

ATFM UPDATE ASIA-PACIFIC

Global 8 ATFM Conference

4 – 7 November 2014

Cancun, Mexico

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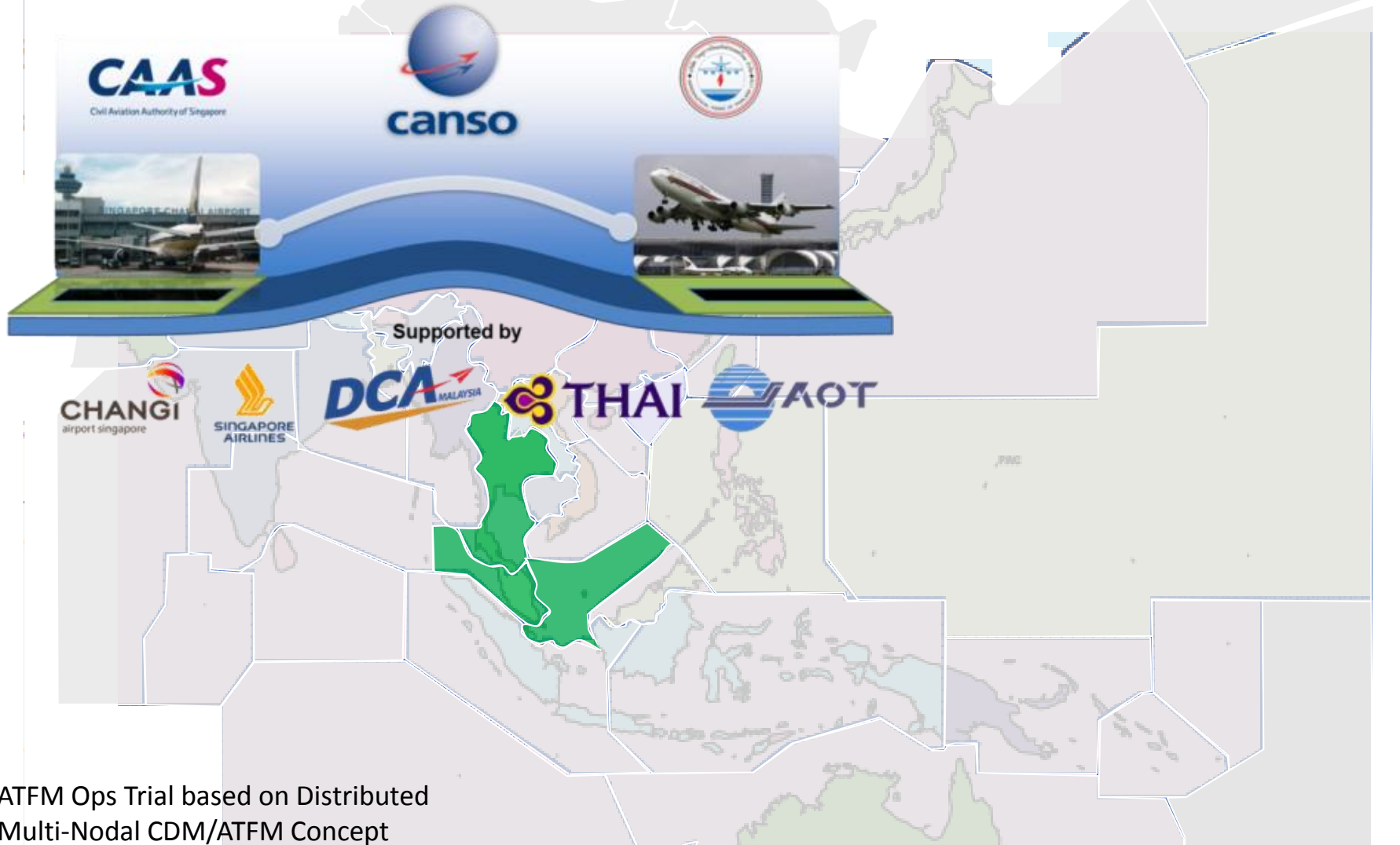
Outline

- Recent ATFM Activities : Asia-Pacific
- Multi-Nodal ATFM Concept Development
- Multi-Nodal ATFM Concept of Operations
- Benefits of Cross-Border ATFM
- ATFM Operational Trial based on Distributed Multi-Nodal CDM/ATFM Network Concept

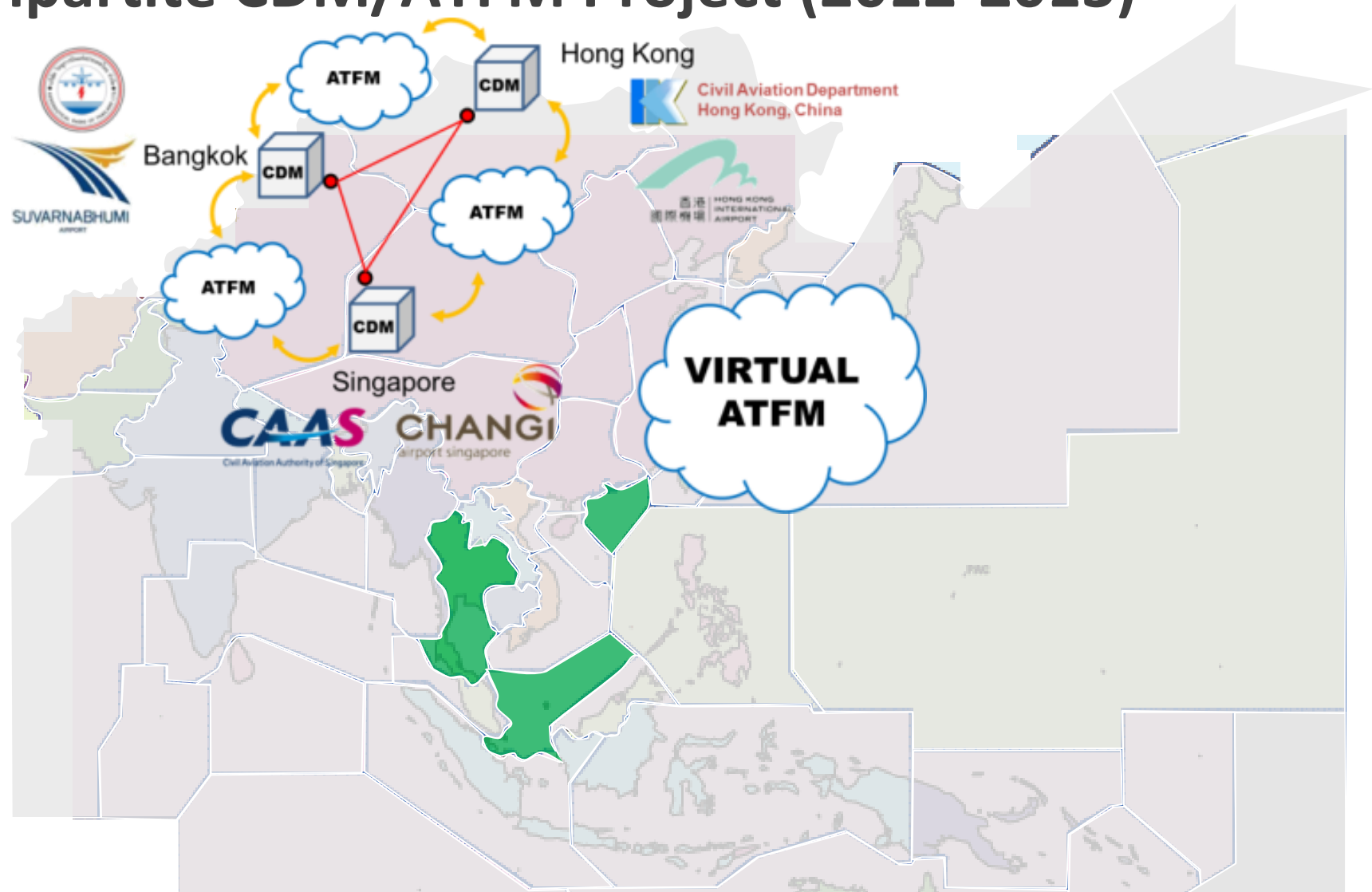
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CANSO Bangkok – Singapore Whole-Flight CDM (2011 - 2012)



