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Gurantz et al.

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(54) **SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION**

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(22) Filed: **Nov. 6, 2002**

Related U.S. Application Data

(60) Provisional application No. 60/345,965, filed on Nov. 7, 2001, provisional application No. 60/333,722, filed on Nov. 27, 2001, provisional application No. 60/358,817, filed on Feb. 22, 2002.

(51) **Int. Cl.**
H04H 1/00 (2006.01)

(52) **U.S. Cl.** **455/3.02**; 455/3.01; 455/3.04; 455/427; 725/71; 725/78

(58) **Field of Classification Search** 455/3.01–3.05, 455/103, 137, 12.1, 20, 427; 725/64, 71, 725/78, 98, 118
See application file for complete search history.

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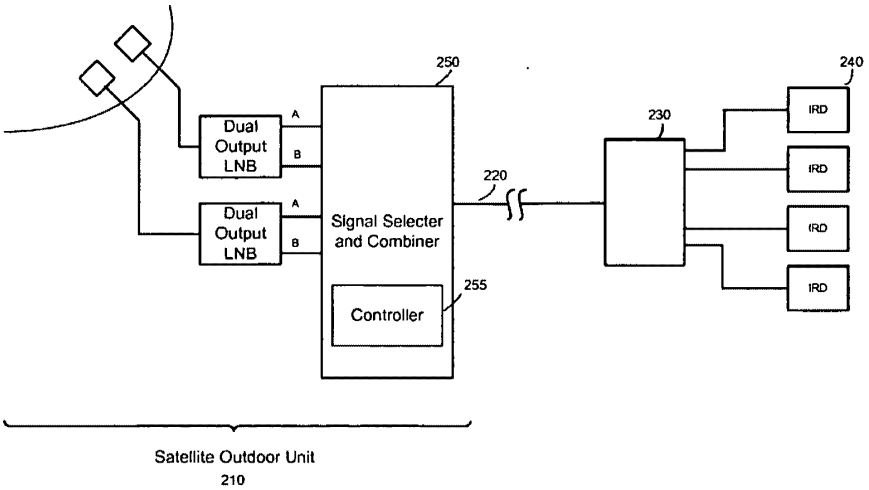
* cited by examiner

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(57) **ABSTRACT**

In a satellite receiving system, program channels are selected from one or more broadband signals and combined with other selected channels and transmitted from a first unit, for example an outdoor unit, to a second unit, for example a gateway, server, or set-top box, using a single cable. Channels can be selected by digitizing the broadband signal then digitally filtering to isolate the desired channels. The outputs of several LNBs can be selected and combined into one signal. Multiple set-top boxes can receive independent signals over a single cable from the outdoor unit.

23 Claims, 17 Drawing Sheets



DISH 1007

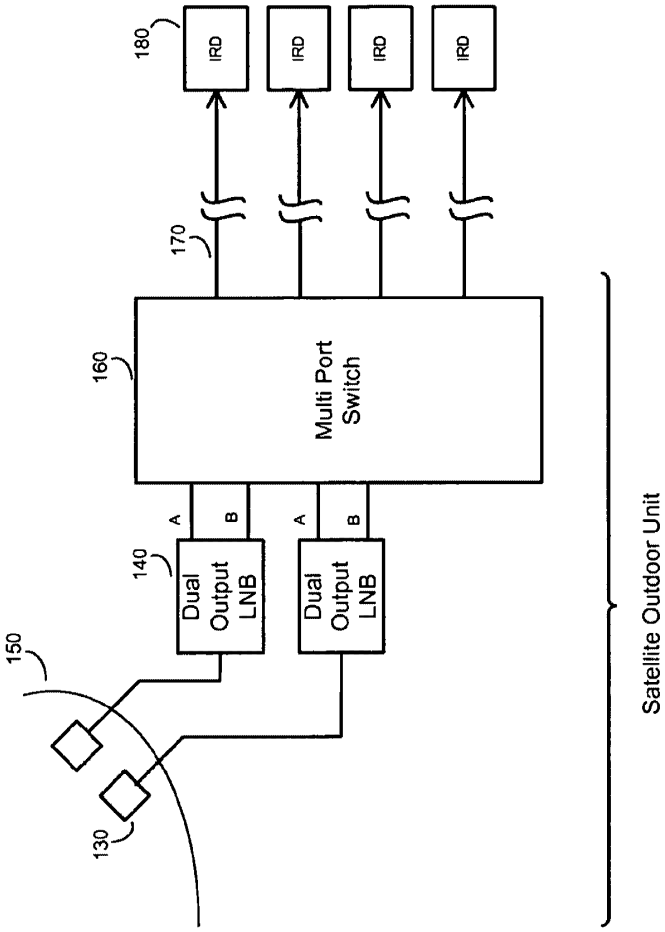


FIG. 1
Prior Art

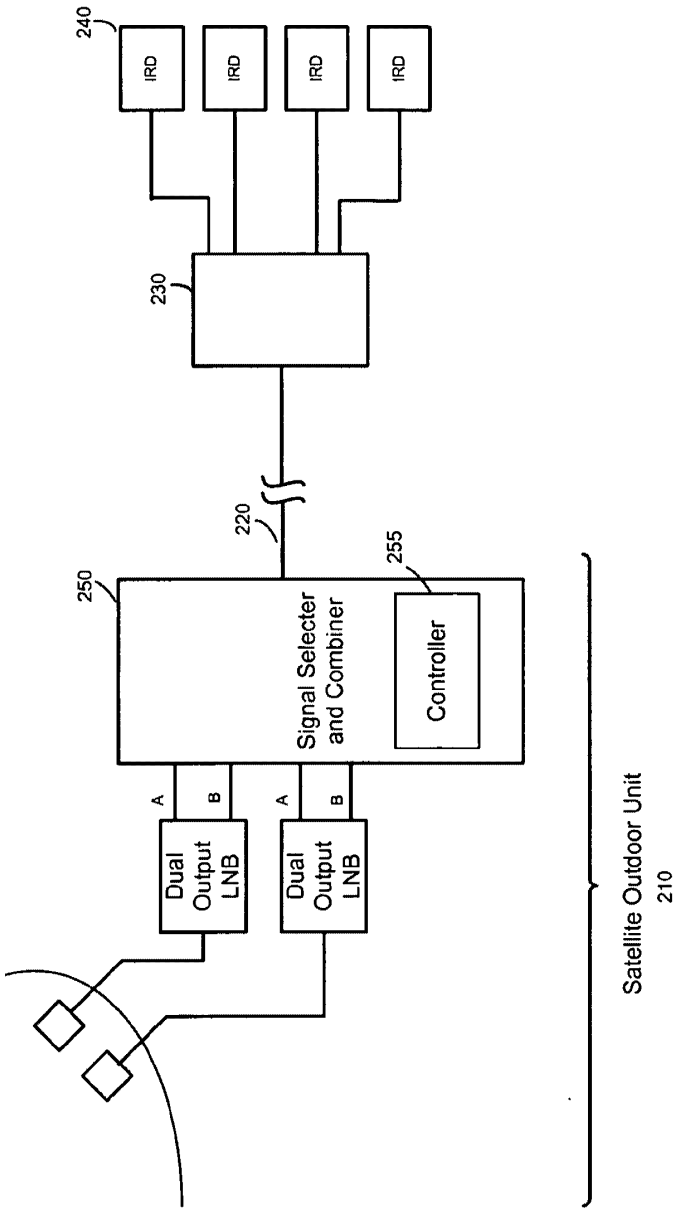

240
IRD
IRD
IRD
IRD
230
220
255
250
Signal Selecter and Combiner
Controller
A
B
A
B
Dual Output LNB
Dual Output LNB
Satellite Outdoor Unit
210

FIG. 2

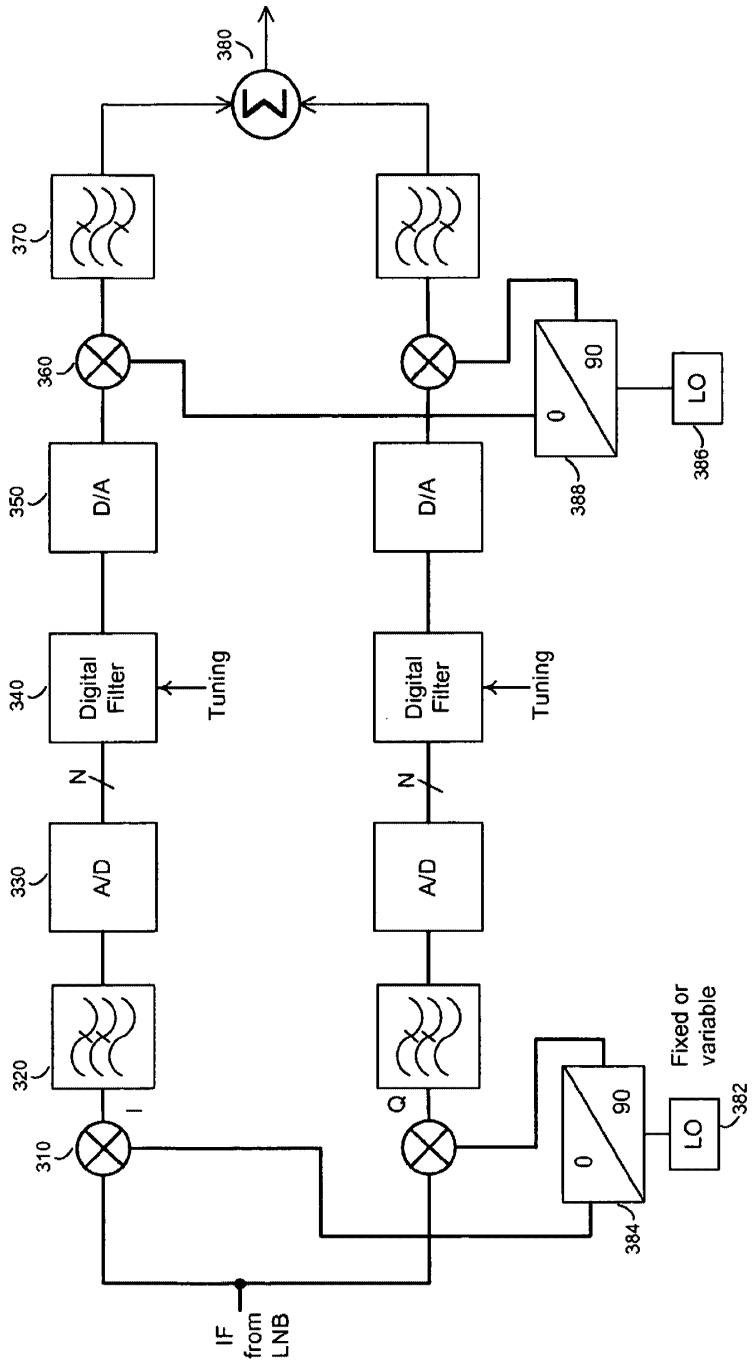

380
370
360
350
340
330
320
310
D/A
Digital Filter
Tuning
N
A/D
I
Q
90
0
LO
386
388
384
382
Fixed or variable
IF from LNB

FIG. 3

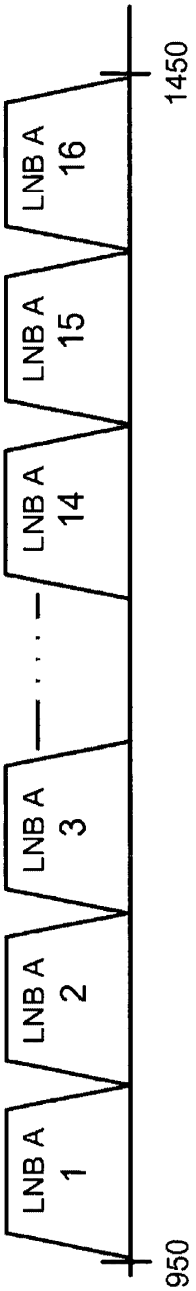


FIG. 4

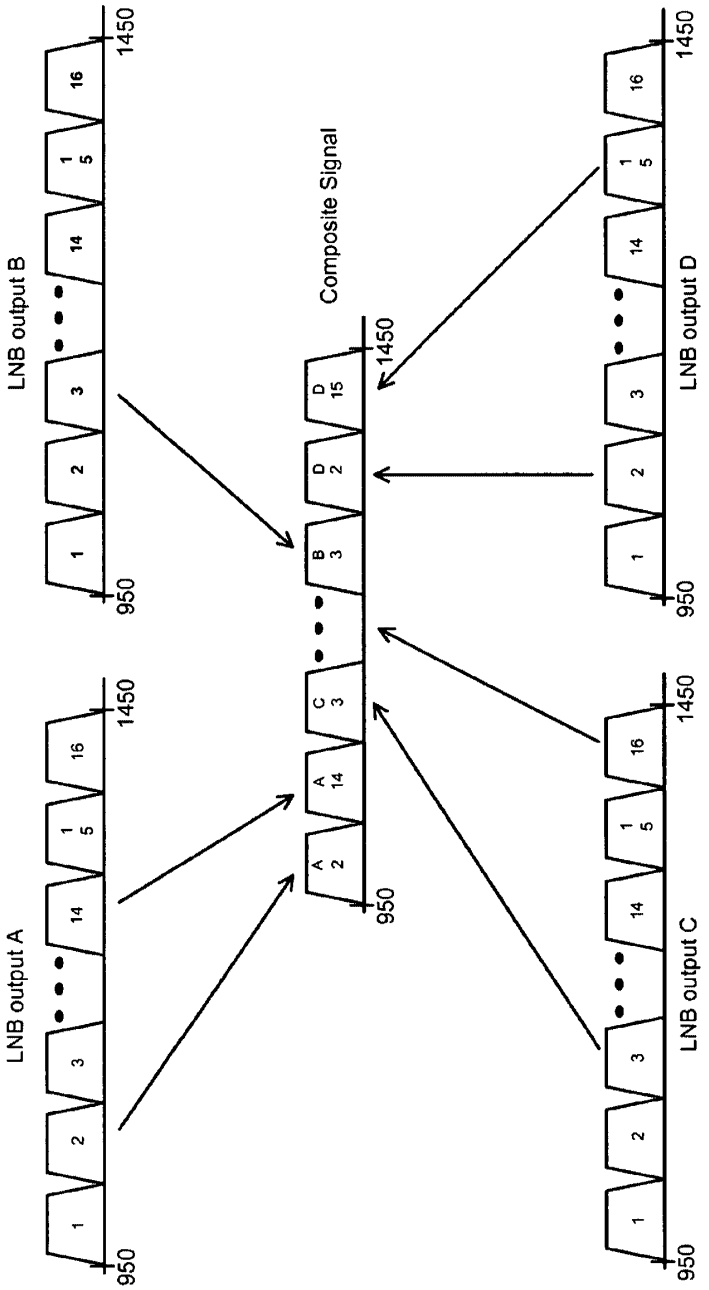
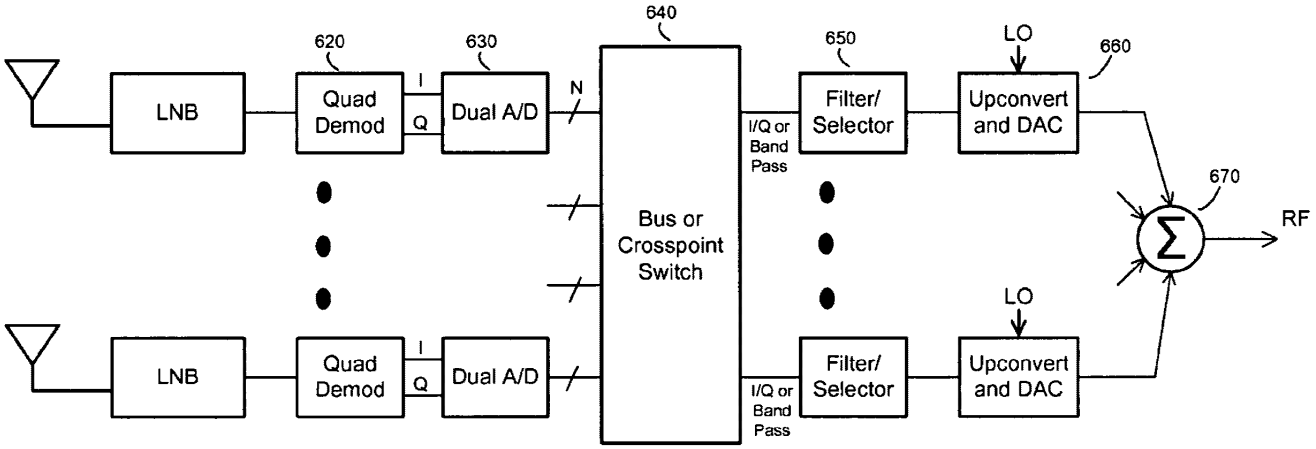
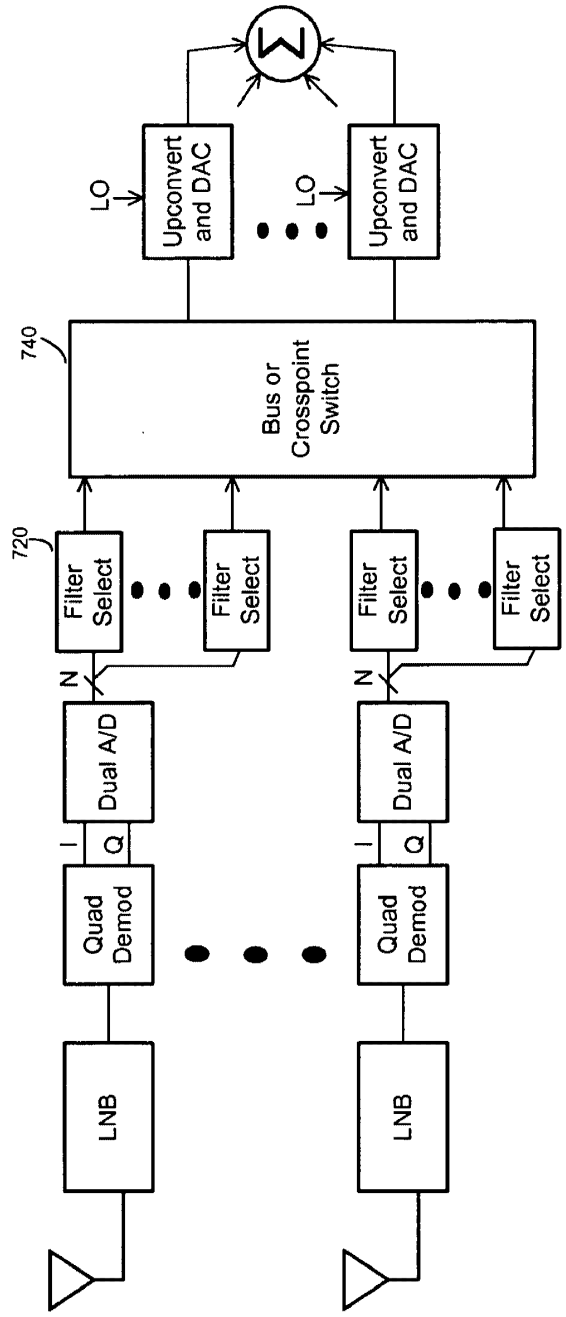

LNB output A
LNB output B
LNB output C
LNB output D
Composite Signal
950
1450
1
2
3
14
15
16
A 2
A 14
B 3
C 3
D 2
D 15

FIG. 5



Digital Routing of Digitized Signals

FIG. 6



Digital Routing of Digitized Signals

FIG. 7

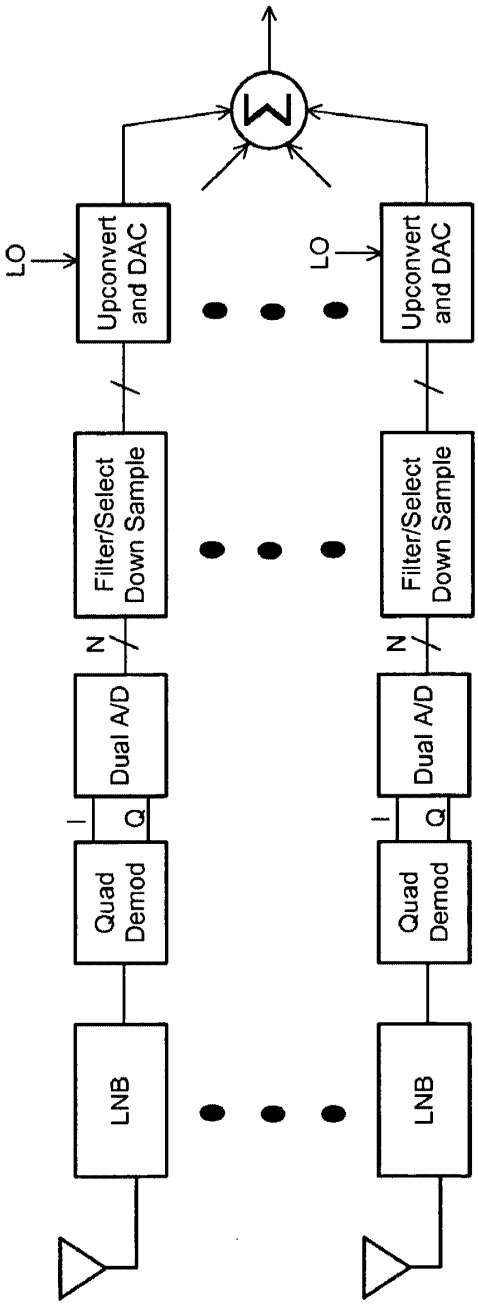

LO
Upconvert and DAC
LO
Upconvert and DAC
Filter/Select Down Sample
Filter/Select Down Sample
N
N
Dual A/D
Dual A/D
I
Q
I
Q
Quad Demod
Quad Demod
LNB
LNB

FIG. 8

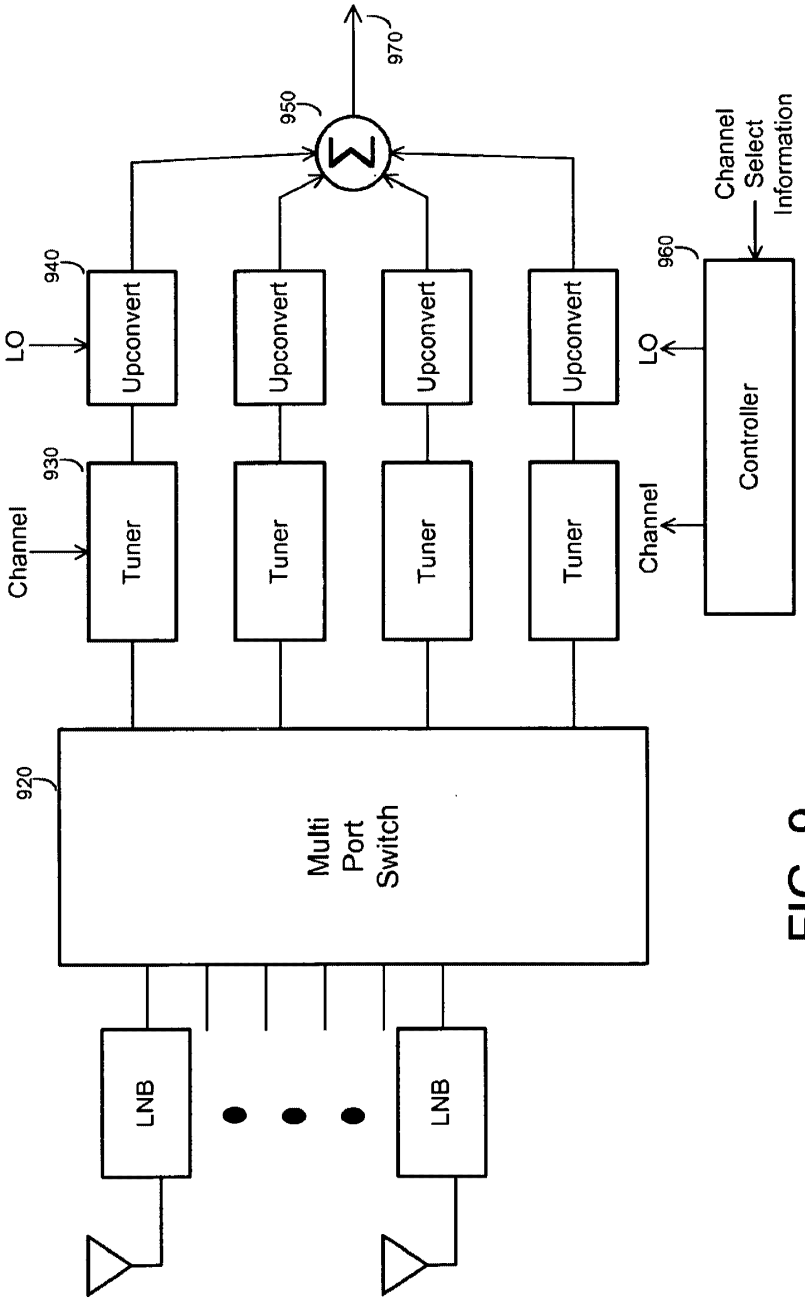

970
950
Channel Select Information
960
940
LO
Upconvert
Upconvert
Upconvert
Upconvert
LO
930
Channel
Tuner
Tuner
Tuner
Tuner
Channel
Controller
920
Multi Port Switch
LNB
LNB

FIG. 9

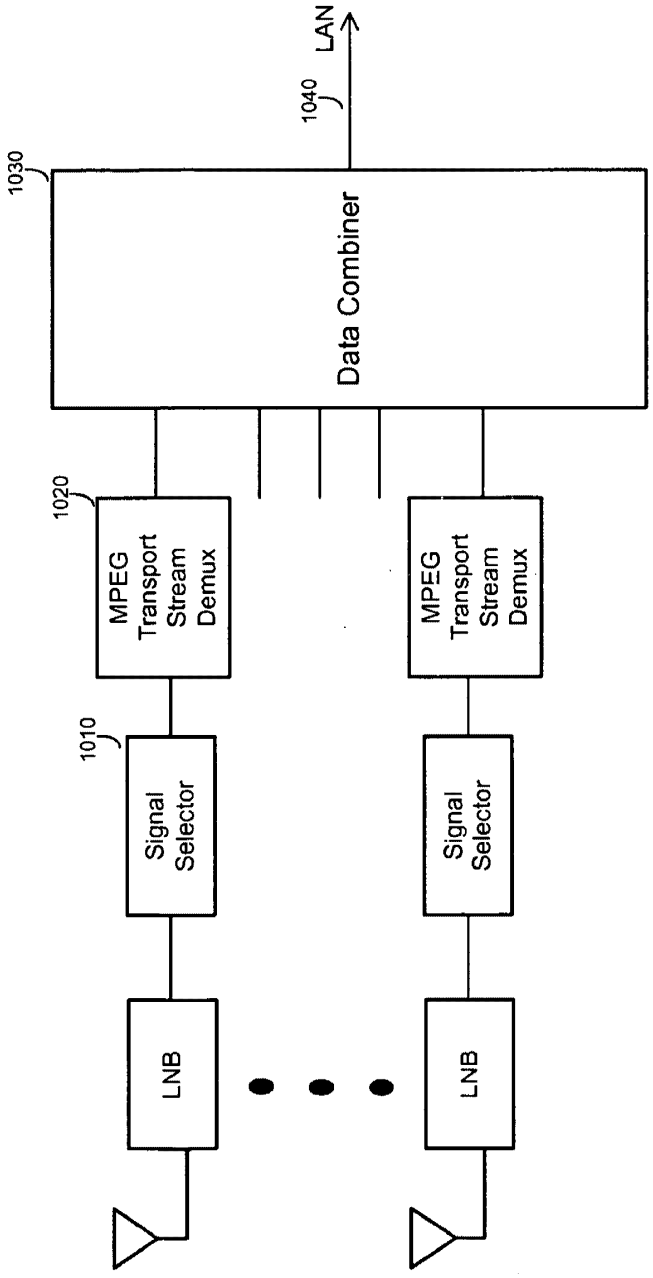

LAN
1040
1030
Data Combiner
1020
MPEG Transport Stream Demux
MPEG Transport Stream Demux
1010
Signal Selector
Signal Selector
LNB
LNB

FIG. 10

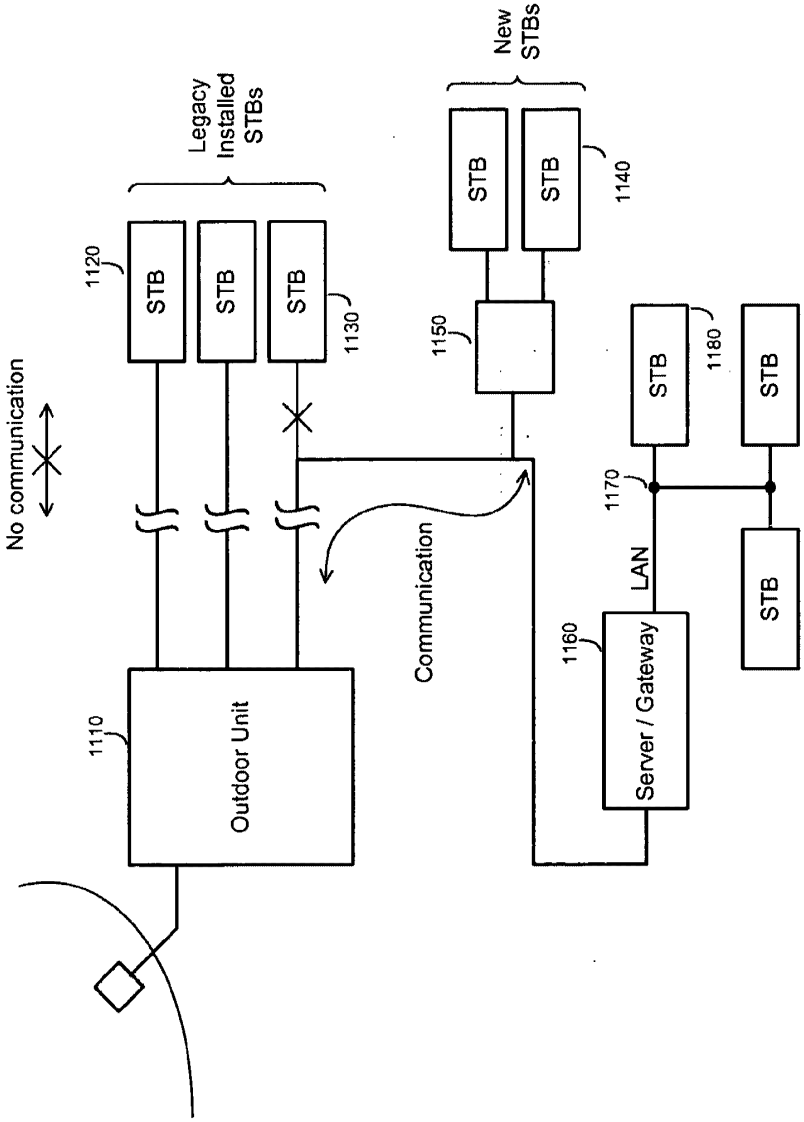

Legacy Installed STBs
New STBs
STB
1120
1130
1140
1150
1160
1170
1180
1110
No communication
Communication
LAN
Outdoor Unit
Server / Gateway

FIG. 11

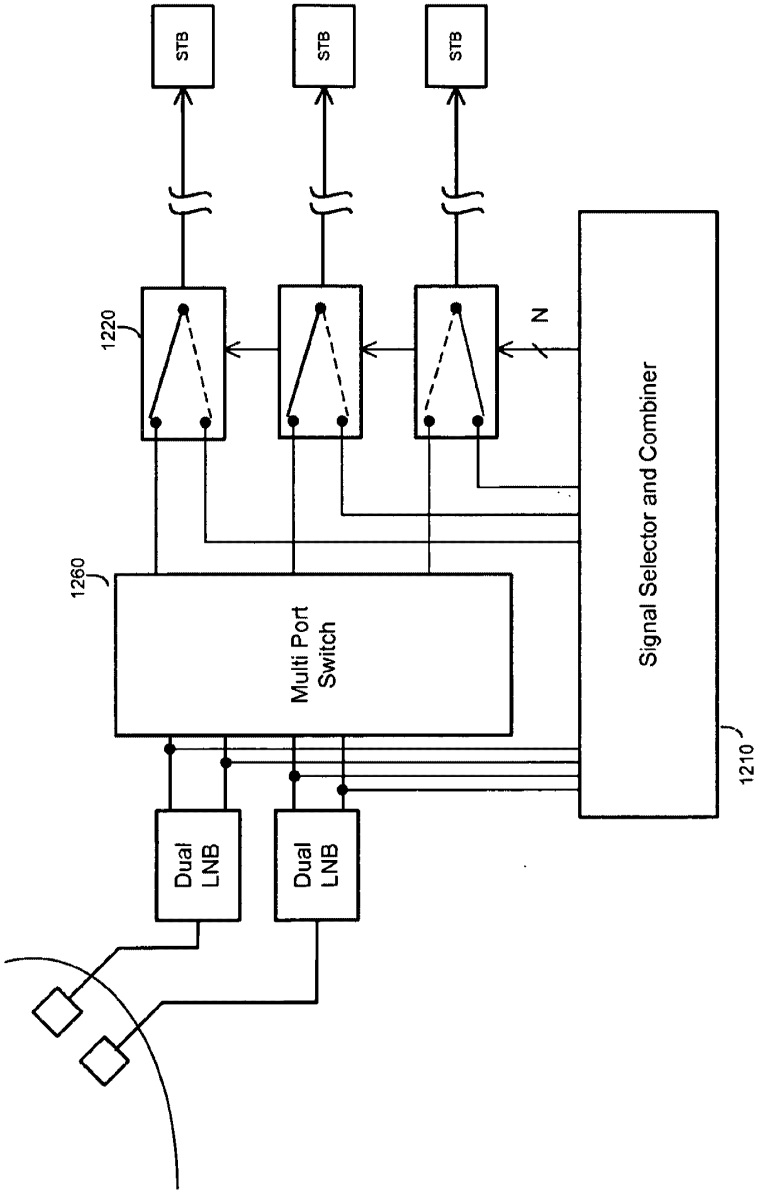

STB
STB
STB
1220
N
Signal Selector and Combiner
1210
1260
Multi Port Switch
Dual LNB
Dual LNB

FIG. 12

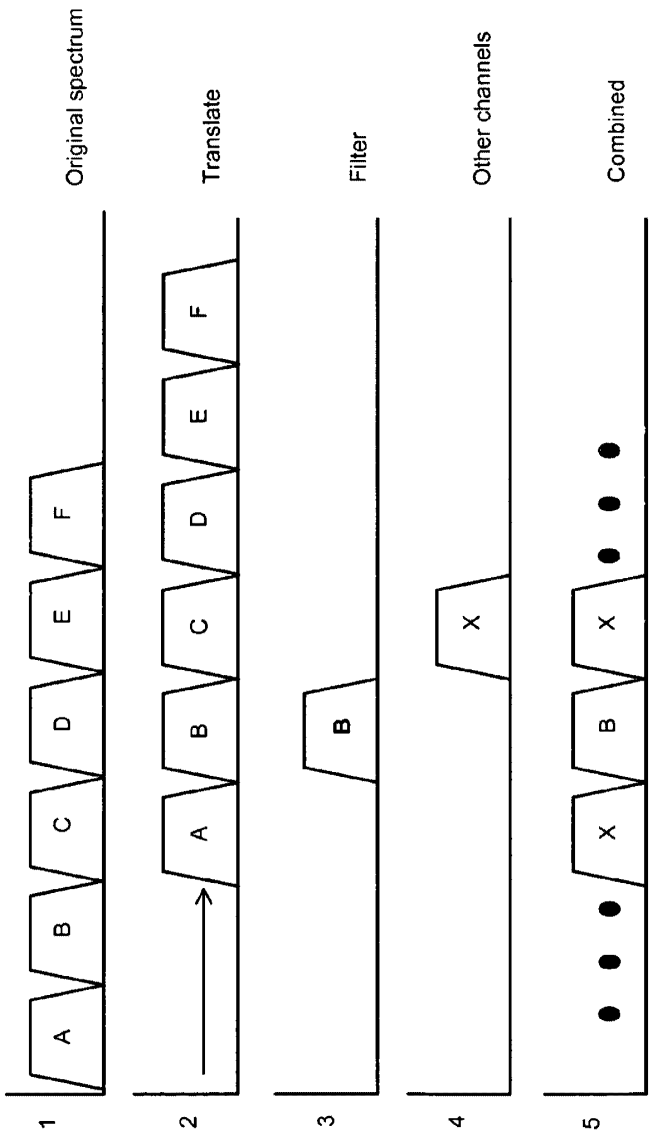

Original spectrum
Translate
Filter
Other channels
Combined
A
B
C
D
E
F
X
1
2
3
4
5

FIG. 13

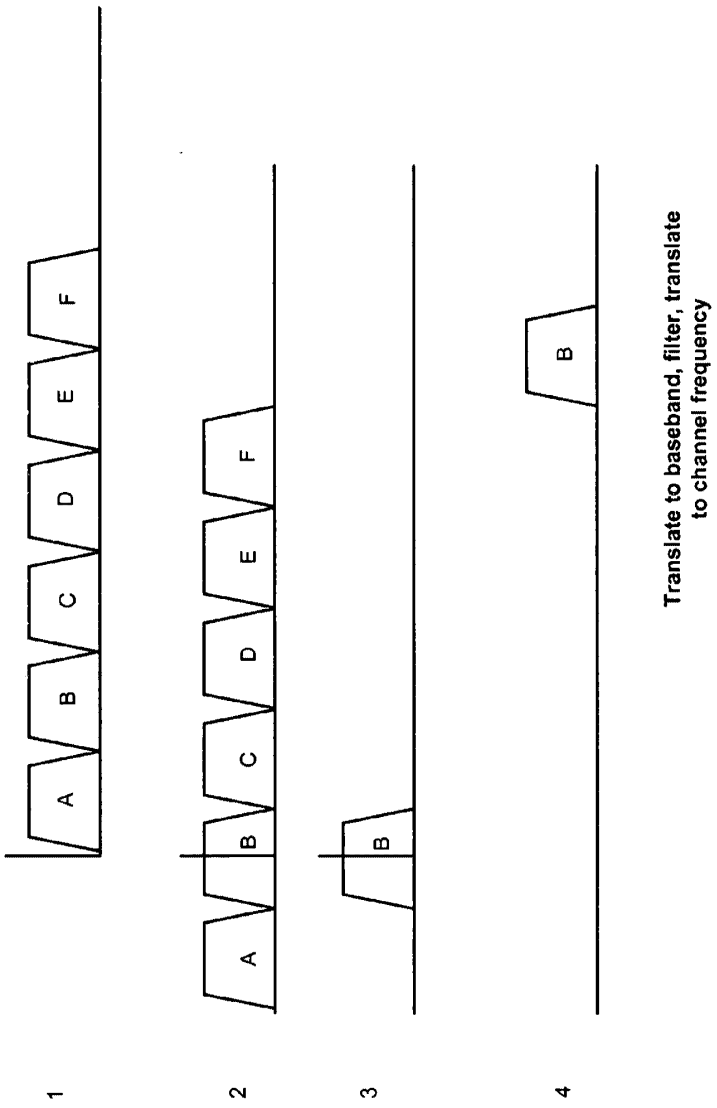

A
B
C
D
E
F
1
2
3
4
Translate to baseband, filter, translate to channel frequency

FIG. 14

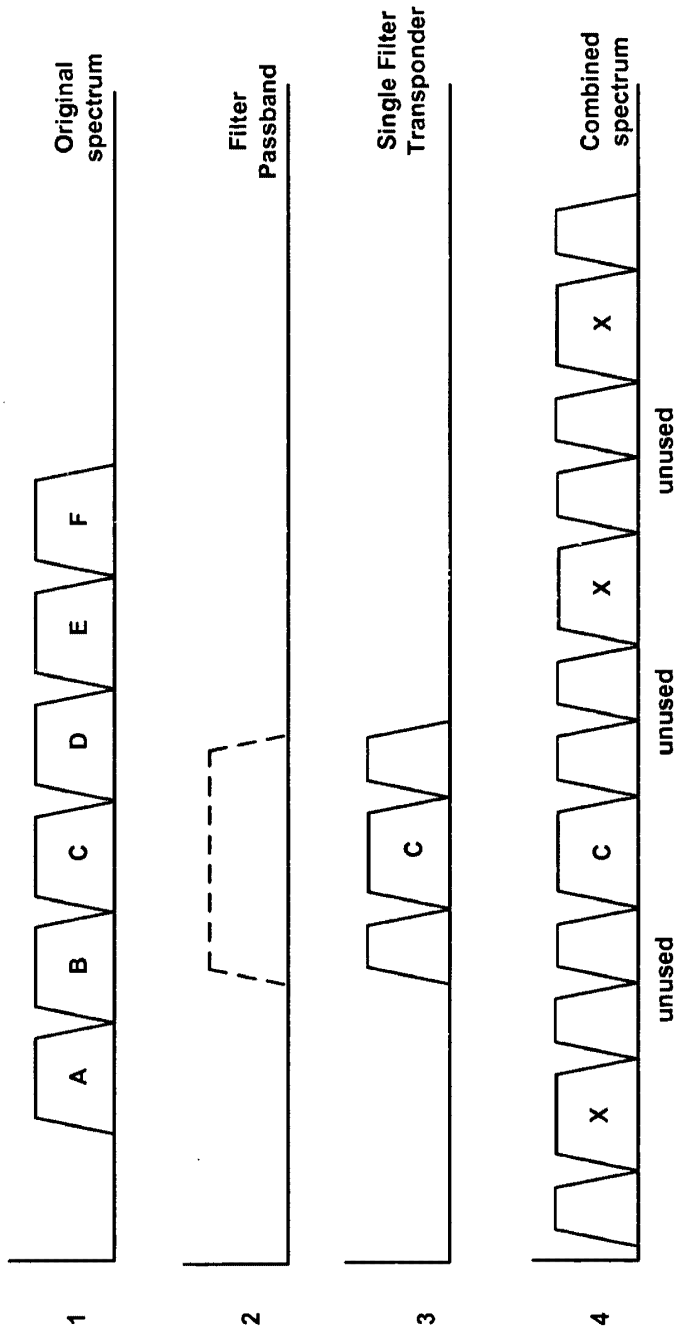

Original spectrum
A
B
C
D
E
F
1
Filter Passband
2
Single Filter Transponder
C
3
Combined spectrum
X
unused
C
unused
X
unused
X
4

FIG. 15

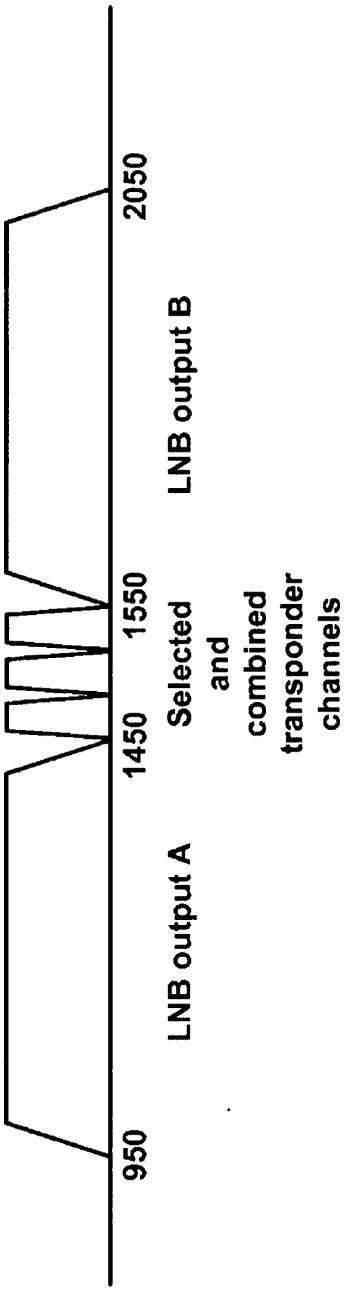
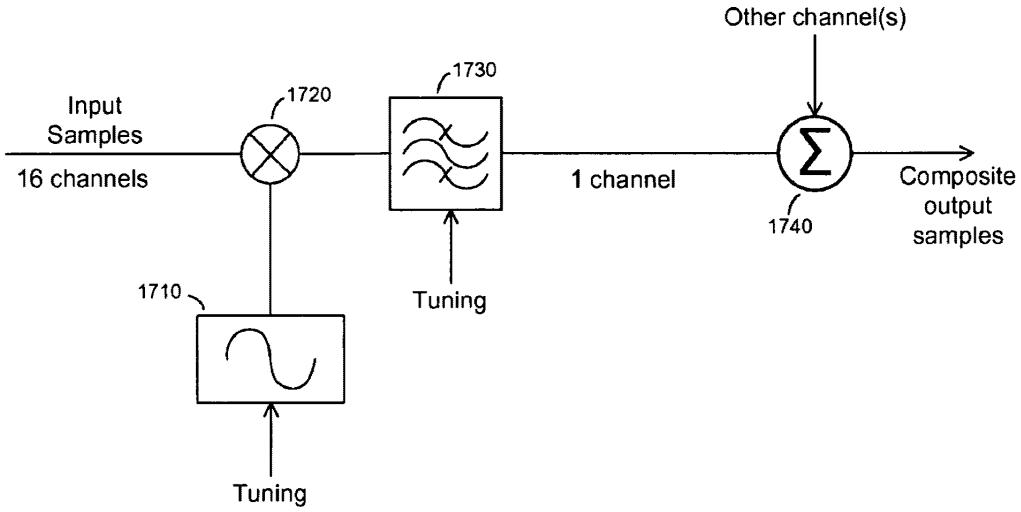

950
LNB output A
1450
Selected and combined transponder channels
1550
LNB output B
2050

FIG. 16



Digital Frequency translator and filter with summer

FIG. 17

SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION

RELATED APPLICATIONS

This application claims priority to U.S. provisional patent application No. 60/345,965 filed Nov. 7, 2001 entitled "Signal Selector and Combiner for Broadband Content Distribution"; U.S. provisional patent application No. 60/333,722 filed Nov. 27, 2001 entitled "Signal Selector and Combiner for Broadband Content Distribution"; and U.S. provisional patent application No. 60/358,817 filed Feb. 22, 2002 entitled "Signal Selector and Combiner for Broadband Content Distribution", each of which is incorporated herein by reference.

BACKGROUND

Referring to FIG. 1, a satellite receiver outdoor unit (ODU) **110** typically comprises a dish antenna **150**, one or more antenna feed horns **130**, one or more low noise amplifier and block down converters (LNB) **140**, and an optional multiport cross point switch **160**. Dish **150** collects and focuses received signal power onto antenna feed horns **130** which couples the signal to LNBs **140**. A single dish **150** may have multiple feed horns **130** wherein each feed receives a signal from a different satellite in orbit. An installation may have more than one dish, feed, and LNB assemblies. The cross point switch **160** allows connection of the outdoor unit **110** to more than one integrated receiver decoder (IRD) **180** located inside the building. IRDs are commonly called set top boxes (STBs) arising from their typical installed location on top of TV sets. The LNB **140** converts the signal transmitted by a satellite in Earth orbit, for example C band, Ku band, or another frequency band, to a lower intermediate frequency (IF) suitable for transmission through coax inside a building. For example, L band IF (950 to 1450 MHZ) with RG-6 or RG-11 coax cable is commonly used. The IRD **180** tunes one transponder channel, demodulates the IF signal from the LNB down to base band, provides channel selection, conditional access, decodes the digital data to produce a video signal, and generates an RF output to drive a television.

A satellite outdoor unit may have as many as three or more LNBs each with two receiving polarizations. The received polarization is selected by sending a voltage or other control signal to the LNB. In this configuration there are six possible 500 MHz signals that may be selected by the multiport cross point switch to be routed to each IRD. The 500 MHz signal is typically comprised of 16 transponder signals of 24 MHz bandwidth each with a guard band in between each transponder signal. Other transponder bandwidths are used such as 36 MHz, 54 MHz with a single channel or shared by two TV signals, and 43 MHz.

A problem with the conventional approach to connecting an outdoor unit to IRDs is that multiple cables are required to be run from the outdoor unit: one cable for each room where an IRD is located. When a new IRD is added another cable must be installed. In an application using a media server, a central processor for all video signals, multiple cables are needed to route signals from the ODU to the server.

FIG. 4 shows a representative spectrum of the signal output by an LNB. In a conventional satellite ODU this signal is routed through a cross point switch to one of the IRDs. Note that all transponder channels in the signal are from a single LNB and from the same polarization satellite signal. The cross point switch allows any of the cables connected from the ODU to the IRDs to be switched to any of the LNBs. A dedicated cable for each IRD is needed because in general each IRD is not using the same LNB and polarization at the same time. A server requires access to several LNB signals simultaneously, thus requiring several cables.

U.S. Pat. No. 6,134,419, incorporated herein by reference, by Williams assigned to Hughes Electronics, addresses part of the problem. The Williams patent recognizes that the bandwidth of the signal from each of the two polarizations is too broad to be transmitted over standard RG-6 or RG-59 cable, particularly when combined with the cable CATV signal. Williams addresses this problem using a transmodulator, by demodulating and remodulating to a different modulation scheme the RHCP and LHCP signals using a tuner, decoder, packetizer, cable encoder, and up converter for each of 32 transponder channels. The transmodulator outputs a signal with a higher-level modulation scheme to reduce the bandwidth occupied by the satellite signals. In the example provided, the QPSK signals from the LNBs are transmodulated to 128-QAM, reducing the bandwidth from 1000 MHz to 192 MHz. At the set top box (STB) the 128 QAM signal is demodulated and processed to produce an NTSC analog video signal sent to a television set.

One problem with the Williams approach is the circuit complexity due to the 32 tuner paths required in the transmodulator. For an increase in the number of satellite signals, this problem becomes more pronounced. Williams discloses modulation using 128-QAM, which requires a higher signal to noise ratio (SNR) than QPSK and is it more susceptible to impairment from multipath present in a cable environment.

U.S. Pat. No. 5,959,592 incorporated herein by reference, by Petruzzelli addresses combining both the left hand circular polarized (LHCP) and right hand circular polarized (RHCP) signals into one signal that is transmitted from the ODU. In the disclosed band stacking approach, the output of two low noise amplifiers (LNAs), each 500 MHz wide, are frequency translated to different IF frequencies and summed into a signal with a bandwidth of more than 1000 MHz. In one example disclosed, the different IF bands are 950 to 1450 MHz and 1550 to 2050 MHz. The problem with this approach is that the resulting bandwidth is very wide and becomes impractical when the number of LNB signals increases because each LNB output requires 500 MHz of bandwidth on the cable.

Satellite systems are described generally in G. E. Lewis, "Communication Services via Satellite" Butterworth-Heinemann Ltd. 1992.

SUMMARY OF THE INVENTION

A channel selecting and combining solution is used in the outdoor unit where one or more transponder channels are selected from each LNB output. The transponder channel or channels needed from each LNB are selected by a filter. Each selected transponder signal may be translated to a new channel frequency. The selected transponder channels are combined to form a composite signal. All of the selected, translated, and combined transponder channels are transmitted over a single cable to a gateway unit that extracts the channels to distribute to the IRDs. The gateway can frequency translate each transponder channel to its original frequency. Alternatively, the IRDs connect directly from the cable or through a splitter and tune the desired transponder channels. A channel translation mapping table is used to

coordinate the channel assignment between the original channels and new channels. In another alternative embodiment, the gateway transmits the video information over a digital data network.

LNB outputs can be sampled by a broadband A/D converter and filtered with a digital filter to select a transponder channel. Alternatively, a tuner can select a transponder channel. The selecting process extracts from the wide band LNB output a narrow band transponder channel.

Each IRD communicates the channels it needs to receive, directly or indirectly, to the signal selector. This information is used to select the transponder channel to combine in the signal selector output signal, the ODU downlink. New IRD designs can incorporate a signaling channel that uses unoccupied regions of the frequency spectrum of the cable, or a wireless communication link, to communicate the channel information. To provide compatibility with existing IRDs, the channel information can be communicated by an IR or RF auxiliary channel to the gateway or outdoor unit.

Many newer homes have coaxial cable installed that runs to a central location. In the present invention a gateway is located at the central location that receives the combined signal from the outdoor unit and distributes the signals to the IRDs. An IRD requests a channel through an IR or RF signal communicated to the gateway. The RF communication can be in the cable connecting the IRD to the gateway or a wired or wireless signal.

The present invention requires only one cable wire to be routed from the outdoor unit to inside the building or to a gateway. Additional IRDs can be added without any installation effort needed on the outdoor unit. In certain configurations the invention eliminates the cross point switch.

The present invention can be used along with other signals transmitted on the distribution cable. The combined transponder signal can occupy a predetermined region of the frequency spectrum while another service, such as CATV can occupy a different region. Another example of shared use of the cable is along with a single or band stacked satellite signal. In this example, frequencies such as 950–1450 and 1550–2050 are used by a conventional satellite system, and frequencies outside and between these frequency bands are occupied with a combined transponder signal according to the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** Shows a prior art configuration of a satellite TV installation.

FIG. **2** shows a satellite TV installation according to the present invention.

FIG. **3** shows a block diagram of a selector and combiner according to the present invention.

FIG. **4** Shows a diagram of the frequency spectrum of individual LNB output signals according to the prior art.

FIG. **5** shows a diagram of the frequency spectrum of individual LNB output signals and the frequency spectrum of the composite RF signal comprising selected transponder signals in accordance with the present invention.

FIG. **6** shows an embodiment of the present invention wherein the sampled data is distributed digitally to channel selector filters.

FIG. **7** shows an embodiment of the present invention wherein the selected channel data is distributed digitally to the up converters.

FIG. **8** shows an embodiment of the present invention wherein the each LNB has a dedicated selector and up converter.

FIG. **9** shows an embodiment of the present invention wherein tuners and up converter are used to select and combine transponder channels.

FIG. **10** shows an embodiment wherein selected channel are processed by an MPEG transport stream demultiplexer and combined as data packets for digital LAN transmission.

FIG. **11** shows a satellite TV installation according to the present invention providing compatibility with existing installed STBs and new STBs and using a server/gateway.

FIG. **12** shows details of an outdoor unit providing compatibility with new and existing STBs.

FIG. **13** shows the frequency spectrum of signals at various points in the signal processing.

FIG. **14** shows the frequency spectrum of signals in another embodiment of the invention using base band processing.

FIG. **15** shows the frequency spectrum of signals filtered and combined with excess bandwidth.

FIG. **16** shows the frequency spectrum of conventional LNB signals combined with selected transponder channels in accordance with the present invention.

FIG. **17** shows one example of a frequency translator and filter.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. **2**, a satellite TV installation according to the present invention is shown. Signal selector **250**, part of satellite outdoor unit **210**, extracts the needed transponder channels from each of the LNB outputs and combines the channels into one composite signal transmitted on cable **220**. Gateway **230** receives the signals and provides distribution to the IRDs located in the building. Controller **255** is responsible for communicating channel map, control, and status information with gateway **230** and IRDs **240**. Controller **255** also tunes filters and local oscillators in the signal selector and maintains the channel map specifying the assigned frequency slots for transponder channels. Alternatively, the channel map can be maintained by gateway **230**.

Gateway **230** can be a simple power splitter/summer allowing the IRDs to connect directly to the cable. Gateway **230** would be located inside the home in a convenient location that allows connection to the IRDs **240**. Gateway **230** is designed to pass signaling from IRDs **240** to ODU **210** that contains the channel selection information.

Each LNB output signal is applied to a signal selector that extracts zero, one, or more transponder channels to be combined into a composite signal.

Refer to FIG. **3**. In an embodiment of the present invention, a quadrature down converter is used to produce I and Q analog signals. The down converter is comprised of a local oscillator **382**, phase splitter **384** to produce an in-phase and quadrature-phase LO, two mixers **310**, and two filters **320**. The filters **320** reject the undesired mixing products. The I and Q signals are sampled by high-speed broadband A/D converters **330** to create I and Q digital samples. The samples are N bits wide, where N is selected to limit the degradation to the signal to an acceptable level. The entire 500 MHz band is digitized by this operation. All further digital processing is done using complex operations applied to the I and Q digital samples. The sample rate is 500 MHz or higher.

The resolution of the A/D converters is in the range of 4 to 12 bits. To sample and reproduce a QPSK signal 6 to 8 bits would be adequate. More bandwidth efficient modulation

such as 8PSK would require more bits of resolution. The selection of resolution is based on considering power consumption, SNR, and cost.

