NextGen at UPS

Captain Jon Burrows
UPS Airlines
Assistant Chief Pilot

UPS Investment in NextGen

DataComm

All 747's (14) have CPDLC-FANS 1/A

All MD11's (38) have CPDLC-FANS 1/A

All 767's (59) will have CPDLC-FANS 1/A

Navigation

All 767 (59), A300 (54), 747 & MD11 are RNAV 0.3

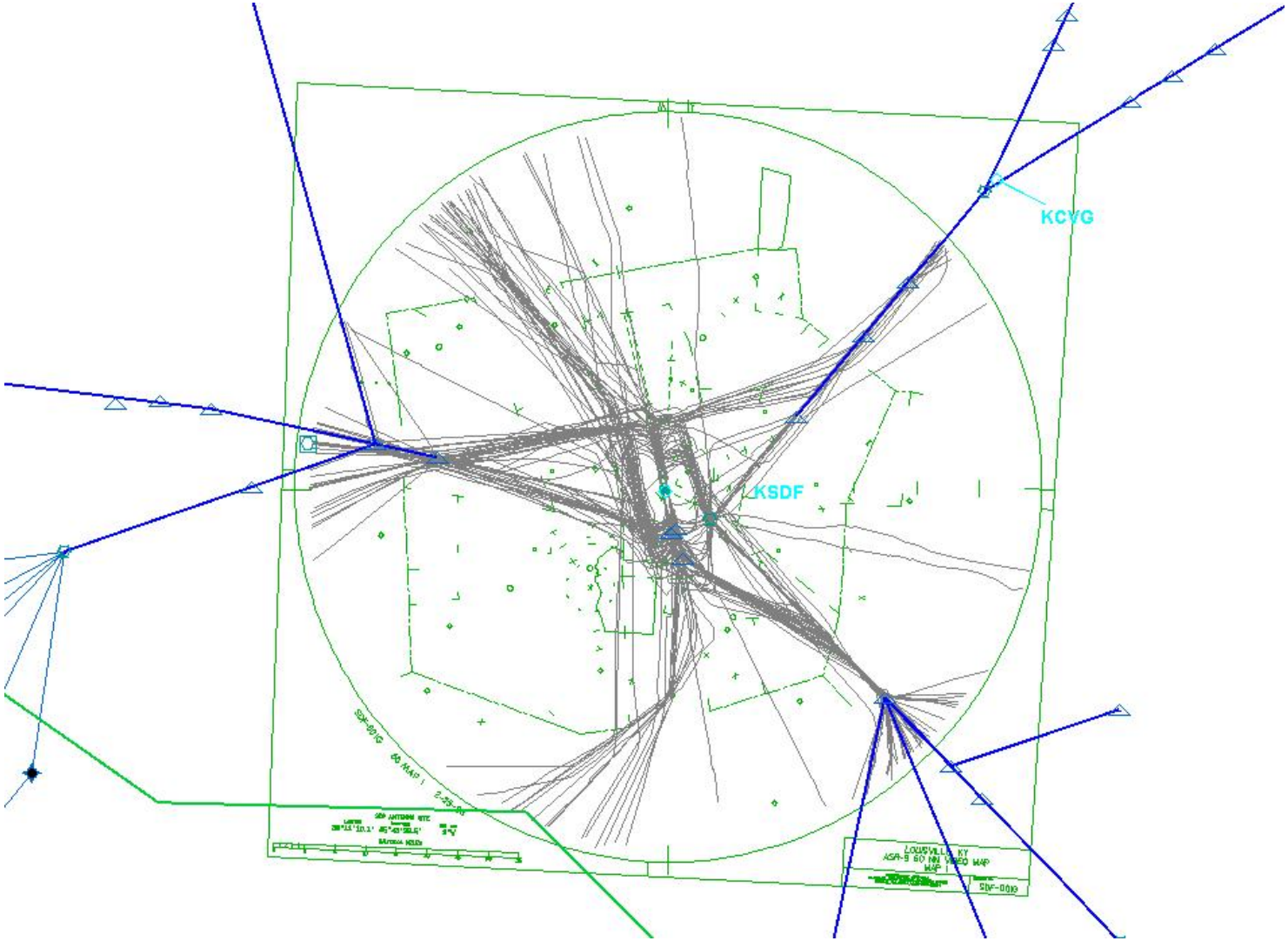
Surveillance

Entire UPS fleet (214 aircraft) ADS-B "OUT" equipped

107 Aircraft have ADS-B "IN"

11 Aircraft SafeRoute equipped

RNAV Arrivals



Part of Team Effort to Implement RNAV

June 2009

Commenced FAA 18-Step Process for RNAV SIDs in SDF

June 2008

Commenced FAA 18-Step Process for RNAV STARS in SDF

Completed design of RNAV STARs :

DAMEN EMAUS FRIZN

MAUDD NERVE TUPAY SACKO

TARGETS tested, Simulator tested, running TAAM simulations

Several constructed as OPDs, some as NextGen CDAs

What is a NextGen CDA?

