

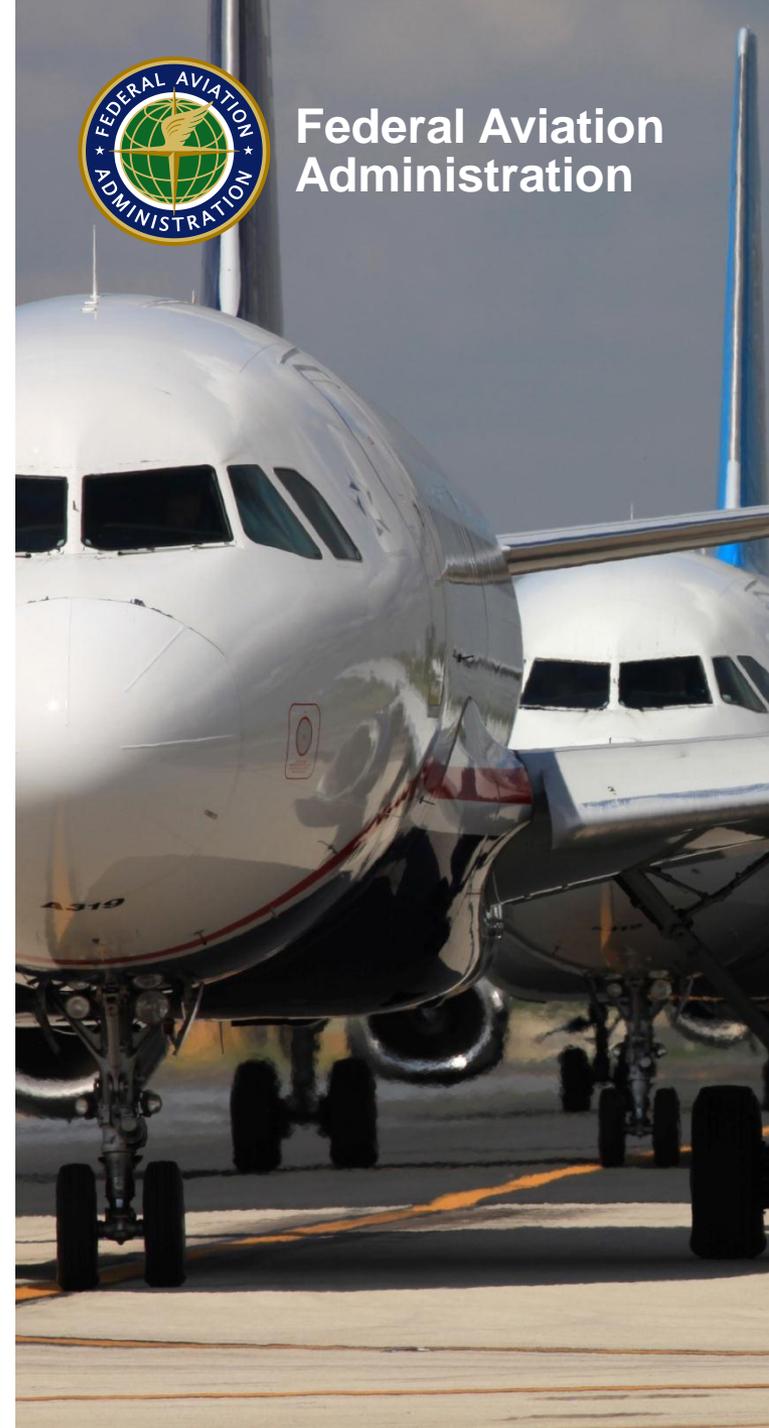
Decision Support Systems (DSS)

