International Civil Aviation Organization

The First Meeting of the Asia/Pacific Air Traffic Flow Management Steering Group (ATFMSG/1)

Tokyo, Japan, 8 – 10 December 2010

Agenda Item 3: Review of Relevant Information/Meetings

AIR TRAFFIC FLOW MANAGEMENT (ATFM) SURVEY FOR ASIA/PACIFIC

(Presented by the Secretariat)

SUMMARY

The Asia/Pacific ATFM survey was conducted from March to April 2010. This paper presents the result of the survey.

This paper relates to:

Strategic Objectives:

A: Safety – Enhance global civil aviation safety

C: Environmental Protection – Minimize the adverse effect of global civil aviation on the environment

Global Plan Initiatives:

GPI-1 Flexible use of airspace

GPI-6 Air Traffic Flow Management

GPI-16 Decision support and alerting systems

1. INTRODUCTION

1.1 In light of the regional increase of ATFM activities and in response to the provisions of ICAO Global Plan Initiative (GPI)- 6 *Air Traffic Flow Management*, the 18th Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/18, September 2007) adopted Conclusion 18/7 for the conduct of a regional ATFM Seminar in 2008. Japan Civil Aviation Bureau hosted the seminar/workshop in October 2008 at Fukuoka in Japan.

2. DISCUSSION

2.1 The outputs of the ATFM Seminar/Workshop were presented to APANPIRG/20 as a series of six outcomes and five recommendations, and, based on these, the meeting adopted the following Conclusions:

Conclusion 20/11 – ATFM Steering Group and Concept of Operations

That a regional ATFM Steering Group be constituted and tasked with preparing an Asia/Pacific Regional ATFM Concept of Operations based on analysis of regional data and traffic flows. The ATFM Steering Group should consider the outcomes and recommendations from the October 2008 ATFM Seminar/Workshop (Fukuoka, Japan) and information about the CAR/SAM ATFM Project contained in IP/3 to APANPIRG/20 as guidance in deriving its Objectives and Terms of Reference.

2.2 The meeting recognized the importance of providing information about the current status of ATFM in the region to the ATFM Steering Group, and agreed to utilize the ATFM Survey Questionnaire that had been prepared by the ATM/AIS/SAR and the CNS/MET Sub-Groups based on the information from the Caribbean (CAR)/South America (SAM) ATFM Project. APANPIRG/20 formulated the following Conclusion:

Conclusion 20/13 – Conduct Regional ATFM Survey

That a survey of Asia/Pacific States be conducted based on the questionnaire at Appendix C to the APANPIRG/20 Report on Agenda Item 3.2, with the objective of benchmarking the current status of Air Traffic Flow Management (ATFM) activities in the Asia/Pacific Region.

2.3 The Asia/Pacific ATFM survey was conducted from March to April 2010 and the Regional Office has received responses from 15 States, i.e. Australia, Hong Kong China, Macau China, Fiji, India, Japan, Malaysia, Mongolia, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Thailand and the United States. The result of the survey has been complied as **Attachment A** hereto.

3 ACTION BY THE MEETING

3.1 The meeting is invited to:

a) review the result of ATFM survey conducted in March and April 2009 as in Attachment; and

b) identify any problems from the survey and analyze the result with the objective of benchmarking the current status of ATFM in the region; and

……

Note: Section/paragraph numbers below are identical with those of the survey.

2. Airport Capacity

2.1 Does your administration (and/or State) currently have a method, whether basic or complex, for calculating airport capacity?

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China		X
Fiji		X
India	X	
Japan	X	
Malaysia		X
Mongolia		X
New Zealand	X	
Pakistan		X
Philippines		X
Republic of Korea	X	
Singapore	X	
Thailand	X	
United States	X	
15	9	6

2.2 If yes, please provide any available airport capacity data for your main airports in the following table.

Total Capacity = Airport Acceptance Rate (AAR) + Airport Departure Rate (ADR).

AUSTRALIA

Airport Name	Runway configuration	Airport Acceptance Rate (AAR) VMC	IMC	ILS	Airport Departure Rate (ADR)	Total Capacity
Brisbane	01	25	25	22		
	01 Fog	00	00	12		
	01 Departure (D) and 01-14 Arrival (A)	32	22	00		
	01 D and 01-32 A	32	22	00		
	01 D and 19 A	10	10	10		
	14	18	15	00		
	19	25	25	22		
	19 Fog	00	00	12		
	19 D and 19-14 A	34	22	00		
	32	18	00	00		

Airport Name	Runway configuration	Airport Acceptance Rate (AAR) VMC	IMC	ILS	Airport Departure Rate (ADR)	Total Capacity
Sydney	07	24	24	24		
	16L -16R	46	38 (42,PRM)	34		
	16 D and 07 A	26	26	26		
	16 D and 25 A	28	28	28		
	25	24	24	24		
	25-34R D and 34L 34R A	34	34	34		
	25 D and 34 A	34	34	34		
	34L – 34R	50	44 (46,PRM)	38		
	Curfew	10	10	10		
	SODPROPS 34L A and 34L D(non Jet) 16L D (Jet)	24	00	00		
Melbourne	09	22	20	00		
	09 D and 34 A LAHSO	40	00	00		
	16	25	22	22		
	16 A and 27 D	27	25	22		
	27	25	22	22		
	27 D and 34 A LAHSO	42	00	00		
	34	25	24	00		
	DEDRAT (34 D and 27 A/D)	20	20	20		
Perth	03	24	20	20		
	06	16	13	13		
	21	24	20	20		
	24	16	13	13		
	24D and 21- 24 A	26	20	20		

Notes:

- The Airport Acceptance Rates are for Major Capital Cities only and are under review.
- Departures are not included in the figure provided.
- Land and Hold Short Operations (LAHSO)
- Precision Runway Monitoring (PRM)

HONG KONG, CHINA

Airport Name	Runway configuration	Airport Acceptance Rate (AAR) VFR	MVFR	IFR	Airport Departure Rate (ADR)	Total Capacity
Hong Kong Int'l Airport (VHHH)	Segregated, independent parallel			32	32	59*

Comments
* declared total capacity for scheduling purpose = 59/hr between 0830 and 2359L

INDIA

Airport Name	Runway configuration	Airport Acceptance Rate (AAR) VFR	MVFR	IFR	Airport Departure Rate (ADR)	Total Capacity
Delhi	09/24, 10/28, 11/29			30	25	55
Mumbai	09/27, 14/32			16	16	32
Kolkata	01R/19L, 01L/19R			13	12	25
Chennai	07/25, 12/30	14			14	28
Hyderabad	09/27	14			14	28
Bangalore		14			14	28
Ahmedabad	05/23	10			10	20

