



## **AIRCELL BROADBAND SERVICE**

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**Technology Primer for Business Aviation • March 2007**



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On the heels of a major FCC auction victory and another record-smashing year in 2006, AirCell is hard at work on one of most revolutionary and useful innovations in modern airborne telecommunications history...AirCell broadband!

Unlike anything that's come before, AirCell broadband has been called "the link we've all been waiting for", bringing an exclusive, affordable high-speed data connection to aircraft equipped with the AirCell Axxess™ system.

When AirCell broadband becomes available in early 2008, you'll be able to surf the Internet, check e-mail, send attachments, and log into your corporate VPN using your own personal laptop or PDA. For those accustomed to expensive, slow, or non-existent connectivity in flight, AirCell broadband will truly change the way you fly.

As AirCell broadband development continues at a rapid pace, we're pleased to begin sharing early information about the exciting new service. Along with some behind-the-scenes philosophy and history leading up to today, we'll talk about how you can begin preparing your flight department to take advantage of it. We invite you to contact us if you'd like to be kept informed as more information becomes available.

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## **1. WHAT IS AIRCELL BROADBAND?**

Set for debut in early 2008, AirCell broadband is a new high-speed data connection that supports full-scale Internet surfing, e-mail and corporate VPN access in flight. Because it uses advanced air-to-ground technology, AirCell broadband will provide robust data rates at a fraction of the cost, weight, and complexity of any satellite-based technology available now or in the foreseeable future.

From an equipment perspective, AirCell broadband will be available as an optional, add-on link to the AirCell Axxess cabin system. If you already have AirCell Axxess installed in your aircraft, you'll simply need to add the AirCell broadband radio and a small, air-to-ground antenna.

## **2. WHAT'S THE DIFFERENCE BETWEEN AIRCELL AXCESS AND THE AIRCELL BROADBAND SERVICE?**

They're apples and oranges – they're two separate systems that contribute different elements of a comprehensive airborne communications system.

- AirCell Axxess is a CABIN SYSTEM – including the aircraft's wireless hotspot, wired and wireless handsets, PBX switching, and other in-cabin functions. In addition, the AirCell Axxess system comes standard with two built-in channels of Iridium satcom that provide right-out-of-the-box functionality.
- The AirCell broadband service is a high-speed LINK that connects the AirCell Axxess cabin system to the ground by installing optional equipment aboard the aircraft.

### 3. WITH AIRCELL AXCESS AND THE NEW AIRCELL BROADBAND LINK INSTALLED ABOARD MY AIRCRAFT, WHAT FEATURES WILL I GET AND WHAT DEVICES CAN I USE?

In typical corporate aircraft configuration, the AirCell Axxess system provides the cabin management functions – including 802.11b/g wireless service – and the AirCell broadband link provides the high-speed connection to the ground. Together, they'll allow you to use your own compatible Wi-Fi device in the cabin to surf the Internet, check e-mail and access your corporate VPN.

Many devices with 802.11b/g Wi-Fi capabilities will function with AirCell Axxess and the AirCell broadband service. Below is an early look at compatible COTS (“Commercial Off-the-Shelf”) devices, along with their status in today’s consumer market.

- **Laptops.** Nearly all newly-manufactured, Wi-Fi-equipped laptop PCs will be compatible. If you’ve ever logged on to a wireless hotspot at a coffee house or hotel, your laptop will work fine with AirCell Axxess and the AirCell broadband link.
- **Smartphones and PDAs.** Until now, major ground wireless providers have resisted building Wi-Fi functionality into their devices because of the revenue threat posed by people roaming onto free public Wi-Fi networks to make voice calls. Now, there is a major market shift underway – called convergence – toward all-in-one, Wi-Fi-capable devices, and 2007 will see triple-digit expansion rates. Even the popular Blackberry and Treo will soon be offered with Wi-Fi capabilities. As these devices continue to increase in popularity, AirCell will continue its compatibility testing and will publish a list of devices that are compatible with AirCell Axxess and the AirCell broadband link.
- **Other Devices.** In addition to laptops and Smartphones, Wi-Fi capabilities are permeating an astonishing and increasing number of other mobile wireless devices.

## **4. WHERE WILL AIRCELL BROADBAND COVERAGE BE AVAILABLE?**

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### **AT WHAT ALTITUDE?**

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### **WILL COVERAGE BE SEAMLESS, OR WILL MY DATA SESSIONS GET 'DROPPED' FROM TIME TO TIME AS I FLY?**

At initial debut in early 2008, service coverage will be available throughout the continental United States – coast to coast, border to border. Driven by FAA requirements in the air transport market, seamless coverage for both airline and business aircraft will likely begin at approximately 10,000' AGL. Providing full, nationwide coverage right from the start, AirCell's ground network is initially expected to include fewer than 100 ground stations. Handoffs between ground stations will be seamless and invisible, giving users uninterrupted service as they move across the country. Initial coverage will be available throughout the continental United States, from coast to coast and border to border, and coverage in Canada, Mexico and the Caribbean is planned to follow.

