# Integrated Demand Management (IDM) Concept of Operations

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# Integrated Demand Management (IDM)

CONCEPT SUMMARY: IDM integrates NextGen strategic and tactical traffic management capabilities to increase system efficiency, schedule predictability, and user-preferred flight outcomes when demand/capacity imbalances affect traffic going to a major airport.

In the strategic time horizon, a Collaborative Trajectory Option Program (CTOP) is developed to "precondition" demand into the tactical Time Based Flow Management (TBFM) arrival scheduling and spacing system*. Flights are assigned departure times and routes to regulate demand delivery to one or more constraints.

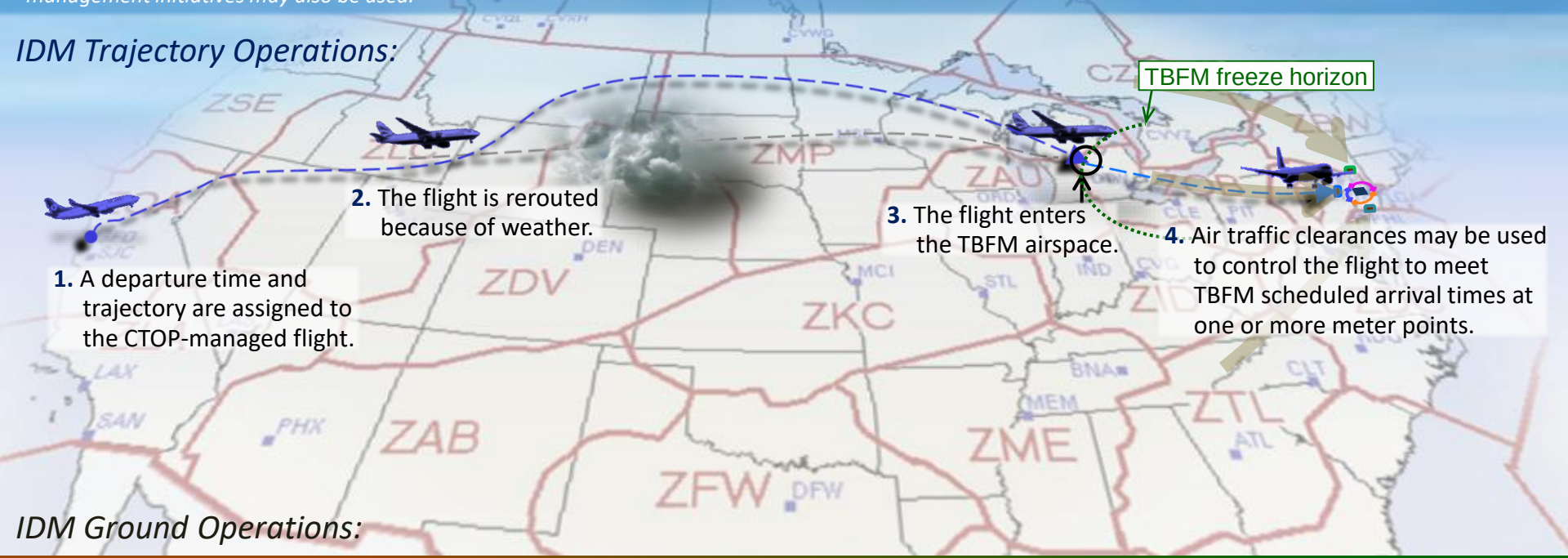
**Strategic preconditioning is not exclusively limited to CTOP; other traffic management initiatives may also be used.*

In the intermediate time horizon, the plan is executed and monitored, and adjusted as needed when conditions change. TBFM operations are also planned during this period, and its automation configured for the expected demand.

In the tactical time horizon, after flights cross the TBFM freeze horizon, TBFM departure scheduling and arrival metering provide a well-sequenced and coordinated feed to the TRACON and airport.

The graphic below shows a sequence of IDM-related events a flight may encounter. The slides that follow elaborate on the corresponding ground operations performed within each time horizon.

## *IDM Trajectory Operations:*




## *IDM Ground Operations:*

**STRATEGIC TIME HORIZON**

Plan, coordinate and initiate a Collaborative Trajectory Option Program (CTOP).

