



Ministry of Land Infrastructure, Transport and Tourism
CIVIL AVATION BUREAU OF JAPAN



New Developments in ATFM/CDM Japan (NARAHG)

**Cross-Border ATFM Workshop
Bangkok, Thailand
17– 18 November 2015**



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History of Air Traffic Management in Japan

~ 1994
Tactical ATC

- Flow control restrictions as occasion demands were taken by ACCs to cope with air traffic congestion.
- No computer system to support proper judgment.
- Unnecessary delay and concentration of traffic in major airports.

1994 ~
ATFM Center

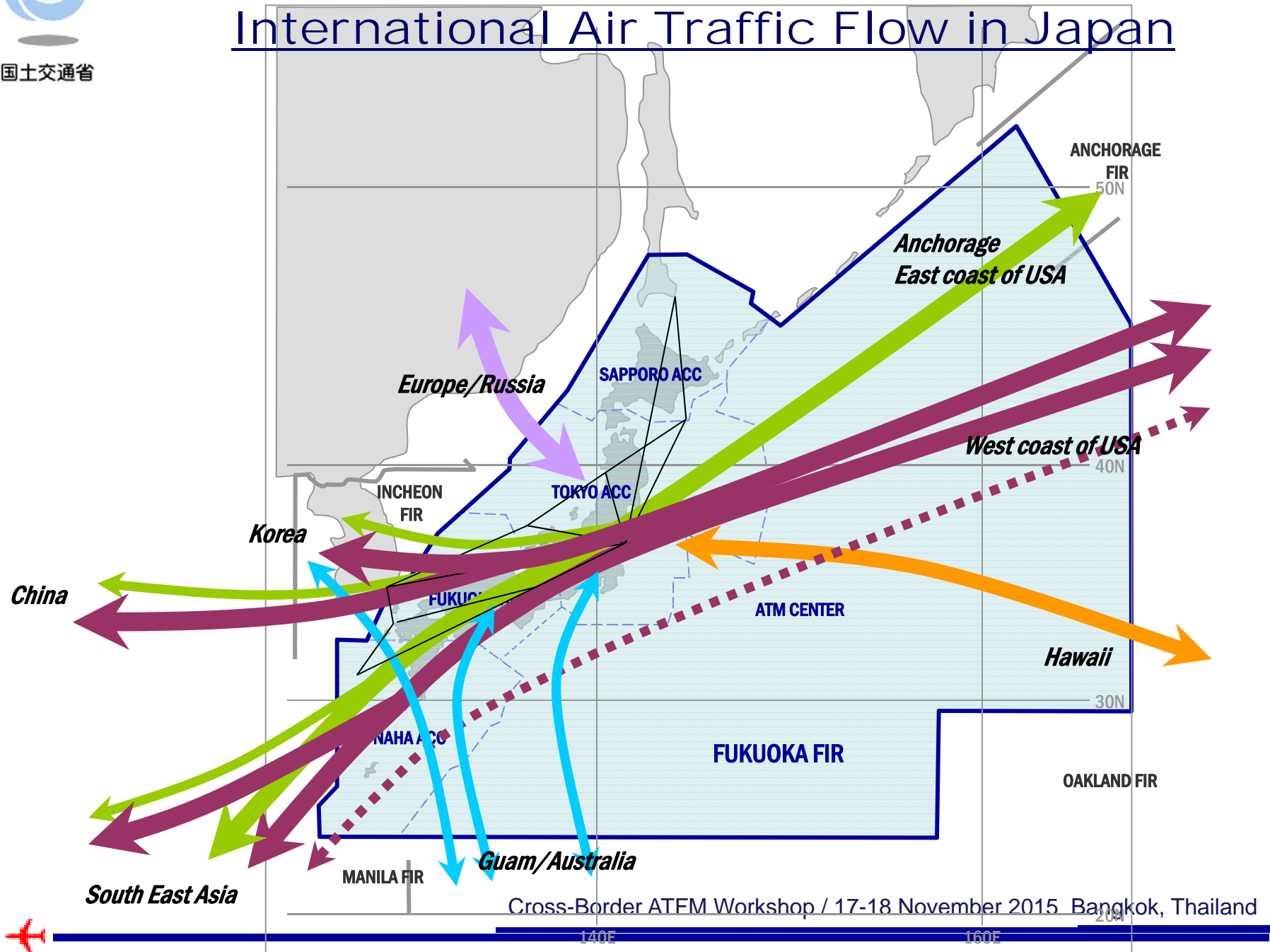
- The ATFM Center was established and began modern operation by introducing computer system. However, those function was quite limited. It was only providing air traffic flow management services.

2005 ~
ATM Center

- In order to respond to a further increase in air traffic volume, the ATFM Center was upgraded to the ATM Center by adding a full-scale ASM function and the oceanic ATM function. By tightly linking these three functions based on the concept of CDM, the ATM center developed a comprehensive ATM service.
- Tokyo and Naha FIR were integrated into Fukuoka FIR.