JAPAN

Airport Name	Runway configuration	Airport Acceptance Rate (AAR) VFR	MVFR	IFR	Airport Departure Rate (ADR)	Total Capacity
Tokyo (RJTT)	16L/34R, 16R/34L, 22/04	Not defined	-	15 aircraft/30 min	Not defined	
Narita (RJAA)	16L/34R, 16R/34L	Not defined	-	depend on the number of DEP aircraft but minimum 13 aircraft/30 min	Not defined	19 aircraft/30 min

NEW ZEALAND

Airport Name	Runway configuration	Airport IFR Acceptance Rate (AAR) VFR	MVFR	IFR	Airport Departure Rate (ADR)	Total Capacity
Auckland	23L	27				46
	23L		25			45
	23L			24 IBJ		42
	23L			23 IBC		42
	23L			6 FOG		12
Auckland	05R	25				45
	05R		23			44
	05R			22 IBJ		38
	05R			21 IBC		38
	05R			8-10 FOG		16-20

Airport Name	Runway configuration	Airport IFR Acceptance Rate (AAR) VFR	MVFR	IFR	Airport Departure Rate (ADR)	Total Capacity
Wellington	16	32				41
	16		26			39
	16			22 IBJ		32
	16			15 IBC		27
	16			0 FOG		0
Wellington	34	32				37
	34		26			34
	34			22 IBJ		28
	34			15 IBC		26
	34			0 FOG		0

Comments
IBJ – Instrument Below Jet, IBC – Instrument Below Circling.

The majority of VFR operations at their aerodromes are by light aircraft which have a low runway occupancy rate. VFR operations of this nature are able to be sequenced into the normal IFR Traffic pattern by aerodrome control without the need for flow control.

New Zealand uses the Collaborative Flow Manager (CFM) as their primary means of flow management.

REPUBLIC OF KOREA

Airport Name	Runway configuration	Airport Acceptance Rate (AAR) VFR	MVFR	IFR	Airport Departure Rate (ADR)	Total Capacity
Incheon International	Parallel (3 runways) 15/33 16/34			33	34	67 flights/hr
Gimpo International	Parallel (2 runways) 32R-L/14R-L	5	1	15	15	36 flights/hr
Jeju International	Cross (2 runways) 06/24, 13/31	1	1	14	17	33 flights/hr

Comments
"SIMMOD" (FAA) and "RAMS" (ISA Ltd., France) Programs were used to calculate the airport capacity. Those programs are not KCAO's property. For copyrights restriction, it's not able to send the e-copy of these products.

SINGAPORE

Airport Name	Runway configuration	Airport Acceptance Rate (AAR) VFR	MVFR	IFR	Airport Departure Rate (ADR)	Total Capacity
WSSS	2 runways parallel	N/A	N/A	36	36	72

Comments
Runway capacity derived from capacity studies carried out through airfield simulation software.

THAILAND

Comments
- See Airport capacity data in Appendix 2 and explanation in Appendix 1
- Airport capacity data have not been verified against real situation

UNITED STATES

All major U.S. airports have metrics identified as per above criteria. Methodology follows:

To calculating the potential aerodrome arrival rate (AAR) determine the average ground speed, in knots, of all arrival aircraft crossing the runway threshold. Take this number and divide it by the spacing interval, in nautical miles, required at the runway threshold between successive arrival aircraft on final. If the quotient is a fraction then round down to the next whole number.

Calculate the potential AAR value for each possible aerodrome runway configuration and for the following weather conditions:

– Visual Meteorological Conditions (VMC) - weather allows vectoring for visual approaches;

– Marginal VMC - weather does not allow vectoring for visual approaches, but visual separation on final is possible; and

– Instrument Meteorological Conditions (IMC) – Visual approaches and visual separation on final are not possible

This potential AAR does not take into consideration other factors that will need to be considered to determine the actual AAR. You must consider such things as the need to maintain a balance between arrivals and departures. Certainly, you can dedicate an airport to an extremely high AAR but at some point, if you do not allow departures to utilize the runway you will approach gridlock on the airport with no alternative to move the vast number of arrival aircraft that have landed. You must take the potential AAR and adjust for factors such as, weather conditions, runway conditions, taxiway layout, ramp space and support facilities

Identify any conditions that may reduce the Potential AAR and, using good judgment, adjust the potential AAR to obtain an actual AAR. Conditions may include but are limited to:

Intersecting arrival and departure runways
Lateral distance between arrival runways
Dual use runways – runways that share arrivals and departures
Land and Hold Short operations
Availability of high speed taxiways
Airspace limitations and constraints
Procedural limitations (noise abatement, missed approach procedures)
Taxiway layouts
Meteorological Conditions

3. En-route Sector Capacity

3.1 Does your administration (and/or State) currently have a method, whether basic or complex, for calculating enroute sector capacity?

	YES	NO
Australia	X	
Hong Kong, China	X	
Fiji		X
India		X
Japan	X	
Malaysia		X
Mongolia		X
New Zealand		X
Pakistan		X
Philippines		X
Republic of Korea	X	
Singapore	X	
Thailand		X
United States	X	
14	6	8

3.2 If yes, please provide any available airport capacity data for your main airports in the following table.

AUSTRALIA

An example of the type of report that can be extracted and collated from the Eurocat system and an Excel spread sheet example of Sector Analysis Data for a Night Shift was provided.

HONG KONG, CHINA

ACC	Sector Name	Sector Altitudes	Sector Capacity	Time Increments
Hong Kong	APP/DEP	SFC-F130	40	60
	Terminal Radar (Holding)	F130-250	30	60
	En-route	ABV F250	36	60

Comments
Sector capacity values based on empirically derived data.
Generic sector groups/altitudes are shown rather than specific sectors. Average sector capacity figures are shown. Note: Capacities are based on Sector occupancy times not entry times alone. Capacity figures are considered as "monitoring values" which trigger more detailed analysis of expected workload and complexity.

JAPAN

ACC	Sector Name	Sector Altitudes	Sector Capacity	Time Increments
all	all (except for oceanic sectors		controllers workload 1800 sec/30 min	30 min

Comments
One method of calculating sector capacity is based on "DORA TASK" method and "MBB method" which are mentioned in Air Traffic Services Planning Manual (Doc 9426), Appendix C.

REPUBLIC OF KOREA

ACC	Sector Name	Sector Altitudes	Sector Capacity	Time Increments
Incheon (8 sectors)	East	1,000ft AGL − FL600	58	60 min
	North	1,000ft AGL − FL600	62	60 min
	North-west	1,000ft AGL − FL600	54	60 min
	South-west	1,000ft AGL − FL600	54	60 min
	South	1,000ft AGL − FL600	58	60 min
	Jeju	1,000ft AGL − FL600	54	60 min
	Low-central	1,000ft AGL − FL255	58	60 min
	High-central	FL255 − FL600	64	60 min

Comments
"DORATASK methodology" introduced by Doc 9426 was applied to calculate the Incheon ACC enroute sector capacity.

