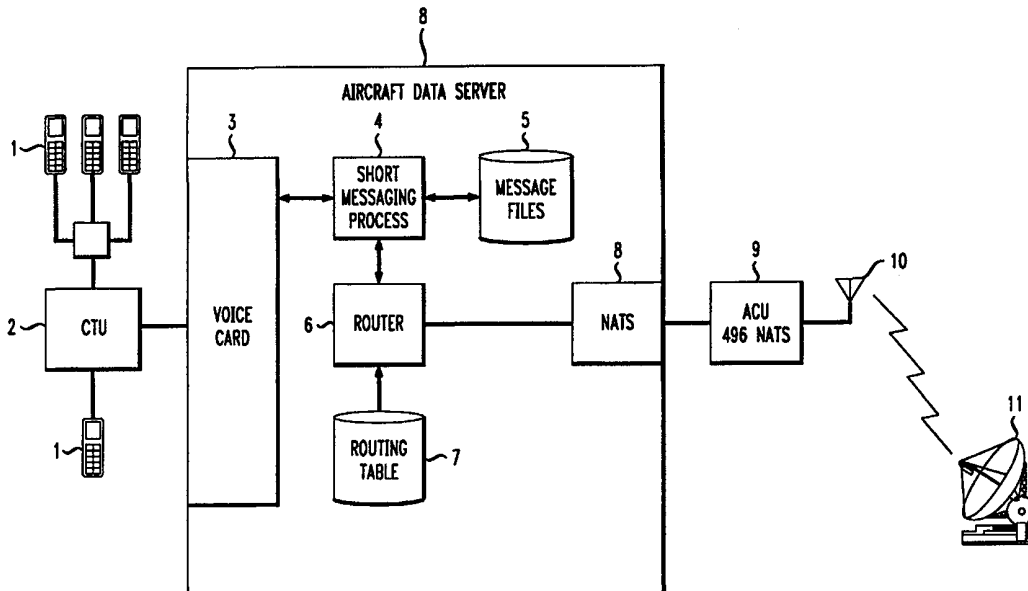




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(54) Title: SHORT MESSAGING METHOD AND SYSTEM FOR AIRBORNE PASSENGERS



(57) Abstract

An air-to-ground telecommunications system allows callers to store messages on an aircraft data server when sufficient air-to-ground communication bandwidth is unavailable for transmitting a call. The system allows aircraft callers to leave voice, fax, e-mail or other data messages. The messages are stored on the aircraft until sufficient bandwidth becomes available for transmission to the ground. Transmitting messages requires shorter air time and more efficient bandwidth usage because messages do not require a high degree of interaction between parties. The messages can also be compressed before transmission for further efficiently using aircraft-to-ground bandwidth.

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**SHORT MESSAGING METHOD AND SYSTEM FOR
AIRBORNE PASSENGERS**

5 **CROSS REFERENCE TO RELATED APPLICATIONS**

The present application is related to copending application Serial Number (Attorney docket LEUCA 1-6), filed concurrently, and commonly assigned with the present invention.

10 **BACKGROUND OF THE INVENTION**

1. Field of the Invention

The present invention relates to the field of telecommunications. More particularly, the present invention relates to a method and a system for communicating between parties, of which at
15 least one party is an airborne party.

2. Description of Related Art

Conventional communications systems allow radio-frequency (RF) communications between an airborne party, for
20 example, on an airplane, and a ground-based party. Due to the limited radio-frequency (RF) bandwidth available for an aircraft-to-ground link, only a small number of airborne callers can use such a system at any one time. When a particular aircraft-to-ground link is filled to

capacity, calls from an aircraft are placed into a queue until a channel becomes available. This is inconvenient for some callers because the purpose of the call was to convey a short message to another party and by being placed in a queue causes the call to take much longer than
5 should be necessary. What is needed is a system that allows an airborne caller to leave a message for a ground-based caller without waiting for an aircraft-to-ground channel to become available. What is also needed is a system that compresses messages, thereby efficiently using the aircraft-to-ground bandwidth.