**INTERMEDIATE TIME HORIZON**

- Implement, monitor and adjust program.
- Configure TBFM as needed to manage inbound traffic.

**TACTICAL TIME HORIZON**

Conduct time-based flow management (TBFM) operations.

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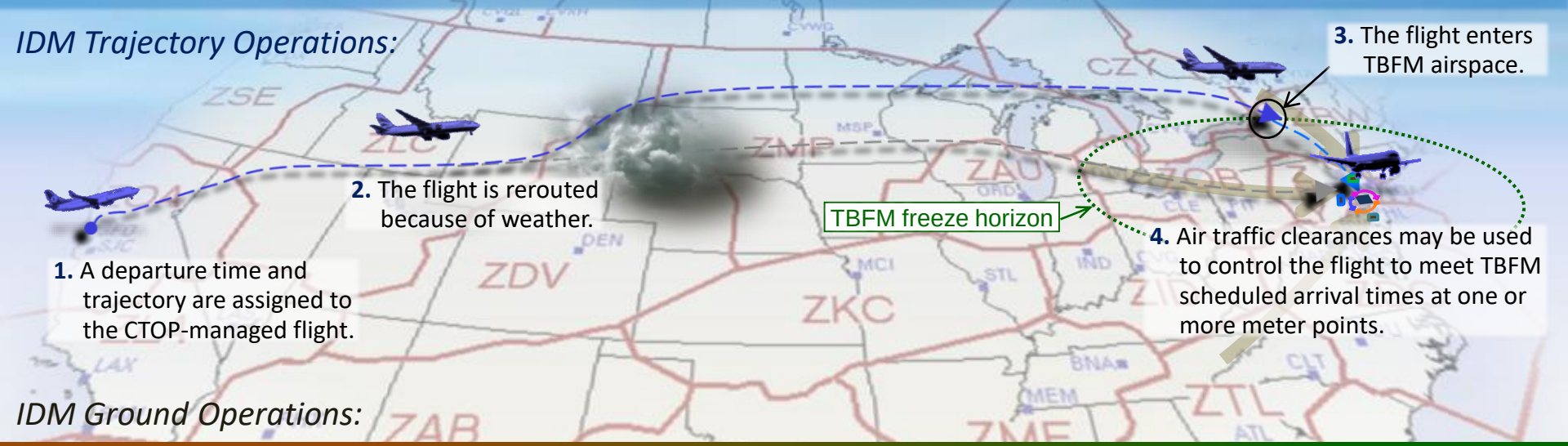
The graphic shows a sequence of IDM-related events a trans-continental flight may encounter under IDM. The ribbon at the bottom describes the sequence of IDM ground operations performed over time.

## *IDM Trajectory Operations:*




## *IDM Ground Operations:*

**STRATEGIC TIME HORIZON**

Plan, coordinate and initiate a Collaborative Trajectory Option Program (CTOP).

**INTERMEDIATE TIME HORIZON**

- Implement, monitor and adjust program.
- Set up TBFM to manage inbound traffic.

**TACTICAL TIME HORIZON**

Conduct time-based flow management (TBFM) operations.

