

# A Bridge That Connects—CommScope Helps “Smoothen” Hong Kong-Zhuhai-Macao Bridge

## China Hong Kong-Zhuhai-Macao Bridge

- The across-sea bridge that connects Hong Kong, Zhuhai and Macau
- The longest across-sea bridge in the world, with a total length of 55,000 meters

## Country/Region

China/Guangdong Province



## Current Demand

On October 24, President Xi Jinping announced the “official commissioning of the bridge unparalleled in the world—the longest across-sea bridge, Hong Kong-Zhuhai-Macao Bridge.” Residents from Guangdong, Hong Kong, and Macau competed with each other to travel on the bridge and post their pictures on the Internet.

How to ensure quality communication given the several tens of thousands of people traveling on the bridge? As the supplier for the wireless and cable communication project of the bridge, the industrial leader CommScope thought ahead and designed carefully, fully realizing total wireless communication coverage throughout the bridge. There are many wonderful stories worth sharing and remembering.

## “Compliance” Challenge of a State’s Key Project

On September 16, 2018, the super typhoon Mangkhut hit Zhuhai right on. The Hong Kong-Zhuhai-Macao Bridge, nevertheless, remained intact throughout the storm. Monitoring information from the bridge showed that the bridge was safe and normal, and the high- and low-voltage power supply and distribution systems were operating normally. CommScope’s antennas were being challenged, as well, just like the Hong Kong-Zhuhai-Macao Bridge, and also appeared to be functional.

This is not the first time CommScope has offered wireless communication coverage to large bridges. CommScope’s prior successful projects include the Donghai Bridge, where CommScope’s antennas were adopted to realize wireless communication coverage.

**Nevertheless, none is as unique as the Hong Kong-Zhuhai-Macao Bridge. The Hong Kong-Zhuhai-Macao Bridge is one of the state’s key projects—and also the longest and the most complex bridge in the world. It spans three regions: Zhuhai, Hong Kong and Macau. For both the nation and the Guangdong-Hong Kong-Macao Greater Bay Area, it is significant.** The client highly emphasizes the wireless coverage of the bridge. In light of the fact that the sea area where the bridge is located is attacked by typhoons every year—and that corrosion by highly salty mist

is common, in addition to the absence of any shelter against the powerful ultra-violet radiation—the antenna materials required ultra-high weather resistance. The Hong Kong-Zhuhai-Macau Bridge is around 55 kilometers long in total. There are both the underwater tunnel and the above-sea bridge, with relatively obvious flexure and undulation. These also mandate stern requirements for the performance indicators of antennas. The bridge is known for its highly stringent security measures and management. As such, real-time testing of equipment on the bridge is impossible. In addition, mobile communication coverage on the bridge involves three operators: China Mobile, China Telecom and China Unicom. Therefore, all-band coverage to accommodate multiple operators needs to be fulfilled. In addition, to look beautiful, these antennas need consistent appearance and dimensions. **All of these require very high-quality antennas.**

The bridge administration was strict in all respects; installation and construction were no exception. The needs of the three operators had to be satisfied at the same time, and the installation and construction requirements of the bridge had to be fulfilled. For example, the antennas may only be installed onto the gantries of the bridge as designated by the bridge administration. Relocating installed devices or adding equipment was disallowed while the communication requirements were being fulfilled because, once commissioned, closed-off management would apply to the bridge due to the security operations of Hong Kong, Zhuhai and Macau. Armed police would be responsible for the security on the bridge. This makes normal maintenance even more difficult. Maintenance in ordinary application scenarios is impossible. **As a result, the antennas were required to be of high quality and high reliability.**

## Comprehensive Communication Solution Satisfies Personalized Demands

### Complex Application Scenario

Generally speaking, the Hong Kong-Zhuhai-Macau Bridge is not straight. Instead, the bridge is designed with relatively more flexure and undulation, based on the directions of waves and the underwater conditions. In addition, the bridge administration strictly required that the antennas be installed onto designated gantries. A lot of adjacent gantries are 3 kilometers away from each other. Despite the enormous difficulty, CommScope realized perfect coverage. The multiband narrow-beam high-gain antenna provided by CommScope (RVV-33B-R3) realized seamless long-distance high-speed communication coverage.



### System Shared among Multiple Operators

To fulfill service requirements, the operators required that more than two systems be installed at the same time. There had to be as few antennas installed as possible and they had to look beautiful wherever possible and meet the gantry's wind resistance requirement. The multiband multiport narrow-beam high-gain antenna provided by CommScope perfectly addressed this issue. As required by the bridge administration, CommScope provided the 700M-2700M multiband antennas that were strictly consistent in terms of the size and dimension, appearance, and color and covered 2G/3G/4G network bands.

### Strict Reliability Requirement

In light of the characteristics of bridge management and vehicle travel, it was required that the equipment should need no maintenance—and minimal service—over an extended period of time. Due to the unique location of the bridge, it required typhoon resistance and resistance against corrosion by salty mist that were superior to ordinary antennas. CommScope's antennas are equal to or above national standards—and some of them even have a reliability design and have gone through environmental experiments higher than those required by the IEC standards. Design and environmental inspections are performed on the antennas so their reliability and lifespan are fully guaranteed. CommScope applied its more than 15 years of experience in the field equipped with antennas at base stations to practically prove that the indicators—such as high reliability and long lifespan of its antennas—could satisfy the needs of the Hong Kong-Zhuhai-Macau Bridge.

