



....Airborne Internet.... Applications Abound !

A Presentation to the ICNS Conference



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Main Topics for Today

- 1. Describe Airborne Internet and the Collaborative Information Environment**
- 2. Describe some potential applications that could use network connectivity in aviation**
- 3. Let your imagination take it from here....**



Some things to think about.....

**“Most People’s Vision of the Future is a
More Efficient Past”**

Glen Hiemstra, Futurist

“Walking Backwards Into the Future”

Bo Redeborn, Eurocontrol, Director ATM



AIRBORNE INTERNET/Collaborative Information Environment

What IS this thing?

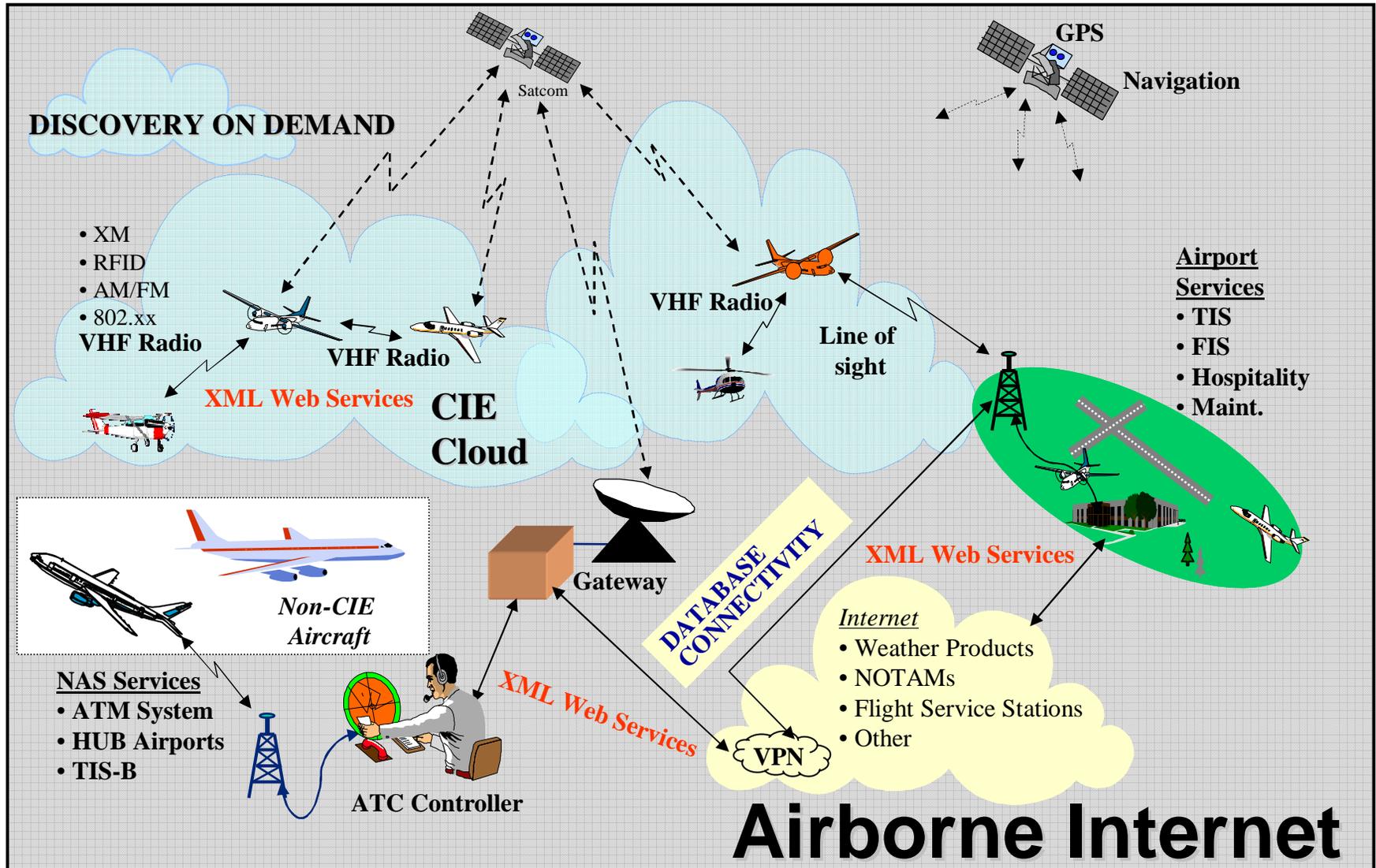
A concept that overlays network theory and principles into the transportation realm