Industry Forum

By: Rebecca Guy
Date: April 23, 2014



Federal Aviation
Administration

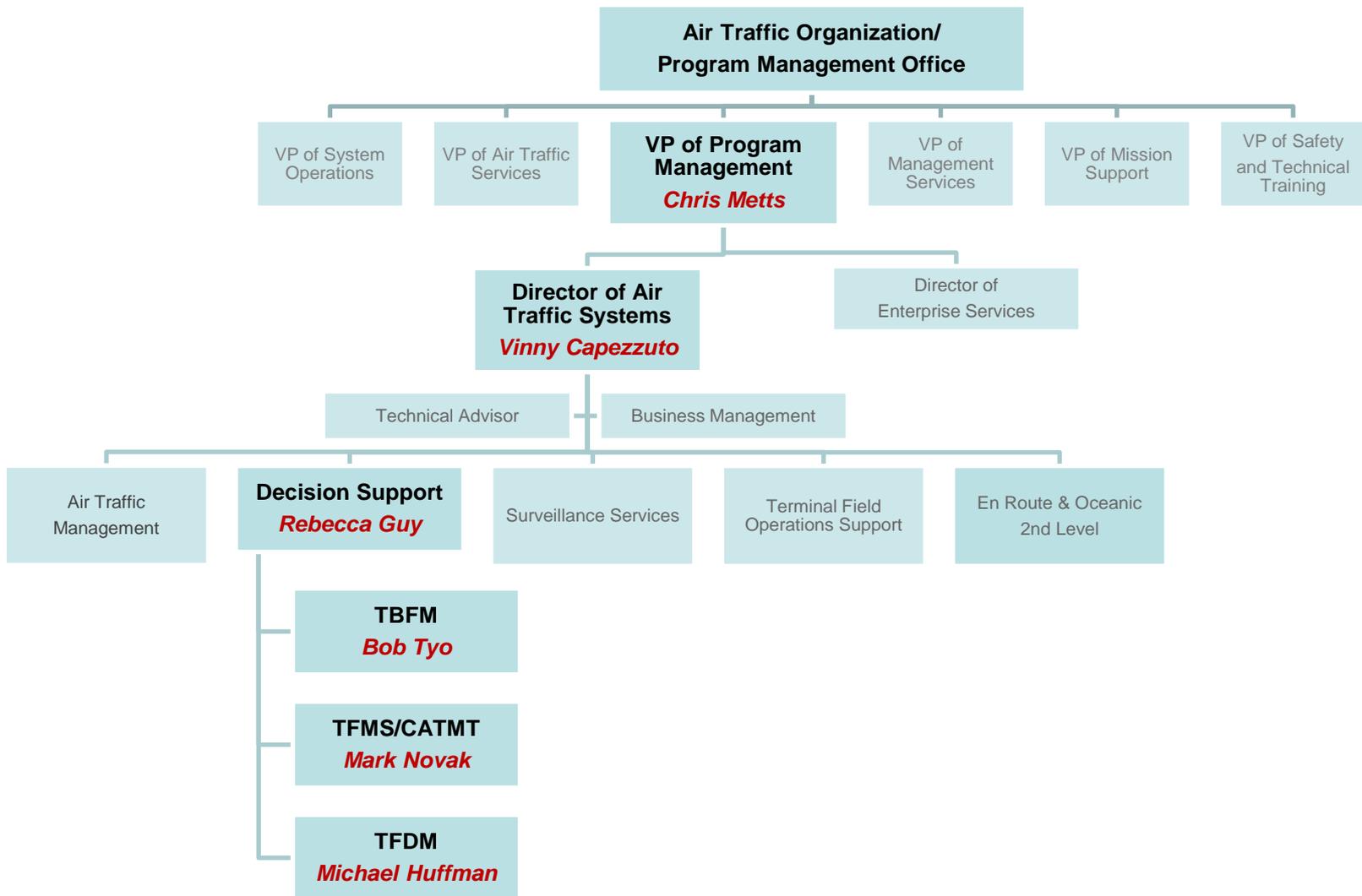


Agenda

- **DSS team: *Who are we?***
- **DSS mission: *Traffic Flow Management***
- **DSS vision: *Enabling NextGen***
- **DSS components: *3Ts***
 - Traffic Flow Management System (TFMS)
 - Time Based Flow Management (TBFM)
 - Terminal Flight Data Manager (TFDM)
- **Integrated TFM: *3Ts working together***



DSS: Who are we?



DSS Mission: Traffic Flow Management (TFM)

- **NextGen is an ongoing transformation of the NAS.**
 - Incremental implementation of new technologies and procedures is vital to meeting future growth of aviation.
- **DSS facilitates NextGen vision through TFM – TFDM, TBFM and TFMS**
 - Ensures efficient flow of traffic and maximizes system throughput across the NAS
 - Improves the quality of service to NAS users by accommodating user preferences
 - Improves common situational awareness by real-time information sharing



DSS Vision: Enabling NextGen

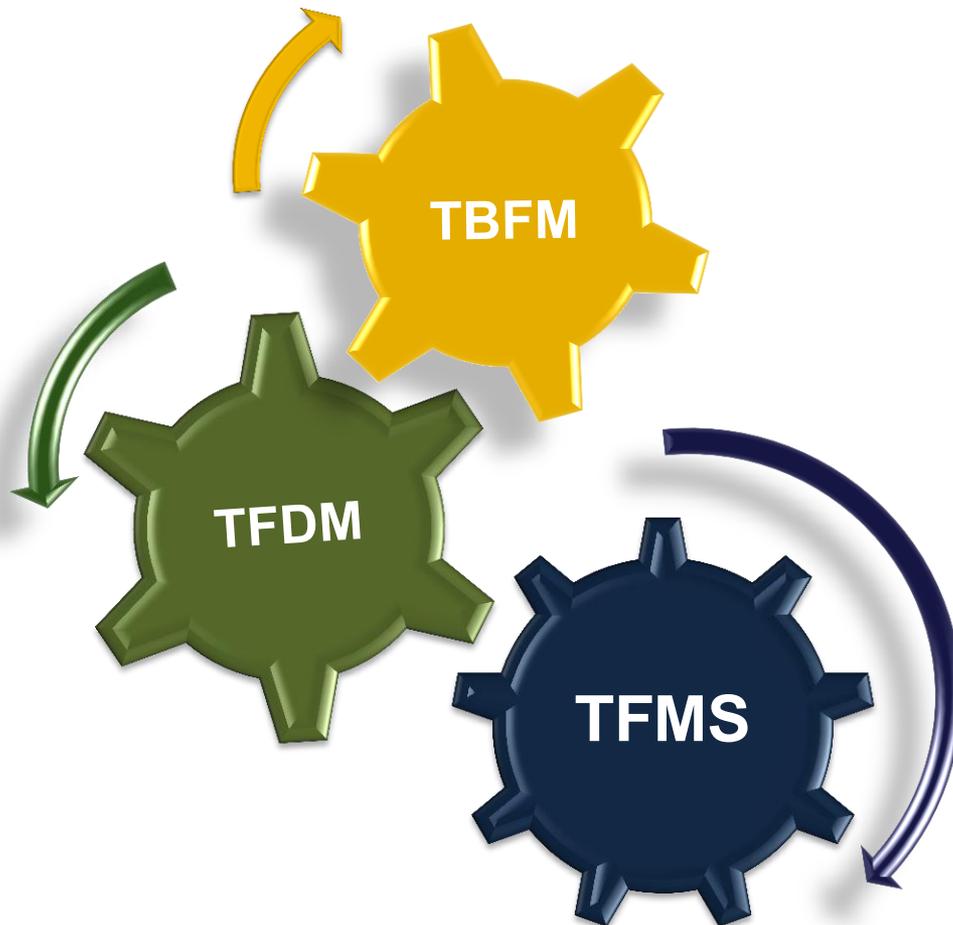
➤ **Enable NextGen technologies in TFM operations**