A coherent LO generated by carrier tracking is not needed since the sampled data is not decoded in the ODU. An unknown carrier offset is present between the LO and the carrier of the received signal. A small additional carrier offset is introduced by the down conversion process but will be removed in the carrier recovery operation in the IRD. It is desirable that the LO carrier noise be low enough to be tracked out by the carrier loop in the IRD.

Digital filtering **340** is used to select one or more of the transponder output signals. The digital filter may operate by applying a band pass filter transfer function to the broadband signal to isolate a single transponder channel. The filter uses known digital architectures such as finite impulse response (FIR) or infinite impulse response (IIR). The filter is tuned by programming a set of filter coefficients to select a specific pass band. Frequency domain filter can also be employed using FFT or DFT architectures. Other filtering techniques include polyphase filter structure. These filtering techniques are well known in the digital signal processing field. References covering digital filtering include Thomas J. Cavicchi "Digital Signal Processing" John Wiley & Sons, 2000; Sanjit K. Mitra, "Digital Signal processing, a Computer Based Approach" McGraw-Hill, 2001; Proakis and Manolakis, "Introduction to Digital Signal Processing", Macmillan Publishing, 1988; DSP and applications, Analog Devices.

Referring again to FIG. **3**, the selected transponder channel is then frequency translated to a new carrier frequency. The selected and frequency translated digital signal is converted to an analog signal using a D/A converter for the I and Q components. One approach is to convert the digitally filtered signal to the analog domain using a D/A converter **350**, then using a quadrature modulator with mixers **360**, phase splitter **388**, LO **386**, and summer **380**. Alternatively, this can be done by a digital mixing operation where a rotating phasor is multiplied by the data samples to translate their frequency, then converting the frequency shifted digital signal to an analog signal with a D/A.

LO **386** is variable to allow the selected channel to be frequency translated to any of the channels available in the band. Alternatively, the LO can be fixed at different a frequency for each of the channel selectors.

Alternatively, a single transponder channel can be selected by translating the spectrum down in frequency to place the selected channel at base band then applying a low pass filter transfer function to isolate a single channel. The translation can be done by a digital mixing operation wherein the sample data is multiplied by a data sequence representing a carrier frequency. A post-mixing filter rejects the undesired mixing terms.

FIG. **14** shows the frequency spectrum of the signal as it is processed. The original spectrum **1** is frequency translated to locate the selected transponder channel at base band, as shown in spectrum **2**. A low pass filter then passes one transponder channel and removes signal information from the other transponder channels, shown in spectrum **3**. This signal is then converted to an analog signal, mixed to a new frequency, and summed with other channels in the analog domain.

One summer input is provided for each signal selectors. This is a broadband signal comprising up to 16 or 32 channels. Alternatively, a summer combines the analog I and Q signals from all the signal selectors.

Two basic approaches to combining are possible. One approach is to combine digitally filtered signals in the digital domain. This can be achieved with all filtered transponder channels to be combined presented at a sample rate equal to the composite output rate. The other approach is to combine the selected signals in the analog domain. This leads to two possible approaches to filtering. One is to implement filters with the same input and output sample rate. The other approach is to filter with an output sample rate that differs from the input sample rate.

An example of a digital combining embodiment, a 500 msps broadband sampling of the LNB output could be filtered to produce a 500 msps output stream representing one or more transponder channels. Each transponder channel may be frequency translated to the desired new carrier frequency, then filtered to produce a single transponder signal that can be combined with other similarly selected transponder channels.

FIG. **13** shows the frequency spectrum of a sample stream as it is processed. The original spectrum **1** is frequency translated to locate the selected transponder channel at the desired frequency, as shown in spectrum **2**. A band pass filter then passes one transponder channel and removes signal information from the other transponders channels, shown in spectrum **3**. This filtering operation selects one transponder. In this example transponder channel B is selected. The sample stream for the selected channel is added to the sample stream from other filtering sections, represented in spectrum **4**, to produce a composite sample stream in spectrum **5**. Other selected channels are represented by channels labeled X.

FIG. **17** shows a block diagram of the processing elements to perform these steps. Local oscillator (LO) **1710** feeds mixer **1720** and is then band pass filtered by filter. LO is variable to allow the selected channel to be frequency translated to any of the channels available in the band. Filter **1730** has a programmable pass band frequency, tuned by loading different filter coefficients. Summer **1740** adds the sample stream to other sample streams. Several transponder channels are selected, each requiring one input to an adder. One embodiment uses a two input adder for each filter channel to implement a pipeline adder. The time delay introduced by a pipeline adder does not present a problem to the system because the receivers are each demodulating one transponder and the relative time delay is not apparent.

The frequency translation can occur either before or after the filtering operation. An advantage to translating first followed by filtering is that the filter removes the unwanted mixing terms generated. In either case, a rotating phasor is multiplied by the data samples to translate their frequency.

An example of an analog-combining embodiment, the digital filters may have an output sample rate that differs from the input sample rate. This can be inherent in the filtering operation or result from a down sampling done after filtering. Down sampling after the selecting filter is possible because the single channel the bandwidth is narrower than the A/D output and fewer samples are needed to represent the signal.

The spectrum is placed at the desired RF frequency by choosing the LO frequency driving the up converters. One example would be 950 to 1450 MHz, a standard IF frequency for DBS systems. This frequency band is compatible with standard set top box (STB) hardware. Other IF frequencies could be used. Using this technique, standard STB hardware can receive the new composite signal and demodulate and decode the video and audio signals. Specific TV channels are located at new transponder frequencies. A

mapping table allows the IRD/STB to tune to the correct transponder channel. The bandwidth of the spectrum can be 500 MHz for a 16-transponder system, 1000 MHz for a 32-transponder system, or other bandwidths according to the number of transponder channels present on the cable. If the system uses band stacking, the A/D converter can directly sample the 1000 MHz IF signal, with or without a frequency translation, or the two LNB polarizations can be separated into two 500 MHz signals each digitized with separate A/D converters.

Alternatively, the IF signal from the LNB can be directly band pass sampled by a single A/D converter. The IF signal can be frequency translated to a different IF frequency before band pass sampling. Band pass sampling requires a higher speed A/D converter than base band sampling, but only a single A/D.

One pair of A/D converters is provided for each LNB output. Alternatively, the LNB output can be band pass sampled using a single A/D converter. At a given point in time some LNB outputs may not be accessed by a user. If no transponder channel is selected from a particular LNB output, the A/D converters associated with that LNB output may be switched off to reduce power consumption and heat generation, or reallocated to process another LNB output.

The A/D digitizes the entire LNB output signal; therefore all transponder channels are available in the sampled data. More than one transponder channel may be selected from the A/D data to be combined in the composite signal. When all A/D are powered up any combination of transponder channels from any LNB output can be combined into the composite signal for distribution to the gateway and STBs.

FIG. **5** shows a frequency spectrum of the composite signal. Each of the available channels can be occupied with any transponder channel of any polarization from any LNB. One or more channels are used by each active IRD connected to the system. The number of transponder channels in the composite signal can be from as few as 2 to as many as 32, depending on the number of simultaneous channels needed in the system.

In general, the selecting and combining process will result in transponder channels located at different frequencies than where originally found. A translation table maps original channel locations on the selector input to new channel locations on the selector output. This map created and maintained by a controller located in the ODU or the gateway and is communicated to the IRDs or other devices in the network.

The channel selector performs a frequency selective filtering operation to select the desired transponder frequency. The transition band of this filter is steep, passing the selected transponder channel and rejecting adjacent transponder channels. The transition region available is derived from the guard band between channels. This can be as small a few Mega-Hertz. If the LNB carrier offset is large, a shift in the spectrum will result in the selecting filter cutting off part of the desired spectrum and passing part of an adjacent channel. For this reason a carrier offset estimate is desirable. Since all transponder channels from a given LNB will have approximately the same offset, it is only necessary to monitor one transponder channel from each LNB to determine the offset for all channels. Any of several know techniques for estimating the carrier offset may be employed. One example is two use two filters each approximately half the transponder bandwidth. By measuring the ratio of power from each filter output, an estimate of the carrier offset can be determined. Once the carrier offset is estimated, the sampled signal can be multiplied by a rotating phasor value to digitally shift the spectrum back to the nominal position. Alternatively, this frequency offset correction can be done in the analog domain, or a combination of digital and analog approaches.

Another approach to addressing the unknown carrier offset in the LNB is to use a wider filter to select transponder channels, wherein the bandwidth of the filter passes the selected transponder and part of the adjacent spectrum. In this way, if the transponder signal is not centered in the filter bandwidth the band edges will not be attenuated by the filter roll off. This excess bandwidth will allow some energy from the neighboring transponder signals. A wider channel separation is needed on the combined signal, for example the selected transponders can be spaced twice the conventional spacing. This approach makes less efficient use of the cable spectrum but simplifies the hardware implementation by reducing the requirement of or eliminating the carrier offset correction. Additionally, a less steep filter roll off is possible.

FIG. **15** shows the signal spectrum as it is processed. Spectrum **1** is a representative original spectrum. Spectrum **2** shows the filter pass band characteristic, which is wider than one transponder channel. Spectrum **3** is the result of filtering one transponder channel. Spectrum **4** is a composite of several transponder channels. A region between the selected channels is unused. The exact shape of the unused spectrum will be dependent on the filter roll-off characteristics, but is not significant. The objective is to pass the selected transponder signal without distortion.

The approach of using a filter with excess bandwidth technique is also useful for implementing the invention using an analog approach. A filter with a stop band substantially wider than the transponder channel allow using filters with more gradual transition band, and is therefore simpler to implement. The excess bandwidth can range from less than 5% to 100% wider than the transponder bandwidth.

FIG. **6** shows a variation of the present invention that uses a cross point switch or shared bus **640** to distribute data from the A/Ds to the channel selecting filters. The cross point switch, also called crossbar switch, allows any signal input to be passed to any output. It can take the form of a data selector or multiplexer. Implemented as a shared bus, data sinks receive signals from data source using a time-multiplexed bus. Either a cross point switch or a shared bus can be unidirectional or bidirectional. The cross point principle applies to digital signals and analog signals. LNB outputs are quadrature down converted **620** and sampled by dual A/D converters **630**. The parallel data is routed through cross point switch **640** so that any filter has access to any A/D data. Filter/selector **650** selects the desired transponder channel that is then up converted by quadrature modulator **660**. All selected channels are combined in summer **670**.

FIG. **7** shows a variation where the cross point switch **740** is located after the selecting filter **720**. In this configuration the selecting filter **720** may also include a down sampler to reduce the bus traffic bandwidth in the cross point switch **740**. Down sampling is possible because after selecting a single desired channel the bandwidth is narrower and fewer samples are needed to represent the signal. One or more selecting filters **720** may be connected to the output of each A/D, each filter **720** selecting one transponder channel.

FIG. **8** shows a configuration wherein each LNB has a dedicated selecting filter and up converter. The selecting filter may digitally select multiple channels from the broadband A/D data to drive the up converter and DAC.

FIG. **9** shows another alternative where analog tuners **930** select desired transponder channels that are up converted by up converter **940**. All signals are combined by summer **950**

to drive the signal cable **970** from the ODU. A multiport switch **920** allows any tuner to connect to any LNB output. The number of signal selecting paths comprising tuner **930** and up converter **940** is selected based on the maximum number of simultaneous users. A multiple-tuner personal video recorder would use more than one signal. Controller **960** receives channel select information either from the cable or a separate data channel such as infrared (IR) or wireless RF link or other source. Channel select information from the controller **960** programs the tuner **930** and up converter **940** LO. Channel select information can come to the controller over a wireless remote control signal or using signaling sent over the cable.

Up converters **940** can operate at a fixed LO frequency with one up converter **940** being assigned to each user connected on the cable. The various LO frequencies are unique. Alternatively, the down conversion process of each tuner **930** can be set to down convert directly to a predetermined IF frequency which is unique for each selected signal, thereby eliminating a separate up converter. A simplified IRD can be used with this approach wherein the IRD needs only tune to a single selectable IF frequency. The tuning range is narrower than a convention 500 MHz tuner and the channel selection is limited to as few as four choices compared to up to 16 or more in a convention IRD tuner.

FIG. **10** shows another alternative where signal selector **1010** selects a transponder channel. MPEG transport stream demultiplexer **1020** extracts a specific video program that is combined by data combiner **1030**. Several MPEG streams are multiplexed as needed, and packets are formatted for transmission on a digital network. A digital LAN **1040** connects directly to the ODU. Channel information is communicated to the ODU through the LAN.

FIG. **11** shows another alternative used where new STBs are used with existing STBs. ODU **1110** supplies a signal to each of the connected cables according to the type of STB attached to the cable. Existing legacy STBs **1120** are supplied with an IF signal as in a conventional system, and the STBs **1120** will tune to a single transponder channel. New STBs **1140** will be supplied with a composite signal according to the present invention comprising all the transponder channels that are selected; the new STB **1140** will tune and decode the requested channel.

A new STB **1140** can be installed in place of an existing STB **1130** by simply connecting the new STB **1140** to the cable in place of the existing STB **1130**. More than one new STB **1140** can be installed by using a signal splitter **1150** to provide a signal to multiple STBs. New STBs use a signaling system for selecting transponder channels that passes through the splitter to the ODU. Existing STBs will each have a dedicated connection to the ODU, as provided in the original installation. This is required because existing STBs use voltages or other control means to select LNB outputs that do not support multiple STBs on a single cable.

Also in FIG. **11**, server/gateway **1160** receives the composite transponder signal, decodes specific programs, and distributes the program information in packetized MPEG over a digital local area network (LAN) **1170** to STBs **1180**. Ethernet or other LAN technology is suitable for this function.

A new STB operating in accordance with the present invention is provided with a means of communication with the signal selector and combiner in the ODU. At power up or at periodic intervals the ODU or the STB initiates communication over the attached cable. This communication can be an in band or out of band signal. The ODU polls the STBs connected to determine if the STB is a conventional STB or new design STB. Because conventional STBs will not respond to the polling request, the absence of response is an indication of a conventional STB. A new STB will respond to the polling request and establish communication with the ODU.

The means of communication on the cable can be a TDMA frame structure with slots assigned to each STB, a frequency division multiplex (FDM) approach with unique frequencies assigned to each STB, or any other known technique for two-way communication by multiple devices over a signal channel. An extension of DiSEqC protocol commonly used for satellite dish control can be used for this communication. DiSEqC uses a gated 22 kHz carrier to communicate binary data and can be adapted for use to transfer data needed. The data rates are low for this communication path. Device configuration, channel mapping, and channel requests are among the types of data communicated between the ODU and STB.

Referring to FIG. **12**, signal selector and combiner **1220** taps the signals output from each LNB to provide the transponder selection function. Switch **1220** is under control of the signal selector and combiner **1210**. Switch **1220** will be actuated to supply either a conventional signal from multiport switch **1260** or the composite transponder signal from signal selector and combiner **1210**. Switch **1220** can be a solid-state device or electromechanical relay.

Referring to FIG. **16**, another application of the present invention is to provide selected transponder signals along with other services transmitted on the same cable wiring. The selected transponder signals can be transmitted in unoccupied regions of the cable, such as above, below, or between broadband satellite signals. The number of transponder channels transmitted can be adapted to the available spectrum. In one example, 950 MHz to 1450 MHz is used by one conventional LNB output signal; 1550 MHz to 2050 MHz is used by another conventional LNB output, leaving 1450 MHz to 1550 MHz available. One or more selected transponder channels from any LNB can be inserted into this region. Suitable guard bands need to be provided to prevent interference, for example 3 transponder channels at 31.25 MHz spacing uses 93.75 MHz. Another example of this application is to combine a standard CATV signal occupying 50 to 750 MHz with selected satellite transponder channels that are combined and transmitted at frequencies above the CATV band.

Using the present invention, any number of transponder channels can be selected and combined. Conventional IRD tuners are designed to tune channels anywhere in a 500 MHz or 1000 MHz range, requiring a wide tuning range for the front-end filter and LO. In an application where few channels are needed, the tuner range can be narrower, thus simplifying the design and lower cost. For example, a residential installation may typically have four television sets, some tuning only one channel at a time; others tune two channels in the case of picture in picture (PIP) or personal video recorder (PVR). This application would require 4 to 8 channels be distributed in the house simultaneously. A tuner would be required to tune over a 125 MHz to 250 MHz range.

Several variations in architecture are possible using the present invention. At each stage in the signal path, alternatives are available for implementation. Specific functions can be implemented in the analog domain or digital domain. Dedicated resources can be provided for each possible connection, or a pool of resources can be used. Dedicated resources insure that the peak demand can be satisfied unconditionally, but leads to unused capacity. Pooling

enables a trunking efficiency to be realized and exploits statistical properties of usage to address most requirements.

A pool of A/D converters that can accept a signal from any LNB output through an RF crossbar switch. The number of simultaneous LNB signals that can be processed is limited to the number of A/D converters provided. Alternatively, dedicated A/D converters, one connected to each LNB output allows all LNBs to be processed if needed.

A pool of filter/selectors connected to a common bus, the pool size dictating the number of simultaneous transponder channels that can be selected. Alternatively, a predetermined number of filters can be attached to each A/D converter.

The filters/selectors can be grouped with each LNB or can be a common resource available to process any signal from any LNB. This choice trades off circuit complexity of implementing more filters with circuit complexity of routing LNB outputs through a crossbar switch.

Each of the operations of mixing, filtering, and combining can be done as an analog operation or digital operation.

Partitioning of functions can take a number of forms. The circuitry can be implemented in a monolithic integrated circuit (IC), a hybrid, discrete components, or a combination of technologies.

Another application of the present invention is to simplify upgrades to an existing system. A dual tuner STB that enables viewing and recording of two different channels requires two input cables to allow any combination of LNB signals to be received. A single cable input would be limited to viewing and recording two channels from the same LNB output. When the upgrade is performed, the installation of an additional cable is difficult. By selecting and combining the desired channels at the ODU a single cable can be used to transmit all channels. A re-map of channel locations occurs. A conventional dual tuner STB can be used with this approach by providing a splitter at the input to the STB that supplies the composite signal to both cable inputs. A software upgrade to the STB may be needed to support the channel re-mapping.

Other implementations for signal processing include: No cross point switch, digitize, digital filter select, frequency translate, RF combine; cross point switch, analog tuner select, frequency translate, RF combine; digitize, digital filter select, digital network combine; digitize, digital filter select, decode, MPEG stream over a network; digitize, digital filter select, decode, MPEG to analog, restack channels, RF combine. One skilled in the art will recognize that many variations are possible to implement the present invention of selecting signals and combining onto a signal cable.

Another property of the present invention is that the process of digitizing, selecting, and combining is modulation independent. Either a digital or analog selecting and combining approach can be designed to process any form of phase/amplitude modulation. Although the dominant modulation type in direct broadcast satellite systems is QPSK, alternatively BPSK, 8-PSK or multi-level QAM and PSK signals can be distributed in the same way.

What is claimed is:

1. A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising:

a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals from at least one broadband LNB signal based on the transponder select information;

a frequency translator coupled to the signal selector that is capable of shifting the selected transponder signals to new carrier frequencies to produce RF signals; and

a signal combiner coupled to at least one frequency translator capable of combining at least two RF signals to produce a composite signal;

wherein the modulation of the composite signal is the same as the modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable;

whereby the composite signal is transmitted to the IRD.

2. The signal distribution system of claim **1** further comprising a plurality of IRDs and wherein the composite signal is transmitted on a single cable connected to the ODU and all IRDs receive channels extracted from the composite signal.

3. The signal distribution system of claim **1** wherein the signal selector comprises an analog to digital converter and a digital filter.

4. The signal distribution system of claim **1** wherein the signal selector comprises a tuner.

5. The signal distribution system of claim **1** further comprising an integrated receiver decoder (IRD) connected to the coaxial cable with a plurality of tuners within the IRD, wherein each tuner within the IRD receives the composite signal and each tuner uses at least one transponder signal.

6. The signal distribution system of claim **1** wherein transponder select information is transmitted over the same cable as the composite signal.

7. The signal distribution system of claim **1** wherein transponder select information is transmitted over a wireless link.

8. A signal distribution system for distributing signals comprising a plurality of channels from a plurality of sources between a first unit and a second unit over a communication medium comprising:

means in the first unit responsive to information transmitted by the second unit for extracting selected channels from each of the plurality of sources and combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; and

means in the second unit for receiving the composite signal and demodulating and decoding at least one channel; and

means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

9. The signal distribution system of claim **8** wherein the control information comprises channel selection requests originating from the second unit and the control information comprises channel mapping information originating from the first unit.

10. The signal distribution system of claim **8**, further comprising a means in the first unit for carrier offset correction.

11. The signal distribution system of claim **8** wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.

12. The signal distribution system of claim **11** wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.

13. The signal distribution system of claim 12 wherein the means for communicating uses the same communication medium as the composite signal.

14. A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of:

communicating a transponder request signal to the ODU from the IRD;

in the ODU, selecting a plurality of transponder signals extracted from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals;

combining selected transponder signals into a composite signal;

transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

15. The method of claim 14 wherein the step of selecting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal.

16. The method of claim 14 wherein the step of combining comprises frequency translating the selected transponder channels to a variable frequency before combining.

17. The method of claim 15 further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.

18. The method of claim 14 further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.

19. The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD and all IRDs receive the same composite signal.

20. The method of claim 14 wherein the transponder request signal is transmitted over a wireless link to the ODU.

21. The method of claim 14 further comprising the steps of:

frequency translating the selected transponder channels to a variable frequency before combining; and

splitting the composite signal inside a home and distributing to a plurality of IRDs.

22. The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.

23. The method of claim 21 wherein the transponder request signal is transmitted over a wireless link to the ODU.

* * * * *

Attorney Dkt. No.: 05JM-127749

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of Gurantz et al.	Group Art Unit:	TBD
U.S. Patent No. 7,130,576	Examiner:	TBD
Patent Date: October 31, 2006		
For: SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION		

Mail Stop: *Ex Parte* Reexamination
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

INFORMATION DISCLOSURE STATEMENT

Sir:

In accordance with 37 C.F.R. §§ 1.56, 1.97 and 1.98, Applicant submits the attached form which identifies documents that might be deemed material to the reexamination of the above-identified patent.

Applicant respectfully requests that the identified documents be considered in the reexamination of this patent, and that such consideration be made of written record in the patent file.

Dated: December 20, 2006

Respectfully submitted,

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(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	TBD
Filing Date	TBD
First Named Inventor	Itzhak GURANTZ
Art Unit	TBD
Examiner Name	TBD
Attorney Docket Number	05JM-127751

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 4,953,184		Simone	
		US- 5,278,837		Kelley	
		US- 5,285,284		Takashima et al.	
		US- 5,654,774		Pugel et al.	
		US- 5,703,390		Green et al	
		US- 6,005,861		Humpleman	
		US- 6,353,463		Seo	
		US- 6,437,837		Seo	
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] "Number[4] "Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
		EP 1009113				
		EP 0757489				

Examiner Signature		Date Considered	

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Sheet 2 of 2

Complete if Known	
Application Number	TBD
Filing Date	TBD
First Named Inventor	Itzhak GURANTZ
Art Unit	TBD
Examiner Name	TBD
Attorney Docket Number	05JM-127751

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Eutelstat, "Information for Installers of Hot Bird tm DVB-S Systems, Version 1.0" http://www.eutelstat.com/docs/tech, June 7, 1999	
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		Thomson Consumer Electronics "RCA DirectTV Receiver with UltimateTV Service Setup Guide" WebTV Networks, Inc. 2000	

Examiner Signature		Date Considered	

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EXHIBIT K

Translation of Abstract for EPO 1009113A1

An improved satellite reception plant, which exhibits: an entrance receipt circuit with converter circuits (9), an electronic control unit (15), and with a data bus for the controlling of several participants/Receiver (13), who at an antenna line (11) is connectable, the data bus consists of a multi-master bus (11 '), about what between the connectable participant/Receiver (13) and the electronic control unit (15) data communication for the control and allocation satellite programs requested of the individual participant/Receiver selected and is feasible, the data bus (11 ') consists of the antenna line (11), and those participants/Receiver (13) are provided with a mechanism to the production and evaluation of a collision protection signal, whereby guaranteed it is that at a certain time communication with the CONTROLLER (156) is out feasible on the part of only one participant/Receivers (13).

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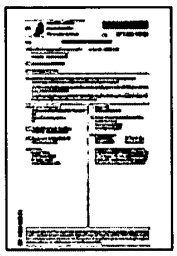
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Title: **EP1009113B1: Satellite communication system, in particular satellite receiving system and method for management of an antenna receiving system**[German][French]

Derwent Title: Satellite reception installation with associated data bus [Derwent Record]



High Resolution

Low Resolution

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Abstract: [From equivalent EP1009113A1] Eine verbesserte Satelliten-Empfangsanlage, die aufweist:eine Eingangs-Empfangsschaltung mit Konverterschaltungen (9),einer Steuerungseinheit (15),und mit einem Datenbus zur Steuerung mehrerer Teilnehmer/Receiver (13), die an einer Antennenleitung (11) anschließbar sind,der Datenbus besteht aus einem Multimaster-Bus (11'), worüber zwischen den anschließbaren Teilnehmer/Receivern (13) und der Steuerungseinheit (15) eine Datenkommunikation zur Steuerung und Zuordnung der von den einzelnen Teilnehmer/Receivern ausgewählten und angeforderten Satellitenprogramme durchführbar ist,der Datenbus (11') besteht aus der Antennenleitung (11), unddie Teilnehmer/Receiver (13) sind mit einer Einrichtung zur Erzeugung und Auswertung eines Kollisionsschutz-Signals versehen, wodurch sichergestellt ist, daß zu einem bestimmten Zeitpunkt eine Kommunikation mit dem Controller (156) nur von Seiten

eines einzigen Teilnehmers/Receivers (13) aus durchführbar ist.

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Designated Country: AT BE CH DE DK ES FR GB GR IE IT LI LU NL PT SE SI

Family: Show 8 known family members

Claims: Hide claims

1. Satellite communication installation, in particular satellite reception installation having a circuit arrangement (1) for selectively receiving electromagnetic waves which are emitted from one or possibly more satellites with vertical and horizontal polarization in a lower or upper frequency band, as appropriate, having the following features:

- - a control unit (15), and
- - a data bus for controlling a plurality of subscribers/receivers (13),

characterized by the following further features:

- - the data bus comprises a common multimaster data bus (11') which can be used to carry out data communication between the connectable subscribers/ receivers (13) and the control unit (15) for the purpose of controlling and allocating the satellite programmes requested and selected by the individual subscribers/receivers;
- - the common multimaster data bus (11') comprises a common antenna line (11), and
- - the subscribers/receivers (13) are provided with a device for producing and evaluating a collision prevention signal which ensures that, at one particular instant, communication with the control unit (15) can be carried out only by a single subscriber/ receiver (13).

2. Satellite communication installation according to Claim 1, characterized in that the device for producing and evaluating a collision prevention signal is designed such that, before a control signal is dispatched, a collision prevention phase preceding the actual control signal is first executed, said collision prevention phase involving the multimaster data bus (11') first being checked for activities of another subscriber/receiver (13) and/or of the control unit (15), with the result that the subscriber/receiver (13) concerned dispatches actual control signals to the control unit (15) only when no activity can be established on the multimaster data bus (11').

3. Satellite communication installation according to Claim 2, characterized in that the collision prevention phase is in at least three parts and, in this context, comprises a first bus activity observation phase for a time period (t0) in which a check is carried out to determine whether other subscribers/receivers (13) or the control unit (15) are active on the multimaster data bus (11'), a subsequent bus request phase with a time period (t2) in which a signal which signals an activity is output to the multimaster data bus (11') by the subscriber/receiver (13), and a subsequent further bus observation phase for a second time period (t2), in which no signal (11) is output to the multimaster data bus (11').

4. Satellite communication installation according to one of Claims 1 to 3, characterized in that the data transmission serving the purpose of

collision prevention on the multimaster bus (11') for controlling the connected subscribers/receivers (13) is based on the basis of a signal changeover, communication between a subscriber/receiver (13) and the control unit (15) being able to be started only when the presence of a predefined signal has first been detected on the multimaster bus (11').

5. Satellite communication installation according to Claim 4, characterized in that the signal changeover is based on the basis of a DC voltage level changeover, communication between a subscriber/receiver (13) and the control unit (15) being able to be started only when the presence of a predefined DC voltage level has first been detected on the multimaster bus (11').

6. Satellite communication installation according to one of Claims 1 to 5, characterized in that the data transmission serving the purpose of collision prevention on the multimaster bus (11') for controlling the connected subscribers/receivers (13) is based on a signal changeover system, communication between a subscriber/receiver (13) and the control unit (15) being able to be carried out only when a predefined signal has been detected on the multimaster bus (11').

7. Satellite communication installation according to Claim 6, characterized in that the signal changeover is based on a DC voltage level changeover system, communication between a subscriber/receiver (13) and the control unit (15) being able to be carried out only when a predefined DC voltage level has been detected on the multimaster bus (11').

8. Satellite communication installation according to one of Claims 1 to 7, characterized in that the connected subscribers/receivers (13) comprise a DC voltage detector device or a DC voltage threshold value discriminator which can be used to recognize the "blocked" or "operational" operating state for the subscriber/receiver (13) concerned on the basis of a DC voltage signal which is higher or lower than a threshold value.

9. Satellite communication installation according to one of Claims 1 to 8, characterized in that the signal structure for data interchange between a subscriber/receiver (13) and the control unit (15) is fundamentally designed such that the actual control signal is preceded by a "header" comprising at least three phases, namely a first bus observation phase for a time period (t0), a subsequent bus request phase for the time period (tl), and a renewed subsequent further bus observation phase for a time period (t2), the bus request phase involving the subscriber/receiver concerned outputting a DC voltage signal to the antenna line (11), i.e. to the bus (11'), for the time period (t1), which indicates bus activity to the other connected subscribers/receivers (13).

10. Satellite communication installation according to one of Claims 1 to 9, characterized in that at least some of the values for the bus observation phase (tO) are preselected or preset to be different for the different subscribers/receivers.

11. Satellite communication installation according to one of Claims 1 to 10, characterized in that, when a subscriber/receiver (13) is newly added or connected, the times (tl, t2) allocated to it in connection with a preceding address allocation for the bus request phase and/or the subsequent second bus activity monitoring phase are set so as to be changed, preferably increased.

12. Satellite communication installation according to one of Claims 1 to 11, characterized in that the time phase (t2) for the second bus observation phase is shorter than the first bus observation phase with the time (tO) for all connected subscribers/receivers (13).

13. Satellite communication installation according to one of Claims 1 to 12, characterized in that all the subscribers/receivers (13) have the same values for the time period (t0) for the first bus observation phase of a signal instruction.

14. Satellite communication installation according to one of Claims 1 to 13, characterized in that the connected subscribers/receivers (13) are designed such that their mode of operation and driving can be implemented on the basis of a DiSEqC protocol.

15. Satellite communication installation according to one of Claims 1 to 14, characterized in that the connected subscribers/receivers (13) are designed such that, once a subscriber/receiver (13) has sent an instruction, no further instruction can be dispatched for a minimum waiting time.

16. Method for operating a satellite communication installation according to one of Claims 1 to 15, characterized in that, before a control signal, in particular an address request signal or a programme instruction signal, is dispatched to the control unit (15) by a receiver, a collision prevention checking method having a collision prevention phase which precedes the actual control signal is first carried out, said collision prevention phase involving the bus (11') first being checked for activities of another subscriber/receiver (13) and/or of the control unit (15), with the result that the subscriber/receiver (13) concerned dispatches actual control signals to the control unit (15) only when no activity can be established on the bus (11').

17. Method according to Claim 16, characterized in that the collision prevention phase is in at least three parts and, in this context, comprises a first bus activity observation phase for a time period (tO) in which a check is carried out to determine whether other subscribers/receivers (13) or the control unit (15) are active on the bus (11'), a subsequent bus request phase with a time period (t2) is carried out [sic] in which a signal which signals an activity is output to the bus (11') by the subscriber/receiver (13), and a subsequent further bus observation phase for a second time period (t2), in which no signal (11) is output to the bus (11').

18. Method according to Claim 16 or 17, characterized in that, once the bus request signal has been output, the subscriber/receiver (13) first changes over to a bus observation phase again, which outputs no signal, in order then to output an address request signal or a programme instruction signal to the controller only when there is no activity observed on the bus (11, 11').

19. Method according to one of Claims 16 to 18, characterized in that the collision prevention checking method takes place with its changeover between two DC voltage values, preferably between a DC voltage value "0" and a DC voltage value which is different from this, and in that the supply of a predefined DC voltage value can be detected by the other connected subscribers/receivers (13) and can be interpreted as bus activity of another connected subscriber/receiver (13) or of the control unit (15), with the result that the output of an individual address request signal or of a programme instruction signal [lacuna] not be started or a preliminary phase serving the purpose of collision prevention must be terminated again.

[German] [French]

Description

Expand description

Die Erfindung betrifft eine Satelliten-Kommunikationsanlage, insbesondere Satelliten-Empfangsanlage, sowie ein zugehöriges Verfahren zu deren Betrieb nach dem Oberbegriff des Anspruches 1 bzw. 16.

Other Abstract Info:

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(54) Satelliten-Kommunikationsanlage, insbesondere Satelliten-Empfangsanlage sowie zugehöriges Verfahren zum Betrieb einer Antennen-Empfangsanlage

(57) Eine verbesserte Satelliten-Empfangsanlage, die aufweist:

- eine Eingangs-Empfangsschaltung mit Konverterschaltungen (9),
- einer Steuerungseinheit (15),
- und mit einem Datenbus zur Steuerung mehrerer Teilnehmer/Receiver (13), die an einer Antennenleitung (11) anschließbar sind,
- der Datenbus besteht aus einem Multimaster-Bus (11'), worüber zwischen den anschließbaren Teilnehmer/Receivern (13) und der Steuerungseinheit (15) eine Datenkommunikation zur Steuerung und Zuordnung der von den einzelnen Teilnehmer/Receivern ausgewählten und angeforderten Satellitenprogramme durchführbar ist,
- der Datenbus (11') besteht aus der Antennenleitung (11), und
- die Teilnehmer/Receiver (13) sind mit einer Einrichtung zur Erzeugung und Auswertung eines Kollisionsschutz-Signals versehen, wodurch sichergestellt ist, daß zu einem bestimmten Zeitpunkt eine Kommunikation mit dem Controller (156) nur von Seiten eines einzigen Teilnehmers/Receivers (13) aus durchführbar ist.

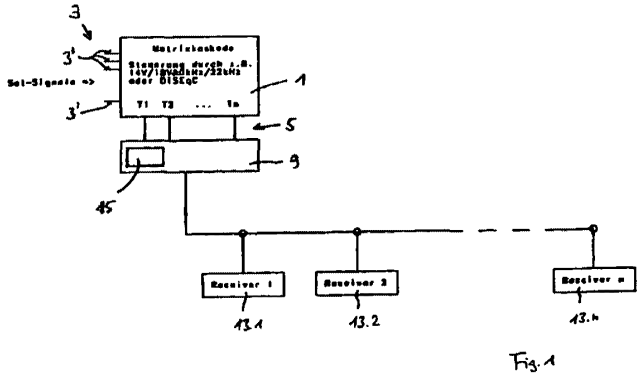


Fig. 1

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Beschreibung

[0001] Die Erfindung betrifft eine Satelliten-Kommunikationsanlage, insbesondere Satelliten-Empfangsanlage, sowie ein zugehöriges Verfahren zu deren Betrieb nach dem Oberbegriff des Anspruches 1 bzw. 12.

[0002] Für die unterschiedlichen Einsatzzwecke sind unterschiedlichste Satellitenanlagen bekannt geworden. Zu den Satellitenanlagen gehören neben den bekannten Satelliten-Empfangsanlagen auch sogenannte Transceiver, die zum Empfangen und Senden dienen, wie aber auch Sendeanlagen. Insbesondere bei Mehrfamilienhäusern kann eine Satelliten-Empfangsanlage mit einer Kopfstation vergleichbar der aus dem Prospekt "Kathrein-Antennen-Electronic", Ausgabe 8/96 bekannten Empfangsanlage UFO eingesetzt werden. Die Empfangsanlage umfaßt in der Kopfstation eine Vielzahl von Konvertern, wobei jeweils ein zu empfangendes Programm mittels eines Konverters in eine terrestrische Empfangs-Frequenz umgesetzt wird. Sollen n verschiedene Programme empfangen werden, so muß die Kopfstation n Receiver aufweisen. Alle angeschlossenen Teilnehmer können dann durch entsprechende Kanalauswahl an ihrem Fernsehgerät oder Videorecorder die entsprechenden Programme empfangen oder aufzeichnen.

[0003] Darüber hinaus ist auch bereits eine sogenannte Kathrein Mini-Ufo-Anlage bekanntgeworden. Diese Anlage umfaßt eine Satelliten-Empfangsanlage, d.h. eine Kopfstation mit für jeden angeschlossenen Teilnehmer einem Receiver, der aber nunmehr teilnehmerabhängig von jedem Teilnehmer angesteuert wird. Dazu ist für jeden Teilnehmer in der Regel in dem Raum, in dem der Fernseher oder Videorecorder aufgestellt ist, ein Infrarot-Steuergerät angeschlossen, worüber die Steuersignale über das 220 V Netz zur Kopfstation, d.h. bis zu den in der Kopfstation vorgesehenen einzelnen Receivern weitergeleitet werden können. Auch wenn beispielsweise über die Satelliten-Empfangsanlage grundsätzlich fünfzig unterschiedliche Satelliten-Programme empfangbar sind, wird bei fünf angeschlossenen Teilnehmer das von jedem Teilnehmer ausgewählte Satellitenprogramm auf eine bestimmte Kanalfrequenz umgesetzt. Sind vier angeschlossene Teilnehmer aktiv, so werden fünf ausgewählte Programme auf fünf unterschiedlichen Kanalfrequenzen über eine Antennenleitung zu den fünf angeschlossenen Teilnehmern weitergeleitet.

[0004] Ansonsten sind Einzel-Empfangsanlagen bekannt, bei welchen jeweils nur ein Teilnehmer über den angeschlossenen Receiver ein von ihm ausgewähltes Programm empfangen kann. Darüber hinaus sind auch sogenannte Twin-Konverter (Twin-LMB) bekannt, um gleichzeitig zwei unterschiedliche Programme empfangen zu können. Dazu ist es jedoch erforderlich, daß die die Konverterschaltung umfassende Eingangsempfangs-Schaltungsanordnung zwei Ableitungen zum angeschlossenen Teilnehmer bzw. Receiver umfaßt, um dann beispielsweise am angeschlossenen Fernsehgerät ein Programm zu empfangen und über ein am Twin-Receiver angeschlossenes Videogerät (VCR) das über die zweite Antennenleitung eingespeiste weitere Programm aufnehmen zu können.

[0005] Auch bei derartigen Einzel-Empfangsanlagen kann durch Einschaltung eines Umschalttones von 0 KHz auf 22 KHz in jedem der beiden Konverterzweige eine Umschaltung von einem unteren auf ein oberes Frequenzband und zum Empfang von vertikalen und horizontalen Polarisationen von dem angeschlossenen Twin-Receiver aus vorgenommen werden.

[0006] Obgleich die beiden erstgenannten Lösungen nur eine einzige Antennenleitung zu der Vielzahl von angeschlossenen Teilnehmern benötigt, sind diese technischen Lösungen jedoch aufwendig und dadurch kostenintensiv. Die zuletzt genannte Twin-Lösung zum Empfang zweier Programme oder die Verwendung einer entsprechenden Umschaltmatrix, von der zu jedem Teilnehmer eine separate Antennenleitung verläuft, ist demgegenüber preislich deutlich günstiger, da hier unterschiedlicher Konverter an jedem Antennenkabel angeschlossen werden können. Das Problem besteht jedoch in der Praxis häufig darin, daß in vielen Häusern zu den angeschlossenen Teilnehmern nicht ausreichend viele Antennenleitungen verlegt sind.

[0007] Schließlich wird auch auf die Vorveröffentlichungen HENNING, KRIEBEL: Digitales Schaltkonzept für Sat-Anlagen, in: Funkschau 1995 Heft 22, S. 58,59 sowie MÜLLER, K.: Sat-Anlagen DiSEqC gesteuert, in: RFE 1997, Heft 6, S. 32-34 verwiesen. Aus diesen Druckschriften sind jeweils DiSEqC-gesteuerte Satelliten-Empfangsanlagen bekannt, welche eine Eingangs-Empfangsschaltung, eine Schaltmatrixanordnung (Multischalter) zum auswahlmäßigen Empfang von einem oder mehreren Satelliten mit vertikaler oder horizontaler Polarisation in einem unteren oder oberen Frequenzband sowie eine Steuerungseinheit (in dem Receiver) umfassen. Die Steuerung zwischen der Steuerungseinheit und den separat angeschlossenen Receivern erfolgt jeweils über eine zwischen dem Receiver und der Steuerungseinheit geschaltete Antennenleitung.

[0008] Auch bei diesen Lösungen werden also mehrere Antennenkabel benötigt.

[0009] Aufgabe der vorliegenden Erfindung ist es von daher, eine Satelliten-Anlage, d.h. eine Satelliten-Empfangs- und/oder Sendeanlage bzw. ein zugehöriges Verfahren zu deren Betriebsweise zu schaffen, bei der zwei Teilnehmer und mehr angeschlossen werden können, die gegenüber herkömmlichen Lösungen technisch einfacher und damit günstiger aufgebaut und dadurch letztlich einfacher und kostengünstiger betreibbar ist.

[0010] Die Aufgabe wird erfindungsgemäß bezüglich der Satellitenanlage entsprechend den im Anspruch 1 und bezüglich des Betriebsverfahrens entsprechend den im Anspruch 12 angegebenen Merkmalen gelöst. Vorteilhafte Ausgestaltungen der Erfindung sind in den Unteransprüchen angegeben.

[0011] Die vorliegende Erfindung beschreitet nunmehr einen völlig anderen Weg. Erfindungsgemäß können also

an einer einzigen Antennenleitung z.B. vier oder acht Teilnehmer angeschlossen werden, ohne daß es zu Problemen bezüglich der Datenübertragung und Ansteuerung der Teilnehmer und Zuordnung bestimmter Adressen kommt.

[0012] So kann gemäß der Erfindung beispielsweise in einer Kopfstation ein Konverterblock vorgesehen sein, in welchem für jeden angeschlossenen Teilnehmer eine separate Konverterstufe vorgesehen ist. Dort wird das jeweils vom einzelnen angeschlossenen Teilnehmer ausgewählte Satellitenprogramm, d.h. die entsprechende Satellitenprogramm-Kanalfrequenz in unterschiedliche Kanalfrequenzen mit ausreichendem Frequenzabstand umgesetzt und über eine Summenschaltung mit einem gemeinsamen zu allen Teilnehmern führenden Receiverbus, d.h. einer Antennen-Ableitung eingespeist.

[0013] An dieser Antennenleitung sind dann die verschiedenen Teilnehmer angeschlossen.

[0014] Bevorzugt erfolgt dabei in der jeweiligen Konverterstufe eine Umsetzung in einen einem einzelnen Teilnehmer und damit Receiver zugeordneten Frequenzkanal, der im Bereich der empfangenen Satellitenfrequenzebene liegt, so daß vom Prinzip her teilnehmerseitig herkömmliche Receiver angeschlossen werden können.

[0015] Die angeschlossenen Receiver arbeiten mit einer Controller-Einheit so zusammen, daß mittels eines entsprechenden Receiver-Signals die ihm zugeordnete Konverterstufe so angesteuert wird, daß am entsprechenden Ausgang dieser Konverterstufe des Konverterblockes das ausgewählte Programm auf einen voreingestellten Frequenzkanal umgesetzt und in die alleinige Antennenleitung eingespeist wird. Dazu ist erfindungsgemäß nunmehr ein Datenbus für die Steuerung der angeschlossenen Teilnehmer/Receiver im Zusammenspiel mit der Controller-Einheit vorgesehen, der erfindungsgemäß aus dem Antennenkabel, d.h. üblicherweise aus einem einzigen zu den mehreren angeschlossenen Teilnehmer führenden Antennenkabel besteht. Dieser Datenbus kann als Multimaster-Bus bezeichnet werden, da die angeschlossenen Teilnehmer nicht in einer Master-Slave-Konfigurationen betrieben werden, sondern im Prinzip gleichberechtigt an diesen Multimaster-Bus angeschlossen sind.

[0016] Über diesen Multimaster-Bus ist es dann möglich, vom Controller aus jedem Receiver eine bestimmte Adresse in der Konverterstufe zuzuordnen, so daß über die dem jeweiligen Receiver zugeordnete Konverterstufe ein teilnehmerseitig ausgewähltes Programm auf einen anderen Kanal, d.h. eine andere Kanalfrequenz umsetzt wird, so daß alle angeschlossenen Teilnehmer/Receiver über diesen ihnen zugewiesenen Kanal auswahlmäßig alle über die Satelliten-Empfangsantenne grundsätzlich empfangbaren Programme auswählen und empfangen können. Dem Konverterblock ist eine Matrix vorgeschaltet, die es den einzelnen Teilnehmern, d.h. den angeschlossenen Receivern, unabhängig voneinander erlaubt, jedes beliebige Programm, unabhängig davon, ob es mit vertikaler oder horizontaler Polarisation in einem unteren oder oberen Frequenzband übertragen wird, auszuwählen und zu empfangen.

[0017] Die angeschlossenen Receiver arbeiten mit einer Controller-Einheit so zusammen, daß jeder Receiver nur dann Steuersignale senden und empfangen kann, wenn kein anderer Receiver aktiviert ist bzw. der Controller keine Signale an den Bus abgibt. Erfindungsgemäß sind dazu also Maßnahmen für einen Kollisionsschutz vorgesehen, worüber gewährleistet ist, daß zu einem gegebenen Zeitpunkt immer nur ein Receiver am Bus aktiv sein kann, also Daten aussenden oder vom Controller empfangen kann. Dazu wird der Multimaster-Bus mittels einer Gleichspannungs-Pegelumschaltung so betrieben, daß stets erkennbar ist, ob der Multimaster-Bus zur Übertragung neuer Sendesignale durch einen anderen Receiver betriebsbereit oder gesperrt ist. Sobald ein Receiver Sendesignale an die Controllerstationen abgibt oder von dieser empfängt, ist durch die erwähnte bevorzugt durchgeführte Gleichstrompegelumschaltung der Multimaster-Bus in seinen Zustand "gesperrt" versetzt, so daß andere Receiver nicht in eine Kommunikation mit dem Controller eintreten können.

[0018] In einer bevorzugten Ausführungsform der Erfindung ist das Übertragungsprotokoll so aufgebaut, daß dann, wenn zwei oder drei Receiver gleichzeitig betätigt werden sollten, diese nach einer unterschiedlich eingestellten Zeit jeweils überprüfen, ob noch ein anderer Receiver sich im "Kommunikationsstadium" befindet. Wird dies festgestellt, wird der jeweilige Receiver, der dies erkennt, wieder in seine Ausgangslage zurückgeschaltet und muß einen erneuten Wartezyklus abwarten. Dadurch kann gewährleistet werden, daß stets nur zu einem Zeitpunkt über einen Receiver eine Konverterstufe angesteuert wird.

[0019] Die Erfindung wird nachfolgend anhand eines Ausführungsbeispieles näher erläutert. Dabei zeigen im einzelnen:

Figur 1 : einen grundsätzlichen Aufbau der erfindungsgemäßen Satelliten-Empfangsanlage mit einer Matrixkaskade, an derem Ausgang ein Konverterblock mit einer Vielzahl von erfindungsgemäßen Konverterstufen vorgesehen ist;

Figur 2 : eine auszugsweise detailliertere Wiedergabe des Konverterblockes gemäß Figur 1;

Figur 3 : Struktur eines Befehls für die Multimaster-Kommunikation; und

Figur 4 : ein Beispiel für den erfindungsgemäß vorgesehenen Kollisionsschutz, wenn z.B. zwei Receiver gleichzeitig aktiviert werden.

[0020] In Figur 1 ist eine Matrixanordung 1 mit einem Eingang 3 und einem Ausgang 5 wiedergegeben. Die Matrix kann auch als Matrixkaskade aufgebaut sein, bzw. in der Form von zwei oder mehr nacheinander geschalteten vier x vier-Matrixblöcken. Beispielsweise über vier Eingänge können jeweils das vertikale und das horizontale untere und obere Band der über eine Satellitenposition ausgestrahlten Programme empfangen werden. Die verschiedenen über vertikale oder horizontale Polarisationen empfangenen Frequenzbänder liegen dann an den verschiedenen Eingangsleitungen 3' des Eingangs 3 der Matrix-Anordnung 1 an. Schließlich kann die Matrix-Anordnung so aufgebaut sein, daß eine Steuerung durch Umschaltung von 14 V/18 V und/oder von 0 KHz/22 KHz oder mittels DiSEqC erfolgen kann.

[0021] Auf der Ausgangsseite ist gemäß Figur 1 ein Konverterblock 9 geschaltet, auf den nachfolgend noch anhand von Figur 2 näher eingegangen wird.

[0022] Am Ausgang des Konverterblockes ist eine Antennenleitung, nachfolgend auch kurz Ableitung 11 genannt, angeschlossen, die zu den n-Receivern 13 führt.

[0023] Schließlich ist auch noch eine Steuerungseinheit 15 vorgesehen, die separat zum Konverterblock oder im Konverterblock 9 mit untergebracht sein kann, und die für die Ablaufsteuerung benötigt wird.

[0024] Wie anhand von Figur 2 zu ersehen ist, umfaßt der Konverterblock 9 entsprechend der Anzahl der angeschlossenen Receiver n-Konverterstufen 19. Jede Konverterstufe 19 ist zwischen einem Ausgangsanschluß T_1 bis T_n der Matrixanordnung 1 und einer Summenschaltung 21 vorgesehen, von der dann die erwähnte alleinige Antennenleitung 11 ausgeht, die nachfolgend teilweise auch als Receiverbus 11 bezeichnet wird.

[0025] Um die Matrix zu steuern, muß die Steuereinheit ein Umschaltsignal von 14 Volt bzw. 18 Volt Gleichspannung und ein Tonsignal von wahlweise 0 KHz und beispielsweise 22 KHz abgeben, um darüber die über vertikale oder horizontale Polarisationen in einem unteren oder oberen Frequenzband von einer Satellitenposition empfangenen Programme auszuwählen. Um die entsprechende Ansteuerung in der Matrix-Anordnung 1 in bekannter Weise vorzunehmen, umfaßt jede Konverterstufe 19 einen Spannungsschalter 23 sowie einen nachgeordneten 22 KHz-Modulator 25. Der jeweilige Spannungsschalter 23 und der 22 KHz-Modulator 25 werden vom Controller 15 entsprechend den von den Receivern 13.1 bis 13.n gesendeten Signalen gesteuert. Mit anderen Worten können die Receiver 13 mittels dem DiSEqC-Protokoll den Controller ansteuern, der diese Signale umsetzt bzw. weitergibt und dabei entsprechend dem betreffenden Modulator 22 und den Spannungschalter 23 zur Auswahl und Einstellung eines gewünschten Programmes ansteuert. Ebenso können die Receiver aber herkömmlich mittels einer Gleichspannungsumschaltung und einer Ab- und Zuschaltung eines Frequenztones beispielsweise von 22 KHz arbeiten, um hierüber das gewünschte Programm auszuwählen, wobei dann vom Controller ebenfalls wieder eine entsprechende Umsetzung zur Ansteuerung der Matrix 1 vorgenommen wird. Nur der Vollständigkeit halber wird angemerkt, daß eingangsseitig an einer oder mehrerer kaskadenartig zusammengeschalteter Matrizen beispielsweise auch acht Eingänge vorgesehen sein können, um nicht nur ein oberes und unteres vertikal bzw. horizontal polarisiertes Programm eines Satelliten, sondern Programme von mehreren Satelliten empfangen zu können. Auch hier kann dadurch dann teilnehmerseitig eine Vielfachauswahl vorgenommen werden.

[0026] Wie aus Figur 2 auch ersichtlich ist, umfaßt jede Konverterstufe 19 ferner in Empfangsrichtung folgend parallel zu dem Schaltzweig 27 einen Kondensator 31 zur galvanischen Trennung, einen ersten Mischer 33, einen nachgeschalteten Verstärker 35, einen nochmals nachgeschalteten SAW-Filter 37 sowie einen ausgangsseitig geschalteten weiteren Mischer 39.

[0027] Während der erste Mischer 33 über ein VCO 33a (also einen spannungsgesteuerten Oszillator) mit einer darüber unterschiedlich wählbaren Oszillatorfrequenz betreibbar ist, wird die Oszillatorfrequenz des zweiten Mischers 39 beispielsweise mittels einer festeingestellten Lokaloszillatorfrequenz f_1 bis f_n einem jeweils zugeordneten Lokaloszillators 39a angesteuert. Durch den zwischengeschalteten SAW-Filter 37 kann die kanalbezogene Durchlaßfrequenz von beispielsweise 479,5 MHz eingestellt werden.

[0028] Liegt beispielsweise das gesamte satellitenantennenseitig empfangene Frequenzspektrum zwischen 0,95 GHz bis 2,15 GHz (wobei dieses Frequenzspektrum an jedem Matrix-Ausgang T_1 bis T_n anliegen kann) und ist beispielsweise die Lokaloszillatorfrequenz des ersten variabel einstellbaren Lokaloszillators 33a von 1,4295 GHz bis 2,6295 GHz variierbar, so ist bei der angegebenen Durchlaßfrequenz des Filters 37 und bei einer fest eingestellten Lokaloszillatorfrequenz von beispielsweise 1,4795 GHz der ersten Konverterstufe die variabel einstellbare Lokaloszillatorfrequenz des ersten Mischers 33 so veränderbar, daß ein hierüber ausgewähltes Programm auf eine Kanalmittenfrequenz von 1,0 GHz eingestellt wird.

[0029] In der zweiten Konverterstufe 19b ist beispielsweise die ausgangsseitig fest eingestellte Lokaloszillatorfrequenz auf 1,5295 GHz eingestellt, also um 0,05 GHz höher. Dementsprechend wird hier die variabel einstellbare Lokaloszillatorfrequenz des ersten Mischers 33 hierüber so gewählt, daß das auswahlmäßig empfangene Programm mit einer Kanalfrequenz von 1,05 GHz in die gemeinsame Antennenleitung eingespeist wird. Entsprechend werden die fest eingestellten Lokaloszillatorfrequenzen einer jeden nachfolgenden Konverterstufe um 0,05 GHz höher eingestellt, wobei im gezeigten Ausführungsbeispiel die letzte Konverterstufe 19n eine ausgangsseitige Kanalfrequenz von 0 GHz zugewiesen werden kann.

[0030] Nachfolgend wird auf die Steuerung und Betriebsweise der Empfangsanlage näher eingegangen. Anders

als beim bekannten DiSEqC-Steuerungssystem wird hier die Gleichspannungskomponente zur Kommunikation mit verwendet. Dazu muß die Spannung auf dem Bus hochohmig gemessen werden.

[0031] Dabei wird zunächst einmal auf Figur 3 verwiesen, anhand der die Struktur eines Befehls für die Multimaster-Kommunikation erläutert wird.

[0032] Daraus ist zu ersehen, daß die Befehlsstruktur einen sog. "Header", also ein Vorsignal umfaßt, welches sich in drei Zeitabschnitte t0, t1 und t2 gliedert, die allesamt dem Kollisionsschutz dienen (worauf später noch eingegangen wird).

[0033] Daran schließt sich das eigentliche Steuerungssignal z.B. in Form eines Adreßanforderungs- oder Programmbefehl-Signals an, welches sich ebenfalls wieder in die drei Zeitabschnitte t3, t4 und t5 gliedert, wobei t3 und t5 Schutzintervalle darstellen, und im Zeitintervall t4 der eigentliche Signalbefehl, der eine DiSEqC-ähnliche Struktur besitzt, von dem jeweiligen Receiver abgegeben wird.

[0034] Von Seiten der Receiver bzw. des Controllers sind dabei vier Funktionszustände zu unterscheiden, nämlich

- der Zustand im Fall einer erstmaligen Adreßanforderung (nach dem Neuanschließen eines Receivers, oder aber, wenn die bereite früher einmal erhaltenen Adreßdaten nicht mehr zur Verfügung stehen oder gelöscht wurden),
- der Zustand im Fall einer nochmaligen späteren Adreßanforderung (nach dem bereits der jeweilige Receiver früher bereits einmal eine Adresse erhalten hatte),
- der Zustand im Fall eines sog. Programmbefehls, d.h. bei der Übermittlung der Daten bezüglich eines teilnehmerseitig am Receiver ausgewählten gewünschten Programms, und
- der Zustand, wenn ein Receiver das Signal für die Adreßvergabe als Antwort vom Controller 15 erhält.

