Keeping track

Helicopter operators are beginning to access new satellite communications technologies offering the ability to track aircraft and stay connected anywhere in the world. Tim Guest reports.

Connectivity, whether for voice or data, including critical tracking and positional information transmission, has always been a challenge for aircraft and particularly for helicopters. The need and demand for such connectivity is even more so in today's world of anytime, anywhere communications, where good bandwidth and high data speeds are the minimum expectation of business and leisure passengers the world over.

Latitude Technologies – which offers what its director of helicopter and general aviation sales, David Thomas, calls "probably the most economical, quality build aerial satellite telephone on the market" – says that, traditionally, the requirements and expectations of individuals, not only corporate but from a commercial perspective, are what's driving the quest for connectivity solutions on board helicopters. "Those expectations are based on what we have and use in our homes," Thomas says, "and in our daily lives. In those scenarios we talk in terms of download speeds and bandwidth – and we are willing to pay

more to get faster and better services – and that is what creates the expectation of the helicopter passenger/user."

Typical business travellers want to send and receive emails as well as make and receive phone calls, and perhaps in certain regions some VIP passengers with enough money may even want to download movies, but that's really expensive, according to Thomas. So it's the expectation of the passenger that is driving the need for ever more in-flight bandwidth and download speeds.

For fixed-wing airlines, business aircraft and jet leasing firms, the problem has been largely solved by turning more and more to satellite communication systems to meet these demands and deliver in-flight personal communications and Internet connectivity experiences commensurate with services people would expect on the ground. But while uplink and downlink to and from an aeroplane fuselage, via an exterior high-gain antenna, is relatively straightforward on a fixed-wing aircraft, the same cannot be said for helicopters. The rotor itself presents a

particular problem in blocking the smooth and uninterrupted passage of data packets; developing involved algorithms and clever mathematics are the only ways to overcome this issue.

ESSENTIAL SATCOMS

Of the satellite networks out there that offer or support aeronautical satcoms services of interest to helicopter operators, ViaSat, Inmarsat and Iridium are providers of some. Looking at the Iridium network, which is used by Latitude, Thomas points out that the network "is capable, at this point, of delivering 2.4 kbps", which he stresses is a very small pipe through which to pass information. According to Thomas, the problem with helicopters when it comes to download speeds is the antenna; mounting one of the size required to receive sufficient download speeds in the 100–200 kbps range "to do big emails" is a real issue.

"Fifty kilobits per second will support moderate emails, but you need a bigger pipe for bigger items. There is not a product out there quite yet that does that in a global sense. Other than making phone calls and sending SMSs, there hasn't really been a breakthrough in downloading." He adds that there are experimental systems being

business aviation

A helicopter undergoes installation of Inmarsat's SwiftBroadband.

developed with the likes of Augusta Westland and some of the larger companies like Airbus working with companies to develop an antenna that works, but they can become very costly. And beyond the high expenses related to certification and other costly issues associated with operating a helicopter, or fleet of helicopters, operators have to weigh up the advantages against costs of around US$250,000 for a satellite communications system that will enable passengers simply to "do a few emails on a short-duration flight".

With expectations, however, showing no sign of relenting, technology continues to keep up with demand. Iridium's new Certus network will play a role in meeting those demands; it's a new multi-service platform powered by the $3 billion Iridium NEXT constellation. With widespread coverage and a range of speeds eventually up to 1.4 Mbps, Iridium Certus is set to deliver reliable, global, enterprise-grade mobile satellite communications services, which will support a range of aeronautical satcoms applications including with helicopter users. For Latitude's Thomas, this should easily provide the bandwidth required – 50 kbps – for effective in-flight helicopter services and enable manufacturers to develop an antenna that is a lot less expensive, in turn making the data rates less expensive. The cost and the weight of a high-gain system are the issue, he says, as opposed to a low-gain antenna that would work over the Iridium network.

On the transmission problem created by the rotor, Thomas adds, "Delivering uplink and downlink to and from the satellite is challenged by the rotor. The problem – and Inmarsat has worked exhaustively to build algorithms to

work with blade shadowing – is getting data through the blades; when the blade goes over the antenna it cuts off the data stream and breaks the comms with the satellite. With the rotor revolving some 300 times per minute, it chops the signal; to get high-speed data through rotor blades has been a real challenge and is where much of the cost comes from."

