

*Required Navigation Performance
at
Alaska Airlines*

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Director, Airspace and Technology



Alaska Air Group

Alaska Airlines

Horizon Air

17.2 million passengers/yr.

6.9 million passengers/yr.

9,940 employees

4,000 employees

116 aircraft

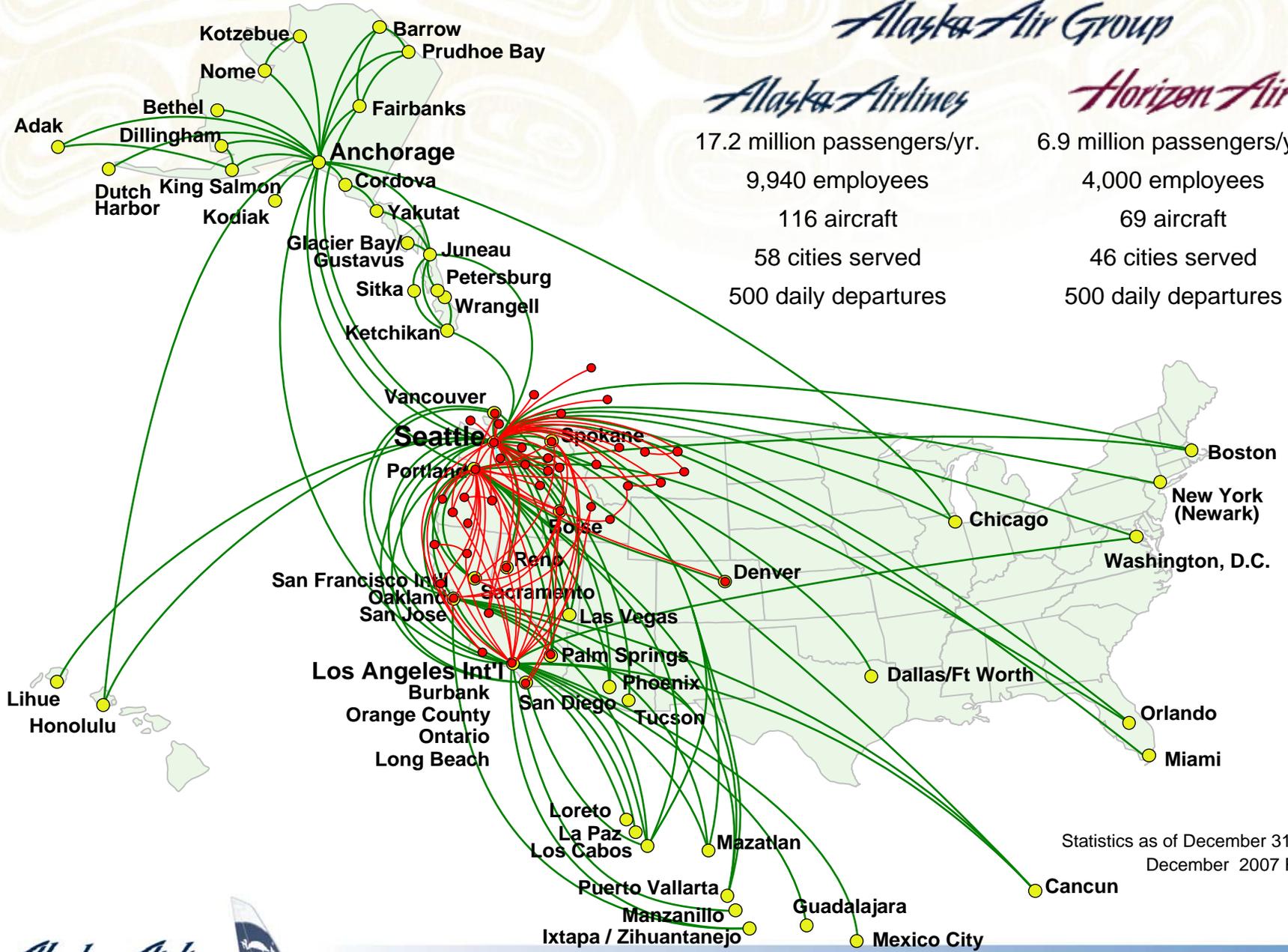
69 aircraft

58 cities served

46 cities served

500 daily departures

500 daily departures



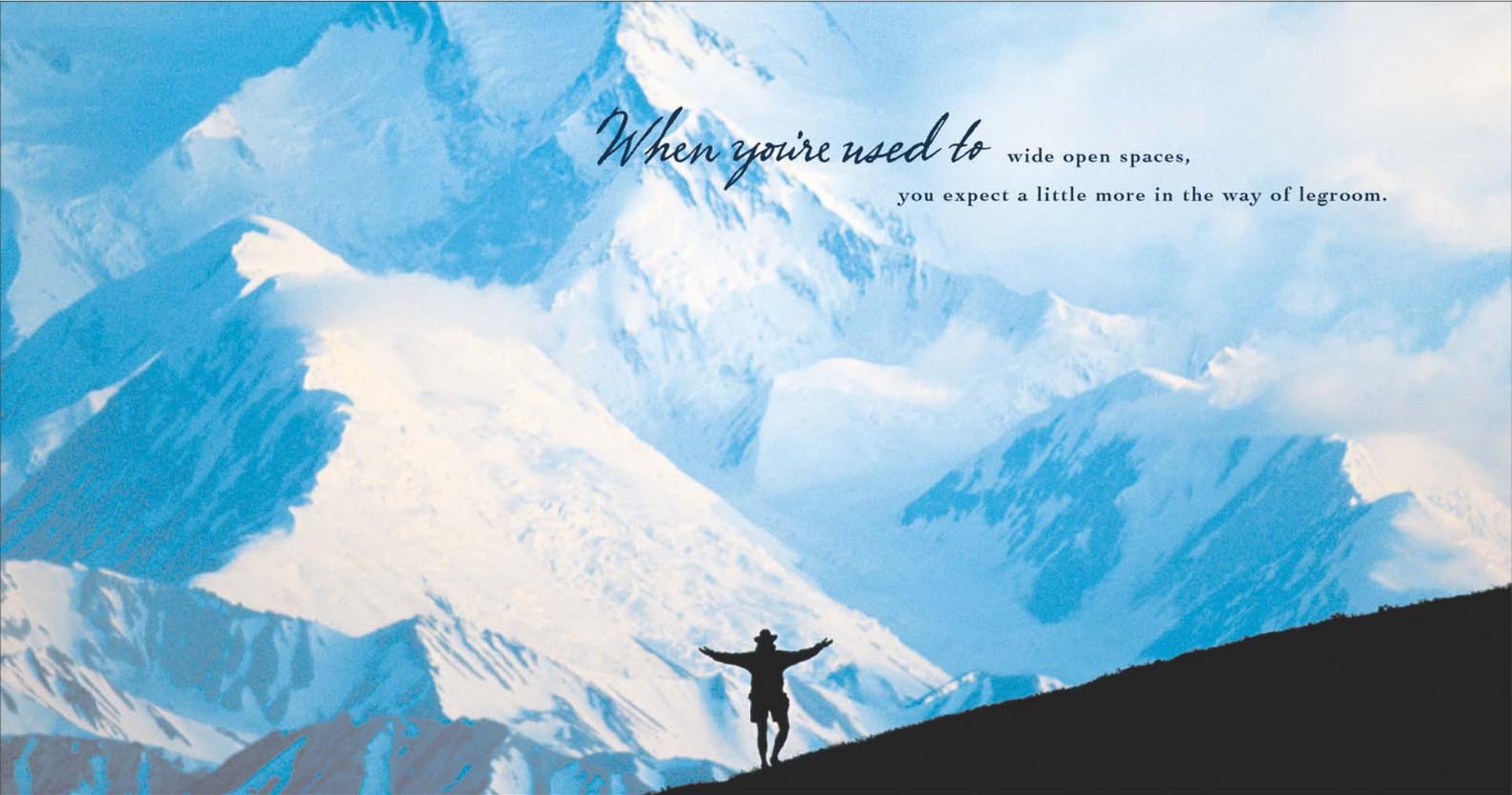
Statistics as of December 31, 2006
December 2007 Routes





Welcome to the world's only
600,000 square mile animal park.





When you're used to wide open spaces,
you expect a little more in the way of legroom.

