

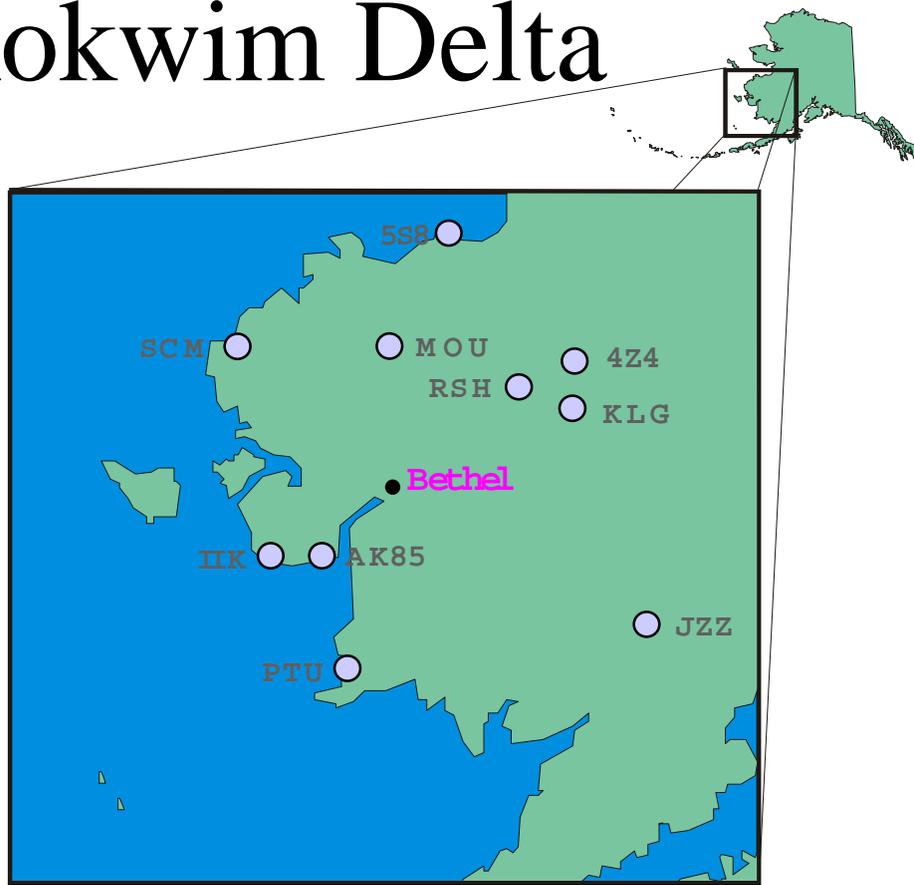
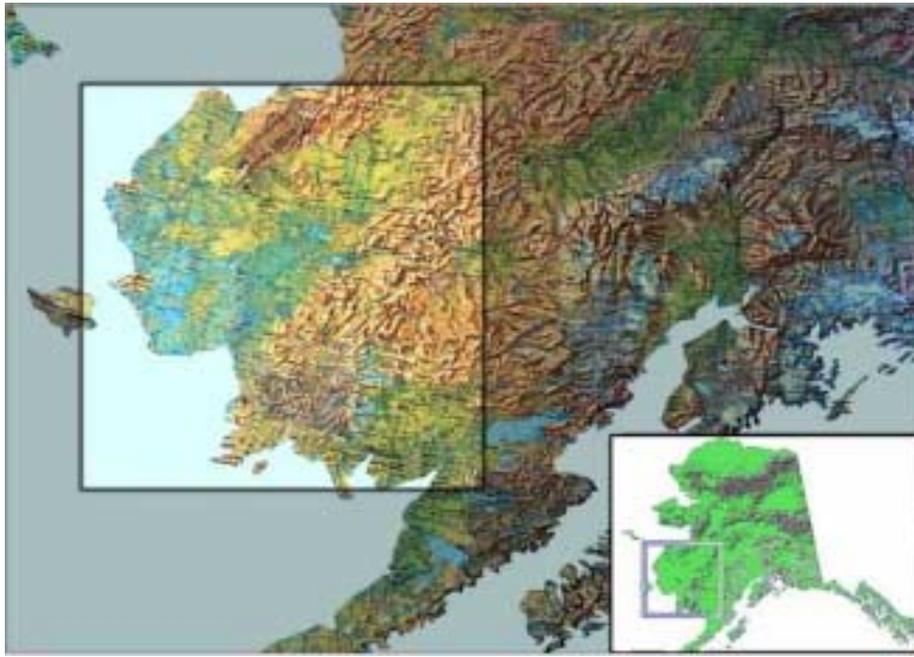


