Title: PAY-PER-VIEW PROGRAM ACCESS CONTROL SYSTEM

Abstract: A pay-per-view program access control system which combines a television signal (52) with a telephone control signal (58) to allow a remotely located telephone connection to be coupled to a television receiver via a single wire or transmission line (59). The television signal is combined with the telephone control signal and the combined signals are then separated at a remote location by a splitter (66). Once separated, the television signal (202) and telephone control signal (206) can be used as if they had been transmitted to the remote location separately. The single transmission line also carries one or more pilot tones with or without modulated data to select one of a plurality of transmission signals to couple to the television receiver via a multiscratch.
PAY-PER-VIEW PROGRAM ACCESS CONTROL SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of and is a continuation-in-part of United States Patent Application Serial No. 09/159,064, filed on September 23, 1998, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention relates generally to television programming and Web TV access control and more specifically relates to an apparatus and method for distributing control signals which selectively couple at least one of plurality transmission signals to a television receiver.

Description of the Prior Art:

Television programming and Web TV access control systems use a telephone line to communicate with a central office and a high frequency signal line to receive a transmission signal. Pay-per-view programming, the most known form of controlled access television, is a common method of distributing premier entertainment both by cable and satellite transmissions (hereinafter “transmission source”). Web TV also utilizes a high frequency signal line and telephone line to control access. As illustrated in Figure 1, such systems generally employ an addressable converter box 10, which receives a scrambled television signal from a transmission source. A subscriber to the pay-per-view system or Web TV system wishing to view a particular program or internet address will typically use a selection mechanism which is built into the converter 10. Alternatively, the subscriber can manually contact a customer service center by telephone with a particular request.
In response to a valid programming request, either through a manual inquiry or automatic inquiry from the converter 10, a computer at the transmission source will access the subscriber's converter 10 over a telephone line connection. A control code is then transferred via the telephone connection to the subscriber's converter 10, thereby allowing the converter 10 to de-scramble the selected transmission source signal. The de-scrambled signal is passed from the converter 10 to a conventional television set in a form suitable for reception and viewing.

The prior art system just described has several drawbacks. First, the television set, cable connection, and telephone connection must be substantially co-located. Second, when multiple televisions are used in a particular dwelling, each television must be near a separate telephone connection. Often, this is not the case, rendering the conventional system impractical or at least inconvenient for the subscriber.

The present invention overcomes the shortcomings in the prior art by providing a control signal distribution system, which eliminates the requirements of the television and telephone connection being substantially co-located.

In addition, transmission sources, such as satellite dishes, often provide two or more output signals, which serve as alternate sources of the television signal for the receiver via a multiswitch disposed between the dish and the receiver. These output signals typically differ in polarization and the direction from which the dish receives the signal. The disadvantage associated with these signals is that a control signal must be provided to the multiswitch from the satellite receiver set-top box to select the appropriate signal to be coupled to the television receiver. Generally, this results in the placement of a dedicated line between the receiver and the multiswitch.

**OBJECTS AND SUMMARY OF THE INVENTION**

It is an object of the present invention to provide a pay-per-view program access control system, which eliminates the need in conventional pay-per-view systems to have a telephone jack, and a receiver or converter situated in proximity to each other.
It is another object of the present invention to provide a pay-per-view program access control system which is designed to operate with various standard television receivers, such as DSS receivers, as well as standard modems.

It is yet another object of the present invention to provide a control system for accessing pay-per-view television programs or Web television programs in which the telephone control signals and the television transmission signals are transmitted over a single transmission line.

It is still another object of the present invention to provide a pay-per-view program access control system, which includes a built-in amplifier for the received television signal.

It is a further object of the present invention to provide a control system for accessing pay-per-view and Web television from any room in a house having connection to a telephone.

It is still a further object of the present invention to provide a pay-per-view program access control system, which overcomes the disadvantages of conventional access control systems.

It is yet a further object of the present invention to provide an apparatus and method for selectively coupling one of a plurality of transmission signals from a transmission source to a television receiver using one or more pilot tones or the modulation of data on a single pilot tone.

In accordance with one form of the present invention, a television programming and Web TV access control system which receives a television signal from a transmission source and a telephone control signal from a telephone line includes a combiner circuit and a splitter circuit. The combiner circuit combines the telephone control signal and the television signal and generates a combined television and telephone control signal which is coupled to the splitter circuit remotely located from the combiner circuit. The combiner circuit and splitter circuit are coupled via a single transmission path. The splitter circuit receives the combined television and telephone
control signal and separates the television signal from the combined television and telephone control signal and the telephone control signal from the combined television and telephone control signal. These individual signals can then be coupled to a receiver connected to a television set.

In a preferred embodiment, a DSS (Digital Satellite Systems) satellite dish is connected to a first combiner/splitter circuit. The first combiner/splitter circuit is also coupled to an outside telephone line. The first combiner/splitter circuit combines the television signal from the DSS satellite dish with the telephone control signal from the telephone line. The combined signal is then coupled to the second combiner/splitter circuit via a coaxial cable. The second combiner/splitter circuit separates the television signal and telephone control signal into individual signals. These individual signals can then be input into a DSS receiver. The separated television control signal is input into the RF input of the DSS receiver and the separated telephone signal is input into the telephone jack of the DSS receiver.

The present invention can also be used to send data out from a receiver onto a telephone line. The first combiner/splitter circuit receives a television signal from the DSS satellite dish and couples the television signal to the second combiner/splitter circuit via the coaxial cable. The second combiner/splitter circuit receives the television signal and receives a telephone signal from the DSS receiver. The telephone signal is then combined with the television signal on the coaxial cable. This second combined television signal is coupled to the first combiner/splitter circuit where the telephone signal from the DSS receiver is separated from the combined television signal and coupled to the telephone line.

The first combiner/splitter may be located anywhere in the house or other dwelling where there is a connection to a telephone. Preferably, the first combiner/splitter is situated in the basement of the house and is connected to the telephone distribution module to which the outside telephone lines are connected. The first combiner/splitter is also coupled to the antenna via a transmission line or cable, which very often is also routed through the basement of the dwelling.
The second combiner/splitter is preferably located near the DSS receiver. It is preferably universal in design so that it may connect and operate with currently marketed DSS receivers. It includes a modular telephone jack, which is connected via a standard short (jumper), telephone line to the modular telephone jack found on conventional DSS receivers. It also has an RF cable output jack which connects via a standard short (jumper) cable to the RF input of the DSS receiver.

The advantage of the system of the present invention is that there is no need to run a telephone extension line across the room from the DSS receiver to a telephone jack, or to have a separate telephone line installed running from the DSS receiver to the telephone distribution module, as is done with conventional pay-per-view control systems. With the present invention, the DSS receiver transmits the pay-per-view program request signals through the second combiner/splitter situated adjacent to it to the first remotely located combiner/splitter over the television cable, and not through a separate telephone line. The first combiner/splitter separates out and transmits the request signals over the telephone line to the central office. Therefore, no direct connection from the DSS receiver to a telephone jack is necessary.

The present invention can also be used to control a multiswitch, which selectively couples one of a plurality of transmission signals from the transmission source, such as a satellite dish, to the television receiver. A control signal is generated by the television receiver based upon the channel being received and the relative strength of the received signal. The control signal is detected by the second combiner/splitter and a pilot tone representative of the detected control signal is generated. The pilot tone is then passed through a band pass filter prior to transmission on the single transmission path.

The first combiner/splitter detects the pilot tone after passing it through a band pass filter and regenerates a control signal representative of the detected tone. The regenerated control signal is then applied to the line coupling the multiswitch between the transmission source and the first combiner/splitter. The multiswitch then selectively couples one of a plurality of transmission signals from the transmission source to the first combiner/splitter and ultimately to the television receiver in response to the regenerated control signal. The advantage of the present invention is that the most appropriate
transmission signal can automatically be coupled to the television receiver based upon such parameters as the channel being received (i.e., odd or even) and the strength of the signal being received.