Tripartite CDM/ATFM Project (2012-2013)

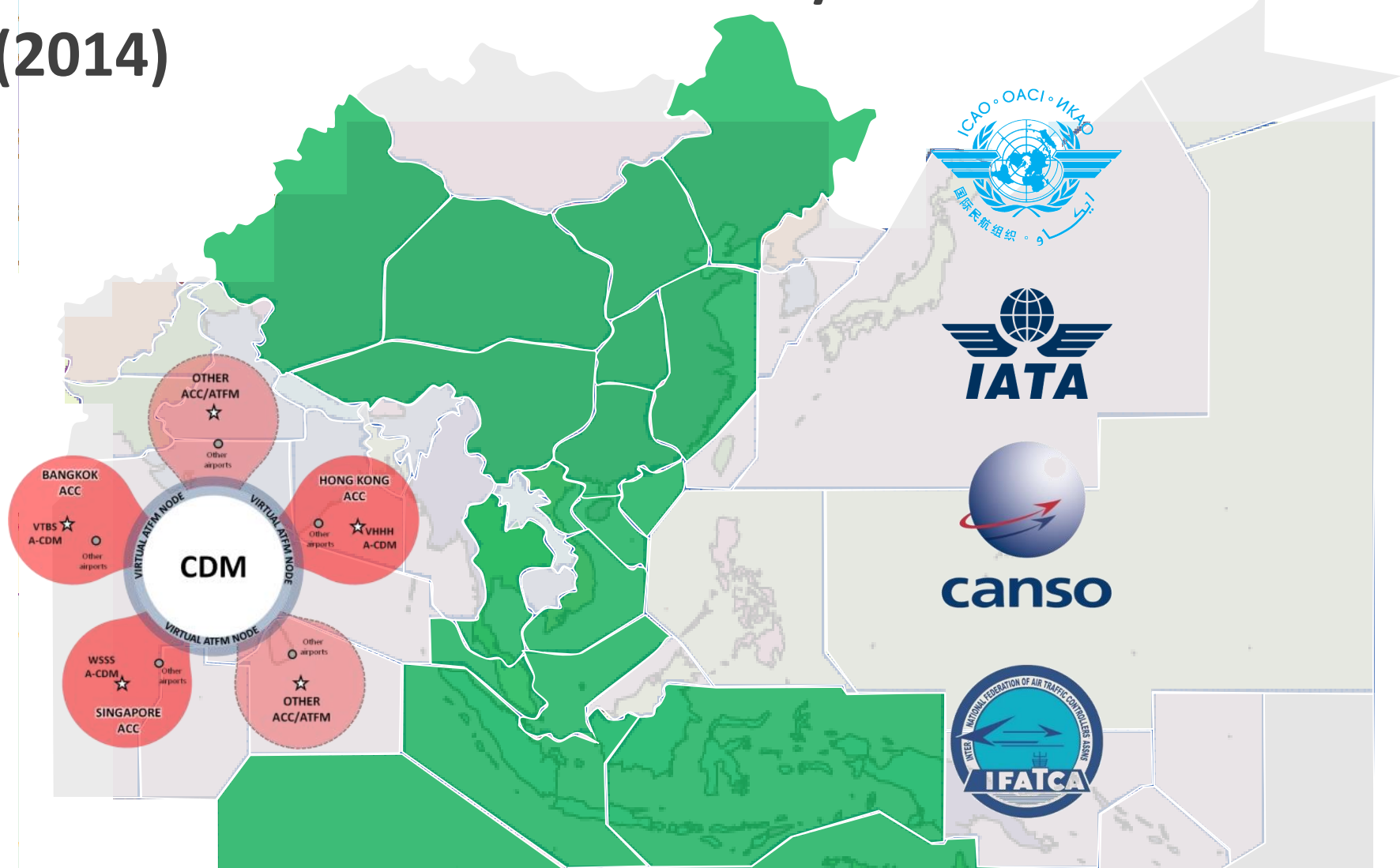


ATFM Ops Trial based on Distributed
Multi-Nodal CDM/ATFM Concept

APEC ATM Emissions Reduction (2012-2013)

