Customer expectations mature as cabin technology comes of age

Faster in-flight communications and significantly improved wireless connectivity remain the dominant themes among aircraft cabin outfitters and OEMs this year, as customers and the industry alike anticipate the introduction of improved systems able to use bandwidth available on the Ka band. Offering speeds up to 10 times faster than legacy L-band communications and the current state-of-the-art Ku-band systems, Ka-band connectivity promises to elevate in-cabin voice communications and data streaming from an experience comparable to older dial-up modem speeds to capabilities rivaling and even surpassing today’s fastest and most advanced home and office Internet connections.

In-flight entertainment (IFE) systems and advanced digital cabin management systems (CMS) are such staples of modern business aircraft that it is difficult to believe that more than 25 years have passed since the earliest equipment found its way into the most expensive long-range aircraft. What is easy to believe, however, is that these systems will only continue to grow more advanced and more reliable as the industry shifts focus from the availability of such technologies to refining that equipment to make such systems more robust than ever, and offering faster speeds and connectivity than ever dreamed possible.

“The trend is clearly toward office-in-the-sky,” said James Pearson, director of global business development in VIP and general aviation (GA) aircraft for ViaSat. “That capability has been limited, however, as previous solutions may not have offered the bandwidth necessary to do much more than send emails.”

Furthermore, while such systems were once the exclusive domain of intercontinental business aircraft, today’s medium-range business jet customers also expect to be able to access Web, instant messaging and email accounts through their laptops, smartphones and PDAs.

“There isn’t much variance between aircraft size to customer desires within our lineup,” said William Gay, completion sales director for Gulfstream Aerospace. “Our clients all want the same things: cabin comfort and cabin entertainment.”

Those clients are also typically well informed about the capabilities they want, though specific manufacturers and capabilities often require detailed explanations and management of customer expectations.

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“We aren’t exactly spec’ing off-the-shelf equipment from Best Buy,” noted Stephen Maiden, president and CEO of Constant Aviation, a Cleveland, Ohio-based MRO. “Integration and approvals often require a significant amount of time, and each job poses unique challenges. Most are custom one-off installations, each requiring different equipment listings and modifications, with a heavy emphasis on cabin electronics and amenities.”

**OEMs Build on Legacy Systems To Match Current Tech**

As customer expectations rise to meet rapidly evolving technological developments, manufacturers are building upon the foundations of their legacy product lines to add capability to existing systems.

Earlier this year, TrueNorth Avionics launched its open-architecture Optelity product line, a new Wi-Fi platform complementing the company’s Simphone cabin communications solution. “Simphone remains a highly capable system, but it’s a decade old,” said TrueNorth CEO Mark van Berkel. “Optelity is our next step, which builds on advancements made in wireless capacity, processor speeds and other technologies.”

Intended as an upgrade path for existing Simphone customers, as well as an in-flight connectivity and entertainment solution for light jets, Optelity control boxes also occupy less space than TrueNorth’s earlier systems.

Rockwell Collins announced at EBACE that it had surpassed 250 deliveries of its seven-year-old Venue cabin management system and entertainment solution for business aircraft. The company bills Venue as an open-architecture design that “accommodates future technologies,” and is scalable from “a BBJ down to a Hawker or even turboprops.”

“We’ve seen a huge pop in the retrofit market, including being selected last year on a handful of [high-end completions],” added Lupita Ho, principal marketing manager for cabin systems at Rockwell Collins. That stems, she said, from “the capabilities and reliability of the system, and word of mouth has been enormous.”

The latest Venue iteration, which includes fiber-optic cabling and high-definition video capabilities, will soon be available as a retrofit option on Bombardier Global XRS and Global 5000s equipped with the company’s earlier Cabin Electronic System (CES). Such scalability is important considering the speed of technology’s advancements in the segment.

Justin Dye, Honeywell product manager for cabin management and IFE, noted that Honeywell’s current business splits “roughly 50/50” between retrofits and OEM. “Original manufacturers are interesting customers,” he noted. “Each one has its preferred supplier; we all play where we play. The primary differences are in the level of configurability, as OEM installations are generally standardized.” Private jetliners are “always the most complex, and generally the capabilities scale to aircraft size.”