These and other objects, features and advantages of the present invention will become apparent from the following detailed description of illustrative embodiments thereof, which is to be read in connection with the accompanying drawings.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a block diagram of an addressable converter for de-scrambling pay-per-view signals in a manner known in the prior art.

Figure 2 is a block diagram of a control signal distribution system for facilitating pay-per-view access, formed in accordance with the present invention.

Figure 3 is a block diagram of a control signal distribution system, formed in accordance with the present invention, operatively coupled to multiple televisions within a dwelling.

Figure 4 is a block diagram of a telco modulator circuit, formed in accordance with the present invention.

Figure 5 is a block diagram of a telco demodulator circuit, formed in accordance with the present invention.

Figure 6 is a block diagram of a telco modulator/demodulator circuit, formed in accordance with the present invention.

Figure 7 is a block diagram of a pay-per-view program access control system illustrating the interior blocks of the combiner circuit and splitter circuit formed in accordance with the present invention.

Figure 8 is a block diagram of a pay-per-view program access control system similar to Figure 7 illustrating the path of a television signal from a transmission source to the receiver.
Figure 9 is a block diagram of a pay-per-view program access control system similar to Figure 7 illustrating the path of the telephone line control signal to the receiver.

Figure 10 is a block diagram of a pay-per-view program access control system similar to Figure 7 illustrating the path of a telephone signal from the receiver to the telephone line.

Figure 11 is a block diagram of a pay-per-view program access control system similar to Figure 7 illustrating the path of a pilot tone from the pilot tone generator to the pilot tone detector.

Figure 12 is a block diagram of an alternative embodiment of the pay-per-view program access control system illustrating the interior blocks of a first and a second combiner/splitter circuit formed in accordance with the present invention.

Figure 13 is a block diagram of a second alternative embodiment of the pay-per-view program access control system illustrating the interior blocks of a first and a second combiner/splitter circuit formed in accordance with the present invention.

Figure 14 is a block diagram of a third alternative embodiment of the pay-per-view program access control system illustrating the interior blocks of a first and a second combiner/splitter circuit formed in accordance with the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Referring to Figure 2, a pay-per-view access control signal distribution system formed in accordance with the present invention is illustrated. The system includes two primary operating blocks: a telco modulator circuit 12 and a telco demodulator circuit 14. The telco modulator circuit 12 is connected to an incoming transmission source as well as an outside telephone line connection. In response to a request to view controlled access programming, the telco modulator circuit 12 receives appropriate control codes via the telephone connection with a customer service center. The telco modulator circuit 12 processes the received control codes and impresses a modulated signal representing these codes upon the received transmission source signal, thus generating a modulated cable signal. The telco modulator circuit 12 presents the modulated cable signal on an
output port which is operatively coupled to the telco demodulator circuit 14. Preferably, the telco modulator circuit 12 and telco demodulator circuit 14 are operatively coupled via coaxial cable 16. However, optical links, radio links and other such linking communications media may be employed in the alternative.

The telco demodulator circuit 14 receives the modulated cable signal and extracts the control codes therefrom. The telco demodulator circuit 14 passes the control codes through a control output port which is operatively coupled to the telco input-output (I/O) port 10a of a standard addressable converter 10. The converter 10 transmits and receives control signals from the telco demodulator circuit 14 as if the converter 10 were directly connected to the outside telephone line connection. In this fashion, telephone line connections need not be placed proximate the converter 10 or television set.

In addition to passing the control codes, the telco demodulator circuit 14 presents the transmission source signal on a cable signal output port 10b. The cable signal output port is operatively coupled to the converter 10 and the scrambled cable signal is transferred thereto.

As illustrated in Figure 3, by employing a single telco modulator circuit 12 and multiple telco demodulator circuits 14, the present invention provides control signals to multiple converters 10 within a building with only a single physical connection to an outside telephone line connection.

Figure 4 illustrates typical functional blocks, which are included in a first embodiment of the telco modulator circuit 12. The telco modulator circuit 12 preferably includes a telco line seize circuit 20 which is operatively coupled to the outside telephone line connection. The line seize circuit 20 preferably includes dial tone detect, ring detect and telephone line seizing capability. These functions operate under the control of a microprocessor 22 or equivalent control circuit. The telco line seize circuit 20 selectively couples the telephone line connection to a suitable decoder, such as a dual tone modulated frequency (DTMF) decoder 24, which receives and decodes control code signals from the customer service center. The decoder 24 presents the demodulated control code signals to the microprocessor 22.
The telco modulator circuit 12 further includes a radio frequency (RF) modulator circuit 26. The RF modulator circuit 26 preferably includes an input port operatively coupled to an incoming transmission source signal and a modulated cable output port. The RF modulator circuit 26 is responsive to the microprocessor 22, which provides control signals in response to received control code signals from the decoder 24. In response to signals received from the microprocessor 22, the RF modulator circuit 26 creates a modulating signal which is impressed on the transmission source signal and the modulated transmission source signal is presented on the modulated cable output port of the telco modulator circuit 12.

Referring to Figure 5, the telco demodulator circuit 14 is illustrated in block diagram form. The telco demodulator circuit 14 preferably includes an RF demodulator circuit 30 which receives the modulated cable signal and extracts the control code information therefrom. The RF demodulator circuit 30 passes the transmission source signal to an output port which is operatively coupled to a conventional addressable converter 10. The RF demodulator circuit 30 is also preferably connected to a microprocessor circuit 32 which receives the demodulated control code signals therefrom. The telco demodulator circuit 14 preferably includes a telephone interface encoder 34 and telephone line seize circuit 36. Both the encoder 34 and line seize circuit 36 are preferably coupled to, and controlled by, the microprocessor 32. The encoder circuit 34 and line seize circuit 36 cooperate to provide a simulated telephone line interface which is operatively coupled to the telephone line connection 10a of the standard addressable converter 10.

While the telco modulator circuit 12 and telco demodulator circuit 14 have been described and illustrated as distinct designs, an alternate embodiment of the present invention employs a single telco modulator/demodulator circuit 40 design at each point in the control signal distribution system. A universal telco modulator/demodulator circuit 40 is illustrated in Figure 6. The telco modulator/demodulator circuit 40 includes an RF modulator/demodulator circuit 42, an encoder/decoder circuit 44 and a telco line seize circuit 46 all operatively coupled to, and controlled by, a microprocessor 48. The RF modulator/demodulator circuit 42 combines the functions of the RF modulator 26 and RF demodulator circuit 30. The encoder/decoder circuit 44 combines the functions of the
decoder circuit 24 and the encoder circuit 34. In other aspects, the telco
modulator/demodulator circuit 40 operates in a manner previously described for each of
the telco modulator circuit 12 and demodulator circuit 14, based on their placement in the
system. Figure 1 is a block diagram of an addressable converter for de-scrambling
transmission signals in a manner known in the prior art.

An alternative design, constructed in accordance with present invention, of a pay-
per-view television access control system is illustrated in Figures 7-11 and will now be
described. Referring initially to Figure 7, the program access control system preferably
includes a first combiner/splitter circuit 48 and a second combiner/splitter circuit 66.
The first combiner/splitter circuit 48 is preferably coupled to the second combiner/splitter
circuit 66 through an ordinary radio frequency (RF) television cable 59.

The first combiner/splitter circuit is preferably connected to a transmission
source, such as a television antenna or incoming television cable, via a coaxial cable 49.
The first combiner/splitter circuit 48 is also connected to a telephone line 80 to receive
and send signals over the telephone line. The signal which the first combiner/splitter
circuit 48 receives may be a control signal sent from a central office to program a
converter or receiver to allow a particular movie to be viewed on the user's television.

The first combiner/splitter circuit 48 combines the signal from the transmission
source (e.g., the television signal from the antenna) with the telephone control signal
(e.g., from the central office) and generates a combined signal. The combined signal is
provided to the second combiner/splitter circuit 66 via a coaxial cable 59. The coaxial
cable 59 may be the same cable which is used ordinarily to carry the signal from the
television antenna to the television or converter box or receiver. Now, with the present
invention, the first and second combiner/splitter circuits 48, 66 are interposed in-line
with this cable 59, the first combiner/splitter circuit 48 preferably being situated close to
telephone jack, such as in a basement where the telephone lines enter the dwelling and
are connected to the distribution module, and the second combiner/splitter circuit 66 is
preferably situated close to the television (or the converter or receiver).

