A

Seminar report

on

Airborne Internet

Submitted in partial fulfillment of the requirement for the award of degree of MCA

SUBMITTED TO: **SUBMITTED BY:**

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Preface

I have made this report file on the topic **Airborne Internet**; I have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude to …………..who assisting me throughout the preparation of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.

Introduction

The word on just about every Internet user's lips these days is "broadband." We have so much more data to send and download today, including audio files, video files and photos, that it's clogging our wimpy modems. Many Internet users are switching to cable modems and digital subscriber lines (DSLs) to increase their bandwidth.

There's also a new type of service being developed that will take broadband into the air. In this paper, we'll learn about the future of the Airborne Internet. We'll take a look at the networks in development, the aircraft and how consumers may use this technology.

Land-based lines are limited physically in how much data they can deliver because of the diameter of the cable or phone line. In an airborne Internet, there is no such physical limitation, enabling a broader capacity.

The airborne Internet will function much like satellite-based Internet access, but without the time delay. The airborne Internet will actually be used to compliment the satellite and ground-based networks, not replace them. These airborne networks will overcome the last-mile barriers facing conventional Internet access options.

What is Airborne Internet

Also known simply as AI, the airborne Internet is a communication network that is designed to include nodes or points of contact or interaction on different types of aircraft.

First conceived in 1999, the idea of an Internet communications and delivery system that is air-based for use by passengers and crew on airplanes has undergone some revisions over the years, especially as technology continued to advance during the first decade of the 21st century.

In additional to consumer applications, the airborne Internet is also perceived as being a means of creating a communications and information network that could be used in emergency situations or as part of military strategies.

The idea behind the airborne Internet is to eliminate the need for any type of communications infrastructure that is land-based.

Instead, the equipment needed to create the network would be installed in aircraft of different types, essentially making it possible to maintain communications and information flow even if key facilities located on the ground were rendered inoperable. At the same time, the air-based Internet would have full capability to interact with land-based facilities when and as practical.

Works of Airborne Internet

The concept seems pretty simple, have a plane flying over head in a pattern carrying long range 4g transmitters, transmitting internet across the city. Looking into the triginomotry in this, it could potentially cover an area of up to 30-40 miles.

I ran some numbers, and to have 2 Beechcraft Barons flying so that one was always in the air, it would cost $5,000 a day roughly. If you had 5,000 customers, paying $30 a month for high-speed internet from this service, then doesn't this business venture sound like it has potential?

A used aircraft would cost around $250,000 and around $50,000 to outfit it with the transmitters roughly, meaning the total cost would be around $300,000 to cover a city (50 mile radius) with this, currently, cell phone towers cost 150,000 to 200,000 and in cities, only cover a few miles. Doesn't this seem plausible?

This plane would fly a few miles over the Earth, which is about how far away some cell towers are from consumers, and there would be air between the plane and the reciever, not buildings and walls, extending the range.

In order for consumers to pick up on the signal, a home base station would be used that could power an antenna to provide high upload and download speeds.

The aircraft would essentially be a "wireless router" in the sky, transmitting all of the data to a base station that has a backbone connection to the internet.

REQUIREMENTS

- The airborne Internet won't be completely wireless. There will be ground-based components to any type of airborne Internet network.

- The consumers will have to install an antenna on their home or business in order to receive signals from the network hub overhead.

- The networks will also work with established Internet Service Providers (ISPs), who will provide their high-capacity terminals for use by the network.

- These ISPs have a fiber point of presence -- their fiber optics is already set up. What the airborne Internet will do is provide an infrastructure that can reach areas that don't have broadband cables and wires.

IMPLEMENTATION SYSTEMS

Three companies are planning to provide Airborne Internet by placing aircrafts in fixed patterns over hundreds of cities.

Angel Technologies

Angel Technologies Corporation, with headquarters in St. Louis, Mo., is a privately-held wireless communications company using proprietary High Altitude Long Operation (HALO™) aircraft to deliver services worldwide. Augmenting terrestrial towers and orbiting satellites, Angel's HALO aircraft will fly fixed patterns in the stratosphere above major cities to deliver metropolitan wireless services at lower cost, with increased flexibility and improved quality of service.

Sky Station International

Sky Station International has pioneered technology that utilizes a solar powered lighter-than-air platform held geostationary in the stratosphere to provide high capacity wireless telecommunications services to large metropolitan regions. Worldwide regulatory approval for the use of stratospheric platforms was granted by the ITU inNovember 1997 and by the U.S. Federal Communications Commission (FCC) earlier that year.

Aero Vironment With NASA

AeroVironment Inc is a technology company in Monrovia, California, and Simi Valley, California, that is primarily involved in energy systems, electric vehicle systems, and unmanned aerial vehicles (UAVs). Paul B. MacCready, Jr., a famous designer of human powered aircraft, founded the company in 1971. The company is probably most well-known for developing a series of lightweight human-powered and then solarpowered vehicles.