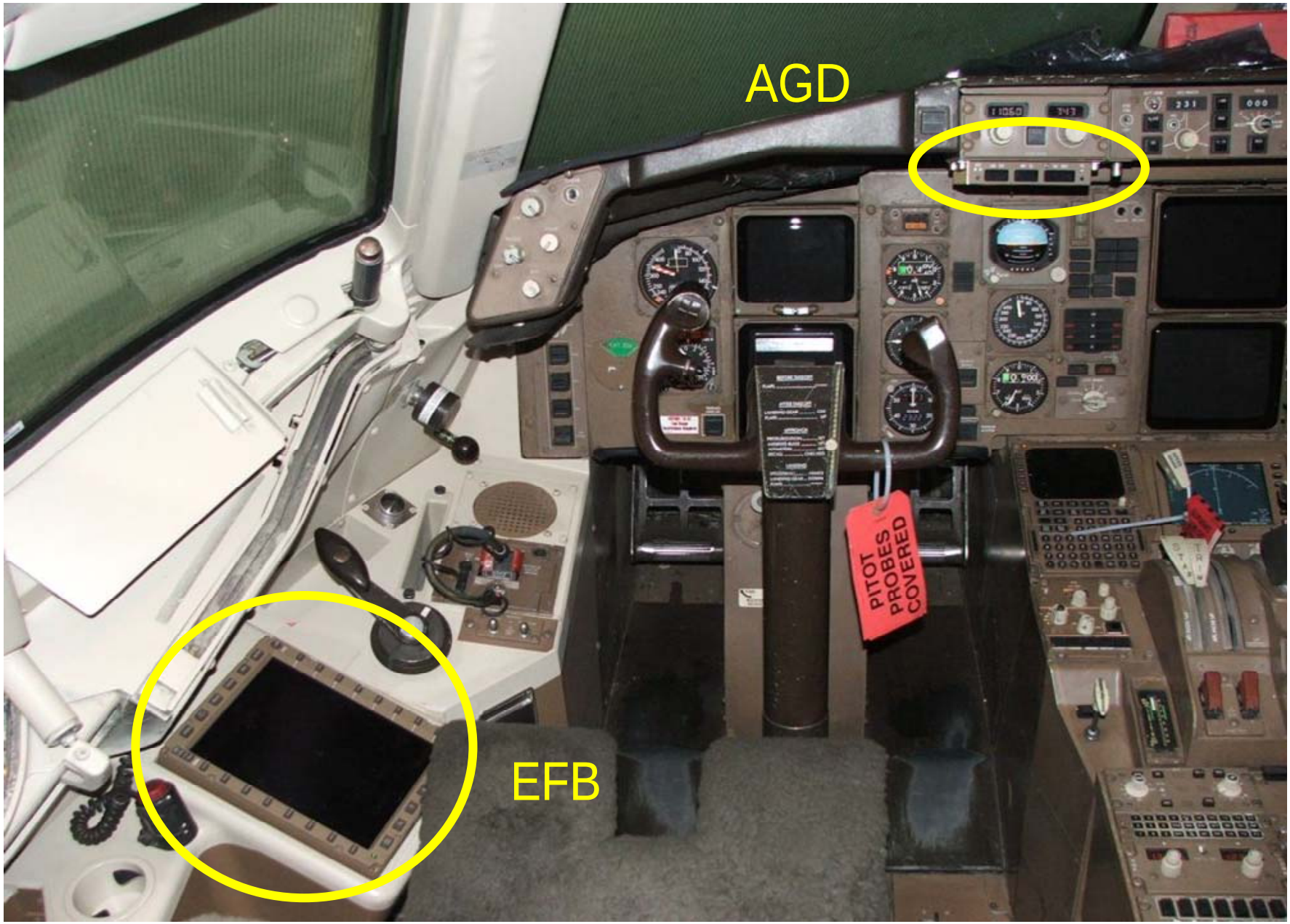
Dual Boeing Class 3 EFBs

Single ADS-B Guidance Display (AGD)

ACSS ADS-B SafeRoute System

ACSS/Astronautics CDTI

Retrofit to UPS B-757/767 Fleets


AGD
EFB
PITOT PROBES COVERED

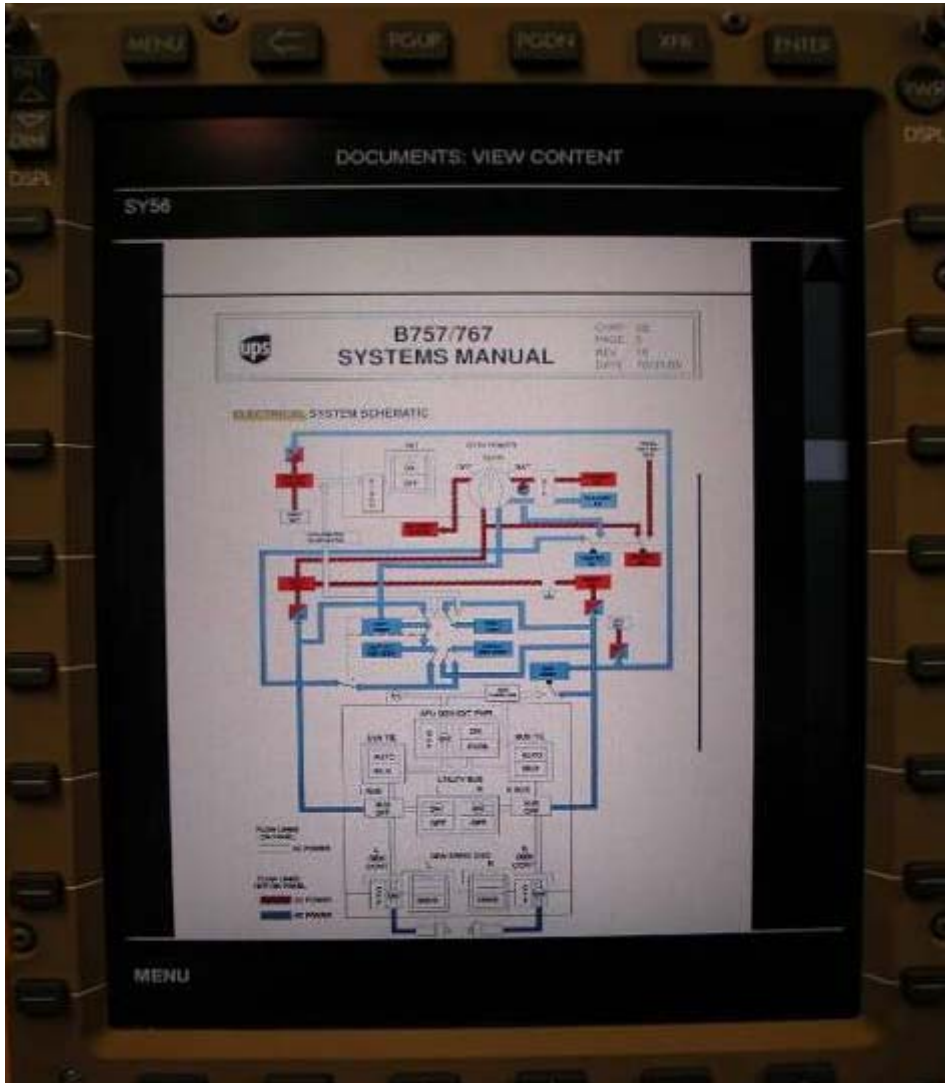
Boeing/Astronautics EFB

- Dual processor/dual hard drive
- Windows Side-Class 2
  - Document Browser-Type A
  - Terminal Charts-Type B
- Linux side-Class 3
  - ACSS/Astronautics CDTI-Type C
  - ACSS SafeRoute Applications-Type C


NO SMOKING
767
EFB

Terminal Charts

Document Browser



ACSS SafeRoute System

ADS-B Applications

- Surface Area Movement Management (SAMM)
- Merging & Spacing (M&S)
- CDTI Assisted Visual Separation (CAVS)
- M&S and CAVS require AGD device


AGD
PITOT
PROBES
COVERED

ADS-B Guidance Display (AGD)

Single unit on Captain's side provides:

- Command Speed (Merging & Spacing applications only)
- Differential Ground Speed
- Distance to Target
- CDTI Message Advisories/Alerting

Visibility by Either Pilot

Technology Solutions to Address

Issues of Our Time

Runway incursions (SAMM)