[0035] Die möglichen Zeiten für die Werte t0 bis t5 können für die unterschiedlichen Multimaster-Kommunikationsbefehle bzw. -signale im gezeigten Ausführungsbeispiel folgende Werte aufweisen:

Erstmalige Adreßanforderung

t0 (ms) : 10
t1 (ms) : 40
t2 (ms) : 0
t3 (ms) : 10
t4 (ms) : 36 (3Byte E2 71 07)
t5 (ms) : 5

Spätere Adreßanforderung:

t0 (ms) : 10
t1 (ms) : 20, 24, 28, 32 (je nach ehemaliger Adresse)
t2 (ms) : 4, 8 (je nach ehemaliger Adresse)
t3 (ms) : 10
t4 (ms) : 36 (3Byte E2 71 F07)
t5 (ms) : 5

Adreßvergabe (Befehl als Antwort vom Controller):

t0 (ms) : 0
t1 (ms) : 0
t2 (ms) : 0
t3 (ms) : 10
t4 (ms) : 60 (5Byte E4 Ax yy zz zz)
t5 (ms) : 4

Programmbefehl:

t0 (ms) : 10
t1 (ms) : 4, 8, 12, 16 (je nach zugeteilter Adresse)
t2 (ms) : 4, 8 (je nach zugeteilter Adresse)
t3 (ms) : 10
t4 (ms) : 60 (5Byte EA Ax Fy zz zz)

t5 (ms) : 5

[0036] Die anhand von Figur 3 wiedergegebene Signalstruktur gilt gleichermaßen für ein von einem Receiver 13 erstmalig abgegebenes Adreßanforderungs-Signal, wie auch im Falle eines späteren Adreßanforderungs-Signals und im Falle eines Signale zur Abgabe eines Programmbefehls (Programmauswahl-Befehl). Lediglich im Falle des Adreßanforderungs-Signals ist das vom Controller als Antwort abgegebene Adreßvergabe-Signal insoweit unterschiedlich gebildet, als dort die Zeiten für t0, t1 und t2 jeweils 0 Sekunden beträgt.

[0037] In der nachfolgenden Tabelle sind Werte für die Zuordnung von Adresse und Kollissionsschutz-Header wiedergegeben, und zwar für den Fall eines Programmbefehls (also von Seiten des Receivers/Teilnehmers eine bestimmte Programm-Vorauswahl getroffen wurde und die Daten an den Controller gesendet werden), wie aber auch für den Fall eines an den Controller abgegebenen Adreßanforderungs-Signals:

Tabellen

Zuordnung von Adresse und Kollisionsschutz-Header				
	Programmbefehl		Adreßanforderung	
	t1 (ms)	t2 (ms)	t1 (ms)	t2 (ms)
A1	4	4	20	4
A2	8	4	24	4
A3	12	4	28	4
A4	16	4	32	4
A5	4	8	20	8
A6	8	8	24	8
A7	12	8	28	8
A8	16	8	32	8

[0038] Die Funktionsweise entsprechend dem in Figur 3 wiedergegebenen Befehl ist folgermaßen:

[0039] Wird ein Receiver erstmals an eine Satellitenanlage angeschlossen, so überprüft er zunächst für eine Busbeobachtungsphase t0 von 10 ms, ob auf dem Bus eine Busaktivität festgestellt wird. Nur wenn auf dem Bus keine Kommunikation stattfindet, also die vom betreffenden Receiver gemessene Gleichspannung auf der Antennenleitung 11, die nachfolgend teilweise auch als Datenbus 11' bezeichnet wird, 0 Volt beträgt (oder einen Wert unterhalb eines Schwellwertes aufweist), so wird dies als "keine Busaktivität" gewertet. Es findet also keine Datenkommunikation auf dem Datenbus 11', d.h. Antennenleitung 11 statt, so daß grundsätzlich die Abgabe eines erstmaligen Adreßanforderungs-Signals, eines sog. Call-for-Address-Befehles möglich ist.

[0040] Nach Ablauf der ersten Busbeobachtungsphase t0 von 10 ms gibt der betreffende Receiver ein Gleichspannungssignal (von beispielsweise 14 V, also über einem Schwellwert liegend) ab, und zwar für eine fest eingestellte Zeit t1 von 40 ms. Diese Phase t1 wird auch als Busanforderungs-Phase bezeichnet, in der ein Signal "High" an den Bus 11' abgegeben wird. Dadurch sollen die anderen Receiver erkennen, daß ein anderer Receiver nunmehr ein Signal zum Controller absenden möchte.

[0041] Sollte in dieser Phase ein anderer Receiver zuschalten, so würde er eine Gleichspannung auf der Antennenleitung 11 detektieren, also feststellen, daß bereits eine Datenkommunikation stattfindet. In diesem Falle würden alle anderen Receiver in "Warteposition" verbleiben, da durch die detektierte Gleichspannung der Datenbus für sie gesperrt ist.

[0042] Hat der Receiver im genannten Beispiel noch nie eine Adresse erhalten (oder ist eine ihm einmal zugewiesene Adresse im Receiver wieder gelöscht worden), so ist für diesen einmaligen Zustand die weiters Busbeobachtungsphase t2 auf 0 ms gesetzt, so daß sofort das eigentliche Steuersignal, hier das "Call-for-Address-Sendesignal" CfA entsprechend dem Zeitraum t3, t4 und t5 an den Controller 15 über die Antennenleitung 11 abgesendet wird.

[0043] Sobald der Controller erkennt, daß nach Ablauf der Zeit t5 das Call-for-Address-Signal abschließend vom Receiver erhalten ist und der Receiver wieder auf den "Low"-Zustand (keine Gleichspannungsfrequenz auf den Bus 11' abgeben) zurückgeschaltet hat, wird ohne Zeitverzögerung sofort vom Controller 15 ein Adreßvergabe-Signal an den betreffenden Receiver zurückgesendet, welches keinen Header aufweist, da entsprechend den oben wiedergegebenen Daten t0 bis t2 jeweils 0 ms betragen.

[0044] Für den Fall, daß sich ein Receiver zwischenzeitlich im Standby Betrieb befand oder ausgeschaltet wurde

und anschließend wieder neu eingeschaltet worden ist, gelten die oben wiedergegebenen Daten nicht für die erstmalige Adreßanforderung, sondern für eine allgemeine (spätere) Adreßanforderung, die sich nur durch die unterschiedlichen Zeiten t1 unterscheiden. Nach erneutem Zuschalten eines Receivers, der schon einmal eine Adresse zugeteilt bekam, werden die Zeiten t1 für den Header für das Adreßanforderungs-Signal aus den Zeiten t1 des diesem Receiver zugeordneten Programmbefehl-Signals hergeleitet, wobei diese ihm jeweils zugeordnete Zeit t1 um 16 ms erhöht wird. Hatte der betreffende, nunmehr wieder zugeschaltete Receiver vorab die Zeit t1 = 8 ms für das Programmbefehl-Signal zugeteilt bekommen, so erhöht sich dadurch die Zeit t1 bei nochmaligem späterem Anschalten für sein Adreßanforderungs-Signal auf t1 = 24 ms u.s.w. und z.b. t2 = 8 ms. Nach dem Busanforderungssignal für die Phase t1 schließt sich somit also noch eine weitere Busaktivitäts-Überprüfungsphase für den Zeitraum t2 an, um nochmals zu überprüfen, daß vor Absendung des eigentlichen Sendesignales (Call-for-Address-Signals oder Programmanforderungs-Signal) kein anderer Receiver vorrangig auf dem Bus aktiv ist.

[0045] Nachdem ein Receiver nach Abgabe eines Call-for-Address-Befehls vom Controller ein Adreßvergabe-Signal erhalten hat, kann er einen Programmbefehl an den Controller abgeben, der von seinem Aufbau und seiner Struktur her ebenfalls dem in Figur 3 wiedergegebenen Befehl für die Multimaster-Kommunikation entspricht. Die einzelnen Werte für t0 bis t5 sind in der oben wiedergegebenen Tabelle "Zuordnung von Adresse und Kollisionsschutz-Header" aufgeführt. Unterschiedlich zu einem Adreßanforderungs-Befehl ist lediglich, daß hier nach Abgabe des Programmbefehls an den Controller vom Controller kein Antwort-Signal abgegeben wird.

[0046] Aus der vorstehend erläuterten Schilderung ergibt, daß bei der Adreßvergabe das Signal folgendes Format hat:

E4 Az yy xx xx

beispielsweise in HEX E4 A8 42 1305 mit der folgenden

Bedeutung:

[0047]

Az	für die Adressen 1...8
A8	Adresse 8
yy	für den Kollisionsschutz, hier im gezeigten Ausführungsbeispiel beispielsweise 42 mit der Bedeutung 14 V 16 ms ein 8 ms Pause
xx xx	die Sat-ZF-Frequenz von 0950 Mhz bis 2150 Mhz und
0000	für nicht umgesetzte Signale, d.h. der Receiver arbeitet normal.

[0048] So können beispielsweise acht verschiedene Kollisionsschutz-Header für Befehle.

11, 12, 21, 22, 31, 32, 41, 42

bestehen, denen beispielsweise (programmtechnisch) folgende Bedeutung zugeordnet werden können:

11: erste Stelle 14 V 4 ms ein, zweite Stelle 4 ms Pause,
42: erste Stelle 14 V 16 ms ein, zweite Stelle 8 ms Pause,

usw.

[0049] Die dem Kollisionsschutz diendene Überprüfungsphase der Busaktivitäten in den Zeitintervallen t0 bis t2 wird nachfolgend anhand von Figur 4 erläutert.

[0050] Figur 4 geht davon aus, daß Receiver 2 bereits angeschaltet ist, also bereits eine Adreßvergabe vom Controller 15 zugeordnet bekam, und daß der Teilhehmer über Receiver 2 versucht, ein neues Programm auszuwählen, so daß Receiver 2 ein neues Programmbefehl-Signal abgeben will. Dazu beobachtet Receiver 2 in der dem Kollisionsschutz dienenden Vorphase t0 = 10 ms, ob eine Datenkommunikation auf der Antennenleitung 11 stattfindet oder nicht. Allenfalls problematisch könnte nunmehr sein, daß zum gleichen Zeitpunkt nunmehr ein zweiter Receiver mit seiner Busüberprüfungsphase beginnt, um nachfolgend ein Adreßanforderungs- oder Programmbefehl-Signal abzugeben. Um dies zu vermeiden, dient das nachfolgende, im Detail erörterte Kollisionsschutz-Verfahren.

[0051] Gemäß dem Ausführungsbeispiel nach Figur 4 wird z.B. gleichzeitig zu dem Zeitpunkt, zu dem Receiver 2 mit der Abgabe seines dem Kollisionsschutz dienenden Header-Signals eines Programmbefehl-Signals beginnen will, eingeschaltet. Hat Receiver 1 in einer vorhergehenden Betriebsphase die Adresse A1 zuerteilt bekommen, so lauteten die alten Daten für das Programmbefehl-signal des Adreßplatzes A1 gemäß der oben wiedergegebenen Tabelle t1 = 4

ms und t2 = 4 ms. Die Zeit für t1 wird dann bei einem erneuten Anschalten des Receivers und dem Versuch der Abgabe eines Call-for-Address-Befehls um 16 ms bezüglich des letzten Programmbefehls erhöht, so daß aus der t1 = 4 ms für den Adreßplatz A1 für die nachfolgende Adreßforderung entsprechend der oben wiedergegebenen Tabelle t1 = 20 ms wird. Dabei wird ferner in dem vorliegenden Beispiel gemäß Figur 4 davon ausgegangen, daß Receiver 2 die Adresse A2 zugewiesen erhielt, dessen Zeiten t1 = 8 ms und t2 = 4 ms betragen.

[0052] Wenn also gemäß Ausführungsbeispiel nach Figur 4 Receiver 2 einen neuen Programmbefehl an den Controller abgeben will und Receiver 1 zum gleichen Zeitpunkt angeschaltet wird (wobei mit einem "*" jeweils der Start einer neuen Sequenz gekennzeichnet ist), so beobachten beide Receiver für die Busbeobachtungsphase t0 = 10 ms, ob auf dem Bus 11 eine Kommunikation zwischen einem anderen Receiver und dem Controller stattfindet. Beide Receiver erkennen jedoch während der Vorphase t0 = 10 ms, daß der Bus in seinem Zustand "low" ist, also keine Gleichspannung auf dem Bus anliegt, also keine Kommunikation stattfindet.

[0053] Nach Ablauf der Zeit t0 schalten von daher beide Receiver gleichzeitig in ihren aktiven Zustand um, geben also ein Gleichspannungssignal an den Bus 11' ab, wodurch grundsätzlich die "Busanforderung" eingeleitet werden soll, d.h. der Versuch, den Bus für andere Receiver zu sperren, um ein Adreßanforderungssignal oder einen Programmbefehl-Signal an den Controller abzugeben.

[0054] Während nunmehr die Busanforderung von Receiver 1 20 ms dauert, bricht Receiver 2 die Befehlssequenz nach 8 ms Busanforderung ab, weil bei Beginn des nachfolgenden erneuten Busbeobachtungszeitraumes t2 das Signal von Receiver 1 noch am Bus anliegt, Receiver 2 also feststellt, daß der Bus zur Kommunikation mit dem Controller nicht frei ist.

[0055] Nach Ablauf der Busaktivität-Beobachtungsphase t1 = 20 ms schaltet Receiver 1 in die Phase t2 um, bei welcher von ihm wiederum kein Gleichspannungssignal an den Bus 11 abgegeben wird. Da auch vom Receiver 2 kein Gleichspannungssignal am Bus anliegt, erkennt Receiver 1, daß er sein Adreßanforderungssignal an die Kopfstation abschicken kann. Sein eigentliches "Call-for-Address-Signal" gemäß der Zeitfolge t3 bis t5 wird von Receiver 1 unmittelbar nach Ablauf der Phase t2 an die Kopfstation (Controller 15) abgesandt. Sofort nachdem Receiver 1 die Befehlssequenz beendet hat, startet die Kopfstation die Signalisierung und weist Receiver 1 eine freie Adresse zu (z. B. A6 mit t1 = 8 ms, t2 = 8 ms).

[0056] Während der gesamten Kommunikationsphase beobachtet Receiver 2, ob an dem Bus ein Gleichspannungssignal anliegt oder nicht. Nachdem Receiver 1 am Ende seiner Busanforderungs-Phase nach Ablauf der Zeit-t1 wieder in seinen Zustand "Low" umgeschaltet hat, also kein Gleichspannungssignal an die Antennenleitung 11 abgegeben hat, hat auch unmittelbar wieder Receiver 2 festgestellt, daß keine Busaktivität stattfindet. Zu diesem Zeitpunkt begann Receiver 2 wieder mit seiner Busbeobachtungsvorphase für die Zeit t0 = 10 ms. Da aber die erneute Busbeobachtungsphase des Receivers 1 nur für den kurzen Zeitraum t2 = 4 ms andauert, wurde Receiver 2 nach Ablauf dieses Zeitraums t2 = 4 ms erneut feststellen, daß ein anderer Receiver wieder bereits ein Gleichspannungssignal an den Bus 11 abgegeben und damit das Antennenkabel 11 für die Datenkommunikation für ihn gesperrt ist. Receiver 2 hat deshalb erneut sein Header-Signal abgebrochen und ist in die Busüberwachungsphase zurückgeschaltet worden.

[0057] Wenn, wie erläutert, das oben erwähnte Antwortsignal, d.h. das vom Controller an den Receiver 1 abgesandte Adreßvergabesignal beendet ist, erkennt Receiver 2 erneut, daß nunmehr der Bus wieder "frei" ist, da kein Gleichspannungssignal am Bus anliegt. Er beginnt (wie nach der Busanforderungsphase t1 des Receivers 1 schon einmal) eine neue mit "*" gekennzeichnete Sequenz, d.h. Receiver 2 startet seine Befehlssequenz erneut. Allerdings startet jetzt auch Receiver 1 mit der ihm vorher vom Controller zugewiesenen Adresse A6 einen Programmbefehl, weil mit dem Einschalten auch ein Programm eingestellt wird. Beide Receiver starten mit der Busbeobachtungs-Vorphase t0 = 10 ms, wobei auch die Busanforderungsphase ts = 8 ms bei beiden Receivern identisch ist. Im nachfolgenden Beobachtungsintervall t2 muß jedoch Receicer 1 die Befehlssequenz abbrechen, weil Receiver 2 schon nach t2 = 4 ms mit der Aussendung seines eigentlichen Programm-Signals beginnt. Erst wenn Receiver 2 den Befehl abgeschickt hat, startet Receiver 1 erneut seine Befehlssequenz, von dem im Diagramm gemäß Figur 3 nur der Startpunkt in Form eines "*" eingetragen ist.

[0058] Daraus ist also ersichtlich, daß neben dem eigentlichen Call-for-Address-Signal bzw. dem Programmbefehl-Signal die gesamte Struktur des Multimaster-Kommunikationsbefehls eine Vorphase mit der Zeitspanne t0 bis t2 umfaßt, die dem Kollisionsschutz dienen, und von einer anfänglichen Busbeobachtungsphase in eine Busanforderungssignalphase mit erneuter nachfolgender Busüberprüfungsphase gegliedert ist. Durch diesen Kollisionsschutz ist gewährleistet, daß immer nur ein Receiver Befehle an den Controller abgeben und im Falle einer Adreßanforderung unmittelbar danach vom Controller nur einen für ihn bestimmte Adreßplatz erhalten kann.

[0059] Als günstig erweist sich dabei auch, daß die Zeiten t2 für die zweite Busbeobachtungsüberprüfungsphase für alle Receiver kürzer sind als die für alle Receiver verbindliche erste Busbeobachtungsphase t0, die im gezeigten Ausführungsbeispiel 10 ms betragen, wohingegen die Zeiten t2 für alle Receiver kleiner als 10 ms sind. Dadurch konnte auch in dem oben erwähnten Ausführungsbeispiel Receiver 1 problemlos nach erfolgreicher Abgabe seines Header-Signals mit der Absendung seines Adreßanforderungs-Signals fortfahren.

[0060] Ebenso erfolgt der Kollisionsschutz bei einem oder mehreren Receivern, die nur ein Adreßanforderungssi-

gnal abgeben, oder auch im Falle von mehreren Receivern, die nur ein Programmbefehl-Signal zum Controller absenden wollen. Der Kollisionsschutz ist ebenso wirksam, wenn ein oder mehrere Receiver ein Adreßanforderungssignal und andere Receiver gleichzeitig ein Programmbefehl-Signal abgeben wollen.

Patentansprüche

1. Satelliten-Kommunikationsanlage, insbesondere Satelliten-Empfangsanlage mit einer Konverterschaltung (9) und vorzugsweise einer der Konverterschaltung (9) vorgeschalteten Matrixanordnung (1) zum auswahlmäßigen Empfang von elektromagnetischen Wellen, die von einem oder gegebenenfalls mehreren Satelliten mit vertikaler und horizontaler Polarisation gegebenenfalls in einem unteren oder oberen Frequenzband ausgestrahlt werden, mit folgenden Merkmalen:

   - einer Steuerungseinheit (15), und
   - einem Datenbus zur Steuerung mehrerer Teilnehmer/Receiver (13)

   gekennzeichnet durch folgende weitere Merkmale:

   - Der Datenbus umfaßt einen gemeinsamen Multimaster-Datenbus (11'), über welchen eine Datenkommunikation zwischen den anschließbaren Teilnehmern/Receivern (13 und der Steuerungseinheit (15) durchführbar ist zur Steuerung und Zuordnung der von den einzelnen Teilnehmern/Receivern ausgewählten und angeforderten Satellitenprogramme;
   - der gemeinsame Multimaster-Datenbus (11') umfaßt eine gemeinsame Antennenleitung (11), und
   - die Teilnehmer/Receiver (13) sind mit einer Einrichtung zur Erzeugung und Auswertung eines Kollisionsschutz-Signals versehen, welches sicherstellt, daß zu einem bestimmten Zeitpunkt eine Kommunikation mit der Steuerungseinheit (15) nur von Seiten eines einzigen Teilnehmers/Receivers (13) aus durchführbar ist.

2. Satelliten-Kommunikationsanlage nach Anspruch 1, **dadurch gekennzeichnet**, daß die Einrichtung zur Erzeugung und Auswertung eines Kollisionsschutz-Signals so ausfgebaut ist, bzw. derart arbeitet, daß vor der Absendung eines Steuerungssignals zunächst eine dem eigentlichen Steuerungssignal vorgelagerte Kollisionsschutz-Phase durchgeführt wird, in welcher zunächst der Multimaster-Datenbus (11') auf Aktivitäten eines anderen Teilnehmers/Receivers (13) und/oder der Steuereinheit (15) überprüft wird, so daß nur dann, wenn keine Aktivität auf dem Multimaster-Datenbus (11') feststellbar ist, von dem betreffenden Teilnehmer/Receiver (13) eigentliche Steuerungssignale an die Steuerungseinheit (15) abgesendet werden.

3. Satelliten-Kommunikationsanlage nach Anspruch 2, **dadurch gekennzeichnet**, daß die Kollisionsschutz-Phase zumindest dreigegliedert ist und dabei eine erste Busaktivitätsbeobachtungsphase für eine Zeitdauer (t0), in der überprüft wird, ob andere Teilnehmer/Receiver (13) oder die Steuerungseinheit (15) am Multimaster-Datenbus (11') aktiv sind, eine nachfolgende Busanforderungsphase mit einer Zeitdauer (t2), in welcher ein eine Aktivität signalisierendes Signal von dem Teilnehmer/Receiver (13) an den Multimaster-Datenbus (11') abgegeben wird, und eine nachfolgende weitere Busbeaobachtungsphase für eine zweite Zeitdauer (t2) umfaßt, in der kein Signal (11) an den Multimaster-Datenbus (11') abgegeben wird.

4. Satelliten-Kommunikationsanlage nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet**, daß die dem Kollisionschutz dienende Datenübertragung auf dem Multimaster-Bus (11') zur Steuerung der angeschlossenen Teilnehmer/Receiver (13) auf der Basis einer Signal-Umschaltung basiert, wobei eine Kommunikation zwischen einem Teilnehmer/Receiver (13) und der Steuerungseinheit (15) nur dann begonnen werden kann, wenn zunächst auf dem Multimaster-Bus (11') das Vorliegen eines vordefinierten Signals detektiert wurde.

5. Satelliten-Empfangsanlage nach Anspruch 4, **dadurch gekennzeichnet**, daß die Signal-Umschaltung auf der Basis einer Gleichspannungspegel-Umschaltung basiert, wobei eine Kommunikation zwischen einem Teilnehmer/Receiver (13) und der Steuerungseinheit (15) nur dann begonnen werden kann, wenn zunächst auf dem Multimaster-Bus (11') das Vorliegen eines vorderfinierten Gleichspannungspegels detektiert wurde.

6. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet**, daß die angeschlossenen Teilnehmer/Receiver (13) eine Gleichspannungsdetektor-Einrichtung oder Gleichspannungs-Schwellwertdiskriminator umfassen, worüber in Abhängigkeit eines gegenüber einem Schwellwert größeren oder kleineren Gleichspannungssignals der Betriebszustand "gesperrt" oder "betriebsbereit" bei kennzeichnet, daß die dem Kollisionsschutz dienende Datenübertragung auf dem Multimaster-Bus (11') zur Steuerung der angeschlossenen Teilnehmer/Receiver (13) auf der Basis einer Signal-Umschaltung basiert, wobei eine Kommunikation zwischen einem Teilnehmer/Receiver (13) und der Steuerungseinheit (15) nur dann begonnen werden kann, wenn zunächst auf

dem Multimaster-Bus (11') das Vorliegen eines vordefinierten Signals detektiert wurde.

7. Satelliten-Empfangsanlage nach Anspruch 6, **dadurch gekennzeichnet**, daß die Signal-Umschaltung auf der Basis einer Gleichspannungspegel-Umschaltung basiert, wobei eine Kommunikation zwischen einem Teilnehmer/Receiver (13) und der Steuerungseinheit (15) nur dann begonnen werden kann, wenn zunächst auf dem Multimaster-Bus (11') das Vorliegen eines vordefinierten Gleichspannungspegels detektiert wurde.

8. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet**, daß die angeschlossenen Teilnehmer/Receiver (13) eine Gleichspannungsdetektor-Einrichtung oder Gleichspannungs-Schwellwertdiskriminator umfassen, worüber in Abhängigkeit eines gegenüber einem Schwellwert größeren oder kleineren Gleichspannungssignals der Betriebszustand "gesperrt" oder "betriebsbereit" bei dem betreffenden Teilnehmer/Receiver (13) erkennbar ist.

9. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet**, daß die Signalstruktur für Datenaustausch zwischen einem Teilnehmer/Receiver (13) und der Steuerungseinheit (15) grundsätzlich so aufgebaut ist, daß dem eigentlichen Steuerungssignal ein "Header" vorgeschaltet ist, der zumindest drei Phasen umfaßt, nämlich eine erste Busbeobachtungs-Phase für einen Zeitraum (t0), eine nachfolgende Busanforderungsphase für den Zeitraum (t1), und eine erneute nachfolgende weitere Busbeobachtungsphase für einen Zeitraum (t2), wobei in der Busanforderungsphase für den Zeitraum (t1) von dem betreffenden Teilnehmer/Receiver ein Gleichspannersignal an die Antennenleitung (11), d.h. den Bus (11') abgegeben wird, wodurch den anderen angeschlossenen Teilnehmern/Receivern (13) eine Busaktivität angezeigt wird.

10. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet**, daß die Werte für die Busbeobachtungsphase (t_0) für die unterschiedlichen Teilnehmer/Receiver zumindest teilweise unterschiedlich vorgewählt oder voreingestellt sind.

11. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet**, daß bei einer erneuten Zu- oder Anschaltung eines Teilnehmers/Receivers (13) die ihm im Zusammenhang mit einer vorausgegangenen Adreßvergabe zugeordneten Zeiten (t1, t2) für die Busanforderungsphase und/oder die nachfolgende zweite Busaktivitätsüberwachungsphase verändert, vorzugsweise erhöht eingestellt sind.

12. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 11, **dadurch gekennzeichnet**, daß die Zeitphase (t2) für die zweite Busbeobachtungsphase bei allen angeschlossenen Teilnehmern/Receivern (13) kürzer ist als die erste Busbeobachtungsphase mit der Zeit (t0).

13. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 12, **dadurch gekennzeichnet**, daß alle Teilnehmer/Receiver (13) gleiche Werte für die Zeitdauer (t0) für die erste Busbeobachtungsphase eines Signalbefehls aufweisen.

14. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 13, **dadurch gekennzeichnet**, daß die angeschlossenen Teilnehmer/Receiver (13) mittels DiSEqC-Protokolls arbeiten.

15. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 14, **dadurch gekennzeichnet**, daß nach dem Senden eines Befehls durch einen Teilnehmer/Receiver (13) für eine minimale Wartezeit kein weiterer Befehl abgesandt wird.

16. Verfahren zum Betrieb einer Satellitenempfangsanlage nach zumindest einem der Ansprüche 1 bis 15, **dadurch gekennzeichnet**, daß vor der Absendung eines Steuerungssignals, insbesondere eines Andreßanforderungs-Signals oder eines Programmbefehl-Signals von einem Receiver an die Steuerungseinheit (15) zunächst eine dem eigentlichen Steuerungssignal vorgelagerte Kollisionsschutz-Phase durchgeführt wird, in welcher zunächst der Bus (11') auf Aktivitäten eines anderen Teilnehmers/Receivers (13) und/oder des Controllers (15) überprüft wird, so daß nur dann, wenn keine Aktivität auf dem Bus (11') feststellbar ist, von dem betreffenden Teilnehmer/Receiver (13) eigentliche Steuerungssignal an die Steuerungseinheit (15) abgesendet werden.

17. Verfahren nach Anspruch 16, **dadurch gekennzeichnet**, daß die Kollisionsschutz-Phase zumindest dreigliedrig ist, und dabei eine erste Busaktivitätsbeobachtungsphase für eine Zeitdauer (t0), in der überprüft wird, ob andere Teilnehmer/Receiver (13) oder die Steuerungseinheit (15) am Bus (11') aktiv sind, eine nachfolgende Busanforderungsphase mit einer Zeitdauer (t2) durchgeführt wird, in welcher ein eine Aktivität signalisierendes Signal von dem

Teilnehmer/Receiver (13) an den Bus (11') abgegeben wird, und eine nachfolgende weitere Busbeobachtungsphase für eine zweite Zeitdauer (t2) umfaßt, in der kein Signal (11) an den Bus (11') abgegeben wird. daß das Signal, wodurch eine Aktivität auf den Bus (11') signalisiert wird, aus einem Signal, insbesondere einem Gleichspannungssignal (11) besteht.

18. Verfahren nach Anspruch 16 oder 17, **dadurch gekennzeichnet**, daß nach Abgabe des Busanforderungs-Signals der Teilnehmer/Receiver (13) zunächst nochmals in eine kein Signal abgebende Bußbeobachtungsphase umschaltet, um dann lediglich bei nicht beobachteter Aktivität im Bus (11, 11') ein Adreßanforderungs-Signal oder ein Programmbefehl-Signal an den Controller abzugeben.

19. Verfahren nach einem der Ansprüche 16 bis 18, **dadurch gekennzeichnet**, daß das Kollisionsschutz-Prüfverfahren mit seiner Umschaltung zwischen zwei Gleichspannungswerten, vorzugsweise zwischen einem Gleichspannungswert "0" und einem davon abweichenden Gleichspannungswert erfolgt, und daß die Einspeisung eines vordefinierten Gleichspannungswertes durch die anderen angeschlossenen Teilnehmer/Receiver (13) detektierbar und als Busaktivität eines anderen angeschlossenen Teilnehmer/Receivers (13) oder der Steuerungseinheit (15) interpretierbar ist, mit der Folge, daß mit der Abgabe eines eigenen Adreßanforderungs-Signals oder eines Programmbefehl-Signals nicht begonnen oder eine dem Kollisionsschutz dienende Vorphase wieder abgebrochen werden muß.

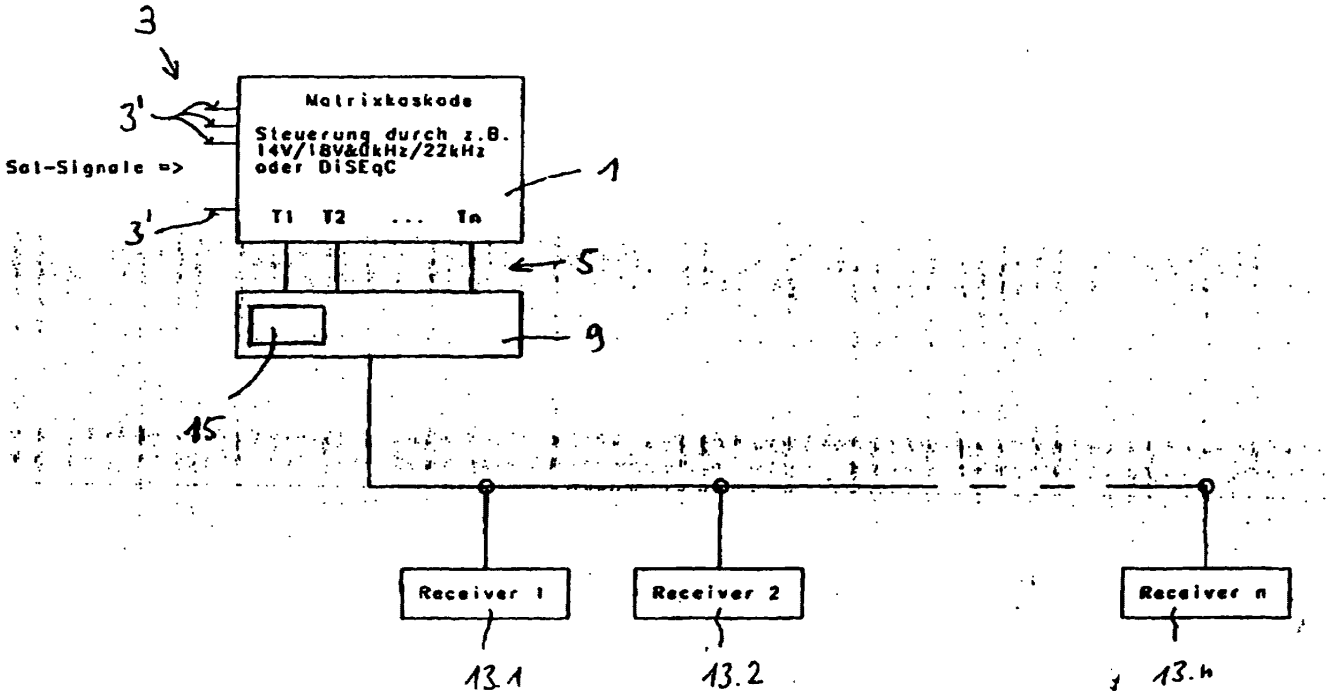

3
3'
Matrixkaskode
Steuerung durch z.B.
14V/18V&0kHz/22kHz
oder DiSEqC
Sat-Signale =>
1
3'
T1 T2 ... Tn
5
9
15
Receiver 1
Receiver 2
Receiver n
13.1
13.2
13.n

Fig. 1

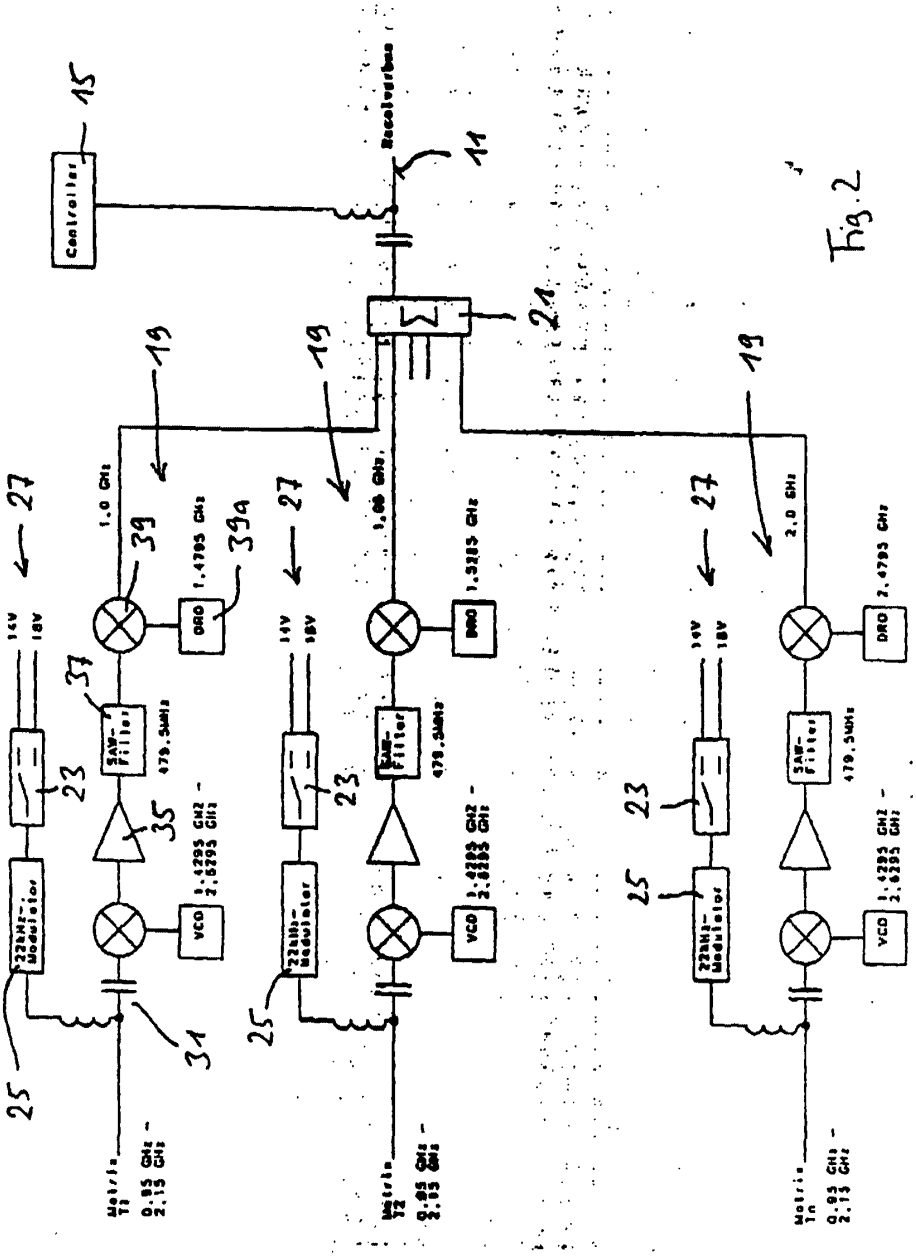

Controller
15
Receiverbus
11
21
19
27
23
25
31
35
37
39
39a
DRO
VCO
SAW-Filter
22kHz-Modulator
1.0 GHz
1.4795 GHz
1.3385 GHz
2.0 GHz
2.4795 GHz
479.5MHz
14V
18V
Matrix
0.95 GHz -
2.15 GHz

Fig. 2

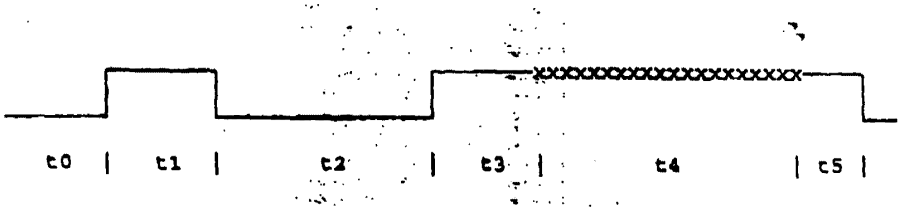


Fig. 3

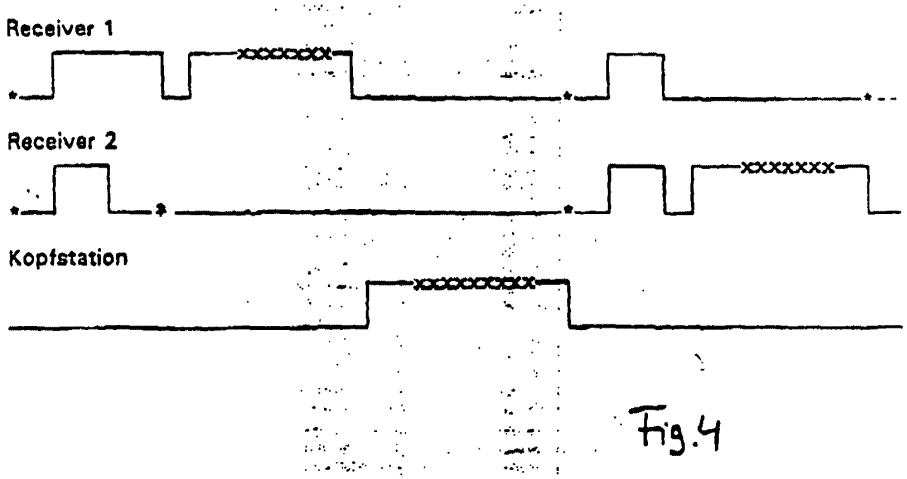


Fig. 4

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Nummer der Anmeldung
EP 98 12 2808

EINSCHLÄGIGE DOKUMENTE

Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int.Cl.6)
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Der vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt

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29-04-1999

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Title: **EP0757489A2: Satellite receiver with a controllable head end**[German

Derwent Title: Satellite reception system for multi-occupation dwelling - has control facility at each individual subscriber using random distribution method for protecting subscriber privacy [Derwent Record]

Country: **EP** European Patent Office (EPO)

Kind: **A2** Publ. of Application without search report (See also: EP0757489A3, EP0757489B1)



Inventor: **Ilsanker, Anton**;
Flinner, Udo;

Assignee: **Kathrein-Werke KG**
Corporate Tree data: Kathrein-Werke KG (KATHREINWERKE);
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Published / Filed: **1997-02-05** / 1996-07-16

Application Number: **EP1996000111459**

IPC Code: Advanced: **H03D 7/16**; **H04H 1/00**; **H04N 7/20**;
Core: **H03D 7/00**; more...
IPC-7: **H04N 7/20**;

ECLA Code: **H04H40/20**; H03D7/16B; H04N7/20;

Priority Number: 1995-08-03 **DE1995019528589**

Abstract: Satellite reception system for multi-occupation dwelling The satellite reception system has a controlled head station with a converter (16) employing a number of converter modules (17,18), receiving satellite transmission programmes within a respective reception plane. The outputs of the converter modules are fed to a number of subscribers (45) via an output collector field (41) and signal distribution lines (43). A microcontroller control device (33) controls the local oscillators (21,23) within the converter modules, with the individual subscribers incorporating a control facility for the corresponding reception converter using a random distribution method.

INPADOC Legal Status: Show legal status actions **Buy Now:** Family Legal Status Report

Designated Country: AT CH DE ES FR IT LI

Family: Show 7 known family members

First Claim: Show all claims 1. Satelliten-Empfangsanlage mit steuerbarer Kopfstation mit folgenden Merkmalen:

- - mit einer Umsetzereinheit (16) mit mehreren Umsetzermodulen (17, 18),
- - an den Eingängen (19) der Umsetzermodule (17, 18) stehen die von der Satellitenempfangsanlage empfangenen Programme in einer geeigneten Frequenz-Ebene an,
- - die Ausgänge (39) der Umsetzermodule (17, 18) sind über ein Ausgangs-Sammelfeld (41) und eine nachfolgende Leitung (43) mit mehreren Teilnehmern (45) verbunden
- - die Umsetzereinheit (16) umfaßt ferner eine Steuereinheit (33) mit einem Mikrokontroller (35) zur Ansteuerung der Lokaloszillatoren (21, 23) in den Umsetzermodulen (17) oder zur Ansteuerung der Tuner (55) und/oder Module (61) für die Umsetzermodule (18) im Falle einer Modulationswandlung,

gekennzeichnet durch die folgenden weiteren Merkmale

- - die einzelnen Teilnehmer (45) erhalten spätestens bei Zuschaltung einen beliebigen Empfangsumsetzer (17, 18) und damit dessen Ausgangskanal (39) sowie eine Steuerungsmöglichkeit für diesen Empfangsumsetzer (17, 18) nach einem Zufalls-Verteilverfahren zugeordnet.

Description

Expand description

Die Erfindung betrifft eine Satelliten-Empfangsanlage mit einer steuerbaren Kopfstation nach dem Oberbegriff des Anspruches 1.

Other Abstract Info:

None

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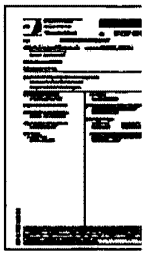
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Title: **EP0757489B1: Satellite receiver with a controllable head end**[German

Derwent Title: Satellite reception system for multi-occupation dwelling - has control facility at each individual subscriber using random distribution method for protecting subscriber privacy [Derwent Record]



Country: **EP** European Patent Office (EPO)

Kind: **B1** Patent [i] (See also: EP0757489A2, EP0757489A3)

Inventor: **Ilsanker, Anton**;
Flinner, Udo;

Assignee: **Kathrein-Werke KG**
Corporate Tree data: Kathrein-Werke KG (KATHREINWERKE);
News, Profiles, Stocks and More about this company

Published / Filed: **2002-03-06** / 1996-07-16

Application Number: **EP1996000111459**

IPC Code: Advanced: **H03D 7/16**; **H04H 1/00**; **H04N 7/20**;
Core: **H03D 7/00**; more...
IPC-7: **H04N 7/10**; H04N 7/20;

ECLA Code: **H04H40/20**; H03D7/16B; H04N7/20;

Priority Number: 1995-08-03 **DE1995019528589**

Abstract: [From equivalent EP0757489A2] Satellite reception system for multi-occupation dwelling The satellite reception system has a controlled head station with a converter (16) employing a number of converter modules (17,18), receiving satellite transmission programmes within a respective reception plane. The outputs of the converter modules are fed to a number of subscribers (45) via an output collector field (41) and signal distribution lines (43). A microcontroller control device (33) controls the local oscillators (21,23) within the converter modules, with the individual subscribers incorporating a control facility for the corresponding reception converter using a random distribution method.

Attorney, Agent or Firm: **Flach, Dieter Rolf Paul, Dipl.-Phys.** ;

INPADOC Legal Status: Show legal status actions **Buy Now:** Family Legal Status Report

Designated Country: AT CH DE ES FR GB IT LI NL

Family: Show 7 known family members

Claims: Hide claims 1. Satellite receiving system having a controllable head station, with the following features:

- - having a converter unit (16) with a number of converter modules (17, 18),
- - the programs received by the satellite receiving system are applied at a suitable frequency level to the inputs (19) of the converter modules (17, 18),
- - the outputs (39) of the converter modules (17, 18) are connected to a number of subscribers (45) via an output distributor (41) and a downstream line (43),
- - the converter unit (16) furthermore has a control unit (33) with a microcontroller (35) for driving the local oscillators (21, 23) in the converter modules (17), or for driving the tuner (65) and/or modules (61) for the converter modules (18) in the case of modulation conversion,

characterized by the following further features:

- - the individual subscribers (45) are allocated, at the latest on connection, a random reception converter (17, 18) and thus its output channel (39) as well as a control option for this reception converter (17, 18) on the basis of a random distribution method.

2. Satellite receiving system having a controllable head station, with the following features:

- - having a converter unit (16) with a number of converter modules (17, 18),
- - the programs received by the satellite receiving system are applied at a suitable frequency level to the inputs (19) of the converter modules (17, 18),
- - the outputs (39) of the converter modules (17, 18) are connected to a number of subscribers (45) via an output distributor (41) and a downstream line (43),
- - the converter unit (16) furthermore has a control unit (33) with a microcontroller (35) for driving the local oscillators (21, 23) in the converter modules (17), or for driving the tuner (65) and/or modules (61) for the converter modules (18) in the case of modulation conversion, **characterized in that** the individual subscribers (45) are permanently allocated to individual converter modules (17, 18), and **in that** the output channel frequencies are always set differently on the basis of the random principle method, and the receiver-end connecting appliances (46, 47, 49) are tuned thereto.

3. Satellite receiving system according to Claim 1 or 2, **characterized in that** the control unit (33) signals the output channel (39) which is assigned to the individual subscriber (45) for automatic setting of a local oscillator (52) and hence of an associated mixer (53) in the subscriber-end converter (49), in order, at the subscriber-end receiver (47) or at a connected receiving appliance (46), to set a fixed reception channel or a fixed reception frequency independently of the input channel and output channel (19, 39) of the converter modules (17, 18) of the conversion unit (16).

4. Satellite receiving system according to one of Claims 1 to 3, **characterized in that** the controller is initialized by the receiver (45), and the control sequence is governed by the control unit (33) which is integrated in the converter unit (16).

5. Satellite receiving system according to one of Claims 1 to 4, **characterized in that** a subscriber input converter (49) with a mixer (53) and a local oscillator (52) is positioned upstream of the receivers, and is driven via a microcontroller (51).

6. Satellite receiving system according to Claim 5, **characterized in that** the microcontroller (51) in the subscriber input converter (49) is driven via the satellite receiver (47).

7. Satellite receiving system according to Claim 5 or 6, **characterized in that** the microcontroller (51) is driven via an I²C bus (48), via the satellite receiver (47).

8. Satellite receiving system according to one of Claims 5 to 7, **characterized in that** the subscriber input converter (49) is controlled by means of a remote control, in particular an infrared remote control (54).

9. Satellite receiving system according to one of Claims 1 to 6, **characterized in that** the control unit (33) which is provided in the converter unit (16), that is to say in particular the microcontroller (35) which is integrated in it, is driven directly via the satellite receiver (47) installed at the subscriber end, in particular by means of a DiSEqC control system, or the like.

[German] [French]

Description

Expand description

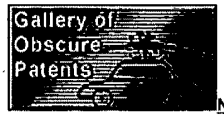
Die Erfindung betrifft eine Satelliten-Empfangsanlage mit einer steuerbaren Kopfstation nach den Oberbegriffen der Ansprüche 1 oder 2.

Other Abstract Info: None

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(54) Satelliten-Empfangsanlage mit steuerbarer Kopfstation

(57) Eine Satelliten-Empfangsanlage mit steuerbarer Kopfstation weist die folgenden Merkmale auf

- mit einer Umsetzereinheit (16) mit mehreren Umsetzermodulen (17, 18),
- an den Eingängen (19) der Umsetzermodulen (17, 18) stehen die von der Satellitenempfangsanlage empfangenen Programme vorzugsweise in der Zwischenfrequenz-Ebene an,
- die Ausgänge (39) sind über ein Ausgangs-Sammelfeld (41) und eine nachfolgende Leitung (43) mit mehreren Teilnehmern (45) verbunden
- die Umsetzereinheit (16) umfaßt ferner eine Steuereinheit (33) mit einem Mikrokontroller (35) zur Ansteuerung der Lokaloszillatoren (19, 23) in den Umsetzermodulen (17) oder zur Ansteuerung der Tuner (55) und/oder Module (61) für die Umsetzermodule (18) im Falle einer Modulationswandlung,
- die einzelnen Teilnehmer (45) erhalten spätestens bei Zuschaltung nach einem Zufalls-Verteilverfahren eine Steuerungsmöglichkeit für einen beliebigen Empfangsumsetzer (17, 18) und damit den Ausgangskanal (39) dieses Empfangsumsetzers (17, 18) zugeordnet.

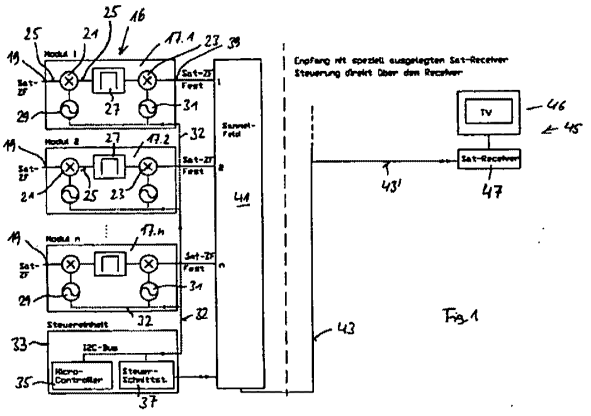


Fig.1

EP 0 757 489 A2

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Beschreibung

Die Erfindung betrifft eine Satelliten-Empfangsanlage mit einer steuerbaren Kopfstation nach dem Oberbegriff des Anspruches 1.

Grundsätzlich sind Satelliten-Einzelempfangsanlagen und sog. Mehrteilnehmeranlagen zu unterscheiden.

Bei sog. Mehrteilnehmeranlagen wird beispielsweise im Rahmen der Satellitenempfangsanlagen eine Sternverteilung mit Schaltmatrix verwendet, worüber dem einzelnen Teilnehmer kein festgelegtes Programmpaket permanent angeboten wird, sondern worüber jeder Teilnehmer die Möglichkeit erhält, sich sein Programmangebot selbst auszuwählen. D.h. er kann zwischen den in der Regel beiden Polarisationen (oder beispielsweise auch den vier Polarisationen unter entsprechender Berücksichtigung der links und rechts zirkularpolarisierten Wellen) eines Satelliten oder zwischen zwei (oder mehreren) Satellitenempfangsantennen umschalten, um die hierüber ausgestrahlten Programme zu empfangen.

Schließlich sind darüber hinaus auch zur Versorgung mehrerer Teilnehmer Satelliten-Signalaufbereitungen nach Art von Kopfstationen bekannt geworden.

Eine derartige Kopfstation ist beispielsweise aus der Vorveröffentlichung DE-Z „Antennen - für den Satellitenempfang", Thurl/Ilsanker, Franzis Arbeitsbuch, 1991, Seite 83 bis 85 bekannt.

Die dort beschriebene Kopfstation umfaßt beispielsweise sechs Kanalzüge, die eine Programmauswahl aus zwei unterschiedlichen Polarisationen bzw. von zwei Satelliten und die Einspeisung in ein UHF-taugliches Verteilnetz zeigt. Mit dem Eingangssammelfeld wird die freie Beschaltung der Eingänge der Kanalzüge in der Zwischenfrequenz-Ebene ermöglicht, so daß sechs beliebige Programme aus dem gesamten Angebot ausgewählt werden können. Im Ausgangssammelfeld werden die UHF-Kanäle Zusammengefaßt. Die Einstellung der Ein- und Ausgangskanäle erfolgt durch einen Mikroprozessor. Dabei ist die Satellitenkompaktaufbereitung modular aufgebaut, d.h. die Demodulatoren und Modulatoren werden als Einheiten gefertigt, geprüft und dann in das Gerät integriert.

In Abweichung zu der vorstehend erläuterten Kopfstation sind aber grundsätzlich auch sog. „steuerbare Kopfstationen" bekannt geworden, worüber die angeschlossenen Teilnehmer über ihren Receiver oder ein Zusatzmodul bestimmte Programme aus dem angebotenen und empfangenen Programmspektrum auswählen können.

Dazu ist eine Außeneinheit mit einer Antenne und in der Regel einem Konverter (einschließlich einer Polarisationsweiche) vorgesehen, worüber ein oder mehrere Polarisationen oder die von einem oder mehreren Satelliten empfangenen Signale (beispielsweise über ein Multifeed-Speisesystem) einer Umschalteinheit zugeführt werden, die mit entsprechender Anzahl von Eingängen und schaltbaren Ausgängen zumindest in Höhe der Zahl der angeschlossenen Teilnehmerzahl ausgestattet ist.

An diese Ausgänge werden wie bei einer Satelliten-Zwischenfrequenz-Sternverteilung fernsteuerbare Umsetzereinheiten mit fest eingestelltem Ausgangskanal angeschlossen. Jedem angeschlossenen Teilnehmer ist dabei ein bestimmter Ausgangskanal zugeordnet.

Der größte Nachteil dieser fernsteuerbaren Empfangseinheiten ist aber, daß ein wirkungsvoller Schutz der Privatsphäre preisgünstig nicht realisierbar ist. D.h. jeder Nachbar kann bei Kenntnis der Kanaltabelle des Verteilnetzes feststellen, welches Programm vom jeweiligen Teilnehmer eingeschaltet ist. Es versteht sich von selbst, daß dies höchst unerwünscht ist, weshalb derartige Anlagen in der Regel nicht eingesetzt werden, obwohl sie durchaus Vorteile besitzen, wie z. B. der Erhalt der Durchschleifstruktur, Preiswürdigkeit gegenüber kanalselektiver Aufbereitung und volle Programmvielfalt.

Zudem ist eine Gemeinschaftsantennenanlage beispielsweise aus der DE 40 12 657 A1 bekannt geworden. Die Anlage besitzt ein Verteilkabel, dessen Eingang mit den Ausgängen von Umsetzern verbunden ist. Den Umsetzern werden von einer Antenne Träger zugeführt, die mit Fernsehsignalfrequenzen moduliert sind. Jeder Umsetzer erzeugt aus einem wählbaren dieser Träger einen mit dem gleichen Fernsehsignal modulierten neuen Träger mit einer jeweils vorbestimmten Frequenz. Jeder Umsetzer und seine vorbestimmte Frequenz ist jeweils einem von mehreren Ausgängen des Verteilkabels zugeordnet. Bei dem Ausgang steht ein Fernsteuersender, der im betreffenden Umsetzer die Wahl des von der Antenne zugeführten Trägers steuert. Die Anlage benötigt nur so viele Umsetzer und muß über das Verteilkabel nur so viele neue Träger mit verschiedenen vorbestimmten Frequenzen übertragen, wie Ausgänge am Verteilkabel vorhanden sind. Trotzdem können an jedem der Ausgänge alle Fernsehsignale gewählt werden, mit denen die von der Antenne zugeführten Träger moduliert sind.

Schließlich ist aus der DE 93 06 499 U1 eine Schaltungsanordnung und eine Vorrichtung zum Betreiben einer Antennenempfangsvorrichtung mit wenigstens einer Empfangsantenne bekannt geworden, deren Antennenausgangssignale jeweils mehreren Empfangsteilnehmern über eine Verteilleitung einer Gemeinschafts-/Hausempfangsanlage zu geleitet werden. Dabei ist ferner vorgesehen, daß wenigstens ein ausgewählter Kanal in Abhängigkeit eines teilnehmerspezifischen Wählsignals auf die Verteilleitung schaltbar ist.