***...Information CONNECTIVITY....A
scalable, general purpose, multi-
application data channel for people in
transit***

A.I. brings Network Enabled Operations to the aircraft



Collaborative Information Environment “Meet us in the cloud”



Original graphic courtesy of Computer Networks & Software, Inc.

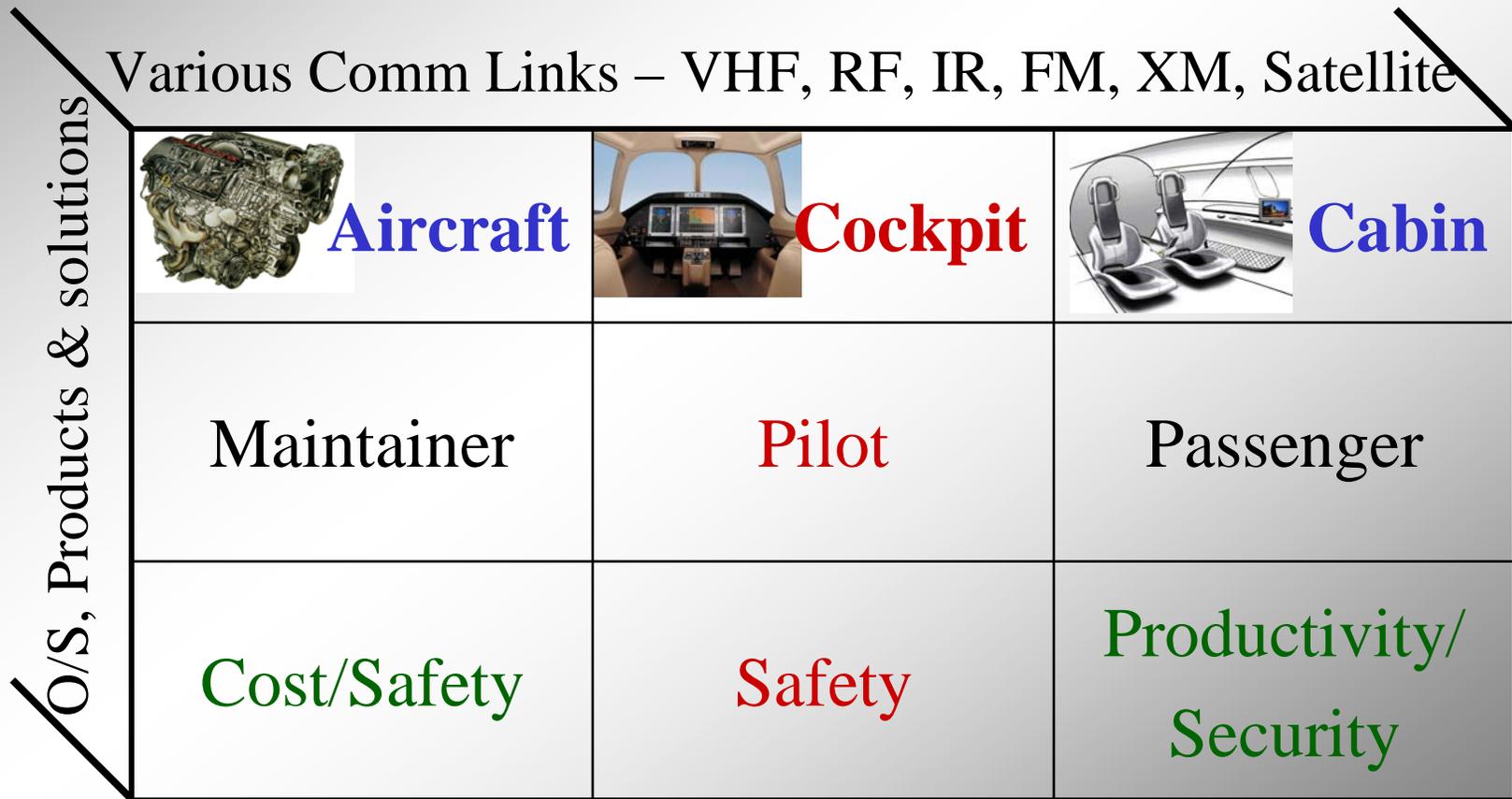


A.I. Extended Definition and Basic Principles

- **Network capability for all classes of aircraft: transport, biz jet, GA, helicopter**
