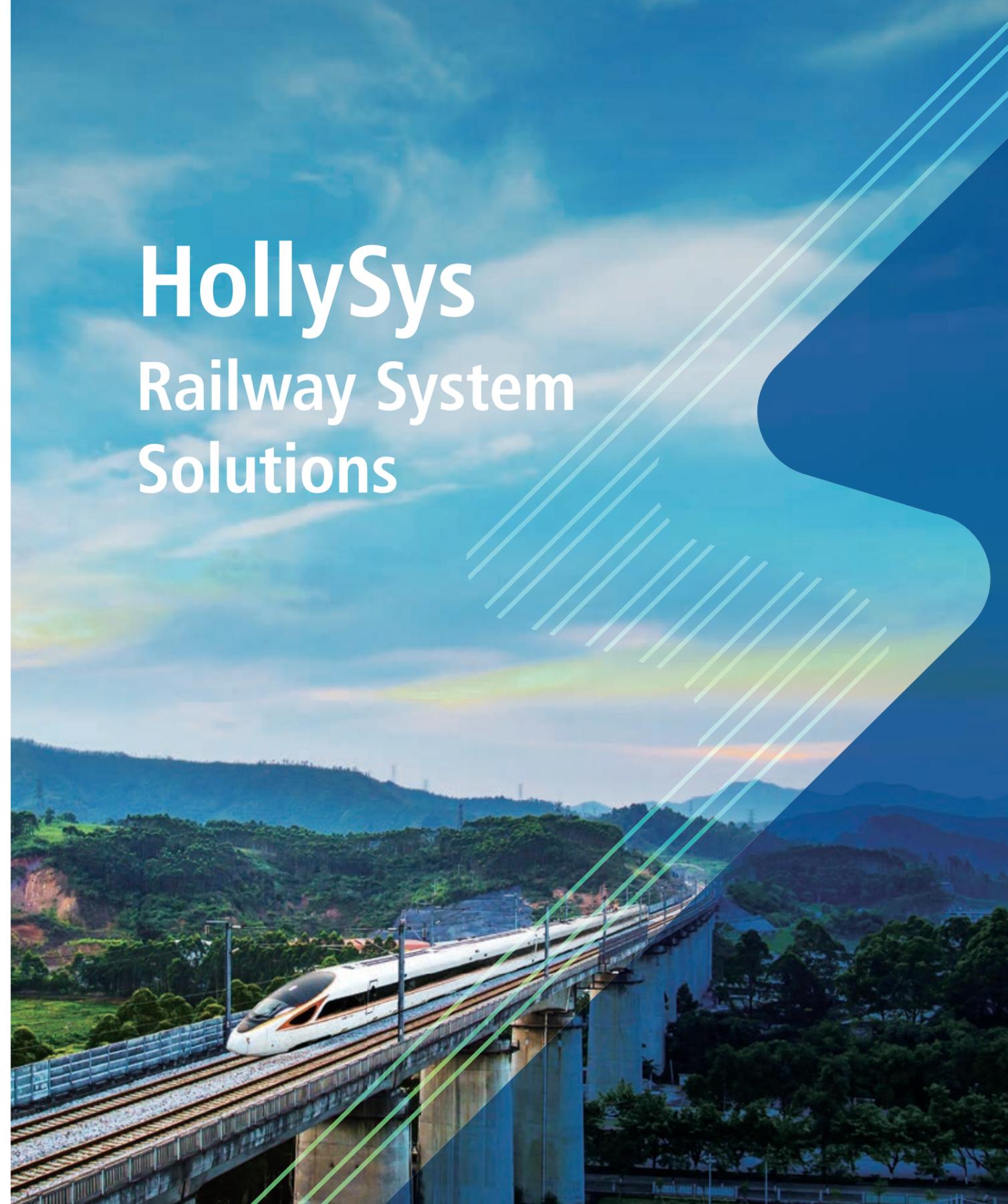


HollySys

Railway System Solutions



BEIJING HOLLYSYS CO.,LTD

NO.2 DISHENG MIDDLE ROAD,BEIJING ECONOMIC -TECHNOLOGICAL DEVELOPMENT AREA,100176

P.R.CHINA TEL: 010 - 58981000 FAX: 010 - 58981100

WEB: WWW.HOLLYSYS.COM

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SOLUTIONS

TOTAL SOLUTIONS FOR BETTER TRANSPORTATION

As an experienced Contractor, turnkey provider, systems integrator and manufacturer, HollySys provides comprehensive Customer-Oriented Solutions in railway system industry. From mainline railway to Metro, from Urban to inter-city railway, and from High Speed Railway to freight Railway transportation, HollySys provides overall advanced solutions for design, manufacturing, installation, testing & commissioning, maintenance and operation of Signalling System and Main Control System. In addition, HollySys proposes the cost-effective and sustainable solutions for each project type, such as constructions of new lines, connections of different lines, extension and renovation of existing lines. Through continuous technological innovation ability and strong R&D capacity, HollySys provides up-to-date technical solutions and safe products to meet customers' requirements.

Signalling System Solution for Railway

Signalling System Solution for Metro

Signalling System Solution for New Types of Rail Transit

SCADA System Solution

Intelligent Urban Rail Solution Based on Cloud - Edge - End

Intelligent Railway Maintenance Solution

New Technical Solutions for Rail Transit



Signalling System Solutions for Railway

Proven Record of Solid Credibility

Based on many years of experience in the field of Control Command Signalling systems and continuous improvement of the products, HollySys provides suitable and advanced railway signalling system solutions to the clients, which covers high-speed railway, intercity railway, traditional railway and industrial railway for freight transportation.



- Railway Basic Signalling System Solution
- ERTMS/ETCS LEVEL 1 Solution
- ERTMS/ETCS LEVEL 2 Solution
- PTC System Solution
- Train Control System Solution for High-speed Railway (up to 250km/h)
- Train Control System Solution for High-speed Railway (up to 350km/h)
- Next Generation Train Control System Solution for High-Speed Railway
- ATO Solution for High-Speed Railway
- Signalling Solution for Industrial Railway

Railway Basic Signalling System Solution

System Introduction

In order to meet the needs of customers who construct railway lines with limited investment, HollySys has developed a set of Basic Signalling System (BSS) which conforms to global standards, is safe and reliable, can be deployed quickly with low investment.

BSS system is composed of Centralized Traffic Control system, interlocking system, train detection system, point machine, signal and maintenance monitoring system, etc. The BSS realizes the functions of centralized dispatching management of trains, safety train operation, signal display & control and maintenance diagnosis. BSS can work independently or as a backup signalling system of more advanced level signalling system.

BSS system, as a basic signalling system, can be upgraded to other advanced level signalling system easily. It can be used for railway project with construction requirement of gradual upgrade in different phases.

Features



Safety and Reliability

The control equipment has proven record of reliability and fulfills various standards. The core equipment such as interlocking and train detection system have got SIL4 certification. Based on the principle of fail-safe, with functions of self-inspection, self-diagnosis and maintenance, BSS guarantees the safety and reliable operation of trains.



Expansibility

The system adopts modular and standardized design, can be easily expanded to meet the needs of extension and renovation, to realize a larger scale project.



Flexibility

The interlocking system can be equipped with centralised or regionally distributed according to user requirements. The interface between the interlocking host and I/O devices can be wired or wireless.



Compatibility

With standardized universal interface protocol and modular system design, it can be overlaid and upgraded to other more advanced signalling systems.

Customer Value



Short Construction Period

Mature solutions and system equipment in a modular and standardized design way, assembly and testing in factory make it easy to be implemented. It is helpful for shortening the construction period.



Upgrade Gradually

After the signalling system is put into operation, it can be seamlessly upgraded to a signalling system with higher automation level by a simple superposition renovation if needed.



Low Investment

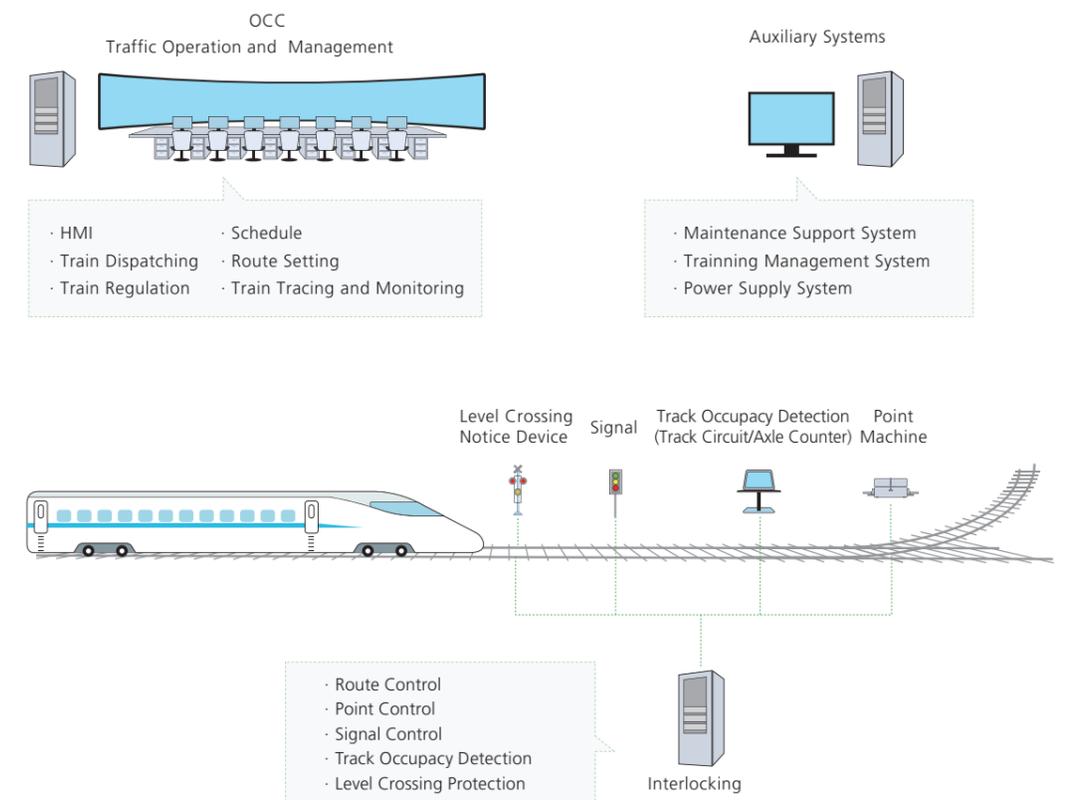
Basic signalling control system and high-reliability equipment with maintenance support system can reduce construction and maintenance costs.



Customized Service

The display of HMI (icons, layouts, etc.) and operation manner can be customized according to different national standards, different user requirements and site conditions.

System Composition Diagram



ERTMS/ETCS LEVEL 1 Solution

System Introduction

ETCS Level 1 is a intermittent transmission based train control system with an underlying signalling system. movement authority is generated trackside and transmitted to the train via balises, a continuous speed supervision system is provided on board, which also protects against exceeding the authority. HollySys has developed it according to international railway standards and has obtained Baseline-3 (B3R2) TSI certification for both trackside (LEU and balise) and on-board signalling equipment. The ERTMS/ETCS Level 1 solution offered by HollySys includes a centralised traffic control system, an intelligent maintenance system and an ETCS Level 1 system. It can be equipped with distributed computer-based interlocking or solid static interlocking systems. Through wireless communication, the system achieves remote control of trackside equipment and intelligent maintenance of signalling equipment.

Features

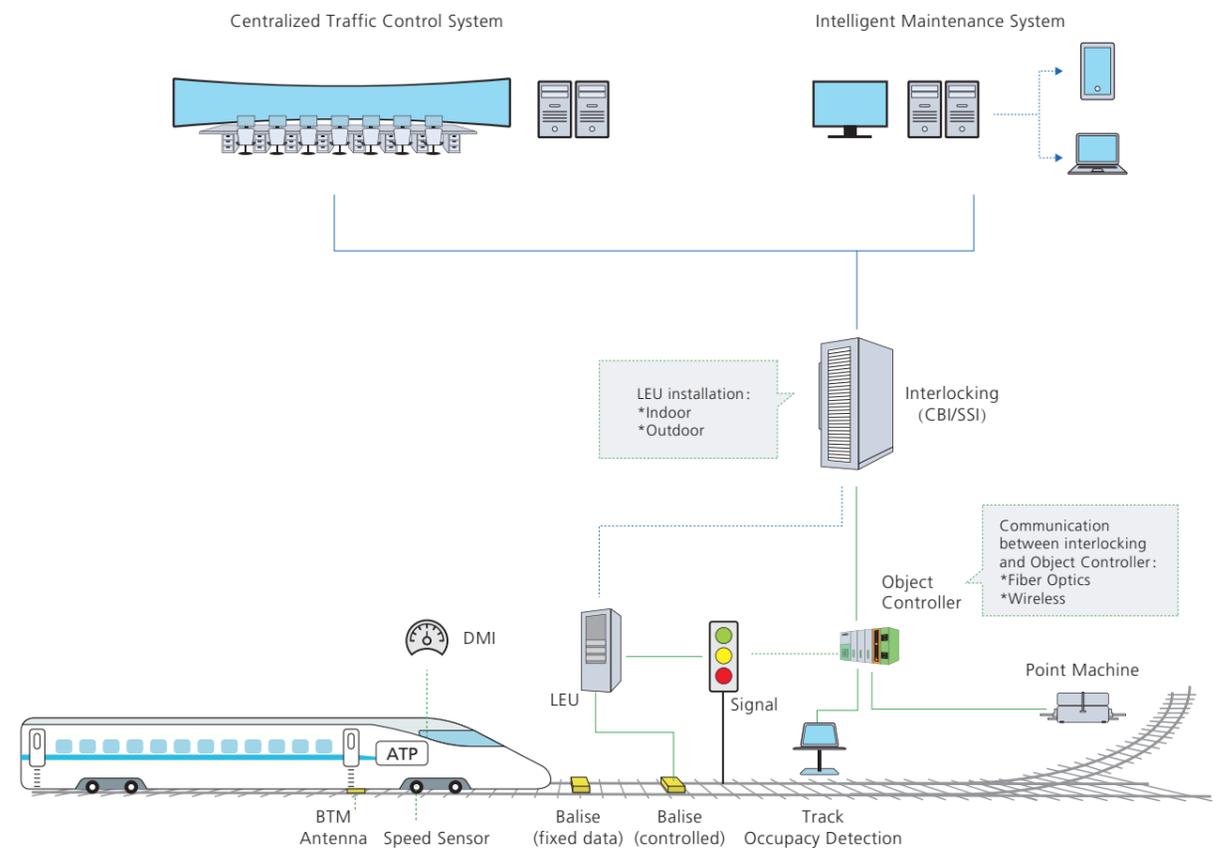
- Intermittent**
 Realize the transmission of movement authority, line description and temporary speed restriction between trackside and on-board system based on Balises.
- Widely Used**
 Easily overlaid on a variety of existing signalling systems on railways in different countries.
- Flexible Configuration**
 The system can be tailored flexibly according to existing national systems and user requirements; Trackside control equipment could be flexibly deployed indoors or outdoors, wiredly or wirelessly according to site conditions.
- Functions Extension**
 With the technology of Cloud Computing and Big Data Analysis, it can achieve intelligent maintenance for both trackside and on-board equipment to meet different requirements.



Customer Value

- Customized Service**
 The system implements a customized configuration according to different models, user requirements, communication type and site conditions.
- System Integration**
 The system integrates the functions of dispatching and maintenance. The trackside object controller(LOC) integrates the functions of control and acquisition, and is equipped with both wired and wireless modules to meet different interface requirements. Center equipment may integrate with the technology of Cloud Computing and Big Data Analysis; By integrating the status of equipment at different levels, it improves the intelligence of the whole system.
- Cost Saving**
 Thanks to the improved communication among equipments, the level of both intelligence and integration of equipment have been enhanced, thus saving the cost of equipment, design, construction and maintenance.

System Composition Diagram



ERTMS/ETCS LEVEL 2 Solution

System Introduction

ETCS Level 2 is a radio-based train control system with an underlying signalling system. It is based on continuous bi-directional wireless data communication between the Radio Block Centre (RBC) and the trains, with balises mainly for position referencing. HollySys has obtained Baseline-3 (B3R2) TSI certification for the RBC and the on-board train control system. The ERTMS/ETCS Level 2 solution offered by HollySys includes the Centralised Traffic Control System, the Intelligent Maintenance System and ETCS Level 2. It can be equipped with distributed Computer Based Interlocking or Solid Static Interlocking systems. In addition to conventional solutions, the system provides remote control of trackside equipment and intelligent maintenance of signalling equipment.

Features



Continuous Control

Train speed and the target-distance are controlled through onboard-trackside bi-directional transmissions of real-time data.



Interoperability

Enables the interoperability between ETCS level 2 railway lines and operation in degrade level.



Flexible Configuration

The system can be flexibly customised to match existing national systems and user requirements. Trackside control equipment can be flexibly deployed indoors or outdoors, wired or wireless, depending on site conditions. Lineside signals and object controllers are optional and can be suppressed if necessary.

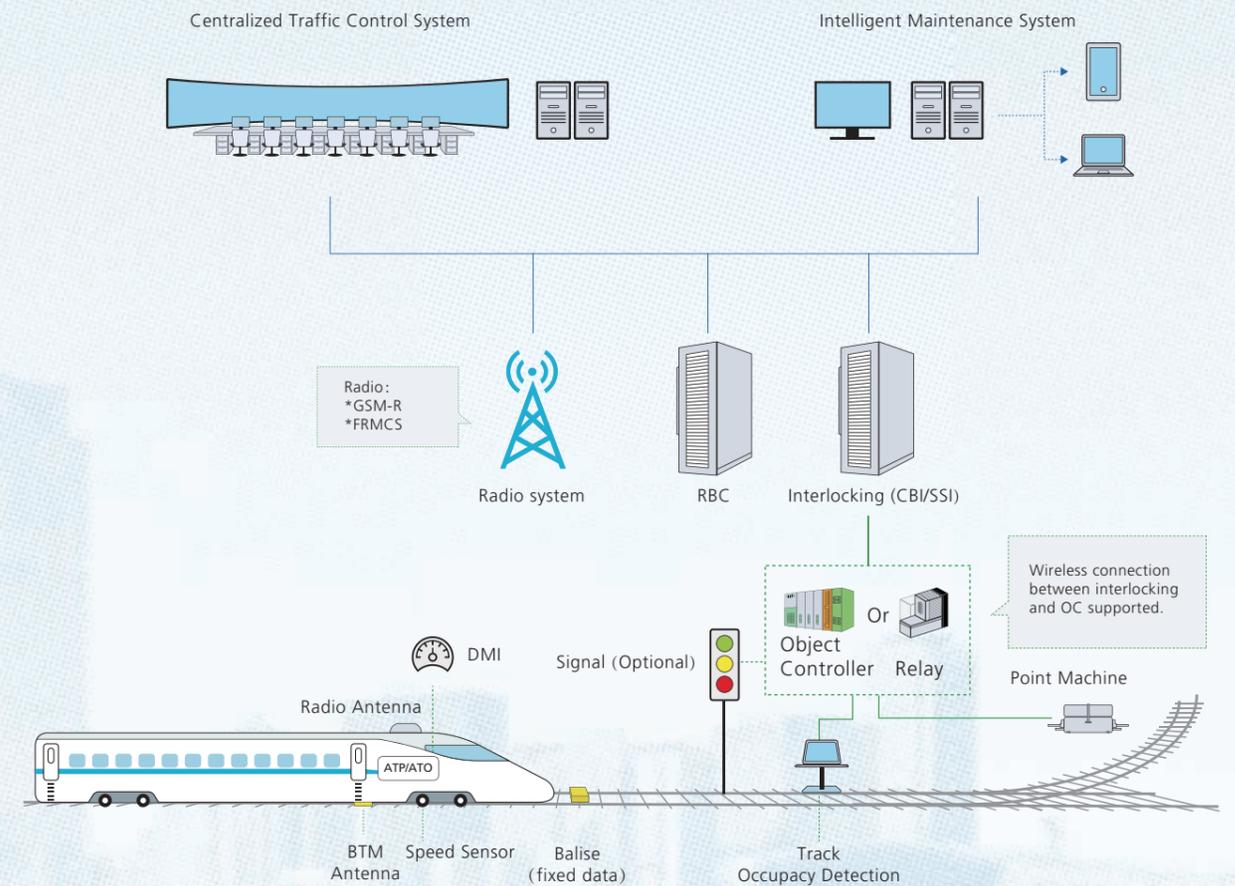


Integration

The Center system integrates the functions of dispatching and maintenance. The trackside object controller equipment integrates the functions of control and acquisition, it is also equipped with both wired and wireless modules.



System Composition Diagram



PTC System Solution

System Introduction

CDSS (Communication based Distributed Signalling System) is a Positive Train Control (PTC) system developed by HollySys. It integrates subsystems including Centralized Traffic Control, Control Command Signalling, Communication and Information, and control train operation in safe, reliable, accurate and effective ways.

PTC system can realize data transmission between control center, on-board and trackside equipment based on wireless communication, and realize train positioning by utilizing GPS. The track circuit/axle counter/balise are not mandatory on trackside, the control center can uniformly control signalling components distributively placed on the wayside. The system is featured by wider application, less equipment quantity, easy maintenance, flexible and efficient engineering configuration.

Features



Less Equipment

Satellite positioning is adopted, and track circuit/axle counter, balise and other trackside equipment can be removed. Interlocking hosts are centrally arranged, and object controllers are distributed beside the rails. The Interlocking hosts and object controllers communicate wirelessly, thus saving a large number of optical and electric cables.



Moving Block Technology

The system adopts "Moving Block" technology based on wireless communication, which optimize the headway.



Remote Maintenance

By using the remote mobile maintenance terminal, the maintainer can remotely apply for the operation of work zone, check the signal equipment and train running status, fill in the maintenance log, and other functions.



Customer Value



Widely Used

Be applicable to different types of freight and passenger lines.



Flexibility

Offer flexible and fast engineering configuration based on different requirements.



High Safety

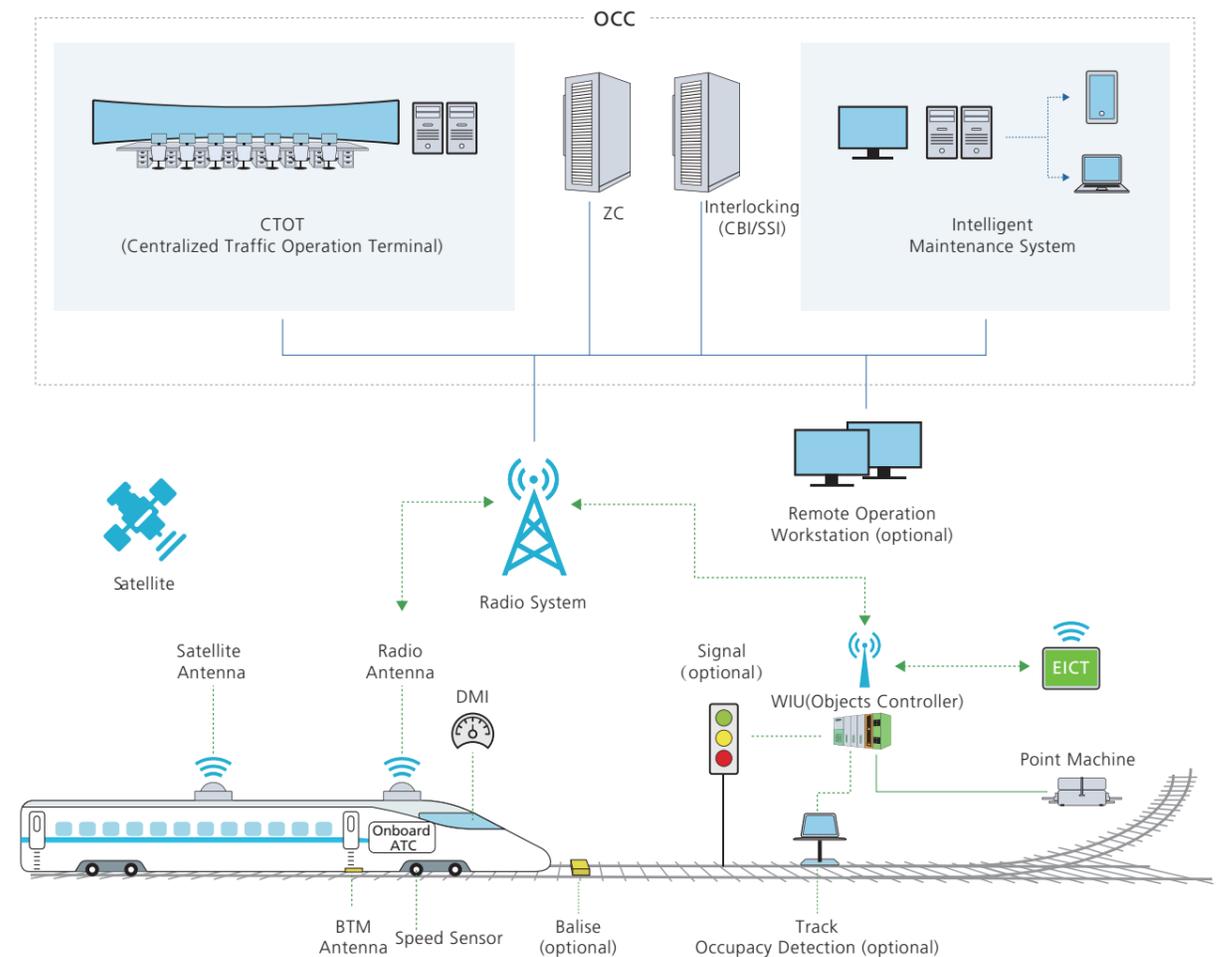
Meet the requirements of prevention of train collision, protection of rail workers against train impact, and prevention of trains from entering allowable restricted area defined by user.



Cost Saving

Distributively place signalling components on the trackside and achieve centralized control, which can reduce investment, energy consumption and maintenance work.

System Composition Diagram



Train Control System Solution for High-speed Railway (up to 250km/h)

System Introduction

Continuous transmission of movement authority (MA) from track to train via track circuit, spot transmission of line data, route status and temporary speed restricted information from track to train via balises. Train Control Center generates train operation permission (low frequency information and Temporary Speed Restriction) and send to the on-board equipment through variable balise and frequency shift track circuit. Balises are needed to transfer positioning information, line parameters, speed limit and parking location information to the onboard equipment.

Features



Safety and Reliability

It is based on the principle of fail-safe, conforms to IEEE, IEC, CENELEC standards and national railway standards. The core equipment such as train control center, interlocking, track circuit, on-board ATP, LEU, balise have got SIL4 safety certificates. The control equipment has proven record of reliability and performs various functions of self-inspection, self-diagnosis and maintenance, which guarantee the safe operation of trains.



ATO Functions Support

The system can be configured with ATO (GoA2) equipment in order to realize automatic train operation.

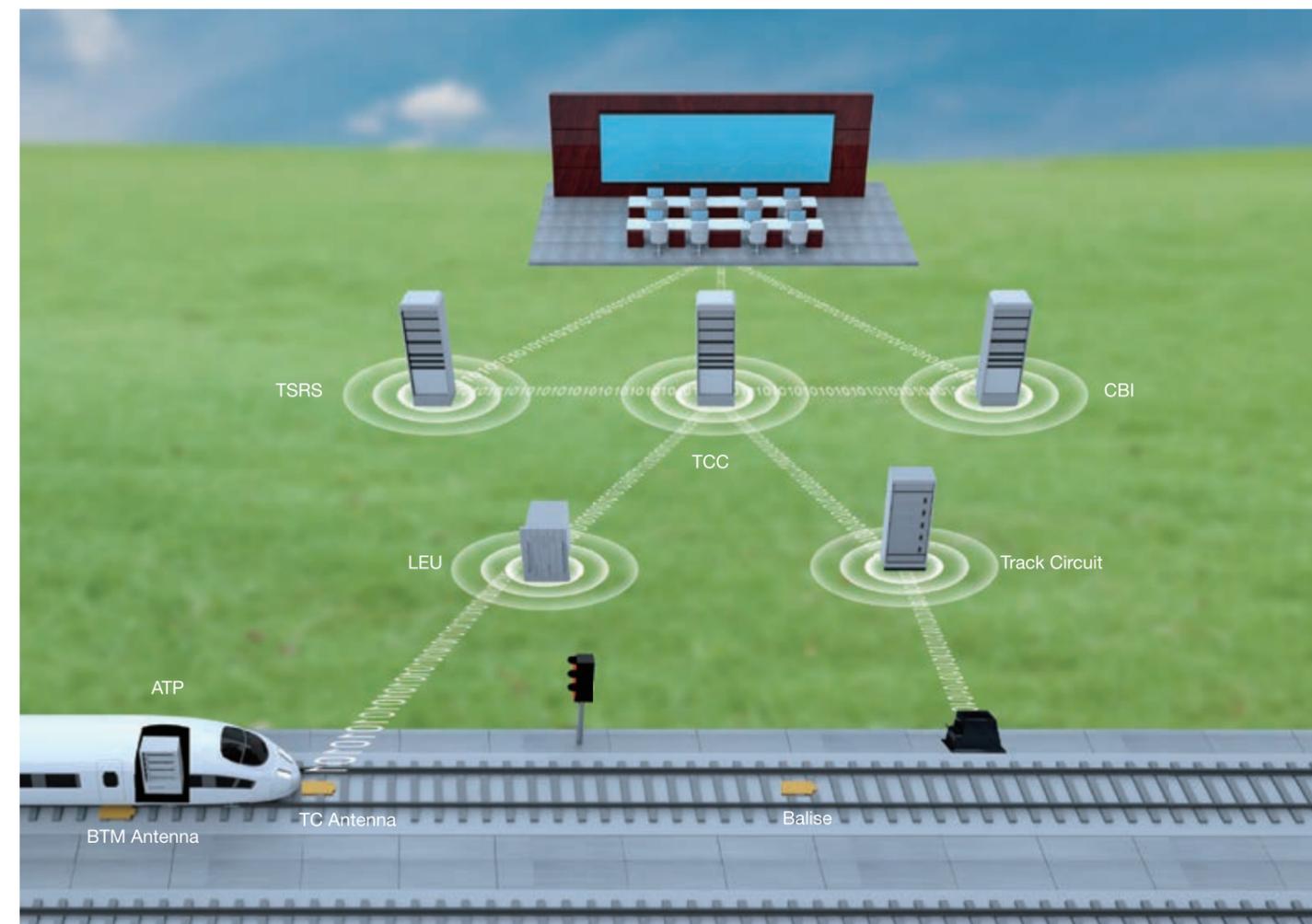


Transport Efficiency

The system can ensure the safe operation of trains at a high speed up to 250km/h, with a minimum 3 minutes train headway and high transport efficiency.

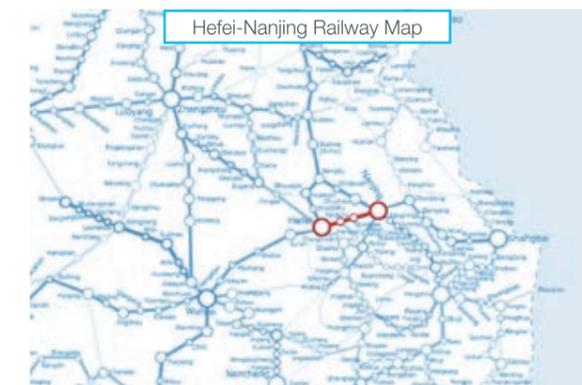


System Composition Diagram



Typical Cases

In 2008, HollySys CTCS-2 Train Control System has been successfully applied to HeFei-Nanning Line which is the first high speed rail line of 250km/h in China.



Train Control System Solution for High-speed Railway (up to 350km/h)

System Introduction

It is based on RBC and GSM-R to realize train control message bi-direction data transmission between on-board and trackside equipment and adopts target distance continuous speed control mode to monitor the safe operation of trains.



Features



Safety and Reliability

Based on the principle of fail to safe, it conforms to IEEE, IEC, CENELEC standards and national standards. The core equipment such as RBC, interlocking, on-board ATP and balise have got SIL4 safety certification, and the time-proven control equipment has high reliability and plenty functions of self-inspection, self-diagnosis and maintenance, which can effectively guarantee the safe operation of trains.



Continuous Train Operation Control

RBC provides the train with "continuous" train movement authority (MA) through the train-ground wireless communication system, and the on-board equipment adopts continuous speed mode curve to control the train operation.



Continuous Bi-Directional Data Communication

GSM-R wireless communication technology is adopted to realize bi-directional data continuous transmission between RBC and train.

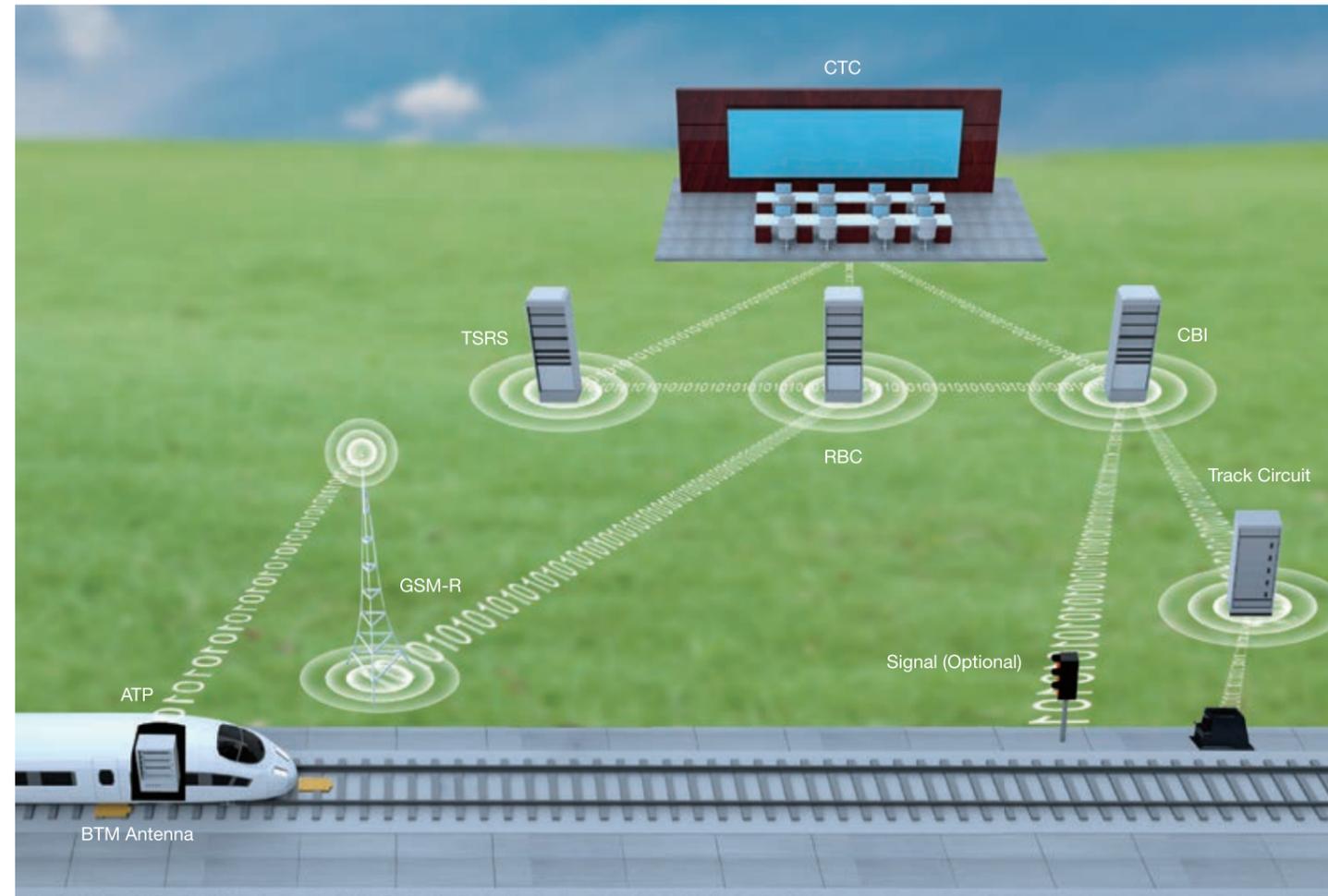


ATO Functions Support

The system can configure ATO equipment to realize automatic train driving.