Alaska Airlines









Typical JNU Day



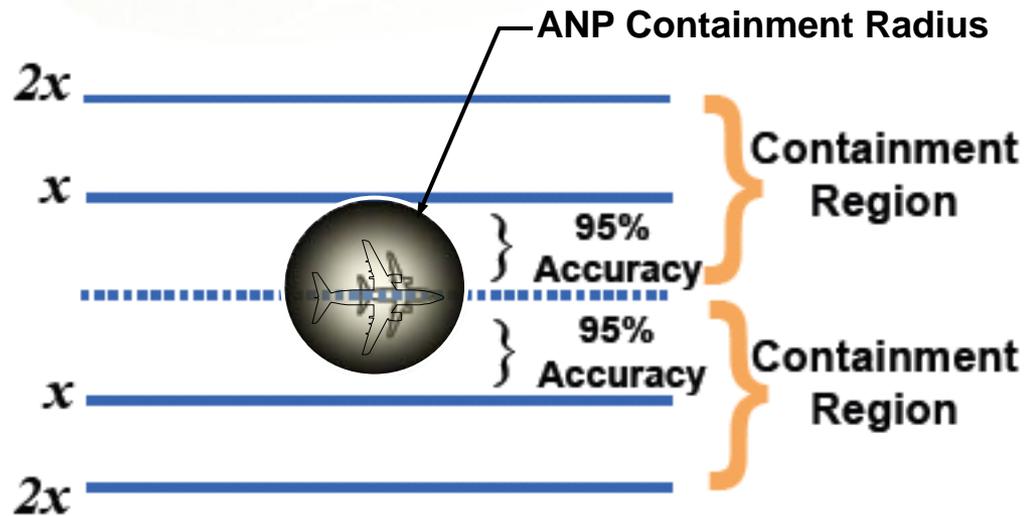


Harsh Operating Environment

- Remote locations
- Mountainous terrain in close proximity to runways
- Nonprecision approaches with angular and lateral offsets from runway
- Circling approaches
- Navaid outages
- Nonradar air traffic control
- Hostile weather: high winds, snow/ice

RNAV/RNP Key Concepts

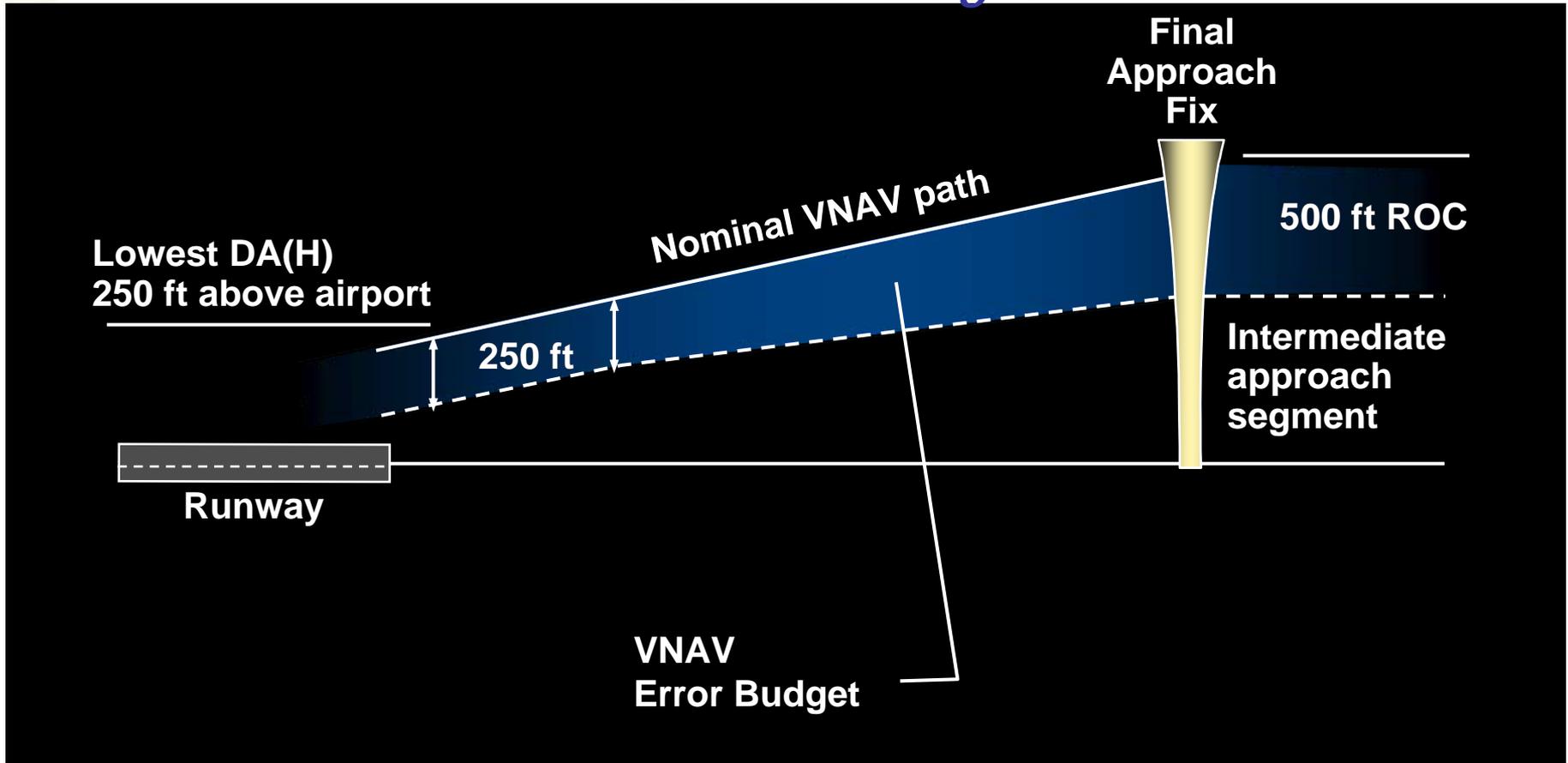
- Satellite-based navigation
- RNP-x is aircraft path conformance (with accuracy x (nm) or better, 95% of time)
- RNP Containment Region is an area 2 x RNP-x on either side
- 99.999% probability that aircraft is within containment region