- **Based upon open standards**
- **Utilize the same commercial technologies that the Internet is based on**
- **Connectivity at all altitudes, oceanic, Gulf of Mexico, potential world wide**
- **Must be reliable, available, persistent**



Functional Picture of the Collaborative Information Environment





Applications

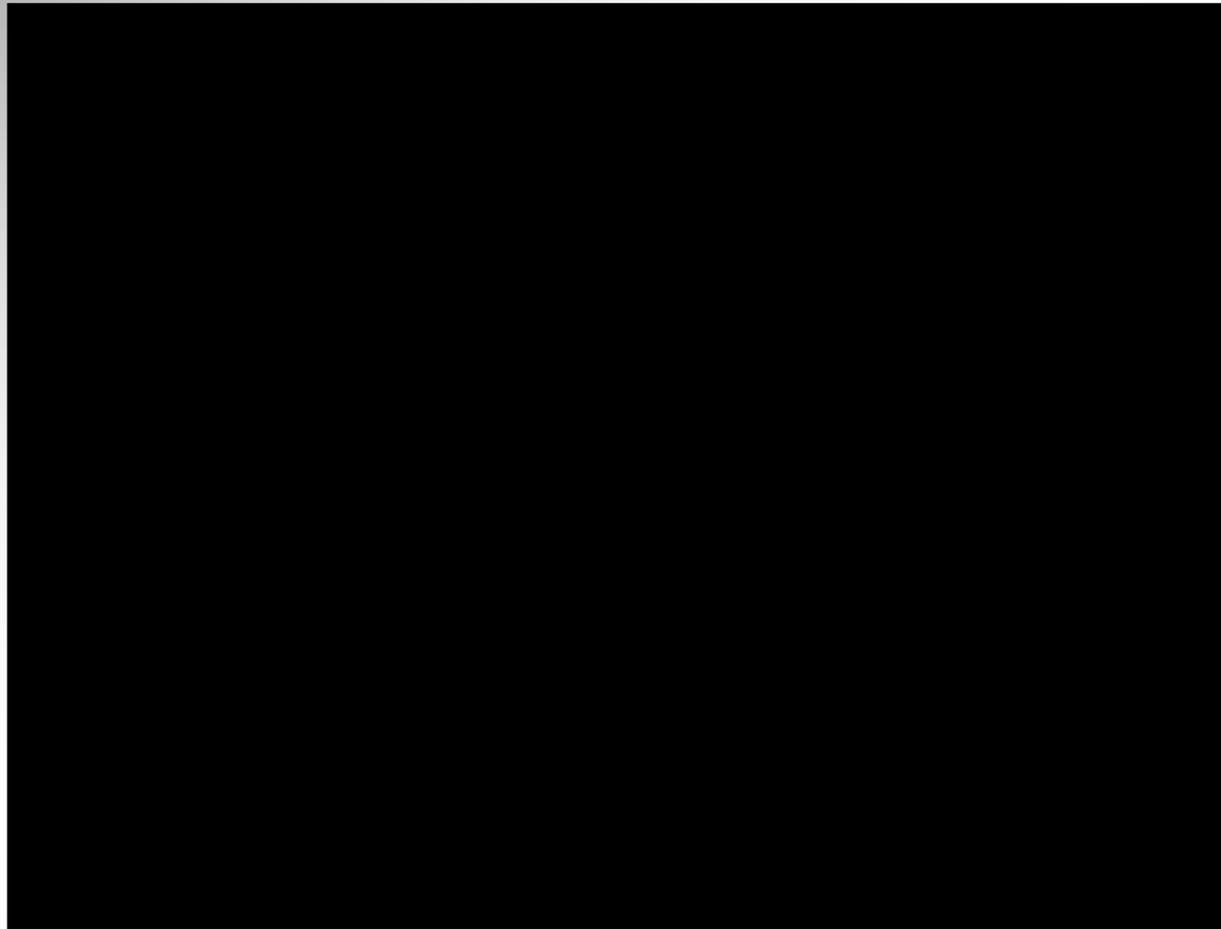
---- A.I. Enables Information Sharing ----

