



Common Affordable Tactical Network Integration Program (CATNIP)

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Outline



- Current Reality
- CNS/ATM Upgrades
- Cockpit Integrations
- Relevant Capabilities
- Summary



----- We hit the Wall -----
Tactical Data Links appear unaffordable



Naval Aviation Lacks Appropriate Digital Connectivity



- Commercial Airliners have Data link capability
 - ACARS, VDL-2, INMARSAT, HFDDL, 1090ES ADS-B
- Business Aviation is getting connected
 - Iridium, 1090ES ADS-B,
- General Aviation is getting UAT ADS-B & FIS-B
 - Cockpit display of traffic information, (XM) radio weather
- Some naval aircraft have Link-16, and VMF
 - Interoperability issues
 - Unique platform integrations
 - Lacks dynamic flexibility

Naval Aviation cockpits are the last to get connected



Current Reality (We hit the wall)



Most platforms have unique mission computer systems and software architectures

- Prime vendors control interfaces and integration
- New capabilities still require extensive integration efforts unique to that platform
- Platform integration is usually very expensive
- A military platform that can't participate in collaborative warfare will be eligible for early retirement
- Collaborative Warfare will require agile network connectivity

Lack of capability to grow = Aircraft no longer relevant



CNS/ATM Tactical Aircraft Compliance*



Aircraft	8.33 kHz **	Mode S with ELS / EHS **	RVSM **	RNP RNAV **	1090ES ADS-B (Future Growth)
EP/P-3	G	B		B	R
KC/C-130T	B	G		R	R
C-2A	B	G		G	R
E-2C	G	G		G	R
EA-6B	B	B		R	R
KC-130J	B	G		R	R
VH-60N	B	B		R	R
H-53 series		G		G	R
MH-60R/S	B	G		R	R
F/A-18E/F	B	G	B	G	R
MV-22B	R	G		R	R
AUH-1Z/Y	B	G		R	R
AV-8B	B	R	G***	FY-10	R
F/A-18A+/C/D	Y	R	G***	FY-10	R
CH-46E		R		R	R
T-45C			R	R	R

USCG
HC-130H
 8.33
 EHS
 RNP RNAV
 ADS-B

G
G
G
G

B Capability Exists
G Integration Underway
Y Some Aircraft Have Achieved Capability
R Presently Noncompliant.
 Not Applicable for this aircraft

