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(54) **MOCA GATEWAY SPLITTER**

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(51) **Int. Cl.**
H04L 12/28 (2006.01)
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(Continued)

(52) **U.S. Cl.**
CPC ***H04L 12/2838*** (2013.01); ***H04L 12/2801*** (2013.01); ***H04N 7/106*** (2013.01);
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CPC H04L 12/2838; H04L 12/2801; H04N 21/43615; H04N 21/04; H04N 21/26;
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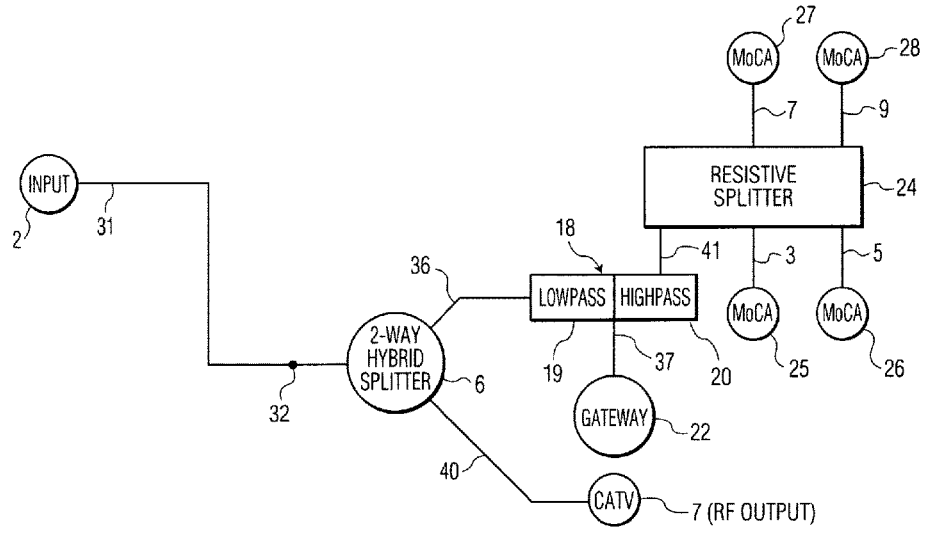
(57) **ABSTRACT**

A CATV/MoCA (*cable television/Multimedia over Coax Alliance*) signal distribution system includes a first 2-way hybrid splitter for receiving a CATV input signal and splitting it into first and second CATV output signals, a second 2-way hybrid splitter for receiving the second CATV output signal and splitting it into third and fourth CATV output signals, with the latter being connected to a CATV output port. A first diplex filter is receptive of the first CATV output signal, and MoCA signals for providing electrical isolation therebetween and connecting them to a modem port. A second diplex filter is receptive of the third CATV output signal and MoCA signals for providing electrical isolation therebetween and connecting them to a Gateway port. A resistive splitter is connected between the first and second diplex filters and a plurality of individual MoCA signal ports for providing bidirectional MoCA signal flow therebetween.

24 Claims, 7 Drawing Sheets



(51) **Int. Cl.**

H04N 7/173	(2011.01)
H04N 21/426	(2011.01)
H04N 21/436	(2011.01)
H04N 21/472	(2011.01)
H04N 21/61	(2011.01)
H04N 21/643	(2011.01)

(52) **U.S. Cl.**

CPC ***H04N 7/17309*** (2013.01); ***H04N 21/426*** (2013.01); ***H04N 21/43615*** (2013.01); ***H04N 21/47214*** (2013.01); ***H04N 21/6118*** (2013.01); ***H04N 21/6168*** (2013.01); ***H04N 21/643*** (2013.01)

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CPC H04N 21/47214; H04N 21/616; H04N 21/6118; H04N 7/106; H04N 7/17309

See application file for complete search history.

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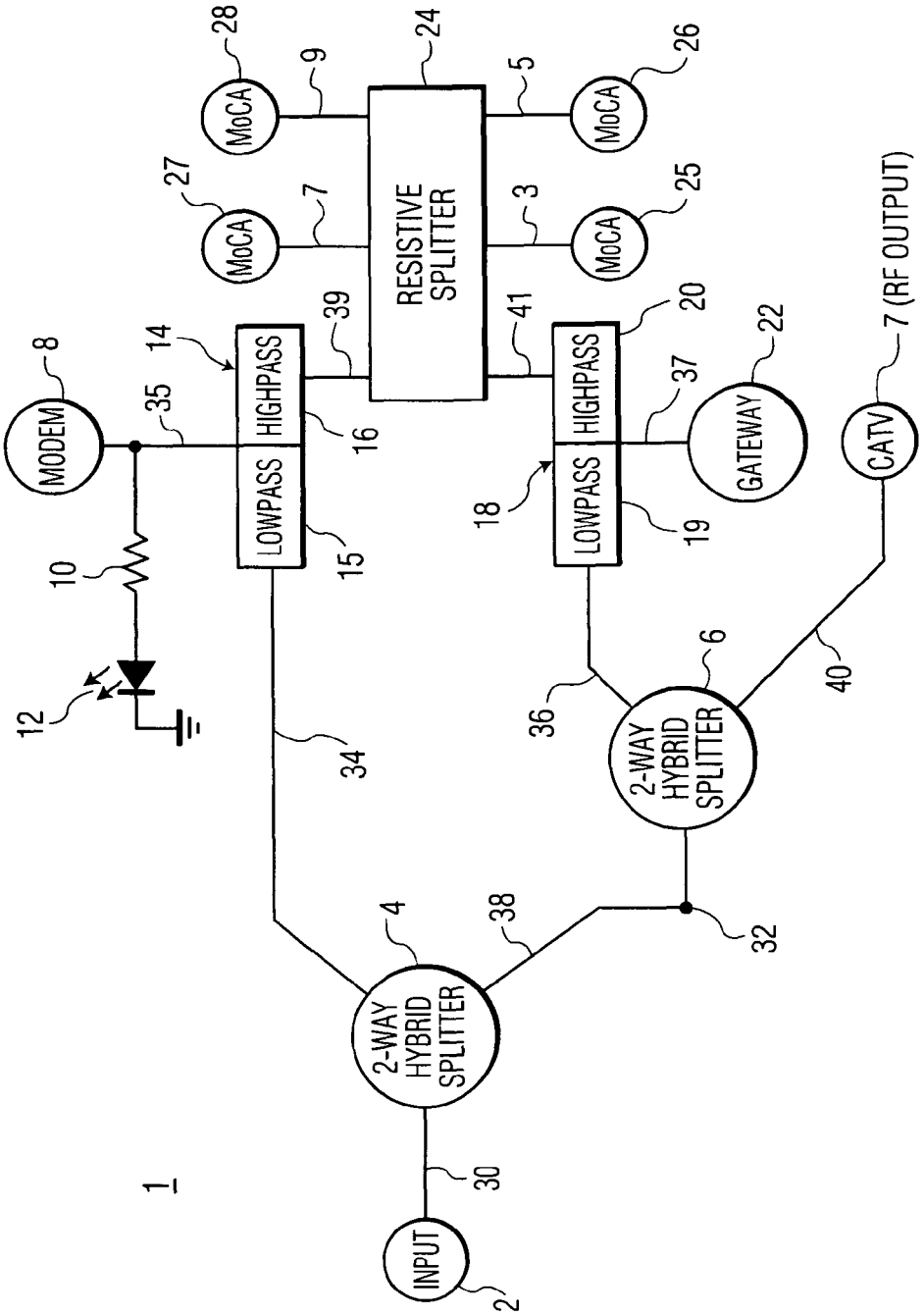
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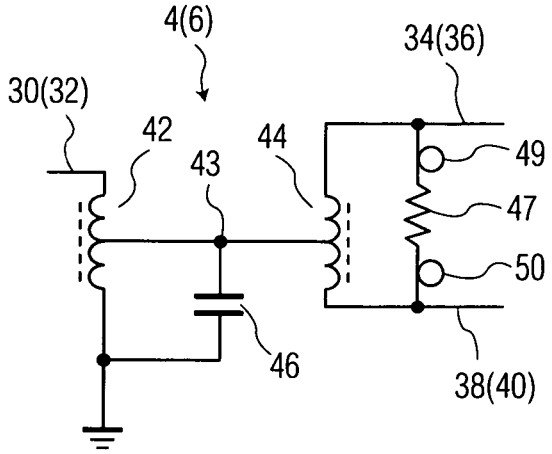
INPUT
2
30
2-WAY HYBRID SPLITTER
4
38
32
2-WAY HYBRID SPLITTER
6
36
40
34
12
10
MODEM
8
35
14
LOWPASS
HIGHPASS
15
16
39
RESISTIVE SPLITTER
41
18
LOWPASS
HIGHPASS
19
20
37
GATEWAY
22
CATV
7 (RF OUTPUT)
MoCA
28
9
24
5
MoCA
26
MoCA
27
7
3
MoCA
25