Capstone

Chris Moody

December 2000

Initial Capstone Area of Interest: Yukon - Kuskokwim Delta



Alaskan Issues and Challenges

- Localities heavily dependent upon aviation
- Difficult environmental conditions
- Difficult connectivity in remote areas
 - Capstone using satellite-based comm for much of their infrastructure
- ATC surveillance not available or limited at low altitudes

Typical Capstone Aircraft



Capstone Services

- **ADS-B air-to-air:** use as aircraft equip
- **ADS-B air-to-ground**
 - Initial implementation into Anchorage Center automation system (MEARTS) in “shadow mode”
 - Eventual migration to operational use (target Jan. ‘01)
 - ADS-B targets handled like radar targets
- **TIS-B ground-to-air**
 - TIS-B testbed being developed at FAA Technical Center

Capstone Services

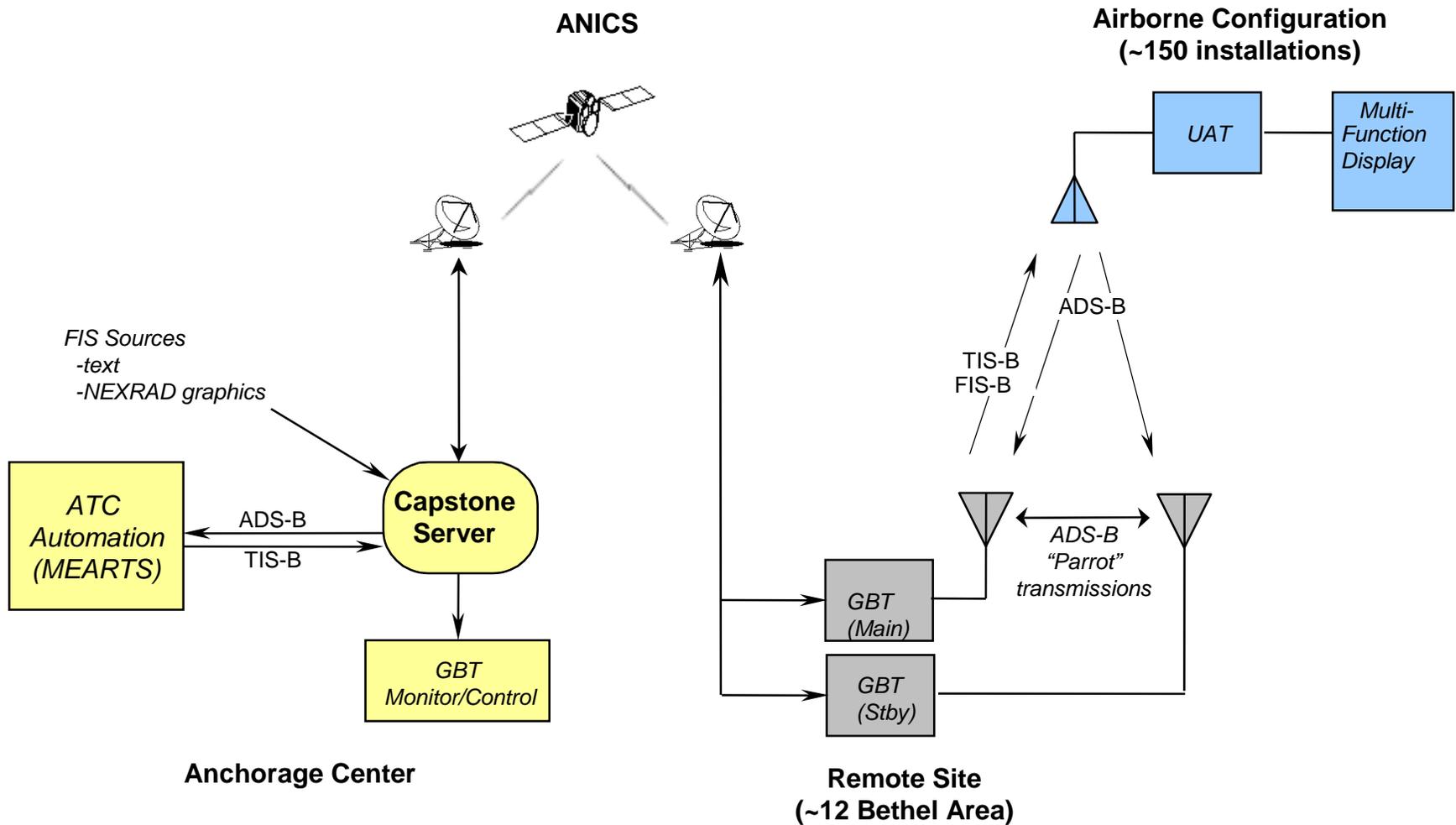
(concluded)

