Not Your Daddy’s Data Link

Musings on Datalink Communications

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By

James Branstetter

FAA SATS Program
NASA Langley Research Center
Hampton, Virginia
Keen Eye for a Straight Proposal
(Next Gen Data Link)

Reassess missions & goals of current programs

Integrate new services & ideas

Make business case for operable system
(consolidate/near-term/future systems)

“Supplemental” Datalink Service (SDS)

Multi-Mode DataLink Radio
So many datalinks …
… so little funding!!!

FAA programs under economic scrutiny

– CPDLC: Still a good idea
– NEXCOM: Digital imperative/Long deployment
– LAAS: Done in by economic times
– ADS-B: Next for the axe?
Brave New World

Security Issues

– new national goal after 9-11
– flight deck video (real-time)
– Secure flight tracking (non-defeatable)
– Independent and secure communications (air marshal & TSA personnel)
Time marches on!

Efficiency & Economy of operations
  – FAA & Airlines – controller/pilot workload

New service at small airports and in non-radar airspace
  – General Aviation (SATS) – Cockpit centric ATM, Self Separation

Maintenance operations
  – Downlink aircraft service data

Ground operations
  – Aircraft & Ground vehicle – surface movement coordination
**Through the Looking Glass**

**Combine program attributes** (synergy)
- Meet multiple agency/community requirements economically
- Provide stepwise, integrated system to serve basic needs
- Design secure, more robust system

**Develop a long-range plan**
- Boeing & Inmarsat quasi-working global ATC
- FAA’s dime ran out with NEXCOM

**Look for partnering opportunities**
Dollars & Sense Cooking

Business case needed for individual and agency investment
Safety and security need only economic footing
TSA/DHS interests may become major driver of technology – *not* the market
SATS innovative requirements may wag the dog
Economics 101

Look at big picture
  – Smaller airlines + lower cost = reduced AIP funding
  – Pay for service around the corner; handwriting

FAA: Coordinate & Capitalize on existing programs

Aviation community: Look for new sources of funding
The Missing Link(s)

VHF services will NOT provide “wide-band” communications environment

NEXCOM (as currently cast) not well understood
- Will NOT extend communications coverage to additional airspace
- Poised to provide relief “voice” capacity for overcrowded enroute sectors and terminal areas
- Long wait for data service

UAT does not offer an addressable service

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Straight Shooting

Reformat NEXCOM program for near-term services
  – Reassess (optimize) VDL modes (-2, -3, -4)
  – Deploy at SATS airports enabling new services
  – Simultaneously provide enroute CPDLC service

Develop long-range plan encompassing all needs
  – “Supplemental Datalink Service”
  – Support with “fast-track” R&D program

Plan interoperable systems & services
All is not lost

CPDLC investments:
- Capitalize on infrastructure developed for MIA trials
- Continue development of controller interfaces and network infrastructure

NEXCOM investments:
- Deploy (limited) VDL “data-early” service (forget digital voice)
- Network infrastructure being designed (Harris & ??)
- Continue ground radio procurement (providing basic infrastructure)
- Prototype avionics procurement (Rockwell, Avidyne)
A Keen “Aye” for service  
( aka Supplemental Datalink System )

Provide enhanced capability for all aircraft
  – Wideband
  – Secure
  – Addressable

Enable new services in all airspace/for all users
  – Untowered airports
  – Uncontrolled airspace
  – Enroute

Acknowledge roadblocks not heretofore considered
  – NEXCOM incapable of wideband service
  – UAT not addressable
Wide-bandwidth capability – to handle new security needs and pilot service applications
  – Data
  – Video
  – Voice (VoIP)

Scaleable channel capacity to meet requirements of various operating environments
  – Terminal areas/Major airports – supplement existing
  – Untowered airports – will be “primary” means of CNS

Secure and robust systems to assure integrity

Open standards (TCP/IP)
Terms of Endearment
Back to the Future

Investigate RF Spectrum reclamation/reuse
  – “Alternative Comm Spectrum Study” by Ohio U. AEC
  – “Overlay” service on existing frequencies
  – C-band (abandoned MLS spectrum; “owned” resource)

Employ state-of-the-art modulation schemes
  – Future-generation cellular/WAN techniques
  – Spread-spectrum communications techniques

Probe Research by NASA, DoD
“C-band” – an extinct Dodo bird – not!

- Wide swath of spectrum available allowing wideband comm design
- “Shared” spectrum allocation allows AOC/APC communications to coexist
- Clean sheet afforded for design considerations (modulation scheme & channel plan)
- No haggling, we “own” the frequency band
Who’s on First

National imperative to save MLS frequency band from jaws of 5-G/WAN (next WRC)
SATSLab flight tests at 5.8 Ghz (802.11a)
Europeans conducting leading research
Inmarsat L/C-band satellite launch
R&D opportunities abound for prototype avionics
  – RF power generation onboard in small packages
  – High-gain antenna design (especially for small aircraft)
Where’s the Beef?

*Airborne Internet* – the way, the truth, & light

Killer apps designed – sans “implemented”

connectivity

SATS & partners – avenue for experiment

Avant-guard research efforts (FAATC lab)

Opportunity for collaboration (AICG, NASA, DoD)
Count the Players

NEXCOM program office
  – Early deployment of a trial VDL-3 “data only” service

TSA/DHS involvement
  – Invite participation

SATS research partners
  – infrastructure to conduct proof-of-concept

FAA, NASA, DoD
  – Focused R&D initiatives
The Future Is NOW!

Airborne Internet Collaboration Group
- Multifaceted group – sounding board for aviation community
- Create new aviation standard for A.I.
- Forum for expanded flight safety interests

SATS
- Support “self-controlled airspace” philosophy
- R&D expertise among members

Identify resources for funding prototype activities

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SBIR, STTR programs (FAA and NASA)  
Centers of Excellence/Joint Univ Program  
NASA directed programs (GRC)  
  – NextNAS, ATAS  
DoD programs  
  – Joint Tactical Radio System  
  – Global Information Grid
Piece de Resistance
(Multi-Mode Data-Link Radio)

Opportunity to combine best aspects of:
- VDL -2, -3, -4 to provide data-only services
- 8.33 analog – stopgap voice problem mitigation
- SDS deployed on wide area basis (? C-band)
- ADS-B – supportable with new system (900 M)

Need to make as cheaply as possible so all can “buy in” – and large scale benefits accrue
Simon says – err, the “Fab-5” say:

Time ripe to revisit & recast multiple programs
Integrate security & new service applications
Make the business case
Focus R&D efforts
  – SDS (wideband)
  – MMDLR
Capitalize on collaborative R&D
Th-th-th-that’s All! – Folks

Thank you for listening
Comments invited
Jim Branstetter 757-864-6396
j.r.branstetter@larc.nasa.gov
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