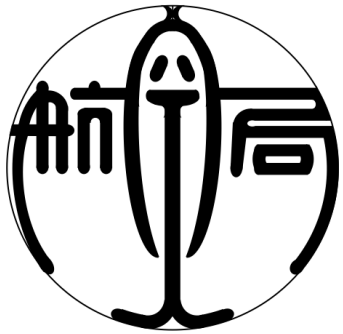
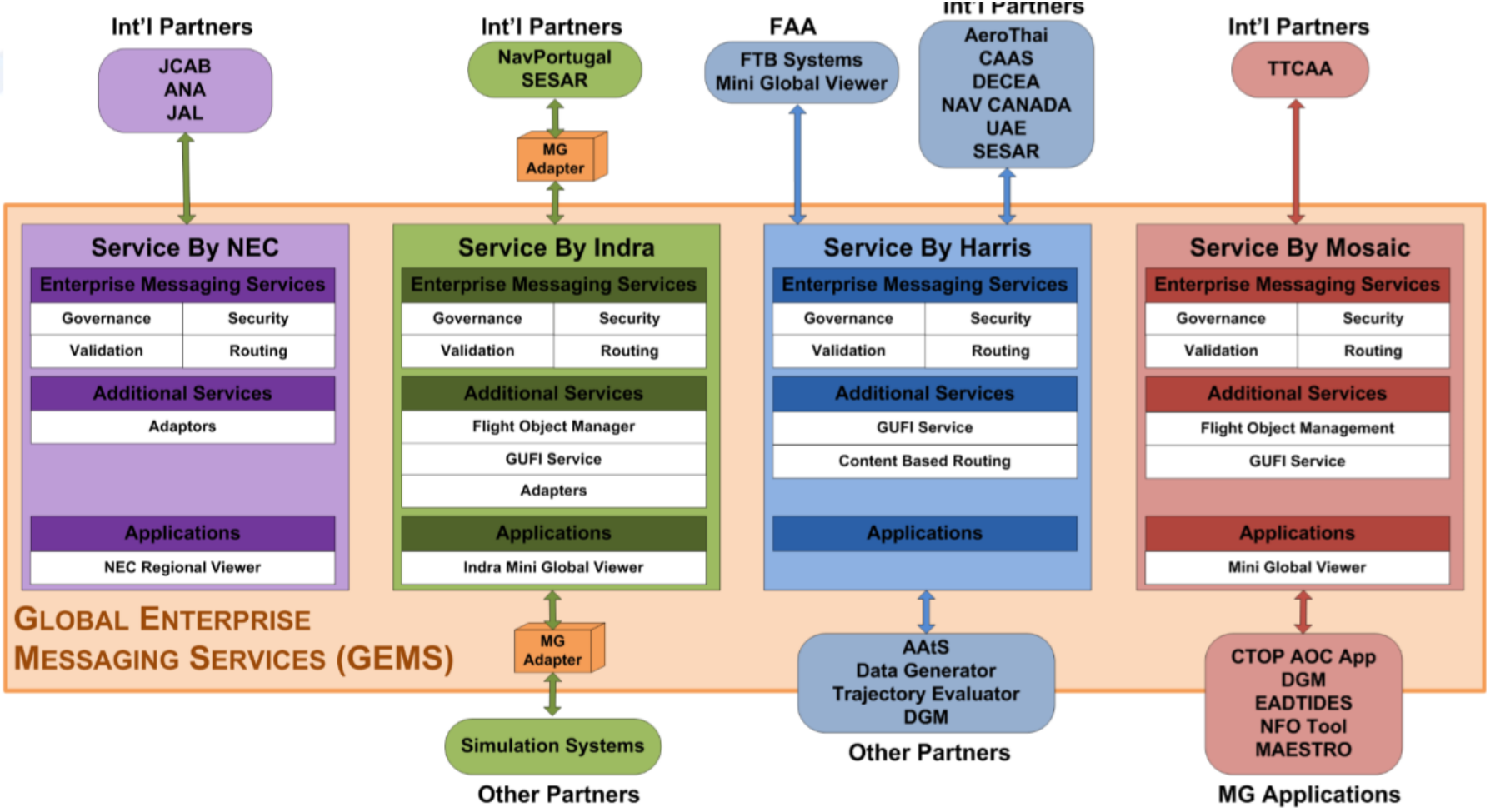
CAAS

Civil Aviation Authority of Singapore



GEMS Architecture



SWIM Applications

- Trajectory Evaluator (TE)
  - Run queries on airspace constraints
  - Evaluate impact to planned flight routes
- Data Governance Module (DGM)
  - Check compliance of all messages with the AIXM, FIXM and iWXXM standards
  - Keeps a record of all message passing through it
  - Data query on stored messages
  - Display tracks and messages
  - Performance dashboard

Partner Systems

- CAAS Mini Global Simulator (far left screen)
- JCAB Mini Global Simulator (center left screen)
- DGM and TE (center right screen)
- AEROTHAI Enterprise Messaging Service and MG II Test simulator (far right screen)

