AirCell Presentation to the Federal Communications Commission

A Case for Competitive Access and Broadband Applications within the Air-To-Ground Spectrum

October 29, 2004
FCC Docket 03-103

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KEY POINTS

- **Several factors led to the market failure of past ATG providers, but not multiple service providers**
- **The technical solutions recommended by AirCell and Boeing allow two terrestrial providers, with no penalties or impediments to full broadband capability, and can be simply implemented**
- **Airlines and passengers want cell phones and Internet access onboard**
- **Competition important to airlines and passengers**
- **No viable alternatives to 800 MHz ATG Band**
- **Licensing scheme must accommodate unique market**

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What happened to the ATG Market?

1979 – 1990 (Airfone Experimental License)
- Infancy of wireless communications
- Unrealistic usage projections – little market data
- High cost custom built hardware
- Only 4 MHz -- 6 KHz channels for efficiency
- Sweet deals needed to entice airlines to offer service – free hardware, installation and share of gross revenue

1990 – 2003 (Allocation made – 6 licenses granted)
- Airfone controlled 100% of market
- Only three licensees built systems
- Airlines expected even sweeter deals to switch from Airfone to new entrants
- Equipment custom built and very expensive
- Installation costly, equipment intrusive and heavy

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What happened to the ATG Market?

1990 – 2003 (Cont.)

Bottom line: Cost to passenger = $8 for the first minute

In the meantime….
Proliferation of inexpensive cell phones & laptops
Cell phone charges fall to pennies per minute
Cell phone usage allowed while aircraft on ground
Inability of current technology to support high-speed data or meet passenger Internet needs
It wasn't multiple competitors that led to market failure, it was poor timing and bad business decisions
Airfone has had a monopoly for several years and its business is still a failure

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New AirCell/Boeing ATG Proposal

- **AirCell and Boeing have converged on a common approach for ATG broadband**
  - Responsive to airline desires for broadband and competition
  - Full broadband capability on flexible, shared basis
  - Protection for Airfone legacy service and base stations
- **AirCell and Boeing agree that AirCell's proposal promotes the NPRM's call for innovation, spectrum-efficiency and competition**
- **Proposal builds on prior AirCell innovation and success in FCC-supported spectrum re-use**
  - Opened critical safety and passenger sectors un-served by Airfone
  - Dramatically reduced equipment and service costs to General Aviation
  - ATG is natural home for AirCell customer migration to broadband

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AirCell Proposal: Summary

- **Offers true BROADBAND competition**
  - Each system/operator is isolated from the others
    - **Broadband data rates reduced by less than 1% due to inter-system interference**
    - **Less than 1% probability for SINR degradation of >2dB**
  - Each operator can offer the same broadband rate to the aircraft and seat as the "monopoly" / single operator case
  - Airlines and passengers benefit from ATG competition
- **"Off-the-shelf" technology used**
- **Full service all the way to the ground (deck-to-deck)**
- **Simple rules for spectrum sharing**

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Broadband Network Costs & Transition Plan

- **AirCell, Boeing, and Airfone propose the same technology – CDMA**
  - Equipment costs are the same whether there are 1 or 2 operators
  - No special base station or aircraft antennas required

- **Incumbent network transition**
  - Airfone can keep all of its current sites for old & new system
  - Transition bandwidth for incumbent under the AirCell proposal is same as in the "broadband monopoly" scenario

- **Airfone needs only a fraction of 4 MHz for transition**
  - Low utilization of 3900 calls/day* could be supported by limited channels and small bandwidth

* Calculation based on Airfone having 1700 commercial aircraft equipped, with 2.3 calls/day/aircraft – as indicated by Airfone President's statements to the NY Times 10-10-04, Source (1)

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AirCell Two Carrier Scenario - XP

- **Utilizes cross-polarization to provide isolation between carriers**
  - AirCell tests and operational experience show 12-15 dB (or more) isolation between horizontally polarized and vertically polarized systems
  - Naval radar not a concern (no reverse banding)
- **Utilizes frequency offset isolation once legacy narrowband system is discontinued**
  - Provides additional isolation between the two systems
- **Isolation sufficient to allow two system to operate with virtually no intersystem impacts**
  - both broadband
  - both deck-to-deck

