability figures.

Network Element Backup

Huawei’s railway solutions support 1+1 core network redundancy through geographical redundant nodes. For an example one eNodeB connects to two eCNS and one eCNS connects two PTT servers further improving the overall system reliability.

Redundancy of the radio coverage is critically important for railway operation. For this reason Huawei introduced the unique concept of a Master eNodeB and a Slave eNodeB. The eNodeBs are deployed along the track to provide redundant coverage. Without manual intervention the slave eNodeB will take over from the master eNodeB in case of loss of function (i.e. fire, flood...)."
Huawei eWBB Solution to Satisfy Shuohuang’s Requirements

Our customer awarded Huawei to help them with a solution to double their actual cargo capacity in order to meet a targeted 350 million tons transportation capacity per year. Our solution helps the operator to reach their targets by providing multi-locomotive synchronization control command transmission, substantially enhancing the carrying capacity of each train. In order to meet the operational demands, both traditional data service and broadband service were offered.

Railway info management is the main indicator of the modernization of railways, the current strategy of the development of the railway by leaps and bounds brings new opportunities and challenges for the railway info management, and railway info management has entered a new period of development. To provide convenient full-service for travelers and shippers need to build secure, efficient railway communication information system, and make it become the nervous system of the railway. Based upon more than 20 years’ successful experience of information and communications, Huawei provided railway communication solutions for more than 10 countries and regions. Huawei provide full range of railway communication solutions including railway multi-service bearer network solution, GSM-R communication solution, railway intelligent security video surveillance solution, station information service solution, digital train solution. Which, Huawei railway multi-service bearer solution is to build a network infrastructure for Railway Information System, to provide a unified, secure, reliable and efficient bearer network for the railway.

The challenges that railway multi-service bearer network faced

Rail height info management makes the communication requirement between different level OCCs and stations surge. Only to current statistics, the nearest railway multi-service bearer network carrying more than 40 kinds of services. Complex and diverse business brings criteria requirements to multi-service bearer network:

- Multi-service needs a variety of access methods;
- Video surveillance, video conferencing trigger massive data transmission requirements, and need a guaranteed broadband;
- A high speed railway need to deal with unexpected situations, there is an urgent need to improve the network disaster recovery capabilities, to protect transportation security;
- Traditional machine rooms are full of different equipments, have a high energy consumption and difficult to manage. It is difficult to fulfill customers’ requirements to reduce the CAPEX and OPEX.

Facing these serious problems, we believe that a key factor in the construction of railways multi-service bearer network includes the following aspects:

- Guarantee Railway Transportation Security
  - High disaster recovery capability ensure the railway Business and transportation security.
- Large Capacity and Continuous Expansion
  - Meet the increasing bandwidth requirements of video monitoring, video conference and other business, and satisfy the real-time video transmission requirements.
- Multi-service Access
  - Various interfaces meet the access need of dispatching, signal equipment monitoring, video monitoring, passenger information, SCADA, etc
- Low Operation Cost
  - Powerful network management ability cost down maintenance fee

Based on the above considerations, Huawei railway multi-service bearer network provide a secure, reliable and efficient network to achieve the protection of the secure operation and high quality of service.
Huawei railway multi-service bearer solution

Railway multi-service bearer network is an important infrastructure for railway information system to protect the security, improve the transport capability and management efficiency of railway. The general thought of building Huawei rail service bearer network is shown in figure below:

- **Stations**: OSN series of optical transmission equipment and various types of routers, switches will deploy to realize direct access for various types of business in the stations. Meanwhile, the convergence and backbone layer transmission equipments will support the interconnection between different stations and OCC in different countries or regions.
- **Track side**: The low-end OSN device fulfill the access requirements of the base stations, video surveillance and interval stations along the track. With 1+1 protection ring network, the disaster recovery capability will be significantly improved;
- **High-speed rail**: Deploy relatively intensive access points to support the GSM-R base stations;
- **Remote station**: 2 to 3 access rings to ensure sufficient capacity to assure the access of business.