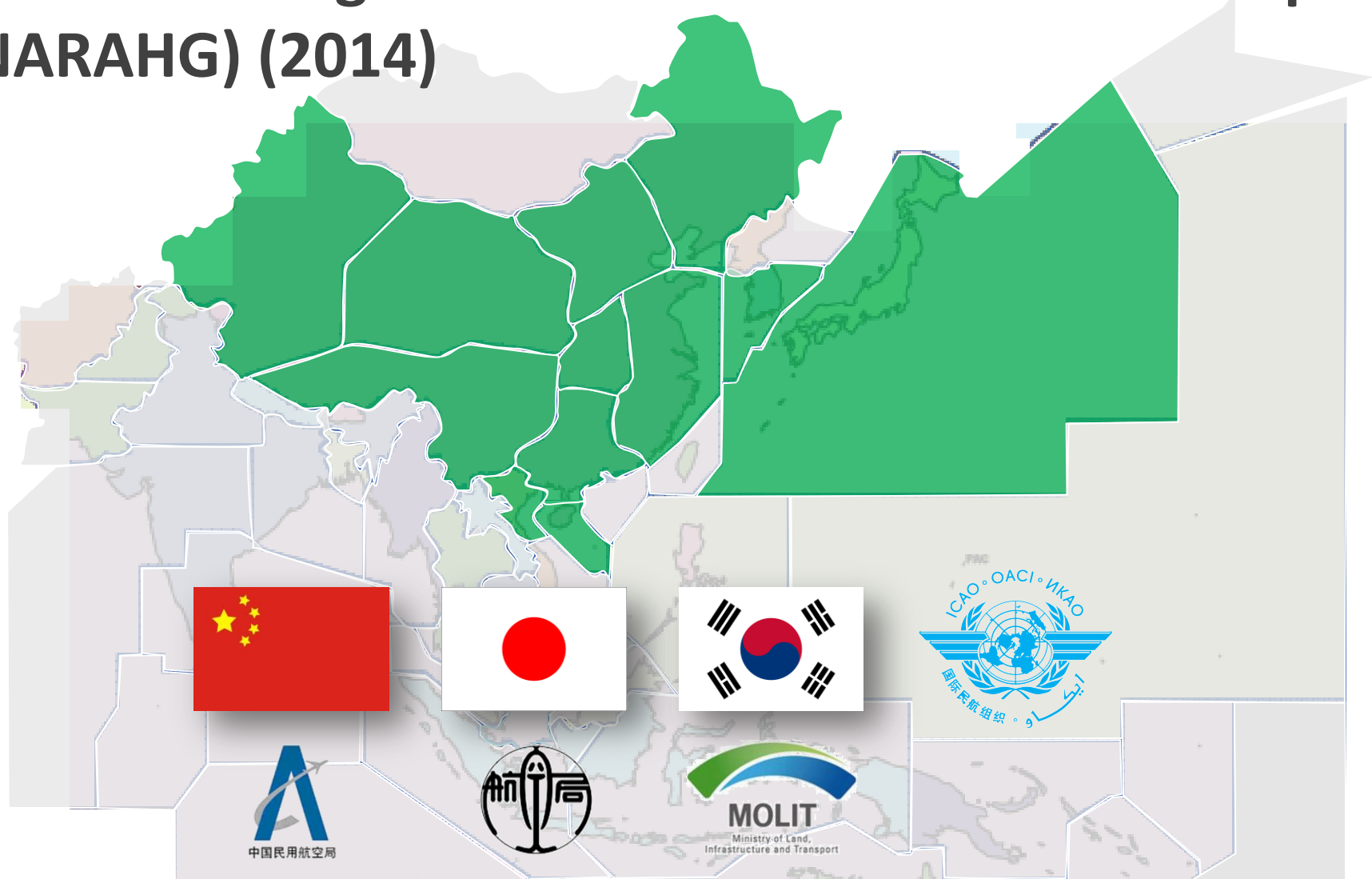


Distributed Multi-Nodal CDM/ATFM Network (2014)

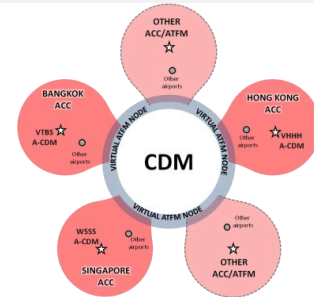


ATFM Ops Trial based on Distributed
Multi-Nodal CDM/ATFM Concept

North Asia Regional ATFM Harmonization Group (NARAHG) (2014)



Outline

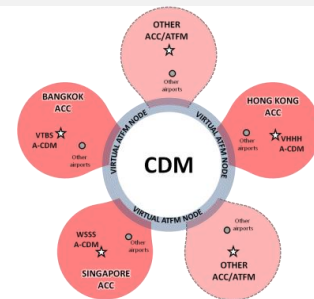


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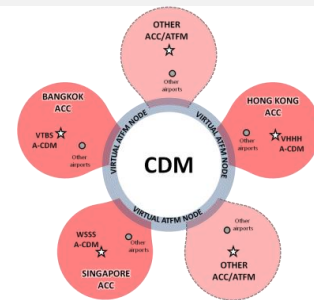
ATFM/CDM

Proof of Concept Project

- 10 months proof of concept research project supported by industry partner.
- Develop a viable ATFM/CDM concept suitable for adoption by States in the APAC region
- Concept development through the concept engineering process involving concept Analysis, Exploration, Development including a benefit analysis
- Industry Stakeholders such as ANSPs, Airlines and airports operators collaborated as key contributors of operational inputs
- The project has concluded in Jan 2014 with the concept and shared at the ICAO ATFM/SG 3 meeting



Existing ATFM/CDM Methods



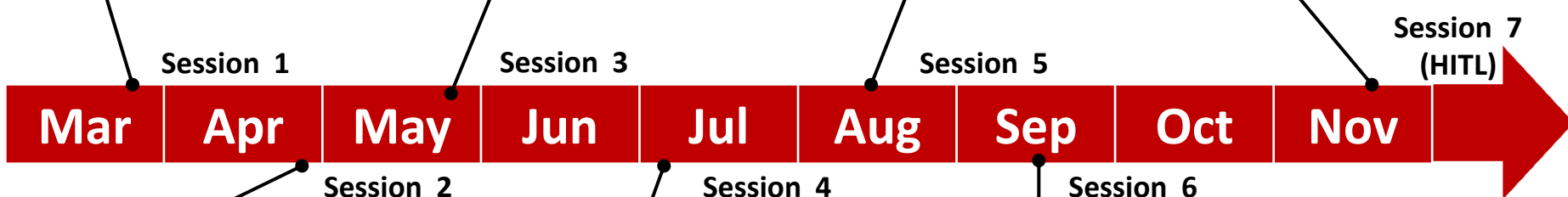
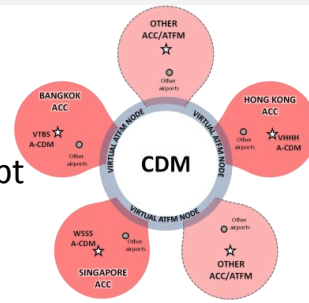
- ATFM Implementations Studied: USA, Europe, Australia, and South Africa



- Current ATFM implementations achieve demand and capacity balance when applied to flights regulated by a single authority
- Asia Pacific has a number of international hub airports with limited domestic traffic to apply existing ATFM principles
 - e.g. Hong Kong and Singapore are 100% international
 - Concept applicable to ANSPs with significant domestic traffic
- Concept had to be developed to regulate flights to an airport with a demand and capacity imbalance departing from ANSPs under a different control authority

Stakeholder Involvement

- Present concept engineering process
- Operational site visits
- Introduce and refine core functionality of Regional ATFM/CDM concept
- Discussion on specific components of concept
- Prepare for November HITL
- Validate concept in a simulation environment