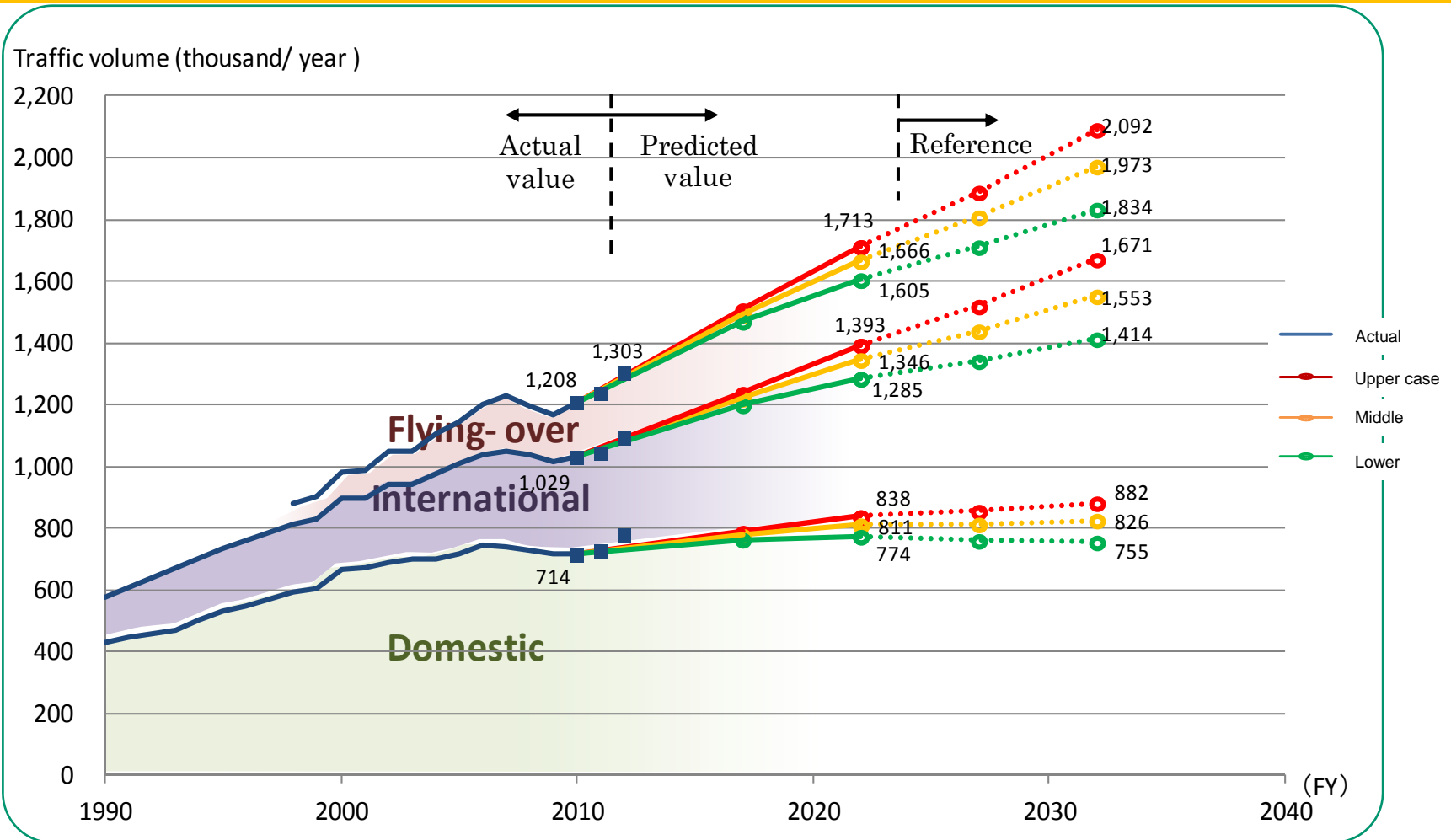
International Air Traffic Flow in Japan





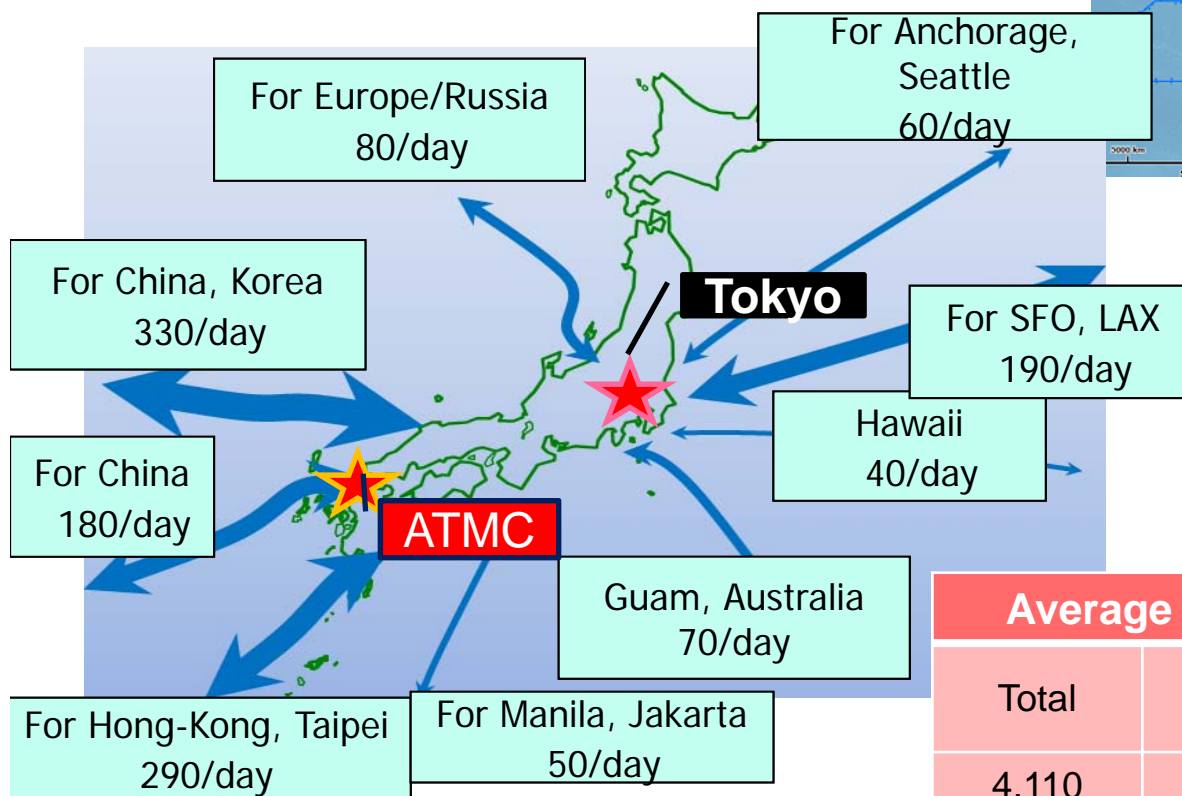
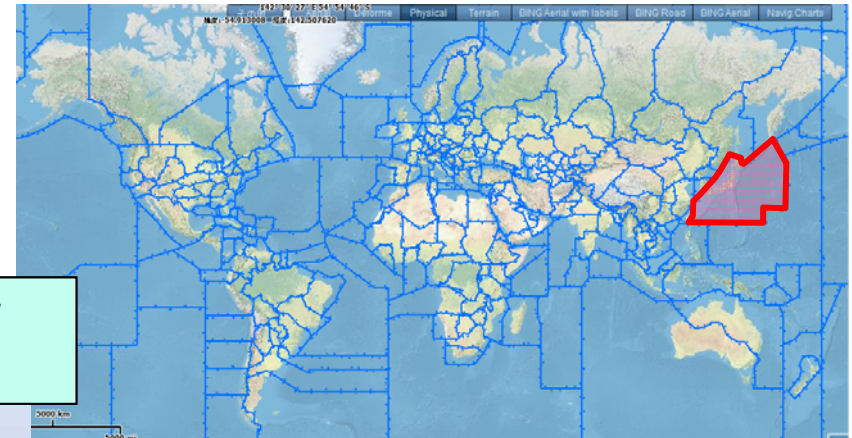
Traffic growth in Japan

- International flight and flying-over are increased. Domestic flight is dependent on the case of GDP.
- Even if GDP is estimated low, the number of aircrafts will exceed the limit of air traffic control capacity around 2025.
- The demand may go up rather than this forecast by further promotion of inbound tourism and the growth of LCC.



ATM and Traffic volume in Japan

- Location and Traffic Flow
- 1 FIR, 1 ATMC, 4 ACCs,



Average Flight counts per day	
RJTT (Haneda) airport	1060 (ARR & DEP)
RJAA (Narita) airport	570 (ARR & DEP)

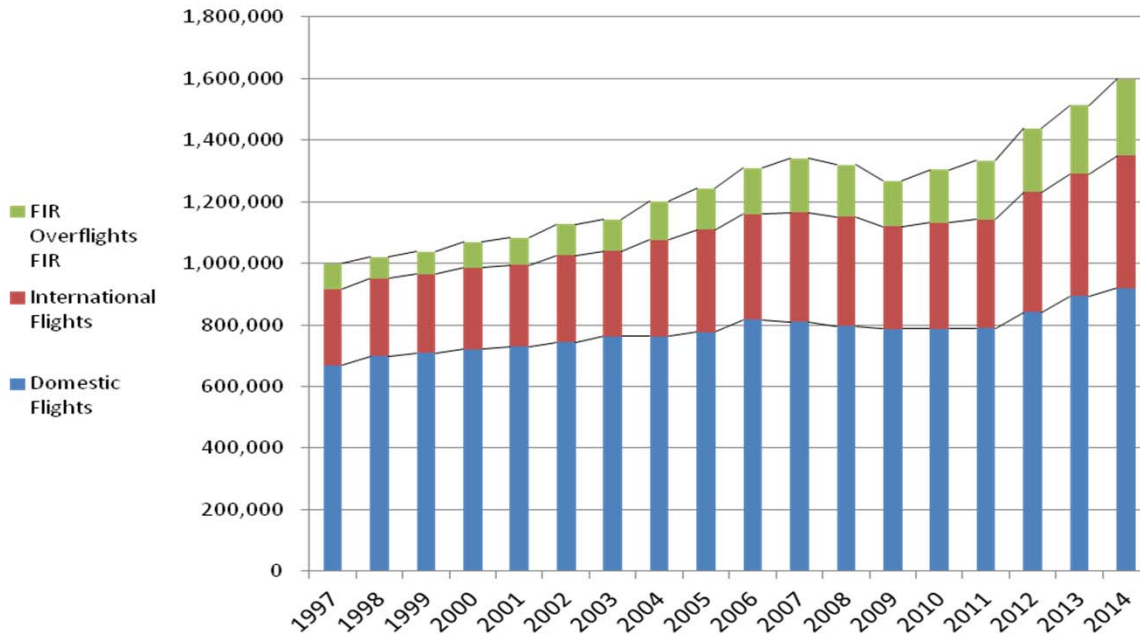
Average Flight counts per day (IFR only)			
Total	Domestic flight	International flight	Over flight
4,110	2,300	1,290	520



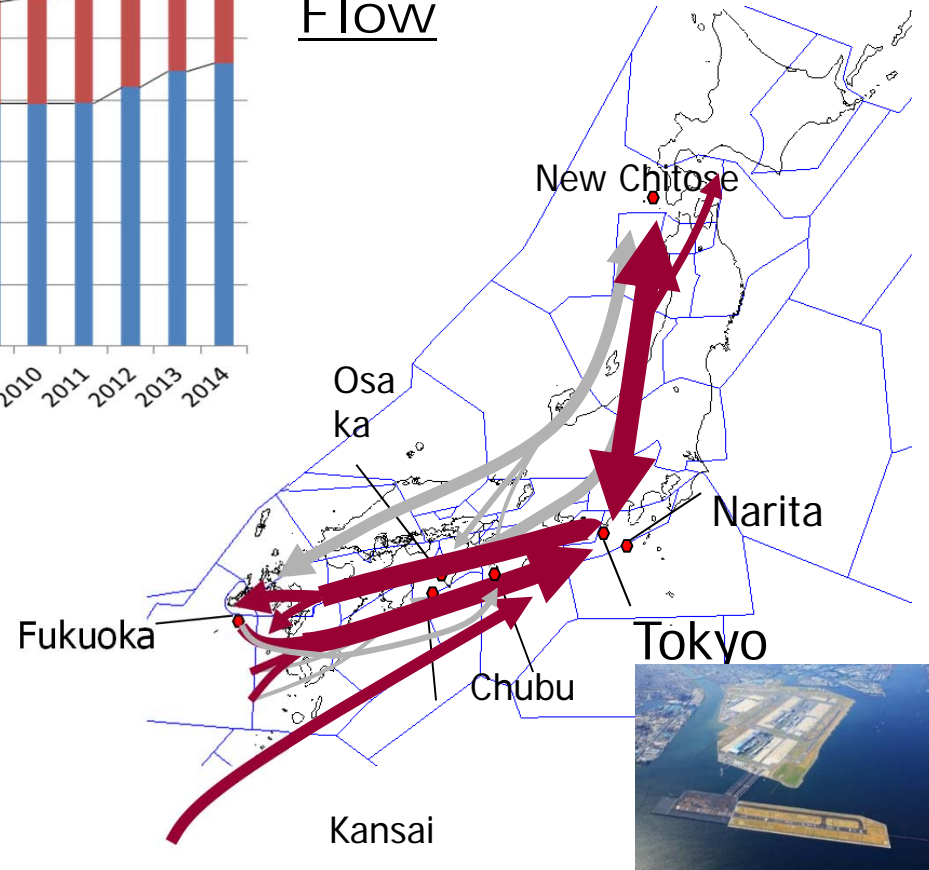


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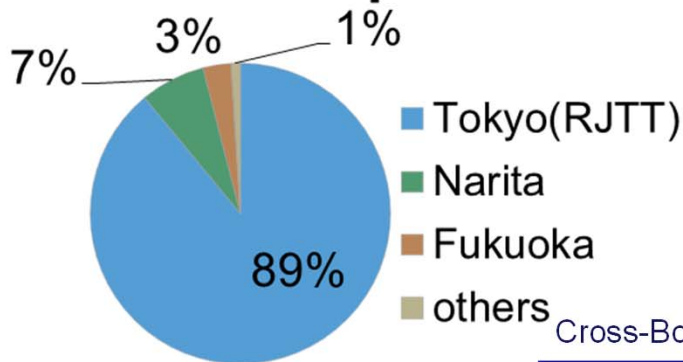
Air Traffic Volume Trend



Domestic Air Traffic Flow



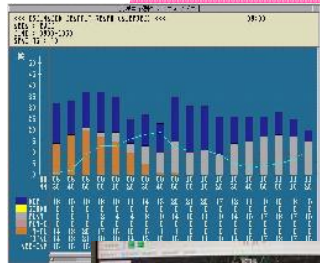
flow control initiatives for destination airports





ATFM and ASM

- ◆ Monitor of air traffic flow and volume
- ◆ Route coordination with aircraft operators
- ◆ Flow control