* New development aircraft will be delivered CNS/ATM compliant

** Signed Functional Requirements Document

*** RVSM Certification Underway

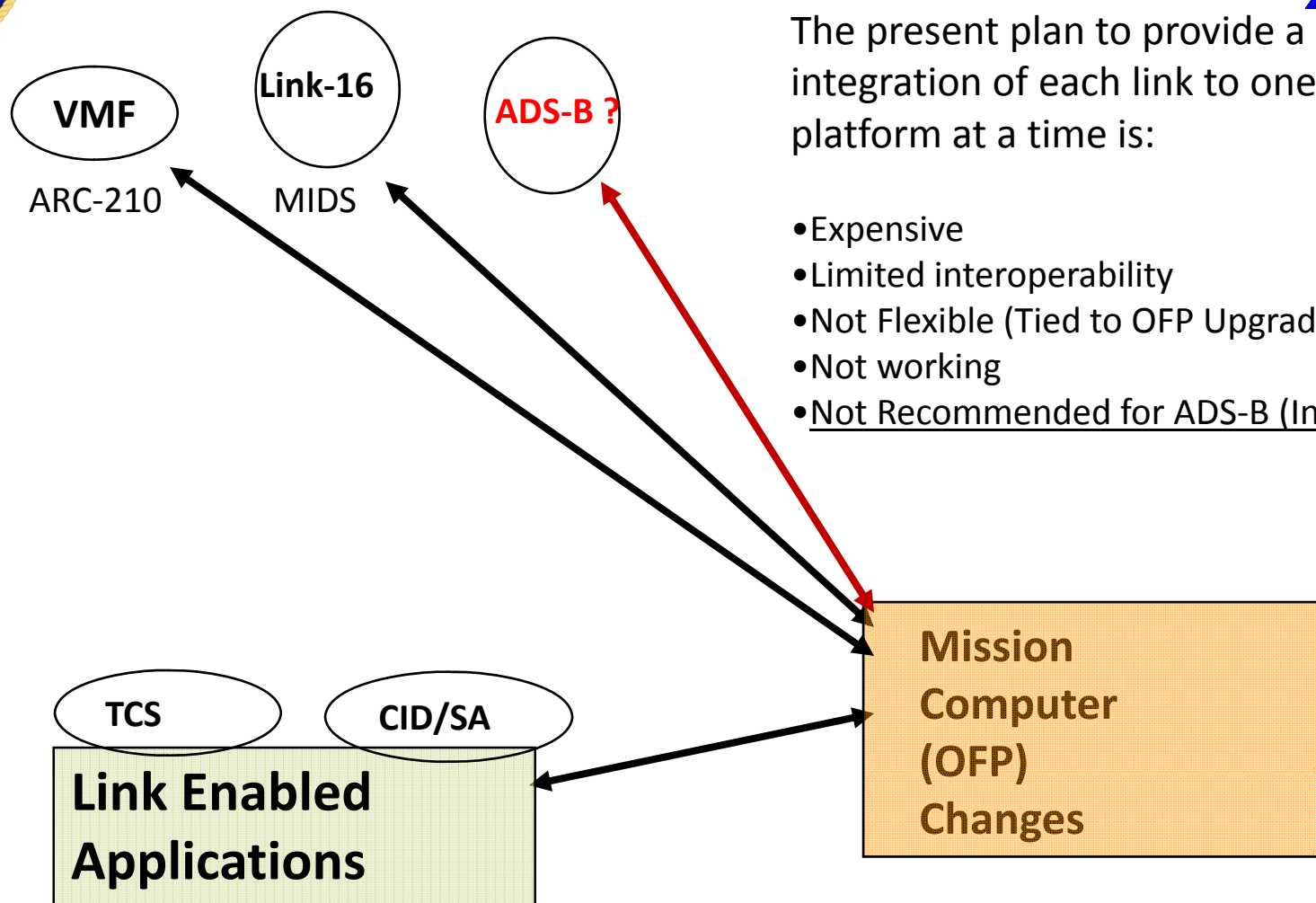
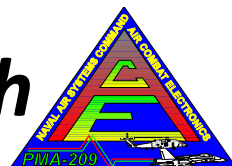


CH-53E CNS/ATM Cockpit (Future)





Current Data-Link Integration Approach



The present plan to provide a unique integration of each link to one platform at a time is:

- Expensive
- Limited interoperability
- Not Flexible (Tied to OFP Upgrades)
- Not working
- Not Recommended for ADS-B (In)

TCS = Time Critical Strike (Digital- CAS)

