Transportation Industry
IP Solutions
Transportation Industry Solutions

Huawei enterprise One Net network solutions — SEC-T

Characteristics of transportation industry’s business network

- Secure
  - 1 classified business data isolation
  - 2 data security protection
  - 3 comprehensive network access authentication

- Efficient
  - 1 large forwarding
  - 2 low-latency packet forwarding
  - 3 data, access, transport equipment, unified management

- Convenient
  - 1 rapid deployment of all network service
  - 2 new businesses to easily overlay
  - 3 cloud computing network architecture

= Trusty

- 1 99.999% reliability factor
- 2 links industrial confidence
- 3. the whole network end to end 50ms Recovery
A railway network is functionally segmented into four smaller networks: data network, dispatching network, ticket network, safety network. The four networks operate independently for the sake of service security. Compared with the other three, the data network carries the most complex services, supports more network clients, and requires more VPN and QoS operations.

Investment on an integrated railway data network generally covers three layers:

- **Backbone layer network**: This backbone network is generally directly invested by the headquarters of the railway ministry or railway company, aiming at building an MPLS/IP-based network to simultaneously carry multiple services such as pipe isolation and QoS-demanding applications and at the same time setting up a central data center as well as a remote backup disaster recovery center.
- **Administration core network**: This network is constructed primarily by railway bureaus, aiming at building a 3- or 4-layer reliable aggregation and access network. The link layer, network layer and service layer are holistically designed to ensure network availability. At the same time, a data center is set up at railway bureaus so that services do not need to be aggregated entirely to the upper-layer railway ministry for distribution and sharing.
- **Station local area network (LAN)**: This network is generally built in conjunction with basic station facilities, aiming at building a security access network that supports multiple terminals and services. Data for bandwidth-hungry services can be stored locally and it is dumped only when needed. At the same time, an integrated management platform (IMP) for stations can be used for providing convenient services for passengers.

The Huawei IP integrated services data network solution classifies transportation industry services primarily into six types based on application scenarios: signal detection, video surveillance, teleconferencing, VoIP, PIS, and OA. The solution then analyzes their requirements for priority, bandwidth, reliability, security, latency, and continuity. This approach helps efficiently deploy services over the entire network in order to best meet customers’ service demands and achieve the ideal combination of networks and service systems.
Focus on safety, CRH Services Network of China

Backgrounds

- China Railway High-speed (CRH), has been built more than 7531 km, and top speed of 416 km/h
- It need “Better-organized, Better-designed, Better-construction, Better-management, Better-quality engineering and better-security” network

Huawei solutions

- Diversity transmission, access, data, clock synchronization system of integrated solutions
- OSN7500/3500 equipment used OSN2000 equipment range at data, voice, GSM-R etc. to protection business scheduling
- Using NE40E, and S Series switch device as a focal point of high-speed data service

benefits

- Ensure long-term stability under extreme environmental
- Network architecture based on a comprehensive cloud into the "high-Speed Railway age "

- Switching capacity: 1.44 Tbit/s
- 8 service slots and 32 sub-slots
- Maximum port density: 320 x GE/320 x FE/32 x 10GE

- Switching Capacity: 640 Gbit/s
- 3 service slots and 12 sub-slots
- Maximum port density: 120 x GE/120 x FE/12 x 10GE
- NE40E-X3

- Switching capacity: 2 Tbit/s
- Hardware-based cluster with a bandwidth of 256 Gbit/s
- Maximum port density: 576 x GE/576 x FE/480 x 10GE
- Board cache capacity: 200 ms/GE
- End-to-end ETH/MPLS QAM protection switchover of 50 ms
- More than 30% energy saving

- Multi-core distributed service processing
- Non-Blocking switching, with a maximum forwarding capacity of 3.5 Mpps and WAN performance of 1000 Mbits
- Dual-mode network and flexible access
- Converged multiple services
- Integrated and open designs

- iStack, simplifying network structure and management
- Support for ring/tree link protection protocols, such as STP/RSTP/MSTP, RRPP, BFD, etc.
- Easy deployment: USB-based rapid deployment, auto configuration, HGMP, and web management

- Unified network management, All-IP network equipment, and reduced network operation & maintenance (O&M) costs

- AR-G3

- S7700

- S3700
SEC-T transmission network solutions

For rail transport (railway and subway) unified full-service transmission network

The Huawei railway full-service transmission solution has four layers: backbone layer, core layer, aggregation layer and access layer. The solution also covers the power dispatching, self-coupling transformer, GSM-R base station, relay stations, repair centers, etc.

The prominent features of this solution include (1) 50 ms protection over the entire ring network, (2) unified multi-service support, and (3) ultra-long-distance transmission.