ATFM

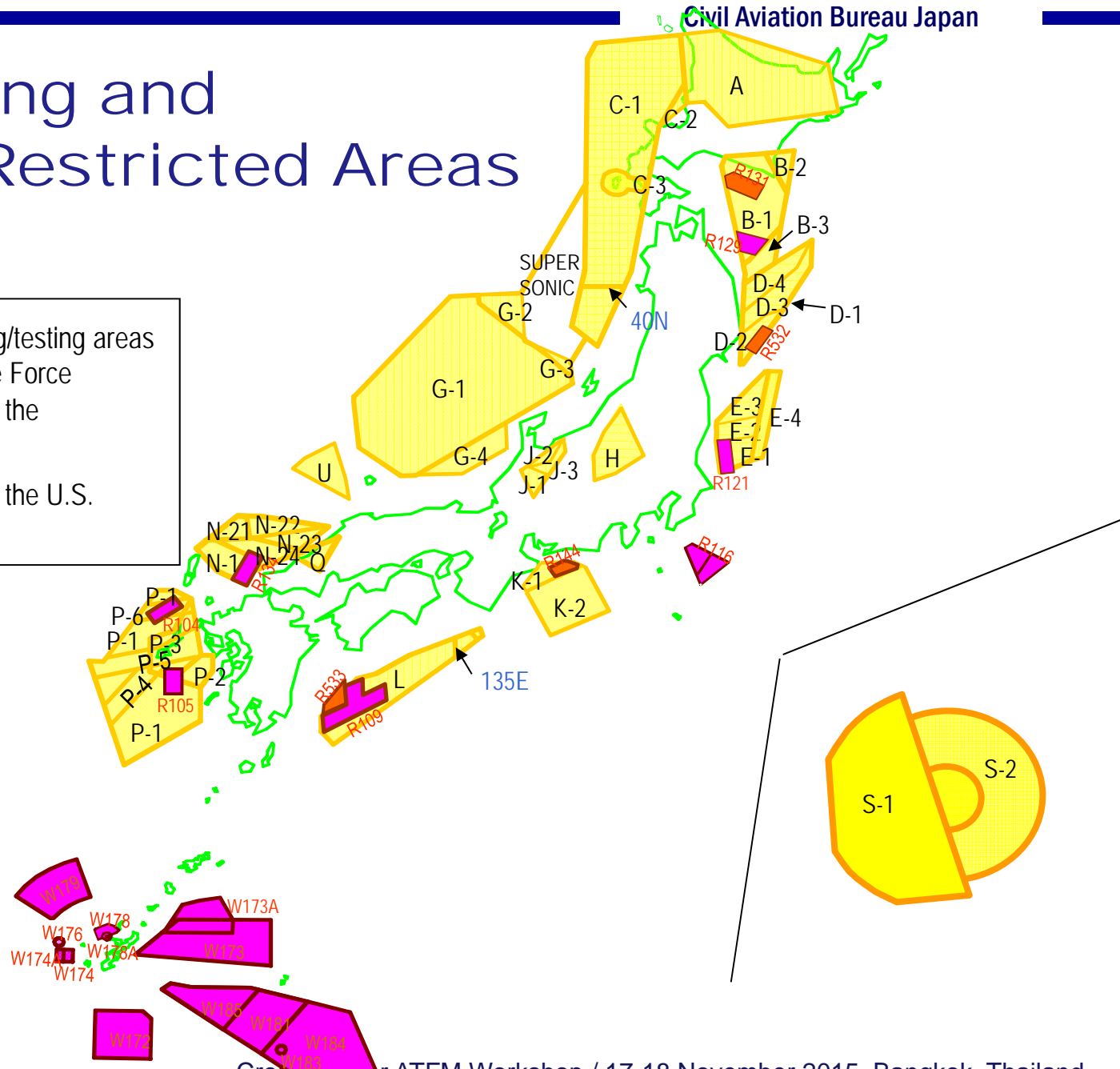
ASM

- ◆ Designing of airspace and airways
- ◆ Management of civil training and testing airspace
- ◆ Coordination with military for flexible use of airspace



Training and Restricted Areas

-  High altitude training/testing areas for the Self-Defense Force
-  Restricted areas for the Self-Defense's use
-  Restricted areas for the U.S. Force



Capacity Management

→ ATMC set Capacity-value by considering ATC workload.

■ SECTOR :

Direct assessment of ATC Workload
(“Time Summation” of ATC tasks)

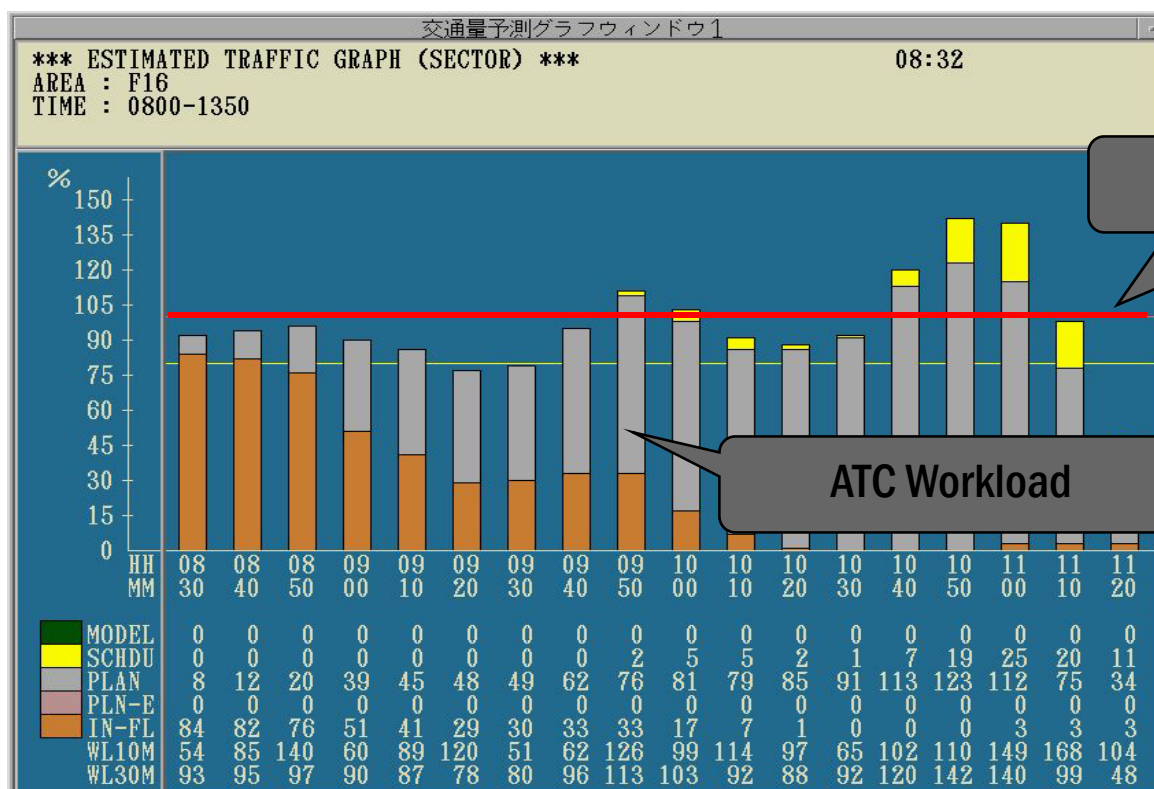
■ AIRPORT :

Direct assessment of Runway & Airspace capacity

Capacity Management

- Sector -

■ Acceptable Controllers work loads per 30min.



Time Summation

Controller's Workload vs. Time Frame of reference

Task analysis on each sector

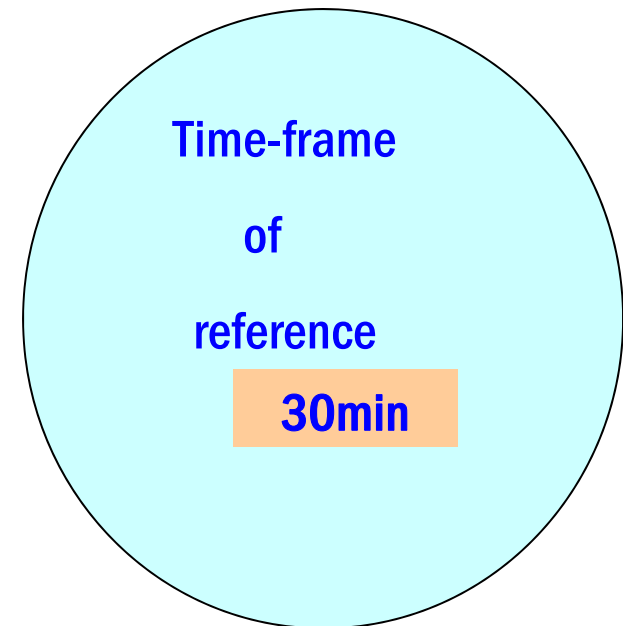
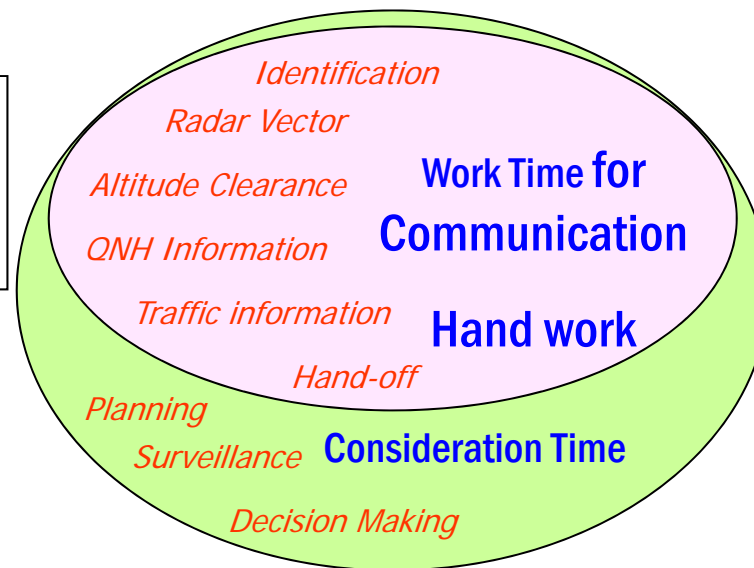
- required time for each separate task
- frequency of occurrence regarding each task
- aircraft's flight time of the sector



Definition
of
Workload Value



Adaptation
to
actual flight
plan

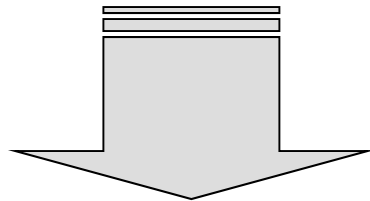


Coefficient of Controller's Workload

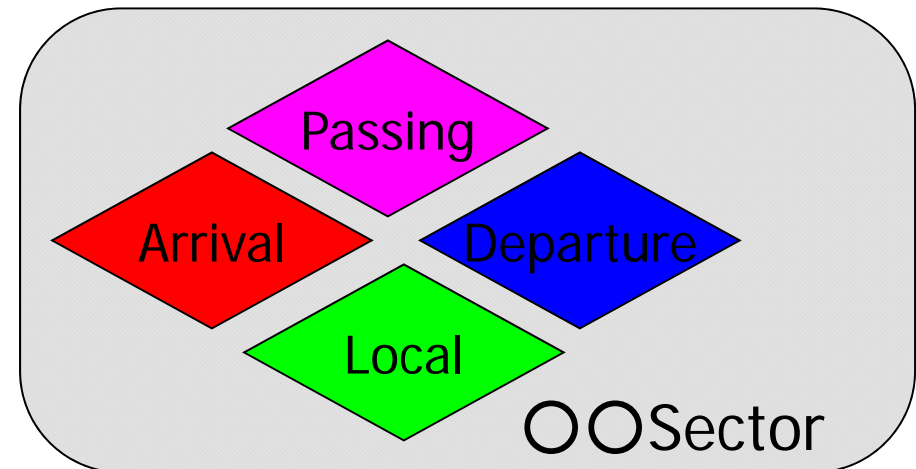
→ Calculation of Coefficient

$$\text{Coefficient of Controller's Workload} = \frac{\text{Average Controller's Workload}}{\text{Average Staying Time}}$$

