

A photograph of an air traffic control tower at sunset. The tower is illuminated with blue lights, and its top is lit with a bright yellow light. The sky is a mix of orange, red, and purple. The tower is on the left side of the image. The text is on the right side of the image.

# Distributed Multi-Nodal ATFM Operational Trial

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

# Distributed Multi-Nodal ATFM concept of operation

- Each ANSP operating an independent, virtual ATFM/CDM node supported by an interconnected information sharing framework
- Airport-CDM mechanisms, especially at busy airports, can supplement ATFM in the CDM process
- ATFM between participating ANSPs through agreed set of business rules for key stakeholders
- Concept of Operation will allow inclusion of international flights and airborne flights
- Traffic Management Initiative (TMI) through dissemination of Calculated Take Off Time (CTOT) at departure
- Accords greater flexibility to airspace users to manage delays through collaboration and negotiation with ANSPs and Airport Operators within existing ATC procedures and constraints

# The Journey to the Starting Line

- ATFM Ops Trial Kick-Off Meeting in June 2014 in Singapore
- Total of Six Ops Trial Project Meetings took place over 12 months
- Numerous teleconferences
- **ATFM Ops Trial commenced on 29 June 2015**



# Distributed Multi-Nodal ATFM Operational Trial

## Tiered Participation Model

**Level 3 ATFM Nodes**  
Generate, Distribute, Comply to CTOT

- China
- Hong Kong China
- Singapore
- Thailand

**Level 2 ATFM Nodes**  
Receive and Comply to CTOT

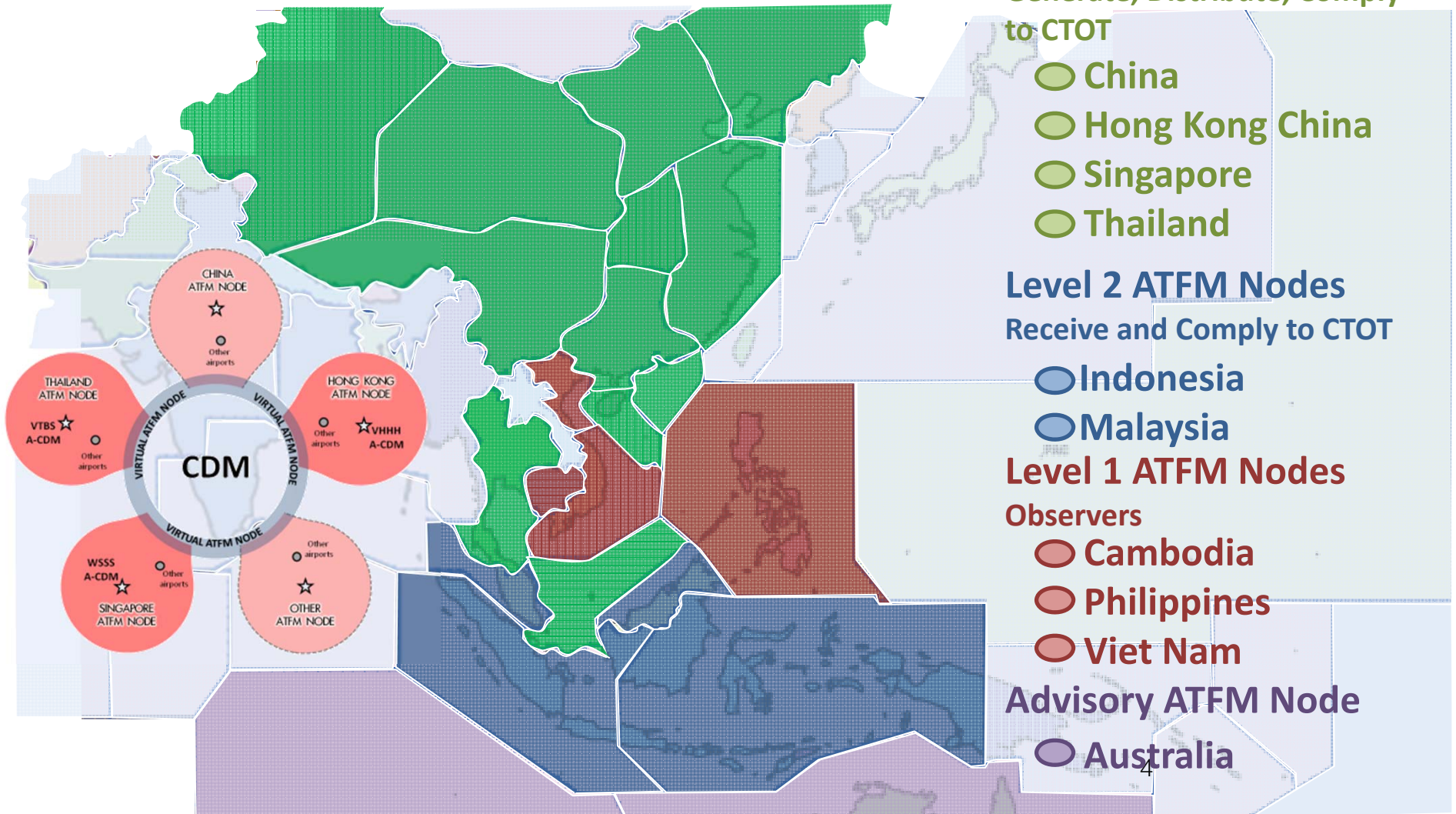
- Indonesia
- Malaysia

**Level 1 ATFM Nodes**  
Observers

- Cambodia
- Philippines
- Viet Nam

**Advisory ATFM Node**

- Australia



# Distributed Multi-Nodal ATFM Operational Trial

## Tiered Participation Model

Tiered Participation Level	Capabilities	Number of Members
Level 3 ATFM Nodes	Capable to generate, deliver, receive, and comply with CTOT	4 ANSPs 13 airports 13 airlines
Level 2 ATFM Nodes	Capable to receive and comply with CTOT	2 ANSP 13 airports 8 airlines
Level 1 ATFM Nodes	Observe and participate in the Trial Progress	3 ANSPs
Advisory ATFM Nodes	Provide advice to the Trial	1 ANSP

# Distributed Multi-Nodal ATFM Operational Trial

## Phased Approach

**Phase 1**  
**2015 - 2016**

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

**Phase 2**

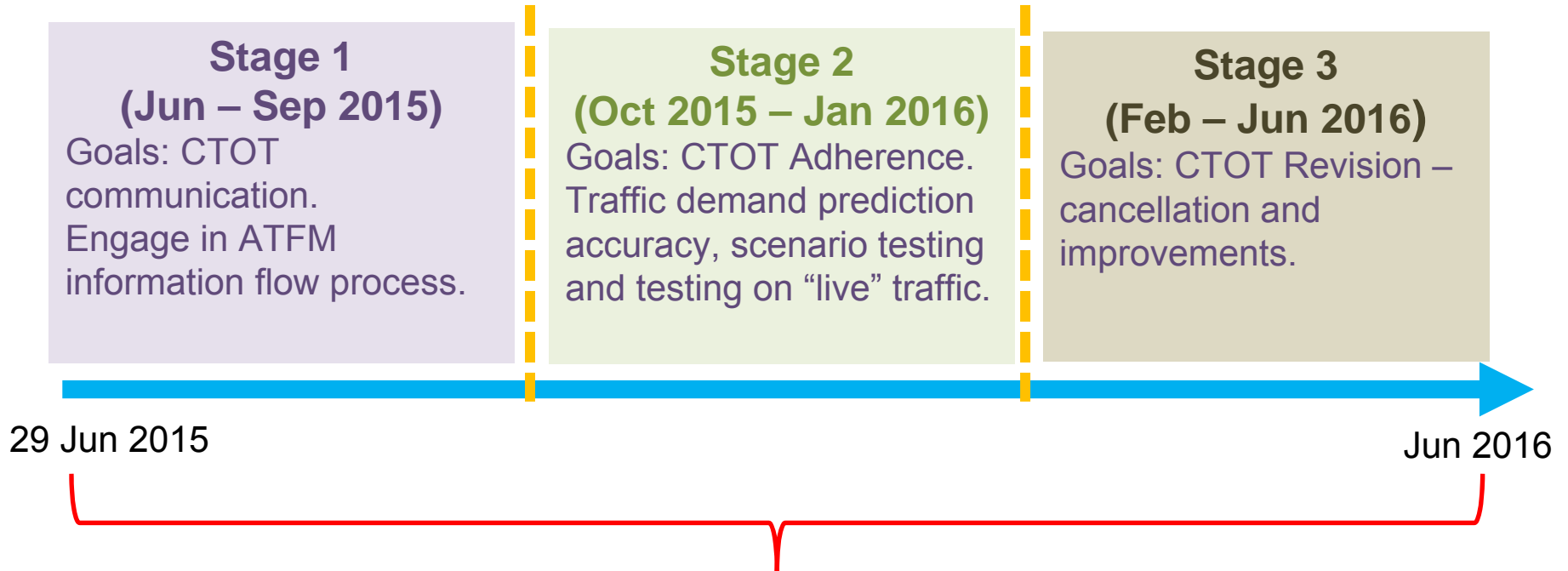
- Ground Delay Program supporting Airspace Congestion & Capacity Planning
- Explore interconnectivity among ATFM systems