**Smaller Aircraft Aren’t Neglected, But Fewer Options Available**

As the market continues to emphasize advanced CMS and in-flight entertainment solutions on medium-range and large-cabin business aircraft, smaller aircraft have not shared in these developments. That stems from not only the price tags for these aircraft but also their shorter mission profiles.

“We have seen requests for in-flight entertainment, but given our price of $3 million [for the Eclipse 550 very light jet], adding another $50,000 to $75,000 on top of that really doesn’t suit our mission,” said Ken Ross, president of global services and support for Eclipse Aerospace. “However, the 550 does offer power outlets at each seating position in the cabin, as well as USB ports to plug an iPad or similar device into.”

Similarly, Daher-Socata also offers power ports and USB outlets in the cabin of its TBM 900 turboprop single, as well as XM satellite music or radio. Pilatus Aircraft includes moving-map displays in the cabins of PC-12 NG turboprop singles.

Additionally, Cessna offers an onboard DVD-based entertainment system, complete with individual LCD video screens and wireless head-phones, as part of the Oasis executive interior package on its Grand Caravan EX turboprop single. That actually exceeds the equipment level for its longer-legged Citation Mustang very light jet, which offers but two 12V power outlets in its four-place passenger cabin.

–R.F.

**The JetJukebox from Flight Display Systems allows streaming of music and movies and displays a moving map.**

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‘Robust Architecture’ Allows Future Upgrades

Buyers seeking the latest in cabin electronics for their new business aircraft, or to retrofit the latest systems to their existing airplane, may choose from dedicated communications in-flight connectivity solutions, to fully integrated CMS capabilities encompassing communications, entertainment packages, lighting and other features under a

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common system architecture and user interface.

Flight Display Systems offers its Smart Cabin control system, allowing passengers to adjust lighting and cabin temperature, make galley service calls and control IFE and even an external flight view camera through its upgraded JetJukebox wireless media streamer. Compatible with any iOS, Android or Windows device, JetJukebox allows streaming to mobile device screens as well as hardwired displays in the aircraft cabin, with cabin controls ranging from single-button OLED interfaces to a seven-inch touchscreen for use by flight attendants to control the cabin environment.

Honeywell Aerospace delivered its first all-digital Ovation Select CMS in late 2012. The system is an evolution from the company’s earlier Ovation C series CMS offering, with particular emphasis on not only greater in-flight capabilities but also easier serviceability.

In total, Ovation systems have been installed in approximately 1,600 aircraft, with Ovation Select installed on 54 aircraft, including Boeing Business Jets, the Global Express, Falcon 900 and G550. The system is also offered on Embraer’s Legacy 650 and Lineage 1000, as well as the upcoming Legacy 450 and 500.

In addition to lighting and environmental controls, the system may be tailored to operate cabin window shades. “There has definitely been a shift to how cabin systems are viewed, from thinking of those components as hardware to considering the complete in-flight experience,” added Dye. “That brings in the flight crew, maintainers, passengers; all of those folks have a say in determining what the cabin experience should be, and how serviceable those systems are.”

The result, Dye added, has been a shift toward smaller box sizes and fewer wires, to ease the installation process and turn the aircraft around quickly in the event of system maintenance.

“Ovation Select is differentiated by the level of integration available,” he said. “The system has a robust architecture that doesn’t need to be changed to accommodate whatever you want to throw at it. Business people who are more interested in productivity may share a laptop with the cabin through a VGA input, while all users appreciate low latency rates in the equipment, similar to their home entertainment systems.”

Customers also want the option to reconfigure the system as needed, with a minimum of downtime. “They want their main space, a living...
space and an office space,” Dye noted. “There might be 30 available Internet connections on the aircraft, some seats wired and others with wireless access. Changing those locations around amounts to essentially a software push.”

### Integration and Reliability Are Key

Although many OEMs select third-party vendors to equip new aircraft with cabin electronics systems, Gulfstream opted to bring that process in-house for its G650. The Gulfstream Cabin Essential package, also available in the company’s medium-range G280, gives the manufacturer complete control over the integration process.

“We are working toward making cabin interiors approach the reliability of other systems on board the aircraft,” said Gay. “A lot of that focus goes toward redundancy in the cabin systems, just as we see with engines and flight controls.”

