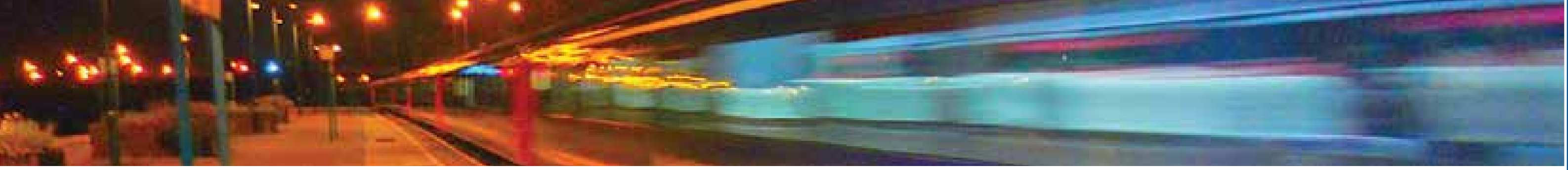
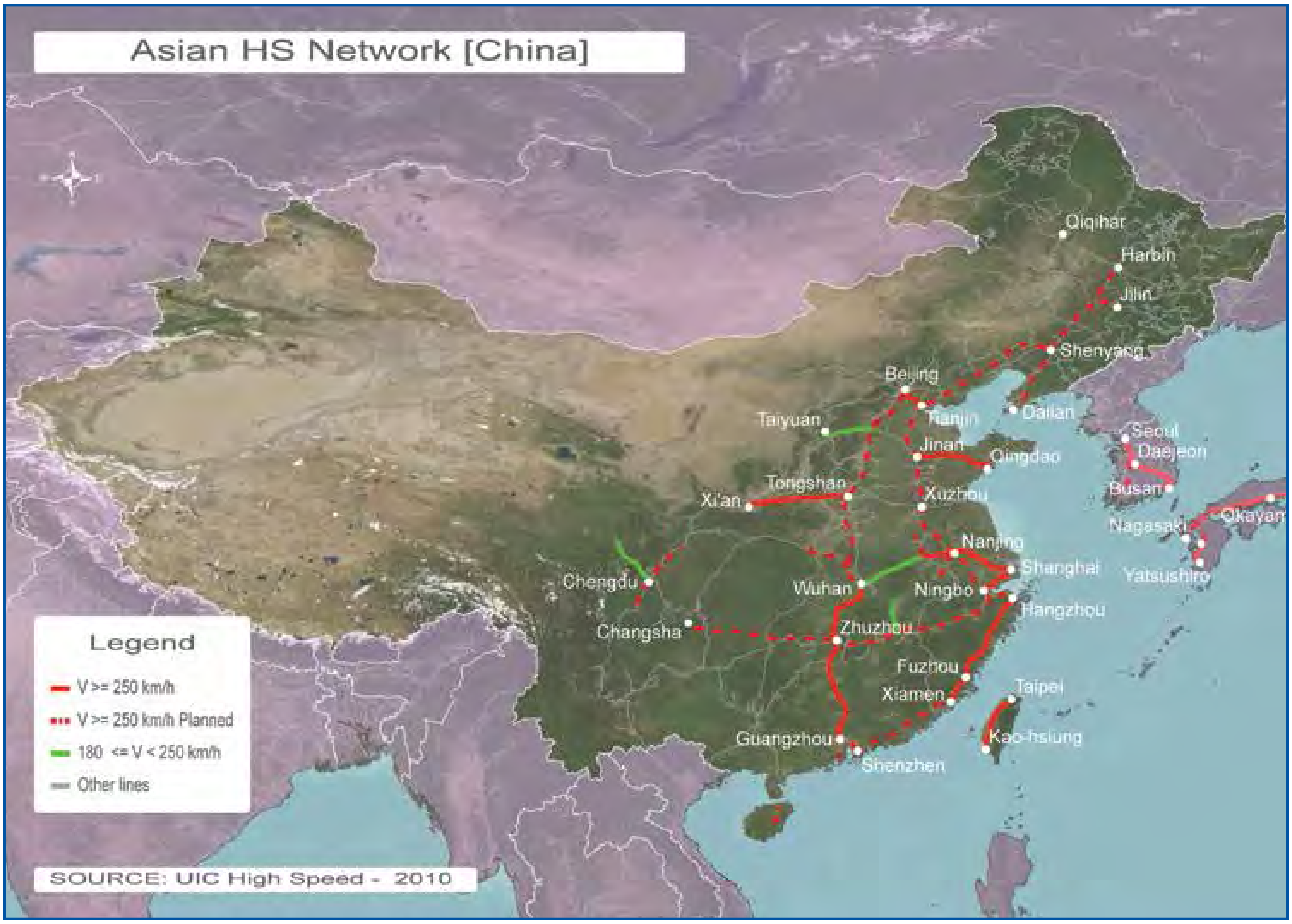