System Composition Diagram



Customer Value



Cost Saving

The system adopts integrated design, all-electronic design and lineside object control technology to reduce the number of equipment, cables and civil engineering requirements. The equipment has high reliability, low maintenance or no maintenance requirement, and is equipped with maintenance support system, which can effectively reduce the construction and maintenance costs and minimize the investment.



Transport Efficiency

The system can ensure the safe operation of trains at a high speed up to 350km/h, with a minimum 3 minutes headway and high transport efficiency. Automatic driving of high-speed trains can be realized when ATO functions is configured, which can further improve transportation efficiency.

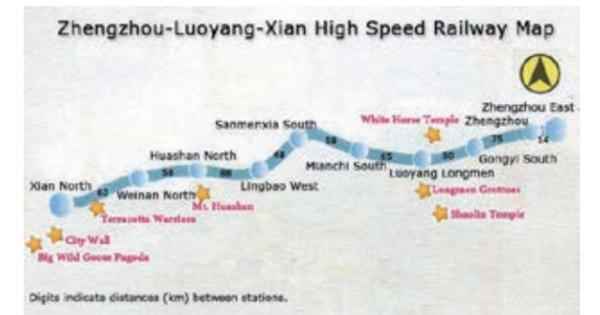


Customized Service

According to different national standards, different user needs and different site conditions, customized configuration can be carried out.

Application Cases

In 2010, HollySys Train Control System has been successfully put in revenue service in Zhengzhou-Xi'an rail line in China. The length of this line is 505km and includes 10 stations with 42 repeater stations. The maximum running speed of this line is 350km/h.



Next Generation Train Control System Solution for High-Speed Railway

System Introduction

Based on HollySys continuous accumulation and innovative research in the technical fields of signalling, control, communication and computer, we have designed and developed a new generation of high-speed railway train control system, which has large transportation capacity, high comfort, high intelligence and high cost performance on the essential of safety and reliability.

The system is composed of intelligent dispatching equipment, RBC, Interlocking, on-board equipment, satellite positioning equipment, wireless communication equipment and intelligent operation and maintenance equipment, etc. It adopts moving block technology or virtual block technology which is based on wireless communication (configurable), it has the capability of multi-source fusion autonomous positioning. There is no need for block signal, track circuit or axle counter beside the track, and the balise can be optional.

Features



Safety and Reliability

Based on the fail-safe principle, it conforms to IEEE, IEC, CENELEC standards and national standards. The core equipment such as RBC, TSRS, on-board equipment, satellite positioning system and interlock have got SIL4 safety certification, and the control equipment have proven record of reliability and fulfills intelligent diagnosis functions, which guarantees the safe and reliable operation of trains.



Moving Block Technology

The system controls trains based on the principle of moving block. According to the real-time position reported by trains, it dynamically calculates the movement authority at the rear of the ahead train, effectively reducing the headway between trains.



Bi-Directional Wireless Communication

The system supports wireless communication technologies such as GSM-R, LTE and 5G, and realizes bi-directional data communication between trackside equipment and on-board equipment, fulfill real time information transmission such as line data, moving authority and train position report in real time.



Multi-Source autonomous Positioning

On-board equipment combines various information such as satellites, balise, speed sensors and digital maps, and locates trains through multi-source fusion algorithm.



Train Integrity Check

The on-board equipment can judge the train integrity through satellite, sensor, wind pressure monitoring and other information. It also can cooperate with train tail equipment EOT to jointly check the train integrity.



ATO Functions Support

The system can configure ATO equipment and functions as required to realize automatic train driving.



Customer Value



System Integration

The ground facility adopts interlocking train control integrated equipment, which can realize train control functions on the ground such as movement authority, line data and interlocking control. It has simplified the system composition and data flow, and reduces the occupied space of equipment.



Transport Efficiency

The system performs train tracing based on moving block, resulting in short train headway and high transport efficiency. When ATO functions is configured, automatic train driving can be realized, and transportation efficiency can be further improved.



Cost Saving

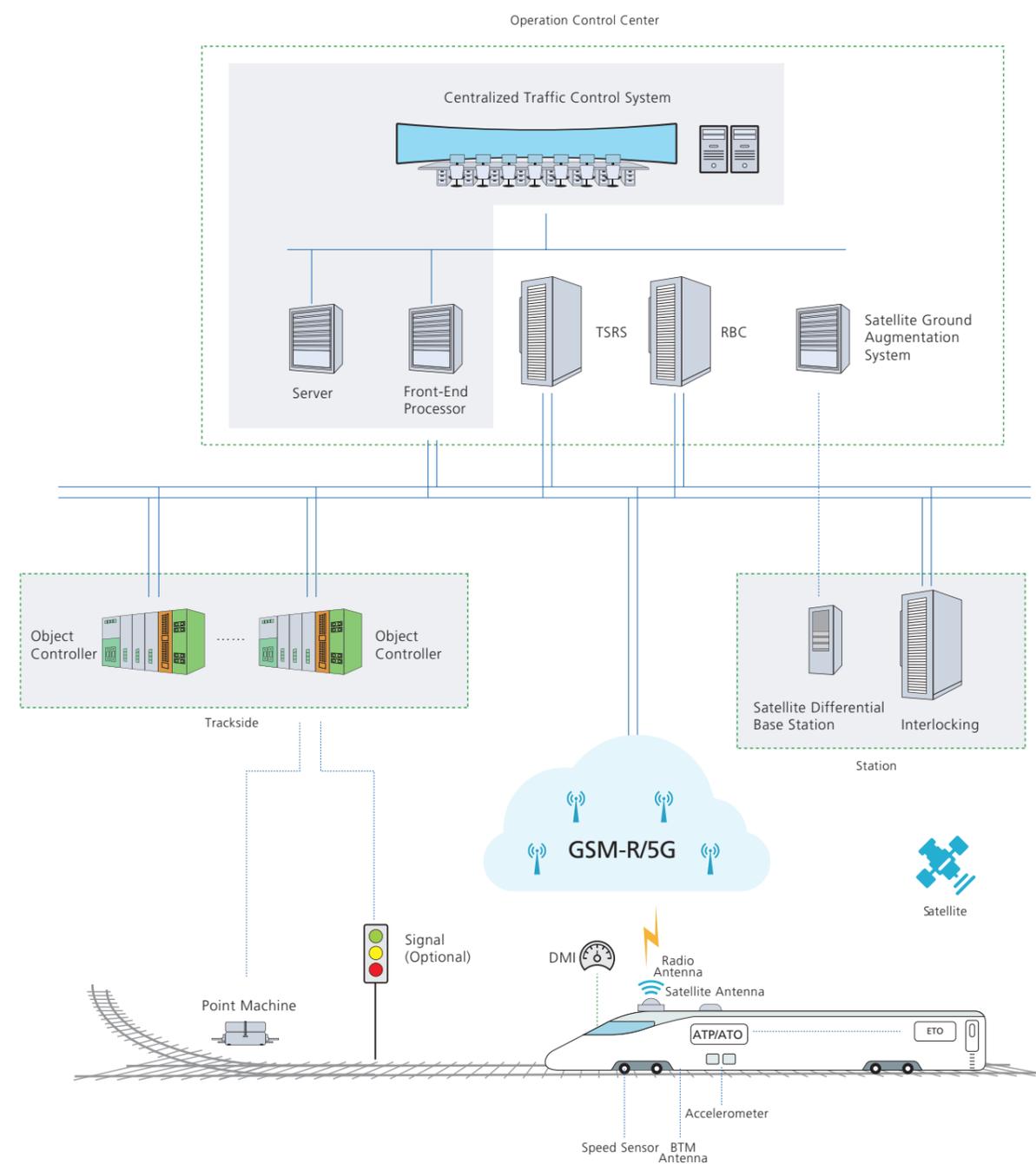
Due to the adoption of wireless communication, train independent positioning and integrated design without relying on track circuit, all-electronic design and lineside object control technology, the number of trackside equipment, the amount of cables and civil engineering required are reduced, and the high-reliability equipment is equipped with intelligent operation and maintenance functions, which effectively reduces construction costs and post-maintenance costs.



Customized Service

According to different national standards, user's needs and site conditions, customized configuration can be carried out.

System Composition Diagram



ATO Solution for High-Speed Railway

System Introduction

HollySys provides ATO (GoA2) technology for railways with running speed to 350km/h, which helps to realize automatic train control to improve transport efficiency, reduce labor intensity of drivers and ensure passenger safety.



Features



SIL2 Safety Certification

The system adopts redundancy design and has SIL2 safety certification.



High Stopping Accuracy

The system can accurately stop on the platform with stopping deviation less than 50cm on the 350km/h high-speed railway line.



ATO Self-learning Technology

The system adopts online self-learning technology to realize more accurate train control, so as to eliminate the influence of train control caused by line changes and vehicle performance differences, and enhance the robustness and stability of ATO controller.



Energy Saving

While meeting the operation target, the system optimizes the dwell time and trip time of trains at various stations and block sections, so as to achieve the macro-level energy efficiency.

It also saves energy for each single train through the automatic control algorithm of train speed when the traction voltage collection is added as the basis for calculating the target speed.



Customer Value



Automatic Operation

Improve transport efficiency, and reduce labor intensity of drivers.



More Efficient Maintenance and Diagnosis System

Improve intelligence and maintainability.



More Accurate Control of Operation Speed and Arrival & Departure Time

The system can realize more stable operation, more comfortable journey, less energy consumption and lower operation cost, and deliver punctuality and efficiency.

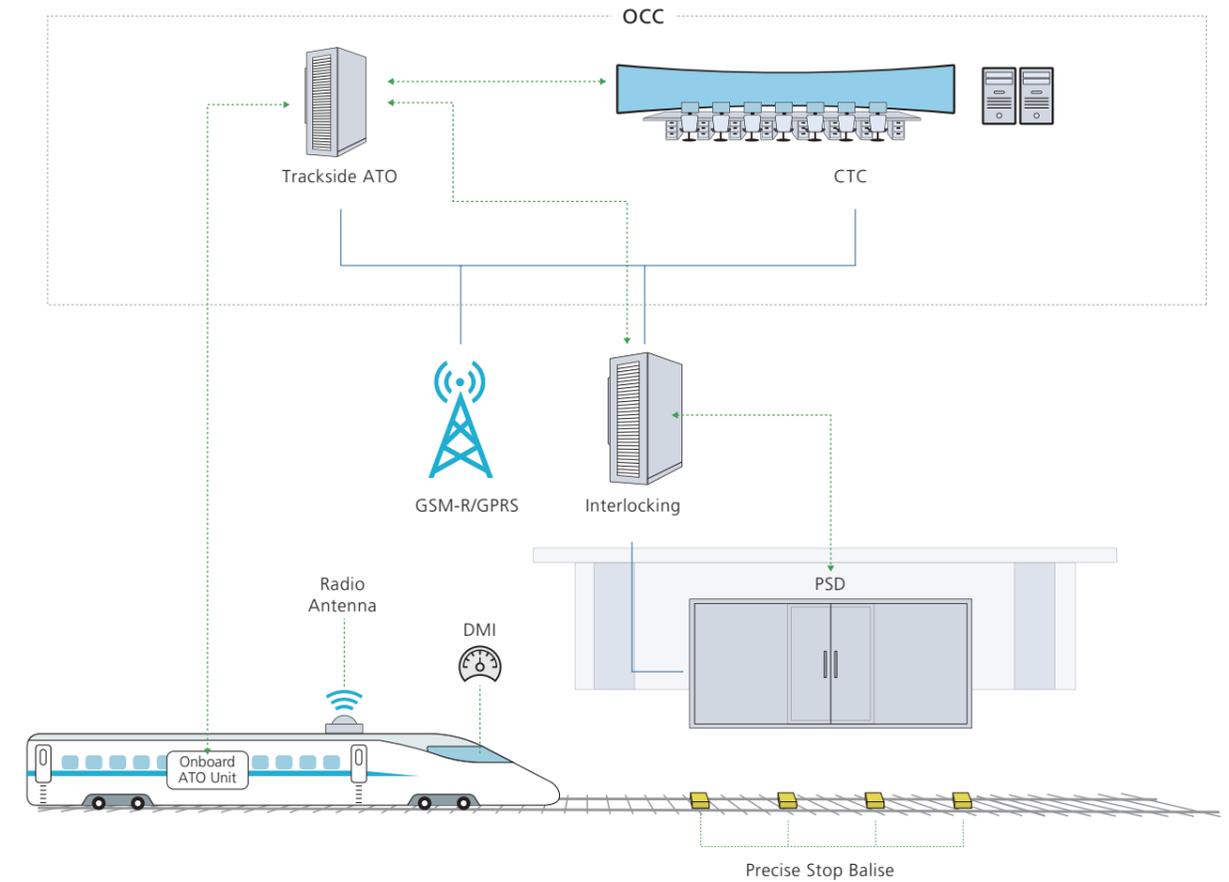


More Accurate Train Stopping Control, Train Door/Platform Screen Door Coordinated Control

The system will ensure safety of passengers when getting on/off the train.



System Composition Diagram



Typical Cases

In 2017, HollySys initially developed 350km/h ATO System, for high-speed rail and has been applied in Beijing-Shenyang Line.



Signalling Solution for Industrial Railway

System Introduction

HollySys delivers a full range of turn-key solutions aimed to increase the economic value of the Industrial Railway Lines (e.g. Mine-to-Port, Point-to-Point), decrease cost and regulate the operations according to the specific Customers' needs.

- Dynamic business-driven train / fleet scheduling
- Profit-oriented traffic management
- Throughput-efficient operations management

This Signalling System of HollySys is a standard solution for Global Freight applications and the update iteration of a long series of train control systems offered by HollySys for Freight Applications in the marketplace. It takes a staged approach foreseeing scalability and reuse of the installed equipment of the previous stage.

Features



Active Control

Realize the functions of train autonomous positioning and active protection based on satellite positioning, target control and other technical means.



Support Wireless

Realize remote control of turnout, signal and other equipment through communication between central equipment and wayside equipment.



Deep Integration

Integrate the train control system with other systems through network technology to deliver a more comprehensive system monitoring and management to meet the diversified user's needs.



Intelligent Maintenance

Know the status of each element in real time through the Internet of Things (IoT) and realize preventive maintenance and intelligent maintenance based on cloud computing and big data analysis.

Customer Value



Simplified System

The system structure are simplified and there is less equipment, which greatly reduces the construction cost, design cost and operation and maintenance cost.



Service as Core

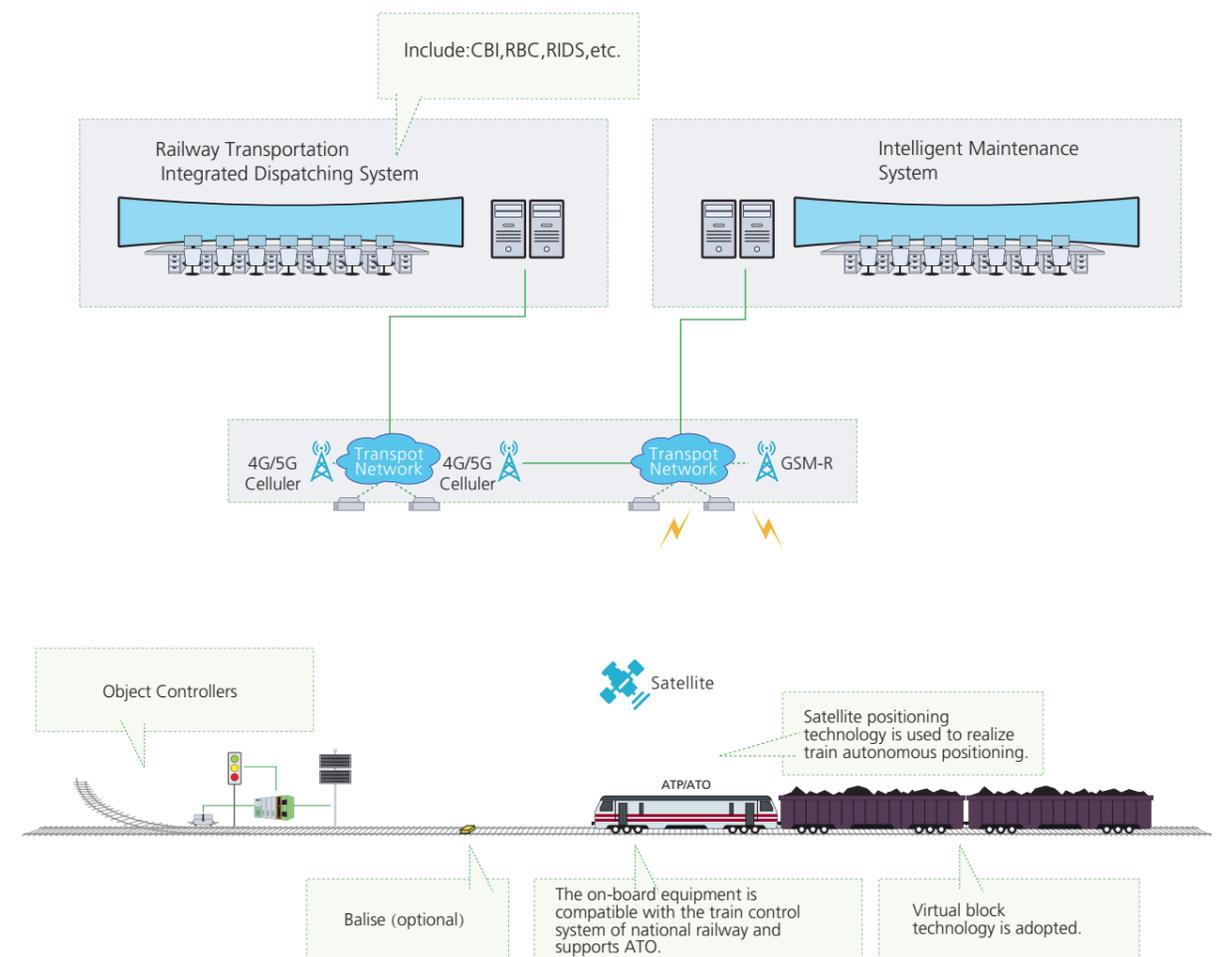
The central equipment supports the simultaneous operations of multiple lines, and can be customized according to the needs of users.



Intelligent Operation and Maintenance

Based on the unified operation and maintenance platform, the intelligent operation and maintenance is realized by using technologies such as big data and cloud platform.

System Composition Diagram



Signalling Solution for Metro

HollySys supports its global clients to create more reliable and sustainable metro networks that relieve the pressure of urban mobility and meet the challenges of population and city growth.

Based on advanced technology, HollySys provides the high cost-effective signalling system solutions for mass transit systems.



- CBTC Solution
- Fully Automatic Operation System Solution
- Train Autonomous Circumambulation System Solution
- General Signalling Solution for Multi-Standard Train Control System

CBTC Solution

System Introduction

CBTC is a train control system using bi-directional wireless communication between on-board system and wayside equipment. Based on the train location information obtained through wireless communication, the system generates a MA based on Moving Block Principle. CBTC System enables safe movement of each train and unmanned operation through ATO.

HollySys CBTC System configured with SIL4 system meets Global Standards and assures world-class reliable train operation.



 IEEE 1474 for CBTC.

 Safety assurance through 2 out of 2 Composite Fail-Safe structure.

 EN50126/50128/50129 standards of SIL4 system.

 Reliability assurance through Hot-Standby duplex structure.

Features



Global Standards

- Compliant with IEEE, IEC, CENELEC standards and national standards



High Safety and Reliability

- Developed based on proven trackside safety platform and general on-board safety platform which are both SIL4 certificated
- All core subsystems are SIL4 certificated in GA/SA level
- The system has been verified in domestic and overseas subway projects



Multi-level and Multi-system

- Support intermittent, intermittent and continuous, and continuous train control.
- Adapt to train control system requirements on subway, light rail, APM, monorail, tram, intermediate and low speed maglev train and urban railway
- Support fully-automatic train operation system and realize GOA4-level automatic operation
- Realize interoperability of rail transits, support network operation and provide technical support for sectional reconstruction of existing lines



Efficient Maintainability

- Lower maintenance cost
- Higher maintenance efficiency
- Expansibility
- Platform and modular design
- Tolerant and redundancy design

Customer Value



Be safe, stable and controllable.



Improve reliability and transport efficiency.



Reduce life cycle costs and investment risks.

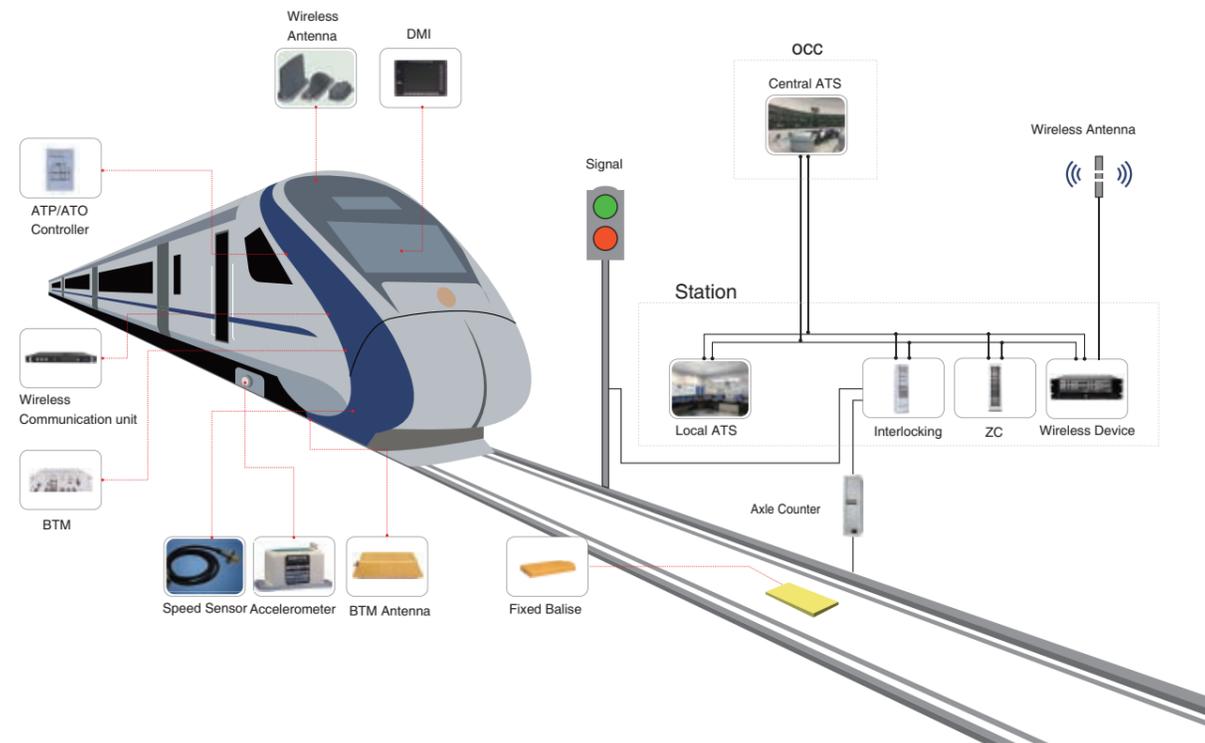


Improve service quality.



Be customizable.

System Composition Diagram



Typical Cases

Beijing Subway Changping Line

As a system integration contractor, HollySys has successfully implemented Beijing Subway Changping Line Signalling project. Phase 1 has been in operation since December 28th, 2010. Phase 2 has been in operation since December 26th, 2015.



Kunming Changshui Airport Line

As a system integration contractor, HollySys has successfully implemented Kunming Changshui Airport signalling Project. The project has been in operation since June, 2021.



Fully Automatic Operation System Solution

System Introduction

Fully Automatic Operation (FAO) is the highest level in the automation of urban rail transit train operation.

The FAO system is an advanced signalling system based on CBTC. It is mainly composed of Train Integration Automatic System (TIAS), ZC, DSU, CBI, VOBC and DCS.

The train operation can be completed automatically by the FAO system without manual attendance, such as train wake up and train sleep. The FAO system solution becomes the best choice for urban rail transit at present.

HollySys FAO system is equipped with system functions conforming to global standards, supports interconnection between lines, and can realize DTO or UTO operation according to specific operation requirements of users.



Automatic operation totally unattended.



Enhance security technology and improve security.



Enhance system reliability through multiple redundancy.



Realize full-process and full-time automatic processing.

Features



Interoperability

The system adopts Interoperability technology to realize the train running on the same line or across lines that signalling system supplied by different suppliers, and to realize network operation.



High Integration

The system takes the TIAS as the Core and integrates other related systems such as SCADA, BAS, FAS, PIS and PA based on a unified platform.



Enhance Safety

On the basis of configuring SIL4 equipment, realize safety operation by adding train obstacle detection system, platform clearance detection system and SPKS.



High Reliability

The system adopts redundancy measures to further improve the reliability, for example, end-to-end redundancy design of BTM antenna, speed sensor and accelerometer; ATO equipment adopts redundant design; TCMS network and hard-wired redundancy are adopted for interface with vehicles.



Customer Value



Safe and Reliable

FAO is capable of ensuring the safety of trains, passengers and operators. The multiple redundancy design significantly reduces the system failure rate compared to traditional GoA2 technology, further improving system reliability.



Cost Saving

With less operation staff and maintenance staff required, the cost of manpower is reduced significantly.



Efficient Transportation

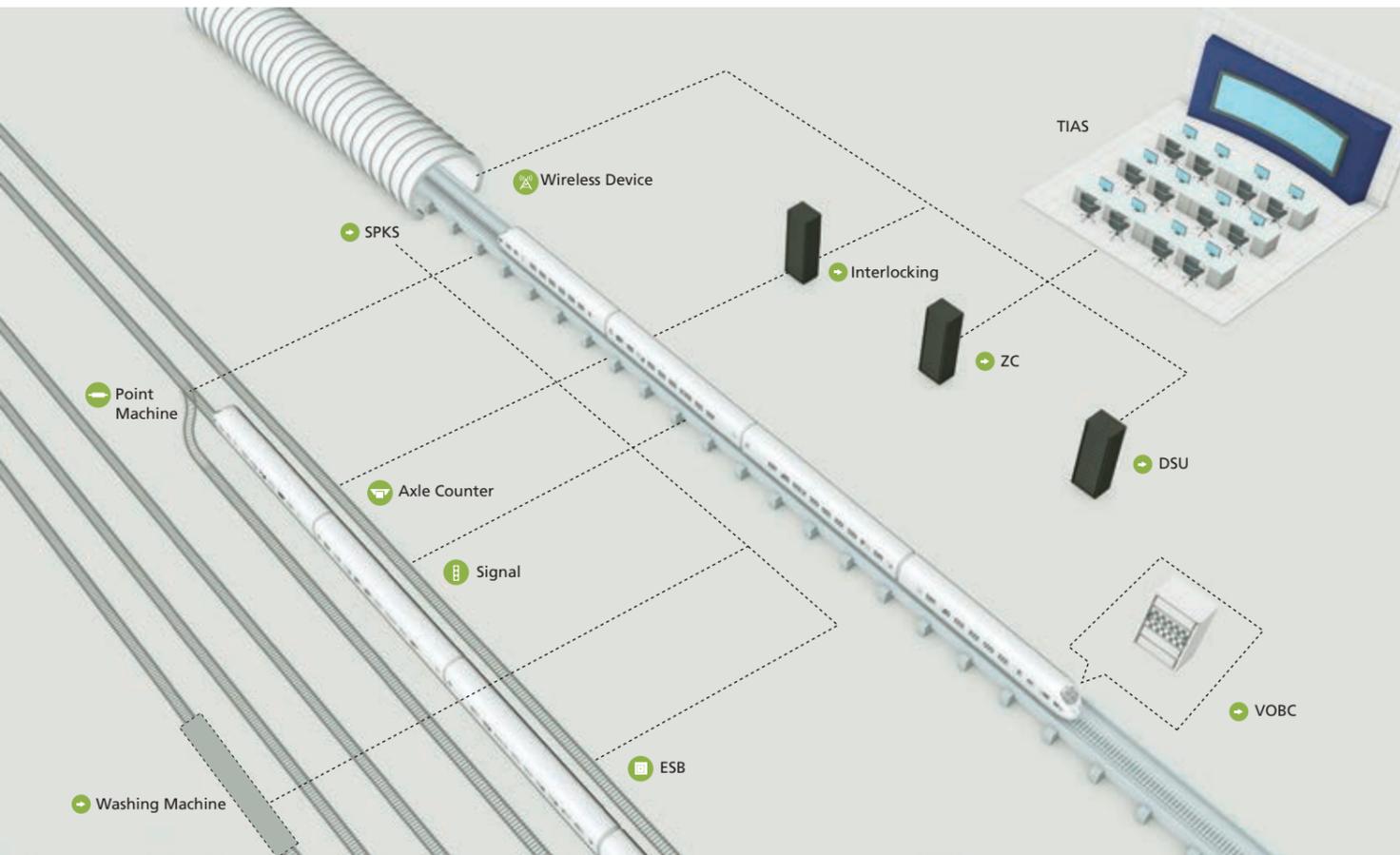
The automation level of the system is GoA4, which reduces the response time of driving operation and saves the stop time.



Improve Service Quality

All-round safety design ensures passengers' safety, and high-reliability design reduces transportation interruption or inefficiency caused by system failure, reduces passengers' transfer through interconnection, saves passengers' travel time and improves passengers' travel satisfaction.

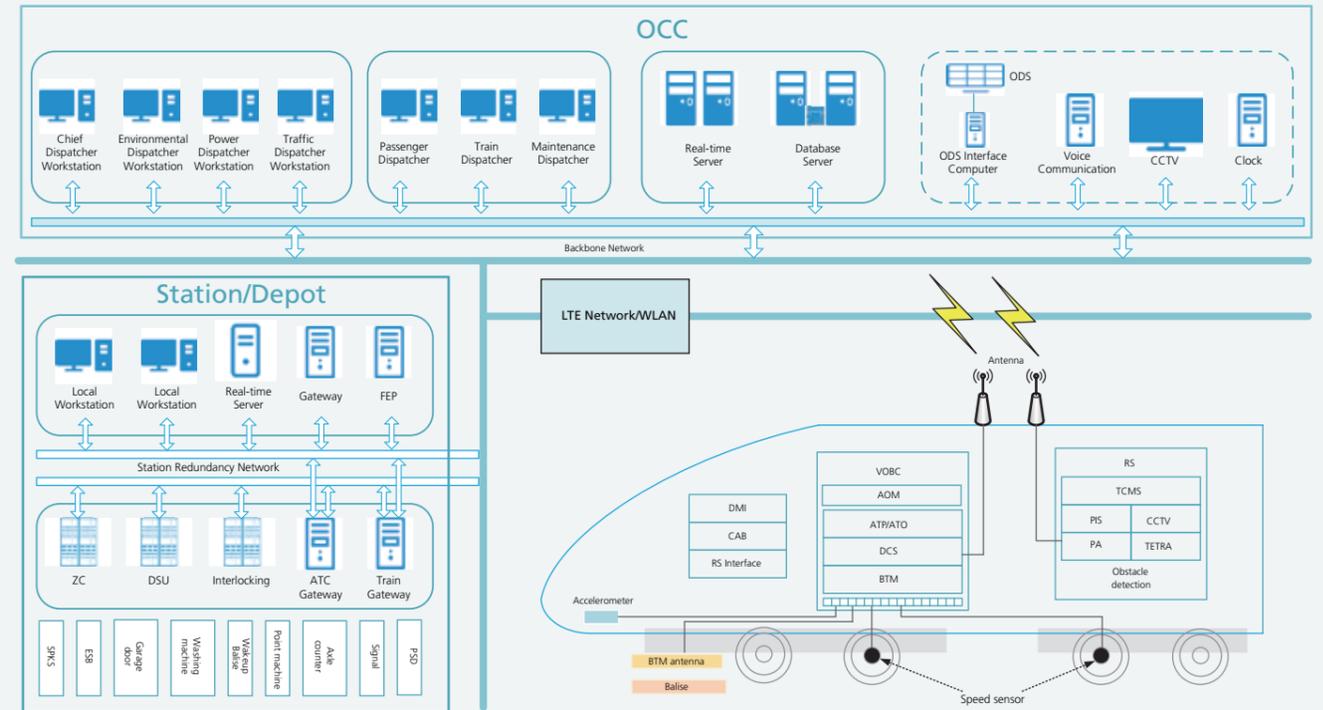
System Composition Diagram



Typical Cases

Beijing Subway Line 17

HollySys FAO system has been successfully applied to Beijing subway line 17. The project has been in operation since December, 2021. In this project, FAO interoperability has been realized between HollySys and other suppliers.



Train Autonomous Circumambulate System Solution

System Introduction

As users have higher demands for transportation capacity, operation and maintenance, HollySys has combined advanced train control technology and experience to develop the next generation of train control system: a system based on active control. This system takes the train as the center and simplifies the system architecture and trackside equipment through the innovation of train operation control concept. It realizes the on-demand use of trackside resources and independent operation of trains, and provides users with higher transportation efficiency and more flexible operation capacity to save costs.



Based on wireless communication.



Combining train-to-train communication and intelligent sensing technology.



Thanks to train centric solution, train separation, level of line resource utilization, operation headway are improved; the architecture of the system is simplified.



Realizing information communication, remote control and intelligent maintenance among equipment via network.

Features



Initiative Control

Realize automatic route detection, control of resources of line according to needs, automatic train protection based on train-to-train communication and target control technologies.



Remotely Control

The wireless communication is used to support the information exchange between OCC equipment and wayside equipment, which can realize the remote control of point machines and signal etc.



Highly Integrated

A more comprehensive monitoring and management system can be established based on the network technology. Furthermore, the integration of train control system and other systems can meet different requirements of customers.



Intelligent Maintenance

Acquire real-time equipment status through the Internet of Things (IoT), and realize preventative and intelligent maintenance based on cloud computing and big data analysis.



Customer Value

Higher Transport Capacity

By means of train-to-train communication and resource utilization as needed, the train headway and turn-back interval are reduced, and the transport efficiency is improved.

