Flexible Use of Airspace in China

Liu Yonggang
Airspace Management Center
Air Traffic Management Bureau
Beijing
Contents

- Basics of ATMB and China Airspace Management
- Evolution of Airspace Demand of China
- Development of Flexible Use of Airspace in China
- Future Planning & Prospect of Flexible Use of Airspace
Basics of ATMB and China Airspace Management

Ministry of Transportation

CAAC

Air Traffic Management Regulatory Office (Supervision)

Air Traffic Management Bureau (Operation)
Basics of ATMB and China Airspace Management

CAAC

Air Traffic Management Bureau

North China ATMB (Beijing)
- Tianjin, Hebei, Shanxi, Inner Mongolia Sub-Bureaus;

East China ATMB (Shanghai)
- Shandong, Jiangsu, Jiangxi, Anhui, Zhejiang, Fujian, Sub-Bureaus
- Qingdao, Xiamen, Ningbo, Wenzhou ATM Station

Middle & South China ATMB (Guangzhou)
- Hunan, Hubei, Guangxi, Henan, Hainan Sub-Bureaus
- Shenzhen, Zhuhai, Sanya, Guilin, Zhanjiang, Shantou ATM Stations

Southwest China ATMB (Chengdu)
- Yunnan, Guizhou, Chongqing, Xizang Sub-Bureaus

Northwest China ATMB (Xi’an)
- Gansu, Qinghai, Ningxia Sub-Bureaus
- Heilongjiang, Jilin Sub-Bureaus

Northeast China ATMB (Shenyang)
- Dalian ATM Station

Xinjiang ATMB (Urumqi)
- Akso ATMB Station
Basics of ATMB and China Airspace Management

Operational structure of ATMB HQs
The National ATC Commission is usually lead by a vice-Prime Minister. Its Office is established at the Headquarters of the General Staff of the P.L.A.
Basics of ATMB and China Airspace Management

- **Airspace Users**
  - Commercial Aviation
    - (47 airlines, 1954 aircraft)
  - General Aviation
    - (about 1800 aircraft)
  - Military Aviation
Three types of user are developing very fast, with the airspace being increasingly congested.
Three ACCs (Beijing, Guangzhou and Shanghai) has been put into operation since 2003.
Two new ACCs (Chengdu, Xi’an) has been put into operation in 2013.
ATMB will integrate 20 Upper Control Areas into 7 greater Upper Control Areas in next five years, with the purpose of reducing coordination and expediting traffic flow.
Basics of ATMB and China Airspace Management

- Traffic flow heavy in east, light in west
- Highest density lies on Bohai Gulf, Yangtze Delta, Pearl River Delta areas
- Busy routes lies in east of Beijing-Xi’an-Chengdu-Kunming
Evolution of Airspace Demand in China

- Average Annual Growth Rate of Civil Air Traffic over 10% in the past 10 years
- Rapid Increase of Airspace Demand From Different Users
- Insufficient Airspace Capacity is of Prime Concern
Evolution of Airspace Demand in China

- Control Sectors

**2009-2013 Number of Sector**

- Area Sector
- Approach (Terminal) Sector
- Total

<table>
<thead>
<tr>
<th>Year</th>
<th>Area Sector</th>
<th>Approach (Terminal) Sector</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>105</td>
<td>51</td>
<td>156</td>
</tr>
<tr>
<td>2010</td>
<td>118</td>
<td>74</td>
<td>192</td>
</tr>
<tr>
<td>2011</td>
<td>124</td>
<td>78</td>
<td>202</td>
</tr>
<tr>
<td>2012</td>
<td>133</td>
<td>82</td>
<td>215</td>
</tr>
<tr>
<td>2013</td>
<td>148</td>
<td>82</td>
<td>230</td>
</tr>
</tbody>
</table>
Evolution of Airspace Demand in China

Controller Workforce

2004-2013  The number of Controllers
Evolution of Airspace Demand in China

Volume of Air Transportation Turnover
(in hundred million ton*km)

Average Annual Growth Rate = 12.6%
Evolution of Airspace Demand in China

Volume of Passenger
(hundred million)

Average Annual Growth Rate = 12.7%
Evolution of Airspace Demand in China

Volume of Aircraft Movements (Ten Thousand)

Average Annual Growth Rate = 13.3%
Development of Flexible Use of Airspace in China

Annual total distance of route increased around 3.31%
Evolution of Airspace Demand in China

Flight Punctuality (%)
Evolution of Airspace Demand in China

Comparison of Aviation Development Index (2004-2013)
Evolution of Airspace Demand in China

Future Demand Forecast

<table>
<thead>
<tr>
<th></th>
<th>2004-2012</th>
<th>2012-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume of Air</td>
<td>12.92%</td>
<td>13.71%</td>
</tr>
<tr>
<td>Transportation Turnover</td>
<td>13.04%</td>
<td>13.08%</td>
</tr>
<tr>
<td>Volume of Passenger</td>
<td>10.28%</td>
<td>9.72%</td>
</tr>
<tr>
<td>Volume of aircraft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>movements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comercial Airline Fleet</td>
<td>12.41%</td>
<td>9.37%</td>
</tr>
</tbody>
</table>