The second combiner/splitter circuit 66 separates the television signal and the
telephone control signal from the combined signal. The television signal is then
provided by the second combiner/splitter circuit 66 to the RF input 71 of the receiver 70 (or converter) and the telephone control signal is provided by the second combiner/splitter circuit 66 to the telephone jack 72 of the receiver 70 (or converter).

In a preferred form of the invention, the first combiner/splitter circuit 48 includes an amplifier 51. The television signal is provided to the amplifier 51, which increases the strength of the signal. This is to compensate for any losses through the system, but also advantageously provides a signal boost to compensate for losses due to long cable runs as can occur when locating the receiver and television a distance from the antenna.

The first combiner/splitter circuit 48 further includes a high pass filter 52. The high pass filter 52 allows only signals with frequencies higher than preferably about 50 MHz to pass through it. (The television band covering channels 2-88 is from about 50 MHz to about 450 MHz and DSS signals range from about 950 MHz to 1450 MHz.) The amplified television signal passes through the high pass filter 52 and is output onto coaxial cable 59.

The second combiner/splitter circuit 66 receives the television signal from the coaxial cable 59. Preferably, the second combiner/splitter circuit 66 includes a high pass filter 61, which also passes signals with frequencies higher than 50 MHz in a manner similar to high pass filter 52. The television signals pass through high pass filter 61 and are provided on an RF output jack 200 of the second combiner/splitter circuit 66. A short jumper coaxial cable 202 is used to connect the second combiner/splitter circuit 66 with the RF input 71 of receiver 70 (or converter).

The path of the television signal from the antenna or transmission source 47 to the receiver 70 (or converter) connected to the television is illustrated by the dashed line in Figure 8. The television signal is received by the antenna or other transmission source 47 (such as a cable provided to the dwelling) and is provided to the first combiner/splitter circuit 48 via cable 49. The signal passes through amplifier 51 and high pass filter 52, at which point it combines with any telephone signals received from a central office, and the combined signal is transmitted via television cable 59 to the second combiner/splitter circuit 66. There, the television signal is separated from the combined signal by passing
it through the high pass filter 61. It is then provided to the output jack 200 and then to the RF input 71 on the receiver 70 via jumper cable 202.

The television signal from the transmission source is considered to be present at all times and will follow the same path. When a telephone signal is not being received or transmitted, the television signal will not be combined with any other signal and the system will be essentially transparent to the television signal.

The amplification of the television signal from the transmission source is an important feature of the present invention. As signals propagate through a coaxial cable, the signals diminish in strength. Often, a receiver requires a commercially available amplifier to be installed to combat the signal loss. The present invention eliminates the need for a separate amplifier to be purchased and installed. The consumer can purchase the present invention and achieve a strong signal at the receiver 70 and also eliminate the additional wiring required in conventional pay-per-view program access control systems.

The components of the first and second combiner/splitter circuits 48 and 66 with regard to the handling of telephone signals will now be described in greater detail and are shown in Figure 7. The path of the telephone signal received from a central office on the telephone line to the receiver 70 is illustrated by the dashed line in Figure 9.

Referring initially to Figure 7, the first combiner/splitter circuit 48 receives a signal from a central office on telephone line 80. The first combiner/splitter circuit 48 includes a relay 53 which selectively connects the rest of the telephone circuit in the first combiner/splitter circuit 48 to the telephone line 80. The relay is provided to prevent a 130 volt ring signal from damaging the system. The relay 53 will only be closed when a call is being placed by the receiver (or converter). Therefore, the telephone line cannot receive a call, and the corresponding ring signal, while the first combiner/splitter circuit 48 is connected.

The first combiner/splitter circuit 48 includes an isolation transformer 54. The isolation transformer 54 is connected to the output of relay 53. Isolation transformer 54 has a 1:1 voltage ratio and is used to convert the telephone signal from a balanced mode to an unbalanced mode so that the signal may be transmitted on a coaxial cable.
Telephone signals are normally in a balanced mode, that is, the telephone signal is across two lines of equal but opposite voltage. Signals on coaxial cables, however, must be unbalanced, that is, have a line with a voltage and a ground line. Therefore, it is necessary to convert the telephone line signal from balanced to unbalanced and unbalanced to balanced throughout the system.

The first combiner/splitter circuit 48 further includes a band pass filter 55. The band pass filter 55 is coupled to the output of the isolation transformer 54. The band pass filter 55 stops all signals with frequencies preferably below about 300 Hz and above about 3000 Hz. Telephone signals approximately range from 300 Hz to 3000 Hz.

The outputs of the high pass filter 52 (for the television signal) and the band pass filter 55 (for the telephone signal) are coupled together in the first combiner/splitter circuit 48. The telephone signals which pass through band pass filter 55 are blocked by high pass filter 52 so that the telephone signals will not interfere with the television signals received by the antenna or other transmission source 47. Similarly, the television signals will not pass through band pass filter 55 and will not interfere with signals on telephone line 80. However, the television signals outputted from high pass filter 52 and the telephone signals outputted by band pass filter 55 will combine and be transmitted from the first combiner/splitter circuit 48 on coaxial cable 59.

The combined television and telephone signals pass through coaxial cable 59 and are received by the second combiner/splitter circuit 66. The second combiner/splitter circuit 66 separates the television and telephone signals. It includes a high pass filter 61, as mentioned previously, but also a band pass filter 62. The inputs of the high pass filter 61 and band pass filter 62 are coupled together into cable 59. The high pass filter 61 has a lower cut-off frequency of 50 MHz, as mentioned previously, and the band pass filter 62 preferably passes frequencies only between about 300 Hz and about 3000 Hz, i.e., the band of frequencies in which telephone signals reside. Accordingly, the high pass filter 61, in conjunction with the band pass filter 62, separate the television signal from the telephone signal.

As mentioned previously, the television signal is outputted by the high pass filter 61 to an RF jack 200 which is used to provide the television signal to the RF input of a
receiver 70 or converter connected to a television. The second combiner/splitter circuit 66 includes an isolation transformer 63 to which the output of the band pass filter 62 is connected. Isolation transformer 63 has a 1:1 voltage ratio and is used to convert the telephone signal from an unbalanced mode to a balanced mode. The second combiner/splitter 66 includes a modular telephone jack 204. The output of the isolation transformer 63 is connected to the modular telephone jack 204 so that the separated telephone signal may be provided to the telephone jack 72 of the receiver 70 or converter via a short jumper telephone line 206.

The path of the telephone signal from a central office to the receiver 70 is illustrated by Figure 9 of the drawings. The telephone signal on telephone line 80 is provided to the first combiner/splitter circuit 48, and passes through relay 53, isolation transformer 54 and band pass filter 55 in the first combiner/splitter circuit 48. The telephone signal is combined with any television signal present and the combined signal is outputted on RF cable 59 to the second combiner/splitter circuit 66. There, the combined signals are separated so that the separated telephone signal passes through band pass filter 62 and isolation transformer 63. The telephone signal is provided to modular jack 204 and to the telephone jack 72 on the receiver 70 through jumper telephone line 206.

In a typical pay-per-view system, the user selects with his remote control what program he wishes to watch. The receiver 70 receives the signals from the remote control and must generate program request signals that must be transmitted to the central office of the cable provider. These signals are conveniently transmitted on the telephone line. Accordingly, the second combiner/splitter circuit 66 preferably has the capability of transmitting these telephone signals along the same RF cable 59 in an opposite direction, and the first combiner/splitter circuit 48 has the capability of receiving these signals and passing them on through telephone line 80 to the central office of the cable provider. A description of the components used in the first and second combiner/splitter circuits 48, 66 and the paths of the telephone and related signals which permit such transmission will now be described in detail and are illustrated in Figures 10 and 11.
Referring initially to Figure 10 of the drawings, the path of a telephone signal (such as a program request signal) from telephone jack 72 of receiver 70 to the telephone line 80, for transmission to the central office of the cable provider, is illustrated. The television signal from the transmission source 47 follows the same path as illustrated in Figure 8. The telephone signal from telephone jack 72 is received by the second combiner/splitter circuit 66 and is provided to the isolation transformer 63. Isolation transformer 63 converts the telephone signal from a balanced mode to an unbalanced mode. The signal from isolation transformer 63 is then passed to band pass filter 62. The band pass filter 62 passes the telephone signal to coaxial cable 59 where it combines with the television signal already present on the cable. The introduction of the telephone signal onto coaxial cable 59 results in a combined television and telephone signal.