FIG. 1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34(36)
30(32)
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38(40)

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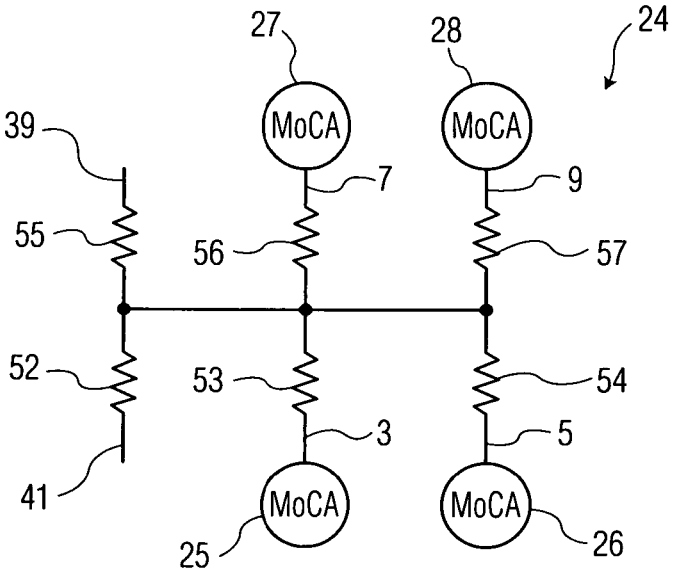
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28
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MoCA
MoCA
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MoCA
MoCA
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FIG. 3

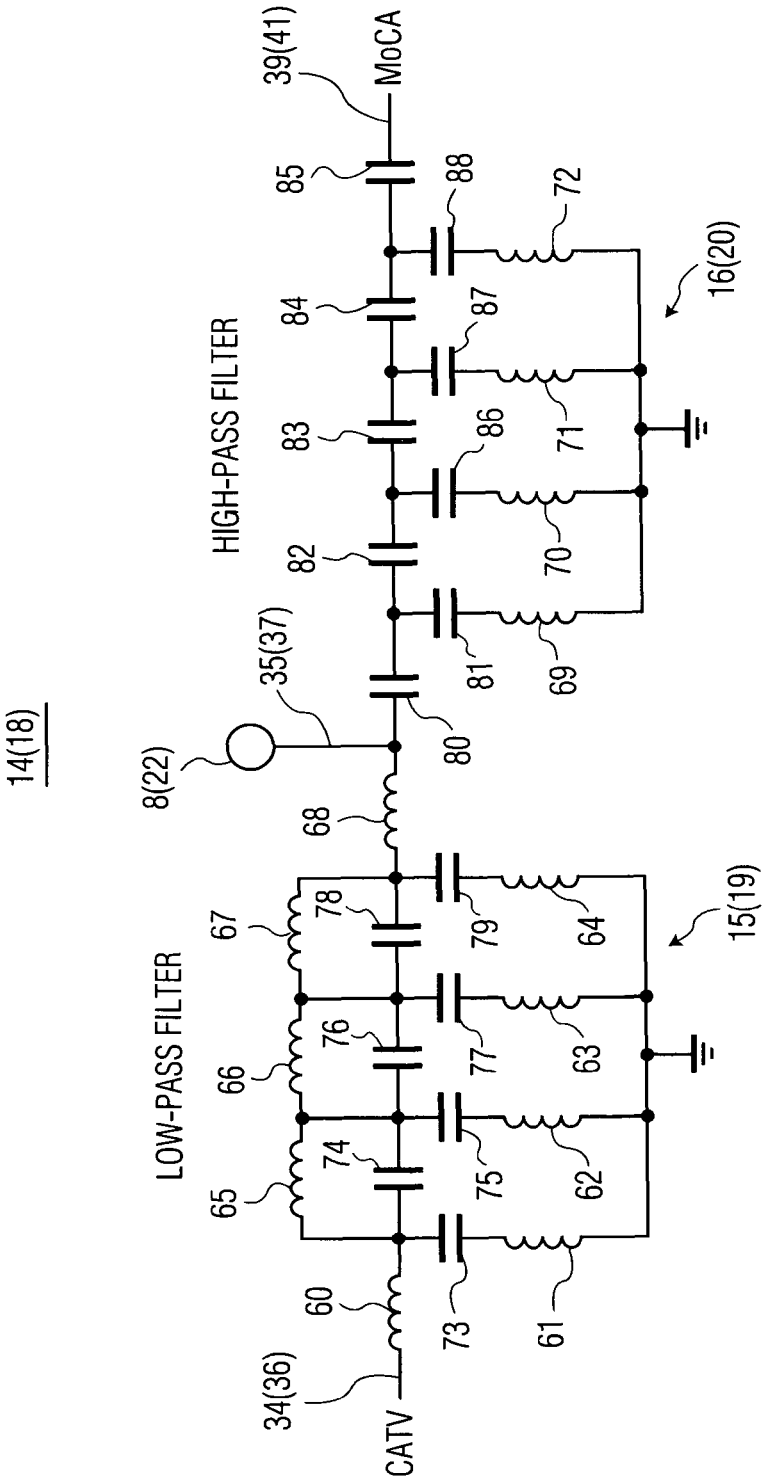
14(18)
8(22)
35(37)
39(41)
MoCA
CATV
34(36)
HIGH-PASS FILTER
LOW-PASS FILTER
15(19)
16(20)
60
61
62
63
64
65
66
67
68
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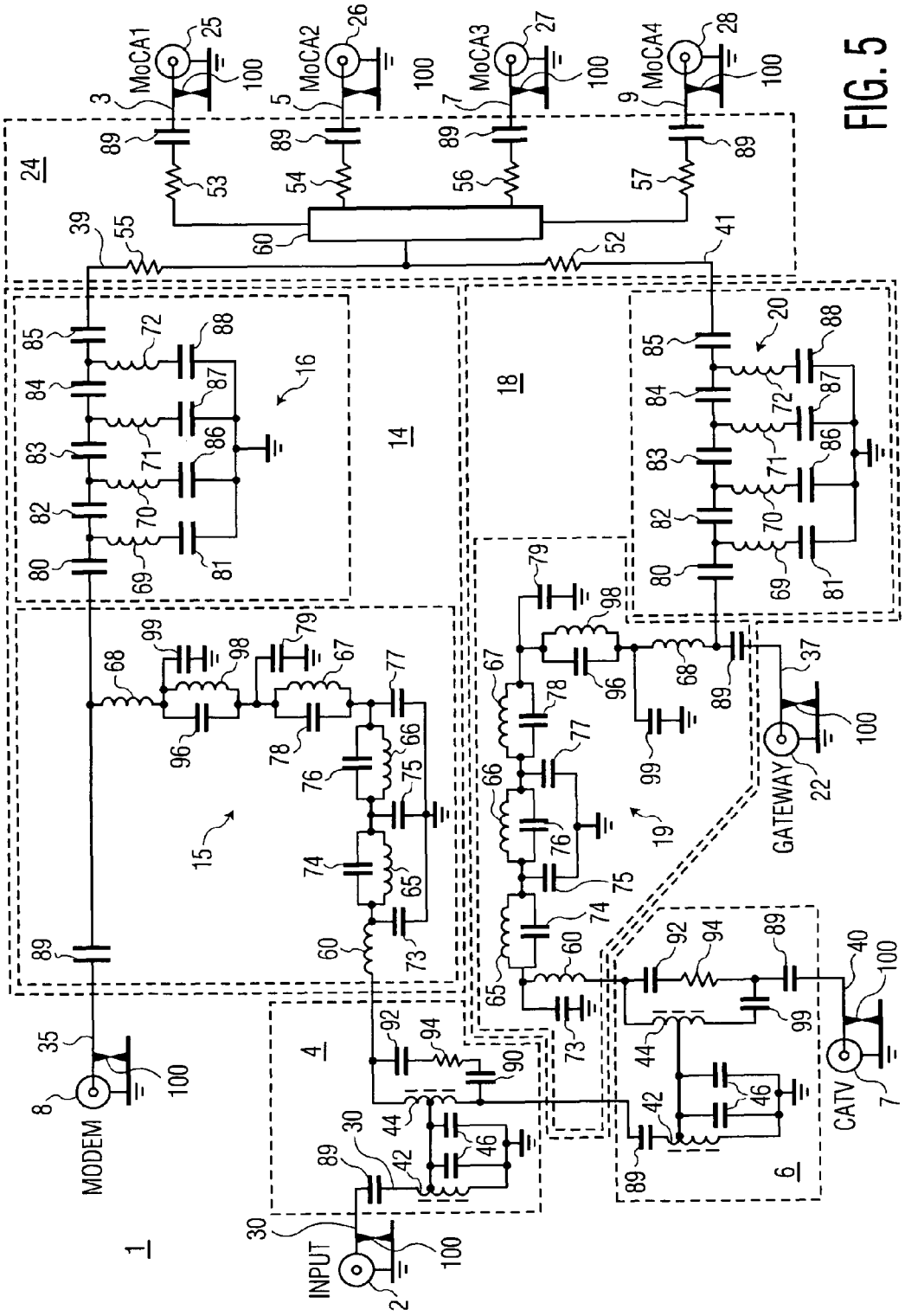
FIG. 4