10

SUMMARY OF THE INVENTION

The present invention provides a method and a communications system that allows airborne callers to leave voice, data, or fax messages for intended recipients who are ground-based.
15 The messages are stored on an airborne platform until sufficient bandwidth becomes available for transmission to a ground-based station. Transmitting messages requires correspondingly shorter air time and results in an efficient bandwidth usage because messages do not require a high degree of interaction between parties. The present
20 invention further provides a system that compresses a stored message

before transmission so that aircraft-to-ground bandwidth is used efficiently.

The advantages of the present invention are provided by a method and a communications system that includes a plurality of aircraft telephone units, a control unit coupled to the aircraft telephone units, a memory device that stores messages when communication bandwidth is unavailable, and a transceiver that sends and receives calls and messages to and from ground stations. An airborne party is given the option of storing a message or waiting to place the call directly when sufficient bandwidth becomes available. A stored message can be compressed before transmission and decompressed after reception, making shorter broadcast times possible. The caller is given the option of having a message sent directly to an intended recipient, or to an answering service, and a delivery receipt is transmitted to the originator of the message. Messages can be a voice message, an e-mail message, a fax message, or a data message. The message can be divided into a plurality of packets that are each transmitted separately for further improving efficient bandwidth usage.

20 **BRIEF DESCRIPTION OF THE DRAWINGS**

The present invention is illustrated by way of example and not limitation in the accompanying figures in which like reference numerals indicate similar elements and in which:

Figure 1 illustrates an aircraft short messaging system according to the present invention; and

Figure 2 is a flow chart showing the basic steps used by the system of Figure 1 for storing messages on an aircraft and for transmitting messages to a ground station.

10 DETAILED DESCRIPTION

Figure 1 shows a schematic block diagram of an aircraft-to-ground telecommunications system that allows airborne callers to leave short messages for intended recipients who are ground-based according to the present invention. The present invention be used on
15 airborne platforms such as airplanes, helicopters and space vehicles.

Callers place and receive calls using aircraft telephone or terminal units

1. Calls can be voice, fax, e-mail or other data transmission.

Outgoing calls are routed to a Cabin Telecommunications Unit (CTU)

2. CTU 2 prompts the caller in a well-known manner for obtaining
20 call data, such as the message type, that is, whether the call is a voice call or a data call, the destination of the call and the method of

payment. Once the call data has been collected and validated, CTU 2 then requests an idle air-to-ground channel from a Bearer Service System (BSS) 9. If there is sufficient air-to-ground bandwidth for the call, CTU 2 proceeds with the call.

5 If there is insufficient air-to-ground bandwidth for the call, CTU 2 routes the call to a voice processing circuit 3 that is part of an aircraft data server 13 for recording a short message. Voice processing circuit 3 interacts with a short message processor 4 for handling the message, such as by compressing and/or encrypting the
10 message. Short message processor 4 prompts the caller to begin the message transfer. The message is recorded, compressed and/or encrypted and stored in a message file memory 5. Multiple messages are stored in a message data file.

 Short message processor 4 receives availability status
15 air-to-ground bandwidth via a Bearer Services System (BSS) interface (I/F) circuit 8. When sufficient air-to-ground bandwidth becomes available, short message processor 4 instructs a router 6 to deliver message files stored in message files memory 5 to a ground station 11. Router 6 also performs call control functions and, if needed,
20 multiplexing of short message file contents with data from other aircraft data server applications. Data transfer from aircraft data server

8 to the ground station 11 is accomplished via a Bearer Services System 9 and an antenna 10, employing well-known air-to-ground communication system techniques, such as that used by AT&T's North American Terrestrial System (NATS). Ground station 11 forwards the short message file to a short message ground-based server 12 using well-known data communications techniques. Short message server 12 parses the received short message file into the different short messages forming the message file, decompresses and/or decrypts the respective messages and attempts to deliver each respective message to its intended destination 14. That is, voice messages are sent to the destination voice terminals and data messages are sent to data terminals. Short message server 12 tracks delivery status of each respective message and provides status information to the message originator as requested by the message originator.

