Federal Aviation Administration

SBS Ground-Based Interval Management Briefing for SC-186 WG6

ATO-E Surveillance and Broadcast Services

February 24, 2011

Agenda

- GIM-S Overview
- GIM-S Alternatives Analysis Overview
- Schedule

IM Program Personnel

- Program Manager – Robert Nichols
- Project Lead – John Koelling
- GIM Lead – Chris Daskalakis
- FIM Lead – Randy Bone
- IM Systems Engineer – Roberta Massiah
- IM-S ConOps Team – Rafe Katkin, Peter Moertl, Karen Viets
- Operations Support – Wes Stoops
- Participants from ATO-E SOS, ERAM, & TBFM

Ground-based Interval Management for Spacing (GIM-S) Overview

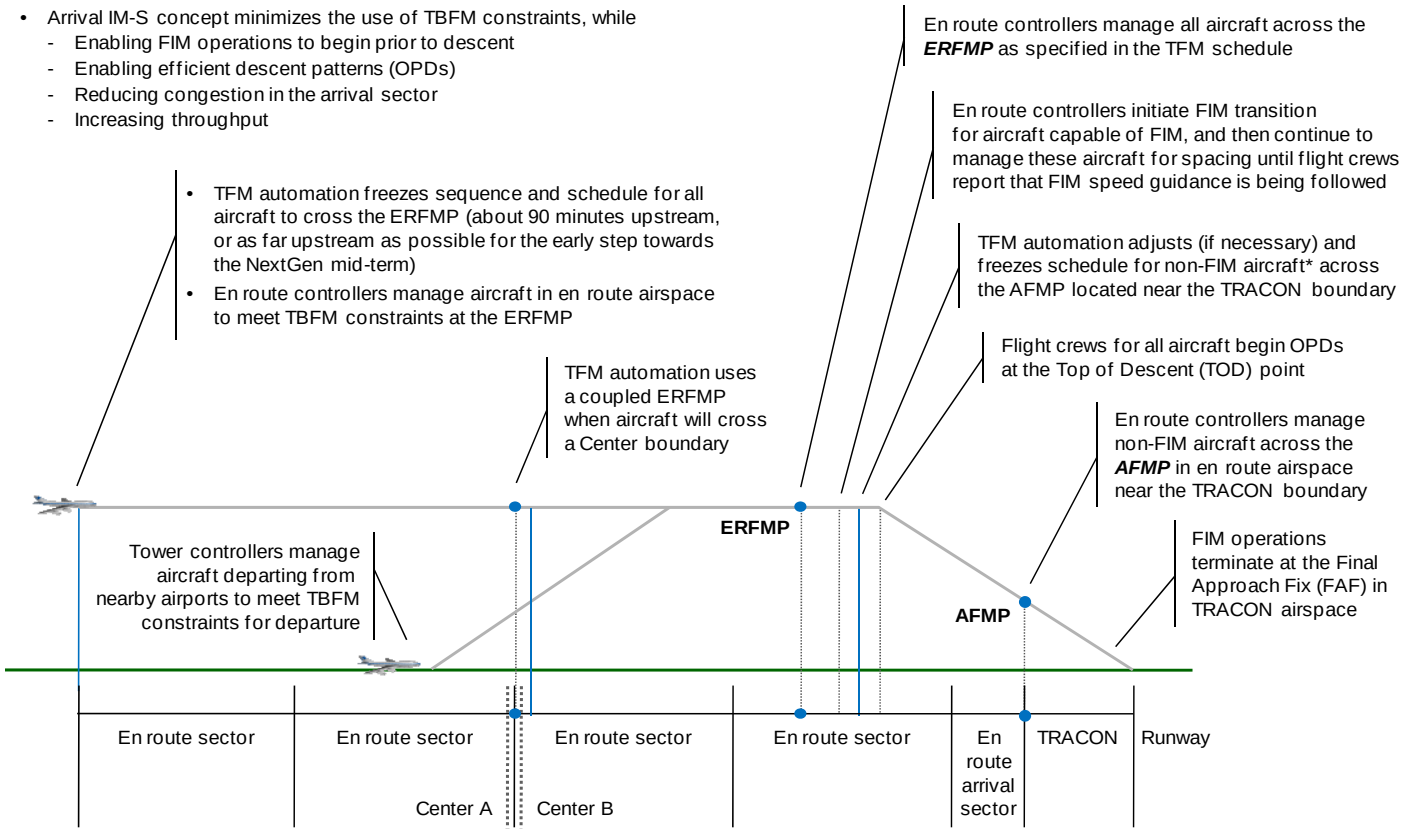
- The GIM-S System is a set of ground-based functions intended to support Interval Management for Spacing (IM-S) (*formerly "Merging & Spacing"*) operations by:
  - Providing accurate & consistent arrival spacing to precondition arrival streams for Optimized Profile Descents (OPDs) & fully utilize the runways
  - Providing effective sequencing & scheduling services for advanced equipage operations such as FIM-S.