HighSpeedRail
TEXASHSR.ORG



UIC Map of China's High-Speed Rail Lines

China is the fourth largest country in the world and ranks first in total population. Bordering a total of 14 different countries, including Russia, India, Kazakhstan, and Vietnam, China has a widely diverse land use, terrain, and climate. Maintaining several significant urban centers, including Shanghai with 16.6 million people and Beijing (capital) with 12.2 million people, the country is listed as 47 percent urban. The country's GDP of $11.29 trillion ranks as the third largest economy, following the European Union as a whole and the United States.. Its gross domestic product (GDP) per capita of $8,400 ranks 120th. Facing congested passenger and freight rail conditions, China chose to invest in capacity improvements on the existing rail system and develop a dedicated high-speed rail network connecting the major population centers. The figure above displays the International Union of Railways (UIC) map of the 6,300 km (3,900 miles) of current and 7,200 km (4,500 miles) of planned high-speed rail network lines in China.

SYSTEM DESCRIPTION AND HISTORY

According to the UIC, the first high-speed rail line segment in the China opened in 2003 between Qinhuangdao and Shenyang. The 405 km (252 mile) segment operates at a speed of 200 km/h (125 mph) is now part of a 6,299 km (3,914 mile) network of high-speed rail lines stretching across China operating at maximum operating speeds of at least 160 km/h (100 mph) as shown in the table below. The UIC reports an additional 7,240 km (4,499 miles) of high-speed lines will be added to the network to develop a high-speed rail network comprising 13,539 km (8,413 miles).

The 120 km (75 miles) Beijing to Tianjin segment that opened in 2008 signifies China's first ultra-fast high-speed rail operations. The World Bank topic paper by Bullock (2012) examining the first three years of operation indicates there are two general types of high-speed line development in China: trunk lines, which are passenger-only lines designed to operate at a maximum speed of 350 km/h (220 mph) and secondary lines designed with a maximum speed of 250 km/h (155 mph), also referred to as "speeded-up" lines meaning conventional lines upgraded for increased speeds. These two types are shown in the line segments presented in the following table.

UIC Table of China's High-Speed Rail Lines

Stage	Speed		Year	Length	
	km/h	mph	Opened	km	miles
In Operation:					
Qinhuangdao – Shenyang	200	125	2003	405	252
Beijing – Tianjin	300	185	2008	120	75
Jinan – Qingdao	200	125	2008	362	225
Nanjing – Hefei	200	125	2008	166	103
Hefei – Wuhan	200	125	2008	356	221
Shijiazhuang – Taiyuan	200	125	2009	190	118
Wuhan – Guangzhou	300	185	2009	968	601
Ningbo – Wenzhou– Fuzhou	200	125	2009	562	349
Zhengzhou – Xi'an	300	185	2010	458	285
Fuzhou – Xiamen	200	125	2010	275	171
Chengdu – Dujiangyan	160	100	2010	72	45
Shanghai – Nanjing	300	185	2010	300	186
Nanchang – Jiujiang	200	125	2010	92	57
Shanghai – Hangzhou	300	185	2010	158	98
Changchun – Jilin	200	125	2010	96	60
Hainan East Circle	200	125	2011	308	191
Guangzhou – Zhuhai North	160	100	2011	93	58
Beijing – Shanghai	300	185	2011	1,318	819
Guangzhou – ShenZhen (Xianggang)	300	185	2011	104	65
TOTAL				**6,396**	**3,979**
Under Consturction:					
Guangzhou – Zhuhai (include Extend Line)	160	100	2011	49	30
Wuhan – Yichang	300	185	2011	293	182
Tianjin – Qinhuangdao	300	185	2011	261	162
Nanjing – Hangzhou	300	185	2011	249	155
Hangzhou – Ningbo	300	185	2011	150	93
Hefei – Bengbu	300	300	2011	131	81
Mianyang – Chengdu–Leshan	200	125	2012	316	196
Xiamen – Shenzhen	200	200	2012	502	312
Beijing – Wuhan	300	185	2012	1,122	697
Haerbin – Dalian	300	185	2012	904	562
Nanjing – An'qing	200	125	2012	258	160
TOTAL				**4,235**	**2,631**
Planned:					
Tianjin – Yujiabu	300	185	2011	45	28
Wuhan – Xiaogan	200	125	2011	55	34
Wuhan – Huangshi	200	125	2011	84	52
Tianjin – Bazhou– Baoding	200	125	2012	145	90
Xuzhou – Zhengzhou	300	185	2012	343	213
Jinzhou – Yingkou	200	125	2012	100	62
Haerbin – Qiqihaer	200	125	2012	281	175
Xi'an – Baoji	300	185	2012	150	93
Shenyang – Dandong	200	125	2012	230	143
Shijiazhuang – Hengshui (section of Taiyuan – Qingdao)	300	185	2012	100	62
Hangzhou – Changsha	300	185	2012	880	547
Qingdao – Rongcheng	200	125	2012	250	155
Guangxi Northern Gulf	200	125	2012	238	148
Total				2,901	1,803
GRAND TOTAL				**13,539**	**8,413**

