

The FedEx logo is positioned in the top left corner. It features the word "Fed" in white and "Ex" in orange, both in a bold, sans-serif font.A FedEx cargo plane is shown in flight, orbiting a globe of the Earth. The plane is white with the FedEx logo on its side. The globe is centered on the Americas. The background is a gradient of purple and blue. Two yellow orbital lines are visible around the globe.

# **OPERATIONAL ISSUES**

## **Wake Vortex and Airport Capacity**

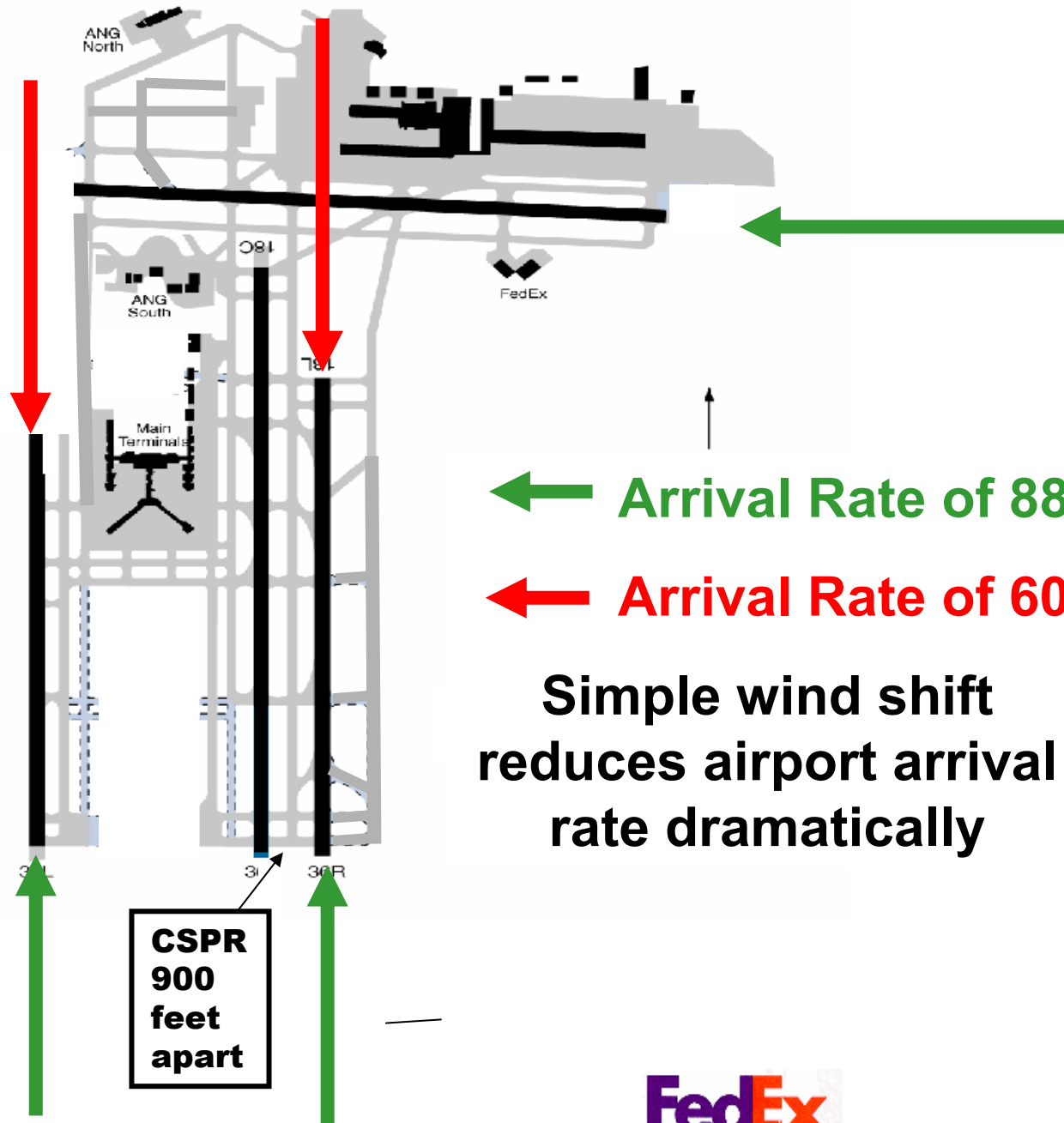
**Paul Cassel – Director of Flight Operations**