The first combiner/splitter circuit 48 is responsive to the combined television and telephone signal. The telephone signal cannot pass through high pass filter 52, but will pass through band pass filter 55. Similarly, the television signal passes through high pass filter 52, but is blocked by band pass filter 55. Thus, only the television signal is passed to isolation transformer 54 connected to band pass filter 55. Isolation transformer 54 converts the separated telephone signal from an unbalanced mode to a balanced mode and provides the telephone signal to relay 53. The telephone signal passes through relay 53 to the telephone line 80 for transmission to the central office of the cable provider.

Preferably, the first combiner/splitter circuit 48 will only be connected to an open telephone line when the receiver 70 attempts a connection by initiating a telephone signal transmission. Usually, relay 53 will be open, thus disconnecting the first combiner/splitter circuit 48 from the telephone line. In order for the receiver to communicate with the central office of the cable provider, and visa versa, a telephone control circuit is provided in the system of the present invention. Preferably, portions of the control circuit are situated in both the first and second combiner/splitter circuits 48, 66.

Referring now to Figure 11 of the drawings, the second combiner/splitter circuit 66 preferably includes an off-hook detector 64. In operation, when the receiver 70 makes a call (i.e., initiates a telephone signal transmission), a signal from receiver 70 on
telephone jack 72 creates an off-hook condition, which signal is received by the off-hook detector 64. The second combiner/splitter circuit 66 further includes a pilot tone generator 65. The pilot tone generator 65 is connected to the output of the off-hook detector 64. The off-hook detector 64 generates a signal which is received by the pilot tone generator 65. In response, the pilot tone generator 65 generates a pilot tone having a frequency which is outside and preferably above the frequency range of the band pass filters 55, 62 and below the range of the high pass filters 52, 61 situated in the first and second combiner/splitter circuits 48, 66. For example, the pilot tone generator 65 may generate a signal having a frequency of about 5 kHz or higher, but certainly well below the 50 MHz cut-off frequency of the high pass filters 52, 61.

The output of the pilot tone generator 65 is coupled to the outputs of the band pass filter 62 and high pass filter 61. Since the frequency of the pilot tone is outside the frequency range of the band pass filter 62 and high pass filter 61, the pilot tone will not pass through these filters back to the receiver 70. Accordingly, the pilot tone is transmitted along with the telephone signals and television signal on RF cable 59 and is received by the first combiner/splitter 48.

The first combiner/splitter circuit 48 includes a pilot band pass filter 58. The input of the pilot band pass filter 58 is coupled to the output of the band pass filter 55 and the output of the high pass filter 52, and is electronically coupled to RF cable 59. The pilot band pass filter 58 has a specific pass band which is sufficiently different from that of high pass filter 52 and band pass filter 55 so that the pass bands of these filters 52, 55, 58 do not overlap and are sufficiently separated in frequency. The pass band of pilot band pass filter 58 is centered in frequency at the frequency of the pilot tone so as to allow the pilot tone to pass therethrough. Since the pilot tone is out of the frequency range of high pass filter 52 and band pass filter 55, the pilot tone will not pass through filters 52 and 55 and corrupt the television or telephone signals respectively on cable 49 and telephone line 80. Similarly, the television and telephone signals passing through the first combiner/splitter circuit 48 are outside the pass band of pilot band pass filter 58 and thus are blocked by filter 58.
The first combiner/splitter circuit 48 further includes a pilot tone detector 56. The output of the pilot band pass filter 58 is connected to the input of the pilot tone detector 56. The pilot tone detector 56 detects whether a pilot tone is present and provides a control signal on its output in response to the presence of a pilot tone.

The first combiner/splitter circuit 48 further includes a relay driver 57. The output of the pilot tone detector 56 is coupled to the input of the relay driver 57, which may be a conventional transistor circuit to open and close relay 53. The output of relay driver 57 is coupled to relay 53. In response to detecting a pilot tone, which is indicative of the receiver 70 initiating a transmission, the pilot tone detector 56 provides a control signal to relay driver 57 which causes relay 53 to close, thereby establishing a connection to the telephone line 80. Receiver 70 can then place a call to the central office of the cable provider as is well known in the art.

The path of the pilot tone is shown by the dashed line in Figure 11. It is generated by pilot tone generator 65 and passes over the same RF cable 59 that carries the telephone and television signals. The tone passes from the second combiner/splitter circuit 66 to the first combiner/splitter circuit 48. The tone is received by the pilot band pass filter 58 and passes therethrough to pilot tone detector 56. Pilot tone detector 56, in response to the pilot tone, generates a control signal which drives relay 57 which, in turn, causes relay 53 to close, establishing a telephone line connection.

Additional alternative embodiments of the pay-per-view television access control system are illustrated in Figures 12-14 and will now be described. Referring initially to Figure 12, the program access control system preferably includes the first combiner/splitter circuit 48 and the second combiner/splitter circuit 66. The first combiner/splitter circuit 48 is preferably coupled to the second combiner/splitter circuit 66 through the radio frequency (RF) television cable 59.

The first combiner/splitter circuit 48 is preferably connected to the transmission source 47, such as a satellite dish, via a multiswitch 45 and the coaxial cable 49. The first combiner/splitter circuit 48 is also connected to the telephone line 80 to receive and send signals over the telephone line. The signal which the first combiner/splitter circuit
48 receives may be the control signal sent from the central office to program the converter or receiver 70 to allow a particular movie to be viewed on the user's television.

The first combiner/splitter circuit 48 combines the signal from the transmission source (e.g., the television signal from the antenna) with the telephone control signal (e.g., from the central office) and generates the combined signal. The combined signal is provided to the second combiner/splitter circuit 66 via the coaxial cable 59. The first and second combiner/splitter circuits 48, 66 are interposed in-line with the coaxial cable 59, the first combiner/splitter circuit 48 preferably being situated close to a telephone jack, such as in the basement where the telephone lines enter the dwelling and are connected to the distribution module. The second combiner/splitter circuit 66 is preferably situated in proximity with the television receiver.

The second combiner/splitter circuit 66 separates the television signal and the telephone control signal from the combined signal. The television signal is then provided by the second combiner/splitter circuit 66 to the RF input 71 of the receiver 70 (or converter), and the telephone control signal is provided by the second combiner/splitter circuit 66 to the telephone jack 72 of the receiver 70 (or converter). In a preferred form of the invention, the first combiner/splitter circuit 48 includes the amplifier 51.

The first combiner/splitter circuit 48 also includes the high pass filter 52. The high pass filter 52 allows only signals with frequencies higher than preferably about 50 MHz to pass through it. (The television band covering channels 2-88 ranges from about 50 MHz to about 450 MHz and DSS signals range from about 950 MHz to 1450 MHz.) The amplified television signal passes through the high pass filter 52 and is output onto the coaxial cable 59.

The second combiner/splitter circuit 66 receives the television signal from the coaxial cable 59. Preferably, the second combiner/splitter circuit 66 includes the high pass filter 61, which also passes signals with frequencies higher than 50 MHz in a manner similar to high pass filter 52. The television signals pass through high pass filter 61 and are provided on the RF output jack 200 of the second combiner/splitter circuit 66.
The short jumper coaxial cable 202 is used to connect the second combiner/splitter circuit 66 to the RF input 71 of receiver 70.