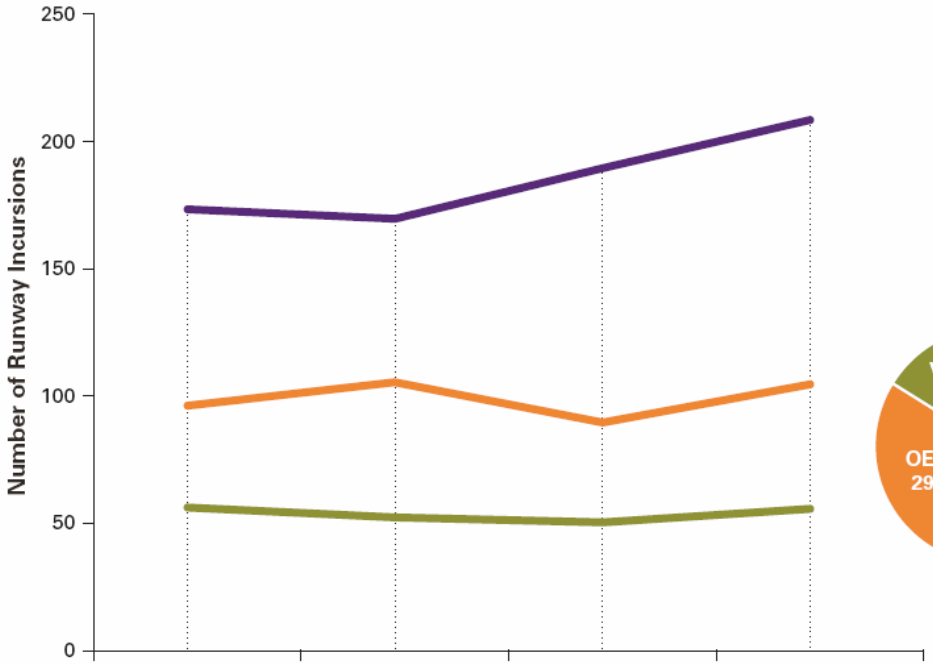
Terminal airspace capacity issues (M&S and CAVS)

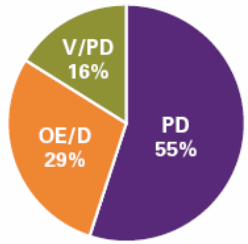
Environmental concerns (CDA)

Increasing fuel prices (CDA)

Runway Incursion Statistics

Number and Rate of Incursions for Each Runway Incursion Type (FY 2004 through FY 2007)





	FY 2004		FY 2005		FY 2006		FY 2007		Total	
	Number	Rate per Million Ops	Number	Rate per Million Ops	Number	Rate per Million Ops	Number	Rate per Million Ops	Number	Rate per Million Ops
Pilot Deviations	173	2.74	169	2.68	190	3.11	209	3.42	741	2.98
Operational Errors/ Deviations	97	1.54	105	1.66	89	1.46	105	1.72	396	1.59
Vehicle/Pedestrian Deviations	56	0.89	53	0.84	51	0.84	56	0.92	216	0.87
									1,353	5.45

SafeRoute SAMM

Outstanding Situational Awareness tool

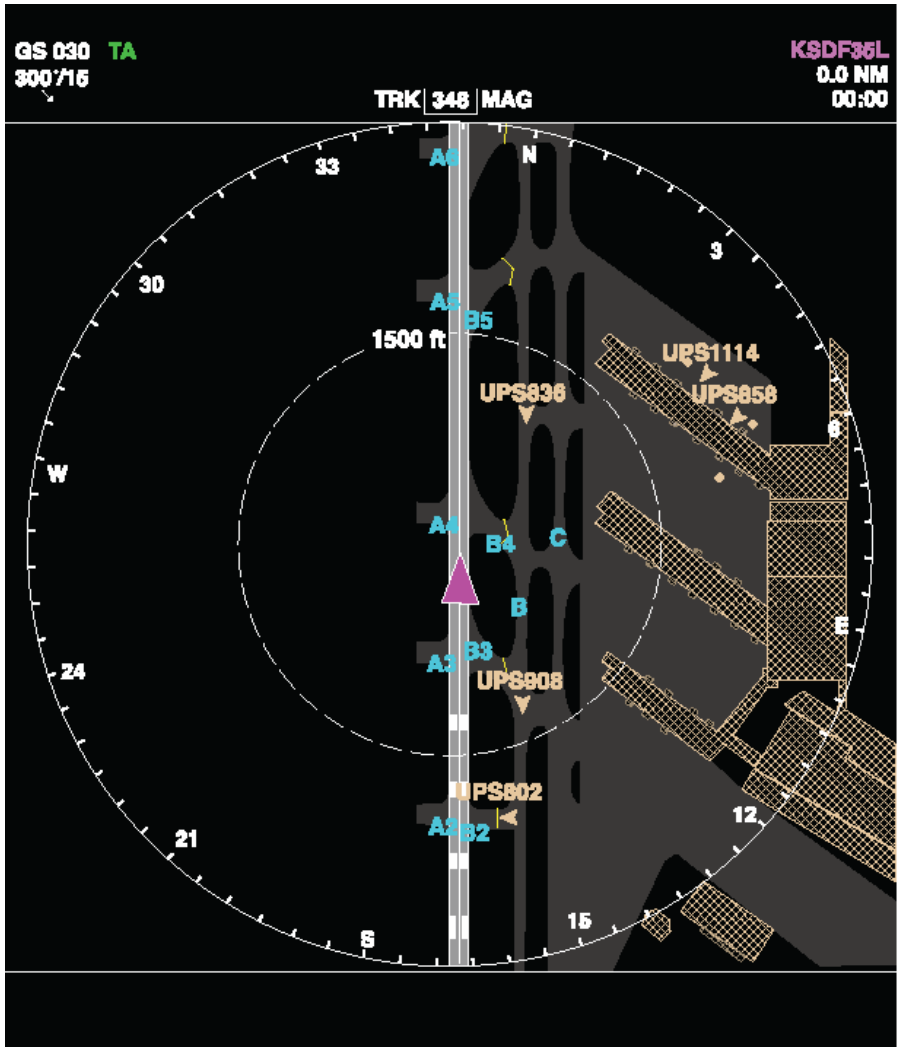
Displays own aircraft geographical position

Displays traffic:

