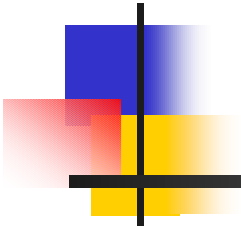


# The Radio Regulation and Frequency Planning in China



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# Main tasks for radio regulation

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**According to *Radio Regulatory Provisions, People's Republic of China***

- **Maintain the order of electric waves in the air and make an effective use of radio spectrum resources and ensure regular operation of various types of radio services**
- **The principle of uniform planning, rational exploitation, scientific management and paying service should be implemented for radio spectrum**
- **Management and supervision of R&D, production, import and sale of radio transmission equipment.**

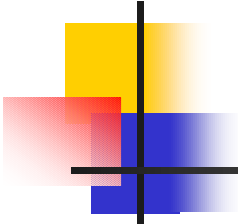
# China's radio regulatory institutions (1)



**Radio regulatory institutions are set up in 2-level regulatory mechanism, namely Ministry of Information Industry and various radio regulatory institutions at provincial, autonomous regional and municipal level**

- **State radio regulatory institution: MII takes charge of state radio regulatory functions, and its Radio Regulation Department is its specific executive body**
- **Provincial radio regulatory institutions: They implement state radio regulatory policies and carry out local administrative regions' radio regulation work upon state's authorization**
- **Provincial agencies: Various provincial radio regulatory institutions can set up their agencies at prefectural level, municipal level or county level to carry out respective administrative regions' radio regulation work**

# China's radio regulatory institutions (2)

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- **Army radio regulatory institutions: Whole Army Radio Regulatory Commission is responsible for radio regulatory work within military system, and the office of Whole Army Radio Regulatory Commission is its specific executive body**
  - **The joint conference held by Radio Regulatory Department of the MII and Whole Army Radio Regulatory Commission is responsible for coordinating radio regulation matters needing to be decided through consultation between both army and local administrations**
  - **Directorate General of Broadcast, Film TV, Ministry of Railways and Ministry of Public Security etc. can entrust their own functional units with radio regulation work and radio regulatory policy implementation in line with their respective radio service operation condition and upon authorization by state radio regulatory institution**

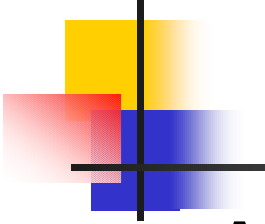
# China Radio Monitoring Network (1)



**China Radio Monitoring Center is the technical support of national radio regulatory institution. Its main functions are:**

- **Responsible for the construction, operation, maintenance and management of radio monitoring infrastructure**
- **Responsible for radio monitoring tasks and searching radio interference sources and illegal radio stations by technically methods, and dealing with this problem by authorization**
- **Responsible for the construction, operation, maintenance and management of National Radio Management Information System infrastructure**
- **Responsible for the construction, maintenance and management of National Radio Equipment Test Center and testing of the certification of radio transmitting equipment**

# China Radio Monitoring Network (2)

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- **Area monitoring station: 7 stations mainly taking charge of shortwave monitoring**
  - **Provincial radio monitoring station: is the technical support of Provincial Radio Regulation Institutions and takes charge of radio wave monitoring and quality supervision testing of radio equipment and management of provincial MIS**
  - **City monitoring station: is the technical support of local institutions and takes charge of radio wave monitoring of local areas.**



# Main functions of the state radio regulation

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**According to *Radio Regulatory Provisions, People's Republic of China***

- **Formulate policies, guidelines and administrative regulations for radio regulation**
- **Lay down radio regulatory provisions**
- **Take charge of uniform regulation of radio stations and radio frequencies**
- **Coordinate the treatment of matters concerning radio regulation**



# Main function (1) of Radio Regulation Department

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- **Formulate radio spectrum plan and rationally exploit and utilize spectrum resources**
- **Assignment and management of radio frequency resources**
- **Management of radio stations**
- **Take charge of radio monitoring**
- **Take charge of coordinating the treatment of radio interference matters and maintain the order of electric waves in the air**





# Main function (2) of Bureau of Radio Regulation

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- Implement radio regulation according to the law
- Take charge of coordination of satellite orbital positions
- Take charge of approving the types of radio transmitting equipment
- Participate international radio conference by authorization
- Take charge of radio communication regulation involving foreign counterparts



# Radio Frequencies Plan Professional Consultation Committee

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- Main tasks:

Launch proposals of frequencies division and plan, and new radio services and policies of exploitation and utilization of frequency spectrum

- Members:

Academician and experts who are well known in wireless communication and appointed by the Minister of Information Industry