The path of the television signal from the antenna or transmission source 47 to the receiver (or converter) connected to the television will now be described. The television signal is received by the satellite dish or other transmission source and is provided to the first combiner/splitter circuit 48 via cable 49. The signal passes through amplifier 51 and high pass filter 52, at which point it combines with any telephone signals received from the central office, and the combined signal is transmitted via coaxial cable 59 to the second combiner/splitter circuit 66. There, the television signal is separated from the combined signal by passing it through the high pass filter 61. The television signal is then provided to the output jack 200 and then to the RF input 71 on the receiver 70 via jumper cable 202.

The television signal from the transmission source is considered to be present at all times and will follow the same path just described. When a telephone signal is not being received or transmitted, the television signal will not be combined with any other signal and the system will essentially be transparent to the television signal.

The path of the telephone signal received from the central office on the telephone line to the receiver 70 will now be described. The first combiner/splitter circuit 48 receives the signal from the central office on telephone line 80 and passes the telephone signal through the isolation transformer 54, which is coupled to the band pass filter 55. The band pass filter 55 rejects all signals with frequencies preferably below about 300 Hz and above about 3000 Hz. Telephone signals range from about 300 Hz to about 3000 Hz.

The outputs of the high pass filter 52 (for the television signal) and the band pass filter 55 (for the telephone signal) are coupled together in the first combiner/splitter circuit 48. The telephone signals which pass through band pass filter 55 are blocked by high pass filter 52 so that the telephone signals will not interfere with the television signals received by the antenna or other transmission source 47. Similarly, the television signals will not pass through band pass filter 55 and will not interfere with signals on telephone line 80. However, the television signals outputted from high pass filter 52 and
the telephone signals outputted by band pass filter 55 will combine and be transmitted from the first combiner/splitter circuit 48 on coaxial cable 59.

The combined television and telephone signals pass through coaxial cable 59 and are received by the second combiner/splitter circuit 66. The second combiner/splitter circuit 66 separates the television and telephone signals. It includes the high pass filter 61 and the band pass filter 62. The inputs of the high pass filter 61 and band pass filter 62 are coupled together into cable 59. The high pass filter 61 has a lower cut-off frequency of 50 MHz, as mentioned previously, and the band pass filter 62 preferably passes frequencies between about 300 Hz and about 3000 Hz, i.e., the band of frequencies in which telephone signals reside. Accordingly, the high pass filter 61, in conjunction with the band pass filter 62, separate the television signal from the telephone signal.

The television signal is outputted by the high pass filter 61 to the RF jack 200, which provides the television signal to the RF input of the receiver 70 connected to the television. The second combiner/splitter circuit 66 also includes the isolation transformer 63 to which the output of the band pass filter 62 is connected. Isolation transformer 63 preferably has a 1:1 voltage ratio and converts the telephone signal from an unbalanced mode to a balanced mode. The second combiner/splitter 66 includes the modular telephone jack 204. The output of the isolation transformer 63 is connected to the modular telephone jack 204 so that the separated telephone signal may be provided to the telephone jack 72 of the receiver 70 via the short jumper telephone line 206.

The telephone signal on telephone line 80 is provided to the first combiner/splitter circuit 48 and passes through the isolation transformer 54 and band pass filter 55 in the first combiner/splitter circuit 48, as shown in Figure 12. The telephone signal is combined with any television signal present, and the combined signal is outputted on RF cable 59 to the second combiner/splitter circuit 66. There, the combined signals are separated so that the separated telephone signal passes through band pass filter 62 and isolation transformer 63. The telephone signal is provided to modular jack 204 and to the telephone jack 72 on the receiver 70 through jumper telephone line 206.
In a typical pay-per-view system, the user selects with his remote control the program he wishes to watch. The receiver 70 receives the signals from the remote control and generates program request signals that are transmitted to the central office of the cable provider. These signals are conveniently transmitted on the telephone line. Accordingly, the second combiner/splitter circuit 66 preferably has the capability of transmitting these telephone signals along the same coaxial cable 59 in an opposite direction, and the first combiner/splitter circuit 48 has the capability of receiving these signals and passing them on through telephone line 80 to the central office of the cable provider. A description of the components used in the first and second combiner/splitter circuits 48, 66 and the paths of the telephone and related signals which permit such transmission will now be described.

The telephone signal from telephone jack 72 is received by the second combiner/splitter circuit 66 and provided to the isolation transformer 63. Isolation transformer 63 converts the telephone signal from a balanced mode to an unbalanced mode. The signal from isolation transformer 63 is then passed to band pass filter 62. The band pass filter 62 passes the telephone signal to coaxial cable 59 where it combines with the television signal already present on the cable. The introduction of the telephone signal onto coaxial cable 59 results in a combined television and telephone signal.

The first combiner/splitter circuit 48 is responsive to the combined television and telephone signal. The telephone signal cannot pass through high pass filter 52, but will pass through band pass filter 55. Similarly, the television signal passes through high pass filter 52, but is blocked by band pass filter 55. Thus, only the telephone signal is passed to isolation transformer 54 connected to band pass filter 55. Isolation transformer 54 converts the separated telephone signal from an unbalanced mode to a balanced mode and provides the telephone signal to the telephone line 80 for transmission to the central office of the cable provider.

Referring again to Figure 12, the second combiner/splitter circuit 66 preferably includes a signal detector 69, the pilot tone generator 65, and a pilot band pass filter 67. The input of the signal detector 69 is connected to the RF output jack 200, and the output of the signal detector 69 is connected to the input of the pilot tone generator 65. The
signal detector 69 detects the presence of preferably 13 volts (v), 18 volts (v) and/or 22kHz on the line and outputs that information to the pilot tone generator 65. The pilot tone generator 65 generates one of preferably eight pilot tones having a frequency, which is representative of the presence of 13v, 18v and/or 22KHz. The frequency generated is outside and preferably above the frequency range of the band pass filters 55, 62 and below the range of the high pass filters 52, 61. For example, the pilot tone generator 65 may generate a signal having a frequency of about 5 kHz or higher, but certainly well below the 50 MHz cut-off frequency of the high pass filters 52, 61.

The output of the pilot tone generator 65 is coupled to the input of the pilot band pass filter 67, which passes the pilot tone. Since the frequency of the pilot tone is outside the frequency range of the band pass filter 62 and high pass filter 61, the pilot tone will not pass through these filters back to the receiver 70. Accordingly, the pilot tone is transmitted along with the telephone signal and television signal on the coaxial cable 59 and is received by the first combiner/splitter 48.

The first combiner/splitter circuit 48 also includes the pilot band pass filter 58. The pilot band pass filter 58 is coupled to the pilot band pass filter 67, band pass filter 62 and high pass filter 61 in the second combiner/splitter circuit 66 via the coaxial cable 59. The pilot band pass filter 58 has a specific pass band which is sufficiently different from that of high pass filter 52 and band pass filter 55 so that the pass bands of these filters 52, 55, 58 do not overlap and are sufficiently separated in frequency. The pass band of pilot band pass filter 58 is centered in frequency at the frequency of the pilot tone so as to allow the pilot tone to pass. Since the pilot tone is out of the frequency range of high pass filter 52 and band pass filter 55, the pilot tone will not pass through filters 52 and 55 and corrupt the television or telephone signals, respectively, on cable 49 and telephone line 80. Similarly, the television and telephone signals passing through the first combiner/splitter circuit 48 are outside the pass band of pilot band pass filter 58, and thus are blocked by filter 58.

The first combiner/splitter circuit 48 further includes the pilot tone detector 56 and a signal generator 73. The output of the pilot band pass filter 58 is connected to the input of the pilot tone detector 56. The pilot tone detector 56 detects whether a pilot tone
is present and provides a control signal on its output, which is representative of the frequency of the pilot tone. The control signal is coupled to the signal generator 73, which preferably provides 13v, 18v and/or 22kHz on the coaxial cable 49.

