TACEC Phase 3 Report

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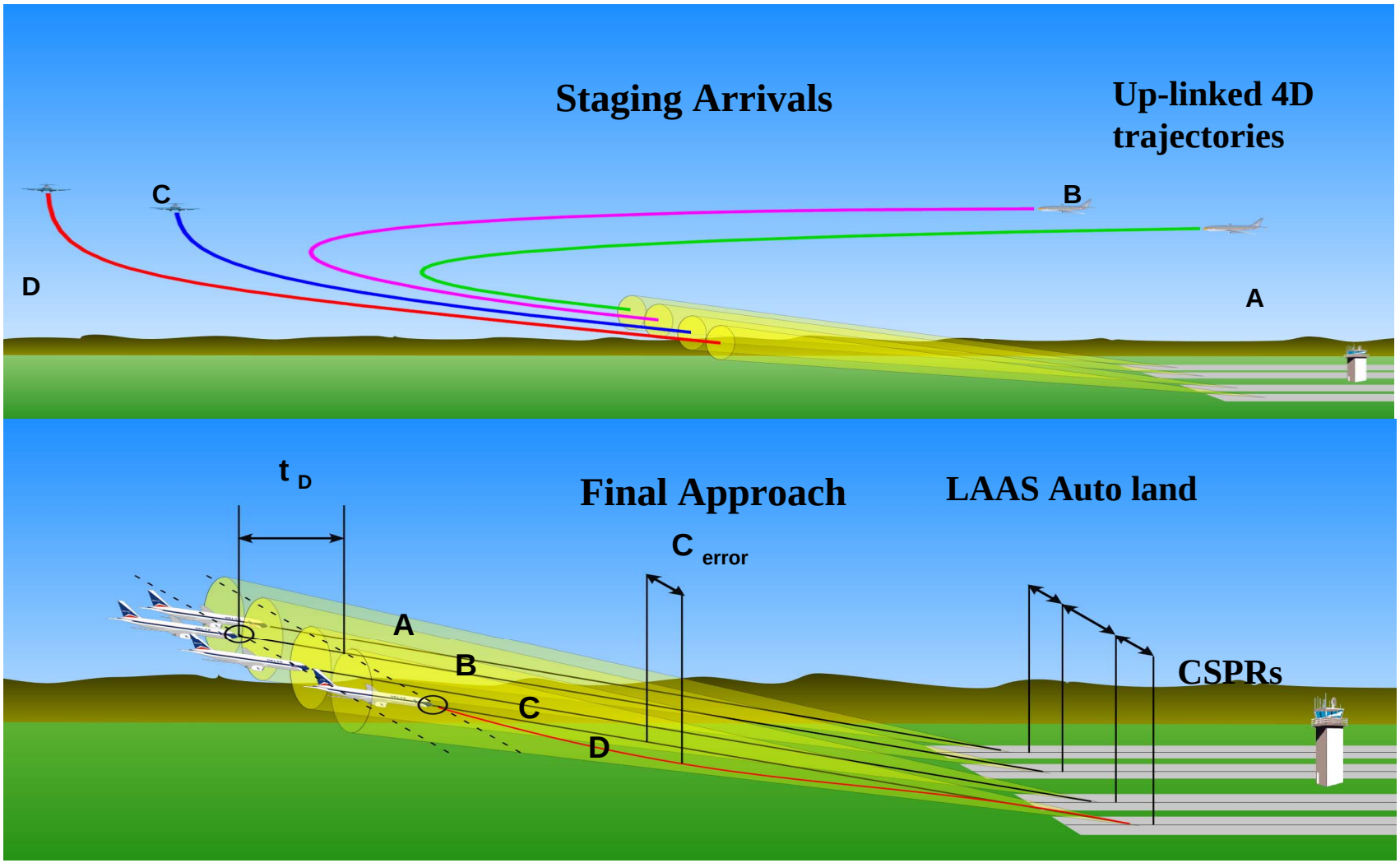
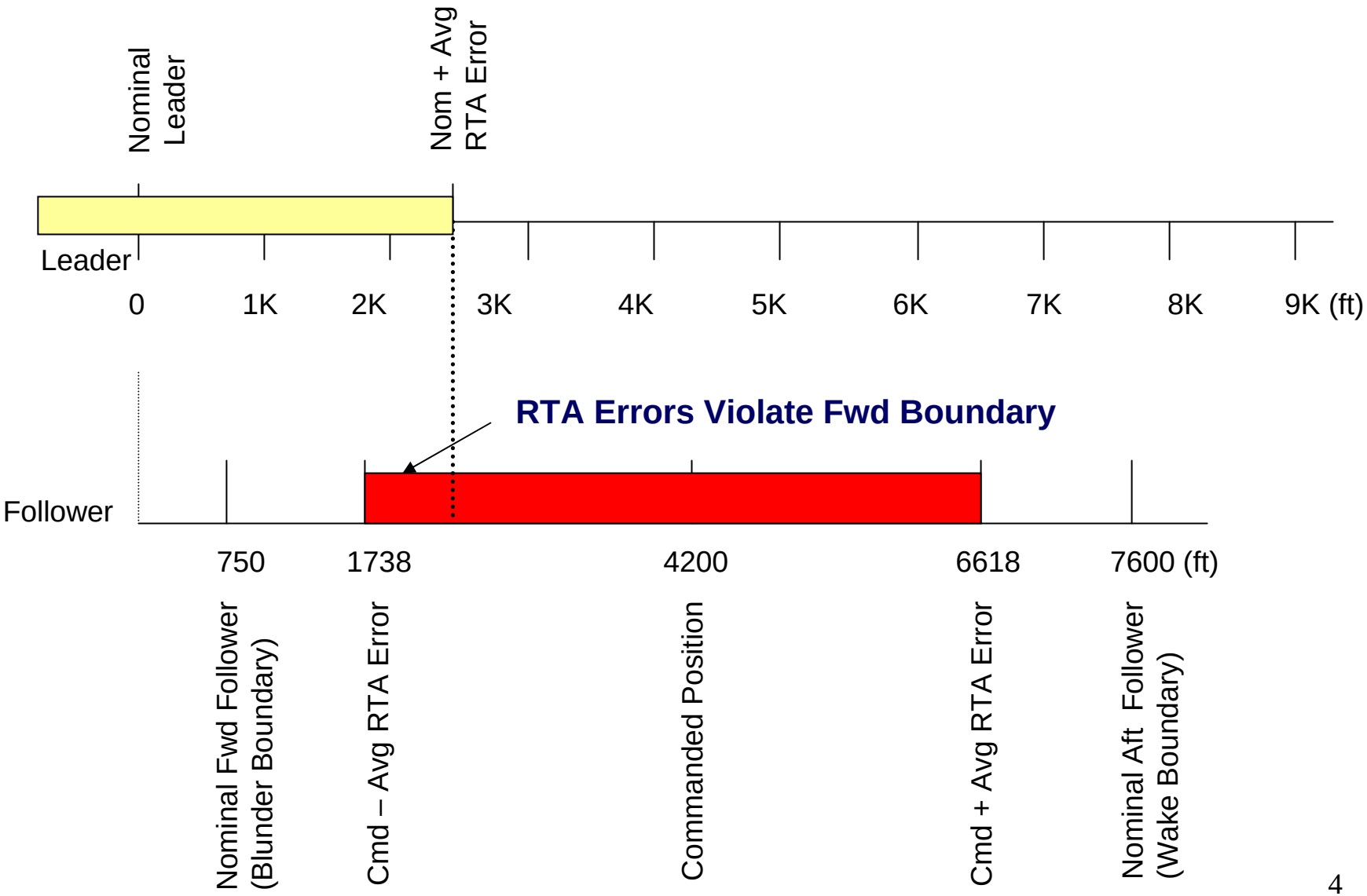
Agenda