SINGAPORE

ACC	Sector Name	Sector Altitudes	Sector Capacity	Time Increments
WSJC	North-east	290 – 410	62.4	1 hour
	South	290 – 410	42.0	1 hour
	West	290 – 410	24.0	1 hour

Comments
Sector capacity is calculated by multiplying the number of routes with the number of available cruising levels and the flow rate of flights on each route in a one-hour period.

THAILAND

Comments
AEROTHAI is currently conducting internal study on sector capacity.

UNITED STATES

Comments

Sector capacity is the optimum number of flights in a given sector, at a specified period of time that can be managed safely and efficiently. All U.S. sectors have sector capacity assignments. On a real time basis, the average flights per 15 min period are smoothed via algorithms and a number is electronically calculated by tools to monitor sector workload.

Determining Sector Capacity

- For each 15 minute period, determine the **average sector** flight time, in minutes by observing the number of flights in a sector in a 15 minute period. Add the number of minutes each flight spends in the sector and divide that by the number of flights during this period
- Multiply the **average sector** flight time in minutes by 60 seconds to get the average sector flight time -- in seconds
- Divide the **average sector** flight time in seconds by 36 seconds. This 36 seconds is a value established for use in the United States by human factor experts and represents the average time a controller interacts with a flight while in a sector

– The quotient is the **optimum sector capacity value** for 15 minutes

Now that you have calculated the **optimum sector capacity value** all individual sector complexity impacts or factors must be considered before establishing the final sector capacity value for that sector. This will require a Subject Matter Expert (SME) familiar with the area and sector being evaluated. Usually SMEs are supervisor/s or manager/s of the area/sector being evaluated. Sector complexity factors are typically described in two different ways: static and dynamic.

Static sector factors to consider are characteristics that do not change or change infrequently and are generally related to the airspace design. Take the **optimum sector capacity value** and adjust, up or down, for static sector complexity factors. SMEs must take into consideration the static factors that affect the sector such as:

- Airway structure in the sector
- Airspace volume of the sector
  - Vertically and horizontally
- Complexity of operations in the sector
  - Number of adjoining sectors
  - Amount of climbing/descending traffic
  - Terrain
  - Military operations and special use airspace

Upon considering these static factors, a final **sector capacity value** is identified.

To maintain a safe sector volume, on a real time basis, dynamic sector factors must then be constantly evaluated to adjust the **sector capacity value** to account for factors that fluctuate and are characteristic of impacts that may change over time. This value can and must fluctuate in real time to ensure safety based on dynamic impacts to the sector airspace. Impacts include weather, special event traffic volume, NAVAID or communication outages, sectors being combined, staffing shortages, etc.

4. Procedures for Phases of ATFM

4.1 Does your administration (and/or State) currently have procedures/arrangements in place to support the following phases of ATFM?

a) Airport Strategic

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China	X	
Fiji		X
India	X	
Japan	X	
Malaysia		X
Mongolia	X	
New Zealand	X	
Pakistan		X
Philippines		X
Republic of Korea		X
Singapore	X	
Thailand		X
United States	X	
15	9	6

b) Airport Tactical

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China	X	
Fiji	X	
India	X	
Japan	X	
Malaysia	X	
Mongolia	X	
New Zealand	X	
Pakistan		X
Philippines		X
Republic of Korea	X	
Singapore	X	
Thailand	X	
United States	X	
15	13	2

c) Airspace Strategic

	YES	NO
Australia	X	
Hong Kong, China	PARTIAL	
Fiji	X	
India		X
Japan	X	
Malaysia		X
Mongolia	X	
New Zealand	X	
Pakistan		X
Philippines		X
Republic of Korea		X
Singapore		X
Thailand	X	
United States	X	
14	7	6

d) Airspace Tactical

	YES	NO
Australia	X	
Hong Kong, China	X	
Fiji	X	
India	X	
Japan	X	
Malaysia		X
Mongolia	X	
New Zealand	X	
Pakistan	X	
Philippines		X
Republic of Korea	X	
Singapore	X	
Thailand	X	
United States	X	
14	12	2

Comments

Australia
Not all airports and airspace volumes are included.

Hong Kong, China
c): Sector capacity taken into consideration when declaring combined Arrival/Departure rate.
Overflight routings strategically planned and published but traffic numbers not strategically or pre-tactically limited.

Macao, China
via flight scheduling and slot approval – slot compliance and adjustment

Fiji
Airport & Airspace Strategic – VFR lanes, SID, lateral separation areas and proposed STARs
Airport Tactical – Flow Control Procedures; issuance of EAT, holding and departure slots
Airspace Tactical – UPR, DARP

India
AAI is in the process of establishing central air traffic flow management (ATFM) in India

Malaysia
Flow control is currently provided to arriving aircraft into KLIA only. This was achieved through speed control, holding at outer holding stack (in the air) or holding at the departure airport. Holding at departure airport is only applicable to aircraft departing from nearby domestic airport.

Calculation is done using the ATC system prediction tools at 100 NM away from KLIA to calculate the estimate landing time for each aircraft. The landing time will be compared with a pre determine landing slots calculated based on landing interval (usually 2, 2, 3 minutes). To arrive at this landing slot, the aircraft will be required to speed up, slow down or hold in the air or on the ground for nearby domestic airport.

New Zealand
The CFM (Collaborative Flow Manager) tool we use for Flow Management influences both Airport Strategic and Airport Tactical flows.

Pakistan
ATFM applied through BOBCAT.

Republic of Korea
ATFM procedures are performed in accordance with the agreement among ATC authorities. Restrictions such as inbound speed, required time & distance are usually issued about 60 minutes before application.

Thailand
Airspace Strategic: BOBCAT operations
Airport Tactical & Airspace Tactical: Appendix 3 (Arrival Management)

5. Flow Management Data Processing and Display

5.1 Does your administration (and/or State) have a system to receive, process, and display flight plan data (FPL, RPL, etc.)?

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China	X	
Fiji	X	
India	X	
Japan	X	
Malaysia	X	
Mongolia	X	
New Zealand	X	
Pakistan	X	
Philippines	X	
Republic of Korea	X	
Singapore	X	
Thailand	X	
United States	X	
15	15	0

5.2 Does your administration (and/or State) have a database that includes airspace information (for example, ACC boundary coordinates, sector boundary coordinates, NAVAIDS, airways, special use airspace) and airport information (for example, runway and taxiway layout, ramp layout, parking gate information)?