Demgegenüber ist es Aufgabe der vorliegenden Erfindung, eine verbesserte Satellitenempfangsanlage mit einer steuerbaren Kopfstation zu schaffen, die auf günstige Weise einen Schutz der Privatsphäre erlaubt. Mit anderen Worten soll gewährleistet werden, daß andere angeschlossene Teilnehmer sich nicht darüber informieren können, welche Programme andere ange-

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schlossene Teilnehmer aktuell empfangen und zugeschaltet haben.

Die Aufgabe wird erfindungsgemäß entsprechend der im Anspruch 1 oder im Anspruch 2 angegebenen Merkmale gelöst.

In der vorliegenden Erfindung wird eine einfache Methode geschaffen, mittels der ein preiswerter Schutz der Privatsphäre ermöglicht wird. Dabei werden erfindungsgemäß alle Vorteile einer fernsteuerbaren Empfangseinheit beibehalten.

Das erfindungsgemäße Verfahren geht dabei davon aus, daß die einzelnen Empfangskanäle für die zugeschalteten Teilnehmer nach einem Zufallsverfahren (Random) zugeordnet werden. Andere angeschlossene Teilnehmer im Haus können dabei zwar feststellen, welche Programme insgesamt mittels der Empfangseinheiten empfangen werden, nicht aber, welcher Teilnehmer welches Programm aktuell eingeschaltet hat und sieht. Bei jedem Einschalten wird dem Teilnehmer im wahlfreien Zugriff ein Kanal zugewiesen und sein Empfangsgerät automatisch auf den entsprechenden Empfangskanal eingestellt oder zumindest eine Information abgegeben, die die Einstellung ermöglicht. Da mit jedem Einschalten eine neue Berechtigung vergeben werden kann, ist es für einen anderen Teilnehmer praktisch nicht möglich, die Kanalzuordnung der übrigen Teilnehmer festzustellen.

Zudem ist es in einer bevorzugten Ausführungsform der Erfindung ferner möglich zu gewährleisten, daß außer der fehlenden Zuordnung nur die selbstgewählte und eingestellte Kanalauswahl ein brauchbares Bild oder einen brauchbaren Radioempfang liefert.

Die Erfindung wird nachfolgend anhand von Ausführungsbeispielen näher erläutert. Dabei zeigen im einzelnen:

Figur 1 : einen schematischen Schaltplan einer erfindungsgemäßen Ausführungsform mit einer Ansteuerung durch einen Receiver ohne weitere Zusatzeinrichtung;

Figur 2 : eine der erfindungsgemäßen Umsetzereinheit vorgeschaltete Satellitenempfangsanlage;

Figur 3 : ein Figur 1 entsprechendes Ausführungsbeispiel, bei welchem die Ansteuerung mittels eines dem Receiver vorgeschalteten Umsetzers (Modem) mittels eines I^2C-Busses erfolgt;

Figur 4 : ein zu Figur 1 und 3 abgewandeltes Ausführungsbeispiel, bei welchem die Ansteuerung mittels eines dem Receiver vorgeschalteten und mittels einer Fernbedienung bedienbaren Umsetzers erfolgt;

Figur 5 : eine entsprechende Schaltungsanordnung mit Verteilung im VHF-/UHF-Bereich, welche der in Figur 2 wiedergegebenen Schaltungsanordnung nachgeschaltet ist.

Figur 2 zeigt eine der erfindungsgemäßen Umsetzereinheit vorgeschaltete Satellitenempfangsanlage mit einem einer Satellitenantenne zugeordneten Speisesystem 3, eine diesem nachgeschaltete Polarisationsweiche 5 sowie beispielsweise zwei Konverterschaltungen 7 (LNB, LNC etc.) in dem jeweiligen Empfangszwetg zum Empfang der vertikalen wie horizontalen Polarisationen.

Die beiden Ausgänge der beiden Zweige zum Empfang der vertikalen wie horizontalen Polarisationen stehen mit Eingängen 9 einer Umschalteinheit 11 in Verbindung.

Sollen beispielsweise auch zusätzlich noch links oder rechts zirkularpolarisierte Wellen empfangen werden, so werden unter Berücksichtigung der hierfür üblichen Eingangsschaltungen an der Umschalteinheit 11 vier Eingänge 9 vorgesehen sein, nämlich zum Empfang einmal der vertikal, der horizontal, der links und der rechts polarisierten Wellen. Ebenso könnte die Zahl der Eingänge an der Umschalteinheit 11 zunehmen, wenn beispielsweise Programme von verschiedenen Satelliten über mehrere Satellitenantennen oder beispielsweise von einem Multifeed-Speisesystem empfangen werden sollen.

Bei der Umschalteinheit 11 handelt es sich um eine X:Y-Umschalteinheit, wobei „X" die Zahl der Eingänge und „Y" die Zahl der Ausgänge betrifft, die zumindest der Zahl der angeschlossenen Teilnehmer entspricht.

An die in Figur 2 gezeigten Ausgänge 13 wird die bei einer Satelliten-Zwischenfrequenz-Sternverteilung fernsteuerbare Umsetzereinheit 16 (fernsteuerbare Kopfstation 16) mit fest eingestellten Ausgangskanälen angeschlossen, wie dies anhand von Figur 1 gezeigt ist. D.h. jeder Eingang 19 der in Figur 1 gezeigten Umsetzereinheiten 17 ist mit der Umschalteinheit 11 gemäß Figur 2 verbunden.

Die Umsetzereinheit 16 umfaßt danach also n-Umsetzer-Module 17, die jeweils einen ersten Mischer 21 und einen zweiten Mischer 23 mit einem in der Empfangsleitung 25 dazwischen angeordneten Filter 27 (SAW-Filter). Der erste bzw. zweite Mischer 21, 23 wird jeweils über einen Lokaloszillator (PLL) 29 bzw. 31 angesteuert.

Die Steuerung erfolgt über einen Daten- oder Steuerungsbus 32, und zwar mittels einer Steuereinheit 33, die über einen Mikrocontroller 35, also einen Mikroprozessor, sowie beispielsweise eine entsprechende Steuerschnittstelle 37 verfügt.

Den Ausgängen 39 der Umsetzermodule 17 ist ein sog. Sammelfeld 41 nachgeschaltet, worüber die über die einzelnen Umsetzermodule 17 empfangenen Signale auf eine gemeinsame Übertragungsleitung 43 zu den einzelnen angeschlossenen Teilnehmern 45 übertragen werden. In Figur 1 ist lediglich einer der an einer von der Übertragungsleitung 43 abzweigenden

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Zweigleitung 43' angeschlossene Teilnehmer 45 mit einem Satellitenreceiver 45 gezeigt.

Über die oben erwähnte Steuereinheit 33 wird letztlich auch der Datenaustausch zwischen den angeschlossenen Teilnehmern 45 und der Empfangseinheit gemäß Figur 2 (also den Konvertern etc.) sowie die Umsetzereinheiten 17 einschließlich der Umschalteinheit 11 u. a. auch zur Auswahl der Polarisationen gesteuert, wobei der betreffende, dem einzelnen Teilnehmer zugeteilte Ausgangskanal dann dem Teilnehmer auch übermittelt wird.

Nachfolgend wird auf die Funktionsweise näher eingegangen. Wird davon ausgegangen, daß alle Teilnehmer 45 abgeschaltet sind, so kann die Funktionsweise derart sein, daß beim Einschalten eines Empfängers 47, also der in Figur 1 gezeigten Konverter, über den Mikroprozessor oder -controller 35 allen Teilnehmern oder zumindest dem aktuell zugeschalteten Teilnehmer nach dem Zufallsprinzip ein bestimmter Ausgangskanal 39, also ein bestimmtes Umsetzmodul 17 der n-Module 17 zugewiesen wird.

Würde beispielsweise der in Figur 1 gezeigte angeschlossene Teilnehmer 45 seinen Fernseher 46 zuschalten, so könnte ihm über den Mikroprozessor das Umsetzermodul 17.2 zugeordnet werden.

Dabei können die Umsetzermodule 17, d.h. deren Lokaloszillatoren, so eingestellt sein, daß die einzelnen Module entsprechend der Bandbreite der Filter 27 die teilnehmerseitig ausgewählten Programme in folgende Kanäle bzw. Kanalbreiten in das Sammelfeld einspeisen:

Modul 17.1:	950 - 980 MHz
Modul 17.2:	990 - 1.020 MHz
Modul 17.3:	1.030 - 1.060 MHz
u.s.w.	
Modul 17.n:	1.550 - 1.580 MHz

Wird also beispielsweise davon ausgegangen, daß an den Eingängen 19 der Umsetzermodule 17 in der Zwischenfrequenz (ZF)-Ebene die von den Satelliten empfangenen Programme in einem Frequenzband von 950 MHz bis 2.050 MHz anstehen, und der erwähnte Teilnehmer 45 nunmehr ein Satellitenprogramm empfangen will, welches in der ZF-Ebene in dem Kanal von 1.250 MHz bis 1.280 MHz ansteht, so wird der erste Lokaloszillator 29 auf eine Frequenz von 1.743,25 MHz und der zweite Lokaloszillator 31 auf eine Mischerfrequenz von 1.483,25 MHz eingestellt, so daß unter Berücksichtigung des Filters 27 nunmehr am Ausgang 39 das so ausgewählte Programm mit der bezüglich des Moduls 17.2 fest eingestellten Satelliten-Zwischenfrequenz (SatZF) von 990 bis 1.020 MHz in das Sammelfeld 41 eingespeist wird.

Über den Satelliten-Receiver 47 vorgewählt und damit letztlich über die Steuereinheit 33 gesteuert, wird also der jeweilige Receiver nach dem Zufallsprinzip einem stets anderen Modul zugeschaltet - im erläuterten Ausführungsbeispiel das Umsetzermodul 17.2 - so eingestellt, daß das receiverseitig ausgewählte Programm in die in diesem Modul fest eingestellte Ausgangs-Satelliten-Zwischenfrequenz von beispielsweise 990 bis 1.020 MHz umgesetzt wird.

Schaltet sich ein nächster Teilnehmer ein, so wird diesem ebenfalls wieder nach dem Zufallsprinzip über den Mikroprozessor 35 ein nächstes der n vorgesehenen Umsetzermodule 17 zugeordnet.

Da gleichzeitig über den Mikroprozessor 35 die entsprechenden Daten auch an den Receiver übermittelt werden, kann über diesen Receiver stets nur die über das ihm zugeordnete Umsetzermodul 17 eingestellte Programm empfangen werden. Rückschlüsse, welche Teilnehmer welche weiteren Programme empfangen, d.h. eine Zuordnung, welcher Teilnehmer welches Programm empfängt, ist nicht möglich.

Bei Satelliten-Receivern 47 (Empfängern) mit zugeordneten Empfängerumsetzern werden also die Lokaloszillatoren 29, 31 über die Steuereinheit 33 automatisch eingestellt und somit die Zuordnung von gesteuertem und empfangenem Kanal hergestellt.

Unabhängig von dem vorstehend erläuterten Randomverfahren muß die dem Zufallsprinzip unterliegende Zuordnung der einzelnen Übertragungskanäle an die einzelnen Teilnehmer nicht zwingend zum Zeitpunkt des Einschaltens gestartet werden. Ein günstiger Zeitpunkt liegt beispielsweise dann vor, wenn alle Teilnehmer abgeschaltet sind. Eine Zufallsvergabe kann aber auch stets dann durchgeführt werden, wenn sich ein neuer Teilnehmer zuschaltet, wobei dann aus der Gruppe der einzelnen Teilnehmer noch nicht zugeordneten Umsetzermodulen 17 entsprechend dem Zufallsprinzip ein nächstes Umsetzermodul 17 dem jeweils nächsten zugeschalteten Teilnehmer zugeordnet wird.

In einer alternativen Ausführungsform ist es aber auch möglich, daß die einzelnen Teilnehmer 45 einer festen, stets gleichbleibenden Umsetzereinheit zugeordnet bleiben, beispielsweise der in Figur 1 dargestellte Teilnehmer 45 (Satellitenreceiver 47) stets dem Umsetzermodul 17.2 zugeordnet ist und bleibt. In diesem Falle könnten nach dem Zufallsprinzip über die Steuereinheit 33, d.h. den Mikroprozessor 35, gesteuert die Lokaloszillatoren 29, 31 automatisch so angesteuert werden, daß die Ausgangskanäle nach dem Zufallsprinzip beispielsweise auf die vorstehend wiedergegebenen Ausgangskanal-Breiten nicht fest eingestellt, sondern jeweils nach dem Zufallsprinzip unterschiedlich eingestellt werden. Auch in diesem Falle ist es anderen angeschlossenen Teilnehmern nicht möglich festzustellen, welcher Teilnehmer gegenwärtig welche Programme empfängt.

In dem geschilderten Ausführungsbeispiel gemäß Figur 1 und 2 erfolgt keine Modulationswandlung, sondern lediglich eine Umsetzung der ausgewählten Ein-

gangskanäle in einem fest definierten Ausgangskanal. Die Orientierung über die eingestellten Programme wird durch den Satelliten-Receiver 47 vorgenommen, wenn dieser entsprechend wie in Figur 1 schematisch dargestellt ist, ausgerüstet ist. Receiver 45 mit entsprechender Ausrüstung können die Steuerung im Zusammenspiel mit der Steuereinheit 33 ohne eine Zusatzeinrichtung vornehmen. Neuartige Steuerungssysteme wie DiSEqC sind hier sehr gut geeignet.

Andernfalls kommt eine Schaltung gemäß Figur 3 in Betracht, bei welcher die Einstellung der Programme beispielsweise mittels eines dem Receiver 47 vorgeschalteten Modems 49 (Umsetzer 49) möglich ist, wobei die Ansteuerung des Modems 49 vom Satelliten-Receiver 47 über einen I^2C-Bus 48 erfolgen kann.

Gemäß dem Ausführungsbeispiel nach Figur 3 ist vorgesehen, daß dabei das Modem 49 eine interne Steuerschnittstelle 50 umfaßt, worüber über die Leitung 43' und die Übertragungsleitung 43 die Datenkommunikation mit der in der steuerbaren Kopfstelle 16 vorgesehenen Steuereinheit 33 erfolgt. Ferner umfaßt das Modem 49 gemäß Figur 3 einen Mikrokontroller 51, der einen in dem Modem 51 integrierten Lokaloszillator (PLL) 52 ansteuert, der wiederum den im Modem 50 integrierten Mischer 53 ansteuert, worüber das jeweils ausgewählte Programm auf die für den Empfang des Satellitenprogramms geeignete UHF-/VHF-Empfangsfrequenz umgesetzt wird.

Ist der Receiver 47 nicht entsprechend wie in Figur 3 ausgestaltet, so kommt eine Ansteuerung des erwähnten Modems 49 - wie in Figur 4 dargestellt ist - mittels einer Fernbedienung 54 in Betracht.

Durch das jeweilige Modem 49 erfolgt also dann die Umsetzung der Satelliten-Zwischenfrequenz auf die für den Fernsehempfang geeignete UHF-/VHF-Empfangsfrequenz.

Der in Figur 4 erläuterte Umsetzer 49 umfaßt im Falle einer Fernbedienung beispielsweise noch eine LED-Anzeige 55 und einen Infrarot-Detektor 56, worüber angezeigt wird, wenn die Fernbedienung 54 aktiviert ist.

Alternativ zu den erläuterten Ausführungsbeispielen ist es gemäß Figur 5 aber auch möglich, daß eine Verteilung bereits im VHF-/UHF-Bereich erfolgt.

Die in dem Ausführungsbeispiel gemäß Figur 5 gezeigte Umsetzereinheit oder fernsteuerbare Kopfstation 16 umfaßt vier Umsetzermodule 18.1 bis 18.n, an deren Eingängen 19 ebenfalls wieder die Satelliten-Zwischenfrequenz ansteht.

Die Umsetzermodule 18 umfassen danach aber jeweils eingangsseitig einen Tuner 65 und einen Video-Zweig 57 sowie einen Audio-Zweig 59 zur Umsetzung der Bild- und der Tonsignale.

Der Video-Zweig 57 und der Audio-Zweig 59 sind ausgangsseitig mit einem Modem 61 verbunden, in welchem eine Umsetzung von der Satelliten-Zwischenfrequenz in den VHF-/VHF-Frequenzbereich erfolgt.

Die Ausgänge 39 dieser Umsetzermodule 18 können nunmehr so eingestellt sein, daß an den einzelnen Ausgängen der Module folgende Frequenzen anstehen:

Modul 18.1:	230 - 260 MHz
Modul 18.2:	270 - 300 MHz
Modul 18.4:	310 - 370 MHz
u.s.w.	
Modul 18.n:	830 - 860 MHz

Ansonsten erfolgt die Steuerung wie anhand von Figur 3 erläutert, wonach die in den VHF-/UHF-Bereich umgesetzten und von den einzelnen Teilnehmern ausgewählten empfangenen Programme wiederum über ein Sammelfeld 41 und eine nachgeschaltete Übertragungsleitung 43 mit davon abzweigenden Zweigleitungen 43' den einzelnen Empfänger 45 gegebenenfalls unter Zuvorschaltung eines Modems 49 übertragen werden.

Bei dem Ausführungsbeispiel gemäß Figur 5 wird also in Abweichung zu den Ausführungsbeispielen gemäß Figur 1 oder 3 und 4 eine Modulationsumwandlung in den VHF-/UHF-Bereich vorgenommen. Dadurch kann die Installation unverändert bleiben, wobei auch die Steckdosen nicht getauscht werden müssen. Ein Umsetzer beim Teilnehmer übernimmt die Umsetzung in einen festen Satelliten-Zwischenfrequenz-Kanal und die Signalisierung und Modemfunktion für die Fernsteuerung der Empfangskanäle. Die Einstellung der richtigen Ausgangsfrequenz wird automatisch vorgenommen, wobei die Lokaloszillator-Frequenz des Umsetzers durch den Controller der Umsetzereinheit ferngesteuert wird. Die Teilnehmerreceiver werden für alle Programmplätze auf die gleiche Satelliten-Frequenz eingestellt. Dadurch ändert sich an den Programmauswahlgewohnheiten der Teilnehmer nichts, die vorprogrammierten Programmzuordnungen bleiben erhalten, wobei die OSD-Einblendungen weiterhin stimmen.

Aus den oben erläuterten Ausführungsbeispielen geht hervor, daß die nachfolgend auch als Teilnehmereingangsumsetzer bezeichneten Modems 49 je nach Anwendung und Ausstattung einen Infrarotempfänger, einen Anschluß für einen I^2C-Bus 48 und/oder eine Empfangseinheit für DiSEqC-Signale, eine LED-Anzeige 55 zur Anzeige der eingestellten Programme bzw. für die Signalisierung des Empfangskanals umfassen. Ein Mikroprozessor 51 übernimmt die Synchronisation des notwendigen Datentransports für die Lokaloszillatoren 52 bei den Teilnehmereingangs-Umsetzern 49 und die Signalisierung beim Einschalten des Empfängers (Sat-Receiver 47) zum Starten des nach dem Zufallsprinzip arbeitenden „Random-Verfahrens" in den Haupt- oder Umsetzereinheiten, die allgemein auch als Kopfstation 16 bezeichnet werden. Bei Teilnehmer-Eingangsumsetzern 49 mit Infrarotempfän-

ger können durch Umschalten des Befehlssatzes verschiedene Receivertypen berücksichtigt werden. Hier muß speziell auf unterschiedliche Toggelfunktionen Rücksicht genommen werden. Der Befehlssatz eines solchen Empfängerumsetzers hat natürlich einen eingeschränkten Befehlsvorrat.

Im Zusammenspiel insbesondere mit den erwähnten empfängerseitigen Umsetzern 49 sind Receiver 47 zu verwenden, die entsprechend ausgestattet sind. Receiver, die mit DiSEqC ausgerüstet sind, können prinzipiell Umsetzer 49 steuern, wenn der Satelliten-Receiver 47 die vollen DiSEqC-Möglichkeiten unterstützt. Bei Steuerungssystemen DiSEqC ist es z. B. vorgesehen, die Lokaloszillator-Frequenz der Konverter - die in diesem Falle natürlich ebenfalls mit dem DiSEqC-Steuerungssystem ausgerüstet sein müssen - an den Satelliten-Empfänger 47 zu melden und den Empfänger 47 dann automatisch entsprechend der Lokaloszillator-Frequenz einzustellen. Bei einem Empfänger 47 mit entsprechender Ausstattung braucht man bei Verteilung in der ersten Satelliten-Zwischenfrequenz (1. Sat-ZF) kein Eingangsmodem bzw. keinen Eingangsumsetzer 47, wie die in dem Ausführungsbeispiel anhand von Figur 1 dargestellt ist, und hat trotzdem den vollen Bedienungskomfort.

Ferner sind Satelliten-Empfänger 47 bekannt, die einen Data-I/O-Eingang aufweisen. Bei entsprechender Ausgestaltung der Software des Empfängers 47 kann dieser Data-I/O-Eingang zur Steuerung des Umsetzers 47 bzw. der Umsetzereinheit 16 verwendet werden. Die Notwendigkeit einer zusätzlichen Fernbedienung entfällt. Der Empfänger 47 kann mit dem Umsetzer, d.h. dem Modem 47, Daten austauschen. Schließlich ist auch eine Änderung der Lokaloszillator-Frequenzeintragung beim Empfänger 47 möglich. Die Einstellung der notwendigen Frequenz beim Empfänger 47 würde dann automatisch erfolgen.

Schließlich ist aber auch die Verteilung zusätzlicher terrestischer Programme möglich. Werden beispielsweise UHF-Frequenzen für Übertragungen terrestischer Programme bei dem Ausführungsbeispiel gemäß Figur 5 benötigt, so kann man die entsprechenden Kanäle der FM-Verteilung sperren.

Der Vollständigkeit halber wird auch angemerkt, daß ein gutes Bild bzw. ein guter Ton nur in den Ausführungsbeispielen erzielbar ist, in denen ein teilnehmerseitiger Umsetzer 49 vorgesehen ist. Mit anderen Worten liefert also nur die selbstgewählte und eingestellte Kanalauswahl ein brauchbares Bild und einen brauchbaren Radioempfang. Auch dadurch wird das erfindungsgemäße Konzept unterstützt, wonach andere angeschlossene Teilnehmer nicht feststellen können, welche Programme andere angeschlossene Teilnehmer gerade empfangen.

Abschließend wird noch angemerkt, daß es sich bei dem vorstehend erläuterten Steuerungssystem DiSEqC um ein an sich bekanntes Steuerungssystem "Digital Satellite Equipment Control", also ein digitales Satellitenempfangs-Gerätesteuerungssystem, handelt.

Patentansprüche

1. Satelliten-Empfangsanlage mit steuerbarer Kopfstation mit folgenden Merkmalen:

   - mit einer Umsetzereinheit (16) mit mehreren Umsetzermodulen (17, 18),
   - an den Eingängen (19) der Umsetzermodule (17, 18) stehen die von der Satellitenempfangsanlage empfangenen Programme in einer geeigneten Frequenz-Ebene an,
   - die Ausgänge (39) der Umsetzermodule (17, 18) sind über ein Ausgangs-Sammelfeld (41) und eine nachfolgende Leitung (43) mit mehreren Teilnehmern (45) verbunden
   - die Umsetzereinheit (16) umfaßt ferner eine Steuereinheit (33) mit einem Mikrokontroller (35) zur Ansteuerung der Lokaloszillatoren (21, 23) in den Umsetzermodulen (17) oder zur Ansteuerung der Tuner (55) und/oder Module (61) für die Umsetzermodule (18) im Falle einer Modulationswandlung,

   gekennzeichnet durch die folgenden weiteren Merkmale

   - die einzelnen Teilnehmer (45) erhalten spätestens bei Zuschaltung einen beliebigen Empfangsumsetzer (17, 18) und damit dessen Ausgangskanal (39) sowie eine Steuerungsmöglichkeit für diesen Empfangsumsetzer (17, 18) nach einem Zufalls-Verteilverfahren zugeordnet.

2. Satelliten-Empfangsanlage mit steuerbarer Kopfstation mit folgenden Merkmalen:

   - mit einer Umsetzereinheit (16) mit mehreren Umsetzermodulen (17, 18),
   - an den Eingängen (19) der Umsetzermodule (17, 18) stehen die von der Satellitenempfangsanlage empfangenen Programme in einer geeigneten Frequenz-Ebene an,
   - die Ausgänge (39) der Umsetzermodule (17, 18) sind über ein Ausgangs-Sammelfeld (41) und eine nachfolgende Leitung (43) mit mehreren Teilnehmern (45) verbunden
   - die Umsetzereinheit (16) umfaßt ferner eine Steuereinheit (33) mit einem Mikrokontroller (35) zur Ansteuerung der Lokaloszillatoren (21, 23) in den Umsetzermodulen (17) oder zur Ansteuerung der Tuner (55) und/oder Module (61) für die Umsetzermodule (18) im Falle einer Modulationswandlung, **dadurch gekennzeichnet**, daß die einzelnen Teilnehmer (45) einzelnen Umsetzermodulen (17, 18) fest zugeordnet sind, und daß nach dem Zufallsprinzip-Verfahren die Ausgangskanal-Frequenzen stets unterschiedlich eingestellt und die

empfängerseitigen Anschlußgeräte (46, 47, 49) hierauf abgestimmt werden.

3. Satelliten-Empfangsanlage nach Anspruch 1 oder 2, **dadurch gekennzeichnet**, daß die Steuereinheit (33) den dem einzelnen Teilnehmer (45) zugewiesenen Ausgangskanal (39) zur automatischen Einstellung eines Lokaloszillators (52) und damit eines zugehörigen Mischers (53) beim teilnehmerseitigen Umsetzer (49) meldet, um am teilnehmerseitigen Receiver (47) oder einem angeschlossenen Empfangsgerät (46) einen festen Empfangskanal bzw. eine feste Empfangsfrequenz unabhängig vom Eingangskanal- und Ausgangskanal (19, 39) der Umsetzermodule (17, 18) der Umsetzeinheit (16) einzustellen.

4. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet**, daß die Steuerung durch die Empfänger (45) initialisiert und der Ablauf der Steuerung mittels der in der Umsetzereinheit (16) integrierten Steuereinheit (33) erfolgt.

5. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet**, daß den Empfängern ein Teilnehmer-Eingangsumsetzer (49) mit einem Mischer (53) und einem Lokaloszillator (52) vorgeschaltet ist, der über einen Mikro-Kontroller (51) angesteuert wird.

6. Satelliten-Empfangsanlage nach Anspruch 5, **dadurch gekennzeichnet**, daß der Mikro-Kontroller (51) in dem Teilnehmer-Eingangsumsetzer (49) über den Satelliten-Receiver (47) angesteuert wird.

7. Satelliten-Empfangsanlage nach Anspruch 5 oder 6, **dadurch gekennzeichnet**, daß die Ansteuerung des Mikro-Kontrollers (51) über den Satelliten-Receiver (47) über einen I^2C-Bus (48) durchgeführt wird.

8. Satelliten-Empfangsanlage nach einem der Ansprüche 5 bis 7, **dadurch gekennzeichnet**, daß die Steuerung des Teilnehmer-Eingangsumsetzers (49) mittels einer Fernbedienung, insbesondere einer Infrarot-Fernbedienung (54) durchgeführt wird.

9. Satelliten-Empfangsanlage nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet**, daß die Ansteuerung der in der Umsetzereinheit (16) vorgesehenen Steuereinheit (33), d.h. insbesondere des darin integrierten Mikro-Kontrollers (35) direkt über den teilnehmerseitig installierten Satelliten-Receiver (47) durchgeführt wird, insbesondere mittels eines Steuerungssystems DiSEqC oder dergleichen.

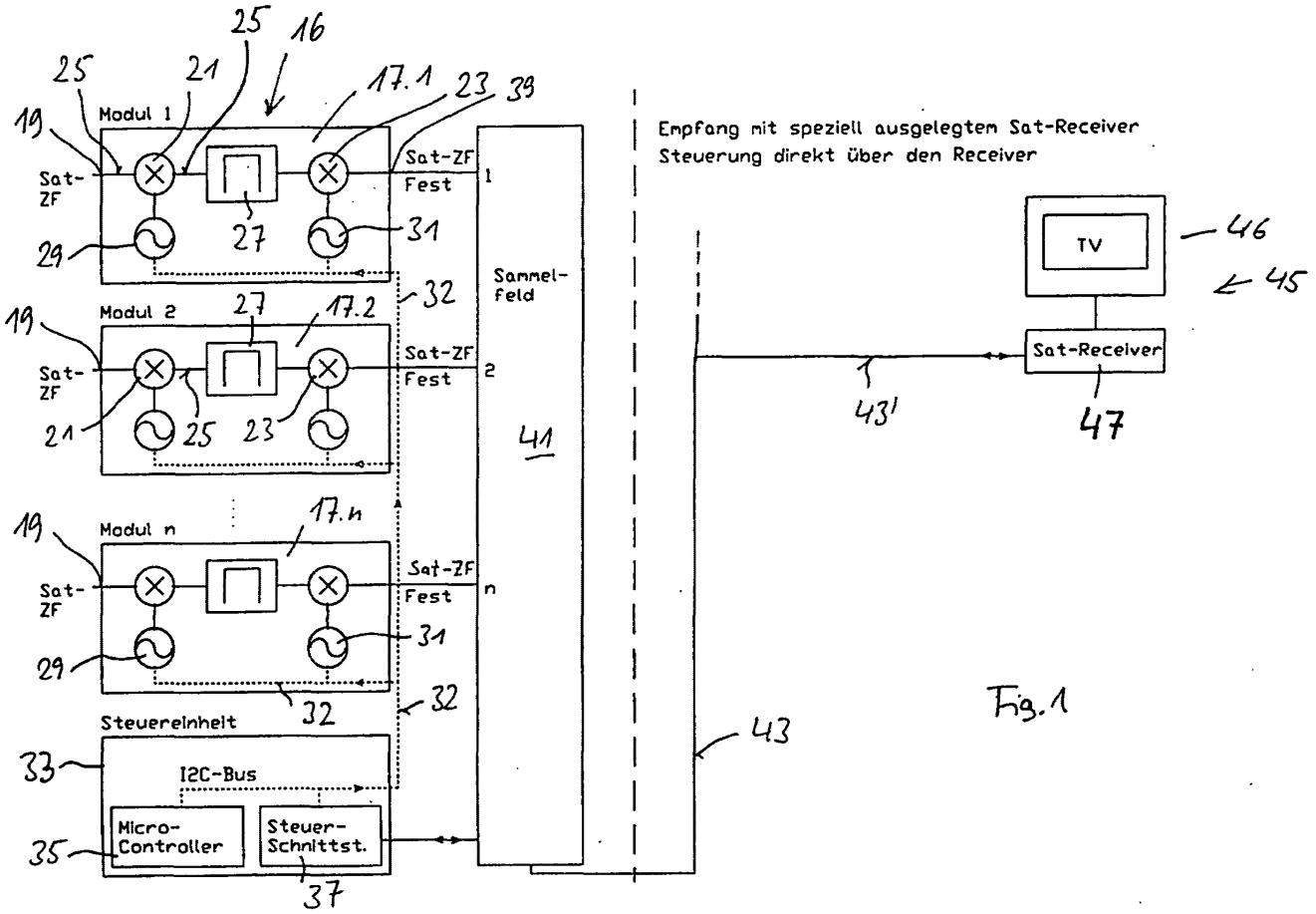


Fig. 1

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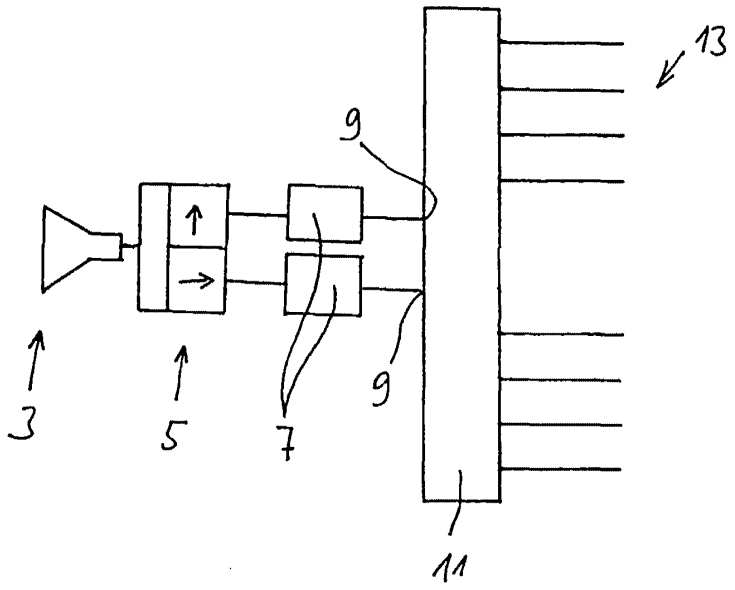


Fig.2

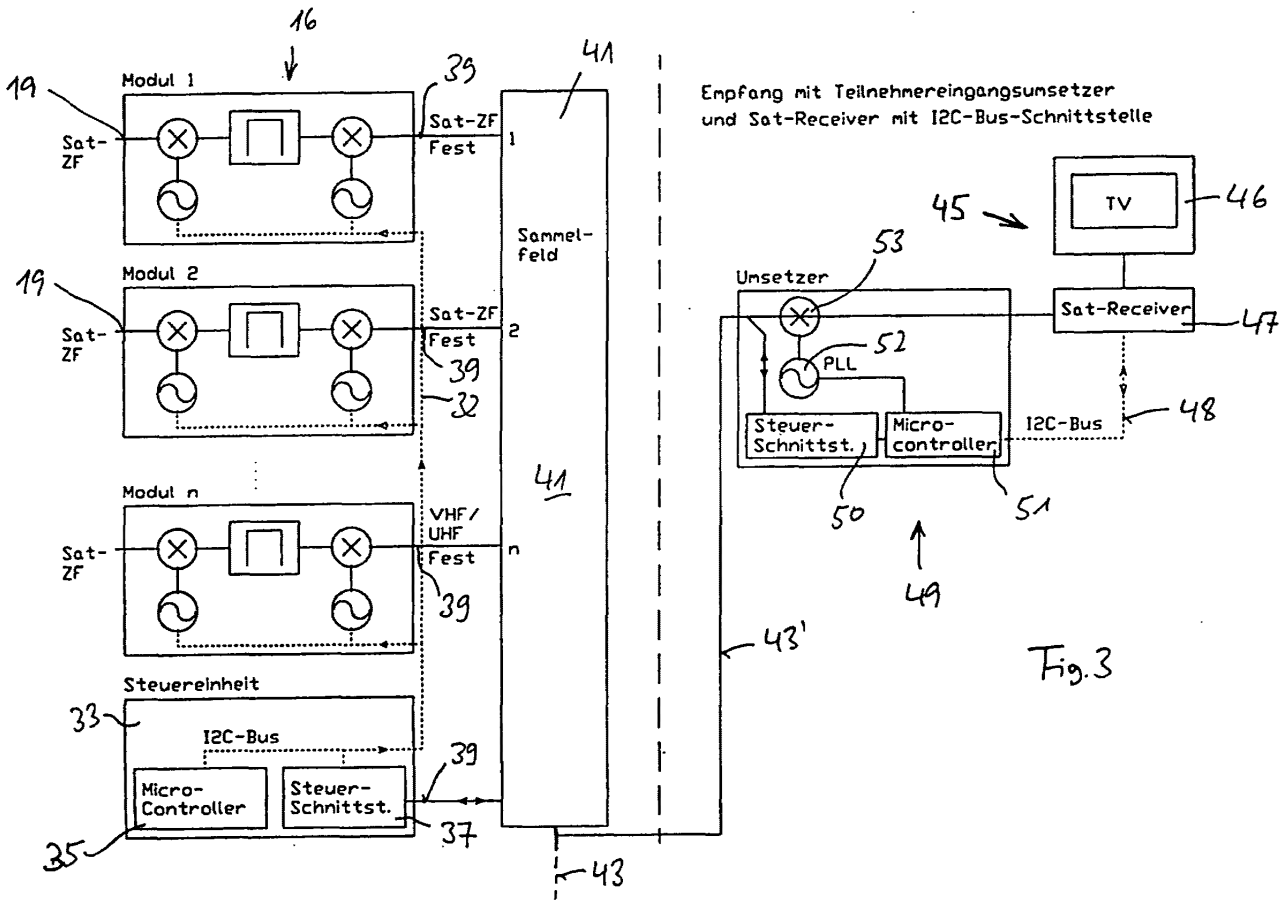


Fig.3

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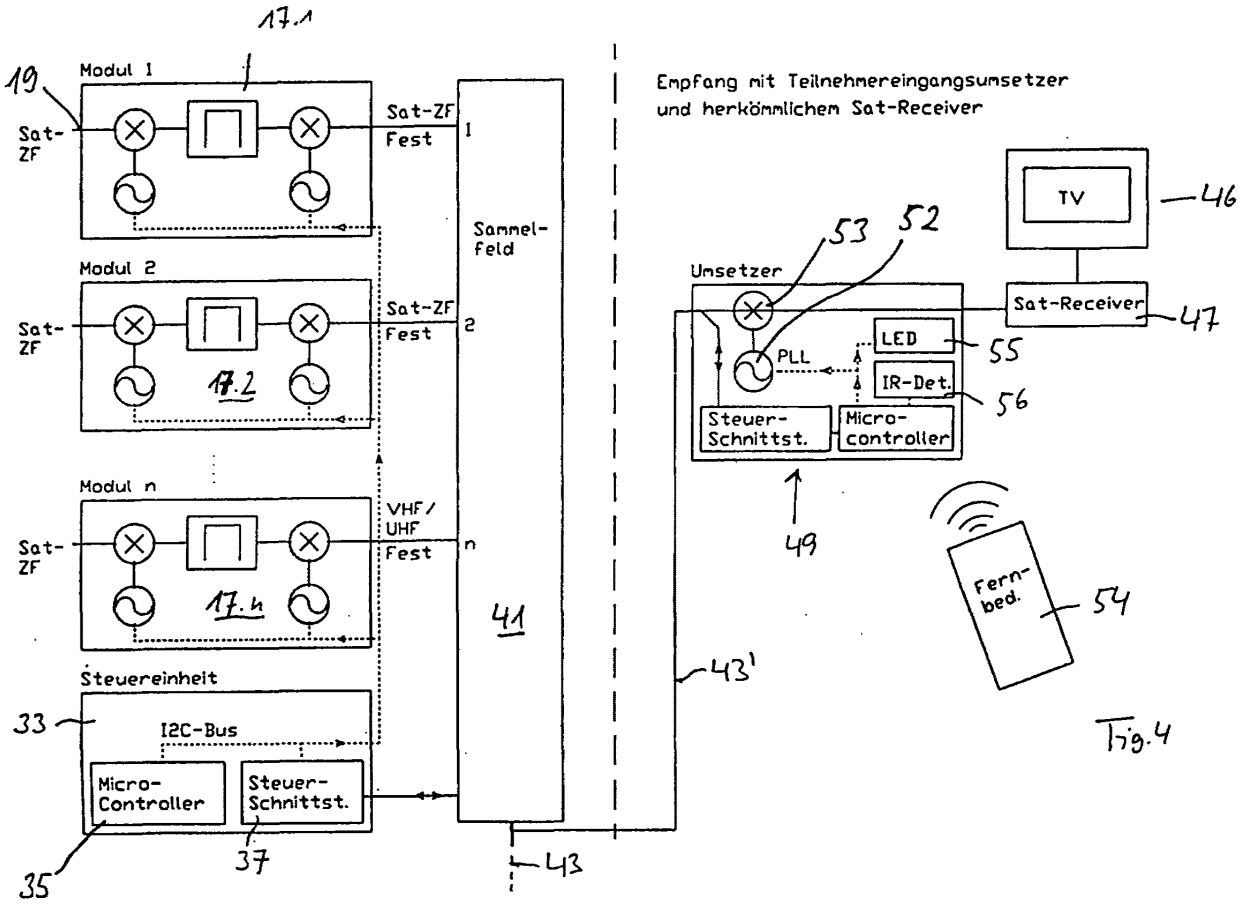


Fig.4

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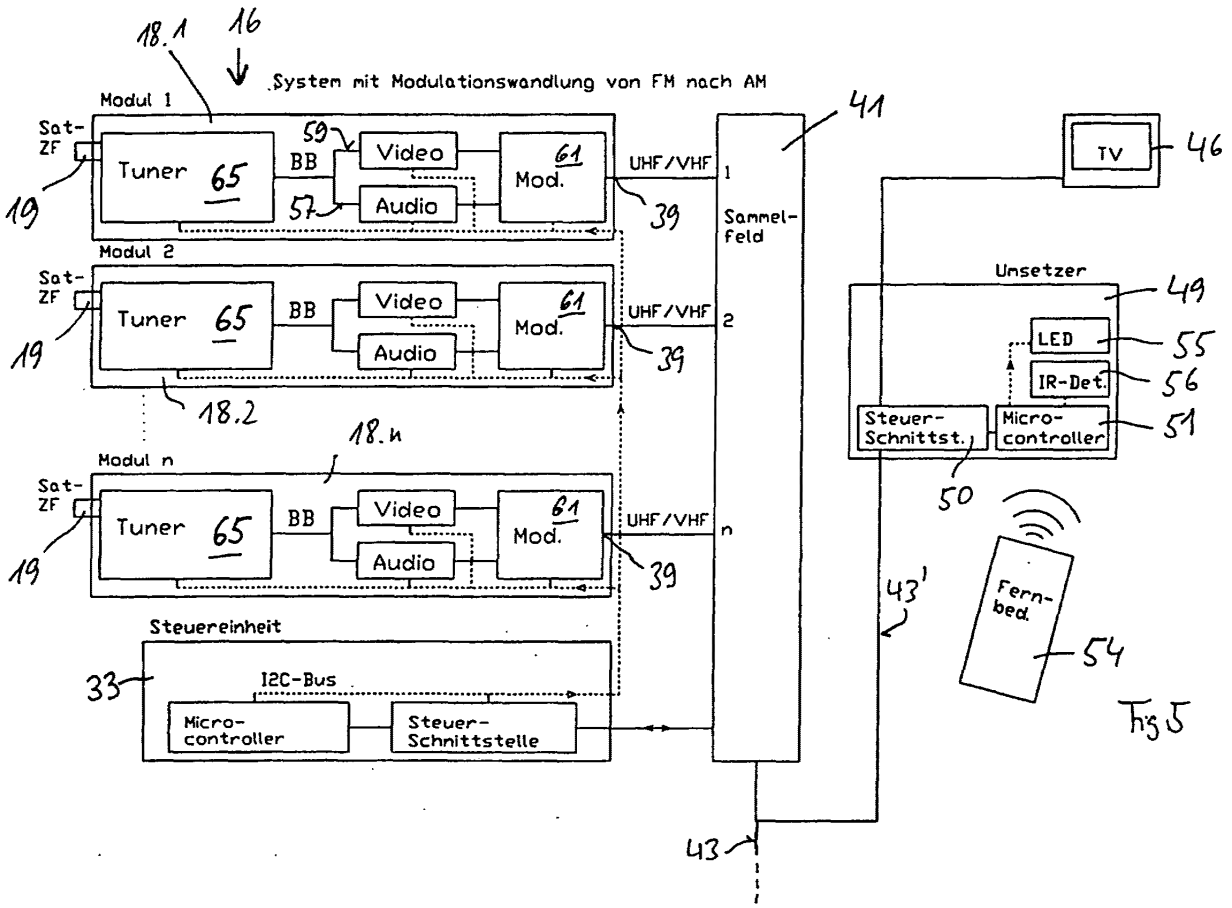


Fig 5

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Patent Assignment Abstract of Title

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Assignors: GURANTZ, ITZHAK **Exec Dt:** 12/19/2002

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NOTICE OF FAILURE TO COMPLY WITH *EX PARTE* REEXAMINATION REQUEST FILING REQUIREMENTS (37 CFR 1.510(c))

The Central Reexamination Unit (CRU) in the United States Patent and Trademark Office (USPTO) has received a request for *ex parte* reexamination. The request cannot be processed, because the below-identified filing date requirements for an *ex parte* reexamination request have not been satisfied. If a fully compliant response is not received within 30 days of the mailing date of this notice, the request will be treated as a prior art citation under 37 CFR 1.501 or closed from public view, at the Office's option. A **filing date** will **NOT** be assigned to the request until the deficiencies noted below are corrected (37 CFR 1.510(d)):

The following items required by **37 CFR 1.510(a) and (b)** are missing:

☐ 1. The *ex parte s* reexamination filing fee under 37 CFR 1.20(c)(1) – see attached Form PTO-2057.

☐ 2. An identification of the patent by its patent number, and of every claim of the patent for which reexamination is requested.

☐ 3. A citation of the patents and printed publications that are presented to raise a substantial new question of patentability.

☒ 4. A statement pointing out each substantial new question of patentability based on the cited patents & printed publications, and a detailed explanation of the pertinency and manner of applying the patents & printed publications to every claim for which reexamination is requested.

☐ 5. A legible copy of every patent or printed publication (other than U.S. patents or U.S. patent publications) relied upon or referred to in (3) and (4) above, accompanied by an English language translation of all the necessary and pertinent parts of any non-English language document.

☐ 6. A legible copy of the entire patent including the front face, drawings, and specification/claims (in **double** column format) for which reexamination is requested, and a legible copy of any disclaimer, certificate of correction, or reexamination certificate issued in the patent. All copies must have each page plainly written on only one side of a sheet of paper.

☐ 7. A certification by the third party requester that a copy of the request has been served in its entirety on the patent owner at the address provided for in 37 CFR 1.33(c). The name and address of the party served must be indicated. If service was not possible, a duplicate copy of the request must be supplied to the Office.

☐ 8. Other:

☐ Explanation of above item(s): See Attachment.

Any written correspondence in response to this notice must include a submission pursuant to the attached instructions. **The instructions for a detailed explanation for an *ex parte* reexamination request differ from those for an *inter partes* reexamination request.** Any written correspondence in response to this notice should be mailed to the Central Reexamination Unit (CRU), ATTN: "Box *Ex Parte* Reexam" at the USPTO address indicated at the top of this notice. Any "replacement documents" may be facsimile transmitted to the CRU at the FAX number indicated below. A REPLACEMENT STATEMENT AND EXPLANATION UNDER 37 CFR 1.510(b)(1) and (2) MAY NOT BE FACSIMILE TRANSMITTED.

James R. Matthews

Legal Instruments Examiner, Central Reexamination Unit
(571) 272- 6274 ; FAX No. (571) 273-9900

cc: Patent Owner's Name and Address: Michhael W. Landry
5098 Seachese Street
San Diego, CA 92130

INSTRUCTIONS TO NOTICE OF FAILURE TO COMPLY WITH *EX PARTE* REEXAMINATION REQUEST FILING REQUIREMENTS (37 CFR 1.510(c))

HOW TO REPLY TO THIS NOTICE

Any written correspondence in response to this notice must include either a **replacement document**, or, **if item #4 is checked and/or it is otherwise specifically required by the Office, a paper containing a replacement statement and explanation under 37 CFR 1.510(b)(1) and (2)** that either replaces the originally-filed statement and explanation or provides a previously missing statement and explanation. A replacement document either replaces an originally-filed document, or provides a previously missing document, that contains part(s) of the request other than the statement and explanation as set forth in 37 CFR 1.510(b)(1) and (2). For example, a replacement to the originally-filed listing of cited patents and printed publications, PTO/SB/08 (formerly designated as PTO-1449) or its equivalent, is a replacement document.

If a paper containing a replacement statement and explanation, or a replacement document (other than a replacement certificate of service), is submitted by a third party requester, it must be **accompanied by a certification that a copy of the replacement statement and explanation under 37 CFR 1.510(b)(1) and (2), or that a copy of the replacement document, has been served** in its entirety on the patent owner at the address provided for in 37 CFR 1.33(c). The name and address of the party served must be indicated. If service was not possible, a duplicate copy of the replacement statement and explanation (or replacement document) must be supplied to the Office.

REPLACEMENT STATEMENT AND EXPLANATION UNDER 37 CFR 1.510(b)(1) and (2) (ITEM #4 IS CHECKED)

The **statement and explanation under 37 CFR 1.510(b)(1) and (2)** (see item #4) must discuss **EVERY patent or printed publication cited in the information disclosure statement** in at least one proposed rejection or statement identifying a substantial new question of patentability (SNQ), AND in a corresponding detailed explanation (see the below discussion). Furthermore, **EVERY claim for which reexamination is requested** must be discussed in at least one proposed rejection or statement identifying an SNQ and in the corresponding detailed explanation. If item #4 is missing or incomplete, a paper containing a **replacement statement and explanation under 37 CFR 1.510(b)(1) and (2) is required.**

A paper containing a replacement statement and explanation under 37 CFR 1.510(b)(1) and (2) may NOT be facsimile transmitted. It must be received by first class mail or by USPS Express Mail.

If an originally-filed information disclosure statement cites patents or printed publications that are NOT discussed in at least one proposed rejection or statement identifying an SNQ AND in the corresponding detailed explanation **in the originally-filed request**, the requester must file either (a) a **replacement document, i.e., a replacement PTO/SB/08 (former PTO-1449)** or its equivalent, listing **ONLY** those patents and printed publications that are so discussed, or (b) a paper containing a **replacement statement and explanation under 37 CFR 1.510(b)(1) and (2).** If the first option is chosen, the replacement PTO/SB/08 or its equivalent should include a cover letter expressly withdrawing from the request any previously cited references that are being omitted by the replacement PTO/SB/08 or its equivalent. The requester may, if desired, file both a replacement PTO/SB/08 or its equivalent and a paper containing a replacement statement and explanation, if the replacement statement and explanation discusses EVERY patent or printed publication, cited in the replacement PTO/SB/08 or its equivalent, in at least one proposed rejection or statement identifying an SNQ and in the corresponding detailed explanation.

Requester is NOT required to, and should not, additionally file a replacement copy of any exhibits, references, etc., or other replacement parts of the request (i.e., replacement documents) if a defect requiring a replacement document is not specifically identified by this notice.

Examples of When a Replacement Statement and Explanation under 37 CFR 1.510(b)(1) and (2) Is Required:

1. The originally-filed request fails to discuss **EVERY** patent or printed publication cited in the originally-filed information disclosure statement in at least one proposed rejection or statement identifying an SNQ and in the corresponding detailed explanation, and the requester does not wish to file a replacement PTO/SB/08 (formerly designated as PTO-1449) or its equivalent listing ONLY those patents and printed publications that are so discussed.

2. The originally-filed request discusses every patent or printed publication cited in the information disclosure statement in at least one proposed rejection or statement identifying an SNQ, but **fails to discuss EVERY patent or printed publication cited in the information disclosure statement in a detailed explanation that corresponds to the proposed rejection or statement identifying an SNQ.**

3. The originally-filed request fails to discuss **EVERY CLAIM** for which reexamination is requested in at least one proposed rejection or statement identifying an SNQ, and in the corresponding detailed explanation.

Examples of Proposed Rejections and Statements Identifying a Substantial New Question of Patentability (SNQ)

Proposed rejections

Claims 1-3 are obvious over reference A in view of reference B.
Claims 4-6 are obvious over reference A in view of references B and C.
Claims 7-10 are obvious over reference Q in view of reference R.

Statements identifying a substantial new question of patentability

A substantial new question of patentability as to claims 1-3 is raised by reference A in view of reference B.
A substantial new question of patentability as to claims 4-6 is raised by reference A in view of references B and C.
A substantial new question of patentability as to claims 7-10 is raised by reference Q in view of reference R.

A proposed rejection or statement identifying an SNQ must be repeated with any *replacement* detailed explanation that corresponds to the proposed rejection or statement identifying an SNQ, in any paper containing a replacement statement and explanation under 37 CFR 1.510(b)(1) and (2).

In addition, the requester should include an explanation of *how the SNQ is raised.*

1. Assume that claim 1 of the patent recites, as one of the limitations, widget W. Requester would state that the XYZ reference, cited in the information disclosure statement, contains a teaching of widget W as recited in claim 1, and that this teaching was not present during the prior examination of the patent under reexamination (i.e., the teaching is "new"). Requester would also state that he believes that a reasonable examiner would consider this teaching important in determining whether or not the claims are patentable. For this reason, requester would state that this teaching by the XYZ reference raises a substantial new question of patentability (SNQ) with respect to at least claim 1 of the patent. Similarly, if dependent claim 6 adds widget H, the requester would state that the ABC reference, cited in the information disclosure statement, contains a teaching of widget H as recited in claim 6, that this teaching was not present during the prior concluded examination of the patent, that a reasonable examiner would consider this teaching important in determining whether or not the claims are patentable, and that this teaching raises an SNQ with respect to dependent claim 6 of the patent.

2. Assume that claim 1 of the patent recites, as one of its limitations, limitation W. Assume either that reference XYZ was applied in a rejection during the prior examination of the patent, or that the teachings of reference XYZ are purely cumulative to a reference cited in a rejection during the prior examination of the patent. Assume further that reference ABC teaches that limitation W would have been either inherent given the teachings of reference XYZ, or would have been obvious in view of the combination of XYZ and ABC. Reference ABC was cited in an information disclosure statement but was never discussed or applied in a rejection ***in combination with the XYZ reference*** during the prior examination of the patent under reexamination. **Requester would state** that reference XYZ was present during the prior examination of the patent under reexamination because it was applied in a rejection during the prosecution of the patent, and that reference ABC was cited in an information disclosure statement but never applied in a rejection (or never discussed), **in combination with the XYZ reference** during the prior examination of the patent under reexamination Requester would then state (1) that the ***combination*** of the XYZ reference and the ABC reference, both of which are cited in the information disclosure statement, contains a teaching of limitation W as recited in claim 1, (2) that this teaching provided by the **combination** of the XYZ and ABC references was not present during the prior examination of the patent under reexamination, (3) that a reasonable examiner would consider this teaching important in determining whether or not the claims are patentable, and (4) that this teaching raises an SNQ with respect to claim 1 of the patent.

Example of a Detailed Explanation

Assume, for example, that a requester believes that the XYZ reference, alone, anticipates claims 1-5. The requester would expressly propose a rejection of claims 1-5 under 35 USC 102(b) as being anticipated by the XYZ reference. In a claim chart, the requester would then show how **each limitation** of claims 1-5 is anticipated by the XYZ reference. If the requester believes that the XYZ reference, in view of the ABC reference, renders obvious claims 6-10, the requester would expressly propose a rejection of claims 6-10 under 35 USC 103 as being obvious over the XYZ reference in view of the ABC reference. In a claim chart, the requester would then show which limitations of claims 6-10 are taught by the XYZ reference, and which limitations of claims 6-10 are taught by the ABC reference. The requester should quote each pertinent teaching in the prior art reference, referencing each quote by page, column and line number, and any relevant figure numbers.

A **patent owner**, when filing a request for reexamination in an *ex parte* reexamination proceeding, may satisfy the requirement under 37 CFR 1.510(b) for supplying a detailed explanation by comparing, limitation-by-limitation, the claim(s) under reexamination with the teachings of each reference cited in the information disclosure statement and in the statement pointing out an SNQ. Each limitation of the claim(s) must be separately discussed. For each claim limitation, the patent owner must do one of the following: (a) show how at least one reference teaches or suggests the limitation, (b) admit that the limitation is "old", or (c) state that the limitation is believed to be missing from the reference. In a claim chart, the patent owner should quote each pertinent teaching in the prior art reference,

referencing each quote by page, column and line number, and any relevant figure numbers. Proposed applications of the cited references and/or proposed combinations of the cited references should separately identified. The patent owner is not required to

expressly propose a rejection of the claim(s) or provide a statement of why the claim(s) under reexamination would have been obvious over a proposed reference combination.

REPLACEMENT DOCUMENTS

If the originally-filed PTO/SB/08 (former PTO-1449) or its equivalent lists patents or printed publications that are NOT discussed in at least one proposed rejection or statement identifying an SNQ AND in the corresponding detailed explanation **in the originally-filed request**, the requester may file a paper containing a **replacement PTO/SB/08 (former PTO-1449) or its equivalent** listing **ONLY** those patents and printed publications that are so discussed. The replacement PTO/SB/08 or its equivalent should include a cover letter expressly withdrawing from the request any formerly cited references that are now being omitted by the replacement PTO/SB/08 or its equivalent. Similarly, if **any patent or printed publication discussed** in at least one proposed rejection or statement identifying an SNQ AND in the corresponding detailed explanation **in the originally-filed request is not listed in the originally-filed PTO/SB/08 (former PTO-1449)** or its equivalent, the requester must file a **replacement PTO/SB/08 (former PTO-1449)** or its equivalent listing all of the patents and printed publications, including the previously omitted reference(s), and provide copies of the missing references if copies were not provided with the originally-filed request

If a copy of a patent, printed publication, or an English-language translation of a patent or printed publication, that is cited in the PTO/SB/08 (former PTO-1449) or its equivalent, is illegible, missing, or incomplete (i.e., it does not contain all of the pages indicated in the PTO/SB/08 (former PTO-1449) or its equivalent), a replacement copy of the patent or printed publication is required.

