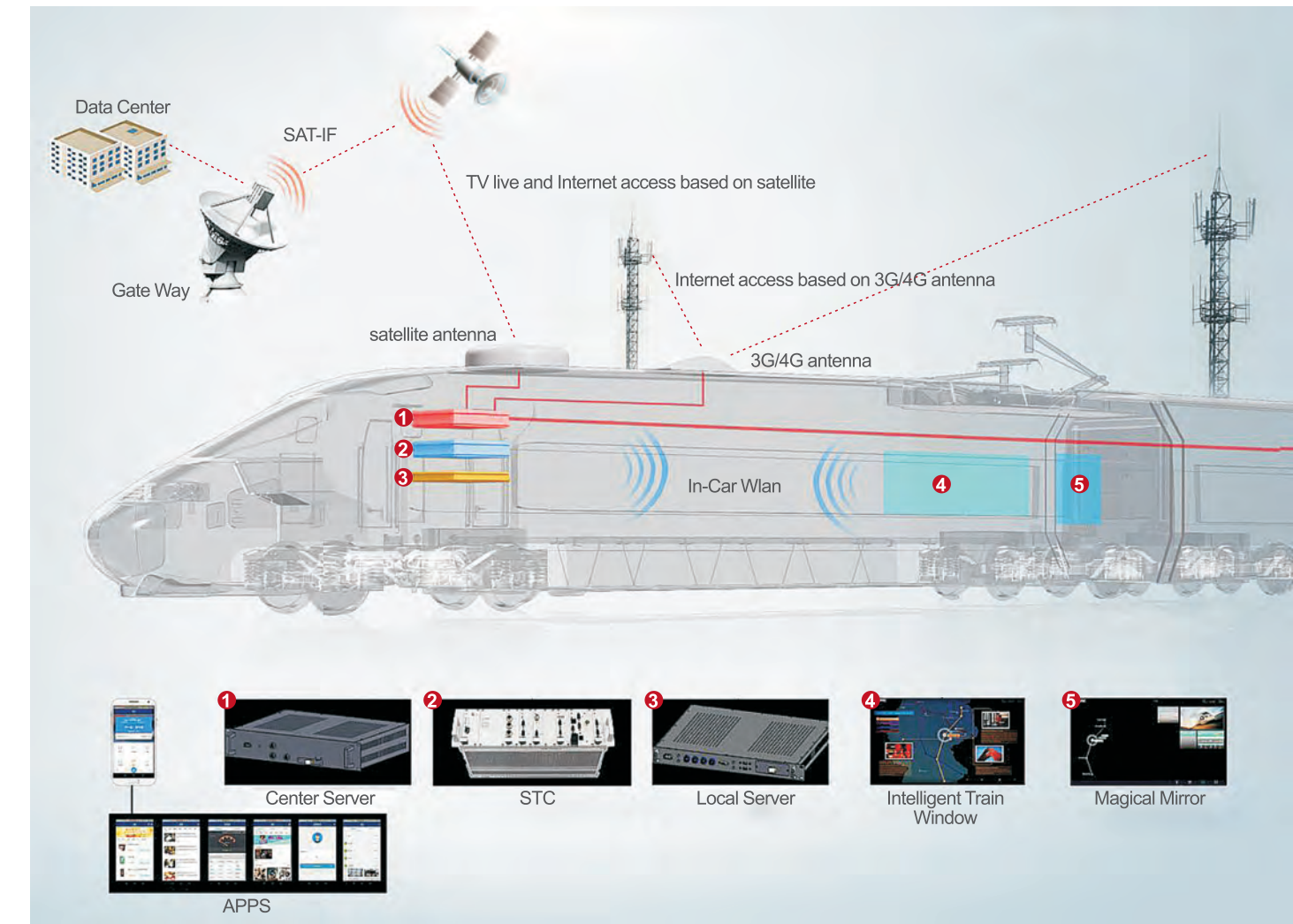## WORKING WITH YOU TO **CONNECT THE WORLD**

CRRC

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CRRC

PASSENGER INFORMATION SYSTEM BASED ON SATELLITE COMMUNICATIONS
A connected journey

OVERVIEW

CRRC's new passenger information system is based on satellite communications technology and enables full Wi-Fi coverage in every compartment to meet passengers' rising demands for reliable Internet access and digital services such as onboard LAN entertainment and live television. In addition, a new generation of entertainment and information terminals, including smart windows and mirror displays, allows greater access to information. Our system is fully integrated with more traditional passenger service systems, making this the most efficient way for passengers to access information quickly, efficiently and in real-time.

MAIN FEATURES

▶ SATELLITE COMMUNICATIONS ACCESS

The network connects an on-board satellite antenna to a ground master station, enabling a wide range of services including internet access and radio or television live-streaming, as well as crew protection and emergency communications for high speed trains. Passengers can use the Internet to make voice calls, browse news hold video conferences live-stream radio and television programmes. The satellite communication network also acts as a back-up system, and provides an emergency communication channel to ensure constant and reliable data transmission and communication between the train and ground control. This allows for more a more reliable and safer operation of high speed vehicles, and ensures the continuous and normal operation of the emergency system.