- The entire network is a highly reliable ring. With industry-leading ring network protection technology, the system can quickly recover from any fault within 50 ms to ensure the continuity and security of critical production and scheduling services.
- Using WDM or TDM technology, the system can multiplex links to uniformly carry multiple services while effectively isolating them. The system provides a variety of interfaces (from 64 kbit/s to 10 Gbit/s) to effectively interconnect all complex terminals.
- The system provides efficient transmission over long distances (single-hop 40G transmission distance of more than 1500 km). This effectively reduces fault points and ensures the smallest network transmission delay as well as efficient service information transmission.

The Huawei railway full-service transmission network solution can be customized to meet different customers demands for interfaces, bandwidths, distances, models, and costs. At the same time, this solution uses the industry’s most convenient network management platform to achieve simple and rapid service deployment. The comprehensive network reliability designs of this solution ensures quick switching protection without impact on customer experience and fully protect railway data services.
SEC-T Railway Full-Service Transmission Network case

More Farther, Russia TransTeleCom Railway network

Backgrounds

- Transtelecom plan and implement DWDM national backbone to communicate with Eurasia telecommunications services since June 2001
- Requirement of a long-haul industry service extends a total of 18,713 kilometers

Huawei solutions

- Uses the OptiX BWS 1600G long-haul DWDM equipment
- The advanced SuperWDM technology
- Advanced high-power amplifier (HBA) and Raman technology are used to fulfill ULH

benefits

- 10 hops without regeneration extending to 1000 kilometers, and the longest section reaches 1700 kilometers
- Construction cost is 30% lower than the others
- Provide service more rapidly and shorten the time for investment return

The world’s longest DWDM

“TransTeleCom provide London to Beijing communication services which network delay round trip time is only 160 milliseconds.

--- consider the company’s European and Asian information superhighway---”

Igor Kelshev
Senior Vice President of TTC International Marketing

OSN 550
OSN 3500
RTN 910
RTN 950
OSN 1800
OSN 8800 T16

MSTP
Microwave
WDM

- Unified switching
- Adaptation to multiple scenarios: MSTP/Hybrid/Packet
- Support for IEEE 1588v2 (precision clock)
- Rich choices of interfaces: 10GE/GE/FE/ATM/TDM CES
- Compatible service cards

- Integrated microwave for TDM/ATM/IP full-service transport, and support for smooth TDM -> Hybrid -> Packet evolution
- Industry-leading adaptive modulation (AM) technology, which dynamically adjusts bandwidth and improves spectrum efficiency by four times
- Multi-carrier polymer on a single device, with air interface bandwidth of up to 1.6 Gbit/s
- Built-in switching matrix and multi-directional networking

- Shared platform that enables smooth upgrade to 40G/100G x 80 wavelengths
- ODUk/ODUflex full-service cross-connection, achieving bandwidth sharing across the entire network
- Rich 40G commercial applications (Huawei has obtained more than 50 projects worldwide, the largest global share
- 100G: ultra-long transmission distance of up to 2,110 km during Telefonica, BT, and DT live network testing
- Intelligent optical ASON, ensuring uninterrupted services

- Unified network management, All-IP network equipment, and reduced network operation & maintenance (O&M) costs
SEC-T Huawei Airport Communications Network Solution
covering airport production, management, security and public communication

An airport terminal network is generally divided into four layers: data center layer, the core layer, convergence layer and access layer. It carries all the data, video, voice services and has five main business subsystems: aviation information backbone subsystem, bank settlement subsystem, research network subsystem, remote access subsystem, and Internet subsystem.

The airport terminal network features high stability, reliability, security, manageability, and convenience:

- Stability: All the important nodes in the network have a high reliability by deploying router and switch stack/cluster and protecting services.
- Reliability: Important services (such as BHS, GOIS, CCTV, DCS and data) are protected with comprehensive multi-link backup. Other services at above the convergence layer are protected with link backup.
- Security: Every service egress is deployed with firewalls to effectively reduce security risks. In addition, remote access and data egress are properly encrypted for strong security.
- Manageability: A unified network management platform is used to uniformly manage switches, routers and other equipment and distribute services to improve maintenance efficiency.
- Convenience: WLAN (or 3G) is used, which allows users to access services from any location. This effectively eliminates troubles in laying out cables or seeking for an access point.

The Huawei airport unified communications network solution uses advanced switch hardware cluster (stacking) technology to achieve loop-free, highly reliable protection for the entire network. The solution also provides equipment-level, link-level, network-level and service-level quick protection. High-priority services like voice and video surveillance are reliably carried over the IP network. WLAN hotspot coverage is also supported. All these make this solution truly a unified communications service bearer platform for airports.
Customer Needs

- The Chengdu international airport terminal network system was needed to provide hardware basis for all airport network information. All service application systems must ensure efficient and stable operations.