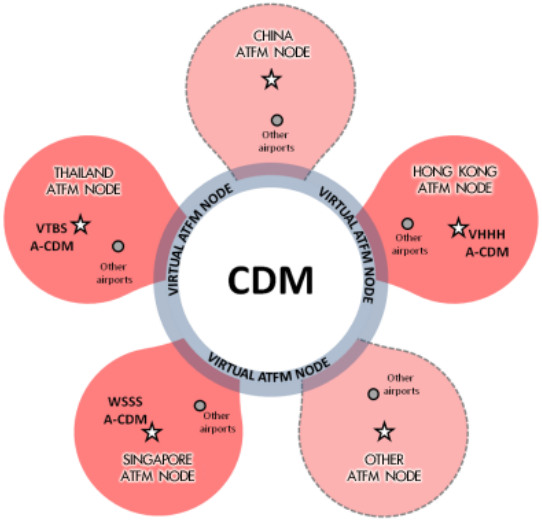
SCENARIO

Cross Border Air Traffic Flow Management (AEROTHAI)

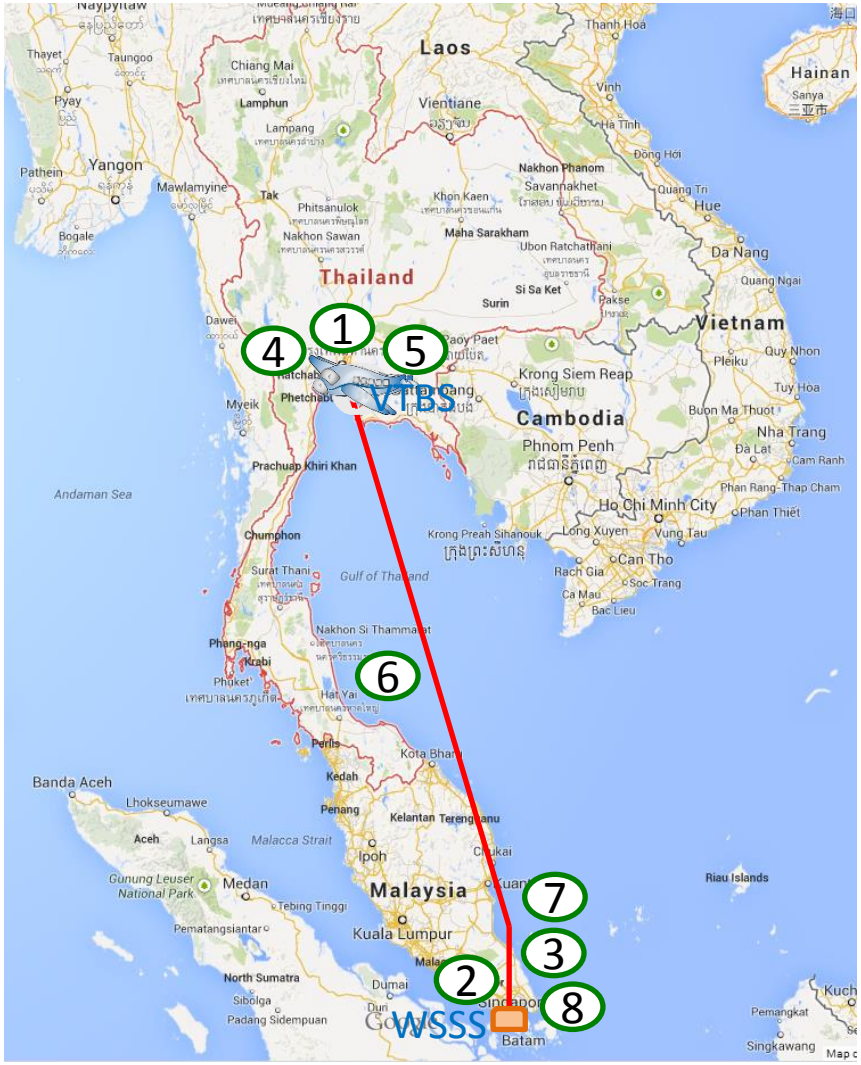
Cross-Border Air Traffic Flow Management

Distributed Multi-Nodal ATFM Operational Trial

- Demand and Capacity Balancing at capacity-constrained airports
- Manage arriving flights using Ground Delay Program
- Issuance of Calculated Take-Off Time (CTOT)
  - Publish CTOT on Web Portal
  - E-mail alerts about the implementation of ATFM measures, CTOT published on Web Portal, and slot management Web Conference
  - Optional delivery of CTOT using AFTN/ADEXP message



Cross-Border Air Traffic Flow Management



1. AEROTHAI submits Flight Plan
2. CAAS issues NOTAM for runway closure at Singapore Changi Airport
3. CAAS publishes Calculated Take-Off Time (CTOT)
4. AEROTHAI publishes Target Take-Off Time (TTOT)
5. AEROTHAI publishes Departure message
6. AEROTHAI publishes airborne track data within Bangkok FIR
7. CAAS publishes airborne track data within Singapore FIR
8. CAAS publishes Arrival message