(A unit value per minute)



Established on every flight type in each sector



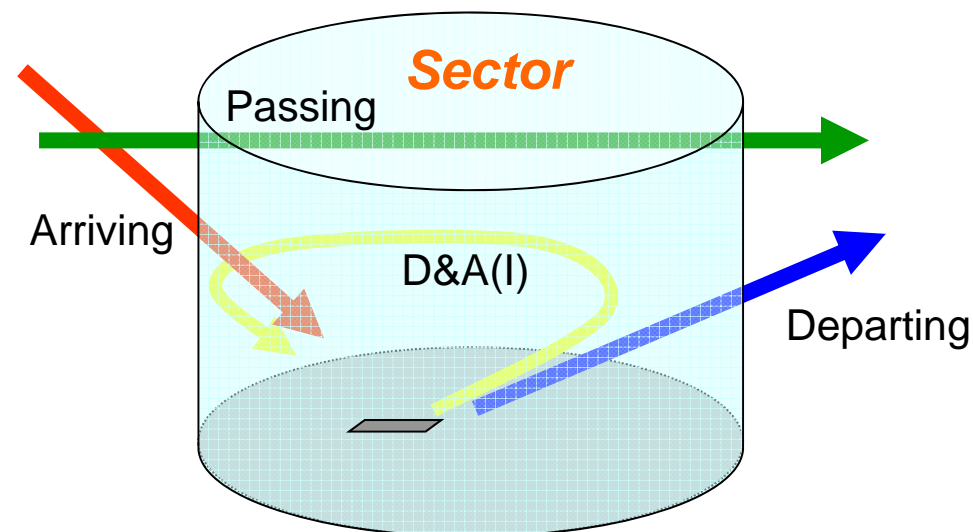
Operationally weighted workload

- Workload is valued according to:
 - Sector Characteristics
 - Flight Type Characteristics

Factors of Sector Characteristics

Airspace Structure	
-Size	
-Form (Relation to other airspace)	
Airspace Complexity	
-Airways, Routes, Intersections	
-Traffic Flow concerning Airports	
Ratio of Flight Types	etc.

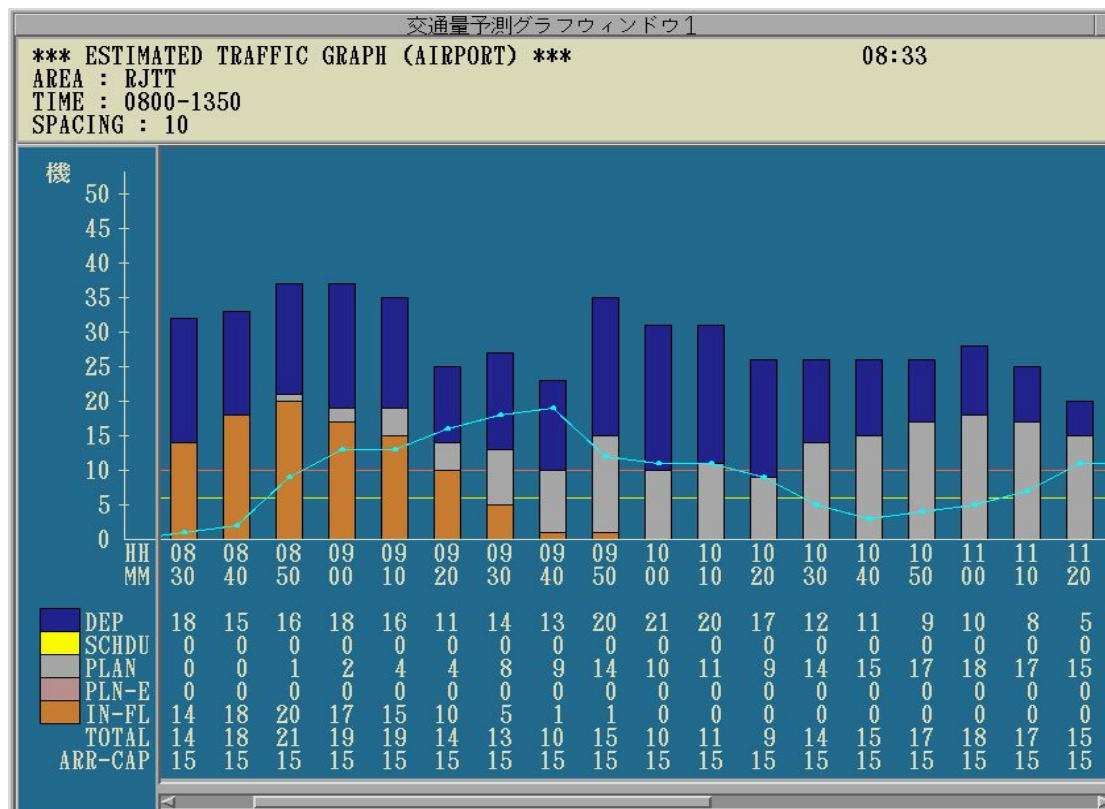
Flight Type Characteristics



Workload not equal to the number of traffic

Capacity Management - Airport -

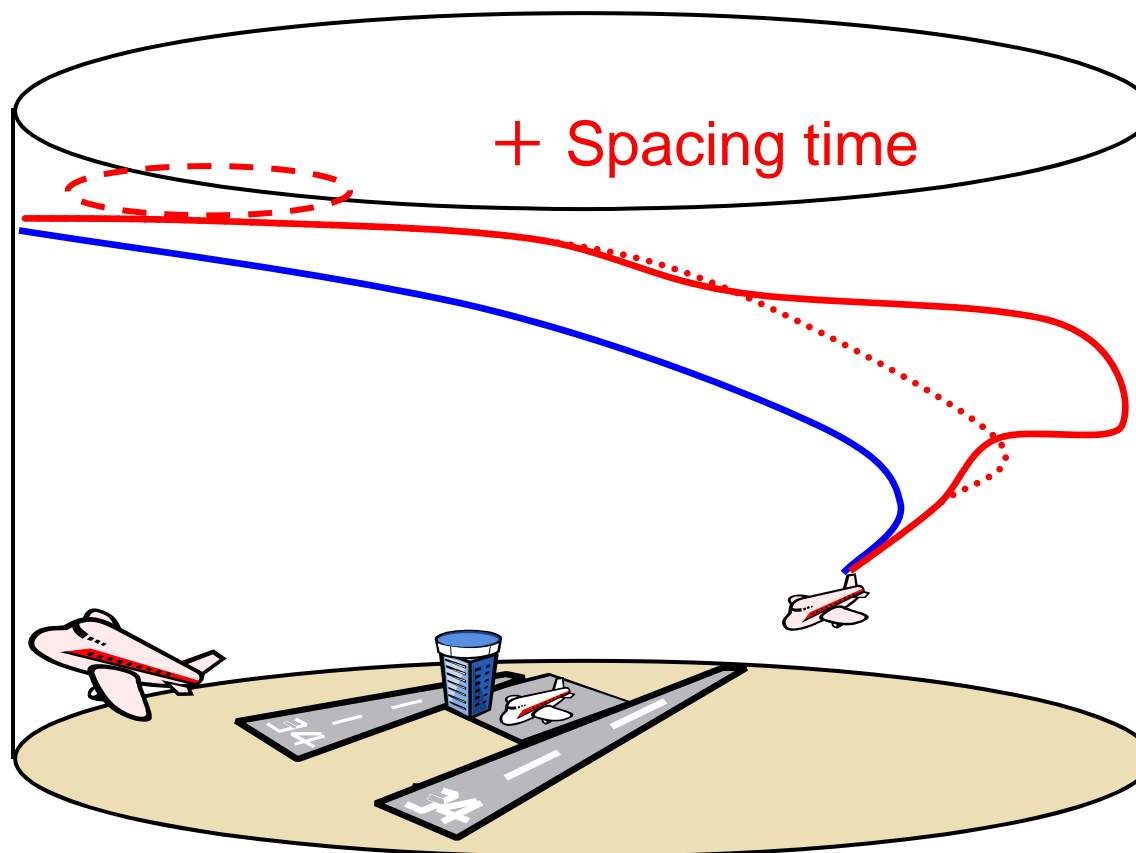
- Acceptable Number of aircraft per 30min, and
- Acceptable spacing time in ACA per 10min.