**Overview of railway multi-service bearer network**

**Why huawei**

- **Multi-protection**, protect railway communication: important business use a ring (such as dispatch operations, GSM-R business, etc.), access device key board backup and service access card protection; use MSP protection, 1+1 MSP protection, SNCP protection; completely independent of the physical routing to solve single point failure problems.
- **Channel isolation**, improve business security: different business goes into the corresponding VPN Line for business security isolation; flexible Ethernet solution techniques are used in EPL, EVPL, EVPLAN CTC, FAS, financial transactions, ticket booking and other business, to isolate into a separate VC channel for transmission; in accordance with the importance of the business, configured with different QoS levels, in the case of shared bandwidth, give priority to high priority services.
- **Multiple business interfaces**, multi-service access needs: abundant type of boards to provide a variety of business interface E1/STM-1/FE, dispatching, wireless communications, computer monitoring, emergency telephone and other services through E1 interface access, video surveillance, PS (passenger information system), video conferencing and office OA, and other business through the router / switch via FE port to access.
- **Upgrade and expand**, without interrupt the business to meet the railway development needs: change broads to achieve expansion without business interruption; easy to add nodes and expand capacity. Smooth evolution to adapt to the all-IP development needs of the railway business: the Hybrid dual-core process Railway voice services, data services, to achieve efficient bearing of the rail business; without replacing the device, simply replace the boards, simple and easy operation to achieve a smooth evolution.
- **Unified network management system**, allows simple operation and maintenance: remote upgrade, maintenance, without on-site operations; cross-domain end-to-end service provisioning.

**Success Story**

**World’s highest railway — Qinghai-Tibet Railway**

The Qinghai-Tibet Railway is the implementation of the landmark projects in the Chinese western development strategy, is one of the four major projects of the new century. The road is east from Xining in Qinghai Province and west to Lhasa; the total length is 1566 km. The Qinghai-Tibet Railway is the world’s highest and longest plateau railway, poor natural conditions, high altitude, high winds, and the settlement raise strict adaptability and stability requirements to equipments.

**Huawei solution**

Transmission network: mature and stable Huawei OSN series MSTP transmission equipments networking and HONET access device to the formation of transmission access network.

**Benefits**

- Long-term stable operation ensure the safe operations of the railway, reducing operations and maintenance costs;
- Large-scale deployment in high-altitude alpine conditions, lay the foundation for subsequent expansion.

**Data Network**: Huawei NE, switches, AR router and unified network management system achieve a full range of the equipment maintenance and equipments long-term stable operation to achieve long-term secure and stable operation of the railway. Powerful network management capabilities, business end-to-end deployment and management to enhance the rail network monitoring and management level, to reduce operation and maintenance personnel, and improve the efficiency of operation and maintenance.

**Benefits**

- Reduce spare parts, green energy, reduce OPEX. Huawei can meet your demands in various aspects in the railway service bearer. With experienced local partners we can provide a full range of support to reach you expedite reliable, secure, high-performance goals.
Intelligent Video Surveillance Application

This railway transportation solution provides the following functions:

Station surveillance:
- Important area surveillance (e.g. station entrances and exits, ticket windows, elevators, railway platforms)
- Unattended object detection
- Loitering detection
- Suspicious activity detection

Railway security video surveillance solution

As we develop the informatization, network technology has been applied widely in production and management of railway traffic systems. The stable operation of rail transport system ensures the normal operation of the national production and life. However, the reality about rail transport systems is that complex environment issues such as wind speeds, temperature, humidity, and landslides and even having multiple departments, distributed locations are some of the major obstacles of routine maintenance during a railway operation. Huawei’s railway Video Surveillance solution solves these challenges.

With the features of visible, easy-to-store, query, and share, the digital video has been an important part of the integrated video surveillance system and is used in service management. Users can use the network to implement for remote surveillance. The intelligent software system has the ability to analyze a large amount of data, improving the surveillance efficiency and implementing convenient surveillance management.

Railway surveillance:
- Seamless coverage of wired and wireless networks
- Signal coverage along railway track including bridges, tunnels and culverts
- A signal tower at a height of 15 meters per kilometer

Railway carriage surveillance:
- Video surveillance system: monitors railway carriage doors and emergency control switches.
- Fisheye camera: monitors inside the railway carriage.
- High-speed railway communication: (HRC) sends video feeds to the control center in real time.

Advantages

Multi-Service Integration and Flexible Networking
- Integrates with the communication network, internet, and the internet of things to comprehensively collect traffic data.
- Provides flattened network elements to integrate the source data collected by peripheral devices, under the support of the geographic information system (GIS) and network video surveillance (NVS).
- Supports professional and reliable transmission links, multi-level and multi-domain architectures, and flexible networking modes.