- **What questions are we trying to answer and how are we using ACES?**
- **Metrics**
- **Phase 3 results**
- **Lessons Learned**
- **Issues/Challenges about our assessment**

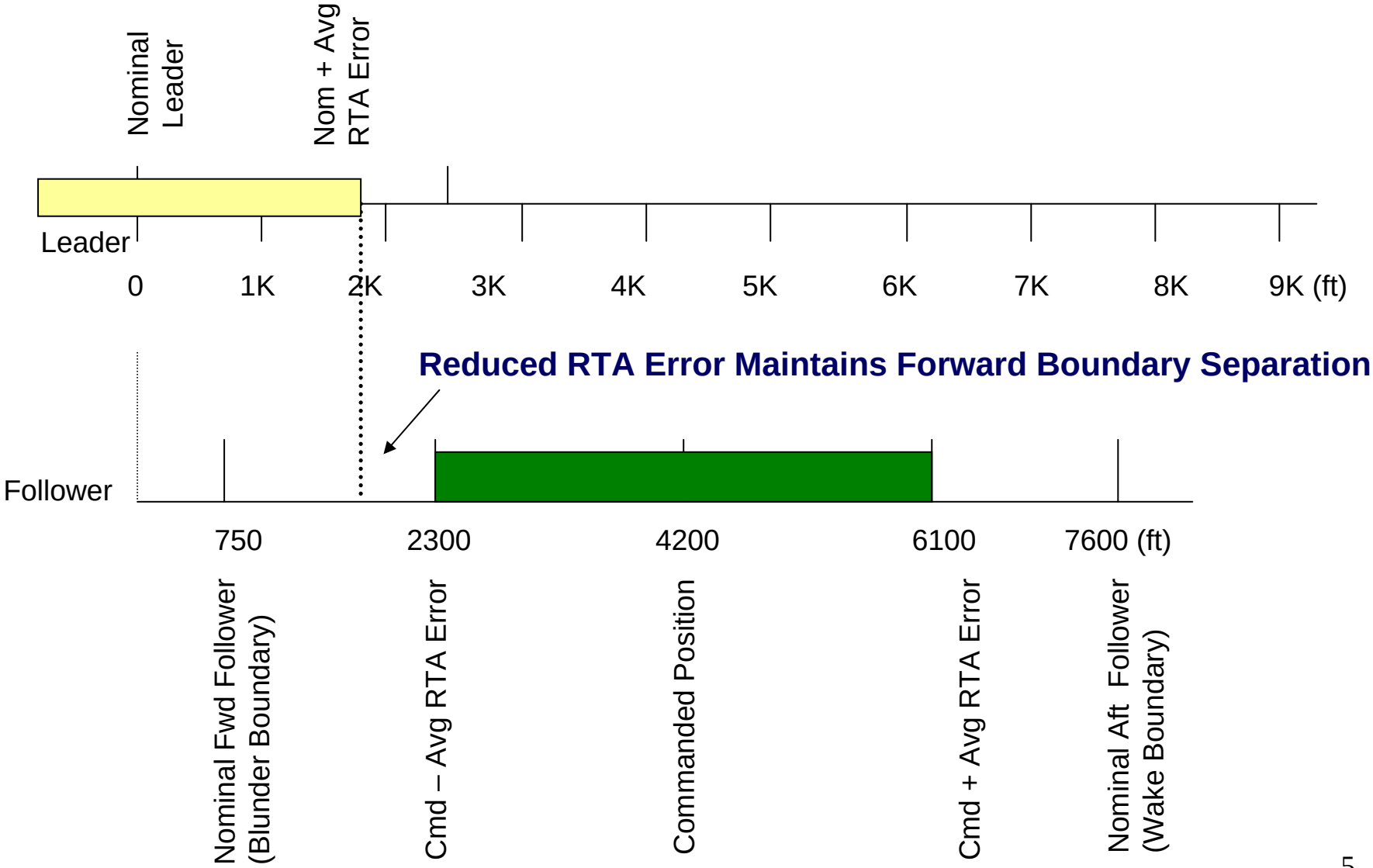
TACEC Overview



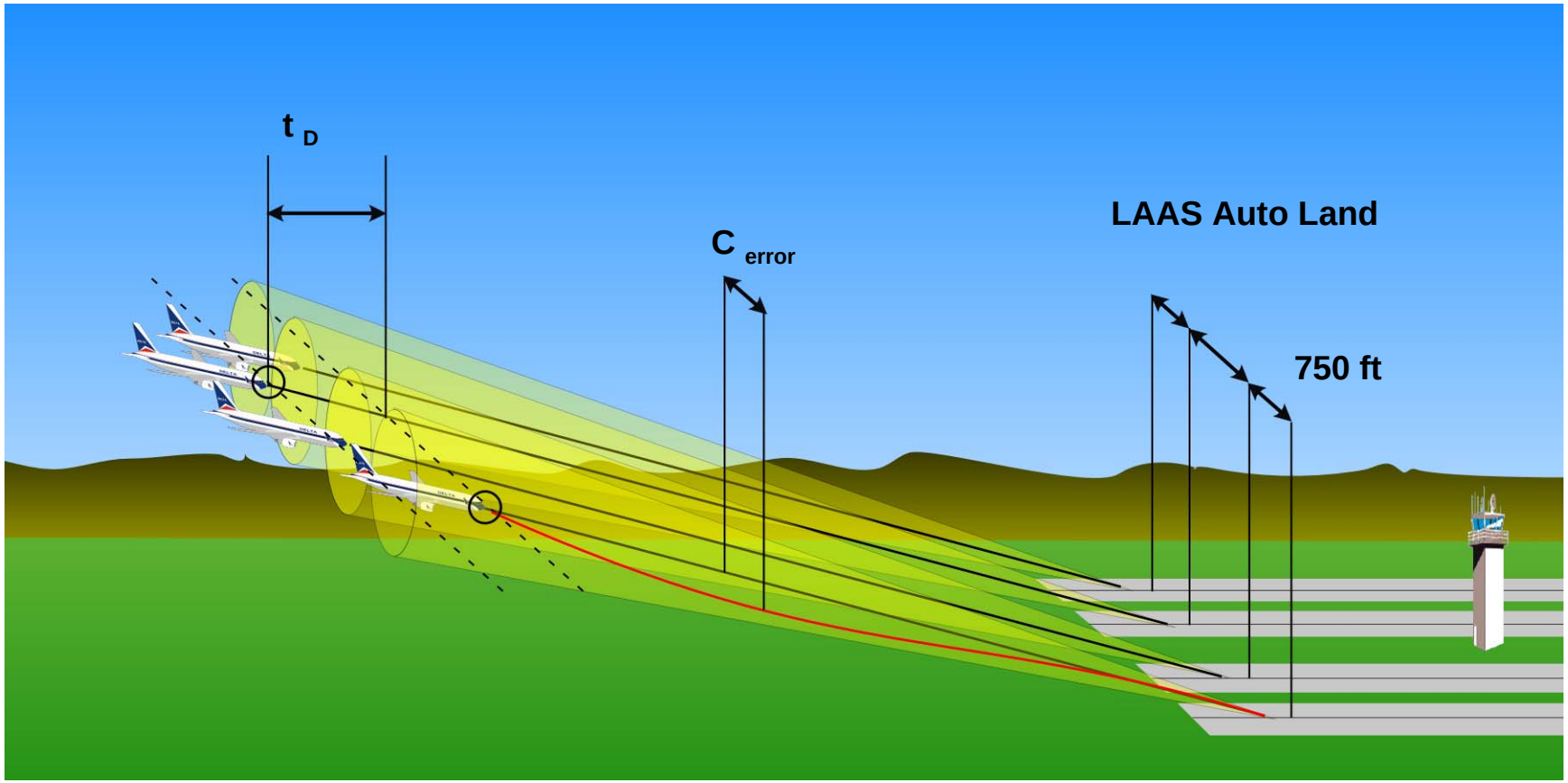
Leader/Follower Positions, Independent Control In Initial/Final Approach