**Phase X**  
**Vision**

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

# Distributed Multi-Nodal ATFM Operational Trial

## Phased 1



- Goals:
- 1) Establish Cross-border ATFM/CDM Framework
  - 2) Regulated Traffic Flow into airports (Demand/ Capacity Balancing)
  - 3) Predictability in operation
  - 4) Reduction in airborne holdings

# Distributed Multi-Nodal ATFM Operational Trial

Week Starting	Activity
29 Jun 2015	Test Communications and Conferencing Framework
6 Jul 2015	Familiarization with Web-Portal for CTOT Delivery
13 Jul 2015	FPL Submission (3hrs before EOBT) ICAO Message Handling
20 Jul 2015	Monitor effectiveness of demand prediction
27 Jul 2015	Mid-Trial Operational Trial Review
3 Aug 2015	Determine Airport Acceptance Rate (AAR) from inputs
10 Aug 2015	ATFM Daily Plans (ADPs)
17 Aug 2015	Use of ATFM Tool to Model CTOT; Transmit and receive CTOT
24 Aug 2015	Simulate multiple ATFM Measures
31 Aug 2015	End-of-Stage 1 Operational Trial Review
7 Sep 2015	Preparation for Stage 2
15-16 Sep 2015	Multi-Nodal ATFM Ops Trial Project Meeting (Multi-Nodal/7)





# Distributed Multi-Nodal ATFM Operational Trial

## Stage 1 - Communication Framework

### Communications framework

- Information dissemination (ADP and CTOT information)
- CDM processes
- Weekly test
  - Each node conduct 1 day while the rest support
  - Review teleconferences

# Distributed Multi-Nodal ATFM Operational Trial

## Lessons Learned

- Efficient and well-defined communications framework
  - Project and Ops Points of Contact
  - Dissemination of Alerts and Acknowledgements
  - Web Portal + E-Mail notification
  - Optional CTOT delivery via AFTN / Slot Allocation Messages
- Flight Plan filing requirements
  - FPL submission 3 hours before EOBT
  - Submission of CHG/DLA message when EOBT diverge by more than 15 minutes
  - Prompt submission of CNL

# Distributed Multi-Nodal ATFM Operational Trial

## Lessons Learned

- Lead Time
  - Practical timeline should be considered for processes such as AAR determination by ATFM Units, assessment of the operational effects of ATFM Measures by AUs and AOs, CDM web conferences, etc.
  - Processes prior to issuing of CTOTs affects the lead time stakeholders have to make operational preparations and adjustments, if required
  - Lead time provided prior to implementation of GDP is an important factor to consider for successful implementation of ATFM
- Co-ordination for multiple ATFM measures
  - Pro-active real time co-ordination by ATFMUs would be required to combine or de-conflict processes that involve the same stakeholders

# Distributed Multi-Nodal ATFM Operational Trial

## Stage 2

1. Traffic demand prediction accuracy
  - Data and Statistic Framework Development
  - Data Analysis
  - Airline and Airport Engagement
2. Scenario Testing of ATFM Measures
  - Scenario exercises and validation
  - Test Script development and validation
3. Controlled testing on “live” traffic
  - Conduct testing on selected “live” traffic under controlled environment

# Distributed Multi-Nodal ATFM Operational Trial

## Stage 3

1. Defined scope controlled testing on “live” traffic
  - Conduct testing of “live” traffic under controlled environment and within a defined scope
2. Advance CTOT Management
  - CTOT revisions and cancellations
  - Slot swapping
  - Test Script Development and validation

# Aeronautical Meteorological (MET) Information for ATFM

- Accurate capacity determination and adjustments are key for effective ATFM
- Accurate weather forecast and predictions are necessary for adjustments on Airport Acceptance Rate (AAR) to achieve demand-capacity balancing
- Need for close working relationship between ATM and MET

# ATFM and A-CDM

- ATFM and A-CDM integration is also essential to successful ATFM
- Nodes could explore possibility to link ATFM and A-CDM frameworks, to create seamless air traffic flow operations within Airports

Thank you