Higher Operational Availability

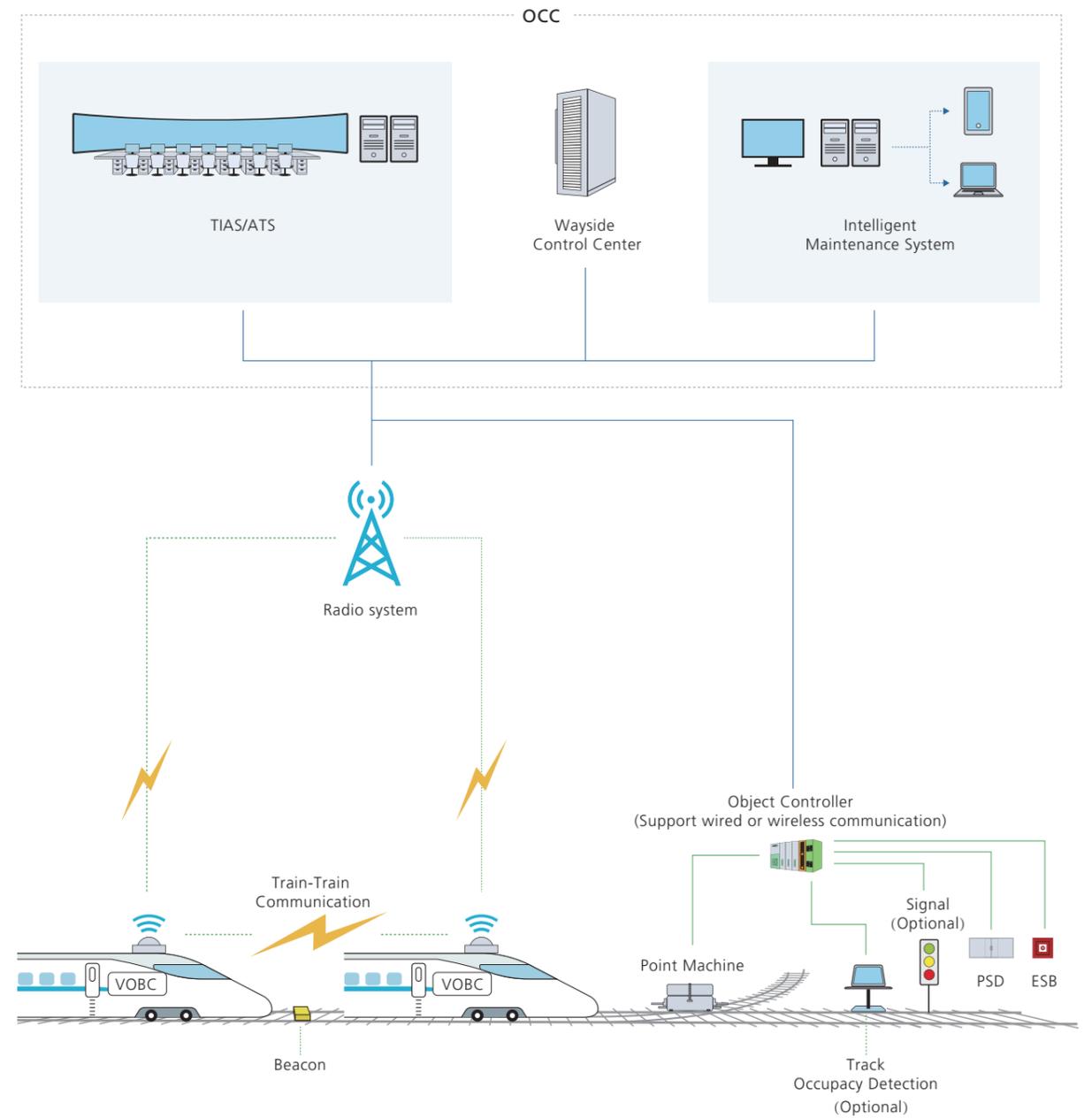
More flexible train operation can be organized, and the train can run bidirectionally in any section and turn back at any point.

Cost Saving

The system structure is simplified, the number of equipment is reduced compared with the traditional system. The control equipment is set in the center, and the object controller is installed at the trackside, thus saving the number of cables, construction cost and maintenance cost.



System Composition Diagram



General Signalling Solution for Multi-Standard Train Control System

System Introduction

Differences in signalling systems between different lines in different countries or within the same country bring difficulties to Interoperability. HollySys has developed a multi-standard compatible train control system, which can realize Interoperability among CBTC lines and ETCS lines in Europe, CTCS lines in China and other signalling systems.

The HollySys compatible train control system adopts a set of general safety computer platform, which has the functions and interfaces of different signalling systems, and can automatically switch the On-board signalling system according to the type of signalling system of the front line without affecting the train operation.

Features



Compatible With Different Signalling Systems

The train can run on lines with different signalling systems, and the train will not be degraded or decelerated when crossing the border.



Integrated Design

The system adopts an on-board computer platform and peripherals to realize the signal system functions of different systems.



Customer Value



Interconnection

Through the application of compatible train control system, trains can run on different lines and realize interconnection.



Cost Saving

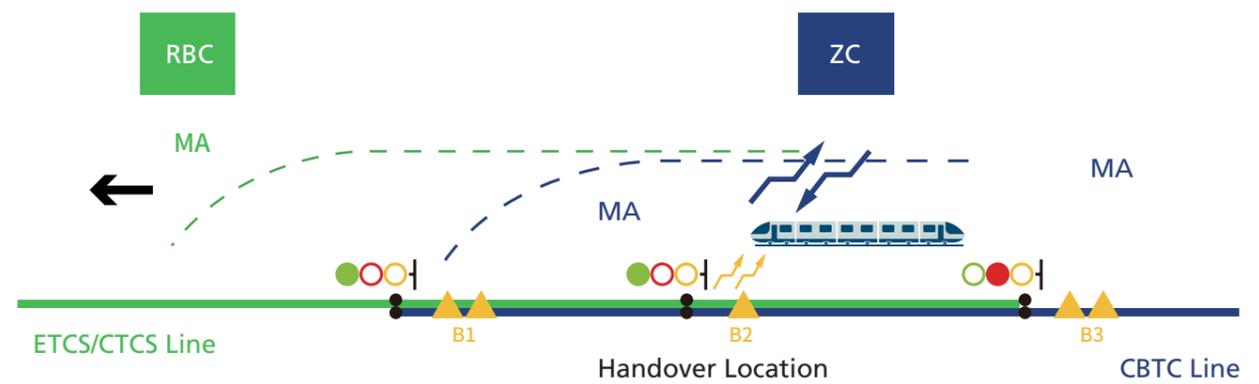
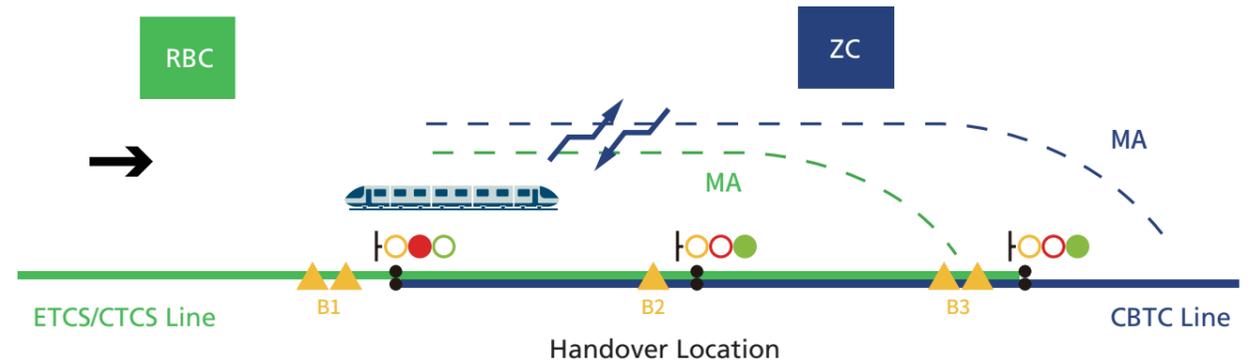
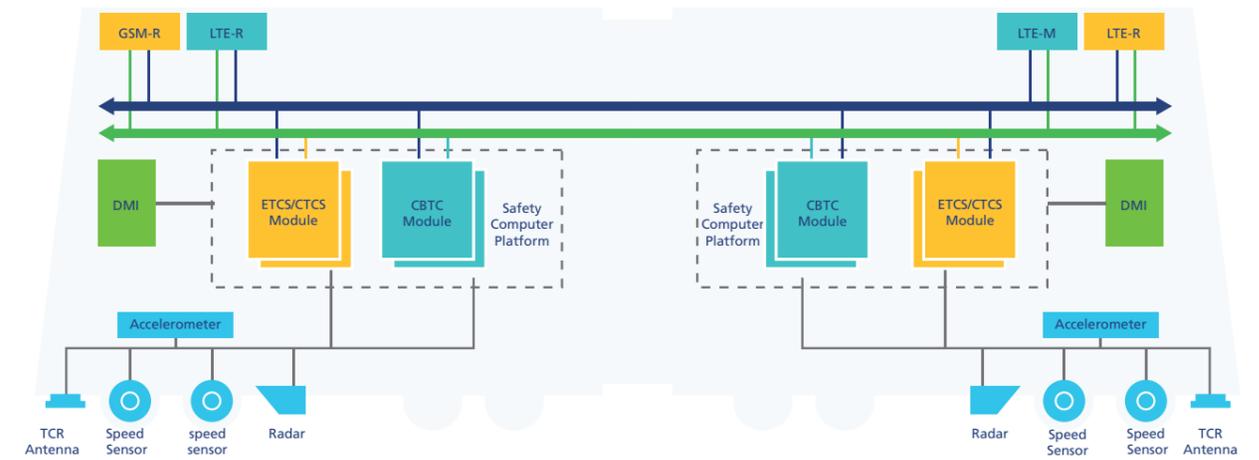
The system adopts integrated design, with less equipment and installation space, which can save costs.



Customized Service

It can be compatible with different existing signal systems according to different user's requirements.

System Composition Diagram



Signalling System Solution for New Types of Rail Transit

We Focus on all Rail Transit Needs

Besides railways and metro, HollySys is also committed to provide other new rail transit signalling system solutions, including maglev, mountain rail, straddle and hanging monorails and trams.

- Signalling Solution for High-Speed Maglev Rail Lines
- Signalling Solution for Medium & Low-Speed Maglev Rail Lines
- Signalling Solution for Mountain Rail Lines
- Signalling Solution for Straddle Monorail Lines
- Signalling Solution for Hanging Railway Lines
- Signalling Solution for Trams



Signalling Solution for High-Speed Maglev Rail Lines

System Introduction

HollySys has tailored a new generation of high-speed maglev train control system solution, which adopts the integrated design of train and ground, which consists of an integrated operation dispatching system, Zone Controllers, location equipment, wireless communication equipment and on-board equipment, so as to realize the safe protection and automatic operation of trains and provide users with safe, reliable, efficient and comfortable transportation services.

Features



High Safety

It is designed based on the principle of fault-safety, and compliant with IEEE, IEC, CENELEC standards and national standards. The safety equipment adopts the "2x2oo2" safety structure and has SIL4 certification.



State-of-Art Technology

The system adopts quasi-moving block technology and double protection curve to realize train tracing, speed safety protection and safe parking control, and has the functions of unmanned train.



High Reliability

The system adopts hot standby redundant structure design, and has multiple functions of self-inspection, self-diagnosis and maintenance. Time-proven high reliable equipment ensures the stable operation of trains.



Highly Integrated

The comprehensive operation and dispatching system is adopted, and the functions of traffic dispatching, power monitoring and control, electromechanical monitoring and control, and passenger service are deeply integrated to form an information sharing resource platform and realize information sharing and interconnection and interaction.



Customer Value



High-Speed Operation Safety

It can ensure the high-speed and safe operation of trains at a speed up to 600km/h.



High Transport Efficiency

The system adopts quasi-moving block technology to realize train tracing and shorten the headway. It also adopts automatic train control technology to realize automatic driving functions such as automatic train speed regulation, accurate platform stopping, automatic departure to improve transport efficiency.



Cost Saving

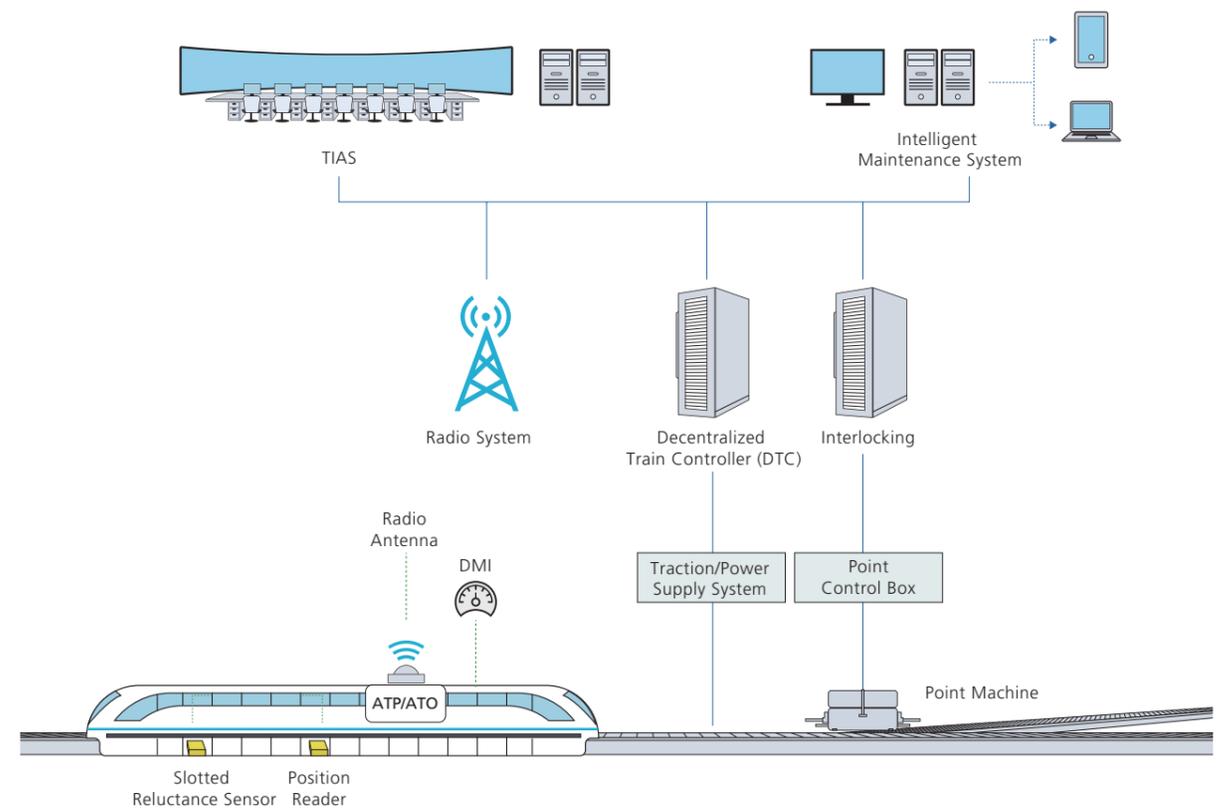
The system adopts integrated dispatching and management, which saves the number of equipment and personnel allocation. It adopts integrated design, all-electronic design and target control technology to save construction cost and maintenance cost.



Low Carbon and Environmental Protection

The system follows the green design concept, and reduces the energy consumption of train traction through the energy-saving.

System Composition Diagram



Signalling Solution for Medium & Low-Speed Maglev Rail Lines

System Introduction

HollySys medium and low speed maglev train control system is a new generation maglev train control system solution tailored for medium and low speed maglev trains based on CBTC system, taking into consideration the characteristics of medium and low speed maglev lines and vehicles. Trackside ATC equipment is responsible for the calculation and management of Movement Authority, while on-board ATC is responsible for the safety protection and automatic driving of train operation, providing users with safe, reliable, efficient and comfortable transportation services.

Features



High Safety

The system follows and comforts with the principle of fail-safe with IEEE, IEC, GENELEC standards and national standards. Safety equipment adopts "2x2oo2" safety structure, which has SIL4 certification.



State-of-Art Technology

The system adopts moving block mode to realize train tracing control. The headway is less than 90 seconds and fully automatic unmanned driving is supported.



High Reliability

The system adopts hot standby redundant structure design, and has multiple functions of self-inspection, self-diagnosis and maintenance. Time-proven high reliable equipment ensures the stable operation of trains.



High Integration

The system takes the TIAS as the Core and integrates other related systems such as SCADA, BAS, FAS, PIS and PA based on a unified platform.



High Adaptability

It can adapt to different types of maglev trains with different speeds through configuration, including embedded type and beam-holding type.



Customer Value



Transport Efficiency

The system realizes the train headway control based on the Moving Block technology, with the minimum headway reaching 90 seconds. ATO automatically controls the train operation according to the plan, and realizes automatic driving functions such as automatic train speed regulation, accurate platform stopping, automatic departure, etc. The system has high transport efficiency.



Cost Saving

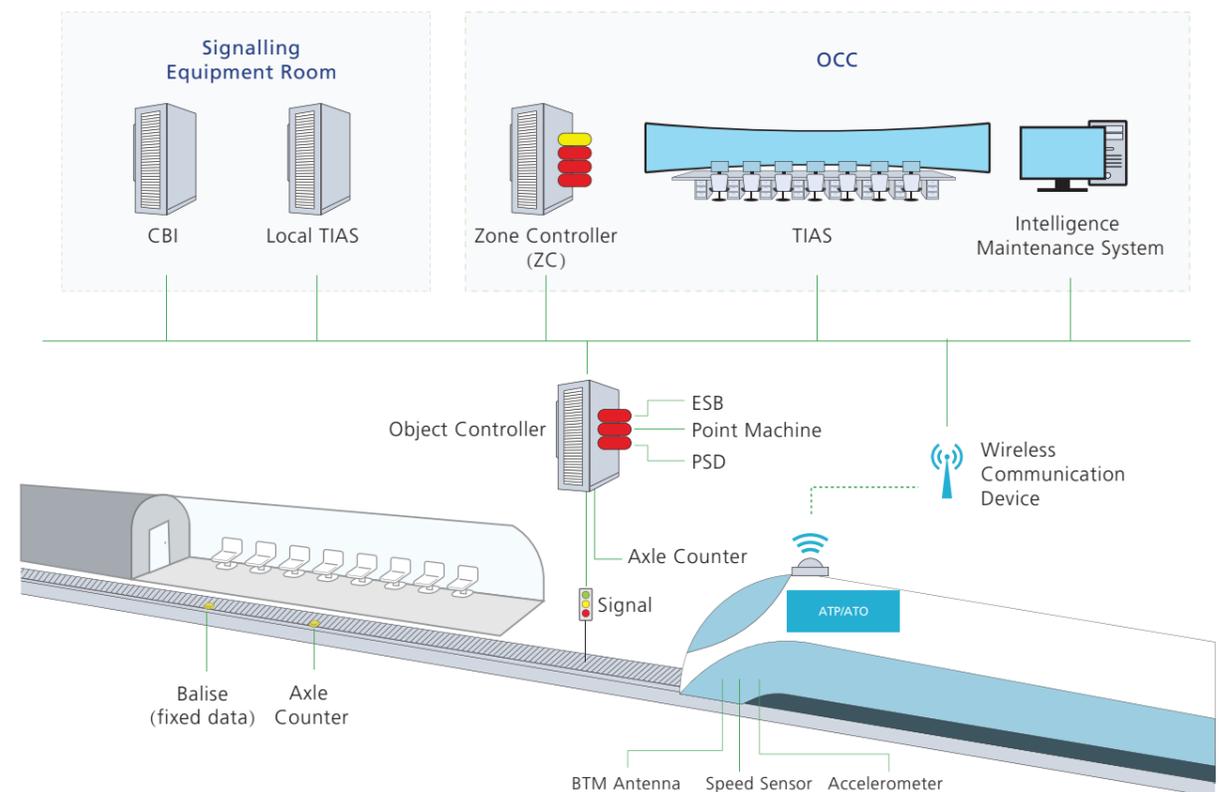
The system adopts integrated dispatching and management, which saves the number of equipment and personnel allocation. Integrated design, all-electronic design and object control technology are adopted to reduce the number of equipment, cables and civil engineering required, thus reducing the construction cost and maintenance cost.



Low Carbon and Environmental Protection

The energy-saving control technology and algorithm adopted by the dispatching system and ATO system can reduce the energy consumption of train traction.

System Composition Diagram



Signalling Solution for Mountain Rail Lines

System Introduction

The train control system of HollySys Mountain Rail Transit is based on CBTC system, combined with the characteristics of mountain rail transit lines and vehicles, and is a cost-effective train control system solution tailored for mountain trains. It controls the safe operation of trains on steep grade rack-and-pinion lines and safely enters/exits the rack-and-pinion lines, providing users with safe, reliable, efficient and comfortable transportation services.

Features



High Safety

The system follows the principle of fail-safe and comforts with IEEE, IEC, CENELEC standards and national standards. Safety equipment adopts "2×2oo2" safety structure, which has SIL4 certification.



High Integration

The system takes the TIAS as the Core and integrates other related systems such as SCADA, BAS, FAS, PIS and PA based on a unified platform.



High Reliability

The system adopts hot standby redundant structure design, and has multiple functions of self-inspection, self-diagnosis and maintenance. Time-proven high reliable equipment ensures the stable operation of trains.



Flexible Configuration

The system supports Solid Static Interlocking, centralized deployment and regional distributed deployment. Train location adopts multi-sensor fusion location technology, supports beacon, satellite and other ways, and can be flexibly selected according to the field conditions.



State-of-Art Technology

Train tracing control is realized by moving block method, the headway is less than 90 seconds, and ATO automatic driving is supported.

Customer Value



Transport Efficiency

The system uses Moving Block technology to track trains with a minimum headway of 90 seconds. ATO automatically controls the train operation according to the plan, and realizes automatic driving functions such as automatic train speed regulation, accurate platform stopping, automatic departure, etc. The system has high transport efficiency.



Cost Saving

The system adopts integrated dispatching and management, which saves the number of equipment and stuffing; Integrated design, all-electronic design and object control technology are adopted to reduce the number of equipment, cables and civil engineering required, thus effectively reducing the construction cost and maintenance cost.



Low Carbon and Environmental Protection

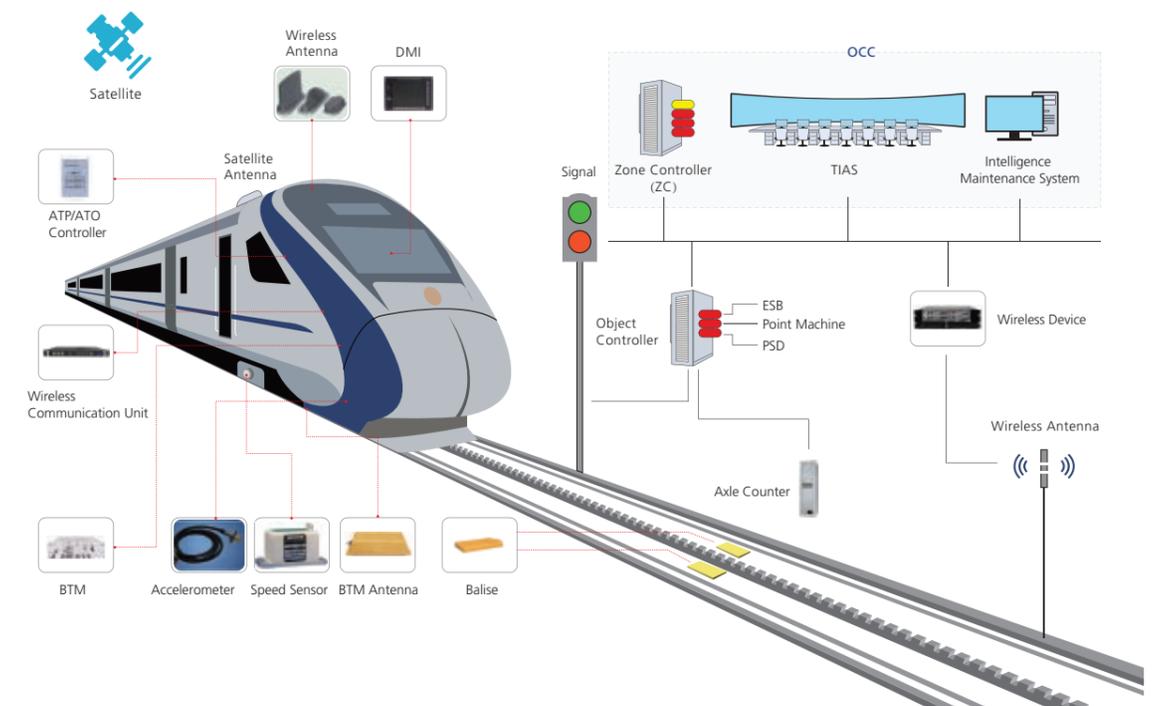
The energy-saving control technology and algorithm adopted by the dispatching system and ATO system can effectively reduce the energy consumption of train traction.



Customized Service

According to different national standards, different user's needs and different site conditions, customized configuration can be carried out.

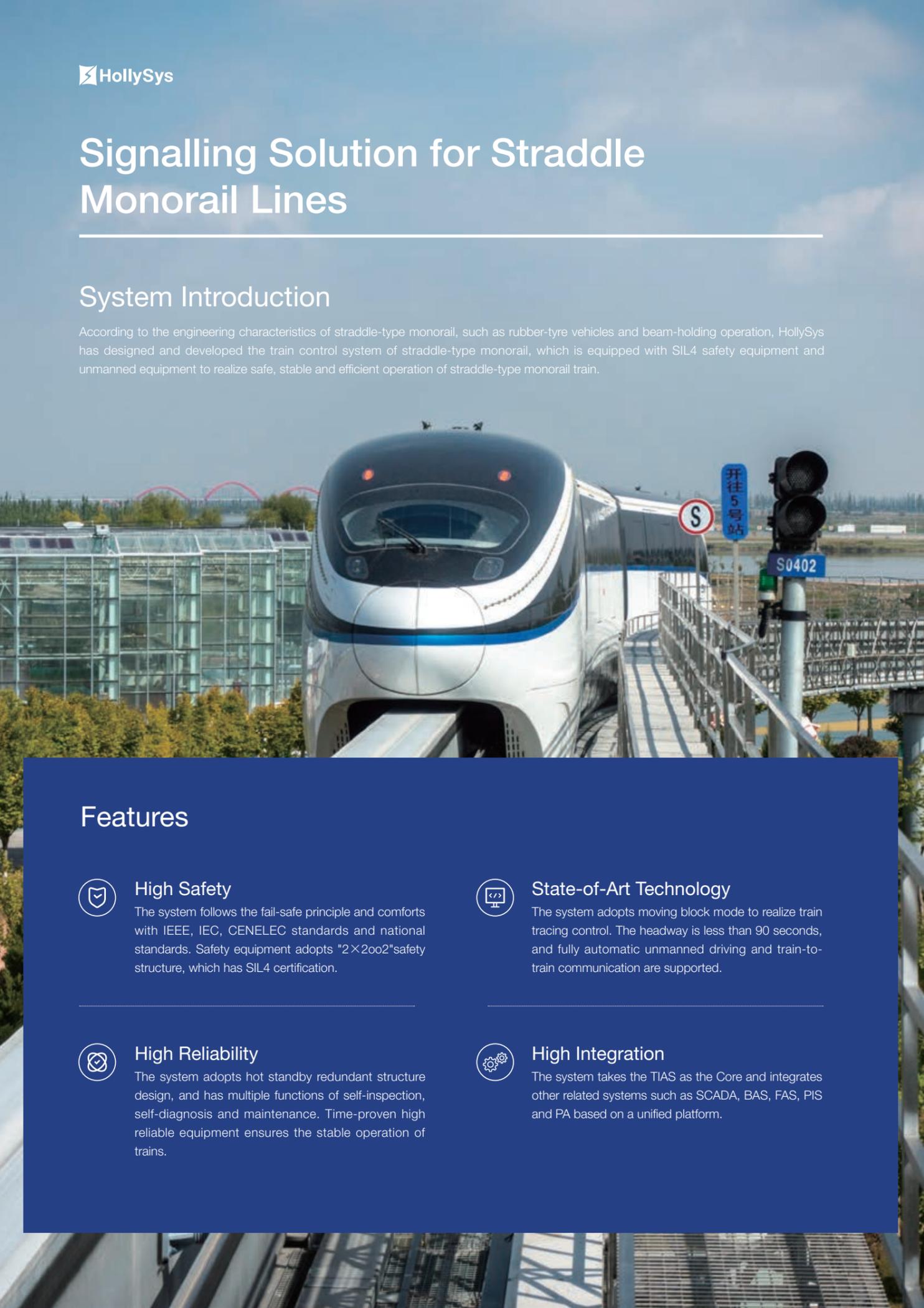
System Composition Diagram



Signalling Solution for Straddle Monorail Lines

System Introduction

According to the engineering characteristics of straddle-type monorail, such as rubber-tyre vehicles and beam-holding operation, HollySys has designed and developed the train control system of straddle-type monorail, which is equipped with SIL4 safety equipment and unmanned equipment to realize safe, stable and efficient operation of straddle-type monorail train.



Features

High Safety
The system follows the fail-safe principle and conforms with IEEE, IEC, CENELEC standards and national standards. Safety equipment adopts "2x2oo2" safety structure, which has SIL4 certification.

State-of-Art Technology
The system adopts moving block mode to realize train tracing control. The headway is less than 90 seconds, and fully automatic unmanned driving and train-to-train communication are supported.

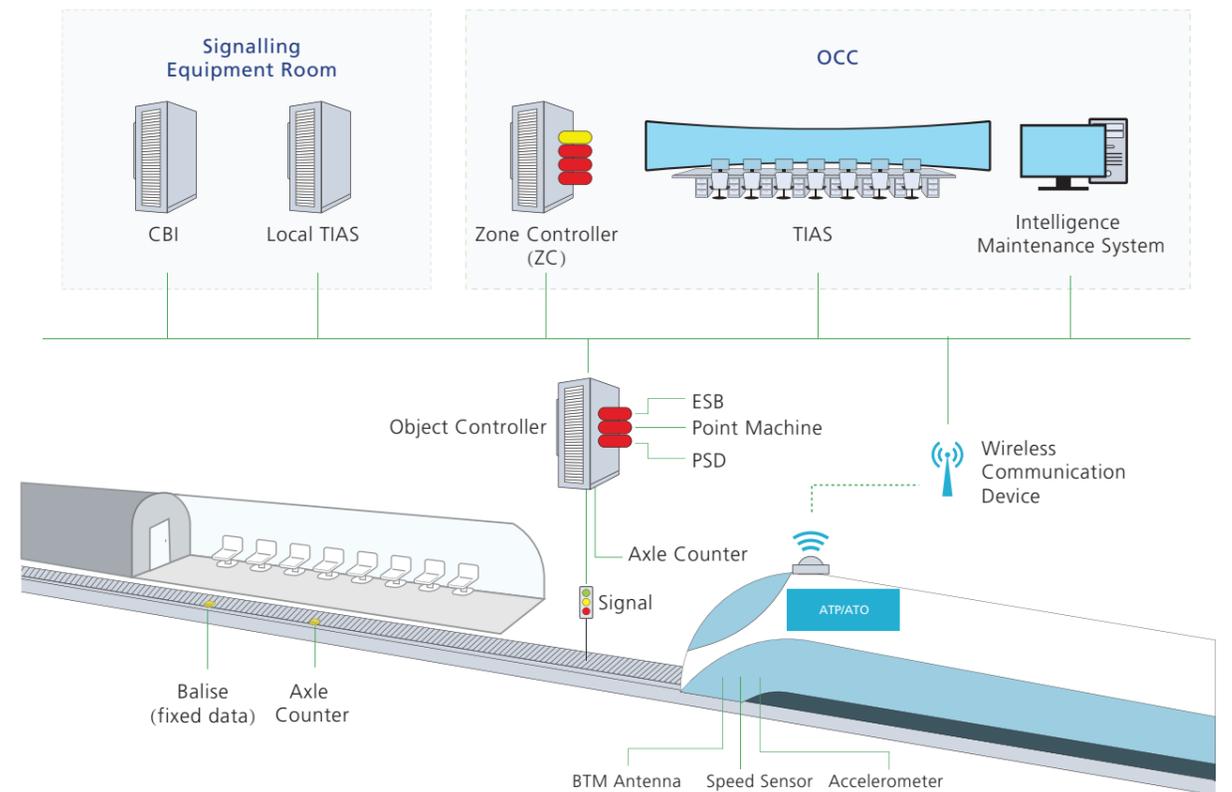
High Reliability
The system adopts hot standby redundant structure design, and has multiple functions of self-inspection, self-diagnosis and maintenance. Time-proven high reliable equipment ensures the stable operation of trains.

High Integration
The system takes the TIAS as the Core and integrates other related systems such as SCADA, BAS, FAS, PIS and PA based on a unified platform.

Customer Value

- Transport Efficiency**
 The system uses Moving Block technology to realize train tracing, with a minimum headway of 90 seconds. ATO automatically controls the train operation according to the plan, and realizes automatic driving functions such as automatic train speed regulation, accurate platform stopping and automatic departure, thus improving the transport efficiency.
- Cost Saving**
 The system adopts integrated dispatching and management, saving the number of equipment and staffing; Integrated design, all-electronic design and object control technology are adopted to reduce the number of equipment, cables and civil engineering required, thus effectively reducing the construction cost and maintenance cost.
- Low Carbon and Environmental Protection**
 The energy-saving control technology and algorithm adopted by the dispatching system and ATO system can effectively reduce the energy consumption of train traction.

System Composition Diagram



Signalling Solution for Hanging Railway Lines

System Introduction

The hanging railway has become the new choice of urban rail transit with its advantages such as low noise, low cost, less occupied area, simple construction, around-the-clock operation, safety and comfort, as well as demountability and reusability of railway, etc.

The hanging railway train control system which is developed independently by HollySys, adopts a moving block train control mode based on radio communication and realizes full automation and safe and efficient operation, with obvious advantages of modularization, integration and low cost.

Features

Modular Design
The modular design helps meet the requirement of line extension or modification.

High Adaptability
Adapt to special conditions for installation of hanging railway engineering, integrate with equipment such as optical fiber sensor and beacon.