Leader/Follower Position, Coupled Control In Final Approach



TACEC Flight Corridors



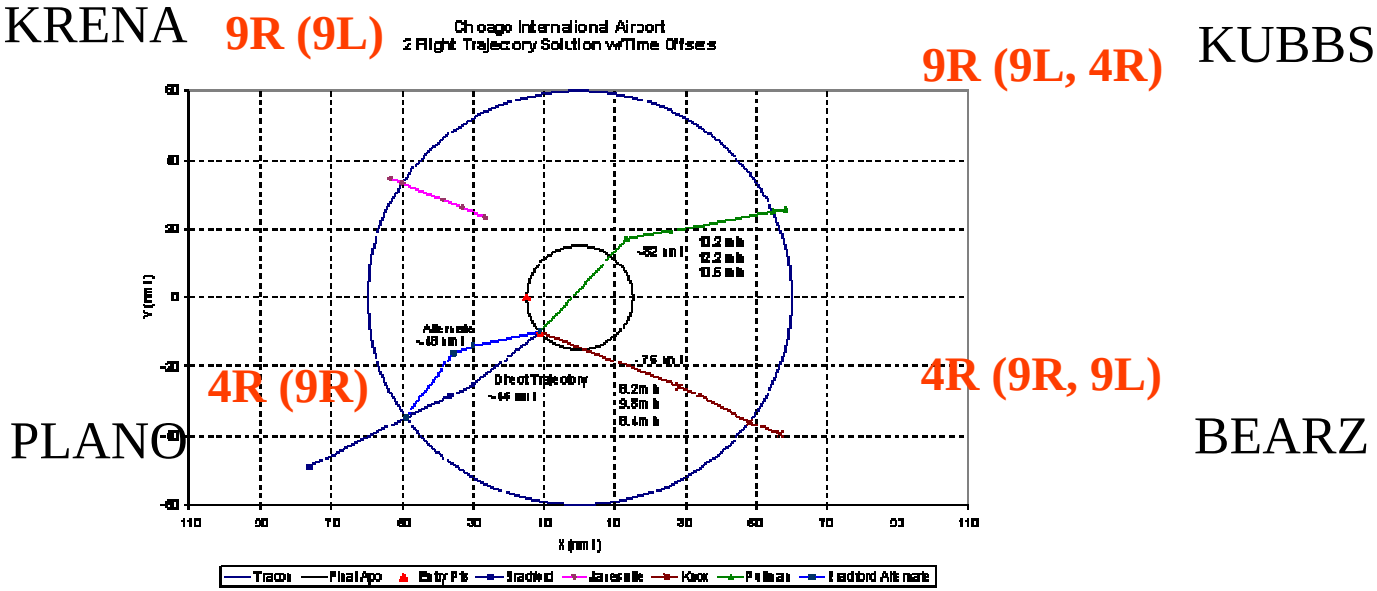
Research Question #1

- **Can TACEC handle 2x traffic growth without an unreasonable increase in delay?**
  - **Answered in Phase 2 with B2. Yes, however**
  - **Group spacing not modeled with B2 low-fi terminal**
    - **Performed offline analysis**
  - **Utilized B3 enhanced terminal model**
    - **Assignments limited to a single runway/fix pair**
    - **Synchronized departures not modeled**
    - **Flight delay fixed in B3.2.1**

Group Assignment

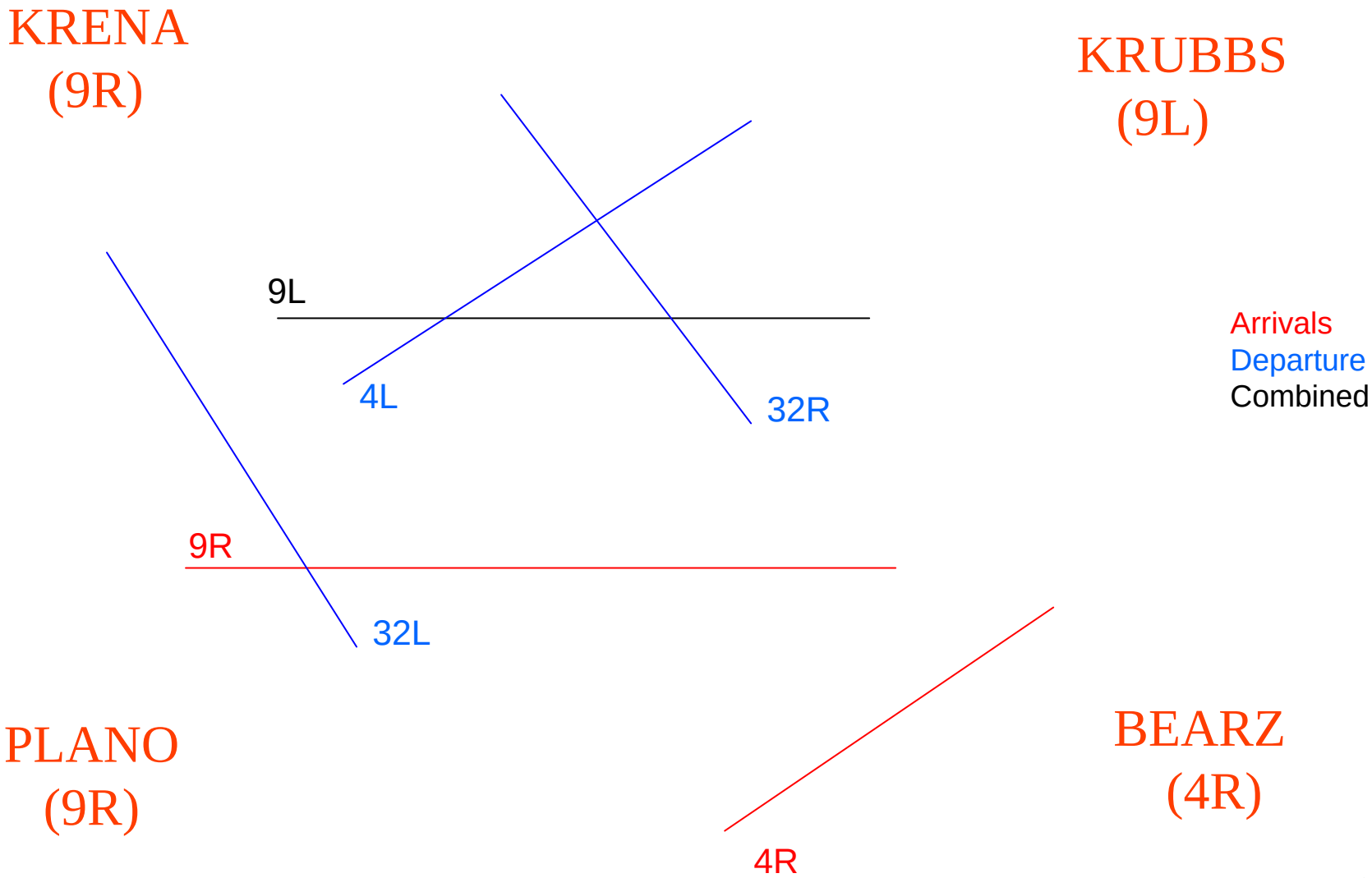
Non-ACES Arrival Grouping Example – ORD Fixed Routes