- **FIS-B** (weather, NOTAMs, SUAs etc.)
 - Text products
 - Ground-based weather radar graphics
 - Uplink available in Bethel
- **Other Related Services**
 - New GPS non-precision approaches to small village airports
 - New FAA-certified Automated Weather Observing System stations with broadcast capability
 - Terrain awareness

Capstone FY00 Program Specifics

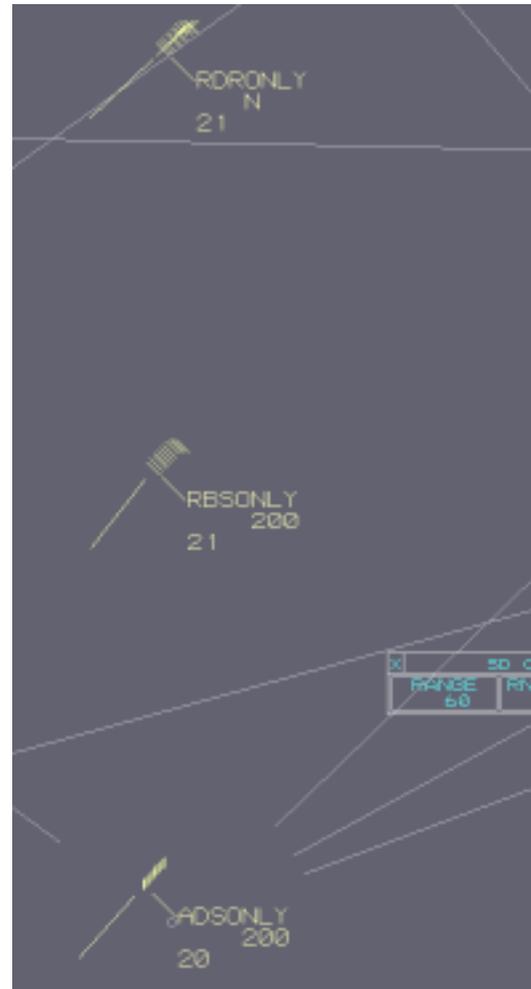
- Yukon - Kuskokwim Delta Region
 - Initial area of interest--plan to cover the entire state later
 - Region is nearly 100% dependent upon aviation
 - Bethel is the “hub”
 - Plan 12 ground stations for this region
- Up to 150 aircraft equipped (near 100% equipage)
 - Light piston single/twin aircraft in Part 135 (Air Taxi) operations
 - Avionics equipage:
 - IFR-certified GPS receiver
 - Integrated ADS-B / TIS-B / FIS-B transceiver (UAT)
 - Terrain database/CFIT avoidance
 - Multi-function color graphics display for presentation of above information
 - \$15-20k (current pricing)
 - All costs incurred by FAA Alaska

Capstone Architecture



Capstone ATC Perspective

- ADS-B displayed only if radar unavailable for a given target
- ADS-B target display updated at 6 second rate
- 5 nmi separation standard

