Airborne Internet- Overview, Working And Its Applications

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Abstract : Airborne network is an emerging field in the wireless networks. They can provide an interconnected digital data network between aircraft, and between aircraft and the ground. It has the potential to change how aircraft are monitored and tracked by the air traffic control system, and how they exchange information with and about other aircraft. Critical information such as weather, turbulence, and landing conditions can be transferred, as well as the distance between aircraft .In this paper we were discussing about the airborne internet, architecture of airborne internet ,working, advantages and its applications.

***IndexTerms* - Airborne internet, Working ,Airborne Network Architecture, Applications**

I. INTRODUCTION

Airborne Internet is a private, secure and reliable peer-to-peer aircraft communications network that uses the same technology similar to commercial Internet. It is an implementation which connects aircraft to a ground-based Internet access node, including the information which is passed across this communication link. It provides airborne access to wealth of Internet information and resources. It is convenient and has several uses like flight planning, en route reservations, travel arrangements. It is useful in providing the information about weather, surrounding airspace environment and for aircraft-to-aircraft communications[4]. Land based lines are limited physically in how much data they can deliver because of the diameter of the cable. In airborne Internet, there is no such physical limitation for enabling a broader capacity. It provides an opportunity for the passengers to access the internet at very altitude that is in aero plane and in other conventional services. Airborne Internet began as a supporting technology for NASA's Small Aircrafts Transportation System[1].

Components for installation of airborne internet are:

1.External antenna.

2.Internet hub installed in aircraft.

The security applications include flight tracking or deviation monitoring, in-flight video monitoring, cockpit voice or video recording.

Airborne Internet

II. AIRBORNE INTERNET

The Airborne Internet is a proposed network in which all nodes would be located in aircraft. The network is intended for use in aviation communications, navigation, and surveillance (CNS) and would also be useful to businesses, private Internet users, and government agencies, especially the military. In time of war, for example, an airborne network might enable military planes to operate without the need for a communications infrastructure on the ground. Such a network could also allow civilian planes to continually monitor each other's positions and flight paths[5].

The airborne Internet won't be completely wireless. There will be ground-based components to any type of airborne Internet network[6]. 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 are 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. Shown in Figure 1.

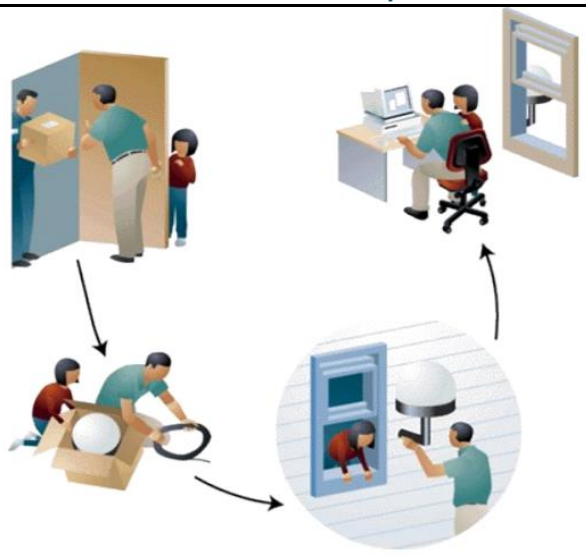

Figure 1: Photo courtesy Angel Technologies (Airborne-Internet systems will require that an antenna be attached to the side of your house or work place)

III. WORKING

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 (DSL's) to increase their bandwidth. There's also a new type of service being developed that will take broadband into the air. Shown in figure 2.

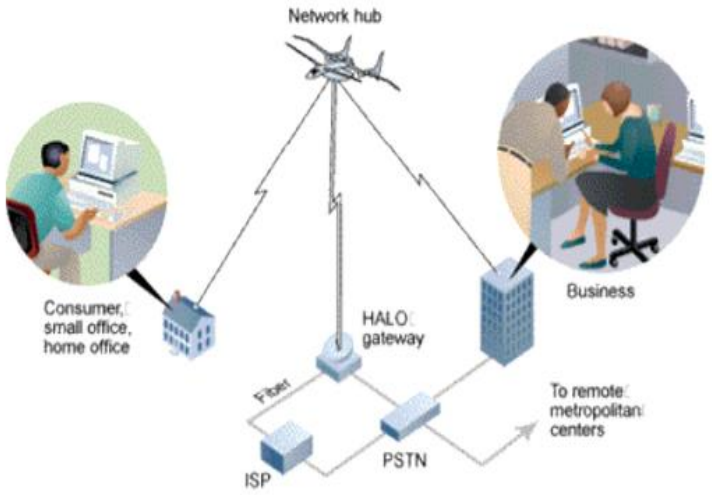

Figure 2: HALO Network will enable a high-speed wireless Internet connection

At least three companies are planning to provide high-speed wireless Internet connection by placing aircraft in fixed patterns over hundreds of cities. Angel Technologies is planning an airborne Internet network, called High Altitude Long Operation (HALO), which would use lightweight planes to circle overhead and provide data delivery faster than a T1 line for businesses. Consumers would get a connection comparable to DSL. Also, Aero Environment has teamed up with NASA on a solar-powered, unmanned plane that would work like the HALO network, and Sky Station International is planning a similar venture using blimps instead of planes. Now we'll look at the networks in development, the aircraft and how consumers may use this technology at their homes[7].