Figure 2 is a flow chart showing an exemplary method for storing and transmitting message calls from an aircraft according to the present invention. At step 20, an airborne caller places a call from aircraft telephone 1. At step 21, CTU 2 determines whether bandwidth is available for transmitting the call directly. At step 22, if sufficient bandwidth is available, the call is transmitted to the ground station directly. If sufficient bandwidth is not available, at step 23 the caller is

queried whether the call should be sent as a message. If the caller desires to send a message, then the caller is switched to processor 4 for recording and storing a short message at step 24. When processor 4 determines that bandwidth is available, the stored message is

5 transmitted to a ground station at step 25. Upon receipt at the ground station, the message is decompressed at step 26. At step 27, the message is sent to the dialed number, which may be the intended recipient or an answering service. At step 28, a delivery receipt is sent to the originator of the message.

10 If the caller opted not to store a message at step 23, then the caller can wait in a queue at step 29 until sufficient bandwidth becomes available for placing the call directly to the dialed number at step 30.

THE CLAIMS

What is claimed is:

1. A method for transmitting a call, the method comprising
the steps of:
 - 5 receiving a call at a controller from a local terminal, the
call being directed to a remote terminal;
determining whether sufficient communication
bandwidth is available for transmitting the call to the remote terminal;
storing a message in a memory device when sufficient
10 communication bandwidth is not available for transmitting the call;
transmitting the message to the remote terminal when
sufficient bandwidth becomes available for transmitting the message.
2. The method of claim 1, wherein the controller, the local
15 terminal and the memory device are on an airborne platform.
3. The method of claim 2, wherein the step of determining
whether sufficient communication bandwidth is available includes the
step of providing an option to an originator of the call of recording the
20 message before transmission.

4. The method of claim 2, further comprising the step of receiving a delivery receipt at the local terminal when the message is delivered to the remote terminal.

5 5. The method of claim 2, further comprising the step of compressing the recorded message before the step of transmitting the message to the remote terminal.

6. The method of claim 2, further comprising the steps of:
10 dividing the message into a plurality of packets; and
transmitting each packet separately.

7. The method of claim 2, wherein the message is one of a voice message, a data message, a fax message and an e-mail message.

15

8. The method of claim 7, wherein the message is delivered to one of an intended recipient of the message and an answering service.

20 9. A communications system, comprising:
a plurality of local terminal units;

a transmitter transmitting calls to a remote terminal;
a control unit coupled to the local terminal units, the
control unit receiving a call from one of the plurality of local terminal
units and determining whether communication bandwidth is available
5 for transmitting the call from the transmitter; and
a memory device, coupled to the control unit, storing a
message when transmitter communication bandwidth is unavailable.

10. The system of claim 9, wherein the local terminal units
10 and the memory device are on an aircraft.

11. The system of claim 10, wherein the processor provides
an option for an originator of the call for storing a message before
transmission.

15

12. The system of claim 10, wherein the local terminal unit
receives a delivery receipt when the message is received by the remote
terminal.

20 13. The system of claim 10, wherein the processor
compresses the message before transmitting to the remote terminal.

14. The system of claim 10, wherein the processor divides the message into a plurality of packets that are each transmitted by the transmitter separately.

5

15. The system of claim 10, wherein the stored message is one of a voice message, a data message, a fax message and an e-mail message.

10 16. The system of claim 15, wherein the transmitter transmits the message to one of an intended recipient and an answering service.