- Introduce Stakeholders to current ATFM/CDM procedures and demonstrate benefits

- Explore potential modifications to improve the Regional ATFM/CDM concept

- Explore Regional ATFM concept with Thailand, Malaysia, and Hong Kong ANSPs

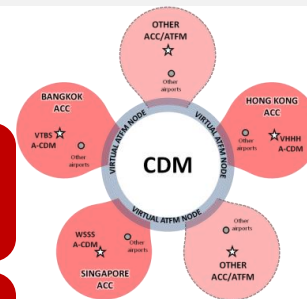
Local industry stakeholders

Local & other stakeholders

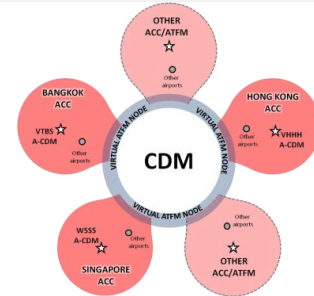


ANSP (ATC), Airlines and Airport Operators

HITL Simulation - Technology Testbed



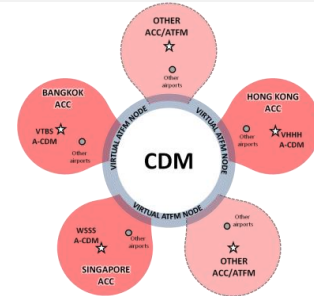
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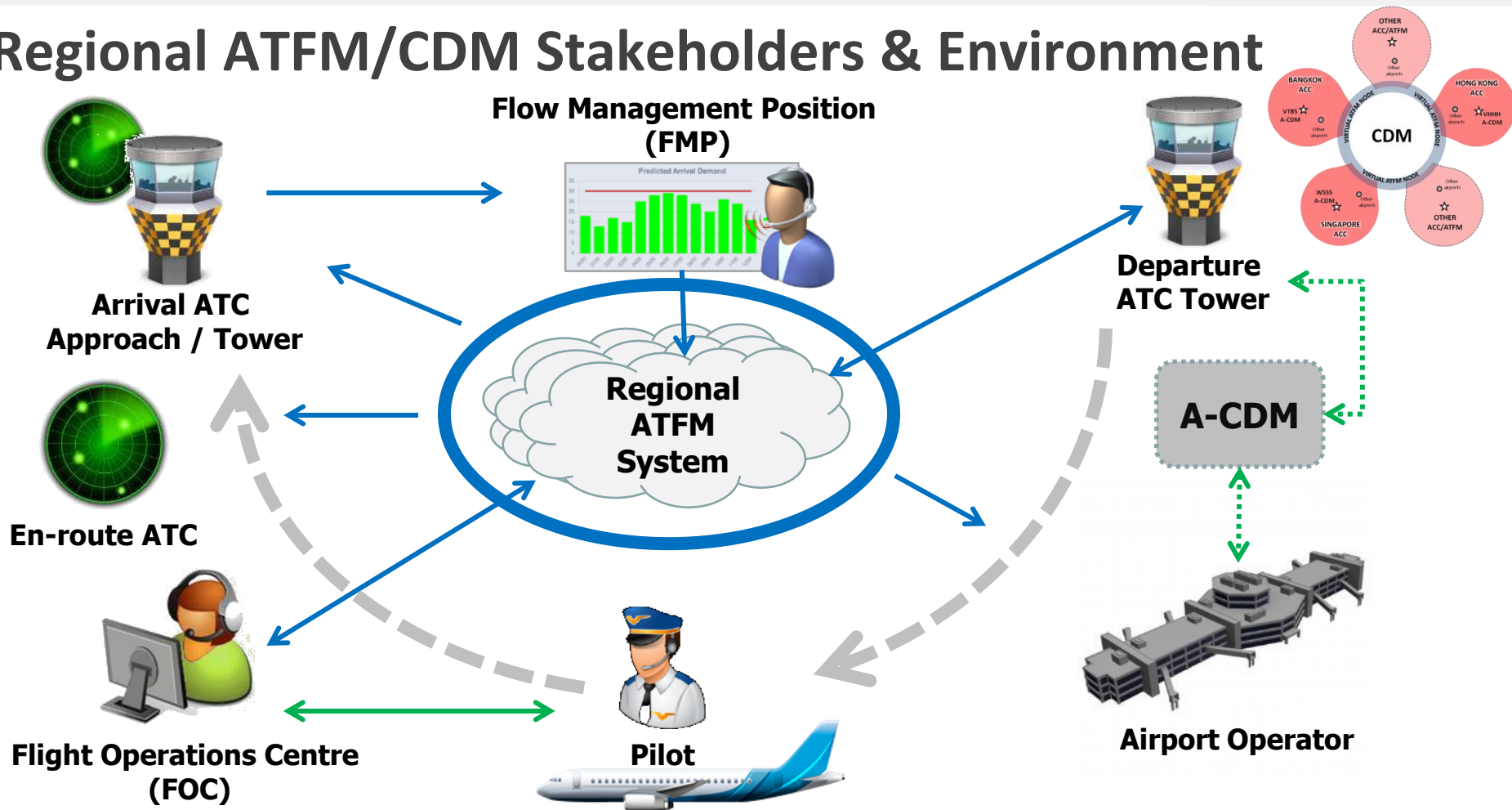
Multi-Nodal ATFM

Concept of Operation



- Each ANSP operating an independent, virtual ATFM/CDM node supported by an interconnected information sharing framework.
- A-CDM mechanisms, especially at busy airports, can supplement ATFM in the CDM process.
 - Air traffic flow effectively managed between participating ANSPs through agreed set of business rules for stakeholders.
 - Concept of Operation allows inclusion of international flights and airborne flights
- Accords greater flexibility to airspace users to manage delays through collaboration and negotiation with ANSPs and Airport Operators within existing ATC procedures and constraints

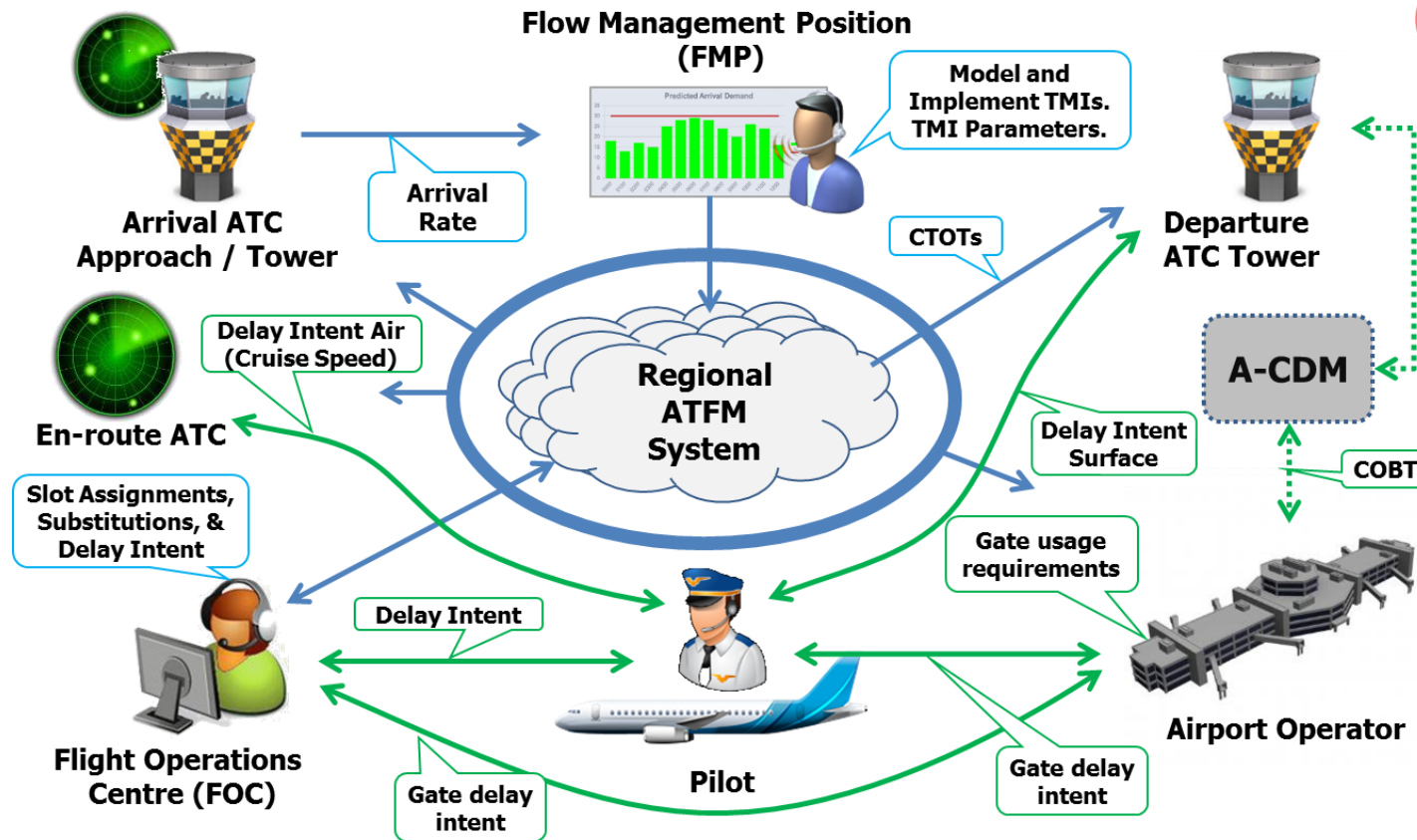
Regional ATFM/CDM Stakeholders & Environment