Modified version of slide 2 for IDM webpage

# IDM Ground Operations
# STRATEGIC TIME HORIZON

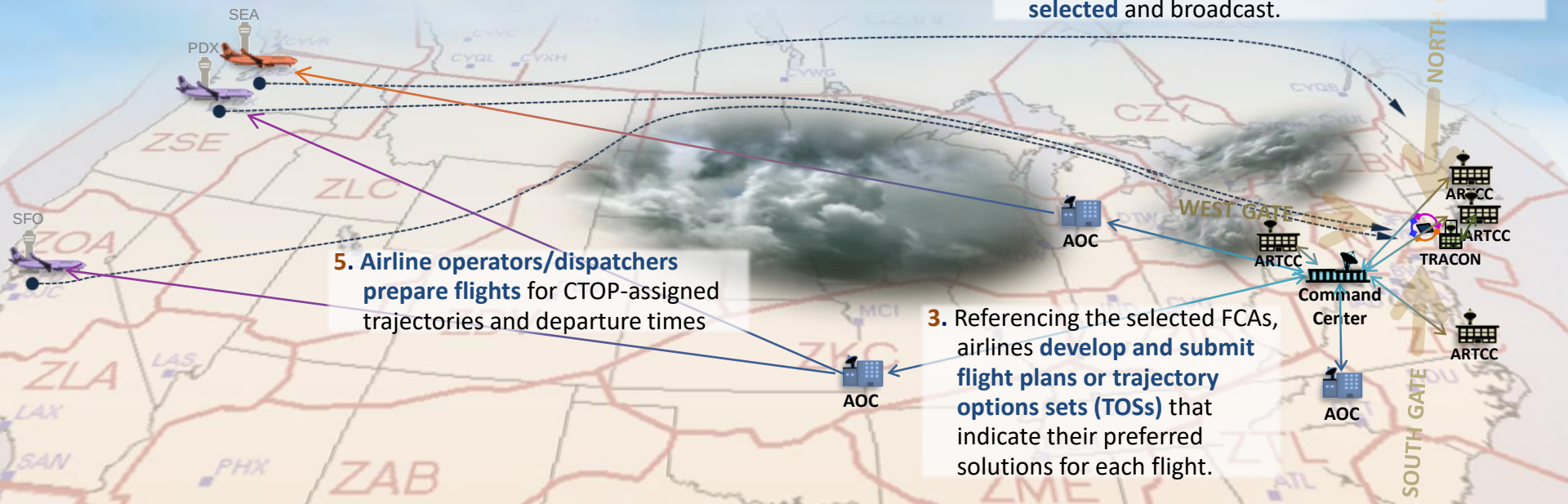
## Plan, coordinate and initiate a Collaborative Trajectory Option Program (CTOP)

SUMMARY OF STRATEGIC GROUND OPERATIONS (~4-6 hours before program onset): Forecast conditions suggest that capacity limitations at one or more airspace resources may impact flights traveling to a major NAS airport. The ATC System Command Center (ATCSCC) coordinates with both users and affected air traffic facilities to determine the nature and extent of the problem, and to develop a collaborative solution using CTOP or other traffic management initiatives (TMIs). Operators may submit flight plans or trajectory option sets (TOSs) that indicate to CTOP the operators' preferred solution with respect to ground delay and route assignment. CTOP parameters (including flow constrained areas (FCAs), capacity settings, program onset time, and duration) are finalized, and the program is initiated.

The sequence of activities is illustrated below.

**1.** Command Center, operators and facilities evaluate forecast conditions and discuss possible need for CTOP.

**2.** Command Center and local facilities **establish airspace, arrival gate, and airport capacity estimates**. Critical capacity/demand mismatches are **identified and analyzed**, then the **FCAs are selected** and broadcast.




**5.** **Airline operators/dispatchers prepare flights** for CTOP-assigned trajectories and departure times

**3.** Referencing the selected FCAs, airlines **develop and submit flight plans or trajectory options sets (TOSs)** that indicate their preferred solutions for each flight.

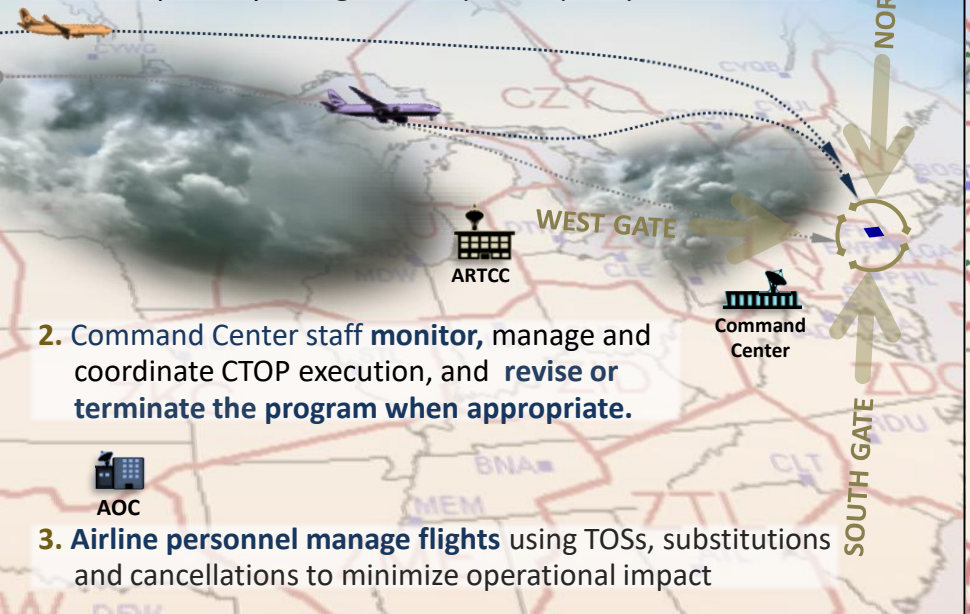
**4.** Using the most current flight plan and TOS information, the Command Center uses **CTOP automation to model and compare predicted outcomes** for different **capacity settings, onset time, duration, onset time, and geographic range**. A solution is finalized and the CTOP is initiated, with departure times and route assignments sent for all flights.