Capacity Management - Airport -

Runway Cap : 15 per 30min
Airspace Cap: 10min

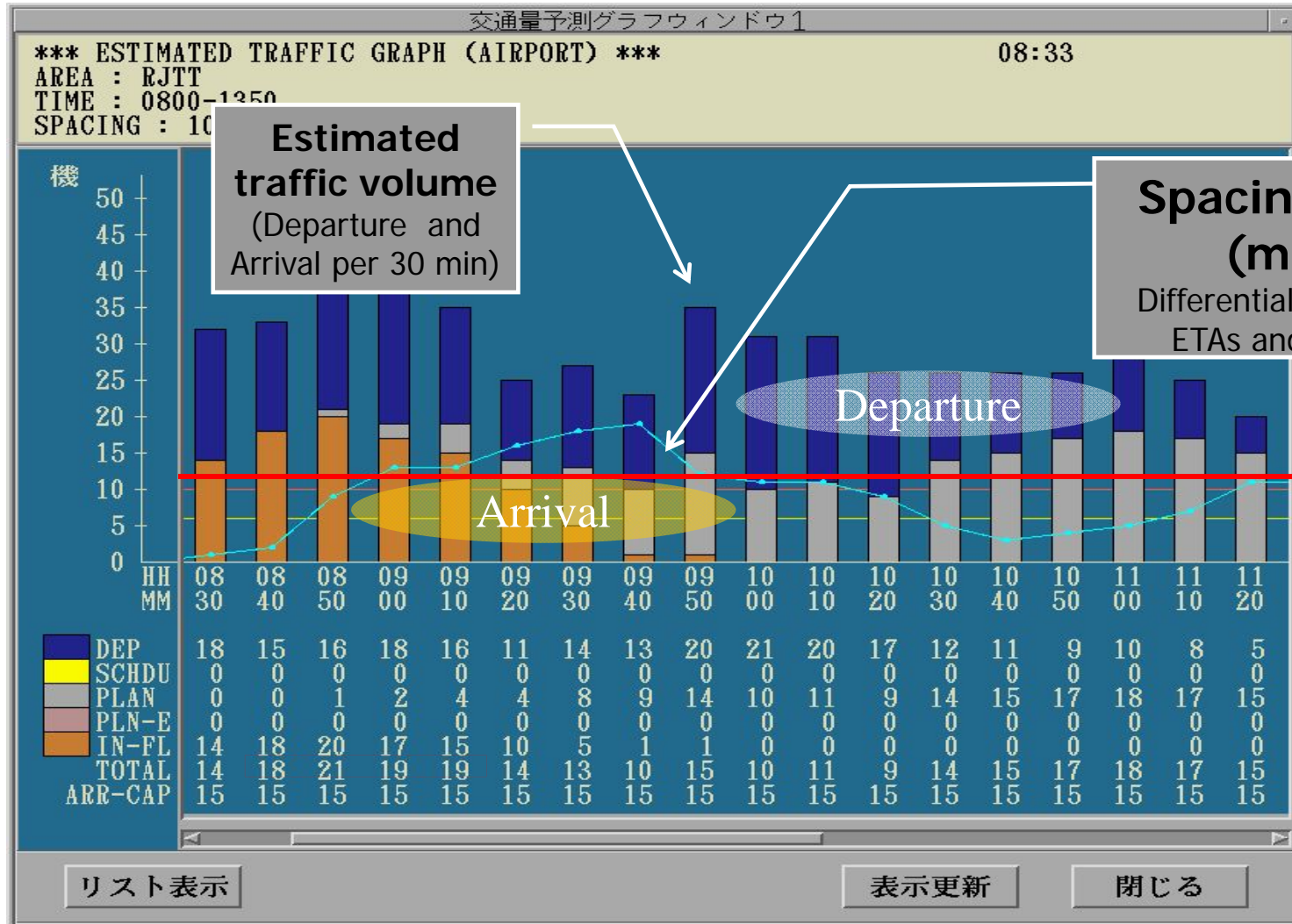
Airport Capacity evaluation



	ETA	ELDG	SPCE
1	1200	1200	0
2	1200	1202	2
3	1201	1204	3
4	1201	1206	5
5	1202	1208	6
6	1202	1210	8
7	1202	1212	10
8	1203	1214	11
9	1204	1216	12
10	1204	1218	14
11	1214	1220	6



Flow Control - Airport -

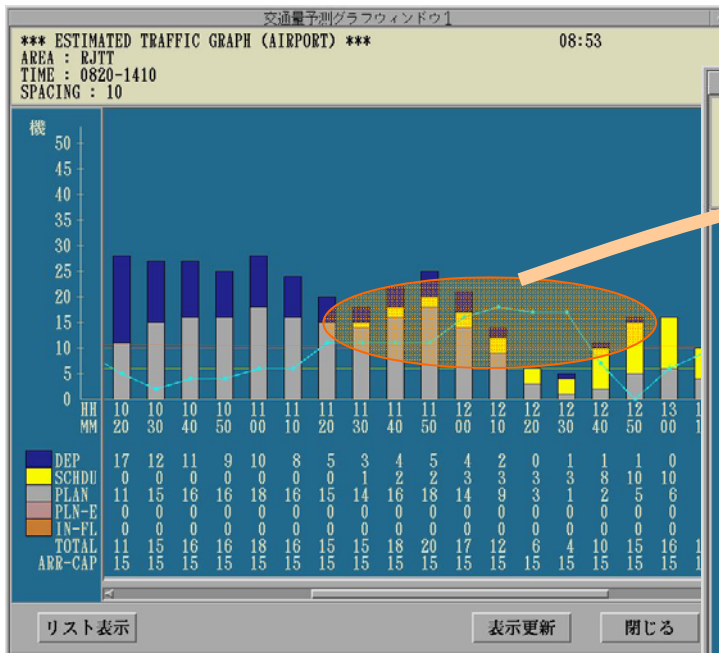




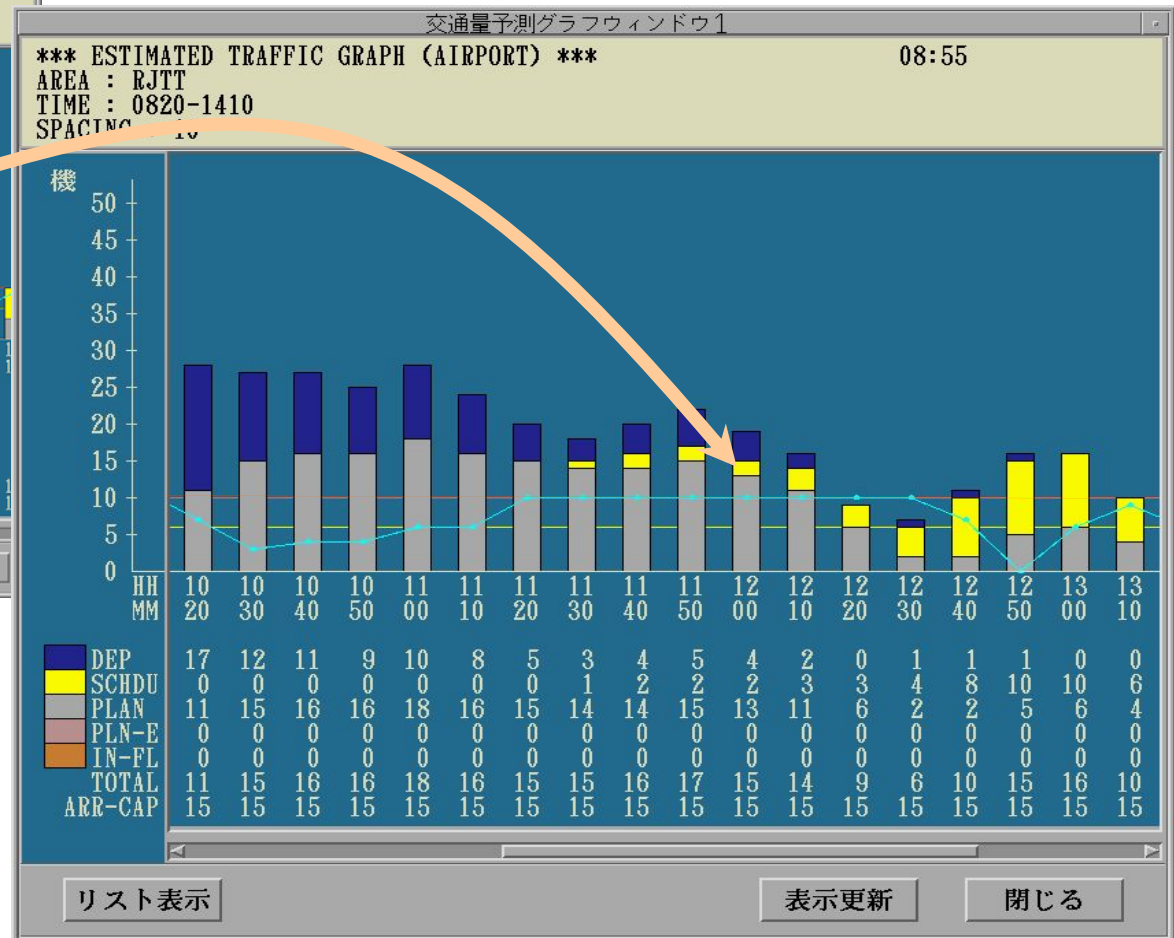
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Flow Control - Airport -