MoCA1
MoCA2
MoCA3
MoCA4
MODEM
INPUT
GATEWAY
CATV
1
2
3
4
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6
7
8
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14
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16
18
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22
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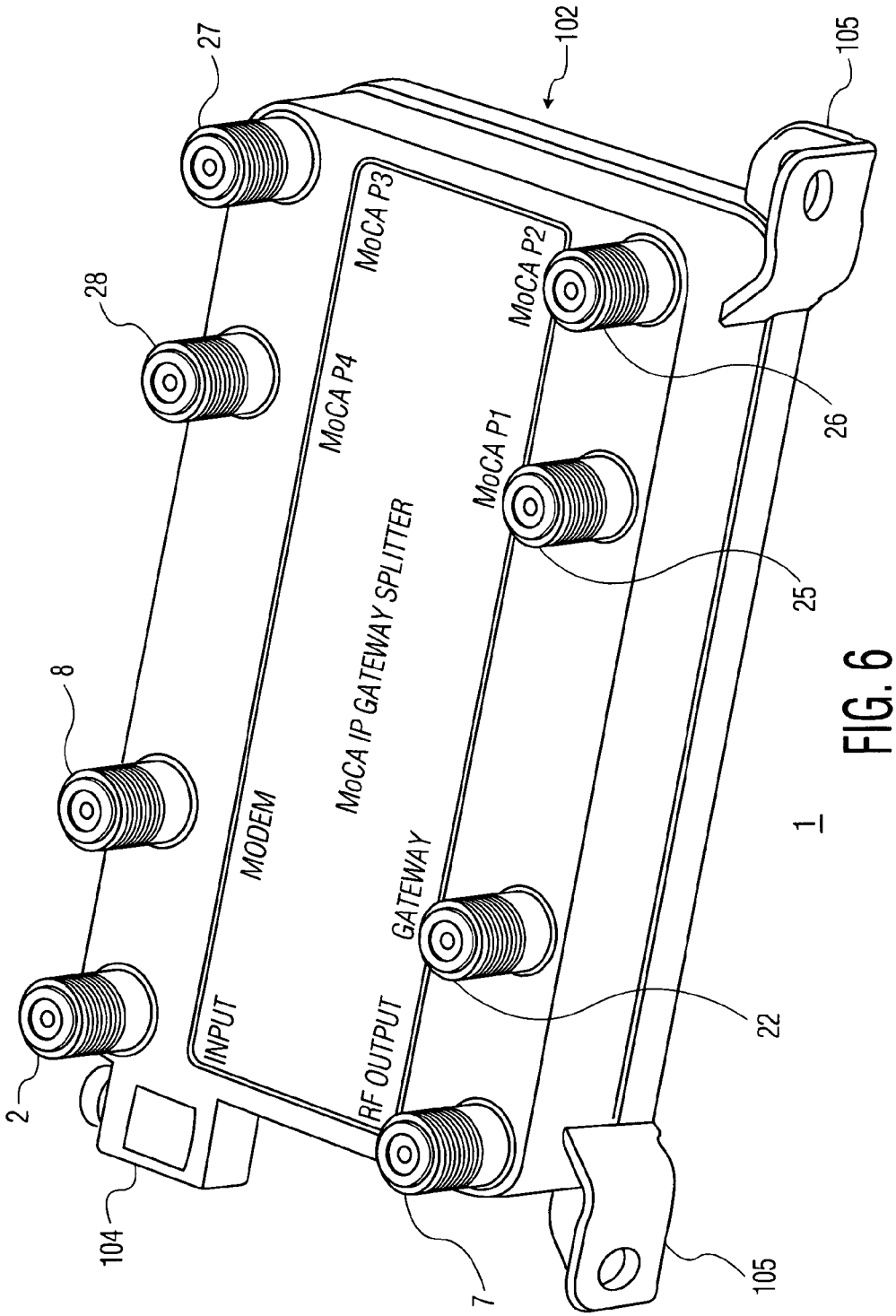
99
100

FIG. 5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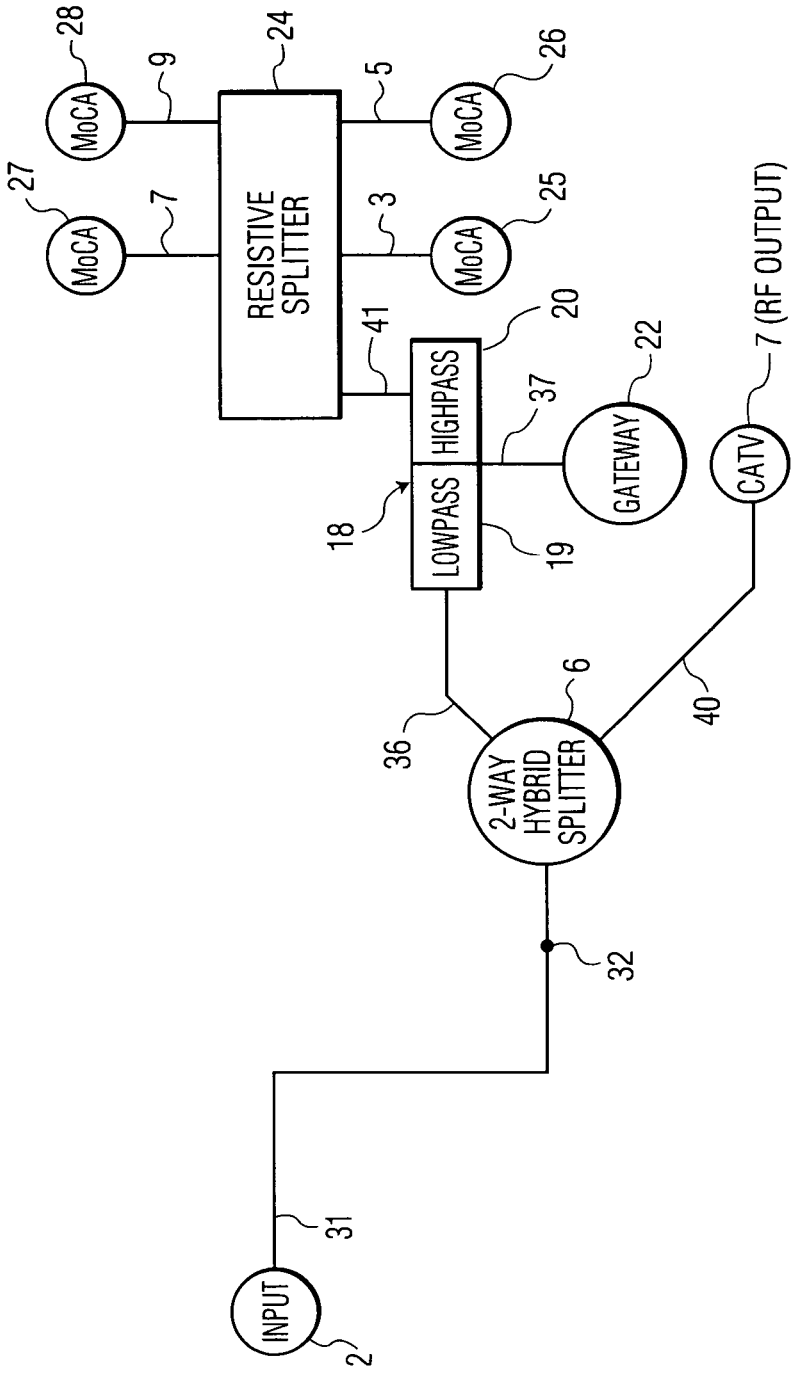
102
105
28
MoCA P3
MoCA P2
MoCA P4
MoCA P1
26
MoCA IP GATEWAY SPLITTER
25
8
MODEM
GATEWAY
INPUT
RF OUTPUT
22
2
104
7
105
1

