Sky Mobile

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Abstract:

In the present day world, **Mobiles** have been playing a major role in better communication between one person and another. Air passengers are required by the law to switch off their mobile phones on board any flight. In this regard it is very important to maintain the consistency of communication even as a user flies in an Airplane. As a result many techniques have been introduced to meet the above requirements.

Sky Mobile is one such technique which provides support for both the user and the service provider for the communication in a easier and efficient way. This paper is an application of low frequency (LF) i.e. **BLUE-TOOTH** which is commonly used in short networks. We are placing a solution for mobile phones user's to use their mobiles on Airplanes that will be safe and helpful for both customer and service provider i.e. traveling consumer and mobile companies. This solution enables the user to remain connected in flight; the switch over from the cellular network to the **in-flight Bluetooth network** does not require any user initiation or change of the mobile handset. Here we make use of **Bluetooth Airplane Gateway (BTAG)** to detect the mobile phones while boarding and **Ground Switching Center (GSH)** to record the incoming calls and outgoing calls. Hence the user uses his handset as usual and not affecting the aircraft signals and the communication continuesnaturals

1. INTRODUCTION

Air passengers are required by the law to switch off their mobile phones on board any flight. This requirement has been imposed due to the two reasons.

- First, signals emitted by the mobile phones interfere with the Air Traffic Control (ATC) signals, undermining the safety of the flight.
- Second, a mobile at such an altitude connects to multiple base stations simultaneously, clogging the resources of the ground network. Sky mobile is the novel solution based on the integration of the diverse communication links: Bluetooth, cellular network (GSM/1S-95), PSTN and Air to ground connections.

This solution enables the user to remain connected in flight, the switch over from the cellular network to the in-flight Bluetooth network does not require any user initiation change of

2. SYSTEM OVERVIEW

- The switch over from cellular network to the Bluetooth network is automatic, not requiring any user initiation.
- The user phone number stays the same & he may receive calls on his usual mobile.
- No change of handset is required while boarding a flight.

Here the Bluetooth Airplane Gateway (BTAG) detects mobile phones as soon as it enters the airplane. The Bluetooth airplane gateway (BTAG) instruct the mobile phone to send the message to the cellular network (GSM), asking it to forward all incoming calls for the mobile to an assign number at the Ground Switching Center (GSH). This is done just before takeoff. The cellular network connection is switch off, resulting in all hazardous

2.1 Requirements

- The system should be able to establish connection with negligible failure rate.
- The voice quality should be comparable to that of cellular networks.
- Sufficient security measures should be provided to prevent unauthorized usage.

3. System Operation

the mobile handset. Bluetooth, due to its power and short range and frequency hopping present negligible interference to ATC signals. When the passenger enters the plane, call forwarding is set up from the cellular networks to Grounds Switching Center and hazardous GSM emissions of the mobile phones are automatically switch off. All voice (or data) is received at GSC and transferred to an air ground to link to the Bluetooth airplane gateway (BTAG)in the plane.

Data received at BTAG is finally transmitted over an in flight Bluetooth network to the passenger here a Bluetooth enabled GSM phone is implemented on a laptop using a GSM modem and a Bluetooth kit &the ground switching center using a phone modem for connecting to the PSTN the automatic set up of various communication hops, call routing & transmission of voice over these link has been demonstrated, the system provides a unique & useful service is & perceived to be highly marketable.

Emissions from the handset being switch off. The handset is now connected through a Bluetooth link to the BTAG, which is in turn connected GSC over an approved air to ground link.

All incoming & outgoing calls are connected through the GSC to BTAG, which forward them to the mobile phone, thus allowing the user to make or receive calls on the usual handset. To execute the above steps this system needs to perform the following task:

- Automatic detection of mobile phones entering the airplane an exchange of specific instruction for call forwarding and GSM switch off.
- Establishment of reliable communication link across diverse network: the cellular network (GSM), the public switch telephone network (PSTN) and the in - flight Blue tooth network.
- Transfer of voice data across this composite communication channel.
- Authentication to provide security & prevent misuse.
- Bluetooth airplane gateway (BTAG)
- Ground switching center (GSC)

There are three *software modules:*

- GSM module (interfaces to the GSM Network)
- PSTN module (interfaces to the PSTN)
- Bluetooth module (to carry out voice communication over blue