IV. AIRBORNE INTERNET ARCHITECTURE

Airborne Network is a MANET infrastructure that provides communication services through at least one node that is on a platform capable of flight . Airborne networks are communication networks consisting of both ground nodes and airborne assets. Owing to the limited dependence on current infrastructure, they can be considered a special kind of ad hoc networks; they can also be ordered as "opportunistic networks "[2]. The network is intended to use in aeronautics Communications, Navigation, and Surveillance (CNS) and are also useful to private Internet users, businesses, and government agencies, especially the military. At least three different ways are proposed for placing communication nodes alot. The first way is the manned aircraft, the second

way uses unmanned aircraft, and the third way uses blimps. The nodes may provide surface to-air, air-to-air, and surface-to-surface communications. The flight nodes or blimps can hover at altitudes of around 16 km and can cover regions of about 64 km in radius. Airborne networks incline to show high heterogeneity. For example, combat planes and interceptors show high mobility and aircraft movements may cause contacts to spasmodically go down due to antenna mis alignment[2]. Shown in figure 3.

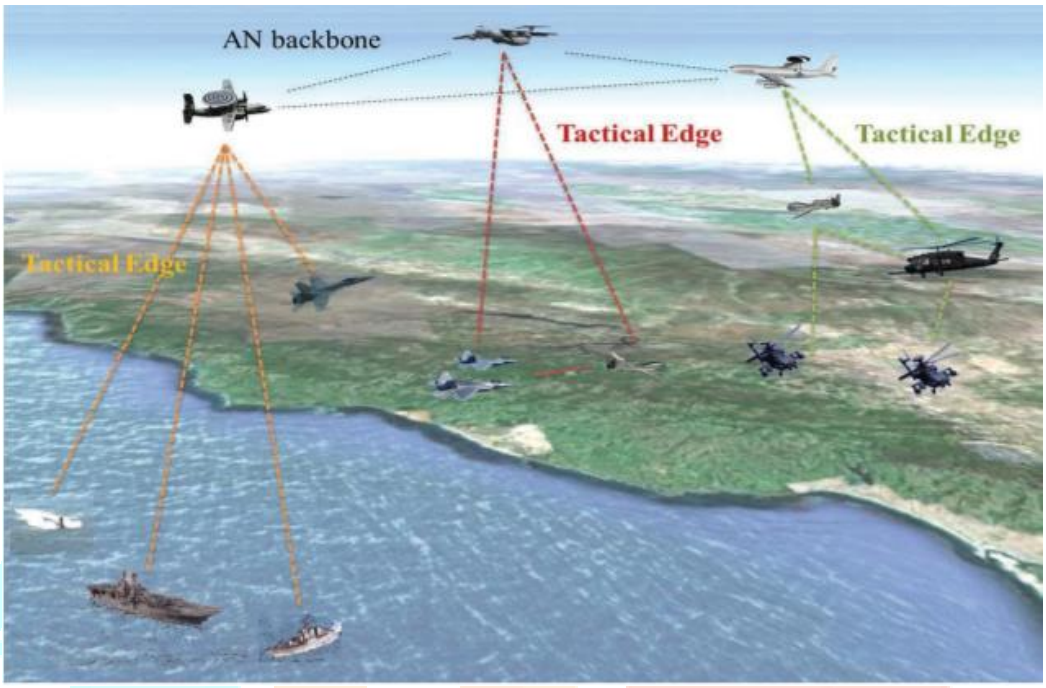

Figure 3: Airborne Network Architecture

Airborne networks are often categorized by the presence of such intermittent links. Such kind of aircraft in the network will effect in dramatic changes in topology and temporary connection failures. Aircraft which have much lower speed, like Unmanned Aerial Vehicles (UAVs) and helicopters, can hover around a particular region. Handheld radios which are used as ground assets have less mobility, and are inhibited by restricted battery life. Although traditional ad hoc routing protocols are intended for mobile nodes, they may not be certainly suitable for airborne nodes because of high-speed motion and recurrent connection interruptions [2]. Operative and capable routing protocol for airborne networks must adjust to heavy motion, ever changing topology and diverse routing abilities.

V. APPLICATIONS

There is always a need for high capacity and throughput in aircraft communications both in military and civil aviations. The military specifically transmits and receives video, data, voice and other information among various dismounted, maneuver force elements, air-borne and maritime assets. So the need for better performance gives way to the demand for high band-width which in turn increases data rate. FSO has various applications such as

Security management : It is not detectable and no license is required so it can be used as a last mile access providing high data rate without any kind of interference.

Enterprise connectivity :As FSO are easily upgradable so they can be used to connect two buildings or among buildings with Local Area Wireless networks (LANs), Storage Area Networks (SANs). Thus it can be used to establish a link between buildings, ships, aero-planes to ground stations.

Defense : since these are easy to deploy and have more reliability so they can be used in military operations may it be for communication or rescue operation[3].

Disaster recovery : During any natural calamity all the established links get ruptured so at that time FSO or hybrid FSO/RF can be used as a backup and the further operation can be carried on.

Mobile backhaul connectivity : It can be used to extend the network of cellular phones, bring traffic back to any specific channel or take it to any base station with a very high speed.

VI. ADVANTAGES

i) Increase productivity and economic growth: The growth in connectivity will enable higher volume aircraft operations and allow people in transit to use otherwise unproductive time.

ii) Lower cost : Flight deck functions in the aircraft will be consolidated and the number of required radius will be reduced, which will save aircraft owners money in addition to weight and space[1].

iii) Increase security, reliability and scalability.

iv) Reduce risk.

v) Increase innovation.

vi) Increase flexibility.

VII. 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. 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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