# IDM Ground Operations
# INTERMEDIATE TIME HORIZON

## Implement, monitor and adjust CTOP program

(1) CTOP GROUND OPERATIONS SUMMARY (after program initiation): The Command Center and local air route traffic control centers (ARTCCs) monitor the CTOP for changes in either capacity or demand, which can occur for a variety of reasons. Airline operators may make flight substitutions, revise TOSs, or cancel flights. Flights may be re-routed or experience unexpected delays. Previously unscheduled "pop-up" flights may appear. When forecast demand deviates too much from the target capacity, CTOP automation can trigger an automatic revision. When forecast capacity changes (e.g., due to weather), the Command Center may choose to manually revise the CTOP in order to reallocate the demand.

1. Center controllers and traffic managers manage reroutes and gate reassignments **with appropriate coordination**, and report any changes in airspace capacity.

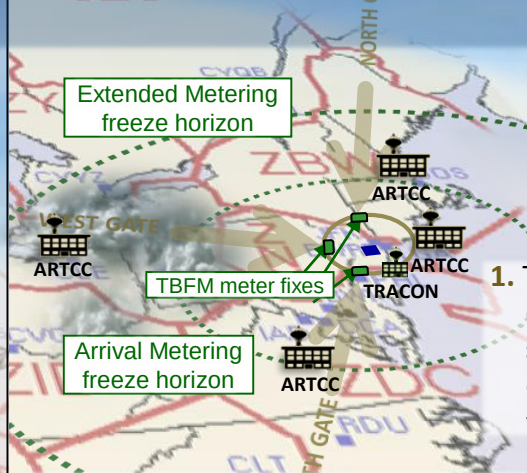



2. Command Center staff **monitor,** manage and coordinate CTOP execution, and **revise or terminate the program when appropriate.**

3. **Airline personnel manage flights** using TOSs, substitutions and cancellations to minimize operational impact

## Configure TBFM for pre-conditioned demand

(2) TBFM GROUND OPERATIONS SUMMARY (2-4 hours before arrival): TBFM procedures and configuration settings may be changed based on observed conditions and expected demand. Examples include use of specific procedures or settings for TBFM departure scheduling, changes to TBFM buffer or acceptance rate entries, and different air traffic control procedures, especially in the Extended Metering region. Depending on the situation, the latter can vary from active metering with "times on the glass", to Ground Interval Management (GIM) speed clearances, to simple delay monitoring until the need for more active control arises. Decisions are coordinated as appropriate across all Centers involved in managing the TBFM traffic.




1. Traffic managers at the TBFM-controlling Center **evaluate the situation and configure TBFM**, coordinating entries and plans with the adjacent facilities.

2. Center traffic managers responsible for both Arrival and Extended Metering regions prepare to manage the TBFM traffic. Each facility **evaluates its expected demand and selects an air traffic control method** appropriate to the situation. TBFM **departure load is checked and TBFM departure scheduling methods are planned** to minimize the occurrence of excessive airborne or ground delay.

3. **Local decisions are communicated, insuring that Center plans are coordinated** and will provide the desired outcome.