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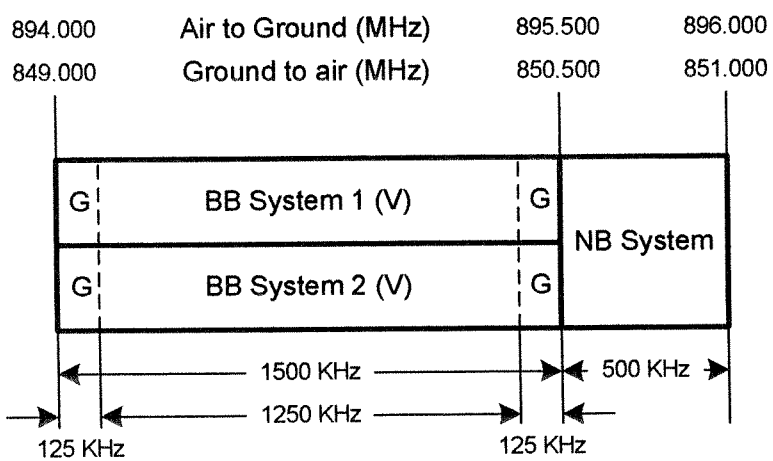
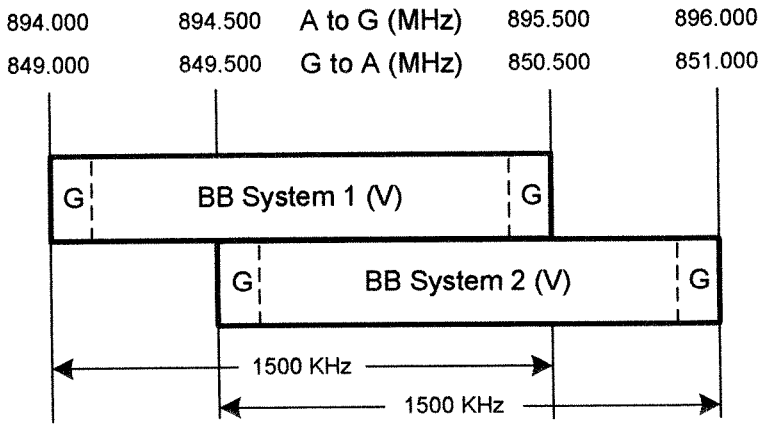
Spectrum Plan



G = Guardband BB = Broadband NB = Narrowband

Initial plan, with narrowband system still in operation



G = Guardband BB = Broadband NB = Narrowband

Final plan, after narrowband system operation discontinued

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Rule requirements

- **Sites serving same airspace located within 2 miles of each other at airports, 5 miles for cross country**
  - Licensees can leverage existing reference site list to minimize any issues related to agreeing on site locations
  - Airfone can keep all current sites
  - Sites can be moved or added by mutual agreement
- **Carriers must maintain similar coverage from nearby sites**
  - Similar antennas and transmit powers
  - 20 dB discrimination on antennas from 15° to 90°
- **Carriers have option to build/not build any particular site**
  - Transmitters control potential for near-far interference from low altitude aircraft
  - Cross country split sites don't require nearby site from other system

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FCC Recently Confirmed that Spectrum Sharing "Should be Implemented, and Improved, Wherever Possible"

- **The July 16, 2004 *Big LEO Order* (FCC 04-134) Implemented Sharing Among MSS Operators in a 3 MHz Portion of L-Band**
  - "Sharing this spectrum should promote spectral efficiency by increasing the number of MSS licensees that will use this spectrum, particularly at a time when the demand for spectrum has increased. In fact, we believe that promoting efficient spectrum use through sharing spectrum is consistent with our overall spectrum policy." (para. 45)
  - Requiring "spectrum users to share is consistent with the" Spectrum Policy Task Force Report. (fn. 131)
  - Sharing "would be more beneficial than granting MSS operators exclusive access." (para. 47)

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Licensing / Competitive Bidding Rules

