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March 2, 2004

VIA ELECTRONIC FILING

Marlene H. Dortch
Federal Communications Commission
Office of the Secretary
445 12th Street, SW
Washington, DC 20554

Re: Notice of Ex Parte Presentation in Amendment of Part 22 of the Commission's Rules To Benefit the Consumers of Air-Ground Telecommunications Services; WT Docket No. 03-103

Dear Ms. Dortch:

On March 1, 2004, representatives of The Boeing Company ("Boeing") met with members of the Commission staff to address certain issues raised in the above-referenced proceeding. The participants in the meeting included: Sean Schwinn, Mike Delachapelle, Audrey Allison and Guy Christiansen of Boeing; Philip Malet of Steptoe & Johnson; Richard Arsenault, Jay Jackson, Kathy Harris and Moslem Sawez of the Wireless Telecommunications Bureau; and Julius Knapp, Thomas Derenge, Shameeka Hunt, Salomon Satche and Neal McNeil of the Office of Engineering and Technology. The issues discussed at the meeting are set forth in the attached presentation.

Any questions regarding this matter may be directed to the undersigned.

Respectfully submitted,

s/Carlos M. Nalda

Carlos M. Nalda
Counsel to The Boeing Company

Attachment
cc (w/ att.): Richard Arsenault
Jay Jackson
Kathy Harris
Moslem Sawez
Julius Knapp
Thomas Derenge
Shameeka Hunt
Salomon Satche
Neal McNeil

Boeing Proposal For ATG FNPRM

Presentation to Wireless Telecommunications Bureau

March 1, 2004

Overview

- Boeing comments in ATG NPRM expressed need for Further NPRM to resolve issues of ATG/NATS spectrum use and cellphone use on aircraft. Current record provides an inadequate basis for a decision.
- FCC has received further proposals regarding ATG/NATS spectrum use from Verizon Airfone and Aircell which provide for either one or two entrants in the ATG/NATS band.
- Boeing proposal would accommodate multiple providers and facilitate advanced services.
- Commission should proceed with Further NPRM to address the various proposals put forward on ATG/NATS spectrum use and cellphone use on aircraft.

Part I:

Boeing Proposal for Use of ATG/NATS Spectrum

Current Proposals for ATG/NATS Spectrum Use

- Verizon Airfone proposes that ATG/NATS band be re-segmented into two 1.25 MHz channels and allocated to a single user (Verizon Airfone).
- AirCell proposes a spectrum sharing approach in which the ATG/NATS band could be shared between 2 co-primary users (Verizon and AirCell), and no others.
- Boeing's proposal offers robust competition from multiple providers while ensuring development of advanced services to the flying public.
- Boeing believes customer demand for broadband aeronautical services makes it possible for 3-6 network service providers to profitably serve the aeronautical market.

Summary of Boeing Proposal

- Re-channel ATG Spectrum: Re-channeling the ATG/NATS band would allow use of higher data rate 3G cellular wireless waveforms.
- Use Smart Base Stations and Directional Antennas: A combination of both smart base station antennas and directional aeronautical antennas would make it possible for up to 6 service providers to share the ATG/NATS spectrum.
- Base Station Separation: Minimum separation distance for ATG towers would mitigate inter-system interference.
- Transition Period: Verizon Airfone's current services can be accommodated during a transition period. AirCell does not provide any service in the ATG/NATS band and should not be afforded any special incumbent status.

Proposed ATG Service Features

Intermediate gain antennas on aircraft and base stations

- Provides spatial isolation
- Enables spectral reuse
- Increases spectral capacity (more aircraft served in ATG bands)
- Uses affordable and established terrestrial base station technology