CID = Combat Identification

SA = Situational Awareness



Common Network processing

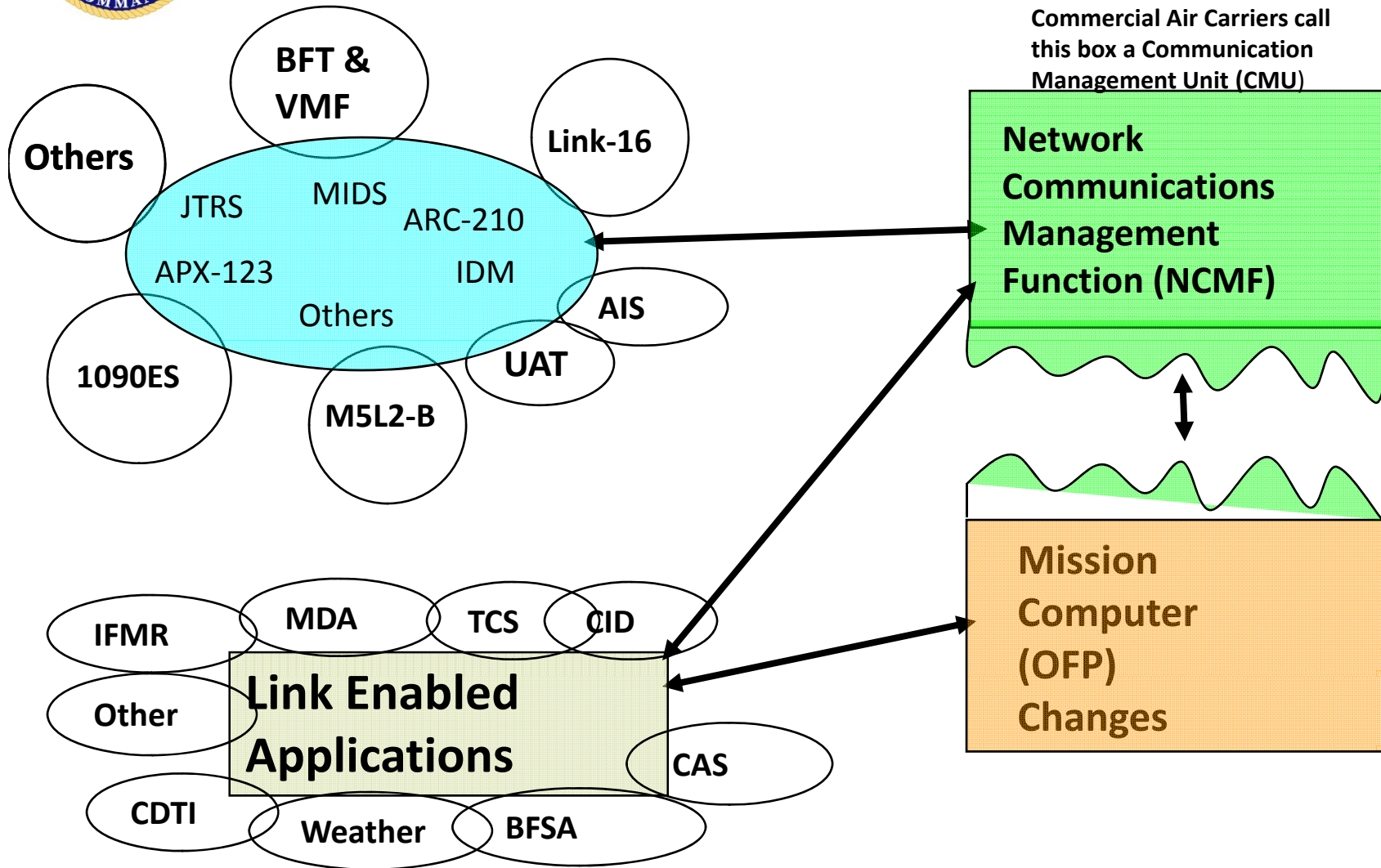


- Flight Computers may be unique for each airframe
 - Unique flight dynamics
 - Unique flight controls
- Mission Computers may be unique to each weapon system
 - Unique set of onboard sensors
 - Unique weapons delivery capability
- Network Management processing should **not** be unique for any specific aircraft
 - Network hardware is common (ARC-210, MIDS JTR, APX-123)
 - Network processing and fusion of networks could be accomplished with common software

The TV Cable box & processing is not unique to your house



Common Affordable Tactical Network Integration Program (CATNIP)



Commercial Air Carriers call this box a Communication Management Unit (CMU)