FIG. 6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MoCA
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24
RESISTIVE SPLITTER
5
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MoCA
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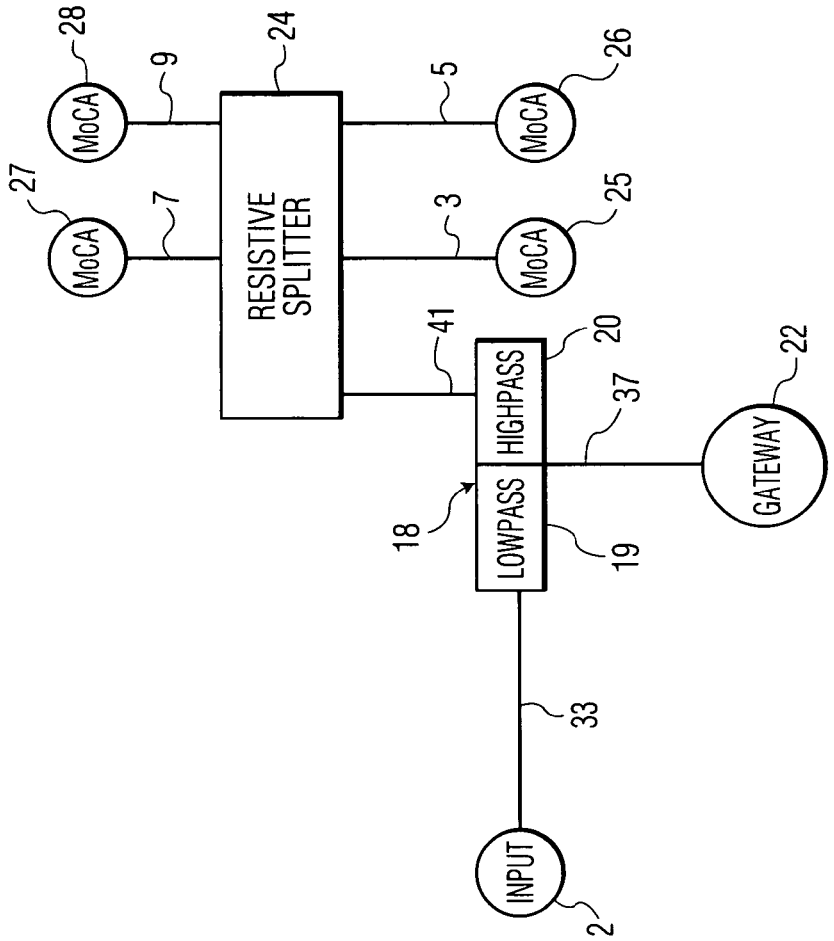
MoCA
7
3
25
MoCA
41
20
HIGHPASS
22
37
GATEWAY
7 (RF OUTPUT)
CATV
18
LOWPASS
19
6
36
2-WAY HYBRID SPLITTER
40
32
31
INPUT
2

FIG. 7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MoCA
9
24
RESISTIVE SPLITTER
5
26
MoCA
27
MoCA
7
3
25
MoCA
41
20
HIGHPASS
37
22
GATEWAY
18
LOWPASS
19
33
INPUT
2

FIG. 8

MOCA GATEWAY SPLITTER

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

RELATED APPLICATION

The present Application *is a reissue of U.S. Pat. No. 9,356,796, granted May 31, 2016, which was filed on Apr. 21, 2014 as U.S. application Ser. No. 14/120,054, which* is a Continuation Application from co-pending application Ser. No. 13/868,261, filed on Apr. 23, 2013, under the title "MoCA GATEWAY SPLITTER."

FIELD OF THE INVENTION

The present invention applies broadly to cable television devices, and more specifically to cable television devices associated with receiving a cable television (CATV) signal, and distributing the same to a plurality of devices such as television sets, modems, and Multimedia over Coax Alliance (MoCA) devices, and so forth.

BACKGROUND OF THE INVENTION

Typical cable television (CATV) systems provide for sharing a common coaxial medium relative to CATV signals for permitting various users in the system to communicate with the headend of the system, where the CAN signals originate, but not with each other due to the directionality of signal flow imposed by the requirement that the various users be signal isolated from one another.

In recent years Multimedia over Coax Alliance (MoCA) systems have been developed that operate in a different frequency spectrum or band than CATV systems. MoCA systems are designed to communicate bilaterally with each other, meaning that any port of a MoCA system device serves both an input and output port. MoCA devices are typically located within a home or building for permitting users therein to communicate with a single or dedicated MoCA networking device for permitting each user to selectively record a television program for later viewing. It is important in such MoCA systems to keep the CATV input signals wholly isolated from the MoCA signals within the system. More specifically, one portion of such systems permit typical CATV signals to be connected to individual devices such as television sets, cable boxes, and so forth, in a standard manner, whereby all standard CAN signal ports are isolated from all MoCA ports in the system, as previously mentioned.

The development of what is now typically known as "Cable Gateway Devices" has progressed to providing such devices with the capability to communicate in both the CATV signal band of typically 5 to 1002 MHz, in conjunction with permitting communication by users in the MoCA frequency band that typically is from 1125 MHz to 1675 MHz (megahertz). Accordingly, such Cable Gateway devices permit information that is transmitted through a public CAN system to be shared amongst MoCA device users joined in a private network within a commercial or residential building. Such Cable Gateway devices permit CATV signals to be rebroadcast within a different frequency band via connections controlled through typically digital logic means, completely avoiding the use of physical switching or movement of cables between certain ports.

The present inventors recognize that there is a need in the art for a simplified and cost effective Cable Gateway device that isolates the CATV and MoCA bands, insuring that MoCA band signals cannot become involved with the CATV signals.

SUMMARY OF THE INVENTION

The present invention is a Passive Gateway device that avoids a direct signal path and electrical isolation between a CATV signal input port, and MoCA client or user input/output ports, a function not known to be provided in extended bandwidth conventional splitters. The present inventive device permits users in a building to connect a CATV signal to various TV sets, modems, and so forth, while at the same time permitting bidirectional communication between a plurality of users of individual in-home media devices within a building, each connected through a coaxial cable network terminated at the output ports of the invention and utilizing the RF spectrum allocated to Multimedia over Coax Alliance (MoCA), for example. The dedicated devices for users can be Media Center client devices enabling Multi-room Digital Video Recording (MR-DVR), multi-player gaming, or high-speed data communications. The recording device can be a Gateway recording device, for example.

In one embodiment of the invention providing a Passive Gateway device, two-way splitter means receptive of CATV input signals connects these signals to first and second diplex filters, and to an RF output port for connection of CAN signals to legacy devices such as known cable boxes, television sets, and so forth. The first diplex filter means is for providing a lowpass filter section that cuts off near the high end of the CAN signal band, that is at about 1002 MHz, and a highpass filter section for passing MoCA band signals. The first diplex filter means provides a modem output port for feeding both CAN signals or MoCA band signals from both the lowpass and highpass filter sections thereof. The highpass filter section of the first diplex filter means provides a MoCA signal connection to a resistive splitter means connected to a plurality of MoCA ports. The second diplex filter means also includes a lowpass filter section for passing CATV signals, and a highpass filter section for passing MoCA signals, whereby the highpass and lowpass filter sections provide for connection to a Gateway output port for connecting CAN signals and/or MoCA signals to a Gateway recorder and controller, for example. The highpass filter section of the second diplex filter means provides for the connection of MoCA signals to a plurality of independent MoCA ports via the resistive splitter.