- Each ANSP has an independent FMP and ATFM System
- Each ANSP independently manages demand/capacity of its own Arrival Airport(s)/ Air space
- Stakeholders/ANSPs communicate via existing Internet/Telecommunications networks
- Data from each ANSP is viewable by stakeholders via software web interfaces

- Between ATFM and Stakeholders
- Between Stakeholders

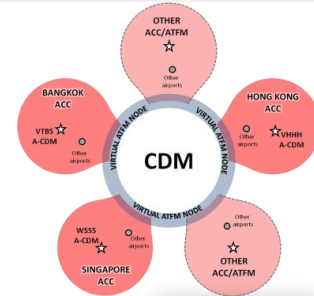
Delay Management by Aircraft Operators



- Aircraft Operators manage the TMI delay assigned to flights
- Aircraft Operators perform CDM with Airport Operators for ground/surface delay intent
- Slot assignments can be viewed via software web interface and notifications
- FOC performs CDM with Pilots to coordinate delay absorption intent and update into ATFM
- Pilots operate request Cruise Speed and Flight Levels per current ATC procedures and within ATC constraints

— • Between ATFM and Stakeholders
— • Between Stakeholders

Outline



- Recent ATFM Initiatives : Asia-Pacific



- Multi-Nodal ATFM Concept Development



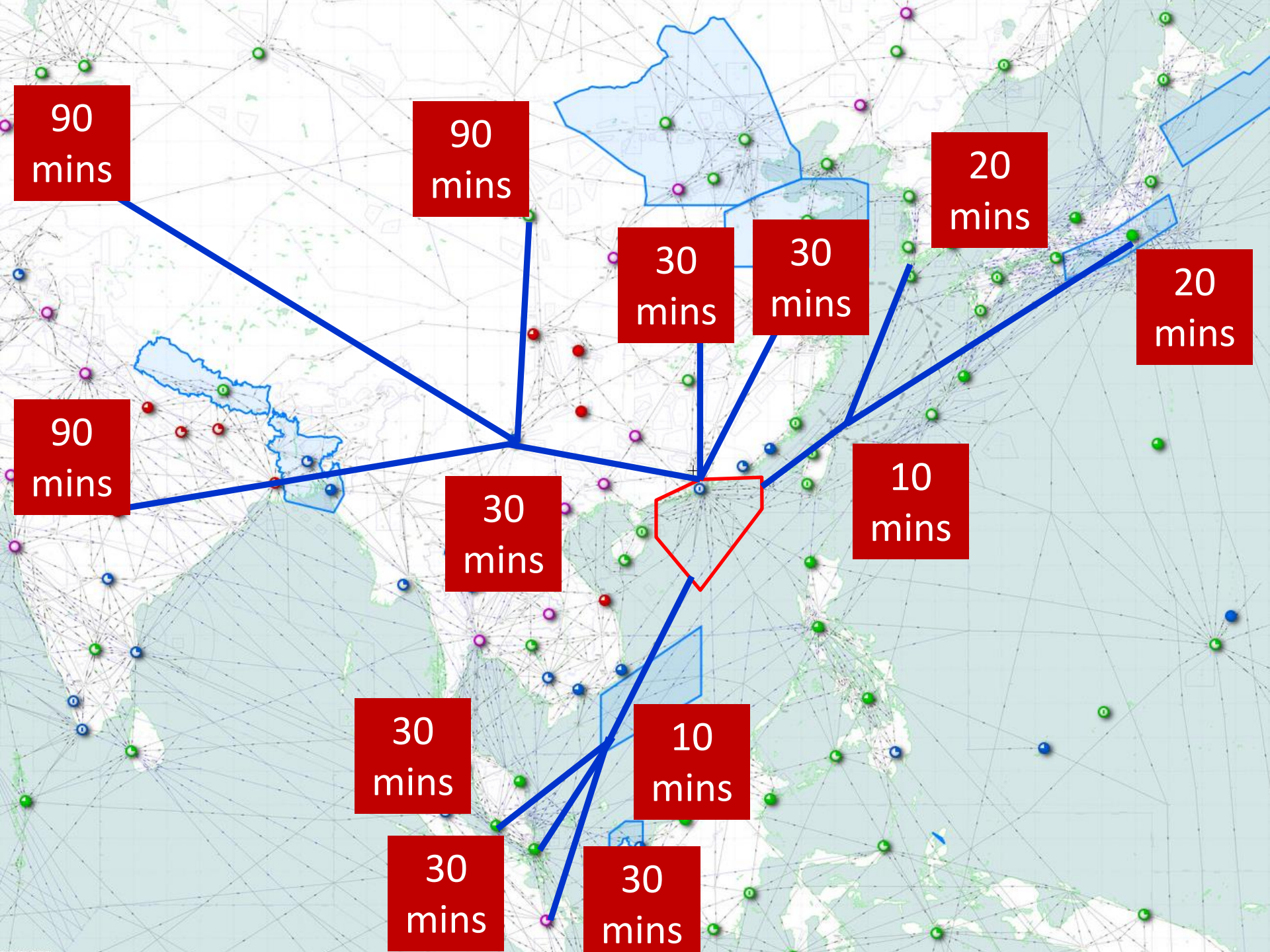
- Multi-Nodal ATFM Concept of Operations