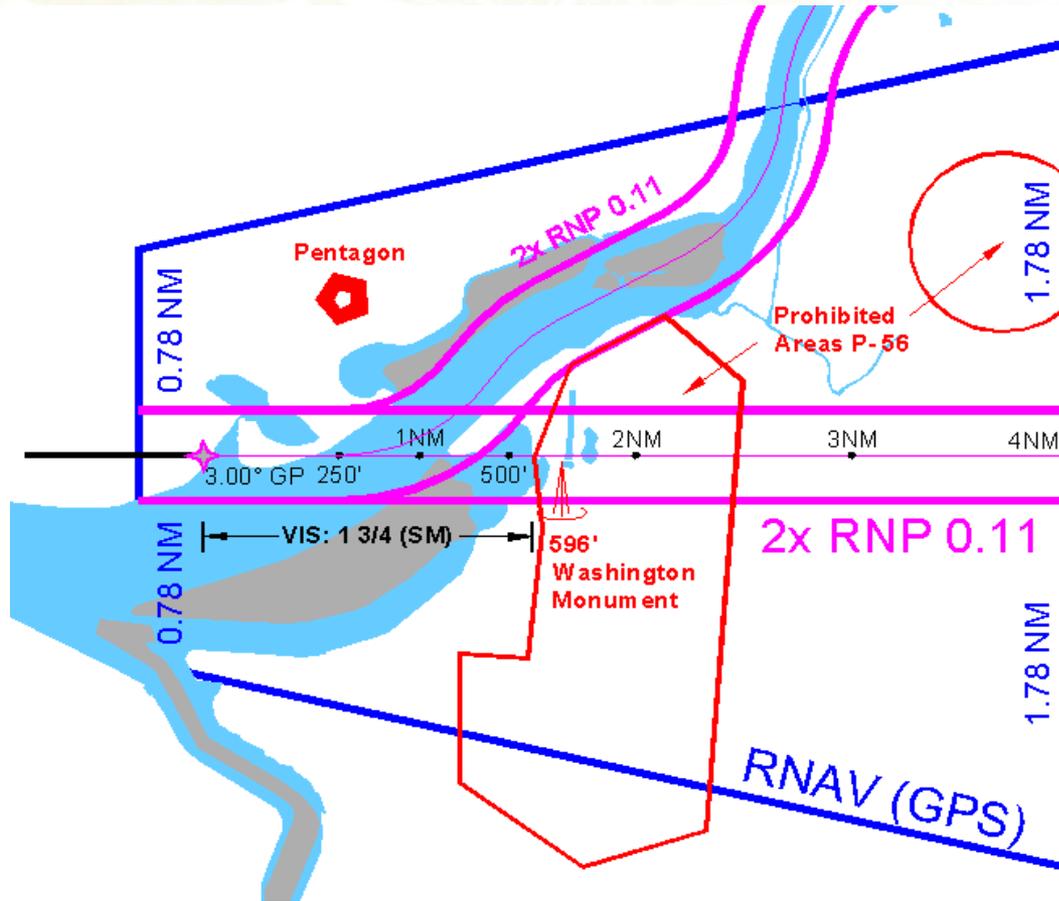
RNP=RNAV + Monitoring= Containment

Obstacle Clearance

Vertical Error Budget



RNP vs. RNAV Airspace

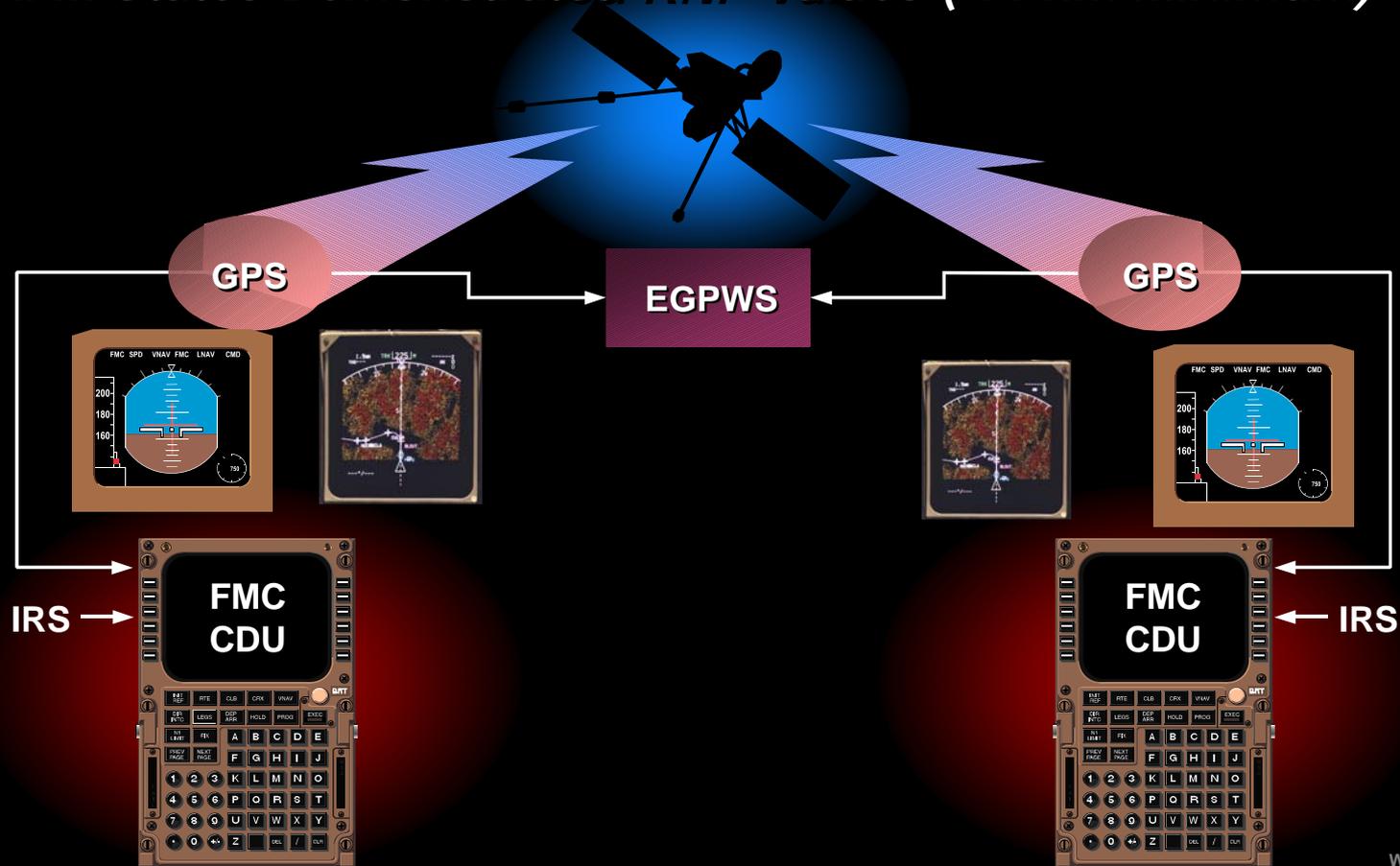


RNP Program Elements

- Aircraft Equipment
- Pilot Training
- Pilot Procedures
- Approach and Departure Procedure Development
- Approach and Departure Procedure Maintenance
- Navdata Integrity checks (every 28 days)
- Monthly FAA Reports
- Daily Receiver Autonomous Integrity Monitoring (RAIM) checks (Dispatch)

RNP Equipage

AFM States Demonstrated RNP Values (.11 nm Minimum)