In a second embodiment of the invention, the present invention provides a portion of the first embodiment of the invention for providing users with a CAN connection port, a Gateway port, and a plurality of MoCA ports. More specifically, the second embodiment of the invention includes a 2-way hybrid splitter for receiving a CATV input signal, and splitting off to a CAN port for connection thereto by users, and to a hybrid filter. The hybrid filter provides for an output to a Gateway port, and another output from a highpass section thereof to a resistive splitter. The resistive splitter provides connection to a plurality of MoCA port.

In a third embodiment of the invention, the 2-way hybrid splitter of the second embodiment is eliminated, and a CAN input signal is connected directly to the lowpass filter section

of a hybrid filter. An output from the hybrid filter is connected to a Gateway port, and the highpass filter section is again connected to a resistive splitter for permitting bidirectional communication devices connected to a plurality of ports of the resistive splitter.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments of the present invention are described with reference to the drawings, in which like items are identified b y the same reference designation, wherein:

FIG. **1** is a block circuit schematic diagram for one embodiment of the invention;

FIG. **2** is a circuit schematic diagram of a 2-way hybrid splitter for an embodiment of the invention;

FIG. **3** is a circuit schematic diagram of a resistive splitter used in an embodiment of the invention;

FIG. **4** is a circuit schematic diagram of a diplex filter used in various embodiments of the invention;

FIG. **5** is a circuit schematic diagram showing circuitry details for a prototype device providing the various necessary functions for an embodiment of the invention; and

FIG. **6** is a top view of a "MoCA Gateway splitter" prototype housing developed by the inventors for an embodiment of the invention.

FIGS. **7** and **8** are block circuit schematic diagrams for second and third embodiments of the invention, respectively.

DETAILED DESCRIPTION OF THE INVENTION

With reference to FIG. **1**, a simplified block diagram of the present CATV MoCA splitter includes an input terminal **2** for receiving a CATV signal typically having a frequency range of 5 MHz to 1002 MHz, and is connected via an electrically conductive line path or lead **30** to the input of a 2-way hybrid splitter **4**. The 2-way hybrid splitter **4** has a first output connected via an electrically conducted path **34** to the input of a first diplex filter **14**, and a second output connected via an electrically conductive path **38** to an input **32** of a second 2-way hybrid splitter **6**. The 2-way hybrid splitter **6** has a first output connected via an electrically conductive path **36** to a second diplex filter **18**, and a second output connected via an electrically conductive path **40** to a CATV (RF output) terminal **7**. The first diplex filter **14** includes a lowpass filter section **15** for passing CAN signals in the frequency range from 5 MHZ to 1002 MHz for outputting on an electrically conductive path **35** for connection to a modem terminal **8**. When a modem (not shown) is connected to the modem terminal **8**, typically the modem will provide a voltage feed of 12 volts DC that is connected via electrically conductive path **35** through a resistor **10** (typically 1 k Ω), to a light emitting diode **12**, for indicating by its light output connection of a modem to terminal **8**. Diplex filter **14** also includes a highpass filter section **16** for passing MoCA signals having a frequency range 1125 MHz to 1675 MHz, for connection via an electrically conductive path **39** to a 6-way resistive splitter **24**. The second diplex filter **18** includes a lowpass filter section **19** passing CAN signals having a frequency range of 5 MHZ to 1002 MHz via an electrical conductive path **37** to a Gateway terminal **22**. The Gateway terminal **22**, in one example, may be connected to a Gateway recording and programmable apparatus (not shown). In this example, indicated CATV signals are passed from the Gateway terminal **22** to the programmable recording apparatus (not shown), MoCA signals having a frequency range of 1125 MHz to 1675 MHz are bidirectionally passed between Gateway terminal **22** and the Gateway recording device (not shown).

MoCA signals, in this example, as previously mentioned, having a frequency range of 1125 MHz to 1675 MHz, are bidirectionally passed between a highpass filter section **16** diplex filter **14** via an electrically conductive pass **39** to a 6-way resistive splitter **24**. Similarly, the highpass filter section **20** of diplex filter **18** is connected via an electrically conductive path **41** to bidirectionally pass MoCA signals to the 6-way resistive splitter **24**. However, splitter **24** is not meant to be limited to a 6-way resistive splitter, and can be configured to provide any desired number of MoCA ports within practical limits. The 6-way resistive splitter **24** bidirectionally passes MoCA signals via individual electrically conductive paths **3**, **5**, **7**, and **9**, to MoCA terminals or ports **25**, **26**, **27**, and **28**, respectively. In this example, individual MoCA clients (not shown) can be individually connected to the ports or terminals **25** through **28**, respectively, for permitting each of them to program the Gateway device (not shown) to record desired cable television programs for later viewing. The diplex filters **14** and **18** insure that the CATV signals are electrically isolated from the MoCA signals.

A typical 2-way hybrid splitter circuit schematic is shown in FIG. **2**. In this example, the typical hybrid 2-way splitter **4**(**6**) includes a matching transformer having a primary winding **42** with one end individually connected to an electrically conductive path **30**(**32**), with the other end of the winding **42** being connected to ground. The splitter **4**(**6**) also includes a secondary winding **44** having one end individually connected to electrically conductive paths **34**(**36**), respectively, and another end connected to electrically conductive paths **38**(**40**). In this example, the primary winding **42** has a turns ratio of 2:5 relative to a center tap **43** connected between the primary winding **42** and the secondary winding **44**. The secondary winding **44** has a turns ratio of 2:2 relative to the center tap **43**. A capacitor **46** is connected between the center tap and ground to match the leakage inductance inherent in the interconnection of the transformer windings **42** and **44**. A series circuit of a resistor **47** and two inductors **49** and **50** are connected across the secondary winding **44**, as shown. Note that the inductors **49** and **50** are chokes that modify the phase cancellation at the very high end of the frequency band of signals outputted from either of the splitters **14** and **18**. The resistor **47**, in combination with the chokes **49** and **50** sets the phase cancellation between the two output lines from the secondary winding **44** in order to maximize the electrical isolation therebetween. Note that the value of the capacitor **46** is typically 1 pF (picofarads), the chokes **49** and **50** typically have values of 5 nH (nanohenries), and resistor **47** a value of 200 ohms.

The circuit schematic diagram for a 6-way resistive splitter **24** for an embodiment of the invention is shown in FIG. **3**. Six resistors **52** through **57** each have one end connected in common as shown. The other end of resistor **55** is connected to electrically conductive circuit path **39** to the highpass filter section **16** of diplex filter **14**. The other end of resistor **52** is connected via electrically conductive path **41** to the highpass filter section **20** of diplex filter **18**. The other end of resistor **53** is connected via electrically conductive path **3** to MoCA terminal **25**. The other end of resistor **54** is connected via electrically circuit path **5** to MoCA terminal **26**. The other end of resistor **56** is connected via electrically conductive path **7** to MoCA terminal **27**. The other end of resistor **57** is connected via electrically conductive path **9** to MoCA terminal **28**.

A diplex filter circuit schematic diagram, shown in FIG. **4**, can be used to provide diplex filters **14**, **18**, respectively. As shown, each diplex filter **14** (**18**) includes a plurality of inductors **60** through **72**, and a plurality of capacitors **73** through **88**, connected in series and parallel circuit combinations, as shown. Values of the aforesaid inductors and capacitors are selected for obtaining the required lowpass filter frequency range, and highpass filter frequency range, as previously indicated.