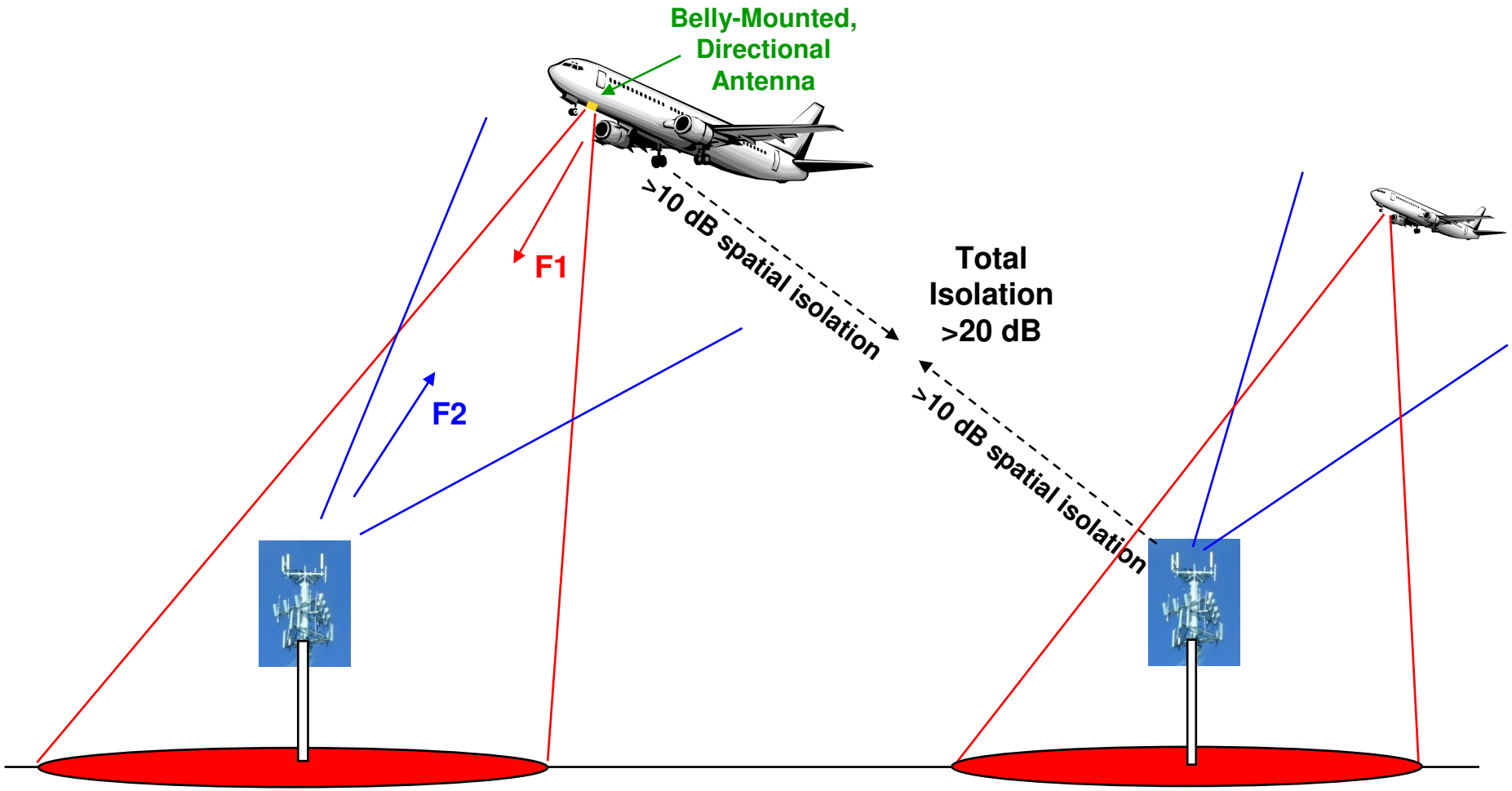
Use of any CDMA cellular standard having 1.25 MHz channels

- No need to require a particular 3G standard – there are many variants of CDMA2000
- Inter-system interference is not dependent on the particular standard

