



The Satcom Services Race

Inflight connectivity just keeps getting better and less expensive.

By George C. Larson

The beauty of competition is that it drives innovation and sharpens pencils. As we're getting closer to the rollout dates for more broadband services from satellite communications providers, the scene begins to resemble a chariot race as the competitors stiffen their resolve to lead the pack — lots of jostling and no holds barred.

And this is a race that really has no finish line, as the competitors will keep driving toward the next Great Thing.

Satellite operator Iridium named its future-generation data transfer service NEXT, implying that there will be more to come. The company is engaged with prospective development partners to shape the system that will define the generation of

satellites and ground services for the next few decades after its current constellation of ever-moving low-earth-orbit (LEO) satellites is finally retired. Son of Iridium can be expected to raise the bar a couple of notches while pushing rates down.

Telecom service and equipment provider AirCell, currently the leader in terms of airborne telephones in service, will soon open up spectrum for business aircraft and the airlines that will provide broadband through ground stations using cell phone technology at affordable rates and carry voice calls at as little as \$1.00 a minute. With a successful bid for the necessary spectrum at an FCC auction in June 2006, AirCell gained the bigger data pipe it needed to offer broadband using air-ground connections. Coverage for such services will extend across the continental United States (Canada, Mexico and the

Caribbean to follow) from 10,000 feet agl and higher over a system of about 100 ground stations that will hand off calls as the aircraft traverses the ground in a manner similar to cell phones.

Inmarsat, which leases capacity on its geostationary satellites seemingly fixed in space some 22,000 miles above the equator, will soon complete its constellation of I-4 satellites and offer global Ku-band (typically 11-16 GHz) connections using a big pipe that can support not just Internet traffic, but video as well. Inmarsat's Swift 64 high-speed connection is being used by a significant number of mostly high-end operators. ARINC is also targeting the Ku customer, whose demographic generally involves a high-end airplane big enough to handle the cost, weight and complexity of a steerable antenna on the fin and with enough seats to carry the multiple callers

Photography: Getty Images



that Ku needs to compete on rates. Because of those requirements, Ku penetration of the overall business aviation market is still small.

For business operators, satellite service providers have simplified their rate packages to a single monthly fee to match flight departments' budgeting requirements, and because cell phone rate levels based on packages of minutes have become an established, familiar standard. Bill Peltola, AirCell's senior vice president of business aviation solutions, says, "We get very little pushback on that. People understand it and are used to it."

Rates aboard commercial airlines are still a crapshoot as the previous phone services were soundly rejected by passengers and, subsequently, Boeing canceled Connexion, its proprietary Ku-based broadband service, before it ever left the ground.

Airline systems are expected to handle simultaneous callers in the low double digits, but not offer unlimited capacity. AirCell says rates will be announced soon, but promises only that they will be "substantially less than other available aeronautical broadband services" — which is careful wording.

A white paper ("Technology Primer for Business Aviation") published in March (http://aircell.com/index.php?option=com_content&task=view&id=24&Itemid=368&L3=business) by AirCell promised "affordable" broadband in early 2008 via its Axxess system's wireless features and an additional radio and antenna that would allow connectivity in flight to rival home DSL service. Data rates are asymmetric: 3.1 megabits per second from the ground to the airplane and 1.8 Mbps from the airplane to the ground. Why? Typically,

data entry from the originator is in the form of a brief request, query or command to retrieve a file, say. By contrast, the response is usually a larger data bundle to build a weather map or download an image. Because the air-to-ground link measures only hundreds, rather than thousands, of miles, power and antenna size can be minimized compared to a typical Ku system.

Peltola says the AirCell system's characteristics — specifically, small, light, simple and cheap — means a "phase shift" is coming. "We'll see airplanes that would not have considered it before. We're offered by all of the OEMs as standard equipment or a standard option" in addition to the dealer network. And he's not alluding just to VLJs, but to anything down to single-engine pistons; helicopters are also a very attractive market.

An important claim made by AirCell is what it terms a "network neutral" cabin system, which means an operator can select the services that will carry the signal, be it global services such as Iridium and Inmarsat, or the company's own broadband network for the U.S. mainland. There is not such flexibility when it comes to the cabin connection, which must be via the AirCell Axxess system. The system is based not on a cellular picocell (a device aboard the airplane that reroutes standard cell phone calls to the outside network), but on the Wi-Fi standards used in hotels, so-called "hotspots" such as the Starbucks connections, and on typical home- or office-based wireless routers such as Apple's AirPort or the many Linksys models with their familiar rabbit ears. In addition to providing the Wi-Fi connection to growing numbers of telecom devices so equipped, Axxess also handles wired and cordless telephone handsets. Two channels of Iridium are standard as well.