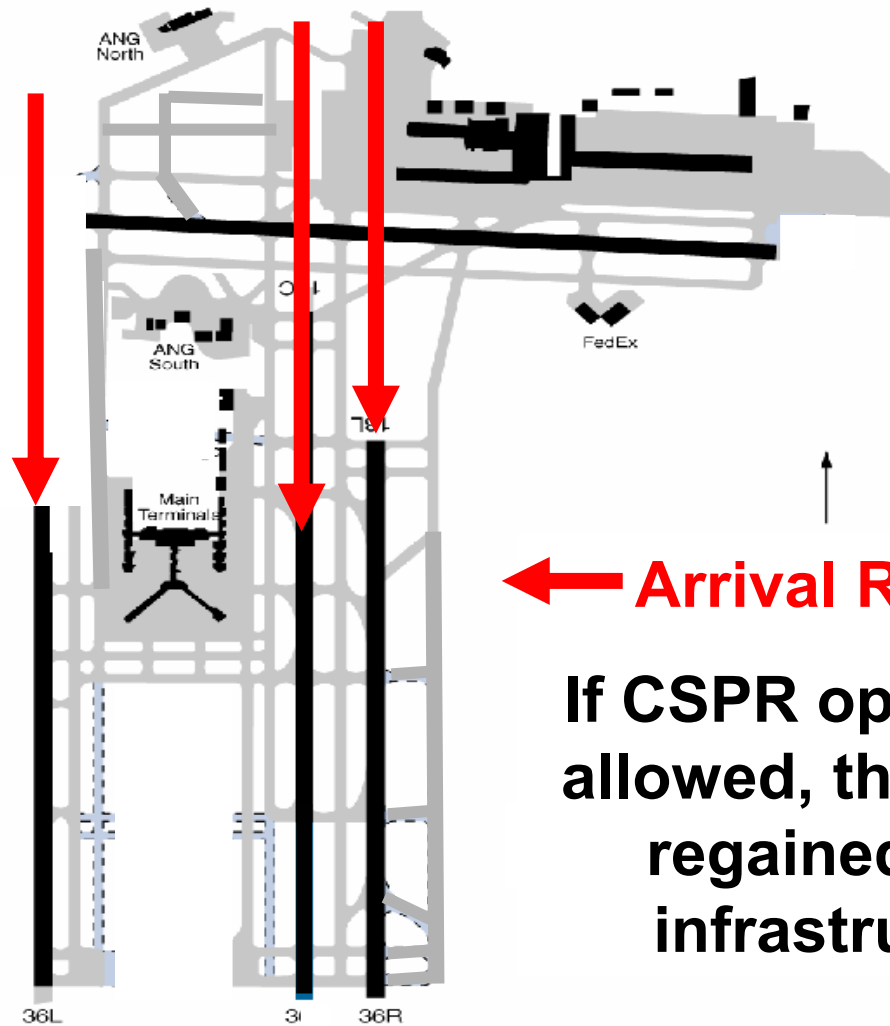
# What is the Need for CSPR Operations

(Closely Spaced Parallel Runways)

- New runway could cost as much as \$1 Billion USD.
  - Environmental and legal actions
  - Land availability
  - Noise mitigation
- Airports are land locked by towns, harbors, freeways, etc.
- Only way to increase capacity economically is utilizing present assets with appropriate processes and procedures to enhance capacity and SAFETY.