Preferably, the transmission source 47 or satellite dish includes a left-hand side and a right-hand side superimposed together on the same dish. Each side of the dish provides a right-hand circularly polarized output for the reception of even channels and a left-hand circularly polarized output for the reception of odd channels. Thus, four output signals from the satellite dish are preferably coupled to four inputs of the multiswitch 45. The multiswitch preferably couples one of the four output signals to the first combiner/splitter circuit 48 depending upon the control signal output by the signal generator 73. Preferably, 13v and 18v indicate whether the right-hand or left-hand circularly polarized outputs are to be coupled to the first combiner/splitter circuit 48, and the absence or presence of 22kHz indicates whether the output signals from the right-hand or the left-hand side of the satellite dish are to be coupled to the first combiner/splitter circuit 48.

The path of the pilot tone passes over the same RF cable 59 that carries the telephone and television signals. The tone passes from the second combiner/splitter circuit 66 to the first combiner/splitter circuit 48. The tone is received by the pilot band pass filter 58 and is passed to the pilot tone detector 56. The signal generator 73, in response to the pilot tone, generates the control signal that drives the multiswitch 45 to couple one of the four output signals from the satellite dish back to the first combiner/splitter circuit 48.

Figure 13 shows an alternative embodiment of the television access control system illustrated in Figure 12, in which the signal detector 69 and pilot tone generator 65 have been replaced by three distinct pilot tone generator 65 and signal detector 69 pairs. Each of the signal detectors is responsible for detecting one of 13v, 18v or 22KHz, and each of the pilot tone generators 65 is responsible for generating a tone having a frequency indicative of 13v, 18v and/or 22KHz. Likewise, three distinct signal generator 73 and pilot tone detector 56 pairs have been substituted for the signal generator 73 and the pilot tone detector 56 shown in Figure 12. Each pilot tone detector 56 is responsible
for detecting at least one tone representative of 13v, 18v and/or 22KHz, and passing information regarding the detection of the specific pilot tone to its corresponding signal generator 73, as shown in Fig. 13. Each of the signal generators 73 is responsible for generating 13v, 18v or 22KHz in response to the corresponding tone being detected by its corresponding pilot tone detector 56.

Figure 14 shows another alternative embodiment of the television access control system shown in Figure 12 wherein a signal encoder 75 and a pilot signal modulator 79 have been substituted for the pilot tone generator 65 shown in Figure 12. The input of the signal encoder 75 is coupled to the output of the signal detector 69, and the output of the signal encoder is coupled to the input of the pilot signal modulator 79. The output of the pilot signal modulator is then coupled to the input of the pilot signal band pass filter 67. The signal detector 69 provides information to the signal encoder 75, preferably in digital format, which indicates whether 13v, 18v and/or 22KHz have been detected. The signal encoder 75 preferably includes a microprocessor, microcontroller and/or an application specific integrated circuit (ASIC). The signal encoder 75 then provides data representative of whether 13v, 18v and/or 22KHz has been detected to the pilot signal modulator 79, which modulates the data onto the pilot tone and passes the modulated pilot signal to the pilot band pass filter 67.

Likewise, the first combiner/splitter circuit 48 shown in Figure 14 substitutes a signal decoder 77 and a pilot signal demodulator 81 for the pilot tone detector 56 shown in Figure 12. The input of the pilot signal demodulator 81 is coupled to the output of the pilot signal band pass filter 58, and the output of the pilot signal demodulator 81 is coupled to the input of the signal decoder 77. The output of the signal decoder 77 is then coupled to the input of the signal generator 73. Upon receiving the modulated pilot signal via the pilot band pass filter 58, the pilot signal demodulator 81 demodulates the signal and extracts the data representative of the presence of 13v, 18v and/or 22KHz. This information is provided, preferably in digital format, to the signal decoder 77. The signal decoder 77 then provides a control signal to the signal generator 73 which causes the signal generator to again generate 13v, 18v and/or 22KHz and apply it to the cable 49 coupled to the multiswitch 45.
The first and second combiner/splitter circuits 48, 66 are powered by tapping off a DC voltage from the RF input of the receiver 70 or converter, as is well known in the art. The DC voltage is coupled from the second combiner/splitter circuit 66 to the first combiner/splitter circuit 48 via the coaxial cable 59 and, preferably, to the DSS satellite dish or antenna 47 via coaxial cable 49. Conventional circuitry, such as DC blocking capacitors and rectifier circuits, may be employed in the first and second combiner/splitter circuits 48, 66 to extract the DC voltage carried on the RF cable 202 connected between the RF input 71 of receiver 70 and output 200 of the second combiner/splitter circuit 66.

The present invention has applicability to interactive or web TV access control. Interactive TV has similar requirements to those of pay-per-view television programming. Signals from a receiver connected to a television are sent via telephone lines from a modem in the receiver to a remotely located central office. Accordingly, a connection to a telephone line from the interactive television system is required, in much the same way as that for a pay-per-view television receiver. Accordingly, two combiner/splitter circuits, constructed in accordance with the present invention, may be used to transmit both television and telephone signals over a single RF cable without the need for additional wiring from the interactive TV receiver to a telephone jack or telephone distribution module.

This invention is not limited to television programming and Web TV access control. Any system which processes two or more signals which are separated in frequency may utilize the present invention to reduce the number of necessary transmission paths.

By employing the control signal distribution system of the present invention, pay-per-view programming and Web TV access control is simplified and improved. The present invention eliminates the requirements for television sets to be co-located with a telephone line connection. Further, the present invention provides means for multiple television sets to communicate with a customer service center through only a single telephone line connection. Still further, the present invention provides a method and apparatus for selectively coupling one of a plurality of transmission signals from a
transmission source to a television receiver in response to one or more pilot tones or the modulation of data on a single pilot tone.

Although illustrative embodiments of the present invention have been described herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various other changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention.
WHAT IS CLAIMED IS:

1. A multiple frequency signal combiner/splitter system comprising:

   a combiner circuit, the combiner circuit inputting a television signal and a
   telephone signal, the combiner circuit generating a combined television and telephone
   signal, the combined television and telephone signal being representative of the
   television signal and the telephone signal; and

   a splitter circuit, the splitter circuit inputting the combined television and
   telephone signal from the combiner circuit via a single transmission path, the splitter
   circuit separating the combined television and telephone signal into discrete signals
   representative of the television signal and the telephone signal.

2. The multiple frequency signal combiner/splitter system as defined by
   Claim 1, further comprising a switch, the switch inputting a plurality of television
   signals, the switch selectively coupling at least one of the plurality of television signals
   from the transmission source to the combiner circuit.

3. The multiple frequency signal combiner/splitter system as defined by
   Claim 2, wherein the splitter circuit includes a signal detector, a tone generator and a first
   band pass filter, the signal detector being responsive to a first control signal, the signal
   detector outputting a second control signal in response to detecting the first control
   signal, the tone generator being responsive to the second control signal, the tone
   generator generating a tone in response to the second control signal, the tone having a
   frequency within a first range of frequencies, the first band pass filter being responsive to
   the tone, the first band pass filter passing at least one signal having a frequency within
   the first range of frequencies, the first band pass filter outputting the at least one passed
   signal including the tone to the combiner via the single transmission path; and

   wherein the combiner includes a second band pass filter, a tone detector and a
   signal generator, the second band pass filter being responsive to the tone from the
   splitter, the second band pass filter passing at least one signal having a frequency within
   the first range of frequencies, the second band pass filter outputting the at least one
passed signal having a frequency within the first range of frequencies including the tone to the tone detector, the tone detector outputting a third control signal in response to detecting the tone, the signal generator being responsive to the third control signal, the signal generator generating a fourth control signal in response to the third control signal, the switch being responsive to the fourth control signal, the switch selectively coupling at least one of the plurality of television signals to the combiner in response to the fourth control signal.

