Wayside Control for High-Speed Railway Systems

Project Introduction

China has the world?s longest high-speed rail network with top speeds reaching 350 km/h. High-speed trains in China have transported 600 million passengers sincetheir introduction on April 18, 2007. A High Speed Railway operator in China built a 308 km fiber optic network along 22 stations. To control the trains from wayside control cabinets, they included different types of controllers to ensure reliable, non-stop operation. Advantech´s EKI managed switches played an integral part in the communication capabilities of this system.

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Intelligent Transportation China

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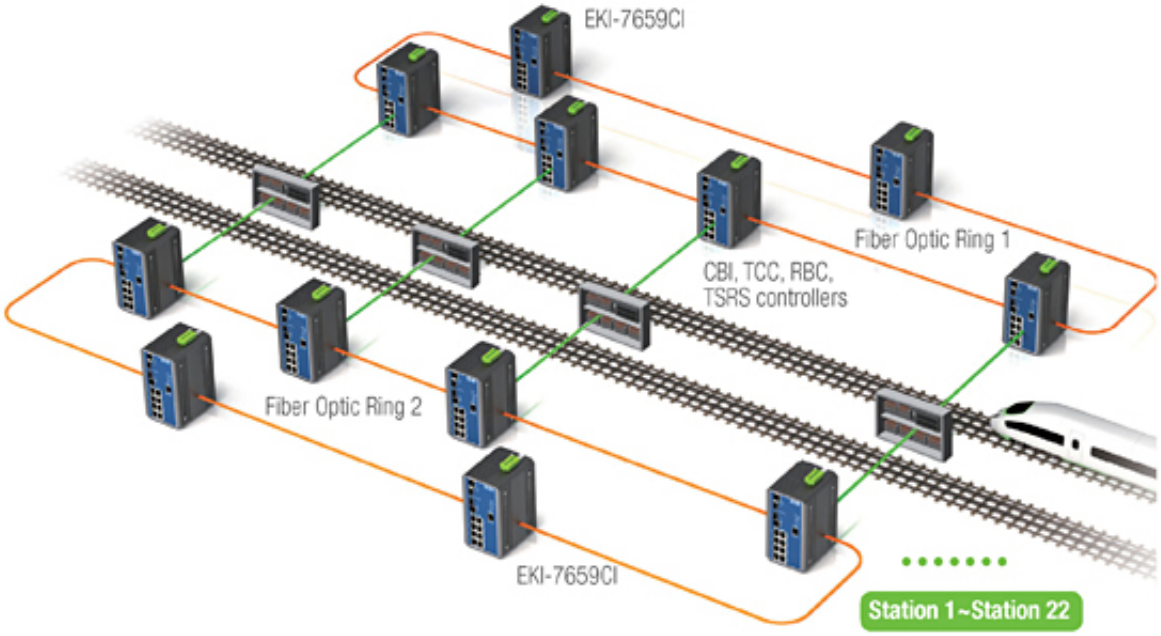
System Requirements

When constructing this project the operator had many concerns about the communication system itself. In the past they had dealt with a number of issues stemming from poorly constructed communication systems along high-speed rails, including poor cable quality, unreliability under severe weather conditions, unexpected communication loss and misconnected fiber optic connections which limited theredundancy of the system. Advantech was confident its Industrial Communication products could meet and surpass their high expectations.

Project Implementation

EKI-7659CI	8+2G Combo Managed Industrial Ethernet Switch with Wide Temperature
EKI-4654R	24 x 10/100Base-T Copper Ports + 2 x 1000Base SFP Ports
SFP-GLX/LC-40	Small Form-factor Pluggable (SFP) Transceiver Module
SFP-GTX/RJ45	1000Base-T RJ45 SFP Module

System Diagram



System Description

Over 70 EKI Ethernet managed switches and 150 SPF modules were used to construct a redundant system, consisting of independent right and left fiber optic rings. These switches form a dual fiber opticring network, with each controller simultaneously connected to each ring. Advantech?s X-Ring technology ensures a backup circuit is established to compensate for errors such as broken links. This comprehensive redundancy concept offers the maximum possible security.In addition, the unique features of Advantech?s EKI series switches helped overcome all of the concerns the operator previously had about creating a fiber optic system. Loopback Detection allows each port to automatically detect loops caused by faulty cables, and automatically shut them down and generate automatic alarms. Broadcast Storm Control makes it so that each port can throttle the amount of broadcast traffic to limit the impact on the whole network. And Advantech?s Duplicate Ring Master Detection can detect & manage redundant rings when it senses a duplicate ring.

Conclusion

Advantech?s EKI series of Industrial Communication devices created a reliable redundant high-speed communication system for the wayside control cabinets in an ultra-modern high-speed railway system in China. These products not only provide non-stop operation that can be centrally managed & monitored, but also switches to interconnect with different networks and robustness against the adverse conditions that exist along high-speed railway systems.