- ✓ Performance Based Navigation (PBN) –use of RNAV/RNP and Optimized Profile Descent (OPD) technologies in TBFM
- ✓ System Wide Information Management (SWIM) – TFM data exchange with external systems through SWIM
- ✓ System-wide solutions that are able to be tailored for individual aircraft –
 - ✓ Surface
 - ✓ Routes- Utilizing user preferences

➤ **Provide integrated, responsive and collaborative TFM solutions that maximize efficiency and reduce delay.**

- ✓ **INTEGRATED:** Strategic and tactical TFM strategies are modeled and implemented as a single cohesive strategy.
- ✓ **RESPONSIVE:** Faster more effective responses to evolving conditions in the NAS.
- ✓ **COLLABORATIVE:** Data sharing among stakeholders facilitates solutions that impose no more controls on flights than needed, allowing flight operators to fly their preferred routes at preferred times.

DSS components: 3Ts are the engines of DSS



Traffic Flow Management System (TFMS)

Decision support system for planning and mitigating demand-capacity imbalances in the NAS.

Time-Based Flow Management (TBFM)

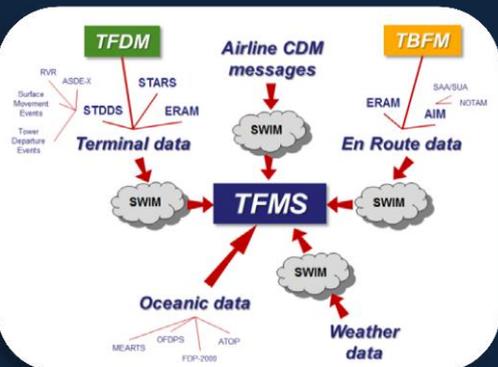
Decision support system for metering based on time to optimize the flow of aircraft.

Terminal Flight Data Management (TFDM)

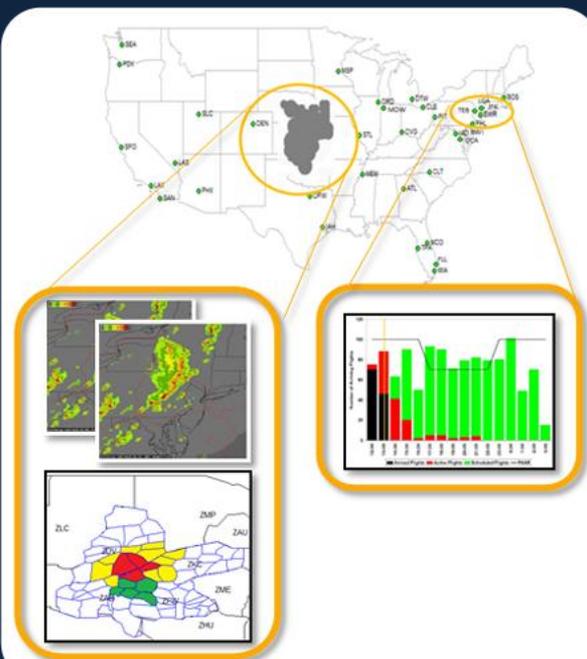
A new decision support system for airport surface management and ATC tower functions.

TFMS: Focusing on efficiently improving the “greater NAS”

