Flight Operator Substitution in TFDM and TFDM Flight Collaboration Service (TFCS)

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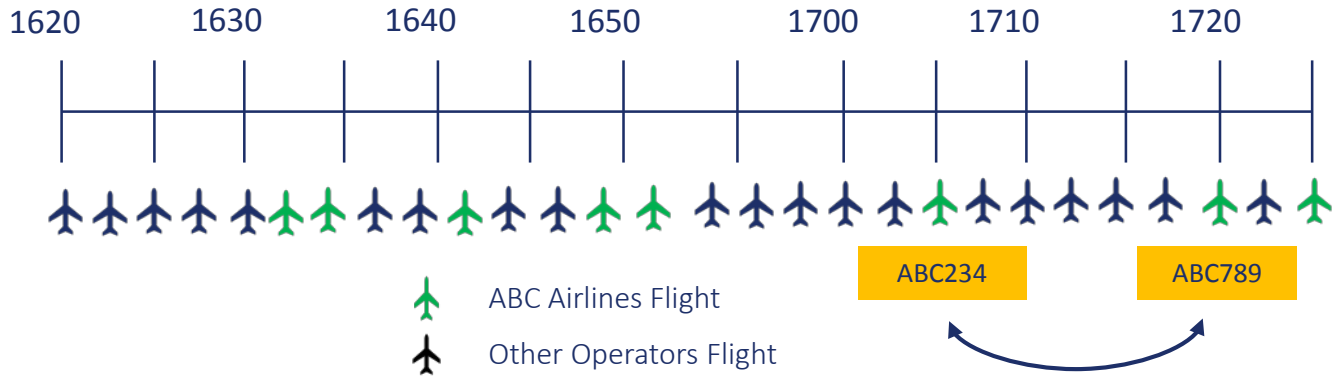
Introduction to TFDM Surface Metering Substitution Capability

- **During a Surface Metering Program (SMP), flight operators will have the ability to substitute flights**
  - **Capability was requested by flight operators during Surface-CDM concept development**

- **What does substitution in an SMP mean?** When feasible and if desired, flight operators can swap the TMATs between two or more flights **or** place flights into the TMAT times held by previous flights that have been canceled or delayed.



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Benefits of Substitution in an SMP

- Flight operators can prioritize flights during an SMP
  - Flights can be substituted to redistribute surface metering hold

- Flight operators can “protect” their slots prior to the start of an SMP by marking them for substitution
  - Giving them flexibility to use slots later even if a flight is cancelled now

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TFDM Substitution Overview

- TFDM will provide a SWIM interface (TFCS) to enable flight operators to substitute flights within a Surface Metering Program
- Concept is similar to substitution capability provided in existing TFMS platform to substitute during Ground Delay Program (GDP) or Airspace Flow Program (AFP)
- Flights may be substituted after an SMP is approved or “affirmed” (i.e., TMATs assigned); to be eligible for substitution:
  - All flights must be part of the same SMP
  - All flights must be operated by the same major carrier as defined in TFMS (includes regional affiliates)
  - A flight may not have passed the spot (exception for flights with intent to hold in AMA)
  - A flight may not be exempt from rationing
  - Flights with FAA assigned control times (EDCT/APREQ), diversion recovery, ground stops are exempt
  - Substitution times between flights match according to exact or inexact rules
- Flights may be “marked for substitution” prior to an SMP being affirmed, allowing the flight operator to preserve a flight’s original departure time (should the flight later cancel or be delayed) for substitution

Key Substitution Terminology

Term	Definition
Earliest Off Block Time (EOBT)	Data element provided by the Flight Operator to indicate the earliest the flight operator could depart from its gate.
Marked for substitution	Allows TFDM automation to assign a metering time based on the IOBT priority of the flight without regard to the flight being delayed or cancelled by the flight operator.
Protection Period	Locally agreed upon time that a Flight Operator has to substitute a delayed or canceled flight before the automation reclaims the allocated capacity.
Reclamation Window	Period of time measured from the current time forward beyond which the automation will not act on a canceled or delayed flight to reclaim capacity.
Static Time Horizon (STH)	Configurable amount of time from current time used to limit TMAT changes to flights.
Target Movement Area Entry Time (TMAT)	A metering time assigned to flights that are subject to any SMP used to schedule flights entry onto the airport movement area.
Target Off Block Time (TOBT)	Advisory time that TFDM recommends a flight depart from its gate in order to comply with a TMAT or other FAA assigned control time.