- **Two Licenses Needed to Ensure Competition**
  - Single license does not address the single provider concern noted in the NPRM
  - Without competition, the needs of smaller air carriers and general aviation may be ignored
  - To be effective, rules must prevent licenses from being acquired by the same provider

- **Bidding Credits Should Be Available, Consistent with Precedent**
  - 15% for bidders under $40 million in revenue; 25% for bidders under $15 million in revenue (47 C.F.R. 1.2110(f)(2))
  - Same credits as provided in the recent nationwide auction of 1670-75 MHz

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The Communications Act Requires the FCC to Promote Competition

- **If Auction Authority Is Used, the Commission Must Seek to Promote the Section 309(j)(3) Objectives of:**
  - The development and rapid deployment of new technologies, products and services for the benefit of the public . . .
  - Promoting economic opportunity and competition and ensuring that new and innovative technologies are readily accessible to the American people by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses . . .
  - Efficient and intensive use of the electromagnetic spectrum

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ATG Services Are CMRS Services, Subject to a "Heightened Scrutiny" on Competition

- "Congress established the promotion of competition as a fundamental goal of CMRS policy formulation and regulation." (*Ninth Competition Report* at para. 6)

- Section 332(c)(1)(C) requires the FCC to analyze and report annually:
  - whether there is effective ATG competition
  - whether any provider has a dominant share of the ATG market
  - whether additional ATG providers would likely enhance competition

- FCC stopped reporting on ATG after the *Second Competition Report*

- Section 332(c)(1)(C) establishes that promoting competition alone is a sufficient basis for a public interest finding

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The false premise ... *Satellite Solutions Offer A Competitive Alternative to Terrestrial Air-to-Ground Telecom*

Today's facts, including Airfone's strategy[2], clearly indicate that satellite solutions are not a competitive option

- No U.S. airline has installed satellite communications aboard its narrow-body domestic aircraft
- Satcom weight, drag and cost have only been defendable for transcontinental widebody aircraft
- Verizon Airfone today charges $4/min + $4 setup for a terrestrial ATG call, but needs to charge $10/min + $10 setup for an Inmarsat satcom call[3]
- Iridium & Globalstar – Low cost voice and narrow band data, not able to support broadband telecom features.

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Majority of U.S. carriers have elected to not provide Airfone or satellite passenger telecom services

Alaska Airlines
American Airlines
America West
ATA
AirTran
Frontier Airlines
Independence Air
JetBlue Airways
Northwest Airlines
Southwest Airlines

Plus all Regional Airlines with the exception of United Express and Midwest Express

- **More than 6,400 aircraft are un-served (~79% of the U.S. fleet)[7]**
- **Airlines need competitive offerings and have made that request known to the FCC**
- **Verizon Wireless customers pay $0.10 per minute with $10 Monthly fee or $0.69 without fee. Everyone else pays $4.00/minute, plus a $4.00 set-up charge**

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Even considering next generation solutions ...

- Using an ATG CDMA broadband terrestrial link, a passenger will pay less than $0.50/minute for a voice call and the aircraft system will cost less than $100K installed.

Whereas ...

- The newest satellite offerings* will charge $2-7/min**, with equipment costs ranging from $500K to well over $1 million**

*Inmarsat IV, Connexion by Boeing, Rockwell-Collins eXchange, ARINC/Telenor, ARINC SkyLink

**Sources (4,5,6)

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Market Potential – Inflight Cellular Services
(as compared with Terrestrial Cellular Market)

	U.S Terrestrial Cellular Market	U.S. Inflight Comm Market (at 2004 traffic)
Total Available Market / Potential Users	232 million [4] (U.S. pop. ages 15-up)	600 million [1] (U.S. enplanements)
Subscribers / Enplanements Served	160 million [2]	38 million (est. 80% fleet pen. & 8% uptake)
Customer Access, Hours per Year	934 billion (16 hours per day x 365)	85 million (2.2 hours per flight)
Minutes of Use	813 billion [2]	900 million [3] (est. voice, SMS & data sessions)
Annual Revenue	$87.6 billion [2]	$510 million [3] (equipment & services)
Total U.S. Network, sites deployed	163,000 [2]	480 (four providers)