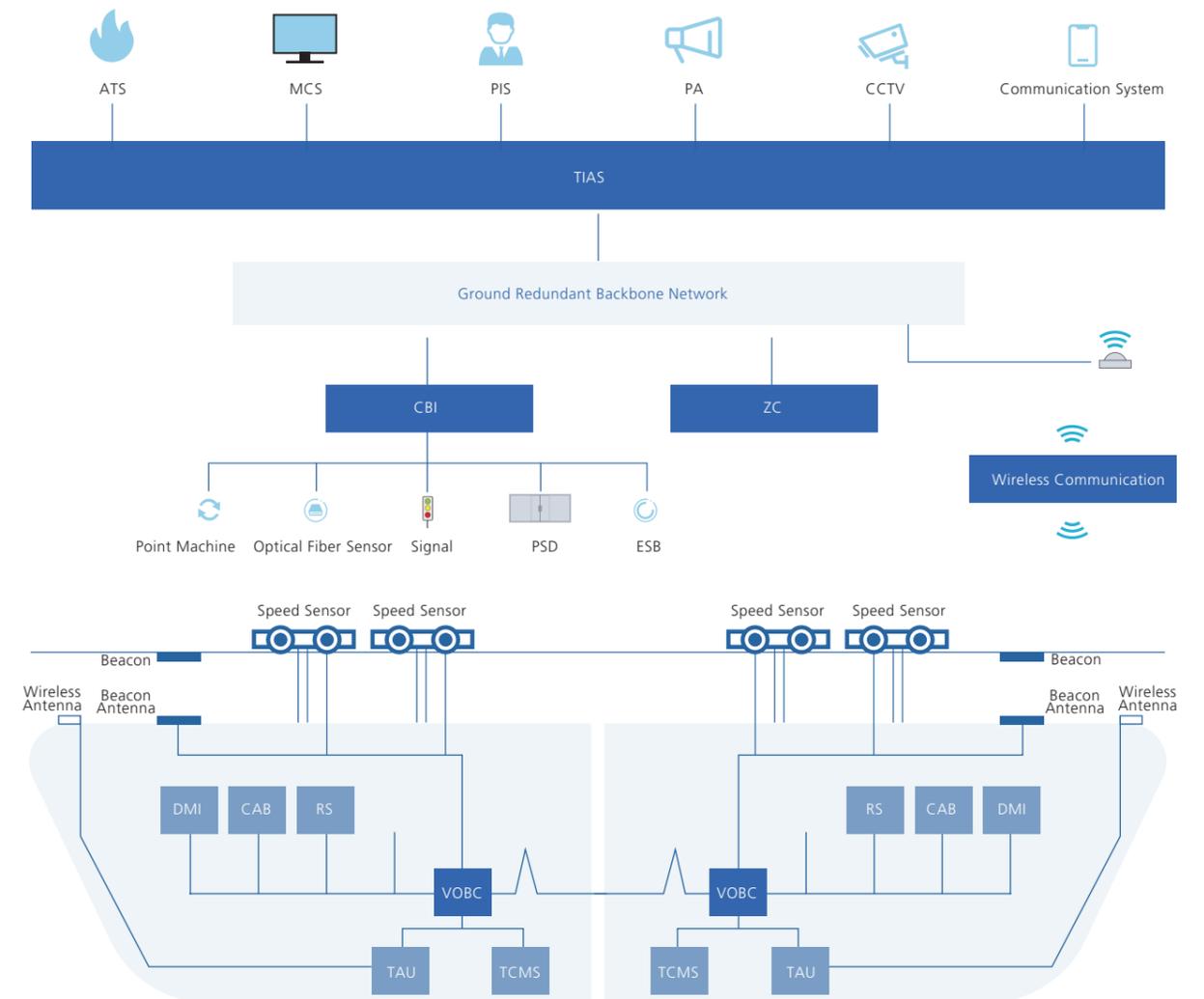
High Integration
The operation and dispatching platform highly integrates train operation, electric power, passenger service and other information so as to help operation personnel to improve integrated dispatching level.

Low Cost
The centralized control of equipment and simple configuration of trackside equipment greatly reduces construction and maintenance costs, so as to minimize the cost for system throughout full life cycle.

Customer Value

- Transportation Efficiency**
The system adopts Moving Block technology and unmanned driving technology, with short headway and high transportation efficiency.
- Cost Saving**
The system adopts integrated dispatching and management to save the number of equipment and staff, and implements integrated design, all-electronic design and target control technology to save construction cost and maintenance cost.
- Low Carbon and Environmental Protection**
The energy-saving control technology and algorithm adopted by the dispatching system and ATO system can effectively reduce the energy consumption of train traction.

System Composition Diagram



Signalling Solution for Trams

System Introduction

TCS-500 Signalling system is a modern signalling system for tramcars developed by HollySys with intellectual property right, by breaking through overall structure design of traditional signalling system and adopting key technology research such as bi-direction communication of train-wayside data and train positioning.

Features



Safety

The turnout controller has passed the SIL4 certification.



Concise Structure

Reduce wayside equipment through multi-information fusion positioning.



Platform

Provide universal platform to meet operation needs of lines of different rights of way.



Intelligence

Have multiple intelligent functions such as junction priority and automatic turnout control, etc.



Integration

Build an integrated dispatching system platform integrating multiple specialties.



Small Size

Adapt to limited space of cab.



Module

Cater to customer needs through module design.

Customer Value



Low Life-Cycle Cost

The system adopts integrated dispatching and management to save the number of equipment and staffing; and implements integrated design, all-electronic design and object control technology to save construction cost and maintenance cost.



Efficient

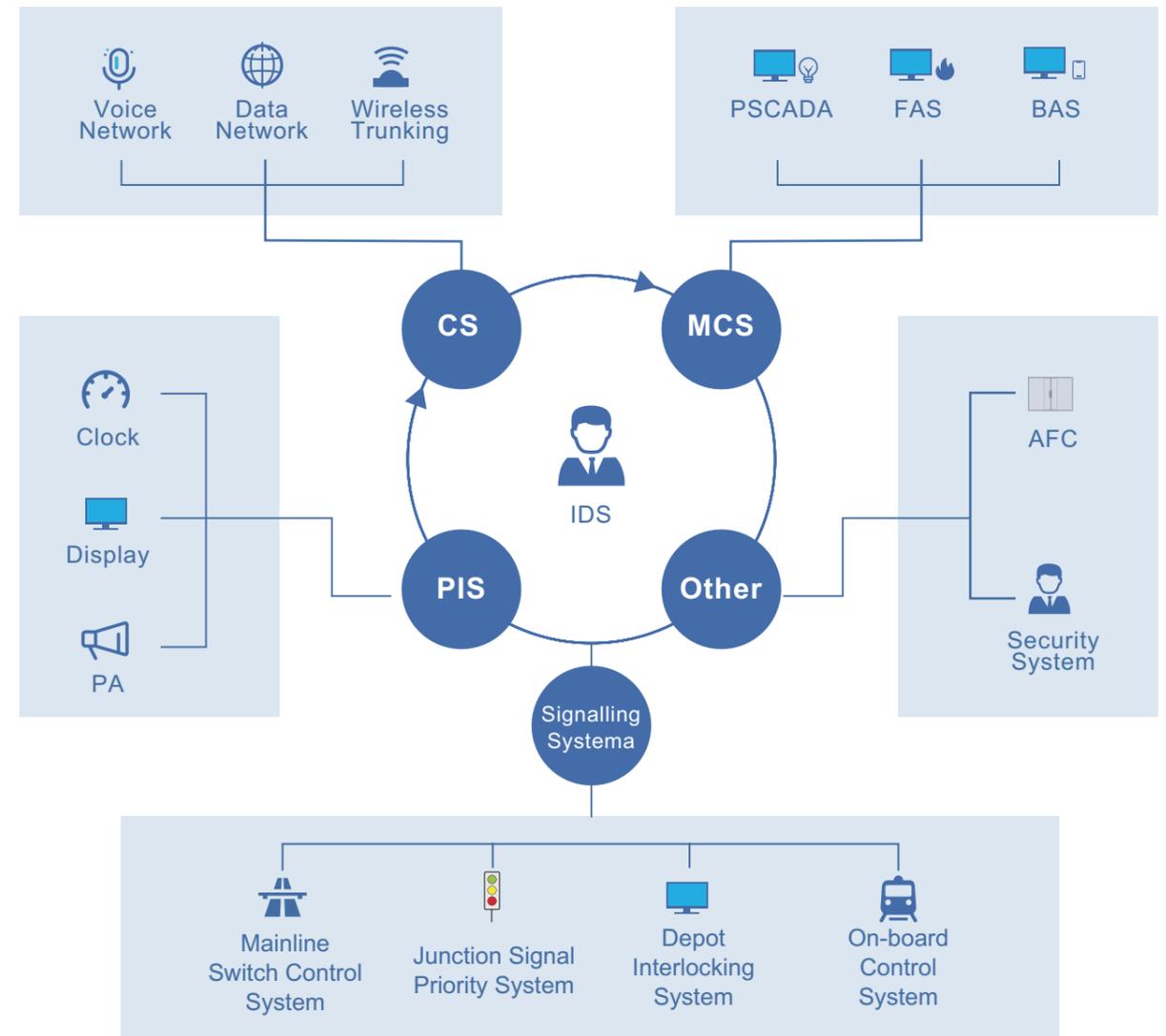
The system is equipped with junction priority system, which can interface with different road traffic signalling control systems. Through advanced intersection priority algorithm, the traffic efficiency of trams can be improved, while ensuring that road traffic is not disturbed.



Flexible

It can meet the interface requirements of different types of vehicles, road traffic signalling systems and other third-party systems. It can meet different expansion requirements such as line extension, transformation and vehicle increase.

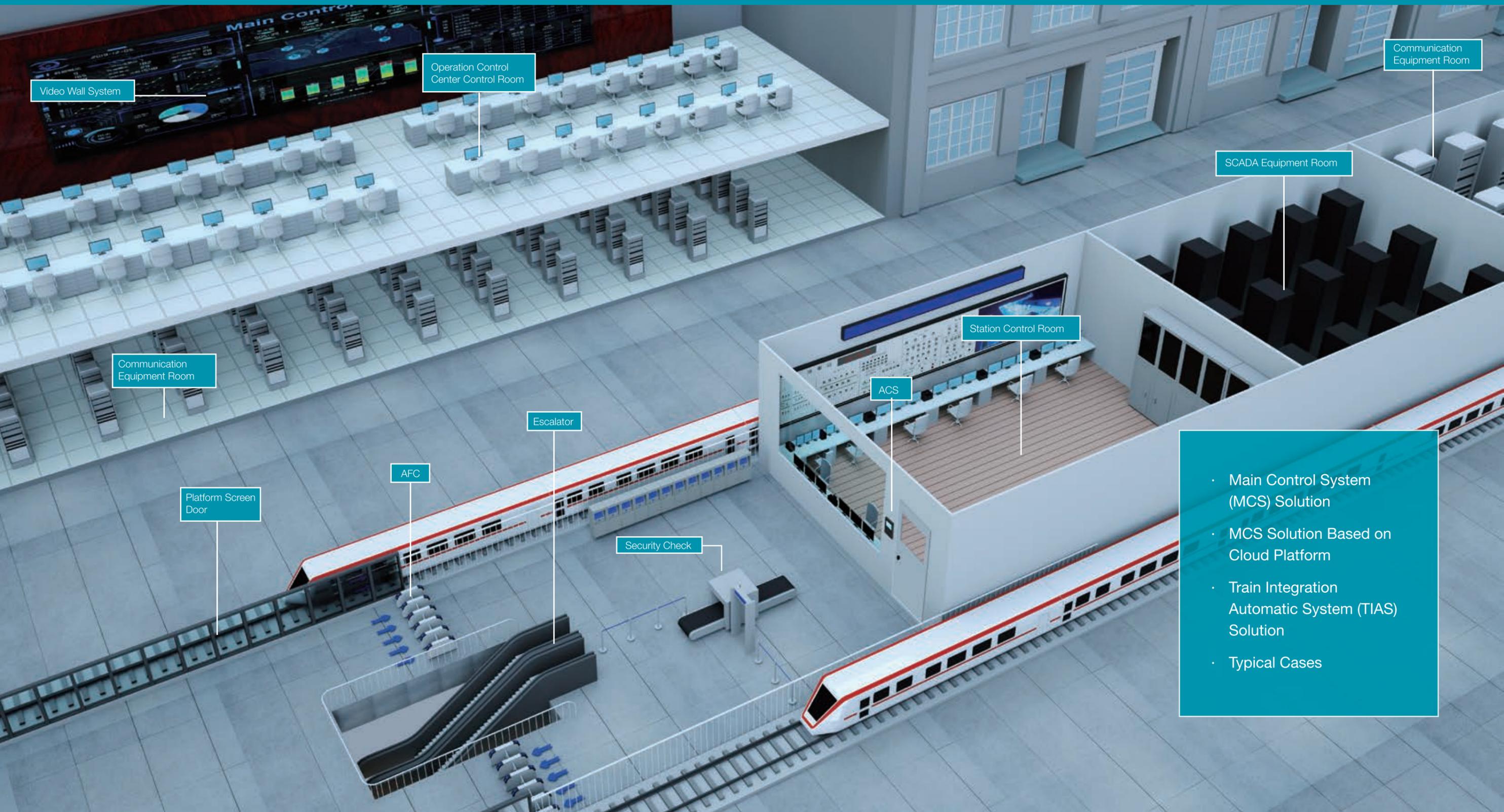
System Composition Diagram



SCADA System Solution

SCADA system is also known as MCS (Main Control System) which is a highly integrate automated monitoring system, Its main purpose is to form a unified hierarchical distributed computer integrated system by integrating and interconnecting power SCADA system and Electrical & Mechanical (E&M) system (FAS, BMS, Signalling, Communication, PSD) , so as to realize centralized monitoring and management functions.

Through user friendly HMI of the SCADA systems, it can monitor and manage the whole line of the operation more conveniently and effectively by traffic dispatchers in OCC.



Video Wall System

Operation Control Center Control Room

Communication Equipment Room

SCADA Equipment Room

Communication Equipment Room

Station Control Room

ACS

Escalator

AFC

Platform Screen Door

Security Check

- Main Control System (MCS) Solution
- MCS Solution Based on Cloud Platform
- Train Integration Automatic System (TIAS) Solution
- Typical Cases

Main Control System (MCS) Solution

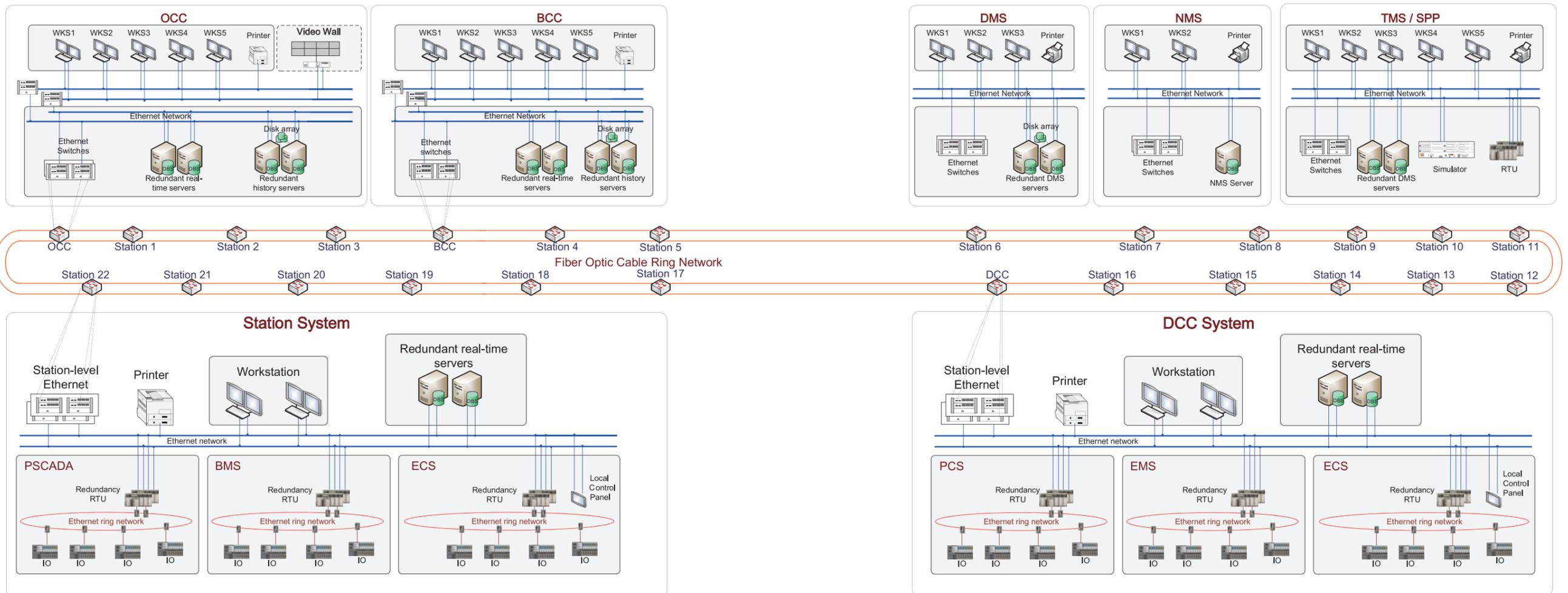
System Introduction

Main Control System can highly integrate the data of the different professional categories through the unified database, application software and human-machine interface, The Command processing from issuing to execution is directly, which realizes the comprehensive monitoring of Power Supply, Electrical & Mechanical, PSD, PIS and other equipment in urban rail transit effectively. MCS also realizes the rapid linkage between systems and emergency disposal under abnormal circumstances, providing technical support for users to expand linkage scenarios and decision support as required.

Features

-  Proven Hardware and Software Platform
-  Unified Internal Communication Mechanism
-  Unified Database Platform
-  Multiple Interface Modes
-  Friendly HMI

System Composition Diagram



Customer Value



Save Equipment Investment

Integrate subsystems into an integrated system and save the investment in subsystem hardware.



Cut Down Human Resources

Comprehensive operation management personnel can manage the operation and maintenance of multi-disciplinary systems.



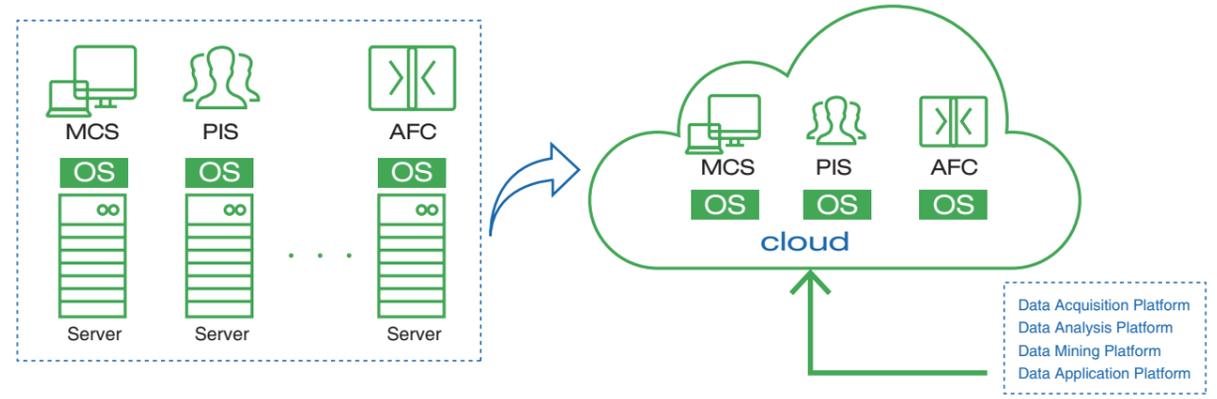
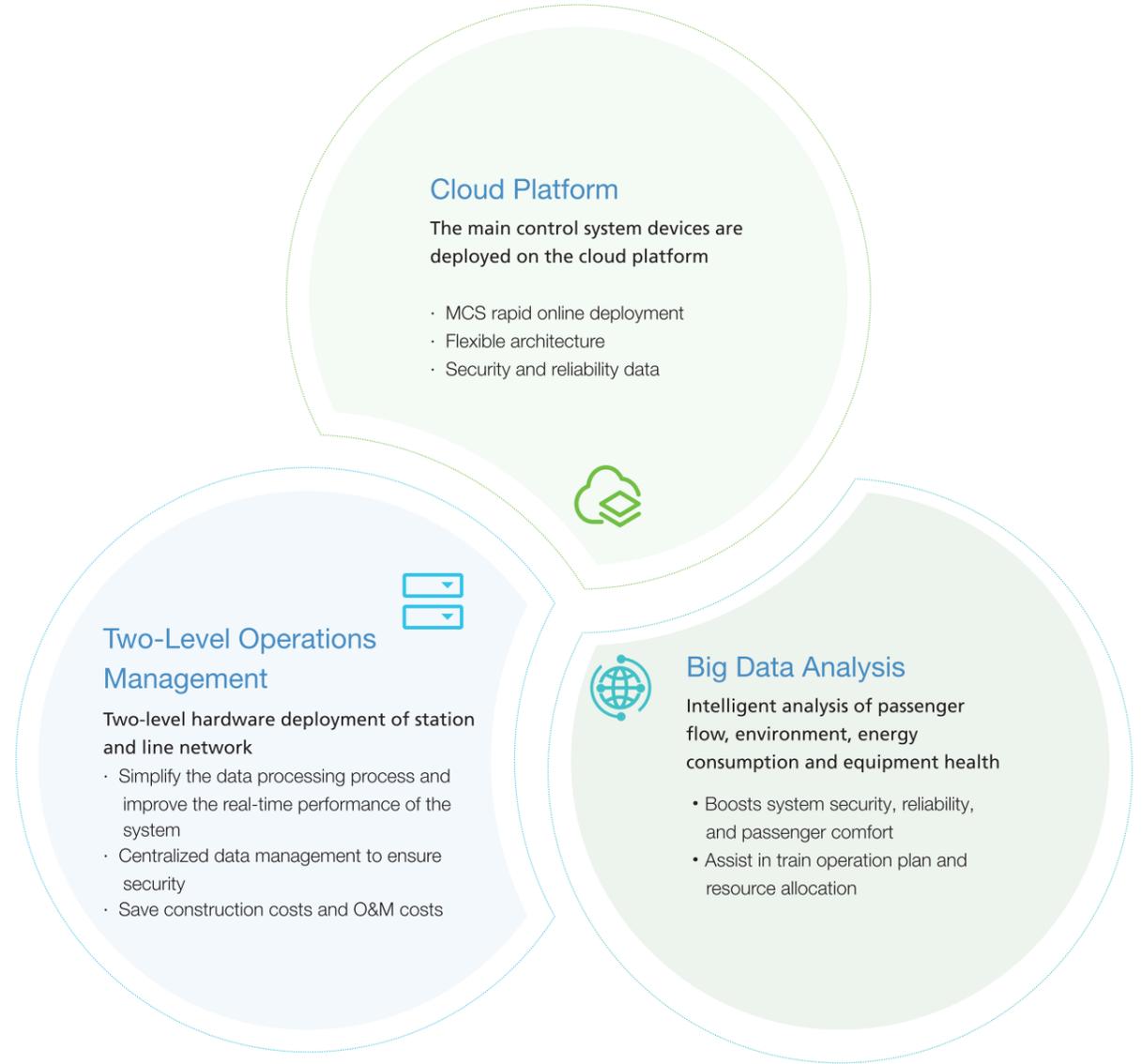
Improve Operation Efficiency and Emergency Response

Through rapid linkage between systems to realize automatic implementation of emergency response plan.

MCS Solution Based on Cloud Platform

MCS Based on Cloud Platform

Based on integrating of Artificial Intelligence, Big data, Cloud computing and Internet of Things and other information technologies, HollySys has developed a "two-level transportation management" urban rail comprehensive monitoring system based on cloud platform, to achieve the intelligent integrated monitoring of more than 20 subsystems, such as Power Supply, E&M and Communication system.



Train Integration Automatic System (TIAS) Solution

System Introduction

The TIAS (Train Integration Automatic System), which integrated ATS (Automatic Train Supervision) and MCS (Main Control System), realizes more than twenty sub-systems centralize monitoring, which includes rolling stock, signalling, power supply, and ECS, etc. The unified HMI could improve the efficiency of the traffic control, along with the automated handle capacity under fault mode and disaster. TIAS achieves GoA4 level and support Unattended Train Operation.

Features



Customer Value

System Composition Diagram

Independent Intellectual Property Rights

The whole system has completely independent intellectual property rights, providing system-wide solutions and multiple and flexible operation support functions.

Safety and Reliability

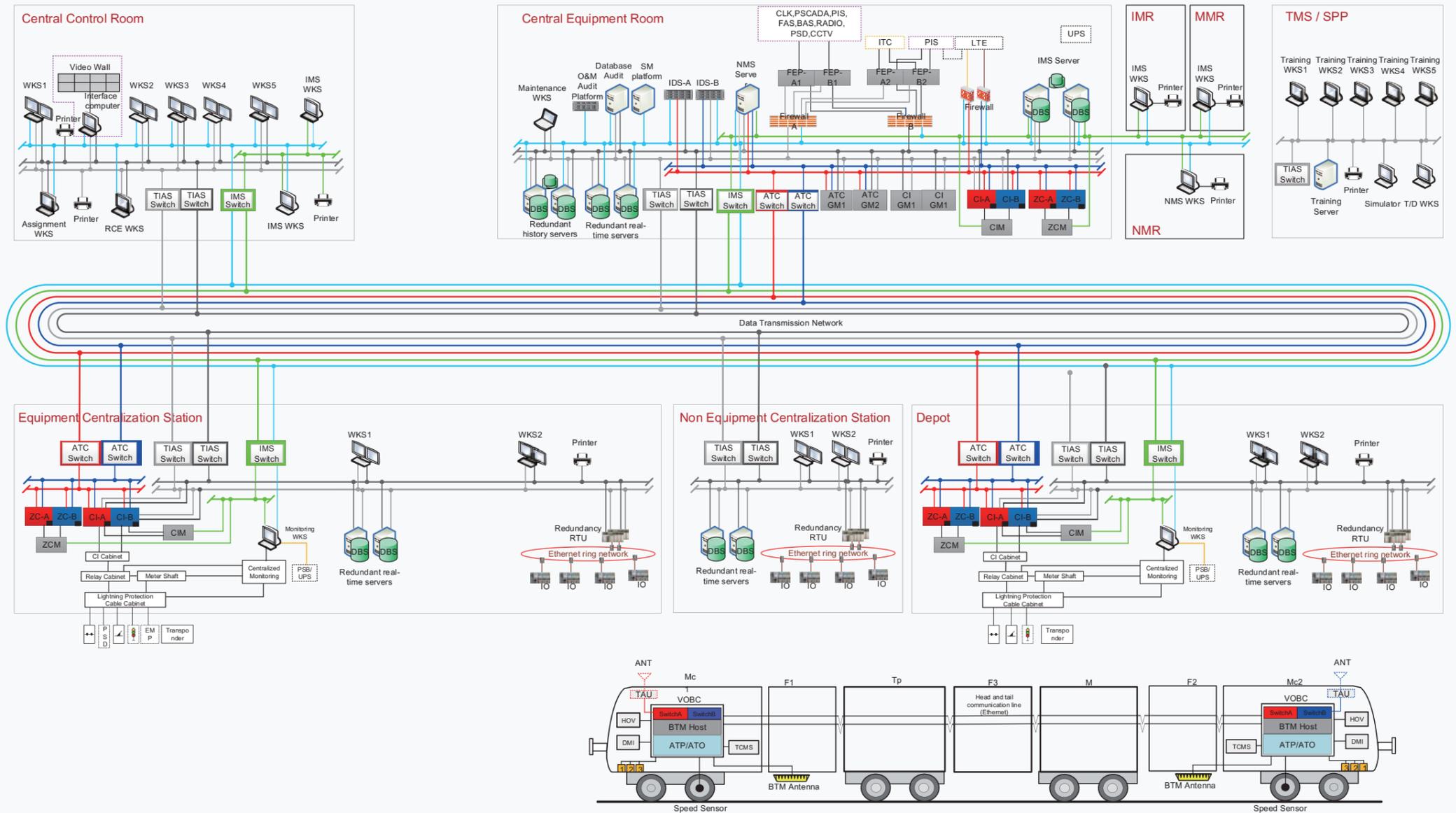
Take the operation management as the core, and provide rapid linkage between multi-disciplinary systems in normal operation mode and fault disaster mode and emergency handling of abnormal situations, so as to further improve operational safety.

Reduce Maintenance Costs

Unified software and hardware platforms, which reduce equipment maintenance types, to improve operation and maintenance efficiency, and reduce construction and life cycle operation and maintenance costs.

Customized Service

The system can be customized according to the standards of different nations or regions, the needs of different users and different site conditions.



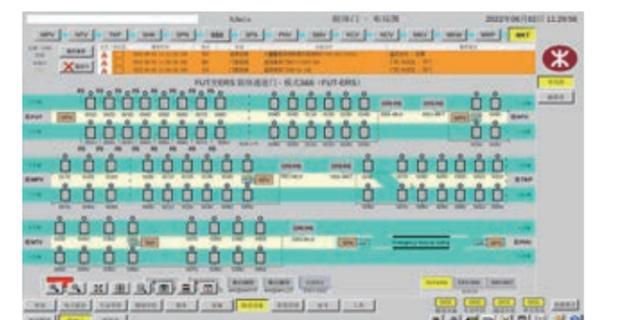
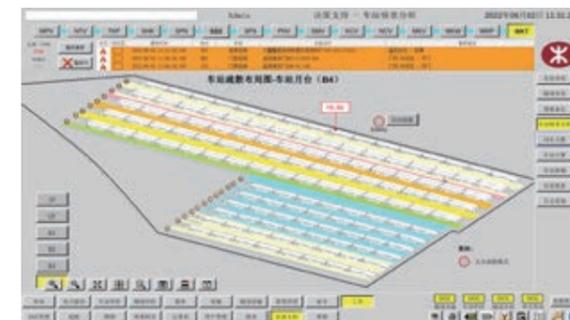
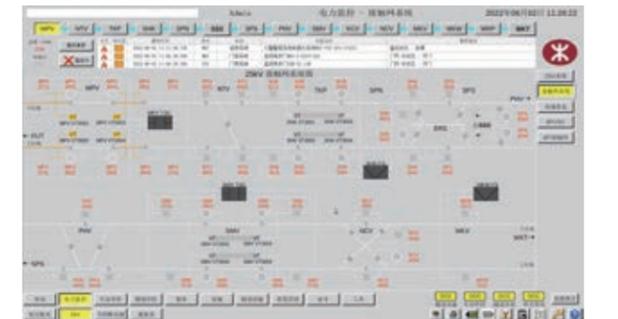
Typical Cases

HollySys SCADA systems serve **54** subway lines in **15** cities around the world



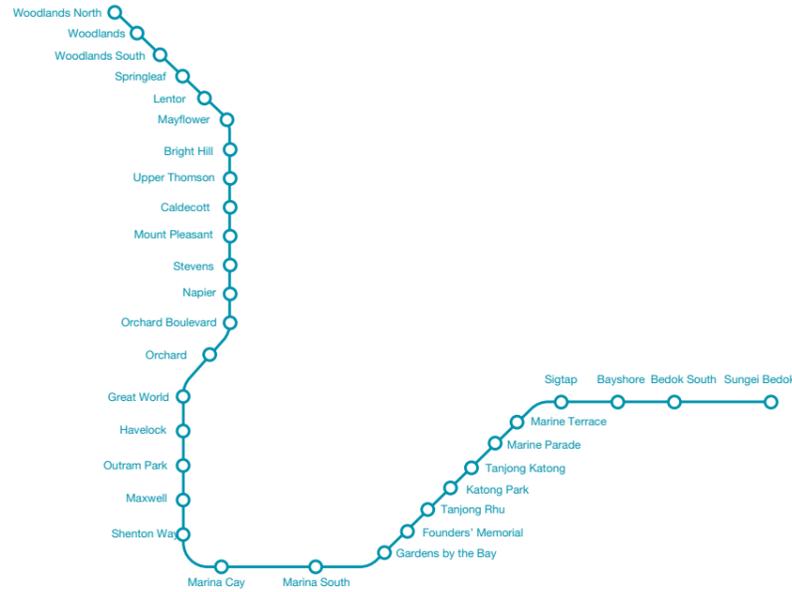
The MCS Project of Guangzhou-Shenzhen-Hong Kong Express Rail Link Hong Kong Section

HollySys participated in the construction of the international high-speed railway signalling system as a signal integrator for the first time, and successfully applied its independent developed high-speed railway signalling system and main control system to Hong Kong high-speed railway by competing with world-class rail transit signal system manufacturers. From 2013 to 2017, HollySys won MTR Contractor Quality Award for each year, setting a record for MTR's first electromechanical contractor winning consecutive awards within the project cycle. In 2016, it was awarded MTR Gold Quality Award, the highest award of MTR project Quality management, which set the record for the first E&M contractor winning MTR Gold Quality Award.



SCADA System Project of Singapore Thomson-East Coast Line

HollySys supplies independent developed SCADA software platform and PLC products, undertakes the main control system design, R&D production, logistic, installation, testing and delivery of this project. The project end user highly recognised HollySys for international engineering project capability. Meanwhile, this project achieves overseas breakthrough for the first time.



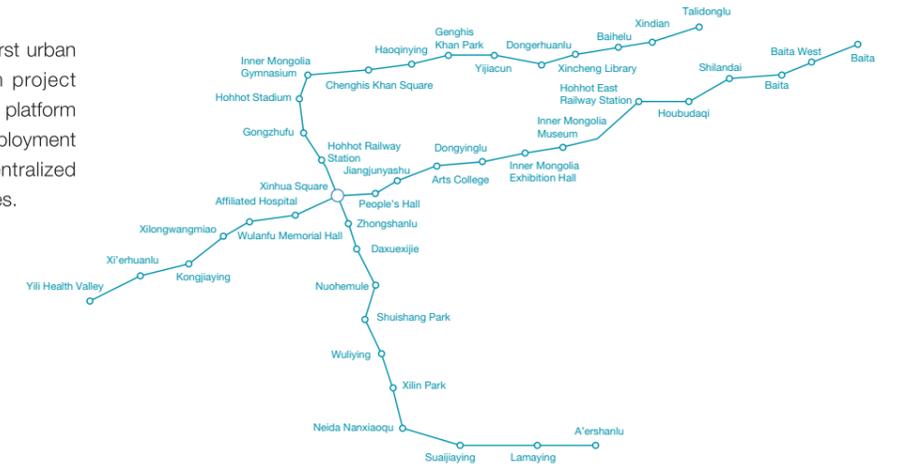
HMI Example



Main Control System Project Based on Cloud Platform

Hohhot Metro Line 1 & 2

Hohhot Metro Line 1 & 2 is the first urban rail transit main control system project based on line-network-level cloud platform in China. It adopts server flat deployment for the first time and realizes centralized operation management of two lines.



Smart Urban Rail Solution Based on Cloud-Edge-End

With the rapid development of urban rail transit construction, all cities will face the dual pressure of construction and operation. The construction of smart urban rail operation and maintenance system has become the main way to adapt to the needs of urban rail transit network operation, improve the operation and maintenance management level of equipment and facilities, and promote the implementation and application of innovative technology and equipment. Smart Urban Rail Based on Cloud-Edge-End technology as a new generation of information technology and the product of manufacturing depth fusion, by implementing the comprehensive linkage of man, machine, things, to build a new industrial IoTs manufacturing and service system, which become the infrastructure supporting the fourth industrial revolution, It will have an all-round, deep-seated and revolutionary impact on the future industrial development.