- **SWIM**
- **CPDLC**
- **Weather**
- **TAMDAR**
- **Oceanic Data Channel**
- **VoIP**
- **Black Box**
- **EFB**
- **SATS**
- **FAMs: video, voice**
- **XML aviation services**
- **Voice XML**
- **Surveillance Augmentation**

Future: applications not imagined today



SATS High Volume Operations (HVO)



PROCEDURE SELECT

DANVILLE KDAN
RWY 20 SATS LPV
JUBOD-JEDOR-KDAN
JEDOR ON MISSED
SATS UNICOM 123.05

SEQUENCE REQUEST

- 1 a4806f
- 2 NASA501 NC
- 3 NCSAT
- 4 SESATS

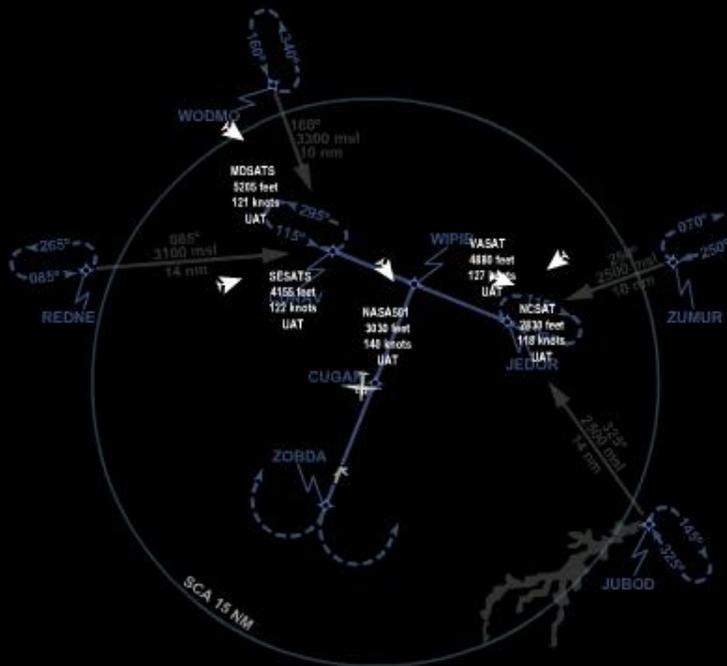
SURVEILLANCE CHECK

AMM SURVEILLANCE OK
AMM UAT UPLINK OK

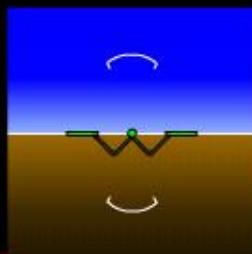
REQUEST PRIORITY

CANCEL SEQUENCE

DECLARE MISSED



127 KT GROUND 184° TRACK 1830 FT ALT MSL



- TRAFFIC STANDARD
- OWNERSHIP STANDARD
- MAP DAY NORMAL
- 80 40 20
- 10 5 TAXI

HIDE TIMERS

AMM MSG LOG
CONFIGURE
INFO-LINK
SENSOR
MAP-TRACK UP
MAP-NORTH UP

PROCEDURE SELECT

DANVILLE KDAN
RWY 20 SATS LPV
JUBOD-JEDOR-KDAN
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SURVEILLANCE CHECK

AMM SURVEILLANCE OK
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REQUEST PRIORITY

