Challenges of Aircraft Inflight Entertainment & Connectivity Systems

For years, inflight entertainment systems have been helping to break the tedium of air travel for passengers on long flights. In recent years, the proliferation of mobile devices such as smartphones, tablets, and laptops has led to a new trend of inflight connectivity: offering WiFi connections to passengers that allows them to access inflight and other entertainment content on their personal devices. This is a positive for both airlines and their customers; however, it does present some issues.

Using these modern inflight entertainment and connectivity (IFEC) systems, passengers are able to connect enroute with their personal devices and enjoy content of their choosing. This is a significant advantage for consumers who often choose premium airlines over budget options for extended flights because of their IFEC systems. Furthermore, these WiFi based systems reduce maintenance costs relative to embedded alternatives. They also have the potential to remove almost all of the sometimes miles of wiring necessary for traditional IFE systems[i]. IFEC systems are

WiFi Connections for Personl Devices, the Future of IFE

even offering new and innovative sources of revenues for airlines such as enhanced in-flight retailing.[ii]

Of course, they are not without their issues. Many security concerns arise from passengers being able to connect their devices to aircraft systems. Furthermore, reliability continues to be an issue for these satellite based connections. Addressing these challenges will be a continuing challenge for the industry over the next few years.

Cyber Security In Flight

One of the most significant issues for new IFEC systems is ensuring that passenger data is discrete from operational data. This breaks down into two core areas of concern. The first is simply ensuring that flight data is being handled by a robust system and that it will not be affected by any fault in the passengers' connection. The second, and arguably more serious, concern is that someone connected to the

passengers' inflight WiFi may be able to maliciously access the plane's operational systems.

Cyber security firm IOActive recently reported that it has found a number of flaws in the most common inflight WiFi systems. In fact one of its consultants has apparently managed to access a plane's satellite communication systems through the IFEC system.[iii] This further raises concerns that these progressive entertainment options may be opening serious security vulnerabilities. Among the issues cited in the firm's report are hard-coded credentials that are accessible through firmware vulnerabilities, insecure and undocumented protocols, backdoors, and other high-risk vulnerabilities.[iv] These types of security issues are not uncommon, in fact hard-coded credentials exist to facilitate maintenance and servicing; however, they highlight the necessity for aircraft systems to be held to a higher than typical standard of security.

Some security experts have even hypothesized that the ill-fated Malysian Airlines flight MH370 may have fallen victim to an individual maliciously accessing the aircraft's systems.[v] The general consensus is that this was not the case; however, whether the cause of this crash was a cyber-attack, the possibility does underscore the importance of addressing these potential issues with urgency. Even Boeing, whose 777 aircraft have been highlighted for a potential security fault,[vi] have spoken up that the aerospace industry must be proactive in ensuring the safe and secure setup and usage of IFEC systems.[vii]

The FAA's regulations state that any electronic system in an aircraft must not compromise the safe operation of the plane in the event of failure.[viii] IOActive's report not only suggests that aircraft's systems may be vulnerable from malicious intrusion but that inflight connectivity may be linked with operational systems in a way that could present safety issues even in the event of an accidental fault.

Fortunately, recent regulatory action is pushing aircraft with IFEC systems to meet higher standards than previous aircraft in order to ensure safe flight.[ix] In particular a ruling by the FAA a year ago stated that Boeing 777 aircraft would have to "ensure that the security (i.e., confidentiality, integrity, and availability) of airplane systems is not compromised by unauthorized wired or wireless electronic connections between the airplane information services domain, aircraft control domain, and the passenger entertainment services."

While it is likely that current IFEC systems pose a cyber-security threat to the safe operation of aircraft, there are also positive steps being taken by all interested

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parties to ensure that these systems are properly insulated from other critical components of the aircraft. Nonetheless, it will be essential for the industry to continue to push for improvements to the security of these systems until all vulnerabilities are satisfactorily addressed.