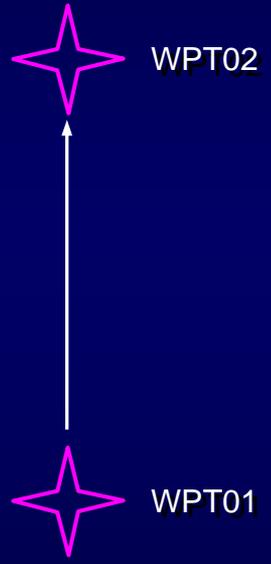
W002W.70





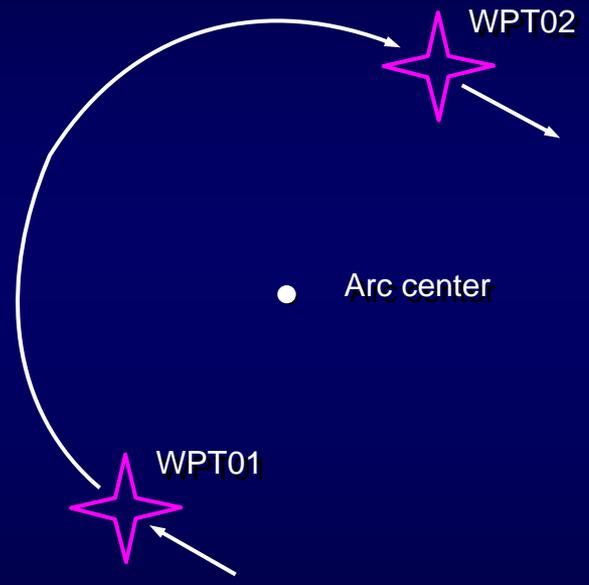
RNP Leg Types

Track to a Fix



Great circle track between two fixes

Radius to a Fix

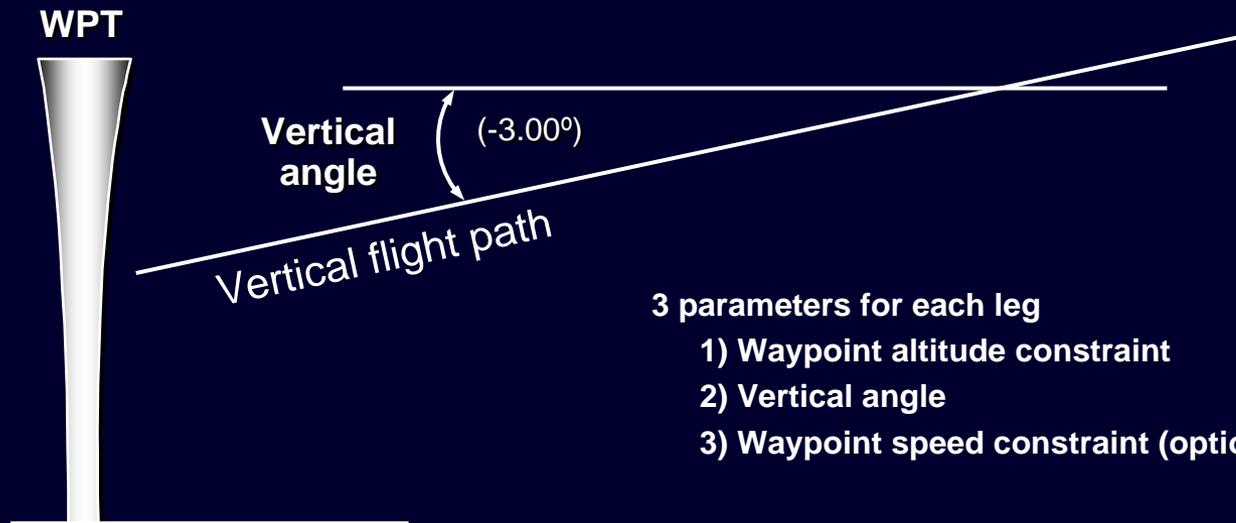


Constant radius to a fix

RNP supports both Straight and Curving Leg Types



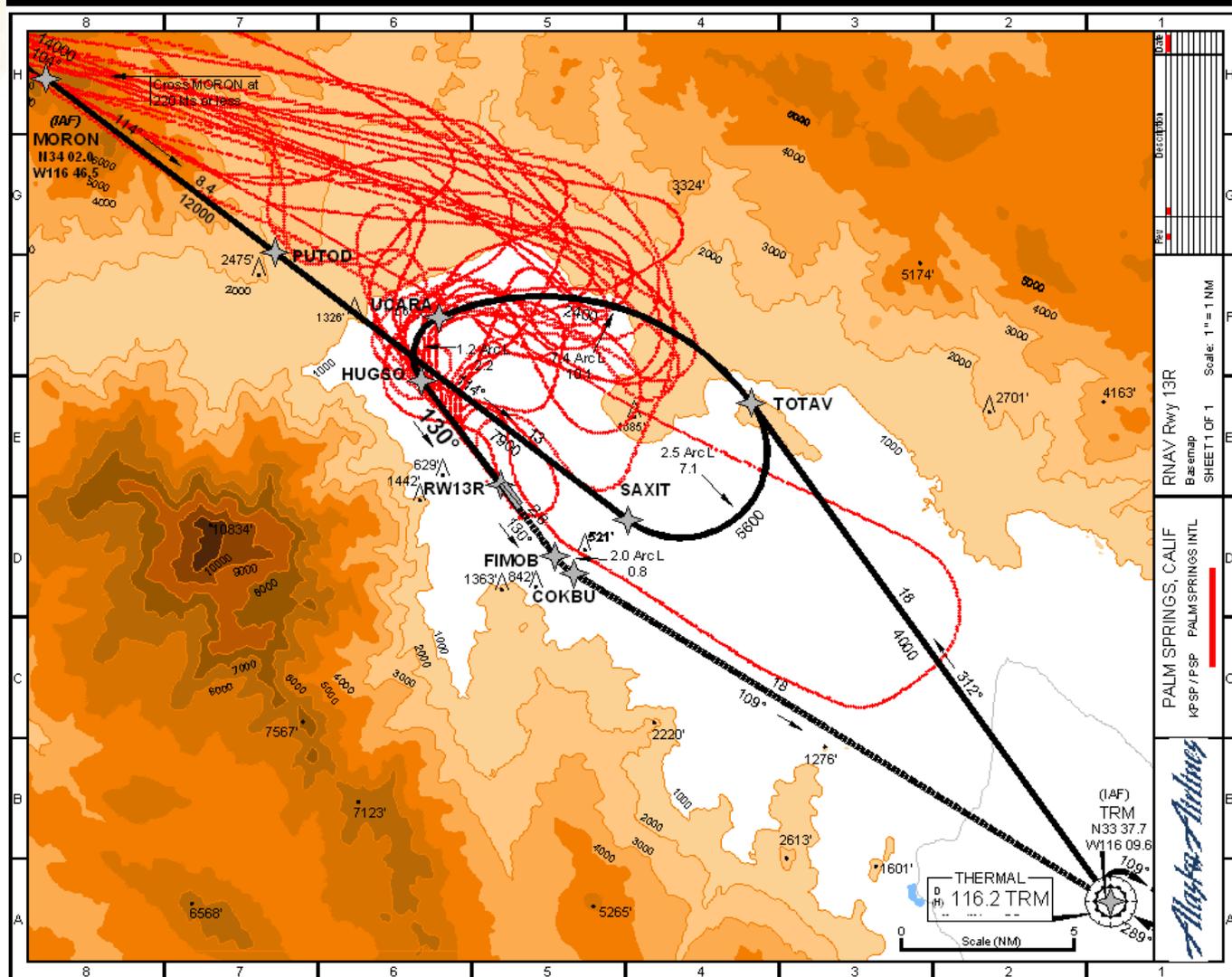
Vertical Capability



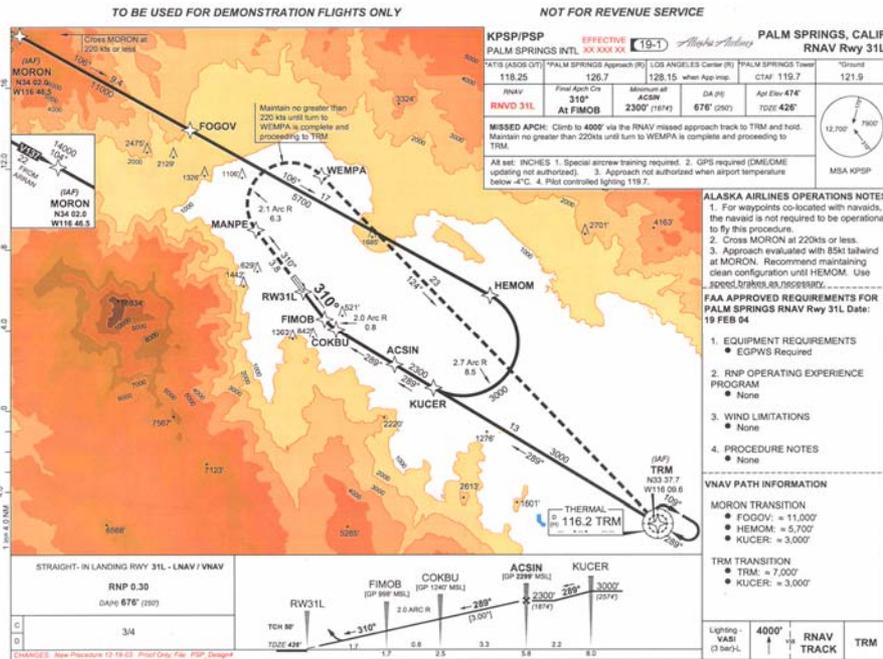
3 parameters for each leg

- 1) Waypoint altitude constraint
- 2) Vertical angle
- 3) Waypoint speed constraint (optional)

PSP: Before and After



Minima Improvements



RNAV Rwy 31L

Procedure	Standard	RNP
Runway 13R	None	250' / 3/4M
Runway 31L	1826' / 3M	254' / 1M