- Benefits of Cross-Border ATFM

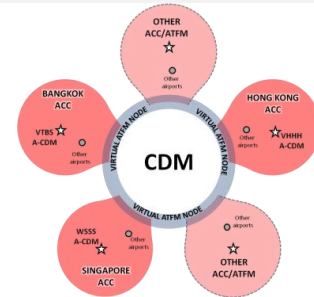
- ATFM Operational Trial based on Distributed Multi-Nodal CDM/ATFM





ATFM Operational Trial

- ATFM Operational Trial using the concept of **Distributed Multi-Nodal ATFM Network**
- Trial Participation - **ANSPs, Airport Operators and Airspace Users**
- Strong support and participation from **ICAO, IATA, CANSO** and **IFATCA**
- **Members** - Australia, China, Hong Kong China, Indonesia, Malaysia, Singapore, Thailand, Viet Nam
 - Airports of Thailand, Changi Airport Group
 - Singapore Airlines and Cathay Pacific Airways.
- **Dedicated POCs** have formed a working group to work on several essential capability building elements for the trial
- Target to **commence ATFM Operational Trial in June 2015**



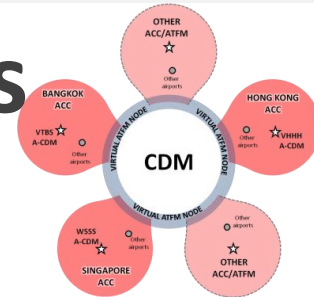
ATFM Operational Trial : Objectives

- Create greater ATFM awareness
- Increase collaboration among trial members
- Increase stakeholder participation
- Agree on common concept
- Define appropriate ATFM Tool
- Define stakeholder roles and responsibilities
- Define Business rules for stakeholder groups
- Draft appropriate ATFM procedure
- Develop ATFM education/ Training
- Identify staffing requirement
- Validate the concept
- Test various ATFM measures
- Overall cross border ATFM effectiveness

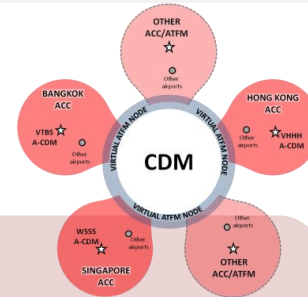
Stakeholder
engagement &
involvement

Capability development
approach

ATFM Operational Trial
as the test platform



ATFM Ops Trial : Phased Approach



Phase 1 2015

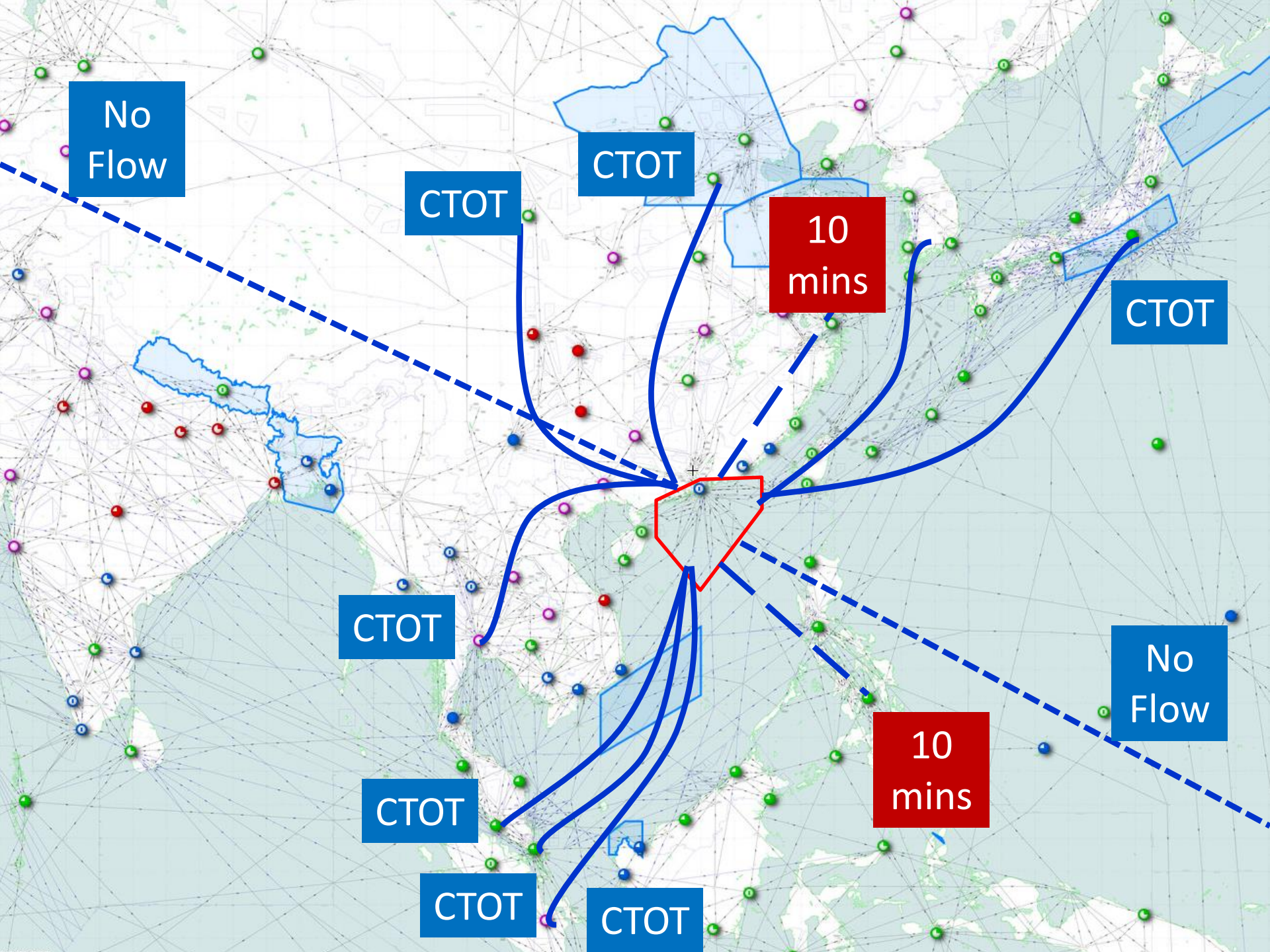
- Distributed Ground Delay Program
 - Airport Arrival Constraints (short-term & medium-term) e.g. weather, runway outage

Phase 2

- Ground Delay Program supporting Airspace Congestion & Capacity Planning
- Explore interconnectivity among ATFM systems

Phase X Vision

- Fully interconnected Global ATFM Service
- Integration with SWIM and 4D-Trajectory Management



No Flow

CTOT

CTOT

10 mins

CTOT

CTOT

No Flow

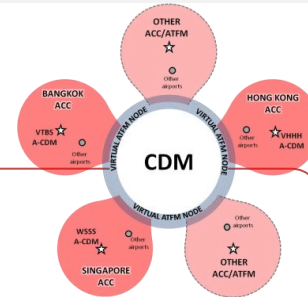
CTOT

10 mins

CTOT

CTOT

Tiered Participation Level : ANSPs



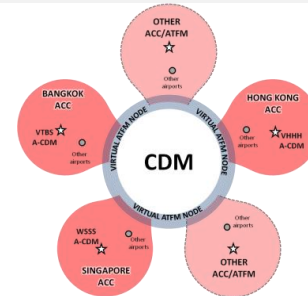
- Level 0**
- Current Operations: MDI, MIT, MINIT, etc.