Unified and Open Platform
- Integrates with the following applications to construct a unified traffic command platform:
  - Signal control
  - ePolice
  - Checkpoint
  - Traffic data collection
- Integrates with diversified service support systems to provide customer-specific solutions.

Sharing resources

Integrating with various applications

Unified security solution

Using structural design

Diversified Intelligent Applications

Intelligent platform
- Unregistered vehicle detection
- Red-light running detection
- Traffic status prediction
- Intelligent traffic guidance
- Intelligent charging

Intelligent peripheral devices
- Collecting the following signals:
  - Traffic control signal
  - Alarm signal
  - Environment surveillance signal
  - Global Positioning System (GPS)
  - Geographic information system (GIS)
- Providing the following functions:
  - Intrusion detection
  - Crowd behavior recognition
  - Object abandonment detection
  - Object theft detection
  - Population density analysis
Passenger service solution

For most people, railway is an important way to travel. At present, with the speed of train faster and faster, passengers are increasingly concerned about the passenger service quality. There are some challenges in railway passenger service as follow:

- Troublesome ticketing: Manual ticketing mode is low efficiency and poor experience
- Boring journey: What a boring journey lacking of entertainment facilities
- Static indicator: Passengers need real-time, dynamic indicator in emergency
- Low return on investment: passenger service has been almost a non-for-profit service, but a large investment project. Railway owner need new profit opportunity.

To help railway operators improve passenger service quality and passenger’s satisfaction, Huawei provides railway passenger service solution.

Challenge:
- Ticket window sale mode can’t meet different passenger need
- Traditional call center is energy-intensive and noisy

Architecture:

Benefit:
- Telephone, on-line, self-service and ticket window meet individualized need
- Green call center help provide better service by creating 1 dB lower noise than 55dB average and needing 7w lower power than 300w average.

Overview of Huawei passenger service solution

There are three parts in this solution, which are individualized, green ticketing service solution focusing on solving ticketing service problem, convenient, profitable station service solution focusing on solving station service problem, uninterrupted onboard communication solution focusing on solving onboard communication and entertainment problems.
Convenient, profitable station service solution

**Challenge:**
- Traditional passenger service is static; passengers need real-time, dynamic indicator in emergency

**Architecture:**
- IP network
- Information Center
- Clock
- PA
- Interface Server
- Video Server
- Advertisement Server
- Storage
- Work Stations
- Switch
- Master Clock
- Slave Clock
- Controller
- LCD
- Screen Wall
- Work Station
- Server
- Call station
- Loudspeaker
- Power Amplifier
- Interface Server
- Video Server
- Advertisement Server
- Switch
- Call station
- Master Clock
- Slave Clock
- LED
- LCD
- Screen Wall
- Work Station
- Server
- Call station
- Loudspeaker
- Power Amplifier
- Interface Server
- Video Server
- Advertisement Server
- Switch
- Call station
- Master Clock
- Slave Clock
- LCD
- Screen Wall
- Work Station
- Server
- Call station
- Loudspeaker
- Power Amplifier
- Interface Server
- Video Server
- Advertisement Server
- Switch
- Call station
- Master Clock
- Slave Clock

**Benefit:**
- Integrated, real-time information service improves passenger satisfaction
- Advertisement operation in PIS can make money

Uninterrupted onboard communication solution

**Challenge:**
- Unable to communicate properly in high speed train
- Lack of entertainment facilities onboard

**Architecture:**
- Backhaul Network
- LTE
- Core network
- Gateway
- Carriers A
- Carriers B
- Internet

**Benefit:**
- Passengers get good onboard services at speed more than 350km/h
- Get profit by offering on-board signal coverage for telecom carriers and on-board advertisement
Huawei focuses on the requirements and challenges of various enterprises and provides a conclusive unified communications and collaboration solution consisting of the IP telephony, multimedia conference, collaboration software, IP call center (IPCC) and the TelePresence.

Based on basic communication services, applications and management services, this solution meets the needs of the enterprises' audio communication and collaboration requirements and helps to boost a business' value through facilitating their sustainable development.

**IP Telephony:** provides communication servers, gateways, a series of IP phones, mobile clients, PC clients and Web clients which constitutes a whole system, and provides fixed- and mobile-integrated audio and data services.