▶ CONTINUOUS INTERNET ACCESS

The system combines mobile 3G/4G access with satellite internet access in order to ensure that there is always continuous internet access, even if one of the supply modes fails. Our system also uses different technologies such as load balancing and the simultaneous use of multiple SIM cards from different operators to ensure the biggest internet connection bandwidth.

▶ COMPARTMENT WIFI LAN

The system uses gigabit Ethernet dual-way link aggregation technology to allow both redundancy and bandwidth of onboard Wi-Fi.

▶ MULTIPLE-PLATFORM SERVICE SOFTWARE

The APP is fully compatible with all smart mobile devices from leading global manufacturers, and supports both IOS and Android operating systems.. By creating an account, passengers can enjoy services including audio & video entertainment, on-board shopping, crew interaction, etc. as well as access real-time train status information, travel information and accommodation near stations.

TECHNICAL INTRODUCTION TO PARTS

▶ CENTRAL SERVER

The central server adopts a 3U standard cabinet structure and supports onboard contents services and contents distribution management, simultaneous access to 3G/LTE signal of different operators, Beidou / GPS dual-mode channel, and the installation of LINUX-based App from third parties. It provides one channel of WLAN STA, supports the IEEE802.11 technique and can automatically connect the WLAN network of station which gives stations updated and synchronous contents.
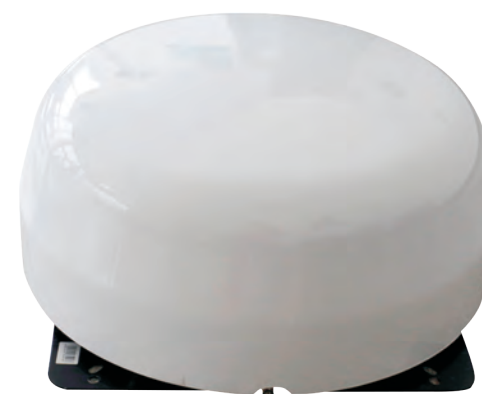
▶ MIRROR DISPLAY

The reflectivity of our mirror display is as high as 82% with ultra high image reflection efficiency and an unparalleled visual effect. The luminance is 500 nits and the contrast ratio exceeds 100000:1. It can display train running information such as speed, arrival station, etc. Passengers can use touch screen operation to play video or television programs.

▶ SATELLITE ANTENNA

Highly efficient panel antenna technology: transmits and receives signals with a common radiation aperture.

Advantages: space saving, low profile, low cross polarization, high port isolation, and excellent sidelobe envelope features.

Intelligent servo control technology: integrates technologies including high-precision inertial navigation, GPS/BD positioning, beacon maximum tracking and gyro stabilization.

Advantages: high reliability of the tracking system, automatic recognition of the transmission signal, and steady reception of live television signals in high-speed and dynamic conditions.

▶ SMART WINDOW

Our Smart Window integrates a 55-inch OLED panel with a maximum light transmittance up to 45% and very high contrast ratio, response speed and color saturation. It does not need to avoid light, includes interactive touch functions and perfectly displays train running status, live television and other travel information.

KEY TECHNICAL PARAMETERS

Transmission bandwidth	Gigabit Ethernet bandwidth no less than 700MB
Applicable standards	Meeting railway standards such as IEC61373-2010, DIN 5510, IEC 60571, IEC 61000,etc
Satellite antenna tracking mode	Inertial navigation + GPS/BD + beacon limit tracking
Maximum angular acceleration of satellite antenna	Direction of 600°/s² and pitch of180°/s²
Satellite antenna recapture time	Target loss within 30s: < 1s; target loss within 20 min: < 10s
Maximum speed of satellite antenna	Direction of 180°/s and pitch of 320°/s
Satellite antenna tracking precision	Better than 1/10 beam width (RMS)
Supported rate of satellite antenna	Supporting a steady signal reception of 380 km/h
Wireless performance	1) Supporting the video concurrent access not less than 120-way and 1Mbps. 2) Uplink and downlink rate of throughput performance of a single user not less than 110Mbp.

COMMERCIAL VALUE AND PRACTICAL APPLICATION

China's 25T passenger train has been our test platform for our passenger information system, where we have successfully demonstrated the platform's range of functions, from live television access to satellite internet access, 3G/4G internet access, compartment WLAN etc, as well as run and completed system installation, equipment simulation, static tests and long-term stability tests over more than 20,000 km. Our EMU WiFi WLAN system for China's standardized EMU is based on satellite communications and 3G/4G Internet access, and has successfully operated over almost 250,000km.

In order to meet the demands of increasingly dense passenger flows on trains, our system uses a cloud-based big data processing center to provide passengers with a more efficient and accurate information system. It is based on data mining technologies and integrated with value-added telecommunications technologies, offering our clients remarkable commercial value.