– Targeting implementation by 2014

GIM-S Concept

Arrival IM-S Concept

- TFM automation coordinates the TBFM constraints that apply to each aircraft (departure, en route, and arrival constraints)
- Tower controllers manage departures from nearby airports
- During cruise, en route controllers manage all arrival aircraft to the ERFMP
- During descent, en route controllers manage non-FIM arrival aircraft to the AFMP
- Arrival IM-S concept minimizes the use of TBFM constraints, while
  - Enabling FIM operations to begin prior to descent
  - Enabling efficient descent patterns (OPDs)
  - Reducing congestion in the arrival sector
  - Increasing throughput



* Although a ***non-FIM aircraft*** is defined as an aircraft that is not currently performing FIM operations, it may be capable of (and initiating) FIM operations, or serving as a target for a trailing aircraft that is performing FIM operations.

Program Schedule

• Technical Meetings (TBFM)	On-Going
• Update TBFM SLA	Dec 2010
• Update ATO-E DLA	Jan 2011
• Baseline GIM-S	Dec 2010
• GIM-S ConOps	March 2011
• GIM-S RD Final	June 2011
• GIM-S IOC	Dec 2014

Responses to WG6 Questions

- **What versions of GIM will use ADS-B data?**
  - GIM functionality, whether GIM-S or GIM-DS, is provided by existing Automation platforms and can be performed with or without ADS-B data
- **What data quality is expected?**
  - Data provided to Automation platforms is consistent with the rule for ADS-B Out
- **When is that version planned to be operational?**
  - GIM-S IOC in support of arrivals is targeted for 2014; subsequent versions in support of other IM-S or IM-DS concepts are still in the planning stages

Backup

Terminology Review – IM Lexicon

- **Specific Terms – Specific Meanings**
  - “FIM-S” FIM for Spacing
  - “FIM-DS” FIM with Delegated Separation
  - “GIM-S” GIM for Spacing
  - “GIM-DS” GIM for Delegated Separation

Terminology – IM Lexicon (continued)

- **Broad terms – Intentionally Broad Meaning**
  - "FIM" Any Flight Deck Based IM (S and DS)
  - "GIM" Any Ground Based IM (S and DS)
  - "IM-S" Interval Management w/Spacing (FIM-S and GIM-S)
  - "IM-DS" Interval Management w/Delegated Separation (FIM-DS and GIM-DS)
  - "IM" All Flavors of Interval Management