FIG. 1

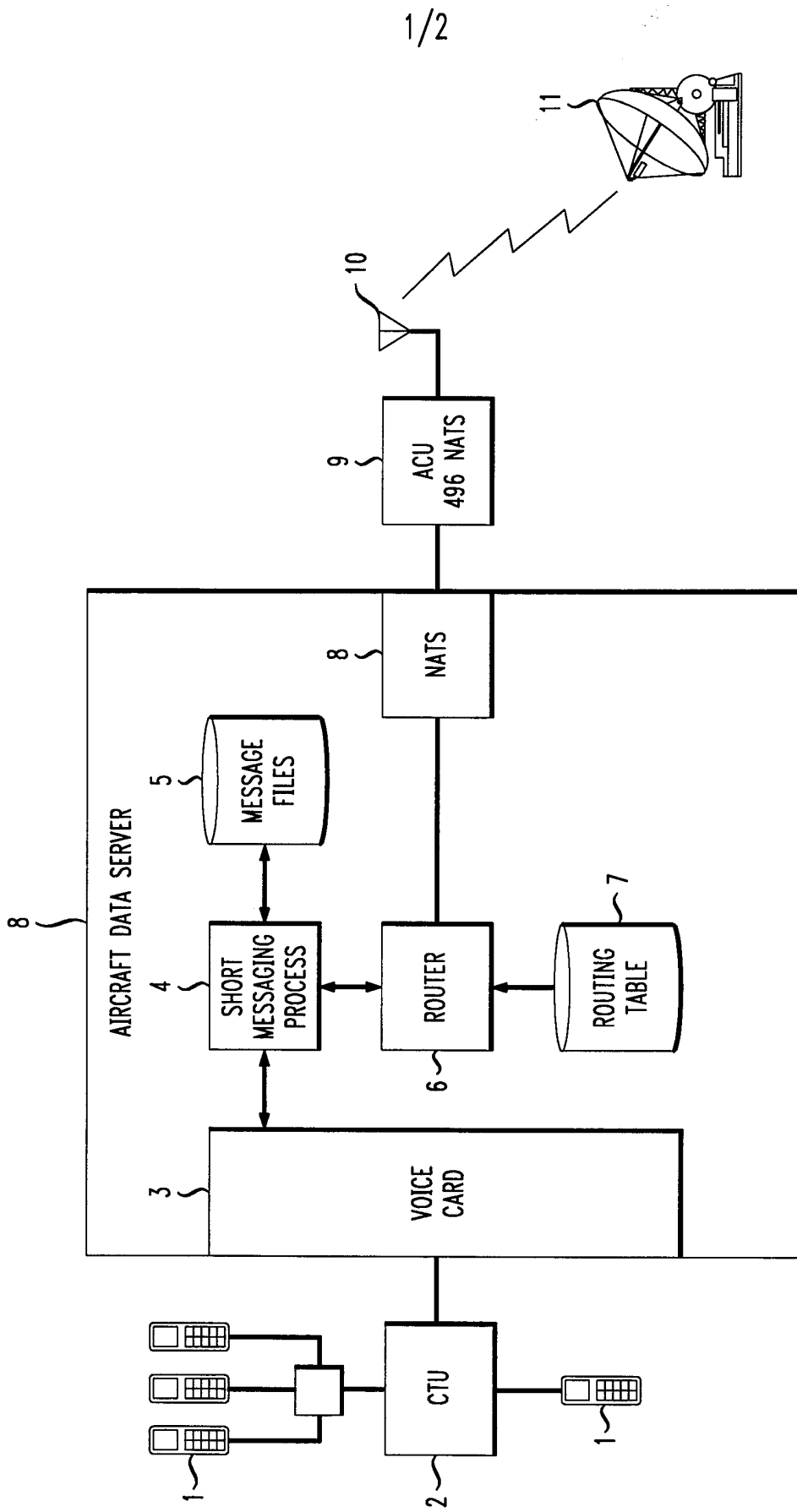
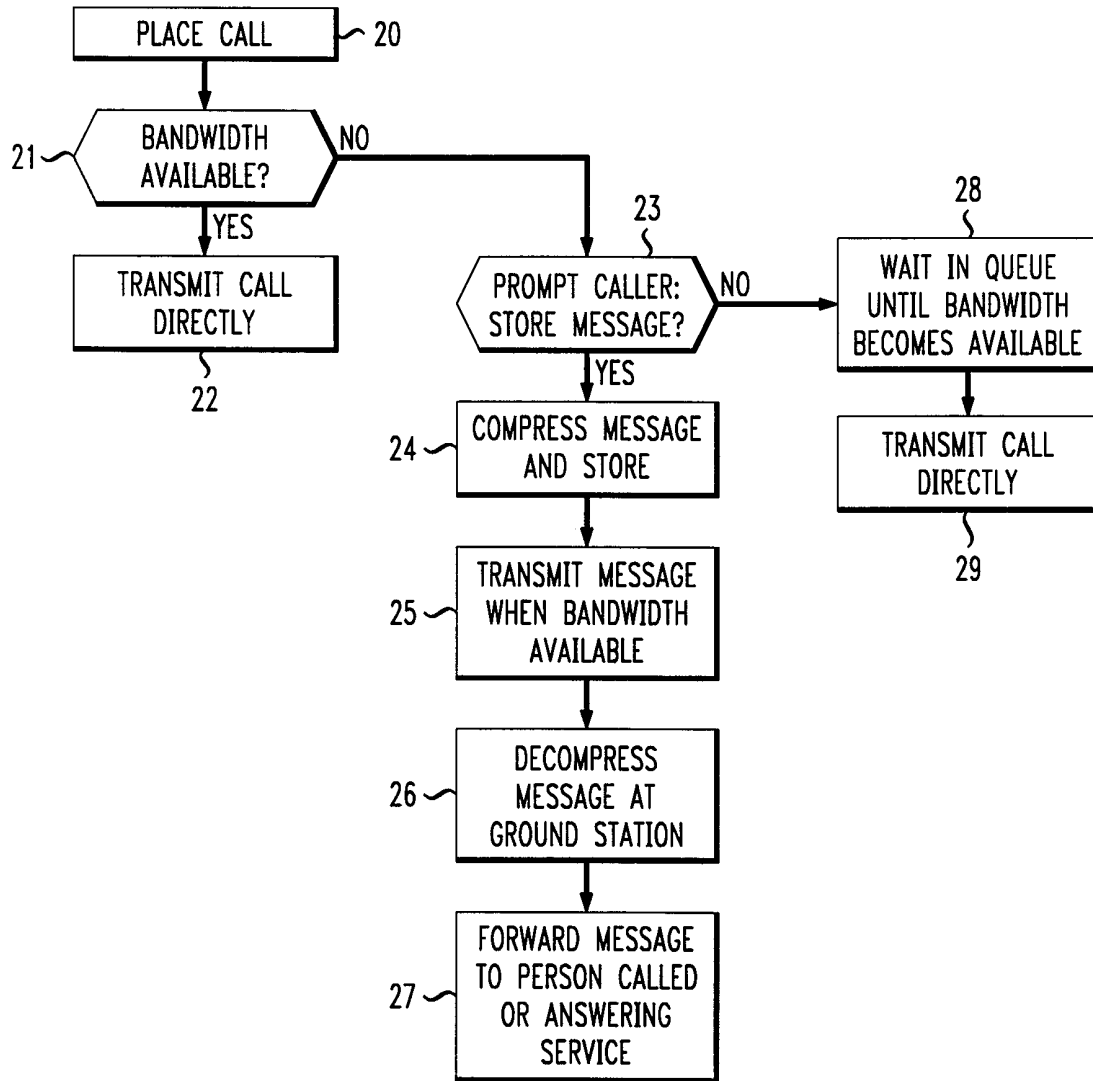