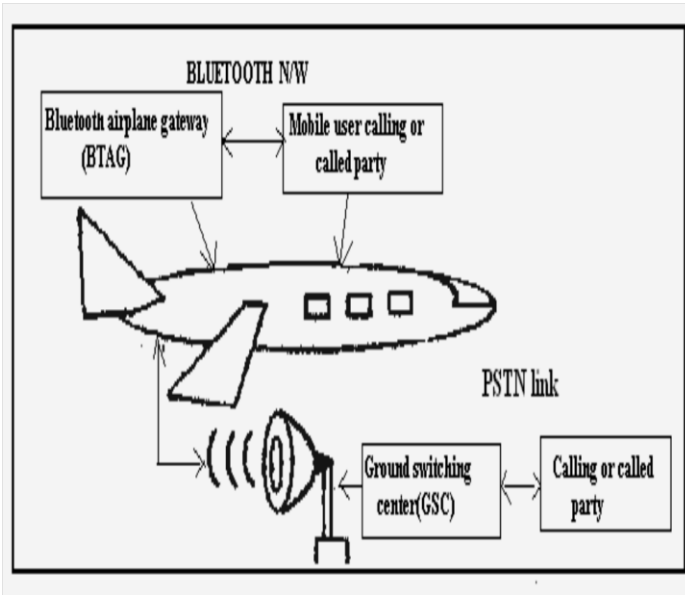


FIG.1 BLOCK DIAGRAM OF BLUETOOTH NETWORK

4. SYSTEM SPECIFICATION

The main modules of the sky mobile system are described in the following:

4.1 The Mobile Unit

5. SOFTWARE

The software system has been divided into the following modules:

5.1 Bluetooth module

The Bluetooth module is the software program from which other module is invoked. The functions of this module are:

- Automatic connection establishment and maintains.
- Sequential invoking of the various modules required for the Integrated system operation.
- Voice transfer over ACL Bluetooth link.

6. The GSM Module

The Bluetooth module invokes the GSM module when the GSM module has to be instructed as described in the system operation. The GSM module first initializes communication with the GSM module through the serial port. This initialization is performed by the GSM -connect tool explained later The module instruct the GSM module by sending GSM 7.07/7.05 AT commands in ASCII format across the RS-232 serial interface. The various tasks performed by this module and the corresponding

GSM-AT commands are described in Table Design Tradeoffs The GSM module is driven by events occurring in the Bluetooth module .For every event, it passes on a serious of commands to the GSM module.

7. PSTN module

The Bluetooth module execute in a synchronization with the PSTN module at the BTAG-GSC end, as mention in the system operation .The PSTN module has been developed to enable the

mobile at the GSC. The PSTN module provides the following features:

2) Accepting a Call

When the device moves from IDLE state, the module waits for fixed number of rings before taking the line off the hook and then the answer the call. This action places the line

Bluetooth enable GSM phones (MU) are implemented on laptop using GSM modem & Bluetooth & Bluetooth kit. It communicates with the BTAG through BT link. In-flight BTAG this unit consists of a pc connected to the provided

Bluetooth kit through USB.

We have utilize the universal serial bus (USB) interface rather than the serial interface since the provided AR1 for the USB could be directly use .The BTAG handles the network of Bluetooth port installed within the flight. It also takes care of routing voice data to the appropriate mobile phone through the corresponding Bluetooth port. The BTAG connected to the GSC over the air to ground link.

4.2 Ground Switching Center (GSQ):

The ground-switching center consists of a pc connected to a phone modem. The modem is standard GVC 56 K speaker phone modem connected to the pc through its serial port.

4.3 Implementation notes

In this current implementation, the ground-switching center (GSC) and the in-flight BTAG reside on the same pc. The air - to-ground links are proprietary and hence in accessible. Therefore, this link has been collapsed on the same pc.

- We have implemented an in-flight Bluetooth consisting of one BTAG and one enabled mobile phone.

The Bluetooth module on the BTAG continuously scans the environments for Bluetooth enable devices. All Bluetooth devices that come in range of the BTAG well capture one or more of the enquiry messages being broadcast by the BTAG & may reply to it. This module handles the replies sequentially & learns the Bluetooth device addressed of every replies. An asynchronous connectionless (ACL) link is then established with the devices that reply. Service Discovery Protocol(SDP) is used to

Determine whether device is mobile and whether it wants sky mobile service.

handling off calls arriving at the landline forwarding number assign to user's

mobile at the GSC. The PSTN module provides the following features:

- Accepting calls from a landline caller and establishing a connection on the PSTN.
- Signaling to the BTAG to indicate call arrival.
- Streaming voice obtained from the BTAG over the PSTN connection &vice versa.
- Directing a call from the Mobile Unit to a phone number on the ground

7.1 Working

1) Initializing the line, Initialization consists of four steps

- Opening a logical line device.
- Negotiating the TAPI version to use.
- Getting the line device capabilities.
- Selecting the first device is the module configuration the line.

in the ACCEPTED state, which it goes into a CONNECTED state.