CANCEL SEQUENCE

DECLARE MISSED

AMM messages

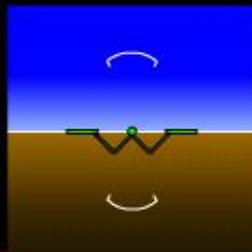
Surveillance acknowledgement
 Surveillance acknowledgement
 Surveillance acknowledgement
 14:57:26 KDAN: Stand by
 14:57:56 KDAN: Stand by
 14:58:20 KDAN: Acknowledged
 15:09:06 KDAN: Stand by
 15:09:36 KDAN: Stand by
 15:10:05 KDAN: Stand by
 15:10:07 KDAN: Start approach, no follow, initial approach fix JEDOR

Message Count

AMMFollow: 1
 AMMGndToAirAck: 1
 AMMCancellation: 1
 AMMStandby: 5
 AMMLanding: 3
 AMMSurveillance: 3
 AMMSurvlChk: 3
 AMMStatus: 242
 TISB-SV: 8179
 OwnshipPosition: 2508
 UATStatus: 2508

128 ^{KT} 185°
 GROUND TRACK

2080 ^{FT}
 ALT MSL



- TRAFFIC STANDARD
- OWNSHIP STANDARD
- MAP DAY NORMAL
- 80 40 20
- 10 5 TAXI

HIDE TIMERS

AMM MSG LOG
 CONFIGURE
 INFO-LINK
 SENSOR
 MAP-TRACK UP
 MAP-NORTH UP

r0.50



Electronic Flight Bags (general purpose PC in the cockpit)

- Initially to replace pilot charts, approach plates, and other flight related paper products
- Updating EFB documents (now being done at the gate)
- Numerous applications could be run on it