IFMR = In-flight Mission Re-planning
CAS = Collision Avoidance System

MDA = Maritime Domain Awareness
CDTI = Cockpit Display of Traffic Information

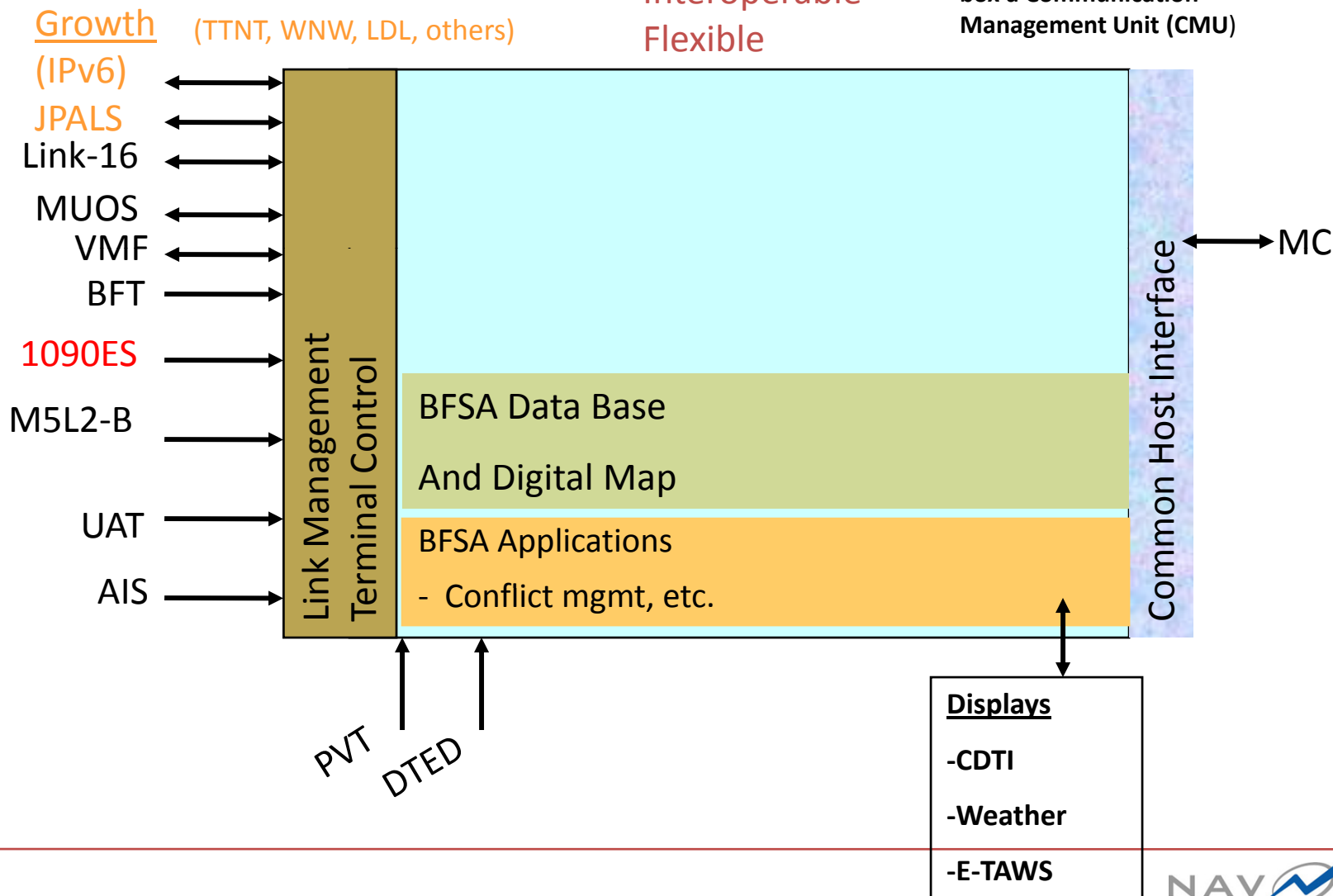


Network Communication Management Function (NCMF)



Affordable
Interoperable
Flexible

Commercial Air Carriers call this box a Communication Management Unit (CMU)





Some Relevant Capabilities for 2025



1090ES	ADS-B using Mode S Extended Squitter
AIS	Automatic Identification System (<i>Ships</i>)
BFT	Blue Force Tracker
CAS	Collision Avoidance System
CDTI	Cockpit Display of Traffic Information
FIS-B	Flight Information Service-Broadcast
IFF Mode 5	Identification Friend or Foe Mode 5
IPV6	Internet Protocol Version 6
JPALS	Joint Precision Approach and Landing System
LAAS	Local Area Augmentation System
M5L2-B	Mode 5 Level 2-Broadcast
M-Code	GPS Waveform
MFOQA	Military Flight Operations Quality Assurance
NAVWAR	Navigation Warfare (NW)
NCO	Network Centric Operations
SRGPS	Shipboard Relative GPS
TBO 4D	Trajectory-Based Operations in 4 dimensions
TCDL	Tactical Common Data Link
TTNT	Tactical Targeting Network Technology
UAT	Universal Access Transceiver
VDL-2/3	VHF data Link version 2 or version 3 (civil)
V TAWS	Visual Terrain Avoidance Warning System
WNW	Wideband Network Waveform
WX	Weather (graphic and digital)



ADS-B (Traffic) Depiction with UAT



Cockpit Display of Traffic Information (CDTI)



