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(54) **SHORT MESSAGING METHOD AND SYSTEM FOR AIRBORNE PASSENGERS**

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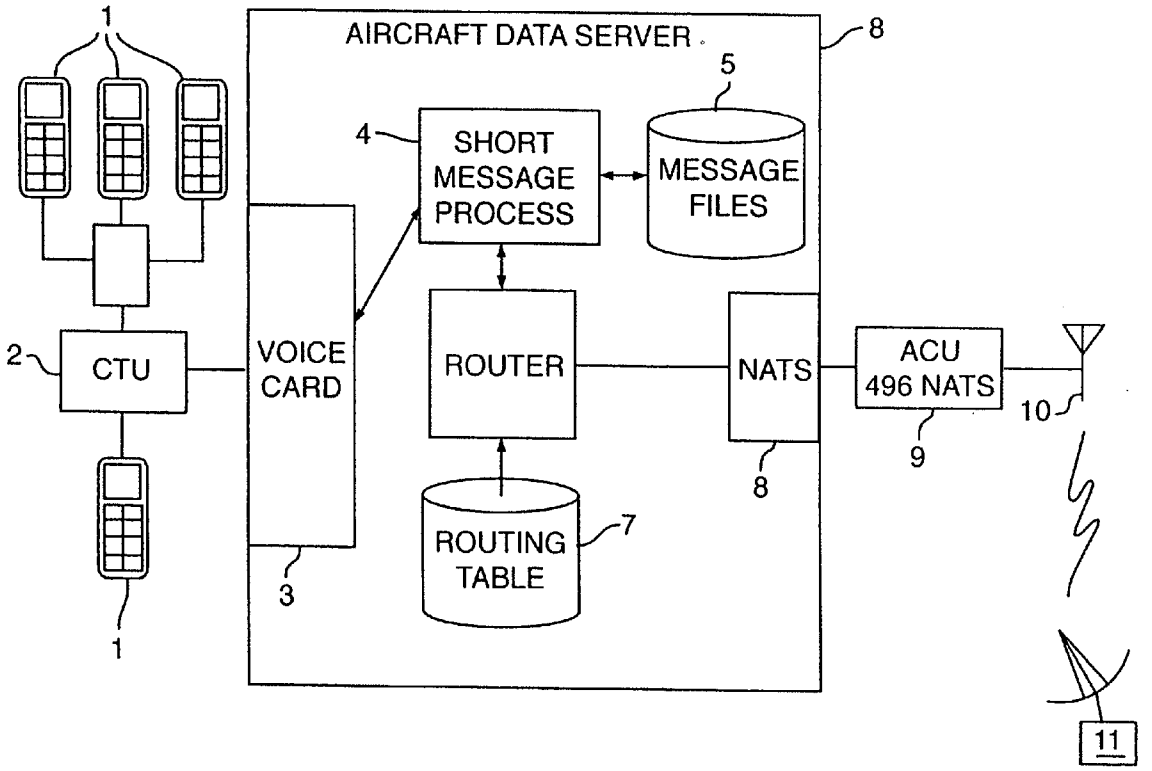
(57) **ABSTRACT**

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.



