

High-Capacity Optical Network Underpins Beijing Olympics

China Unicom upgrades capacity and builds in stability to bring real-time HD broadcasts to billions of viewers.

EXECUTIVE SUMMARY	
CHINA UNICOM	<ul style="list-style-type: none"> Industry: Telecommunications Location: China Number of Employees: 500,000
CHALLENGE	<ul style="list-style-type: none"> Build world-class, high-capacity, Carrier-Ethernet-scale optical network Enable unprecedented bandwidth required to carry high-definition signals Achieve high reliability, high interoperability, and high cross-connect capability
SOLUTION	<ul style="list-style-type: none"> Added Cisco optical platforms in major cities, to raise cross-connect capacity to 320 Gbps Introduced end-to-end services provisioning and network manageability with Cisco Transport Controller and Cisco Transport Manager
RESULTS	<ul style="list-style-type: none"> Achieved 99.9995 percent uptime Enabled record-setting quantity of broadcasted events Provided unprecedented visual quality

Challenge

China Unicom, a nationwide telecommunications operator offering a full range of services, holds to its long-term objective to become a “world-leading broadband communications and information service provider.” Last year the company reported revenues of RMB33.91 billion.

In 2008, Beijing Olympic Broadcasting Company Ltd (BOB) called upon China Unicom to provide an IT infrastructure for the largest Olympic Games in history. The broadcasting event would ultimately reach four billion TV viewers around the world, and posed many technical challenges due to the quantity of events, frequent real-time broadcast sessions, and scattered broadcast locations. The required network called for high reliability, high interoperability, high capacity, high cross-connect capability, and top-notch manageability.

In addition, the network bandwidth requirements were unprecedented. For the first time in Olympics history, the 2008 games would be carried over high-definition TV signals and noncompressed transmissions. At least 1.485 gigabits of bandwidth was needed: more than five times the bandwidth required for standard-definition TV signals.

As the only fixed-communication partner for the 2008 Beijing Olympics, China Unicom’s network had to cover all 33 provinces of China, and network platforms in the United States, Europe, and Japan. All the public broadcast and TV signals for the Olympics needed to be transmitted to the International Broadcast Center (IBC) through China Unicom’s network platform first, and then sent to different parts of the world.

Recognizing these stringent requirements on the transmission network for the real-time broadcast of the Beijing Olympics, China Unicom decided to upgrade and expand the transmission channels of its existing high-capacity (up to 100 Gigabits) optical network, increase the bandwidth, and improve the transmission speed and stability.

Solution

For more than three years before the Beijing Olympics, China Unicom had been using Cisco® optical network solutions as the backbone of its architectural platform. Cisco ONS 15454 SDH/SONET was a fundamental component of the company’s international optical network covering Los Angeles, San Francisco, New York, London, Frankfurt, and Tokyo.

“For the Olympic upgrade project, we chose once again to partner with Cisco,” says Mr. Yunfeng Li, manager, Division of International Network Construction and Operation, China Unicom. “Because of the high interoperability and flexible end-to-end network management platform, we selected the Cisco ONS 15600 and ONS 15454 Multiservice Provisioning Platform (MSPP).” With the new optical network, the high-capacity ONS 15600 was deployed at all major cities (see previous paragraph), and the backbone platform ONS 15454 SDH and SONET was deployed for access service.

The Cisco solution met all of the requirements defined by China Unicom, including:

- **Stability:** For live broadcasts of top international sports events, stability of transmission lines and signals is vital. With the combination of multiple system-level and component-level features, Cisco ONS 15600 MSPP provides “five-nines” reliability, or 99.9995 percent uptime, and is capable of terminating and processing hundreds of data communications channels (DCCs) simultaneously, allowing full network visibility. These inherent capabilities allow end-to-end services to be provisioned and the complete network to be monitored through management software such as Cisco Transport Controller and Cisco Transport Manager. As a result, abrupt transmission faults can be discovered and fixed in a timely fashion, to help ensure the high stability of games broadcast.
- **Carrier-class availability and reliability:** China Unicom attributes the success of the Olympics broadcasts in large part to its emphasis on network availability and overall quality of the service delivered. The carrier-class maintainability and operability of Cisco ONS 15600 offered China Unicom many conveniences. For example, Cisco ONS 15600 MSPP backplane connectors are hot-swappable. There is no need to power off the system to safely repair or replace a faulty backplane. Similarly, system components such as the interface cards, common cards, fan trays, power distribution units (PDUs), and customer access panels are all hot-swappable. This capability helped ensure the continuity of the Olympics’ broadcast service by avoiding disruptions for maintenance or repairs.
- **Security:** Real-time TV broadcasts of events and other production activities require highly available connections and resources. The Cisco ONS 15600 firewall blocks traffic from users outside of the section data communication channel (SDCC) management network. It also has the super-user-initiated logout function, allowing unauthorized sessions to be promptly terminated. In addition, the alarm severity (critical, major, minor) and the service-affecting designation (not reported, not alarmed) can also be provisioned to help ensure the high security of the transmission network.
- **Carrier Ethernet density international transport:** The Carrier Ethernet multirate capabilities introduced in the ONS 15454 MSPP permit live video traffic to be transmitted worldwide, crossing SDH to SONET border and multiple network domains.

The Cisco Transport Manager delivered element and network management functionality for the Cisco ONS products and helped ensure 24-hour operation with accurate monitoring of the optical infrastructure. Due to carrier-class reliability, availability, maintainability, scalability, security, and the whole-network manageability of this infrastructure, the cross-connect capacity between any nodes of the network exceeded 320 Gbps, making the network a real information highway with global coverage. This capacity laid a solid foundation for the stable and smooth worldwide broadcast of the 2008 Beijing Olympics.

In the past, satellite transmission was the main mode for Olympics broadcasts. China Unicom, in 2008, mainly relied on seabed and land-based optical cables supported by satellite. This setup was another first for the Olympics and provided for all-weather, nonblocking transmission of TV signals.

Underpinned by the powerful optical network solutions from Cisco, China Unicom built 600 noncompression transmission paths between 37 Olympic venues and IBC, and provided related services for 16 broadcasters and more than 200 TV stations around the world simultaneously.

Results

“During the 2008 Beijing Olympics, the multitudes of TV and print media reporters gathered in Beijing were able to send out Olympics information in the shortest time possible thanks to the upgraded high-capacity optical network built by Cisco for China Unicom,” says Mr. Li. “As a result, billions of viewers enjoyed extensive coverage of the athletes’ brilliant performances.”

PRODUCT LIST	
Optical Networking	
• Cisco ONS 15600 Multiservice Provisioning Platform (MSPP)	
• Cisco ONS 15454 Multiservice Provisioning Platform (MSPP)	
Management	
• Cisco Transport Controller	
• Cisco Transport Manager	

Outside of the playing fields, the 2008 Beijing Olympics set other world records in terms of the HDTV broadcast signals and transmission times. HDTV content was transmitted through China Unicom’s Cisco-based optical network using the long-distance, noncompression transmission method for the first time, which enabled the undistorted international transmission of HDTV signals with a delay of only tens of milliseconds. TV viewers could see live action almost at the same time as the spectators in the stands. China Unicom provided 3800 hours of live broadcast for BOB, which also set a new record in the broadcast history of the Olympics.

China Unicom has actively collaborated with Cisco for more than five years. As a result of this long-term working relationship, China Unicom successfully completed the aggressive upgrade of its optical network system for the 2008 Beijing Olympics, offering complete video coverage of Olympic Games to viewers around the world, and further strengthening the strategic cooperation with Cisco.

Next Steps

China Unicom is committed to many future collaborative projects with Cisco. The company is confident that the Cisco product and technology roadmaps will continue to serve its customers.

For More Information

For more information on Cisco optical solutions, please visit:

<http://www.cisco.com/en/US/products/hw/optical/ps2006/index.html>.



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