A circuit schematic diagram for a prototype Gateway splitter developed by the inventors is shown in FIG. **5**. As will be explained, the circuitry for the prototype design differs in this embodiment from the previously described embodiments of the invention, whereby additional components have been added. More specifically, spark gaps **100** have been connected individually between input port **2**, CATV port **7**, modem port **8**, Gateway port **22**, MoCA port **25**, MoCA port **26**, MoCA port **27**, MoCA port **28**, and ground, respectively. Note that use of the terminology port is meant to be also analogous to a terminal, whereby typically each of the aforesaid ports are coaxial connector ports. Also, as shown, DC blocking capacitors **89** have been added to 2-way hybrid splitters **4**, **6**, diplex filters **14**, **18**, and the 6-way resistive splitter **24**, each of the blocking capacitors **89** being connected as shown. Each of the 2-way hybrid splitters **4** and **6** include two matching capacitors in parallel between the tap offs from primary winding **42** and secondary winding **44** and ground, as shown. The lowpass filter sections **15** and **19** of diplex filters **14**, **18**, respectively, now each further include additional capacitors **96** and **99**, and a choke for inductance **98**, as shown. The highpass filter sections **16** and **20** of the diplex filters **14**, **18**, respectively, remain identical to the circuitry previously shown in FIG. **4**. Also note that in the 6-way resistive splitter **24**, a connection pad **60** has been included in order to provide a common connection node for all of the resistors of the resistive splitter **24**. Pad **60** is large enough to provide a low impedance node via the copper material of the pad providing body capacitance on a dielectric PC Board substrate. If MoCA ports **25** through **28** are all terminated to MoCA device ports each having a 75 ohm input impedance, the characteristic impedance at pad or node **60** will be 21.5 ohms. In this example, as is typical with CATV systems, the impedance at the various ports is 70 ohms.

In the 2-way hybrid splitters **4** and **6**, the reason that two capacitors **46** are used in parallel between the ferrite transformer windings **42** and **44** is to obtain a more distributed ground connection. The capacitors **46** provide for canceling small amounts of stray inductance in the interconnection between the ferrite core transformers **42** and **44**, for improving high frequency return loss and isolation therebetween. Note further that in the prototype the resistor **94** of the 2-way hybrid splitters **4** and **6** have a value 180 ohms, but can have a resistance range of 150 ohms to 220 ohms depending on the characteristics of the particular ferrite core transformers **42**, **44**, at low frequencies between 5 MHz and 50 MHz. Note further that resistors **94** are connected in series with an inductor (not shown) that is printed on an associated printed circuit board rather than being a discrete component, with the series circuit thereof being connected therebetween capacitors **90** and **92**. Capacitors **90** and **92** improve isolation and return loss at low frequencies.

With further reference to the diplex filters **14** and **18**, as shown in FIG. **5**, note that the lowpass filter sections **15** and **19** thereof, respectively, differ from the circuitry of FIG. **4**. More specifically, in the prototype circuitry four parallel tank circuits are included in the associated lowpass filter sections **15** and **19**, rather than three as shown in FIG. **4**. The additional parallel tank circuit in each section includes capacitors **96** and **99**, and inductor **98**, for further insuring a frequency roll off above 1.0 GHz, thereby avoiding adding additional inductors to every shunt element.

With further reference to the prototype circuit schematic diagram of FIG. **5**, values of various of the components utilized will now be given, but are not meant to be limiting. The DC blocking capacitors **89** each have a value of 2200 (picofarads), and a voltage rating of 50 volts in this example.

In the 2-way hybrid splitter circuits **4** and **6**, the tapoff **43** for the ferrite core transformer **42** is between the second turn and the fifth turn of the seven turns thereof, whereas in the ferrite core transformer **44** the tapoff **43** is between the second turn from each end of the four turns included. The capacitors **90** each have a value of 1000 pf. Capacitors **92** each have a value of 1000 pf. Capacitors **46** each have a value of 1 pf.

For diplex filters **14** and **18**, the inductances **60** each have a 0.3 mm (millimeter) wire diameter, a 1.5 mm coil diameter, and 2.5 turns. Capacitors **73** each have a value of 2.0 pf. Capacitors **74**, **78**, and **96** each have a value of 0.75 pf. The inductances **65**, **66**, **67**, and **98** each have a 0.3 mm wire diameter, 1.7 mm coil diameter, and 2.5 turns, respectively. Capacitors **75** each have a value of 1.8 pf. The capacitors **77** and **79** each have a value of 1.8 pf. Capacitor **99** has a value of 2.2 pf. Inductor **68** has a 0.3 mm wire diameter, a 2.0 mm coil diameter, and 2.5 turns. Capacitor **99** has a value of 2.2 pf. In the highpass filter sections **16** and **20** of diplex filters **14**, **18**, respectively, capacitor **80** has a value of 1.2 pf. Capacitors **82**, **86**, and **87** each has a value of 1.8 pf, respectively. Capacitor **81** has a value of 2.2 pf. Capacitor **83** has a value of 2.0 pf. Capacitor **84** has a value of 1.5 pf. Capacitor **85** has a value of 6.8 pf. Capacitor **88** has a value of 2.5 pf. Inductor **69** has a 0.3 mm wire diameter, a 1.5 mm coil diameter, and 2.5 turns. Inductors **70**, **71** and **72** each have a 0.3 mm wire diameter, a 1.7 mm coil diameter, and 2.5 turns, in this example. In the 6-way resistive splitter **24**, each of the resistors **52** through **57**, respectively, has a value of 54 ohms, in this example. Note that none of the component values used in the prototype as given above are meant to be limiting.

In FIG. **6**, a housing **102** for a Gateway prototype splitter **1** is shown. The MoCA ports **25** through **28** are located at one end of the associated housing **102**, whereas the input port **2**, modem port **8**, RF output port **7**, and Gateway port **22** are located at an opposite end of the housing **102**. Also shown is a terminal **104** for receiving a ground connection. Screw receptive brackets **105** are provided for securing the Gateway splitter to a desired seating surface, such as a mounting base within a cavity or enclosure (not shown).

In the second embodiment of the invention, as shown in FIG. **7**, an input port **2** for receiving a CATV signal is connected via electrically conductive line path **31** to an input **32** of the 2-way hybrid splitter **6**. The 2-way hybrid splitter **6** outputs are connected as in the embodiment of FIG. **1** to the lowpass section **19** of a diplex filter **18**, and the CATV port **7**. Further, as with the embodiment of FIG. **1**, the diplex filter **18** has a connection to a Gateway port **22**, and to a resistive splitter **24**, as shown. Relative to the first embodiment of the invention of FIG. **1**, in the second embodiment the 2-way hybrid splitter **4**, diplex filter **14**, modem port **8**, resistor **10**, and LED **12** have been removed.

A third embodiment of the invention is shown in FIG. **8**. In the third embodiment an input port **2** for receiving a CATV signal provides for connection thereof via an electrical lead line or conductive path **33** directly to the lowpass

section **19** diplex filter **18**. In comparison to the second embodiment of the invention of FIG. **7**, in the third embodiment the 2-way hybrid splitter **6** has been eliminated, which in turn eliminates the provision of a CATV port **7**, as in the other embodiments. Accordingly, relative to embodiment of FIG. **1**, the embodiment of FIG. **7** eliminates the provision of allowing a user to connect a modem, but otherwise retains all of the other connections of the first embodiment. The third embodiment of the invention relative to the second embodiment eliminates the provision of a CATV port **7**, and only provides for a user to have use of MoCA ports, and a Gateway port. Note further that as shown, the resistive splitter **24** of FIG. **1** is a 6-way splitter, whereas the resistive splitter **24** of the second and third embodiments of FIGS. **7** and **8** is a 5-way resistive splitter. However, it should be understood that the resistive splitter **24** can be configured to provide any number of MoCA ports within practical limits.

Although various embodiments of the invention have been shown and described, they are not meant to be limiting. Those of skill in the art may recognize certain modifications to these embodiments, which modifications are meant to be covered by the spirit and scope of the appended claims.

