



- [54] **SIMULTANEOUS TRANSFER OF CONTROL INFORMATION WITH VOICE AND DATA OVER A PUBLIC SWITCHED TELEPHONE NETWORK LINE**
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- [73] Assignee: **Intel Corporation**, Santa Clara, Calif.
- [21] Appl. No.: **912,947**
- [22] Filed: **Aug. 14, 1997**

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Related U.S. Application Data

- [63] Continuation of Ser. No. 687,773, Jul. 26, 1996, abandoned, which is a continuation of Ser. No. 597,352, Feb. 6, 1996, abandoned, which is a continuation of Ser. No. 254, Jan. 4, 1993, abandoned.
- [51] Int. Cl.<sup>6</sup> ..... **H04M 11/06**
- [52] U.S. Cl. .... **379/229; 379/93.09; 379/93.26; 370/468; 370/522**
- [58] **Field of Search** ..... **379/229, 93.01, 379/93.09, 93.14, 93.26; 348/14, 15, 16; 370/522, 264, 265, 281, 437, 468**

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ABSTRACT

[57] A transceiver providing simultaneous transfer of control information with voice and data over a public switched telephone network line is disclosed. In a typical system application, the transceiver is coupled to a public switched telephone network (PSTN) via a single telephone line. The transceiver includes logic for generating control information and for combining the control information with voice signals or data signals for transmission and reception through the PSTN using a single telephone line. The present invention provides a PSTN channel having two component subchannels, a main channel and a side channel. The main channel is provided for the transfer of voice signals and data signals at the same time the side channel is transferring control information and/or additional data signals. The control information transferred on the side channel is used primarily for selecting the transfer of either voice signals or data signals on the main channel. By providing a separate and independent side channel for controlling the main channel, the present invention eliminates the inherent delays caused in the prior art design by switching between a voice transfer mode and a data transfer mode using a single channel. The present invention also allows the transfer of data signals on the side channel simultaneously with the transfer of voice signals on the main channel. These advantages are provided by the present invention without redefining the bandwidth of the standard PSTN channel.

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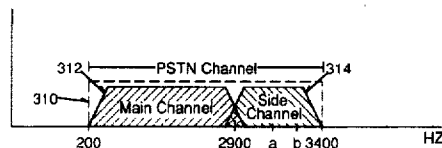
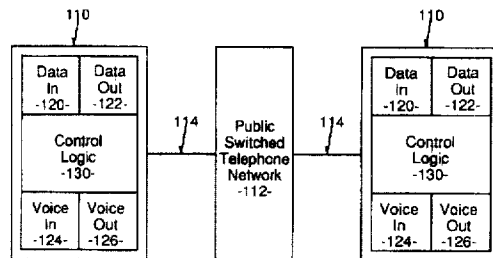
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15 Claims, 3 Drawing Sheets