Forecasted Average Annual Growth Rate
Evolution of Airspace Demand in China

Present Airspace Allocation in China

Airspace For Other Users

Airspace For Civil Aviation
Development of Flexible Use of Airspace in China

Routes and Airways

Total distance of route and airway: 184,646 km
International routes and airways: 88,341 km
Development of Flexible Use of Airspace in China

Density Map of Route Network
Development of Flexible Use of Airspace in China

Restricted Airspace Distribution
Development of Flexible Use of Airspace in China

- **Flexible Use of Airspace (FUA):** Airspace is flexibly shared by different airspace users according to their specific demand.
- **Fragmentation of airspace use should be reduced with highest efforts.**
35 temporary routes established after Olympic Games since March 2009.

Flight delays reduced by 2% in relevant airports in Pearl River Delta (PRD) area, when V17 and V18 temporary routes open to civil flights particular for the city pairs from PRD to Eastern China.

Temporary routes are playing a very important role during big events and bad weather.
Development of Flexible Use of Airspace in China

- Temporary Routes: shared use of airspace between civil aviation and other users

Temporary Routes

- Route X (Only For Domestic Flights)
- Route V (For Both Domestic & Int’l Flights)
- Route W (Part of W Routes For Both Domestic & Int’l Flights)

20% of Total Air-Route Length in China

650 routes, of which temporary routes are 130
Development of Flexible Use of Airspace in China

Benefits From Use of Temporary Routes

Fuel Saved & Carbon Emission Reduced (both in ten thousand tons) between 2009-2013 in China

<table>
<thead>
<tr>
<th>Year</th>
<th>Fuel saved</th>
<th>Emission Reduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>4.77</td>
<td>15.22</td>
</tr>
<tr>
<td>2010</td>
<td>5.79</td>
<td>18.26</td>
</tr>
<tr>
<td>2011</td>
<td>7.01</td>
<td>22.06</td>
</tr>
<tr>
<td>2012</td>
<td>7.62</td>
<td>24.01</td>
</tr>
<tr>
<td>2013</td>
<td>7.78</td>
<td>24.52</td>
</tr>
</tbody>
</table>

NO. of Flights involved (in thousand) & Distance Saved (in ten thousand kilometers) between 2009-2013 in China

<table>
<thead>
<tr>
<th>Year</th>
<th>Movements Used</th>
<th>Distance saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>215.028</td>
<td>865.9</td>
</tr>
<tr>
<td>2010</td>
<td>271.539</td>
<td>1072.3</td>
</tr>
<tr>
<td>2011</td>
<td>371.023</td>
<td>1296.8</td>
</tr>
<tr>
<td>2012</td>
<td>412.955</td>
<td>1411.8</td>
</tr>
<tr>
<td>2013</td>
<td>416.27</td>
<td>1441.4</td>
</tr>
</tbody>
</table>
Development of Flexible Use of Airspace in China

Problems to deal with

- Perception and Understanding Improvement
- Management Mechanism Improvement
- Management Tools Enhancement
Future Planning & Prospect of Flexible Use of Airspace in China

Other Users

Mutual Understandings & Supports

Close Communications & corporations

Proper Motivation Policy

International experience

Civil Aviation
Future Planning Prospect of Flexible Use of Airspace in China

Increased Utilization of Temporary Routes

- Where necessary and possible
- Optimized design
- Flexible Use by purpose
- Integration with flight planning
Future Planning Prospect of Flexible Use of Airspace in China

Increased Utilization of Temporary Routes

- Daytime Temporary Route
- Nighttime Temporary Route
- Weekend Temporary Route
- Holiday Temporary Route
Future Planning Prospect of Flexible Use of Airspace in China

Mechanism of Information Sharing on Use of Temporary Routes

Integrated Information System

Airspace Users Data Sharing

Route Designator

Occupancy Time

Level Restriction

Other
Future Planning Prospect of Flexible Use of Airspace in China

Updated Concept of Airspace Use

- Vital Role in Airspace Optimization
- Single Route to Airspace Blocks
- PBN-based Technology
- Dynamic & Flexible Operation
- Free Flight Concept
Future Planning Prospect of Flexible Use of Airspace in China

PBN-based Flexible Operation

RNAV-Enroute
Future Planning Prospect of Flexible Use of Airspace in China

PBN-based Flexible Operation

RNAV-Terminal
Future Planning Prospect of Flexible Use of Airspace in China

PBN-based Flexible Operation

RNAV-Flight Procedure
Future Planning Prospect of Flexible Use of Airspace in China

- Flight Training
- Search & Rescue
- Low Altitude Airspace
- Air Traveling
- Aerial Photo
- Agricultural & Forest Operation
- Air Sports
Thanks!

Any Questions?