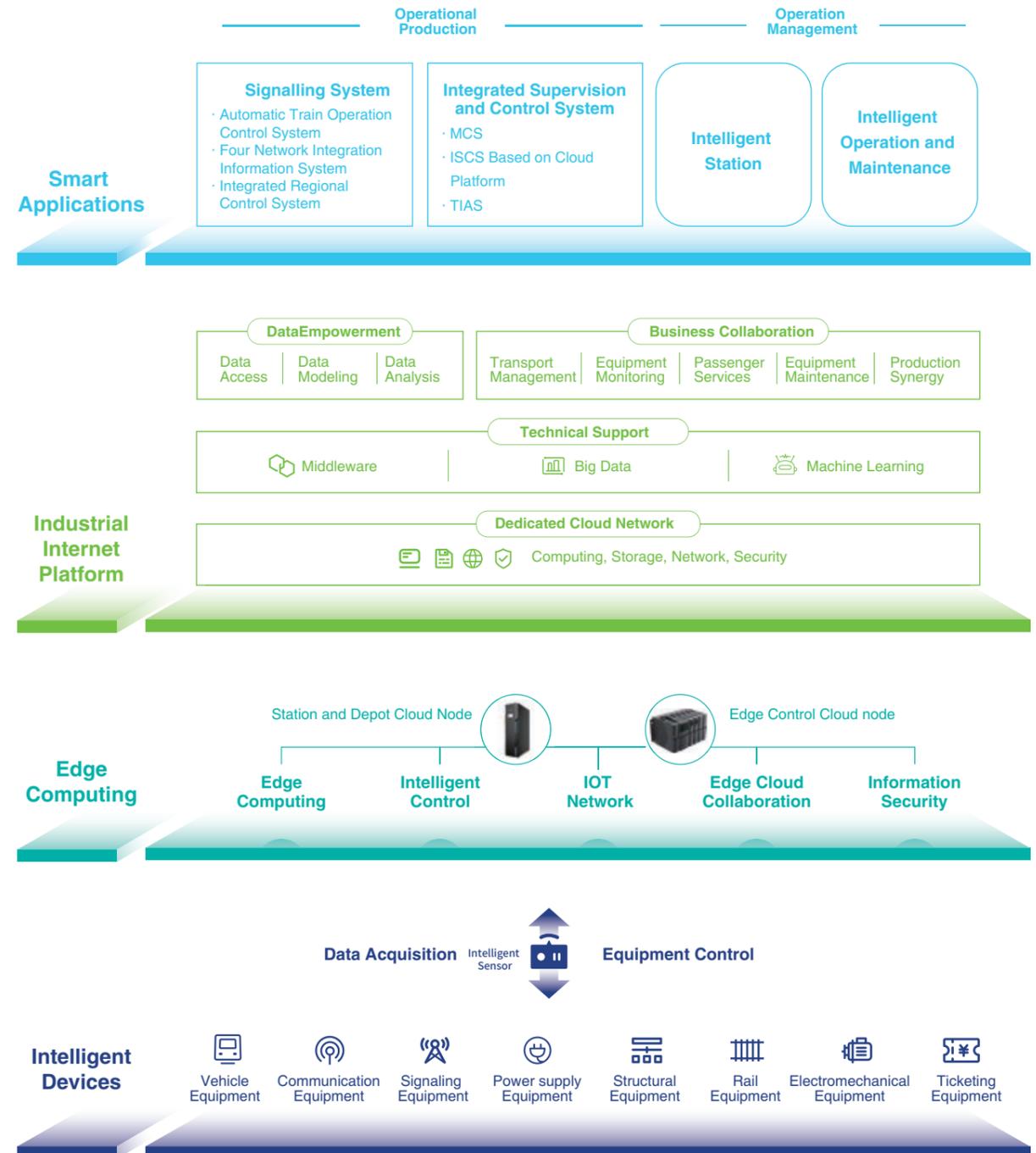


- Overview
- Smart Station Management System
- Intelligent Operation and Maintenance System
- Intelligent Device Diagnosis System
- Station Environment Control Energy Saving System

Overview

System Introduction

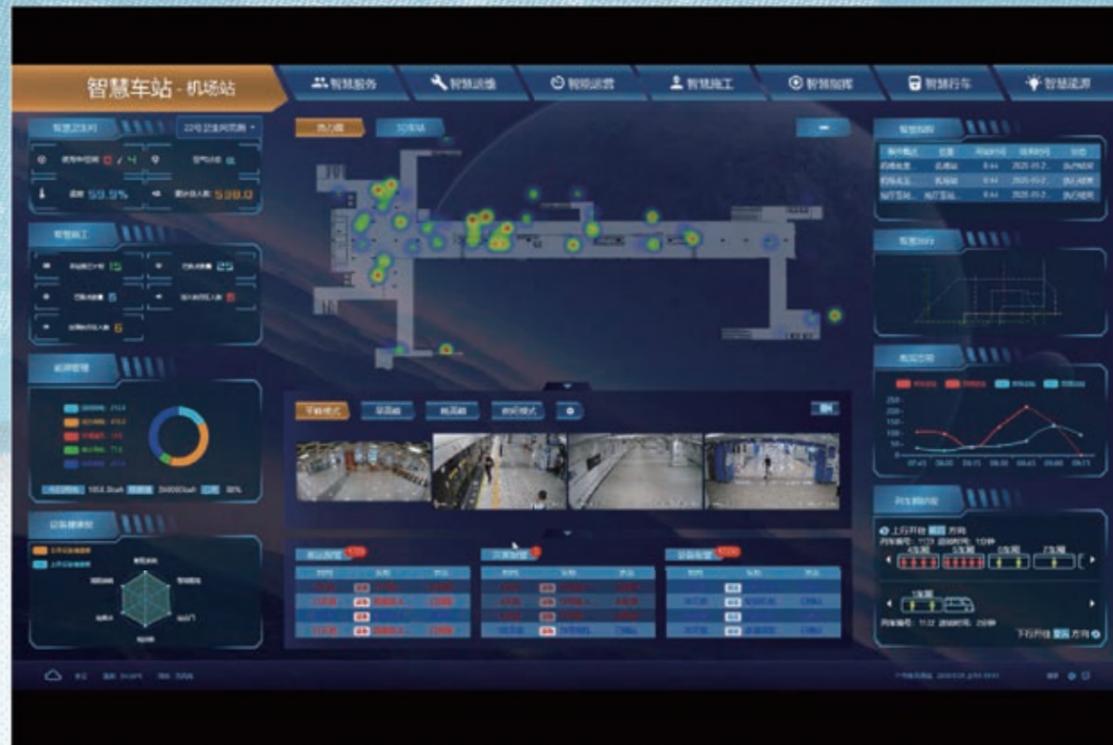
HollySys Smart Urban Rail Solution Based on Cloud-Edge-End technology, by building a central cloud big data platform, to collect a large amount of equipment information, alarms, services, network status and other data, unified modeling was carried out on the data base on the unified data standard, realize the data resource sharing, cross major data value mining, achieve efficient data sharing among service systems, it can simplify business system interfaces, data conversion, centralized data storage and data sharing, and support the realization of intelligent operation and maintenance, smart stations, intelligent equipment and other intelligent urban rail business functions.



Smart Station Management System

System Introduction

To meet the needs of rail transit station management, to build a visualized station automatic intelligent management system through the application of advanced information system integration architecture, visual interaction engine, efficient human-machine collaboration, intelligent modelling integration and other technologies, to achieve automatic control and contingency linkage based on business scenes of the station.



Core Functions



Open/Close the Station with One Key

Save cost, improve efficiency, control quantity, and realize digitalization and automation

Through the digital platform "deep interconnection, integrated control" capability, relying on the comprehensive monitoring system, combined with video analysis, infrared perception, manual remote video confirmation and other technologies, to expand the development of the function of open/close the station with one key. Realize automatic reminding, one key to start, multi-equipment system linkage and remote start.

One- Key Point Machining on station	Turn on the lighting system	Test the running status of PSD	Open the gate
	Turn on the escalator	Turn on the lift	Open the roll-up door
	Turn on the ECS equipment	Open the PIS screens	Open the radio
One- Key Point Machining off station	Last train radio	Last train PIS screens	Close the gate
	Close the ticket machine	Close the PIS screens	Turn off the escalator
	Turn off the lift	Close the roll-up door	Turn on the shutdown mode



Intelligent Self-Service for Passengers' Travel

Realizing intelligent guidance for passengers

Passengers can check the guidance, passenger flow control information, arrival information of the next train, carriage congestion and distribution of strong cold carriages from the interactive screen of station hall, platform projection screen, PIS screen and mobile phone, providing decision support for passengers to choose the optimal path and the most comfortable carriage. Subsequently, the functions of checking the availability of station equipment and facilities, bathroom guidance and usage, and bus arrival reminder can be included based on the indoor navigation application of the official APP.



Automatic Station Inspection

Reducing operational control risks

Intelligent inspection is carried out through the platform, the panoramic view of the station is embedded in BIM, the intelligent analysis functions of the linkage camera patrols the whole station, and the real-time pop-up alarm ensures that the station is in 24-hour real-time monitoring state, and avoids operation safety incidents caused by artificial patrol omission or failure.



Escalator Passenger Injury (retrograde) Warning Linkage

To improve passenger travel safety, reduce personnel on duty and reduce operating costs

The video analysis technology is used to analyze escalator passengers' abnormal behaviors (retrograde, fall, abnormal stop, etc.), and the digital platform is linked with the field equipment to give voice and picture warnings to stop passengers' retrograde behaviors. At the same time, an alarm will pop-up in the system, and the elevator was stopped safely by the remote control.



Construction Work Zone Control Within Running Track

Ensure the construction work safety within running track and improve construction work efficiency

Confirm the qualification of operators through face recognition technology to prevent entering the trackway area by mistake. Support the automatic setting of red flashing lights, and use electronic fence technology and human & train positioning technology to automatically warn against illegal construction activities, based on these technologies, it realizes the intelligent control of construction work zone within the running track.



Joint Disposal of People and Objects

Improve disposal efficiency and reduce safety risks

Through the use of radar detection technology, the Platform Screen Door (PSD) foreign object detection security system is provided. When there is a situation of people and/or objects being trapped by the PSD, the field indicator will be lighted and a warning sound will be issued to help the crew and station to staff deal with it in time. The data is forwarded to the digital platform synchronously, which supports the personnel on duty in the Train control room to handle the incident and effectively guide the joint control of train operation, so as to reduce the degree of passenger injury and the probability of running late.



Standardized Work Identification of Key Positions

Improve the operation abilities and management efficiency, save management costs

Using image processing, face recognition, behaviour analysis and other technologies to realize standardized work identification function. The alarm events and reminders will be intelligence triggered when some common violations occur, such as the driver leaves his position or the operation of the train receiving/departure against the standard.



Train Fault linkage + Passenger Flow Control Linkage

Optimize management and reduce the risk of failure

Real-time monitoring of train operation, real-time pop-up of train fault alarm information, to realize one-stop station operation management, equipment linkage, incident alert, one-click operation response and processing, realize the visualization of station environment and data information, meet the needs of daily production and emergency response of station operation. It realizes the functions of passenger flow monitoring and analysis, operation risk warning, emergency plan visualization, personnel and equipment positioning monitoring, operation resource allocation, event disposal auxiliary decision-making and so on.



Equipment Health Management

Equipment life cycle health management

Relying on the application of comprehensive monitoring system and various subsystems perception technology and data fusion, through data modelling analysis and characteristic parameters of the equipment, the fault diagnosis, fault prediction and intelligent management of environmental control ventilation system, water supply and drainage system, platform door system, firefighting system and other equipment are realized.



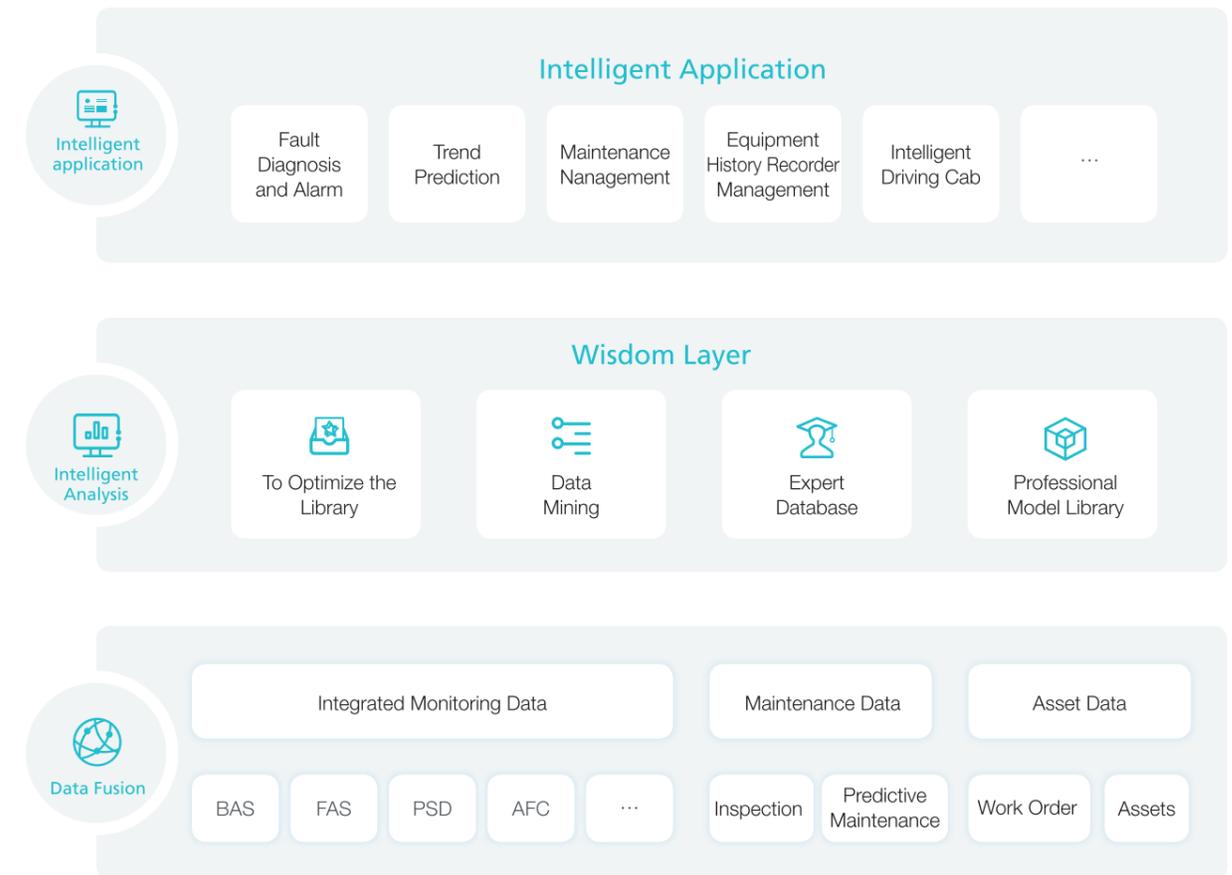
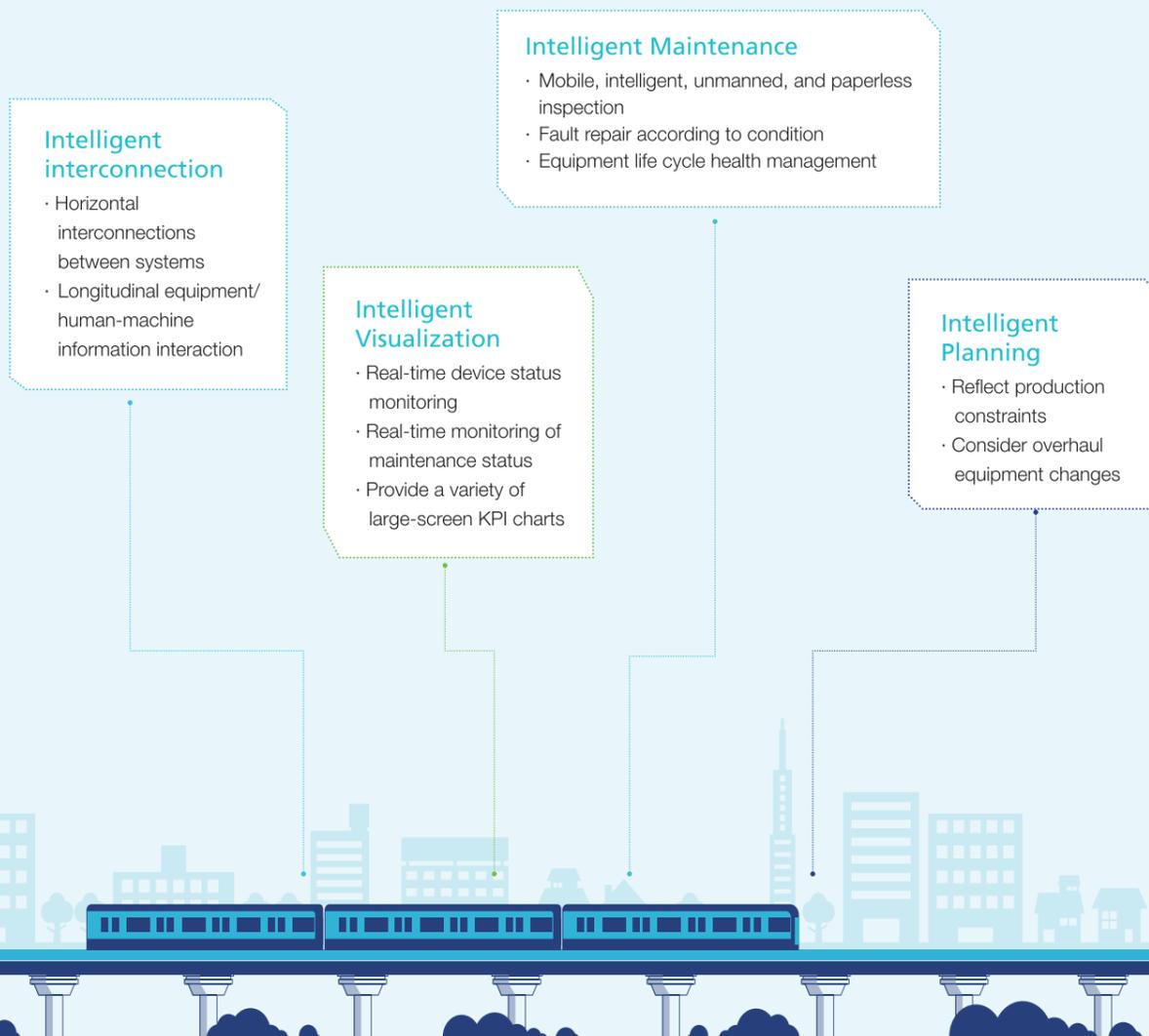
Intelligent Operation and Maintenance System

System Introduction

HollySys urban rail transit intelligent operation and maintenance System is an integrated management platform based on industrial Internet architecture. It uses one systems to achieve efficient and unified multi-dimensional management of operation and maintenance. Through automatic, real-time, comprehensive, and thorough perception, emphasizing the comprehensive interconnection, interworking and interaction from object to object, man to objects, and man to man, realizing predictive maintenance management mode.

The system based on needs for the intelligent operation and maintenance of rail transit, aiming at improving the work efficiency of operation and maintenance personnel and the equipment operation and maintenance level.

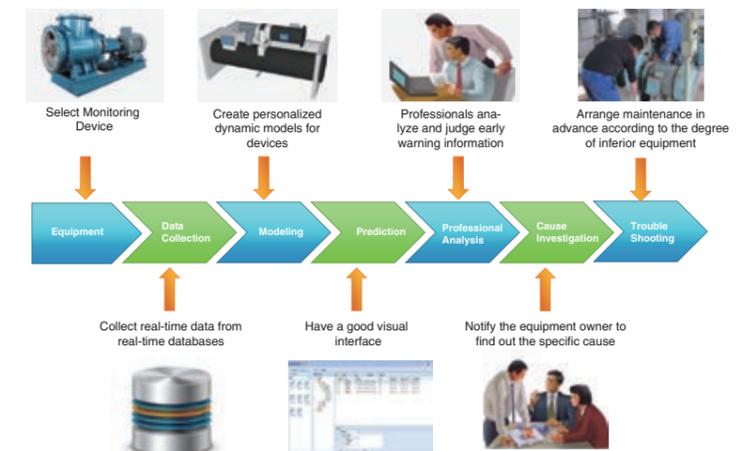
HollySys uses cloud, artificial intelligence, big data, and other information technologies to provide comprehensive intelligent operation and maintenance solutions, realize intelligent interconnection, intelligent visualization, intelligent maintenance, and intelligent planning, and create a new vision of intelligent rail transit operation and maintenance.



System Functions

Intelligent Fault Maintenance Improve Equipment Reliability and Economy

- Massive detection data convergence, with the aid of artificial intelligence (AI) technology for big data analysis
- Establish the equipment diagnosis model, deeply mine the data, find the association rules between the detection data and equipment fault
- Automatic fault locating, rapid resource scheduling and operation linkage, to achieve intelligent maintenance
- Identify hidden trouble in advance and repair faults quickly



Standardization of Operation and Maintenance Management Services

Prevent "missing inspection" and "missing test"

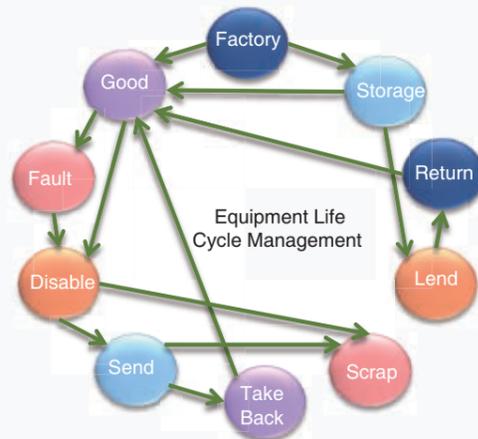
- Establish equipment maintenance database, solidify maintenance record forms into the system, and realize process and standardized management of maintenance and operations
- Compile fault code system and expert knowledge base to improve resource utilization rate and work efficiency

工单名称	类型	申请人	时间	工单状态	处理结果
检修工单	预防性	张三	2019-4-15 09:59	待处理	处理完成
检修工单	预防性	张三	2019-4-15 09:59	处理中	处理完成
检修工单	预防性	张三	2019-4-15 09:59	已处理	处理失败
检修工单	预防性	张三	2019-4-15 09:59	已处理	处理完成
检修工单	预防性	张三	2019-4-15 09:59	已处理	处理完成

Intelligent Equipment Management

Realize equipment life cycle management

- Adopting the dynamic, systematic preventive health records management, advance equipment and alarm equipment management, and budget management, material management to realize interconnection, the equipment management into enterprise value chain management, form the professional equipment, spare parts, tools and other "electronic record", realize the whole life cycle of equipment management



Whole-process Controllability

In-depth mining and analysis of equipment data

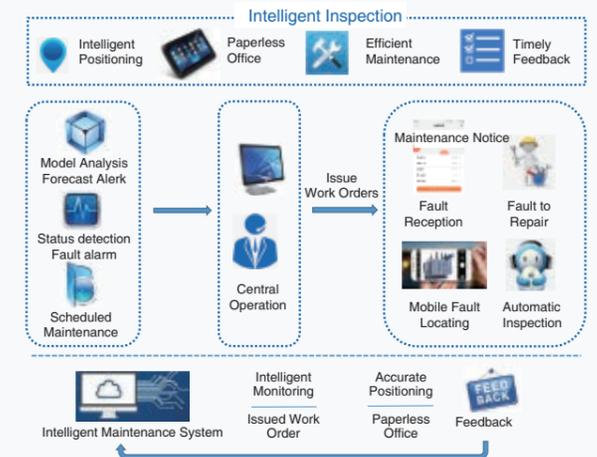
- Personnel and progress information of maintenance work will be tracked and recorded in real time throughout the whole process to ensure safety and effective work. Remote equipment monitoring and progress control can be realized to support operation and maintenance decisions
- Comprehensive display device realizes life cycle information visualization, real-time monitoring of status, intelligent alarm/intelligent prediction, maintenance suggestions, multi-system association and instant message push



Intelligent Inspection

Mobile, unmanned, paperless patrol

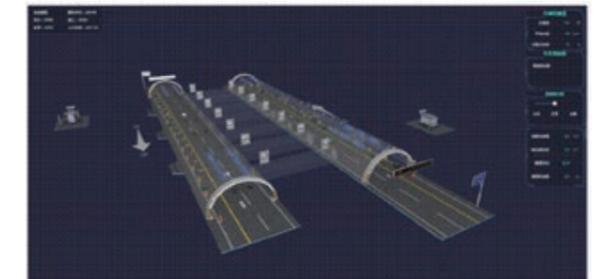
- Use the mobile inspection system to complete the routine maintenance and corrective maintenance, and realize the synchronization of on-site operation situation and remote information of the operation center



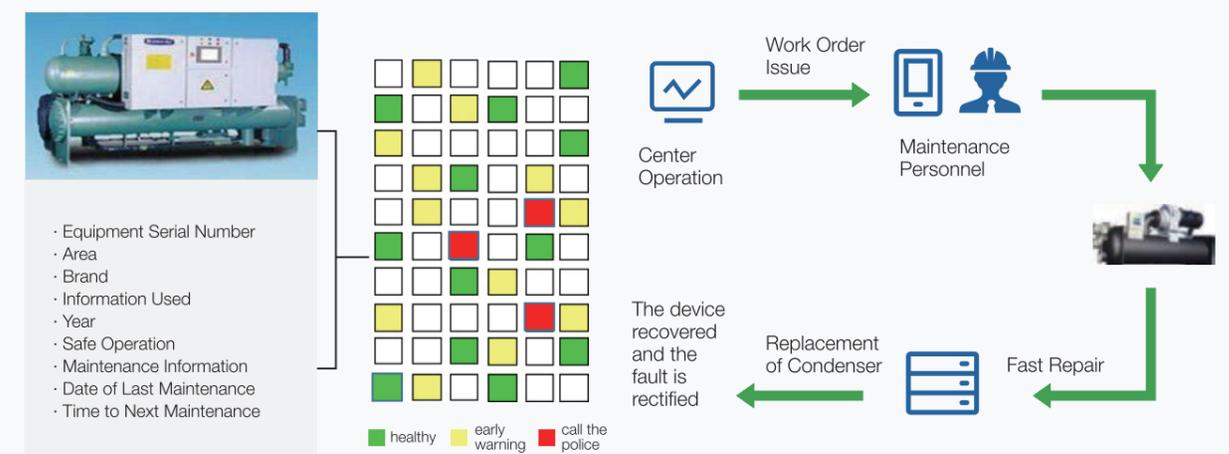
3D Scene Display

Visualization of operation and maintenance management

- Visualized the process and status of station equipment, facilities, personnel and maintenance work
- Core technology uses a powerful 3D graphics engine based on WebGL technology



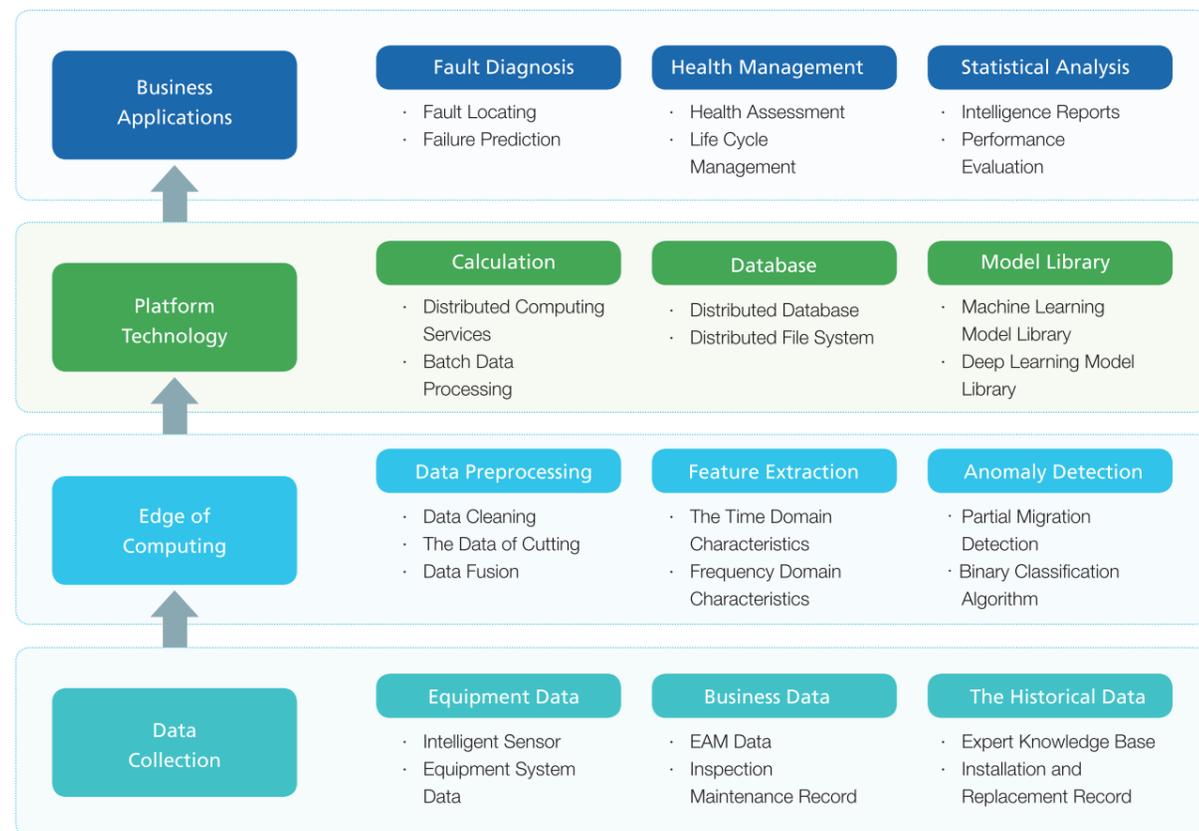
Intelligent Operation and Maintenance System of Chiller in Shenzhen Metro Line 11 Airport Station



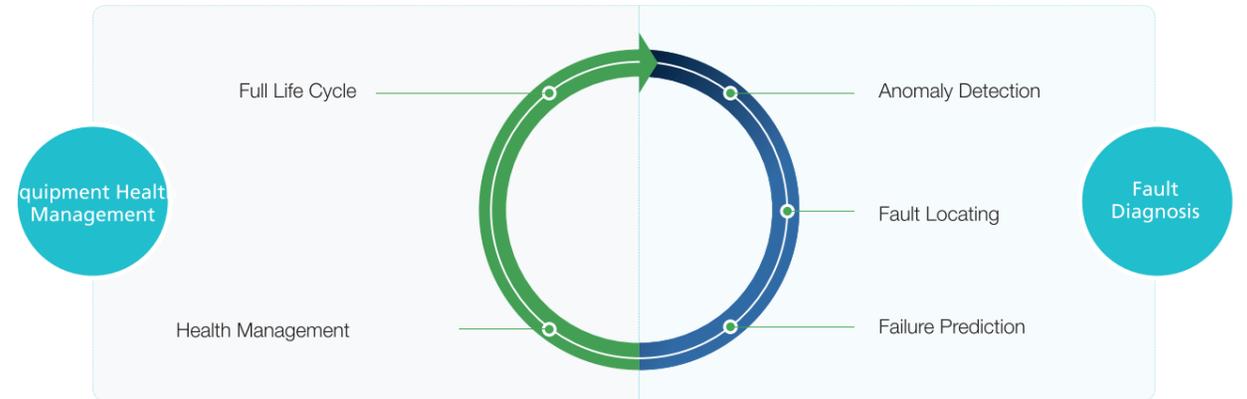
Intelligent Device Diagnosis System

System Introduction

Based on Cloud-Edge-End architecture, advanced technologies such as industrial big data machine learning, Internet of Things and cloud computing are applied to integrate existing system. Integrate the existing system data such as equipment asset management, integrated monitoring and the sensor data of various other equipment, to realize the fault detection, positioning, prediction and full life cycle management through the modeling and analysis of equipment fault and health, promote the transformation from planned maintenance to state maintenance, solve the problem of accurate maintenance, avoid under repair and over repair, and finally achieve cost reduction and efficiency increase.



Core Functions



Customer Value



Cost Saving

Planned maintenance to conditional maintenance, reduce equipment maintenance costs.



Improve the Quality

Make equipment maintenance plan, improve equipment operation quality and service life.



Improve Maintenance Efficiency

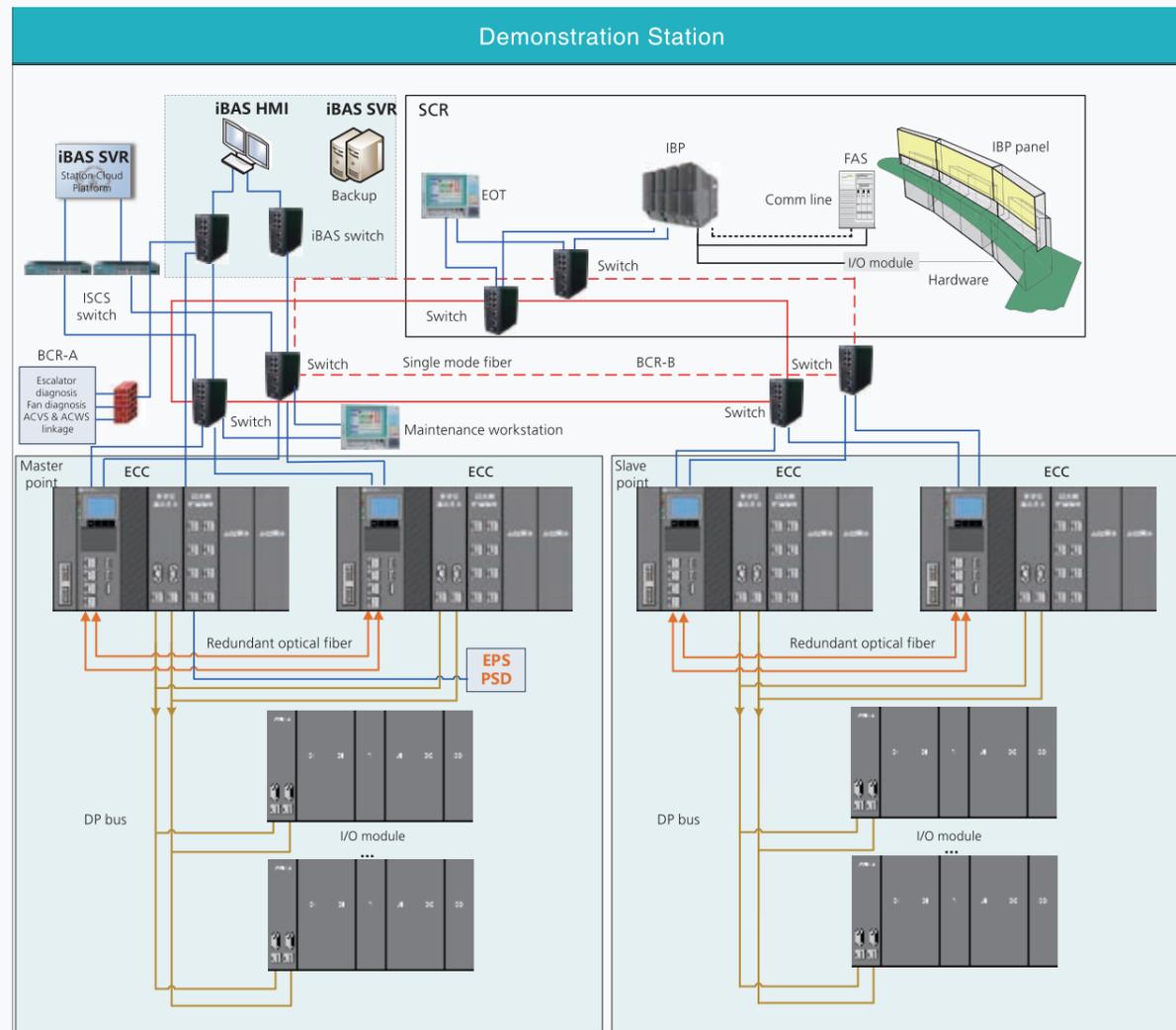
Accurately locate faulty parts of equipment to increase maintenance efficiency.



Security

Real-time monitoring of equipment operation status to ensure safety equipment operation.

The intelligent building automation system (iBAS) of Beijing Metro Line 19 adopts edge-cloud collaborative control technology and uses ECC products to collect and process field data instead of PLC, FEP, edge server and other equipment functions. Realize the traditional BAS functions and the intelligent analysis functions of mechanical and electrical equipment (platform door, battery, water pump, escalator, fan, etc.).