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China	X	
Fiji	X	
India	X	
Japan	X	
Malaysia	X	
Mongolia	X	
New Zealand	X	
Pakistan	X	
Philippines		X
Republic of Korea	X	
Singapore	X	
Thailand	X	
United States	X	
15	14	1

5.3 Does your administration (and/or State) have an electronic ATFM system that displays airborne traffic?

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China		X
Fiji		X
India		X
Japan	X	
Malaysia		X
Mongolia		X
New Zealand	X	
Pakistan	X	
Philippines		X
Republic of Korea	X	
Singapore	X	
Thailand	X	
United States	X	
15	9	6

Comments

Republic of Korea
ATFM function is a component of the ATC system. (The ATFM function works using the same data provided to the ATC system in Incheon ACC).

5.4 Does your administration (and/or State) have a communication system that allows automated or manual exchange of messages to support ATFM decision making (for example, SLOT assignment messages, SLOT adjustment messages, delay reporting messages, alternate route messages)?

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China		X
Fiji		X
India		X
Japan	X	
Malaysia	X	
Mongolia		X
New Zealand	X	
Pakistan	X	
Philippines		X
Republic of Korea	X	
Singapore	X	
Thailand	X	
United States	X	
15	10	5

Comments

Hong Kong, China
SLOT assignment and SLOT adjustment system – Yes; delay reporting and alternate route – No.

5.5 Does your administration (and/or State) have a system to monitor and display the airport acceptance rates (AAR) at the main airports?

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China	X	
Fiji		X
India		X
Japan	X	
Malaysia		X
Mongolia		X
New Zealand	X	
Pakistan		X
Philippines		X
Singapore		X
Thailand	X	
United States	X	
14	7	7

5.6 Does your administration (and/or State) have a system to monitor and display enroute sector capacity?

	YES	NO
Australia	X	
Hong Kong, China	X	
Fiji		X
India		X
Japan	X	
Malaysia		X
Mongolia		X
New Zealand		X
Pakistan		X
Philippines		X
Singapore		X
Thailand	X	
United States	X	
13	5	8

5.7 Does your administration (and/or State) have a system to monitor and display the mix of aircraft using the airspace or airports?

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China	X	
Fiji		X
India		X
Japan	X	
Malaysia		X
Mongolia		X
New Zealand		X
Pakistan		X
Philippines	X	
Singapore	X	
Thailand	X	
United States	X	
14	8	6

6. Surveillance Systems for ATFM Support

6.1 In the following table, list the type of surveillance systems in use in your administration's (and/or State's) airspace structure.

AUSTRALIA

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
Primary Radar	Primary Radar	A-SMGCS
Mode A/C SSR	Mode A/C SSR	
Mode S Radar	Mode S Radar	
ADS-B	PRM	
ADS-C	ADS-C (not used)	
Wide Area Multilateration	Wide Area Multilateration	

HONG KONG, CHINA

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
Primary and secondary surveillance radars	Primary and secondary surveillance radars	ADS-B on trial in southern FIR

FIJI

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
ADS-C & FPL Tracks on an Air Situation Display with planned implementation of an ADS-B surveillance by the 4th quarter of 2010	Presently procedural with planned implementation of an ADS-B surveillance by the 4th quarter of 2010. MLAT will also be installed for surveillance within the Nadi Airport Terminal Area. Surveillance coverage will be finalised when installation is completed.	

INDIA

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
RADAR	RADAR	ASMGCS
ADS-C		

JAPAN

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
Radars	Radars	ASDE
(OCEANIC SECTOR) ADS-C		

MALAYSIA

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
PSR/SSR Radar	PSR/SSR Radar, MLAT	

MONGOLIA

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
No	No	No

NEW ZEALAND

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
MSSR – Modes	MSSR – Mode S	MLAT GRD Surveillance
W.A.M. (early 2011)	W.A.M	
ADS-B (early 2011)	ADS-B 9early 2011)	
	PSR	

PAKISTAN

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
SSR with Mode C	PSR + SSR	

PHILIPPINES

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
MLA ACC – EUROCAT 200 (OLD)	NEC-PSR/SSR (MLA)	None
ALS (NEW	SELEX-PSR/SSR (CLK)	
	TOSHIBA-PSR/SSR (MCT)	

REPUBLIC OF KOREA

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
Radar (PAR/SSR)	Radar (PAR/SSR)	

SINGAPORE

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
Primary & Secondary Radar	Primary 7 Secondary Radar	Multilateration
ADS-C		

THAILAND

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
SSR (Secondary Radar)	SSR (Secondary Radar) PSR (Primary Radar)	A-SMGCS at Survarnabhumi Airport

UNITED STATES

ACC Surveillance System	TMA Surveillance System	Other Surveillance System
Long Range Radar Systems	Airport Surveillance Radar Systems with digital weather processing	ADS-B Multilateration
	Airport Surface Detection Radar	

7. AIS/Map for ATFM Support

7.1 List the AIS and map databases that your administration (and/or State) has available to support ATFM.

AUSTRALIA
Aeronautical Data Management System (ADMS)
ADMS is primarily a database and data entry system for the maintenance of aeronautical reference data. ADMS also incorporates data extract capabilities which are used to provide subsets of data for the AIP and other Airservices Systems and external customers.

HONG KONG, CHINA
AIP and NOTAMS

MACAO, CHINA
Jeppesen Charts

FIJI
1. Hard copies of: Oceanic En-route Charts, GPS, VOR and NDB Area Charts, Visual Navigation Charts and Local Aeronautical Chart
2. Database of ATS Routes including coordinates of ATS/MET reporting points/waypoints
3. AIP Package (including NOTAM database)

INDIA
FIR map, ATS route map, TMA map, Aerodrome layout map, IAL procedure charts, ATS route data, navaid data and aerodrome data

JAPAN
The definition of AIS/map database is not clear in this survey. Japan has established an aeronautical database which includes all of the aeronautical data in accordance with ICAO Annex 15 6.3.1

MALAYSIA
Kuala Lumpur FIR and Kota Kinabalu FIR map

MONGOLIA
AIS has automated system except for AIS/MAP cartography procedures. It is planned to be automated by 2012. If electronic AFTM system would be implemented AIS will be available to provide databases to support ATFM.

NEW ZEALAND
ANAIS – Database – NOTAM, and MET, Route maps (Static data)

PAKISTAN
MAPs showing air routes, reporting points, FIR boundaries, prohibited, restricted and danger areas, radio navigational aids, airports and provision for MAP Generation as required.

PHILIPPINES
Static data operations database, International operations database, Maps & Aeronautical charts available in paper copy & electronic (dgn or pdf format) of European AIS database system

REPUBLIC OF KOREA
a basic computer-based AIS and MAP storage system.