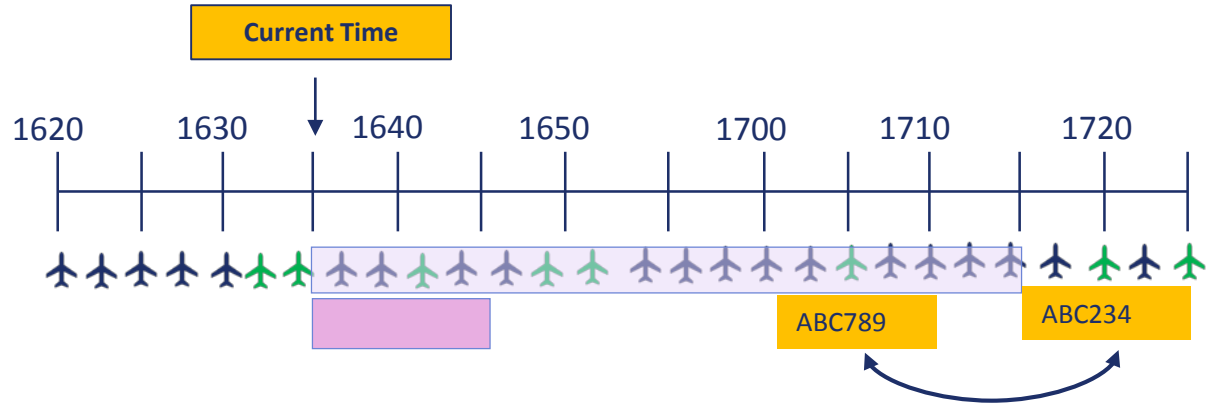
Substitution Scenario #1: Simple Substitution

1. At 16:35, one of the baggage belts used for loading ABC234 fails. The ramp reports to ABC dispatch they'll need to find another bag belt and that ABC234 is to be delayed 20 minutes.
2. ABC Airlines dispatch updates the EOBT for ABC234 to 1700.
3. ABC234 is inside the TMAT Reclamation Window. TFDM automation will allow only 10 minutes (Protection Period) for ABC airlines to decide how to use the TMAT vacated by the delay to ABC234.
4. ABC Airlines has until 1645 to use the TMAT held by ABC234.
5. At 16:37, ABC Airlines submits a substitution request to TFDM indicating that ABC234 and ABC789 will swap TMATs.
6. TFDM automation approves the request and reassigns the TMATs to ABC234 and ABC789.
7. ABC234 now has an EOBT: 1700, TOBT: 1710, TMAT: 1720
8. ABC789 now has an EOBT: 1655, TOBT: 1655, TMAT: 1705

Initial Scenario Set Up

- Surface Metering Program Active @ LAX beginning at 1600 through 1900
- Current Time: 16:35
- ABC234 has an EOBT: 1640, TOBT: 1655, TMAT: 1705
- ABC789 has an EOBT: 1655, TOBT: 1710, TMAT: 1720
- Static Time Horizon is 30 minutes
- TMAT Reclamation Window is 40 minutes
- TMAT Protection Period is 10 minutes

TMAT Timeline for LAX Departures



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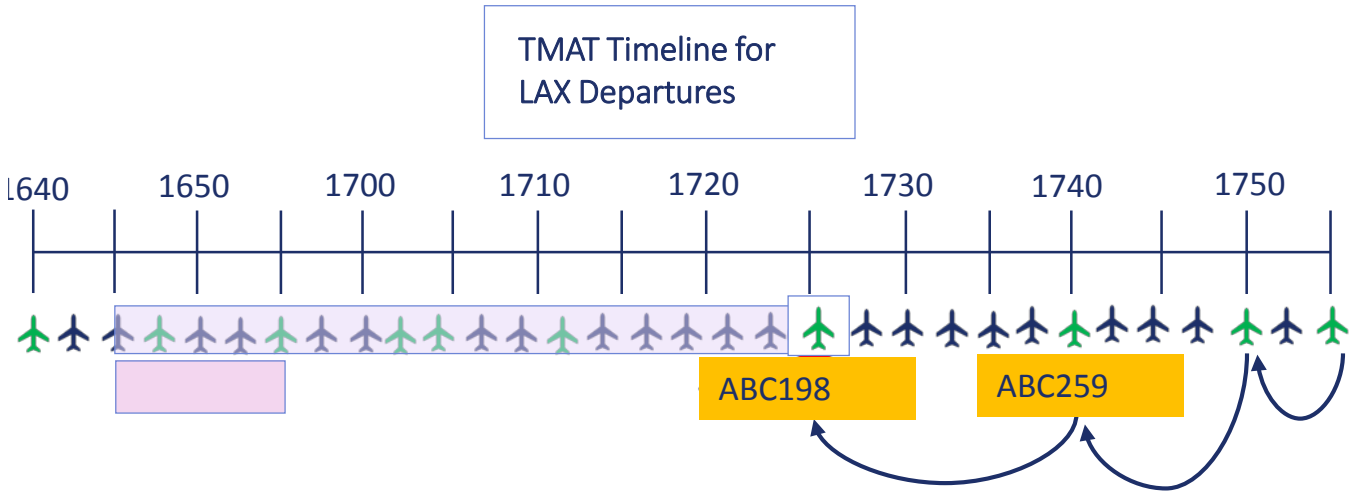
Substitution Scenario #2: Advanced Marking for Substitution