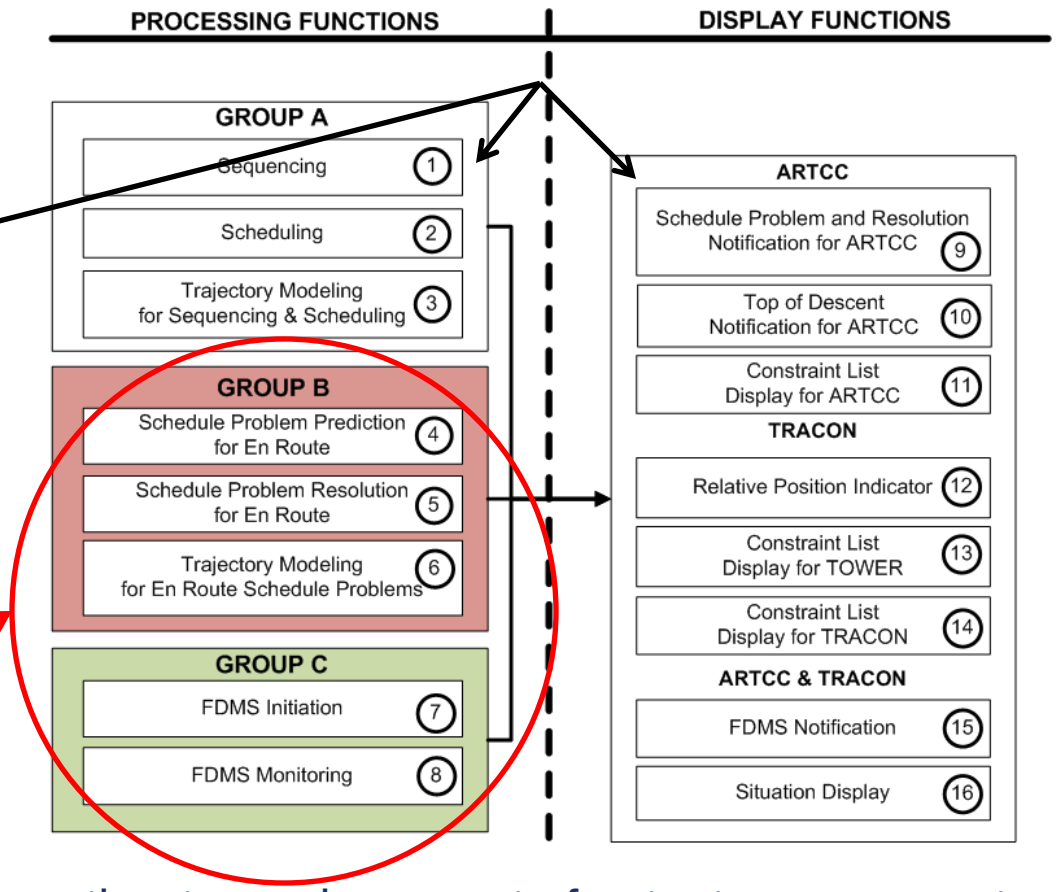
Functional Groups

Non-Shaded (clear fill) = "Static" Functions or Functional Groups

- These have been allocated

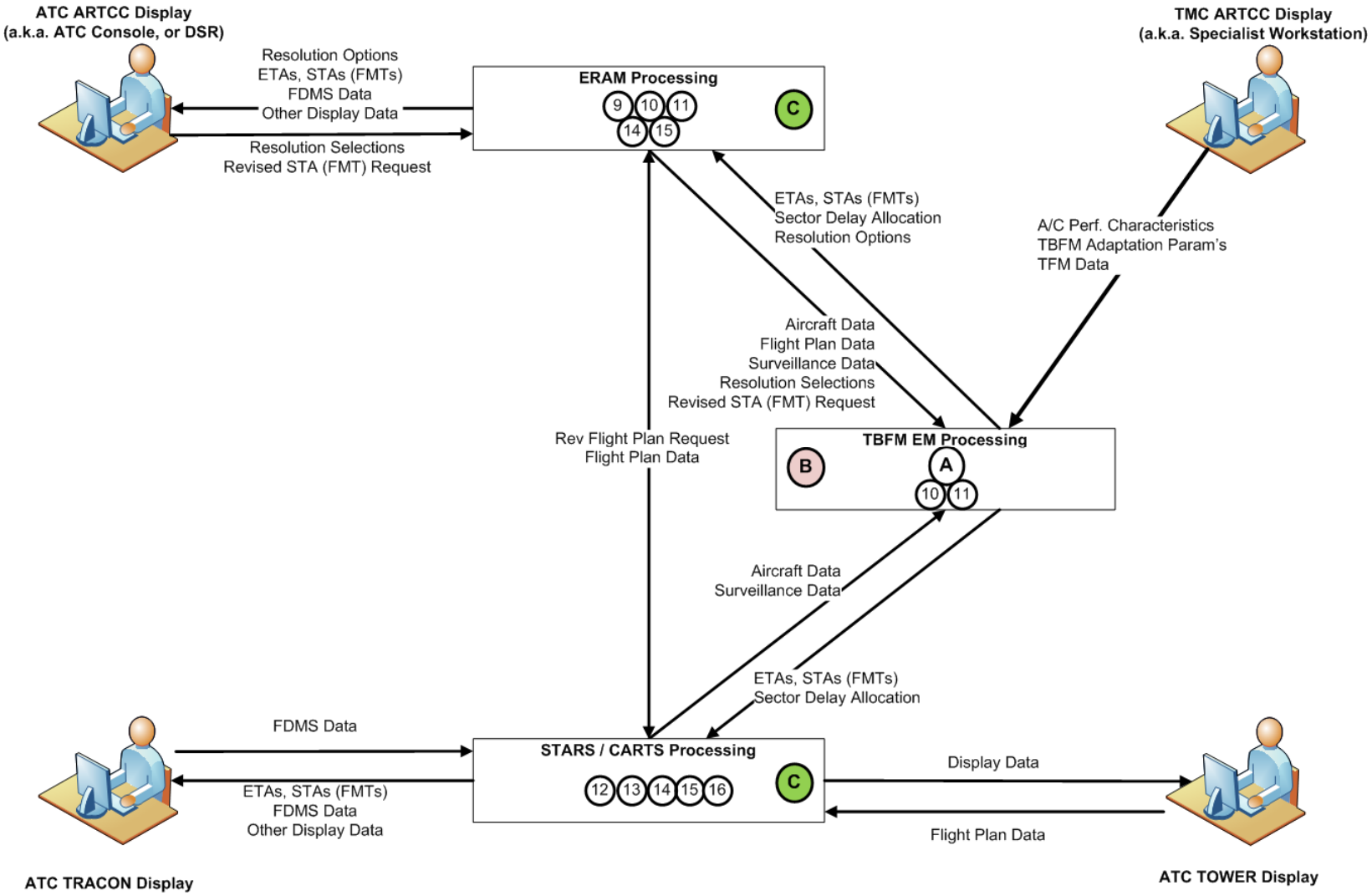
Shaded (color fill) = "Dynamic" Functional Groups

- These must be allocated.



