Airspace Technology Demonstration 2 (ATD-2)

TFDM Terminal Publication Service (TTP)

May 22, 2019
TFDM Terminal Publication (TTP)

- TFDM data feed publishing Flight and Flow data to consumers
- Will provide data exchange between TFDM and NAS Systems and the National Airspace System (NAS) users (airlines, air carriers, air freight, military or general aviation/business aviation operators).
- Accessible via the National Airspace (NAS) Enterprise Messaging Service (NEMS).
- Uses the publish-subscribe (pub-sub) Message Exchange Pattern (MEP).
- XML data format, using FIXM standard for Flight Data
- Airport Information and Traffic Management Restrictions use a schema defined by the TFDM team
ATD-2 Implementation of TTP

- Registered as “NASA TTP” in NSRR
- Currently available via SWIM R&D Gateway
- Based on TFDM specifications
  - Currently no deviations from TFDM specifications
  - Does not include all information published by TFDM
- Publishing data for:
  - Charlotte Douglas International Airport
  - Dallas/Fort Worth Metroplex
- Planning support of NASA TTP for CLT until TFDM proper installed
- Goal - work invested in integrating with ATD-2 via TTP could be utilized with TFDM
IADS and Data Sharing

Applications that Leverage the TTP Prototype Feed

- Mobile Application for GA Flights
- Airline Carrier Ingestion
- TBD

IADS System

SWIM TTP Service

Data Fusion and Mediation (Fuser)

TFDM SWIM
TFMS SWIM
TBFM SWIM
Surface SWIM
Operational TBFM IDAC
R-TBFM CAP/SWIM
R-TBFM IDAC/WSRT
AAL Flight Hub
AAL Surface Surveillance
Commercial Flight Service
NTML/OIS Operational info
# TTP Services

<table>
<thead>
<tr>
<th>Service</th>
<th>Includes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight Data</td>
<td>Individual flight updates containing flight identifiers, targeted times, actual times, runway, parking gate, spot, departure fix (predicted, assigned, actual as appropriate), flight states, and more</td>
</tr>
<tr>
<td>Airport Information</td>
<td>Airport configurations, airport and runway rates, ramp closures, runway closures, taxiway closures</td>
</tr>
<tr>
<td>Traffic Management Restrictions</td>
<td>Call for Release programs departure MIT/MINIT restrictions, departure stop/ground stop programs. Along with list of impacted flights for each</td>
</tr>
<tr>
<td>Flight Delay</td>
<td>Airport and runway delay by arrival, departure, and total</td>
</tr>
<tr>
<td>Operational Metrics</td>
<td>Metrics on airport throughput and individual flight metrics</td>
</tr>
<tr>
<td>SMP</td>
<td>Data about Surface Metering Programs, affected flights, and metering parameters</td>
</tr>
</tbody>
</table>
## TTP Services

<table>
<thead>
<tr>
<th>Name</th>
<th>Event Driven</th>
<th>Full Update</th>
<th>Implemented in NASA TTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight Data</td>
<td>Yes</td>
<td>Every 15 minutes</td>
<td>Yes</td>
</tr>
<tr>
<td>Airport Information</td>
<td>Yes</td>
<td>Every 15 minutes</td>
<td>Yes (subset)</td>
</tr>
<tr>
<td>Traffic Management Restrictions</td>
<td>Yes</td>
<td>Every 15 minutes</td>
<td>Yes (subset)</td>
</tr>
<tr>
<td>Flight Delay</td>
<td>Yes</td>
<td>Every 15 minutes</td>
<td>Yes (subset)</td>
</tr>
<tr>
<td>Operational Metrics</td>
<td>No</td>
<td>Every 1 minute</td>
<td>Yes (subset)</td>
</tr>
<tr>
<td>SMP</td>
<td>Yes</td>
<td>Every 15 minutes</td>
<td>Not currently</td>
</tr>
</tbody>
</table>

- We will continue to track and align with TFDM as much as possible
- Implementation details of specific messages can be found on [NASA TTP NSRR](https://www.nasa.gov/ Programm/TTP/NSRR)
Why TTP?