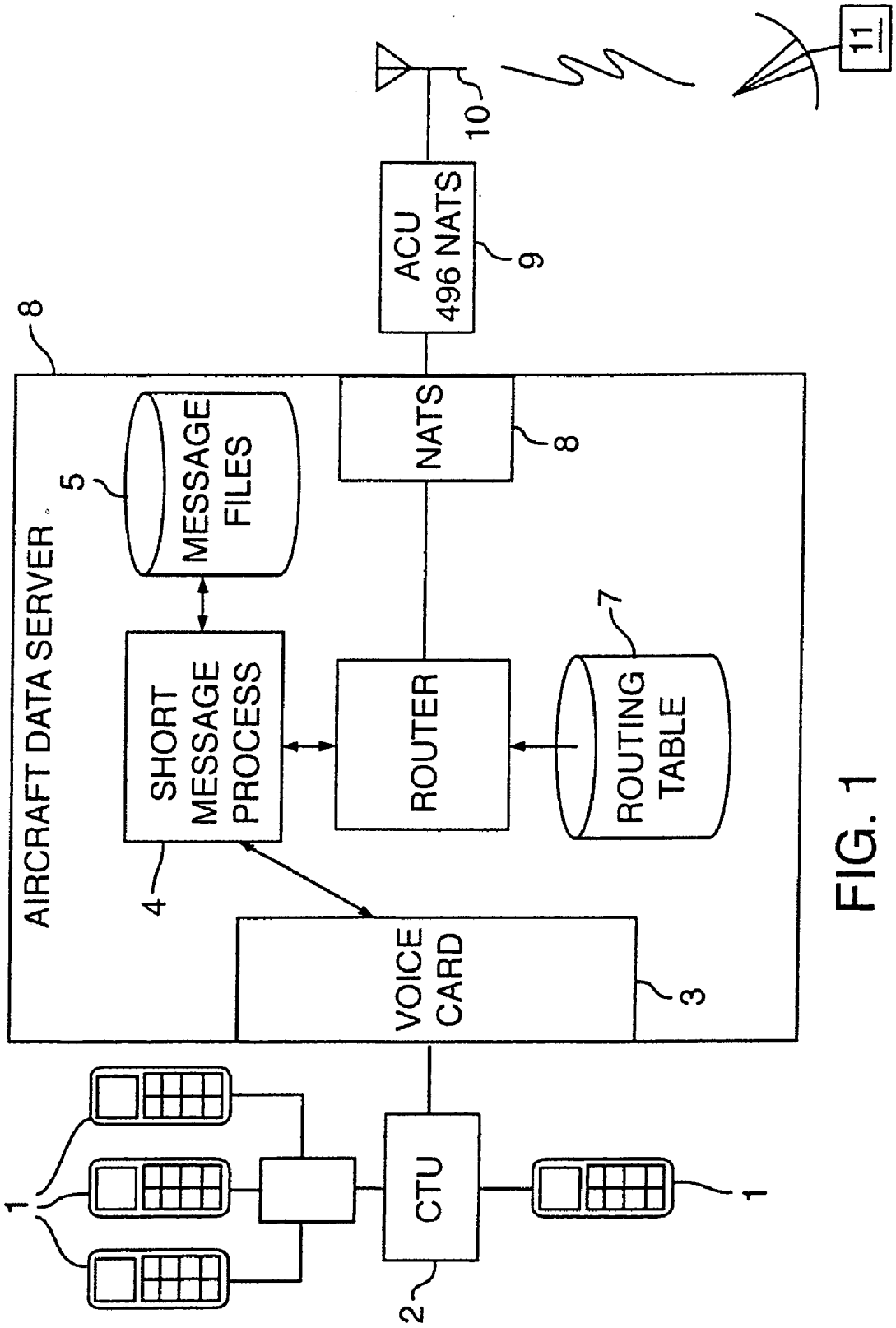

11
10
ACU
496 NATS
9
8
AIRCRAFT DATA SERVER
NATS
8
MESSAGE
FILES
5
SHORT
MESSAGE
PROCESS
4
ROUTER
7
ROUTING
TABLE
VOICE
CARD
3
CTU
2
1
1