(1) FAA forecast, 7/15/04 (2) CTIA news release 3/22/04 (3) AirCell estimate
(4) CIA Population Fact Book

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Expected Passenger Features

Service available to passengers whenever FAA and FCC approve use

- **FAA safety concerns will limit primary use to above 10,000 feet**

Passengers using the system will have access to the same features typically available when roaming:

- **Make and receive voice calls**
- **Call waiting, 3-way calls**
- **Send and receive SMS and data**
- **Access to "home system" voicemail**
- **Cabin like WiFi "hotspot" internet access**

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Airline Expectations

What the Airlines Expect

Simple and lightweight system (wireless cabin)

Broadband from Passenger to Ground – full voice, email/data and Internet capabilities

Attractive business model: low cost system, high value service, with high revenue from passenger use

Competitive offerings from multiple vendors, with ...

Shorter term contracts and flexibility to embrace rapidly changing technologies (driven by consumer needs)

Multiple airlines have asked for competition

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Airfone / Telcordia Misstatements

- **Airfone and Telcordia presentations misstate the facts about AirCell's proposals. The truth is:**
  - No performance penalty for two systems
  - AirCell is proposing CDMA, which will provide true broadband service
  - AirCell proposal will provide continuous full broadband coverage to the ground
  - Ample flexibility to innovate and evolve in the future with minor coordination requirements
  - AirCell plan does not impose any special costs on broadband ATG providers and allows use of off-the-shelf technology

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Space Data Shortcomings

- Cell phones and WiFi devices do not operate in the ATG spectrum
- Even if expanded frequency range could be made available, cell phones and WiFi devices do not put out sufficient power through the fuselage to reach balloons that can be 12-20 miles in altitude but 100+ miles away from the aircraft
- High power levels from user devices will be virtually impossible to certify with the FAA due to interference with avionics
- With frequency re-use needed, 1 MHz insufficient to meet ATG market demands
- Maintaining an ever-present fleet of balloons properly spaced across the nation is at best costly and at worst impossible

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Consequences of Airfone Proposal

- Exclusive access and pricing for Verizon Wireless customers ($0.10 or $0.69 a minute for Verizon customers -- $4.00/minute, plus a $4.00 set-up charge for everyone else)
- No ATG partnership opportunity for other wireless carriers
- May limit service options to smaller airlines and general aviation
- Limits airline ability to negotiate best economic deal for itself and its passengers
- Higher consumer prices
- Only competition drives innovation and brings new services to the consumer
- Inefficient use of the only spectrum available for ATG

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Conclusions ...

- AirCell and Boeing have converged on a common approach for broadband ATG
- Proposal supports competition criteria and NPRM requirements
- Offers ease of transition from legacy services to broadband
- Meets customer and market demands for low cost broadband services

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Sources:

(1) ***Almost here: Cell phones at 37,000 feet*, Joe Sharkey, The New York Times, October 10, 2004**

"William E. Pallone, the president of Verizon Airfone Inc., concedes that those seat-back Airfones are falling out of favor quickly as travelers become more accustomed to fancy technology on the ground. 'At one time, at prices comparable to where we are today, we had as many as 15 users per aircraft, six or seven times as much usage as we have today,' he said, suggesting that seat-back phones have become like airport pay phones: useful when you really need them."

(2) ***Broad Verizon*, Inflight Magazine, Autumn 2004**

"Airfone points out that most US air travel is domestic and regional and says it would be more economically served by a terrestrial infrastructure." Quoting Airfone's President ... "Pallone says that acquisition, installation and support costs will be significantly less than those of satellite systems."

(3) **United Airlines seatback magazine**

(4) ***Satcom Shakeout,* Fred George, as published in Business & Commercial Aviation, September 2004**

(5) ***The Activist Passenger*, Michael Mecham, Aviation Week & Space Technology, September 27, 2004**

(6) ***Taking the Connexion*, Inflight Magazine, Autumn 2004**

(7) **FAA data indicates 8,118 total U.S. commercial aircraft. Calculating 1,700 as Airfone-equipped, resulting in 6,418 or 79% un-served.**

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