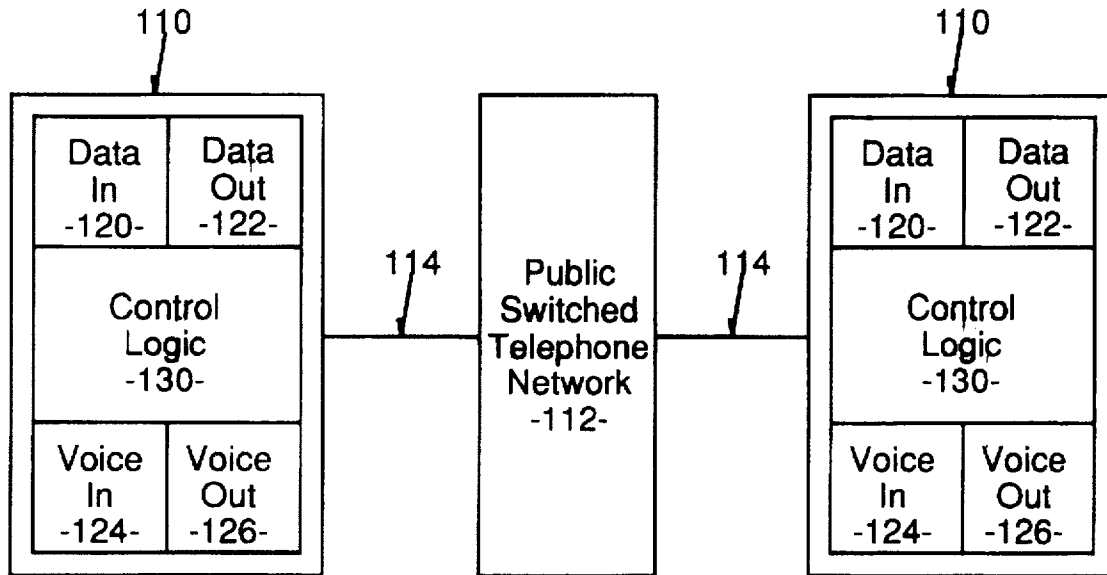


FIGURE 1

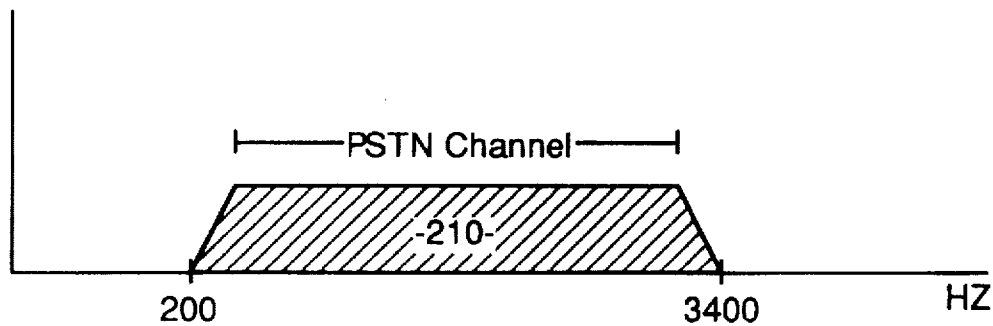


FIGURE 2 (Prior Art)