- Share valuable data with other stakeholders
- Automate data sharing avoiding manual inputs
- Data doesn’t exist in other feeds
- Doesn’t naturally fit into any existing feeds
Example Fields of Interest

• **Flight Data Fields**
  – APREQ Release Time
    • Approval Request Release Time / Call for Release Time received from TBFM
  – Departure Runway Predicted
    • The departure runway predicted by the STBO model
  – Departure Runway Actual
    • The departure runway the flight departed from
  – Arrival Runway Predicted
    • The arrival runway predicted by the STBO model
  – Arrival Runway Actual
    • The departure runway the flight departed from
  – Estimated Time of Departure
    • The time of departure predicted by the STBO model
  – TMI Identifiers
    • Contains a comma delimited list of TMI IDs, one per TMI associated with the flight
Example Fields of Interest cont.

• Traffic Management Information
  – Traffic Management Restriction
    • Data elements available for all TMIs
      – Unique ID
      – Start / End times
  • Miles in Trail
    – Spacing (NM)
    – Applicable airport / fix
  • Minutes in Trail
    – Spacing (minutes)
    – Applicable airport / fix
  • Approval Request (APREQ) List
    – Applicable airport / fix
  • Airport Departure Stop
    – Impacted NAS element
    – Reason for stop

• Airport Information
  – Airport Configuration
    • Arrival Runway
    • Departure Runway
  – Runway Configuration
    • Departure Rate
    • Arrival Rate
    • Runway Closure
Why NASA TTP

• **Practice**
  – NASA TTP was built against the TFDM TTP design standard
  – Using the NASA TTP provides users with a period of time to become familiar with the TTP schema and information provided

• **Integration**
  – Data generated by NASA TTP is accurate and will be similar to the data produced by TFDM
  – Users are able to begin integration of TFDM TTP data into their internal systems / operations prior to TFDM going operational

• **Feedback**
  – Using existing forums (CDM WG, SWIFT, etc.) users are able to ask questions and provide feedback to TFDM prior to its deployment
Example of TTP Utility

- **TMI Flight Lists**
  - Each TMI is published with a unique ID
    - CFR
    - Departure MIT/MINIT restrictions
    - Departure Stop
  - Flight messages published for flights impacted by a TMI(s) have the impacting TMI ID(s) included in their Flight Messages
  - Provides information needed to determine which flights are impacted by a specific TMI
Example of TTP Utility cont.

- **Airport Configuration**
  - Predicted Departure Runway
    - Flight messages published for each flight providing a predicted departure runway
    - Prediction generated by STBO model
  - Estimated Time of Departure
    - Flight messages published for each flight providing a predicted time of departure
    - Prediction generated by STBO model

MITRE Prototype using TTP data @ CLT
Limitations

- **Program intersection limitation**
  - NASA ATD-2 has data that is not in the TFDM requirements
  - NASA ATD-2 does not have all the data to fill the TFDM requirements.
  - TFDM is expected to produce all flight data in FIXM format
  - FIXM does not currently support everything TFDM will need to publish

- **Not a one stop shop**
  - TTP generally not intended to include data that is found in other feeds
How to access ATD-2 TTP feed

• Work with SWIM to establish a connection to SWIM R&D if you don’t already have a connection
  – If you already have a connection getting access to TTP will be pretty straightforward.

• Subscribe to SWIM R&D TTP feed via a new queue that will be established for each stake holder

• Work with ATD-2 team on how to utilize the information
  – See TTP Resources slide for links to documentation
TTP Resources

- **Links to FAA TFDM resources**
  - **Concept Overview:**
    - https://www.faa.gov/air_traffic/technology/tfdm/
  - **SWIM On-Ramping:**
    - https://www.faa.gov/air_traffic/technology/swim/products/get_connected/
  - **Implementation Roadmap:**
    - https://www.faa.gov/air_traffic/technology/tfdm/implementation/

- **Links to ATD-2 TFDM / NASA TTP Resources**
  - **NSRR:**
    - https://nsrr.faa.gov/services/nasa-ttp/profile
  - **NASA Website:**
    - https://www.aviationsystemsdivision.arc.nasa.gov/research/atd2/index.shtml
Questions