ADS-B

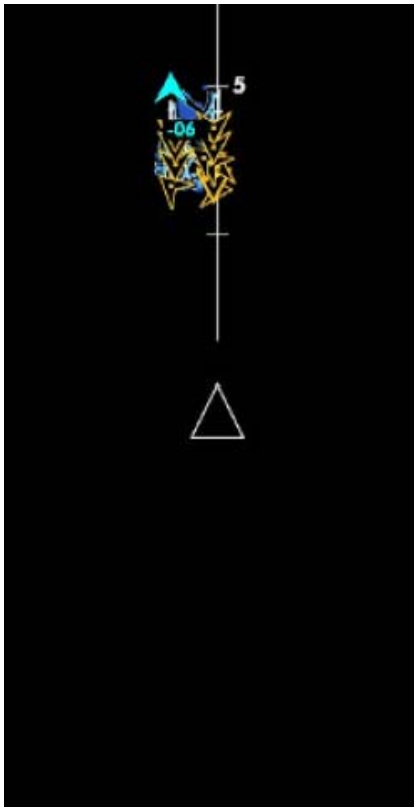
TCAS

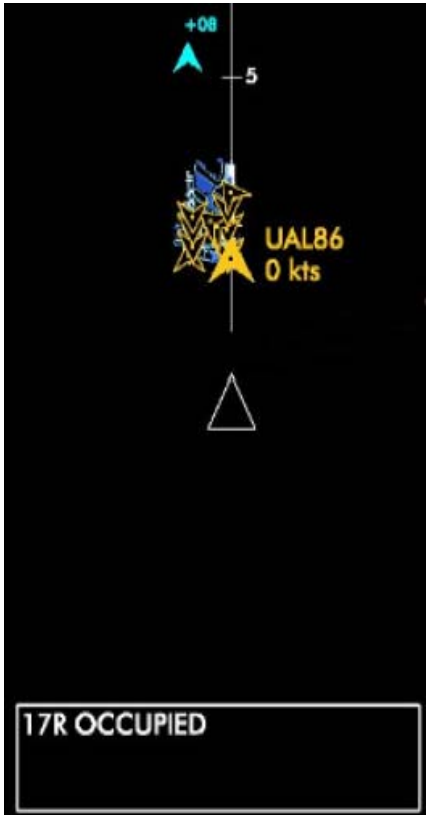
EFB-SAMM Application

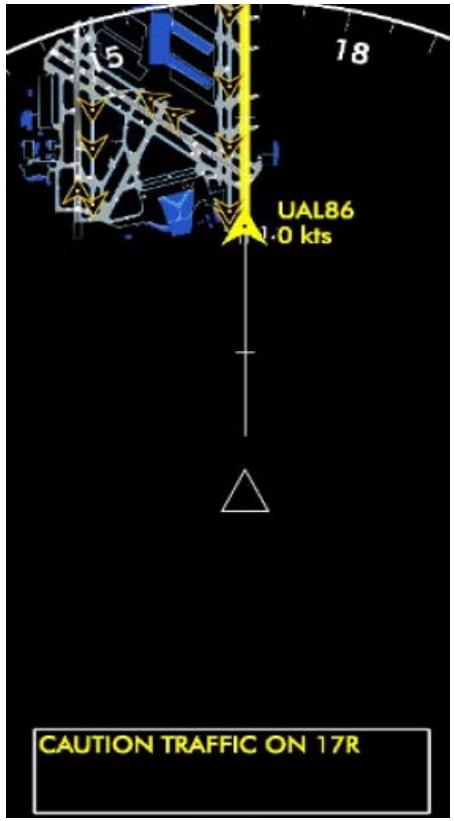


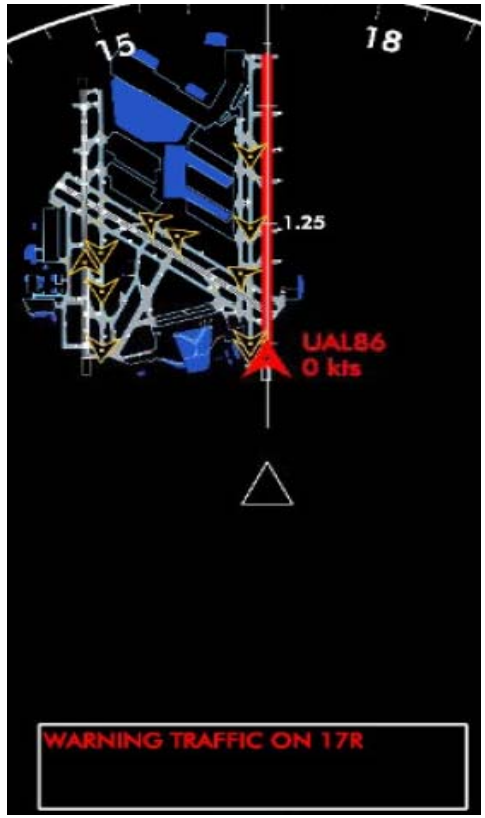
EFB-SAMM Application

ADS-B “IN” Pilot warning if runway traffic conflict exists

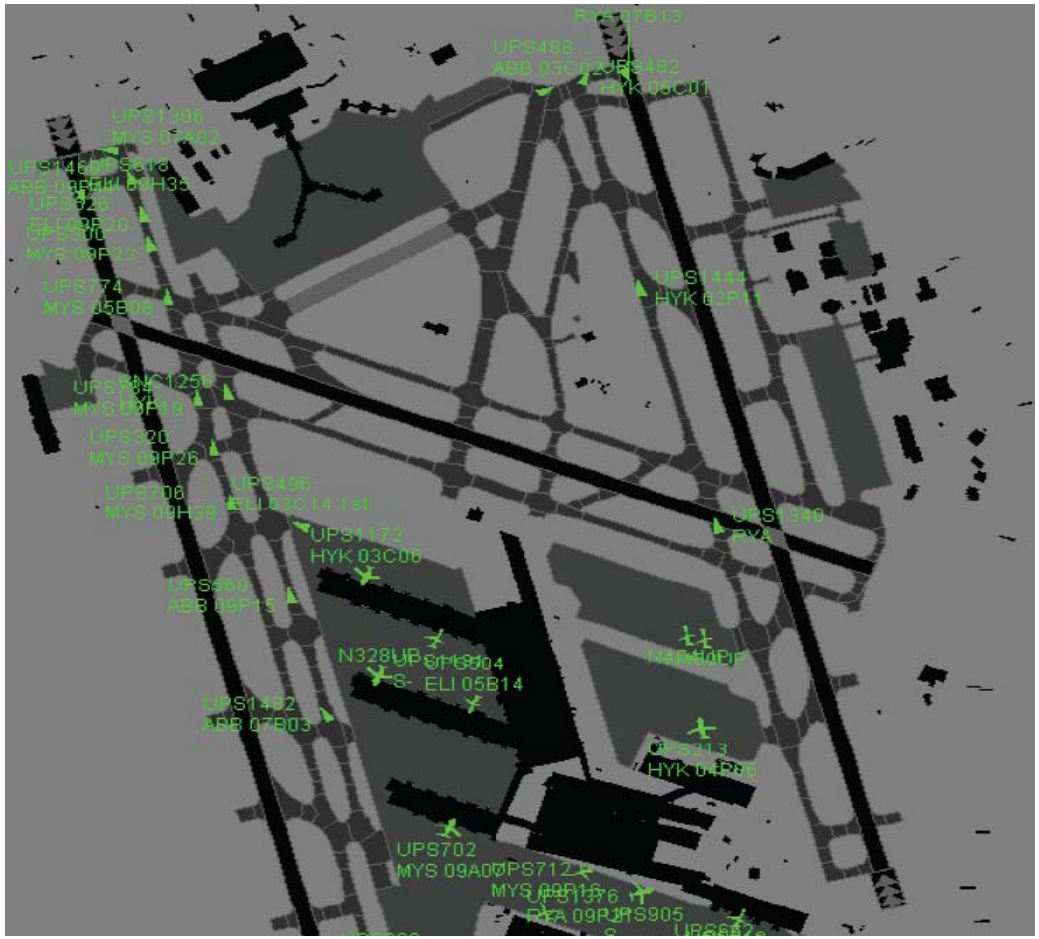








ATC-SAMM Application



KSDF ATC display shows ADS-B aircraft position on airport map.

This is a real time display and can warn ATC of runway and taxiway conflicts between ADS-B aircraft.

Both ADS-B “OUT” and “IN” aircraft are depicted.

Terminal Airspace Issues

Airport Through-put

Environmental Concerns

Time Enroute Concerns

Fuel Burned Concerns