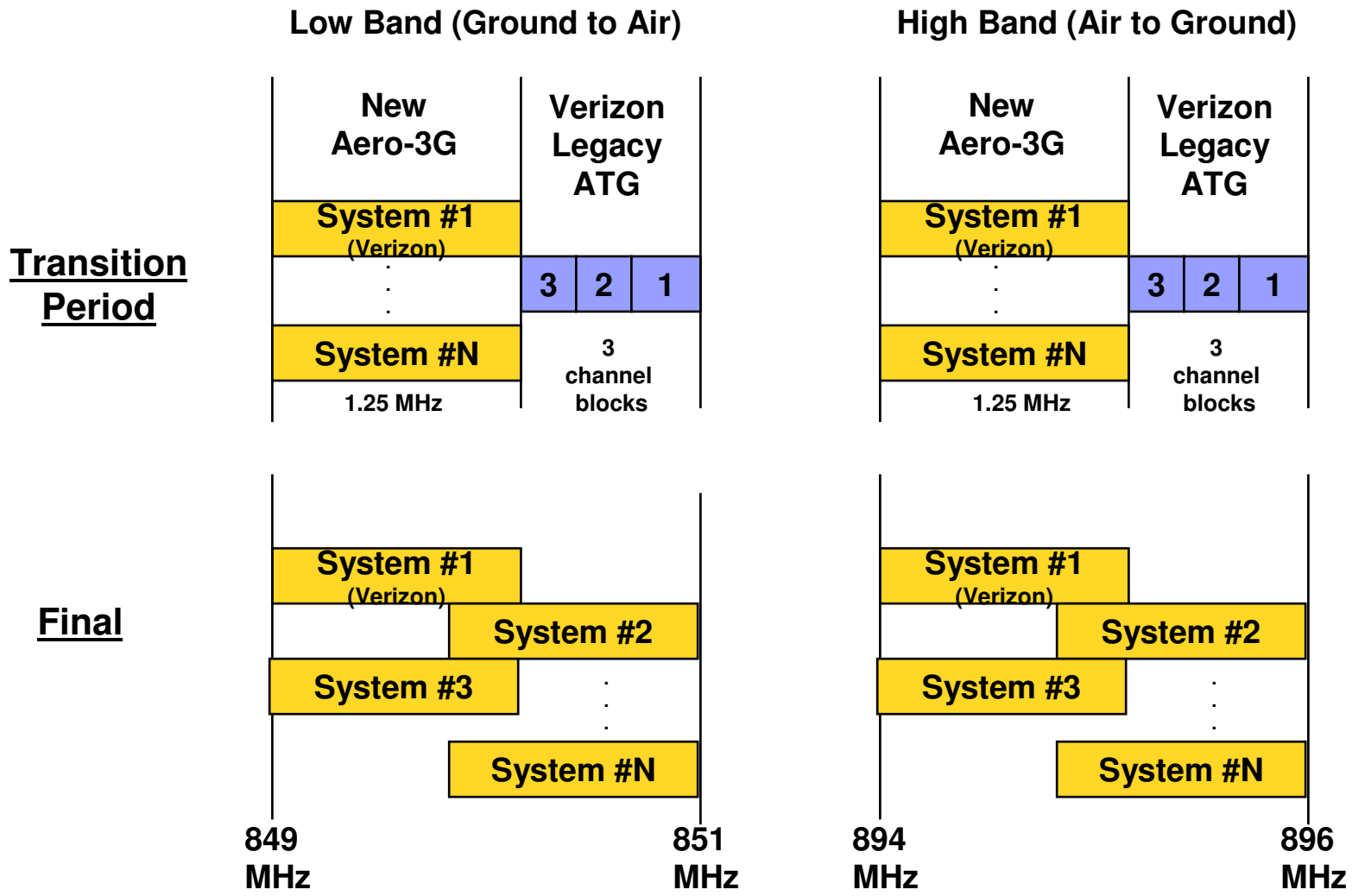
Handoff

- Soft handoff between base stations enabled by dual-beam aeronautical antennas

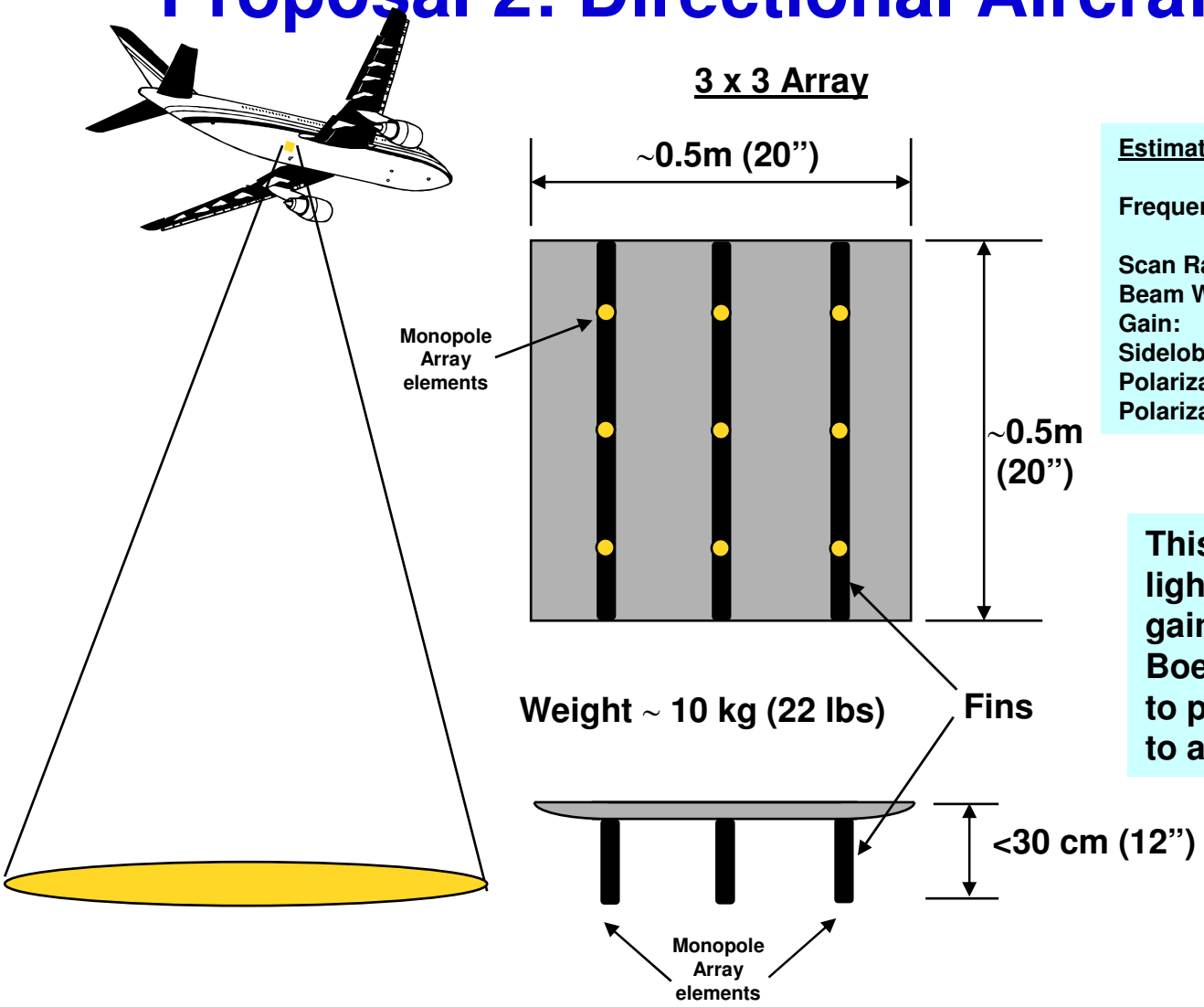
Proposed ATG Service Overview



Proposal 1: Rechannel ATG Spectrum



Proposal 2: Directional Aircraft Antenna



Estimated Performance

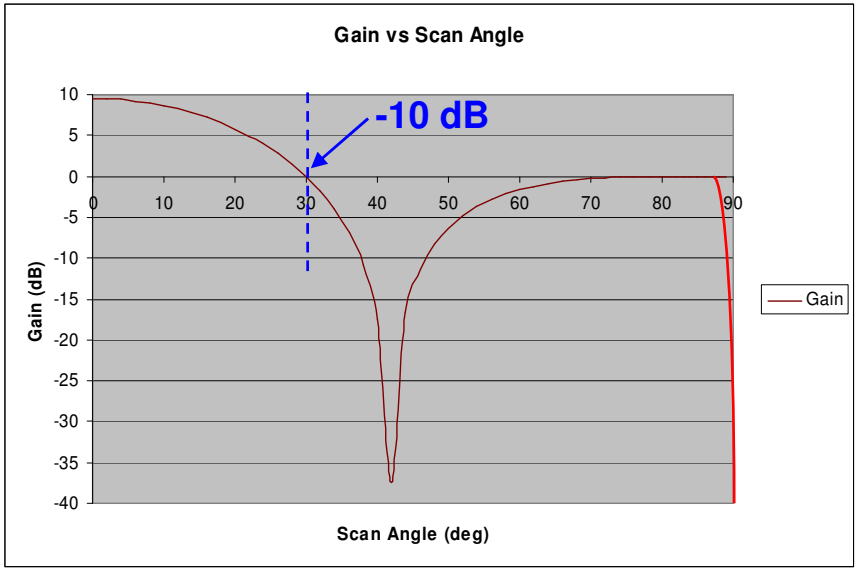