RAIM Check

SFO -FF 0707/1534

BEGIN: 07/13/2007 07:00Z END: 07/14/2007 06:59Z

737-700/ 737-900/ 737-800

SFO 737-NG

SFO RNP .11 WITHIN LIMITS FROM

07/13/2007 07:00Z TO 07/14/2007 06:59Z EXCEPT

FROM 09:33Z TO 10:02Z

FROM 18:00Z TO 18:23Z

FROM 18:28Z TO 18:33Z

FROM 21:43Z TO 21:48Z

FROM 22:32Z TO 22:42Z

FROM 01:47Z TO 01:50Z

FROM 02:13Z TO 02:22Z

FROM 04:14Z TO 04:14Z

FROM 05:02Z TO 05:20Z

FROM 05:31Z TO 05:37Z

FROM 05:43Z TO 05:50Z

SFO RNP .20 WITHIN LIMITS FROM

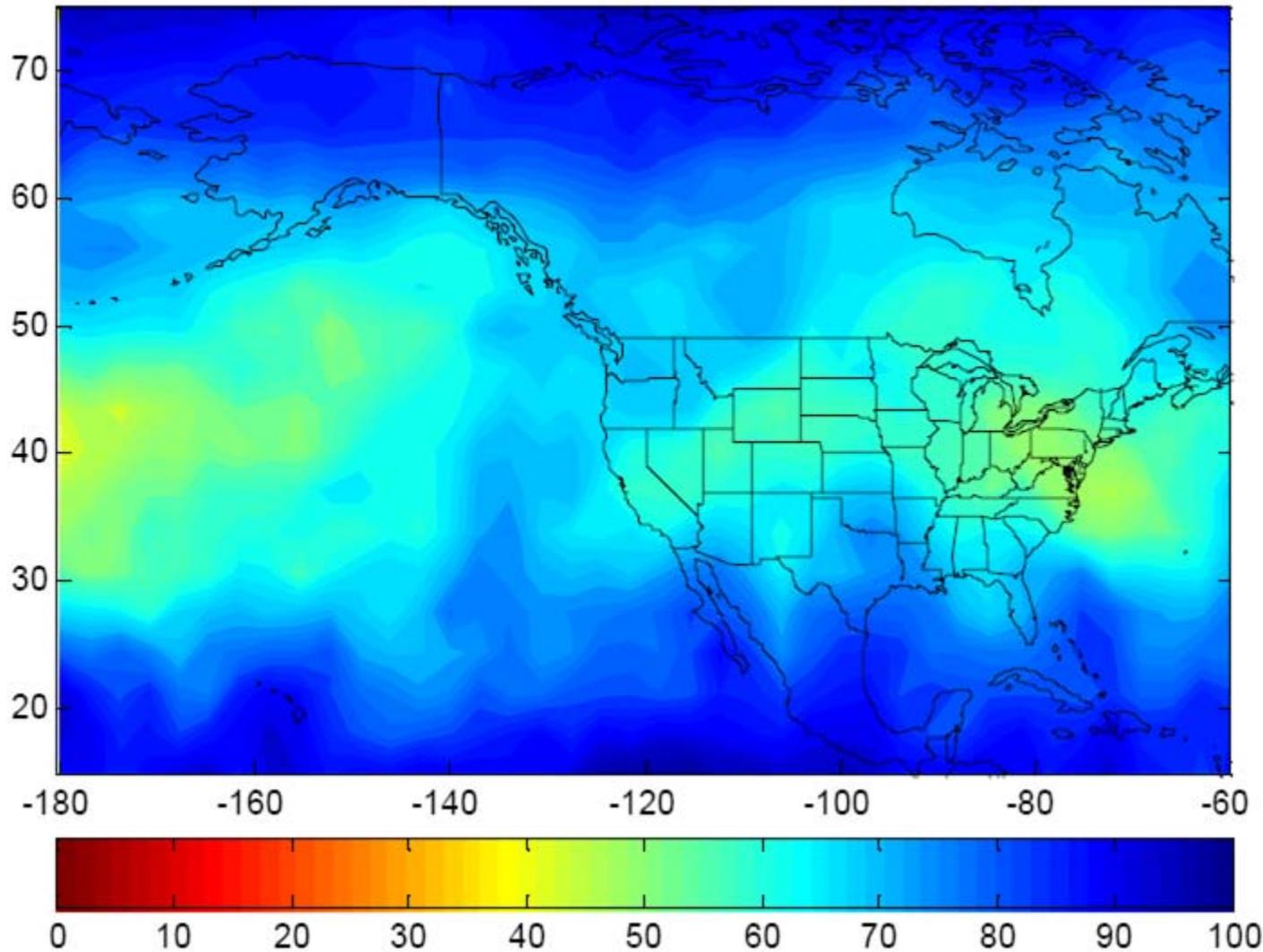
07/13/2007 07:00Z TO 07/14/2007 06:59Z

SFO RNP .30 WITHIN LIMITS FROM

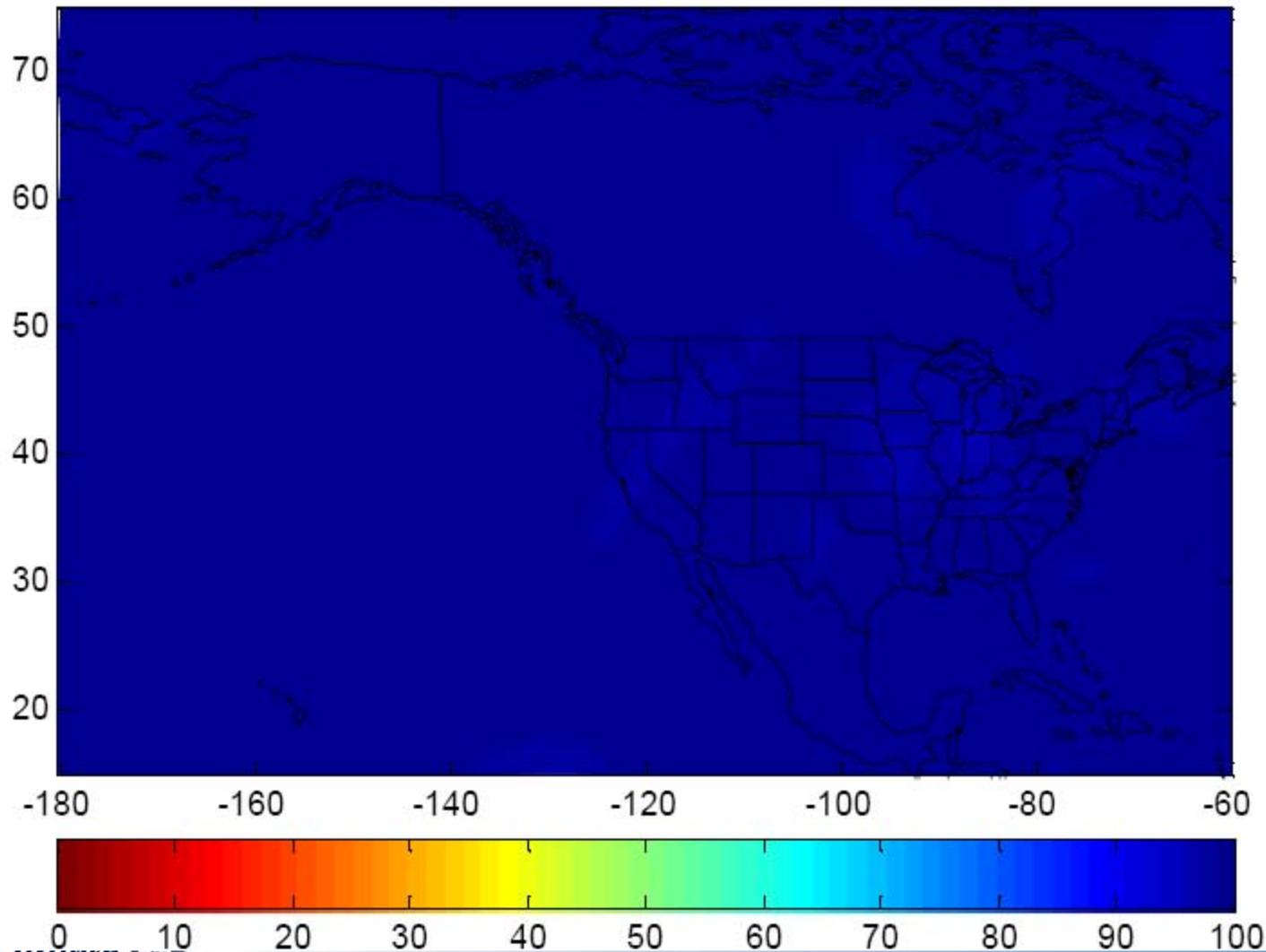
07/13/2007 07:00Z TO 07/14/2007 06:59Z



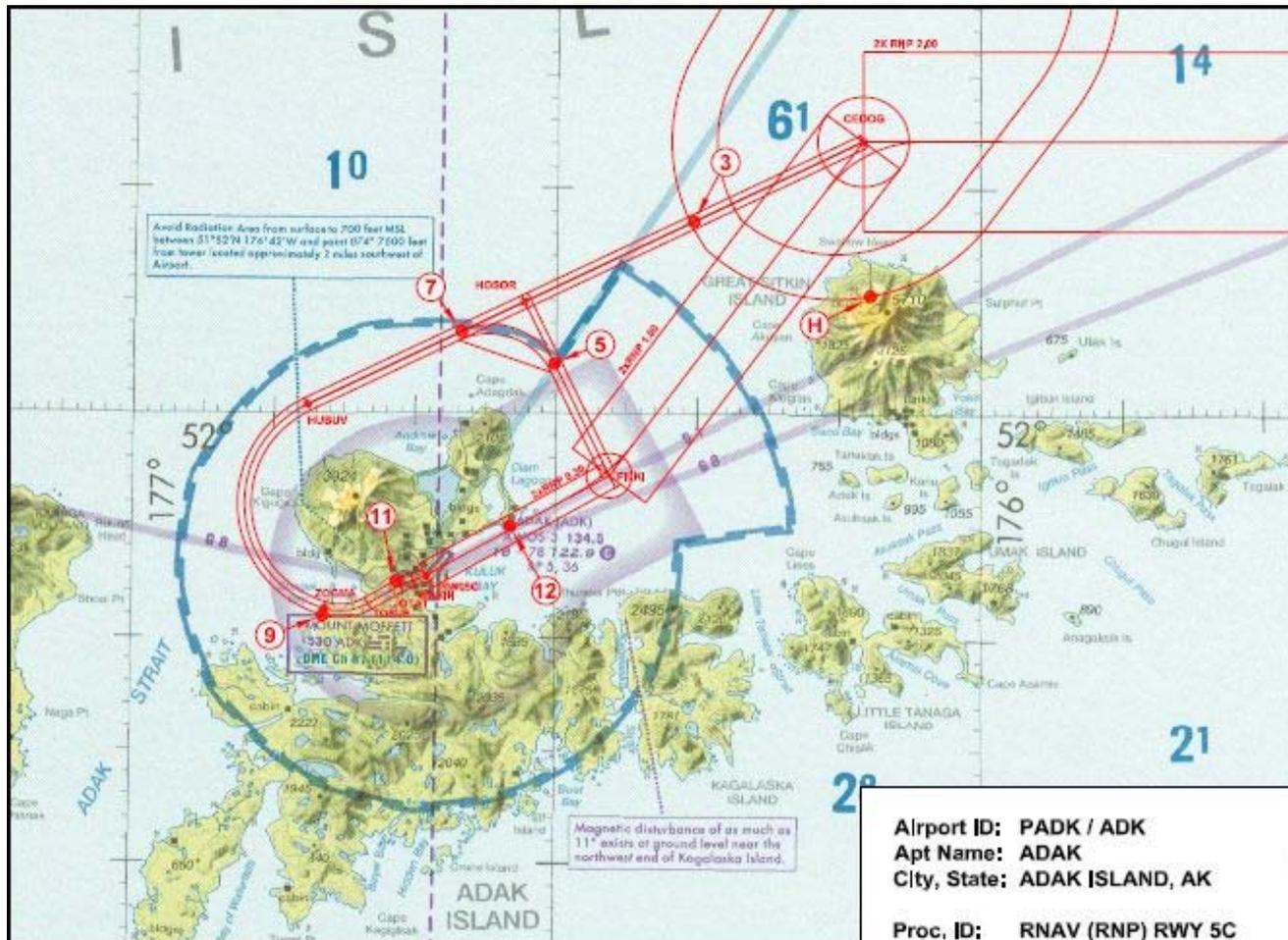
RNP 0.1 Availability: SA On



RNP 0.1 Availability: SA OFF



Adak, AK



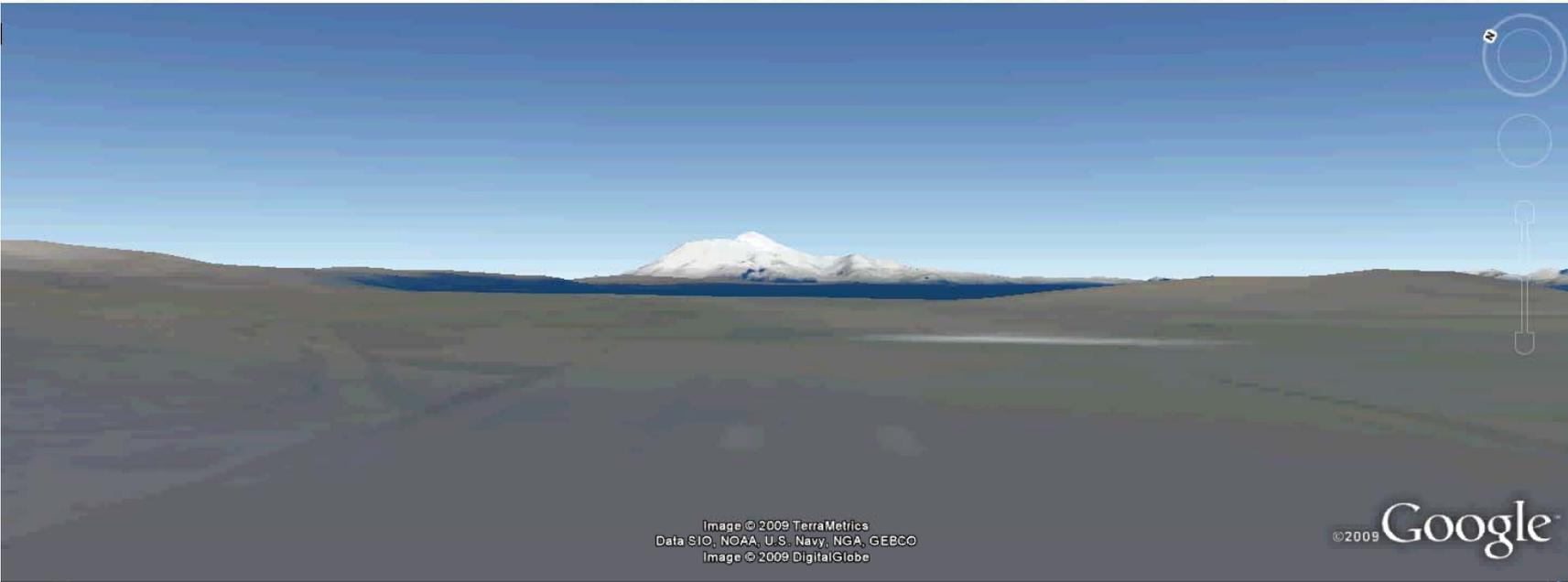
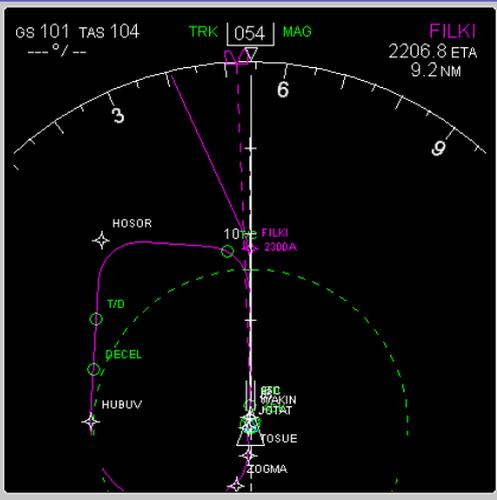
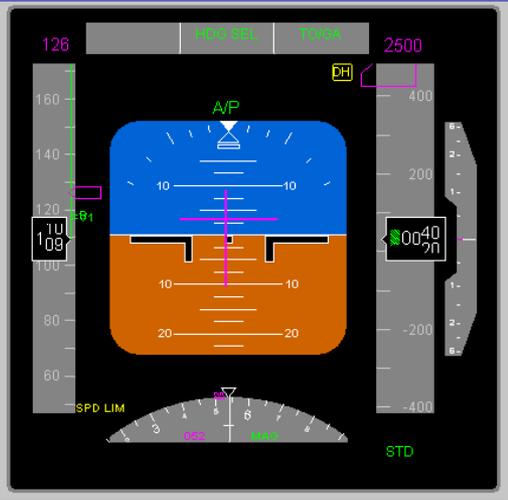