The fear among phone carriers was that Wi-Fi connections would steal call volume by allowing users to make a voice call via Internet services such as Vonage using Voice Over Internet Protocol (VoIP). What was a trickle became a flood and AirCell seems to be betting that Wi-Fi-equipped BlackBerry and Treo handsets due out soon will render picocells, the devices that relay cell calls from an aircraft, a footnote. In early August, American Airlines became the first commercial airline to sign on with AirCell for Wi-Fi-served e-mail and text messaging.

By any measure, Iridium is on a tear. In its latest quarterly report, the company claimed 203,000 subscribers, up 27 percent



from 159,000 year on year. Revenues made strong gains as well, and CEO Matt Desch stated in the release, "Driving these results, among other factors, was across-the-board demand for our data services, with notable recent up-ticks in the machine-to-machine and aeronautical markets." The company noted a 59-percent growth in the aeronautical sector (maritime and military are its top two) and restated its goal of gaining ICAO approval for so-called safety of flight data, which is interesting in context.

Inmarsat has always laid exclusive claim for its robust satellite network as the heart and soul of safety communications for ocean-going ships and ICAO-approved safety of flight communications for civil aircraft plying international air routes beyond normal voice communication range. Although the safety requirement was part of its charter as a quasi-

government consortium when Inmarsat was founded and was hardly regarded as a significant revenue earner, the badge carried a kind of imprimatur that added to its luster.

By gaining ICAO approval and extending safety communication over the top of both poles, Iridium may gain a spot on the pedestal, whether it is real or imagined. Major inroads in equipping helicopter fleets for flight following also brighten its picture. And DayJet's Ed Iacobucci recently announced that the company's near-real-time data link to its fleet would be provided by an Iridium service.

Gaining the ICAO approval "will be a feather in Iridium's cap in terms of its capabilities," says AirCell's Peltola. "I don't see them replacing Inmarsat, but there are a lot of airplanes out there with Iridium.

Our attitude is to stay close to the issue."

A Frost & Sullivan report on LEO mobile satellite systems done in 2002 ripped Iridium as inferior in virtually every respect, but when the Palo Alto, Calif.-based research firm revisited the subject in February 2007, it performed a complete 180 and barely alluded to the earlier survey. The tests compared Iridium with Globalstar, the other LEO satcom company, and the 2007 results cited data showing Iridium calls are "nearly three times more likely to be successfully connected and completed, without being dropped. . . ." Methodology was somewhat different for both surveys, with audio quality getting more emphasis in the earlier one, but F&S noted that technology improvements, satellite aging and replacements easily affect the outcome. And only voice calls were tested, not data service.

While Iridium talks about broadband, it's important to point out that the service it offers today is limited to low-speed data transfer more akin to slow dial-up. Executive Vice President Greg Ewert says the system has plenty of excess capacity. Some service providers think the 2007 "broadband" will actually be multiple-channel connections, and Ewert characterizes it as "an interim step as we move to NEXT, when we will be looking at significantly higher bandwidth throughput and performance characteristics with respect to the network that should provide a quantum leap over the I-4 constellation that Inmarsat runs today." How fast will the interim service be? "The sweet spot is between 64K and 153 kilobits, higher than Swift and close to broadband," Ewert says. "What we're really happy about is we think we have a significant price advantage." Iridium says that as a wholesaler, it doesn't discuss prices, but leaves that up to resellers. Cost savings for equipment, installation and weight are tangible but vary with aircraft and other factors.

NEXT passed its first milestone with the release of a request for information to likely development partners. Ewert says they'll start getting valid data by the fourth quarter of this year and feed it through the internal Iridium engineering organization. By second quarter 2008, they expect to be able to go back to the industry with selections of final partners.

ARINC Direct has been serving the very top end of the business aviation market with Ku band services that provide the highest speeds available among current satellite services. However, coverage is limited to North America and Europe, but Atlantic route coverage is imminent. Bob Thompson, senior director of satellite

Primary Satellite Operators for Aviation Markets

Inmarsat

First service available to aviation users; operates 10 satellites, claims over 8,000 aircraft equipped; global headquarters in London. Launch of third I-4, latest generation satellite, will complete global broadband coverage.