High-speed train at Beijing station

The Chinese CHR380A pulling into Shanghai

Current Status of High-Speed Line Development in China

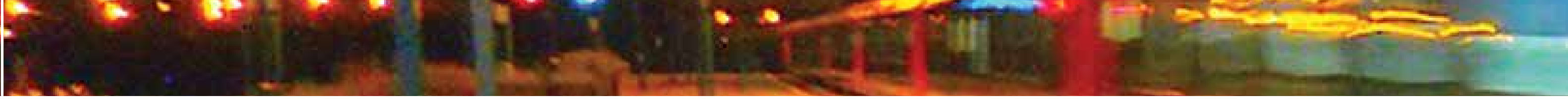
According to a July 2012 article in the International Railway Journal (IRJ), the July 2011 collision between two high-speed trains in Wenzhou resulted in the cessation of construction, a nationwide safety evaluation, and reduction of train speeds over the past year on the Chinese high-speed rail system. As a result of the crash investigation, the Chinese Ministry of Railways (MOR) set up a new department called Major Projects Management Centre that is responsible for the supervision of high-speed railway and other important construction projects.

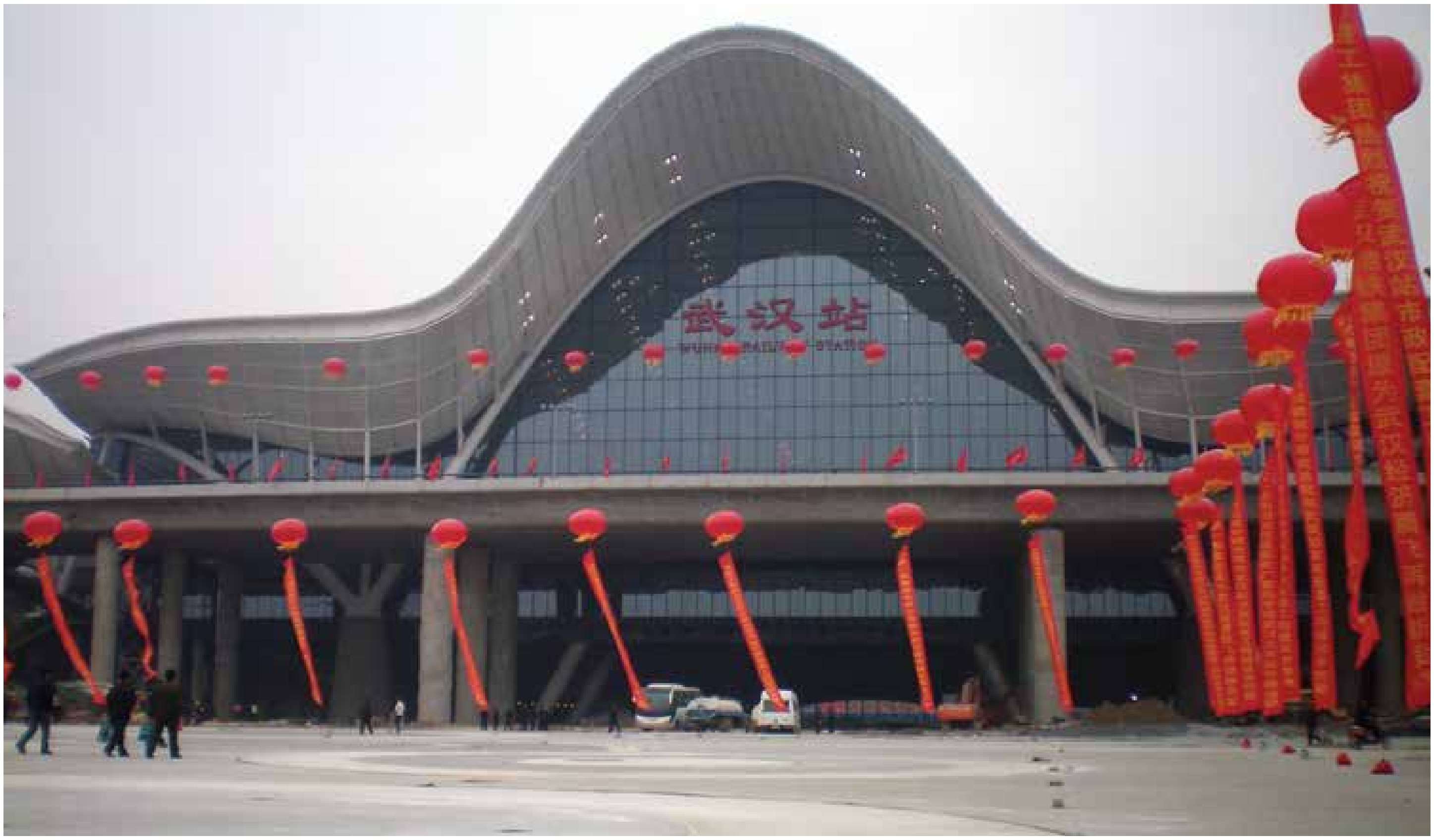
Moving forward, China was able in 2011 to launch into service the 102 km (63 mile) high-speed line between Guangzhou and Shenzhen. Three additional lines are discussed in the IRJ article as moving toward completion at the time this summary was completed:

- Beijing – Wuhan: This lengthy 1,125 km (700 miles) segment will operate at a maximum 300 km/h (186 mph), according to international practice to maintain a safety margin, despite a maximum design speed of 350 km/h (220 mph). This route will reduce the travel time from 10 hours to 4 hours.
- Wuhan – Chengdu: The 293 km (182 mile) line under construction is the Wuhan to Yichang section of the Shanghai-Wuhan-Chengdu line.
- Harbin – Shenyang Dalian: This 904 km (562 mile) line will reduce travel time from 9 hours to 3 hours.

According to the International Union of Railways (UIC), the first high-speed rail line segment in the China opened in 2003 between Qinhuangdao and Shenyang.

Sources: High-Speed Lines in the World; Benchmark of Asian Public Transport Interchanges; High Speed and the City; "Chinese High Speed: in the wake of Wenzhou"; "High-Speed Rail – The First Three Years."





Wuhan Railway Station, Wuhan, China

ECONOMICS AND FINANCE

The Chinese high-speed rail network is owned, developed, and operated by the Ministry of Railways (MOR) of the People's Republic of China. However, the IRJ indicates debt, as a result of the rapid development of the high-speed system, has been a major issue for the MOR, creating new interest in private investment. A May 2012 guideline issue by MOR invites private investors to invest in the overall rail system, including freight, passenger, and high-speed rail development.

Source: "Chinese High Speed: in the wake of Wenzou."

RIDERSHIP AND TRANSPORTATION SYSTEM IMPACTS

Ridership

Ridership information is generally not officially released by the Chinese government. In an assessment of the first three years of high-speed rail operations, Bullock with the World Bank presents ridership estimates and document passenger fares for travel options within several high-speed rail corridors. In 2010, an estimated 290 million passengers traveled via rail operating at speeds greater than 200 km/h (125 mph) in China. Ridership for two corridors include approximately 25 million passengers per year on high-speed services between Beijing and Tianjin and 22 million passengers per year on the line from Wuhan to Guangzhou.

A major finding related to high-speed rail demand is the high level of generated trips, defined as trips made by those who have been induced to travel by the improved service levels (speed, frequency, reliability, and comfort) of high-speed rail. The estimated rates of generated trips include 45 percent for the Wuhan to Guangzhou line; 65 percent for the Beijing to Tianjin line; and 40–50 percent for the Changchun to Jilin line. Most other high-speed rail systems have rates of generated trips around 10 percent.

In examining travel fares, Bullock reviewed fares for several of the 350 km/h (220 mph) and 250 km/h (155 mph) corridors. The examined fares ranged between $0.106 and $0.121 per mile for the 350 km/h (220 mph) corridors and between $0.073 and $0.078 per mile for the 250 km/h (155 mph) corridors. These compare to bus and air fares documented as $0.088 per mile for bus and $0.177 per mile for air. Finally, fares for conventional services are documented as $0.028 per mile for the slowest services and $0.076 for the 200 km/h (125 mph) services. Example calculations of

Example U.S. Dollar Equivalent Fares for China HSR Corridors and Competing Modes

Corridor	Corridor Length		High-Speed Rail ($ 2012 US)	Conventional Rail ($ 2012 US)	Air ($ 2012 US)	Bus ($ 2012 US)
	km	miles				
Wuhan - Guangzhou (350 km/h)	969	602	73	17	106	53
Taiyuan - Beijing (250 km/h)	514	319	25	9	56	28

typical US dollar-equivalent fares for each of the corridors across several modes and using 2012 conversion factors are presented in the table on the following page.