# Main means for radio communication regulation (1)

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- **Laws and regulations**

- Radio Regulatory Provision, People's Republic of China*

- Provisions for Radio Frequency Allocation, People's Republic of China*

- Provisions for Regulation of Imported Radio transmitting Equipment*

- **Administration**

- Formulation of frequency plan, allotment and assignment

- Examination & approval of radio stations and issue of "Radio Station License"

- Investigation, treatment and coordination of radio interference

- Check and issue "Verification Pass for Types of Radio Transmitting Equipment"



# Main means for radio communication regulation (2)

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- **Technology**

- Electromagnetic compatibility analysis**

- Radio monitoring network**

- Radio communication management information network**

- Radio equipment detection and quality supervision**

- **Economy**

- Frequency occupation fee**

- Penalty for violation**



# Management mode of radio frequency/station (1)

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**Frequency assignment and approval of radio station set-up are the daily work of state radio regulatory institutions, and daily management work is taken charge by provincial radio regulatory institutions. For instance:**

- **4GHz? 5GHz? 6GHz                      band  
microwave                      trunk                      relay  
communication**



# Management mode of radio frequency/station (2)

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**Frequency assignment is dealt with by state radio regulatory institutions, while approval of radio station set-up and daily management work are tackled by provincial radio regulatory institutions. For instance:**

- **Service scope covers nationwide or multi-provincial mobile communication networks, radio paging networks and radio trunking communication networks etc.**
- **3.5GHz and 26GHz LMDS wireless access systems**
- **Frequencies of interphones used for professional sectors involved in multi-province**



# Management mode of radio frequency/station (3)

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**Communication networks are subject to examination and approval by state radio regulatory institutions, while approval of radio station set-up and daily management work are tackled by provincial radio regulatory institutions. For instance:**

- **The satellite communication networks are approved by state radio regulatory institutions, while the approval of earth stations set-up in networks and daily radio management work are taken charge by provincial radio regulatory institutions.**



# Management mode of radio frequency/station (4)

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**Within the specified frequency range, “Type Verification Pass” for radio transmitting equipment is issued by the state radio regulatory institutions. The set-up and use of the equipment with type verification pass need no examination and approval and such equipment will not be protected when they are interfered. Provincial radio regulatory institutions supervise the quality of such type of equipment. For example:**

- **Short range radio communication equipment (cordless telephone sets, car radio alarmer)**
- **Public interphones operating in 409MHz band**





# Management mode of radio frequency/station(5)

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**State radio regulatory institutions take charge of space satellite frequency/ orbital positions, for example:**

- **Register in ITU**
- **Coordination with other countries and regions etc.**



# Management mode of radio frequency/station(6)

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**Frequency assignment, radio station set-up and daily regulation work are taken charge by provincial radio regulation institutions. For example:**

- **Frequencies managed upon authorization from state radio regulatory institution, microwave relay communication system, radio paging system and interphone etc.**

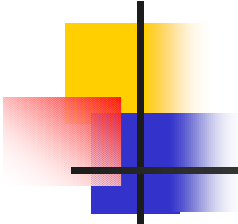


# Management mode of radio frequency/station(7)

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**Frequency planning is tackled by the relevant departments, while examination & approval of radio station set-up and daily management work are dealt with by provincial radio regulatory institutions. For instance:**

- **Directorate General of Radio, Film and TV is responsible for frequency planning of radio stations for broadcast**
- **CAAC is responsible for frequency planning of aviation communication**



# Radio frequencies appointment modes

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- **Administrative appointment:**  
Direct appointment based on policies and regulations, such as mobile communications, paging and interphones.
- **Concerted appointment:**  
Appointment after the negotiation under the circumstances of same utilization by multi-departments and multi-services, such as microwave stations and earth stations, meteorological radar.
- **Bidding appointment:**  
Appointment by bidding under the circumstances of excessive demand but few frequencies resources, such as 3.5GHz wireless access system



# Radio regulation

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**On the occasion of significant event such as 50th anniversary of the founding of P.R.China and Hong Kong's returning etc., the people's government of provinces, autonomous regions and municipalities directly under the central government issue the radio regulation ordinance, clearly defining specific time and regions of prohibiting radio wave transmission and types of radio services and frequency range etc. according to needs of the events and local EM environment.**



# Radio interference monitoring (1)

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- **Daily monitoring:**

**Radio monitoring station monitors the electromagnetic environments in real time, and the radio parameters such as frequencies used by all types of radio stations, transmitting bandwidth and frequency tolerance stored in the data base**