Gay added that when a system failure does occur, Gulfstream has emphasized maintaining a transparent user experience for passengers. “For example, if the path between a control station and a monitor is breached, the CMS will try to identify another path so that failure is transparent to the end user,” he noted. “The fault is recorded by the aircraft for maintenance personnel to address on the ground.”

“At the speed this industry is growing, it’s important that any system be highly scalable,” Dye said. “If I need to swap out a video screen or add a microphone, how much in-depth work does that require? A bad DVD player may ground an aircraft, so we strive for a fit form swap and immediate parts availability to complement the system’s robust architecture and backbone.”

### Customer Demand for Connectivity ‘Loud and Clear’

One overriding theme is clear among providers of OEM and retrofit cabin equipment and electronics: satellite-based voice communications and Internet streaming are the greatest priority among clients using business aircraft, and those customers are increasingly no longer satisfied with systems offering significantly slower connection speeds and greater latency than most home Internet connections.

“The industry is moving toward two primary areas,” noted Constant Aviation’s Maiden. “One is the ability to use your phone on an airplane as if it were your phone at

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Everyone in the cabin has at least one personal electronic device to use during the flight, and passengers want the same speed and utility they have at home.

The Tailwind 550 radome antenna enables private aircraft to receive Ku-band DBS (Direct Broadcast Satellite) television signals. It may be configured for up to 32 unique programming receivers.

On the Horizon: Ka-band Connectivity

Indeed, a “fatter” pipe is on the horizon, in the form of data streamed on bandwidth available in the Ka-band that offers as much as 20 times the wireless connectivity speeds L-band systems can deliver.

“Today’s satellite-based systems provide between one and two Mbps of speed,” explained Curt Gray, director of satellite communications technologies with Melbourne, Fla.-based Satcom Direct. “That’s with Ku-band systems, operating at 12-18 GHz. Those systems rely on lots of satellites and capabilities designed for fixed locations that have been adapted over the years to work on moving aircraft. The next step up is Ka-band, which...
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equipment represents a separate aircraft system that, unlike existing cockpit avionics that also use the L-band, are not shared with any other portion of the aircraft.

“That’s more equipment, and more weight, that you’re not replacing,” Gray noted.

Some of that weight disparity, however, might be offset by smaller component packaging. “There’s less weight and fewer boxes than before,” said Larsen with Satcom1. “Even better, bandwidth speeds [on the Ka-band] are approaching the point where passengers may experience faster connectivity in their airplanes than in their hometowns”—an attractive tradeoff.

Early stages of a fully realized Ka-band satellite network are in place, with airline JetBlue announcing late last year that it would use the ViaSat-1 satellite to provide Ka-band wireless connectivity for passengers on its domestic routes. “They’re consistently seeing 12 Mbps connection,” Gray noted. “As technologies improve, it’s realistic to expect that Ka could provide a 10- to 20 Mbps connection speed to each passenger on board a business aircraft.”

Inmarsat aims to have three Ka-band satellites spanning the globe, except for the poles, in coming years. The ViaSat-2 satellite, which will cover the North Atlantic tracks, is scheduled to launch by 2017, while Eutelsat offers Ka-band connectivity over Europe and the Mideast.

“All use different modem technologies that are not compatible,” Gray said. “You can’t switch between satellites. There’s [also] debate about whether or not there will be enough capacity to handle everyone, given such wide service areas.”

Some of those issues may be addressed through combined systems; for example, Gogo may be paired with SwiftBroadband to provide international L-band connectivity with access to LTE speeds over North America.

Still, the direction the industry is heading is clear. “That’s the next wave, and we’re in exciting times,” Dye noted.

“One of the things we’re also seeing is interest from systems integrators as they construct more complicated networks,” Pearson added, noting that ViaSat recently collaborated on routers for ICG and Satcom Direct. “That means that GA users will benefit greatly from the expansion of Ka-Band systems, and we expect to see speeds comparable to what we’re seeing on [JetBlue].”

Rockwell Collins customers will also benefit from that company’s acquisition last year of Arinc. The purchase included the newest generation of Ka-band service for airline and business aviation customers under the GX Aviation banner.