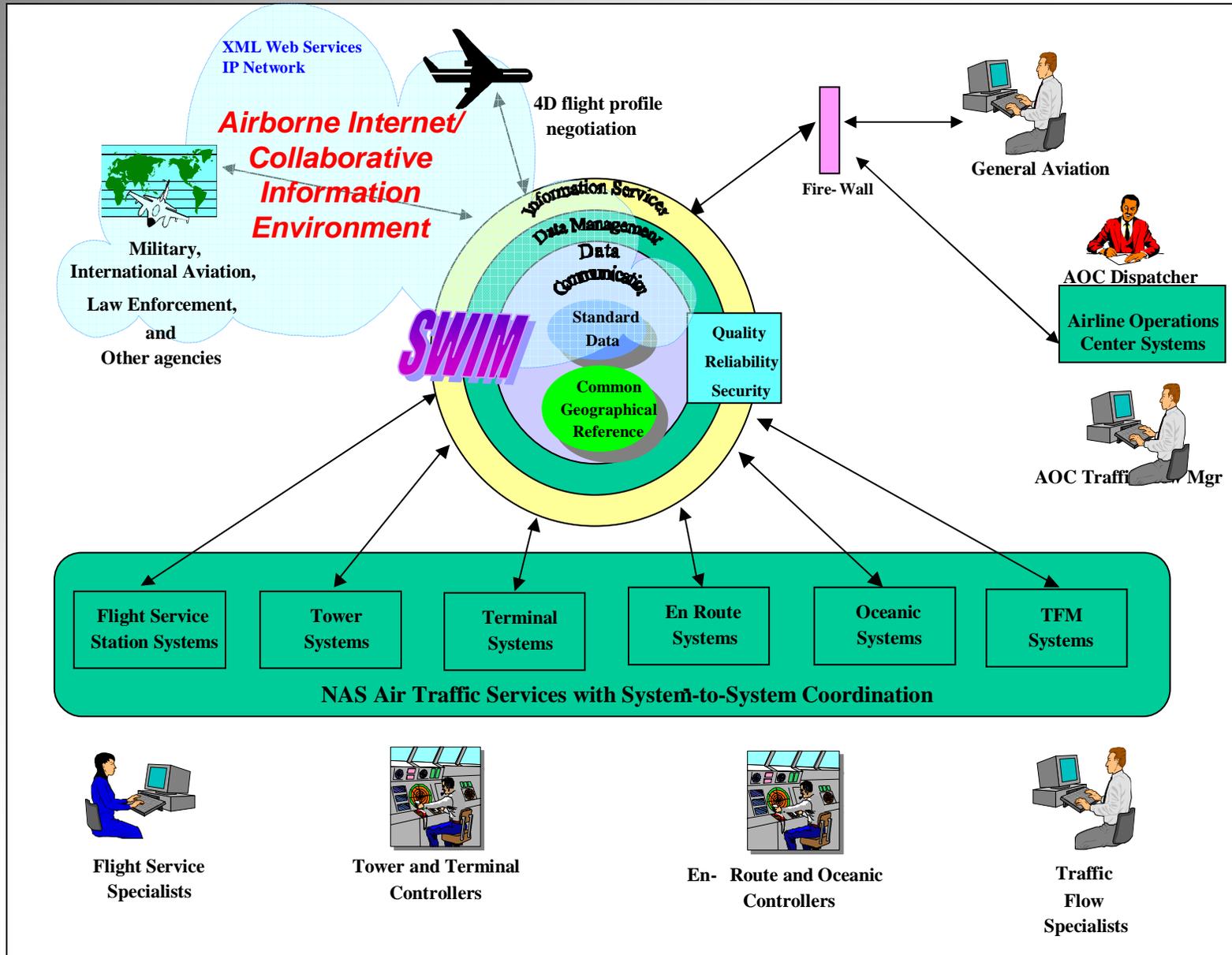
Aircraft Security

- **NGATS (Security Operations, 4.1):**
“**Law enforcement and other agencies responsible for the nation’s security must have access to a common integrated operating picture via secure data link, air-to-ground communication systems, and *airborne internet*.”**
- **Recognized as a potential to enhance information connectivity to the aircraft and to FAMS/LEOs**
- **Mentioned by Paul Polski (DHS) at ICNS 2004**
- **FAMs: need video, voice & data comm**



System Wide Information Management

- **Provide the secure airborne data platform for SWIM**
- **Augmentation to the surveillance data network**
- **Enabling better weather products to the aircraft**
- **Facilitating the airborne element of the Aeronautical Information Management (AIM) network**
- **Collaborative Decision-Making**





Voice Information Retrieval

..... eventually, pilots (information users) will be able to access data using *VOICE....on the Airborne Internet/CIE.*

- Voice Extensible Markup Language (VoiceXML) allows a user to interact with the network through voice-recognition technology by using a voice browser
- W3C (the WWW Consortium) is currently writing version 2.0 of VoiceXML standard
 - Editors are from PipeBeach, Nuance Communications, Speechworks International, Lucent, Motorola, IBM, and Tellme Networks



Weather

- Better weather to the flight deck is always desired
- Network enabled aircraft opens up many more potential weather sources (ie choices)
- TAMDAR



Other Applications....

- Shared Situational Awareness: Flight Object design goal is for flight deck to have same info as ATC
- Voice over IP: private, directed “telephone” calls
- Black Box: real time data downloading
- Telemedicine: remote emergency medical assistance
- Passenger services: email, web browse, VPN
- Aircraft Maintenance: real time monitoring, advance parts replacement
- CPDLC ? Operational costs contributed to kill it
- Oceanic, Gulf of Mexico Data Channel: serious comm deficiency over the water, **surveillance augmentation**



FAA Tech Center

Airborne Internet Research Lab

- Integration to TC NAS labs:
ATC, CNS, Simulations, Security
- Six T.C. Aircraft for flight tests
(7th next year)
- Application research & development
 - **SWIM**, CPDLC, etc.
 - Information Sharing
 - **Surveillance Augmentation**
 - XML aviation services
 - VoIP, “packet” voice
 - FAMS: video, voice
 - Black Box real time data
 - Weather (**sensors**/apps)
 - EFB
 - InfoSec
 - Data Compression
 - IP Version 6





Some things to take with you.....