Cross-Border Air Traffic Flow Management Operational Benefit

- Improve Air Traffic Flow Management across international FIR boundaries
- Improve information flow
  - Improved *predictability*
  - Improved information access
  - Improved flight data exchange between authorized stakeholders
  - Improved CDM
  - Improved efficiency – Optimize traffic flow to accommodate airport and airspace constraints
  - Reduced unnecessary fuel burn and carbon emission

SCENARIO

Hazardous Weather Avoidance (CAAS)

Hazardous Weather Avoidance (Tokyo-SIN)

- Operational Story
  - Advance information allows for better planning
  - Increased predictability
  - Better flying experience for passengers
  - This scenario gives advance warning for severe turbulence in Singapore's FIR
  - Allows time to file a flight plan change to re-route around the turbulence

Hazardous Weather Avoidence (Tokyo-SIN)

Scenario

1. JCAB Files the flight plan for JAL77
2. CAAS issues a SIGMET for severe turbulence over an area of the South China Sea that impacts the flight plan.
3. JCAB updates the flight plan of JAL77 to avoid this area
4. JCAB publishes a DEP message
5. JCAB issues TRACKS
6. CAAS issues TRACKS
7. CAAS issues ARR message

Ops Benefits

- Same as before early information about weather aids in decision making
- This time the decision is to fly an alternate route to avoid the turbulence.

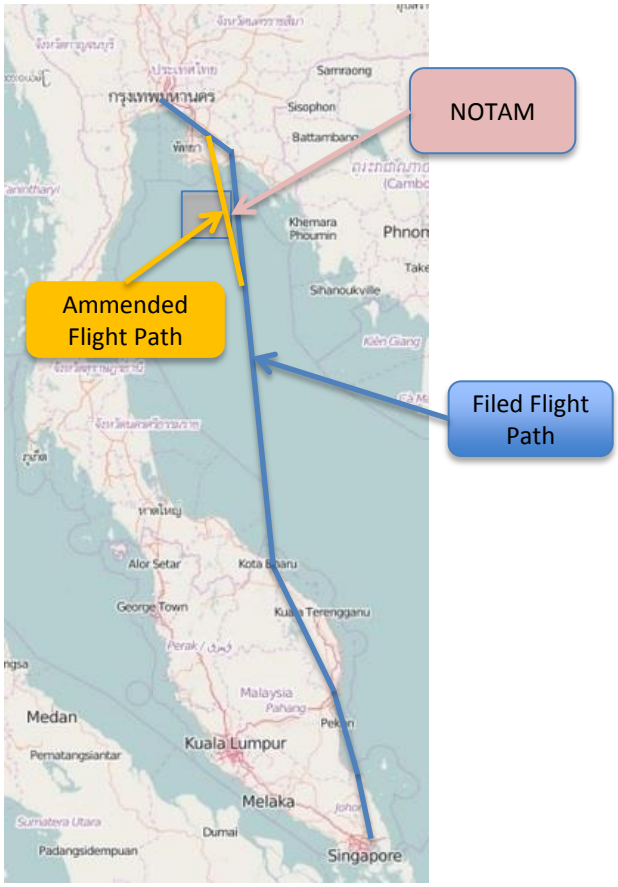
SCENARIO

Data Confidentiality with AIXM (CAAS)

Data Confidentiality AIXM (SIN – BKK)

- Operational Story
  - Similar to the previous scenario
  - Advance information allows for greater predictability
  - Also to demonstrate data confidentiality.
    - Information is only shared between qualified parties
    - Only AEROTHAI and CAAS receive each other's information
    - JCAB cannot see the tracks being published by either party.

Data Confidentiality AIXM (SIN – BKK)



Scenario

1. **AEROTHAI issues NOTAM activating the Danger Area**
2. **CAAS Submits Flight Plan**
3. **AEROTHAI issues 2nd NOTAM de-activating Danger Area**
4. **CAAS submits a flight plan update**
5. **CAAS publishes a DEP message**
6. **CAAS issues TRACKS**
7. **AEROTHAI issues TRACKS**
8. **AEROTHAI issues ARR message**