FIG. 1

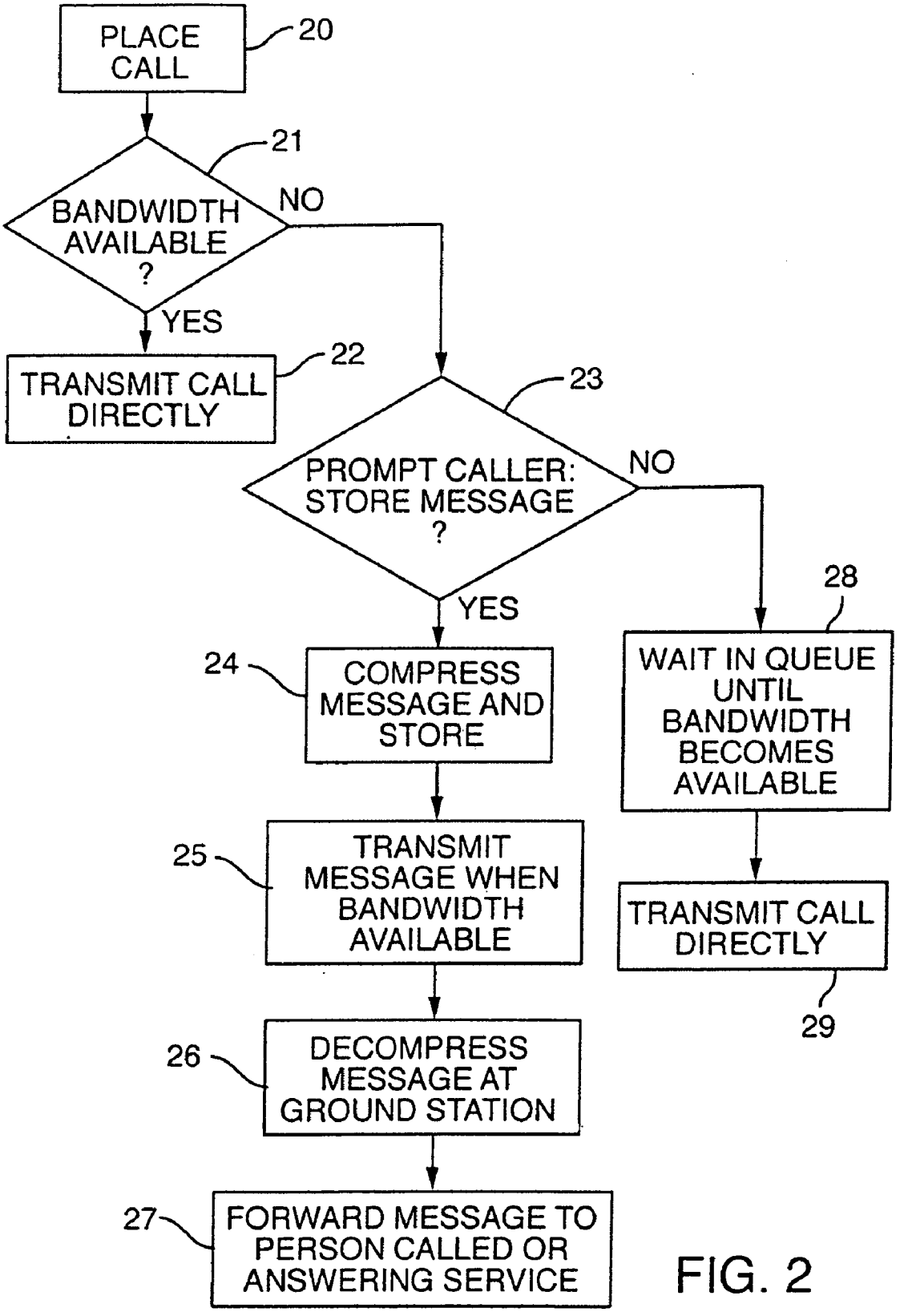

PLACE CALL
20
21
BANDWIDTH AVAILABLE ?
NO
YES
TRANSMIT CALL DIRECTLY
22
23
PROMPT CALLER: STORE MESSAGE ?
NO
YES
28
24
COMPRESS MESSAGE AND STORE
WAIT IN QUEUE UNTIL BANDWIDTH BECOMES AVAILABLE
25
TRANSMIT MESSAGE WHEN BANDWIDTH AVAILABLE
TRANSMIT CALL DIRECTLY
29
26
DECOMPRESS MESSAGE AT GROUND STATION
27
FORWARD MESSAGE TO PERSON CALLED OR ANSWERING SERVICE

FIG. 2

SHORT MESSAGING METHOD AND SYSTEM FOR AIRBORNE PASSENGERS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of application Ser. No. 10/211,929, filed Aug. 2, 2002, which is a continuation of application Ser. No. 09/520,806, filed Mar. 8, 2000, which is a continuation of application Ser. No. 08/989,623, filed Dec. 21, 1997, now abandoned, all of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] 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 least one party is an airborne party.

[0004] 2. Description of Related Art

[0005] Conventional communications systems allow radio-frequency (RF) communications between an airborne party, for 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 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.

SUMMARY OF THE INVENTION

[0006] 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. 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 invention further provides a system that compresses a stored message before transmission so that aircraft-to-ground bandwidth is used efficiently.

[0007] 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.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] 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:

[0009] FIG. **1** illustrates an aircraft short messaging system according to the present invention; and

[0010] FIG. **2** is a flow chart showing the basic steps used by the system of FIG. **1** for storing messages on an aircraft and for transmitting messages to a ground station.

DETAILED DESCRIPTION

[0011] FIG. **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 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 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.

[0012] 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 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.

[0013] Short message processor **4** receives availability status 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, 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 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.

[0014] FIG. **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 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.

[0015] 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**.

1. An apparatus, comprising:
- a ground station configured to receive a combined message via a ground station antenna; and
- a server configured to receive the combined message from the ground station and parse the combined message into at least one individual message and send a delivery receipt to a sender associated with the at least one individual message, wherein the receipt is transmitted from the ground station antenna to an aircraft antenna.

2. The apparatus of claim **1**, wherein the server is configured to deliver the at least one individual message to a message destination.

3. The apparatus of claim **1**, wherein the at least one individual message is an e-mail message.

4. The apparatus of claim **1**, wherein the at least one individual message is a short data message.

5. The apparatus of claim **1**, wherein the server is configured to parse the combined message into a plurality of individual messages.

6. The apparatus of claim **1**, wherein the combined message includes two or more individual email messages.

7. The apparatus of claim **1**, wherein the combined message includes two or more individual data messages.

8. The apparatus of claim **1**, wherein the server is configured to decompress the combined message.

9. The apparatus of claim **1**, wherein the server is configured to decrypt the combined message.

10. A method for receiving a call, comprising:
- receiving a combined message directed to a ground station;
- parsing the combined message into at least one individual message; and
- sending a delivery receipt to a sender of the at least one individual message.

11. The method of claim **10**, further comprising delivering the at least one individual message to a destination.

12. The method of claim **10**, further comprising decompressing the combined message.

13. The method of claim **10**, further comprising decrypting the combined message.

14. The method of claim **10**, further comprising decompressing the at least one individual message.

15. The method of claim **10**, further comprising de-encrypting the at least one individual message.

16. The method of claim **10**, wherein the at least one message is an e-mail message.

17. The method of claim **10**, wherein the combined message includes a plurality of individual messages, and the combined message is parsed into the individual messages.

18. A method for receiving an individual message, comprising:
- determining an available communication bandwidth;
- receiving a combined message directed to a ground station if the available communication bandwidth is sufficient; and
- parsing the combined message to obtain the individual message.

19. The method of claim **18**, wherein the individual message is an e-mail message.

20. The method of claim **18**, wherein the individual message is a short data message.

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