SINGAPORE
NOTAMS, AIP and AIP Supplements

THAILAND
- maps maintained by internal operational charting unit
- Jeppesen map subscriptions
- In-house Aeronautical Information Management database
- Geographic NOTAM information

UNITED STATES
Numerous information systems utilized to provide post data analysis review of actions and responses to traffic, weather and capacity issues.

Numerous information systems to present data in near real-time to plan and monitor traffic flow management

Numerous map data basis to support radar, weather and traffic flow management tools.

7.2 Are they available in an electronic format?

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China		X
Fiji		X
India		X
Japan	X	
Malaysia	X	
Mongolia	X	
New Zealand	X	
Pakistan	X	
Philippines	X	
Republic of Korea	X	
Singapore	X	
Thailand	X	
United States	X	
15	12	3

7.3 What is the routine AIS database update cycle?

	28 day update	56 day update	other
Australia			X
Hong Kong, China	X		
Macau, China			X (42 days)
Fiji		X	
India			X
Japan	X		
Malaysia			X
Mongolia			X
New Zealand		X	
Pakistan			X
Philippines	X		
Republic of Korea	X		
Singapore	X		
Thailand	X		
United States		X	
15	6	3	6

AUSTRALIA
The data base update cycle can be as frequently as daily depending on the nature of the data.

8. Meteorological Information

8.1 Provide the specific meteorological products and/or websites that your administration (and/or State) has available to support ATFM.

Australia	TAF Trend	• Real-time Sensor Data (e.g. RVR) • Weather Radar • Satellite Imagery	• Surface Analysis Charts • Surface Prognosis Charts • SIGWX Chart	• GRIB data (wind & temperature forecasts)	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• Weather Briefing
Hong Kong, China	TAF Trend METAR Local Report	• Real-time Sensor Data (e.g. RVR) • Weather Radar • Satellite Imagery	• Surface Analysis Charts • Surface Prognosis Charts • SIGWX Chart	• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts)	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• VA/TC Advisories • Weather Briefing • Others *i) Terminal Meteorological Forecast (TerMET): An aerodrome forecast for wind, visibility, cloud, significant weather with reference to ATM operational thresholds.* *ii) Extended tropical cyclone forecasts: 24 to 48 hours* *iii) Aviation Thunderstorm Nowcasting System (trial); Radar reflectivity thunderstorm forecast up to 1 hour ahead.*
Macau, China	TAF Trend METAR	• Real-time Sensor Data (e.g. RVR) • Weather Radar • Satellite Imagery	• Surface Analysis Charts • SIGWX Chart	• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts)	• Aerodrome warnings, wind shear warnings and alerts *Thunderstorm Warning & Strong Wind Warning*	• VA/TC Advisories • Weather Briefing

Fiji	TAF Trend METAR Local Report	• Weather Radar • Satellite Imagery	• Surface Analysis Charts • Surface Prognosis Charts • SIGWX Chart	• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts)	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• VA/TC Advisories • Weather Briefing • Others *SPEC, ROFOR, ARFOR, SIGWX, Climate summaries Website: www.met.gov.fj*
India	TAF Trend METAR Local Report	• Real-time Sensor Data (e.g. RVR) • Satellite Imagery	• SIGWX Chart	• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts)	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• VA/TC Advisories • Weather Briefing
Japan	TAF METAR	• Real-time Sensor Data (e.g. RVR) • Weather Radar • Satellite Imagery		• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts) *We don't know these charts exactly*	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• VA/TC Advisories • Weather Briefing • Others (please elaborate)
Malaysia	TAF Trend METAR Local Report	• Real-time Sensor Data (e.g. RVR) • Weather Radar • Satellite Imagery		• Wind/temperature forecast Charts	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• Weather Briefing
Mongolia	TAF Trend METAR	• Real-time Sensor Data (e.g. RVR) • Weather Radar	• Surface Analysis Charts • Surface Prognosis Charts • SIGWX Chart	• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts)	• SIGMET	• Weather Briefing
New Zealand	TAF Trend METAR Local Report	• Real-time Sensor Data (e.g. RVR)	• Surface Analysis Charts • Surface Prognosis Charts • SIGWX Chart	• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts)	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• VA/TC Advisories • Weather Briefing

Pakistan	TAF Trend METAR Local Report	• Real-time Sensor Data (e.g. RVR) • Weather Radar • Satellite Imagery	• Surface Analysis Charts • Surface Prognosis Charts • SIGWX Chart	• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts)	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• VA/TC Advisories • Weather Briefing • Others *Meteorological Watch Office (MWO) – Karachi receives VA/TC advisories from respective RSMC i.e. New Delhi (VIDP) through GTS. These information, communicate further to the users, ATC FIC, communication Centre and all airlines. In case of Tropical Cyclone formation in Arabian Sea, PMD (MWO Karachi) issues local advisories on PMD, web page, electronic/print media and also include in fleet forecast, sea bulletin, marine forecast and SIGMET.*
Philippines	METAR					
Republic of Korea	TAF Trend METAR Local Report	• Real-time Sensor Data (e.g. RVR) • Weather Radar • Satellite Imagery	• Surface Analysis Charts • Surface Prognosis Charts • SIGWX Chart	• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts)	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• VA/TC Advisories • Weather Briefing

Singapore	TAF Trend METAR	• Real-time Sensor Data (e.g. RVR) • Weather Radar • Satellite Imagery	• Surface Analysis Charts • Surface Prognosis Charts • SIGWX Chart	• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts)	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• VA/TC Advisories • Weather Briefing • Others *Climb and descend information, Take-off conditions, Upper-air data (temp, wind, RH, freezing level, condensation level etc.)*
Thailand	TAF METAR	• Real-time Sensor Data (e.g. RVR) • Weather Radar	•	•	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• VA/TC Advisories
United States	TAF Trend METAR Local Report	• Real-time Sensor Data (e.g. RVR) • Weather Radar • Satellite Imagery	• Surface Analysis Charts • Surface Prognosis Charts • SIGWX Chart	• Wind/temperature forecast Charts • GRIB data (wind & temperature forecasts)	• SIGMET • Aerodrome warnings, wind shear warnings and alerts	• VA/TC Advisories • Weather Briefing • Others *ASTAMS*

8.2 List the MET products your facility considers operationally valuable (in order of most importance) to AFTM.

AUSTRALIA
All items in 8.1 are considered operationally valuable

HONG KONG, CHINA
Pre-tactical: TAF, Weather Briefing, Satellite imagery, surface prognostic Charts, SIGWX Chart, VA/TC Advisories, Wind Shear Warnings
Tactical: GRIB data, Weather Radar, Real-Time Sensor Data, METAR

MACAO, CHINA
1.AWOS
2. METAR
3. TAF
4. WEATHER RADAR
5. SATELLITE IMAGE
6. SIGMET

FIJI
1.METAR
2. TAF
3. Aerodrome warnings, wind shear warnings & alerts
4. SIGMET
5. GRIB data (wind and temperature)
6. VA/TC advisories

