Airborne Internet: Network In The Sky

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Airborne Internet (A.I.) is an approach to provide a *general purpose, multi-application data channel* to aviation. In doing so, A.I. has the potential to provide significant cost savings for aircraft operators and the FAA, as it allows the consolidation of many functions into a common data channel. A primary application for A.I. is to track aircraft for the air traffic control system. Many other applications can utilize the same A.I. data channel. The applications available are only limited by the bandwidth available.

A.I. began as a supporting technology for NASA's Small Aircraft Transportation System (SATS). But there is no reason that A.I. should be limited to SATS-class aircraft. All of aviation, and even transportation, has the potential to benefit from A.I.

The principle behind the A.I. is to establish a robust, reliable, and available digital data channel to aircraft. Establishing the general purpose, multi-application digital data channel connection to the aircraft is analogous to the connection of a desktop computer to its local area network, or even the wide area network we call the Internet. But aircraft are mobile objects. Therefore, mobile routing is required to maintain the data channel connectivity while the aircraft moves from region to region.

The desktop computer, whether used in the office or the home, runs many different applications that can all use the same data channel. The applications are designed around the Internet Protocol (IP) standard to take advantage of the existence of the network connection to the computer. Airborne Internet is built upon the same model. A.I. will provide a general purpose, multi-application data channel that numerous applications can use. By combining application and data functionality over a common data channel, aviation has the potential to significantly reduce costs for equipage on the ground and in the aircraft.

If aircraft utilized IP as network computers do, functions in the cockpit could be enabled not currently being provided. It could open up a whole new set of operating capabilities, cost savings, safety and efficiency for tomorrow's aviation industry. The functions provided today that require the use of multiple on-board systems could be reduced to two simple systems.

First, a rigorous and dependable method to maintain the airplane's connection to the ground-based IP network is needed. This function is feasible using a combination of VHF radio (as is used for today's aircraft communications) and an alternate, backup communication method. A satellite communication system could be employed for aircraft that fly in sparsely populated areas that are beyond VHF coverage of the existing NAS infrastructure, or for any aircraft that might lose VHF coverage (even temporarily). Satellite communication is currently being used for trans-oceanic flight today in which aircraft are clearly beyond range of the VHF radio system in the NAS.

Second, a means of accurately determining an aircraft's position is required. Current technology in GPS receivers provides position information reliably and accurately. WAAS and LAAS are aviation systems that utilize GPS and provide error correction to allow aircraft the accuracy needed for navigation and landing.

By combining the GPS provided position information of any moving aircraft (or other vehicle) with reliable mobile network connectivity, the aircraft's position could be constantly reported to the ground network for processing. Further, this data could be intelligently parsed to provide position and tracking information back to aircraft so its flight crew could be aware of other aircraft movement in its proximity. Air-to-air position reporting is possible (such as Automatic Dependent Surveillance-Broadcast, or ADS-B) if the proper radio method is used.

In the end state, it is possible that enough aircraft could utilize the A.I. architecture to create a virtual network in the sky. At any given moment, there are between 4500 and 6000 aircraft in flight over the United States. Air transport aircraft could not only use A.I. for their own purposes, but they could provide a network router function that could sell excess bandwidth to other less bandwidth-demanding aircraft. This network in the sky not only reduces equipage and saves system costs, it could create a revenue stream for air carriers that does not currently exist. It becomes a win-win situation for aviation.

For more information, the reader is encourage to visit http://www.AirborneInternet.com

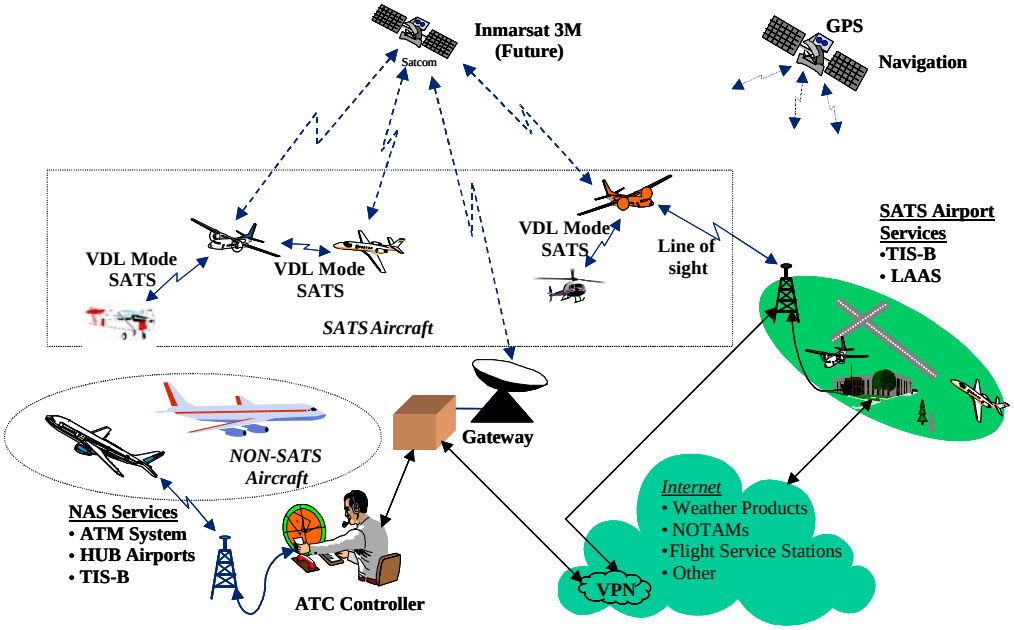

Figure 1: SATS Airborne Internet Conceptual Operation

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