What is claimed is:

[1. A passive Gateway splitter device comprising:

an input port for receiving a CATV input signal;

an RF/CATV output terminal;

a modem port;

a Gateway port for connection to a Gateway device;

a MoCA splitter comprising a first input, a second input, and a plurality of ports configured for being connected to a plurality of MoCA devices associated with a plurality of MoCA clients, the plurality of ports further configured for passing MoCA signals, each of the plurality of ports configured for passing one of the MoCA signals from or to a connected one of the plurality of MoCA devices associated with a respective one of the plurality of MoCA clients;

a first two-way splitter comprising an input connected to said input port, the first two-way splitter further comprising a first output and a second output, the first two-way splitter configured for receiving the CATV input signal via the input of the two-way splitter and splitting the CATV input signal into a first CATV signal output via the first output and a second CATV signal output via the second output;

a second two-way splitter comprising an input connected to the second output of the first two-way splitter, the second two-way splitter further comprising a first output and a second output, the second two-way splitter configured for receiving the second CATV signal via the input of the second two-way splitter and splitting the second CATV signal into a third CATV signal output via the first output of the second two-way splitter and a fourth CATV signal output via the second output of the second two-way splitter, the second output of the second two-way splitter connected to said RF/CATV output terminal;

a first diplex filter comprising an input connected to the first output of the first two-way splitter for receiving the first CATV signal via the first output of the first two-way splitter, the first diplex filter further comprising a first output connected to the modem port and a second output connected to the first input of the MoCA splitter, the first diplex splitter configured for electrically isolating said first CATV signal from said MoCA signals to prevent the MoCA signals from being connected to said input port of the first diplex filter, and for individually bidirectionally connecting the first CATV signal and the MoCA signals to said modem port;

a second diplex filter comprising an input connected to the first output of the second two-way splitter for receiving the third CATV signal via the first output of the second two-way splitter, the second diplex filter further comprising a first output connected to the Gateway port and a second output connected to the second input of the MoCA splitter, the second diplex splitter configured for electrically isolating said third CATV signal from said MoCA signals to prevent the MoCA signals from being connected to said input port of the second diplex filter, and for individually bidirectionally connecting the fourth CATV signal and the MoCA signals to said Gateway port,

wherein the Gateway port provides the MoCA clients associated with the MoCA devices connected to the plurality of ports of the MoCA splitter the ability to program said Gateway device to record their respective desired CATV programs for later viewing.**]**

[2. The device of claim **1**, wherein:

the first diplex filter comprises a lowpass filter section for receiving said first CATV signal, and a highpass filter section for bidirectionally receiving the MoCA signals from said MoCA splitter, the first diplex filter configured for connecting said first CATV signal and the MoCA signals to said modem port, while electrically isolating said MoCA signals both from said first two-way splitter, and from said input port of the passive Gateway splitter device; and

the second diplex filter comprises a lowpass filter section for receiving said third CATV signal, and a highpass filter section for bidirectionally receiving the MoCA signals from said MoCA splitter, the second filter configured for connecting said third CATV signal and the MoCA signals to said Gateway port, while electrically isolating said MoCA signals both from said second two-way splitter and from said input port of the passive Gateway splitter device.**]**

[3. The device of claim **1**, wherein said MoCA splitter further comprises:

a resistive splitter including a plurality of resistors each having one end connected in common, wherein other ends of said plurality of resistors are individually connected to said plurality of ports of the MoCA splitter, respectively, and individually connected to either the first diplex filter or the second diplex filter.**]**

[4. The device of claim **1**, wherein said MoCA splitter further comprises:

a resistive splitter including a plurality of resistors each having one end connected in common, wherein other ends of said plurality of resistors are individually connected to said plurality of ports of the MoCA splitter, respectively, and individually connected to the highpass filter sections of either of said first and second diplex filters.**]**

[5. The device of claim **2**, wherein said MoCA splitter further comprises;

a resistive splitter including a plurality of resistors each having one end connected in common, wherein other ends of said plurality of resistors are individually connected to said plurality of ports of the MoCA splitter, respectively, and individually connected to the highpass filter sections of either of said first and second diplex filters.**]**

[6. The device of claim **1**, wherein said MoCA splitter further comprises:

an electrically conductive connection pad; and

a plurality of resistors, two of which have one end connected in common to said connection pad, wherein other ends of said plurality of resistors are individually connected to either of said first and second diplex filter, the remainder of said plurality of resistors each being individually connected between said connection pad, and the plurality of ports of the MoCA splitter, respectively.]

[7. The device of claim 1, wherein said MoCA splitter further comprises:

an electrically conductive connection pad;

a plurality of resistors, two of which have one end connected in common to said connection pad, wherein other ends of said plurality of resistors are individually connected to the highpass filter sections of said first and second diplex filters, respectively, the remainder of said plurality of resistors each being individually connected between said connection pad, and the plurality of ports of the MoCA splitter.]

[8. The device of claim 2, wherein said MoCA splitter further comprises:

an electrically conductive connection pad;

a plurality of resistors, two of which have one end connected in common to said connection pad, wherein other ends of said plurality of resistors are individually connected to the highpass filter sections of said first and second diplex filters, respectively, the remainder of said plurality of resistors each being individually connected between said connection pad, and the plurality of ports of the MoCA splitter, respectively.]

[9. The device claim 1, wherein said first and second 2-way splitters each consist of hybrid splitter configurations.]

[10. A CATV/MoCA passive signal distribution system comprising:

an input port for receiving a CATV input signal;

an RF/CATV output terminal;

a modem port;

a Gateway device receptive of CATV and MoCA signals;

a Gateway port for connection to said Gateway device;

a MoCA splitter comprising a first input, a second input, and a plurality of ports configured for passing MoCA signals, each of the plurality of ports configured for passing one of the MoCA signals from or to a connected MoCA device associated with a MoCA client;

a first two-way splitter comprising an input connected to said input port, the first two-way splitter further comprising a first output and a second output, the first two-way splitter configured for receiving the CATV input signal via the input of the two-way splitter and splitting the CATV input signal into a first CATV signal output via the first output and a second CATV signal output via the second output;

a second two-way splitter comprising an input connected to the second output of the first two-way splitter, the second two-way splitter further comprising a first output and a second output, the second two-way splitter configured for receiving the second CATV signal via the input of the second two-way splitter and splitting the second CATV signal into a third CATV signal output via the first output of the second two-way splitter and a fourth CATV signal output via the second output of the second two-way splitter, the second output of the second two-way splitter connected to said RF/CATV output terminal;

a first diplex filter comprising an input connected to the first output of the first two-way splitter for receiving the first CATV signal via the first output of the first two-way splitter, the first diplex filter further comprising a first output connected to the modem port and a second output connected to the first input of the MoCA splitter, the first diplex splitter configured for electrically isolating said first CATV signal from said MoCA signals to prevent the MoCA signals from being connected to said input port of the first diplex filter, and for individually bidirectionally connecting the first CATV signal and the MoCA signals to said modem port;

a second diplex filter comprising an input connected to the first output of the second two-way splitter for receiving the third CATV signal via the first output of the second two-way splitter, the second diplex filter further comprising a first output connected to the Gateway port and a second output connected to the second input of the MoCA splitter, the second diplex splitter configured for electrically isolating said third CATV signal from said MoCA signals to prevent the MoCA signals from being connected to said input port of the second diplex filter, and for individually bidirectionally connecting the fourth CATV signals and the MoCA signals to Gateway port;

a plurality of individual MoCA devices associated with a plurality of MoCA clients, respectively, and connected to the plurality of ports of the MoCA splitter, and

wherein the Gateway port provides the MoCA clients associated with the MoCA devices connected to the plurality of ports of the MoCA splitter the ability to program said Gateway device to record their respective desired CATV programs for later viewing.]

[11. The system of claim 10, wherein:

the first diplex filter comprises a lowpass filter section for receiving said first CATV signal, and a highpass filter section for bidirectionally receiving the MoCA signals from said MoCA splitter, the first diplex filter configured for connecting said first CATV signal and the MoCA signals to said modem port, while electrically isolating said MoCA signals both from said first two-way splitter and from said input port of the passive Gateway splitter; and

the second diplex filter comprises a lowpass filter section for receiving said third CATV signal, and a highpass filter section for bidirectionally receiving the MoCA signals from said MoCA splitter, the second diplex filter configured for connecting said third CATV signal and the MoCA signals to said Gateway port, while electrically isolating said MoCA signals both from said second two-way splitter means, and from said input port of the passive Gateway splitter.]

[12. The system of claim 10, wherein said MoCA splitter further comprises:

a resistive splitter including a plurality of resistors each having one end connected in common, wherein other ends of said plurality of resistors are individually connected to said plurality of ports of the MoCA splitter, respectively, and individually connected to either the first diplex filter or the second diplex filter.]