INDIA
Upper Wind Data, Weather Trend & Forecast, SIGMET, Satellite Imagery

JAPAN
It depends on the situation. But generally speaking, weather radar data is useful in most case

MALAYSIA
All

MONGOLIA
No

NEW ZEALAND
SIGMETS, High Level Wind Forecasts, METAR, QNH Forecasts, ATIS

PAKISTAN
Satellite Imagery, Meteorological Radar, SADIS

REPUBLIC OF KOREA
SIGMET, W/X Radar, W/X Briefing

SINGAPORE

1. METAR
2. TAF
3. TREND
4. Weather radar information
5. Satellite imagery
6. SIGMET and VA/TC advisories
7. Real-time weather monitoring observations and data
8. Aerodrome and wind shear warnings
9. Real-time wind profile
10. Upper-air data and information
11. Numerical weather model charts (wind, temperature, precipitation charts etc)
12. SIGWZ charts
13. Access to an intranet/internet-based weather information system
14. Weather briefing terminals for operators and pilots

THAILAND

MET products are not currently being used for the purposes of ATFM

UNITED STATES

Convective forecasts, METARS, SIGMETS, PROG CHARTS, PIREPS

8.3 List the MET products your facility considers operationally insignificant (in order of least importance) to AFTM.

AUSTRALIA
All items in 8.1 are not considered as insignificant

HONG KONG, CHINA
Aerodrome warnings

MACAO, CHINA
Analysis chart, Prognostic chart, weather model

FIJI
1. Satellite imagery
2. surface analysis charts

MALAYSIA
All

MONGOLIA
No

PAKISTAN
Nil

REPUBLIC OF KOREA
None

SINGAPORE
Nil

THAILAND
MET products are not currently used for the purposes of ATFM

8.4 Does your facility use automated processes of gridded data?

	YES	NO
Australia	X	
Hong Kong, China	X	
Macau, China	X	
Fiji	X	
India		X
Japan	X	
Malaysia		X
Mongolia		X
New Zealand		X
Pakistan	X	
Republic of Korea		X
Singapore	X	
Thailand		X
United States	X	
13	8	6

AUSTRALIA
GRIB Data

JAPAN
The range of use is limited

8.5 If no to 8.4, does your facility plan to implement automated processes of gridded data (if yes, please indicated approximate date)?

	YES	NO
Japan	X	
Malaysia		X
Mongolia		X
New Zealand	X	
Philippines	X	
Republic of Korea		X
6	3	3

JAPAN
planning to extend range of use around spring in 2011

NEW ZEALAND
2018

PHILIPPINES
2013

THAILAND
Currently in planning stages

9. Data for Historical and Statistical Analysis

9.1 On the following lines, list the type of databases (i.e. aircraft position data from ADS-B/radar, OPMET data, weather radar data…) your administration (and/or State) maintains to support the analysis of air traffic operations and meteorological activities.

AUSTRALIA
The Aeronautical Decision Information Service (ADIS) group of systems:

The ADIS group of systems have interfaces with other systems both internal and external to Airservices Australia. The following are the group of systems that support aeronautical decisions;

Aeronautical Data Management System (ADMS)

ADMS is primarily a database and data entry system for the maintenance of aeronautical reference data. ADMS also incorporates data extract capabilities which are used to provide subsets of data for the AIP and other Airservices Systems and external customers.

Australian Aeronautical Messaging System (AAMS)

AAMS provides the Aeronautical Message Addressing, Routing and Switching functions for the Airways System, interconnecting a multitude of systems and services. The interconnections are carried over the Airservices Australia ADIN/PSN network.

The AAMS supports both AFTN and AMHS ICAO message formats. Traffic handled by AAMS includes: Flight Plans and associated messages, Notams, Meteorological Traffic, AIDC messaging and service messages.

The system also forms part of the International Aeronautical Fixed Telecommunication Network (AFTN) and is the backbone hub for the Aeronautical Telecommunication Network (AMHS/ATN) for the Pacific Region.

Aeronautical Fixed Telecommunications Network (AFTN)

AFTN is a message switching system which provides access and addressing to and from the international AFTN and the routing of AFTN messages. This system is used to deliver aeronautical messages to air traffic service providers such as control towers, air traffic service centres and external service providers. Typical messages include flight plans, meteorological data, NOTAM, departure messages, AIDC messaging and service messages.

Aeronautical Information Services/Meteorological Service (AIS/MET)

The AIS/MET system provides the following services:

- Disaster Recovery option for NAIPS
- Internet/019 dial service for NAIPS
- METBrief
- AERIS and Volmet Service
- AFTN message logging

Centralised Search and Rescue System (CenSAR)

CENSAR is used to provide a single national database repository of all active and pending Search and Rescue Time (SARTIME) flights in Australia. The CENSAR system receives flight movement messages. Upon a SARTIME becoming expired the system will automatically alert the user to start either the Communications Check or INCERFA (Uncertainty) phases of search and rescue.

Central Traffic Management System (CTMS)

CTMS provides a Flight Programming, scheduling and reporting capability for flights into

Sydney Airport, including compliance reports. It also provides a Flight Progress Monitoring capability to provide estimated landing times for flights between Sydney, Melbourne and Brisbane. It is accessible through Web, WAN and FAX

Electronic Strip Display System (ESDS)

The ESDS provides a repository for AFTN traffic for the channel it is connected to. It provides an automatic strip generation function and capabilities for the user to effectively manage those strips. It also provides the capability of searching for relevant information based on field information extracted from the messages. The system is used by FlightWatch operations in AusFIC

GPS Receiver Autonomous Integrity Monitoring (GPS-RAIM)

The GPS-RAIM system is used to predict GPS availability at specified locations and areas in Australia and neighbouring countries. In order to perform a non-precision approach (NPA) at a particular airport using a GPS receiver, RAIM must be available in that area. RAIM is notified of any satellite outages and is able to calculate local RAIM availability from this data. Pilots can request to have this information supplied as part of their preflight briefings obtained from NAIPS by a briefing officer, AvFax or the Internet.

Meteorological Information System (MIS)

MIS provides an interface between the Bureau of Meteorology (BoM) and Airservices Australia for the provision of GRIB, WX Chart and OMD data from BoM and for the delivery of METEX-C data to BoM. MIS provides an interface that includes checking the data where necessary and on forwarding to the requisite systems. It does this over a single communication medium (IP) to BoM and by virtue of its cluster design spread between Melbourne and Brisbane has automatic fallback (Business Resumption) built in.