## **5. HOW FAST WILL THE AIRCELL BROADBAND SERVICE BE?**

The airborne connectivity world is littered with terms to describe the data rates supported by a particular link. Terms like 'broadband' and 'high-speed data' are often used interchangeably to describe airborne connections that are little faster than original, ground-based dial-up services were 10 years ago.

To give you a complete, accurate sense of the AirCell broadband service's speed, there are two ways for us to describe it – technical terms (the numbers) and practical terms (what it will really feel like to a user).

From a technical standpoint, AirCell broadband uses an EV-DO (Rev. A) air-to-ground link, which provides peak data rates up to 3.1Mbps from the ground to the airplane, and up to 1.8Mbps from the airplane to the ground.

In practical terms, we've found it most meaningful to compare AirCell broadband with speeds people are personally accustomed to experiencing at home and work. The AirCell broadband system will provide business aviation passengers with an experience similar to a DSL connection in a home or small business. If you aren't familiar with a DSL connection, it is several multiples faster than the current generation of 64kbps satellite links. AirCell broadband will be fast enough to give you complete, unfettered access to the Internet without excessive load times. It will run regular e-mail programs with normal attachments just like you do on the ground. It's not as fast as a T1 line feeding a large corporation, but in daily operations very few people would notice a difference in download times between the two – and then, only when working with very large files. Participants that have demonstrated prototypes of the system in flight have been extremely happy with their experience.

## **6. WHERE CAN I BUY AIRCELL BROADBAND EQUIPMENT?**

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### **WILL OTHER MANUFACTURERS' EQUIPMENT OPERATE ON THE AIRCELL BROADBAND NETWORK?**

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### **CAN I USE THE AIRCELL BROADBAND LINK WITH MY EXISTING MAGNASTAR CABIN SYSTEM?**

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### **CAN I USE ANOTHER MANUFACTURER'S WIRELESS HOTSPOT WITH THE AIRCELL BROADBAND SYSTEM?**

The AirCell broadband network and AirCell broadband equipment & services are exclusive to AirCell, and will be offered through AirCell's network of dealers and installation facilities. Only AirCell-manufactured equipment – including AirCell Axxess and its wireless hotspot – will be compatible with the AirCell broadband network.

## **7. I'VE HEARD PEOPLE TALK ABOUT AIRCELL AXCESS BEING A "NETWORK NEUTRAL" CABIN SYSTEM. WHAT IS THAT, AND WHAT DOES IT MEAN TO ME AS AN OPERATOR?**

One of AirCell's core design philosophies was to regard the CABIN SYSTEM (including handsets, wireless hotspot, in-cabin wiring, etc) as separate from the LINKS (such as Iridium®, Inmarsat®, AirCell broadband, etc) that connect the cabin to the ground. "Network neutral" means that an AirCell Axxess operator can select and install the links that best suit their needs, and change anytime, without starting over.

With network neutrality, AirCell Axxess insulates you from changes in networks over time, and lets you take advantage of new technologies as they emerge. A real-time example of this concept is an operator that installed an AirCell Axxess system in 2006. When the new AirCell broadband link debuts in early 2008, all that operator needs to do is add a radio and an antenna and they can take full advantage of the new network without changing any of their in-cabin equipment.

## **8. AMONG OTHER CHALLENGES, EXCESSIVE ANTENNA SIZE HAS ALWAYS BEEN A LIMITING FACTOR WITH AIRBORNE COMMUNICATIONS SYSTEMS. HOW BIG WILL THE AIRCELL BROADBAND ANTENNA BE?**

By nature, antennas communicating with satellites orbiting 22,000 miles above the earth require relatively high power, large equipment and, in some cases, steering mechanisms. In stark contrast to satellite-based systems, the AirCell broadband antenna will be communicating with ground stations less than 200 miles away at relatively low power, so the size and complexity is dramatically less. Actual antenna specifications won't be announced until later in 2007, but AirCell broadband will only require a small, light, fixed antenna.

## **9. WHY WILL AIRCELL BROADBAND BE SO FAST AND AFFORDABLE, WHEN SYSTEMS IN THE PAST HAVE BEEN RELATIVELY EXPENSIVE AND SLOW COMPARED TO WHAT THE WORLD EXPECTS ON THE GROUND?**

The AirCell broadband link uses direct air-to-ground technology instead of satellites, and the benefit of this approach manifests itself all the way through the system. It doesn't require expensive, geosynchronous satellites to operate. It uses off-the-shelf wireless technology and significant elements of existing ground-based infrastructure (towers, backhaul, power sources, etc) already in use by consumer wireless companies. The system requires very little power, so the aircraft antenna is small, affordable, and easy to install. Ground-based airtime is relatively inexpensive compared to monthly satellite transponder leasing costs.