3) Signaling to Bluetooth Airplane Gateway (BATG) As soon as the call is answer (line is placed of the hook), it send the signal to the BTAG indicating call arrival.

4) Voice streaming Voice uses the wave device identifier (for the line) and the voice tool Junctions. The voice data capture

from the PSTN line transferred to the BTAG and vice versa. Voice is played out and recorded using the voice tool on output &input wave device identifier respectively, of the telephone line (obtain during line initialization).

5) Calling A Number

Given a phone number to be called the PSTN module hands. The voice data capture from the PSTN line transferred to the BTAG and vice versa. Voice is played out and recorded using the voice tool on the output &input wave device identifier respectively, of the telephone line (obtain during line initialization). The voice tool provides non-blocking playback and recording support duplex voice.

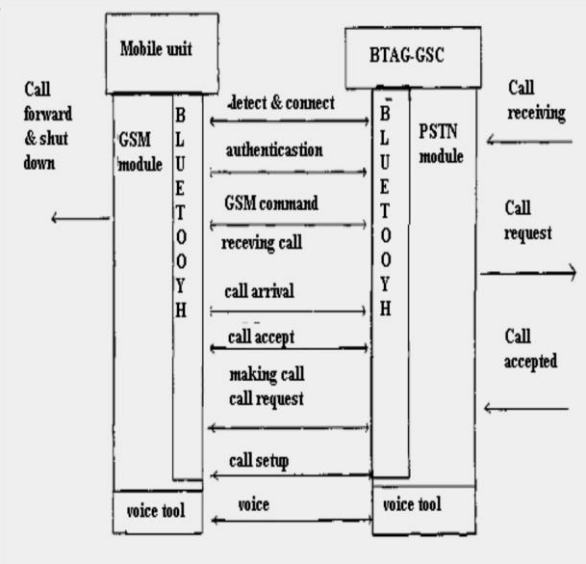
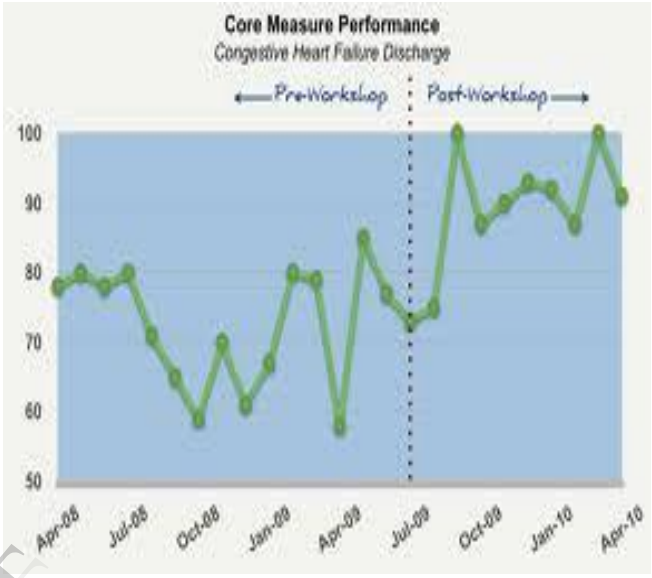


Fig. 2 Interaction Between Mobile And Btag Gsc Unit



8. Conclusion

In this paper we have presented a detail study of sky mobile techniques and how the technology has improved to use the users mobile in the air planes in spite of the law which avoids it.

Sky Mobile is one such technique which provides support for both the user and the service provider for the communication in an easier and efficient way. This paper is an application of low frequency (LF) i.e. **BLUE-TOOTH** which is commonly used in short networks. We are placing a solution for mobile phones user's to use their mobiles on Airplanes that will be safe and helpful for both customer and service provider i.e. traveling consumer and mobile companies. This solution enables the user to remain connected in flight; the switch over from the cellular network to the **in-flight Bluetooth network** does not require any user initiation or change of the mobile handset.

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