- **Find pair meeting a/c type and time constraints**
- **Assign Runway & Group On-Time, adjusting speed as needed**
- **Modify Group On Time to ensure today's wake vortex separation between groups**



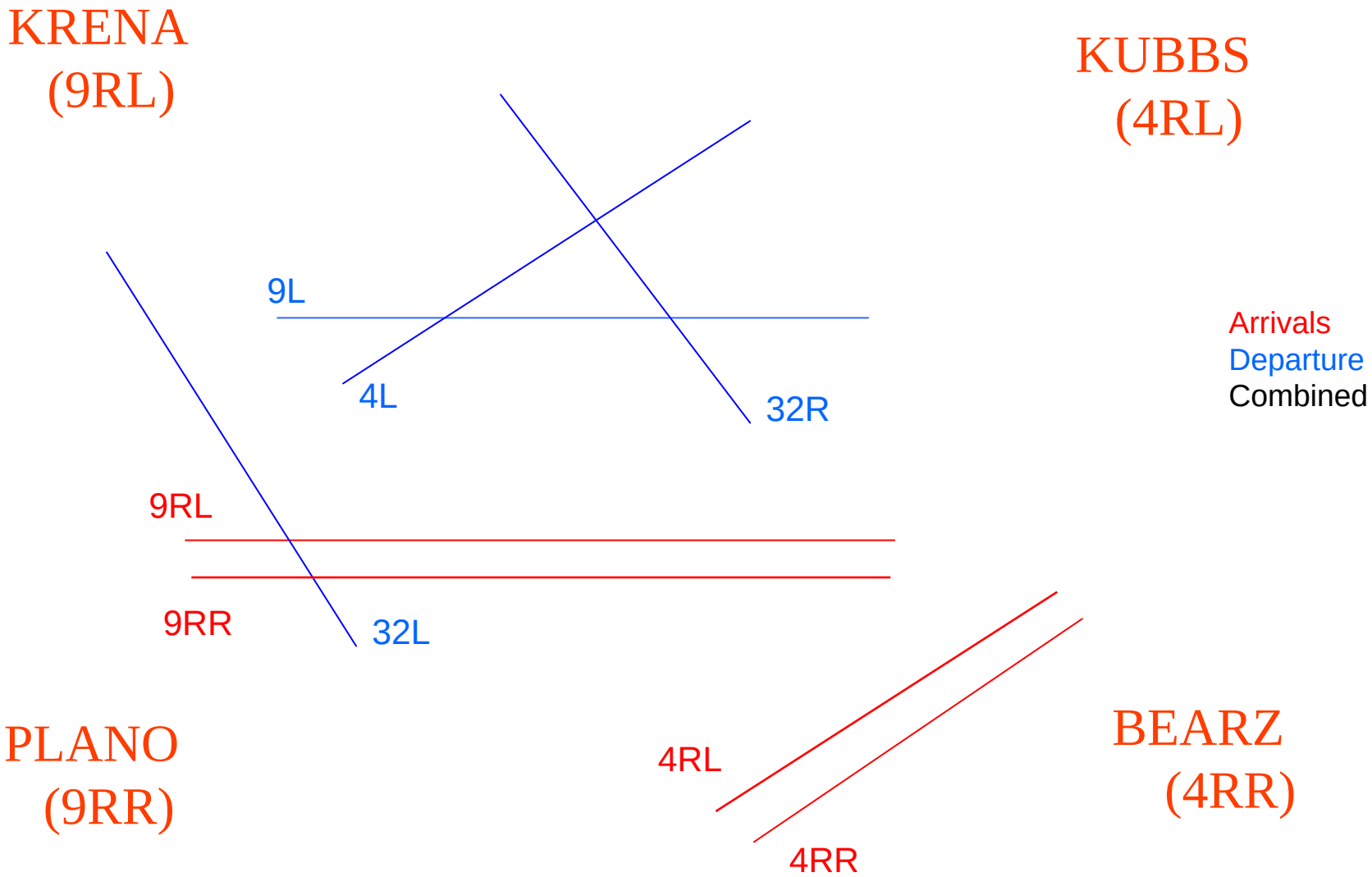
B3 ORD PLAN-X
(Arrival Fix Runway Assignments)