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 Data SIO, NOAA, U.S. Navy, NGA, GEBCO
 Image © 2009 DigitalGlobe

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51°53'13.74"N 176°37'55.10"W elev 15 ft

Eye alt 120 ft

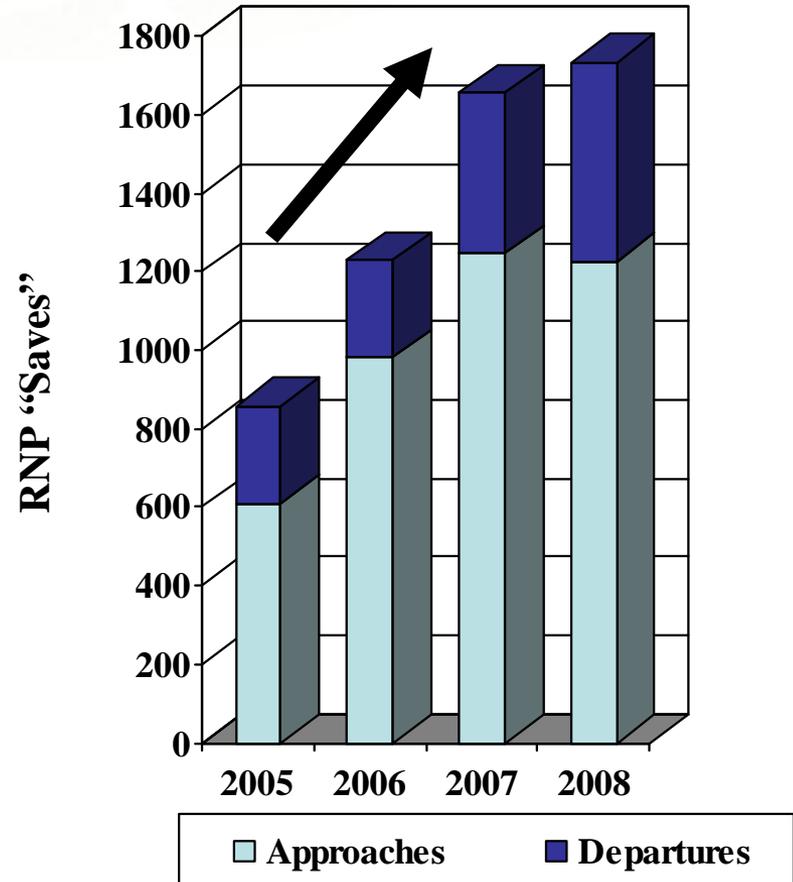


ACT	RTE	LEGS	1 / 3
54°		9.2 NM	
FILKI		.421 /	2300A
327°		7.6 NM	
HOSOR		240 /	2300A
237°		10 NM	
HUBUV		218 /	2300A
4.9	ARC L		
ZOGMA		143 /	2000A
2.5	ARC L	6 P	3.77°
TOSUE		143 /	1195
RNP / ACTUAL			
0.15 /	0.08 NM		
RTE DATA >			



RNP Accomplishments

- Industry leading RNP pioneer
- 100% RNP fleet
- 18 “special” approaches
- 14 “special” departures
- First airline approved to fly FAA’s RNP Public “Specials” (2006)
 - Added 10 locations
- Fly over 12,000 RNP approaches and departures annually
- 2008 - RNP saved \$18.5M in operating costs

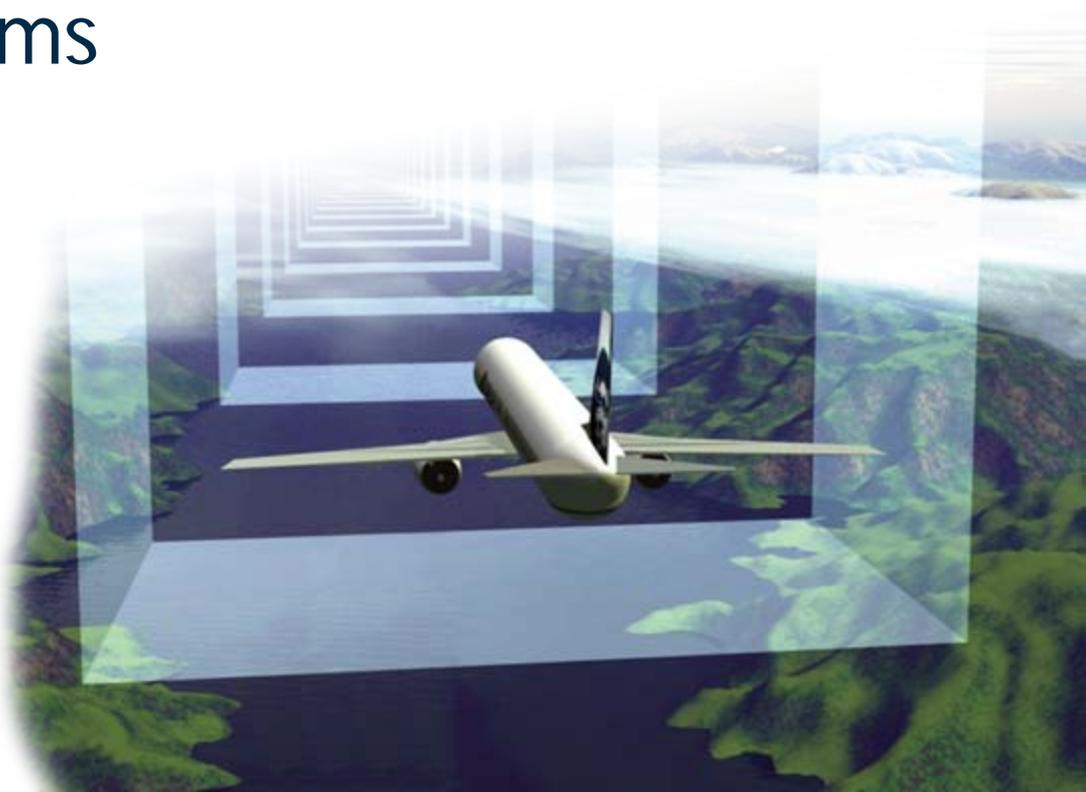


An RNP “save” is an operation that would not have been completed if RNP was not available.