[13. The system of claim 10, wherein said MoCA splitter further comprises:

a resistive splitter including a plurality of resistors each having one end connected in common, wherein other ends of said plurality of resistors are individually connected to said plurality of ports of the MoCA

splitter, respectively, and individually connected to the highpass filter sections of either of said first and second diplex filters.]

[14. The system of claim 10, wherein said MoCA splitter further comprises:

a resistive splitter including a plurality of resistors each having one end connected in common, wherein other ends of said plurality of resistors are individually connected to said plurality of ports of the MoCA splitter, respectively, and individually connected to the highpass filter sections of said first and second diplex filters.]

[15. The system of claim 10, wherein said MoCA splitter further comprises:

an electrically conductive connection pad; and

a plurality of resistors, two of which have one end connected in common to said connection pad, wherein other ends of said plurality of resistors are individually connected to either of said first and second diplex filter, the remainder of said plurality o f resistors each being individually connected between said connection pad, and the plurality of the ports of the MoCA splitter, respectively.]

16. A method of making a passive Gateway splitter device the method comprising:

electrically connecting a lowpass filter section and a highpass filter section of a diplex filter having a first direct current (DC) blocking capacitor to a Gateway port that is connectable to a Gateway device via the first DC blocking capacitor;

electrically connecting the Gateway port to a first surge protection device configured to protect the passive Gateway splitter device from surges;

electrically connecting the lowpass filter section to an input port for receiving a CATV (cable television) input signal via a second DC blocking capacitor, enabling any Gateway device connected to the Gateway port to communicate with the input port via the lowpass filter section in a lower frequency band having a frequency range that is lower than a higher frequency band;

electrically connecting the input port to a second surge protection device configured to protect the passive Gateway splitter device from surges;

electrically connecting the highpass filter section to a MoCA (Multimedia over Coax Alliance) splitter having a plurality of DC blocking capacitors and electrically connecting the MoCA splitter to each of a plurality of MoCA ports via a respective DC blocking capacitor of the plurality of DC blocking capacitors, enabling any MoCA device connected to one of the plurality of MoCA ports to communicate with the Gateway port via the highpass filter section in the higher frequency band; and

electrically connecting each MoCA port to a respective surge protection device configured to protect the passive Gateway splitter device from surges;

wherein the passive Gateway splitter device provides only one signal path from the input port to the MoCA splitter and the lowpass filter section and the highpass filter section of the diplex filter isolate each of the plurality of MoCA ports from the input port.

17. The method of claim 16, wherein the diplex filter is the only diplex filter along the single signal path between the input port and the Gateway port.

18. The method of claim 16, wherein the diplex filter is the only diplex filter along the single signal path between the input port and the MoCA splitter.

19. The method of claim 16, wherein the diplex filter is the only diplex filter along the single signal path between the Gateway port and the MoCA splitter.

20. The method of claim 16, further comprising:

attaching the input port to a housing;

attaching the Gateway port to the housing;

attaching the plurality of MoCA ports to the housing; and

enclosing the diplex filter inside the housing, wherein the diplex filter is the only diplex filter inside the housing.

21. The method of claim 16, wherein the first surge protection device is a first spark gap electrically connected between the Gateway port and ground, the second surge protection device is a second spark gap electrically connected between the input port and ground, and each respective surge protection device is each a respective spark gap electrically connected between one of the plurality of MoCA ports and ground.

22. The method of claim 16, wherein the MoCA splitter is a resistive splitter.

23. The method of claim 16, wherein the MoCA splitter enables any two MoCA devices connected to any two of the plurality of MoCA ports to bidirectionally communicate via the MoCA splitter.

24. The method of claim 16, further comprising:

electrically connecting a two-way hybrid splitter between the input port and the lowpass filter section, the two-way hybrid splitter including a third DC blocking capacitor;

electrically connecting the two-way hybrid splitter to a CATV output port via the third DC blocking capacitor; and

electrically connecting the CATV output port to a third surge protection device configured to protect the passive Gateway splitter device from surges.

25. The method of claim 24, further comprising:

attaching the input port to a housing;

attaching the Gateway port to the housing;

attaching the plurality of MoCA ports to the housing;

attaching the CATV output port to the housing; and

enclosing the diplex filter inside the housing, wherein the diplex filter is the only diplex filter inside the housing.

26. The method of claim 24, wherein the diplex filter is the only diplex filter along the single signal path between the CATV output port and the MoCA splitter.

27. The method of claim 24, wherein the first surge protection device is a first spark gap electrically connected between the Gateway port and ground, the second surge protection device is a second spark gap electrically connected between the input port and ground, the third surge protection device is a third spark gap electrically connected between the CATV output port and ground, and each respective surge protection device is each a respective spark gap electrically connected between one of the plurality of MoCA ports and ground.

28. A method of distributing a CATV (cable television) input signal and MoCA (Multimedia over Coax Alliance) signals with a passive Gateway splitter device, the method comprising:

receiving the CATV input signal by an input port that is electrically connected to a first surge protection device configured to protect the passive Gateway splitter device from surges;

providing the CATV input signal, via a first direct current (DC) blocking capacitor, to a lowpass filter section of a diplex filter having a second DC blocking capacitor;

lowpass filtering the CATV input signal by the lowpass filter section of the diplex filter;

providing the lowpass filtered CATV input signal, via the second DC blocking capacitor, to a Gateway port that is connectable to a Gateway device and is electrically connected to a second surge protection device configured to protect the passive Gateway splitter device from surges;

receiving MoCA signals by a plurality of MoCA ports that are each electrically connected to a respective surge protection device configured to protect the passive Gateway splitter device from surges;

providing each MoCA signal to a MoCA splitter having a plurality of DC blocking capacitors via one of the plurality of DC blocking capacitors;

highpass filtering the MoCA signals by the highpass filter section of the diplex filter; and

providing the highpass filtered MoCA signals to the Gateway port via the second DC blocking capacitor,

wherein only one signal path is provided from the input port to the MoCA splitter and lowpass filtering the CATV input signal and highpass filtering the MoCA signals electrically isolates the input port from each of the plurality of MoCA ports.

29. The method of claim 28, wherein the diplex filter is the only diplex filter along the single signal path between the input port and the Gateway port.

30. The method of claim 28, wherein the diplex filter is the only diplex filter along the single signal path between the input port and the MoCA splitter.

31. The method of claim 28, wherein the diplex filter is the only diplex filter along the single signal path between the Gateway port and the MoCA splitter.

32. The method of claim 28, wherein:

the input port is attached to a housing;

the Gateway port is attached to the housing;

the plurality of MoCA ports is attached to the housing; and

the diplex filter is the only diplex filter enclosed inside the housing.

33. The method of claim 28, wherein the first surge protection device is a first spark gap electrically connected between the input port and ground, the second surge protection device is a second spark gap electrically connected between the Gateway port and ground, and each respective surge protection device is each a respective spark gap electrically connected between one of the plurality of MoCA ports and ground.

34. The method of claim 28, wherein the MoCA splitter is a resistive splitter.

35. The method of claim 28, further comprising:

distributing the MoCA signals received from each of the plurality of MoCA ports to another of the plurality of MoCA ports.

36. The method of claim 28, further comprising:

splitting the CATV signal by a two-way hybrid splitter between the input port and the lowpass filter section, the two-way hybrid splitter including a third DC blocking capacitor;

providing the CATV signal to a CATV output port that is electrically connected to a third surge protection device by the two-way hybrid splitter via the third DC blocking capacitor, the third surge protection device being configured to protect the passive Gateway splitter device from surges.

37. The method of claim 36, wherein:

the input port is attached to a housing;

the Gateway port is attached to the housing;

the plurality of MoCA ports are attached to the housing;

the CATV output port is attached to the housing;

the diplex filter is enclosed inside the housing; and

the diplex filter is the only diplex filter inside the housing.

38. The method of claim 36, wherein the diplex filter is the only diplex filter along the single signal path between the CATV output port and the MoCA splitter.

39. The method of claim 37, wherein the first surge protection device is a first spark gap electrically connected between the input port and ground, the second surge protection device is a first spark gap electrically connected between the Gateway port and ground, the third surge protection device is a third spark gap electrically connected between the CATV output port and ground, and each respective surge protection device is each a respective spark gap electrically connected between one of the plurality of MoCA ports and ground.

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