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<td>PAY-PER-VIEW PROGRAM ACCESS CONTROL SYSTEM</td>
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<td>(57) Abstract</td>
<td>A pay-per-view program access control system which combines a television signal with a telephone control signal to allow a remotely located telephone connection to be coupled to a television receiver via a signal wire or transmission line. The television signal is combined with the telephone control signal and the combined signals are then separated at a remote location by a splitter. Once separated, the television signal and telephone control signal can be used as if they had been transmitted to the remote location separately.</td>
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PAY-PER-VIEW PROGRAM ACCESS CONTROL SYSTEM

This application claims the benefit of United States provisional patent application Serial No. 60/059,784, filed September 23, 1997, entitled “Pay-Per-View Program Access Control System,” 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 a system and method for distributing access control signals received from a telephone line connection throughout a building.

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.

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 a further 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 still another 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.

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.

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.

**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 seizure 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 a 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 a 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 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 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 a 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 in 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 officer 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 have 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 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.
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. Furthermore, the present invention provides means
for multiple television sets to communicate with a customer service center through only a single telephone line connection.

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) a combiner circuit arranged to receive a television and telephone control signal, said combiner circuit generating a combined television signal, said combiner circuit coupling said combined television and telephone control signal to a remote splitter circuit via a single transmission path; and
   (b) a splitter circuit arranged to receive said combined television and telephone control signal and separate said combined television and telephone control signal into discrete signals corresponding to said television signal and said telephone control signal.

2. A multiple frequency signal combiner/splitter system comprising:
   a first combiner/splitter electronically coupled to a transmission source and telephone line, the first combiner/splitter including: a first high pass filter arranged to receive a signal from the transmission source; the first high pass filter passing all signals with frequencies above about 50 MHZ and coupling the passed signals to a second combiner/splitter via a single transmission path; a first band pass filter arranged to receive a signal from the telephone line; the first band pass filter passing all signals with frequencies between about 300 Hz and about 3000 Hz and coupling the passed signals to the second combiner/splitter via the single transmission path; a second combiner/splitter for coupling a transmission signal and telephone signal to a set top box receiver for a television, the second combiner/splitter including a second high pass filter arranged to receive the signals from the single transmission path, the second high pass filter passing all signals with frequencies above about 50 MHZ and coupling the passed signals to an RF input of the set top box receiver; a second band pass filter arranged to receive the signals from the single transmission path; the second band pass filter passing all signals with frequencies between about 300 Hz and about 3000 Hz and coupling the passed signals to a telephone jack of the receiver.
3. The multiple frequency signal combiner/splitter system of claim 2, further comprising a television band frequency gain block arranged to receive the signal from the transmission source, the gain block amplifying the signal and coupling the amplified signal to the first high pass filter.

4. The multiple frequency signal combiner/splitter system of claim 2, further comprising a switch control circuit with a first portion in the second combiner/splitter and a second portion in the first combiner/splitter, the first portion including an off-hook detector arranged to receive a signal from the telephone jack of the receiver and communicate instructions to a pilot tone detector, the pilot tone detector is arranged to receive instructions from the off-hook detector and transmit a pilot tone to the first combiner/splitter via the single transmission path; the second portion including a pilot band pass filter, a pilot tone detector, a relay driver, and a relay, the pilot band pass filter is arranged to receive the signals from the single transmission path, the pilot band pass filter passes only signals with frequencies corresponding to the pilot tone and couples the passed signals to the pilot tone detector; the pilot tone detector is arranged to receive the signals from the pilot band pass filter; the pilot tone detector detects the pilot tone and communicates instructions to the relay driver; the relay driver is arranged to receive instructions from the pilot tone detector; the relay driver is operably connected to the relay; the relay is arranged to connect and disconnect the first combiner/splitter from the telephone line; the relay will couple the telephone line to the first band pass filter when it is closed.