Ops Benefits

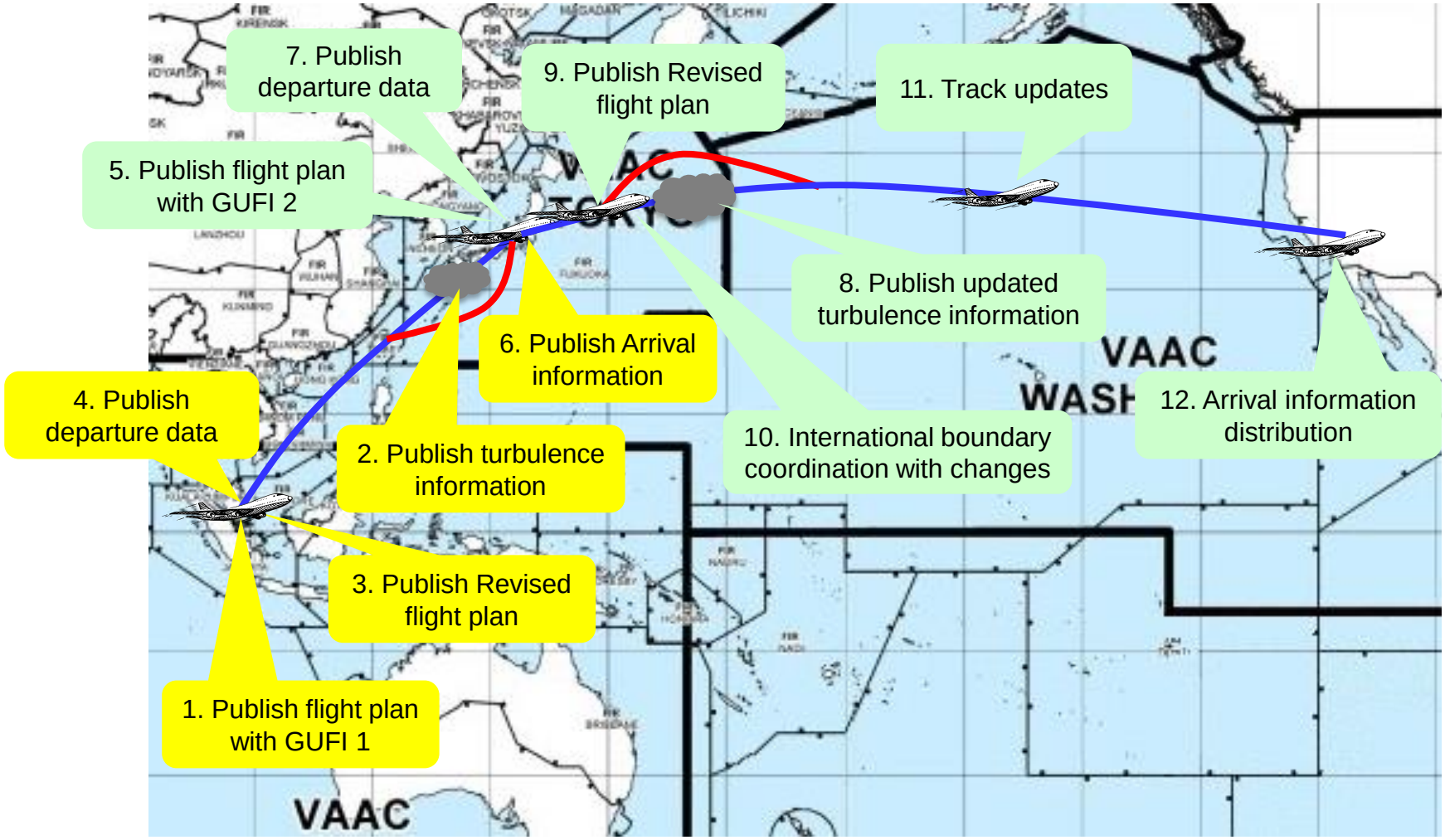
- **Timely provision of information allows for optimization of the flight route to take a shorter path.**

SCENARIO

Pacific Transit (JCAB)