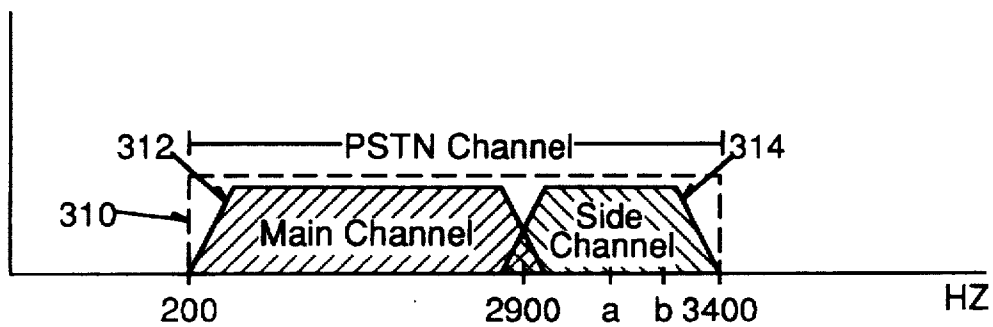


FIGURE 3

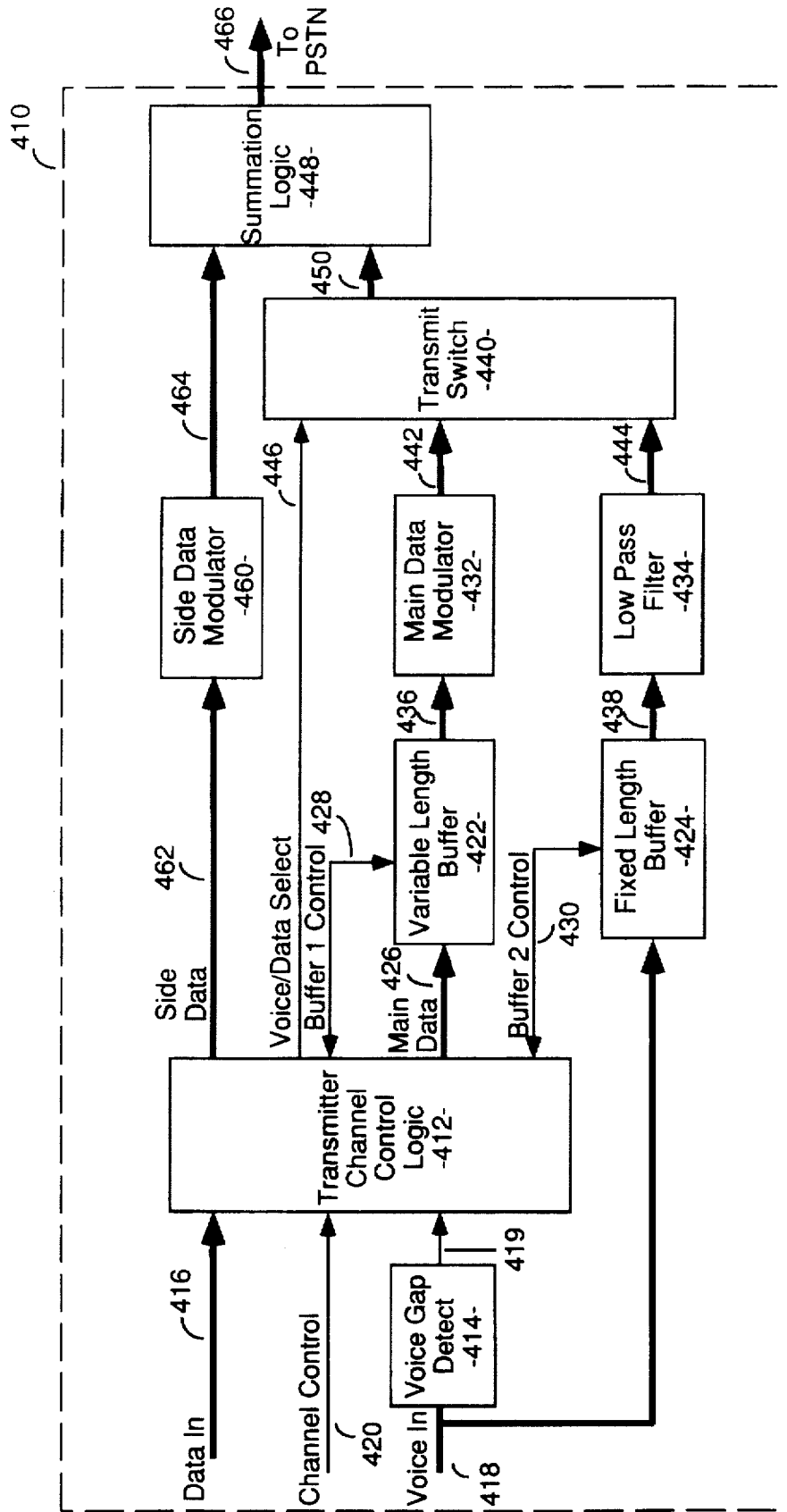


FIGURE 4

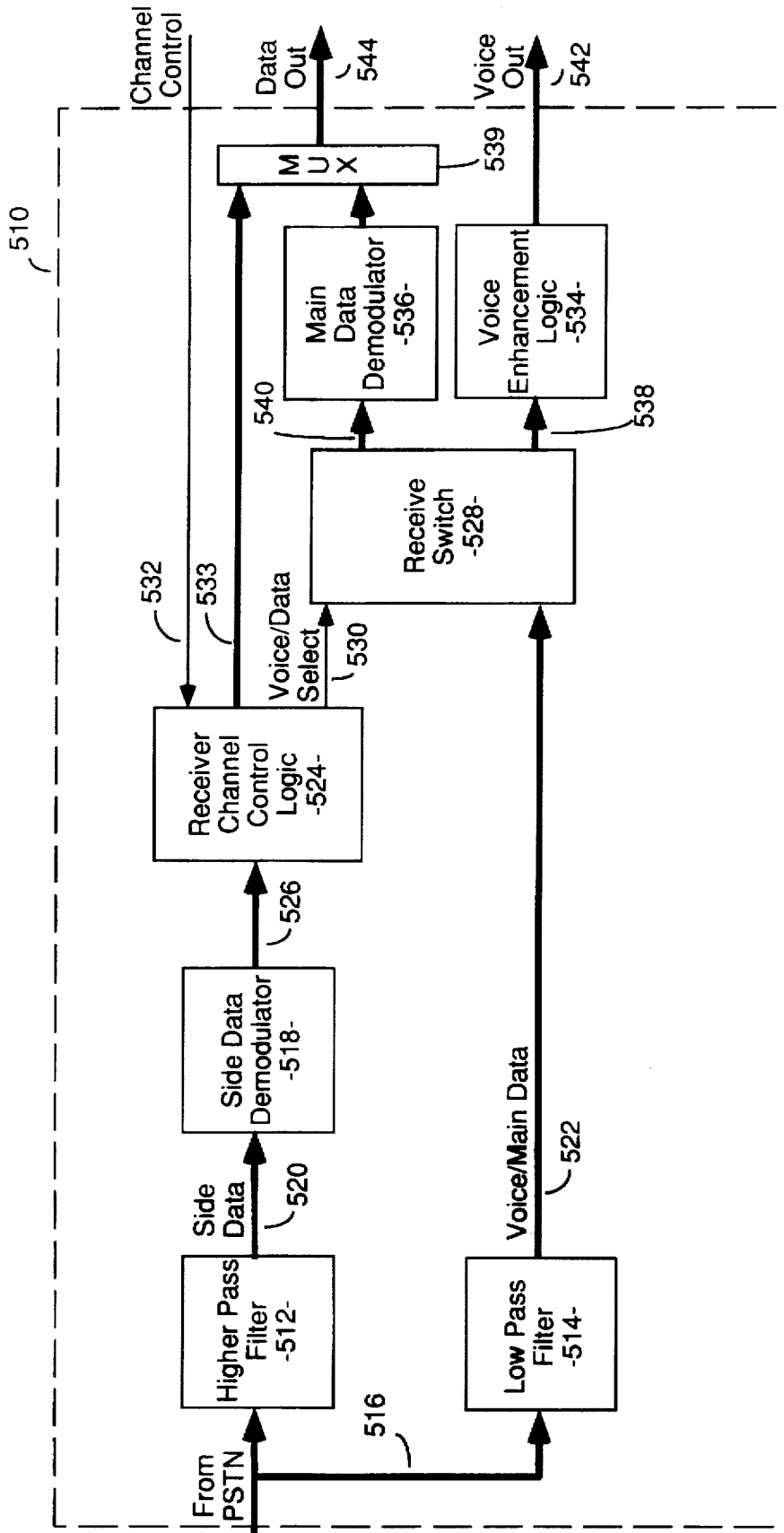


FIGURE 5

**SIMULTANEOUS TRANSFER OF CONTROL  
INFORMATION WITH VOICE AND DATA  
OVER A PUBLIC SWITCHED TELEPHONE  
NETWORK LINE**

This is a continuation of application Ser. No. 08/687,773, filed Jul. 26, 1996, now abandoned, which is a continuation of application Ser. No. 08/597,352, filed Feb. 6, 1996, now abandoned, which is a continuation of application Ser. No. 08/000,254, filed Jan. 4, 1993, now abandoned.

**BACKGROUND OF THE INVENTION**

**1. Field of the Invention**

The present invention relates to the field of information transfer across public switched telephone systems. Specifically, the present invention pertains to the transmission of binary information or facsimile data with voice signals on a public switched telephone network.