## **10. WHY DIDN'T SOMEONE INVENT A SYSTEM LIKE AIRCELL BROADBAND YEARS AGO? WHAT HAS CHANGED THAT MAKES ALL THIS POSSIBLE?**

Three significant things have changed in the airborne telecommunications landscape, all of which are critical to AirCell's ability to develop such a powerful, capable, affordable airborne broadband link.

### ***1. Dedicated Broadband Spectrum***

Nearly 30 years ago, the U.S. Federal Communications Commission set aside dedicated spectrum (frequencies) for companies to use in providing air-to-ground voice and narrowband data communication services. Verizon Airfone® (and its predecessors) used that spectrum to operate the seatback phones aboard several U.S. airlines, in addition to the MagnaStar systems installed on nearly 4,000 business and government aircraft. Then, at the urging of AirCell and others almost four years ago, the FCC began the process of reallocating the existing air-to-ground spectrum to support broadband communications. Step by step, the Commission proposed technical approaches, invited comments, and eventually held a public auction.

When the FCC auction concluded in June 2006, AirCell was proud to have emerged the winner of the exclusive broadband license. This means that AirCell is the only company authorized to use those frequencies for air-to-ground broadband services in the United States.

### ***2. Mobile Wireless Technology***

AirCell has been watching various emerging mobile wireless standards for several years. CDMA EV-DO ("EV-DO") is one such technology that was originally developed to provide broadband service to ground-based consumer devices such as Smartphones. It's very mature technology and is currently in daily use by tens of millions of Sprint® and Verizon® customers.

AirCell researchers were quick to discover that the EV-DO technology was perfectly suited for airborne use. With minor modifications and other application techniques, EV-DO performs wonderfully at jet speeds and altitudes. A rigorous testing and development program, including a high-profile flight demonstration program in 2005, revealed that EV-DO met all our requirements for aeronautical broadband. Specifically, it's solid, fast, reliable, economical and secure. It has longevity and integrates well with off-the-shelf equipment (routers, modems, etc). AirCell's proprietary implementation techniques successfully deal with all speed-related issues, such as Doppler shift. Perhaps best of all, the associated hardware – including the airborne antenna – is very small.

AirCell will “over-build” the capacity of the broadband network to ensure robust service to all its users – business aviation and airlines. Another benefit of EV-DO technology is that as usage continues to grow, AirCell can increase network capacity by expanding existing ground stations or adding new ones, just like ground-based wireless providers do every day. All these capacity increases can be accomplished without requiring any changes to equipment aboard aircraft.

### ***3. AirCell’s Ability to Bring it All Together***

AirCell has more experience applying ground-based wireless technology in the airborne environment than any company in the world, and this is the final critical element of the new broadband service. This unique capability has made us the choice of virtually all the world’s business aircraft manufacturers and leading fractional ownership programs, and the leader in business aviation airborne telecommunications.

## **11. WHEN DOES AIRCELL’S FCC BROADBAND LICENSE EXPIRE?**

AirCell’s FCC license comes up for renewal once every 10 years. Provided AirCell continues to utilize the spectrum for its intended purpose, the renewal process is very straightforward. Follow-on auctions are never part of the renewal process.

## 12. IS AIRCELL'S NEW BROADBAND SERVICE A PICOCELL?

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### DOES IT REQUIRE A PICOCELL TO LET ME USE MY OWN DEVICE IN THE CABIN?

With the AirCell Axxess system and the new AirCell broadband link, you'll be able to use a wide variety of compatible Wi-Fi devices on the system – no picocells are included or required. To understand how this is possible, it's important to note that a *picocell* is the connection point for cellular (not Wi-Fi) devices, while a *wireless router* is the connection point for Wi-Fi (not cellular) devices.

Although AirCell testing has demonstrated that its broadband technology will easily support the use of cellular picocells (including CDMA and GSM protocols), the FAA has yet to approve the use of personal, cellular-based devices in the air. Further, AirCell believes strongly in the simplicity and performance of Wi-Fi-capable devices, as evidenced by their burgeoning popularity on the ground.

With more and more compatible Wi-Fi devices becoming available, the expense, complexity and weight of using picocells aboard business aircraft is eliminated.

## 13. WHAT WILL THE AIRCELL BROADBAND SERVICE COST?

Pricing for AirCell broadband equipment and service will be announced in the near future and is anticipated to be substantially less than other available aeronautical broadband services.

## 14. WILL THE AIRCELL BROADBAND SERVICE BE A SECURE CONNECTION, ENSURING THE PRIVACY OF MY DATA?

AirCell broadband provides security levels equivalent to that found at Wi-Fi hotspots at hotels and coffee houses. AirCell's air-to-ground wireless link is highly secure, using encryption and other techniques to ensure privacy of user data. The system also allows passengers to use corporate VPNs, offering even higher levels of privacy and security.

## IN CONCLUSION

More information about the AirCell broadband system will become available throughout 2007 as we approach service launch in early 2008. In the meantime, we appreciate your continued support and encourage you to contact your AirCell Sales Manager for planning assistance or if you'd like to be kept up to date on AirCell broadband development.

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