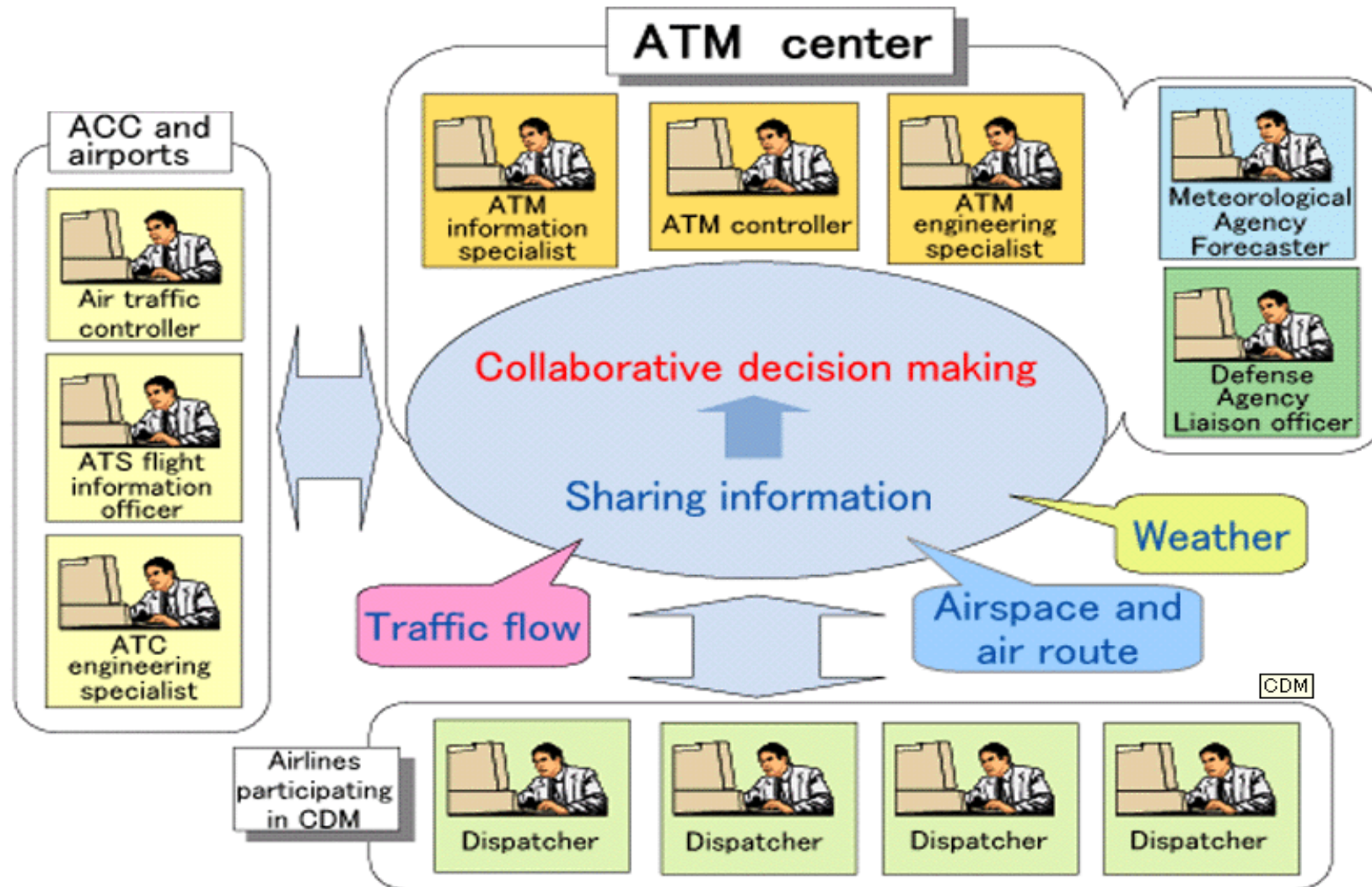
After flow control



Before flow control



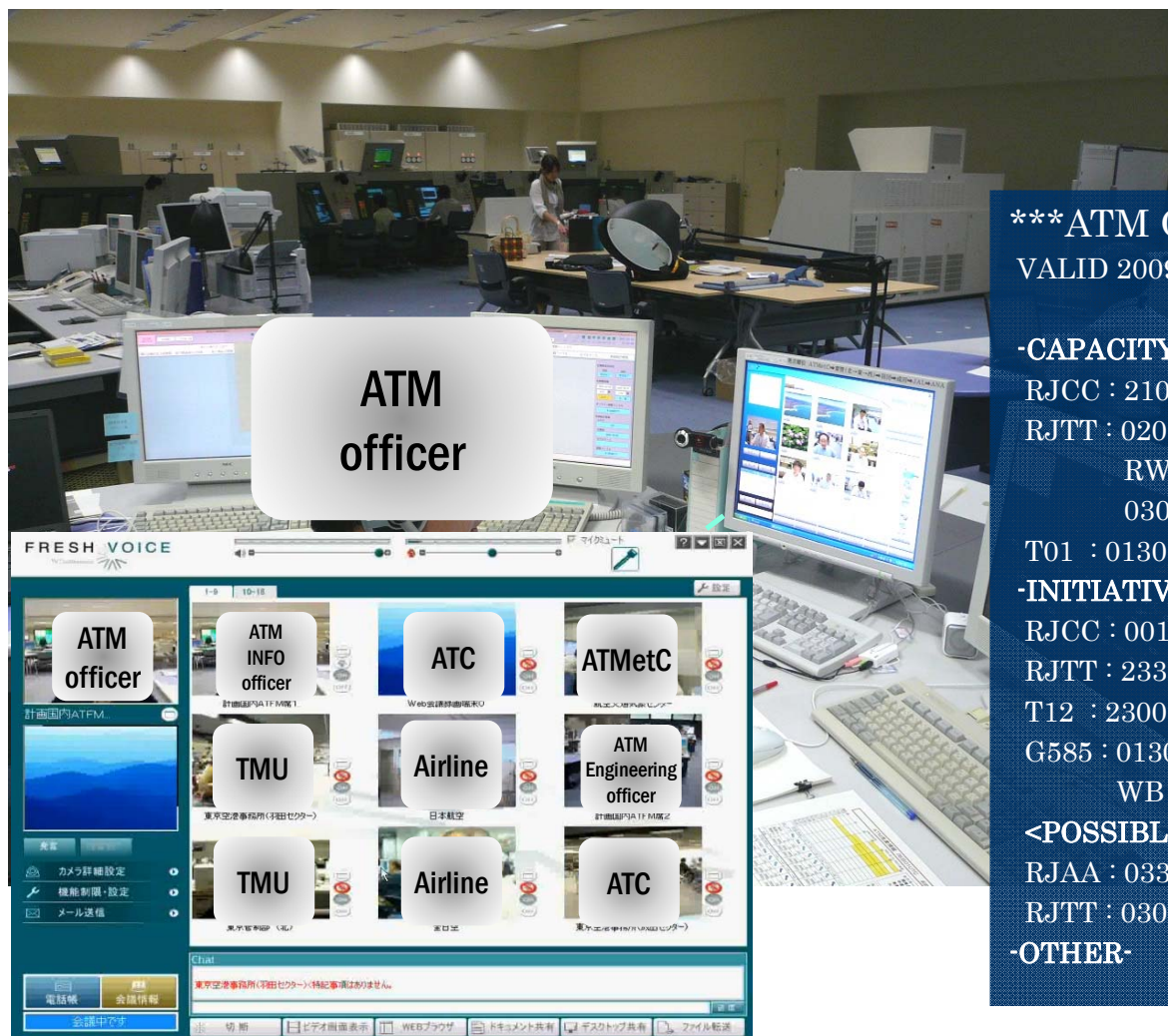
Collaborative Decision Making





CDM Web Conference

【ATFM DAILY PLAN】



*****ATM OPERATIONS PLAN*****
 VALID 2009/0701/2345 THRU 0545

-CAPACITY(CAPA) & CONSTRAINTS-
 RJCC : 2100-0300 CAPA=04-06Δ LOW VIS
 RJTT : 0200-0300 CAPA=10
 RWY 34L/16R CLSD (0200-0245 CONST)
 0300-//// CAPA=14 FLTCK (ILS RWY22)
 T01 : 0130-//// CAPA=92-97 DEV (CB)

-INITIATIVE-
 RJCC : 0010-0150 5MINIT DEP FM RJTT
 RJTT : 2330-0140 EDCT
 T12 : 2300-0005 3MINIT DEP FM RJAA/RJTT
 G585 : 0130-UFN 8MINIT @ SAPRA RGDLS OF ALT
 WB FOR MONGOLIA, RUSSIA, EUROPE

<POSSIBLE>
 RJAA : 0330-0500 15MIT, 250KT @ MELON, MAMAS
 RJTT : 0300-//// EDCT

-OTHER-

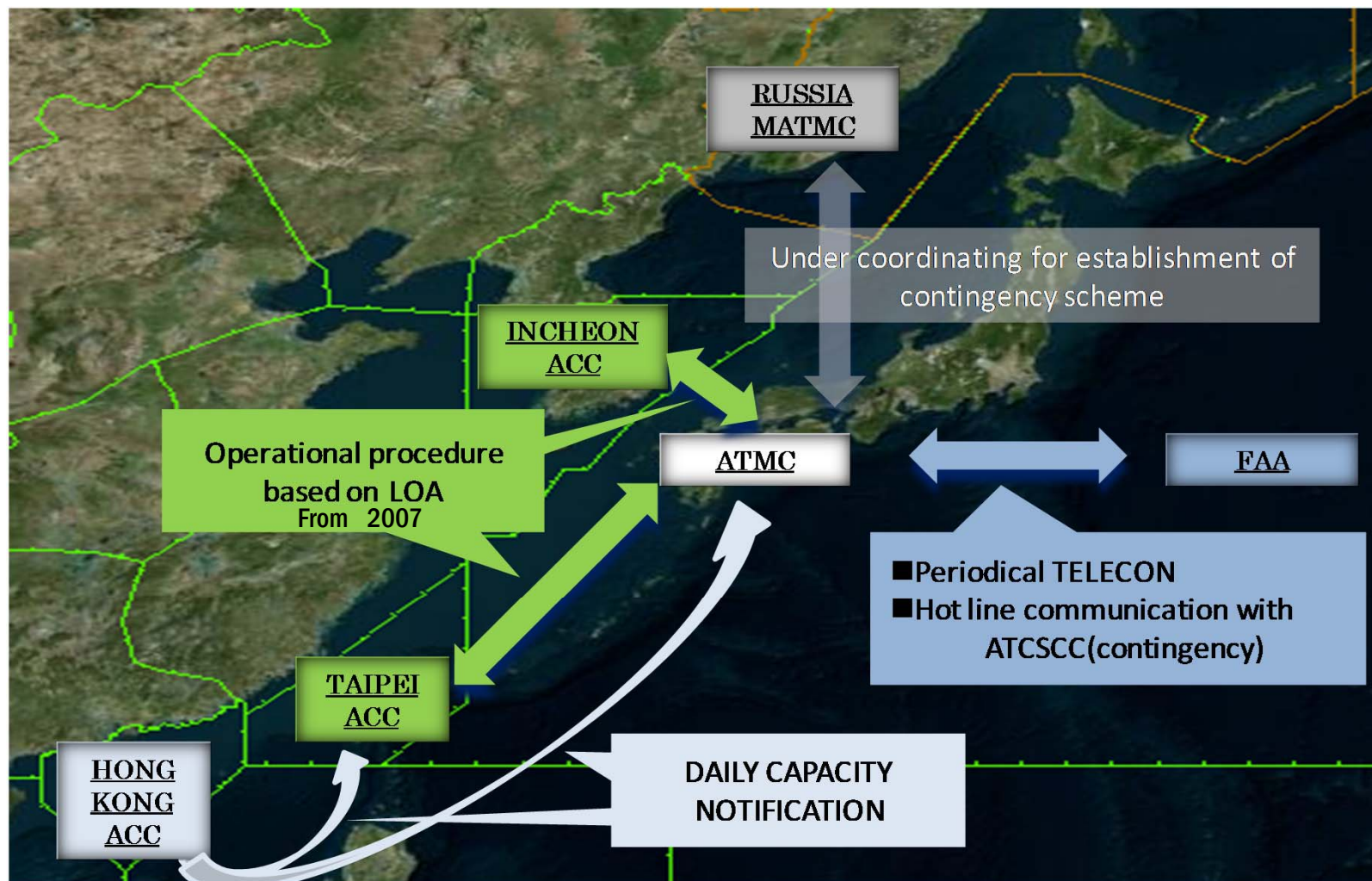
Participants: ATMC, ATC facilities, Airlines, Meteorological agency

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Relationship with neighboring FIR