Monitors demand and capacity for primary NAS resources



Assesses the impact of NAS disruptions and provides alerts

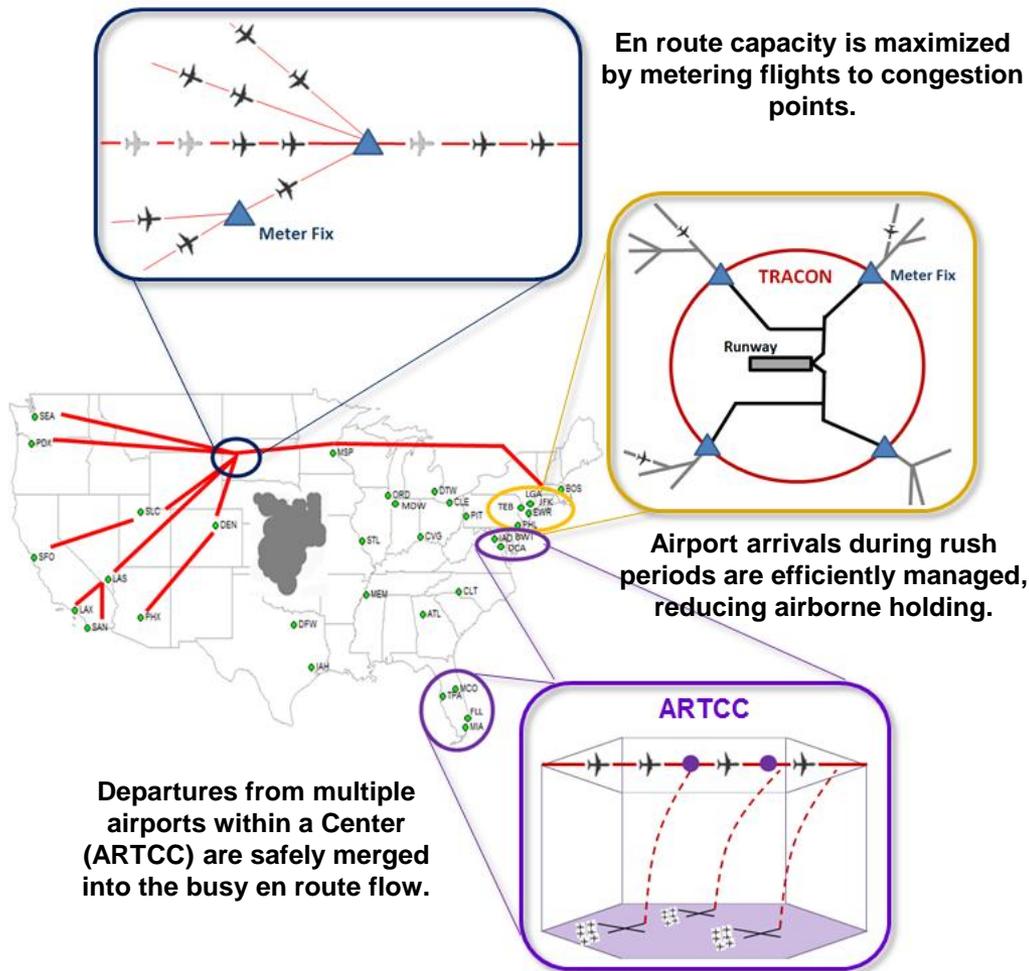


Implements the NAS strategic plan to balance demand with available capacity



Receives updates from other NAS systems and makes adjustments to this plan as needed

TBFM: Metering and Sequencing



TBFM meters and sequences the flow of aircraft to provide a smooth and orderly flow.

TBFM metering lists are generated using complex algorithms to maximize use of available capacity. They are updated dynamically as conditions change.

TBFM assists Air Traffic Controllers by displaying the required delay for each aircraft in the metering list.

TFDM: Surface Management and Electronic Flight Data

TFDM is an acquisition program with four components.



Surface CDM

Better management of surface demand through data exchange among stakeholders



Surface TFM

Decision support capabilities for airport surface resource management



Electronic Flight Data

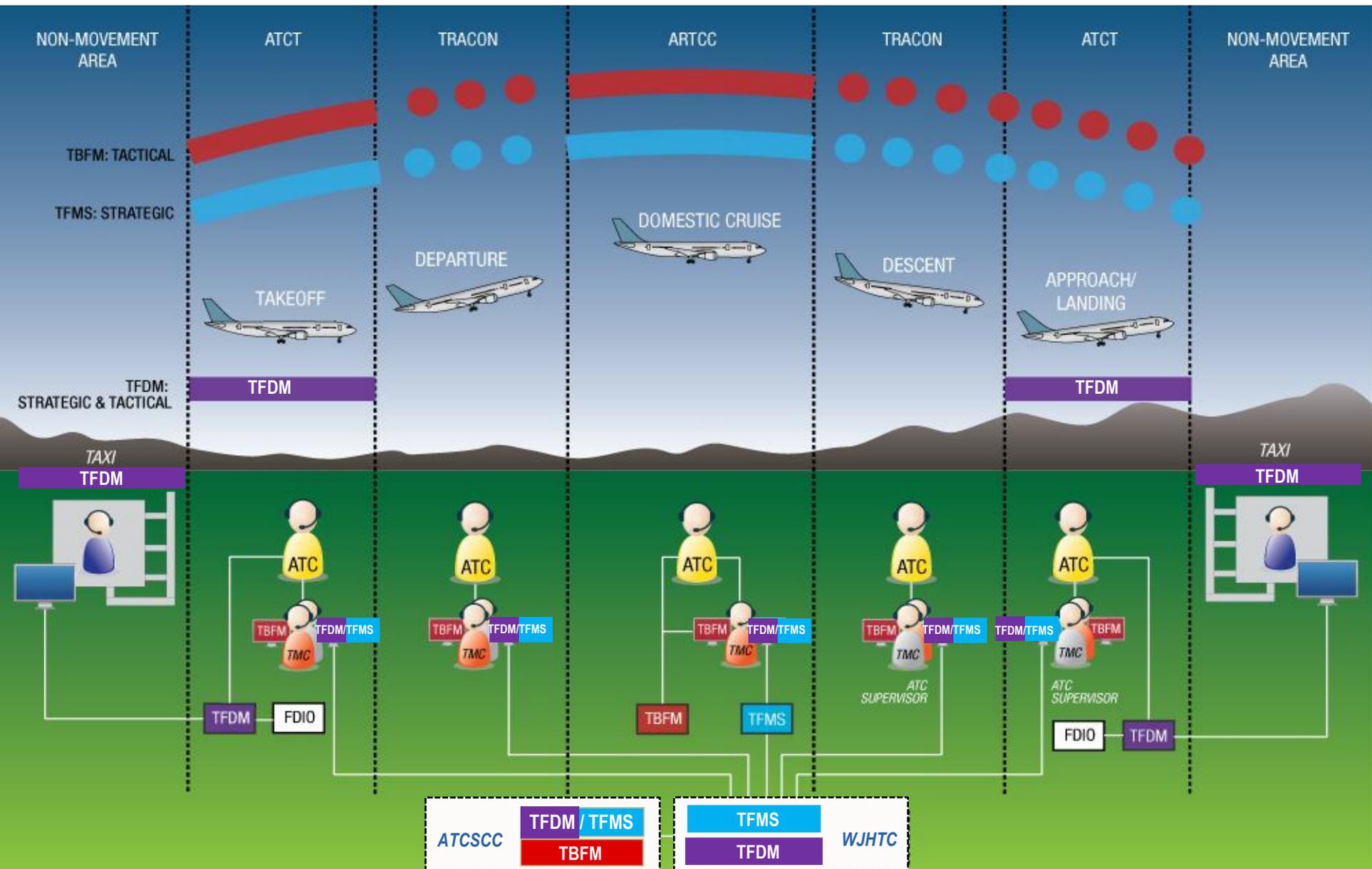
Integrated flight, surveillance and traffic management information in the terminal area