Huawei Solution

- Used the data center-class switch Huawei S9312 as the core switch
- Deployed the S9303 switch as an information network aggregation switch to forward data to the core switch.
- Dual-homed each level of switches

Customer Benefits

- CSS clustering technology for improved capacity, reliability and redundancy of the core equipment
- BFD/GR for OSPF/BGP and other high-availability technologies to ensure that the faulty link switching time is less than 30 ms
- Environmentally-friendly and energy-efficient unique design

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AR-G3
- Multi-core distributed service processing
- Non-blocking switching, with a maximum forwarding capacity of 3.5 Mpps and WAN performance of 1000 Mbit/s
- Dual-mode network and flexible access
- Converged multiple services
- Integrated and open designs

S7700
- Switching capacity: 2 Tbit/s
- Hardware-based cluster with a bandwidth of 256 Gbit/s
- Maximum port density: 576 x GE/576 x FE /480 x 10GE
- Board cache capacity: 200 ms/GE
- End-to-end ETH/MPLS OAM protection switchover of 50 ms
- More than 30% energy saving
- Built-in AC functionality

Access Switch: S5700

- iStack, simplifying network structure and management
- Support for ring/tree link protection protocols, such as STP/RSTP/MSTP, RRPP, BFD, etc.
- Easy deployment: USB-based rapid deployment, auto configuration, HGMP, and web management

- Unified network management, All-IP network equipment, and reduced network operation & maintenance (O&M) costs
A metro/light rail PIS network is generally divided into four layers: data center layer, core/aggregation switching layer, wireless access layer and station/in-vehicle LAN. It carries all the data, video, voice services and provides good services for passengers.

The metro/light rail PIS network features high stability, reliability, security, manageability, and video quality:

- **Stability**: All the important nodes in the network have a high reliability by deploying router and switch stack/cluster and protecting services.
- **Reliability**: Major services are deployed with multi-link-homing protection. In addition, industry-leading RRPP is used over networks between stations to achieve hitless unicast/multicast service protection.
- **Security**: Each station and data center network egress are deployed with firewalls to effectively reduce security risks. In addition, AR is used at Internet egresses for data encryption and security.
- **Manageability**: A unified network management platform is used to uniformly manage switches, APs and other equipment and distribute services to improve maintenance efficiency.
- **Video quality**: The leading WLAN technology and AP connections (at least 3 connections at any time) are used to ensure that video is received smoothly and abnormalities such as image jitter and pause are eliminated.

The Huawei metro/light rail PIS data network solution uses advanced switch hardware cluster (stacking) technology at the core layer of a data center and Ethernet ring networking protection at the aggregation layer to achieve similar high protection as that over the transmission network. High-priority services like voice and video surveillance are reliably carried over the IP network. In addition, Huawei’s unified NMS is used. All these make this solution truly a unified PIS platform for metros and light rails.
SEC-T Metro/Light Rail PIS Network Solution case

Beijing Metro Line 1 and Line 2, Bringing Olympic-Level Quality

Customer Needs

Beijing Metro Line 1 and Line 2 have a total length of 53.54 km, which transport 2 million passengers every day.

The two metro lines required that:

- Security risks were mitigated.
- Service and capabilities reached the international level.
- Operational management costs were continually reduced.

Huawei Solution

- Use of high-end intelligent optical network equipment
  Huawei OptiX OSN 3500
- RPR technology
- General service panels for mitigation of human pressures

Customer Benefits

- Automatic train control, integrated monitoring, and reliable signaling
- Reduced maintenance costs

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Simplified network management, All-IP network equipment, and reduced network operation & maintenance (O&M) costs

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AR-G3 | Eudemon-X Serials
---|---
High performance of up to 6 Gbit/s | Complies with IEEE 802.11a/b/g/n standards.
Packet forwarding rate from 120 kpps to 1500 kpps | AP supports 2.4 GHz/5 GHz dual-frequency and a maximum rate of 600 Mbps.
Number of concurrent connections from 100 kpps to 1200 kpps | AC supports 10 x GE optical ports, 8 x GE optical ports, and 16 x GE electrical ports.
Rich choices of interfaces: ADSL, 3G, E1/CE1, G.SHDSL, WIFI, SA, FE, GE, etc. | Supports WEP, WPA/WPA2, WAPI, and 802.1x authentication/encryption.
| Simplifies equipment management and maintenance.
| Roaming: 50 ms, without service interruption. | Unified network management, All-IP network equipment, and reduced network operation & maintenance (O&M) costs
Transportation Industry

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