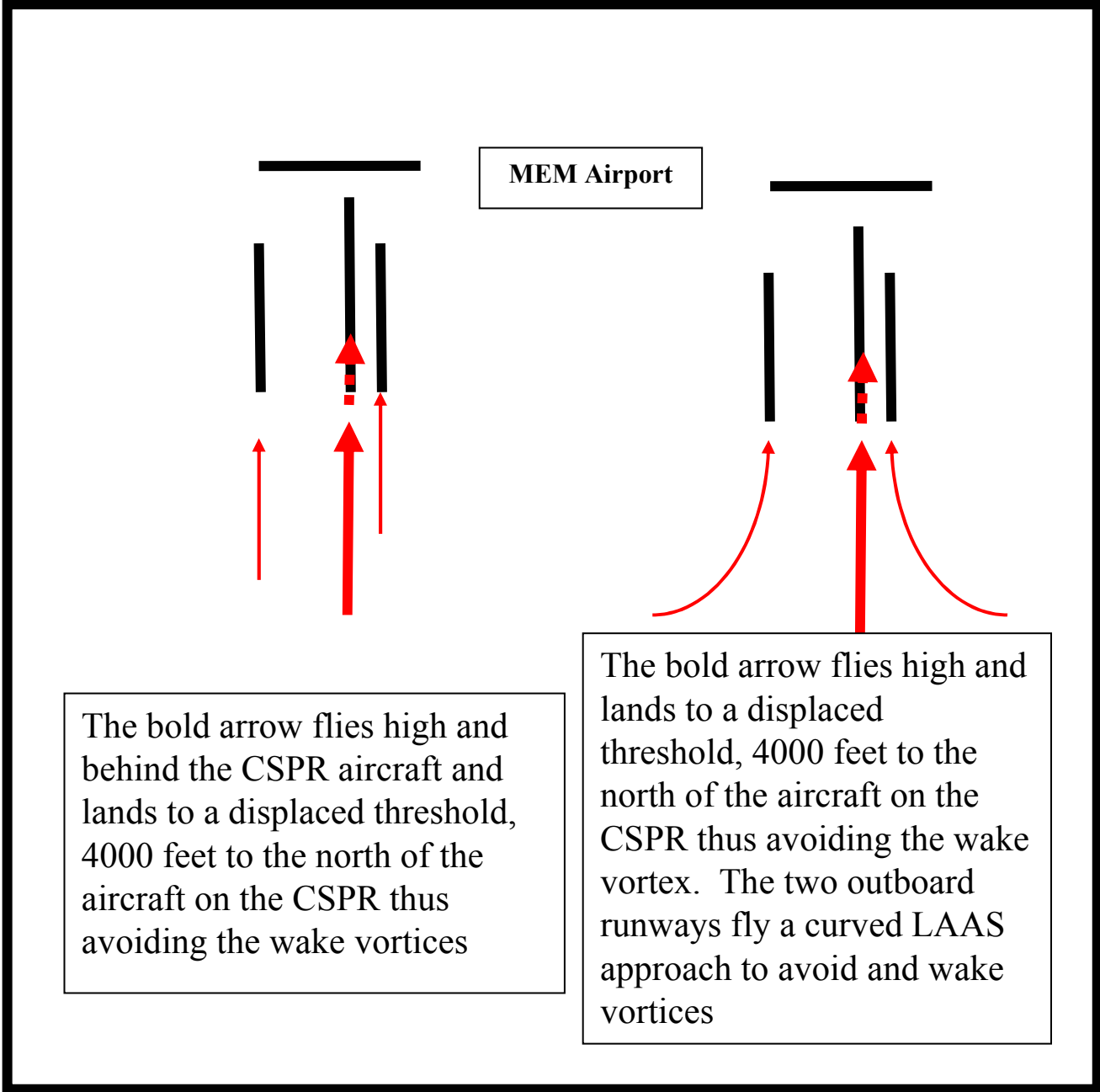
**← Arrival Rate of up to 88**

**If CSPR operations were allowed, then capacity is regained at zero \$\$ infrastructure cost**

# Are CSPR Operations Possible?

Yes, with a system approach?

- Combination of equipage and process
  - GBAS equipage to fly precise approaches
  - Wake vortex detection
  - Procedures for mutual expectations both from the pilot and controller (e.g.; diverging missed approaches, displaced thresholds)
  - Control/management for arrival monitoring (PRM)
  - Surface management to handle operations on CSPR if infrastructure is lacking



The bold arrow flies high and behind the CSRR aircraft and lands to a displaced threshold, 4000 feet to the north of the aircraft on the CSRR thus avoiding the wake vortices

The bold arrow flies high and lands to a displaced threshold, 4000 feet to the north of the aircraft on the CSRR thus avoiding the wake vortex. The two outboard runways fly a curved LAAS approach to avoid and wake vortices