5. The first combiner/splitter of the multiple frequency signal combiner/splitter system of claim 2, further comprising a first isolation transformer arranged to receive a balanced signal from the telephone line, the first isolation transformer converting the balanced signal to an unbalanced signal and coupling the unbalanced signal to the first band pass filter.
6. The second combiner/splitter of the multiple frequency signal combiner/splitter system of claim 2, further comprising a second isolation transformer arranged to receive a balanced signal from the telephone jack of the receiver, the second isolation transformer converting the balanced signal to an unbalanced signal and coupling the unbalanced signal to the second band pass filter.

7. In a television reception system, the combination of:

an electrical pathway for reception of television signals from a transmission source;

a first combiner/splitter coupled to the antenna and selectively coupled to a telephone line, the first combiner/splitter receiving a first television signal from the antenna and a first telephone signal from the telephone line and combining the signal from the antenna and signal from the telephone line in generating a first combined signal therefrom;

a second combiner/splitter, the second combiner/splitter being responsive to the first combined signal, the second combiner/splitter splitting the first combined signal and generating a second television signal and a second telephone signal therefrom; and

a receiver, the receiver being responsive to the second television signal and second telephone signal and generating therefrom a third television signal, the third television signal being coupled to a television, the receiver generating a third telephone signal;

the second combiner/splitter being responsive to the third telephone signal and generating therefrom a second combined signal;

the first combiner/splitter being responsive to the second combined signal and generating therefrom a fourth telephone signal, the fourth telephone signal being selectively provided to the telephone line.
8. The television reception system of Claim 7, wherein the transmission source is an antenna.

9. The television reception system of Claim 7, wherein the transmission source is a cable feed.

10. A method for controlling television programming and Web TV access comprising:
    (a) generating a single signal by combining a television signal with a telephone control signal, said telephone control signal being used to communicate between a receiver and a central office computer;
    (b) coupling said combined signal to a splitter circuit via a single transmission path; and
    (c) separating said television signal and said telephone control signal into discrete signals.

11. A method for a television programming and Web TV access control system to initiate a telephone call comprising:
    (a) detecting a request from a receiver to seize a telephone line;
    (b) generating a pilot tone signal in response to detection of the request to seize a telephone line;
    (c) combining the pilot tone signal with a television signal and generating a combined television/pilot tone signal;
    (d) receiving the combined television/pilot tone signal;
    (e) separating the pilot tone signal from the combined television/pilot tone signal;
    (f) detecting the pilot tone signal; and
    (g) coupling a telephone line to the receiver in response to detection of the pilot tone signal.

12. A method for controlling television programming and Web TV access comprising:
(a) receiving a first television signal;
(b) receiving a first telephone signal;
(c) combining the first television signal with the first telephone signal and generating a first combined signal;
(d) receiving a first combined signal;
(e) separating the first television signal from the first combined signal;
(f) separating the first telephone signal from the first combined signal;
(g) receiving a second telephone signal;
(h) combining the second telephone signal with the first television signal to generate a second combined signal;
(i) receiving a second combined signal;
(j) separating the second telephone signal from the second combined signal to generate a third telephone signal; and
(k) providing the third telephone signal to the telephone line.
Fig. 1 (PRIOR ART)

OUTSIDE OF STRUCTURE

WITHIN STRUCTURE

SCRAMBLED CABLE IN

ADDRESSABLE CONVERTER

DE-SCRAMBLED CABLE OUT

TO TV

TELCO(CONTROL) I/O

Fig. 2

SCRAMBLED CABLE IN

TELCO MODULATOR

MODULATED CABLE IN/OUT

TELCO INTERFACE

TELCO DEMODULATOR

ADDRESSABLE CONVERTER

DESCRAMBLED CABLE OUT

TO TV

10

10b

10a

12

16

14

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Fig. 4

MODULATED CABLE OUT

RF MODULATOR

MICROPROCESSOR

DTMF DECODER

TELCO LINE SEIZE

TO TELEPHONE LINE

CABLE IN

26

12

22

24

20

SUSTITUTE SHEET (RULE 26)