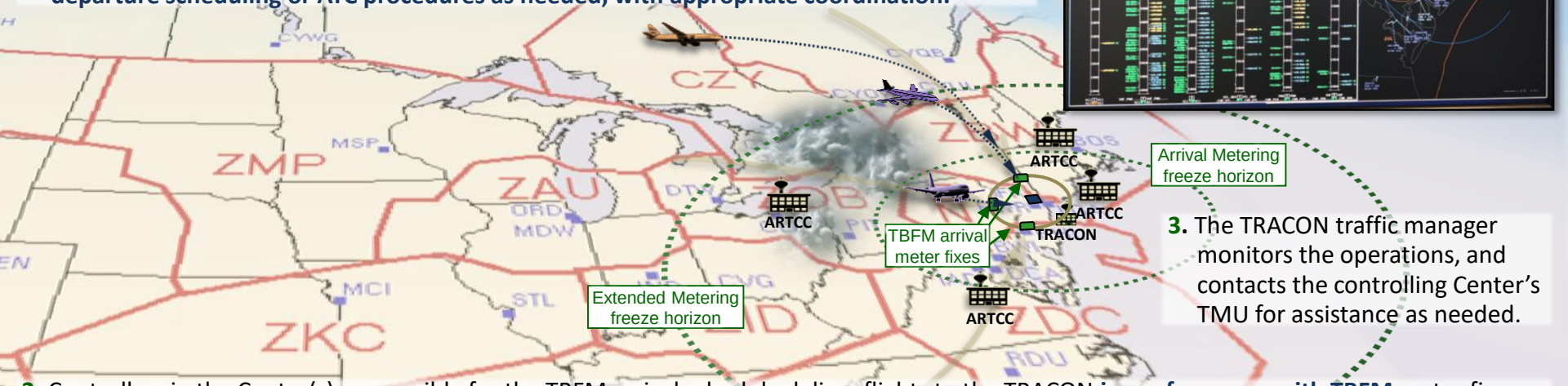
# IDM Ground Operations
# TACTICAL TIMEFRAME

## Conduct time-based flow management (TBFM) operations

SUMMARY OF TACTICAL OPERATIONS: Roughly 90 minutes before arrival, aircraft cross the TBFM Extended Metering freeze horizon, or call for release from departure airports located within the TBFM region, transitioning from CTOP to TBFM flight management. Pre-departures are scheduled into arrival slots close to their CTOP-assigned departure times using appropriate TBFM departure scheduling protocols. As indicated in the prior slide, TBFM-related control of airborne flights in the Extended Metering airspace will vary depending on the amount of control needed to provide satisfactory delivery to the TBFM arrival freeze horizon.

Traffic managers at each facility monitor throughput and delay both within their airspace and downstream to determine whether adjustments to the schedule are needed due to a buildup of airborne or ground delay, or under-delivery to the TRACON. Since the traffic was "preconditioned" by CTOP, airborne delay is minimized, and airport throughput and flight schedules are maintained.

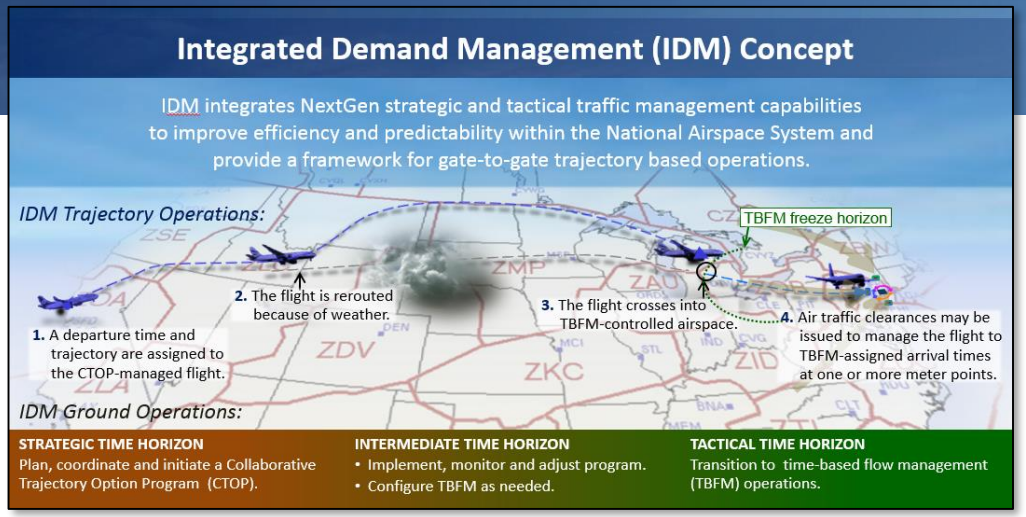
**1.** Controllers in the three adjacent Centers use **predetermined ATC procedures** to control arrival traffic (previous slide). The traffic also uses **predetermined TBFM departure scheduling procedures.** Traffic managers monitor downstream facility delay and throughput, and reroute traffic, adjust the local TBFM schedule, **modify TBFM settings**, and **change departure scheduling or ATC procedures as needed, with appropriate coordination.**