Terminal airspace capacity issues

Impact of ATC airspace variables:

Increased vectoring/holding results in delays

Gaps in arrival stream causes loss of runway throughput

Too many aircraft maneuvers increase controller workload

Flight restrictions limit pilot's free choice to fly efficiently

Source: Dr. Satish C. Mohleji TARA 18 Task Force, Plenary 21 March 2001

How Can We Solve It? Two Part Solution

Fly Continuous Descent Arrivals (CDA)

Less Noise and Emissions

Reduces time enroute and burns less fuel

Utilize Merging and Spacing with CDA

Task is delegated to the flight crew

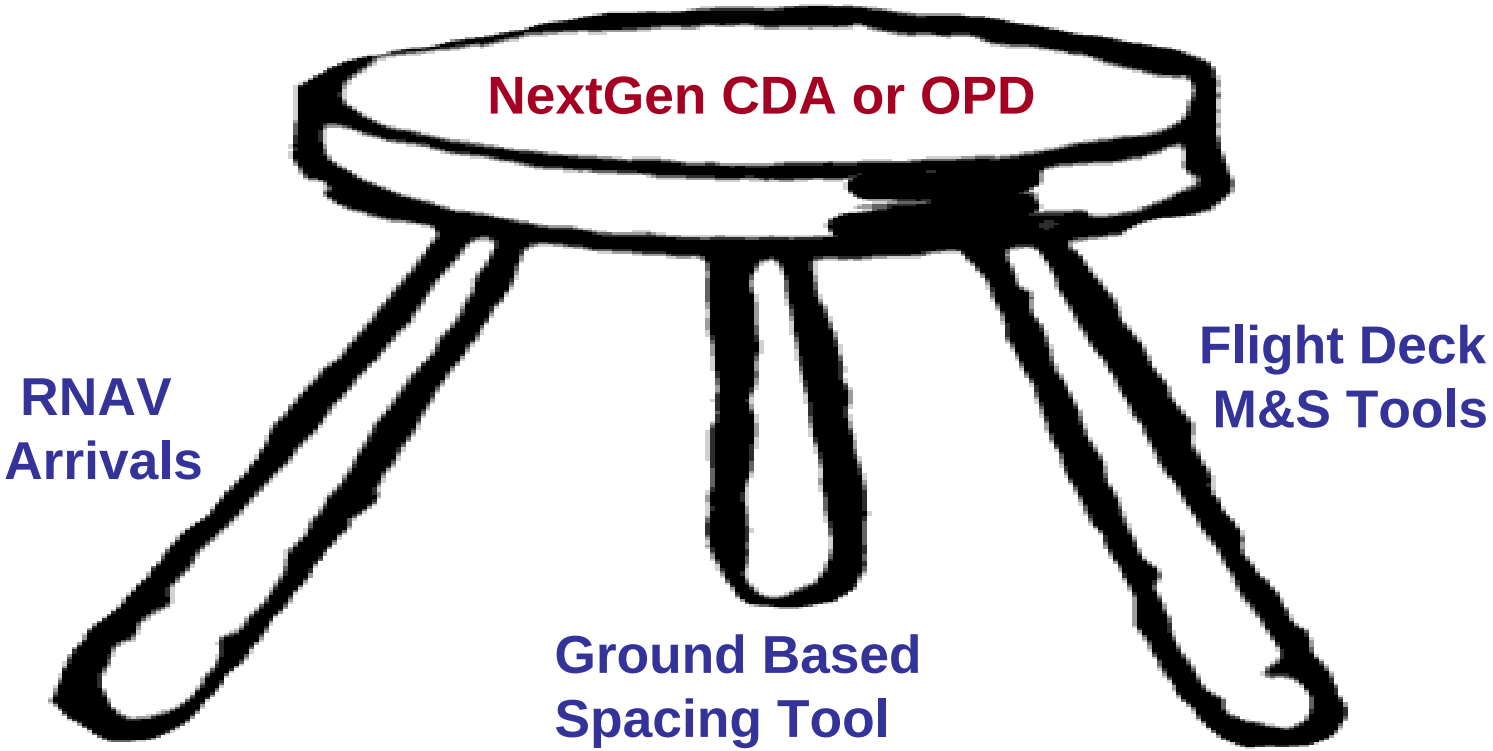
Allows CDA operations with minimal impact to throughput