System Consolidation

Consolidation of tower displays and input devices

Integrated TFM: 3Ts working together

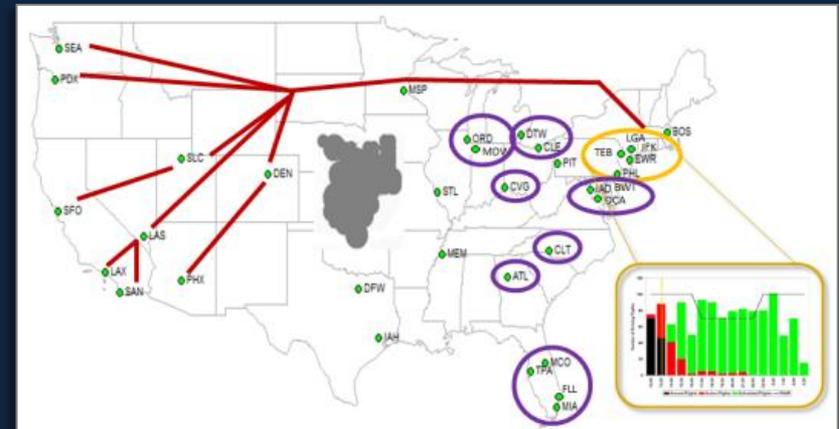
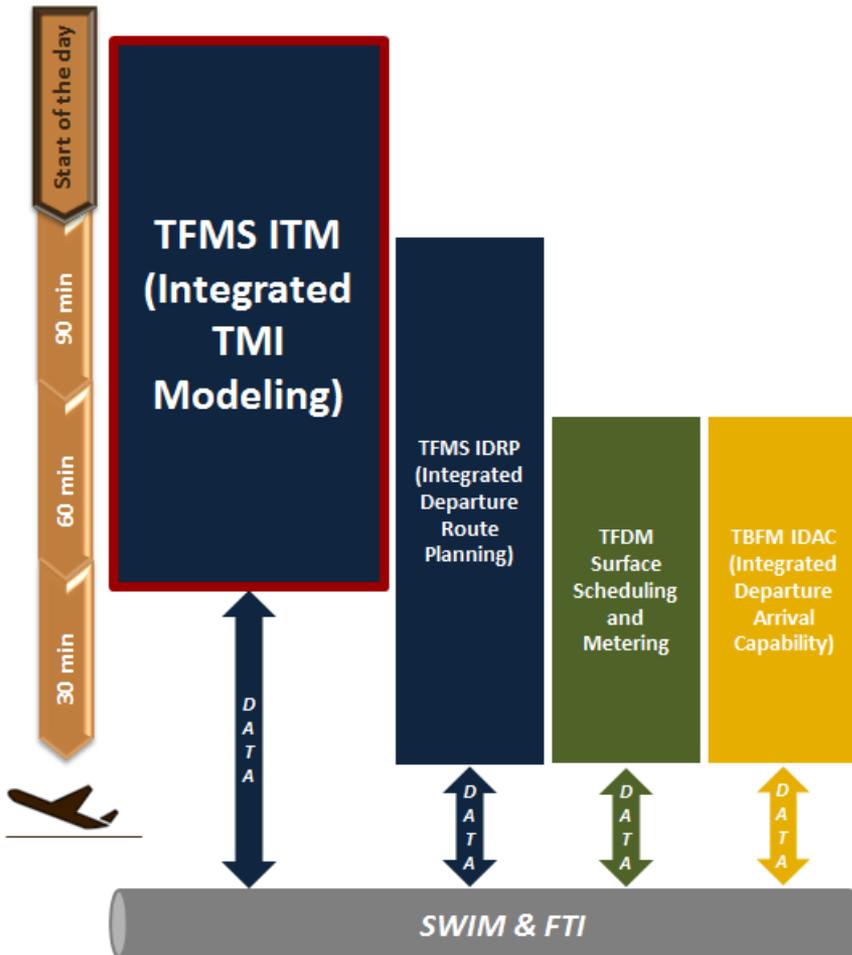


DSS Planned New Capabilities for 2020

Surface 	Departure 	Cruise 	Arrival 	Surface 
T F D M	TFMS Integrated TMI Modeling (ITM)			T F D M
	TFMS Improving Demand Prediction (IDP)	TBFM Metering During Reroute Operations (MDRO)	TFMS Arrival Route Status Impact (ARSI)	
	TFMS Integrated Departure Route Planning (IDRP)	TBFM Path Stretch Controller Advisories	TFMS Airport Acceptance Rate Decision Support (AARDS)	
	TBFM Integrated Departure and Arrival Capability 2 (IDAC 2)		TBFM Terminal Sequencing and Spacing (TSS)	

Integrated 3Ts: Departure Management

Next set of slides walks through how TMU will manage departures in the 2020 timeframe using the new integrated 3T capabilities.