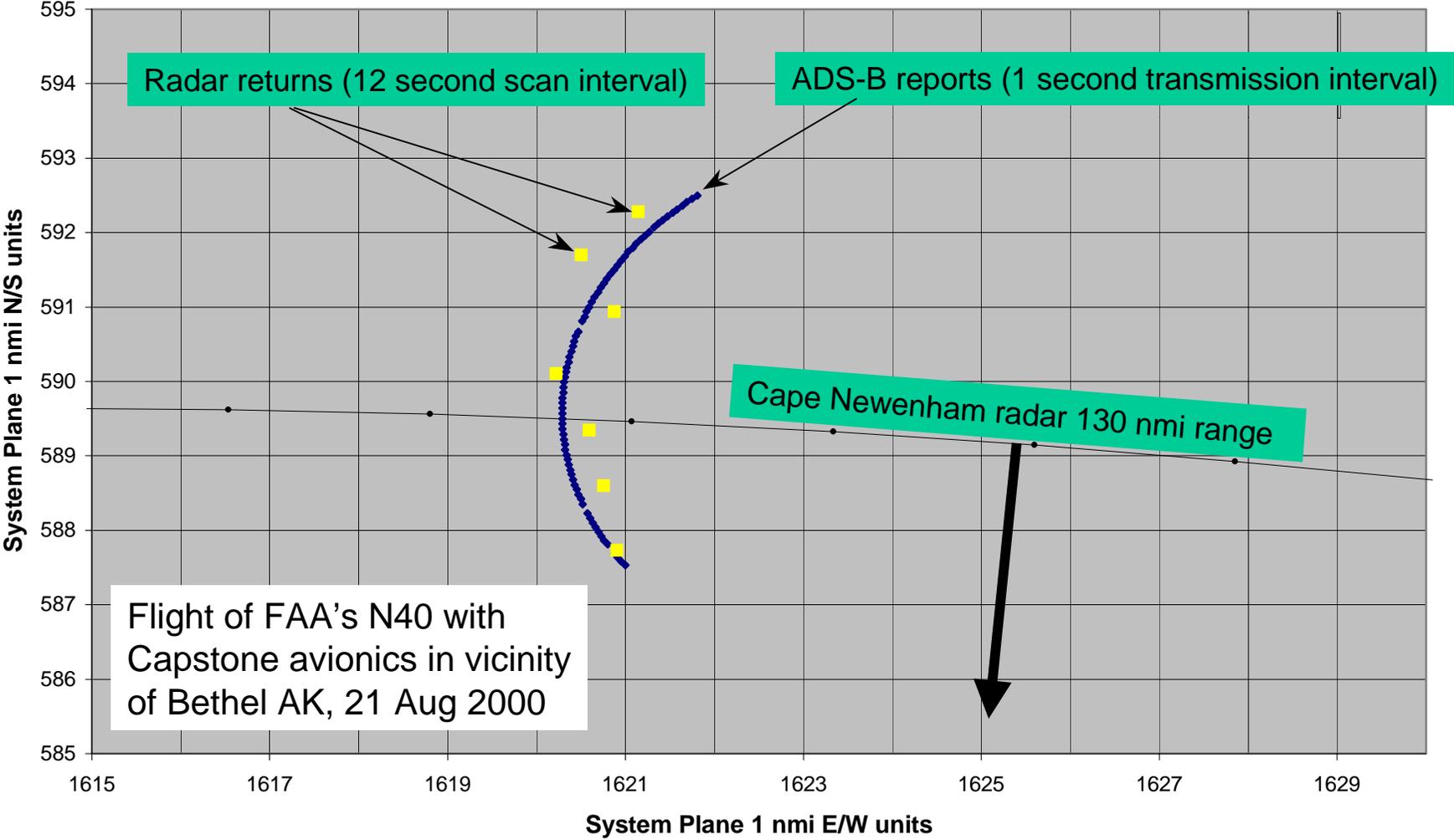


Data Block for track with RBS only
12 sec update

Data Block for track with RBS/ADS-B
12 sec update

Data Block for track with ADS-B only
6 sec update

Cape Newenham Long Range Radar/ADS-B Comparison: Turning Track



Ground Broadcast Transceiver (GBT)



Capstone Avionics



UPS Aviation Technologies INC.