4. The multiple frequency signal combiner/splitter system as defined by Claim 2, wherein the splitter circuit includes a plurality of signal detectors, a plurality of tone generators and a first band pass filter, each of the plurality of signal detectors being responsive to at least one of a plurality of first control signals, each of the plurality of signal detectors outputting a second control signal to a corresponding at least one of the plurality of tone generators in response to detecting at least one of the plurality of first control signals, each of the plurality of tone generators being responsive to the second control signal output from a corresponding at least one of the plurality of signal detectors, each of the plurality of tone generators outputting at least one of a plurality of tones in response to the second control signal, each of the plurality of tones having a frequency within a first range of frequencies, the first band pass filter being responsive to the plurality of tones, the first band pass filter passing at least one signal having a frequency within the first range of frequencies, the first band pass filter outputting the at least one passed signal including the plurality of tones via the single transmission path; and

wherein the combiner includes a second band pass filter, a plurality of tone detectors and a plurality of signal generators, the second band pass filter being responsive to the plurality of tones, the second band pass filter passing at least one signal having a frequency within the first range of frequencies, the second band pass filter outputting the at least one passed signal having a frequency within the first range of frequencies including at least one of the plurality of tones, each of the plurality of tone detectors outputting a third control signal to a corresponding at least one of the plurality of signal generators in response to detecting at least one of the plurality of tones, each of the plurality of signal generators generating a fourth control signal in response to the third control signal, the switch being responsive to the fourth control signal, the switch
selectively coupling at least one of the plurality of television signals to the in response to the fourth control signal.

5. The multiple frequency signal combiner/splitter system as defined by Claim 2, wherein the splitter circuit includes a signal detector, a signal encoder, a signal modulator and a first band pass filter, the signal detector being responsive to a first control signal, the signal detector outputting a second control signal in response to detecting the first control signal, the signal encoder being responsive to the second control signal, the signal encoder outputting an encoded signal in response to the second control signal, the signal modulator being responsive to the encoded signal, the signal modulator modulating a tone using the encoded signal and outputting the modulated tone in response to the encoded signal, the modulated tone having a frequency within a first range of frequencies, the first band pass filter being responsive to the modulated tone, the first band pass filter passing at least one signal having a frequency within the first range of frequencies, the first band pass filter outputting the at least one passed signal including the modulated tone via the single transmission path; and

wherein the combiner includes a second band pass filter, a tone demodulator, a signal decoder and a signal generator, the second band pass filter being responsive to the modulated tone, the second band pass filter passing at least one signal having a frequency within the first range of frequencies, the second band pass filter outputting the at least one passed signal having a frequency within the first range of frequencies including the modulated tone to the signal demodulator, the signal demodulator demodulating the modulated tone and outputting a demodulated signal, the signal decoder being responsive to the demodulated signal, the signal decoder outputting a third control signal in response to the demodulated signal, the signal generator being responsive to the third control signal, the signal generator generating a fourth control signal in response to the third control signal, the switch being responsive to the fourth control signal, the switch selectively coupling at least one of the plurality of television signals to the combiner in response to the fourth control signal.

6. A multiple frequency signal combiner/splitter system comprising:
a first combiner/splitter, the first combiner/splitter including a first high pass filter and a first band pass filter, the first high pass filter being responsive to a television signal from a transmission source, the first high pass filter passing at least one signal having a frequency greater than a first frequency, the television signal having a frequency greater than the first frequency, the first high pass filter outputting the at least one passed signal including the television signal via a single transmission path, the first band pass filter being responsive to a telephone signal from a telephone line, the first band pass filter passing at least one signal having a frequency within a first range of frequencies, the telephone signal having a frequency within the first range of frequencies, the first band pass filter outputting the at least one passed signal including the telephone signal via the single transmission path; and

a second combiner/splitter, the second combiner splitter coupling the single transmission path to a television receiver, the television receiver having a radio frequency input and a telephone input, the second combiner/splitter including a second high pass filter and a second band pass filter, the second high pass filter being responsive to the television signal and the telephone signal from the single transmission path, the second high pass filter passing at least one signal having a frequency greater than the minimum frequency, the second high pass filter outputting the at least one passed signal including the television signal to the radio frequency input of the television receiver, the second band pass filter being responsive to the television signal and the telephone signal from the single transmission path, the second band pass filter passing at least one signal having a frequency within the first range of frequencies, the second band pass filter outputting the at least one passed signal including the telephone signal to the telephone input of the television receiver.

7. The multiple frequency signal combiner/splitter system as defined by Claim 6, wherein the first frequency is about 50MHz.

8. The multiple frequency signal combiner/splitter system as defined by Claim 6, wherein the first range of frequencies is from about 300Hz to about 3000Hz.

9. The multiple frequency signal combiner/splitter system as defined by Claim 6, further comprising an amplifier, the amplifier amplifying the television signal,
the amplifier being disposed between the transmission source and the first high pass filter.

10. The multiple frequency signal combiner/splitter system as defined by Claim 6, further comprising a switch, the switch inputting a plurality of television signals from the transmission source, the switch selectively coupling at least one of the plurality of television signals from the transmission source to the first combiner/splitter.

11. The multiple frequency signal combiner/splitter system as defined by Claim 10, wherein the second combiner/splitter includes a signal detector, a tone generator and a third band pass filter, the signal detector being responsive to a first control signal from the radio frequency input of the television receiver, the signal detector outputting a second control signal in response to detecting the first control signal, the tone generator being responsive to the second control signal, the tone generator outputting a tone in response to the second control signal, the tone having a frequency within a second range of frequencies, the third band pass filter being responsive to the tone, the third band pass filter passing at least one signal having a frequency within the second range of frequencies, the third band pass filter outputting the at least one passed signal including the tone via the single transmission path; and

wherein the first combiner/splitter includes a fourth band pass filter, a tone detector and a signal generator, the fourth band pass filter being responsive to the tone, the fourth band pass filter passing at least one signal having a frequency within the second range of frequencies, the fourth band pass filter outputting the at least one signal within the second range of frequencies including the tone, the tone detector outputting a third control signal in response to detecting the tone, the signal generator generating a fourth control signal in response to the third control signal, the switch being responsive to the fourth control signal, the switch selectively coupling at least one of the plurality of television signals from the transmission source to the first combiner/splitter in response to the fourth control signal.

12. The multiple frequency signal combiner/splitter system as defined by Claim 11, wherein the second range of frequencies is from about 100kHz to about 50MHz.
13. The multiple frequency signal combiner/splitter system as defined by Claim 11, wherein the transmission source includes a satellite dish, the satellite dish including a right side and a left side, the right side of the satellite dish outputting a first right-hand circularly polarized output signal and a first left-hand circularly polarized output signal, the left side of the satellite dish outputting a second right-hand circularly polarized output signal and a second left-hand circularly polarized output signal.

14. The multiple frequency signal combiner/splitter system as defined by Claim 13, wherein the fourth control signal indicates which one of the first right-hand circularly polarized output signal, the first left-hand circularly polarized output signal, the second right-hand circularly polarized output signal and the second left-hand circularly polarized output signal is to be coupled from the transmission source to the first combiner/splitter by varying at least one of the voltage and frequency of the fourth control signal.

15. The multiple frequency signal combiner/splitter system as defined by Claim 10, wherein the second combiner/splitter circuit includes a plurality of signal detectors, a plurality of tone generators and a third band pass filter, each of the plurality of signal detectors being responsive to at least one of a plurality of first control signals from the radio frequency input of the television receiver, each of the plurality of signal detectors outputting a second control signal to a corresponding at least one of the plurality of tone generators in response to detecting at least one of the plurality of first control signals, each of the plurality of tone generators being responsive to the second control signal output from a corresponding at least one of the plurality of signal detectors, each of the plurality of tone generators outputting at least one of a plurality of tones in response to the second control signal, each of the plurality of tones having a frequency within a second range of frequencies, the third band pass filter being responsive to the plurality of tones, the third band pass filter passing at least one signal having a frequency within the second range of frequencies, the third band pass filter outputting the at least one passed signal including the plurality of tones via the single transmission path; and

wherein the first combiner/splitter includes a fourth band pass filter, a plurality of tone detectors and a plurality of signal generators, the fourth band pass filter being
responsive to the plurality of tones, the fourth band pass filter passing at least one signal having a frequency within the second range of frequencies, the fourth band pass filter outputting the at least one passed signal having a frequency within the second range of frequencies including at least one of the plurality of tones, each of the plurality of tone detectors outputting a third control signal to a corresponding at least one of the plurality of signal generators in response to detecting at least one of the plurality of tones, each of the plurality of signal generators generating a fourth control signal in response to the third control signal, the switch being responsive to the fourth control signal, the switch selectively coupling at least one of the plurality of television signals from the transmission source to the first combiner/splitter in response to the fourth control signal.

