# Distributed Multi-Nodal ATFM Operational Trial

Cross Border ATFM Workshop, Jakarta, Indonesia

21 – 22 October 2015

CAAS

Civil Aviation Authority of Singapore

# 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

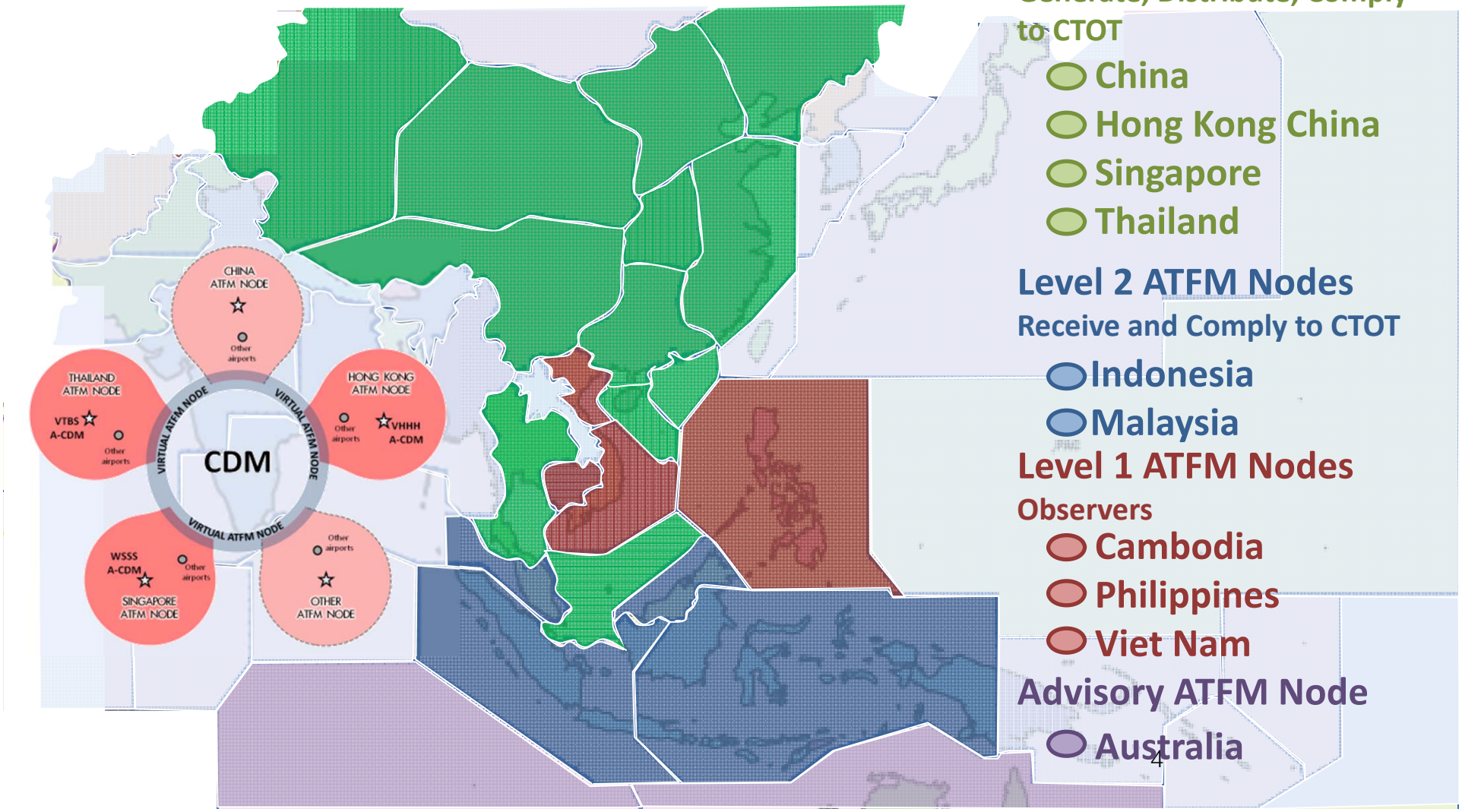
# The Journey to the Starting Line

- 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<br>13 airports<br>13 airlines |
| **Level 2 ATFM Nodes** | Capable to receive and comply with CTOT | 2 ANSP<br>13 airports<br>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**

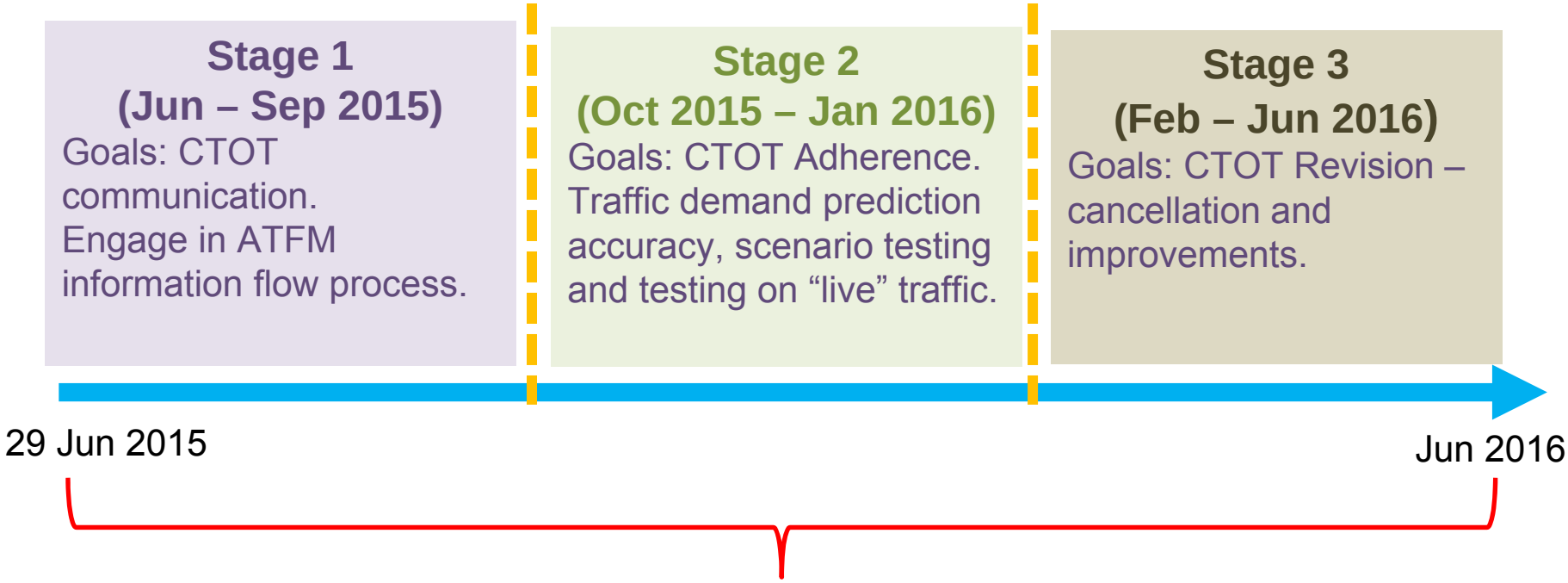
- Ground Delay Program supporting Airspace Congestion & Capacity Planning
- Explore interconnectivity among ATFM systems

**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 Handing |
| 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

- Collaboration between CAAS and Changi Airport Group (CAG) to conduct A-CDM trial
- Plans to link ATFM and A-CDM frameworks, through the application of CTOT, to create seamless air traffic flow operations within Changi Airport

Thank you

Civil Aviation Authority of Singapore