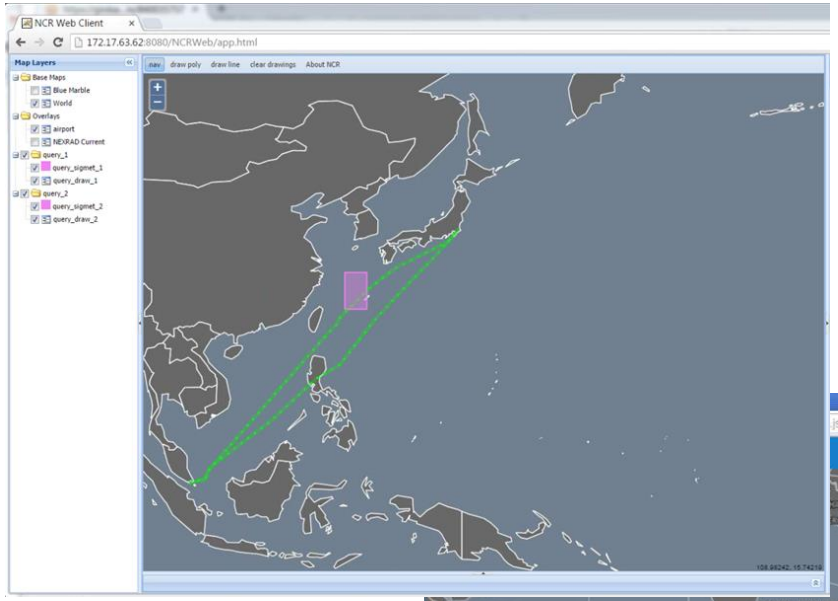
Trans-Pacific Operations

- **Scenario**

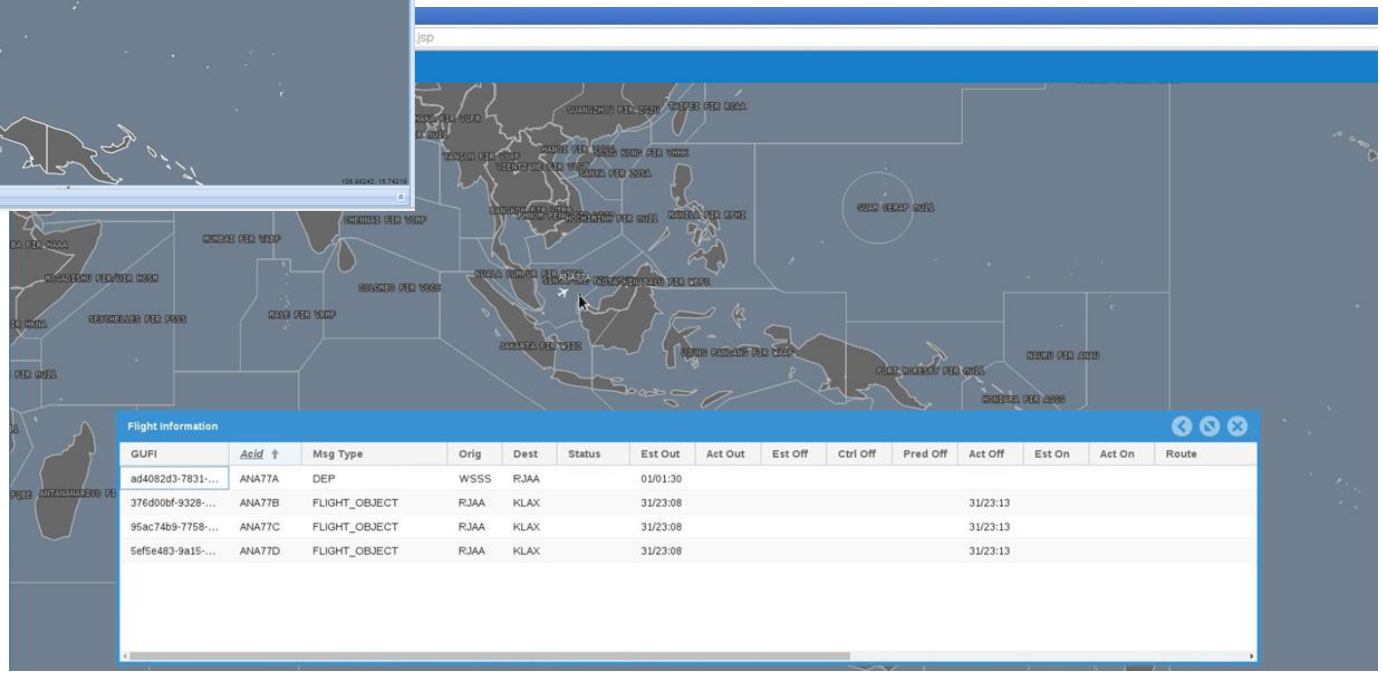


Trans-Pacific Operations

- **Part 1: SIN-Tokyo**



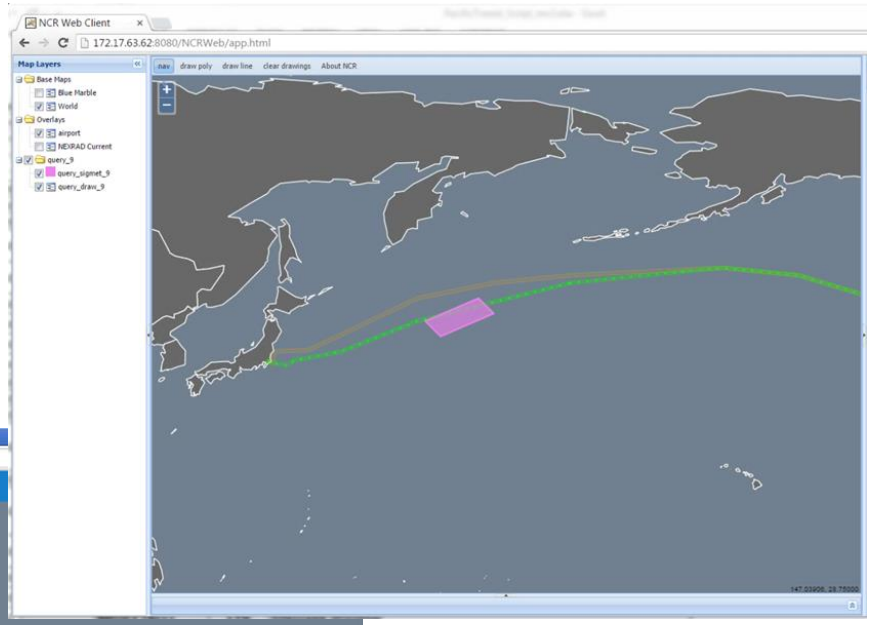
1. CAAS publishes FPL of ANA77A for Part 1
2. JCAB issues SIGMET of turbulence
3. CAAS publishes CHG of ANA77A
4. CAAS publishes DEP and TRACK