Frequency:	849-851 MHz RX 894-896 MHz TX
Scan Range:	0° – 90°
Beam Width (@-10 dB):	~ 60°
Gain:	~10 dB
Sidelobes:	< -10 dB
Polarization Isolation:	> 9 dB
Polarization:	Vertical

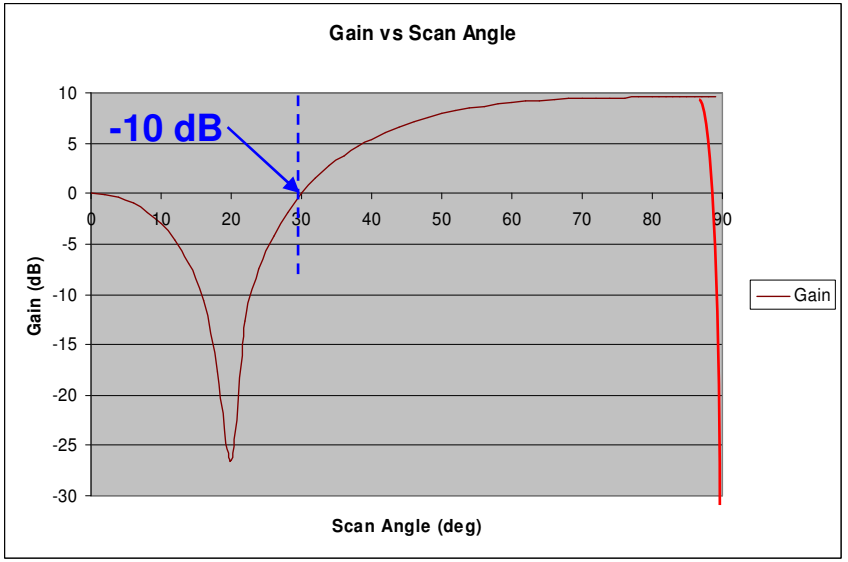
This antenna is much smaller, lighter and cheaper than high-gain Inmarsat or Connexion by Boeing satcom antennas used to provide broadband services to aircraft.