Original RNP Purpose

- Providing vertical guidance
- Guidance to runways without Nav aids
- Reducing Minimums



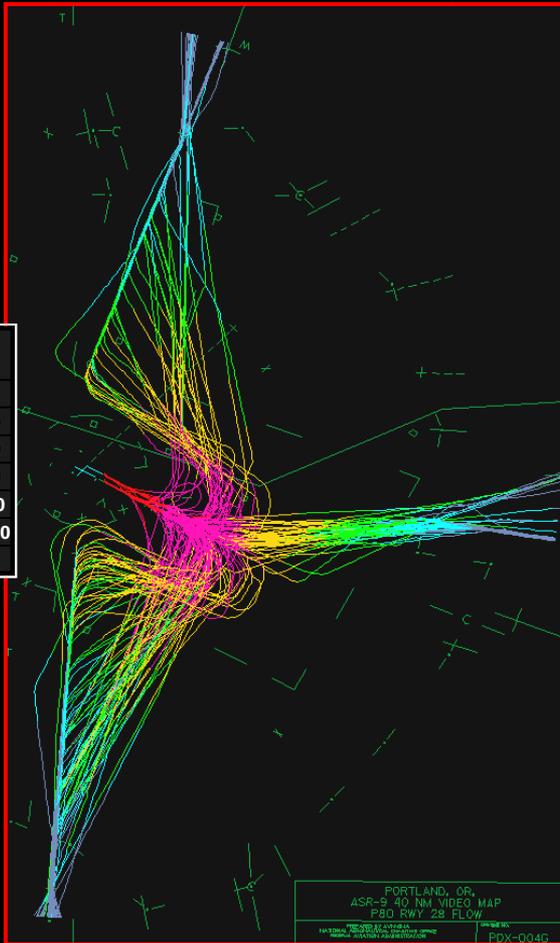
RNP is taking a new path

- Capacity Enhancement
- Efficient Approach & Departure Profiles

Tracks Before and After RNP

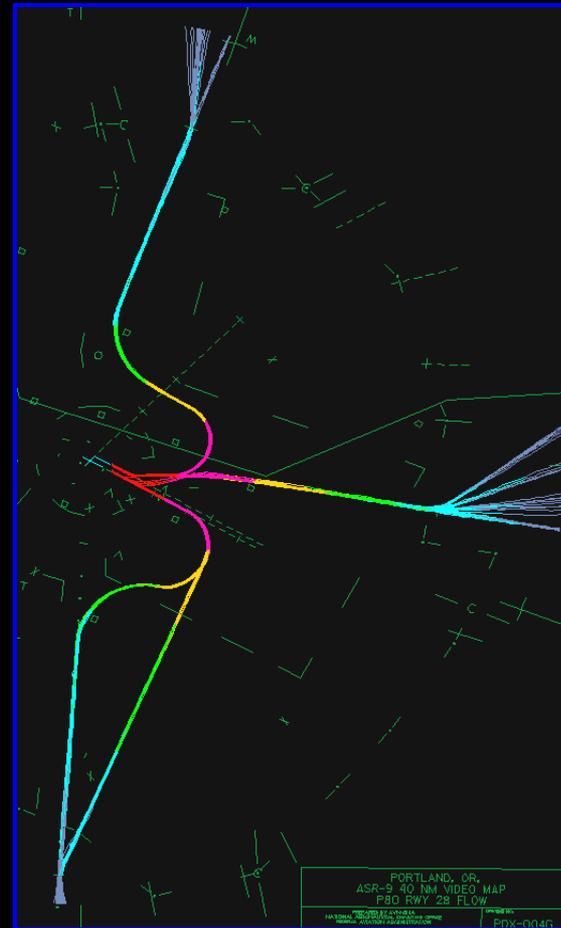
Conventional Navigation

Track Color	Altitude (ft MSL)
Red	< 2,000
Magenta	2,000 – 4,000
Yellow	4,000 – 6,000
Green	6,000 – 8,000
Cyan	8,000 – 10,000
Blue	10,000 – 24,000
Grey	> 24,000



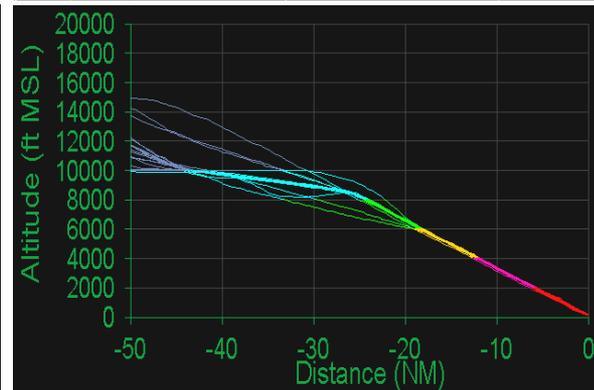
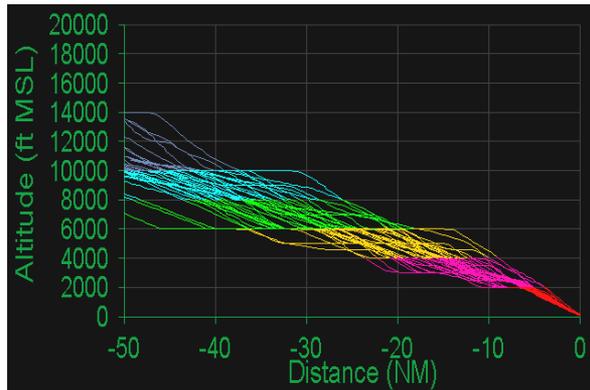
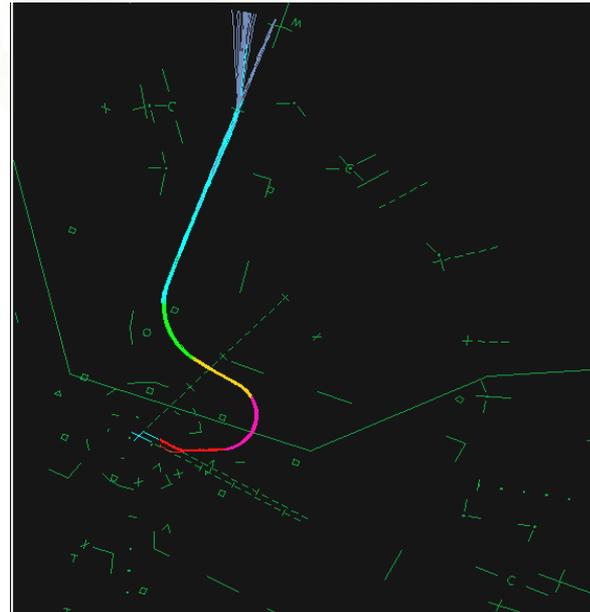
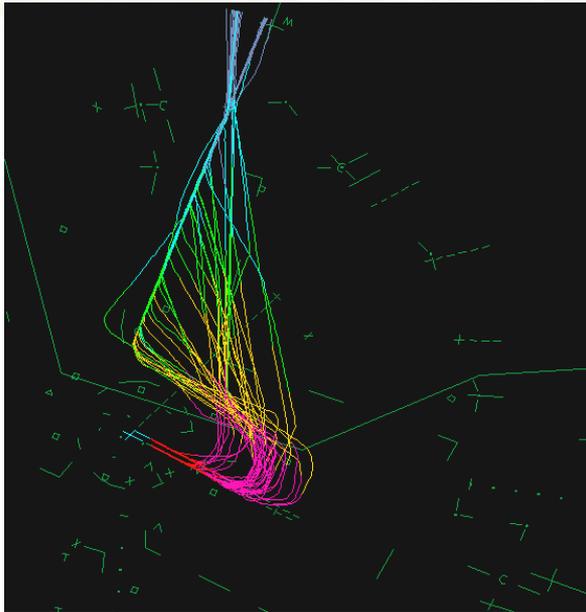
175 flight tracks, RWY 28, Portland, OR