"Functional Groups" work together to produce a set of outputs necessary to achieve a system operational objective *that cannot be achieved without all the functions in that group.* They also reduce number of alternative permutations.

Alternative 2



Benefit: Increased Ability to perform OPDs

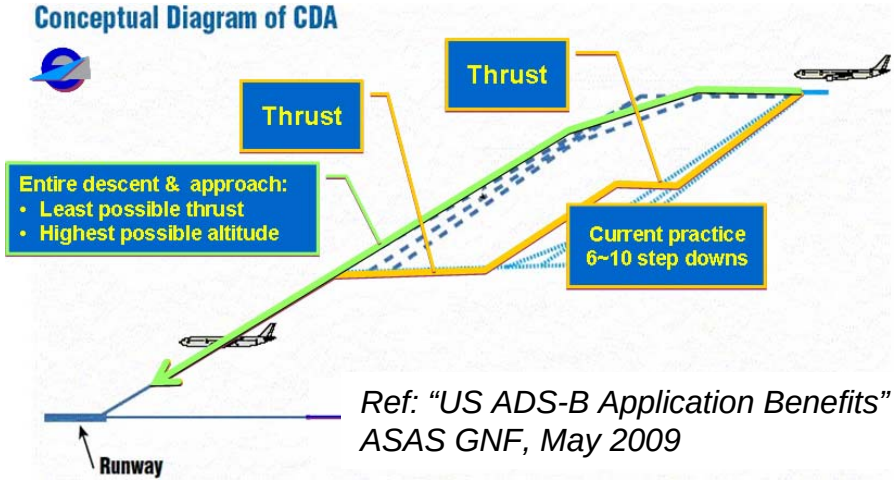
<u>SBS Basis of Estimate, 2.7.3</u>: The SBS program is developing a tool that can be used to optimize aircraft spacing to enable a fuel-saving procedure called continuous descent approaches (CDAs), a.k.a. **Optimized Profile Descents (OPDs)** during increased levels of demand. The prototype tool will be used by UPS in their Airline Operations Center, where UPS will be allowed to adjust aircraft speeds into SDF at night when they constitute most of the demand. This tool will be incorporated into FAA automation to allow FAA controllers to space aircraft from multiple carriers into an airport using ADS-B out. A follow-on tool could use an expanded set of data from ADS-B out (aloft winds, pressure, aircraft specific characteristics) to allow CDAs at somewhat higher demands.

Benefit Start: 2014 after ADS-B ground infrastructure deployment

Beneficiary: Air Transport @ top 100 busiest NAS airports

Primary Analysis Inputs:

1. Fuel savings per CDA.
2. CDA Demand at each airport when 40%<Demand/Capacity<70%.
3. Percentage of ADS-B Out Transport arrivals.



Ref: "US ADS-B Application Benefits" ASAS GNF, May 2009

Benefit: Increased CDAs – Aug. 2007 JRC

Location	Application	Outcome	Risk Adjusted PV $M
CONUS, Hawaii, and Caribbean Surveillance	Radar Airspace ATC Surveillance	Reduction and more efficient maneuvers in response to URET	$801.8
		More efficient metering based on improved TMA accuracy	$417.0
		Increased safety on the surface by controllers	$3.2
		More efficient ATC management of surface movement	$26.9
CONUS, Hawaii, and Caribbean Aircraft Applications	Enhanced Visual Approach - Initial Application	More efficient spacing on approach in VMC	$300.4
	Enhanced Visual Approach - CAVS	Continuation of Visual Approaches in marginal conditions	$196.4
	Enhanced Visual Approach - Merging and Spacing	Increased ability to allow continuous descent approaches	$796.0
	ADS-B ATC Automation Integration		
	Airport Surface Situational Awareness	Increased safety on the surface by pilots	$70.5
	Final Approach and Runway Occupancy Awareness		
Gulf of Mexico Surveillance	Non-radar Airspace ATC Surveillance (includes weather and comm as needed)	High Altitude - Increased Capacity	$459.3
		High Altitude - Optimal Routing	$86.5
Alaska Surveillance and Broadcast Services	Non-radar Airspace ATC Surveillance	Increased IFR capacity (JNU)	$1.1
Total			$3,159.1

ADS-B Out ADS-B In

Ref: "US ADS-B Application Benefits", ASAS GNF, May 2009