### Reasonable Solution to System Interference

Part of the Hong Kong-Zhuhai-Macau Bridge is on the border of Zhuhai and Macau, where co-channel interference among operators in these two areas exists. The narrow-beam antenna provided by CommScope has enhanced coverage performance; meanwhile, it can ensure that the signal irradiation range and reception range are limited to the proximity of the surface of the bridge in order to fulfill the purpose of reducing interference with the co-channel system of Macau and reducing interference from the co-channel system of Macau.

### Wireless and Cable Integrated Coverage

Besides providing high-performance wireless coverage for the bridge's network of operators, CommScope also offers the exclusive communication network a 12-kilometer leaky cable, which not only satisfies the needs of the public communication network but also ensures daily maintenance and allocation of the bridge as a whole.

## Safe and Reliable Comprehensive Cabling Lays Groundwork for Communication

Besides the antennas over the bridge, CommScope's solution was adopted also for the comprehensive cabling for the smart system at the Zhuhai Port of the Hong Kong-Zhuhai-Macau Bridge. The Zhuhai Port of the Hong Kong-Zhuhai-Macau Bridge is the only three-way port of the Pearl River Delta and the only port to the land route that accommodates both passengers and cargo. The border check of Zhuhai Port is one of the major south gates to the motherland; it exercises three functions: namely, port customs clearance, transportation and package service. Respective smart systems at the port have to be highly secure, reliable, and fault tolerant. The security of the system, personal safety, and secure information transmission have to be fully taken into consideration. A comprehensive cabling system is the nervous system of the whole port; it is responsible for transmitting data, voice messages, text and graphics, images, and multimedia information and accommodating the high-speed broadband. In other words, a comprehensive cabling system needs to use a 10 Gigabit backbone network and 100/1000 MHz desktop switch; this is the only way to effectively fulfill the transmission of information within the network and satisfy the needs for utilization in various types of networks.



The unshielded Category 6 cabling scheme offered by CommScope supports the performance of gigabit bandwidth and can satisfy the application needs of smart systems at the port and also support future expansions and upgrades. In addition, the cover of the cable supplied by CommScope is known for its low smoke and halogen-free flame-retardant properties, which ensures low amounts of smoke—and non-spreading toxic smoke—when the cable burns. The CommScope cable that is compliant with the IEC60332-3 high flame resistance standards also has impressively outstanding flame retarding performance; it can prevent the flame from spreading along the cable so the field staff can escape in time. CommScope's comprehensive cabling system is widely used in many large projects. It is proven to be stable and reliable and is sufficiently safe and protective.

## Wireless Communication and Cable Data Transmission are Both Indispensable

While providing an antenna solution for the Hong Kong-Zhuhai-Macao Bridge, CommScope sufficiently took into consideration the various needs of the bridge manager and operator and communication service providers to be truly inclusive; of course, the results are satisfying for all parties. In fact, tests showed all A's for the coverage of the comprehensive communication solution provided by CommScope. In addition, for the Zhuhai Port of the Hong Kong-Zhuhai-Macao Bridge, the comprehensive cabling system offered by CommScope is the continuation of the properties that have been known of its products—that is: high usability, high security, and high reliability to guarantee highly effective and safe transmission of data and to ensure orderly daily tasks carried out at the port.

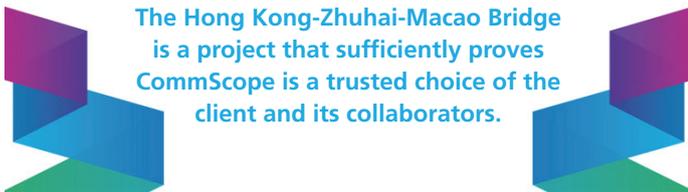
CommScope won clients' trust with its robust technology, high-quality products, abundant practical experience and professional service. CommScope offers the Hong Kong-Zhuhai-Macao Bridge a 24-hour communication coverage solution. On the day it was commissioned, people were able to happily communicate with others and quickly upload their photos; part of the credit should be given to CommScope.

## CommScope is an “all rounder.”

The Hong Kong-Zhuhai-Macao Bridge is an unforeseen challenge not only in terms of its design and construction but also for a communication solution provider. What is worth a thumbs-up is that the comprehensive communication solution offered by CommScope comprehensively satisfies the needs of the bridge for wireless communication and highly effective data transmission, which not only enables business as usual in a bad natural environment but also satisfies the needs of three communication operators at the same time. This perfectly matches the unique structure and design of the bridge. Eventually, CommScope accomplished the task splendidly. Its high-quality, full-coverage communication solution has been well received by the client and its collaborators. The company's ability to adapt to unique application scenarios has taken another step forward.

CommScope (NASDAQ: COMM) helps design, build and manage wired and wireless networks around the world. As a communications infrastructure leader, we shape the always-on networks of tomorrow. For more than 40 years, our global team of greater than 20,000 employees, innovators and technologists has empowered customers in all regions of the world to anticipate what's next and push the boundaries of what's possible. Discover more at [commscope.com](http://commscope.com).

**Regardless of how harsh the application environment is and what the requirements are from users, CommScope is able to provide quick, economical and useful solutions on the basis of a sufficient understanding of the needs and pains of users—and also the characteristics of the network and the system. CommScope works with and supports operators and clients while, at the same time, providing one-stop services, such as all components of a radio-frequency passive transmission system. It not only guarantees the overall quality but also offers comprehensive services such as selection, purchase, installation and testing of equipment.**



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