16. The multiple frequency signal combiner/splitter system as defined by Claim 15, wherein the second range of frequencies is from about 100kHz to about 50MHz.

17. The multiple frequency signal combiner/splitter system as defined by Claim 15, wherein the transmission source includes a satellite dish, the satellite dish including a right side and a left side, the right side of the satellite dish outputting a first right-hand circularly polarized output signal and a first left-hand circularly polarized output signal, the left side of the satellite dish outputting a second right-hand circularly polarized output signal and a second left-hand circularly polarized output signal.

18. The multiple frequency signal combiner/splitter system as defined by Claim 17, wherein the fourth control signal indicates which one of the first right-hand circularly polarized output signal, the first left-hand circularly polarized output signal, the second right-hand circularly polarized output signal and the second left-hand circularly polarized output signal is to be coupled from the transmission source to the first combiner/splitter by varying at least one of the voltage and frequency of the fourth control signal.

19. The multiple frequency signal combiner/splitter system as defined by Claim 10, wherein the second combiner/splitter circuit includes a signal detector, a signal encoder, a signal modulator and a third band pass filter, the signal detector being responsive to a first control signal from the radio frequency input of the television
receiver, the signal detector outputting a second control signal in response to detecting the first control signal, the signal encoder being responsive to the second control signal, the signal encoder outputting an encoded signal in response to the second control signal, the signal modulator being responsive to the encoded signal, the signal modulator modulating a tone using the encoded signal and outputting the modulated tone in response to the encoded signal, the modulated tone having a frequency within a second range of frequencies, the third band pass filter being responsive to the modulated tone, the third band pass filter passing at least one signal having a frequency within the second range of frequencies, the third band pass filter outputting the at least one passed signal including the modulated tone via the single transmission path; and

wherein the first combiner/splitter includes a fourth band pass filter, a tone demodulator, a signal decoder and a signal generator, the fourth band pass filter being responsive to the modulated tone, the fourth band pass filter passing at least one signal having a frequency within the second range of frequencies, the fourth band pass filter outputting the at least one passed signal having a frequency within the second range of frequencies including the modulated tone to the signal demodulator, the signal demodulator demodulating the modulated tone and outputting a demodulated signal, the signal decoder being responsive to the demodulated signal, the signal decoder outputting a third control signal in response to the demodulated signal, the signal generator being responsive to the third control signal, the signal generator generating a fourth control signal in response to the third control signal, the switch being responsive to the fourth control signal, the switch selectively coupling at least one of the plurality of television signals from the transmission source to the first combiner/splitter in response to the fourth control signal.

20. The multiple frequency signal combiner/splitter system as defined by Claim 19, wherein the second range of frequencies is from about 100kHz to about 50MHz.

21. The multiple frequency signal combiner/splitter system as defined by Claim 19, wherein the transmission source includes a satellite dish, the satellite dish including a right side and a left side, the right side of the satellite dish outputting a first
right-hand circularly polarized output signal and a first left-hand circularly polarized output signal, the left side of the satellite dish outputting a second right-hand circularly polarized output signal and a second left-hand circularly polarized output signal.

22. The multiple frequency signal combiner/splitter system as defined by Claim 21, wherein the fourth control signal indicates which one of the first right-hand circularly polarized output signal, the first left-hand circularly polarized output signal, the second right-hand circularly polarized output signal and the second left-hand circularly polarized output signal is to be coupled from the transmission source to the first combiner/splitter by varying at least one of the voltage and frequency of the fourth control signal.

23. A method for controlling television programming and Internet access, the method comprising the steps of:

(a) combining a television signal, a telephone signal and a control signal, the telephone signal being able to transfer television programming and Internet access information between a television receiver and a central office, the control signal being able to indicate which of at least one of a plurality of television signals is to be coupled from a transmission source to the television receiver;

(b) providing the combined television, telephone and control signal via a single transmission path;

(c) separating the combined television, telephone and control signal into the discrete television signal, telephone signal and control signal; and

(d) coupling the separated television signal, the telephone signal and the control signal to the television receiver.
24. A method for controlling television programming and Internet access as defined by Claim 23, further comprising the steps of:

(e) detecting the control signal;

(f) generating a tone from the detected control signal, the tone being representative of the detected control signal;

(g) filtering the tone prior to the step of providing the combined television, telephone and control signal via a single transmission path;

(h) filtering the tone subsequent to the step of providing the combined television, telephone and control signal via a single transmission path;

(i) detecting the tone;

(j) regenerating the control signal from the detected tone, the regenerated control signal being representative of the detected tone; and

(k) coupling at least one of the plurality of television signals from the transmission source to the television receiver selectively in response to the regenerated control signal.

25. A method for controlling television programming and Internet access as defined by Claim 23, further comprising the steps of:

(e) detecting the control signal;

(f) generating an encoded signal from the detected control signal, the encoded signal being representative of the detected control signal;

(g) modulating a pilot signal with the encoded signal;
(h) filtering the modulated pilot signal prior to the step of providing the combined television, telephone and control signal via a single transmission path;

(i) filtering the modulated pilot signal subsequent to the step of providing the combined television, telephone and control signal via a single transmission path;

(j) demodulating the modulated pilot signal;

(k) decoding the demodulated pilot signal;

(l) regenerating the control signal from the decoded demodulated pilot signal; and

(m) coupling at least one of the plurality of television signals from the transmission source to the television receiver selectively as indicated by the regenerated control signal.

20

25
Fig. 3

TELCO MODULATOR

TELCO DEMODULATOR

ADDRESSABLE CONVERTER

TV

TELCO DEMODULATOR

ADDRESSABLE CONVERTER

TV

TELCO DEMODULATOR

ADDRESSABLE CONVERTER

TV

CABLE

TELCO

SUBSTITUTE SHEET (RULE 26)
Fig. 7

SUBSTITUTE SHEET (RULE 26)
### INTERNATIONAL SEARCH REPORT

#### A. CLASSIFICATION OF SUBJECT MATTER

<table>
<thead>
<tr>
<th>IPC(7)</th>
<th>H04N 7/80, 7/175, H04H 4/00</th>
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<td>US CL.</td>
<td>726/66, 69, 106, 181, 197, 370/478</td>
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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)

| U.S.   | 726/66, 69, 106, 191, 197; 370/478 |

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 practicable, search terms used).

#### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 5,027,426 A (CHIOCCA, Jr) 25 June 1991, Col.3, lines 31-47, Col.3, lines 64-Col.4, lines 2; Col.5, lines 50-65; Col.6, lines 38-65</td>
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<td></td>
<td>Fig.1, 2</td>
<td>2-5, 7-22, 24-25</td>
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<td>Y</td>
<td>US 6,144,399 A (MANCHESTER et al.) 07 November 2000, Col.3, lines 20-col.5, lines 43</td>
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<td>US 5,172,413 A (BRADLEY et al.) 15 December 1992, Fig.2, Col.8, lines 33-Col.11, lines 13, especially Col.10, lines 30-65+</td>
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<td>Y</td>
<td>US 5,553,064 A (PAFF et al.) 03 September 1996; Fig.1, all document</td>
<td>2-5, 7-22, 24-25</td>
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<tr>
<td>Y</td>
<td>US 6,023,603 A (MATSUBARA) 08 February 2000, Fig.6</td>
<td>13-14, 17-18, 21-22</td>
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[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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  - **Z** document member of the same patent family

Date of the actual completion of the international search: 09 SEPTEMBER 2001

Date of mailing of the international search report: 18 OCT 2001

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks

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<th>Relevant to claim No.</th>
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<td>US 5,926,744 A (FUKUZAWA et al.) 20 July 1999, Fig.1, 7</td>
<td>13-14, 17-18, 21-22</td>
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<tr>
<td>Y</td>
<td>US 5,905,941 A (CHANTEAU) 18 May 1999, Fig.1</td>
<td>13-14, 17-18, 21-22</td>
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