**2. Related Art**

Several prior art designs provide various levels of voice and data transmission capabilities. In one implementation, a system provides two separate communication links: one link for data and the other link for voice signals. In a typical implementation of this type, two telephone lines are used to handle a data conference. One telephone line is used for transmission of data. The other telephone line is used for the transmission of voice. This implementation, however, consumes at least two telephone lines for each such data conference. In a multipoint conference configuration, two separate telephone bridges would be required to handle such a data conference.

In another implementation of systems combining voice and data information, a communications medium separate from the telephone network is provided. This separate communications medium can be implemented as a separate and independent twisted pair high speed data communications medium. Because these independent transmission media can be optimized for the transmission of voice and data, satisfactory data and voice information rates can be achieved. These systems, however, require that costly installation of the independent communications medium be undertaken. In many cases, the high cost of such an installation is not justified by the need for a combined voice and data system. In other cases, the installation of such a communications medium may not even be possible.

Still other prior art systems can transmit voice signals and data on a single telephone line; however, the transmission of data and voice does not occur simultaneously with control information. In various forms, these systems provide a means to select between a voice transmission mode or a data transmission mode. Each of these modes of transmission are mutually exclusive of the other mode. Thus, a single telephone line may be used to transfer voice information during a first time frame and binary computer data during a second time frame. In many of these systems, a significant time delay is required to change from one mode to the other; because no independent control method is provided. Although these systems carry the benefit of using only a single line of a public switched telephone network, several inefficiencies result from the need to switch between a voice mode or a data mode without independent control. Because in some cases switching between modes is a slow operation, loss of voice or data signals may occur. At the very least, the speed of information transfer across the public switched telephone line is significantly reduced. In other cases, the lack of an independent control mechanism for switching

between a voice transfer and a data transfer mode causes the need for a significant level of operator interaction with the system. Increased levels of operator interaction again decrease the speed of information transfer.

Thus, a better means for transferring voice information and data across a single public switched telephone network line is needed.

**SUMMARY OF THE INVENTION**

The present invention is a transceiver providing simultaneous transfer of control information with voice and data over a public switched telephone network line. In a typical system application, the transceiver is coupled to a public switched telephone network (PSTN) via a single telephone line. The transceiver includes a Voice In interface, a Voice Out interface, a Data In interface, and a Data Out interface. The transceiver includes logic for generating control information and for combining the control information with voice signals or data signals for transmission through the PSTN using a single telephone line. Similarly, this control logic includes logic for receiving the control information as combined with voice and data signals via a single telephone line. The control logic further includes logic for isolating the voice signals received via the telephone line and routing the voice signals through the Voice Out interface. The control logic includes logic for isolating data signals received on the telephone line and for transferring the data signals to a host computer through the Data Out interface. In this manner, the present invention provides a means for transmitting and receiving control information with voice information and computer data via a single standard telephone line.

The present invention modifies the prior art PSTN channel to create a new PSTN channel having two component subchannels, a main channel and a side channel. By dividing the PSTN channel into a main channel and a side channel, the present invention gains the advantage of providing the main channel for the transfer of voice signals and data signals at the same time the side channel is transferring control information and/or additional data signals. The control information transferred on the side channel is used primarily for selecting the transfer of either voice signals or data signals on the main channel. By providing a separate and independent side channel for controlling the main channel, the present invention gains the advantage over the prior art of eliminating the inherent delays caused in the prior art design by switching between a voice transfer mode and a data transfer mode using a single channel. The present invention also provides the advantage of allowing the transfer of data signals on the side channel simultaneously with the transfer of voice signals on the main channel. In this manner, the transfer of voice signals does not completely suppress the simultaneous transfer of computer information. These advantages are provided by the present invention without redefining the bandwidth of the standard PSTN channel.

It is therefore an object of the present invention to provide a system for the simultaneous transfer of control information with voice and data across a single public switched telephone network line. It is a further object of the present invention to provide a system wherein two transmission channels are provided on a single public switched telephone line. It is a further object of the present invention to provide a system wherein control information is transmitted simultaneously on the same public switched telephone network line with voice signals and data signals. It is a further object of the present invention to provide a system for automati-

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