If a copy of any disclaimer, certificate of correction, or reexamination certificate issued in the patent, or a copy of the entire patent for which reexamination is requested as described in item #6, is missing, or if the copy that was received by the Office was illegible or incomplete, a replacement document (i.e., a replacement copy of the disclaimer, certificate of correction, reexamination certificate, or entire patent under reexamination as described in item #6) is required.

If the requester fails to correctly identify the patent number or the claims for which reexamination is requested on the transmittal form for the request (PTO/SB/57, or an equivalent) as described in item #2, and the patent number and the claims for which reexamination is requested are correctly identified in the originally-filed request, a **replacement transmittal form** is required.

If a certificate of service on the patent owner, as described in item #7, is missing, or if the certificate of service received by the Office is inaccurate or incomplete, a replacement certificate of service is required.

Replacement documents may be facsimile transmitted. A paper containing a replacement statement and explanation may NOT be facsimile transmitted.

ATTACHMENT TO PTOL-2077

The Request for *Ex Parte* Reexamination filed on 12/20/2006 does not comply with the filing requirement of an *ex parte* reexamination proceeding under 37 CFR 1.510(b)(2).

Specifically the request does not include a detailed explanation of how each of the references listed below applies to every claim of U.S. Patent No.7,130,576 for which reexamination was requested (claims 1-23).

United States Patents

4,953,184 (Simone)
6,437,837 (Seo)

Foreign Documents

EP 0912059

Non Patent Literature

A Single Chip Universal Digital Satellite Receiver (Kwentus, et al.)

The Information Disclosure Statement (IDS) accompanying the request for reexamination lists the above references, which are not explained as required by the regulation. However, the other references for example US Patent No. 5,278,837 to Kelley are explained in a manner that complies with 37 CFR 1.510(b)(2). The regulation requires that there be an explanation of the pertinency and manner of applying the cited prior art to every claim for which reexamination is requested. All documents listed on the IDS are cited prior art. Therefore, the IDS co-mingles a document relied upon to establish a substantial new question of patentability with documents that are not relied upon to establish a substantial new question of patentability.

Accordingly, in accordance with 37 CFR 1.510(c), 71 Fed. Reg. 9260, February 23, 2006 (effective March 27, 2006), a filing date for the reexamination request will not be granted **at this time**. Patent owner may either submit an explanation of the pertinency and manner of applying the cited prior art in accordance with 37 CFR 1.510(b)(2), or withdraw the citation of the additionally cited documents and replace the listing of prior art documents with a listing confined to the documents for which the above described discussion required by 37 CFR 1.510(b)(2) has been provided.

Any response to this Notice should be directed to:

By Mail:	Mail Stop "*Ex Parte* Reexam" Attn: Central Reexamination Unit Commissioner for Patents P. O. Box 1450 Alexandria VA 22313-1450
By hand:	Customer Service Window Attn: Central Reexamination Unit Randolph Building, Lobby Level 401 Dulany Street Alexandria, VA 22314

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Bib Data Sheet

CONFIRMATION NO. 3367

SERIAL NUMBER	FILING OR 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/008,389	02/06/2007 RULE	455	3992	05JM-127751

APPLICANTS

7130576, Residence Not Provided;
Entropic Communications Inc.(OWNER), San Diego, CA;
RF Magic(3RD PTY REQ), San Diego, CA;
Daniel N. Yannuzzi, San Diego, CA

**** CONTINUING DATA ***************************

This application is a REX of 10/289,011 11/06/2002 PAT 7,130,576
which claims benefit of 60/345,965 11/07/2001
and claims benefit of 60/333,722 11/27/2001
and claims benefit of 60/358,817 02/22/2002

**** FOREIGN APPLICATIONS *********************

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ yes ☐ no			23	3
35 USC 119 (a-d) conditions met ☐ yes ☐ no ☐ Met after Allowance				
Verified and Acknowledged Examiner's Signature Initials				

ADDRESS
24244

TITLE

SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION

FILING FEE RECEIVED		
2520	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	90/008,389	7130576	
	Examiner	Art Unit	
		3992	

Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
90/008,389	7130576
Examiner	**Art Unit** 3992

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

Claim		Date								
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Issue Classification	Application/Control No. 90/008,389	Applicant(s)/Patent under Reexamination 7130576
	Examiner	Art Unit 3992

ISSUE CLASSIFICATION

ORIGINAL		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
455	003.020	/	/
CROSS REFERENCES		/	/
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)	/	/
		/	/
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		/	/

(Assistant Examiner) (Date)		Total Claims Allowed:
(Legal Instruments Examiner) (Date)	(Primary Examiner) (Date)	O.G. Print Claim(s) / O.G. Print Fig.

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		31		61		91		121		151		181
	2		32		62		92		122		152		182
	3		33		63		93		123		153		183
	4		34		64		94		124		154		184
	5		35		65		95		125		155		185
	6		36		66		96		126		156		186
	7		37		67		97		127		157		187
	8		38		68		98		128		158		188
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	11		41		71		101		131		161		191
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	29		59		89		119		149		179		209
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Reexamination	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/008,389	7130576
	Certificate Date	Certificate Number

Requester Correspondence Address: ☐ **Patent Owner** ☒ **Third Party**

Daniel N. Yannuzzi
SHEPPARD, MULLIN, RICHTER & HAMPTON LLP
12275 El Camino Real, Suite 200
San Diego, CA 92130-

LITIGATION REVIEW ☐	(examiner initials)	(date)
Case Name		Director Initials

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	**NUMBER**
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Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination
	90/008,389	7130576
	Examiner	Art Unit: 3992

SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

71338
02/06/07

SHEPPARD MULLIN
SHEPPARD MULLIN RICHTER & HAMPTON LLP
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Writer's Direct Line: 858-720-8924
dyannuzzi@sheppardmullin.com

Our File Number: 05JM-127751

February 6, 2007

Mail Stop: *Ex Parte* Reexamination
Commissioner for Patents
PO Box 1450
Alexandria, VA 222313-1450

Re: Reexamination Control No. 90/008,389
U.S. Patent No. 7,130,576; Issued: October 31, 2006
(*issued from Appl. No. 10/289,011*)
For: **Signal Selector And Combiner For Broadband Content Distribution**
Inventors: Gurantz, et al.
Our Ref: 05JM-127751

Sir:

Transmitted herewith for appropriate action are the following documents:

Cover Letter accompanying Revised Information Disclosure Statement and Clarifying Remarks;

Replacement Statement for the Request for Reexamination of U.S. Patent No. 7,130,576;

Form PTO/SB/08a listing nine cited U.S. references and two cited non-US references;

Form PTO/SB/08b listing five cited non-patent literature documents;

Certificate of Mailing by "Express Mail " (37 CFR 1.10) to the USPTO, Commissioner of Patents;

Certificate of Service by "Express Mail" to Michael Landry; and

One (1) return postcard.

It is respectfully requested that the attached postcard be stamped with the date of filing of these documents, and that it be returned to our us.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-1853.

Respectfully submitted,

Daniel N. Yannuzzi
Attorney for Requester
Registration No. 36,727

for SHEPPARD, MULLIN, RICHTER & HAMPTON LLP

W02-WEST:6DNY1\400187305.1
Enclosures

CERTIFICATE OF MAILING BY "EXPRESS MAIL" (37 CFR 1.10) Applicant(s):			Docket No. 05JM-127751	
Application No. 90/008389	Filing Date 12/20/06	Examiner James R. MATTHEWS	Customer No. 30764	Group Art Unit TBD

Invention: **SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION**

I hereby certify that the following correspondence:

Letter Transmittal;Cover Letter accompanying Revised Information Disclosure Statement and Clarifying Remarks; Replacement Statement for the Request for Reexamination of U.S. Patent No. 7,130,576; Form PTO/SB/08a ;Form PTO/SB/08b; Certificate of Service to Michael Landry (1 pg.); Return Receipt Postcard

(Identify type of correspondence)

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on

Mail Stop: Ex Parte Rexam

February 6, 2007
(Date)

Lisa E. Jambeau
(Typed or Printed Name of Person Mailing Correspondence)

Lisa E. Jambeau
(Signature of Person Mailing Correspondence)

EV 818035656
("Express Mail" Mailing Label Number)

Note: Each paper must have its own certificate of mailing.

P06A/REV03

71338 U.S. PTO
02/06/07

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of Gurantz, et al.	)	
	)	
In re REQUEST FOR REEXAMINATION	)	
of	)	
U.S. Patent No. 7,130,576	)	
	)	
Patent Date: October 31, 2006	)	Atty. Dkt. No. 05JM-127751
	)	Control No. 90/008,389
For: SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION	)	

Mail Stop: *Ex Parte* Reexamination
Attn: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

COVER LETTER ACCOMPANYING REVISED INFORMATION DISCLOSURE STATEMENT AND CLARIFYING REMARKS

This cover letter and these remarks relate to the above-captioned Request for *Ex Parte* Reexamination (the "Original Request"), originally filed on behalf of Requester, R. F. Magic, Inc. On January 10, 2007, the Central Reexamination Unit mailed a Notice Of Failure To Comply With *Ex Parte* Reexamination Request Filing Requirements (the "Notice"). In response to this Notice, Requester, by its undersigned attorney, hereby submits this cover letter with the following remarks, a new Information Disclosure Statement on form PTO/SB/08, and a Replacement Statement for the Original Request, including an updated statement and explanation (the "Replacement Statement").

Requestor hereby expressly withdraws from the request any previously cited references that are being omitted from the replacement PTO/SB/08. Requestor submits that this Cover Letter and Remarks along with the accompanying documents fully address the Notice.

REMARKS

1. References Identified in PTOL-2077

The Attachment to PTOL-2077 accompanying the Notice states that the Original Request does not comply with the requirements set forth in 37 C.F.R. § 1.510(b)(2) because the Original Request does not include a detailed explanation of how each of the references is applied. Particularly, the notice states that a detailed explanation is absent for four of the references listed on the IDS. The references noted are:

United States Patents

4,953,184 (Simone)

6,437,837 (Seo)

Foreign Documents

EP 0912059

Non Patent Literature

A Single Chip Universal Digital Satellite Receiver With 480-Mhz IF Input (Kwentus, *et. al.*)

For the reasons set forth below, and based on the new Information Disclosure Statement submitted herewith, Requester respectfully submits that all noted non-compliance items are hereby cured or sufficiently addressed to render them moot. Requestor addresses each reference individually.

a. References Removed From IDS

United States Patent No. 4,953,184, to Simone, was inadvertently added to the Information Disclosure Statement. The new Information Disclosure Statement accompanying this response on form PTO/SB/08 does not include the '184 Simone patent. Requester hereby expressly withdraws United States Patent No. 4,953,184, to Simone, from the Request. Requester notes that a high-level discussion of the Simone patent remains in the Replacement Statement. This discussion provides background and historical perspective to technologies relating to A/D conversion and digital filtering. A telephone conference with Examiner Patricia Volpe was held on January 31, 2007. Examiner Volpe confirmed that it would be appropriate to leave this discussion of the Simone patent in the document, while removing citation of the Simone patent from the IDS, as the Simone patent is withdrawn from consideration. The undersigned wishes to thank Examiner Volpe for her time.

EP 0912059 was not listed on the original information disclosure statement filed by Requester. It is unclear how this document was raised by the Office as being listed on the original Information Disclosure Statement. Nonetheless, the new Information Disclosure Statement accompanying this response does not include EP 0912059. Although this reference was not believed to be included in the original IDS, out of an abundance of caution, Requester hereby expressly withdraws EP 0912059 from the Request. A telephone conference with Examiner Matthew was held on January 19, 2007 to confirm that this action would be sufficient to address this reference. The undersigned wishes to thank Examiner Matthew for his time.

b. References Properly Addressed in Original Request

As detailed below, the following two references were properly addressed in the Original Request. This was confirmed with Examiner Volpe in the January 31, 2007 telephone conference. The undersigned again wishes to thank Examiner Volpe for her time.

United States Patent No. 6,437,837, to Seo was properly addressed in the Original Request. The Original Request does include a detailed explanation of the pertinency and manner

of applying the Seo '837 patent to claim 10. In particular, a detailed explanation of how the Seo '837 patent is applied to Claim 10 can be found at pages 60 and 94 of the Original Request, and can be found at the same pages in the Replacement Statement.

A Single Chip Universal Digital Satellite Receiver With 480-Mhz IF Input was properly addressed. The Original Request does include a detailed explanation of the pertinency and manner of applying the paper "A Single Chip Universal Digital Satellite Receiver With 480-Mhz IF Input" to the claims. This paper is identified by its full title and then given a shorthand designation as the "Broadcom Paper." This appears in the Table of Exhibits at page 5 and in the list of references at page 9. A detailed explanation of how this reference is applied to Claim 3 can be found at pages 55 and 89 of the Original Request. A detailed explanation of how this reference is applied to Claim 15 can be found at page 95 of the Original Request. These explanations can also be found at the same pages in the Replacement Statement.

2. The Replacement Statement

Although a Replacement Statement is not required to correct the deficiencies noted in the PTOL-2077, an updated Replacement Statement is submitted herewith to correct typographical errors. Particularly, in the discussion of Claim 15 at page 95, the Original Request inadvertently referenced Claim 10 instead of Claim 15 in two instances. These are replaced with proper reference to Claim 15 in the Replacement Statement. Also, at page 55 the Original Request inadvertently reference the "Broadcom Paper" as the "Broadcom Satellite Receiver Reference." This too is corrected in the Replacement Statement. Finally, the Control Number was added to the cover page in the Replacement Statement. The correction of these two typographical errors and the addition of the Control Number are the only changes made by the Replacement Statement.

It was confirmed with Examiner Volpe that copies of the attachments and exhibits do not need to be resubmitted with the Replacement Statement. As such, these are not being refiled herewith.

CONCLUSION

Requester has addressed each of the items raised by the Attachment to PTOL-2077. Specifically, a new IDS on form PTO/SB/08 is submitted without U.S. 4,953,184 or EP 0912059, and a statement made that these are expressly withdrawn. The other two references, U.S. 6,437,837, and the paper "A Single Chip Universal Digital Satellite Receiver With 480-Mhz IF Input" were properly addressed in the Original Request and remain in the Replacement Statement. Requester has pointed the Office to locations in the Original Request and Replacement Statement where these references are addressed. Requestor submits that it has fully complied with all filing requirements for an *ex parte* reexamination proceeding under 37 C.F.R. § 1.510(a) and (b) and respectfully requests that its request for *ex parte* reexamination be accepted as complete and given a filing date.

Respectfully Submitted,

DATED: February 6, 2007

SHEPPARD MULLIN RICHTER & HAMPTON LLP

By _____

DANIEL H. YANNUZZI
Attorney for Requester
Reg. No. 36,727

Sheppard Mullin Richter & Hampton LLP
12275 El Camino Real, Suite 200
San Diego, CA 92130-2006
Telephone: 858-720-8900
Facsimile: 858-509-3961

PTO/SB/08a (09-06)
Approved for use through 03/31/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Apt of 1995 no Persons are required to respond to a collection of information unless it contains a valid OMR control number

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	90/08,389
Filing Date	12/20/06
First Named Inventor	Itzhak GURANTZ
Art Unit	TBD
Examiner Name	James R. MATTHEWS
Attorney Docket Number	05JM-127751

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 5,278,837		Kelley	
		US- 5,285,284		Takashima et al.	
		US- 5,654,774		Pugel et al.	
		US- 5,703,390		Green et al	
		US- 6,005,861		Humpleman	
		US- 6,353,463		Seo	
		US- 6,437,837		Seo	
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] "Number[4] "Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
		EP 1009113				
		EP 0757489				

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1]Applicant's unique citation designation number (optional). [2]See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

American LegalNet, Inc.
www.FormsWorkflow.com

PTO/SB/08b (09-06)
Approved for use through 03/31/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Apt of 1995 no Persons are required to respond to a collection of information unless it contains a valid OMR control number.

Substitute for form 1449B/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 2

	Complete if Known
Application Number	90/008,389
Filing Date	12/20/06
First Named Inventor	Itzhak GURANTZ
Art Unit	TBD
Examiner Name	James R. MATTHEWS
Attorney Docket Number	05JM-127751

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Eutelstat, "Information for Installers of Hot Bird tm DVB-S Systems, Version 1.0" http://www.eutelstat.com/docs/tech, June 7, 1999	
		Eutelstat, Digital Satellite Equipment Control (DiSEqC TM) "Update and Recommendation for Implementation, Version 2.0" http://www.eutelstat.org/press/tv_recept1/html#DiSEqC, April 18, 1997	
		Philips Semiconductors-Integrated Circuits "Data Sheet for UAA3203M Frequency Shift Keying Receiver" Preliminary specification, 1997 Aug 12, www.datasheetcatalog.com	
		A.Y. Kwentus, et al. "A Single Chip Universal Digital Satellite Receiver with 480-Mhz IF Input" IEEE Journal of Solid-State Circuits, Vol. 34, No. 11, November 1999, pp. 1634-1646	
		Thomson Consumer Electronics "RCA DirectTV Receiver with UltimateTV Service Setup Guide" WebTV Networks, Inc. 2000	

Examiner Signature		Date Considered	

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1] Applicant's unique citation designation number (optional). [2] Applicant is to place a check mark here if English language Translation is attached.
This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of Gurantz, et al.	)	
	)	
REQUEST FOR REEXAMINATION	)	
of	)	
U.S. Patent No. 7,130,576	)	
	)	
Patent Date: October 31, 2006	)	Atty. Dkt. No. 05JM-127751
	)	Control No. 90/008,389
For: SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION	)	

Mail Stop: *Ex Parte* Reexamination
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

REPLACEMENT STATEMENT FOR THE

REQUEST FOR REEXAMINATION OF U.S. PATENT NO. 7,130,576

Sir:

Reexamination under 35 U.S.C. §§ 302-307 and 37 C.F.R. § 1.510 is requested of United States Patent No. 7,130,576 (hereinafter "the '576 patent") which was applied for on November 6, 2002 by Gurantz, et al. (but for which some of the subject matter might have an effective filing date of perhaps as early as November 7, 2001). The '576 Patent has not previously been subject to reexamination. This Request is brought on behalf of RF Magic, Inc.

Pursuant to 37 C.F.R. § 1.510, a full copy of the '576 patent is attached as **Exhibit A**.

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L. United States Patent No. 5,285,284 to Takashima et al. 15

The Takashima patent reference (Exhibit M) was filed on November 9, 1992 and issued February 8, 1994, over 7 years before the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b). 15

M. United States Patent No. 6,353,463 to Seo 15

The Seo '463 patent reference (Exhibit N) was filed on August 24, 1998 more than 3 years before the earliest possible priority date of the '576 patent and issued March 5, 2002. It is thus prior art under 35 U.S.C. §102(e). 15

N. RCA DIRECTV Receiver with UltimateTV Service Setup Guide (The RCA Setup Guide) 15

The RCA Setup Guide (Exhibit O) has a copyright date of 2000. This is before the earliest possible priority data of the '576 patent and thus it is prior art under 35 U.S.C. §102(a). 15

O. United States Patent No. 5,278,837 to Kelley 15

The Kelly patent reference (Exhibit P) was filed on June 29, 1992 and issued January 11, 1994, over 7 years before the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b). 15

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B. Claims 2 – 5, 7, 10, 15-17, and 20-23 of the '576 Patent are unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with various secondary references as discussed below: 53

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D. Claims 2 – 5, 7, 10, 15-17, and 20-23 of the '576 Patent are unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification as discussed below: 87

IX. ACTION REQUESTED 99

TABLE OF EXHIBITS

A. United States Patent No. 7,130,576, to Gurantz *et al.*;

B. "INFORMATION FOR INSTALLERS OF HOT BIRD™ DVB-S SYSTEMS, VERSION 1.0" (hereinafter "Eutelsat Installers Guide"), EUTELSAT, dated June 7, 1999;

C. "DIGITAL SATELLITE EQUIPMENT CONTROL (DiSEqC TM) UPDATE AND RECOMMENDATIONS FOR IMPLEMENTATION, VERSION 2.0" (hereinafter "Eutelsat DiSEqC Specification"), EUTELSAT, dated April 18, 1997;

D. United States Patent No. 6,437,837 to Seo (hereinafter "Seo");

E. United States Patent No. 5,073,390 to Green *et al.* (hereinafter "Green");

F. United States Patent No. 6,005,861 to Humplemann (hereinafter "Humplemann");

G. "A SINGLE CHIP UNIVERSAL DIGITAL SATELLITE RECEIVER WITH 480-Mhz IF INPUT" (hereinafter the "Broadcom Paper");

H. "PHILLIPS DATA SHEET FOR UAA3202M FREQUENCY SHIFT KEYING RECEIVER", (hereinafter the "Phillips Data Sheet");

I. United States Patent No. 5,654,774 to Pugel *et al.* (hereinafter "Pugel");

J. United States Patent No. 4,953184 to Simone (hereinafter "Simone");

K. European Patent No. 1009113 (hereinafter "EPO '113 Patent");

L. European Patent No. 0757489 (hereinafter "EPO '489 Patent");

M. United States Patent No. 5,285,284 to Takashima *et al.* (hereinafter "Takashima");

N. United States Patent No. 6,353,463 to Seo (hereinafter "Seo")

O. "RCA DIRECTTV RECEIVER WITH ULTIMATETV SERVICE SETUP GUIDE (hereinafter the "RCA Setup Guide"); and

P. United States Patent No. 5,278,837 to Kelley (hereinafter "Kelley").

I.

SUMMARY OF THE LAW GOVERNING REEXAMINATION

A. Claim interpretation

In determining whether a "substantial new question of patentability" exists as to make reexamination appropriate, "the PTO must apply the broadest reasonable meaning to the claim language, taking into account any definitions presented in the specification." *In re Bass*, 314 F.3d 575, 577 (Fed. Cir. 2002) (citing *In re Yamamoto*, 740 F.2d 1569, 1571 (Fed. Cir. 1984)); *accord In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1369 (Fed. Cir. 2004) ("PTO is obligated to give claims their broadest reasonable interpretation during examination."). Thus, during reexamination (as in an original or reissue examination), claims should be given the broadest reasonable interpretation, rather than the narrower interpretation appropriate in a suit for patent infringement. One rationale for this rule is that in a reexamination, unlike an infringement action, the patent owner may amend the claims. *See In re Yamamoto*, 740 F.2d at 1571-1572.

Consistent with applicable law, the identified claims are given their broadest reasonable interpretation consistent with the '576 patent specification, even though the claims may have a narrower interpretation in an infringement suit. In Requestor's opinion, there is a substantial new question of patentability with respect to claims 1-23, irrespective of the breadth of the interpretation of the claims.

The prior art references upon which the Requester relies — in some cases individually, and in other cases in combinations that the references themselves or the knowledge of one skilled the art suggest — are references that a reasonable examiner would consider important in

deciding whether the claims of the '576 patent are patentable.[1] Moreover, applying the preponderance of the evidence standard[2] for anticipation or obviousness in light of these references leads to only one reasonable conclusion: that claims 1-23 of the '576 Gurantz patent are invalid.

B. Originally cited references used in a reexamination rejection

Under 35 U.S.C. § 303(a), the "existence of a substantial new question of patentability is not precluded by the fact that a patent or printed publication was previously cited by or to the Office or considered by the Office." It is noted, however, that this reexamination request is not based solely on art previously before the Patent Office during prosecution of the '576 patent. The primary references relied on in this request were not cited by or to the Office nor were they considered by the Office. Additionally, while the Seo reference was considered by the Office, it was not considered in combination with the new primary references.

C. Evidence that may be used in a reexamination

In addition to patents and printed publications, admissions by a patentee may also be used as evidence to establish a substantial new question of patentability in combination with a patent or a printed publication. MPEP 2217. An admission by a patentee may reside in a record created during litigation. *Id.* Such patentee admissions may be relied upon for any matter affecting patentability. 37 C.F.R. 1.104(c)(3).

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[1] *See* MPEP § 2242 ("It is not necessary that a '*prima facie*' case of unpatentability exist as to the claim in order for 'a substantial new question of patentability' to be present as to the claim. . . .) (citing *In re Etter*, 756 F.2d 852, 857 n.5 (Fed. Cir. 1985)).

[2] *See Xerox Corp. v. 3Com Corp.*, 69 F. Supp. 2d 404, 407 (W.D.N.Y. 1999) ("[I]n a reexamination proceeding before the PTO, there is no presumption of validity and there must only be a preponderance of the evidence to show unpatentability before the PTO may reject the patent claim(s)."); *Bruning v. Hirose*, 161 F.3d 681, 685 (Fed. Cir. 1998) (patents do not "retain the presumption of validity during reexamination proceedings"); *See also In re Etter*, 756 F.2d 852, 858 (Fed. Cir. 1985) (statutory presumption of patent validity does not apply in patent reexamination proceedings, such that the examiner need not satisfy the "clear and convincing" evidentiary burden to reject a claim).

D. Matters appropriate for consideration in reexamination

Determining whether a claim is entitled to claim benefit of priority from an earlier application or benefit from a 37 CFR 1.131 declaration filed in a related patent are appropriate matters for consideration in reexamination because the priority date of a claim determines whether a given reference is prior art to that claim. *See* MPEP §§ 2258(I)(C) and 201.11.

II.
CERTIFICATION OF SERVICE OF THIS REQUEST

Requestor's representative, by signing below, certifies that pursuant to 37 C.F.R §1.33(c) a copy of this Request for Reexamination in its entirety has been served on the attorney of record for the patent owner at the address listed in the PTO PAIR database, and as verified by the Office's roster of patent attorneys and agents:

Michael W. Landry

5098 Seachase St.

San Diego, CA 92130

858-229-6801

III.
COMMUNICATIONS TO THIRD PARTY REQUESTOR

Please direct all communications for the third party requestor concerning this Request for Reexamination to:

Daniel N. Yannuzzi

Sheppard, Mullin Richter & Hampton LLP

12275 El Camino Real, Suite 200

San Diego, CA, 92130

(USPTO Customer Number 30764)

IV.
CLAIMS FOR WHICH REEXAMINATION IS REQUESTED

Presented below is a request for reexamination of all claims 1-23 of the '576 patent, in view of the following documents:

1. "INFORMATION FOR INSTALLERS OF HOT BIRD™ DVB-S SYSTEMS, VERSION 1.0" (hereinafter "Eutelsat Installers Guide", Exhibit B);

2. "DIGITAL SATELLITE EQUIPMENT CONTROL (DiSEqC TM) UPDATE AND RECOMMENDATIONS FOR IMPLEMENTATION, VERSION 2.0" (hereinafter "Eutelsat DiSEqC Specification", Exhibit C);

3. United States Patent No. 6,437,837 to Seo (hereinafter "Seo", Exhibit D);

4. United States Patent No. 5,073,390 to Green *et al.* (hereinafter "Green", Exhibit E);

5. United States Patent No. 6,005,861 to Humplemann (hereinafter "Humplemann", Exhibit F);

6. "A SINGLE CHIP UNIVERSAL DIGITAL SATELLITE RECEIVER WITH 480-Mhz IF INPUT" (hereinafter the "Broadcom Paper", Exhibit G);

7. "PHILLIPS DATA SHEET FOR UAA3202M FREQUENCY SHIFT KEYING RECEIVER", (hereinafter the "Phillips Data Sheet" Exhibit H);

8. United States Patent No. 5,654,774 to Pugel *et al.* (hereinafter "Pugel", Exhibit I);

9. United States Patent No. 4,953184 to Simone (hereinafter "Simone", Exhibit J);

10. European Patent No. 1009113 (hereinafter "EPO 113 Patent", Exhibit K);

11. European Patent No. 0757489 (hereinafter "EPO 480 Patent", Exhibit L); and

12. United States Patent No. 5,285,284 to Takashima *et al.* (hereinafter "Takashima", Exhibit M);

13. United States Patent No. 6,353,463 to Seo (hereinafter "Seo", Exhibit N);

14. "RCA DIRECTTV RECEIVER WITH ULTIMATETV SERVICE SETUP GUIDE (hereinafter the "RCA Setup Guide", Exhibit O); and

15. United States Patent No. 5,278,837 to Kelley (hereinafter "Kelley", Exhibit P).

These documents are listed on the accompanying For, PTO/SB/08a and Form PTO/SB/08b.

V.
DESCRIPTION OF THE '576 PATENT

A. Published '576 Patent

The published '576 Patent is directed to a satellite receiving system where transponder signals (sometimes referred to as transponder channels[3]) from a broadband satellite signal are selected and combined. The combined signal is then transmitted from an outdoor unit to a set top box or Integrated Receiver Decoder (IRD). Representative independent claims 1, 8, and 14 are reproduced below.

> 1. A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals form satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising: a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals from at least on broadband LNB signal based on the transponder select information; a frequency translator coupled to the signal selector that is capable of shifting the selected transponder signals to new carrier frequencies to produce RF signals; and a combiner coupled to at least one frequency translator capable of combining at least two RF signals to produce a composite signal; wherein the modulation of the composite signal is the same as modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable; whereby the composite signal is transmitted to the IRD.
>
> 8. A signal distribution system for distributing signals comprising a plurality of channels from a plurality of sources between a first unit and a second unit over a communication medium comprising: means in the first unit responsive to

[3] See, for example, Col. 2, lines 55 – 60 where the selected transponder signals are referred to as "transponder channels."

information transmitted by the second unit for extracting selected channels from each of the plurality of sources and combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; and means in the second unit for receiving the composite signal and demodulating and decoding at least one channel; and means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

14. A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of: communicating a transponder request signal to the ODU from the IRD; in the ODU, selecting a plurality of transponder signals extracted from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals; combining selected transponder signals into a composite signal; transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

B. Summary of the Prosecution History of the '576 Patent

The '576 patent was applied for on November 11, 2002, under application Serial Number 10/289/011. The application claimed priority to application 60/345,965 (filed November 7, 2001) and listed Itzhak Gurantz, Ladd El Wardani, and Michael Landry as inventors. The application listed twenty-three (23) claims, three of which were independent – Claims 1, 8, and 14.

On or about April 26, 2005, the Examiner issued a First Office Action rejecting all twenty three claims. In response, on or about August 9, 2005, the patentee amended claims 1, 8, 14, 15, and 17. According to the patentee, these revisions clarified that there is no transmodulation in the claimed invention, that the broadband LNB signal is the full LNB output, and that decoding of transponder signals is performed only in the IRDs,

The patentee's arguments were unpersuasive and the examiner again rejected all 23 claims. In response, the patentee again amended several claims. These amendments imposed limitations that the claimed invention select several transponder signals from the broadband signals and that the claimed invention be able to transmit signals over a single coaxial cable.

Despite these amendments, the Examiner rejected claims 1-23 a third time. Following to this third office action, the patentee conducted an interview with the Examiner and amended claims 8, 16, and 21. The interview included an explanation that the claimed invention "include[s] the limitation of transponder selection responsive to a signal transmitted by an IRD." And that in the claimed "invention, a single cable can run from the selector and combiner, which can be in the ODU, to the inside of the building. The signal is split inside the building using a gateway or splitter device to distribute a composite signal to IRDs. The IRD commands to the selector requests individual transponder signals from satellite signals output by any one of the LNBs. The signal selector selects the transponder signals requested from each IRD, combines all of the selected transponder signals into a composite signal, then transits the composite signal, sent preferably over a single cable, and tunes its requested transponder signal for decoding and display on a television connected to the IRD. The composite signal changes based on collection of transponder select signals from each IRD. ... [W]hereas in the applicant's invention and claim, the frequency translator operates on the signal output from the LNB[.]"

The Examiner allowed all claims as amended following this response. For closer review a detailed summary of the prosecution history is attached as Appendix A.

VI.
THE CITED REFERENCES ARE PRIOR ART TO THE '576 patent

The Eutelsat Installers Guide, Eutelsat DiSEqC Specification[4], Seo Patent, Pugel Patent, Green Patent, Simone Patent, EPO Patent 113, EPO Patent 489, and WIPO 379 references are prior art to the '576 Patent as described below.

A. The Eutelsat Installer's Guide

The Eutelsat Installers Guide (Exhibit B) was published on June 7, 1999, more than two years prior to the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

B. The Eutelsat DiSEqC Specification

The Eutelsat DiSEqC Specification (Exhibit C) was published on February 25, 1998, more than three years prior to the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

C. United States Patent No. 6,437,837 to Seo

The Seo '837 Patent reference (Exhibit D) was filed December 30, 1999, more than two years prior to the earliest possible priority date of the '576 patent and issued on August 20, 2002. It is thus prior art under 35 U.S.C. §102(e).

D. United States Patent No. 5,073,930 to Green

The Green patent reference ((Exhibit E) was filed on October 9, 1989 and issued December 17, 1991, almost 10 years before the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

E. United States Patent No. 6,005,861 to Humpleman

[4] The Eutelsat Installers Guide and the Eutelsat DiSEqC Specification are sometimes referred to collectively as the Eutelsat Reference or the Eutelsat References.

The Humpleman Patent reference (Exhibit F) was filed March 3, 1999, has a priority date of November 22, 1995 and issued December 21, 1999, more than one year prior to the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

F. A Single Chip Universal Digital Satellite Receiver with 480-MHz IF Input (the Broadcom Paper)

The Broadcom Paper (Exhibit G) was published in the IEEE in 1999, more than one year prior to the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

G. Philips Data Sheet for UAA3202M Frequency Shift Keying Receiver (Philips Data Sheet)

The Philips Data Sheet (Exhibit H) was published on August 12, 1997, more than one year prior to the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

H. United States Patent No. 5,654,774 to Pugel *et al.*

The Pugel Patent reference (Exhibit I) was filed June 6, 1995 and issued August 5, 1997, more than four years prior to the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

I. United States Patent No. 4,953,184 to Simone

The Simone Patent reference (Exhibit J) was filed June 1, 1989 and issued August 28, 1990, more than ten years prior to the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

J. European Patent No. 1009113

The EPO 113 Patent reference (Exhibit K) published on June 14, 2001, more than five months prior to the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(a).

K. European Patent No. 0757489

The EPO 489 Patent reference (Exhibit L) was issued on February 5, 1997, more than four years prior to the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

L. United States Patent No. 5,285,284 to Takashima et al.

The Takashima patent reference (Exhibit M) was filed on November 9, 1992 and issued February 8, 1994, over 7 years before the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

M. United States Patent No. 6,353,463 to Seo

The Seo '463 patent reference (Exhibit N) was filed on August 24, 1998 more than 3 years before the earliest possible priority date of the '576 patent and issued March 5, 2002. It is thus prior art under 35 U.S.C. §102(e).

N. RCA DIRECTV Receiver with UltimateTV Service Setup Guide (The RCA Setup Guide)

The RCA Setup Guide (Exhibit O) has a copyright date of 2000. This is before the earliest possible priority data of the '576 patent and thus it is prior art under 35 U.S.C. §102(a).

O. United States Patent No. 5,278,837 to Kelley

The Kelly patent reference (Exhibit P) was filed on June 29, 1992 and issued January 11, 1994, over 7 years before the earliest possible priority date of the '576 patent and thus is prior art under 35 U.S.C. §102(b).

VII.
STATEMENT POINTING OUT EACH SUBSTANTIAL NEW QUESTION OF PATENTABILITY

A. Introduction

Substantial new questions of patentability of the claims of the '576 patent exist under 37 C.F.R. § 1.510(b)(1), as discussed in detail below.

The presence or absence of "a substantial new question of patentability" determines whether or not reexamination is ordered. *See*, MPEP § 2242. In determining whether a substantial new question of patentability exists, MPEP § 2242, Subtitle I, paragraph 3, provides:

> A prior art patent or printed publication raises a substantial question of patentability where there is a substantial likelihood that a reasonable examiner would consider the prior art patent or printed publication important in deciding whether or not the claim is patentable.

The MPEP § 2242 further provides that

> If the prior art patents and/or publications would be considered important, then the examiner should find "a substantial new question of patentability" unless the same question of patentability has already been decided as to the claim in a final holding of invalidity by the Federal court system or by the Office in a previous examination.

For the reasons noted below, Requestor submits that a reasonable Examiner would consider the prior art cited herein important in deciding whether or not the subject claims are patentable. Alone or in combination with other references as described herein.

B. Summary of Applicability of the References

Regarding the references presented with the instant Request, it is noted that with the exception of the Seo '837 patent, none of the references relied on herein were part of the prior art of record during the prosecution of the '576 Patent. The Seo '837 Patent reference was part of the prior art of record, but is presented here in combination references that were not considered by the Examiner during the prosecution of the '576 Patent. As such, and in view of the teachings

thereof, the attached references are believed to present substantial new questions of patentability with respect to the claims of the '576 patent to which it is applied.

A detailed explanation of the pertinence and suggested manner of applying the cited prior art to each of claims 1-23 of the '576 patent is set forth below in Section VIII.

1. The Primary References

a. *The Eutelsat Installer's Guide*

The Eutelsat Installer's Guide (Exhibit B) is directed toward satellite receiving systems and methods for broadband content distribution, and provides an overview of possible satellite reception and distribution system architectures. One such example architecture is illustrated at Figure 11.

Particularly, the Eutelsat Installer's Guide discloses architectures for individual and collective reception systems, that include a satellite dish antenna to receive the satellite transmissions, low noise amplifier and block converters (LNBs) to amplify and block convert the received RF satellite transmission to a lower frequency IF band. The LNBs thus output a broadband LNB signal that is comprised of a plurality of different transponder signals each carrying a different "channel" of program content. For example, Figure 11 illustrates a Quad LNB, which outputs four broadband LNB signals, each carrying one of the four permutations of the two bands (high and low) and two polarizations.

The broadband LNB output signals at the IF frequency are distributed to IF-IF converters, which ultimately perform the channel selection. The distribution can be performed by a matrix switch (sometimes referred to as a multiswitch, multiport switch, or crosspoint switch), or it can be performed by band stacking the LNB outputs and providing the stacked outputs to the IF-IF converters for channel selection. A matrix switch, for example, selects a given broadband LNB

signal and switches or 'connects' it to an identified IF-IF converter. In other words, where a given IF-IF converter has identified a particular channel for selection, satellite IF distribution switches or supplies the broadband LNB signal that contains that channel to the IF-IF converter so it can extract the channel therefrom.

The IF-IF converters receive the broadband LNB signals and select or extract the identified channel therefrom. The IF-IF converters are configured to center the extracted channel about an identified IF frequency so that the channel can be placed in a composite signal along with other channels extracted by other IF-IF converters. To elaborate on channel selection further, each IF-IF converter translates it's extracted channel from its original center frequency in the broadband LNB output to its new center frequency for placement in the composite signal. Without this step, the composite signal could not be properly constructed. As stated by the Eutelsat Installers Guide, the IF-IF converters reconstruct or rebuild the satellite IF spectrum (LNB output) so that it is suitable for distribution by a single cable (the composite signal).

The Eutelsat Installers Guide further discloses that the converted IF outputs combined into the composite signal are distributed by a single cable drop from the combiner to the set top boxes (satellite television receivers). The single composite signal can be split to feed it to multiple set top boxes. Thus, the Eutelsat Installers Guides teaches that a single cable drop from the combiner (in the outdoor unit) can be supplied to the IRDs inside, and split inside, without requiring multiple cable runs from the ODU to inside the premises.

The Eutelsat Installers Guide further discloses that the channel selection can be performed remotely by the IRDs. In particular, the Eutelsat Installers Guide discloses the DiSEqC signaling techniques to provide two-way communication between the satellite receiver (IRD) and the outdoor unit (selection equipment) to allow "remote channel selection."

b. ***The Eutelsat DiSEqC Specifications***

The Eutelsat DiSEqC Specification (Exhibit CD) is directed toward satellite receiving systems and methods, including a signal selector for broadband content distribution. The Eutelsat DiSEqC Specification discloses various architectures for distribution of satellite broadcast signals for satellite television applications, along with remote band and channel selection using the DiSEqC signaling protocol.

One example architecture is illustrated in Figure 19, at page 23 of the Eutelsat DiSEqC Specification (in Annex A of the reference).

The illustrated architecture includes a satellite dish antenna to receive the satellite transmissions, two low noise amplifier and block converters (LNBs) to amplify and block convert the received RF satellite transmission to a lower frequency IF band. The LNBs thus output a broadband LNB signal that is comprised of a plurality of different transponder signals each carrying a different "channel" of program content. For example, Figure 19 illustrates two Quad LNBs, each of which output four broadband LNB signals, wherein each signal carries one of the four permutations of the two bands (high and low) and two polarizations.

The broadband LNB output signals at the IF frequency are distributed to IF-IF converters, which ultimately perform the channel selection. The distribution is illustrated as being performed by a matrix switch (sometimes referred to as a multiswitch, multiport switch, or crosspoint switch) that selects a given broadband LNB signal and switches or 'connects' it to an identified IF-IF converter. In other words, where a given IF-IF converter has identified a particular channel for selection, the matrix switch switches or supplies the broadband LNB signal that contains that channel to the IF-IF converter so it can extract the channel therefrom.

The IF-IF converters receive the broadband LNB signals and select or extract the identified channel therefrom. The IF-IF converters are configured to center the extracted channel about an identified IF frequency so that the channel can be placed in a composite signal along with other channels extracted by other IF-IF converters. To elaborate on channel selection further, each IF-IF converter translates it's extracted channel from its original center frequency in the broadband LNB output to its new center frequency for placement in the composite signal. Without this step, the composite signal could not be properly constructed. As stated by the companion document, the Eutelsat Installers Guide, the IF-IF converters reconstruct or rebuild the satellite IF spectrum (LNB output) so that it is suitable for distribution by a single cable (the composite signal).

The Eutelsat DiSEqC Specification further discloses that the converted IF outputs are combined into the composite signal are distributed by a single cable drop from the combiner to the set top boxes (satellite television receivers). The single composite signal can be split to feed it to multiple set top boxes. Thus, the Eutelsat DiSEqC Specification teaches that a single cable drop from the combiner (in the outdoor unit) can be supplied to the IRDs inside, and split inside, without requiring multiple cable runs from the ODU to inside the premises.

The Eutelsat DiSEqC Specification further discloses that the channel selection can be performed remotely by the IRDs. In particular, the Eutelsat Installers Guide discloses the DiSEqC signaling techniques to provide two-way communication between the satellite receiver (IRD) and the outdoor unit (selection equipment) to allow "remote channel selection."

Because the Eutelsat DiSEqC Specification teaches subject matter claimed in the '576 patent that was not taught in any prior art relied on during prosecution of the '576 patent, the teachings of the Eutelsat Installer's Guide raise a substantial new question of patentability.

2. The Secondary References

The following references in combination the Eutelsat Installers Guide and/or Eutelsat DiSEqC Specification references, render the '576 Patent obvious under 35 U.S.C. §103(a). For each secondary reference, at least one motivation to combine the respective reference with either of the two primary references is provided in accordance with MPEP §2217(I).

a. *The Seo '837 Patent Reference*

The Seo '837 Patent reference (Exhibit D) discloses a digital broadcast signal processing apparatus and method in which channel interference by an analog broadcast is prevented, effectively removing an analog broadcast signal mixed in a digital broadcast signal of a co-channel. The Seo '837 Patent reference was of record during prosecution of the '576 Patent. The Seo Patent reference is presented here in combination with art that was not before the Examiner. Thus, the Seo '837 Patent reference can be applied against the claims of the '576 Patent in combination with other prior art references. The Eutelsat References, discussed above, are related to satellite receiving systems. The Seo '837 reference is related to systems and methods of preventing interference in broadcasts. At the time of the purported invention one of ordinary skill in the art would have been motivated to look to the Seo '837 reference to prevent interference in the satellite broadcasts of the Eutelsat system.

b. *The Green Patent Reference*

The Green Patent reference (Exhibit E) discloses solving the same problem as the Eutelsat References (and the '576 patent). Particularly, the Green Patent reference discloses a system for receiving and distributing satellite transmitted television signals. Even more particularly, Green solves the longstanding satellite television distribution problem that required

multiple cable drops to deliver transponder signals (channels) from a plurality of broadband LNB outputs.

Green solves this problem by allowing transponder channels from a plurality of different LNBs to be provided to subscribers over an existing cable drop. Column 6, lines 42-45 and Column 8, lines 23-26. Thus, Green solves the problem in the same way as it is solved by Eutelsat, and as the solution subsequently appeared in the '576 patent.

This point is best illustrated by referring to a sample figure from each document, illustrating the selection of transponders (channels) from the broadband signal and placement of the selected or extracted channels into the composite signal.

Figure 5 of the '576 Patent:

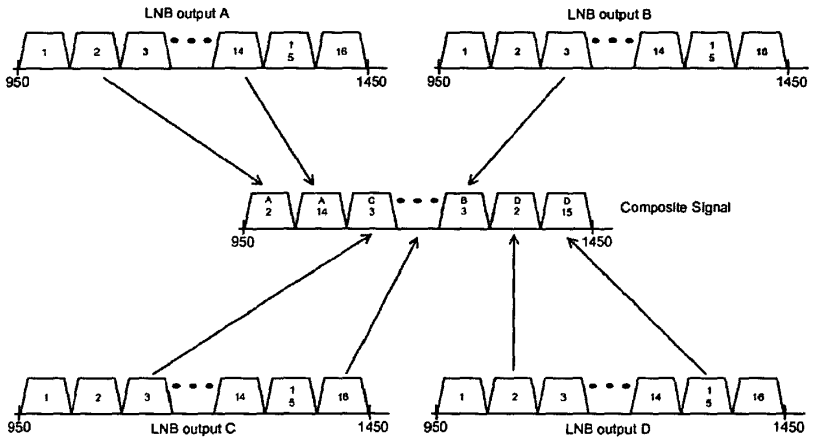


FIG. 5

Figure 2 of the prior art Green Patent:

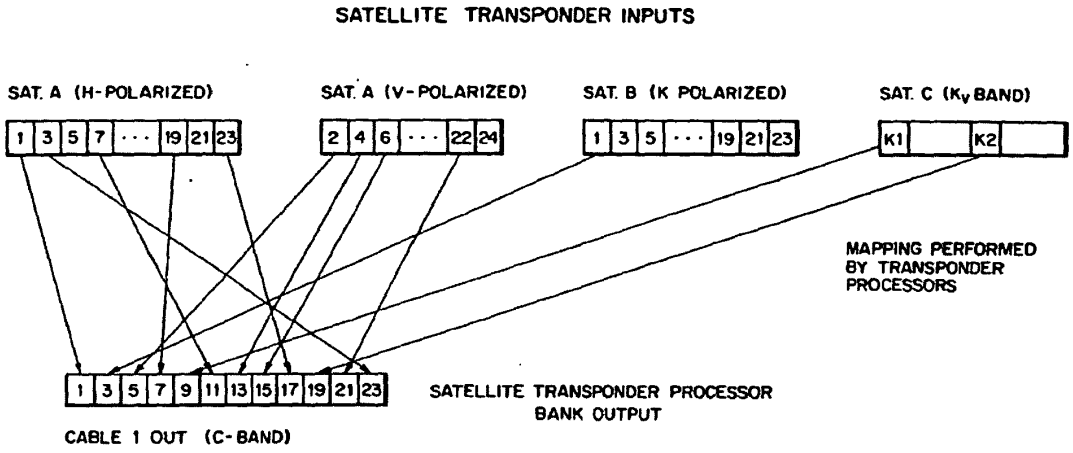


FIG. 2

And, Figure 7 of the prior art Eutelsat Installers Guide

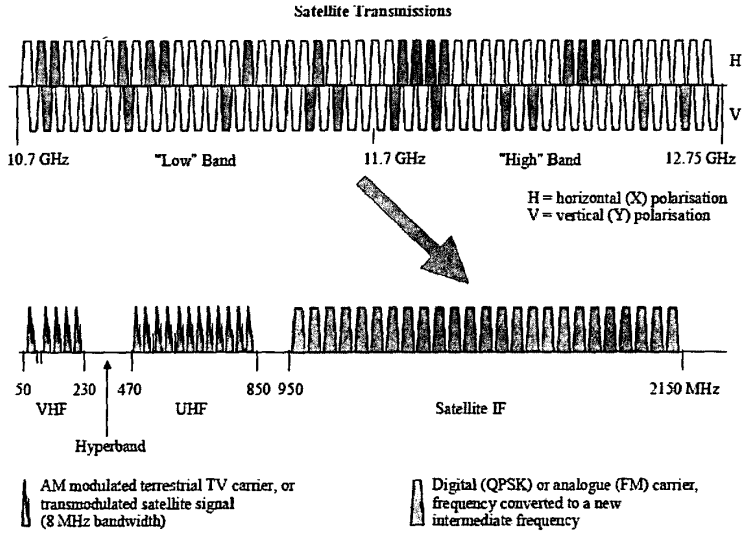


Figure 7 : Broadband Signal Spectrum for an IF-IF Distribution Network

Thus, both prior art references, like the '576 patent, teach selecting transponder signals from a broadband LNB signal, frequency translating the selected signals for placement in a

composite signal, and combining the selected channels into the composite signal for distribution over a single cable to a plurality of users.

The Green Patent reference provides substantial detail regarding, channel selection, combining and distribution. See, for example, Figure 3. Thus, one of ordinary skill in the art reading the Eutelsat reference, would have been motivated to look to Green to obtain detailed information for the solution of the same problem.

c. ***The Humpleman Patent reference***

The Humpleman Patent reference (Exhibit F) discloses a network architecture for in-home distribution of satellite TV (and other signals). The Eutelsat References, discussed above, are related to satellite receiving systems. At the time of the purported invention one of ordinary skill in the art reading the Eutelsat references would have been motivated to look to Humpleman to obtain information regarding in-building distribution of satellite TV signals provided by the Eutelsat outdoor units.

d. ***The Broadcom Digital Satellite Receiver Paper***

The Broadcom Paper (Exhibit G) disclosed conventional receivers use of a SAW filter to perform channel selection for satellite TV systems (Page 11634, first paragraph). Further, the Broadcom paper describes an all digital receiver (Figures 3 and 8) that includes analog to digital converters and digital filtering. Although the Broadcom paper describes analog to digital conversion and digital filtering in the context of a satellite set top box, one of ordinary skill in the art at the time would have understood that such techniques could also be used for channel selection in the signal selector as well.

The Eutelsat References are related to satellite receiving systems. At the time of the purported invention one of ordinary skill in the art would have been motivated to look to the

Broadcom paper to obtain information on digital receiver technology that could be implemented with satellite TV systems such as those taught by the Eutelsat References.

e. ***The Philips Data Sheet***

The Philips Data Sheet (Exhibit H) discloses a wireless receiver that can be used for various wireless communications applications, including, remote controls, telemetry systems, and wireless data transmission. At the time of the purported invention, wireless communications and wireless remote control were a well known alternative to wired communication. Therefore, at the time of the purported invention one of skill in the art would think to use a wireless remote so that to devices that are not located near each other can communicate without wires or cables. Thus, one reading the Eutelsat References would have been motivated to look to the Phillips Data Sheet to obtain information on how to implement wireless signaling for channel control.

f. ***The Pugel Patent Reference***

The Pugel Patent reference (Exhibit I) discloses a tuner for channel selection in a satellite television system. More particularly, at Col. 3, lines 18 – 24, the Pugel Patent reference discloses a tuner **9** for "selecting the particular RF signal corresponding to the desired channel from the plurality of RF signals received ..." And Figure 1 of the Pugel Patent reference illustrates tuner **9** having an input **901** connected directly to the output of the LNB **3**. The Pugel Patent reference further discloses a tuner 54 for a satellite receiver that is configured to select a particular RF signal corresponding to the desired channel from a plurality of RF signals.

The Eutelsat References, discussed above, are related to satellite receiving systems that include channel selection. As discussed above, the Pugel Patent reference discloses a tuner for channel selection in a satellite television system. Therefore, at the time of the purported invention one of skill in the art would have been motivated to look to Pugel to obtain information

on how to implement a tuner for channel selection in a satellite television systems such as those taught by the Eutelsat references.

g. ***The Simone Patent Reference***

The Simone Patent reference (Exhibit J) discloses an analog to digital converter and a digital filter in the same field of endeavor. For example, Col 1, lines 17 – 18 an Col 2, lines 29 - 32 describe a receiver front end that can include and A/D converter as an input to the digital filter 15. One of ordinary skill in the art at the time would have understood that A/D conversion and digital filtering in the context of a satellite set top box could be used for channel selection in the signal selector as well. The Eutelsat References are related to satellite receiving systems. At the time of the purported invention one of ordinary skill in the art would have been motivated to look to the Simone reference to obtain information on A/D conversion and digital filtering that could be implemented with satellite TV systems satellite television systems such as those taught by the Eutelsat references.

h. ***The EPO 113 Patent Reference***

EPO 113 Patent reference (Exhibit K) discloses a satellite reception system that uses tuners (mixers and vcos) to select a channel from a plurality of channels. Figure 2 of the EPO '113 Patent reference shows a structure with a plurality of satellite input signals each having a tuner (mixer and local oscillator) followed by a SAW filter. The Eutelsat References are related to satellite receiving systems. The EPO 113 reference is related to satellite reception system that uses tuners (mixers and VCOs) to select a channel from a plurality of channels. At the time of the purported invention, one of ordinary skill in the art would have been motivated to look to the EPO 113 reference to obtain greater detail for mechanisms for selecting a channel from a plurality of channels in satellite television systems such as those taught by the Eutelsat references.

i. ***The EPO 489 Patent Reference***

The EPO 489 Patent reference (Exhibit L) shows tuners used to select a signal or channel from a satellite broadcast signal. For example, Figures 1 and 3 of EP0757489 illustrate a plurality of satellite input signals SatZF having tuners (mixer and local oscillator). The Eutelsat References are related to satellite receiving systems. The EPO 489 reference is related to tuners used to select a signal or channel from a satellite broadcast signal. Thus, at the time of the purported invention, one of ordinary skill in the art would have been motivated to look to the EPO 489 reference for systems for selecting a channel from a plurality of channels in satellite television systems such as those taught by the Eutelsat references.

j. ***The Takashima et al. Patent Reference***

The Takashima Patent reference (Exhibit M) discloses a television receiver having two tuners. For example, Figure 5, described at Column 2, lines 48 – 52 illustrates a television receiver having a picture-in-picture (PIP) function with two tuners 3 and 4. The Eutelsat References are related to satellite receiver systems, for example, satellite television receiver systems. Because the Takashima reference is directed toward television receiver/tuners and the Eutelsat References are related to satellite televisions receiver systems, one of ordinary skill in the art, at the time of the purported would have been motivated to look to the Takashima reference and known to incorporate two tuners into the system of the Eutelsat References to accomplish the described PIP functionality.

k. ***The Seo '463 Patent Reference***

The Seo '463 Patent Reference (Exhibit N) discloses a dual tuner receiving television signals. The Eutelsat References are related to satellite receiving systems , for example, satellite television receiver systems. Because the Seo '463 patent reference is directed towards television

receiver/tuner and Eutelsat References are directed toward television receiver/tuners, one of ordinary skill in the art, at the time of the purported invention, would have been motivated to look to the '463 reference to incorporate two tuners to allow PIP or watch-and-record functionality in a set top box such as that taught by the Eutelsat references.

l. ***The RCA Setup Guide***

The RCA Setup Guide (Exhibit O) shows a satellite set top box, or IRD, having two tuners. The Eutelsat References are related to satellite receiving systems, for example, satellite television receiver systems. The RCA Setup Guide discloses a dual tuner/receiver receiving television signals. At the time of the purported invention, one of ordinary skill in the art would have been motivated to look to the RCA Setup Guide and noted the use of two tuner/receivers to allow the described PIP or watch-and-record functionality in a set top box such as that taught by the Eutelsat references.

m. ***The Kelly Patent Reference***

The Kelly Patent Reference (Exhibit P) discloses a digital receiver apparatus and method designed for multiple simultaneous users. Because the '576 patent is a satellite receiving system designed to select multiple program channels from one or more broadband signals and the Kelly reference is directed toward digital receiver apparatus and method designed for multiple simultaneous users, one of ordinary skill in the art would have looked to the Kelly reference and known to receive multiple signals.

Kelley is directed at solving the same problem as the Eutelsat references (and the '576 patent) as Kelley describes a receiver system that allows multiple users to receive desired, content selected and extracted from a broadband RF signal. Kelley implements the receiver as a digital receiver.