Intelligent Diagnosis of Platform Screen Door System

The intelligent diagnosis algorithm of platform screen door focuses on solving mechanical faults of the PSD, and the data comes from the fault database generated by the data collected by physical equipment for man-made faults. The dynamic modeling analysis and modal identification of mechanical structure were carried out, and the feature extraction of system mass matrix, stiffness matrix and damping matrix was realized. Finally, machine learning method is used to diagnose and predict faults.



Battery Intelligent Diagnosis

The battery intelligent diagnosis system can carry out digital grade evaluation to the current health state of the battery and predict the remaining life and provide the alarm information to the user, analyze and statistics the battery system equipment, and optimize the management of the battery system equipment.



Water Pump Intelligent Diagnosis

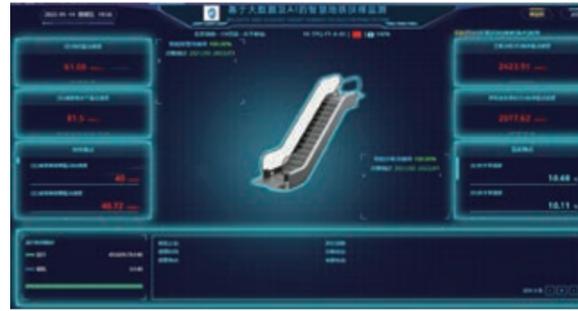
Pump intelligent diagnosis algorithm combined with expert experience and historical data, based on the master control data such as cumulative running time, pump start interval, increase the current peak value, mean value, liquid level and flow judgment logic to diagnose the pump operation status.





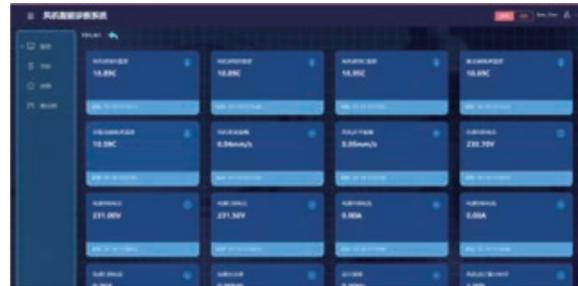
Escalator Intelligent Diagnosis

The escalator intelligent diagnosis system collects data information through many dedicated sensors, and deploys artificial intelligence algorithm in combination with the intelligent diagnosis device to realize fault diagnosis, warning and analysis of the main components of the escalator, such as motor, reducer, drive host, main drive wheel, and cascade chain testifier wheel.



Fan Intelligent Diagnosis

The fan intelligent diagnosis system collects data information through a large number of dedicated sensors, and combines the intelligent diagnosis with artificial intelligence algorithm to realize the fault diagnosis, prediction and analysis of the main parts of the fan, such as impeller, motor and supporting fasteners.



Station Environment Control Energy Saving System

System Introduction

In order to meet the requirements of "green and energy saving" development needs of rail transit, HollySys takes decades of comprehensive monitoring technology as the base and makes full use of cloud, big data, Internet of things, Artificial Intelligence and other intelligent technologies to provide station environmental control and energy saving system solutions for rail transit.

Intelligent Vision



Equipment Level Frequency Conversion

To add intelligent control or energy-saving pump, according to the station heat load, frequency conversion operation of the main fan and circulating pump.

Integrated System Control

From the integrated water system management and control in the early stage to the recent integrated control of ventilation and air conditioning system and water system, the integrated control of the whole ventilation and air conditioning water system has been realized.

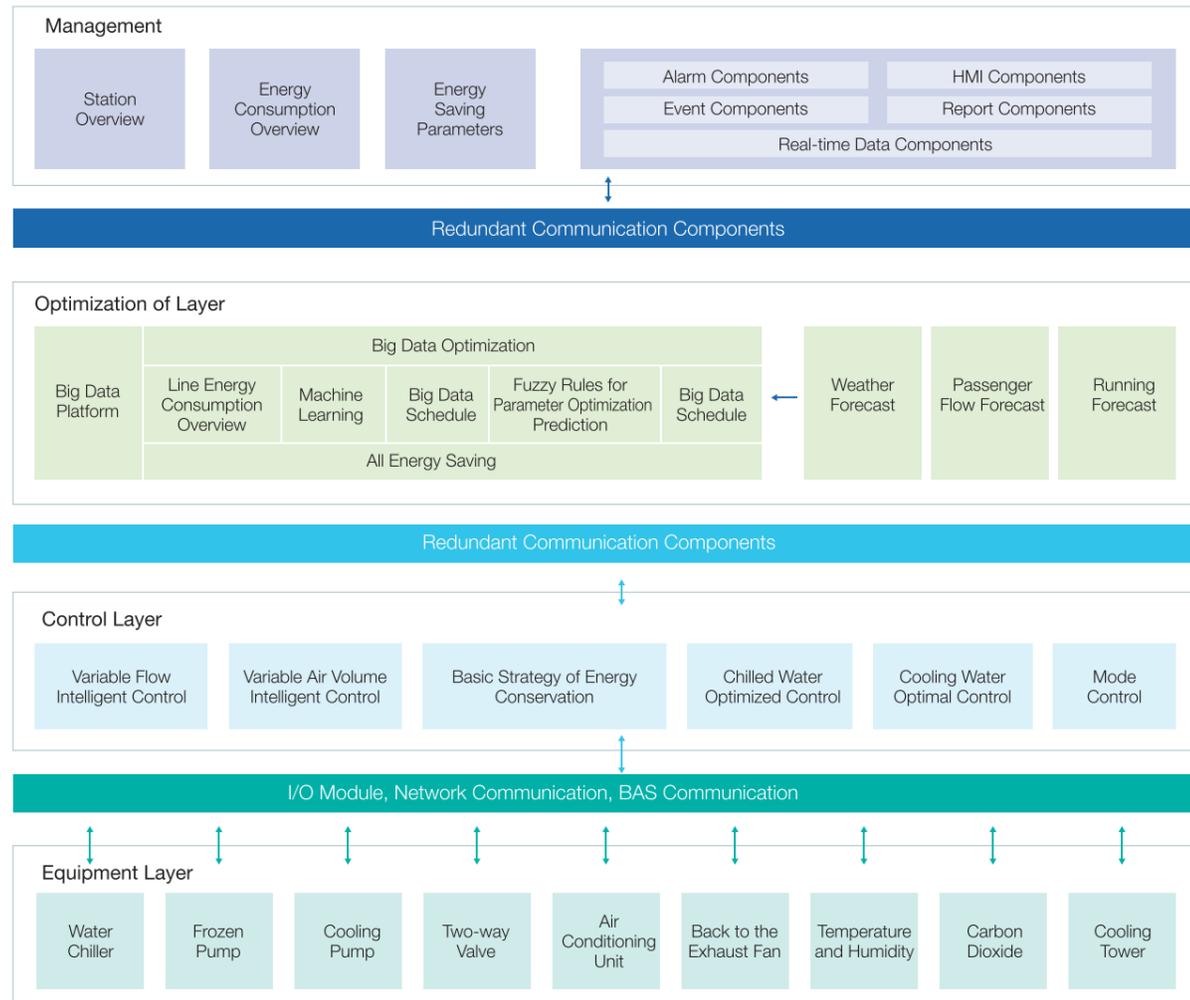
Whole System Load Forecasting and Optimal Control

On the basis of "Combination Adjustment of Fan and Water Pump", the cold capacity prediction and intelligent optimization algorithm based on big data analysis are realized.



System Solutions

The station environmental control and energy saving system based on the whole system load prediction and optimization control, including the control layer, the management layer and the optimization layer. The control layer interacts with the controlled object device of the equipment layer through I/O module, communication or BAS system. The system architecture diagram is as follow:



Core Functions



Basic Strategy

- Energy Efficiency Ratio Calculation
- Wind System Regulation
- Water System Regulation



Energy Saving Management

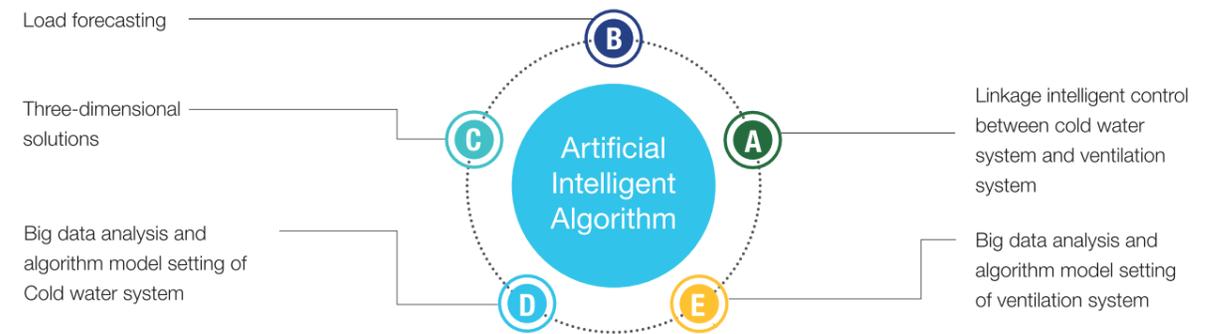
- Energy Consumption Overview
- Energy-saving Monitoring
- Intelligent Alarm
- Report Visualization



Big Data Optimization

- Machine Autonomous Learning
- Big Data Analysis
- Parameter Self-regulation
- Environmental Adaptation

Features



Customer Value



Improve the Operating life of Equipment

Monitor and analyze key equipment and important energy consumption equipment to find out abnormal condition of equipment in time, reduce abnormal operation rate of equipment and improve the effective service life of equipment.



Reduce Operation and Maintenance Pressure

The system helps reduce operation and maintenance management costs, avoid errors and leaks, and improve work efficiency.

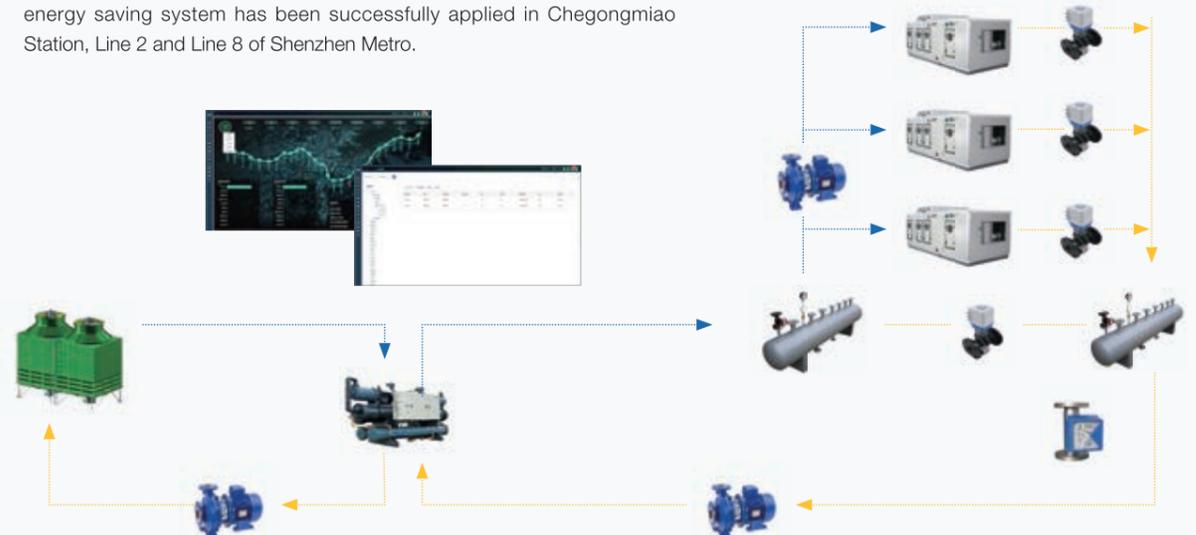


Reduce Energy Consumption

Effectively reduce the operating energy consumption of the environmental control system, effectively maintain the stability and reliability of equipment.

Application Case

Based on the principle of rational utilization, balance of supply and demand and priority of energy efficiency, the station environmental control and energy saving system has been successfully applied in Chegongmiao Station, Line 2 and Line 8 of Shenzhen Metro.



Intelligent Railway Maintenance Solution



- Intelligent Vehicle Workshop Solution
- Intelligent Maintenance Base Solution

Intelligent Vehicle Workshop Solution

Solution Introduction

In order to meet the demand of intelligent operation and maintenance of on-board equipment of multiple unit trains, improve the working efficiency of operation and maintenance personnel and improve the level of equipment operation and maintenance, HollySys focuses on building an intelligent on-board workshop integrating vehicle and ground. On-board wireless downloading equipment is used to ensure the real-time, safe and rapid landing of EMU operation data. Ground and on-board equipment simulation test system, ATP material management system and on-board equipment application (advanced) repair management system run through it. The intelligent analysis system receives the relevant data from the other three systems while acquiring the operation data of the EMU, and simultaneously, incorporates the train control ground data from the ground train control data management technology platform to form a comprehensive analysis of train and ground integration. It realizes the intelligent operation and maintenance of EMU on-board equipment, intelligent interconnection, intelligent internet of things, operation visualization, intelligent maintenance and intelligent scheduling, using in a new prospect for intelligent operation and maintenance of EMU on-board equipment on high-speed railway.

Customer Value



Fast fault location and accurate treatment.



Screening hidden dangers to prevent them from happening.



Multi-type ATP vehicle-ground integration test, factory test standard.



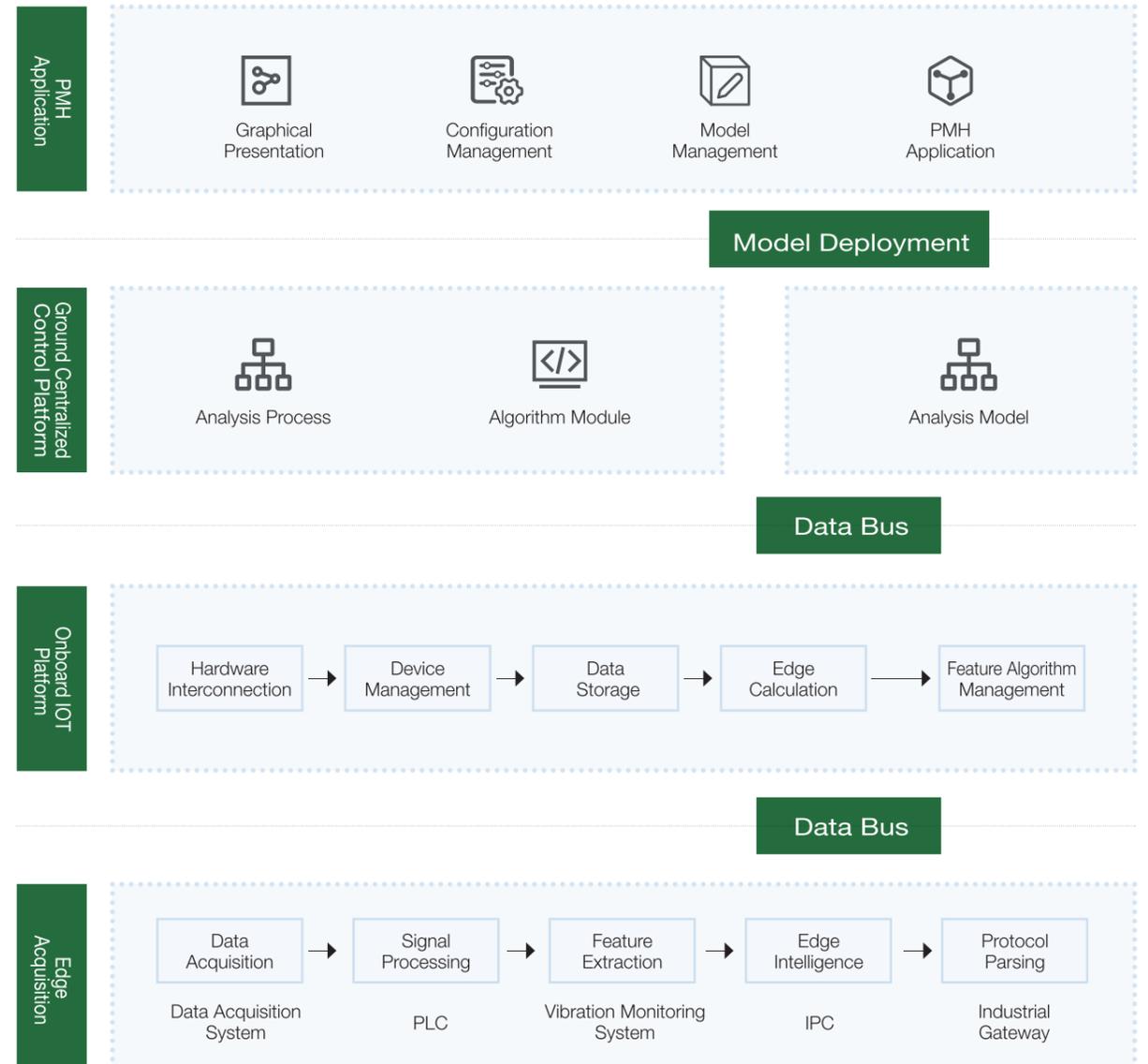
Closely following the user's repair procedure and repair system, and compressing the application repair and advanced repair time of vehicle-mounted equipment.



Shorted average daily video analysis time and data analysis time.

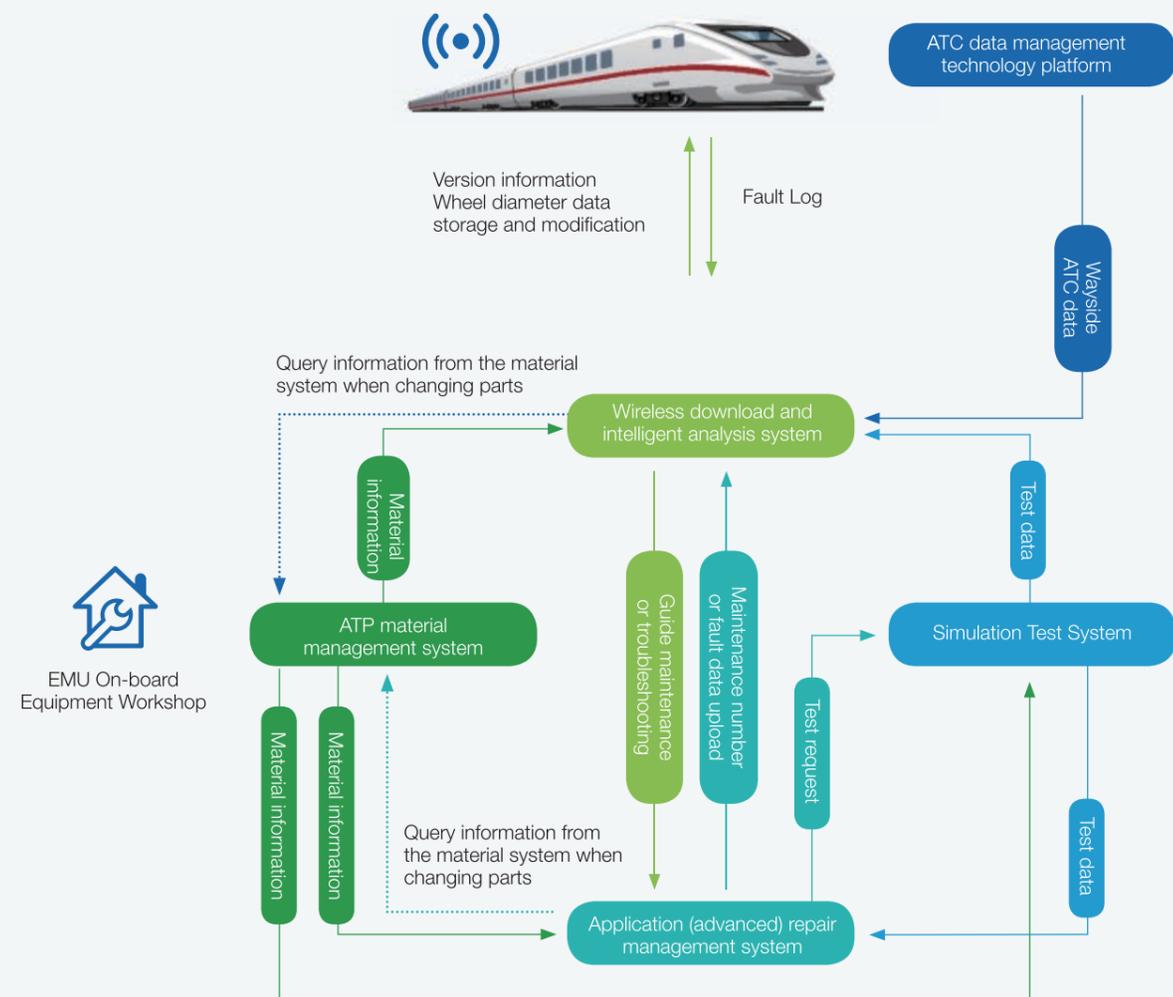
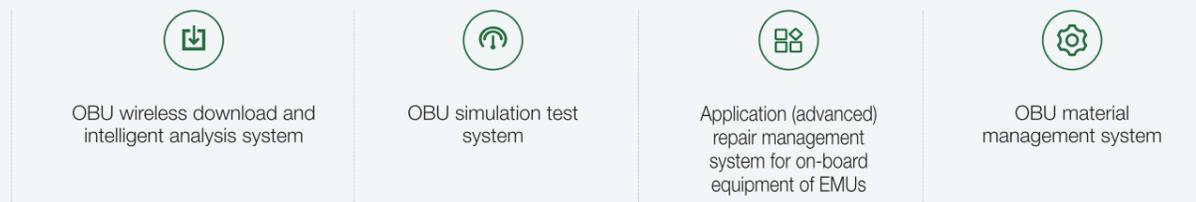


Removing business barriers and eliminate data silos.



System Composition Diagram

The Intelligent vehicle workshop solution consists of the following four systems



Features

Intelligent Link — Connecting everything in the on-board equipment workshop of multiple unit trains.

Set up a unified data information collection platform, and form a multi-dimensional data platform, in which the equipment end-management end of the on-board equipment of the multiple unit train is related to each link of the repair chain of the on-board equipment, and the data of the on-board equipment of the multiple unit train is related to the ground data of train control. Realize the interconnection of all detection and monitoring data.

Intelligent Analysis — Evaluating the status of equipment to prevent missing inspection and repair.

Through the intelligent analysis of the on-board equipment of EMU, the real health status and the future trend of the equipment can be accurately evaluated, and the pre-diagnosis and preliminary positioning of potential on-board equipment faults and hidden dangers can be realized, which provides a basis for the use, maintenance, management and decision-making of on-board equipment.

Intelligent Decision — The equipment status determines the task plan.

With optimization and coordination as the core, it provides tailored support for the use, maintenance, management and decision-making of EMU on-board equipment based on its health status and future trend.

Intelligent Execution — Synchronizing decision-making.

The optimized decision-making is synchronized to the operation and maintenance of EMU vehicle-mounted equipment and the application execution system of EMU vehicle-mounted equipment workshop, covering workshop-level managers and field-level maintenance personnel.

Intelligent Network — Scientific modeling, realizing the whole life cycle management of equipment.

It adopts dynamic and systematic equipment health record management, preventive and early-warning equipment management in advance, and realizes interconnection with budget management and material management, so as to integrate equipment management into user value chain management, form "electronic records" of equipment, spare parts and tools of various specialties, and realize life-cycle management.

Operation Supervision — Visualizing operation and maintenance management.

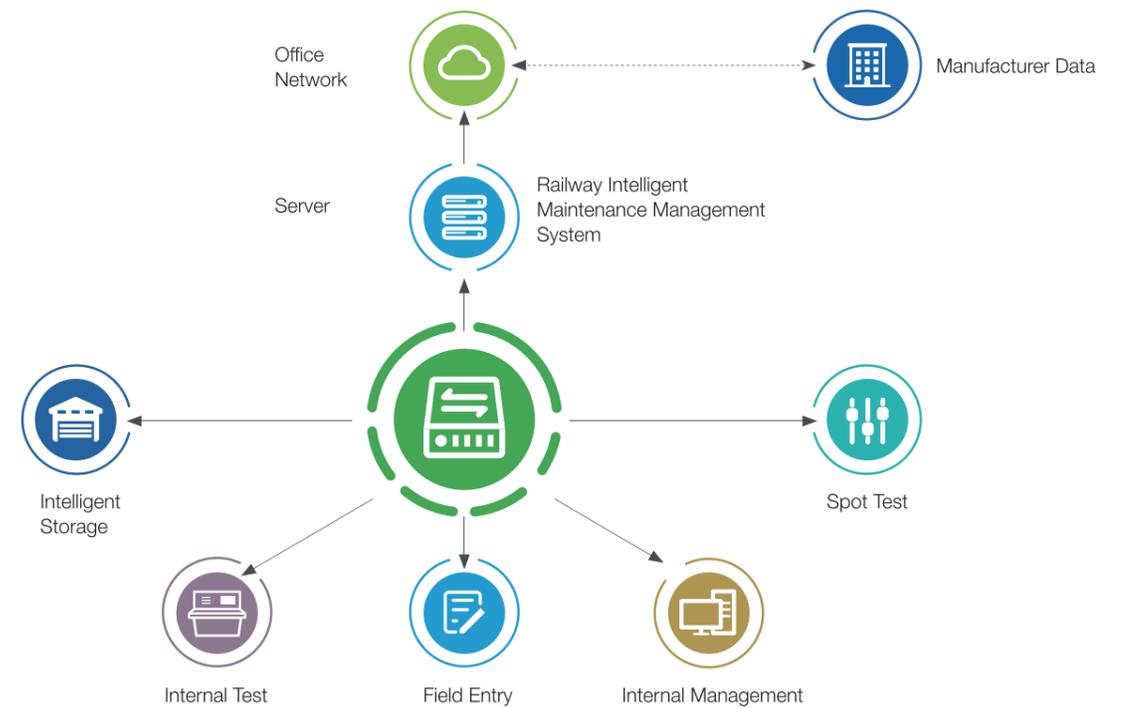
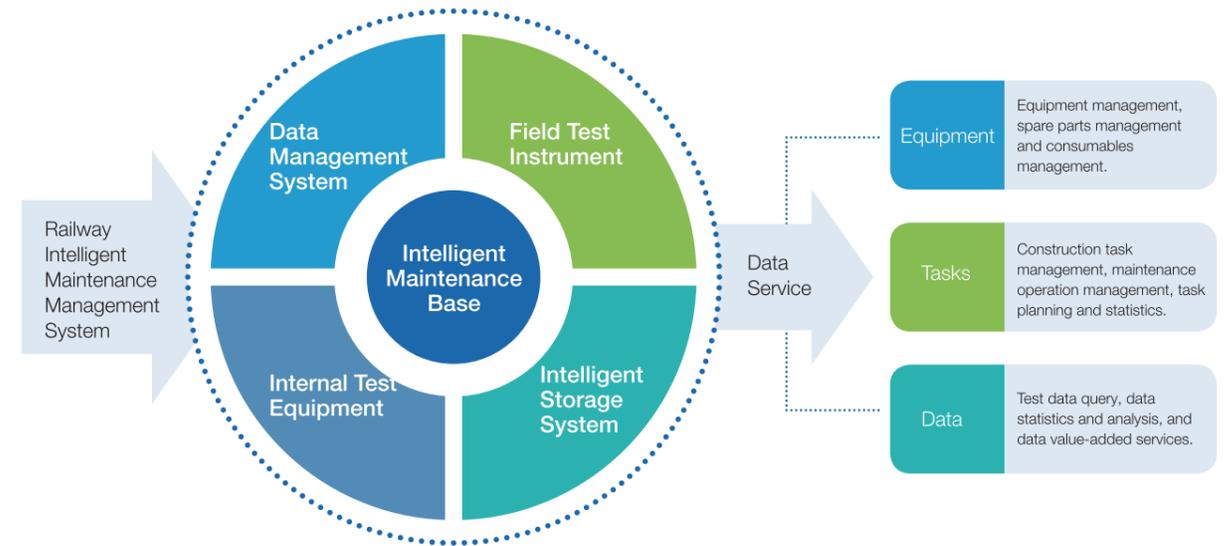
Realize the visualization of the process and status of equipment, facilities, personnel, and maintenance work in the maintenance warehouse of multiple unit trains.

Intelligent Maintenance Base Solution

Solution Introduction

HollySys Intelligent Maintenance Base Solution serve the signal equipment maintenance operations of high-speed railway, general-speed railway, intercity railway and subway, and manage the whole life cycle of rail transit signalling equipment through three dimensions of equipment, tasks and data.

By using network technology, the distance between the device and the site, between the office area and the workshop, and between the experts and the grass-roots workers can be shortened to achieve early detection and resolution of faults. It can achieve comprehensively solve the automatic management and track the production operation process, optimize the management level, improve the operation efficiency, reduce the operation and maintenance costs and ensure the safe operation of the railway signalling system.



Features



Advanced Technical Solution

The system is designed based on B/S architecture, follows design concepts such as modularization, integration and intelligence, and uses advanced technologies such as data mining and Internet of things. It has the characteristics of friendly interface, simple operation, simple maintenance, intelligent decision-making.



Strong Technical Support

HollySys in rail transit leads in intelligent maintenance by making maintenance service more professional and maintenance products more intelligent in the field of industrial digitalization.



Comprehensive Economic Scope

The economic scope includes vehicle-mounted equipment, ground equipment, basic signal equipment, etc., and gradually expands the maintenance business of all-signal products; The business includes material management, assignment of operation tasks, on-site operation safety guidance, inspection data management, data reanalysis and mining, etc.



Open Development Strategy

Open the management software service interface, which is convenient for users to integrate the system down and improve the system functions. Open the hardware product interface, which is convenient for users to integrate the system upwards and saves users' cost. Provide customized services to meet users' special functional requirements and provide all-round services to users.

Typical Cases

A key project of Xi'an Railway Bureau was undertaken by HollySys in September 2021, which became the largest centralized maintenance base for intelligent signalling equipment. The standardized maintenance base of SuiDe Industrial Section located in northern Shanxi province was successfully completed and put into operation. As the core of the Xi'an Railway Bureau's signalling equipment maintenance, the base undertakes the maintenance and measurement tasks of relays, point machines, comprehensive components, electronic information parts accessories, railway special instruments and meters in Baoji-Xi'an line, Taizhong line, Haoji line and other railway lines. The completion of this project marked a new era of intelligent maintenance.



New Technical Solutions for Rail Transit

By advanced technology for future-oriented solution based on the innovative concept of continuous pursuit of technological progress, HollySys can provide the most advanced technical solutions to clients in time.

- Vehicle & Signalling Integration Solution
- Train Virtual Marshalling Solution
- Intelligent Obstacle Detection Solution
- Train Control System Solution Based on Cloud Platform

Vehicle & Signalling Integration Solution

System Introduction

Traditional vehicle and signalling system are designed independently, which requires space, equipment and energy consumption, and affects the real-time improvement of train control. HollySys vehicle & signalling integration solution highly integrates the signalling system with the vehicle. Through the integrated design, the transmission time of control information is shortened, the real-time performance of vehicle control is improved, and the installation space and number of equipment are reduced.

Features

Integrated Design
Integration of hardware, software, network, peripherals and centralized control of signalling system / traction / braking / etc.

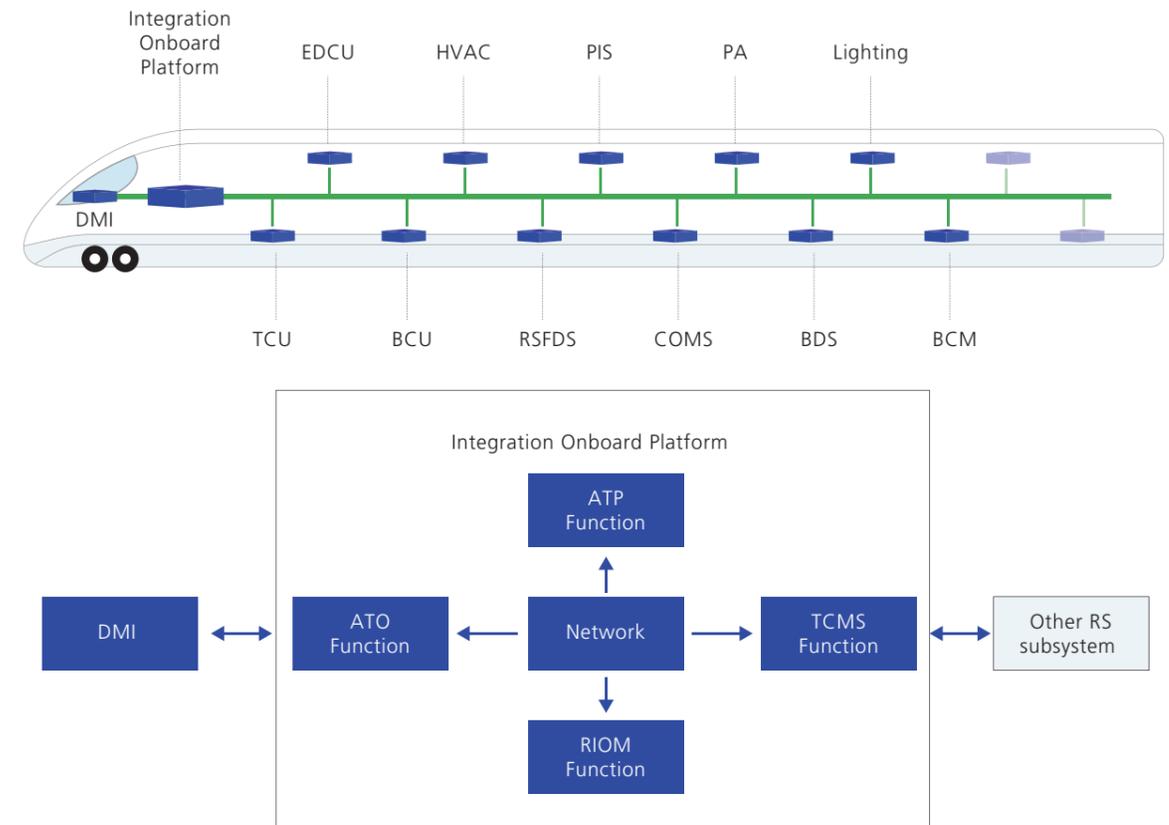
Flexible Configuration
The scope of integration can be determined by configuration, for example, only ATO is integrated with vehicles, or ATP/ATO is integrated with vehicles.

Improve Transportation Efficiency
Through the integrated design of vehicle and signalling system, the real-time performance of signalling control is improved, the train headway is further reduced, the automatic driving control is more accurate, and the transportation capacity of the system is higher.

Cost Saving
Through the integrated design of vehicles and signalling system, the number of hardware and space, the number and weight of cables are reduced, the types and quantity of spare parts are reduced, and the cost is further reduced.

High Real-time Performance
ATP/ATO vehicle control instruction and information collection time is shortened, and real-time performance is improved.

System Composition Diagram



Train Virtual Marshalling Solution

System Introduction

Due to the shortcomings of the fixed train's maximum capacity for transporting passengers, which takes a long time to change the physical marshalling, HollySys designed and developed the train virtual marshalling system. Based on the technologies of train communication and cooperative control, the system can realize the flexible operation of trains in the form of virtual marshalling, get rid of the limitations of traditional fixed marshalling and physical linking, and dynamically configure the transport capacity, thus providing users with higher and more flexible transport service capabilities.

Features

Train-to-Train Communication
 Direct point-to-point bi-directional real-time communication between the front and rear trains in the virtual marshalling queue, and exchange train status and operation information in real time.