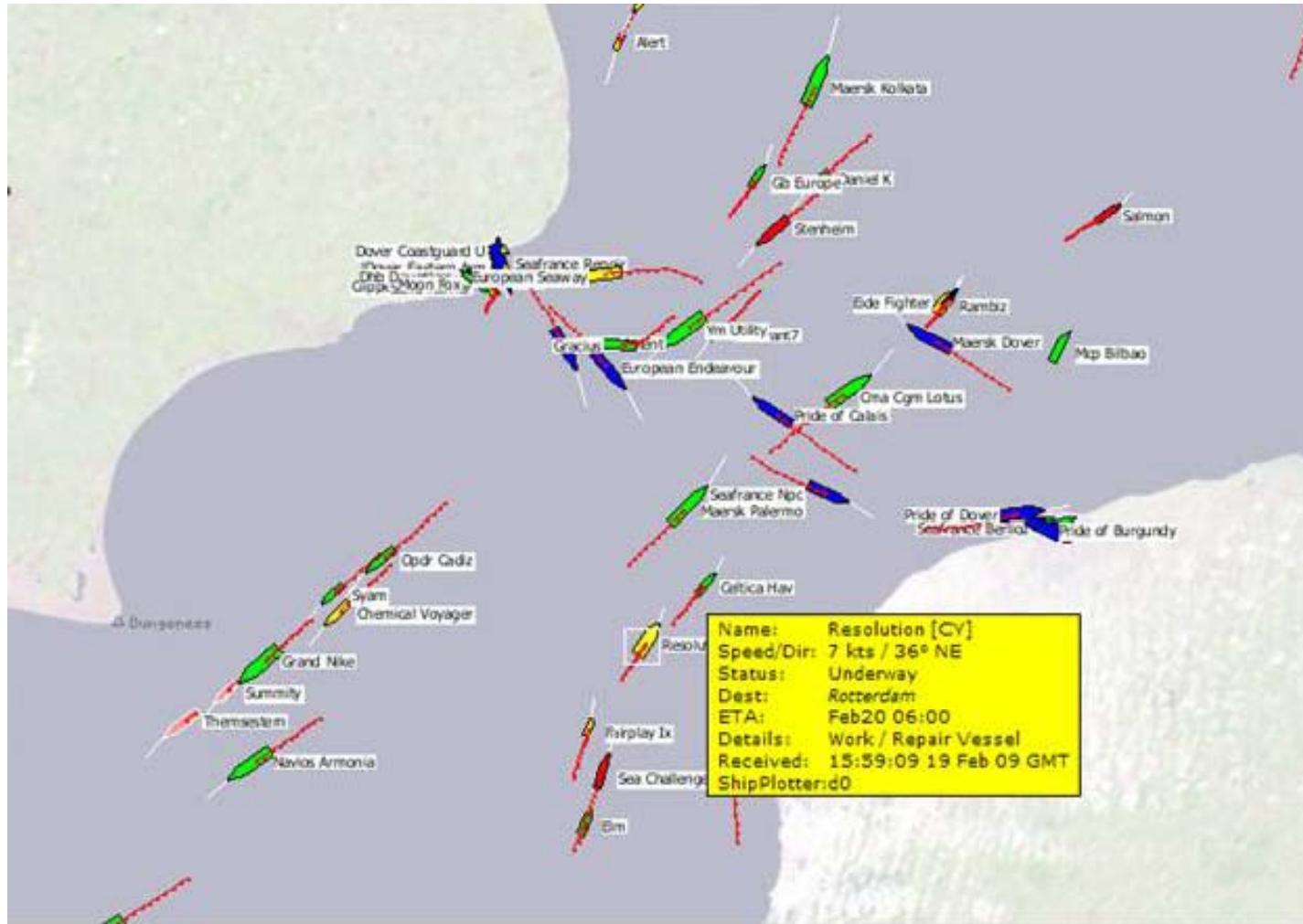
Must have ADS-B (In) to be able to improve cockpit situational awareness with a CDTI.

UAT on 978 MHz is designed for General Aviation below FL 240.

UAT = Universal Access Transceiver



AIS picture in the English Channel





Summary



- The high cost of aircraft integrations could make future aircraft upgrades unaffordable
- The dynamic changes in wireless connectivity can not be supported with platform unique integrations
- CATNIP is one way to keep Naval aviation relevant



BACKUP



Aviation Capability Integration Systems Team (ACIST)



ACIST: a proven model for efficiently fielding integrated capabilities

Aviation
Capability
Integration
Systems
Team

Installing the Structural Foundation for the Future