Beijing South Station

Beijing is China's second largest city and has a population density of 10,154 people per square kilometer (26,470 people per square mile). Unlike many of the major high-speed rail stations around the world, the Beijing South station is located on the outskirts of the city instead of the central city. Replacing an existing passenger rail station, the Beijing South station is part of the country's first major high-speed line segment between Beijing and Tianjin, which are separated by 120 km (75 miles). Implementing the high-speed line reduced travel time from 70 minutes to 30 minutes. Travel by car, by comparison takes 90 minutes.

The improvements to the Beijing South station were largely associated with the preparation of the city for hosting the 2008 Olympic Games. It reportedly operated 146 high-speed trains per day and accommodated over 287,000 passengers daily in 2011. The UIC reports that the station construction costs were $614.25 million.

Modal Analysis

The World Bank topic paper covering the initial three years of Chinese high-speed rail investment addresses the impact of high-speed rail services on both conventional rail and airline services. Bullock notes that service reductions on conventional lines paralleling new high-speed services have in some cases been extensive. One example is the Shaoguan to Guangzhou corridor where in 2009 there were 23 local conventional passenger rail services but only 6 in 2011. Notably, the reduction of conventional passenger rail services has freed up capacity for freight rail services.

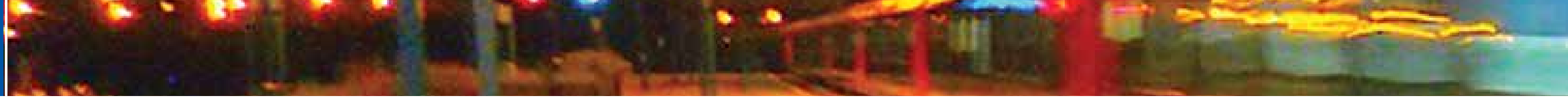
The impact of the new high-speed rail services on air demand appears to be significant on routes up to approximately 500 km (311 miles) and much less significant for the longer routes of distances over 1,000 km (621 miles). In some instances short distance air services were completely retracted, while other short-distance routes experienced significant reduction in demand forcing reductions in service. In the 600 km (375 mile) corridor between Changsha and Guangzhou, passenger demand reduced from 90,000 passengers per month to about 30,000, which reduced air services from 750 flights a month to 250 flights. However, the Beijing to Shanghai corridor at a distance of about 1,300 km (810 miles) has experienced limited reductions in air services as a result of high-speed train operations.

Shijiazhuang–Wuhan High-Speed Railway

The impact of the new high-speed rail services on air demand appears to be significant on routes up to approximately 500 km (311 miles) and much less significant for the longer routes of distances over 1,000 km (621 miles).

The paper also notes that shorter intercity bus routes have also been greatly negatively impacted from high-speed rail implementation, even those routes with fares about half of the high-speed rail fares.

Source: Benchmark of Asian Public Transport Interchanges; "High-Speed Rail – The First Three Years."



BIBLIOGRAPHY

"Chinese High Speed: in the wake of Wenzhou"
International Railway Journal (IRJ), Volume 52, Issue 7, July 2012 (online edition), pp. 21-23
URL: http://www.nxtbook.com/nxtbooks/sb/irj0712/
Date Accessed: July 23, 2012

High Speed and the City
Prepared for the International Union of Railways (UIC) by BB&J Consult, September 2010
URL: http://www.uic.org/IMG/pdf/20101117_highspeed_thecity_finalreport.pdf
Date Accessed: June 20, 2012

High-Speed Lines in the World
International Union of Railways (UIC), Updated November 1, 2011
URL: http://www.uic.org/IMG/pdf/20111101_a1_high_speed_lines_in_the_world.pdf
Date Accessed: May 30, 2012

"High-Speed Rail – The First Three Years: Taking the Pulse of China's Emerging Program"
China Transport Topics No. 04
Prepared by Bullock, Salzberg, and Jin with the World Bank, February 2012
URL: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2012/04/05/000333038_20120405014021/Rendered/PDF/667980BRI0P12500Speed0Rail0Final0EN.pdf
Date Accessed: July 26, 2012

The World Factbook
United States Central Intelligence Agency
URL: https://www.cia.gov/library/publications/the-world-factbook/
Date Accessed: May 31, 2012