Collaborative Control
 After the virtual marshalling of trains is completed, the trains in the fleet run forward cooperatively at fixed intervals.

Dynamic Train Fleet
 The control of train fleet and detachment from fleet is automatically controlled by the system, without stopping and limiting physical position.

Small Headway
 The train headway is further reduced, and the transportation capacity is increased.

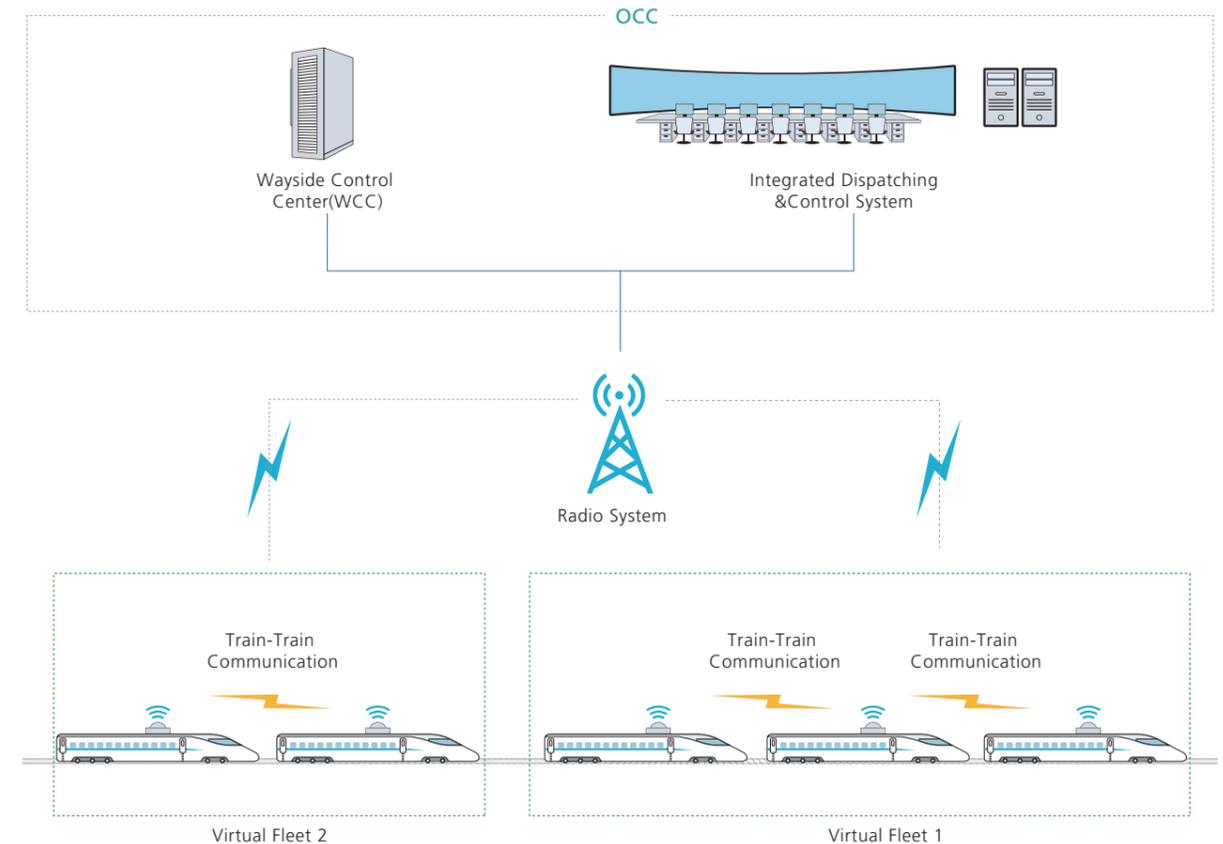
Customer Value

Large Transport Capacity
 After adopting the virtual marshalling solution, the train headway is further reduced, and the system can provide greater transport capacity.

Dynamic Allocation of Transport Capacity
 Small trains and virtual marshalling technology is adopted to realize smaller headway and more flexible transport capacity.

Coping with Risks
 In special periods, on the premise of ensuring transportation efficiency, people can be effectively isolated and the risk of gathering can be reduced. For example, when an epidemic occurs, the risk of people spreading in trains can be effectively reduced by adopting the virtual marshalling operation of small trains.

System Composition Diagram



Intelligent Obstacle Detection Solution

System Introduction

UTO trains are lack of driver's observation will lead to the failure of finding obstacles in front of trains in time. The intelligent obstacle detection system provided by HollySys can effectively solve this problem, provide intelligent monitor for trains, detect obstacles ahead and make timely protection and alert. At the same time, the system can also improve the safety of manual driving when the signalling equipment fails.

The intelligent train detection system adopts radar, video camera and other sensor equipment, adopts deep learning technology and active recognition algorithm based on radar and image recognition, detects the line within a certain distance ahead of the train, finds out the danger in time and gives an alarm or stop the train, thus ensuring the safety of train operation or improving the efficiency of line operation under fault conditions.

Core Functions



Obstacle
Recognition



Obstacle Distance
Calculation



Obstacle
Warning



Train Over-speed
Protection (optional)



Features



Non-Contact Detection

Without touching, trains, pedestrians and obstacles in front of trains, identity functions can be carried out through radar and image recognition technology and intelligent active recognition algorithm.



Long Detection Distance

It can detect fixed and moving objects within 300m in front of the train.



Adaptability

The system can identify pedestrians, signal, objects beside rails, vehicles, and can adapt to different line conditions such as bends, straights, turnout areas, ramps as well as different light and weather conditions.



Independent Use

The train intelligent detection system can interface with trains and signalling to provide obstacle detection results, or can be used as a system independently to perform alarm and train control functions.

Customer Value

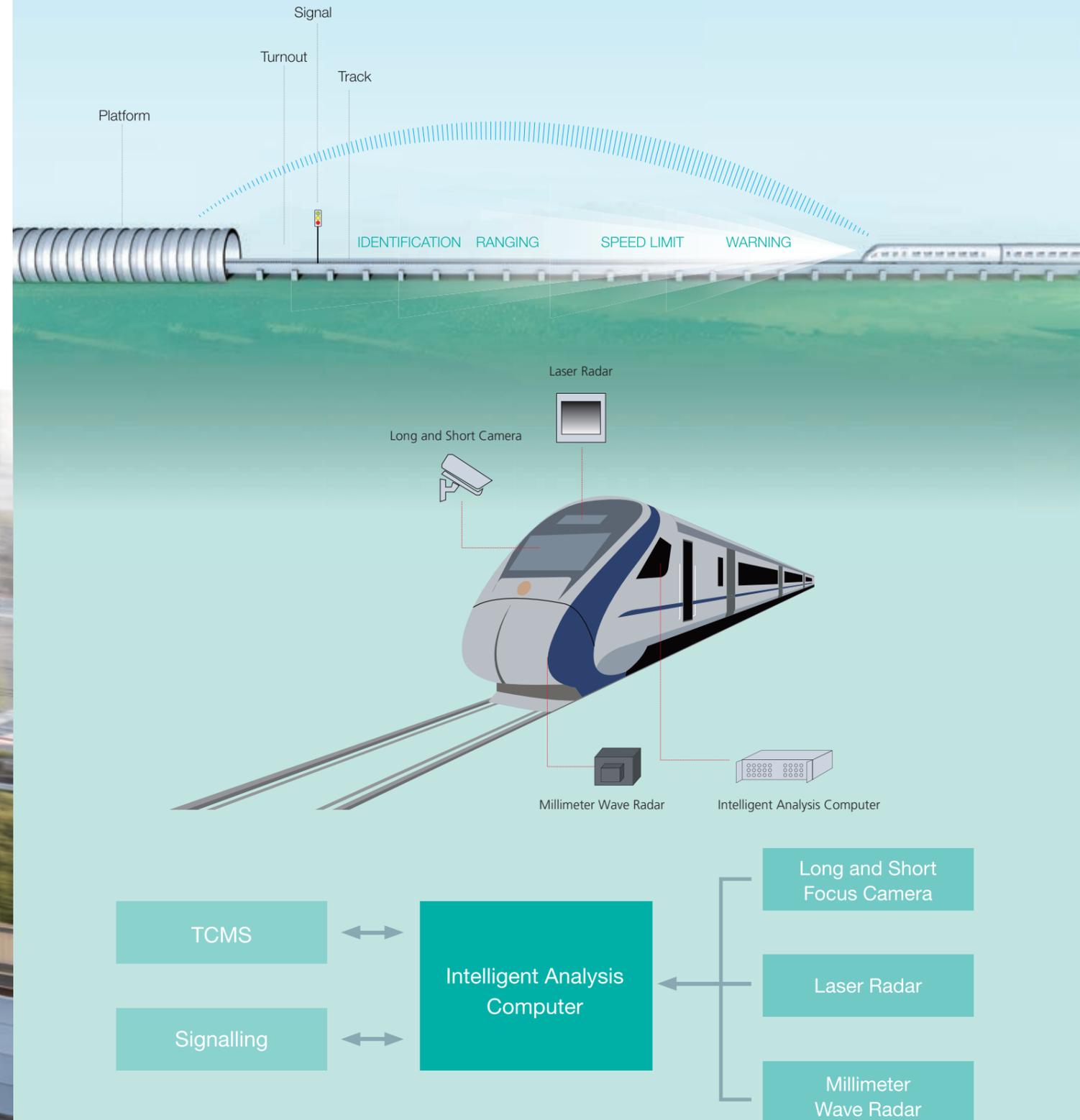
Enhance Safety

Real-time obstacle detection-carried out on the line improves the safety of train operation.

Improve Efficiency

After the signalling system fault is degraded, it assists the driver with safe operation and improve the train operation speed and operation efficiency under degradation.

System Composition Diagram



Train Control System Solution Based on Cloud Platform

System Introduction

Traditional train control systems all adopt the service mode of providing software and hardware, which makes the safety equipment special and difficult to upgrade. HollySys train control system based on cloud architecture integrates new technologies such as cloud platform and 5G besides traditional signalling technology, and runs the signalling system on the cloud platform to realize the virtualization of hardware equipment. Compared with traditional methods, its computing power and storage capacity are higher and more flexible, and it integrates 5G communication technology to realize data exchange and communication with greater bandwidth and speed.

Features

Flexible Computing Power
With the powerful computing resources and storage resources of the cloud platform, it can provide higher computing power and processing power.

Wireless Connection
The control computer is concentrated in the cloud platform, the wayside equipment is controlled by the object controller, and the train control equipment based on cloud platform is wirelessly connected with the object controller, which greatly reducing the number of optical/electrical cables and construction work.

Hardware Virtualization
The computers of ATS, Interlocking and wayside ATC are all provided with virtual devices by the cloud platform.

Intelligent Maintenance
The centralized maintenance service based on cloud platform provides multiple intelligent maintenance functions, and the system has high maintainability.



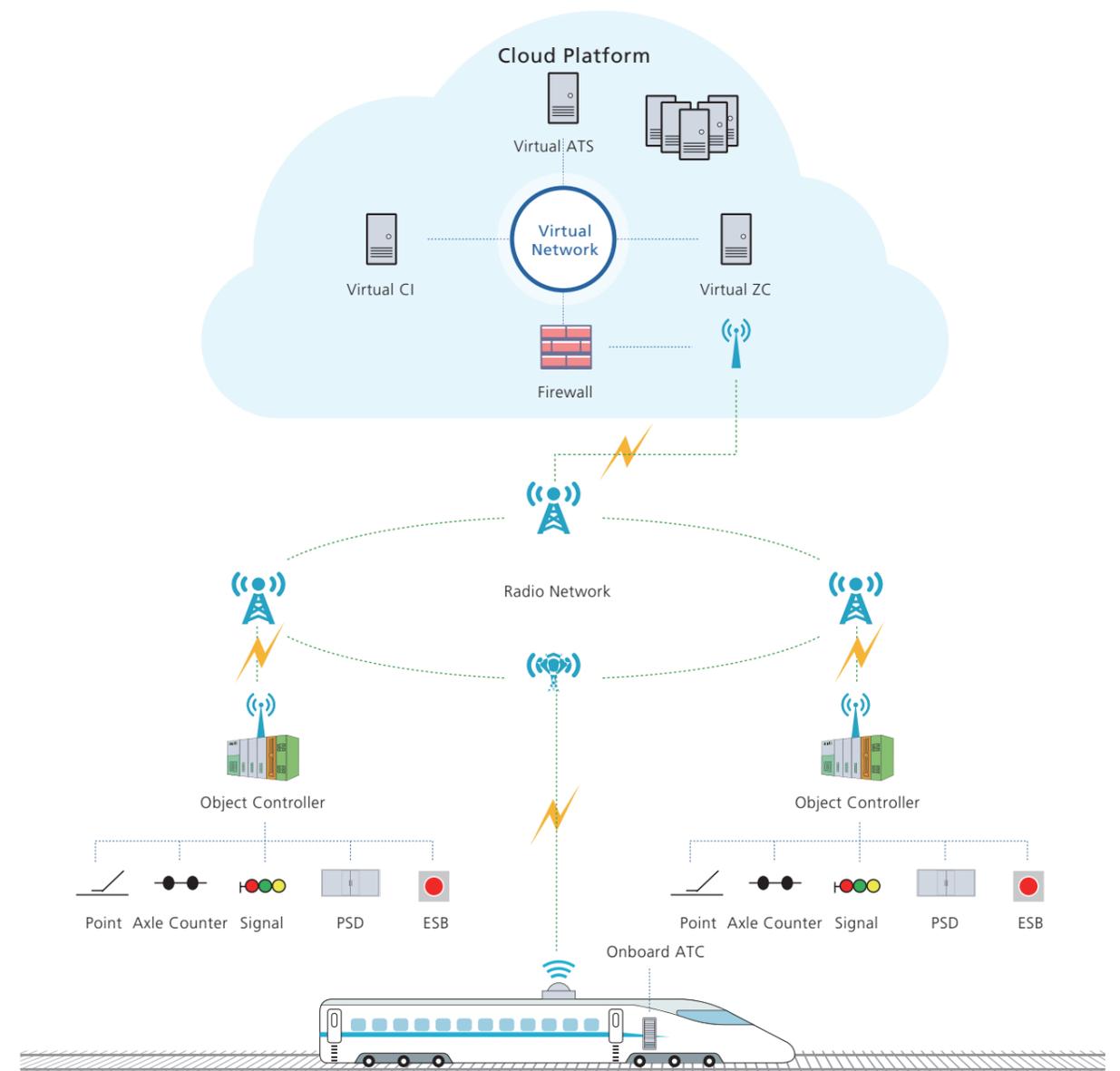
Customer Value

Investment Saving
Equipment virtualization, and wireless connection of object equipment, leads to fewer equipment and cables, which saving construction investment and maintenance costs.

Energy Saving
Minimizing hardware equipment and greatly reducing energy consumption.

Easy to Upgrade
Since the signalling system runs on the cloud platform, it is more convenient and faster to upgrade.

System Composition Diagram



PRODUCTS

General Signalling Products

- Computer Based Interlocking (CBI)
- Centralized Traffic Control System (CTC)
- Object Controller (OC)
- Jointless Track Circuit
- Driver Machine Interface (DMI)

Train Control Signalling Products

- On-board Equipment
- BTM and Antenna
- Balise (controlled & fixed)
- Lineside Electronic Unit (LEU)
- Radio Block Center (RBC)
- Temporary Speed Restriction Server (TSRS)
- Data Storage Unit (DSU)

Urban Signalling Products

- Zone Controller System (ZC)
- Automatic Train Supervision (ATS)
- Vehicle On-board Controller (VOBC)

SCADA System Products

Intelligent Urban Rail Integrated Service Platform

Edge Computing Platform

General Signalling Products

Computer Based Interlocking (CBI)

HCI-1000



Features

- The structure of "2×2oo2"
- SIL4 certified
- Support centralized and regional distributed deployment
- Support Solid Static Interlocking, and Object Controller
- It can be applied to mainline railways, subways and other fields
- Built-in maintenance terminal

Core Functions

- Route control
- Signal control
- Point control
- Track section control
- ESB Emergency Stop Button monitoring
- Platform door monitoring
- Disaster information monitoring
- Electric Code control
- Block control
- Inter-site/inter-station contact
- Level Crossing control and indication
- Depot Contact
- Fault self-diagnosis, maintenance management and alarm

Object Controller (OC)

IOC-HS



Features

- The structure of "2×2oo2"
- SIL4 certified
- Reduced size and flexible layout
- Wide application

Core Functions

- Communication management with interlocking
- Input control
- Output control
- Power management
- Monitoring information collection
- Fault self-diagnosis, maintenance management and alarm
- Support wired communication and wireless communication
- Support to be integrated with the object device as a Intelligent device
- Multiple monitoring and collection functions

Centralized Traffic Control System (CTC)

CTC-1000



Features

- Intelligent decentralized and Autonomous design
- Redundancy design of hot standby for system key equipment
- Cross-platform design, that supports running on multiple operating systems
- Remote one-click automatic upgrade/backup
- Customized HMI based on customer requirements

Core Functions

- Train and signalling equipment status monitoring
- Train schedule management
- Train tracing and recognition
- Train command and regulation
- Route control
- Temporary speed restrictions management
- Wireless dispatching command management
- Queries, statistics and reports
- Fault self-diagnosis, maintenance management and alarm

Jointless Track Circuit (TC)

ZPW-2000S



Core Functions

- To provide track section occupied/clear status information for the trackside signal system
- To continuously transmit real-time control information to the on-board cab signalling equipment

Features

- SIL4 certified
- Support communication coding and relay coding
- Double safety check
- Dynamic detection of track circuit split
- Tuning area optimization
- Outdoor equipment dual isolation redundant protection
- Sender and receiver can achieve "1+1" redundancy
- Integrated structure reduces cost and facilitates implementation
- Easy maintenance

Driver Machine Interface (DMI)

ETCS-HS-DMI



Features

- IP40 / Front IP 65 and Rear IP 40
- SIL2/SILO is optional
- 10.4", 2*8" LCD screens are supported
- Support 640*480, 1024*768 and other resolutions
- The interface can be customized

Core Functions

- Display
- Keyboard acquisition
- Touch screen acquisition
- Sound/language prompts
- Text message prompt
- Communicate with vital computer of onboard equipment
- Fault diagnosis

Train Control Signalling Products

On-board Equipment

400H



ATP Functions

- Overspeed protection and braking
- Protection against Undesirable Train Movement
- Door supervision
- Rear end of train speed restriction maintenance
- Train integrity supervision
- Level transition
- Train speed measurement and positioning

ATO Functions

- Automatic train speed adjustment
- Platform precise parking
- Door management
- Departure management

BTM and Antenna

BTM-hs-200H



Features

- SIL4 certified
- The "2x2oo2" redundancy structure ensures the security of message decoding and transmission
- Comply with ERTMS/ETCS Subset-036/Subset-085
- The internal periodical self-test circuit continuously detects the BTM working status in real time.
- The antenna is full-sealing designed to meet various application environments
- Modular design, for easy and convenient maintenance
- Large capacity of data record, clear running status
- Support historical data query and intelligent analysis and diagnosis of faults

BTM-ANTH-hs



Balise (controlled & fixed)

LKY-hs



Features

- SIL4 certified
- Comply with ERTMS/ETCS Subset-036/Subset-085
- IP68
- Low power consumption and short response time

Radio Block Center (RBC)

HRBC1000



Features

- SIL4 certified
- "2×2oo2" structure
- Built-in maintenance terminal

Core Functions

- Train movement authority calculation
- Train registration/cancellation management
- Level transition management
- RBC handover management
- Track condition information management
- Emergency stop management
- Shunting management
- Fault self-diagnosis, maintenance management and alarm

Lineside Electronic Unit (LEU)

LEUC-hs



Features

- SIL4 certified
- "2×2oo2" structure
- Comply with ERTMS/ETCS Subset-036/Subset-085
- Support relay interface and Ethernet interface
- Detection of cable shorts and opens
- Support indoor and outdoor installation

Temporary Speed Restriction Server (TSRS)

TSRS-HS



Features

- SIL4 certified
- "2×2oo2" structure
- Built-in maintenance terminal

Core Functions

- Communication management
- Verification, storage and prompt of temporary speed restriction command
- Send temporary speed restriction command
- Temporary speed restriction command cancelled
- Temporary speed restriction command deletion
- Sending verification result, execution result and prompt status information of temporary speed restriction command
- Fault self-diagnosis, maintenance management and alarm

Data Storage Unit (DSU)

HDSU-1000



Features

- SIL4 certified
- "2×2oo2" structure
- Manage data of multiple lines
- Support simultaneous download of 40 trains
- Support encrypted/non-encrypted data transmission
- Support broken transmission resume

Core Functions

- Electronic map storage
- Electronic map management
- Electronic map download
- Communication management
- Malfunctions alarm

Urban Signalling Products

Zone Controller (ZC)

HZC-1000



Features

- SIL4 certified
- "2×2oo2" structure
- Support interaction with 4 interlockings
- Support interaction with 4 adjacent ZCs
- Support temporary speed restriction management functions
- The maximum number of controlled trains reaches 40

Core Functions

- Train positioning
- Train headway control
- Temporary speed restriction management
- ZC handover management
- Auxiliary interlock control
- Guarantee of train stopping
- Train turn-back management
- Electronic map version management
- Dormancy supervision
- Wake-up dynamic test
- Rain and snow pattern management
- Remote emergency braking
- Obstacle detection information processing
- Malfunctions alarm

Automatic Train Supervision (ATS)

ATS-1000



Features

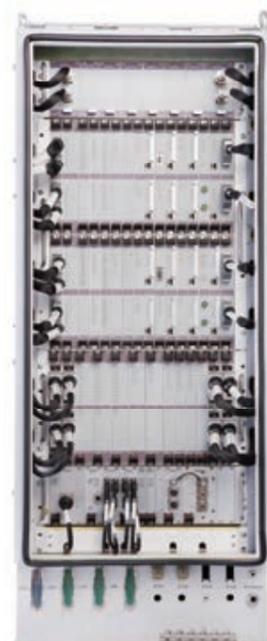
- SIL2 certified
- Cross-platform design, that supports running on multiple operating systems
- Redundancy design of hot standby for system key equipment
- Remote one-click automatic upgrade/backup
- Customized HMI based on customer requirements

Core Functions

- Human-machine interface
- Automatic route control
- Train tracing and recognition
- Automatic train dispatching
- Automatic train adjustment
- Operation planning and management
- Train remote control
- Data records and statistical reports

Vehicle On-board Controller (VOBC)

HCC-1000



Features

- ATP: SIL4 certified
- ATO: SIL2 certified
- Safety redundancy structure of "2x2oo2"
- Support unmanned driving function (optional)
- Support head-to-tail redundancy of speed measuring and positioning equipment
- Support remote restart
- Support remote RM functions

ATP Functions

- Train speed measurement and positioning
- Overspeed protection
- Emergency braking/revocation
- Temporary speed restriction management
- Red light false start protection
- Reverse Movement protection and Roll Away protection
- Train integrity supervision
- Electronic map management
- Door monitoring
- Platform door monitoring
- Operation level/driving mode management
- Train turn-back
- Unmanned driving functions

ATO Functions

- Automatic control of train speed
- Station-to-station running time control
- Platform precise parking
- Stop timing management
- Departure management
- Door control
- Management of holding, adjusting and stopping

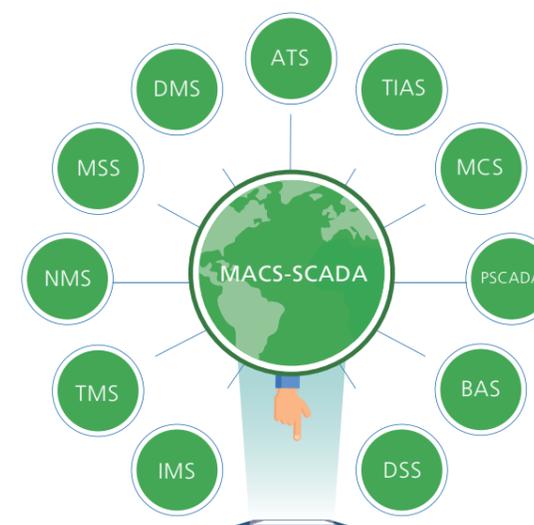
AOM Functions

- Be in dormancy
- Wake up
- Undervoltage protection of battery

SCADA System Products

MACS-SCADA MCS Software

MACS-SCADA MCS software product is a cross-platform and extensible development platform designed and developed based on OPC UA. Based on this platform, various systems such as power monitoring, environmental monitoring, integrated supervision control, automatic train monitoring, and integrated train automation in the field of rail transit can be rapidly developed.



Core Functions



Configuration tools can be used for data modeling (data configuration and graphic configuration) and data downloading of the system. Operation and maintenance tools can automatically upgrade and debug online data.



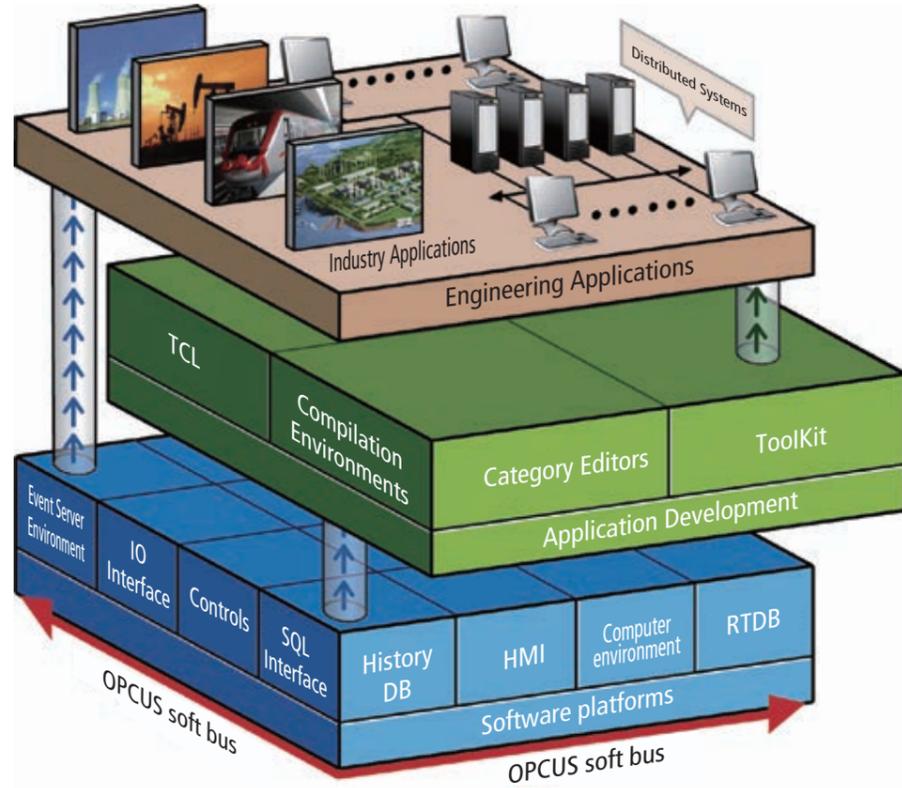
Multiple data services can be provided to realize real-time calculation, processing and interface display of equipment data. Realize archiving and quick inquiry of historical data.



Multiple device drivers can be used to realize the data interaction between the system and external systems, and realize the quick access of device data.



A variety of control modes can be provided such as point control, sequence control, mode control, linkage control and other functions.



Flexible Deployment

It can be deployed flexibly according to requirements, and can realize integrated deployment of collection, processing and display, or can be deployed separately.

Agile Development

A number of API interface libraries, model libraries and graphics libraries are used to realize rapid development of business applications.

Simple Operation and Maintenance

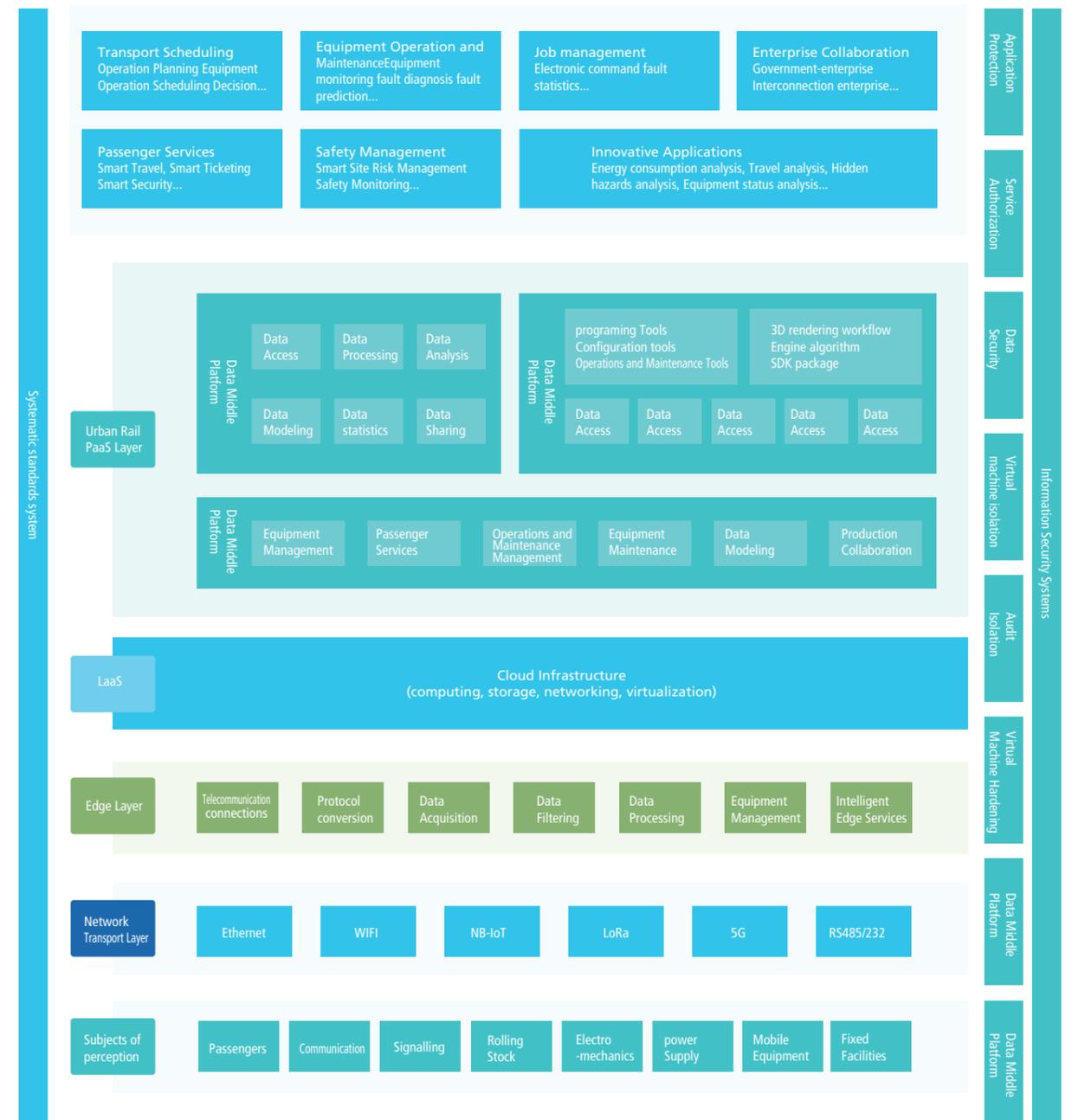
Multiple operation and maintenance tools can monitor the operation of the system in real time.

Security and Reliability

Technologies such as redundant design and communication encryption improve the security of the system. The MACS-SCADA integrated supervision control software platform Beijing Subway Yanfang Line, Line Airport Express Line 17/ 19, Shenzhen Line 6, Hohhot Line 1&2, Kunming Line 5. Among them, the Yanfang Line is the first TIAS system supported by independent research and development platform in China. Please refer to TIAS system introduction for detailed functions.

Intelligent Urban Rail Integrated Service Platform

The intelligent urban rail integrated service platform is an industrial Internet platform that has been widely applied to the urban rail field. The architecture of the platform is mainly composed of two major systems and four levels. The two major systems are the standard specification system and the a security protection system, and the four levels are the edge layer, the IaaS layer, the urban rail PaaS layer, and the urban rail application layer. The platform aims to develop the urban rail information model to shape the platform capability, and realize the business process based on unified data sharing.



Platform Capabilities

Security Services

- OAuth 2.0
- Identity Authentication Services
- Permission Verification Service



Analysis Services

- Predictive Services
- Algorithm Services
- Correlation Analysis Services
- Analysis Framework Services



Data Management

- Model Services
- Time-series Data Services
- Real-time Data Management
- Historical Data Management
- Simulation Data Services
- Alarm Services
- Event Services



Microservices and Application Framework

- Open Service Broker
- RESTful API
- Application Development/ Shelving/Ordering/Deployment



Generic Middleware

- Workflow Services
- Cloud Gateway Services
- Messaging Middleware Services
- Database Middleware Services
- Object Storage Services
- In-Memory Database Services



Visualization Tools

- Modelling Tools
- APP Visual Development Tools –
- Algorithm Programming Designer
- Simulation Tools
- Business Process Designer
- Data Flow Designer

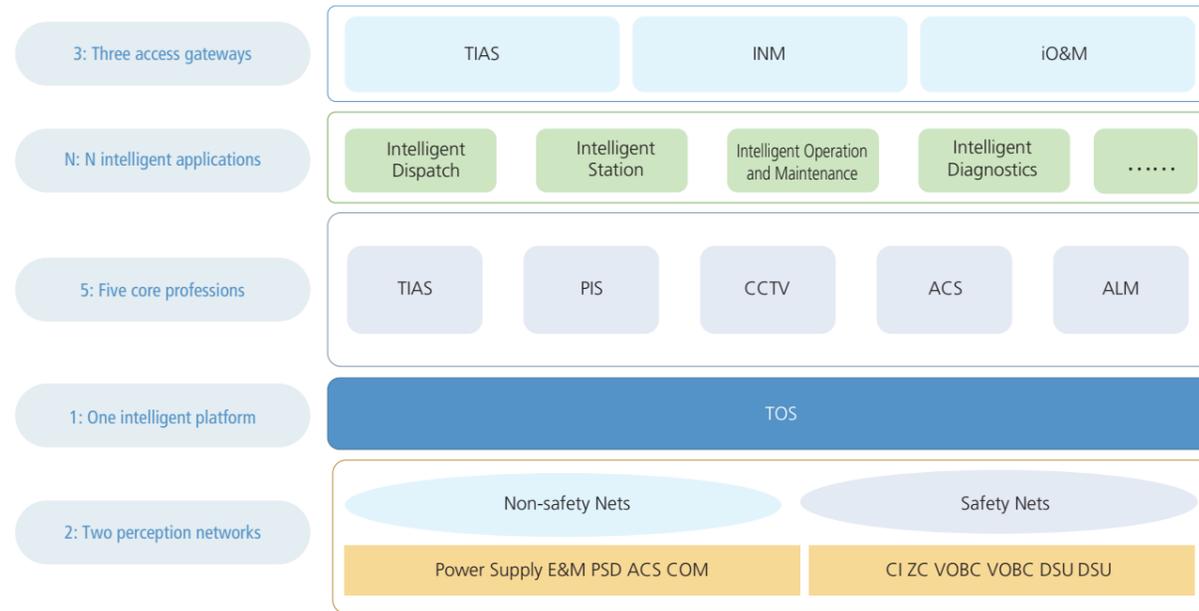


Application



Typical Cases

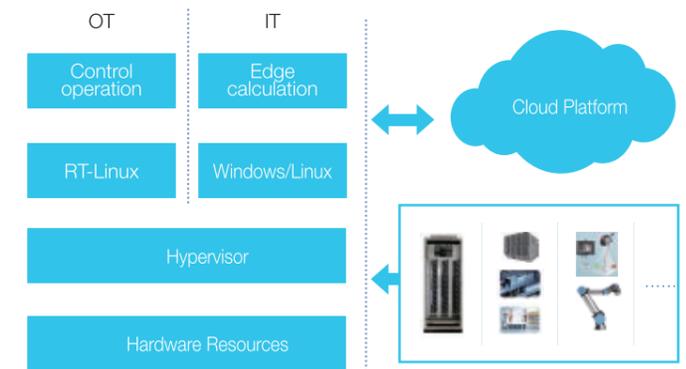
The intelligent urban railway integrated platform is being demonstrated on the Beijing Subway Line 19 Phase I project, which integrates TIAS, PIS, CTV, ACS, ALM and more than 10 telecommunications network management to build intelligent dispatching, smart stations, intelligent operation and maintenance, intelligent diagnostics and other platform-based intelligent urban railway applications, ultimately providing users with three access gateways: integrated train automation, integrated network management and intelligent operation and maintenance.