Raytheon



ORD PLAN-X with VCSPR
(Limited to one runway per fix)

Raytheon



B3 Group On/Off Time Results

B3 Model generates arrival/departure file for follow-on Surface analysis

flightId	aircraftType	airportName	runway	fix	actualRunwayTime	synchronizedOperationId	synchronizationState
8	A320	KORD	4RL	BEARZ-ORD_AC	5/17/2002 7:59	KORD-4R-ARR	0
20	E135	KORD	9RL	PLANO-ORD_AC	5/17/2002 7:59	KORD-9R-ARR	0
6	B733	KORD	4RL	BEARZ-ORD_AC	5/17/2002 8:14	KORD-4R-ARR	1
45	E135	KORD	9RL	KRENA-ORD_AC	5/17/2002 8:14	KORD-9R-ARR	1
25	B735	KORD	4RL	BEARZ-ORD_AC	5/17/2002 8:15	KORD-4R-ARR	1
29	A319	KORD	9RL	KRENA-ORD_AC	5/17/2002 8:15	KORD-9R-ARR	1
76	B735	KORD	4RL	BEARZ-ORD_AC	5/17/2002 8:29	KORD-4R-ARR	1
148	B733	KORD	9RL	KRENA-ORD_AC	5/17/2002 8:29	KORD-9R-ARR	0
78	A320	KORD	4RL	BEARZ-ORD_AC	5/17/2002 8:30	KORD-4R-ARR	1
51	B735	KORD	9RL	KRENA-ORD_AC	5/17/2002 8:44	KORD-9R-ARR	0
253	E135	KORD	4RL	BEARZ-ORD_AC	5/17/2002 8:44	KORD-4R-ARR	0

Additional Research Questions

What airports require increased capacity?

- **Metrics**
  - **Airports where Demand/Capacity > 95%, 15 minutes intervals**
  - **Is Congestion due to Arrivals or Departures?**

Where do the largest delays occur?