- Level 1**
- Observe ATFM Ops Trial (includes Level 0)

- Level 2**
- Facilitate CTOT for Departures (includes Level 1)

- Level 3**
- Demand-Capacity Balancing (DCB) Capability (includes Level 1 and Level 2)

ATFM Ops Trial : Aircraft Operator



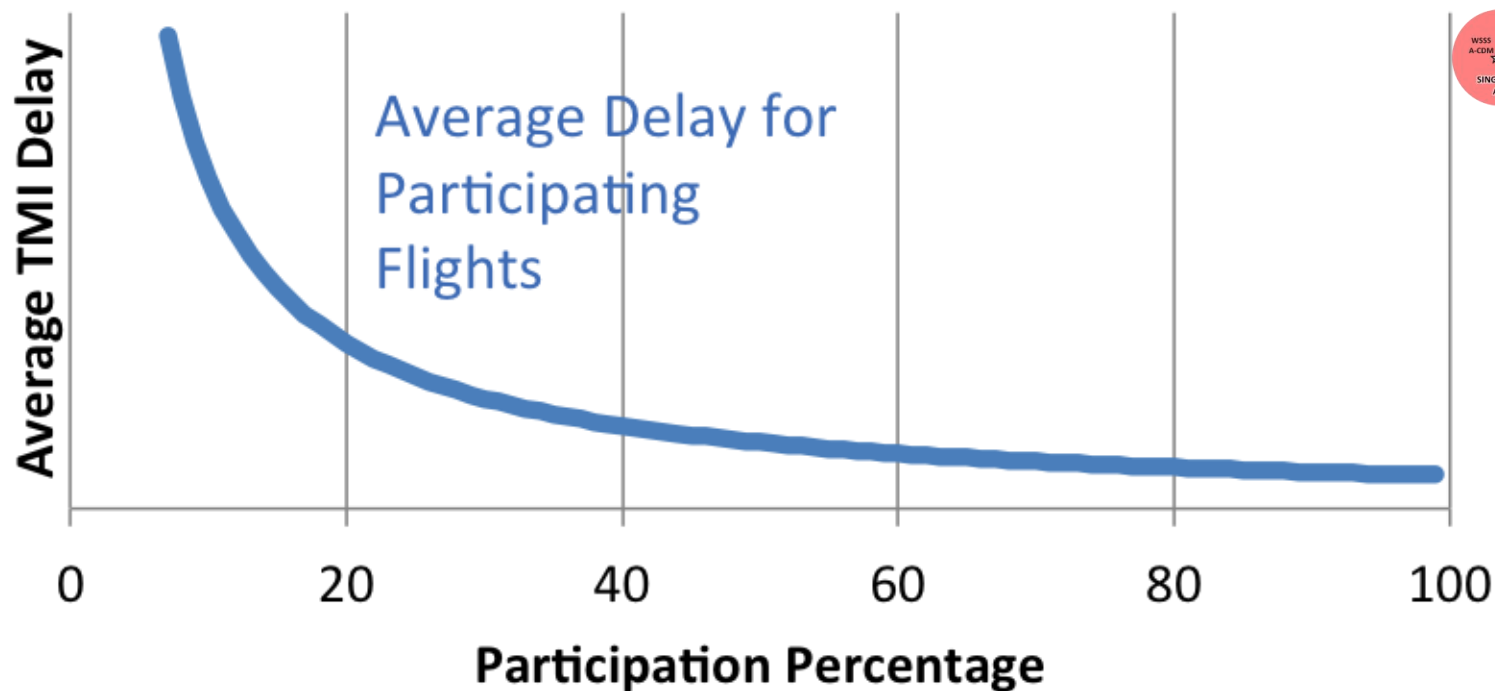
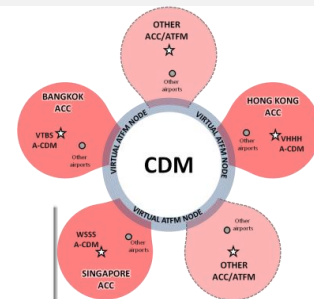
Level 1

- Participate in ATFM Ops Trial
- Manage flight based on CTOTs

Level 2

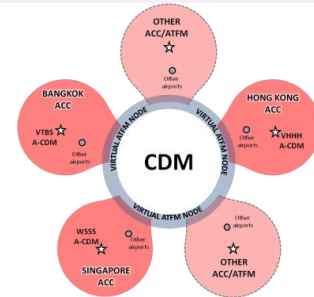
- Advanced CTOT Management
 - Slot Swapping
 - CTOT User Input (Delay Intent)

ATFM Ops Trial : Aircraft Operator



Maximum Participation of flights is key for equitability
 and effectiveness of ATFM Ops Trial outcomes

ATFM Ops Trial : Airport Operator



- The trial offers the opportunity to chart the A-CDM framework support for ATFM
- Airport Operator has the opportunity to examine and derive acceptable delay component at gates
- Airport Operator & ANSP has opportunity for establishing the collaborative framework to support an interlinked ATFM and A-CDM mechanisms
- The collaborative framework bring greater predictability to air traffic flow and optimisation of resources at Airport and airspace
- Optimisation of resources → reduced wastage of capacity → Savings

ATFM Operational Trial : “Evolution”



Ops Trial 1 (Phase 1) : Starting Out – June 2015

- Step 1: Testing linkages, CTOT calculation and distribution, Communication trials (parallel convent. ATFM)
- Step 2: Implement CTOT for departures



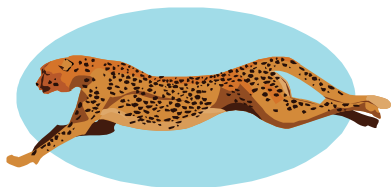
Ops Trial 2 (Phase 1) : Gaining Confidence – Sept 2015?

- Automated Slot Swapping? Further enhancements ...