National Aeronautical Information Processing System (NAIPS)

NAIPS integrates with other Airservices Systems to provide the following ATM functions:

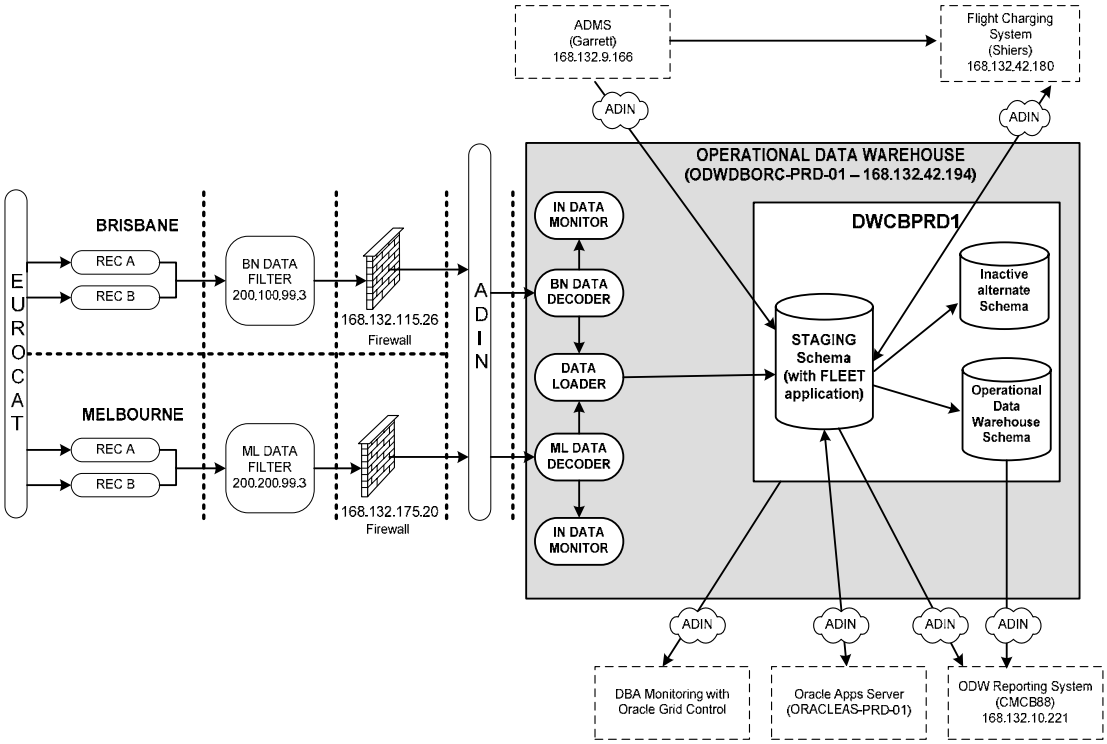
- Enable the compilation, editing, transmission, handling and storage of domestic and international NOTAM.
- An Aeronautical Information Service (AIS) and Meteorological (MET) database.
- A Briefing and Specific Pre-Flight Information Bulletin (SPFIB) on dedicated NAIPS workstations.
- Calculate route sector winds and temperatures for any airways routes segment from Gridded Binary (GRIB) data, which are presented to pilots as part of a SPFIB request.
- The ability to submit SARTIME and ICAO Flight Notifications which are then re-directed to appropriate ATS centres including Eurocat for Flight Data Processing.

Operational Data Warehouse (ODW)

The ODW provides a store of selected operational data from Eurocat and towers which is used to provide historical information for analysis and airways billing.

The Operational Data Warehouse system is comprised of the following:

- an interface to Eurocat which provides enroute flight data;
- an interface to Flight data Edit and Entry Tool (FLEET) to receive non-Eurocat data (flight strips) and make amendment to flight records in Staging database; and
- a Data Warehouse to provide a structured view of selected data to facilitate the update of business and other systems for revenue collection, statistical analysis and other business requirements.



The objective of ODW is to provide accurate, timely data from an authoritative source for use by a number of Airservices business applications. ODW provides a flexible interface predominately for charging but also statistical analysis purposes.

HONG KONG, CHINA
Flight route, ATA/ATD, aircraft position data from Radar and A-SMGCS
Weather radar data and OPMET data archive are available and maintained by Hong Kong Observatory.

MACAO, CHINA
Slot compliance
Actual time of take-off and landing at VMMC
OPMET, AWOS, Satellite, Radar

FIJI
1. Aircraft position data from ADS-C, CPDLC, VHF and HF reports
2. OPMET data disseminated and received and Weather Radar Data

INDIA
Radar Data
OPMET Data
Weather Radar Data

JAPAN
Radar Data
Flight Plan data
Flow Control Data (delay, capacity setting and so on)

MALAYSIA
Aircraft positions based on surveillance system (rada/MLAT) and weather data detected by primary radar system.

MONGOLIA
No.

NEW ZEALAND
For analysis of flight tracks including miles in trail reports, runway use reports and comparison of track flown to planned reports, we use a program which processes our radar data. The reports are available in Excel and are easily manipulated with pivot tables. We also receive the complete day's radar traffic available for displaying on screen through a graphics programme, which will display all tracks, or tracks by any of a large number of criteria, and will also display, in video format, at a speed nominated by the user.

Airways is not the meteorological authority so don'keep data-bases of MET activities, apart from hard data of High Level Wind Forecasts, and ATIS reports.

PAKISTAN
Meteorological Data

REPUBLIC OF KOREA
Aircraft Movement statistics

SINGAPORE
Radar Data, ADS-C/CPDLC Data, Flight Plan Data

THAILAND
- Radar track historical data
- Historical ATS messages, e.g. FPL, DEP
- OPMET databank
- Flight schedule & permission
- Historical NOTAM database

UNITED STATES
Radar & Satellite data, weather radar, Safety and Capacity performance metrics including departure, en route, arrival and delay metrics. Flight tracks to include filed versus flown flight tracks. Modeling tools for "what if " scenario

10. Communications capabilities for Collaborative Decision Making in ATFM

10.1 List the types of communication systems (i.e. AFTN, Internet, dedicated data link, video/tele-conferencing…) your operational units already have or could straightforwardly have with:

(a) other centralized ATFM organizations

AUSTRALIA
Integrated Services Digital Network (ISDN), AFTN, telephone, dedicated land lines.