RNP Approach Operations



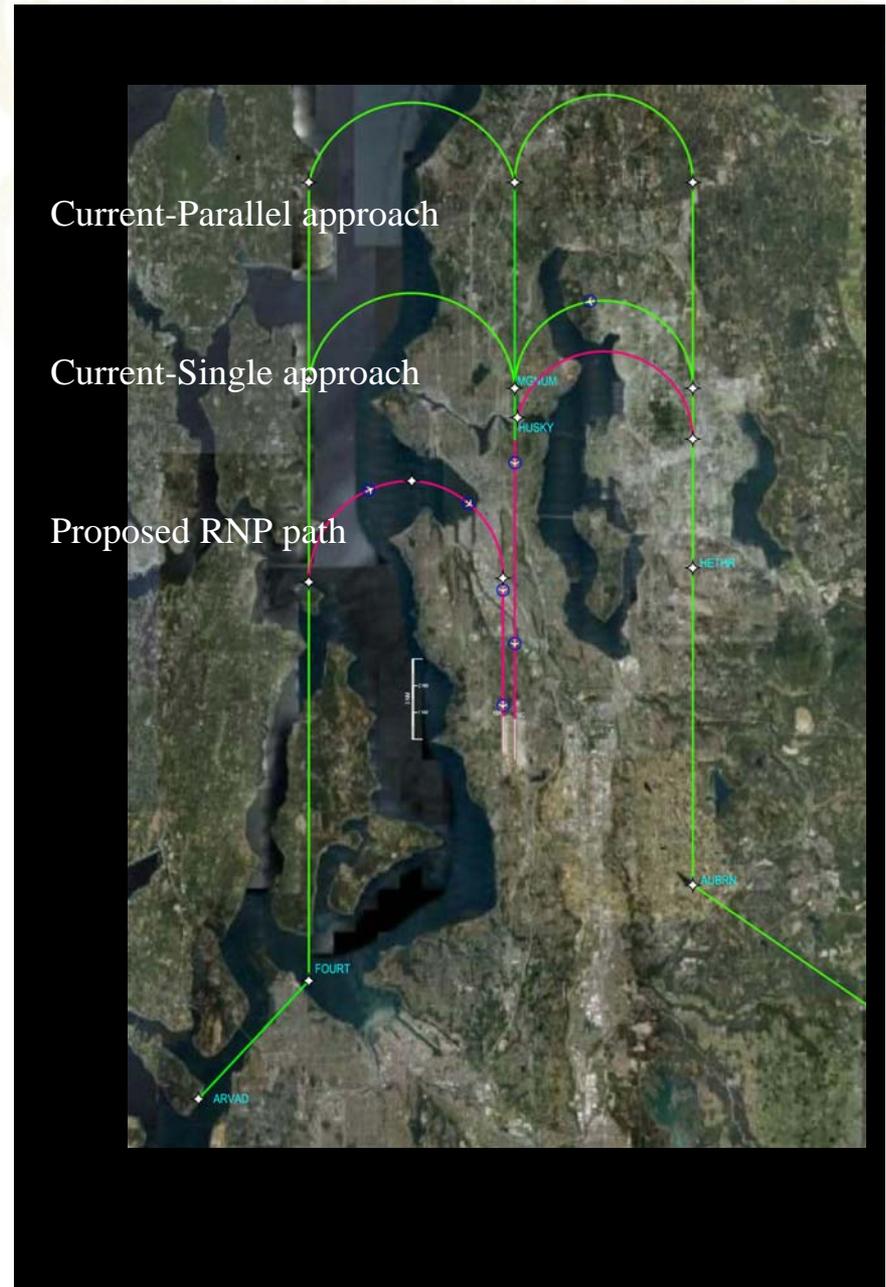
128 flight tracks, RWY 28, Portland, OR

Tracks Before and After RNP



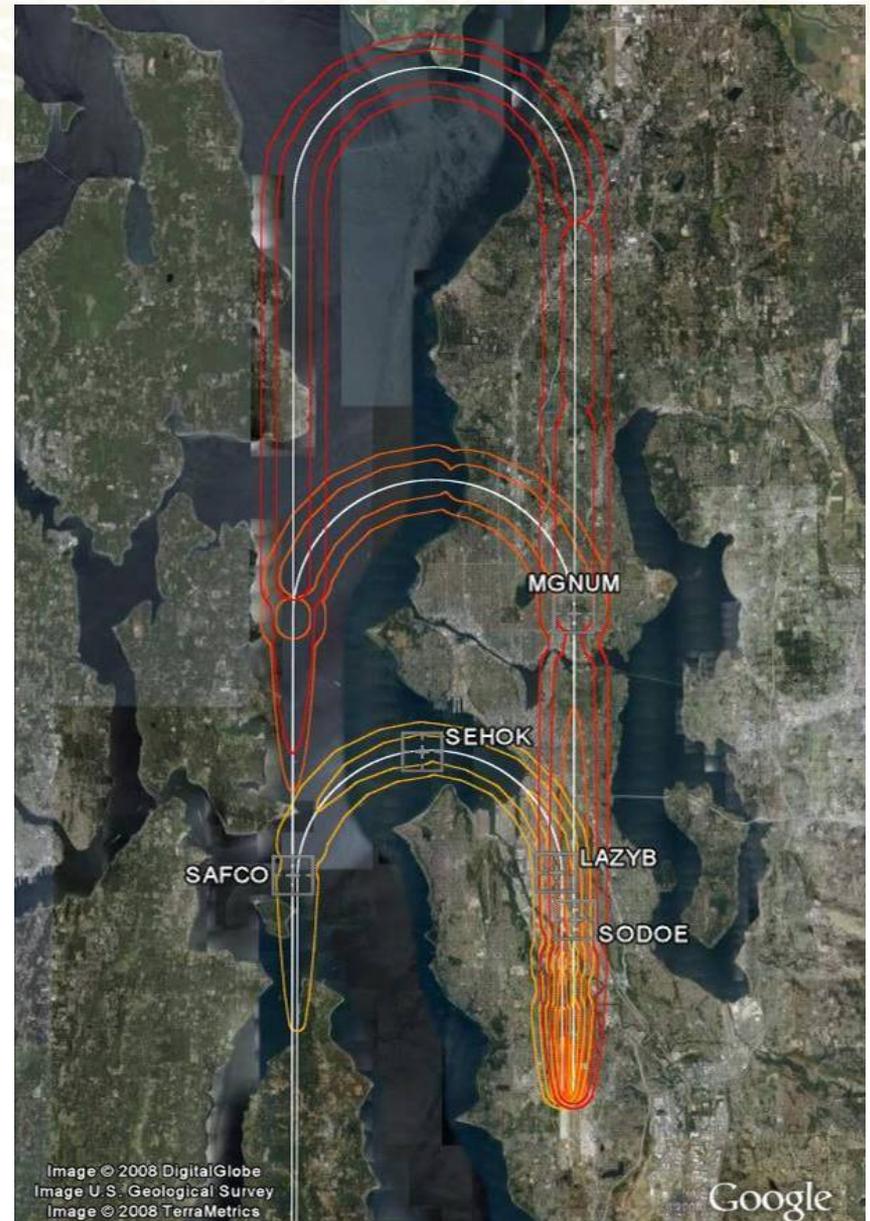
Flight Paths- South flow

- Proposed RNP Path
 - Reduces track miles
 - Overlays Bay/Husky Visuals
 - Optimizes descent profile
 - Approaches to all runway ends with transitions from each arrival post
 - Reduces noise impacts and GHG emissions

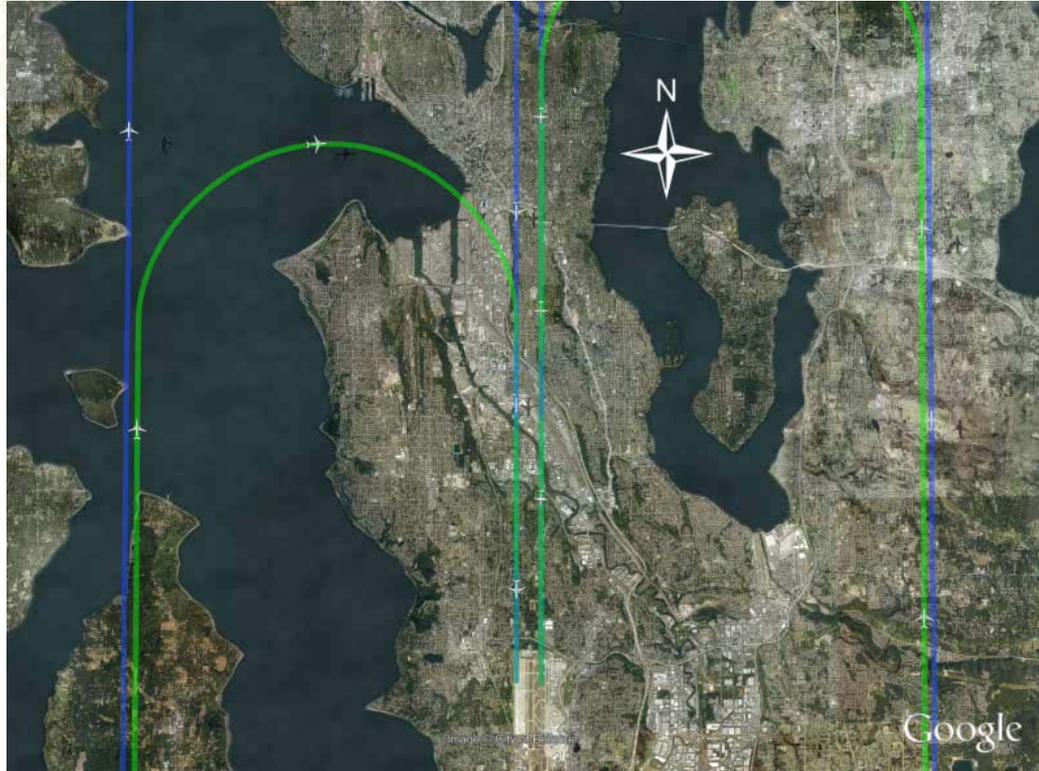


Noise impacts

- Using RNP/CDA aircraft are higher longer, and in idle descent.
- More efficient flight paths reduce over flights north of Seattle.
- Population Count under flight tracks:
 - Longest Track - As Proposed by FAA (Red Track) = 326,000
 - Existing Track (Orange Track) = 239,000
 - Shortest Track - Proposed RNP/CDA (Yellow Track) = 52,000



Annual Benefits



Video clip

Time	4800 Hours	\$20.4M
Fuel Burn	2.9 M Gallons	\$7.3M
CO2 Emissions	30,500 Metric Tons	Removing 5600 cars

Q & A