**eConference:** provides multiple hardware and software solutions including standard conference rooms and web conference, supports multiple forms of conference access such as audio clients, PC clients, and mobile clients. The cloud platform supports multiple types of deployments.

**Collaboration software:** provides various online communication methods, including instance messaging, presence, group, voice mail, and fax mail. The collaboration software is closely integrated with the enterprise inner work flow.

**Management services:** provides consultation, security, integration, and customization services and enables enterprises to focus on their core businesses.

---

**Unified Communication & Collaboration Advantages**

**Cloud service architecture:** features the cloud-pipeline-client architecture, it supports the cloud service and management platform. The enterprise inner communications is seamlessly integrated with outside communications to meet various communication and collaboration needs in multiple enterprise scenarios.

**End-to-end solution:** provides an overall solution for the access, bearer, platform, client, and service. The solution fully satisfies the enterprise communication needs, and integrates the unified communication into the operation process.

**Smooth evolution:** supports the TDM and IP network access on the system platform. The UC solution synchronizes and smoothly evolves with the network and intercommunicates with the heterogeneous network. This solution smoothly interconnects to and transacts from the existing system and protects user's investment.

**Open and integration:** provides various application and development interfaces that completely coordinates and interconnects with the third party's system. These interfaces seamlessly integrate with the IT systems such as the enterprise OA, EPR, and CRM, and highly integrate with the dispatching, recording, and management systems.

**Terminal inclusiveness:** supports the access of various terminals and provides various UC services, such as that of IP phone, mobile phone, WiFi phone, USB phone, fixed-line phone, PC client, handheld mobile multimedia terminal.

**Security protection:** provides an overall solution concerning network security, operation security, desktop security and service security. Based on different application scenarios, the UC solution provides multiple access to the enterprise internal network by signaling and media stream encryption, and SSL VPN methods.
Video Conference & Telepresence

Huawei Telepresence: Ultimate HD Telepresence, Immersive Experience and Easy to Use.

In today’s fast-paced global economy, business is being made between companies and partners distributed around the world, day and night. It is obvious that he who is acting fast upon the market demand will win the game. Huawei TP is the first 1080P 50/60fps Telepresence worldwide, brings people together in a best ever virtual meeting experience with the European industry design idea, comfortable, immediately and enjoyable. Synergy between people creates value, reduces cost and helps you stay ahead of the competition.

Video Conference & Telepresence Solution

TP Mgmt
- Resource Mgmt
- Subscriber Mgmt
- Net Mgmt, CDR

TP server - MCU
- Media Exchange
- Audio Mix
- Multi points control

Terminal Access
- Room TP
- Personal TP

Advantages

Immersive Experience With HD Video and Directional Sound
Huawei Telepresence offers a real life telepresence experience. We have combined the best of video, audio and collaboration technologies. Huawei Telepresence has immersive HD video, HD audio and HD content quality.

Ease of Use: Integrated System Control via Touch Screen
An easy to use system is a long term obstacle for videoconference industry and people hate that complicated and dull remote control. With a re-designed innovative trendy, neat and well organized touch screen GUI, is standing out of competition.

Affordable, Cost-effective Solution
IP technology is evolving, but there are always times that the live video quality is undermined due to quality of service (QoS) issues. With Huawei SEC (super error concealment) and IRC (intelligent rate control) technology, Huawei Telepresence is able to keep producing good video quality even if there are significant packet loss or low bandwidth, latency and jitter over the network link.

Standard-based, Highly Interoperable
Huawei develops standard-based telepresence system, make sure it’s highly interoperable with mainstream telepresence equipments, including telepresence based on TP. Worrying about security of your videoconference call? Huawei Telepresence adopts standard-based H.235 and AES encryption techniques to ensure that your videoconference call is well protected from malicious hacking and sniffing. The device configuration and setup is locked by admin password to avoid any misplay.

Success Story

50 Telepresence Rooms
17 Countries

Challenge
- Team-working construction for 17 countries after incorporation
- To deploy FMC strategy, request unified platform with IMS/NGIN/Telepresence

Solution
- 50 sets Telepresence cover 17 countries
- IMS based solution, TP & UC integrated

Benefit
- Improve meeting efficiency by TP, frequent executives meeting
- Multi-services provided by unified IMS platform
- Reference for Enterprise wholesale, flexible system to expand