Enables full time use of CDA

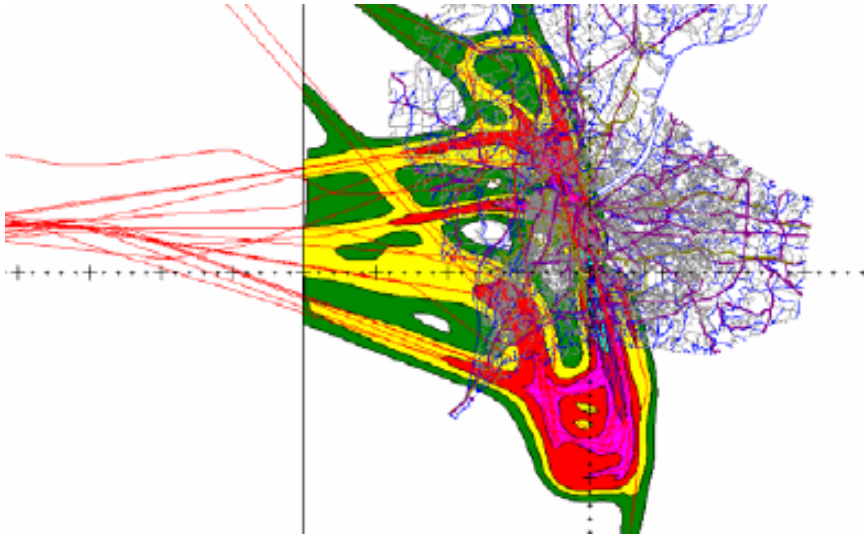
Defined as NextGen CDA

October 2004 – Present: NextGen Demonstration

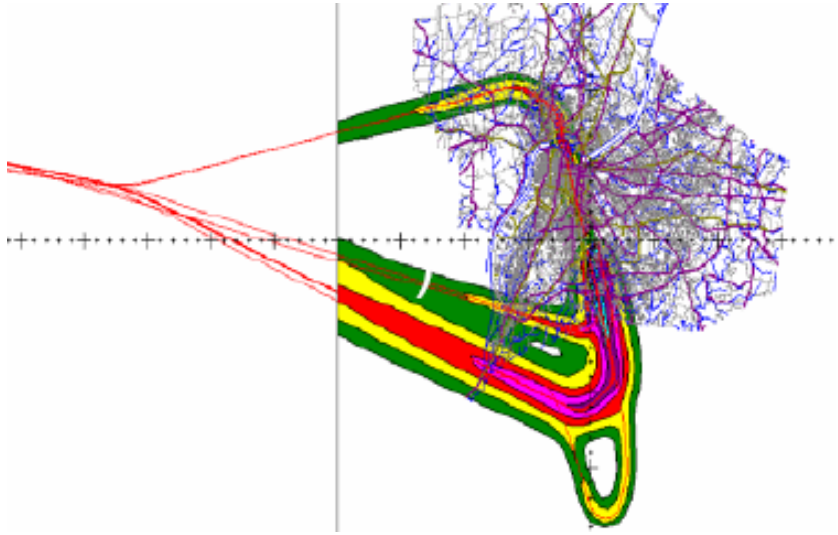
Three-legged Stool



Results-2004 KSDF CDA Trials



Standard Arrival Noise Profile



CDA Arrival Noise Profile

Results-2004 KSDF CDA Trials

–126 flights over 14 day period

–30% reduction in noise

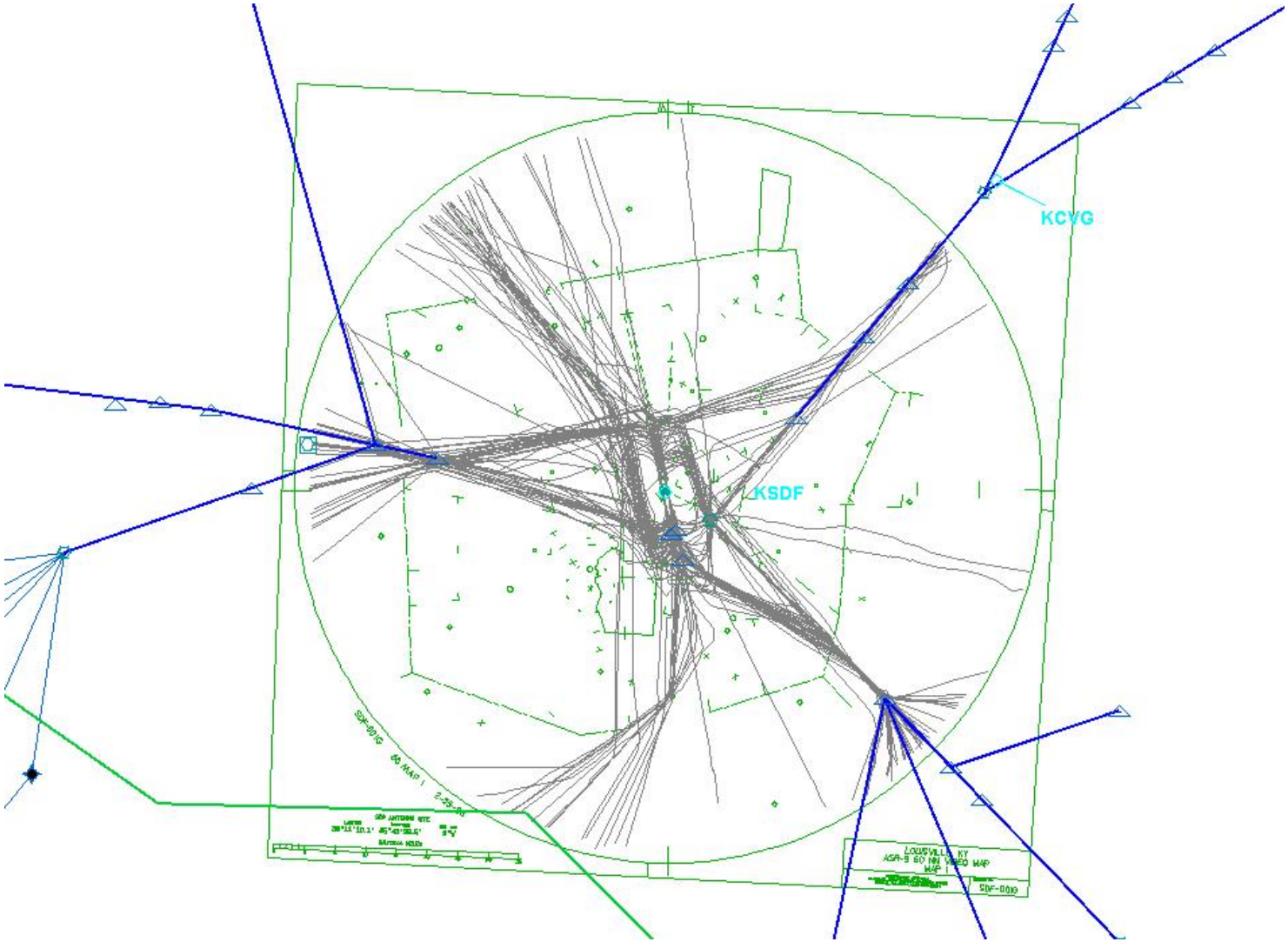
(up to 6 dB)