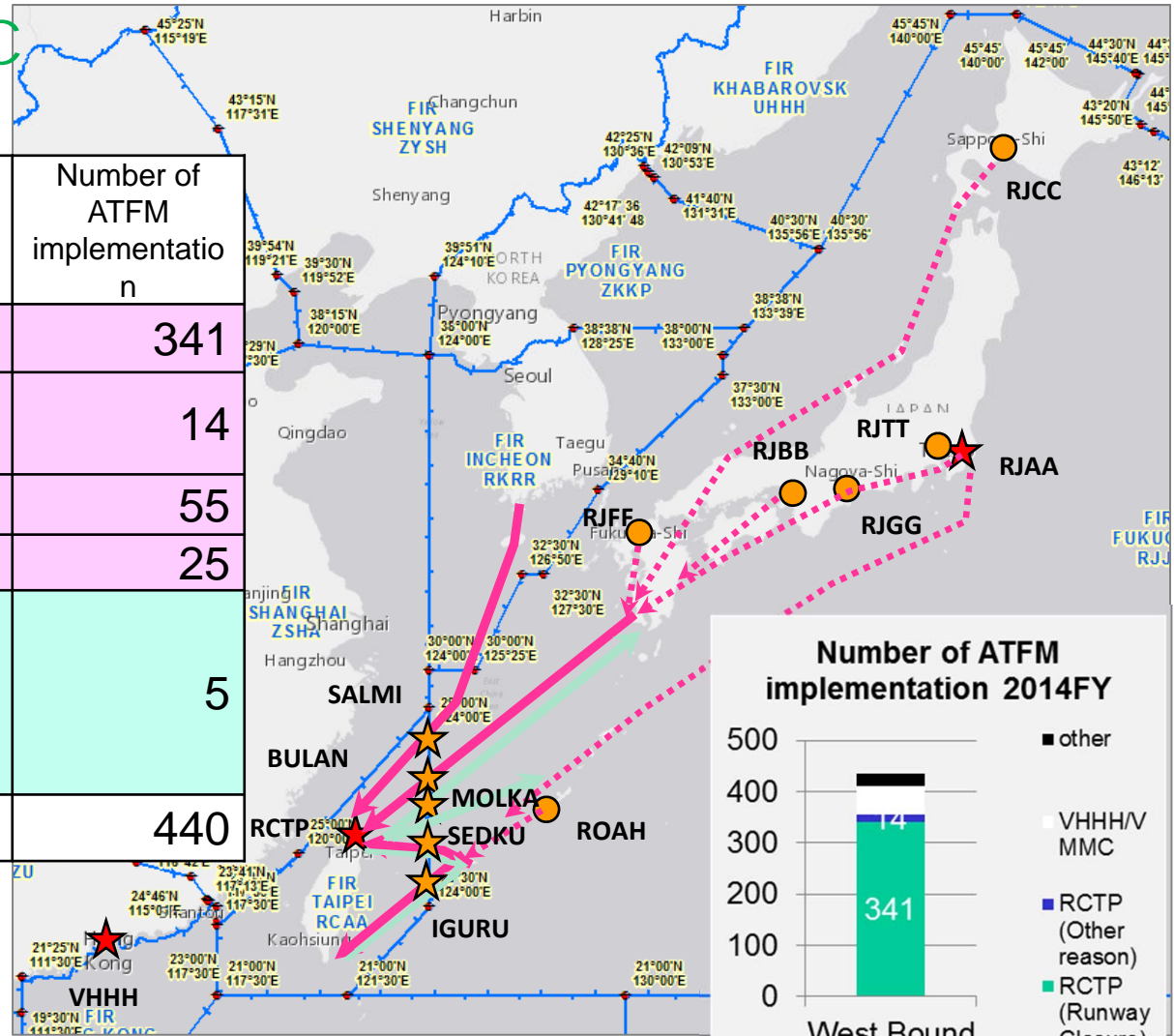


Recent achievements of International ATFM

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Japan – Taipei ACC (2014 FY)

Direction and FIR BDY :Airway	Target	Number of ATFM implementation
West bound at FIR BDY BULAN:A1, SALMI: B576 IGURU:G581 SEDKU:R595	For RCTP (RWY construction)	341
	For RCTP (WX and other reason)	14
	For VHHH/MMC	55
	For RPLL VTBS etc.	25
East bound at FIR BDY MOLKA :M750 IGURU :G581 BORDO :R583 SEDKU:R595	For RJAA/RJTT	5
Total		440

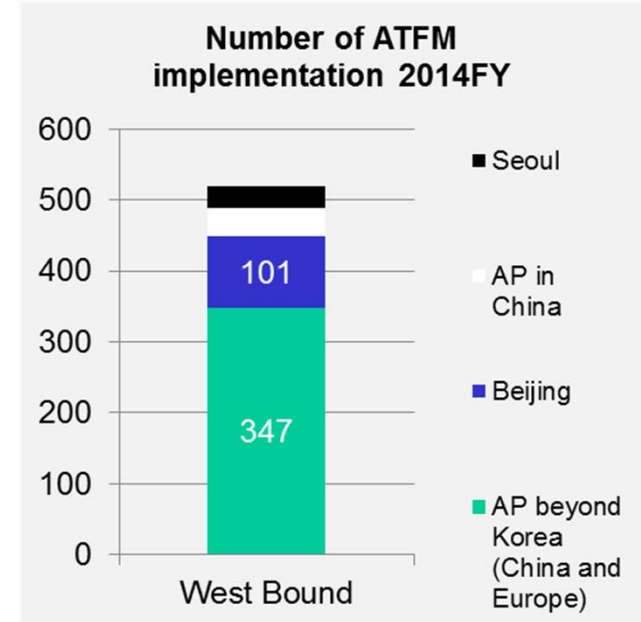
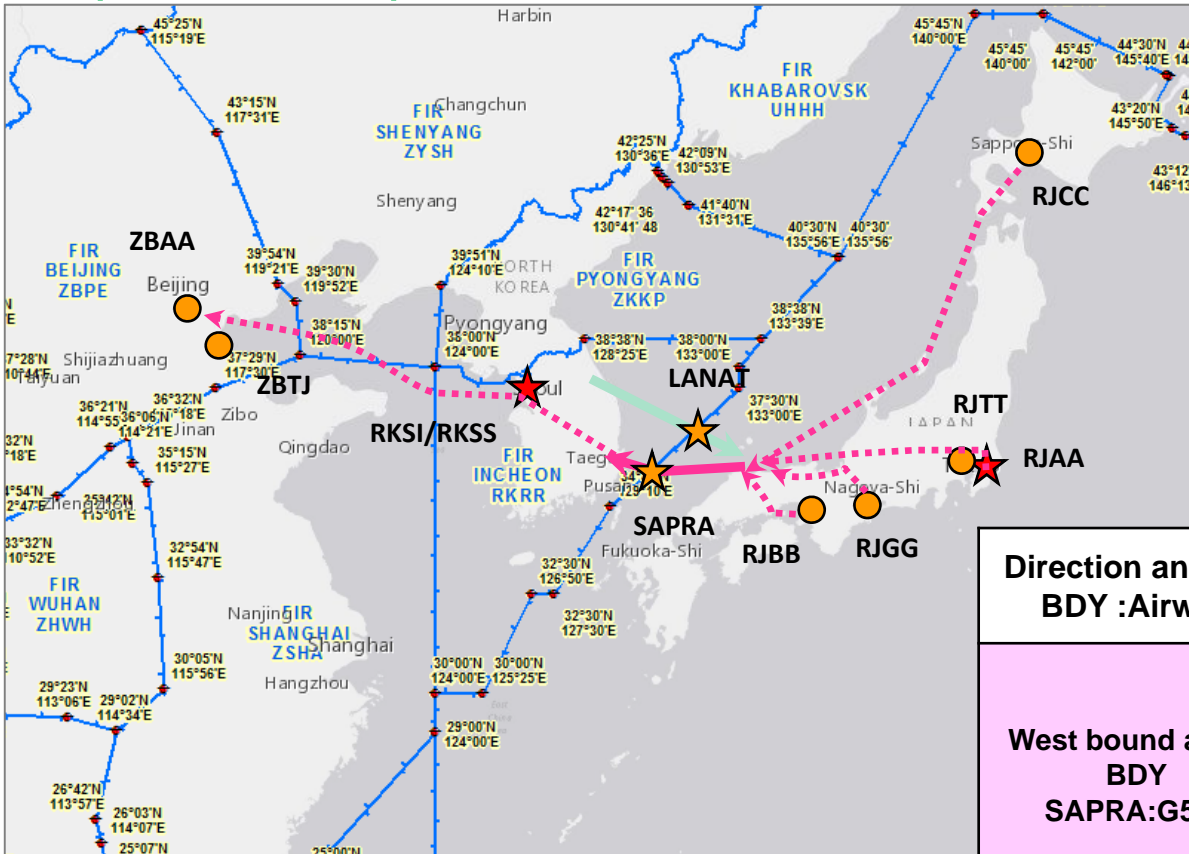




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Recent achievements of International ATFM

Japan – Republic of Korea (2014 FY)

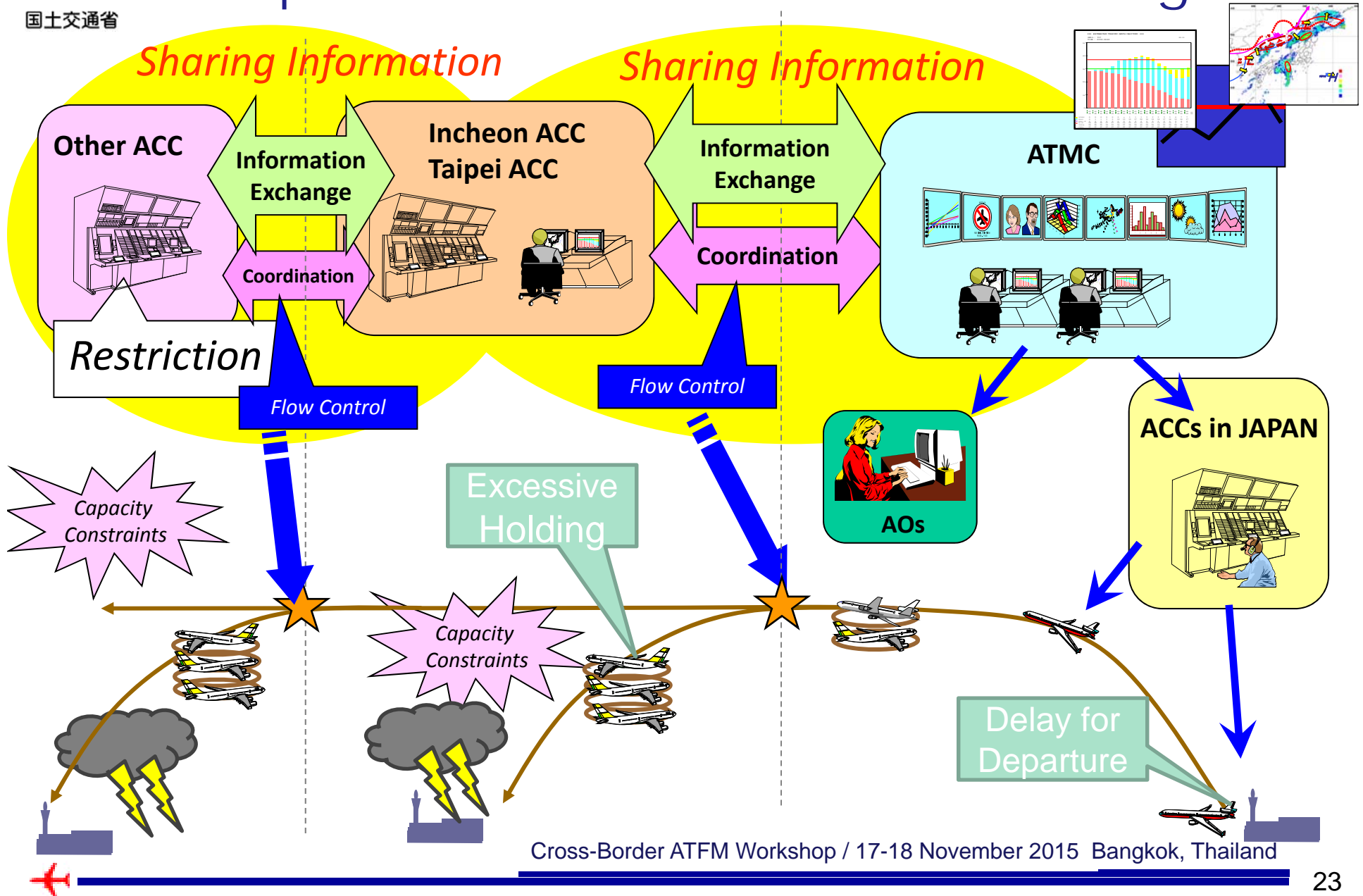


Direction and FIR BDY :Airway	Target	Number of ATFM implementation
West bound at FIR BDY SAPRA:G585	For RKSI/RKSS	31
	For AP beyond Korea	347
	For ZBAA	101
	For AP in China	40
East bound at FIR BDY LANAT:G597	For RJAA/RJTT	2
Total		521