Globalstar

Operates a constellation of 40 satellites in low earth orbit (less than 900 miles); headquarters in Milpitas, Cal.; second generation satellites (builder is Alenia) arriving in 2009; "bent-pipe" technology sends call to earth station. Future deployment of Ancillary Terrestrial Component (ATC) services, a new hybrid satellite-cell phone system, uses common frequencies for satellite and terrestrial networks.

Iridium

Its 66 satellites were launched by original founding company Motorola into low earth orbit (485 miles) and are serviced by Boeing; headquarters in Bethesda, Md.; claims 203,000 subscribers; recently announced first selected partners for NEXT, an IP-based follow-on to the current generation of satellites.

SES Americom

Part of the SES Group with SES Astra and SES New Skies; operates 15 satellites of 37 in the whole network; based in Princeton, N.J.; provides North American coverage for ARINC Direct SKYLink.

Thuraya

Operates two Boeing-built high-capacity telecom satellites in geostationary orbit; a third satellite is planned.

Loral SkyNet

Operates a fleet of five Telstar satellites in geostationary orbits; headquarters in Bedminster, N.J.; provides transatlantic broadband coverage for ARINC Direct SKYLink.

Eutelsat

It owns 19 of the 24 satellites it operates in geostationary orbits; headquarters in Paris; provides European coverage for ARINC Direct SKYLink.

Intelsat

The "leading provider of fixed satellite services in the world," it operates a fleet of 52 satellites, headquarters in Pembroke, Bermuda. Primary markets don't include aviation.

services, has been with ARINC for five years but has long experience in the satellite industry. He looks at three civil markets: long-haul commercial, regional commercial and business jets, and of those, only the business jets provide a solid business model, he says.

"In long-haul commercial there have been a lot of people trying to rush in and fill the vacuum left by Boeing Connexion," he says. "Lufthansa came out with [a request for proposals] and that RFP was answered by a couple teams, one led by Panasonic, which has aspirations of building a Ku-band network, and the other team was led by T-Mobile, which is the German [-based] cell phone provider. Both those teams went at it very seriously, and I don't think there's been a decision made

by Lufthansa, but now there are other airlines lining up behind Lufthansa saying 'We'd be interested, too,' so that market space is still developing and bears watching." In early August, Lufthansa was close to an agreement with T-Mobile to provide text messaging and e-mail services but without voice calls on cell phones. Too annoying, passengers said.

ARINC, which was recently acquired by The Carlyle Group, was originally formed as a wholly owned subsidiary of the major airlines to manage company communications. So it is somewhat ironic that the company turned its back on satellite services to commercial long-haul airlines. "We just can't close the business case," says Thompson. "You can't generate enough revenue from passengers to cover the costs

of the satellite transponders." So it sought a market that can tolerate higher price points, and that market is business jets. "That's why we made the decision five years ago to go after the business jet market with our Ku-band offering," Thompson says. They've been operational since 2005 and have about 70 aircraft up and flying now. "The reason we chose bizjets is the quick takeup and decision-making of that market and they're not as price-sensitive as the retail commercial market. And they're looking for ways to connect an airplane just like an office."

That word — office — became the driver that launched ARINC Direct on the road to Ku, Thompson says. They can provide 3.5 megabits to the airplane and 256 kilobits off. "Our corporate clients turned the aircraft over to their IT departments, and we work with IT to design offerings that they want to duplicate the office. It was a bit of a surprise to us, but even though the flight departments are involved, IT drives it," he says.

Iridium sells its LEO system by claiming reduced or zero time delays in transmission, but ARINC says it's not such a big issue. It leases its transponder connection from the geostationary satellite owners, SES for North America, Loral SkyNet over the Atlantic and Eutelsat over Europe. "Our transit times are about 650 milliseconds round trip," Thompson says. "It's one of the issues we work out with those IT departments, to ensure that the timers in their software programs can handle that slight delay."

From its current perch high atop the technology pecking order, ARINC seems content with its boutique niche and customers with deep pockets. Could broadband ever become a commodity? Yes and no, Thompson says. "It certainly will not be a race to the bottom. Pricing will not be a differentiator."

Maybe. He's still envisioning Ku shrinking in terms of equipment and antenna size and weight, and speaks of growing his market share down into midsize aircraft. Antennas, like Starling's MiniMIJET, are moving off the tail and onto the fuselage, with some employing electronic steering in a low-profile package; a couple already do. But it's a tradeoff: "When you talk to the midsize market, they say they're flying mostly one- to two-hour segments, so do they really need Internet access?" He's not sure.

All competitors for broadband markets will be seeking the balance between price and need. And if the history of consumer products and services teaches us anything, at a low enough price, a nicety becomes a necessity. **B&CA**