– 34% reduction in nitrous oxide (NOx) emissions

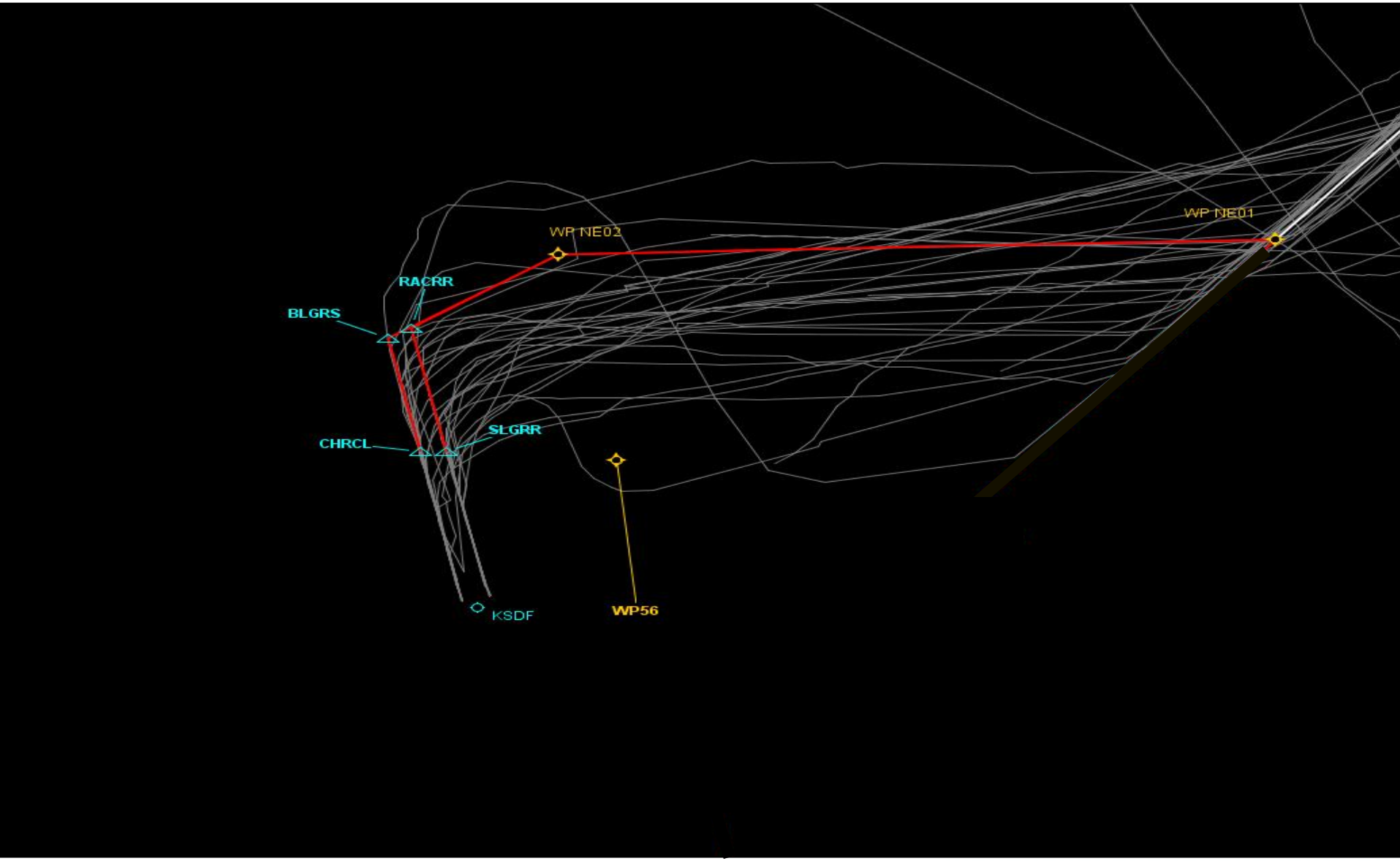
(Below 3000 ft)