Reliability and Connectivity for In-Flight Entertainment

Another issue that is plaguing early IFEC systems is their inability to provide reliable connectivity for passengers. While this is not as severe a concern as security, it is a potentially significant issue for the various airlines that are vying to establish the supremacy of their inflight entertainment offerings.

It has become increasingly clear recently that passengers value highly the availability of in-flight WiFi, particularly on lengthier flights. In fact, a recent study showed that having connectivity comparable to home networks is a top priority for passengers, and that they would even be willing to endure other inconveniences if provided such solutions.[x] For the time being, that level of connectivity and reliability is unlikely; however, next generation systems that provide a satisfactory connection from providers like Gogo will likely be available soon.[xi]

The proliferation of mobile devices has made inflight WiFi a hot commodity for passengers. Offered the chance to consume content on their own devices while on planes, many travelers are opting to travel on premium airlines.[xii] This creates significant economic incentive for airlines and aircraft manufacturers to provide enhanced IFEC systems.

Motivated by the push for improved quality of service, the National Business Aviation Association has formed a subcommittee dedicated to the exploration or standards related specifically to IFEC systems.[xiii] This group will focus on "establishing common equipment, performance and serviceability standards," according to the founders.

Several providers are beginning to claim that their offerings will be able to rival ground-based connections.[xiv] Whether or not this holds true remains to be seen. Furthermore, it is uncertain how rapidly airlines will pick up these more modern systems. However, the popularity of bring-your-own-device (BYOD) based inflight entertainment systems seems to suggest that passengers will be calling for more modern solutions to aircraft connectivity soon.

Airlines Leading the Way with IFEC

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While many airlines are currently exploring or implementing limited inflight entertainment and connectivity systems, several front runners are setting the pace, at least for premium airlines. In particular, Air Emirates is quickly pushing towards offering inflight WiFi for free on its entire fleet.[xv] Currently passengers can get up to 10 MB of data for free and pay a nominal $1 for another 600 MB after that.[xvi] This is plenty for the vast majority of travelers; however, the airline believes that this is not enough and wants to offer completely free service to all travelers in the future.

Lufthansa has combined the paradigms of embedded and bring your own device inflight entertainment with an application that provides many functions of an embedded system through a tablet or mobile phone.[xvii] This is an interesting move that gives travelers the freedom to choose between consuming content provided by the airline or their own. Currently this application, called BoardConnect, is only available for Windows 8 devices.

Singapore Airlines has been taking an end-to-end focus on the travel experience. The airline recently invested significantly both in the development of new lounges and the development of a new embedded IFE system.[xviii] Although the airline is currently more focused on enhancing its embedded options, it is also evaluating the potential advantages of bring your own device setups.[xix]

A Boeing 777 with Embeded IFE

Regardless of approach, it is clear that premium airlines believe that their entertainment offerings present a significant competitive advantage, a perspective reflected by many consumers. After all, for many travelers, inflight entertainment is a must to break the tedium of long range flights.

IFEC Systems, a Key Focus for the Future

The advantages of IFEC systems both from the perspective of the airline and the consumer experience make it an extremely attractive, if not necessary, investment for airlines and aircraft manufacturers. With recent regulatory changes that have enabled travelers more lenient usage of their personal devices during flight, there is a clear movement across the aerospace industry toward systems that leverage personal devices for inflight entertainment.

However, these systems are not without their challenges. The most significant of which being potential cyber security vulnerabilities that must be addressed before IFEC systems become the norm. Beyond that, consumer experience issue such as slow and unreliable satellite connections will also continue to be a concern for the industry. All in all, though, it is clear that not only are IFEC systems here to stay, but also that they represent an attractive future for both providers and consumers alike.

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Maryruth can't help but seek out the keys to environmental sustainability - it's the fire that gets her leaping out of bed every day. With green writing interests that range from sustainable business practices to net-zero building designs, environmental health to cleantech, and green lifestyle choices to social entrepreneurism, Maryruth has been exploring and writing about earth-matters and ethics for over a decade. You can learn more about Maryruth's work on JadeCreative.com.

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