**The monitoring can actively and timely find out the radio stations whose parameters are not in conformity with the requirement, thus the interference source can be removed effectively**



## Radio interference monitoring (2)

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### **Equipment detection:**

- **Do spot check of the equipment with annual examination so as to find out the spurious radiation beyond the limit and frequency shift etc. due to component ageing and damages, and prevent interference**
- **Detect certain type of radio equipment to get rid of unqualified equipment through specific radio regulation tasks (for instance, check of radio paging stations and RF stations etc.)**



## Radio interference monitoring (3)

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### **Interference complaint:**

- **Analyze the characteristics of interference signals based upon subscribers' complaints and monitor specific radio wave to find out interference source**
- **Ultrashort wave interference is tackled by provincial radio regulatory institutions**
- **State radio regulatory institution organizes the monitoring networks to find out the source of short-wave interference and tackles this problem**
- **State radio regulatory institutions deal with satellite interference**





# The principles followed by China frequency planning

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- **Overall consideration of the requirements for various radio services**
- **Full consideration of real conditions for China spectrum utilization**
- **The plan should meet China's real circumstance and be in compliance with international frequency allocation and close to international standards**



# The principles followed by China frequency planning

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- **Select technically matured, advanced & reliable standards and systems and actively support communication modes with high spectrum utility and opened protocol in order to protect national industry and encourage the competition among various manufacturers and different systems**
- **Study on EMC features and the possibility of frequency-share among various kinds of services**
- **Consideration of both long-term and near-term demands, implementation in steps, smooth transition**



# Frequency planning, exploitation and utilization

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## Projects to be studied for frequency planning

- Spectrum demand
- Bandwidth allotment
- Carrier bandwidth
- Features of electromagnetic compatibility
- Guard bandwidth between different services
- Possibility of frequency-share and setup conditions of radio stations



# Work procedure for frequency planning

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**Frequency planning for new technologies and new services should normally be carried out in the following steps :**

- **Research**
- **Technical verification trial**
- **Preliminary determination of frequency planning and regulatory policies**
- **Commercial trial**
- **Final determination of frequency planning and regulatory policies**



# Work procedure for frequency planning - Research

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**The following status can be mastered via technical information exchange and seminar or inspection & investigation**

- **Technologies:** Usable frequency, occupied bandwidth, modulation techniques, frequency reuse, capacity and electromagnetic compatibility with other services etc.
- **Standardization:** Internationally, regionally and industrially formulated standards and intellectual property rights (IPR)
- **Commercialization:** Amount of equipment manufacturers, scale and economic condition of operation market, the degree of maturity of the technologies

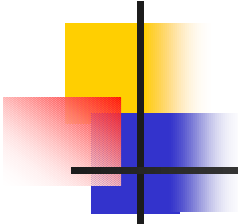


# Work procedure for frequency planning – Technical trial

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**The operators will verify the following matters with the participation of relevant standard-development body and government departments after approving by Radio Regulatory Department of the MII, based on the applications from operators :**

- **Technical features, standardization and commercialization**
- **The electromagnetic compatibility with other technical systems and services**
- **Whether it is in conformity with China's actual circumstances**
- **The reference basis provided for government to make relevant regulatory policies**



# Work procedure for frequency planning – Determination of initial regulatory policies

**The technical verification trial is examined and commented by the experts organized by the government. The study on technical and administrative policies are carried out on the basis of good examination & comment result, then the administrative policies below should be determined:**

- **Determination of frequency bands used for new services and the relationship with other radio services within the same band**
- **Determination of technical specifications of radio transmission technological**
- **Determination of examination & approval management procedures of radio station setup**



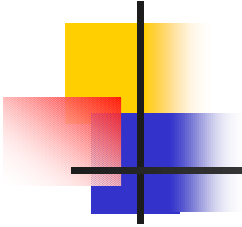
# Work procedure for frequency planning – Commercial trail

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**Based upon the applications from the operators, the government selects the technically capable operators to launch their commercial services at limited number of sites for verifying the following matters:**

- **Management functions of the communication networks and the service functions offered to the subscribers as well as network capacity**
- **Subscribers' acceptability for this service and market status**
- **Compatibility with other radio services**
- **Feasibility and operability of government's administrative policies**





# Work procedure for frequency planning – Final determination of administrative policies

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**Based on the commercial trial result, the government reviews the relevant administrative policies and technical data and the corresponding adjustment should be made if necessary.**



# General regulation provisions

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- **The technical or commercial trials on the new technology carried out without frequency planning should be reported to the MII for approval**
- **Before the commercial trial or formal commercial service are conducted, “verification pass of type of radio transmitting equipment must be obtained**