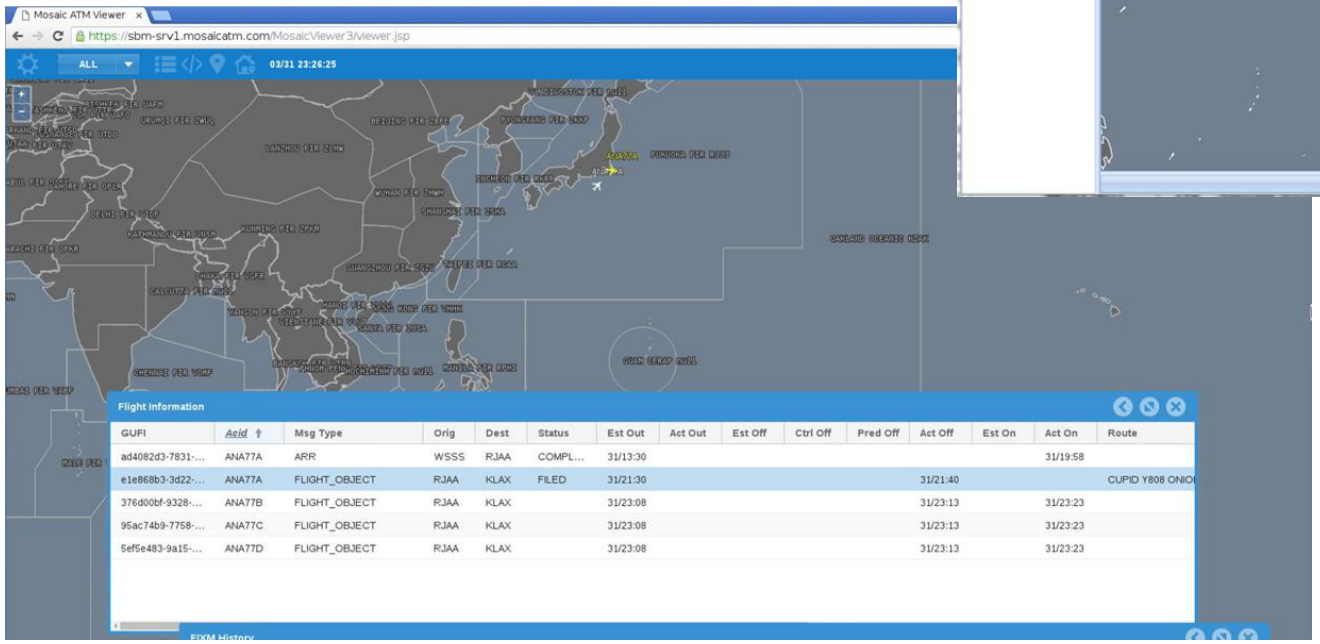


Trans-Pacific Operations

- **Part 2: Tokyo-LAX**

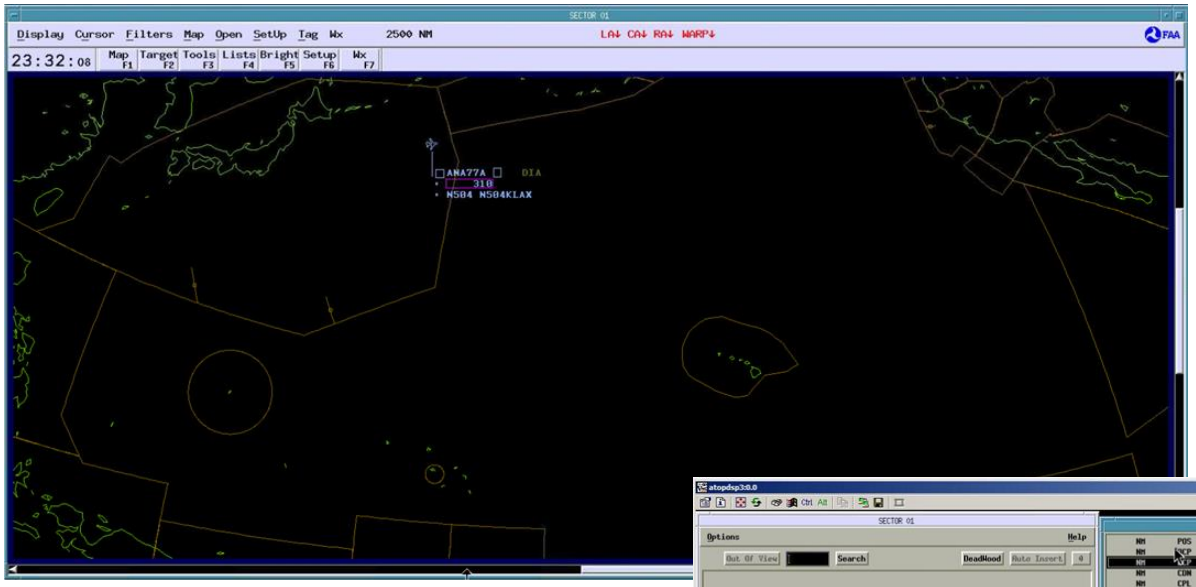
5. JCAB publishes FPL of ANA77A for Part 2
6. JCAB publishes ARR of ANA77A for Part 1
7. JCAB publishes DEP and TRACK
8. JCAB issues updated SIGMET
9. JCAB publishes updated FPL