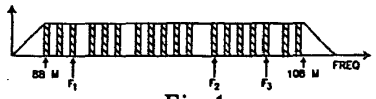


Fig.1



Fig.2

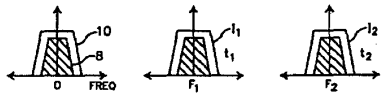


Fig.3 Fig.4a Fig.4b

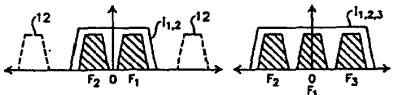


Fig.5 Fig.6

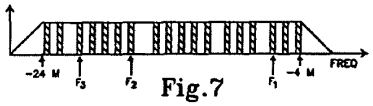


Fig.7

Kelley illustrates the received broadband spectrum in Figure 1, and identifies three channels to be selected therefrom, labeled by their center frequencies F1, F2 and F3. Figure 3 illustrates channel isolation that is obtained by a digital IF filter, Figure 4 illustrates frequency translation of selected channels, and Figure 7 illustrates the reassembled spectrum with the three selected channels frequency translated and reassigned therein.

Because Kelley is directed toward solving the same problem as the Eutelsat References (and the '576 patent), one of ordinary skill in the art reading the Eutelsat References would have been motivated to look to Kelley to determine Kelley's solution and would have understood that a digital receiver could be used for signal selection in satellite television systems such as those taught by the Eutelsat references.

VIII.
DETAILED EXPLANATION OF THE PERTINENCE AND MANNER OF APPLYING THE CITED PRIOR ART TO EVERY CLAIM FOR WHICH REEXAMINATION IS REQUESTED

A. Claims 1, 2, 6, 8, 9, 11-14, 16, 18, 19, 21 and 22 of the '576 Patent are unpatentable under 35 U.S.C. §102(b) as being anticipated by the Eutelsat Installer's Guide as discussed below:

To supplement this detailed discussion, a summary of the applicability of the reference to the claims is provided in the Claim Charts attached as Appendix B.

1. Claim 1

Claim 1 of the '576 patent recites:

> A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals form satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising:
>
> a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals from at least on broadband LNB signal based on the transponder select information;
>
> a frequency translator coupled to the signal selector that is capable of shifting the selected transponder signals to new carrier frequencies to produce RF signals;
>
> and a combiner coupled to at least one frequency translator capable of combining at least two RF signals to produce a composite signal;
>
> wherein the modulation of the composite signal is the same as modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable;
>
> whereby the composite signal is transmitted to the IRD.

The Eutelsat Installer's Guide discloses every element of claim 1 of the '576 patent. For clarity and ease of discussion, the elements of claim 1 are discussed in their constituent pieces.

a. ***A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising***

The Eutelsat Installer's Guide discloses a signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD). Figure 11 (page 20) is a diagram illustrating an example architecture for an RF distribution system including a satellite antenna having a low noise amplifier and block converter (LNB) that sends signals to a satellite receiver (*i.e.*, a set top box or IRD). The LNB is illustrated as a Quad LNB with four output lines to accommodate each of the four band/polarization LNB signals.

For confirmation that the illustrated satellite receiver is an IRD as recited in the claims, the Eutelsat Installer's Guide refers to the satellite receiver as an IRD (integrated receiver decoder) in the description of Figure 11 at page 20, and again at page 27.[5]

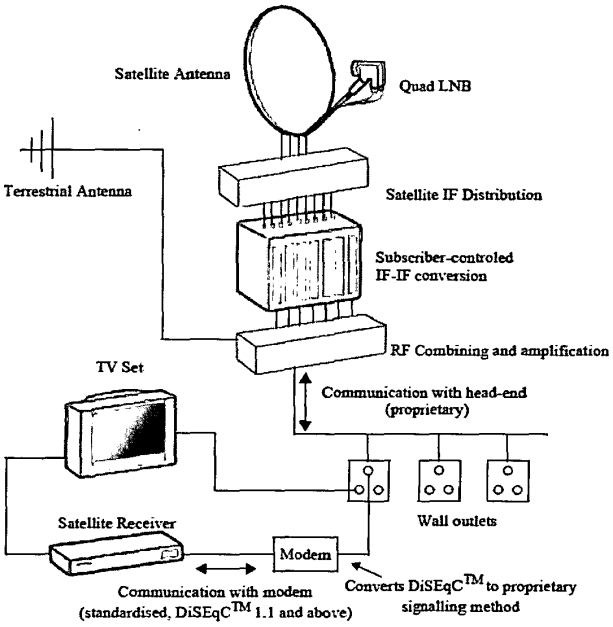


Figure 11 : Architecture of a System with a Remote Controlled Head-End

[5] It should be noted that Figure 11 is similar to the architecture illustrated in Figure 8 with the addition of a signaling capability between the IRD and the upstream equipment for remote channel selection. (Figure 8 has no remote signaling capability).

b. ***a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals***

The Eutelsat Installers Guide teaches a signal selector that receives a plurality of broadband LNB signals and selects one or more transponder channels. For example, at Figure 11, the Eutelsat Installers Guide teaches a Satellite IF Distribution unit and subscriber-controlled IF-IF converters configured to receive the broadband LNB outputs.

The Eutelsat Installers Guide further discloses that the satellite transmissions received by the various receive architectures comprise two frequency bands and two polarizations. See, page 26, second and third paragraphs. These broadband signals each have a plurality of transponders signals. To illustrate this, the Eutelsat Installers Guide shows the satellite transmission bands in Figure 7 (reproduced below). As this figure illustrates, the satellite spectrum is comprised of four broadband signals each having a plurality of transponder signals (the polygons). Each element of the quad LNB receives the satellite transmission and outputs its respective broadband LNB signal. The LNB also amplifies the signal and converts the satellite RF (10.7 to 12.75 GHz in this case) to an intermediate frequency, or IF (hence the name, low noise amplifier and block converter). Note that Figure 7 does not show this RF to IF conversion performed by the LNBs. However, RF to IF conversion is not part of the claims, and is nonetheless well known as part of satellite receiver systems. As evidence of this, see the Background Section of the '576 patent, which, in discussing the "Prior Art" Figure 1, describes the RF to IF conversion performed by the LNBs.

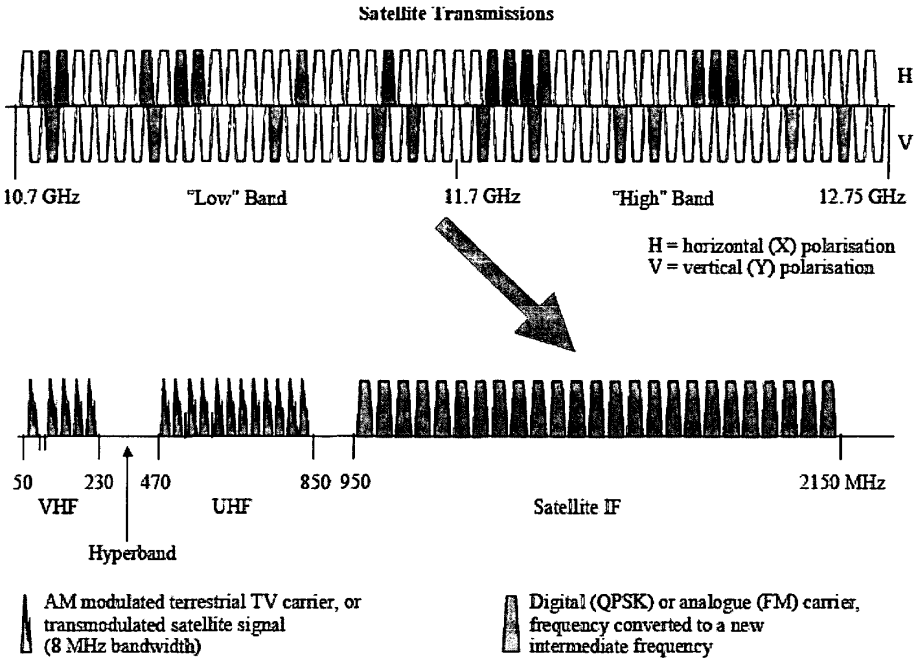


Figure 7 : Broadband Signal Spectrum for an IF-IF Distribution Network

Note that Figure 7 describes IF to IF conversion. Figure 7 is described with reference to Figure 8, which is for channelized IF-IF conversion, rather than for subscriber controlled IF-IF conversion. However, the Eutelsat Installers Guide at page 19, last paragraph, states that the architecture shown in Figure 11 is "similar to that shown in Figure 8 ... except that there must be communication ... so that remote channel selection can be carried out." Therefore, as the only stated difference is that of the remote channel selection, the architecture of Figure 11 is configured to receive the same broadband signals as the architecture of Figure 8.

c. ***the signal selector is responsive to transponder select information transmitted by an IRD***

The Eutelsat Installers Guide discloses that the signal selector is responsive to transponder select information transmitted by an IRD. Particularly, Figure 11 of the Eutelsat Installers Guide illustrates a Satellite Receiver (IRD) that communicates with the head-end

(Outdoor Unit) for channel selection. This is illustrated in Figure 11 by the DiSEqC communications.

Additionally, the Eutelsat Installers Guide at page 19 specifies that there is communication between the terminal (IRD) and the head-end (signal selector) "so that **remote channel selection** can be carried out." (Page 19, last sentence (**emphasis added**).

Additionally, Section 3.5.1.c of the Eutelsat Installers Guide (page 27) describes one signaling protocol that can be used to communicate information from the IRD to the signal selector. The Eutelsat Installers Guide reference refers to the standardized DiSEqC protocol[6] that is used to provide selection information to the outdoor unit. At page 27, the Eutelsat Installers Guide states that the "DiSEqC™ system uses the satellite receiver (IRD) as a single master terminal controlling a number of remote devices such as LNBs." The Eutelsat Installers Guide further states that DiSEqC "allows for the switching and control of compatible units such as LNBs, switches and positioners..." *Id.*, at 27.

d. ***and selects a plurality of transponder signals from at least one broadband LNB signal based on the transponder select information;***

As stated above, Figure 11 illustrates a receive architecture that allows remote channel selection. As stated above, page 19 of the Eutelsat Installers Guide, specifies that there is communication between the terminal (IRD) and the head-end (selector) "so that **remote channel selection** can be carried out." *Id.*, at page 19, last sentence. Additionally, the second-to-last paragraph on page 19 states that the user's terminal (IRD) can remotely tune to a channel by controlling an IF-IF converter.

---

[6] The Eutelsat Installers Guide at page 27 states that DiSEqC has been adopted as an international standard by CENELEC.

Thus, the Eutelsat Installers Guide teaches that the Subscriber-controlled IF-IF conversion unit (signal selector) selects the appropriate transponder signal(s) from the selected LNB band, based on a DiSEqC command from the IRD.

e. ***a frequency translator coupled to the signal selector that is capable of shifting the selected transponder signals to new carrier frequencies to produce RF signals;***

Figure 11 of the Eutelsat Installers Guide illustrates a Subscriber controlled IF-IF conversion box. As the name suggests, the IF-IF converters convert, or frequency translate, an incoming IF signal at one carrier frequency to an IF signal at another carrier frequency. This IF-IF conversion takes the selected transponder signals (Channels) at the received IF frequency, and converts them to a different IF frequency for placement in a composite signal and distribution to the set top box (IRD).

Additionally, Section 3.4.1.c at page 15 states that the IF-to-IF conversion systems rebuild the satellite IF spectrum so that it is suitable for distribution via a single cable. In other words, the selected transponder signals arrive from the LNBs at a given IF center frequency and are relocated to a new IF center frequency for placement on the composite signal. Although 3.4.1.c is for channelized IF-to-IF conversion, the IF-IF conversion in Figure 11 operates the same, except that it is remote controlled (See, page 19, last paragraph).

Figure 7 provides an example of frequency translation wherein selected transponder signals (the individually shaded polygons) are translated from their original broadband frequencies to the new IF carrier frequencies suitable for placement in a composite signal.

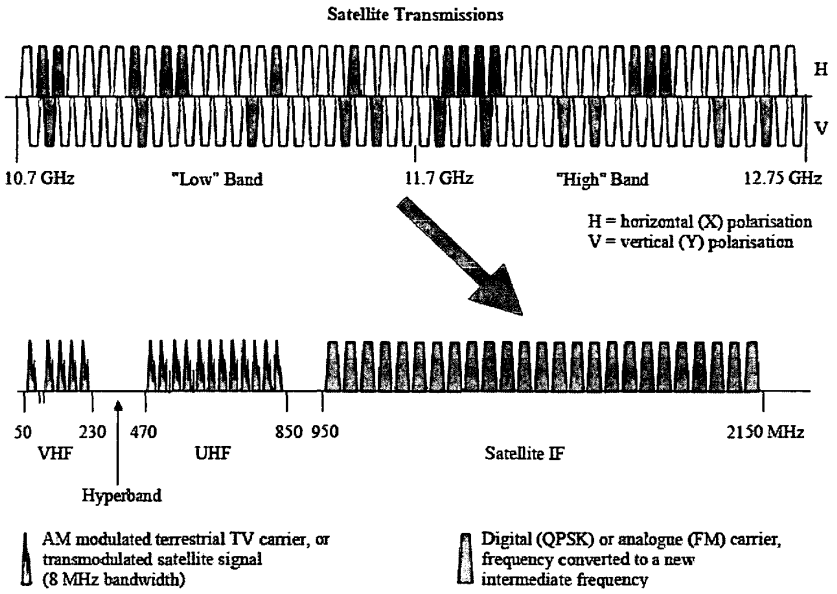
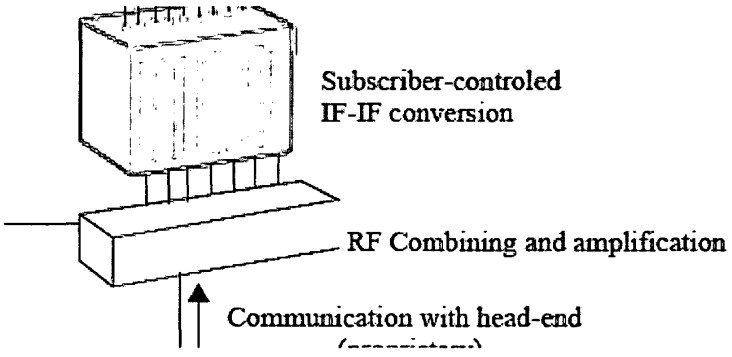


Figure 7 : Broadband Signal Spectrum for an IF-IF Distribution Network

f. ***and a signal combiner coupled to at least one frequency translator capable of combining at least two RF signals to produce a composite signal;***

The Eutelsat Installers Guide also teaches the signal combiner as recited in Claim 1. Particularly, at Figure 11, the Eutelsat Installers Guide discloses an RF Combining and Amplification unit that accepts multiple RF signals from the Subscriber-controlled IF-IF conversion, and combines them into a single composite output signal.



g. ***wherein the modulation of the composite signal is the same as the modulation of the broadband LNB signals;***

The Eutelsat Installers Guide teaches this element of claim 1. Particularly, the Eutelsat Installers Guide discloses architectures that receive QPSK modulated signals, perform the IF-IF frequency translation and provide QPSK signals. Support for this can also be found at Figure 7, which illustrates QPSK signals from the satellite transmission, and selected QPSK transponder signals combined on the composite signal.

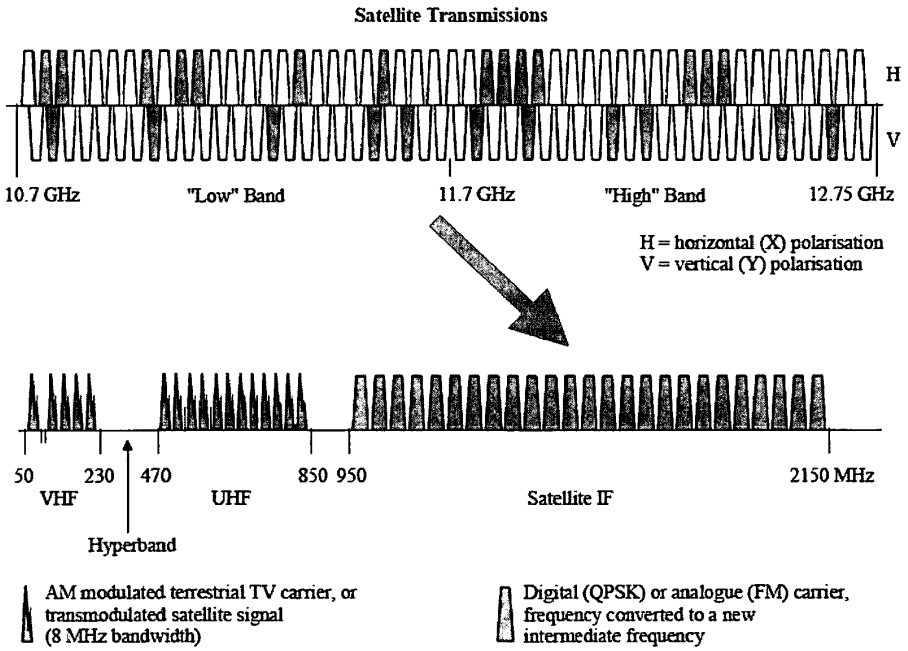


Figure 7 : Broadband Signal Spectrum for an IF-IF Distribution Network

h. ***and wherein the composite signal is transmitted on the coaxial cable;***

The Eutelsat Installers Guide teaches that the composite signal is transmitted on the coaxial cable. At Figure 11, the Eutelsat Installers Guide shows the composite signal routed to the IRDs via a signal path. One of ordinary skill in the art would have understood that satellite TV signals are routed on coaxial cable. Indeed, the Eutelsat Installers Guide reference

specifically refers to this signal path of Figure 11 as coaxial cable. Particularly, at page 27, the Eutelsat Installers Guide references the DiSEqC signaling path as using a coaxial cable. As stated above, this DiSEqC signaling path is the same path as the composite signal path. As such, the Eutelsat Installers Guide teaches that the composite signal path is a coaxial cable.

i. ***whereby the composite signal is transmitted to the IRD***

The Eutelsat Installers Guide teaches that the composite signal is transmitted to the IRD. Still referring to Figure 11, the output of the RF combiner (a composite signal) is sent to the satellite receiver (set top box or IRD).

Accordingly, Claim 1 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

2. Claim 2

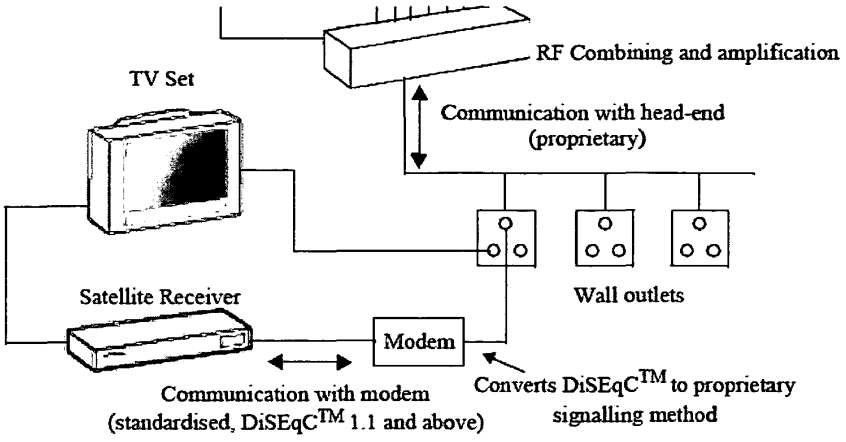
Claim 2 of the '576 patent recites:

> The signal distribution system of claim 1 further comprising a plurality of IRDs and wherein the composite signal is transmitted on a single cable connected to the ODU and all IRDs receive channels extracted from the composite signal.

For clarity and ease of discussion, the elements of claim 2 are discussed in their constituent parts.

a. ***The signal distribution system of claim 1 further comprising a plurality of IRDs***

The Eutelsat Installers Guide teaches that a plurality of IRDs can be provided. Particularly, Figure 11 illustrates multiple wall outlets. One of ordinary skill in the art would have understood that multiple wall outlets are used to support additional IRDs. For example, one IRD can be connected to each additional wall outlet, just as the illustrated IRD is connected to the first wall outlet.



b. ***and wherein the composite signal is transmitted on a single cable connected to the ODU***

Figure 11 also illustrates that the composite signal from the combiner is transmitted on a single cable.

c. ***and all IRDs receive channels extracted from the composite signal.***

Figure 11 also illustrates that the IRDs receive channels from the composite signal. As illustrated, the composite signal is distributed to the IRDs. Particularly, the composite signal is distributed to all the wall outlets (each of which can support an IRD) so that all IRDs connected thereto receive the channels in the composite signal.

Accordingly, Claim 2 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

3. Claim 6

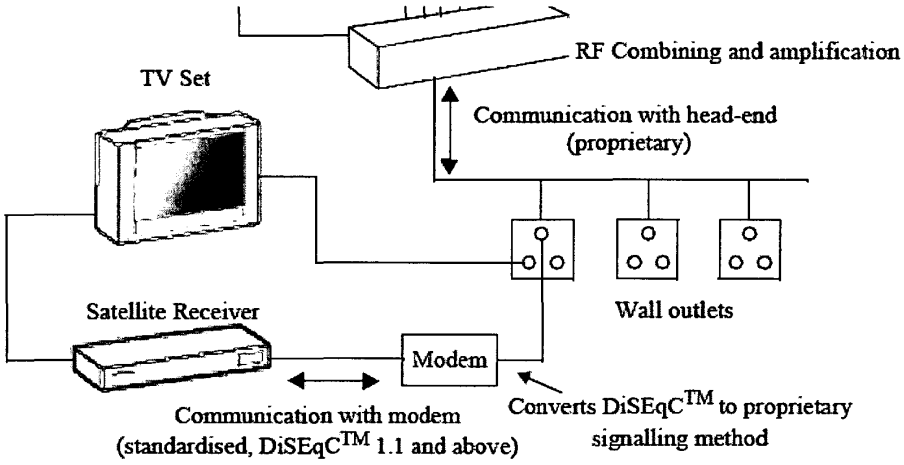
Claim 6 of the '576 patent recites:

a. ***The signal distribution system of claim 1 wherein the transponder select information is transmitted over the same cable as the composite signal.***

The Eutelsat Installers Guide teaches that the channel select information is sent over the same cable as the composite signal. Referring still to Figure 11, the Eutelsat Installers Guide

discloses that the DiSEqC signaling information that is used to select the channels (i.e., to select the transponders) is sent over the same cable as the composite signal.

Also note that the Eutelsat Installers Guide teaches that with conventional signaling systems, the received satellite signals (composite signal) and the control signals are sent over the same cable (page 26, first paragraph after bullets), and that DiSEqC is compatible with these conventional methods (page 27, second-to-last paragraph).



Accordingly, Claim 6 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

4. Claim 8

Claim 8 of the '576 patent recites:

> A signal distribution system for distributing signals comprising a plurality of channels from a plurality of sources between a first unit and a second unit over a communication medium comprising:
> means in the first unit responsive to information transmitted by the second unit for extracting selected channels from each of the plurality of sources and combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium;

and means in the second unit for receiving the composite signal and demodulating and decoding at least one channel;
and means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

For clarity and ease of discussion, the elements of claim 8 are discussed in their constituent parts.

As stated previously, the Eutelsat Installers Guide reference is directed toward a plurality of receiver system architectures and signaling protocols for satellite TV systems.

a. ***A signal distribution system for distributing signals comprising a plurality of channels from a plurality of sources between a first unit and a second unit over a communication medium comprising:***

As stated above with respect to Claim 1, the Eutelsat Installers Guide discloses a plurality of signal distribution systems for satellite TV. The Eutelsat Installers Guide teaches various architectures for distributing signals (Satellite TV signals) comprising a plurality of channels from a plurality of sources between a first unit (the Outdoor Unit) and a second unit (the IRD). One example of such an architecture is that illustrated in Figure 11 of the Eutelsat Installers Guide (reproduced above with reference to claim 1).

b. ***means in the first unit* [ODU] *responsive to information transmitted by the second unit* [IRD] *for extracting selected channels from each of the plurality of sources***

The Eutelsat Installers Guide reference teaches this element of claim 1. Particularly, the Eutelsat Installers Guide reference teaches that the IRD is configured to send information to the outdoor unit to perform channel selection from satellite signals. Specifically, the Eutelsat Installers Guide at page 29 states that the architecture shown in Figure 11 provides "communication, preferably two-way, between each terminal and the head-end so that remote channel selection can be carried out." (See the last sentence of page 29).

c. ***and combining the selected channels into a composite signal***

The Eutelsat Installers Guide also teaches combining the selected channels into a composite signal. As discussed above with respect to Claim 1, Figure 11 of the Eutelsat Installers Guide discloses an RF Combining and Amplification unit that accepts multiple RF signals from the Subscriber-controlled IF-IF conversion unit, and combines these IF signals into a composite output signal.

d. ***without demodulating channels and without changing the modulation of the channels***

The Eutelsat Installers Guide discloses that the signals are selected and combined without changing the modulation of the channels. As discussed above with respect to claim 1, the Eutelsat Installers Guide discloses that QPSK signals are received from the satellite and the signals are distributed to the satellite receiver (IRD) as QPSK signals. As such, no transmodulation is performed. Additionally, the signals are not demodulated either, as they remain QPSK-modulated signals.

e. ***and transmitting the composite signal over the medium;***

The Eutelsat Installers Guide teaches that the composite signal is transmitted to the IRD. At Figure 11, the Eutelsat Installers Guide shows the composite signal routed to the IRDs via a coaxial cable signal path.

f. ***and means in the second unit* [IRD] *for receiving the composite signal and demodulating and decoding at least one channel;***

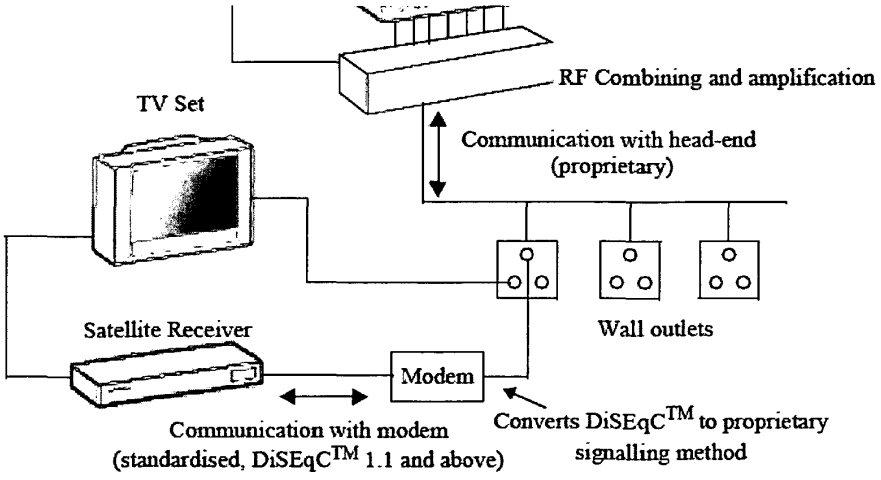
The IRD is defined by the Eutelsat reference as a satellite receiver. Receivers are well known to those of ordinary skill in the art to receive communication signals and to demodulate and decode the signals. Indeed, the Eutelsat Installers Guide discloses that the output of the Satellite Receiver is connected to the television set. As such, one of ordinary skill in the art would have understood that the satellite receiver must demodulate and decode the signal, as

television sets are not configured to handle satellite signals in the IF spectrum as distributed from the combiner.

As further evidence of what one of ordinary skill in the art would have understood regarding satellite television receivers, reference is made to the Background Section of the '576 patent. At Column 1, lines 39 – 44, with reference to the "Prior Art" Figure 1, the IRD (Integrated Receiver Decoder) is described as tuning, demodulating and decoding the received satellite signal.

g. ***and means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.***

The Eutelsat Installers Guide teaches bidirectional communication between the IRD and the switching equipment. Figure 11 illustrates a bidirectional communication path between the IRD (through the wall jack) and the switching equipment.



Additionally, Section 3.5.1.c of the Eutelsat Installers Guide at page 27 discloses Two-way (bidirectional) signaling.

Accordingly, Claim 8 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

5. Claim 9

Claim 9 of the '576 patent recites:

> The signal distribution system of claim 8 wherein the control information comprises channel selection requests originating from the second unit and the control information comprises channel mapping information originating from the first unit.

For clarity and ease of discussion, the elements of claim 9 are discussed in their constituent parts.

a. ***The signal distribution system of claim 8 wherein the control information comprises channel selection requests originating from the second unit***

The Eutelsat Installers Guide reference teaches control information comprising channel selection requests. Particularly, at page 19, the Eutelsat Installers Guide reference states that communication "between each terminal and the head end so that **remote channel selection** can be carried out." Id., at 19 (**emphasis added**).

b. ***and the control information comprises channel mapping information originating from the first unit.***

The Eutelsat Installers Guide reference teaches that the control information also comprises channel mapping information from the switching equipment to the IRD. For example, at page 27 the Eutelsat Installers Guide reference discloses that "[t]wo-way DiSEqC™ (DiSEqC™ 2.0/2.1) further enhances the standard by allowing remote units to report their possible and actual configurations.

One of ordinary skill in the art would have understood that configuration information can include, for example, an identification of the LNB local oscillator frequency or an identification

of the frequencies used by one or more of the IF-IF converters so the IRD can determine which frequency to tune to receive the converter output in the composite signal.

As evidence of what one of ordinary skill in the art would have understood at the time of the purported invention, reference is made to United States Patent No. 5,073,930, to Green *et. al.*, which teaches that the term frequency mapping is used to map the conversion of an IF signal in a wideband LNB output to an IF signal at a translated frequency for placement in the composite signal. *See*, Green at Column 10, lines 4 – 43. As such, one of ordinary skill in the art at the time would have understood that configuration information for the IF-IF converters includes information regarding channel mapping.

Accordingly, Claim 9 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

6. Claim 11

Claim 11 of the '576 patent recites:

a. ***The signal distribution system of claim 8 wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.***

The Eutelsat Installers Guide reference teaches an outdoor unit and a satellite integrated receiver decoder unit (IRD). Figure 11 of the Eutelsat Installers Guide reference discloses a Satellite Receiver. The Satellite Receiver is referenced in various places in the Eutelsat Installers Guide reference as an IRD. For example, page 20 refers to the communication between the wall outlet and the "IRD." Likewise, Section 3.5.1.c states that the signaling systems uses the "satellite receiver (IRD)..." Id., at 27.

Figure 11 also illustrates the LNBs and other switching and distribution equipment, which one of ordinary skill in the art would understand to be outdoor equipment. Also, at the

top of page 27, the reference refers to the two-way communications between the IRD and the selection units as signaling "between the outdoor and indoor units."

Furthermore, as further evidence of what was understood by one of ordinary skill in the art at the time, Figure 1 of the '576 patent (labeled as "Prior Art") and the accompanying description disclose that the satellite antenna, LNBs and switches are an outdoor unit, and the description accompanying prior art Figure 1 describes the IRD as a set top box located inside a building.

Accordingly, Claim 11 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

7. Claim 12

Claim 12 of the '576 patent recites:

a. ***The signal distribution system of claim 11 wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.***

As discussed above with respect to Claim 1, the Eutelsat Installers Guide at page 27 teaches that the communication medium over which the signal is distributed is a coaxial cable. Accordingly, Claim 12 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

8. Claim 13

Claim 13 of the '576 patent recites:

a. ***The signal distribution system of claim 12 wherein the means for communicating uses the same communication medium as the composite signal.***

In this claim, "means for communicating" refers to the bi-directional communication of control information as recited in the preamble of independent claim 8 from which this claim ultimately depends. The Eutelsat Installers Guide reference teaches that the control information

is communicated along the same signal path as the composite signal. This was discussed above with respect to claim 1, for which Figure 11 of the Eutelsat Installers Guide reference was cited as showing bi-directional signaling capabilities along the same signal path as the composite signal.

Accordingly, Claim 13 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

9. Claim 14

Claim 14 of the '576 patent recites:

> A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of:
>
> communicating a transponder request signal to the ODU from the IRD; in the ODU, selecting a plurality of transponder signals extracted from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals;
>
> combining selected transponder signals into a composite signal;
>
> transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

For clarity and ease of discussion, the elements of claim 14 are discussed in their constituent parts.

a. ***A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of:***

The Eutelsat Installers Guide reference teaches communicating a plurality of transponder signals from a satellite outdoor unit that receives satellite broadband signals and communicates these signals to an IRD over a single cable connected to the outdoor unit. As discussed above

with respect to Claim 1, Figure 11 shows a satellite antenna, LNBs and switching equipment that makes up an outdoor unit for receiving satellite broadband signals. The switching equipment selects a plurality of transponder signals in response to DiSEqC commands from the satellite receiver (IRD) and communicates the selected transponder signals to the IRD.

b. ***communicating a transponder request signal to the ODU from the IRD;***

Figure 11 of the Eutelsat Installers Guide reference illustrates signaling information between the satellite receiver (IRD) and the switching equipment (ODU). Additionally, the Eutelsat Installers Guide reference discloses a signaling protocol referred to as DiSEqC signaling that can provide one-way or two-way communication between the IRD and ODU. The Eutelsat Installers Guide also states that this communication allows "remote channel selection" to be carried out. See, page 19, last sentence.

Later in this claim 14, the transponder signals extracted from the broadband LNB signal are selected based on the transponder request signal. As such, the transponder request signal is taught by the Eutelsat Installers Guide reference to the DiSEqC signal used to carry out remote channel selection.

c. ***in the ODU, selecting a plurality of transponder signals extracted from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals;***

The Eutelsat Installers Guide reference teaches selecting transponder signals, or channels. As discussed above with respect to claim 1, and with reference to Figures 7 and 11, the transponder signals are extracted from the received satellite broadband signal.

As also discussed above with respect to claim 1, the selection of the transponder signals is in response to signals from the IRD (transponder request signals).

d. ***combining selected transponder signals into a composite signal;***

The Eutelsat Installers Guide reference teaches combining selected transponder signals into a composite signal. As discussed above with respect to claim 1, Figure 11 of the Eutelsat Installers Guide reference illustrates an RF combining and amplification unit that combines the selected transponder signals into a composite output on a single communication path from the combiner to the IRD(s).

e. ***transmitting the composite signal over the single cable from the ODU to the IRDs,***

The Eutelsat Installers Guide reference teaches transmitting the composite signal over the single cable from the ODU to the IRDs. As discussed above with respect to Claim 1, the composite signal is illustrated in Figure 11 as being transmitted over a single communication path to the IRD(s). As also discussed above, Figure 11 illustrates multiple wall outlets. One of ordinary skill in the art reading the Eutelsat Installers Guide reference would understand that a satellite receiver, or IRD, can be hooked up to each wall outlet.

f. ***wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.***

The Eutelsat Installers Guide reference teaches that the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting. As discussed above with respect to Claim 1, the Eutelsat Installers Guide reference teaches that a QPSK-modulated signal is received from the satellite, and that the selected transponder signals, or channels, are distributed to the IRD(s) as QPSK modulated signals. As such, a system that does not alter the modulation is taught.

Accordingly, Claim 14 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

10. Claim 16

Claim 16 of the '576 patent recites:

a. ***The method of claim 14 wherein the step of combining comprises frequency translating the selected transponder channels to a variable frequency before combining.***

The Eutelsat Installers Guide reference teaches frequency translating the selected transponder channels to a variable frequency before combining. As discussed above with respect to claim 1, the Eutelsat Installers Guide reference shows in Figure 7 that the transponder channels are frequency translated from their respective center frequencies in the broadband satellite signal to their new respective center frequencies in the satellite IF distribution channel.

One of ordinary skill in the art would understand that the frequency translation would occur before combination as the signals will need to be reassigned to their new frequency allocation within the bandwidth of the composite signal. One of ordinary skill in the art would also understand that the assignment would be variable to accommodate allocation of multiple selected signals into the available bandwidth.

Accordingly, Claim 16 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

11. Claim 18

Claim 18 of the '576 patent recites:

a. ***The method of claim 14 further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.***

The Eutelsat Installers Guide reference teaches splitting the composite signal inside a home and distributing to a plurality of IRDs. Particularly, Figure 11 illustrates that the composite signal is split out to a plurality of wall units and distributed to each of the wall units. As stated above, one of ordinary skill in the art would understand that, as in the first unit, an IRD can be connected to each of the other wall units. As such, Figure 11 illustrates splitting the

signal and distributing it to a plurality of IRDs. Also note that the claim references splitting the signal inside a home. Figure 11 illustrates that the signal is split prior to distribution to the wall units. One of ordinary skill in the art would understand that the wall outlets are in the walls of the building (whether it be a home, office, or other building), and that the splitting can occur inside the home.

Accordingly, Claim 18 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

12. Claim 19

Claim 19 of the '576 patent recites:

> The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD and all IRDs receive the same composite signal.

For clarity and ease of discussion, the elements of claim 19 are discussed in their constituent parts.

a. ***The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD***

The Eutelsat Installers Guide reference teaches the transponder request signal is transmitted over the cable from an IRD. As discussed above with respect to claim 2, Figure 11 illustrates that the DiSEqC signal (transponder request signal) is transmitted over the cable from the IRD to the switching equipment.

b. ***and all IRDs receive the same composite signal.***

The Eutelsat Installers Guide reference teaches that all IRDs receive the same composite signal. As discussed above with respect to claim 2, Figure 11 illustrates that the composite signal is distributed via a single cable to the wall outlets, and that an IRD can be connected to each wall outlet.

Accordingly, Claim 19 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

13. Claim 21

Claim 21 of the '576 patent recites:

> The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining; and splitting the composite signal inside a home and distributing to a plurality of IRDs.

For clarity and ease of discussion, the elements of claim 21 are discussed in their constituent parts.

a. ***The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining;***

As discussed above with respect to claim 16, the Eutelsat Installers Guide reference teaches translating the selected transponder channels to a variable frequency before combining.

b. ***and splitting the composite signal inside a home and distributing to a plurality of IRDs.***

As discussed above with respect to claim 18, the Eutelsat Installers Guide reference teaches splitting the composite signal inside a home and distributing to a plurality of IRDs.

Accordingly, Claim 21 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

14. Claim 22

Claim 22 of the '576 patent recites:

a. ***The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.***

Claim 21 from which this claim depends, is taught by the Eutelsat Installers Guide as described with reference to Claim 21. As discussed above with respect to claim 19, The Eutelsat

Installers Guide reference teaches the transponder request signal is transmitted over the cable from an IRD.

Accordingly, Claim 22 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat Installers Guide reference.

B. Claims 2 – 5, 7, 10, 15-17, and 20-23 of the '576 Patent are unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with various secondary references as discussed below:

To supplement this detailed discussion, a summary of the applicability of the references to the claims is provided in the claim charts attached as Appendix B, Part II.

1. Claim 2

Claim 2 of the '576 patent recites:

> The signal distribution system of claim 1 further comprising a plurality of IRDs and wherein the composite signal is transmitted on a single cable connected to the ODU and all IRDs receive channels extracted from the composite signal.

For the reasons set forth above with respect to claim 1, the Eutelsat Installers Guide teaches every element of claim 1, from which claim 2 depends.

As stated above the Eutelsat Installers Guide teaches each and every element of claim 2. However, as also stated above, there is some question regarding whether the limitation reciting "channels extracted from the composite signal" calls into question gateway functionality.

United States Patent No. 6,005,861, to Humpleman, discloses a multimedia network architecture for in-premises distribution of satellite television signals. Humpleman teaches that cable or satellite television signals (Col. 3, lines 28-31) are received at the home and distributed by network **10** to one or more televisions **12, 14** or other video equipment (VCR **16**).

With reference to Figure 1, Humpleman discloses that a network interface unit **32** (i.e., Gateway) receives an external satellite broadcast signal (Col. 3, lines 21 – 35), and that the

external signals are distributed via a network **34** (Col. 3, lines 49 – 55). With particular regard to television signals, Humpleman teaches with reference to Figure 4 that the network interface unit (NIU) **32,** or gateway, receives the external video signal and distributes it to the set top box **40** (Column 7, lines 18 – 34).

Humpleman also teaches that the gateway (NIU **32**) can extract channels from the composite signal before the signal is distributed throughout the home to the set top boxes. See, for example, Column 7, lines 35 – 52, where Humpleman discloses demultiplexing the channel from a multiple channel stream.

Accordingly, Claim 2 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by Humpleman's teachings of a gateway in combination with the Eutelsat Installers Guide reference.

2. Claim 3

Claim 3 of the '576 patent recites:

a. ***The signal distribution system of Claim 1 wherein the signal selector comprises an analog to digital converter and a digital filter.***

As discussed above, the Eutelsat Installers Guide reference teaches each and every element of claim 1, from which Claim 3 depends. The Eutelsat Installers Guide does not teach a digital filter. United States Patent No. 5,278,837, to Kelley, teaches a digital receiver with digital channel selection. At Figure 8, Kelley teaches a digital receiver with an analog to digital converter ADC **106** that digitizes the RF input signal and provides it to a digital tuner. Col. 6, lines 31-34. The output of mixer **18** is provided to a digital IF filter **34** to isolate the desired IF signal. Col. 7, lines 34 – 40.

Accordingly, Claim 3 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with Kelley.

Additionally, The Broadcom Paper teaches that conventional receivers use of a SAW filter to perform channel selection for satellite TV systems (Page 11634, first paragraph). The Broadcom paper describes an all digital receiver (Figures 3 and 8) that includes analog to digital converters and digital filtering. Although the Broadcom paper describes analog to digital conversion and digital filtering in the context of a satellite set top box, one of ordinary skill in the art at the time would have understood that such techniques could also be used for channel selection in the signal selector as well.

Accordingly, Claim 3 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide reference in combination with the Broadcom Paper.

3. Claim 4 - the Eutelsat Installers Guide in combination with United States Patent No. 5,073,930, to Green *et. al.*,

Claim 4 of the '576 patent recites:

a. ***The signal distribution system of claim 1 wherein the signal selector comprises a tuner.***

As discussed above, the Eutelsat Installers Guide reference teaches each and every element of claim 1, from which Claim 4 depends. The Eutelsat Installers Guide does not expressly disclose a tuner to select the transponder signals. However, tuners for channel selection in television receiver systems are notoriously well known. Additionally, there are several references that illustrate the use of tuners in satellite receiver systems.

United States Patent No. 5,073,930, to Green *et. al.*, discloses a satellite receiver system that uses a tuner to perform IF channel selection, and combining a plurality of selected channels into a composite signal for transmission to a set top box.

At Figure 1A, Green discloses a plurality of broadband LNB output signals 104, 106 having a plurality of transponder channels. IF-IF converters 113 are comprised of a plurality of

transponder processors 112 that each receive a broadband LNB signal from which one of the constituent transponder signals will be chosen. Thus, these transponder processors 112 are signal selectors. These signal selectors are described with reference to Figure 3 as including a tuner.

Accordingly, Claim 4 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with Green.

Additionally, United States Patent No. 5,654,774, to Pugel discloses a tuner for channel selection in a satellite television system. More particularly, at Col. 3, lines 18 – 24, the '774 patent discloses a tuner **9** for "selecting the particular RF signal corresponding to the desired channel from the plurality of RF signals received ..." Thus, Pugel teaches that a tuner can be used as a signal selector.

Accordingly, Claim 4 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with Pugel.

Also, European patent numbers EP0757489 and EP1009113 show tuners used to select a signal or channel from a satellite broadcast signal. For example, Figures 1 and 3 of EP0757489 illustrate a plurality of satellite input signals SatZF having tuners (mixer and local oscillator).

Accordingly, Claim 4 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with EP0757489.

Likewise, Figure 2 of EP1009113 shows a similar structure with a plurality of satellite input signals each having a tuner (mixer and local oscillator) followed by a SAW filter.

Accordingly, Claim 4 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with EP1009113.

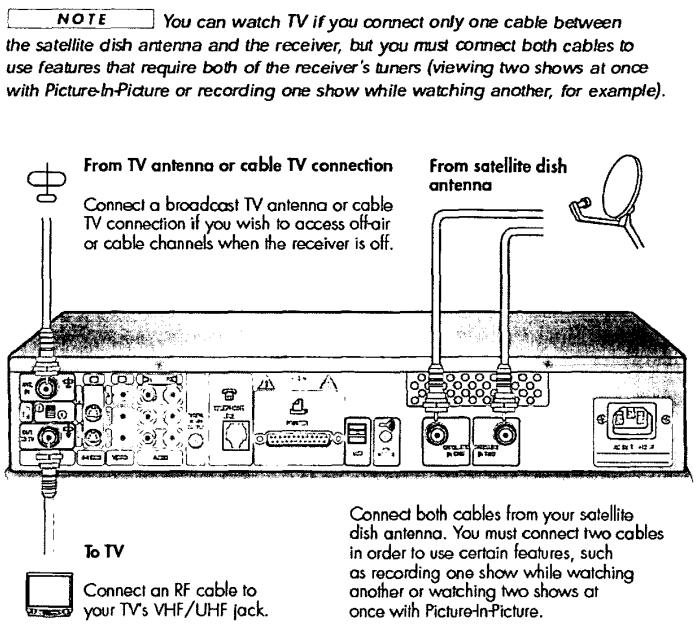
4. Claim 5

Claim 5 of the '576 patent recites:

a. ***The signal distribution system of claim 1 further comprising an integrated receiver decoder (IRD) connected to the coaxial cable with a plurality of tuners within the IRD, wherein each tuner within the IRD receives the composite signal and each tuner uses at least one transponder signal.***

As discussed above, the Eutelsat Installers Guide teaches each and every element of claim 1, from which Claim 5 depends. Also, as illustrated in Figure 19 (page 26), the Eutelsat Installers Guide discloses a satellite receiver or IRD connected to the coaxial cable. However, the Eutelsat Installers Guide does expressly disclose a plurality of tuners within the IRD.

The concept of two tuners in a television receiver was well known at the time of the purported invention to allow features such as picture-in-picture and watch-and-record. As evidence of what would be known by one of ordinary skill in the art the RCA Setup Guide discloses a satellite set top box, or IRD, with multiple tuners. For example, the Figure on page 6 and the accompanying note teaches two tuners to enable picture-in-picture or watch-and-record capabilities.



Accordingly, Claim 5 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with the RCA Setup Guide.

Additionally, United States Patent No. 5,285,284 teaches a television receiver having two tuners. For example, Figure 5, described at Column 2, lines 48 – 52 illustrates a television receiver having a picture-in-picture (PIP) function with two tuners **3** and **4**.

Accordingly, Claim 5 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with the '284 patent.

Additionally, United States Patent No. 6,353,463 is also directed toward a television receiver for receiving and signal processing analog or digital signals. Figure 2 of the '463 patent illustrates a dual tuner **20** receiving the television signals.

Accordingly, Claim 5 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with the '463 patent.

5. Claims 7 and 20

Claim 7 of the '576 patent recites:

a. ***The signal distribution system of claim 1 wherein the transponder select information is transmitted over a wireless link.***

Claim 20 of the '576 patent recites:

b. ***The method of claim 14 wherein the transponder request signal is transmitted over a wireless link to the ODU.***

As stated above, the Eutelsat Installers Guide teaches every element of claims 1 and 14, from which claims 7 and 20 depend, respectively. However, the Eutelsat Installers Guide does not explicitly state that the transponder select information or request signal (*i.e.*, the DiSEqC command) can be sent over a wireless link. However, wireless communications as an alternative to wired communications was well known at the time of the invention.

For example, the Philips Data Sheet for the UAA3202M Frequency Shift Keying Receiver illustrates a single-chip wireless receiver for VHF and UHF systems. (See, General Description on page 2.) Described applications for the wireless receiver are listed as remote control systems, telemetry systems and wireless data transmission (page 2). As such, it would have been obvious to use this or other commonly available wireless technology to communicate transponder select information over a wireless link.

Accordingly, Claim 7 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with the Philips Data Sheet.

For the same reasons, Claim 20 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with the Philips Data Sheet.

6. Claim 10

Claim 10 of the '576 patent recites:

a. ***The signal distribution system of claim 8, further comprising a means in the first unit for carrier offset correction.***

The Eutelsat Installers Guide reference teaches every element of claim 8, from which claim 10 depends. The Eutelsat Installers Guide does not explicitly teach carrier offset correction. However, United States Patent No. 6,437,837, to Seo, in the same field of endeavor, teaches the use of carrier offset correction in receive system for digital television signals. See, for example, Column 4, lines 47 – 57 of the '837 reference.

Accordingly, Claim 10 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with Seo.

Additionally, United States Patent No. 5,073,930, to Green, et al., teaches carrier offset correction in a satellite receiver system. At Column 12, lines 40 – 45, Green discloses carrier offset correction to correct for frequency errors. Note that one would have looked to Green when implementing satellite receiver system architectures. Particularly, Figure 1A of Green illustrates a plurality of selected broadband satellite signals on a bus 110 are sent to transponder units 112 for channel selection, and that the selected transponder channels are then combined by combiners 114. Figure 2 of Green illustrates that the selected transponder channels are mapped into and combined into a single composite signal (labeled as transponder bank output). This is directed toward solving the same goal of channel selection in a satellite receiver system as are the '576 patent and the Eutelsat Installers Guide.

Accordingly, Claim 10 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with Green reference.

7. Claim 15

Claim 15 of the '576 patent recites:

a. ***The method of claim 14 wherein the step of selecting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% TO 100% wider than the bandwidth of the transponder signal.***

The Eutelsat Installers Guide reference teaches every element of claim 14, from which claim 10 depends. The Broadcom Digital Satellite Receiver Paper discloses a 55Mhz bandwidth filter (page 1639, bottom of Col. 1) that is used in a digital satellite receiver capable of supporting variable symbol rates of 1 – 45 Mbaud (i.e., 1 – 45 MHz). Thus, depending on the chosen operating symbol rate, the bandwidth of the filter can range from approximately 20% wider than the signal bandwidth to well more than 100% wider.

Accordingly, Claim 15 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with Broadcom Digital Satellite Receiver Paper in combination with the Eutelsat Installers Guide.

8. Claim 16

Claim 16 of the '576 patent recites:

a. ***The method of claim 14 wherein the step of combining comprises frequency translating the selected transponder channels to a variable frequency before combining.***

As discussed above, The Eutelsat Installers Guide reference teaches every element of claim 14, from which claim 16 depends. Additionally, as discussed above with respect to claim 1, the Eutelsat Installers Guide teaches frequency translating the selected transponder channels (for example, Figure 19 illustrates that the IF to IF frequency translation occurs prior to the signal combining).

Additionally, United States Patent No. 5,073,930, to Green, et al., teaches translation of transponder channels to a variable frequency prior to combining. Transponder channel selection

and channel translation is performed by transponder processors 112 as illustrated in Figure 1. The channels selected by transponder processors 112 are combined by combiners 114. Details of transponder channel selection by transponder processors 112 are illustrated in Figure 3 of the '930 patent. This illustrates that the broadband transponder input is frequency translated by down converter 200, filtered at 202 to select the channel, and upconverted back to IF by upconverter 204. Upconverter 204 performs a variable frequency translation prior to the signal being combined by combiners 114. Particularly, microntroller 206 instructs PLL 248 to select a VCO frequency from between 1530 – 2130 MHz. Varying the local oscillator signal (VCO) varies the frequency of the transponder channel that is output to be combined by combiner 114 (Fig. 1). This is described at Column 14, lines 5-14.

Additionally, Green teaches that the selected frequency can be varied to accommodate flexible mapping of transponder channels into the composite signal. See, Column 10, lines 34 – 43.

Accordingly, Claim 16 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with Green.

9. Claim 17

Claim 17 of the '576 patent recites:

a. ***The method of claim 14 further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.***

As discussed above, The Eutelsat Installers Guide reference teaches every element of claim 14, from which claim 17 depends. Additionally, as discussed above with respect to claim 1, the Eutelsat Installers Guide teaches frequency translating the selected transponder channels (for example, Figure 19 illustrates that the IF to IF frequency translation occurs prior to the signal combining).

Additionally, United States Patent No. 5,073,930 teaches translation of transponder channels to a predetermined frequency prior to combining. Figure 1A of Green illustrates a plurality of selected broadband satellite signals on a bus 110 are sent to transponder units 112 for channel selection, and that the selected transponder channels are then combined by combiners 114. Figure 2 of Green illustrates that the selected transponder channels are mapped into and combined into a single composite signal (labeled as transponder bank output).

Although the transponder processor can map to a variable frequency (as discussed with respect to Claim 16), Green also teaches that once a mapping of transponder channels into the combined signal is decided, the processors can be **preprogrammed** to output on a given frequency. See, Column 10, lines 20 – 23. Thus, the processors translate to a predetermined frequency prior to signal combining.

Accordingly, Claim 17 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide reference in combination with Green.

10. Claim 21

Claim 21 of the '576 patent recites:

> The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining; and splitting the composite signal inside a home and distributing to a plurality of IRDs.

For clarity and ease of discussion, the elements of claim 21 are discussed in their constituent parts.

a. ***The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining;***

As discussed above with respect to claim 16, the Eutelsat Installers Guide either taken alone or in combination with Green teaches translating the selected transponder channels to a variable frequency before combining.

b. ***and splitting the composite signal inside a home and distributing to a plurality of IRDs.***

As discussed above with respect to claim 18, the Eutelsat Installers Guide reference teaches splitting the composite signal inside a home and distributing to a plurality of IRDs.

Accordingly, Claim 21 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with Green.

11. Claim 22

Claim 22 of the '576 patent recites:

a. ***The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.***

Claim 21 from which this claim depends, is taught by the combination of the Eutelsat Installers Guide in combination with Green as described with reference to Claim 21. As discussed above with respect to claim 19, The Eutelsat Installers Guide reference teaches the transponder request signal is transmitted over the cable from an IRD.

Accordingly, Claim 22 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with Green.

12. Claim 23

Claim 23 of the '576 patent recites:

a. ***The method of claim 21 wherein the transponder request signal is transmitted over a wireless link to the ODU.***

Claim 21 from which this claim depends, is taught by the combination of the Eutelsat Installers Guide in combination with Green as described with reference to Claim 21. As

discussed above with respect to claims 7 and 20, the Philips Reference teaches signaling over a wireless link.

Accordingly, Claim 21 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide in combination with Green and further in view of Phillips.

C. Claims 1, 2, 6, 8, 9, 11-14, 16, 18, 19, 21 and 22 of the '576 Patent are unpatentable under 35 U.S.C. §102(b) as being anticipated by the Eutelsat DiSEqC Specification as discussed below

To supplement this detailed discussion, a summary of the applicability of the reference to the claims is provided in the claim charts attached as Appendix C.

1. Claim 1

Claim 1 of the '576 Patent recites:

> A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals form satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising: a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals from at least on broadband LNB signal based on the transponder select information; a frequency translator coupled to the signal selector that is capable of shifting the selected transponder signals to new carrier frequencies to produce RF signals; and a combiner coupled to at least one frequency translator capable of combining at least two RF signals to produce a composite signal; wherein the modulation of the composite signal is the same as modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable; whereby the composite signal is transmitted to the IRD.

The Eutelsat DiSEqC Specification discloses every element of claim 1 of the '576 patent. For clarity and ease of discussion, the elements of claim 1 are discussed below in their constituent parts.

a. ***A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising:***

The Eutelsat DiSEqC Specification discloses a signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD). Particularly, Figure 19 on page 23 of the Eutelsat DiSEqC Specification document illustrates a signal distribution system. The system illustrated in Figure 19 includes a subscriber controlled Satellite Master Antenna Television (SMATV) system. Figure 19 illustrates distributing a plurality of low noise amplifier and block converter (LNB) signals form satellite outdoor unit (ODU) over a coaxial cable to a satellite receiver, or integrated receiver decoder (IRD).

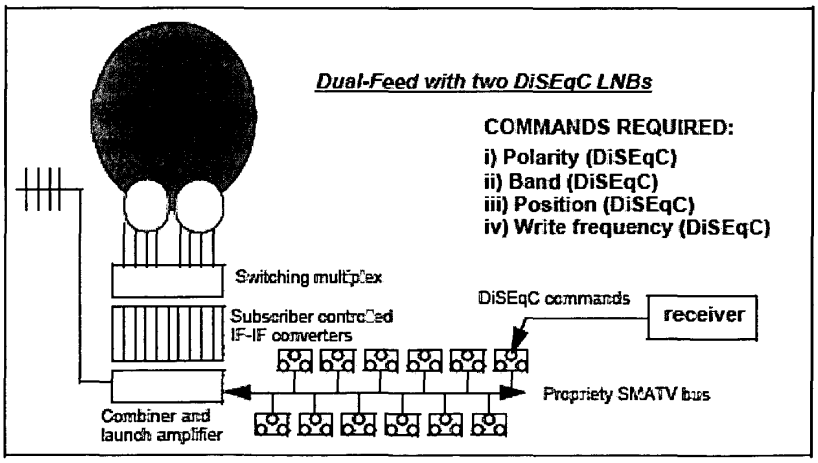


Figure 19: Subscriber controlled SMATV Headend

As stated in the figure itself, the illustrated system is a dual-feed system having two LNBs. As illustrated, each LNB has four LNB outputs feeding a multiplex switch. As illustrated, signals are fed through the selection and combining units to the satellite receiver (IRD).

b. ***a signal selector***

The "signal selector" is described in the '576 patent document as a signal selector **250** (See Figure 2) that extracts the channels from the broadband LNB output. This recited "signal selector" is also specified later on in Claim 1 as selecting a plurality of transponder signals (*i.e.*, transponder channels).