# Frequency planning for current radio access services (1)

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- **460.5-462.0 / 450.5-452.0 MHz  
464.1-467.075 / 454.1-457.075 MHz**  
are used in FDD mode, 25KHz of channel spacing is used for rural areas, sharing the same frequencies with interphones and without interference to interphones.
- **1800-1805 MHz and 1900-1920 MHz are used in TDD mode and for towns and local areas**



# Frequency planning for current radio access services (2)

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- **3400 - 3430 / 3500 - 3530 MHz are used in FDD mode, channel spacing is 1.75, 3.5, 7MHz**  
**5725 - 5850 MHz are used in FDD mode and share WLAN frequencies**
- **24507-25515 / 25757-26765 MHz are used in FDD mode, channel spacing is 3.5, 7, 14, 28MHz.**



# The principle of frequency planning for China's 3G (1)

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- **Full consideration of actual condition of China spectrum use**
- **It should be in conformity with China's actual conditions and try to comply with international frequency allocation and standards**
- **Actively support TD-SCDMA technical standard**



# The principle of frequency planning for China's 3G (2)

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- **Research EMC features among air interfaces and conditions of using adjacent frequency (i.e. antenna spacing, guard band and out-of-band radiation limit etc.)**
- **The planned or used frequency resources for 2G mobile communication are regarded as the extended band for 3G**
- **Consideration of both long-term and near-term demands, implementation in steps, smooth transition**



# **ITU' IMT- 2000 frequency allocation**

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- **2110 - 2170 / 1920 - 1980 MHz**  
**FDD mode**
- **1885 - 1920 MHz and 2010 - 2025 MHz**  
**TDD mode**
- **2170 - 2200 MHz / 1980 - 2010 MHz**  
**Mobile satellite services**



# Currently planned bands

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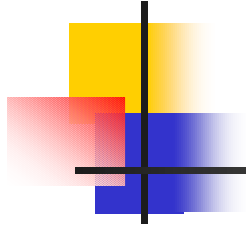
## **GSM bands**

- **885 - 915 / 930 - 960 MHz**
- **1710 - 1755 / 1805 - 1850 MHz**

## **CDMA bands**

- **825 - 835 / 870 - 880 MHz**





## China' available bands for 3G

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- **825 - 835 / 870 - 880 MHz**
- **885 - 915 / 930 - 960 MHz**
- **1710 - 1785 / 1805 - 1880 MHz**
- **1785 - 1805 MHz**
- **1880 - 2025 MHz**
- **2110 - 2200 MHz**
- **2300 - 2400 MHz**



# Preparation work for frequency planning of 3G

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- **Obtain clear knowledge of the status of utilization of IMT-2000 core bands use**
- **Clean up the frequencies within the core bands**
- **Prepare frequency planning scheme of 3G**
- **Publish the scheme at a proper opportune time**

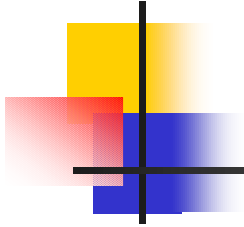


# Bands for digital microwave relay communications

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- **Point to multi-point communication systems:**
  - **1427 – 1525 MHz**
- **Point to point relay communication systems:**
  - **3600- 4200MHz;**
  - **4400- 5000MHz;**
  - **5925- 7110MHz;**
  - **7125- 8500MHz;**
  - **10700- 11700MHz;**
  - **12750- 13250MHz;**
  - **14249- 14501MHz;**
  - **14500- 15350MHz;**
  - **17700- 19700MHz;**
  - **21200-23600MHz;**

# Bands for satellite communications



## **Geostationary satellite:**

- **C band: 3400- 4200 MHz (down link)  
5850- 7075 MHz (up link)**
- **Ku band: 12.5-13.25 GHz (down link)  
13.75-14.8 GHz (up link)**

## **Navigation and telemetering satellite:**

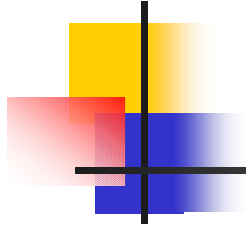
- 1610- 1626.5 MHz (down link)  
2483.5- 2500 MHz (up link)**



# Conclusion

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- **It is necessary to actively study the radio regulation modes in order to adapt to the situation of reform & opening-up and entering into the WTO**
- **Since radio applications become increasingly wider, it is necessary to enhance radio regulation work and speed up the construction of monitoring networks and information networks and actively ensure the normal operation of various radio services**
- **The focus of current frequency planning work is laid on the frequency planning for 3G mobile communication systems and wireless access systems**



# Thank You