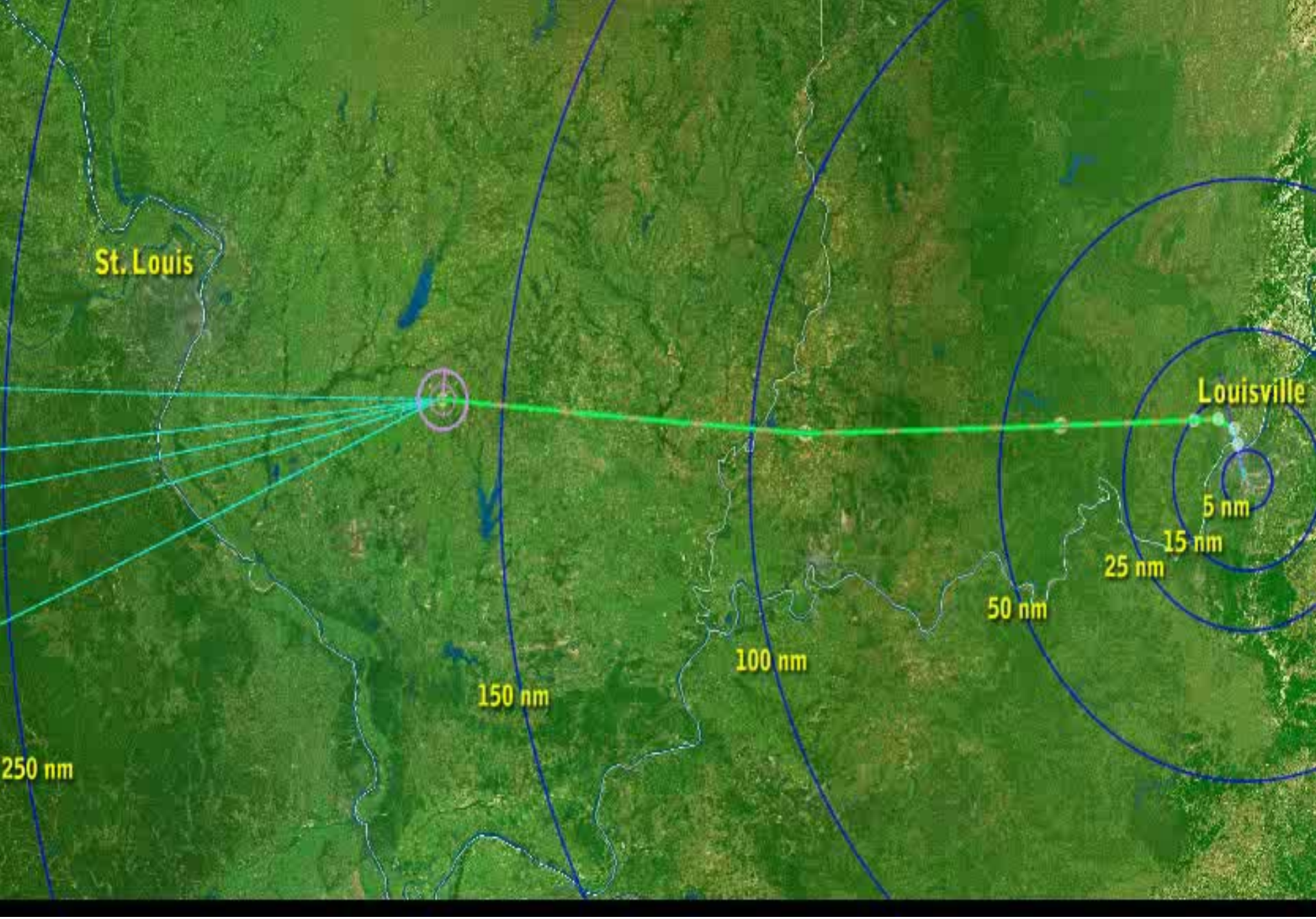
– 250 to 465 lbs less fuel burn/flight

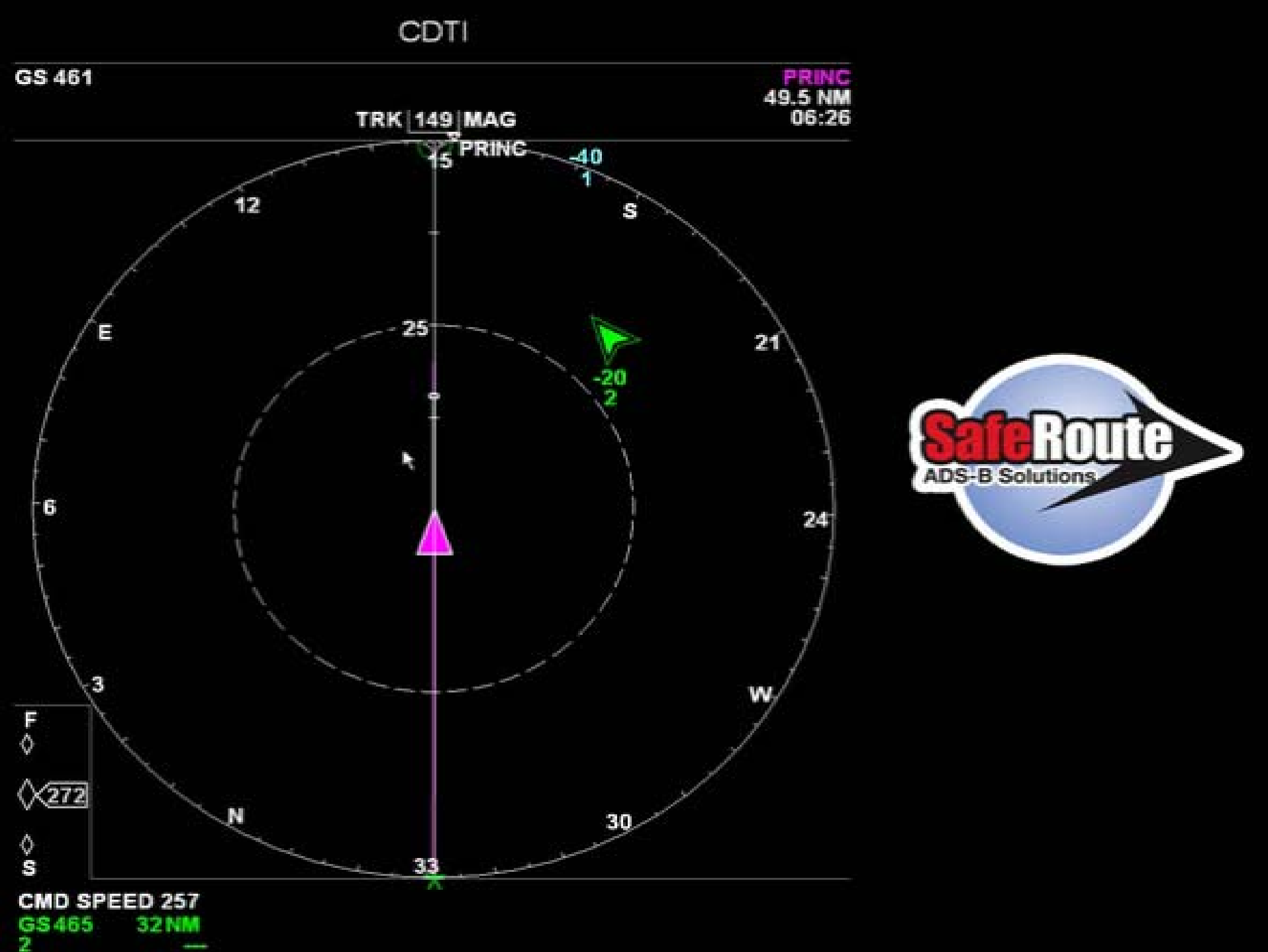
Continuous Descent Arrival (CDA)



Continuous Descent Arrival (CDA)




St. Louis
Louisville
5 nm
15 nm
25 nm
50 nm
100 nm
150 nm
250 nm


CDTI
GS 461
PRINC
49.5 NM
06:26
TRK 149 MAG
PRINC
15
-40
1
12
S
E
25
21
-20
2
6
24
3
W
N
30
33
F
272
S
CMD SPEED 257
GS 465
32 NM
2
SafeRoute
ADS-B Solutions

NextGen CDA Statistics

Received 757 Operational Approval in December 07

Received 767 Operational Approval in Jan 09

60 successful NextGen CDAs flown since 18 Jan 2008 & 1 three-ship

Achieved consistent 6.1 miles between lead & trail ships at landing using 150 second spacing

Fuel savings over normal arrival:

250 to 465 lbs. of fuel average savings (2004 Test)

757 = 21% Descent Fuel Burn Decrease (last 25-min of flight)

767 = 31% Descent Fuel Burn Decrease (last 25-min of flight)

Data collection efforts underway- next effort is Jun 2010.

Success Factors

Easily accepted by controllers:

- Responsible for safety and separation
- Intervenes when necessary
- Handles non-participant as they do today
- Has “the big picture”, more managing, less controlling
- Greatly reduced workload

Easily accepted by pilots:

- Little or no vectoring
- Just fly the CDA using spacing tool
- Predictable and consistent

Success Factors

UPS Implementation in Louisville

Required no change to ATC ground systems

RNP/RNAV procedures widely accepted and proven

Equipment is now developed, installed, certified & Ops Approval

Dedicated development and certification team with ACSS, Astronautics, Boeing, Jeppesen and UPS

Flight crews are using the equipment

TRACON is comfortable with NextGen CDA

Success Factors

Motivated by Safety, Capacity and Efficiency gains

Surface Maps reduce risk of ground collisions & runway incursions

NextGen CDAs provide time and fuel savings

Strategically correct – supports long-term move to Performance Based ATM

Portable to other airports and operators

Thank You

Questions?

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