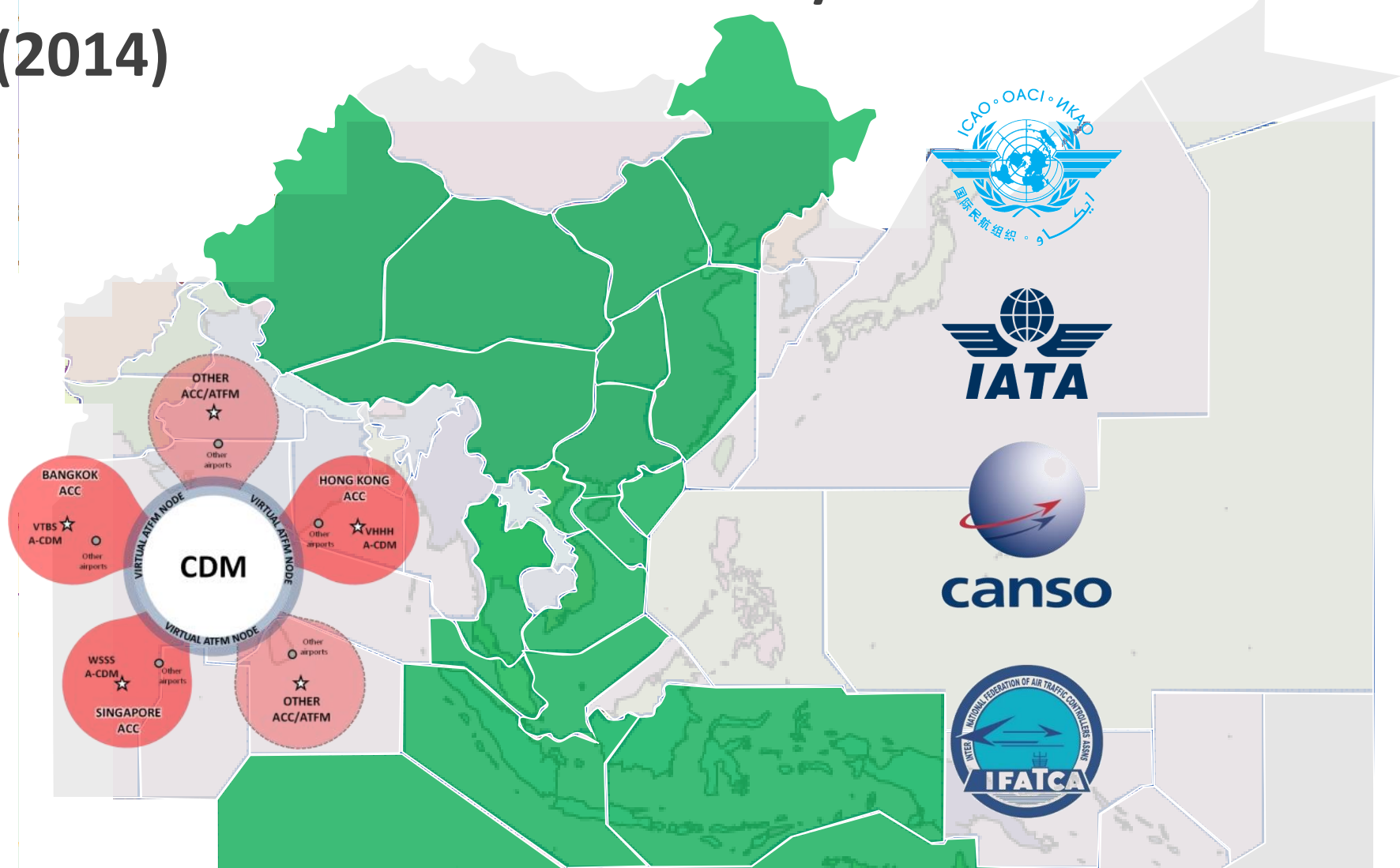


Ops Trial Phase 2:

- Address congestion at other ATM resources : airspace

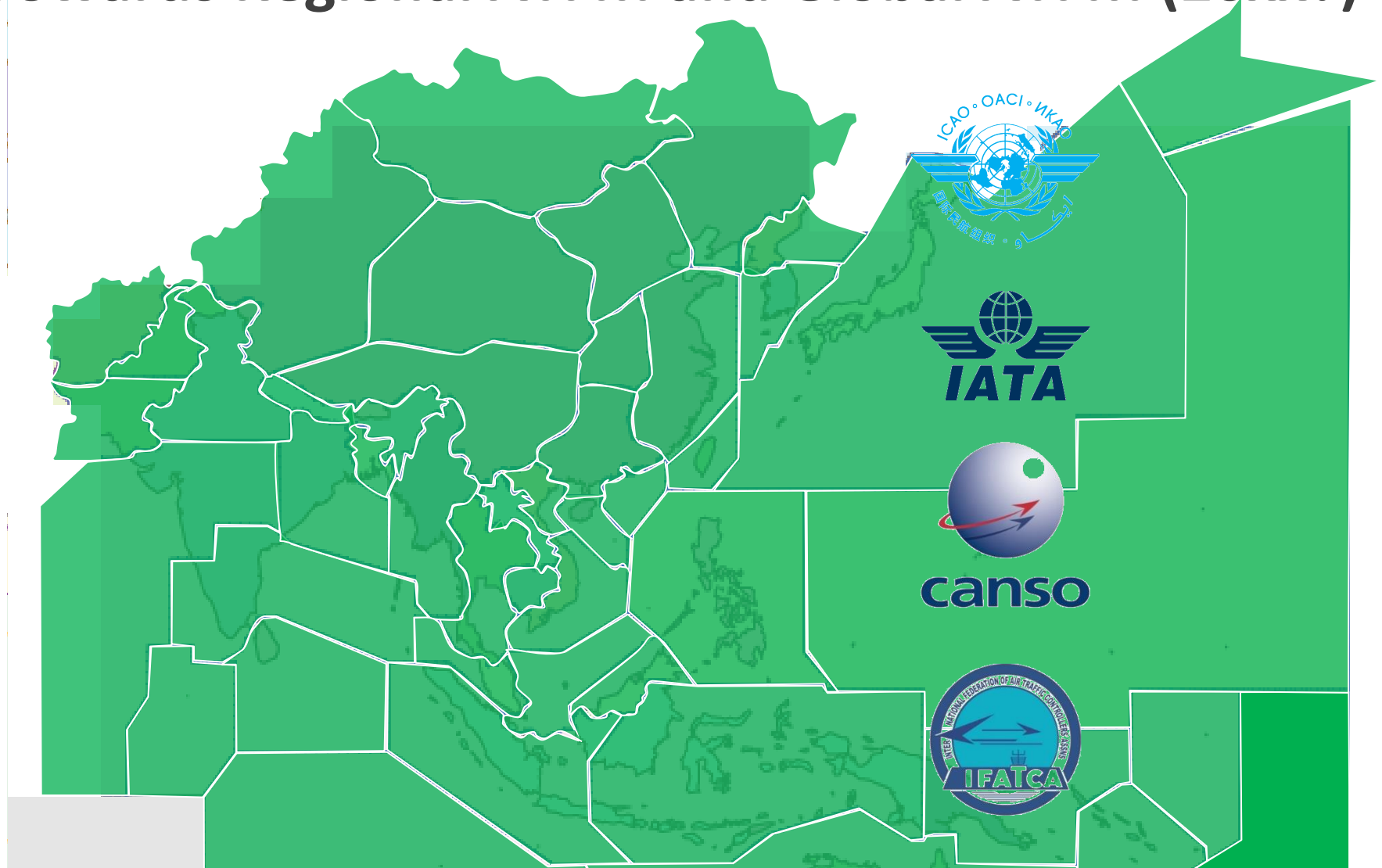


Distributed Multi-Nodal CDM/ATFM Network (2014)



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Towards Regional ATFM and Global ATFM (20xx?)



ATFM Ops Trial based on Distributed
Multi-Nodal CDM/ATFM Concept

QUESTIONS & DISCUSSIONS