- **Metrics**
  - **Average Gate Arrival Delay, 15 minute intervals**
  - **% of Flights > 4.5 min gate arrival delay**
  - **City pairs for flights > 4.5 min gate arrival delay**
  - **For flights > 4.5 min gate arrival delay, what are gate departure, taxi-out, airport departure, airborne, and taxi-in delays?**

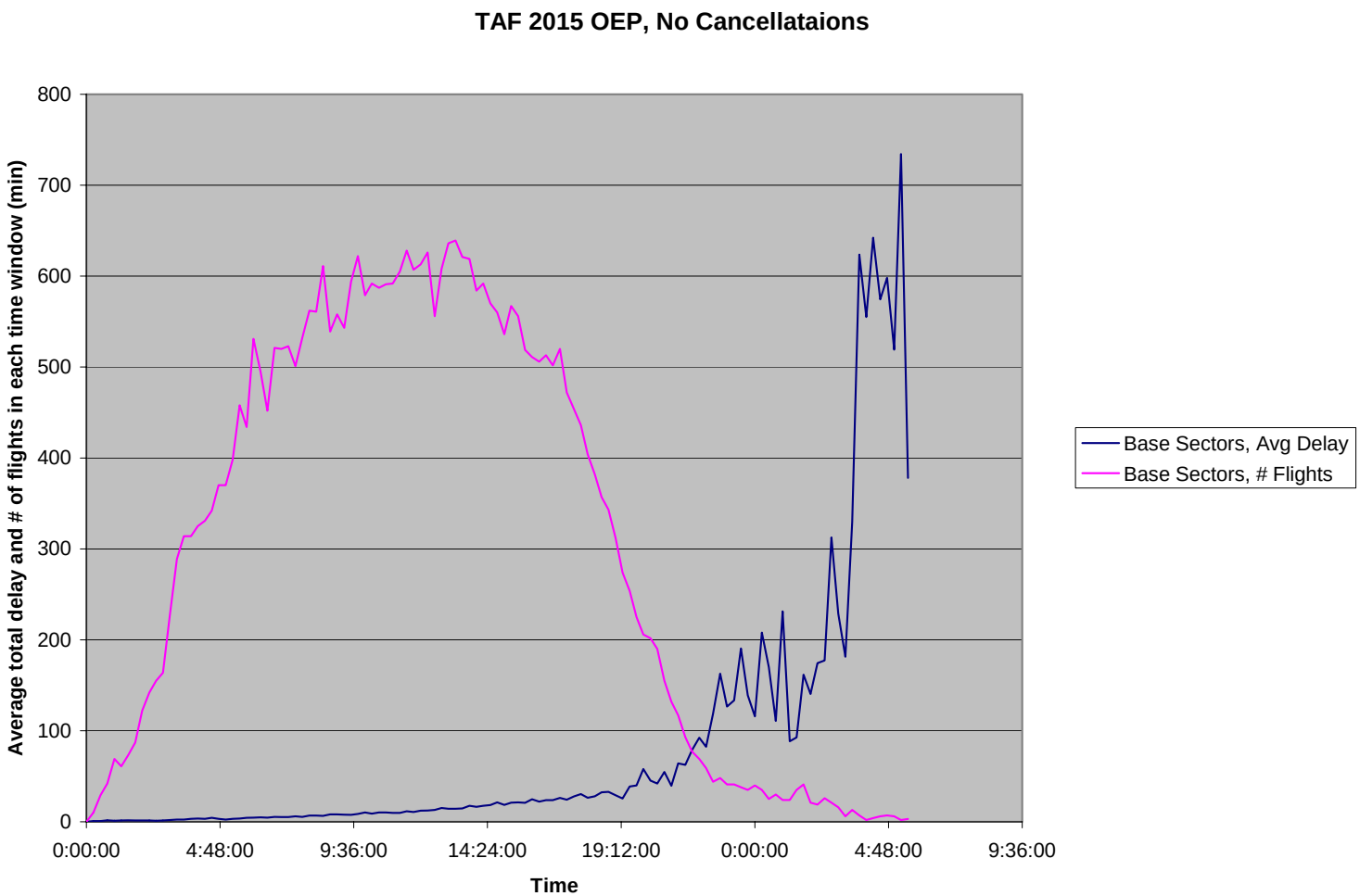
Leverage the Common Experiment Plan Database

Lessons Learned and Challenges

- **B3 Runway-Model data and set-up time is not trivial, but paves the way to an effective terminal model**

- **Recommended Terminal Enhancements Include:**
  - **Runway Load Balancing – single fix to multiple runways**
  - **Synchronized Formation Departures**
  - **Terminal Airspace Trajectory Propogation**
  - **User-friendly interfaces for plug-and-play models**

- **Performance metrics need to account for flight cancellation vs delay**

Lessons Learned and Challenges, cont

- **Average Delays can be misleading after all scheduled departures have past but delayed flights are still taking off**