

Wireless Access in China



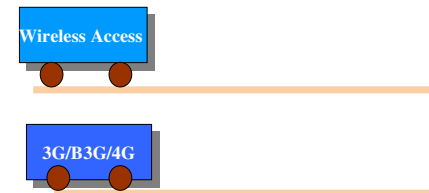
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Definition



- “Wireless access” refers to end-user radio connection(s) to core networks.
- Key characteristic is the use of a multiple access radio system instead of wires in the distribution/access network.
- Land mobile is not included.



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Frequency Bands for Fixed Wireless Access



Year	Frequency Band (MHz)	Systems/ (Shared Systems)
1996	1900-1920	DECT/PHS, (MS)
1998 2003	1800-1805 1785-1805	TDD FWA,
2000	3400-3430/3500-3530	FDD FWA, (FSS)
2001	24507-25515/25757-26765	LMDS
2002	5725-5850	P-P&P-MP FWA , WLAN, (BLUETOOTH, ISM)
2002	2400-2483.5	WLAN, P-P&P-MP FWA, (BLUETOOTH, ISM)
2004	406.5-409.5	TDD FWA, (RA, FS, MS)

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Development of the Wireless Access Industry



- Diversified wireless access technologies, mutually complement for joint development
 - narrowband wireless access
 - broadband wireless access
 - 3.5GHz fixed wireless access technology
 - LMDS
 - WLAN
 - 5.8GHz Broadband wireless access technology

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Development of the Wireless Access Industry



- New technology and demand for new service have driven the development of overall wireless access industry.
- January 2005 :

	Base Stations	Terminal Stations
FWA	4,500	227,000
PHS/DECT	510,000	>50,000,000

- June 2005 : PHS/DECT Subscribers > 80 Million

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Narrowband wireless access



- Frequency:
 - 1785~1805MHz
 - 406.5~409.5MHz
- TDD
- System with independent IPR developed by Chinese Company
- Key technology: smart antenna, software radio (SWR), uplink synchronization etc.

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Narrowband wireless access



- Major applications : village-connected project
- So far, China Netcom has already began massive SCDMA network construction in southern areas of China.

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3.5GHz Wireless Access



- Frequency: 3400~3430MHz / 3500~3530MHz.
- From 2001 to 2004, the Chinese government has organized three bidding campaigns to allocate the 3.5GHz frequency band nationwide.
 - Phase 1: five cities were chosen for trial
 - Phase 2: 32 cities, including major provincial capitals and municipalities directly under the central government
 - Phase 3: All the major cities in China, tendering was organized in March, 2004.

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WLAN



- Frequency: 2.4GHz、5GHz
- Features: portability、broadband、limited coverage
- By September, 2004, the number of WLAN hotspots globally has exceeded 45,000 with market scale of over 1 billion US dollars and that is steadily growing.
- WLAN is widely used in businesses and homes. But many problems are yet to be addressed in the operation of public network.

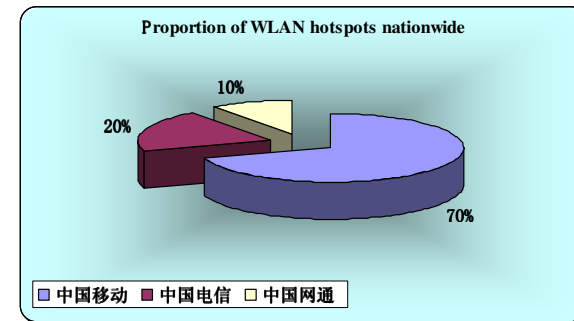
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Development of the Wireless Access Industry



- Distribution of LAN hotspots



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LMDS Local Multi-points Distribution System



- Frequency: 24507~25515 MHz / 25757~26765 MHz;
- By the end of 2002,, MII approved China Netcom, China Telecom, China Mobile and China Unicom to conduct trial for commercialization in designated cities.
- This frequency band requires line-of-sight transmission.
- Operators use LMDS technology to provide base station interconnection and data access.

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Each wireless access technology has its own application and limitation



- No mainstream wireless access technology.
 - Narrowband wireless access mainly provides voice service, but not broadband service.
 - 3.5GHz wireless access and LMDS are fixed broadband wireless access technologies, which support no mobility of users and whose application is mainly for corporate users.
 - WLAN provides convenient Internet access for end users. However, limitations such as limited coverage, multi-operator's roaming, network billing and management have restricted its application to some extent. the WLAN profit-making model is not clear.

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- In recent years, the number of Internet surfers is growing fast . So far, the growth of narrowband dial-up users is slowing down and even see trend of negative growth while during the same time, users of broadband grows very fast.
- xDSL users, represented by ADSL has reached 20 million, a predominant proportion in China's broadband users.
- Compared with wired access, wireless access only takes a small share. It still has huge potential.

Compared with the wired broadband access, the subscriber growth of wireless broadband technology is not fast.

Opportunities and Challenges



- The industry of broadband wireless access is taking shape and improving.
- Technology standards and mature operation model will drive the rapid growth of broadband wireless access industry.
- It will provide opportunity for equipment providers, operators and users.
- The development of future technology will be affected by various factors, including availability of radio frequency resource.



Radio Spectrum for Wireless Access

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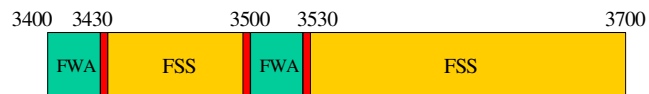
- The available frequency for the 3.5GHz band is only 31.5 MHz.
- Three 10.5 MHz blocks (3x3.5MHz) posing challenges in network construction and frequency reuse.
- No frequency left for new-comers in major cities.

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- 3400-3700MHz is allocated for the “extended C band” for satellite fixed service, which is used in many countries for VSAT.
- Studies have shown that it is extremely difficult for VSAT and FWA co-exist in this band.
- Satellite using extended C band is planned to be launched around 2008. Low possibility to extend FWA allocation in 3.5 GHz band.



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- Frequency: 24507~25515 MHz / 25757~26765 MHz;
- Can be extended if necessary.
- Line-of-sight transmission is required for this band. As the transmission may be affected by the rainfall, transmission distance must be sacrificed to ensure the availability of the network.
- Costs of equipment and networking are quite high. The operators are not very enthusiastic in using it.

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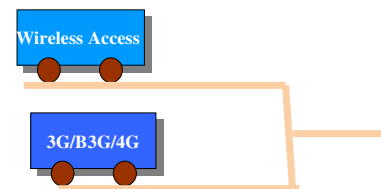
- 5150-5350MHz and 5470-5725MHz
- Adjacent to the current 5725-5850MHz.
- It shares the band with services as radio positioning, so some interference mitigation techniques need to be taken, such as dynamic frequency selection.
- It is hard to guarantee QoS, so it is not suitable for the public network.
- Licensed band

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- 2300-2400MHz and 2500-2690MHz
- This band is designated for future terrestrial mobile service.
- In China, public mobile service and wireless access service belong to two different categories.
- Wireless access cannot use the band for mobile services.
But, will convergence of wireless access and mobile service occur?



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Thanks !