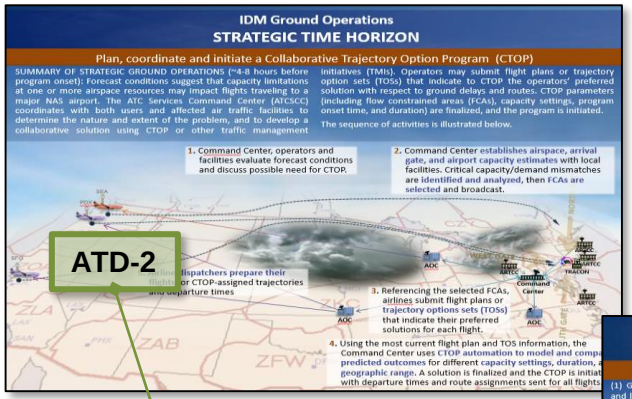

**3.** The TRACON traffic manager monitors the operations, and contacts the controlling Center's TMU for assistance as needed.

**2.** Controllers in the Center(s) responsible for the TBFM arrival schedule deliver flights to the TRACON **in conformance with TBFM** meter fix times. Traffic managers schedule departures, and monitor them for conformance to their assigned departure times. Inbound demand, as well as schedule conformance, throughput and delay within both the local facility and the TRACON are monitored. When delay becomes excessive, or throughput drops, the traffic manager contacts the appropriate facility or facilities (TRACON, adjacent Center, or Command Center) to work out a solution to the problem.

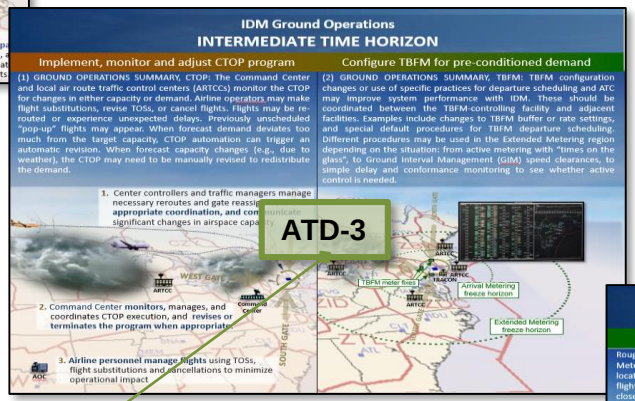
# IDM Overview



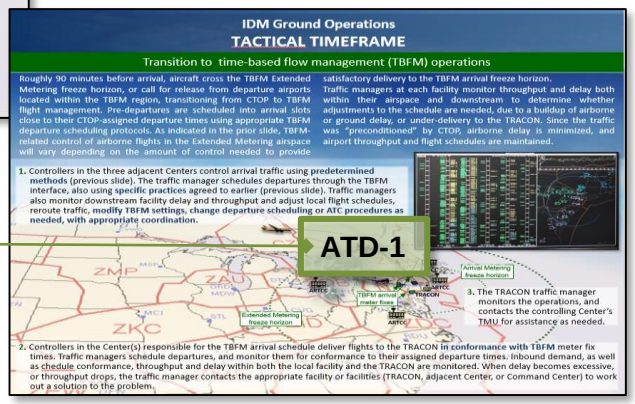

## Strategic
## Initial Traffic Management Initiatives




## Intermediate
## Airborne and Pre-departure Adjustments




## Tactical
## TBFM Scheduling to the Airport




**IDM in conjunction with ATDs can form an initial gate-to-gate TBO framework**