Boeing Proposal: Require aircraft to use directive antennas to minimize interference to/from adjacent towers.

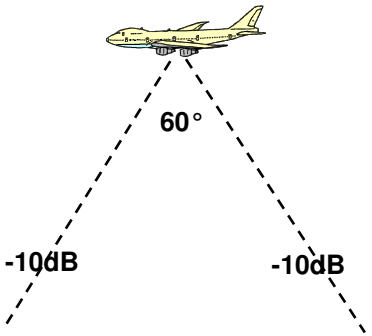
Airborne Antenna Gain Patterns

3x3 Phased Array with Isotropic Elements

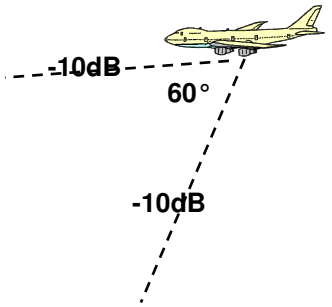




0° scan angle

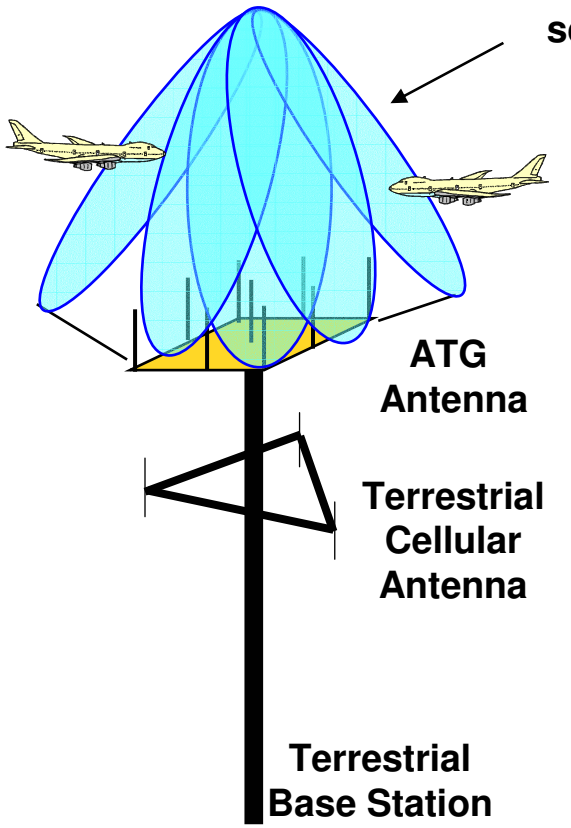


90° scan angle

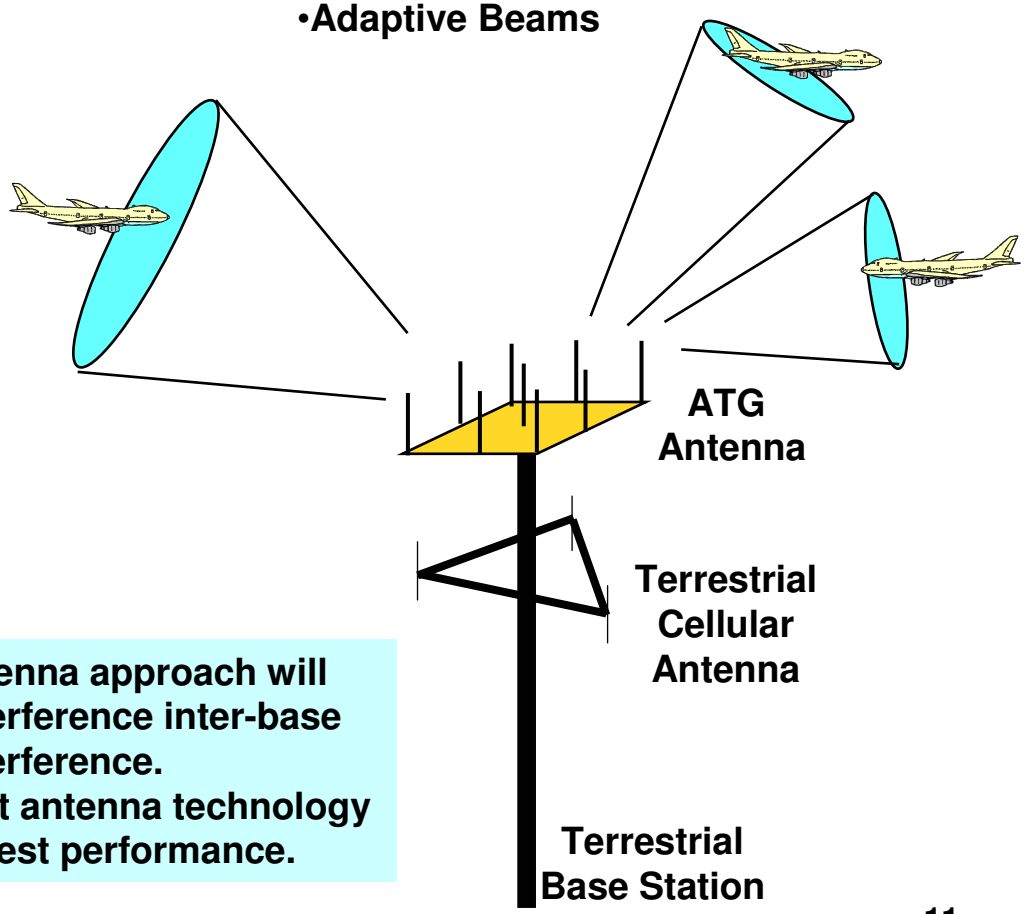


Proposal 3: Improved Base Station Antennas

Multi-Sectored Antennas
Fixed Staring Beams



Smart Antenna Technology
- One beam per aircraft
- Dynamically Steered
- Adaptive Beams



- Either antenna approach will reduce interference inter-base station interference.
- New smart antenna technology provides best performance.

Technology Feasibility

- Smart antenna base stations have been extensively deployed throughout the terrestrial cellular network.
- Over 10% of cellular base stations used smart antennas in 9/03 (see reference). The percentage is higher today.
- Verizon Wireless, the parent company of Verizon Airfone, has deployed smart base station antennas in their terrestrial network.