The Eutelsat DiSEqC Specification teaches a signal selector. For example, at Figure 19, the Eutelsat DiSEqC Specification teaches both a switching multiplex (e.g., a multiswitch) as well as subscriber controlled IF-IF converters.

As described more fully below, the switching multiplex selects the broadband LNB output signals and the IF-IF converters select the transponder signal or channel within the LNB output.

c. ***[a signal selector] that receives a plurality of broadband LNB signals comprising a plurality of transponder signals***

The Eutelsat DiSEqC Specification also discloses that the signal selector receives a plurality of broadband LNB signals, comprising a plurality of transponder signals. Referring still to the architecture illustrated in Figure 19, the Eutelsat DiSEqC Specification discloses a satellite antenna in a dual-feed configuration with two LNBs. As the Eutelsat DiSEqC Specification teaches, the signal selector receives the broadband LNB signals from the LNBs.

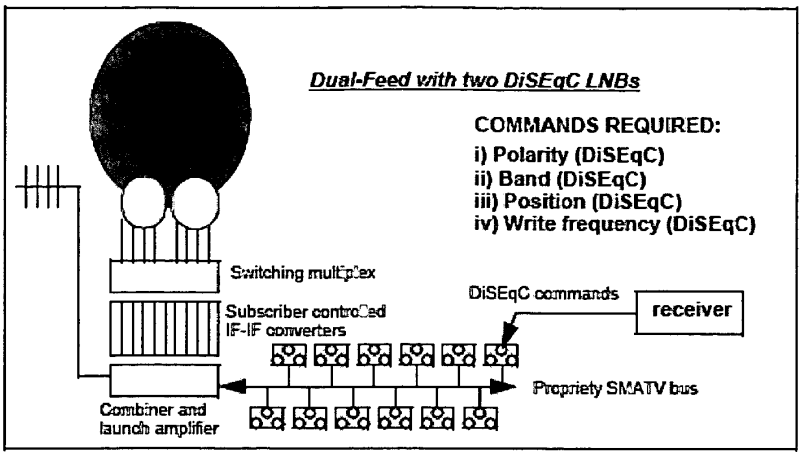


Figure 19: Subscriber controlled SMATV Headend

LNBs, or low noise block converters, were well known at the time of the purported invention. The fact that Figure 19 describes the DiSEqC commands as controlling the Band selected and the Write Frequency further illustrates that the incoming signals include one or more broadband satellite signals (selected by the Band command) with a plurality of channels to be selected (by the Write Frequency command).

Additionally, one of ordinary skill in the art would have understood that LNBs were used to receive a broadband satellite signal, amplify and convert it to similar broadband signals carried at a lower frequency (called intermediate frequency or IF), and output a broadband LNB signal that comprises a plurality of transponder signals. As evidence of what one of ordinary skill in the art would have understood at the time, reference is made to the portion of the Background Section of the '576 patent that references Figure 1, which is labeled as "Prior Art." In this section, at Column 1, Lines 44 – 53, the LNB is described as outputting a broadband 500 MHz signal that is comprised of a plurality of transponder signals of 24MHz bandwidth each. As such, one of ordinary skill in the art would have understood that an LNB outputs a broadband LNB signal comprising a plurality of transponder signals.

d. ***the signal selector is responsive to transponder select information transmitted by an IRD***

The Eutelsat DiSEqC Specification discloses that the signal selector (multiswitch for band selection or IF-IF converter for channel selection) is responsive to transponder select information transmitted by an IRD. The transponder select information taught by the Eutelsat DiSEqC specification is the DiSEqC commands from the IRD. These DiSEqC commands can include a command to select the desired transponder frequency (channel) to be selected and included in the composite signal. For example, reference is made to Figure 19 of the Eutelsat DiSEqC Specification that illustrates a Satellite Receiver (IRD) that sends one or more DiSEqC commands to the signal selector for band and channel selection. Figure 19 also shows that one DiSEqC command is the Write Frequency Command that is explained at page 8, third paragraph, as remotely controlling the selected transponder frequency (channel).

As such, the Eutelsat teaches that the signal selector is responsive to transponder select information from the IRD.

e. ***and selects a plurality of transponder signals from at least one broadband LNB signal based on the transponder select information;***

As stated above, Figure 19 illustrates a receive architecture that allows remote channel selection. As also stated above the Eutelsat DiSEqC Specification specifies that in response to the DiSEqC command, the signal selector selects the transponder signals (channels) from the selected LNB output signal. For instance, the Eutelsat DiSEqC Specification specifies that control of the headend (signal selector) to select a desired channel is accomplished using the DiSEqC Write Frequency command to specify the frequency of the desired transponder signal. *See*, page 8. The legend in Figure 19 further describes that one DiSEqC command is the Write Frequency command, described at page 8 as selecting the desired transponder signal (identified by its center frequency).

f. ***a frequency translator coupled to the signal selector that is capable of shifting the selected transponder signals to new carrier frequencies to produce RF signals;***

Figure 19 of the Eutelsat DiSEqC Specification illustrates a subscriber controlled IF-IF converter. This IF-IF conversion not only extracts the selected transponder signals (channels) in response to the DiSEqC Write Frequency command, but also converts the selected channels to a different IF frequency for distribution to the set top box (IRD). As the name suggests, the IF-IF converters convert, or frequency translate, an incoming IF signal at one carrier frequency to an IF signal at another carrier frequency.

Additionally, page 8 of the Eutelsat DiSEqC Specification discloses a "remote controllable frequency" converter that converts the selected transponder signal.

g. ***and a signal combiner coupled to at least one frequency translator capable of combining at least two RF signals to produce a composite signal;***

The Eutelsat DiSEqC Specification also teaches the signal combiner as recited in Claim 1. Particularly, at Figure 19, the Eutelsat DiSEqC Specification discloses a combiner that combines the RF signals received from the subscriber-controlled IF-IF conversion unit, and combines them into a single composite output signal.

h. ***wherein the modulation of the composite signal is the same as the modulation of the broadband LNB signals;***

The Eutelsat DiSEqC Specification teaches this element of claim 1. Particularly, as illustrated in Figure 19, there is no transmodulation of any of the incoming satellite signals. As such one of ordinary skill in the art would have understood that without transmodulation, the modulation of the composite signal is the same as that of the broadband LNB signals.

i. ***and wherein the composite signal is transmitted on the coaxial cable;***

The Eutelsat DiSEqC Specification teaches that the composite signal is transmitted on the coaxial cable. At Figure 19, the Eutelsat DiSEqC Specification shows the composite signal routed to the IRDs via a signal path. At page 8, the Eutelsat DiSEqC Specification describes using the existing cable tree distribution networks already installed in buildings at that time. One of ordinary skill in the art would have clearly understood that television cable distribution within buildings was done by coaxial cable..

As evidence of what one of ordinary skill in the art would have understood, reference is made to the portion of the Background Section of the '576 patent that describes the Prior Art Figure 1. Here, at Column 1, Lines 33-39, the patentees admit that coaxial cable is commonly used to route the downconverted satellite TV signals.

j. ***whereby the composite signal is transmitted to the IRD***

The Eutelsat DiSEqC Specification teaches that the composite signal is transmitted to the IRD. Still referring to Figure 19, the output of the RF combiner (a composite signal) is sent to the satellite receiver. The satellite receiver is not only well known to be a set-top box, or IRD, but is also referred to as an IRD on page 8.

Accordingly, Claim 1 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

2. Claim 2

Claim 2 of the '576 patent recites:

> The signal distribution system of claim 1 further comprising a plurality of IRDs and wherein the composite signal is transmitted on a single cable connected to the ODU and all IRDs receive channels extracted from the composite signal.

For clarity and ease of discussion, Claim 2 is discussed in its constituent parts.

a. ***The signal distribution system of claim 1 further comprising a plurality of IRDs***

The Eutelsat DiSEqC Specification reference teaches that a plurality of IRDs can be provided. Particularly, Figure 19 illustrates an IRD connected to a first wall outlet. Figure 19 further illustrates additional wall outlets. One of ordinary skill in the art would have understood that multiple wall outlets are used to support multiple IRDs. For example, an IRD can be connected to each additional wall outlet, just as the illustrated IRD is connected to the first wall outlet.

b. ***and wherein the composite signal is transmitted on a single cable connected to the ODU***

Figure 19 also illustrates that the composite signal from the combiner is transmitted on a single cable. Additionally, at page 8, the Eutelsat DiSEqC Specification states that with intelligent headends it is possible to use existing single cable distribution network for signaling..

c. ***and all IRDs receive channels extracted from the composite signal.***

Figure 19 also illustrates that the IRDs receive channels from the composite signal. As illustrated, the composite signal is distributed to all the wall outlets (each of which can support an IRD) so that all IRDs receive the channels in the composite signal. As such, the claim as written is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification .

However, requestors note that the claim wording might be ambiguous in the manner in which it refers to channel extraction from the composite signal. The specification of the '576 patent appears to attribute this extraction to the Gateway. (See, the Summary Section of the '576 patent). Also note, that the Gateway is described as a splitter/summer (col. 4, lines 42 – 47) or mechanism for signal distribution. There is no description, however, regarding how a more complex Gateway would be implemented to ***extract*** channels from the composite signals, nor are

their any drawings illustrating what would be inside a gateway. In fact, the gateway is only illustrated as a 'black box' gateway 230 (Figure 2) or gateway 1160 (Figure 11). Nonetheless, in the event that this element is found to cover extraction from the composite signal by a Gateway, Requestor has uncovered another reference that teaches this in the context of a satellite television distribution system. This reference is addressed below, in the section dealing with substantial new questions of patentability under 35 U.S.C. § 103.

3. Claim 6

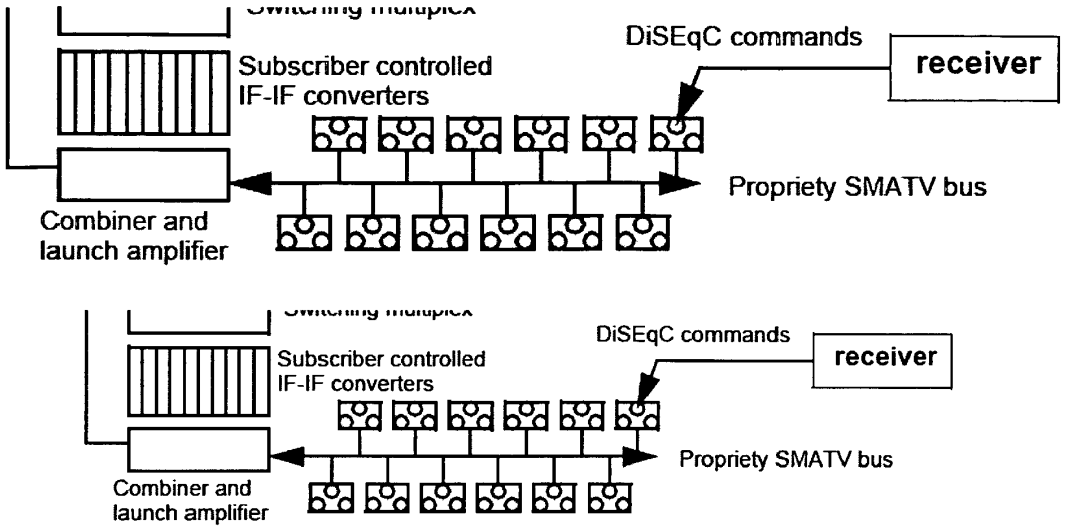
Claim 6 of the '576 patent recites:

a. ***The signal distribution system of claim 1 wherein the transponder select information is transmitted over the same cable as the composite signal.***

The Eutelsat DiSEqC Specification reference teaches that the channel select information is sent over the same cable as the composite signal. Referring again to Figure 19, the Eutelsat DiSEqC Specification discloses that the DiSEqC signaling information that is used to select the channels (i.e., to select the transponders) is sent over the same cable as the composite signal. In Figure 19, the composite signal distributed by the combiner is illustrated as being distributed over a single cable to an IRD (subsequently split to serve multiple wall outlets). The DiSEqC information is also illustrated as being transmitted over the same cable.

Additionally, at Page 8, the Eutelsat DiSEqC Specification teaches that the DiSEqC commands can be transmitted over the existing cable distribution network (i.e., the same coaxial

cable on which the program content is distributed.



Accordingly, Claim 6 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

4. Claim 8

Claim 8 of the '576 patent recites:

> A signal distribution system for distributing signals comprising a plurality of channels from a plurality of sources between a first unit and a second unit over a communication medium comprising: means in the first unit responsive to information transmitted by the second unit for extracting selected channels from each of the plurality of sources and combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; and means in the second unit for receiving the composite signal and demodulating and decoding at least one channel; and means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

For clarity and ease of discussion, the elements of claim 8 are discussed in their constituent parts.

a. ***A signal distribution system for distributing signals comprising a plurality of channels from a plurality of sources between a first unit and a second unit over a communication medium comprising:***

As stated above with respect to Claim 1, the Eutelsat DiSEqC Specification reference discloses a signal distribution systems for satellite TV. The Eutelsat DiSEqC Specification reference teaches various architectures for distributing signals (Satellite TV signals) comprising a plurality of channels from a plurality of sources between a first unit (the Outdoor Unit) and a second unit (the set top box or IRD). One example of such an architecture is that illustrated in Figure 19 of the Eutelsat DiSEqC Specification (page 23).

b. ***means in the first unit responsive to information transmitted by the second unit for extracting selected channels from each of the plurality of sources***

The Eutelsat DiSEqC Specification reference teaches this element of claim 8. Particularly, the Eutelsat DiSEqC Specification reference teaches that the satellite receiver (IRD) is configured to send information to the outdoor unit to perform channel selection from satellite signals. Specifically, the Eutelsat DiSEqC Specification at page 8 states that the receiver (IRD) transmits a desired transponder frequency to be selected by the first unit (headend).

The Eutelsat DiSEqC Specification also discloses that the multiswitch and IF-IF converter are responsive to transponder select information transmitted by an IRD. The Eutelsat DiSEqC Specification teaches that the DiSEqC commands from the IRD can include a command to select the desired transponder frequency to be selected and included in the composite signal (*i.e.*, for extracting selected channels). For example, reference is made to Figure 19 of the Eutelsat DiSEqC Specification that illustrates a Satellite Receiver (IRD) that sends one or more DiSEqC commands to the signal selector for channel selection.

c. ***and combining the selected channels into a composite signal***

The Eutelsat DiSEqC Specification also teaches combining the selected channels into a composite signal. As discussed above with respect to Claim 1, Figure 19 of the Eutelsat DiSEqC Specification discloses a signal Combiner unit that accepts multiple signals from the Subscriber-controlled IF-IF conversion unit, and combines these signals into a composite output signal.

d. ***without demodulating channels and without changing the modulation of the channels***

The Eutelsat DiSEqC Specification reference discloses that the signals are selected and combined without changing the modulation of the channels. As discussed above with respect to claim 1, one of ordinary skill in the art would have understood that QPSK signals are received from the satellite and the signals are distributed to the satellite receiver (IRD) as QPSK signals. As such, no transmodulation is performed. Additionally, the signals are not demodulated either, as they remain QPSK-modulated signals. The Eutelsat DiSEqC Specification shows a system with no demodulation (until the set top box).

Additionally, one of ordinary skill in the art would have understood at the time of the invention that with satellite television systems, the signal was typically distributed to the set-top box as a QPSK signal to account for the lower signal-to-noise ratios associate with satellite television signals as compared to cable television signals. As evidence of the knowledge of one of ordinary skill in the art, reference is made to the Broadcom Digital Satellite Receiver Paper at page 1638, which describes this phenomenon:

> a very high SNR (~30 dB). The low SNR of the satellite-TV system mandates the use of a lower order modulation format (QPSK) versus the higher order modulation formats used in the cable-TV systems (64/256/1024-QAM). Because of the lower order modulation format, the symbol rate must be increased to achieve comparable bit rates, thus requiring the use of more dedicated hardware (i.e., less hardware sharing in the architecture).

e. ***and transmitting the composite signal over the medium;***

The Eutelsat DiSEqC Specification teaches that the composite signal is transmitted to the satellite receiver/IRD. At Figure 19, the Eutelsat DiSEqC Specification shows the composite signal routed to the IRDs via a signal path (the cable tree network).

f. ***and means in the second unit for receiving the composite signal and demodulating and decoding at least one channel;***

The second unit is disclosed by the Eutelsat DiSEqC Specification as a satellite receiver or IRD. Indeed, the term IRD stands for Integrated Receiver Decoder.[7] Receivers are well known to those of ordinary skill in the art to receive communication signals and to tune and demodulate the signals. As the name implies, the, Integrated Receiver Decoder not only receives the signal but also decodes it.

As evidence of what one of ordinary skill in the art would have understood at the time, reference is made to the portion of the Background Section of the '576 patent that references Figure 1, which is labeled as "Prior Art." In this section, the '576 patent teaches that IRDs, or set top boxes are commonly known. See, Column 1, lines 30 – 32. This Background Section further teaches that the satellite receiver or IRD demodulates and decodes the signal. See, Column 1, lines 39 – 44.

g. ***and means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.***

The Eutelsat DiSEqC Specification reference teaches bidirectional communication between the IRD and the switching equipment. Although the above-cited Figure 19 is an illustration for one-way DiSEqC, the Eutelsat DiSEqC Specification also teaches two-way, or bi-directional DiSEqC. See, for example, Section 4.3 in the first full paragraph at page 11, where it

[7] This definition can be found in the Background Section of the '576 patent at Col. 1, lines 29-31.

states: "All of the above recommendations for one-way DiSEqC are applicable to full two-way DiSEqC..."

Accordingly, Claim 8 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

5. Claim 9

Claim 9 of the '576 patent recites:

> The signal distribution system of claim 8 wherein the control information comprises channel selection requests originating from the second unit and the control information comprises channel mapping information originating from the first unit.

For clarity and ease of discussion, the elements of claim 9 are discussed in their constituent parts.

a. ***wherein the control information comprises channel selection requests originating from the second unit***

As stated above, the Eutelsat DiSEqC Specification teaches each and every element of claim 8, from which claim 9 depends. Additionally, the Eutelsat DiSEqC Specification reference teaches control information comprising channel selection requests. Particularly, at page 8, the Eutelsat DiSEqC Specification reference states that the IRDs send write frequency commands (i.e., channel selection requests) to the headend to select the appropriate transponder signal, or channel.

b. ***and the control information comprises channel mapping information originating from the first unit.***

The Eutelsat DiSEqC Specification reference teaches that the control information also comprises channel mapping information from the switching equipment to the IRD. For example, the Eutelsat DiSEqC Specification reference discloses that two-way DiSEqC (DiSEqC 2.0/2.1

etc.) further enhances the standard by allowing the receiver to receive configuration information (mapping information) from the head end. See, for example, page 11.

One of ordinary skill in the art would have understood that configuration information can include, for example, an identification of the LNB local oscillator frequency or an identification of the frequencies used by one or more of the IF-IF converters so the IRD can determine which frequency to tune to in order to receive the converter output in the composite signal.

As evidence of what one of ordinary skill in the art would have understood at the time of the purported invention, reference is made to United States Patent No. 5,073,930, to Green *et. al.*, which teaches that the term frequency mapping is used to map the conversion of an IF signal in a wideband LNB output to an IF signal at a translated frequency for placement in the composite signal. *See*, Green at Column 10, lines 4 – 43. As such, one of ordinary skill in the art at the time would have understood that configuration information includes information regarding channel mapping.

Accordingly, Claim 9 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

6. Claim 11

Claim 11 of the '576 patent recites:

> The signal distribution system of claim 8 wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.

a. ***The signal distribution system of claim 8 wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.***

The Eutelsat DiSEqC Specification reference teaches an outdoor unit and a satellite integrated receiver decoder unit (IRD). Figure 19 of the Eutelsat DiSEqC Specification

reference discloses a Satellite Receiver. The Satellite Receiver is referred to at page 8 in the Eutelsat DiSEqC Specification reference as an IRD.

Figure 19 also illustrates the LNBs and other switching and distribution equipment, which one of ordinary skill in the art would understand to be outdoor equipment. Moreover, the Eutelsat DiSEqC Specification document, illustrates the antennae, LNBs, switching equipment, etc. as outdoor equipment, and the satellite receiver as indoor equipment.

Furthermore, as further evidence of what was understood at the time, Figure 1 of the '576 patent, labeled as "Prior Art" discloses that the satellite antenna, LNBs and switches are an outdoor unit, and the description accompanying prior art Figure 1 describes the IRD as a set top box located inside a building.

Accordingly, Claim 11 of the '576 patent is a unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

7. Claim 12

Claim 12 of the '576 patent recites:

a. ***The signal distribution system of claim 11 wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.***

As discussed above with respect to Claim 1, the Eutelsat DiSEqC Specification reference teaches that the communication medium over which the signal is distributed is a coaxial cable.

Accordingly, Claim 12 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

8. Claim 13

a. ***The signal distribution system of claim 12 wherein the means for communicating uses the same communication medium as the composite signal.***

In this claim, "means for communicating" refers to the bi-directional communication of control information as recited in Claim 8. The Eutelsat DiSEqC Specification reference teaches that the control information is communicated along the same signal path as the composite signal. This was discussed above with respect to claim 1, for which Figure 19 of the Eutelsat DiSEqC Specification reference was cited as showing signaling capabilities along the same signal path as the composite signal. Additionally, as stated above with respect to claim 8, Section 4.3 on page 13 describes bi-directional signaling.

Accordingly, Claim 13 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

9. Claim 14

Claim 14 of the '576 patent recites:

> A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of:
>
> communicating a transponder request signal to the ODU from the IRD; in the ODU, selecting a plurality of transponder signals extracted from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals;
>
> combining selected transponder signals into a composite signal;
>
> transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

For clarity and ease of discussion, the elements of claim 14 are discussed in their constituent parts.

a. ***A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite***

broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of:

The Eutelsat DiSEqC Specification reference teaches communicating a plurality of transponder signals from a satellite outdoor unit that receives satellite broadband signals to an integrated receiver decoder over a single cable connected to the outdoor unit as discussed above with respect to Claims 1 and 8.

b. ***communicating a transponder request signal to the ODU from the IRD;***

Figure 19 of the Eutelsat DiSEqC Specification reference teaches signaling information between the satellite receiver (IRD) and the switching equipment (ODU). Additionally, as discussed above with respect to claim 1, the Eutelsat DiSEqC Specification reference discloses the signaling protocol referred to as DiSEqC signaling that can provide one-way or two-way communication between the IRD and ODU.

The Eutelsat DiSEqC Specification reference discloses sending a transponder request signal to the ODU. Particularly, at page 8 it teaches that a DiSEqC command for selecting a channel based on the transponder frequency (Write Frequency command) is sent from the IRD to the ODU.

c. ***in the ODU, selecting a plurality of transponder signals extracted from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals;***

The Eutelsat DiSEqC Specification reference teaches selecting transponder signals, or channels. As discussed above with respect to claim 1, the transponder signals are extracted from the received satellite broadband signal.

As also discussed above with respect to claim 1, the selection of the transponder signals is in response to signals from the IRD (transponder request signals).

d. ***combining selected transponder signals into a composite signal;***

The Eutelsat DiSEqC Specification reference teaches combining selected transponder signals into a composite signal. As discussed above with respect to claim 1, Figure 19 of the Eutelsat DiSEqC Specification reference illustrates an RF combining and amplification unit that combines the selected transponder signals (or channels) into a composite output on a single communication path from the combiner to the IRD(s).

e. ***transmitting the composite signal over the single cable from the ODU to the IRDs,***

The Eutelsat DiSEqC Specification reference teaches transmitting the composite signal over the single cable from the ODU to the IRDs. As discussed above with respect to Claim 1, the composite signal is illustrated in Figure 19 as being output from the combiner and transmitted over a single communication path to the IRD(s). As also discussed above, Figure 19 illustrates multiple wall outlets. One of ordinary skill in the art reading the Eutelsat DiSEqC Specification reference would understand that a satellite receiver, or IRD, can be hooked up to one or more of the multiple wall outlets.

f. ***wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.***

The Eutelsat DiSEqC Specification reference teaches that the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting. As discussed above with respect to Claim 1, the Eutelsat DiSEqC Specification reference does not show or require any form of transmodulation. As such, one of ordinary skill in the art reading the Eutelsat DiSEqC Specification would understand that the modulation of the carrier signal is not altered.

Accordingly, Claim 14 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

10. Claim 16

Claim 16 of the '576 patent recites:

a. ***The method of claim 14 wherein the step of combining comprises frequency translating the selected transponder channels to a variable frequency before combining.***

The Eutelsat DiSEqC Specification reference teaches frequency translating the selected transponder channels to a variable frequency before combining. As discussed above with respect to claim 1, the Eutelsat DiSEqC Specification reference teaches the transponder channels are frequency translated from their respective center frequencies in the broadband satellite signal to their new respective center frequencies in the satellite IF distribution channel. And Figure 19 illustrates that the IF to IF frequency translation occurs prior to the signal combining.

One of ordinary skill in the art would understand that the assignment could be variable to accommodate flexibility in allocating multiple selected signals into the available bandwidth.

Accordingly, Claim 16 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

11. Claim 18

Claim 18 of the '576 patent recites:

a. ***The method of claim 14 further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.***

The Eutelsat DiSEqC Specification reference teaches splitting the composite signal inside a home and distributing to a plurality of IRDs. Particularly, Figure 19 illustrates that the composite signal is split out to a plurality of wall units and distributed to each of the wall units. As stated above, one of ordinary skill in the art would understand that, as in the first unit, an IRD can be connected to any or all of the other wall units. As such, Figure 19 illustrates splitting the signal and distributing it to a plurality of IRDs.

Also note that the claim references splitting the signal inside a home. Figure 19 illustrates that the signal is split prior to distribution to the wall units. One of ordinary skill in the art would understand that the wall outlets are in the walls of the building (whether it be a home, office, or other building), and that the splitting can occur inside the home.

Accordingly, Claim 18 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

12. Claim 19

Claim 19 of the '576 patent recites:

> The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD and all IRDs receive the same composite signal.

For clarity and ease of discussion, the elements of claim 19 are discussed in their constituent parts.

a. ***The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD***

The Eutelsat DiSEqC Specification reference teaches the transponder request signal is transmitted over the cable from an IRD. As discussed above with respect to claim 6, Figure 19 illustrates that the DiSEqC signal (transponder request signal) is transmitted over the cable from the IRD to the switching equipment.

b. ***and all IRDs receive the same composite signal.***

The Eutelsat DiSEqC Specification reference teaches that all IRDs receive the same composite signal. As discussed above with respect to claim 2, Figure 11 illustrates that the composite signal from the combiner is distributed via a single cable to the wall outlets, and that an IRD can be connected to each wall outlet.

Accordingly, Claim 19 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

13. Claim 21

Claim 21 of the '576 patent recites:

> The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining; and splitting the composite signal inside a home and distributing to a plurality of IRDs.

For clarity and ease of discussion, the elements of claim 21 are discussed in their constituent parts.

a. ***The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining;***

As discussed above with respect to claim 16, the Eutelsat DiSEqC Specification reference teaches translating the selected transponder channels to a variable frequency before combining.

b. ***and splitting the composite signal inside a home and distributing to a plurality of IRDs.***

As discussed above with respect to claim 18, the Eutelsat DiSEqC Specification reference teaches splitting the composite signal inside a home and distributing to a plurality of IRDs.

Accordingly, Claim 21 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

14. Claim 22

Claim 22 of the '576 patent recites:

a. ***The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.***

Claim 21 from which this claim depends, is taught by the Eutelsat DiSEqC Specification as described with reference to Claim 21. As discussed above with respect to claim 19, The

Eutelsat DiSEqC Specification reference teaches the transponder request signal is transmitted over the cable from an IRD.

Accordingly, Claim 22 of the '576 patent is unpatentable under 35 U.S.C. § 102(b) as being anticipated by the Eutelsat DiSEqC Specification reference.

D. Claims 2 – 5, 7, 10, 15-17, and 20-23 of the '576 Patent are unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification as discussed below:

To supplement this detailed discussion, a summary of the applicability of the reference to the claims is provided in the claim charts attached as Appendix C, Part II.

1. Claim 2 - the Eutelsat DiSEqC Specification in combination with United States Patent No. 6,005,861, to Humpleman.

Claim 2 of the '576 patent recites:

> The signal distribution system of claim 1 further comprising a plurality of IRDs and wherein the composite signal is transmitted on a single cable connected to the ODU and all IRDs receive channels extracted from the composite signal.

For the reasons set forth above with respect to claim 1, the Eutelsat Installers Guide teaches every element of claim 1, from which claim 2 depends.

As stated above under the application of the Eutelsat Installers Guide under 35 U.S.C. § 102, the Eutelsat Installers Guide teaches each and every element of claim 2. However, as also stated above, there is some question regarding whether the limitation reciting "channels extracted from the composite signal" calls into question gateway functionality.

United States Patent No. 6,005,861, to Humpleman, discloses a multimedia network architecture for in-premises distribution of satellite television signals. Humpleman teaches that cable or satellite television signals (Col. 3, lines 28-31) are received at the home and distributed by network **10** to one or more televisions **12, 14** or other video equipment (VCR **16**).

With reference to Figure 1, Humpleman discloses that a network interface unit **32** (i.e., Gateway) receives an external satellite broadcast signal (Col. 3, lines 21 – 35), and that the external signals are distributed via a network **34** (Col. 3, lines 49 – 55). With particular regard to television signals, Humpleman teaches with reference to Figure 4 that the network interface unit (NIU) **32,** or gateway, receives the external video signal and distributes it to the set top box **40** (Column 7, lines 18 – 34).

Humpleman also teaches that the gateway (NIU **32**) can extract channels from the composite signal before the signal is distributed throughout the home to the set top boxes. See, for example, Column 7, lines 35 – 52, where Humpleman discloses demultiplexing the channel from a multiple channel stream.

Accordingly, Claim 2 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by Humpleman's teachings of a gateway in combination with the Eutelsat DiSEqC Specification.

2. Claim 3

Claim 3 of the '576 patent recites:

a. ***The signal distribution system of Claim 1 wherein the signal selector comprises an analog to digital converter and a digital filter.***

As discussed above, the Eutelsat Installers Guide reference teaches each and every element of claim 1, from which Claim 3 depends. The Eutelsat Installers Guide does not teach a digital filter. United States Patent No. 5,278,837, to Kelley, teaches a digital receiver with digital channel selection. At Figure 8, Kelley teaches a digital receiver with an analog to digital converter ADC **106** that digitizes the RF input signal and provides it to a digital tuner. Col. 6, lines 31-34. The output of mixer **18** is provided to a digital IF filter **34** to isolate the desired IF signal. Col. 7, lines 34 – 40.

Accordingly, Claim 3 of the '576 patent unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with Kelley.

Additionally, The Broadcom Paper teaches that conventional receivers use of a SAW filter to perform channel selection for satellite TV systems (Page 11634, first paragraph). The Broadcom paper describes an all digital receiver (Figures 3 and 8) that includes analog to digital converters and digital filtering. Although the Broadcom paper describes analog to digital conversion and digital filtering in the context of a satellite set top box, one of ordinary skill in the art at the time would have understood that such techniques could also be used for channel selection in the signal selector as well.

Accordingly, Claim 3 of the '576 patent unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with the Broadcom Digital Satellite Receiver Reference.

3. Claim 4

Claim 4 of the '576 patent recites:

a. ***The signal distribution system of claim 1 wherein the signal selector comprises a tuner.***

As discussed above, the Eutelsat DiSEqC Specification reference teaches each and every element of claim 1, from which Claim 4 depends. The Eutelsat DiSEqC Specification does expressly disclose a tuner to select the transponder signals. However, tuners for channel selection in television receiver systems are notoriously well known. Additionally, there are several references that illustrate the use of tuners in satellite receiver systems.

United States Patent No. 5,073,930, to Green *et. al.*, discloses a satellite receiver system that uses a tuner to perform IF channel selection, and combining a plurality of selected channels into a composite signal for transmission to a set top box.

At Figure 1A, Green discloses a plurality of broadband LNB output signals 104, 106 having a plurality of transponder channels. IF-IF converters 113 are comprised of a plurality of transponder processors 112 that each receive a broadband LNB signal from which one of the constituent transponder signals will be chosen. Thus, these transponder processors 112 are signal selectors. These signal selectors are described with reference to Figure 3 as including a tuner.

Accordingly, Claim 4 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with Green.

Additionally, United States Patent No. 5,654,774, to Pugel discloses a tuner for channel selection in a satellite television system. More particularly, at Col. 3, lines 18 – 24, the '774 patent discloses a tuner **9** for "selecting the particular RF signal corresponding to the desired channel from the plurality of RF signals received ..." Thus, Pugel teaches that a tuner can be used as a signal selector.

Accordingly, Claim 4 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with Pugel.

Also, European patent numbers EP0757489 and EP1009113 show tuners used to select a signal or channel from a satellite broadcast signal. For example, Figures 1 and 3 of EP0757489 illustrate a plurality of satellite input signals SatZF having tuners (mixer and local oscillator).

Accordingly, Claim 4 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with EP0757489.

Likewise, Figure 2 of EP1009113 shows a similar structure with a plurality of satellite input signals each having a tuner (mixer and local oscillator) followed by a SAW filter.

Accordingly, Claim 4 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with EP1009113.

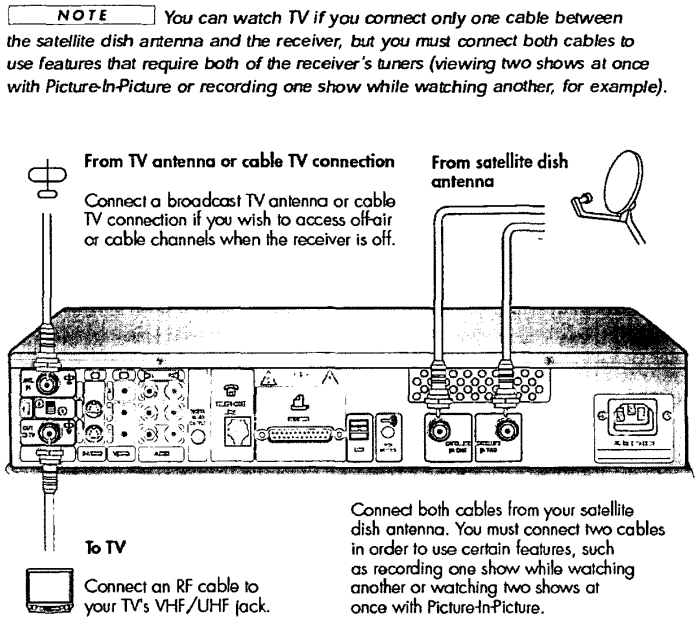
4. Claim 5

Claim 5 of the '576 patent recites:

a. ***The signal distribution system of claim 1 further comprising an integrated receiver decoder (IRD) connected to the coaxial cable with a plurality of tuners within the IRD, wherein each tuner within the IRD receives the composite signal and each tuner uses at least one transponder signal.***

As discussed above, the Eutelsat DiSEqC Specification teaches each and every element of claim 1, from which Claim 5 depends. Also, as illustrated in Figure 19 (page 26), the Eutelsat Installers Guide discloses a satellite receiver or IRD connected to the coaxial cable. However, the Eutelsat Installers Guide does expressly disclose a plurality of tuners within the IRD.

The concept of two tuners in a television receiver was well known at the time of the purported invention to allow features such as picture-in-picture and watch-and-record. As evidence of what would have been known by one of ordinary skill in the art, the RCA Setup Guide discloses a satellite set top box, or IRD, with multiple tuners. For example, the Figure on page 6 and the accompanying note teaches two tuners to enable picture-in-picture or watch-and-record capabilities.



Accordingly, Claim 5 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with the RCA Setup Guide.

Additionally, United States Patent No. 5,285,284 teaches a television receiver having two tuners. For example, Figure 5, described at Column 2, lines 48 – 52 illustrates a television receiver having a picture-in-picture (PIP) function with two tuners **3** and **4**.

Accordingly, Claim 5 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with the '284 patent.

Additionally, United States Patent No. 6,353,463 is also directed toward a television receiver for receiving and signal processing analog or digital signals. Figure 2 of the '463 patent illustrates a dual tuner **20** receiving the television signals.

Accordingly, Claim 5 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with the '463 patent.

5. Claims 7 and 20

Claim 7 of the '576 patent recites:

a. ***The signal distribution system of claim 1 wherein the transponder select information is transmitted over a wireless link.***

Claim 20 of the '576 patent recites:

b. ***The method of claim 14 wherein the transponder request signal is transmitted over a wireless link to the ODU.***

As stated above, the Eutelsat DiSEqC Specification teaches every element of claims 1 and 14, from which claims 7 and 20 depend, respectively. However, the Eutelsat DiSEqC Specification does not explicitly state that the transponder select information or request signal (*i.e.*, the DiSEqC command) can be sent over a wireless link. However, wireless communications as an alternative to wired communications was well known at the time of the invention.

For example, the Philips Data Sheet for the UAA3202M Frequency Shift Keying Receiver illustrates a single-chip wireless receiver for VHF and UHF systems. (See, General Description on page 2.) Described applications for the wireless receiver are listed as remote control systems, telemetry systems and wireless data transmission (page 2). As such, it would have been obvious to use this or other commonly available wireless technology to communicate transponder select information over a wireless link.

Accordingly, Claim 7 the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with the Philips Data Sheet.

Likewise, Claim 20 the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with the Philips Data Sheet.

6. Claim 10

Claim 10 of the '576 patent recites:

a. ***The signal distribution system of claim 8, further comprising a means in the first unit for carrier offset correction.***

The Eutelsat DiSEqC Specification reference teaches every element of claim 8, from which claim 10 depends. The Eutelsat DiSEqC Specification does not explicitly teach carrier offset correction. However, United States Patent No. 6,437,837, to Seo, in the same field of endeavor, teaches the use of carrier offset correction in receive system for digital television signals. See, for example, Column 4, lines 47 – 57 of Seo.

Accordingly, Claim 10 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by Seo in combination with the Eutelsat Installers Guide.

Additionally, United States Patent No. 5,073,930, to Green, et al., teaches carrier offset correction in a satellite receiver system. At Column 12, lines 40 – 45, Green discloses carrier offset correction to correct for frequency errors. Note that one would have looked to Green when implementing satellite receiver system architectures. Particularly, Figure 1A of Green illustrates a plurality of selected broadband satellite signals on a bus 110 are sent to transponder units 112 for channel selection, and that the selected transponder channels are then combined by combiners 114. Figure 2 of Green illustrates that the selected transponder channels are mapped into and combined into a single composite signal (labeled as transponder bank output). This is directed toward solving the same goal of channel selection in a satellite receiver system as are the '576 patent and the Eutelsat Installers Guide. Accordingly, Claim 10 of the '576 patent is rendered obvious by Green in view of Eutelsat Installers Guide.

Accordingly, Claim 10 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat Installers Guide combination with Green.

7. Claim 15

Claim 15 of the '576 patent recites:

a. ***The method of claim 14 wherein the step of selecting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% TO 100% wider than the bandwidth of the transponder signal.***

The Eutelsat DiSEqC Specification reference teaches every element of claim 14, from which claim 15 depends. The Broadcom Digital Satellite Receiver Paper discloses a 55Mhz bandwidth filter (page 1639, bottom of Col. 1) that is used in a digital satellite receiver capable of supporting variable symbol rates of 1 – 45 Mbaud (i.e., 1 – 45 MHz). Thus, depending on the chosen operating symbol rate, the bandwidth of the filter can range from approximately 20% wider than the signal bandwidth to well more than 100% wider.

Accordingly, Claim 15 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Broadcom Paper in combination with Eutelsat DiSEqC Specification.

8. Claim 16

Claim 16 of the '576 patent recites:

a. ***The method of claim 14 wherein the step of combining comprises frequency translating the selected transponder channels to a variable frequency before combining.***

As discussed above, The Eutelsat DiSEqC Specification reference teaches every element of claim 14, from which claim 16 depends. Additionally, as discussed above with respect to claim 1, the Eutelsat DiSEqC Specification teaches frequency translating the selected transponder channels (for example, Figure 19 illustrates that the IF to IF frequency translation occurs prior to the signal combining).

Additionally, United States Patent No. 5,073,930, to Green, et al., teaches translation of transponder channels to a variable frequency prior to combining. Transponder channel selection and channel translation is performed by transponder processors 112 as illustrated in Figure 1. The channels selected by transponder processors 112 are combined by combiners 114. Details of transponder channel selection by transponder processors 112 are illustrated in Figure 3 of Green. This illustrates that the broadband transponder input is frequency translated by down converter 200, filtered at 202 to select the channel, and upconverted back to IF by upconverter 204. Upconverter 204 performs a variable frequency translation prior to the signal being combined by combiners 114. Particularly, microntroller 206 instructs PLL 248 to select a VCO frequency from between 1530 – 2130 MHz. Varying the local oscillator signal (VCO) varies the frequency of the transponder channel that is output to be combined by combiner 114 (Fig. 1). This is described at Column 14, lines 5-14.

Additionally, Green teaches that the selected frequency can be varied to accommodate flexible mapping of transponder channels into the composite signal. See, Column 10, lines 34 – 43.

Accordingly, Claim 16 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification reference in combination with Green.

9. Claim 17

Claim 17 of the '576 patent recites:

a. ***The method of claim 14 further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.***

As discussed above, The Eutelsat DiSEqC Specification reference teaches every element of claim 14, from which claim 17 depends. Additionally, as discussed above with respect to

claim 1, the Eutelsat DiSEqC Specification teaches frequency translating the selected transponder channels (for example, Figure 19 illustrates that the IF to IF frequency translation occurs prior to the signal combining).

Additionally, United States Patent No. 5,073,930 teaches translation of transponder channels to a predetermined frequency prior to combining. Figure 1A of Green illustrates a plurality of selected broadband satellite signals on a bus 110 are sent to transponder units 112 for channel selection, and that the selected transponder channels are then combined by combiners 114. Figure 2 of Green illustrates that the selected transponder channels are mapped into and combined into a single composite signal (labeled as transponder bank output).

Although the transponder processor can map to a variable frequency (as discussed with respect to Claim 16), Green also teaches that once a mapping of transponder channels into the combined signal is decided, the processors can be **preprogrammed** to output on a given frequency. See, Column 10, lines 20 – 23. Thus, the processors translate to a predetermined frequency prior to signal combining.

Accordingly, Claim 17 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification reference in combination with Green.

10. Claim 21

Claim 21 of the '576 patent recites:

> The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining; and splitting the composite signal inside a home and distributing to a plurality of IRDs.

For clarity and ease of discussion, the elements of claim 21 are discussed in their constituent parts.

a. ***The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining;***

As discussed above with respect to claim 16, the Eutelsat DiSEqC Specification either taken alone or in combination with Green teaches translating the selected transponder channels to a variable frequency before combining.

b. ***and splitting the composite signal inside a home and distributing to a plurality of IRDs.***

As discussed above with respect to claim 18, the Eutelsat DiSEqC Specification reference teaches splitting the composite signal inside a home and distributing to a plurality of IRDs.

Accordingly, Claim 21 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with Green.

11. Claim 22

Claim 22 of the '576 patent recites:

a. ***The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.***

Claim 21 from which this claim depends, is taught by the combination of the Eutelsat DiSEqC Specification in combination with Green as described with reference to Claim 21. As discussed above with respect to claim 19, The Eutelsat DiSEqC Specification reference teaches the transponder request signal is transmitted over the cable from an IRD.

Accordingly, Claim 22 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with Green.

12. Claim 23

Claim 23 of the '576 patent recites:

> The method of claim 21 wherein the transponder request signal is transmitted over a wireless link to the ODU.

Claim 21 from which this claim depends, is taught by the combination of the Eutelsat DiSEqC Specification in combination with Green as described with reference to Claim 21. As discussed above with respect to claims 7 and 20, the Philips Reference teaches signaling over a wireless link.

Accordingly, Claim 21 of the '576 patent is unpatentable under 35 U.S.C. §103 as being rendered obvious by the Eutelsat DiSEqC Specification in combination with Green and further in view of the Phillips reference.

IX.
ACTION REQUESTED

In view of the presentation of the above delineated references and their particular relevance to the validity (or patentability) of the subject claims, grant of the subject Reexamination Request is hereby respectfully solicited. Please charge the required fee of $2,520 to Deposit Account No. 191853. Please also charge any additional fees to Deposit Account No. 191853.

Respectfully Submitted,

DATED: February 6, 2007

SHEPPARD MULLIN RICHTER & HAMPTON LLP

By _____
DANIEL N. YANNUZZI
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CERTIFICATE OF SERVICE BY EXPRESS MAIL
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of Gurantz, et al.	)	
	)	
In re REQUEST FOR REEXAMINATION	)	
of	)	
U.S. Patent No. 7,130,576	)	
	)	
Patent Date: October 31, 2006	)	Atty. Dkt. No. 05JM-127751
	)	Control No. 90/008,389
For: SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION	)	

Enclosed are copies of:

Letter Transmittal;
Cover Letter accompanying Revised Information Disclosure Statement and Clarifying Remarks;
Replacement Statement for the Request for Reexamination of U.S. Patent No. 7,130,576;
Form PTO/SB/08a;
Form PTO/SB/08b;
Certificate of Mailing by "Express " (37 CFR 1.10); and
One (1) return postcard.

addressed to:

Michael W. Landry
5098 Seachase Street
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I hereby certify that the above party has been served by Express Mail Label No. EV 834194145 at the address indicated, all the above-referenced documents in their entirety.

Lisa E. Jambeau

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REEXAM CONTROL NUMBER	FILING OR 371 (c) DATE	PATENT NUMBER
90/008,389	02/06/2007	7130576

CONFIRMATION NO. 3367

OC000000022455999

Daniel N. Yannuzzi
SHEPPARD, MULLIN, RICHTER & HAMPTON LLP
12275 El Camino Real, Suite 200
San Diego, CA 92130-2006

Date Mailed: 02/12/2007

NOTICE OF REEXAMINATION REQUEST FILING DATE

(Third Party Requester)

Requester is hereby notified that the filing date of the request for reexamination is 02/06/2007, the date the required fee of $2,520 was received.

A decision on the request for reexamination will be mailed within three months from the filing date of the request for reexamination. (See 37 CFR 1.515(a)).

A copy of the Notice is being sent to the person identified by the requester as the patent owner. Further patent owner correspondence will be the latest attorney or agent of record in the patent file. (See 37 CFR 1.33). Any paper filed should include a reference to the present request for reexamination (by Reexamination Control Number).

cc: Patent Owner

24244
MICHAEL W LANDRY
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Jason McDonald
Office of Patent Legal Administration
Central Reexamination Unit 571-272-7705

PART 3 - OFFICE COPY

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CONFIRMATION NO. 3367

24244
MICHAEL W LANDRY
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REEXAM ASSIGNMENT NOTICE

OC000000022456000

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NOTICE OF ASSIGNMENT OF REEXAMINATION REQUEST

The above-identified request for reexamination has been assigned to Art Unit 3992. All future correspondence to the proceeding should be identified by the control number listed above and directed to the assigned Art Unit.

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Central Reexamination Unit 571-272-7705

PART 3 - OFFICE COPY

Litigation Search Report CRU 3999

Reexam Control No. 90/008,389

TO: Scott Weaver **Location: CRU** **Art Unit : 3992** **Date: 02/26/07** **Case Serial Number: 90/008,389**	**From: James R. Matthews** **Location: CRU 3999** **MDW 7C71** **Phone: (571) 272-4233** **JamesR.Matthews@uspto.gov**

Search Notes

U.S. Patent No- 7,130,576

1) I performed a KeyCite Search in Westlaw, which retrieves all history on the patent including any litigation.

2) I performed a search on the patent in Lexis CourtLink for any open dockets or closed cases.

3) I performed a search in Lexis in the Federal Courts and Administrative Materials databases for any cases found.

4) I performed a search in Lexis in the IP Journal and Periodicals database for any articles on the patent.

5) I performed a search in Lexis in the news databases for any articles about the patent or any articles about litigation on this patent.

Litigation was not found.

Westlaw.

Date of Printing: FEB 26,2007

KEYCITE

US PAT 7130576 SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION, Assignee: Entropic Communications, Inc. (Oct 31, 2006)

History

=> 1 **SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION,** US PAT 7130576, 2006 WL 3085317 (U.S. PTO Utility Oct 31, 2006) (NO. 10/289011)

Patent Family

2 SIGNAL DISTRIBUTION SYSTEM FOR DIRECT BROADCAST SATELLITE SYSTEM, COMBINES RADIO FREQUENCY SIGNALS TO PRODUCE COMPOSITE SIGNAL WHICH USES MODULATION PROCEDURE SAME AS BROADBAND LOW NOISE AMPLIFIER AND BLOCK CONVERTER SIG, DWPL 2007-052908

Assignments

3 Assignee(s): ENTROPIC COMMUNICATIONS INC.,
DATE RECORDED: Dec 27, 2002

Prior Art

C 4 US PAT 6441797 AGGREGATED DISTRIBUTION OF MULTIPLE SATELLITE TRANSPONDER SIGNALS FROM A SATELLITE DISH ANTENNA, Assignee: Hughes Electronics Corporation, (U.S. PTO Utility 2002)

C 5 US PAT 6556807 ANTENNA RECEIVING SYSTEM, Assignee: Mitsubishi Electric & Electronics USA,, (U.S. PTO Utility 2003)

C 6 US PAT 5760822 CENTRAL NODE CONVERTER FOR LOCAL NETWORK HAVING SINGLE COAXIAL CABLE, Assignee: Lucent Technologies Inc., (U.S. PTO Utility 1998)

C 7 US PAT 6437837 DIGITAL BROADCAST SIGNAL PROCESSING APPARATUS AND METHOD IN WHICH CHANNEL INTERFERENCE BY ANALOG BROADCAST IS PREVENTED, Assignee: Samsung Electronics Co., Ltd., (U.S. PTO Utility 2002)

C 8 US PAT 5959592 &LDQUO;IF&RDQUO; BANDSTACKED LOW NOISE BLOCK CONVERTER COMBINED WITH DIPLEXER, Assignee: EchoStar Engineering Corporation, (U.S. PTO Utility 1999)

C 9 US PAT 6947702 SATELLITE BROADCAST RECEIVING AND DISTRIBUTION SYSTEM, Assignee: Global Communications, Inc., (U.S. PTO Utility 2005)

C 10 US PAT 6600730 SYSTEM FOR DISTRIBUTION OF SATELLITE SIGNALS FROM SEPARATE MULTIPLE SATELLITES ON A SINGLE CABLE LINE, Assignee: Hughes Electronics Corporation, (U.S. PTO Utility 2003)

C 11 US PAT 6134419 TRANSMODULATED BROADCAST DELIVERY SYSTEM FOR USE IN MULTIPLE DWELLING UNITS, Assignee: Hughes Electronics Corporation, (U.S. PTO Utility 2000)

C 12 US PAT 6493873 TRANSMODULATOR WITH DYNAMICALLY SELECTABLE CHANNELS, Assignee: Hughes Electronics Corporation, (U.S. PTO Utility 2002)

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Patent Search 7130576 2/26/2007

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289011 (10) 7130576 October 31, 2006

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October 31, 2006

Signal selector and combiner for broadband content distribution

INVENTOR: Gurantz, Itzhak - San Diego, California, United States (US); El Wardani, Ladd - La Jolla, California, United States (US); Landry, Michael - San Diego, California, United States (US)

APPL-NO: 289011 (10)

FILED-DATE: November 6, 2002

GRANTED-DATE: October 31, 2006

ASSIGNEE-PRE-ISSUE: December 27, 2002 - ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS)., ENTROPIC COMMUNICATIONS INC. 9276 SCRANTON ROAD, SUITE 200 SAN DIEGO CALIFORNIA 92121, Reel and Frame Number: 014140/0486

ASSIGNEE-AT-ISSUE: Entropic Communications, Inc., San Diego, California, United States (US), United States company or corporation (02)

LEGAL-REP: Landry, Michael W. -

PUB-TYPE: October 31, 2006 - Utility Patent having no previously published pre-grant publication (B1)

PUB-COUNTRY: United States (US)

REL-DATA:
Provisional Application Ser. No. 60345965, November 7, 2001, PENDING
Provisional Application Ser. No. 60333722, November 27, 2001, PENDING
Provisional Application Ser. No. 60358817, February 22, 2002, PENDING

US-MAIN-CL: 455#3.02

US-ADDL-CL: 455#3.01, 455#3.04, 455#427, 725#71, 725#78

CL: 455, 725

SEARCH-FLD: 455#3.01-3.05, 455#12.1, 455#20, 455#103, 455#137, 455#427, 725#64, 725#71, 725#78, 725#98, 725#118

IPC-MAIN-CL: [8] H04H 001#00 (20060101) Advanced Inventive 20061031 (A F I B H US)

PRIM-EXMR: Anderson, Matthew D.

ASST-EXMR: Sharma, Sujatha

REF-CITED:
5760822, June, 1998, Coutinho, United States (US), 348#121
6437837, August, 2002, Seo, United States (US), 348#735
6441797, August, 2002, Shah, United States (US), 343#840
6493873, December, 2002, Williams, United States (US), 725#78
6556807, April, 2003, Horie et al., United States (US), 455#3.02
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20040060065, March, 2004, James et al., United States (US), 725#71
20050005296, January, 2005, Bargroff et al., United States (US), 725#63

CORE TERMS: channel, transponder, filter, frequency, cable, band, digital, converter, spectrum, selector, sample, bandwidth, select, selecting, combined, analog, satellite, gateway, carrier, tuner, composite, filtering, point switch, outdoor, alternatively, offset, input, transmitted, translated, broadband

ENGLISH-ABST:

In a satellite receiving system, program channels are selected from one or more broadband signals and combined with other selected channels and transmitted from a first unit, for example an outdoor unit, to a second unit, for example a gateway, server, or set-top box, using a single cable. Channels can be selected by digitizing the broadband signal then digitally filtering to isolate the desired channels. The outputs of several LNBs can be selected and combined into one signal. Multiple set-top boxes can receive independent signals over a single cable from the outdoor unit.

NO-OF-CLAIMS: 23

EXMPL-CLAIM: 1

NO-OF-FIGURES: 17

NO-DRWNG-PP: 17

PARENT-PAT-INFO:

RELATED APPLICATIONS

[0001]This application claims priority to U.S. provisional patent application No. 60/345,965 filed Nov. 7, 2001 entitled "Signal Selector and Combiner for Broadband Content Distribution"; U.S. provisional patent application No. 60/333,722 filed Nov. 27, 2001 entitled "Signal Selector and Combiner for Broadband Content Distribution"; and U.S. provisional patent application No. 60/358,817 filed Feb. 22, 2002 entitled "Signal Selector and Combiner for Broadband Content Distribution", each of which is incorporated herein by reference.

SUMMARY:

BACKGROUND

[0002]Referring to FIG. 1, a satellite receiver outdoor unit (ODU) 110 typically comprises a dish antenna 150, one or more antenna feed horns 130, one or more low noise amplifier and block down converters (LNB) 140, and an optional multiport cross point switch 160. Dish 150 collects and focuses received signal power onto antenna feed horns 130 which couples the signal to LNBs 140. A single dish 150 may have multiple feed horns 130 wherein each feed receives a signal from a different satellite in orbit. An installation may have more than one dish, feed, and LNB assemblies. The cross point switch 160 allows connection of the outdoor unit 110 to more than one integrated receiver decoder (IRD) 180 located inside the building. IRDs are commonly called set top boxes (STBs) arising from their typical installed location on top of TV sets. The LNB 140 converts the signal transmitted by a satellite in Earth orbit, for example C band, Ku band, or another frequency band, to a lower intermediate frequency (IF) suitable for transmission through coax inside a building. For example, L band IF (950 to 1450 MHZ) with RG-6 or RG-11 coax cable is commonly used. The IRD 180 tunes one transponder channel, demodulates the IF signal from the LNB down to base band, provides channel selection, conditional access, decodes the digital data to produce a video signal, and generates an RF output to drive a television.