1. At 1200Z, ABC Airlines intends to cancels ABC542 due to a snowstorm at the arrival airport.
2. ABC knows a surface metering program will be implemented later (@ 1400Z) and does not want to lose the TMAT "slot" from ABC542.
3. ABC submits the "marked for substitution message" (✓) for ABC542 and submits a cancellation message to TFDM automation (via TFMS).
4. TFDM automation accepts the marking and sends an acknowledgement message.
5. At 1400Z, when the SMP initiates, TFDM assigns a TMAT of 1725 to ABC542.
6. ABC has until 1655 to utilize the TMAT held by ABC542 (TMAT-Reclamation Window
7. At 1630Z, ABC decides to substitute ABC198 into the TMAT slot held by ABC542. ABC submits the substitution request to TFDM and TFDM accepts the substitution request and sends an acknowledgement to ABC.
8. ABC198 now has an EOBT: 1715, TOBT: 1715, TMAT: 1725.
9. Since the slot vacated by ABC198 is outside of the STH, TFDM will utilize ration-by-schedule algorithms to automatically fill the TMAT vacated by ABC198 with another ABC airlines flight (ABC259).

Initial Scenario Set Up

- Surface Metering Program @ LAX beginning at 1600 through 1900
- Surface Metering Program will be affirmed at 1400 (TMATs assigned)
- ABC542 has an EOBT: 1700 **TOBT: 1715, TMAT: 1725**
- ABC198 has an EOBT: 1715 **TOBT: 1730, TMAT: 1740**
- Static Time Horizon is 30 minutes
- TMAT Reclamation Window is 40 minutes
- TMAT Protection Period is 10 minutes



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Frequently Asked Questions

- **If we substitute flights in TFMS for flights affected by a GDP, will this effect my TMATs in the SMP?**
  - **Yes.** TMATs are assigned to help align a flight to meet any EDCTs received from GDPs/AFPs. If EDCTs change for a flight, this will change that flights TMAT as well.
  - Reminder, flights that already have an assigned EDCT cannot be substituted in TFDM.

- **Can we use the TFMData Request/Reply Service to request substitution in an SMP?**
  - **No.** All requests for substitution in an SMP in TFDM must use the TFCS Request/Reply Service.

- **If we cancel a flight that has a TMAT, are we required to substitute a flight into that TMAT to prevent losing the slot?**
  - **Not necessarily.** If the flight is *outside* the static time horizon, TFDM automation will automatically attempt to fill your empty TMAT slot by compressing your next available flight in the program. However, if no flights are available, the slot may be reclaimed by automation if inside the reclamation window. If the flight is *inside* the static time horizon, you must take action to substitute a new flight into that slot or automation will eventually reclaim it.

- **Can I just flag a flight as "high priority" and send that to TFDM?**
  - **No.** TFDM does not accept a "high priority" flag like ATD-2 when assigning TMATs. However, internally you may be able to flag your high priority flights to determine which substitution requests need to be made to TFDM.

- **Can I just call the ATCT and request flight's be substituted in the SMP?**
  - **No.** All substitution requests must be done via automation. ATCT personnel are not be responsible for completing TFDM substitution requests.

TFDM FOS Collaboration Service (TFCS)