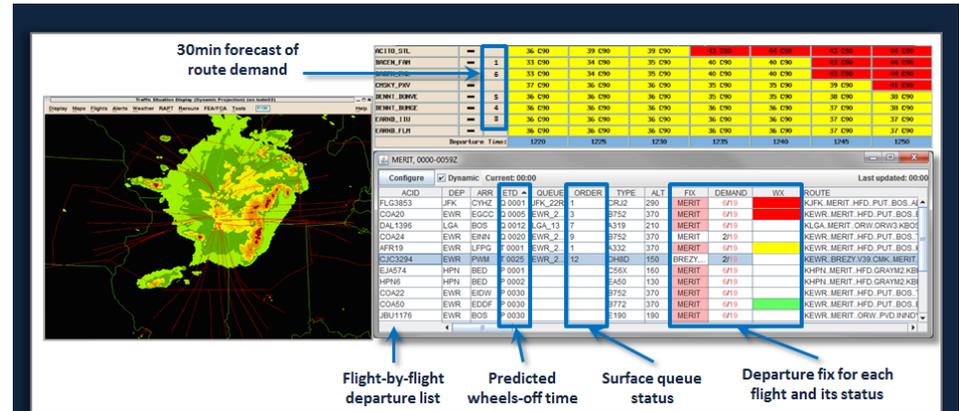
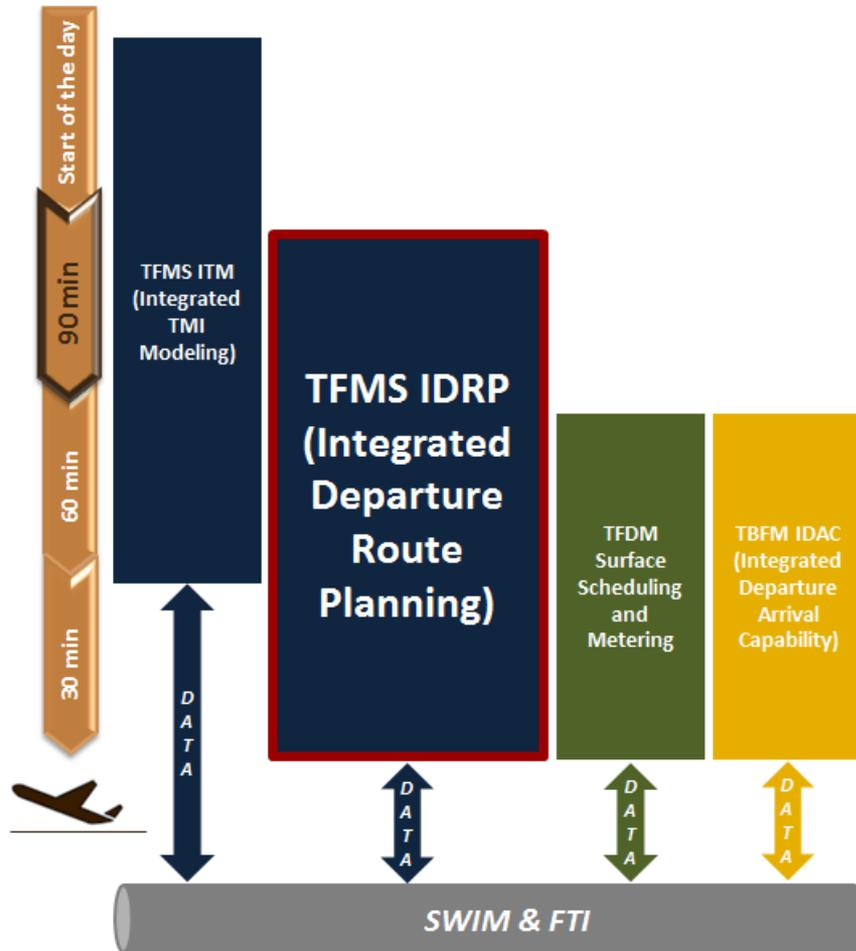


Beginning of the day, TFMS ITM sets a strategic plan for the NAS based on forecast demand and capacity.

Different TMI combinations are modeled to select the option that provides the most NAS efficiency.

This plan may require departure delays on the ground to satisfy airport constraints, and/or reroutes to satisfy en route constraints.

Integrated 3Ts: Departure Management – TFMS (cont.)