A subsidiary of United Parcel Service

Avionics Install Kit



MFD

APOLLO MX20



FIS Message

METAR KRDM 191955Z
01003KT 10SM CLR 15/04 A3011 RMK AO1

FIS Category

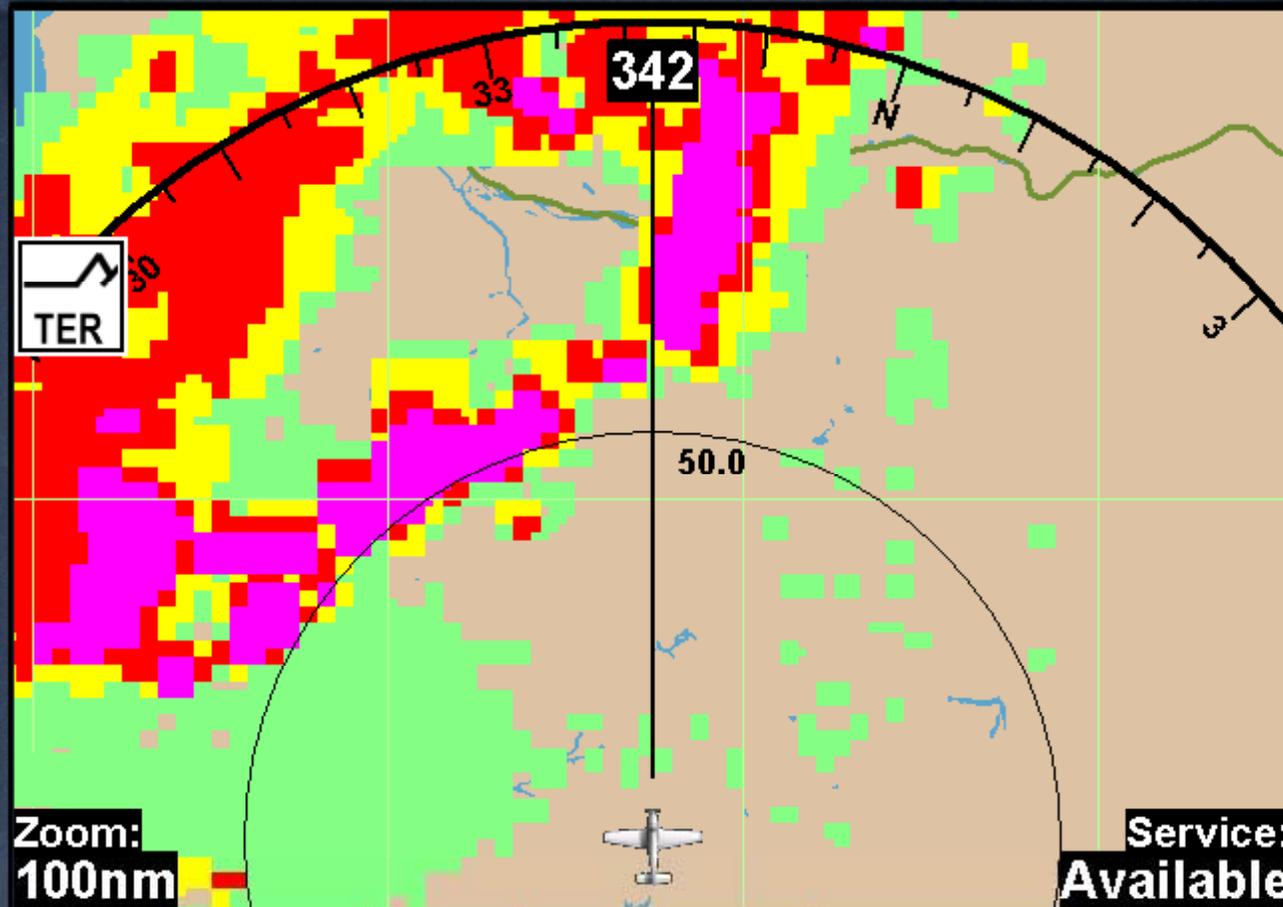
	(Nearest Present Pos)	
METAR	▲ KAST 83.2	191955Z
TAF	KDLS 88.2	
	● KRDM 88.6	
	KTDO 94.0	

⬆ ⬇ ⬇ Sort FIS Data Link



MFD

APOLLO MX20



OFF

TER

342

33

50.0

Zoom:
100nm

Service:
Available

In Out Pan

WX Data Link

MENU
ENT

FN

▲ ▲ ▲ ▲

MFD

APOLLO MX20

Waypoint:
PAN1

Wpt Bearing:
302



Zoom: 40ⁿ_m Alt: 7,000^f Baro: 31.02"
Trk: 302° GS: 100^k Distance: 79.2ⁿ_m

In Out Pan Info Custom Map



MENU
ENT