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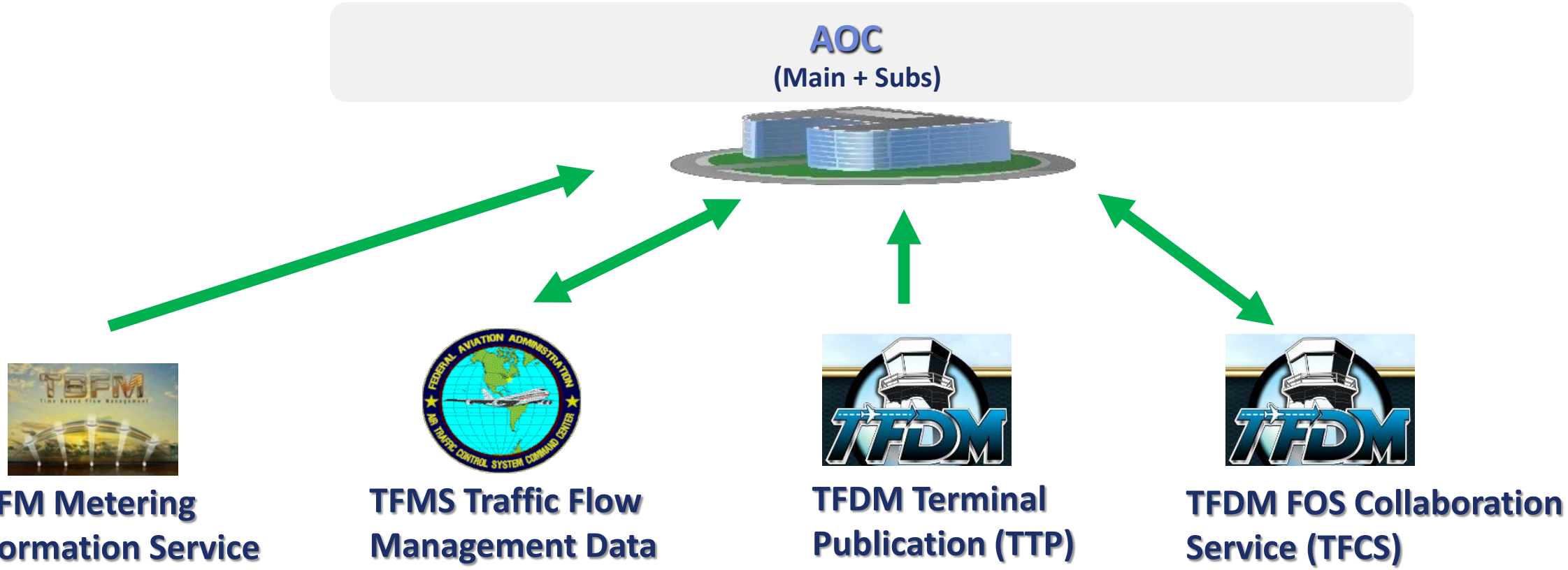
To Achieve Surface Metering Benefits…

…connectivity is required to 3 of 4 TFM SWIM feeds for AOCs



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What is TFCS?

- Request/Reply Service between flight operators and FAA

- TFCS will have two business functions

Business Function	Explanation	Type	Data examples	Intended Users
Flight Substitution	TFDM flight substitution service (only 27 Configuration A sites)	Req/Reply	Substitution requests / responses	FAA & Flight / Ramp / Airport Operators
Airport Data	Submission of Gridlock, ramp status (only 27 Configuration A sites)	Req/Reply	Ramp closure(s), Gridlock status	FAA & Flight / Ramp / Airport Operators

TFCS Data Structure

	Message Type	Description
Flight Substitution	**Flight Substitution Request Message**	Message from the flight operator to the TFDM system that includes the identification of the SMP involved in the substitution request, flights being requested for substitution, and flags for specific flights that are being cancelled and/or having their TMAT relinquished (or marked for future substitution) by the flight operator.
Flight Substitution	**Flight Substitution Response Message**	Message from the TFDM system to the flight operator that provides a response of either success or error for any substitution request. For flights with a success response, the new TMAT will be provided. For flights with an error response, the reason for the error (or rejection) will be provided.
Airport Data	**Closure Request Message**	Message from the flight (or ramp) operator to create, activate, deactivate, update, or remove a closure request for a resource in the non-movement (or ramp) area.
Airport Data	**Closure Response Message**	Message from the TFDM system indicating whether a closure request was successfully received by TFDM.
Airport Data	**Gridlock Request Message**	Message from the flight (or ramp) operator to create, update, or remove a gridlock request for a resource in the non-movement (or ramp) area.
Airport Data	**Gridlock Response Message**	Message from the TFDM system indicating whether a gridlock request was successfully received by TFDM.

Looking Ahead…..

- Substitution and the TFCS SWIM service will come available in 2021
  - First site will be Charlotte-Douglas International Airport (CLT)
- As each Configuration A airport (27 airports in total) comes online with TFDM, the TFCS service will come online for that site as well
- Flight operators can begin to prepare by evaluating TFCS JMSDD and then considering changes needed to internal systems
- FAA will provide additional outreach via CSIT activities (csit@faa.gov)

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Questions?
(csit@faa.gov)

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