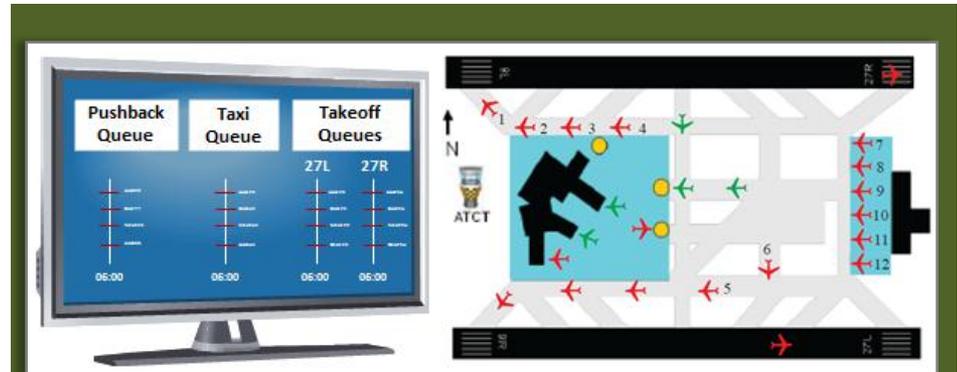
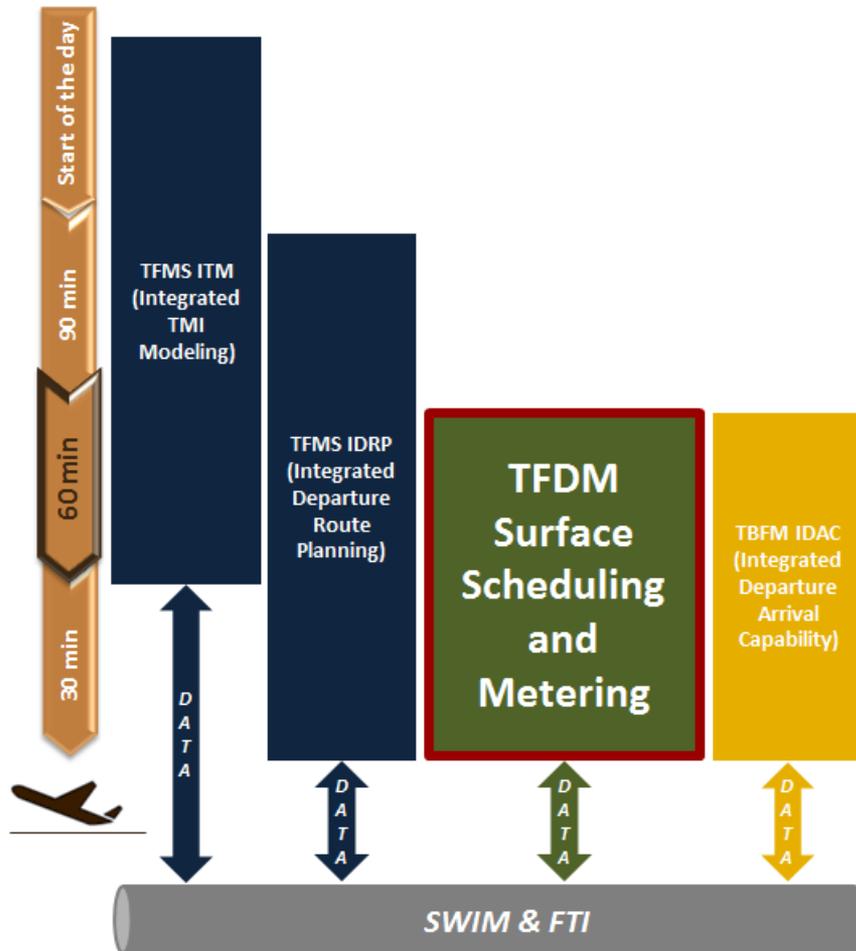
TFMS IDRP combines Route Availability Planning Tool (RAPT) with forecast demand.

IDRP monitors departure fixes and routes and provides alerts to Traffic Managers.

IDRP provides semi-automated flight-specific route solutions for pre-departure flights up to 90 min.

IDRP inputs are updated dynamically (e.g. TFDM surface scheduling times, TBFM IDAC times, Trajectory Options Set (TOS), ITM delays and routes).

Integrated 3Ts: Departure Management - TFDM



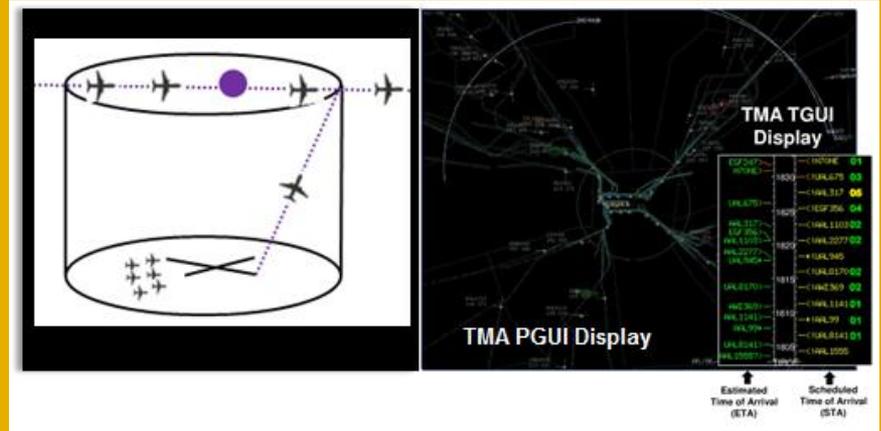
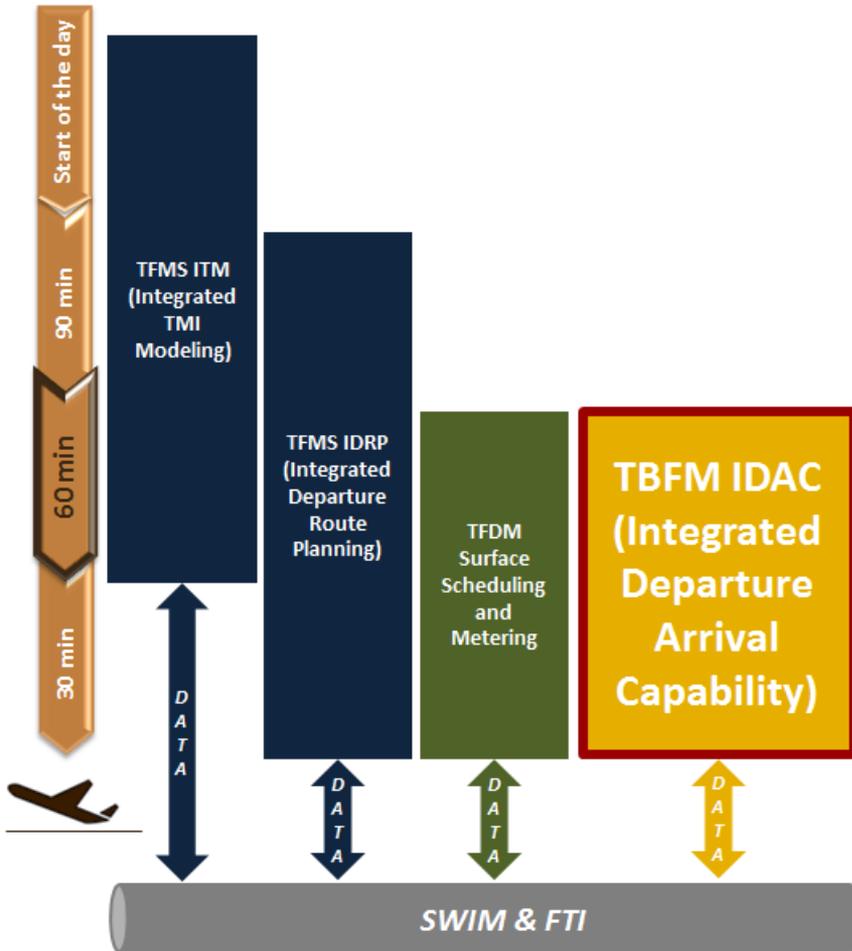
TFDM disseminates status of surface resources to all stakeholders and other NAS systems.