FIG. 2



INTERNATIONAL SEARCH REPORT

International Application No PCT/US 98/23964

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 H04B7/185 H04B7/00 H04L12/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 IPC 6 H04L H04B H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	LOSQUADRO: "SECOMS: Advanced Interactive Multimedia Satellite Communications for a Variety of Compact Terminals" IEE COLLOQUIUM ON EU'S INITIATIVES IN SATELLITE COMMUNICATIONS-MOBILE(REF. NO. 1997/987), 8 May 1997, pages 3/1-3/7, XP002096611 London, UK see the whole document ---	1,2, 4-10, 12-16
X	EP 0 627 866 A (NIPPON ELECTRIC CO) 7 December 1994 ---	1,9
Y	see claim 2 ---	2,4-8, 10,12-16
	-/--	

Further documents are listed in the continuation of box C. Patent family members are listed in annex.

° Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 17 March 1999	Date of mailing of the international search report 31/03/1999
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INTERNATIONAL SEARCH REPORT

I. International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 372 795 A (AMERICAN TELEPHONE & TELEGRAPH) 13 June 1990 see column 2, line 42 - line 52 see column 3, line 38 - column 4, line 17 -----	1,2,6,7, 9,10,14, 15

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Information on patent family members

International Application No
PCT/US 98/23964

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