HONG KONG, CHINA
AFTN capability

MACAO, CHINA
N/A

FIJI
AFTN/ATN AMHS, Internet, Facsimile and Telephone

INDIA
AFTN & Internet

JAPAN
dedicated line (Taipei ACC/Incheon ACC), hot line (FAA/ATCSCC)

MALAYSIA
AFTN, Internet

MONGOLIA
No

NEW ZEALAND
AFTN, Internet
Tele-conferencing (not currently in place)

PAKISTAN
AMHS/AFTN, Internet

PHILIPPINES
AFTN, Internet, Dedicated data link & telephones

REPUBLIC OF KOREA
direct speech link with ATMC in Japan, and Qingdao ACC in China

SINGAPORE
AFTN, Internet and telephone with Bangkok ATFMU

THAILAND
Internet: e-mail

UNITED STATES
AFTN, Internet, dedicated data link, video/tele-conferencing

(b) other ATS units and/or Flight Management Unites

AUSTRALIA
ISDN, AFTN, telephone, Voice Switch Communications System (VSCS with multiple communication paths), dedicated land lines, video conferencing.

HONG KONG, CHINA
AFTN capability

MACAO, CHINA
AFTN direct lines

FIJI
AFTN/ATN AIDC, Internet, Facsimile and Telephone and HF

INDIA
AFTN & DSCN

JAPAN
dedicated line (Oakland/Anchorage ARTCC, Manila ACC)

MALAYSIA
AFTN, Internet

MONGOLIA
No

NEW ZEALAND
AFTN, Internet, Air Traffic Management (ATM) System
Teleconferencing (not currently in place)

PAKISTAN
Hotlines, AMHS/AFTN

PHILIPPINES
AFTN, Internet, Dedicated data link & telephones

REPUBLIC OF KOREA
Direct Speech links with domestic ATC units

SINGAPORE
AFTN, Internet (email) and telephone with other ATSU

THAILAND
AFTN – Telephone – Dedicated link (ATS Direct Speech Circuit)
Internet: e-mail/direct-link using the BOBCAT system

UNITED STATES
AFTN, Internet, dedicated voice and data link, video/tele-conferencing, national aeronautical data network

(c) operators and airspace users

AUSTRALIA
ISDN, telephone, dedicated lane lines.

HONG KONG, CHINA
AFTN capability

MACAO, CHINA
AFTN, telephone lines

FIJI
AFTN/ATN AIDC, Internet, Facsimile and Telephone and HF

INDIA
Internet, Landline (Telecon), Fax

JAPAN
Tele-conferencing system, Intranet (Workstation of ATFM system setup in airline operators' room)

MALAYSIA
Operators and airspace users

MONGOLIA
No

NEW ZEALAND
AFTN, Internet
Teleconferencing (not currently in place)

PAKISTAN
Telephone, Fax, AMHS

PHILIPPINES
AFTN, Internet, Dedicated data link & telephones

REPUBLIC OF KOREA
direct speech link system with major airlines (Korean Airlines, Asiana Airlines, etc.)

SINGAPORE
Internet (email) and telephone with operators

THAILAND
AFTN, Telephone, E-mail

UNITED STATES
AFTN, Internet, dedicated data link, video/tele-conferencing, national organizational representatives on site

(d) airport authorities

AUSTRALIA
ISDN, telephone, dedicated land lines.

HONG KONG, CHINA
Nil

MACAO, CHINA
airport operator is also ATS service provider

FIJI
AFTN/ATN AMHS, Internet, Facsimile and Telephone

INDIA
Internet, Telecon, Fax

JAPAN
None

MALAYSIA
Direct lines, AFTN, Internet

MONGOLIA
No

NEW ZEALAND
AFTN, Internet (not currently in place)

PAKISTAN
Telephone, Internet

PHILIPPINES
AFTN, Internet, Dedicated data link & telephones

REPUBLIC OF KOREA
Direct speech link system with Incheon International Airport Authority and Korea Airport Corporations

SINGAPORE
Internet (email) and telephone with airport operators

THAILAND
Telephone – Coordination via airport FDP system (TECOS) – AFTN – E-mail – Decidated data link – trunk radio

UNITED STATES
Internet, phone links, video/tele-conferencing

(e) meteorological authorities and/or aeronautical MET services

AUSTRALIA
ISDN, telephone, dedicated land lines, MIS.

HONG KONG, CHINA
Tele-conference capability

MACAO, CHINA
AFTN, AMHS, Telephone/Fax, Internet and Intranet

FIJI
AFTN/ATN, AMHS, Internet, Facsimile and Telephone

INDIA
Internet, Telecon, Fax

JAPAN
None. Meteorological specialists and ATM officers are working at same operation room

MALAYSIA
Direct lines, AFTN, Internet

MONGOLIA
No

NEW ZEALAND
AFTN

PAKISTAN
Telephone, Internet, AMHS/AFTN

PHILIPPINES
AFTN, Internet, Dedicated data link & telephones

REPUBLIC OF KOREA
Direct speech link system with Korea Aviation Meteorological Agency

SINGAPORE
AFTN, Internet (email), telephone and dedicated data link

THAILAND
AFTN – E-mail – Direct link (AWAS equipment) - Telephone

UNITED STATES
AFTN, Internet, dedicated data link, video/tele-conferencing, national aeronautical data network

ATFM has a specialised meteorological support service

Australia, Japan and the United States

(f) aeronautical information services

AUSTRALIA
ISDN, AFTN, AAMS

HONG KONG, CHINA
Tele-conference capability

MACAO, CHINA
AFTN, Intranet, telephone lines

FIJI
AFTN/ATN, AMHS, Internet, Facsimile and Telephone

INDIA
Internet & Telecon

JAPAN
Intranet

MALAYSIA
Direct lines, AFTN, Internet

MONGOLIA
No

NEW ZEALAND
AFTN, Internet, FAX

PAKISTAN
AMHS/AFTN, Telephone

PHILIPPINES
AFTN, Internet, Dedicated data link & telephones

REPUBLIC OF KOREA
ATFMC is collocated with AIS(FIS0 and have many direct speech circuits

SINGAPORE
AFTN, Internet (email), telephone and dedicated data link

THAILAND
Direct communications line
Telephone – ATFN – E-mail - Fax

UNITED STATES
Internet, phone links

(g) the transmission of radar and ADS data to the ATFM center

AUSTRALIA
Radar Data and ADS data is available to the current ATFM centre through a number of displays.

HONG KONG, CHINA
Nil

MACAO, CHINA
Not applicable

FIJI
VSAT and Digital Communication links (i.e. fibre-Optics or UHF)

INDIA
Not applicable

JAPAN
Dedicated line (dedicated data link)

MALAYSIA
Not sure

MONGOLIA
No

NEW ZEALAND
The ATM system controls the ATFM, so no separate ATFM centre is provided, nor required.

PAKISTAN
Nil

PHILIPPINES
CADAS, Telephone, Dedicated data link

REPUBLIC OF KOREA
The ATFMC is properly equipped to monitor the real time RADAR data which is provided to the Incheon ACC

SINGAPORE
Nil

THAILAND
Available but not currently in use

UNITED STATES
AFTN, Internet, dedicated voice and data link, video/tele-conferencing, national aeronautical data network

……