- Furthermore, Verizon Airfone received an FCC experimental license to test directional antennas on aircraft.
- ATG spectrum capacity estimates should assume use of the latest technology.
- Verizon Airfone's assertion that ATG spectrum could only support one system appears to be based on use of old technology.

Smart Antenna Technology Deployment

cellular -news

8/7/03

10% of base stations using smart antennas

Smart antenna technology is now deployed in one out of every ten base stations in the world, a significant fact for wireless operators seeking a proven technology to expand the capacity and performance of digital wireless networks, according to a new Visant Strategies study.

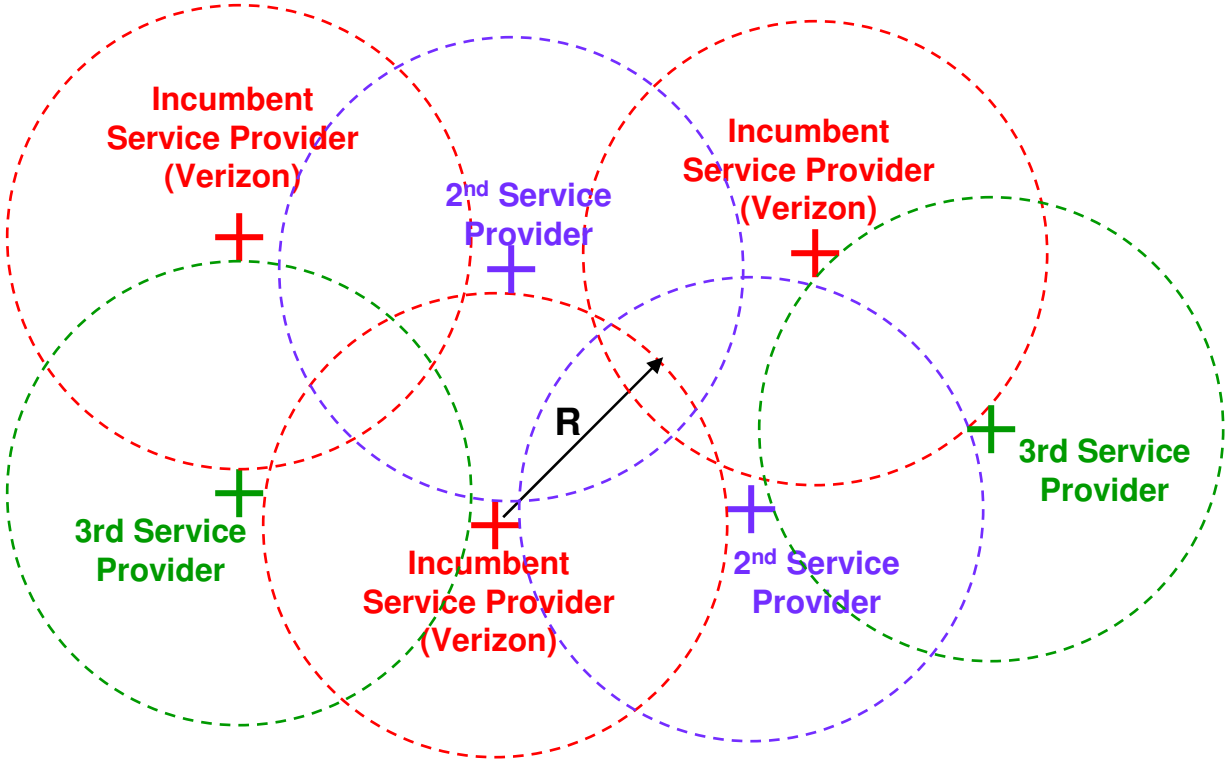
Smart antenna technology, which increases the performance and economics of wireless networks typically through the combination of multiple antennas and advanced signal processing, has become a product many base station manufacturers are now looking to incorporate into their mix, following years of the product being pushed by a number of technology innovators and vendors.