Cross-Border ATFM

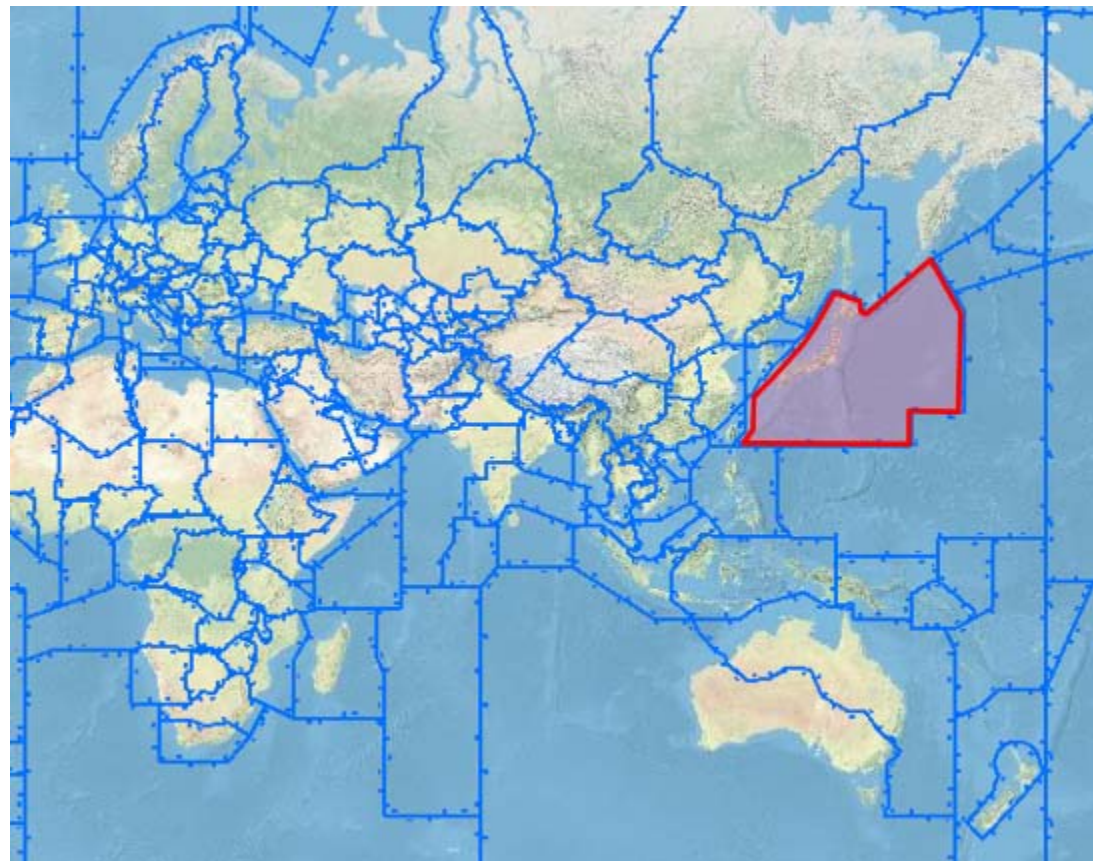


Importance of information sharing



Environment of Asia region

- difference of ATC environment
- difference of ATFM environment
- difference of information sharing scheme
- variety of FIR size

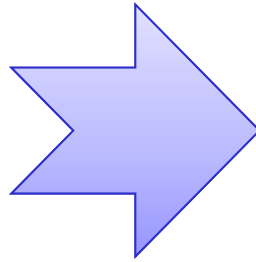


For the future Multi-nodal Flow Management

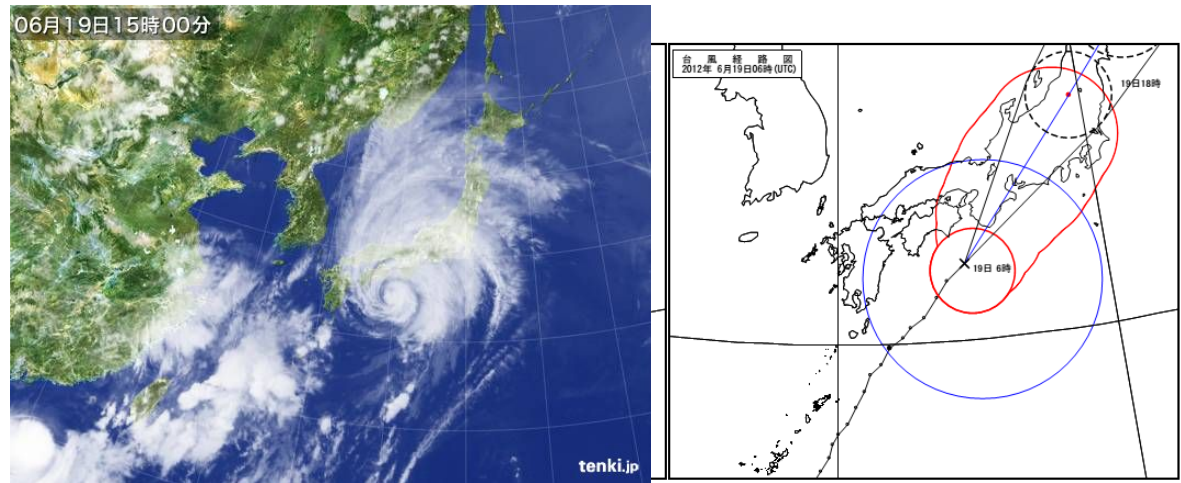
Cross Border ATFM needs,

Reason of constrains

- ✓ *How long does it continue?*
- ✓ *How much does it affect on air traffic?*



Advanced Information exchange among ANSPs





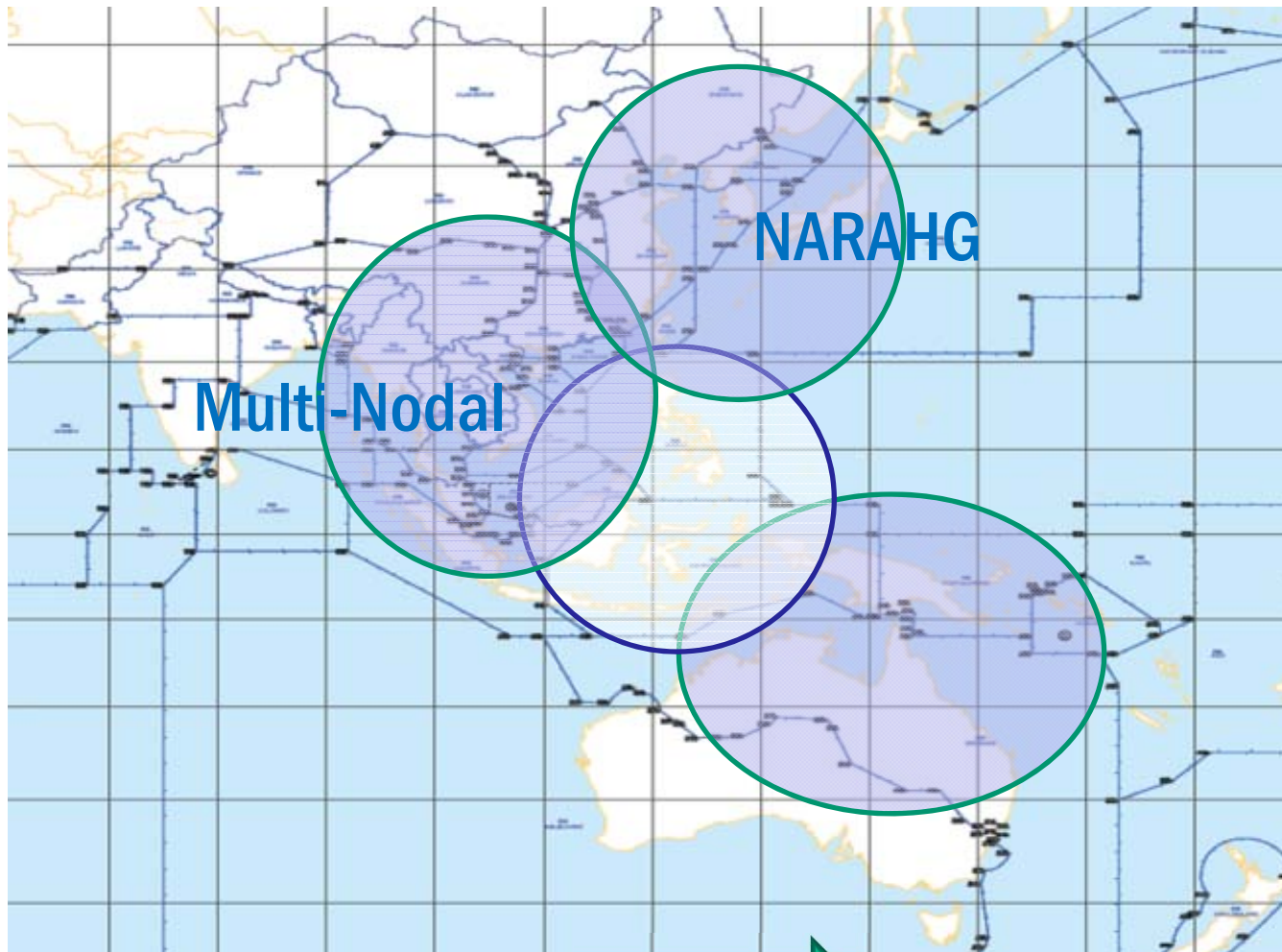
Establishment of NARAHG

Northeast Asia Regional ATFM Harmonization Group (NARAHG)

- Triggered by ICAO APAC Regional Sub Office
- Established in 2014 by ANSPs of Japan, ROK and China as founding members
- Focus primarily on harmonization of ATFM/CDM in the region
- Work in collaboration with ICAO APAC ATFM Steering Group
- Held two meetings so far (NARAHG/1 in Beijing, NARAHG/2 in Fukuoka and NARAHG/3 in Shanghai).



Sub-Regional ATFM Coordination in APAC



Sub-Regional ATFM



Regional ATFM



Thank you