**"Man who say it cannot be done
should not interrupt man doing it."**

-- Old Chinese Proverb

**"To invent, you need a good
imagination and a pile of junk"**

-- Thomas Alva Edison (1847-1931)

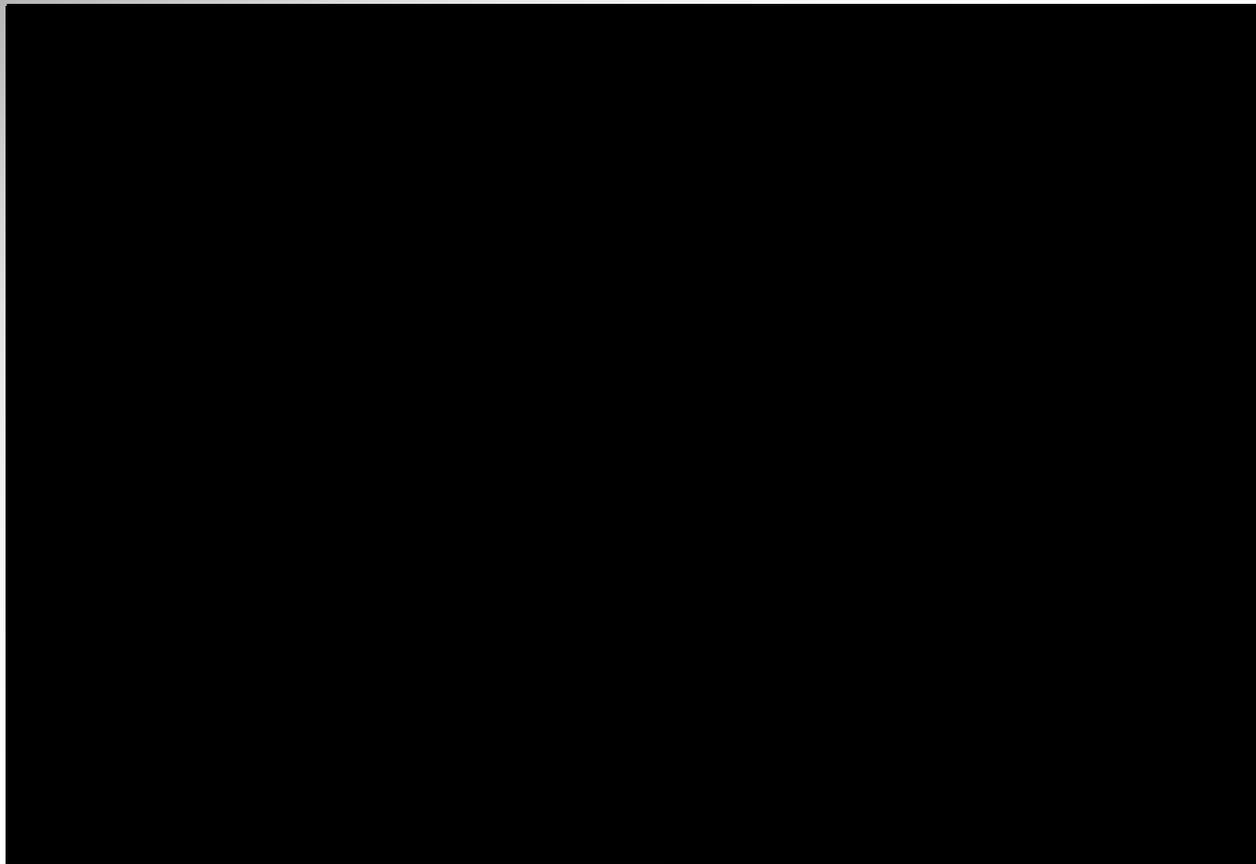


Applications and Airborne Internet

***Let your imagination take it
from here !***



New Concepts In Aviation





Network In the Sky

Every aircraft is a network node

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<http://www.AirborneInternet.com>

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