"Current market conditions, despite the challenges, suggest greater potential for the technology in the near term," said Visant Strategies Senior Analyst Andy Fuertes, the author of the study. "Established infrastructure vendors are now integrating smart antennas into their product as wireless operators exhaust conventional methods of increasing their network capacity," Fuertes said. "Operators are under pressure to improve profitability, and questions linger about moving to 2.5G or 3G in a lot of areas throughout the world, leaving many operators evaluating smart antenna technology."

Market challenges include the current deployments of smart antenna technology mainly enhancing the standard PHS, while the GSM and CDMA2000 markets, the largest in the world, remain untapped, the study finds.

The smart antenna systems market will reach US$1.6 billion in sales globally in 2008, according to the study, with some growth fueled by the improved economics smart antennas will provide to next-generation networks in Europe and broadband wireless access (BWA) networks worldwide.

Proposal 4: Base Station Separation



Require minimum offset distance, R, to adjacent cell towers
- •Based on worst case interference analyses

Base Station placement is first-come, first-served
- •Verizon Airfone's existing ATG base stations are the first
- •All additional base stations must comply with minimum offset distance to all existing base stations

Establish maximum EIRP requirements for earth stations and aeronautical terminals

Inter-Cell Interference Reduction

Interference is the dominant noise in a fully loaded CDMA system. Reduction of inter-cell interference leads to proportional increase in base station capacity.

Calculation of minimum reduction in inter-cell interference for Boeing proposal compared to Verizon Airfone's current approach (hemispheric coverage aero antenna, 3-segment base station antenna):

- **Verizon Airfone uses single element aero antenna, Boeing proposes 3x3-element antenna. Average inter-cell interference reduction = 10*log(3/1) = 4.8 dB due antenna directivity.**

- **Verizon Airfone uses 3-segment base station antenna, Boeing proposes at least 8-segments. Average inter-cell interference reduction = 10*log(8/3) = 4.3 dB**

- **Total inter-cell interference reduction = 9.1 dB (average)**

- **Required inter-cell interference reduction assuming 6 total systems share band = 10*log(6) = 7.8dB**

- **Margin is 9.1 – 7.8 = 1.3 dB**

Part II:

Overview of Results Of Picocell Testing

Pico Cell Testing

- Goal: Determine initial feasibility of Pico Cell operation on aircraft
  - Safety - RF interaction with avionics
  - Call Quality
- Boeing investigated the RF effects of cellular transmissions on aircraft avionics & other systems
  - Initial tests concentrated on actual GSM Pico Cells and handsets
  - Tests carried out in Boeing's EMI laboratories to establish compliance with DO-160 aircraft safety requirements
  - Boeing is involved in/leading the RTCA SC-202 Committee
- System level end-to-end call quality using simulated Satcom link
- Proposed installation of tested articles on experimental aircraft does not represent a hazard and can proceed
- Call quality using simulated Satcom link sufficient to proceed to next steps