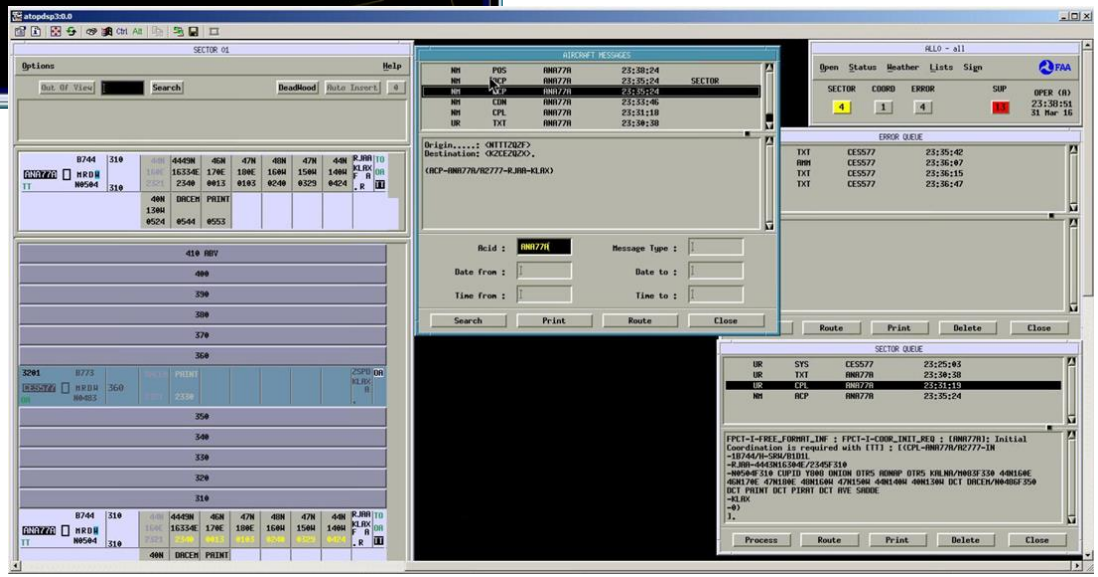




Trans-Pacific Operations

- **Part 2: Tokyo-LAX**





Boundary Coordination:

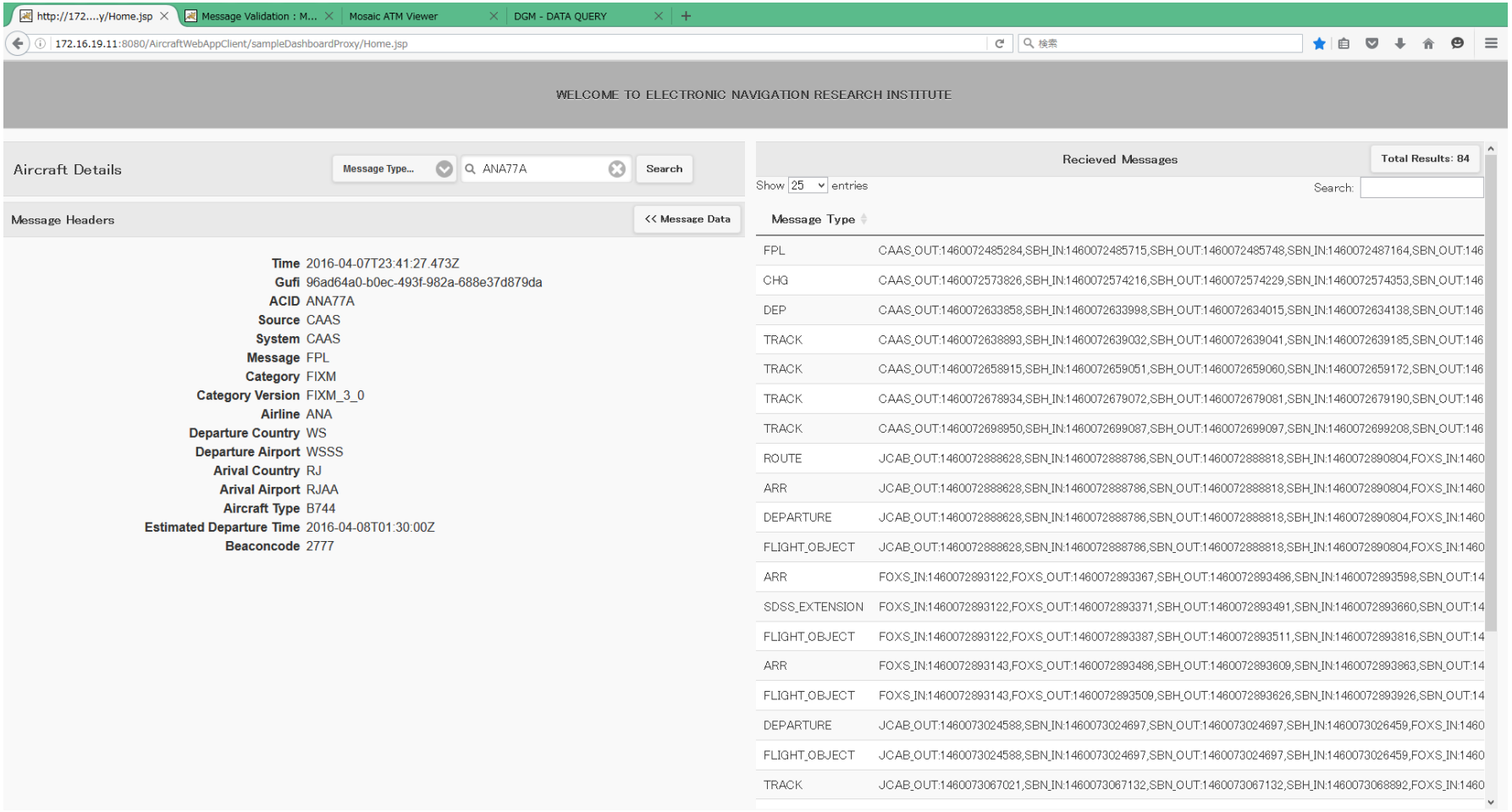
10-1. JCAB publishes ABI and CPL

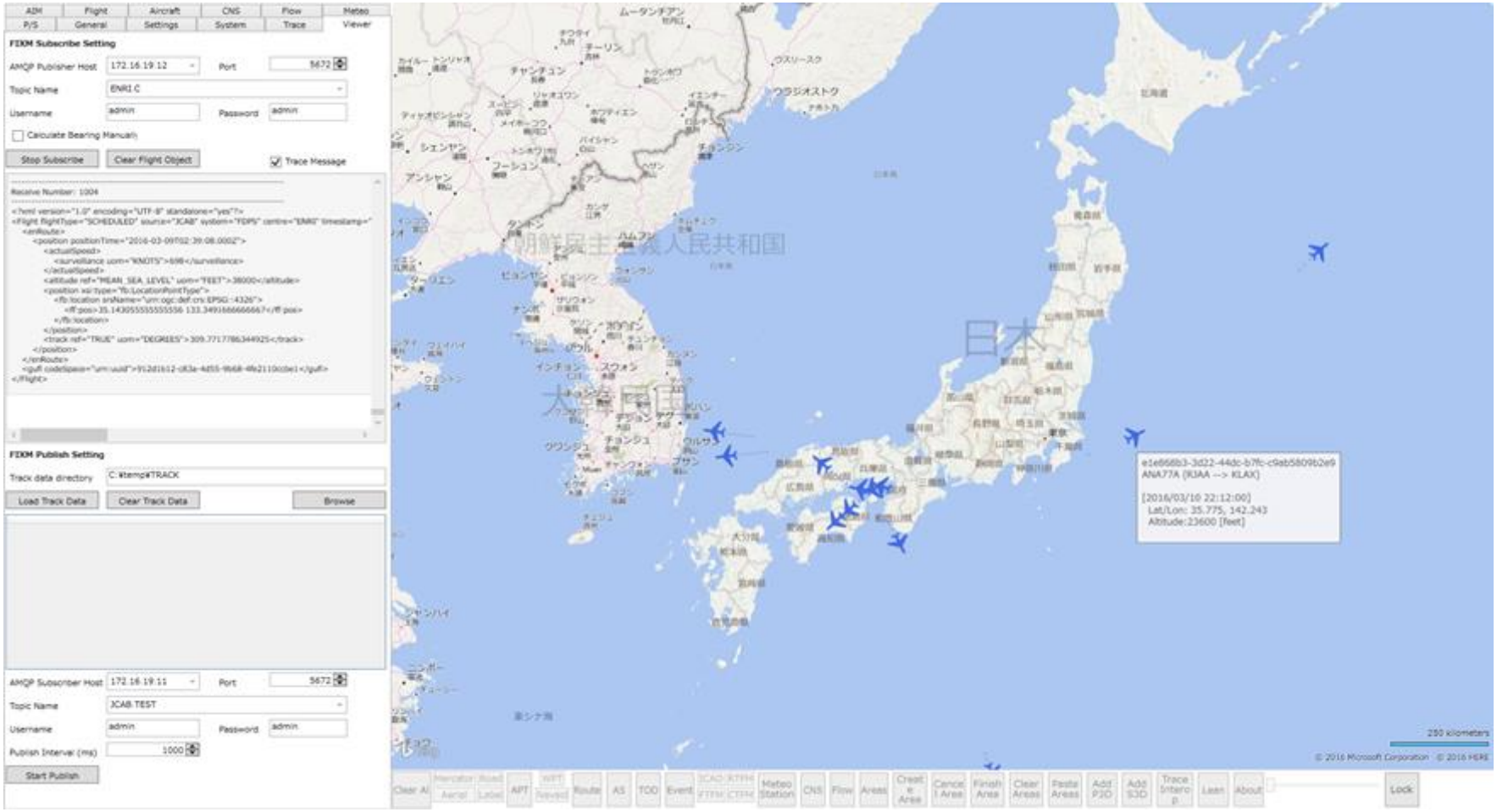
10-2. FAA issues CDN with a change to the boundary crossing altitude

10-3. JCAB publishes ACP

Trans-Pacific Operations

- **Local applications**



Trans-Pacific Operations

- **Local applications**