When necessary, surface metering is implemented using virtual queues. This is a new service, not available through TFMS and TBFM.

Virtual queues eliminate the need to physically reserve a place in the runway queue. Flight can absorb necessary delays at the gate.

Flight operators have the ability to prioritize their departures in the queue based on their business needs.

Integrated 3Ts: Departure Management - TBFM



TBFM IDAC assists Traffic Managers to tactically merge departures from multiple airports into a busy en route stream while making sure the en route capacity is optimized.

IDAC identifies available departure slots that each flight can meet and automates the required coordination between Tower (ATCT) and ARTCC for release times.

IDAC data exchange with TFDM (e.g. surface scheduling times) and TFMS (e.g. ITM delays and routes, IDRP flight times and routes) reduces the uncertainty of aircraft takeoff times and improves the predictability of operations.

Distinct Role of 3Ts

	TFMS	TBFM	TFDM
Objective	<ul style="list-style-type: none"> Monitor NAS Predict demand\capacity imbalances Balance demand with capacity 	<ul style="list-style-type: none"> Sequencing & spacing of airborne flights Merge departures into overhead stream Maximize the use of flow capacity 	<ul style="list-style-type: none"> Improve tower controller efficiency for tower operations Manage flights on airport surface Improve efficiency of surface operations.
Scope/ Target Area	National and regional	300 nautical miles from a metering location	Airport surface (runway, taxiway, ramp)
Planning Horizon	Strategic TMs – typically up to 12 hours Tactical – typically up to 90 minutes	Tactical – typically up to 90 minutes	Strategic surface planning– up to 4 hours Tactical – up to 60 minutes
Main Operational Users	ATCSCC TFMs ARTCC TMU TMCs Airport TMU TMC\Supervisor Non FAA NAS users	ATCSCC TFMs ARTCC TMU TMCs TRACON TMU TMCs Airport TMU TMCs	Airport tower controllers Airport TMU TMC\Supervisor Non FAA NAS users
TMI Control Mechanism	<ul style="list-style-type: none"> Delay flights on the ground Reroute flights to a less congested area 	<ul style="list-style-type: none"> Time based metering Delay flights on the ground 	<ul style="list-style-type: none"> Delay flights at the gate

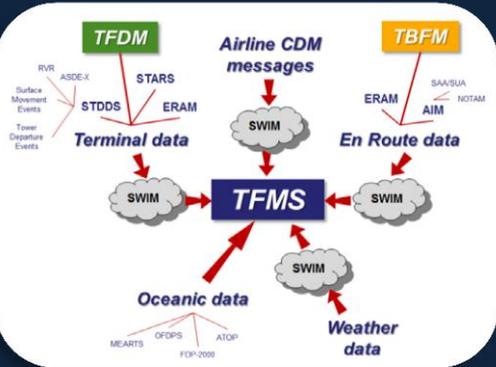


Questions and Answers

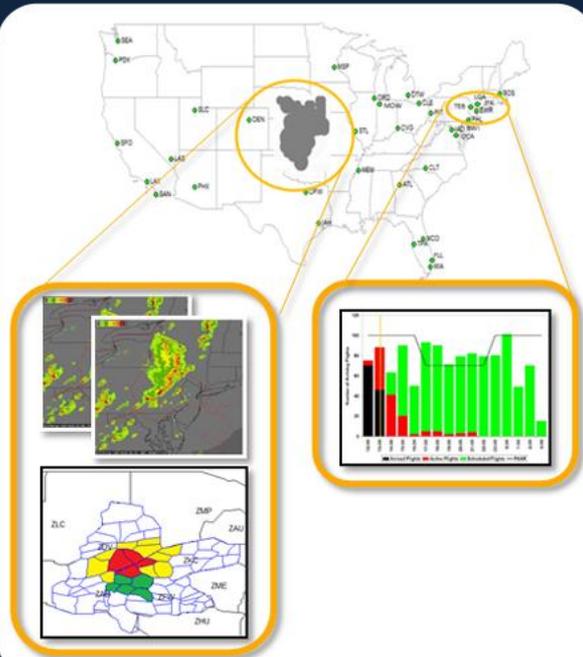


TFMS: Automation backbone and primary source for capturing and disseminating flight information

Monitors demand and capacity for primary NAS resources



Assesses the impact of NAS disruptions and provides alerts



Implements the NAS strategic plan to balance demand with available capacity



Receives updates from other NAS systems and makes adjustments to this plan as needed