**Curved GBAS approaches and displacement of landing thresholds to separate flight paths to mitigate wake vortices?**

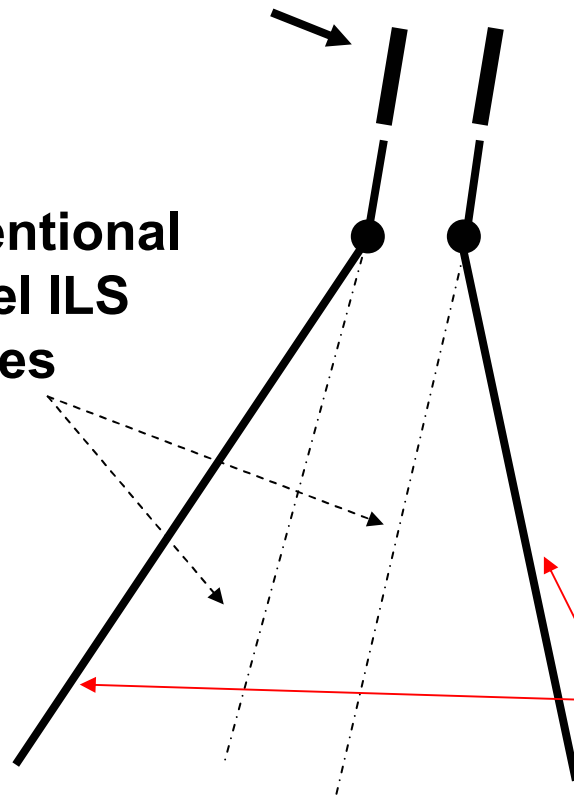


# Simultaneous Approaches Using GBAS

**CSPR Ops**

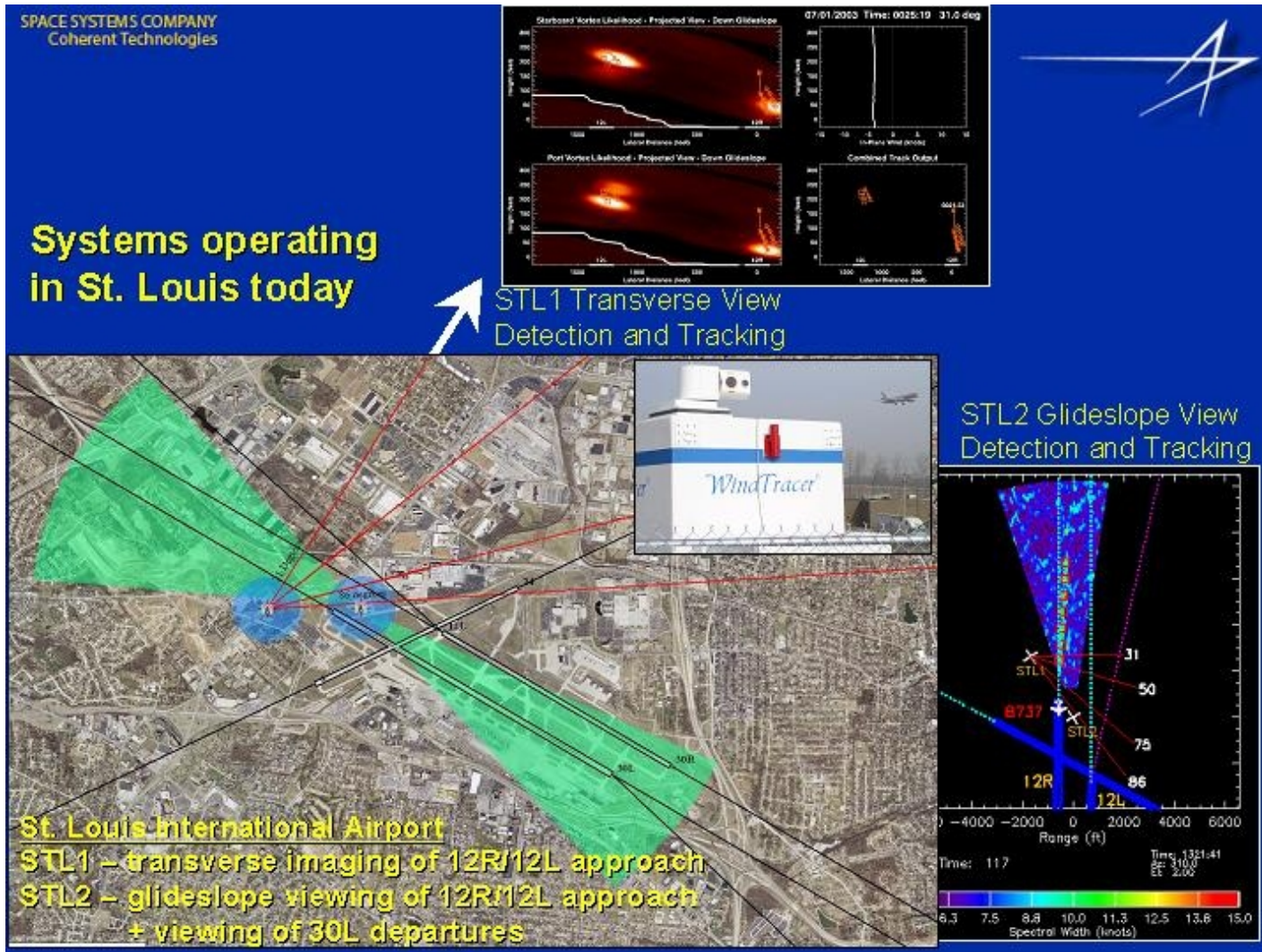
**Conventional  
Parallel ILS  
Courses**

CONCEPT: LAAS course would allow most maneuvering and parallel courses to have extended separation until a short distance from the airport where a minimal turn to final (10-15 degrees) would occur for runway alignment.