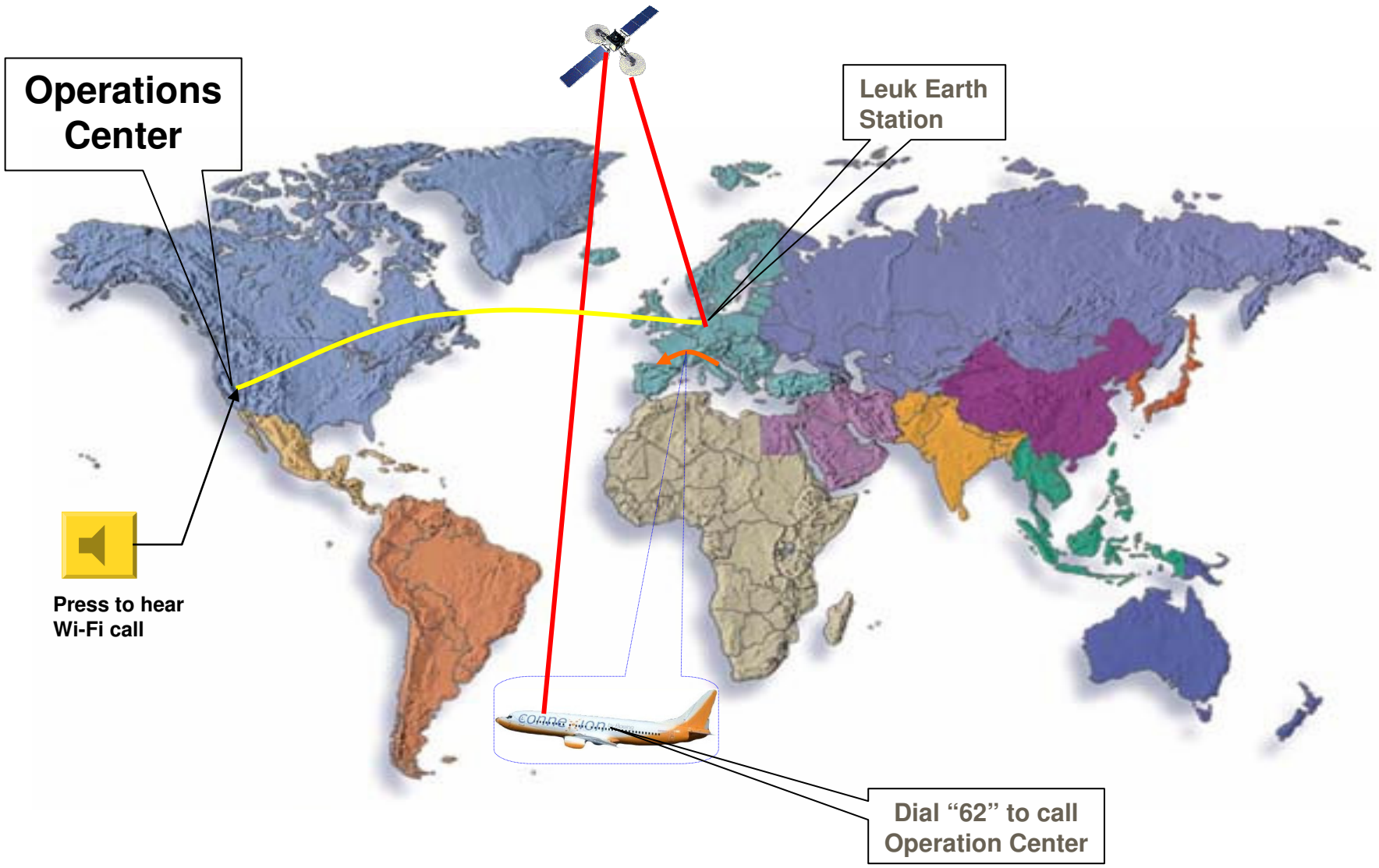
Next Steps

- Integrate with live ground based Satcom test network in Seattle WA
  - Refine design concepts based on above results
- Perform ground and flight testing to demonstrate that adequate reduction in carrier interference can be achieved using pico cells.
  - Finalize test plan
  - Procure equipment – including window treatment & installation
  - Obtain FCC experimental license
- RTCA targets recommendation release end of ’05, which implies availability based on market approval of cell phone use aboard aircraft in mid ’06.
- Boeing plans to be ready when the market is ready

Aircraft Voice Demonstrations

- Connexion One test aircraft demonstrated potential 802.11b IP based Wi-Fi enabled voice applications while touring Europe last month
  - Airline Crew Phone
    - Internal airline operations
    - Connects airlines directly to their “Operations Center”
- Call quality experienced was as good as terrestrial cellular calls in most cases
- Wired and Wireless IP phones provide interim step for dedicated applications much quicker than pico cells

Wi-Fi Phone Call To Operations Center



Conclusions

- Current record before the Commission warrants further consideration of ATG/NATS spectrum and cellphone use issues
- FNPRM would provide sound basis for considering proposals of Verizon Airfone, Aircell and Boeing
- Boeing proposal would accommodate multiple providers and advanced services with minimal technical requirements
- Decision on cellphone use should be deferred to allow consideration of further testing which may resolve outstanding interference concerns of wireless carriers