System Architecture Beijing subway Line 19 Intelligent urban railway

Edge Intelligent Controller (EIC)

Edge Intelligent Controller (EIC) node is an intelligent edge computing platform with independent intellectual property rights and compact industrial size, which integrates core capabilities such as industrial control, edge computing, edge cloud collaboration, internet of things, artificial intelligence and information security.



Feature

Edge Cloud Collaboration

Cloud native virtualization, unified management, active evolution.

Edge Cloud Collaboration

Cloud native virtualization, unified management, active evolution.

Industrial Control

Redundant large PLC.

Artificial Intelligence

Image, visual AI algorithm.

Internet of Things

MQTT/5G/NB-IoT/LoRa...

Information Security

Built-in trusted computing, firewall, data encryption.

Product Advantages

- Independent research and development of software and hardware platform, with completely independent intellectual property rights
- Industrial grade hardware design for harsh field environments
- Strong edge computing power
- Cloud native virtualization technology, deep integration with cloud
- Open Industrial Internet of Things
- Strong compatibility and scalability

Application scenario

Large complex integrated scene integrating edge computing and timing control

E&M

- E&M intelligent equipment diagnosis
- Traditional BAS monitoring
- Energy saving control

Power Supply

- Health analysis of power supply system
- Intelligent protection linkage
- Remote video inspection and security

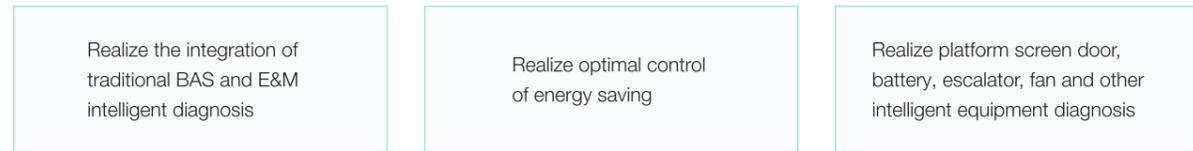
Signalling

- Intelligent Point machine operation and maintenance;
- Intelligent operation and maintenance of equipment room
- Tunnel detection

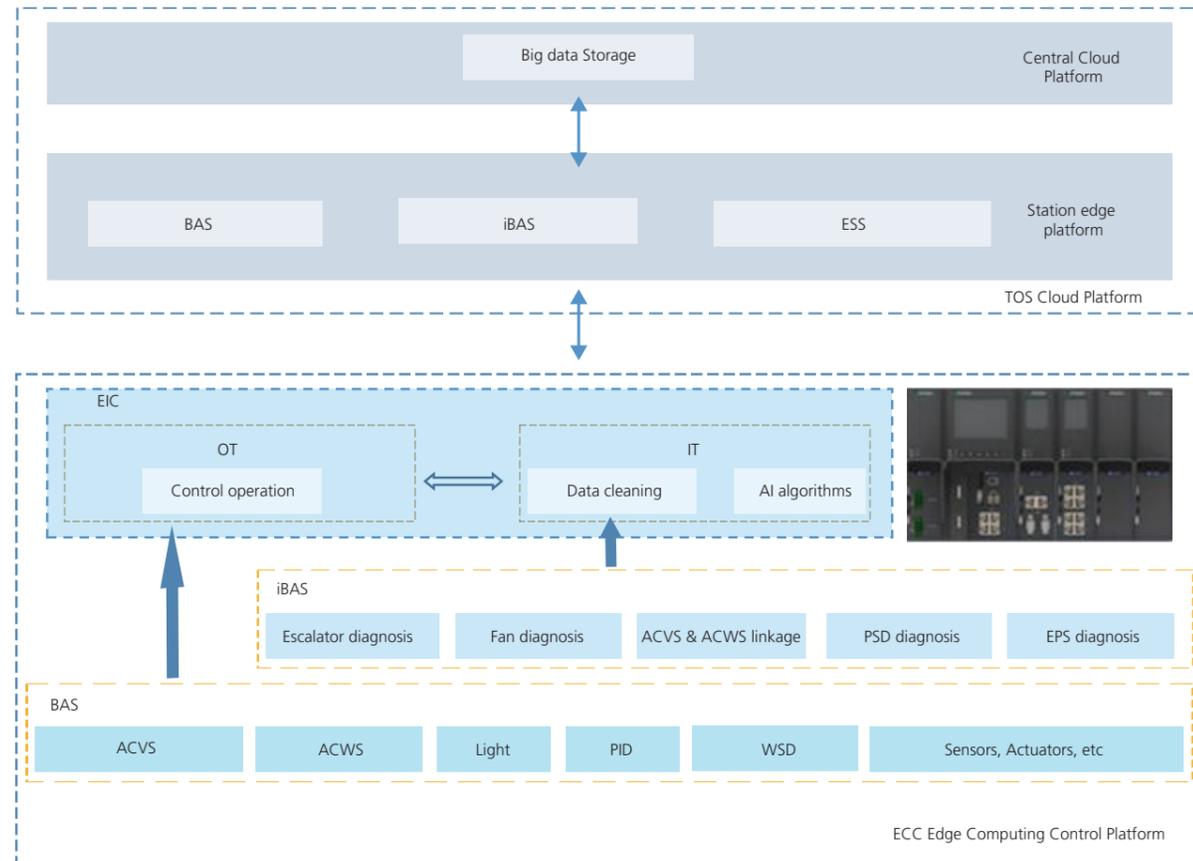
Typical Cases

The iBAS project of Beijing Metro Line 19 phase I

Virtualization technology, combined with traditional industrial control and artificial intelligence algorithms:

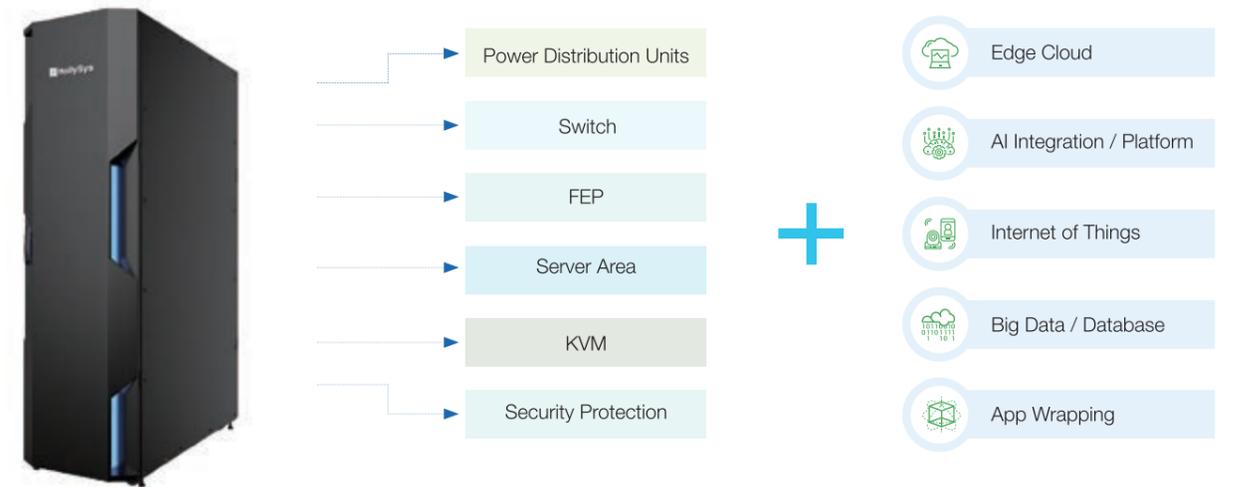


The platform integrates all operation and maintenance subsystems to achieve unified operation and maintenance of the whole system.

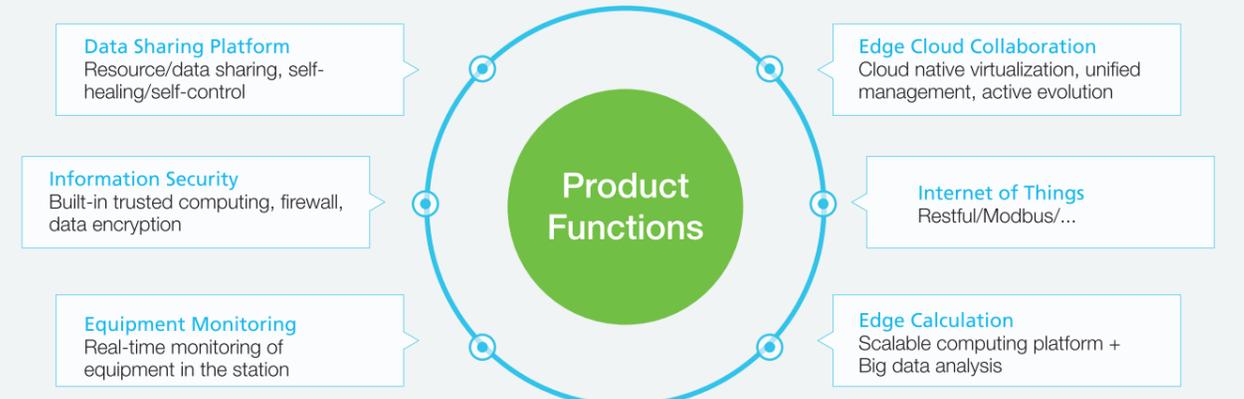


Edge Intelligent Agent (EIA)

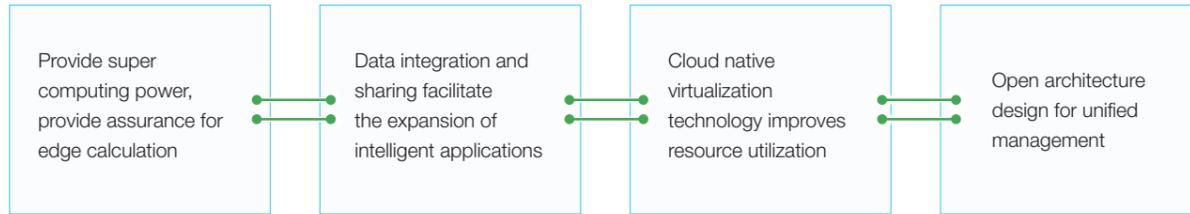
Adopting software and hardware integrated whole cabinet delivery mode, the station-level edge cloud platform realizes the integration and management of resources such as calculation, storage, network and security in the station; Provides various communication protocols and equipment models, realizes the fast access and processing of data in the station and provides convenient service deployment and expansion capabilities and powerful edge computing capabilities to support intelligent applications.



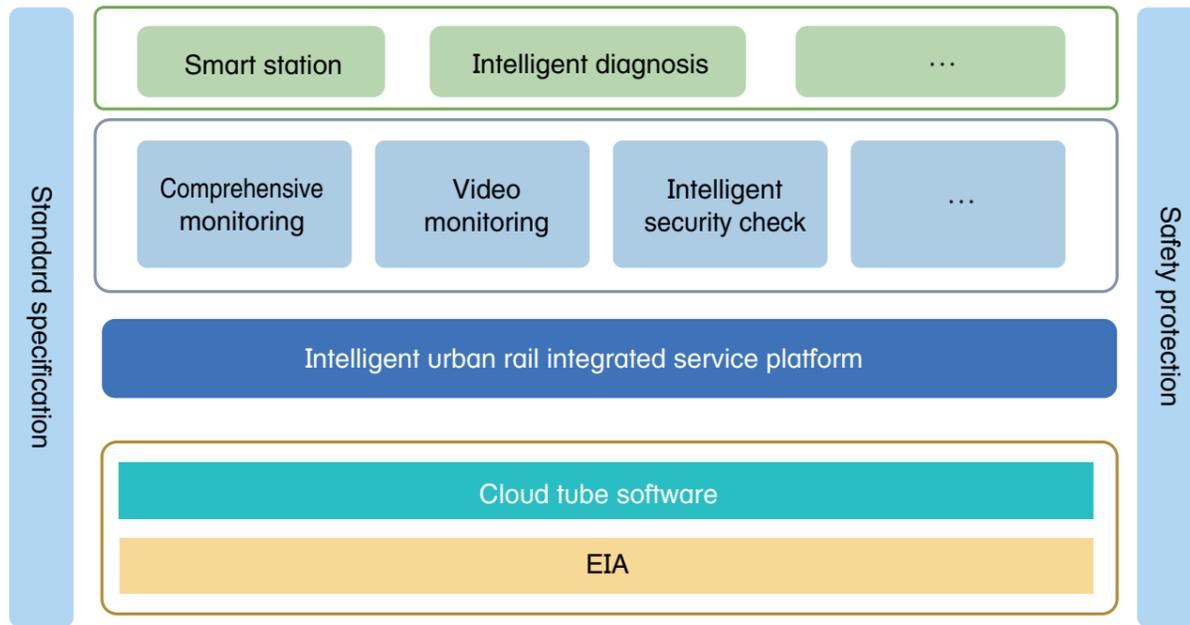
Product Functions



Product Advantages



Application Scenarios



Multi-Professional Data Access

It can carry MCS, video surveillance system, passenger information system, intelligent security check system, face recognition system, security and other professionals through virtual machine or container.

Support Communication Protocols:

IEC103, IEC104, IModbus, OPCUA, HTTP, Restful, MQTT, etc.

Data Sharing

Relying on the comprehensive service platform, the realization of data sharing provides support for intelligent functions such as smart stations and intelligent diagnosis.

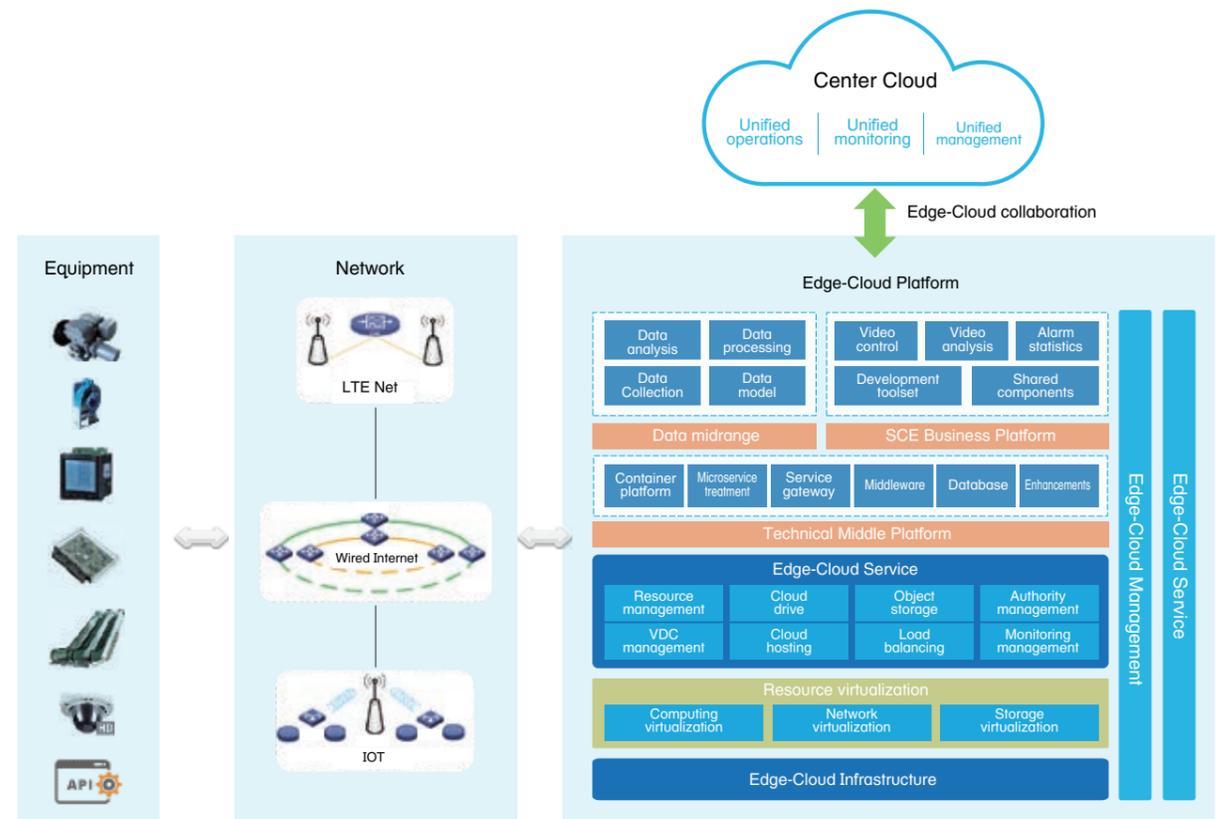
Typical Scenario:

video, broadcast, gate, escalator, rolling shutter door and other equipment linkage, realizing one-button Point Machine station.

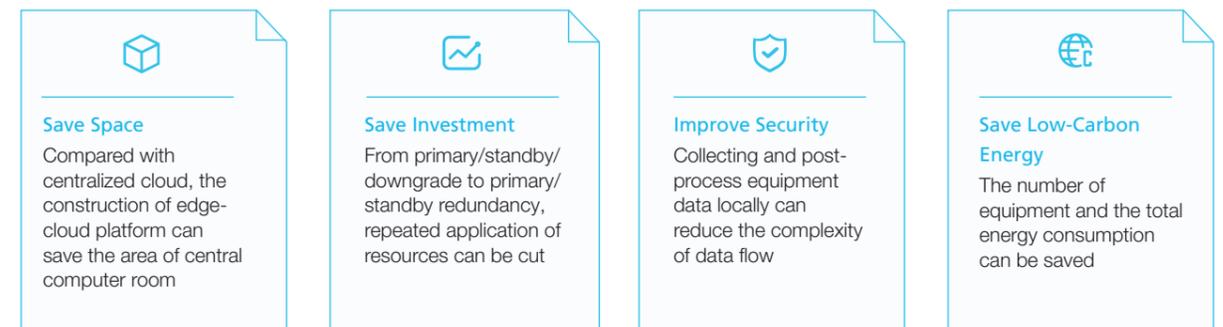
Edge-Cloud Collaboration

Through the open architecture design, it can realize the unified management of resources, centralized distribution of applications and edge-cloud synchronization of data.

Typical Scenario:



Customer Value



Network Architecture

Edge-Cloud Collaboration

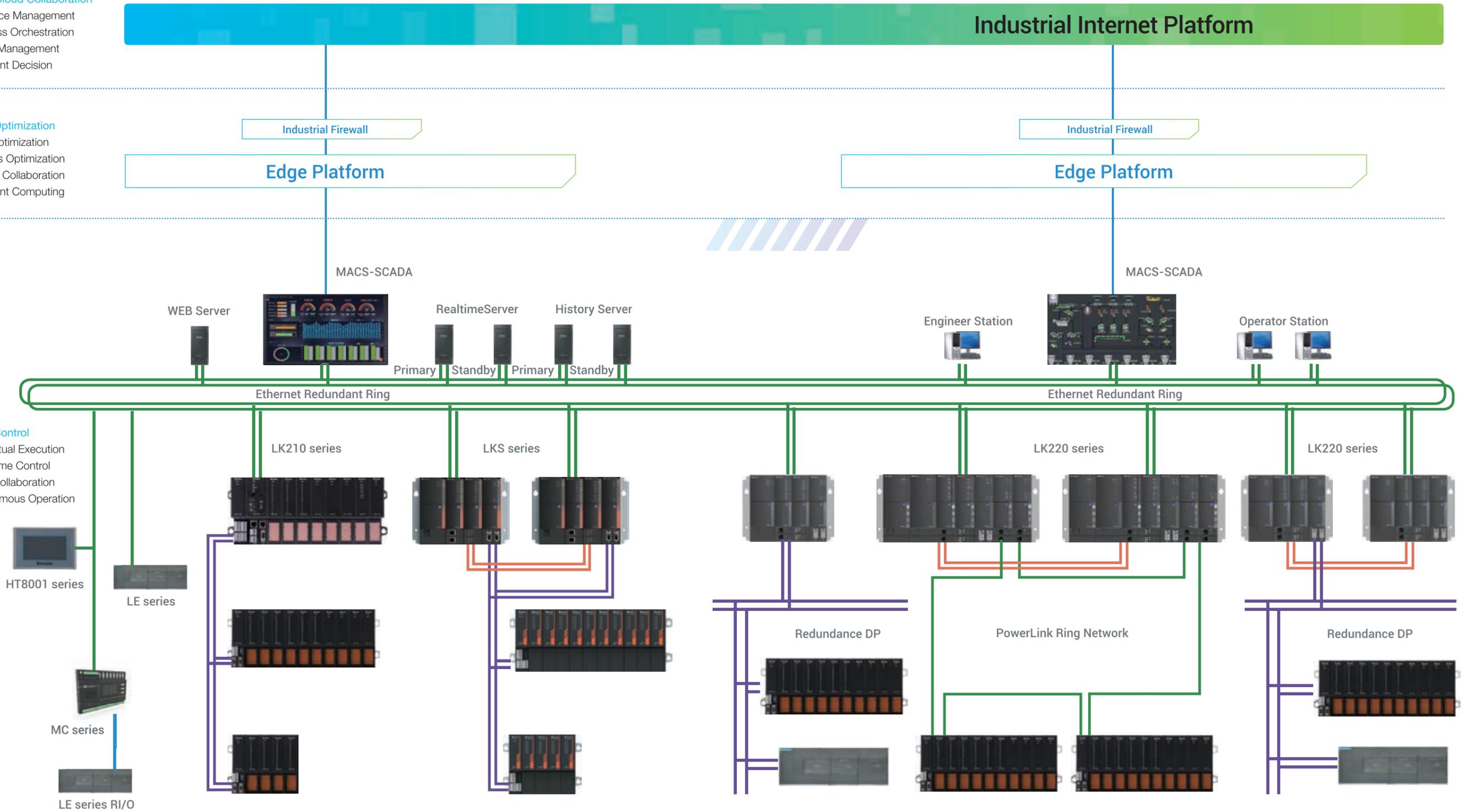
- Resource Management
- Business Orchestration
- Safety Management
- Intelligent Decision

Edge Optimization

- Data Optimization
- Process Optimization
- Service Collaboration
- Intelligent Computing

Edge Control

- Perceptual Execution
- Real-Time Control
- Edge Collaboration
- Autonomous Operation



LK Series Large Scale PLC

- Single-rack or dual-rack redundancy configuration
- High performance controller, with industrial-grade processor, operating at speeds up to 766MHz
- Supporting a variety of general protocols, and expanding different types of I/O modules in various ways
- All boards are coated with protective paint, anti-moisture, anti-salt spray, anti-mold
- High system reliability, with isolation, self-diagnosis, and output preset functions
- All modules support hot-plug and anti-mixing pin
- operating temperature -40~+70°C , storage temperature -40~+80°C



LK series PLC fully integrates the latest achievements of international industrial electronic technology and industrial control technology, strictly follows international advanced industrial standards, comprehensively reflects the requirements of discrete process and continuous process automation, and can handle both equipment automation and process automation.

LK series PLC features high reliability, rich functions, excellent performance, high integration, good expansibility, small size and simpleness. It can provide personalized solutions for different industrial fields.

LK series PLC fully integrates the advantages of PLC and DCS, which not only embodies the characteristics of PLC standardization, integration, openness, and fast discrete control, but also integrates the powerful analog control functions of DCS. It is also of redundancy , hot-plug, strong usability and high stability.

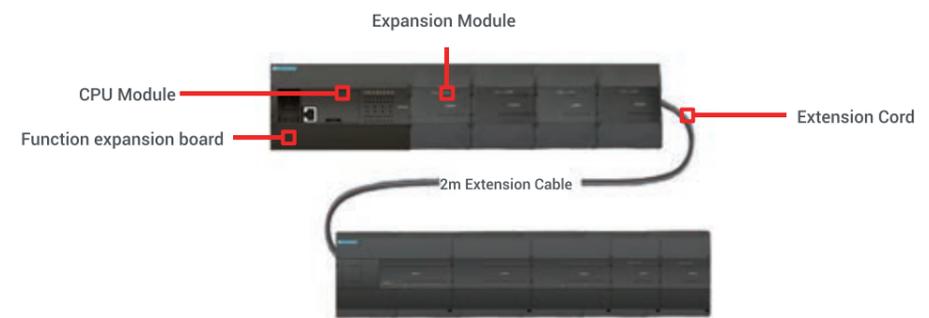
LK series PLC has got CE, UL certification. In order to adapt to special environmental applications, LK series PLC adopts high-end industrial-grade chips and professional design. All modules have undergone strictly professional testing and three-proof treatment.

Applications

- | | | | |
|---------------------|-------------------|---------------|-----------|
| · Metallurgy | · Water treatment | · Chemical | · Energy |
| · Rail | · Pipeline lane | · Oil and gas | · Heating |
| · Water conservancy | · Tunnel | · Hydropower | · Mining |

LE Series Compact PLC

- Compact and functional
- Strong Expansion Capability, with a maximum of 20 I/O modules
- Support for dedicated data storage cards and bulk encrypted downloads
- Powerful motion control and analog control
- Various communication modules supporting fieldbus, wireless network and industrial Ethernet interfaces
- The programming software is easy to understand, supports wizard function, recipe function, drag configuration.
- Super program confidentiality function, function block, program encryption



Naming Scheme

- LE:** LE series PLC products
- 5:** 5 series PLC
- X:** function distinguishing number
- X:** function sub-No.
- X:** serial number
- X:** additional distinguishing number



Function Distinguishing Number	Function Sub No.	SN	Additional Distinguishing Number
1. CPU module	Combination code range: 00 - 99 Even number: 24 V DC power supply, DO output transistor, Odd number: 220 V AC power supply, DO output relay		E: built-in analog I/O L: economical; default: standard
2. Digital I/O module	1 Input module	Code range: 0 - 9	Default
	2 Output module	Code range: 0 - 9 Even: Transistor Output Odd: Relay Output	
	3. Input and output hybrid module		
3. Analog I/O module	1 Input module	Code range: 0 - 9	Default
	2 Output module		
	3. Input and output hybrid module		
4. Communication module	Combination code range: 00 - 99		Default
6. Function expansion board	0 Communication module	Code range: 0 - 9	Default
	1 Input module		
	2 Output module		

TYPICAL CASES

Typical Cases of Railway

Signalling system cases for mainline railway up to 250km/h

Signalling system cases for mainline railway up to 350km/h

Jointless Track Circuit Cases

Typical Cases of Metro

SCADA system cases

Other signalling system cases



Typical Cases of Railway

Signalling system cases for mainline railway up to 250km/h

Item	Name of Railway	Length(km)
1	Hefei-Nanjing Railway	156
2	Fuzhou-Xiamen Railway	276
3	Chengdu-Duijiangyan Railway	94.2
4	Dazhou-Chengdu Railway	374
5	Xiamen-Shenzhen Railway	543
6	Wuhan-Yichang Railway	292
7	Changchun-Hunchun Intercity Railway	471
8	Qinhuangdao-Shenyang High-speed Railway	404
9	Beijing-Shijiazhuang-Wuhan High-speed Railway	1121
10	Second line of Suining-Chongqing Railway	131
11	Wuhan-Xianning Intercity Railway	90
12	Panjin-Yingkou High-speed Railway	100
13	Chongqing-Lichuan Railway	265
14	Yuanping West to Xi'an North section of Datong-Xi'an High-speed Railway	678
15	Xinjiang Section of Lanzhou-Urumqi High-speed Railway	710
16	Mudanjiang-Suifenhe Railway	139
17	Qingdao-Rongcheng Intercity Railway	299
18	Guizhou Section of Guiyang-Guangzhou High-speed Railway	276
19	Shenyang-Dandong Railway	261
20	Foshan-Zhaoqing Intercity Railway	80

21	Jinhua-Wenzhou Railway	189
22	shaanxi Section of Xi'an-Chengdu High-Speed Railway	343
23	Guangyuan to Weituo Section of Lanzhou-Chongqing Railway	302
24	Kunming-Yuxi Railway	49
25	Chengdu-Pujiang Railway	117
26	Sichuan Section of Xi'an-Chengdu High-Speed Railway	166
27	Harbin-Jiamusi Rapid Railway	343
28	Jiangxi Section of Quzhou-Jiujiang Railway	245
29	Second line of Guangzhou-Meizhou-Shantou Railway	45
30	Qianjiang-Changde Railway	336
31	Anshun-Liupanshui Highspeed Railway	118
32	Zhangjiakou-Datong High-speed Railway	142
33	Hong Kong Section of Guangzhou-Hong Kong High-speed Railway	26
34	Dunhua-Changbaishan High-speed Railway	114
35	Taiyuan-Jiaozuo High-speed Railway	359
36	Zhengzhou-Xinzheng Airport Intercity Railway	11
37	Neijiang-Zigong-Luzhou railway	129
38	Yinchuan to Huinong Section of Baotou-Yinchuan High-speed Railway	99
39	Chengdu to Chuanzhusi Section of Chengdu-Lanzhou Railway	276
40	Jingmen-Jingzhou High-speed Railway	79
41	Xiangyang-Jingmen High-speed Railway	117
	Total length	10366

Signalling system cases for mainline railway up to 350km/h

Item	Name of Railway	Length(km)
1	Zhengzhou-Xi'an High-speed Railway	523
2	Xi'an-Baoji High-speed Railway	138
3	Jinan-Qingdao High-speed Railway	310
4	Henan Section of Zhengzhou-Fuyang High-speed Railway	212
5	Henan Section of Zhengzhou-Wanzhou High-speed Railway	350
6	Beijing-Zhangjiakou High-speed Railway	226
7	shannxi Section of Yinchuan-Xi'an High-speed Railway	162
8	Weifang-Laixi High-speed Railway	126
9	Chongqing Section of Zhengzhou-Wanzhou High-speed Railway	184
10	Changde-Yiyang-Changsha High-Speed Railway	158
11	Guizhou section of the Guiyang-Nanning High-speed Railway	176
12	Chengdu-Zigong-Yibin High-speed Railway of South Sichuan Intercity Railway	247
13	Guiyang-Guangzhou High-speed Railway	239
14	Inner Mongolia Section of Jining-Datong-Yuanping High-speed Railway	73
15	Chongqing-Qianjiang High-speed Railway	270
16	Shaanxi Section of ining-Datong-Yuanping High-speed Railway	198
17	Xi'an-Yan'an High-speed Railway & Xi'an Hub Link Line	320
18	Chongqing-Wanzhou High-speed Railway	252
19	Huaibei-Suzhou-Bengbu Intercity Railway	161
20	shannxi Section of Xi'an-Shiyan of High-speed Railway	257
	Total length	4582

Jointless track circuit cases

Item	Name of Railway
1	Xingguo-Quanzhou Railway
2	Guiyang South-West Ring Railway
3	Chengxiang Railway
4	Jingbian-Shenmu Railway
5	Chengdu-Ya'an Railway
6	Beijing Fengshuang Railway
7	Shenyang Hub & Shenda Railway
8	Shijianzhuang-Taiyuan High-speed Railway
9	Zhongchuan Airport to Wuwei Section of Lanzhou-Zhangye No.3 & No.4 Line High-speed Railway
10	Shannxi Section of Jining-Datong-Yuanping High-speed Railway
11	Inner Mongolia Section of Baotou-Yinchuan High-speed Railway
12	Zibo-Boshan Railway Reconstruction

3316 sets of ATP
Over 50% market share in China

1253 sets of Trackside Train Control Systems
 applied to **76** mainline railways, with an operating
 mileage of more than **15000** km
Over 30% market share in China

196 sets of Computer Interlocking Systems
 widely applied to mainline railways and
 industrial and mining railways

ZPW-2000S Track Circuit products applied
 to **22** railways worldwide

Serving **59** metro lines
 across **17** cities worldwide

Typical Cases of Urban rail transit

SCADA system cases

Beijing

- Line 13
- Line 10 Phase 1
- Line 10 Phase 2
- Yizhuang Line
- Link line of Changping Line and Line 8
- Line 8 Phase 2
- Line 8 Phase 3
- Line 14
- Yanfang Line
- Daxing Airport Express
- Line 17
- Line 19

Shenzhen

- Line 1 Phase 1
- Line 1 Extension
- Line 2 Phase 1
- Line 2 East Extension
- Line 2 Phase 3
- Line 4 Phase 2
- Line 6
- Line 8
- Line 11
- Line 14
- Line 6 Branch
- Gangxia North Traffic Hub

Chengdu

- Line 10
- Line 5
- Line 30
- Ziyang Line

Guangzhou

- Line 3
- Line 5 Phase 1
- Line 4 Phase Yellow
- Line 3 North Extension

Wuhan

- Dijiiao to Hankoubei Inter-urban Railway (PSCADA)
- Line 1 (PSCADA)
- Line 4 (PSCADA)
- Line 8 (PSCADA)
- Line 21 (PSCADA)

Qingdao

- Line 13

Dalian

- Line 3 (PSCADA)
- Jinzhou to Pulandian Inter-urban Railway (PSCADA)

Chongqing

- Chongqing Jiangbei International Airport Express

Kunming

- Line 3
- Line 5

Hohhot

- Line 1
- Line 2

Tianjin

- Tianjin Railway Station Traffic Hub
- Tianjinxi Railway Station Traffic Hub
- Yujiaapu Railway Station Traffic Hub
- Line 5
- Binhai New District Rapid Railway (PSCADA)

Lanzhou

- Line 1 (Phase 1)
- Line 2

Singapore

- Thomson Line

Hong Kong

- Guangzhou-Hong Kong High-speed Railway (Hong Kong Section)

Malaysia

- SCADA of Automated Rapid Transit For Samarahan Line and Serian Line in Malaysia

Lanzhou

- Line 1 Phase 1
- Line 2

Hong Kong

- Hong Kong Section of Guangzhou-Hong Kong High-speed Railway
- Hong Kong East Rail Line, Tuen Ma Line, and Tung Chung Line Extension

Singapore

- Thomson East Coast Line

Malaysia

- Kuching Urban Transportation System's Blue and Red Line in Sarawak

Other signalling system cases

- Beijing Changping Line Phase 1&2
- Lycoming Valley Signalling Project
- Kunming Changshui Airport Express
- Chongqing Jiangbei International Airport Express
- ETCS-2 train control system for PRASA's KwaZulu-Natal service region in South Africa
- ETCS-2 ATP for Turkish National Commuter Railway



Automation
For Better Life