The first of three GX Aviation satellites is already in orbit and undergoing final testing, with the second and third scheduled to be in place before year-end. Airborne hardware is in the production phase; testing and certification are anticipated early next year.

Rockwell Collins notes the system will provide Internet...
Refining User Interfaces and Adding Portability

Just as the capabilities of cabin electronics systems have evolved, so too have the graphical user interfaces (GUI) to control cabin entertainment, lighting and communications. Where once there were wired headset plugs and toggle switches adjacent to cabin seating, passengers on board today’s business aircraft will more likely find touchscreen displays either hardwired to the panel, or even with the ability to control their environment from the palm of their hand.

Providing passengers with direct control of their seating environment is a key selling point for OEMs. Cessna bills its Clarity CMS, standard on the Citation X+ and Sovereign+, as “an intelligent cabin management and entertainment technology solution integrated with the aircraft’s avionics and electrical systems.” Touchscreens located at each seat provide passengers with cabin lighting, window shade and environmental controls, as well as data and power ports. Wi-Fi media sharing capabilities are available, allowing connectivity to other passengers and streaming to portable electronic devices.

Cabin Essentials, Ovation Select and Venue also offer the capability to operate cabin controls through an app running on a handheld tablet or smartphone. While Apple’s iOS was once the sole platform for these apps, other operating systems are gaining in popularity.

“Our roadmap for Venue is in line with the consumer market,” said Ho with Rockwell Collins. “Everyone has a tablet, and in particular the Android platform is becoming more popular. As a result, we are porting our existing iOS cabin remote apps over to Android devices.”

“Customers appreciate the higher level of control,” added Honeywell’s Dye. “No matter what kind of device the customer has, the interface should be common.”

Dye noted that when differentiating between Apple’s iOS and Google’s Android, individual preferences tend to be segment-specific and—in particular—region-specific. “iOS dominates the market in North America and is growing in China,” Dye said. “Outside those areas, however, Android rules the game.

“As another example of how quickly our industry moves, we can also look at the growing market for Windows-based devices,” he continued. “Just six months ago, we weren’t sure whether our next port would be to Windows OS or BlackBerry. However, it soon became clear that the latter probably wasn’t where we wanted to go.”

Lufthansa Technik Moves To Diversify Cabin Amenities

Cabin systems also represent a sizable business for MRO provider and aircraft outfitter Lufthansa Technik. The company’s Nice HD CMS is available from several OEMs on aircraft ranging from the A320 series and BBJs and 747s to some Bombardier and Learjet business aircraft, including the upcoming Learjet 85.

David Crossett, principal executive for innovation sales and support with the company, noted that Lufthansa Technik is looking to move past its existing CMS offering. “Our next step is a follow-on product that moves into even greater bandwidth and more futuristic algorithms for video. Our intent is moving away from disc-based movies, to movies stored on a server aboard the aircraft.”

The company will soon release a new content service product that Crossett likened to “Netflix in the Sky,” offering licensed Hollywood movies through its IDair joint venture with Panasonic. The first installation will be on a Challenger 350 scheduled for delivery this month.

“Ultimately, every aircraft featuring Nice HD will be delivered with a media center stocked with licensed content,” Crossett added. “The aircraft will come with a complimentary two-month trial, with a subscription-based continuation available past the trial period, with the ability to store between 30 and 40 titles out of a library of thousands.”

As with IDair’s airline system, Crossett noted that content will include “early window” offerings not yet available on DVD. The system will be rolled out regionally, with Europe and the Middle East following the system’s introduction to North American operators.

Seeing a potential market for lower-priced entertainment solutions, Flight Display Systems launched an entry-level IFE platform in July, called Jetstreamer. Offered at roughly half the price of a JetJukebox installation, Jetstreamer allows wireless streaming of movies, music and other content stored on board the aircraft server to tablets, laptops and smartphones, without an external Internet connection. The system connects to the aircraft Wi-Fi router and allows content streaming to as many as eight devices.

“We know that aircraft owners are looking for cost-effective ways to include carry-on devices in in-flight entertainment, especially without an Internet connection,” says FDS president David Gray. “Jetstreamer allows passengers access to a library of content.”