Latitude still gets push-back from customers about the price of its 'economic' system; he says he points them in the direction of Gogo Business Aviation (formerly Aircell) and other companies that sell satellite phones/services for a price point some three to four times what Latitude charges. Cost is a big factor, he says. "Most people want the service but do not want to pay for it."

For its part, Latitude's SkyNode S100 provides uplink/downlink to the satellite and is a 2.4 kbps data pipe. "It's a very small data pipe over which we also conduct flight tracking, sending 30-byte segments of positional data back and forth. We can do that really cheaply at six US cents per position report, as opposed to $8 per Megabit for Inmarsat data."

The SkyNode S100 offers complete tracking and data telemetry and interfaces to multiple mapping and information management systems. It offers two-way data access from any location and is the preferred real-time data communications module for Latitude's IONode flight data management (FDM) system. The company's S200 offers voice and flight tracking combined; Thomas says that "most of our customers want that ability to connect with voice, too". The SkyNode family of products supports narrow-

band networking for aircraft requiring text messaging, email, FTP and internet access. For high-demand users, Latitude offers internet-in-the-sky capability with Inmarsat's SwiftBroadband satellite service.

All SwiftBroadband systems allow for simultaneous voice and IP data communication over low-profile antennae that are significantly smaller and lighter than any other systems in the market. It has a low-gain blade antenna option with the antenna weighing in at less than a kilogram. It offers a single channel of up to 200 kbps with dynamic IP streaming at 8 or 16 kbps, circuit-switched voice and up to three multi-voice VoIP options. And the associated avionics are small and compact, suiting the airframe of helicopter users. Over the past few years, Inmarsat has worked tirelessly on developing new helicopter waveforms for its SwiftBroadband service, improving signal coding and, thereby, performance to reduce data packet loss when transmitting through the rotors of a helicopter.

TRACKING CAPABILITIES
A widely deployed helicopter operator's mission management system that meets FAA flight data monitoring (FDM) compliance for helicopter air ambulance operators is Honeywell's Sky Connect Tracker III, which is the new technology core of the Sky Connect family. Its FDM function provides a means of collecting data from on-board systems through various interfaces to record and communicate aircraft performance and potential maintenance needs and user-configurable alerts can be generated based on any thresholds that are exceeded. Alert messages are communicated to the ground operations centre using the Iridium satellite network.

Sky Connect Tracker III is an enhancement of its predecessor, providing significantly more capability within virtually the same form factor, including dual channels that enable simultaneous tracking and voice capabilities and an internal non-battery power back-up that will transmit final position reports after the pilot powers down the aircraft, or if any

incident interrupts aircraft power. It provides dual mode functionality; two independent channels mean tracking and making worldwide voice telephone service calls can be done at the same time. It also supports two-way texting.

One major user of Sky Connect is Bristow Group, the largest provider of helicopter services to the global offshore energy industry, which has to be able to track its fleet of helicopters, so that it can divert aircraft in response to bad weather or a medical emergency. It has installed the Honeywell system on approximately 270 helicopters in its commercial fleet to ensure reliable and robust satellite-based data and voice communications.

For Bristow, offshore communications is a vital area – especially as its flights often operate in bad weather and over the sea, out of reach of VHF radio reception. So to ensure the safety of its passengers, it has equipped its helicopters with Sky Connect to deliver a higher degree of safety and provide a complete view of where its fleet is operating at any given time.

It's a complete system that helps helicopter operators more effectively manage their fleets, using the Iridium satellite network's voice, tracking and messaging functions to deliver mission management capabilities that improve operations. It is claimed to be the only product of its type that was developed specifically for the aviation industry and, through its text messaging functionality, provides an easy and quick way for pilots and dispatchers to communicate simple messages to each other.

Pre-stored messages with data fields and a full telephone keypad make text messaging an effective way for crews to communicate up-to-date, accurate flight and operational information. Messages sent to the helicopter by the dispatcher are displayed immediately and all messages received during the flight can be recalled. When equipped with Honeywell's MMU-II cockpit dialler, the Sky Connect system can also include a voice telephone. The system is tied into the aircraft's audio panel and supports more than 500 pre-stored phone numbers.

Helicopter operators now have access to levels of data and the ability to track their fleet and stay connected anywhere in the world, regardless of whether they are over land or water. This is bringing a new connected experience to helicopter pilots and operators and meeting the needs of this growing market segment. ■