Application

- 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.

Architecture Development Airborne Internet

An architecture defines the structural and collaborative relationships of system components. Often described using views (e.g., functional, component, implementation, temporal, user), the architecture provides information to guide system and software developers during initial development and inevitable system improvement activities.

In addition to defining the functional and physical relationships between system components, an architecture often provides design guidance in an attempt to achieve other desirable objectives such as efficient resource utilization, incremental development, verifiability, use of COTS products, ease of maintenance, and system extensibility.

Developing a SATS Airborne Internet architecture consists of the following steps:

1) Understand the SATS operational concepts

2) Define system level requirements

3) Investigate and evaluate the external environment

4) Identify trends and issues that must be addressed

5) Apply modern system design techniques, i.e., design patterns to identify key design elements

6) Document the result and submit for review

Understand the SATS operational concepts – Everyone tends to relate to SATS in a unique way. It is more a new way of thinking about air transportation than a technical concept that beckons to be explored. This leads to a variety of definitions of what SATS is – or should be. To bound the AI architecture problem, we developed a set of system operation assumptions. A sampling of these key assumptions are listed below:

- Pilot – Until such time as highly automated systems can be fully tested and certified, SATS aircraft will have at least one qualified, instrument rated pilot on board. Because of the level of automation on board, the SATS system will enable this pilot to be much more proficient and able to fly in nearly all weather conditions into a large number of minimally equipped airports.

- Airspace – SATS aircraft will share airspace with non-SATS aircraft. This implies a minimum level of system compatibility and equipage in both SATS and non-SATS aircraft. SATS aircraft en route will operate in Class A airspace, SATS aircraft landing at small/medium sized airports will operate in Class C, D, or E airspace.

- Avionics – in addition to the minimum set of avionics required of normal IFR1[2] aircraft, SATS aircraft will have on board additional avionics equipment to enable the pilot to operate in near all-weather situations. If SATS is to be prototyped in 2005 and operational in 2025, this equipment will need to be compatible with systems used by commercial and general aviation airports to not require expensive new ground support systems not currently planned by the FAA.

- Flight rules – to meet its objectives, SATS aircraft will need to be able to access small and medium sized airports. These same airports currently support VFR2[3] traffic in addition to IFR traffic. Flight rules will have to be modified to support a mixture of IFR, VFR and SATS traffic.

Define system level requirements – Specific, verifiable requirements for a SATS communications system must be developed. The communications system is unique in that it is both an end system and an enabling infrastructure.

As an end system it must provide pilot-controller, pilot-pilot, and pilot-flight operations communications. As an enabling infrastructure it must support applications associated with navigation, surveillance, and other functions.

Requirements need to be developed in the traditional areas of communication, navigation, and surveillance, including both avionics and ground infrastructure, consistent with the infrastructure defined in the task below.

System level requirements also need to be developed for onboard flight management and sensor/actuator systems capable of providing the level of support necessary to achieve the SATS goal of two crew performance with a single crew member. Other requirements will include support for passenger support systems

Investigate and evaluate the external environment – SATS, although a revolutionary transportation concept will have to work within the National Airspace System (NAS). This is true both during SATS prototyping in 2005 and during full-scale development, in 2025. The NAS itself is evolving necessitating developing an understanding of the capabilities of NAS over time.

This can be very tricky as the NAS is subject to many forces that are political, not technical, and as such is difficult to predict. For example, there are currently three competing communication technologies to provide aircraft-aircraft position reporting.

Clearly, there is agreement that position reporting is desirable, but which technological approach will survive is like trying to choose between VHS and Betamax before the marketplace has spoken.

Identify trends and issues that must be addressed – To be successful, SATS must function within the context of technology evolution and systems development. We present a summary of some of the trends and issues in the next section of this paper.

Apply modern system design techniques – SATS presents an ideal opportunity to apply object-oriented design techniques for the collection, analysis and documentation of system architecture. Elements of the resulting design include:

- Design patterns to identify key components of the design
- Layers of abstraction to minimize coupling of user level functionality to implementation details
- Exploitation of natural cohesiveness, common software functional patterns
- Communications protocols between major functional objects

Document the result and submit for review – Peer review is a vital step in the development of an architecture for a system as complex and safety critical as a new aircraft transportation system.

CONCLUSION

Thus this airborne internet technology has a wide range of utilities in the field of aviation services like aircraft monitoring and air traffic management, weather information etc., and also provides an opportunity for the passengers to access the internet at very high altitudes that is, in the aeroplanes and other conventional services.

This new technology has already begun creating splashes in the industry.
With the advent of Airborne Internet the remote sections of the world may get into main frame development.

However, the technology still has to undergo testing of potential network performance.
Facility to increase the antennas to control the traffic needs to be provided.
Economic feasibility of the project also needs a review.

Thus it is a further new trend in this mobile world which is establishing the connectivity by building network in the air.

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