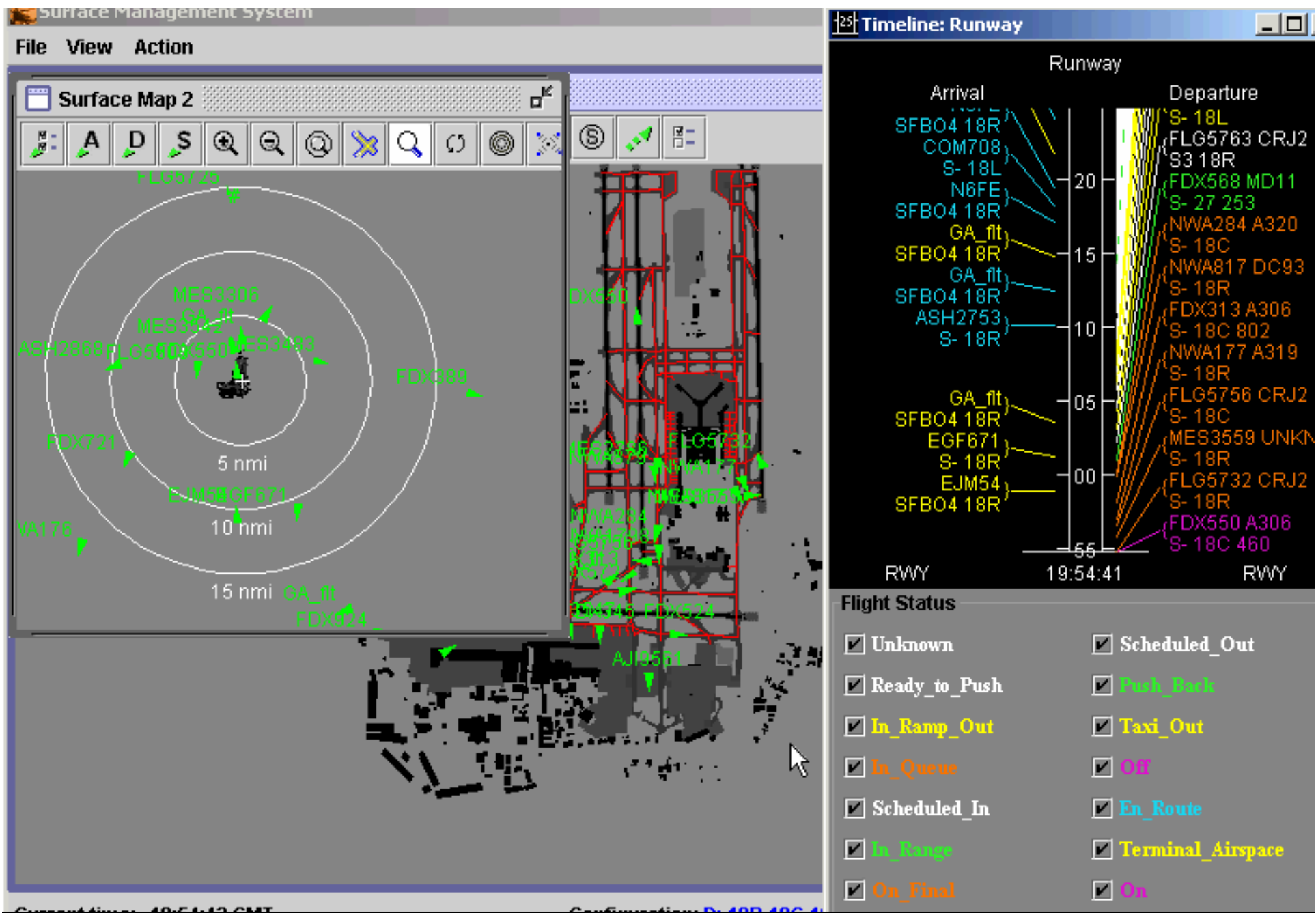


**GBAS Final Approaches Courses**

# The Detection



LIDAR Wind Tracer depiction



**Surface Management to promote CSPR ops**

# Research (Your Efforts) will Determine Needs for this Important Capacity Enhancement

- Aircraft/ground equipage – GBAS, P-RNAV?
- Wake vortex detection – LIDAR, TDWR?
- Procedures/Process – Diverging MA's, Displaced Thresholds?
- Monitoring – PRM Radar?
- Surface Management for CSPR ground traffic management? – Multi-lateration or ADSB-B



**FedEx desires to be actively involved in the future to ensure this doesn't happen**



**We need Uniform Global Standards!!!!**