[0003]A satellite outdoor unit may have as many as three or more LNBs each with two receiving polarizations. The received polarization is selected by sending a voltage or other control signal to the LNB. In this configuration there are six possible 500 MHz signals that may be selected by the multiport cross point switch to be routed to each IRD. The 500 MHz signal is typically comprised of 16 transponder signals of 24 MHz bandwidth each with a guard band in between each transponder signal. Other transponder bandwidths are used such as 36 MHz, 54 MHz with a single channel or shared by two TV signals, and 43 MHz.

[0004]A problem with the conventional approach to connecting an outdoor unit to IRDs is that multiple cables are required to be run from the outdoor unit: one cable for each room where an IRD is located. When a new IRD is added another cable must be installed. In an application using a media server, a central processor for all video signals, multiple cables are needed to route signals from the ODU to the server.

[0005]FIG. 4 shows a representative spectrum of the signal output by an LNB. In a conventional satellite ODU this signal is routed through a cross point switch to one of the IRDs. Note that all transponder channels in the signal are from a single LNB and from the same polarization satellite signal. The cross point switch allows any of the cables connected from the ODU to the IRDs to be switched to any of the LNBs. A dedicated cable for each IRD is needed because in general each IRD is not using the same LNB and polarization at the same time. A server requires access to several LNB signals simultaneously, thus requiring several cables.

[0006]U.S. Pat. No. 6,134,419, incorporated herein by reference, by Williams assigned to Hughes Electronics, addresses part of the problem. The Williams patent recognizes that the bandwidth of the signal from each of the two polarizations is too broad to be transmitted over

standard RG-6 or RG-59 cable, particularly when combined with the cable CATV signal. Williams addresses this problem using a transmodulator, by demodulating and remodulating to a different modulation scheme the RHCP and LHCP signals using a tuner, decoder, packetizer, cable encoder, and up converter for each of 32 transponder channels. The transmodulator outputs a signal with a higher-level modulation scheme to reduce the bandwidth occupied by the satellite signals. In the example provided, the QPSK signals from the LNBs are transmodulated to 128-QAM, reducing the bandwidth from 1000 MHz to 192 MHz. At the set top box (STB) the 128 QAM signal is demodulated and processed to produce an NTSC analog video signal sent to a television set.

[0007]One problem with the Williams approach is the circuit complexity due to the 32 tuner paths required in the transmodulator. For an increase in the number of satellite signals, this problem becomes more pronounced. Williams discloses modulation using 128-QAM, which requires a higher signal to noise ratio (SNR) than QPSK and is it more susceptible to impairment from multipath present in a cable environment.

[0008]U.S. Pat. No. 5,959,592 incorporated herein by reference, by Petruzzelli addresses combining both the left hand circular polarized (LHCP) and right hand circular polarized (RHCP) signals into one signal that is transmitted from the ODU. In the disclosed band stacking approach, the output of two low noise amplifiers (LNAs), each 500 MHz wide, are frequency translated to different IF frequencies and summed into a signal with a bandwidth of more than 1000 MHz. In one example disclosed, the different IF bands are 950 to 1450 MHz and 1550 to 2050 MHz. The problem with this approach is that the resulting bandwidth is very wide and becomes impractical when the number of LNB signals increases because each LNB output requires 500 MHz of bandwidth on the cable.

[0009]Satellite systems are described generally in G. E. Lewis, "Communication Services via Satellite" Butterworth-Heinemann Ltd. 1992.

SUMMARY OF THE INVENTION

[0010]A channel selecting and combining solution is used in the outdoor unit where one or more transponder channels are selected from each LNB output. The transponder channel or channels needed from each LNB are selected by a filter. Each selected transponder signal may be translated to a new channel frequency. The selected transponder channels are combined to form a composite signal. All of the selected, translated, and combined transponder channels are transmitted over a single cable to a gateway unit that extracts the channels to distribute to the IRDs. The gateway can frequency translate each transponder channel to its original frequency. Alternatively, the IRDs connect directly from the cable or through a splitter and tune the desired transponder channels. A channel translation mapping table is used to coordinate the channel assignment between the original channels and new channels. In another alternative embodiment, the gateway transmits the video information over a digital data network.

[0011]LNB outputs can be sampled by a broadband A/D converter and filtered with a digital filter to select a transponder channel. Alternatively, a tuner can select a transponder channel. The selecting process extracts from the wide band LNB output a narrow band transponder channel.

[0012]Each IRD communicates the channels it needs to receive, directly or indirectly, to the signal selector. This information is used to select the transponder channel to combine in the signal selector output signal, the ODU downlink. New IRD designs can incorporate a signaling channel that uses unoccupied regions of the frequency spectrum of the cable, or a wireless communication link, to communicate the channel information. To provide compatibility with existing IRDs, the channel information can be communicated by an IR or RF auxiliary channel

to the gateway or outdoor unit.

[0013]Many newer homes have coaxial cable installed that runs to a central location. In the present invention a gateway is located at the central location that receives the combined signal from the outdoor unit and distributes the signals to the IRDs. An IRD requests a channel through an IR or RF signal communicated to the gateway. The RF communication can be in the cable connecting the IRD to the gateway or a wired or wireless signal.

[0014]The present invention requires only one cable wire to be routed from the outdoor unit to inside the building or to a gateway. Additional IRDs can be added without any installation effort needed on the outdoor unit. In certain configurations the invention eliminates the cross point switch.

[0015]The present invention can be used along with other signals transmitted on the distribution cable. The combined transponder signal can occupy a predetermined region of the frequency spectrum while another service, such as CATV can occupy a different region. Another example of shared use of the cable is along with a single or band stacked satellite signal. In this example, frequencies such as 950[ndash]1450 and 1550[ndash]2050 are used by a conventional satellite system, and frequencies outside and between these frequency bands are occupied with a combined transponder signal according to the present invention.

DRWDESC:

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]FIG. 1 Shows a prior art configuration of a satellite TV installation.

[0017]FIG. 2 shows a satellite TV installation according to the present invention.

[0018]FIG. 3 shows a block diagram of a selector and combiner according to the present invention.

[0019]FIG. 4 Shows a diagram of the frequency spectrum of individual LNB output signals according to the prior art.

[0020]FIG. 5 shows a diagram of the frequency spectrum of individual LNB output signals and the frequency spectrum of the composite RF signal comprising selected transponder signals in accordance with the present invention.

[0021]FIG. 6 shows an embodiment of the present invention wherein the sampled data is distributed digitally to channel selector filters.

[0022]FIG. 7 shows an embodiment of the present invention wherein the selected channel data is distributed digitally to the up converters.

[0023]FIG. 8 shows an embodiment of the present invention wherein the each LNB has a dedicated selector and up converter.

[0024]FIG. 9 shows an embodiment of the present invention wherein tuners and up converter are used to select and combine transponder channels.

[0025]FIG. 10 shows an embodiment wherein selected channel are processed by an MPEG transport stream demultiplexer and combined as data packets for digital LAN transmission.

[0026]FIG. 11 shows a satellite TV installation according to the present invention providing compatibility with existing installed STBs and new STBs and using a server/gateway.

[0027]FIG. 12 shows details of an outdoor unit providing compatibility with new and existing STBs.

[0028]FIG. 13 shows the frequency spectrum of signals at various points in the signal processing.

[0029]FIG. 14 shows the frequency spectrum of signals in another embodiment of the invention using base band processing.

[0030]FIG. 15 shows the frequency spectrum of signals filtered and combined with excess bandwidth.

[0031]FIG. 16 shows the frequency spectrum of conventional LNB signals combined with selected transponder channels in accordance with the present invention.

[0032]FIG. 17 shows one example of a frequency translator and filter.

DETDESC:

DETAILED DESCRIPTION OF THE INVENTION

[0033]Referring to FIG. 2, a satellite TV installation according to the present invention is shown. Signal selector 250, part of satellite outdoor unit 210, extracts the needed transponder channels from each of the LNB outputs and combines the channels into one composite signal transmitted on cable 220. Gateway 230 receives the signals and provides distribution to the IRDs located in the building. Controller 255 is responsible for communicating channel map, control, and status information with gateway 230 and IRDs 240. Controller 255 also tunes filters and local oscillators in the signal selector and maintains the channel map specifying the assigned frequency slots for transponder channels. Alternatively, the channel map can be maintained by gateway 230.

[0034]Gateway 230 can be a simple power splitter/summer allowing the IRDs to connect directly to the cable. Gateway 230 would be located inside the home in a convenient location that allows connection to the IRDs 240. Gateway 230 is designed to pass signaling from IRDs 240 to ODU 210 that contains the channel selection information.

[0035]Each LNB output signal is applied to a signal selector that extracts zero, one, or more transponder channels to be combined into a composite signal.

[0036]Refer to FIG. 3. In an embodiment of the present invention, a quadrature down converter is used to produce I and Q analog signals. The down converter is comprised of a local oscillator 382, phase splitter 384 to produce an in-phase and quadrature-phase LO, two mixers 310, and two filters 320. The filters 320 reject the undesired mixing products. The I and Q signals are sampled by high-speed broadband A/D converters 330 to create I and Q digital samples. The samples are N bits wide, where N is selected to limit the degradation to the signal to an acceptable level. The entire 500 MHz band is digitized by this operation. All further digital processing is done using complex operations applied to the I and Q digital samples. The sample rate is 500 MHz or higher.

[0037]The resolution of the A/D converters is in the range of 4 to 12 bits. To sample and reproduce a QPSK signal 6 to 8 bits would be adequate. More bandwidth efficient modulation

such as 8PSK would require more bits of resolution. The selection of resolution is based on considering power consumption, SNR, and cost.

[0038]A coherent LO generated by carrier tracking is not needed since the sampled data is not decoded in the ODU. An unknown carrier offset is present between the LO and the carrier of the received signal. A small additional carrier offset is introduced by the down conversion process but will be removed in the carrier recovery operation in the IRD. It is desirable that the LO carrier noise be low enough to be tracked out by the carrier loop in the IRD.

[0039]Digital filtering 340 is used to select one or more of the transponder output signals. The digital filter may operate by applying a band pass filter transfer function to the broadband signal to isolate a single transponder channel. The filter uses known digital architectures such as finite impulse response (FIR) or infinite impulse response (IIR). The filter is tuned by programming a set of filter coefficients to select a specific pass band. Frequency domain filter can also be employed using FFT or DFT architectures. Other filtering techniques include polyphase filter structure. These filtering techniques are well known in the digital signal processing field. References covering digital filtering include Thomas J. Cavicchi "Digital Signal Processing" John Wiley & Sons, 2000; Sanjit K. Mitra, "Digital Signal processing, a Computer Based Approach" McGraw-Hill, 2001; Proakis and Manolakis, "Introduction to Digital Signal Processing", Macmillan Publishing, 1988; DSP and applications, Analog Devices.

[0040]Referring again to FIG. 3, the selected transponder channel is then frequency translated to a new carrier frequency. The selected and frequency translated digital signal is converted to an analog signal using a D/A converter for the I and Q components. One approach is to convert the digitally filtered signal to the analog domain using a D/A converter 350, then using a quadrature modulator with mixers 360, phase splitter 388, LO 386, and summer 380. Alternatively, this can be done by a digital mixing operation where a rotating phasor is multiplied by the data samples to translate their frequency, then converting the frequency shifted digital signal to an analog signal with a D/A.

[0041]LO 386 is variable to allow the selected channel to be frequency translated to any of the channels available in the band. Alternatively, the LO can be fixed at different a frequency for each of the channel selectors.

[0042]Alternatively, a single transponder channel can be selected by translating the spectrum down in frequency to place the selected channel at base band then applying a low pass filter transfer function to isolate a single channel. The translation can be done by a digital mixing operation wherein the sample data is multiplied by a data sequence representing a carrier frequency. A post-mixing filter rejects the undesired mixing terms.

[0043]FIG. 14 shows the frequency spectrum of the signal as it is processed. The original spectrum 1 is frequency translated to locate the selected transponder channel at base band, as shown in spectrum 2. A low pass filter then passes one transponder channel and removes signal information from the other transponder channels, shown in spectrum 3. This signal is then converted to an analog signal, mixed to a new frequency, and summed with other channels in the analog domain.

[0044]One summer input is provided for each signal selectors. This is a broadband signal comprising up to 16 or 32 channels. Alternatively, a summer combines the analog I and Q signals from all the signal selectors.

[0045]Two basic approaches to combining are possible. One approach is to combine digitally filtered signals in the digital domain. This can be achieved with all filtered transponder channels to be combined presented at a sample rate equal to the composite output rate. The other approach is to combine the selected signals in the analog domain. This leads to two

possible approaches to filtering. One is to implement filters with the same input and output sample rate. The other approach is to filter with an output sample rate that differs from the input sample rate.

[0046]An example of a digital combining embodiment, a 500 msps broadband sampling of the LNB output could be filtered to produce a 500 msps output stream representing one or more transponder channels. Each transponder channel may be frequency translated to the desired new carrier frequency, then filtered to produce a single transponder signal that can be combined with other similarly selected transponder channels.

[0047]FIG. 13 shows the frequency spectrum of a sample stream as it is processed. The original spectrum 1 is frequency translated to locate the selected transponder channel at the desired frequency, as shown in spectrum 2. A band pass filter then passes one transponder channel and removes signal information from the other transponders channels, shown in spectrum 3. This filtering operation selects one transponder. In this example transponder channel B is selected. The sample stream for the selected channel is added to the sample stream from other filtering sections, represented in spectrum 4, to produce a composite sample stream in spectrum 5. Other selected channels are represented by channels labeled X.

[0048]FIG. 17 shows a block diagram of the processing elements to perform these steps. Local oscillator (LO) 1710 feeds mixer 1720 and is then band pass filtered by filter. LO is variable to allow the selected channel to be frequency translated to any of the channels available in the band. Filter 1730 has a programmable pass band frequency, tuned by loading different filter coefficients. Summer 1740 adds the sample stream to other sample streams. Several transponder channels are selected, each requiring one input to an adder. One embodiment uses a two input adder for each filter channel to implement a pipeline adder. The time delay introduced by a pipeline adder does not present a problem to the system because the receivers are each demodulating one transponder and the relative time delay is not apparent.

[0049]The frequency translation can occur either before or after the filtering operation. An advantage to translating first followed by filtering is that the filter removes the unwanted mixing terms generated. In either case, a rotating phasor is multiplied by the data samples to translate their frequency.

[0050]An example of an analog-combining embodiment, the digital filters may have an output sample rate that differs from the input sample rate. This can be inherent in the filtering operation or result from a down sampling done after filtering. Down sampling after the selecting filter is possible because the single channel the bandwidth is narrower than the A/D output and fewer samples are needed to represent the signal.

[0051]The spectrum is placed at the desired RF frequency by choosing the LO frequency driving the up converters. One example would be 950 to 1450 MHz, a standard IF frequency for DBS systems. This frequency band is compatible with standard set top box (STB) hardware. Other IF frequencies could be used. Using this technique, standard STB hardware can receive the new composite signal and demodulate and decode the video and audio signals. Specific TV channels are located at new transponder frequencies. A mapping table allows the IRD/STB to tune to the correct transponder channel. The bandwidth of the spectrum can be 500 MHz for a 16-transponder system, 1000 MHz for a 32-transponder system, or other bandwidths according to the number of transponder channels present on the cable. If the system uses band stacking, the A/D converter can directly sample the 1000 MHz IF signal, with or without a frequency translation, or the two LNB polarizations can be separated into two 500 MHz signals each digitized with separate A/D converters.

[0052]Alternatively, the IF signal from the LNB can be directly band pass sampled by a single

A/D converter. The IF signal can be frequency translated to a different IF frequency before band pass sampling. Band pass sampling requires a higher speed A/D converter than base band sampling, but only a single A/D.

[0053]One pair of A/D converters is provided for each LNB output. Alternatively, the LNB output can be band pass sampled using a single A/D converter. At a given point in time some LNB outputs may not be accessed by a user. If no transponder channel is selected from a particular LNB output, the A/D converters associated with that LNB output may be switched off to reduce power consumption and heat generation, or reallocated to process another LNB output.

[0054]The A/D digitizes the entire LNB output signal; therefore all transponder channels are available in the sampled data. More than one transponder channel may be selected from the A/D data to be combined in the composite signal. When all A/D are powered up any combination of transponder channels from any LNB output can be combined into the composite signal for distribution to the gateway and STBs.

[0055]FIG. 5 shows a frequency spectrum of the composite signal. Each of the available channels can be occupied with any transponder channel of any polarization from any LNB. One or more channels are used by each active IRD connected to the system. The number of transponder channels in the composite signal can be from as few as 2 to as many as 32, depending on the number of simultaneous channels needed in the system.

[0056]In general, the selecting and combining process will result in transponder channels located at different frequencies than where originally found. A translation table maps original channel locations on the selector input to new channel locations on the selector output. This map created and maintained by a controller located in the ODU or the gateway and is communicated to the IRDs or other devices in the network.

[0057]The channel selector performs a frequency selective filtering operation to select the desired transponder frequency. The transition band of this filter is steep, passing the selected transponder channel and rejecting adjacent transponder channels. The transition region available is derived from the guard band between channels. This can be as small a few Mega-Hertz. If the LNB carrier offset is large, a shift in the spectrum will result in the selecting filter cutting off part of the desired spectrum and passing part of an adjacent channel. For this reason a carrier offset estimate is desirable. Since all transponder channels from a given LNB will have approximately the same offset, it is only necessary to monitor one transponder channel from each LNB to determine the offset for all channels. Any of several know techniques for estimating the carrier offset may be employed. One example is two use two filters each approximately half the transponder bandwidth. By measuring the ratio of power from each filter output, an estimate of the carrier offset can be determined. Once the carrier offset is estimated, the sampled signal can be multiplied by a rotating phasor value to digitally shift the spectrum back to the nominal position. Alternatively, this frequency offset correction can be done in the analog domain, or a combination of digital and analog approaches.

[0058]Another approach to addressing the unknown carrier offset in the LNB is to use a wider filter to select transponder channels, wherein the bandwidth of the filter passes the selected transponder and part of the adjacent spectrum. In this way, if the transponder signal is not centered in the filter bandwidth the band edges will not be attenuated by the filter roll off. This excess bandwidth will allow some energy from the neighboring transponder signals. A wider channel separation is needed on the combined signal, for example the selected transponders can be spaced twice the conventional spacing. This approach makes less efficient use of the cable spectrum but simplifies the hardware implementation by reducing the requirement of or eliminating the carrier offset correction. Additionally, a less steep filter roll off is possible.

[0059]FIG. 15 shows the signal spectrum as it is processed. Spectrum 1 is a representative original spectrum. Spectrum 2 shows the filter pass band characteristic, which is wider than one transponder channel. Spectrum 3 is the result of filtering one transponder channel. Spectrum 4 is a composite of several transponder channels. A region between the selected channels is unused. The exact shape of the unused spectrum will be dependent on the filter roll-off characteristics, but is not significant. The objective is to pass the selected transponder signal without distortion.

[0060]The approach of using a filter with excess bandwidth technique is also useful for implementing the invention using an analog approach. A filter with a stop band substantially wider than the transponder channel allow using filters with more gradual transition band, and is therefore simpler to implement. The excess bandwidth can range from less than 5% to 100% wider than the transponder bandwidth.

[0061]FIG. 6 shows a variation of the present invention that uses a cross point switch or shared bus 640 to distribute data from the A/Ds to the channel selecting filters. The cross point switch, also called crossbar switch, allows any signal input to be passed to any output. It can take the form of a data selector or multiplexer. Implemented as a shared bus, data sinks receive signals from data source using a time-multiplexed bus. Either a cross point switch or a shared bus can be unidirectional or bidirectional. The cross point principle applies to digital signals and analog signals. LNB outputs are quadrature down converted 620 and sampled by dual A/D converters 630. The parallel data is routed through cross point switch 640 so that any filter has access to any A/D data. Filter/selector 650 selects the desired transponder channel that is then up converted by quadrature modulator 660. All selected channels are combined in summer 670.

[0062]FIG. 7 shows a variation where the cross point switch 740 is located after the selecting filter 720. In this configuration the selecting filter 720 may also include a down sampler to reduce the bus traffic bandwidth in the cross point switch 740. Down sampling is possible because after selecting a single desired channel the bandwidth is narrower and fewer samples are needed to represent the signal. One or more selecting filters 720 may be connected to the output of each A/D, each filter 720 selecting one transponder channel.

[0063]FIG. 8 shows a configuration wherein each LNB has a dedicated selecting filter and up converter. The selecting filter may digitally select multiple channels from the broadband A/D data to drive the up converter and DAC.

[0064]FIG. 9 shows another alternative where analog tuners 930 select desired transponder channels that are up converted by up converter 940. All signals are combined by summer 950 to drive the signal cable 970 from the ODU. A multiport switch 920 allows any tuner to connect to any LNB output. The number of signal selecting paths comprising tuner 930 and up converter 940 is selected based on the maximum number of simultaneous users. A multiple-tuner personal video recorder would use more than one signal. Controller 960 receives channel select information either from the cable or a separate data channel such as infrared (IR) or wireless RF link or other source. Channel select information from the controller 960 programs the tuner 930 and up converter 940 LO. Channel select information can come to the controller over a wireless remote control signal or using signaling sent over the cable.

[0065]Up converters 940 can operate at a fixed LO frequency with one up converter 940 being assigned to each user connected on the cable. The various LO frequencies are unique. Alternatively, the down conversion process of each tuner 930 can be set to down convert directly to a predetermined IF frequency which is unique for each selected signal, thereby eliminating a separate up converter. A simplified IRD can be used with this approach wherein the IRD needs only tune to a single selectable IF frequency. The tuning range is narrower

than a convention 500 MHz tuner and the channel selection is limited to as few as four choices compared to up to 16 or more in a convention IRD tuner.

[0066]FIG. 10 shows another alternative where signal selector 1010 selects a transponder channel. MPEG transport stream demultiplexer 1020 extracts a specific video program that is combined by data combiner 1030. Several MPEG streams are multiplexed as needed, and packets are formatted for transmission on a digital network. A digital LAN 1040 connects directly to the ODU. Channel information is communicated to the ODU through the LAN.

[0067]FIG. 11 shows another alternative used where new STBs are used with existing STBs. ODU 1110 supplies a signal to each of the connected cables according to the type of STB attached to the cable. Existing legacy STBs 1120 are supplied with an IF signal as in a conventional system, and the STBs 1120 will tune to a single transponder channel. New STBs 1140 will be supplied with a composite signal according to the present invention comprising all the transponder channels that are selected; the new STB 1140 will tune and decode the requested channel.

[0068]A new STB 1140 can be installed in place of an existing STB 1130 by simply connecting the new STB 1140 to the cable in place of the existing STB 1130. More than one new STB 1140 can be installed by using a signal splitter 1150 to provide a signal to multiple STBs. New STBs use a signaling system for selecting transponder channels that passes through the splitter to the ODU. Existing STBs will each have a dedicated connection to the ODU, as provided in the original installation. This is required because existing STBs use voltages or other control means to select LNB outputs that do not support multiple STBs on a single cable.

[0069]Also in FIG. 11, server/gateway 1160 receives the composite transponder signal, decodes specific programs, and distributes the program information in packetized MPEG over a digital local area network (LAN) 1170 to STBs 1180. Ethernet or other LAN technology is suitable for this function.

[0070]A new STB operating in accordance with the present invention is provided with a means of communication with the signal selector and combiner in the ODU. At power up or at periodic intervals the ODU or the STB initiates communication over the attached cable. This communication can be an in band or out of band signal. The ODU polls the STBs connected to determine if the STB is a conventional STB or new design STB. Because conventional STBs will not respond to the polling request, the absence of response is an indication of a conventional STB. A new STB will respond to the polling request and establish communication with the ODU.

[0071]The means of communication on the cable can be a TDMA frame structure with slots assigned to each STB, a frequency division multiplex (FDM) approach with unique frequencies assigned to each STB, or any other known technique for two-way communication by multiple devices over a signal channel. An extension of DiSEqC protocol commonly used for satellite dish control can be used for this communication. DiSEqC uses a gated 22 kHz carrier to communicate binary data and can be adapted for use to transfer data needed. The data rates are low for this communication path. Device configuration, channel mapping, and channel requests are among the types of data communicated between the ODU and STB.

[0072]Referring to FIG. 12, signal selector and combiner 1220 taps the signals output from each LNB to provide the transponder selection function. Switch 1220 is under control of the signal selector and combiner 1210. Switch 1220 will be actuated to supply either a conventional signal from multiport switch 1260 or the composite transponder signal from signal selector and combiner 1210. Switch 1220 can be a solid-state device or electromechanical relay.

[0073]Referring to FIG. 16, another application of the present invention is to provide selected transponder signals along with other services transmitted on the same cable wiring. The selected transponder signals can be transmitted in unoccupied regions of the cable, such as above, below, or between broadband satellite signals. The number of transponder channels transmitted can be adapted to the available spectrum. In one example, 950 MHz to 1450 MHz is used by one conventional LNB output signal; 1550 MHz to 2050 MHz is used by another conventional LNB output, leaving 1450 MHz to 1550 MHz available. One or more selected transponder channels from any LNB can be inserted into this region. Suitable guard bands need to be provided to prevent interference, for example 3 transponder channels at 31.25 MHz spacing uses 93.75 MHz. Another example of this application is to combine a standard CATV signal occupying 50 to 750 MHz with selected satellite transponder channels that are combined and transmitted at frequencies above the CATV band.

[0074]Using the present invention, any number of transponder channels can be selected and combined. Conventional IRD tuners are designed to tune channels anywhere in a 500 MHz or 1000 MHz range, requiring a wide tuning range for the front-end filter and LO. In an application where few channels are needed, the tuner range can be narrower, thus simplifying the design and lower cost. For example, a residential installation may typically have four television sets, some tuning only one channel at a time; others tune two channels in the case of picture in picture (PIP) or personal video recorder (PVR). This application would require 4 to 8 channels be distributed in the house simultaneously. A tuner would be required to tune over a 125 MHz to 250 MHz range.

[0075]Several variations in architecture are possible using the present invention. At each stage in the signal path, alternatives are available for implementation. Specific functions can be implemented in the analog domain or digital domain. Dedicated resources can be provided for each possible connection, or a pool of resources can be used. Dedicated resources insure that the peak demand can be satisfied unconditionally, but leads to unused capacity. Pooling enables a trunking efficiency to be realized and exploits statistical properties of usage to address most requirements.

[0076]A pool of A/D converters that can accept a signal from any LNB output through an RF crossbar switch. The number of simultaneous LNB signals that can be processed is limited to the number of A/D converters provided. Alternatively, dedicated A/D converters, one connected to each LNB output allows all LNBs to be processed if needed.

[0077]A pool of filter/selectors connected to a common bus, the pool size dictating the number of simultaneous transponder channels that can be selected. Alternatively, a predetermined number of filters can be attached to each A/D converter.

[0078]The filters/selectors can be grouped with each LNB or can be a common resource available to process any signal from any LNB. This choice trades off circuit complexity of implementing more filters with circuit complexity of routing LNB outputs through a crossbar switch.

[0079]Each of the operations of mixing, filtering, and combining can be done as an analog operation or digital operation.

[0080]Partitioning of functions can take a number of forms. The circuitry can be implemented in a monolithic integrated circuit (IC), a hybrid, discrete components, or a combination of technologies.

[0081]Another application of the present invention is to simplify upgrades to an existing system. A dual tuner STB that enables viewing and recording of two different channels requires two input cables to allow any combination of LNB signals to be received. A single cable input would be limited to viewing and recording two channels from the same LNB

output. When the upgrade is performed, the installation of an additional cable is difficult. By selecting and combining the desired channels at the ODU a single cable can be used to transmit all channels. A re-map of channel locations occurs. A conventional dual tuner STB can be used with this approach by providing a splitter at the input to the STB that supplies the composite signal to both cable inputs. A software upgrade to the STB may be needed to support the channel re-mapping.

[0082]Other implementations for signal processing include: No cross point switch, digitize, digital filter select, frequency translate, RF combine; cross point switch, analog tuner select, frequency translate, RF combine; digitize, digital filter select, digital network combine; digitize, digital filter select, decode, MPEG stream over a network; digitize, digital filter select, decode, MPEG to analog, restack channels, RF combine. One skilled in the art will recognize that many variations are possible to implement the present invention of selecting signals and combining onto a signal cable.

[0083]Another property of the present invention is that the process of digitizing, selecting, and combining is modulation independent. Either a digital or analog selecting and combining approach can be designed to process any form of phase/amplitude modulation. Although the dominant modulation type in direct broadcast satellite systems is QPSK, alternatively BPSK, 8-PSK or multi-level QAM and PSK signals can be distributed in the same way.

ENGLISH-CLAIMS:
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What is claimed is:

1. A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising: a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals from at least one broadband LNB signal based on the transponder select information;a frequency translator coupled to the signal selector that is capable of shifting the selected transponder signals to new carrier frequencies to produce RF signals; anda signal combiner coupled to at least one frequency translator capable of combining at least two RF signals to produce a composite signal;wherein the modulation of the composite signal is the same as the modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable;whereby the composite signal is transmitted to the IRD.

2. The signal distribution system of claim 1 further comprising a plurality of IRDs and wherein the composite signal is transmitted on a single cable connected to the ODU and all IRDs receive channels extracted from the composite signal.

3. The signal distribution system of claim 1 wherein the signal selector comprises an analog to digital converter and a digital filter.

4. The signal distribution system of claim 1 wherein the signal selector comprises a tuner.

5. The signal distribution system of claim 1 further comprising an integrated receiver decoder (IRD) connected to the coaxial cable with a plurality of tuners within the IRD, wherein each tuner within the IRD receives the composite signal and each tuner uses at least one transponder signal.

6. The signal distribution system of claim 1 wherein transponder select information is

transmitted over the same cable as the composite signal.

7. The signal distribution system of claim 1 wherein transponder select information is transmitted over a wireless link.

8. A signal distribution system for distributing signals comprising a plurality of channels from a plurality of sources between a first unit and a second unit over a communication medium comprising: means in the first unit responsive to information transmitted by the second unit for extracting selected channels from each of the plurality of sources and combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; andmeans in the second unit for receiving the composite signal and demodulating and decoding at least one channel; andmeans in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

9. The signal distribution system of claim 8 wherein the control information comprises channel selection requests originating from the second unit and the control information comprises channel mapping information originating from the first unit.

10. The signal distribution system of claim 8, further comprising a means in the first unit for carrier offset correction.

11. The signal distribution system of claim 8 wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.

12. The signal distribution system of claim 11 wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.

13. The signal distribution system of claim 12 wherein the means for communicating uses the same communication medium as the composite signal.

14. A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of: communicating a transponder request signal to the ODU from the IRD;in the ODU, selecting a plurality of transponder signals extracted from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals;combining selected transponder signals into a composite signal;transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

15. The method of claim 14 wherein the step of selecting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal.

16. The method of claim 14 wherein the step of combining comprises frequency translating the selected transponder channels to a variable frequency before combining.

17. The method of claim 15 further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.

18. The method of claim 14 further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.

19. The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD and all IRDs receive the same composite signal.

20. The method of claim 14 wherein the transponder request signal is transmitted over a wireless link to the ODU.

21. The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining; andsplitting the composite signal inside a home and distributing to a plurality of IRDs.

22. The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.

23. The method of claim 21 wherein the transponder request signal is transmitted over a wireless link to the ODU.

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California Inventors Develop Broadband Content Distribution Signal Combiner US Fed News November 7, 2006 Tuesday 5:59 AM EST

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LENGTH: 243 words

HEADLINE: California Inventors Develop Broadband Content Distribution Signal Combiner

BYLINE: US Fed News

DATELINE: Alexandria, Va.

BODY:

ALEXANDRIA, Va., Nov. 7 -- Itzhak Gurantz and Michael Landry, both of San Diego, and Ladd El Wardani of La Jolla, Calif., have developed a signal selector and combiner for broadband content distribution.

According to the U.S. Patent & Trademark Office: "In a satellite receiving system, program channels are selected from one or more broadband signals and combined with other selected channels and transmitted from a first unit, for example an outdoor unit, to a second unit, for example a gateway, server, or set-top box, using a single cable. Channels can be selected by digitizing the broadband signal then digitally filtering to isolate the desired channels. The outputs of several low noise amplifier and block converters can be selected and combined into one signal. Multiple set-top boxes can receive independent signals over a single cable from the outdoor unit."

The inventors were issued U.S. Patent No. **7,130,576** on Oct. 31.

The patent has been assigned to Entropic Communications Inc., San Diego.

The original application was filed on Nov. 6, 2002, and is available at:

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=**7,130,576.**PN.&OS=PN/**7,130,576**&RS=PN/**7,130,576**.

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PATENT NO. 7,130,576
ART UNI 3992

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified ex parte reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a replly has passed, no submission on behalf of the ex parte reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Order Granting / Denying Request For Ex Parte Reexamination	Control No. 90/008,389	Patent Under Reexamination 7130576	
	Examiner Scott L. Weaver	Art Unit 3992	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

The request for *ex parte* reexamination filed *06 February 2007* has been considered and a determination has been made. An identification of the claims, the references relied upon, and the rationale supporting the determination are attached.

Attachments: a)☐ PTO-892, b)☒ PTO/SB/08, c)☒ Other: *Decision On Request*

1. ☒ The request for *ex parte* reexamination is GRANTED.

RESPONSE TIMES ARE SET AS FOLLOWS:

For Patent Owner's Statement (Optional): TWO MONTHS from the mailing date of this communication (37 CFR 1.530 (b)). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).**

For Requester's Reply (optional): TWO MONTHS from the **date of service** of any timely filed Patent Owner's Statement (37 CFR 1.535). **NO EXTENSION OF THIS TIME PERIOD IS PERMITTED.** If Patent Owner does not file a timely statement under 37 CFR 1.530(b), then no reply by requester is permitted.

2. ☐ The request for *ex parte* reexamination is DENIED.

This decision is not appealable (35 U.S.C. 303(c)). Requester may seek review by petition to the Commissioner under 37 CFR 1.181 within ONE MONTH from the mailing date of this communication (37 CFR 1.515(c)). **EXTENSION OF TIME TO FILE SUCH A PETITION UNDER 37 CFR 1.181 ARE AVAILABLE ONLY BY PETITION TO SUSPEND OR WAIVE THE REGULATIONS UNDER 37 CFR 1.183.**

In due course, a refund under 37 CFR 1.26 (c) will be made to requester:

a) ☐ by Treasury check or,

b) ☐ by credit to Deposit Account No. _____, or

c) ☐ by credit to a credit card account, unless otherwise notified (35 U.S.C. 303(c)).

cc:Requester (if third party requester)

Decision on Request for Ex Parte Reexamination

Reexamination has been requested for claims 1-23 of United States Patent Number 7,130,576 to Gurantz et al. filed November 6, 2002, issued on October 31, 2006.

A substantial new question of patentability (SNQ) affecting claims 1-23 of United States Patent Number 7,130,576 to Gurantz is raised by the request for reexamination on February 6, 2007 for the reasons set forth below.

The References Cited in The Request

The Request identifies the following documents as providing teachings relevant to claims 1-23 of United States Patent Number 7,130,576 to Gurantz

Exhibit B	"INFORMATION FOR INSTALLERS OF HOT BIRD TM DVB-S SYSTEMS, VERSION 1.0" (hereinafter "Eutelsat Installers Guide"), EUTELSAT, dated June 7, 1999;
Exhibit C	"DIGITAL SATELLITE EQUIPMENT CONTROL (DiSEqC TM) UPDATE AND RECOMMENDATIONS FOR IMPLEMENTATION, VERSION 2.0" (hereinafter "Eutelsat DiSEqC Specification"), EUTELSAT, dated April 18, 1997;
Exhibit D	United States Patent No. 6,437,837 to Seo (hereinafter "Seo");
Exhibit E	United States Patent No. 5,073,390 to Green et al. (hereinafter "Green");
Exhibit F	United States Patent No. 6,005,861 to Humplemann (hereinafter "Humplemann");
Exhibit G	"A SINGLE CHIP UNIVERSAL DIGITAL SATELLITE RECEIVER WITH 480-Mhz IF INPUT" (hereinafter the "Broadcom Paper");
Exhibit H	"PHILLIPS DATA SHEET FOR UAA3202M FREQUENCY SHIFT KEYING RECEIVER", (hereinafter the "Phillips Data Sheet");
Exhibit I	United States Patent No. 5,654,774 to Pugel et al. (hereinafter "Pugel");
Exhibit J	United States Patent No. 4,953184 to Simone (hereinafter "Simone");

Exhibit K	European Patent No. 1009113 (hereinafter "EPO '113 Patent");
Exhibit L	European Patent No. 0757489 (hereinafter "EPO '489 Patent");
Exhibit M	United States Patent No. 5,285,284 to Takashima et al. (hereinafter "Takashima");
Exhibit N	United States Patent No. 6,353,463 to Seo (hereinafter "Seo")
Exhibit O	"RCA DIRECTTV RECEIVER WITH ULTIMATETV SERVICE SETUP GUIDE (hereinafter the "RCA Setup Guide");
Exhibit P	United States Patent No. 5,278,837 to Kelley (hereinafter "Kelley").

Exhibit D was of record during examination of the application with became the 7,130,576 patent to Gurantz, however, Exhibit D was not considered in combination with the new references cited in the request and as such is being viewed in a new light.

None of exhibits B-C or E-P listed above was previously considered nor made of record during prosecution of the application which became the 7,130,576 patent to Gurantz and as such have not been previously considered nor addressed during an 'examination' of the application which became the 7,130,576 patent to Gurantz, nor in a final holding of invalidity by the Federal Courts. The references listed above are not cumulative to the prior art of record.

Prosecution History

An examiners reasons for allowance was not provided during prosecution of the application which became the 7,130,576 patent to Gurantz.

In response to a third office action rejecting the claims, the patentee conducted an interview with the examiner. The interview included an explanation of the distinction between the claimed invention and the references relied on. The interview included an explanation that the claimed invention "include[s] the limitation of transponder selection responsive to a signal transmitted by an IRD." And that in the claimed "invention, a single cable can run from the selector and combiner, which can be in the ODU, to the inside of the building. The signal is split inside the building using a gateway or splitter device to distribute a composite signal to IRDs. The IRD commands to the selector requests individual transponder signals from satellite signals output by any one of the LNBs. The signal selector selects the transponder signals requested from each IRD, combines all of the selected transponder signals into a composite signal, then transits the composite signal, sent preferably over a single cable, and tunes its requested transponder signal for decoding and display on a television connected to the IRD. The composite signal changes based on collection of transponder select signals from each IRD.... [W]hereas in the applicant's invention and claim, the frequency translator operates on the signal output from the LNB[.]"

Claim 1 reads as follows:

> 1. A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising:
> a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals from at least one broadband LNB signal based on the transponder select information;
> a frequency translator coupled to the signal selector that is capable of shifting the selected transponder signals to new carrier frequencies to produce RF signals; and
> a signal combiner coupled to at least one frequency translator capable of combining at least two RF signals to produce a composite signal;
> wherein the modulation of the composite signal is the same as the modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable; whereby the composite signal is transmitted to the IRD.

Issues Raised in the Request

The Requestor alleges that an SNQ is raised by Exh B.

It is agreed that the consideration of Exh B raises a substantial new question of patentability as to claims 1-2, 6, 8-9, 11-14, 16, 18-19, and 21-22 of the 7,130,576 patent to Gurantz.

Request pages 30-38, are hereby incorporated by reference from the request for reexamination for their explanation of the teaching provided in Exh B that was not present in the prosecution of the application which became the 7,130,576 patent to Gurantz

In summary, Exh B provides a discussion of Figure 11 and page 19 of Exh B which discusses architecture that includes communication between the terminal (IRD) and the head-end (selector) so that remote channel selection can be carried out , transmission of composite signal on coaxial cable (figure 11, p.27), and transmission of the composite signal (output of the RF combiner) sent to the IRD .

There is a substantial likelihood that a reasonable examiner would consider this teaching important in deciding whether or not the claim is patentable. Exh B was not before the examiner during prosecution of the 10/289,011 application which became the 7,130,576 patent to Gurantz. Accordingly, Exh B raises a substantial new question of patentability as to claims 1-2, 6, 8-9, 11-14, 16, 18-19, and 21-22 which question has not been decided in a previous examination of the 7,130,576 patent to Gurantz.

The Requestor alleges that an SNQ is raised by Exh C.

It is agreed that the consideration of Exh C raises a substantial new question of patentability as to claims 1-2, 6, 8-9, 11-14, 16, 18-19, and 21-22 of the 7,130,576 patent to Gurantz.

Request pages 65-71, are hereby incorporated by reference from the request for reexamination for their explanation of the teaching provided in Exh C that was not present in the prosecution of the application which became the 7,130,576 patent to Gurantz

In summary, Exh C provides a discussion of Figure 19 and page 8 of Exh B which discusses architecture that includes communication between the terminal (IRD) and the multiswitch (selector) so that band and channel selection can be carried out , transmission of composite signal on coaxial cable (figure 19, p.8), and transmission of the composite signal (output of the RF combiner) sent to the satellite receiver (IRD).

There is a substantial likelihood that a reasonable examiner would consider this teaching important in deciding whether or not the claim is patentable. Exh C was not before the examiner during prosecution of the 10/289,011 application which became the 7,130,576 patent to Gurantz. Accordingly, Exh C raises a substantial new question of patentability as to claims 1-2, 6, 8-9, 11-14, 16, 18-19, and 21-22 which question has not been decided in a previous examination of the 7,130,576 patent to Gurantz.

Requestor further alleges that claims 2-5, 7, 10, 15-17, and 20-23 may be unpatentable in consideration of secondary references (exhibits D-P) in combination with (exhibit B as indicated on pages 53- 65 and exhibit C as indicated on pages 87-99) of the request. Since each of the exhibits B and C as indicated in the request is considered to raise a substantial new question of patentability as noted above, the combinations of exhibits B and C separately with exhibits D-P therewith as suggested on pages 53-65 and 87-99 respectively of the request also raises substantial new question of patentability for similar reasons.

All claims 1-23 of the patent will be reexamined as requested in the request.

Conclusion

Extensions of time under 37 CFR 1.136(a) will not be permitted in these proceedings because the provisions of 37 CFR 1.136 apply only to "an applicant" and not to parties in a reexamination proceeding. Additionally, 35 U.S.C. 305 requires that *ex parte* reexamination proceedings "will be conducted with special dispatch" (37 CFR 1.550(a)). Extensions of time in *ex parte* reexamination proceedings are provided for in 37 CFR 1.550(c).

The patent owner is reminded of the continuing responsibility under 37 CFR 1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, involving U.S. Patent Number 7,130,576 throughout the course of this reexamination proceeding. The third party requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§ 2207, 2282 and 2286.

Please mail any communications to:
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Central Reexamination Unit
Commissioner for Patents
P. O. Box 1450
Alexandria VA 22313-1450

Please FAX any communications to:
(571) 273-9900
Central Reexamination Unit

Please hand-deliver any communications to:
Customer Service Window
Attn: Central Reexamination Unit
Randolph Building, Lobby Level
401 Dulany Street
Alexandria, VA 22314

Any inquiry concerning this communication or earlier communications from the Reexamination Legal Advisor or Examiner, or as to the status of this proceeding, should be directed to the Central Reexamination Unit at telephone number (571) 272-7705.

Scott L. Weaver
Primary Examiner
Central Reexam Unit 3992
(571) 272-7548

SCOTT L. WEAVER
CRU EXAMINER-AU 3992

Conferees:

ROLAND G. FOSTER
CRU EXAMINER-AU 3992

PTO/SB/08a (09-06)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	TBD
Filing Date	TBD
First Named Inventor	Itzhak GURANTZ
Art Unit	TBD
Examiner Name	TBD
Attorney Docket Number	05JM-127751

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		~~US-4,958,184~~		~~Simonc~~	
/SLW/		US-5,278,837		Kelley	
/SLW/		US-5,285,284		Takashima et al.	
/SLW/		US-5,654,774		Pugel et al.	
/SLW/		US-5,703,390		Green et al	
/SLW/		US-6,005,861		Humpleman	
/SLW/		US-6,353,463		Seo	
/SLW/		US-6,437,837		Seo	
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FOREIGN PATENT DOCUMENTS

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/SLW/		EP 1009113				
/SLW/		EP 0757489				

Examiner Signature	/Scott Weaver/	Date Considered	03/20/2007

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Sheet 2 of 2

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First Named Inventor	Itzhak GURANTZ
Art Unit	TBD
Examiner Name	TBD
Attorney Docket Number	05JM-127751

NON PATENT LITERATURE DOCUMENTS

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/SLW/		Eutelstat, "Information for Installers of Hot Bird tm DVB-S Systems, Version 1.0" http://www.eutelstat.com/docs/tech, June 7, 1999	
/SLW/		Eutelstat, Digital Satellite Equipment Control (DiSEqC TM) "Update and Recommendation for Implementation, Version 2.0" http://www.eutelstat.org/press/tv_recept1/html#DiSEqC, April 18, 1997	
/SLW/		A.Y. Kwentus, et al. "A Single Chip Universal Digital Satellite Receiver with 480-Mhz IF Input" IEEE Journal of Solid-State Circuits, VoL. 34, No.11, November 1999, pp.1634-1646	
/SLW/		Philips Semiconductors-Integrated Circuits "Data Sheet for UAA3203M Frequency Shift Keying Receiver" Preliminary specification, 1997 Aug 12, www.datasheetcatalog.com	
/SLW/		Thomson Consumer Electronics "RCA DirectTV Receiver with UltimateTV Service Setup Guide" WebTV Networks, Inc. 2000	

Examiner Signature	/Scott Weaver/	Date Considered	03/20/2007

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First Named Inventor	Itzhak GURANTZ
Art Unit	TBD
Examiner Name	James R. MATTHEWS
Attorney Docket Number	05JM-127751

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SW		US- 5,278,837		Kelley	
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SW		US- 5,654,774		Pugel et al.	
SW		US- 5,703,390		Green et al	
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Examiner Signature	SW	Date Considered	3/20/2007

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Sheet 2 of 2

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Art Unit	TBD
Examiner Name	James R. MATTHEWS
Attorney Docket Number	05JM-127751

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SW		Eutelstat, "Information for Installers of Hot Bird tm DVB-S Systems, Version 1.0" http://www.eutelstat.com/docs/tech, June 7, 1999	
SW		Eutelstat, Digital Satellite Equipment Control (DiSEqC TM) "Update and Recommendation for Implementation, Version 2.0" http://www.eutelstat.org/press/tv_recept1/html#DiSEqC, April 18, 1997	
SW		Philips Semiconductors-Integrated Circuits "Data Sheet for UAA3203M Frequency Shift Keying Receiver" Preliminary specification, 1997 Aug 12, www.datasheetcatalog.com	
SW		A.Y. Kwentus, et al. "A Single Chip Universal Digital Satellite Receiver with 480-Mhz IF Input" IEEE Journal of Solid-State Circuits, Vol. 34, No. 11, November 1999, pp. 1634-1646	
SW		Thomson Consumer Electronics "RCA DirectTV Receiver with UltimateTV Service Setup Guide" WebTV Networks, Inc. 2000	

Examiner Signature	SW	Date Considered	3/20/07

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Reexamination	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/008,389	7130576
	Certificate Date	Certificate Number

Requester Correspondence Address: ☐ **Patent Owner** ☒ **Third Party**

Daniel N. Yannuzzi
Sheppard, Mullin, Richter & Hampton LLP
12275 El Camino Real, Suite 200
San Diego, CA 92130

LITIGATION REVIEW ☒	SLW (examiner initials)	2/2/6/2007 (date)
Case Name		Director Initials
None		

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	**NUMBER**
1.	
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3.	
4.	

Litigation Search Report CRU 3999

Reexam Control No. 90/008,389

TO: Eric Keasel/Fred Ferris Location: CRU Art Unit : 3992 Date: 06/03/08 Case Serial Number: 90/008,389	From: James R. Matthews Location: CRU 3999 MDW 7C71 Phone: (571) 272-4233 JamesR.Matthews@uspto.gov

Search Notes

U.S. Patent No.- 7,130,576

1) I performed a KeyCite Search in Westlaw, which retrieves all history on the patent including any litigation.

2) I performed a search on the patent in Lexis CourtLink for any open dockets or closed cases.

3) I performed a search in Lexis in the Federal Courts and Administrative Materials databases for any cases found.

4) I performed a search in Lexis in the IP Journal and Periodicals database for any articles on the patent.

5) I performed a search in Lexis in the news databases for any articles about the patent or any articles about litigation on this patent.

Westlaw.

Date of Printing: JUN 03,2008

KEYCITE

US PAT 7130576 SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION, Assignee: Entropic Communications, Inc. (Oct 31, 2006)

History

=> 1 **SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION,** US PAT 7130576, 2006 WL 3085317 (U.S. PTO Utility Oct 31, 2006) (NO. 10/289011)

Patent Family

2 SIGNAL DISTRIBUTION SYSTEM FOR DIRECT BROADCAST SATELLITE SYSTEM, COMBINES RADIO FREQUENCY SIGNALS TO PRODUCE COMPOSITE SIGNAL WHICH USES MODULATION PROCEDURE SAME AS BROADBAND LOW NOISE AMPLIFIER AND BLOCK CONVERTER SIG, DWPL 2007-052908

Assignments

3 Assignee(s): ENTROPIC COMMUNICATIONS INC.,
DATE RECORDED: Dec 27, 2002

Patent Status Files

. Request for Re-Examination, (OG date: Apr 10, 2007)

Prior Art (Coverage Begins 1976)

C 5 US PAT 6441797 AGGREGATED DISTRIBUTION OF MULTIPLE SATELLITE TRANSPONDER SIGNALS FROM A SATELLITE DISH ANTENNA, Assignee: Hughes Electronics Corporation, (U.S. PTO Utility 2002)

C 6 US PAT 6556807 ANTENNA RECEIVING SYSTEM, Assignee: Mitsubishi Electric & Electronics USA,, (U.S. PTO Utility 2003)

C 7 US PAT 5760822 CENTRAL NODE CONVERTER FOR LOCAL NETWORK HAVING SINGLE COAXIAL CABLE, Assignee: Lucent Technologies Inc., (U.S. PTO Utility 1998)

C 8 US PAT 6437837 DIGITAL BROADCAST SIGNAL PROCESSING APPARATUS AND METHOD IN WHICH CHANNEL INTERFERENCE BY ANALOG BROADCAST IS PREVENTED, Assignee: Samsung Electronics Co., Ltd., (U.S. PTO Utility 2002)

C 9 US PAT 5959592 &LDQUO;IF&RDQUO; BANDSTACKED LOW NOISE BLOCK CONVERTER COMBINED WITH DIPLEXER, Assignee: EchoStar Engineering Corporation, (U.S. PTO Utility 1999)

C 10 US PAT 6947702 SATELLITE BROADCAST RECEIVING AND DISTRIBUTION SYSTEM, Assignee: Global Communications, Inc., (U.S. PTO Utility 2005)

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C 11 US PAT 6600730 SYSTEM FOR DISTRIBUTION OF SATELLITE SIGNALS FROM SEPARATE MULTIPLE SATELLITES ON A SINGLE CABLE LINE, Assignee: Hughes Electronics Corporation, (U.S. PTO Utility 2003)

C 12 US PAT 6134419 TRANSMODULATED BROADCAST DELIVERY SYSTEM FOR USE IN MULTIPLE DWELLING UNITS, Assignee: Hughes Electronics Corporation, (U.S. PTO Utility 2000)

C 13 US PAT 6493873 TRANSMODULATOR WITH DYNAMICALLY SELECTABLE CHANNELS, Assignee: Hughes Electronics Corporation, (U.S. PTO Utility 2002)

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Link to Claims Section

October 31, 2006

Signal selector and combiner for broadband content distribution

REEXAM-LITIGATE: February 6, 2007 - Reexamination requested February 6, 2007 by RF Magic, San Diego, CA; (Attny. Is: Daniel N. Yannuzzi, Sheppard, Mullin, Richter & Hampton, LLP, San Diego, CA), Reexamination No. 90/008,389 (O.G. April 10, 2007) Ex. Gp.: 3992

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ASSIGNEE-AT-ISSUE: Entropic Communications, Inc., San Diego, California, United States (US), United States company or corporation (02)

LEGAL-REP: Landry, Michael W. -

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Provisional Application Ser. No. 60333722, November 27, 2001, PENDING
Provisional Application Ser. No. 60358817, February 22, 2002, PENDING

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REF-CITED:
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CORE TERMS: channel, transponder, filter, frequency, cable, band, digital, converter, spectrum, selector, sample, bandwidth, select, selecting, combined, analog, satellite, gateway, carrier, tuner, composite, filtering, point switch, outdoor, alternatively, offset, input, transmitted, translated, broadband

ENGLISH-ABST:

In a satellite receiving system, program channels are selected from one or more broadband signals and combined with other selected channels and transmitted from a first unit, for example an outdoor unit, to a second unit, for example a gateway, server, or set-top box, using a single cable. Channels can be selected by digitizing the broadband signal then digitally filtering to isolate the desired channels. The outputs of several LNBs can be selected and combined into one signal. Multiple set-top boxes can receive independent signals over a single cable from the outdoor unit.

NO-OF-CLAIMS: 23

EXMPL-CLAIM: 1

NO-OF-FIGURES: 17

NO-DRWNG-PP: 17

PARENT-PAT-INFO:

RELATED APPLICATIONS

[0001]This application claims priority to U.S. provisional patent application No. 60/345,965 filed Nov. 7, 2001 entitled "Signal Selector and Combiner for Broadband Content Distribution"; U.S. provisional patent application No. 60/333,722 filed Nov. 27, 2001 entitled "Signal Selector and Combiner for Broadband Content Distribution"; and U.S. provisional patent application No. 60/358,817 filed Feb. 22, 2002 entitled "Signal Selector and Combiner for Broadband Content Distribution", each of which is incorporated herein by reference.

SUMMARY:

BACKGROUND

[0002]Referring to FIG. 1, a satellite receiver outdoor unit (ODU) 110 typically comprises a dish antenna 150, one or more antenna feed horns 130, one or more low noise amplifier and block down converters (LNB) 140, and an optional multiport cross point switch 160. Dish 150 collects and focuses received signal power onto antenna feed horns 130 which couples the signal to LNBs 140. A single dish 150 may have multiple feed horns 130 wherein each feed receives a signal from a different satellite in orbit. An installation may have more than one dish, feed, and LNB assemblies. The cross point switch 160 allows connection of the outdoor unit 110 to more than one integrated receiver decoder (IRD) 180 located inside the building. IRDs are commonly called set top boxes (STBs) arising from their typical installed location on top of TV sets. The LNB 140 converts the signal transmitted by a satellite in Earth orbit, for example C band, Ku band, or another frequency band, to a lower intermediate frequency (IF) suitable for transmission through coax inside a building. For example, L band IF (950 to 1450 MHZ) with RG-6 or RG-11 coax cable is commonly used. The IRD 180 tunes one transponder channel, demodulates the IF signal from the LNB down to base band, provides channel selection, conditional access, decodes the digital data to produce a video signal, and generates an RF output to drive a television.

[0003]A satellite outdoor unit may have as many as three or more LNBs each with two receiving polarizations. The received polarization is selected by sending a voltage or other control signal to the LNB. In this configuration there are six possible 500 MHz signals that may be selected by the multiport cross point switch to be routed to each IRD. The 500 MHz signal is typically comprised of 16 transponder signals of 24 MHz bandwidth each with a guard band in between each transponder signal. Other transponder bandwidths are used such as 36 MHz, 54 MHz with a single channel or shared by two TV signals, and 43 MHz.

[0004]A problem with the conventional approach to connecting an outdoor unit to IRDs is that multiple cables are required to be run from the outdoor unit: one cable for each room where an IRD is located. When a new IRD is added another cable must be installed. In an application using a media server, a central processor for all video signals, multiple cables are needed to route signals from the ODU to the server.

[0005]FIG. 4 shows a representative spectrum of the signal output by an LNB. In a conventional satellite ODU this signal is routed through a cross point switch to one of the IRDs. Note that all transponder channels in the signal are from a single LNB and from the same polarization satellite signal. The cross point switch allows any of the cables connected from the ODU to the IRDs to be switched to any of the LNBs. A dedicated cable for each IRD

is needed because in general each IRD is not using the same LNB and polarization at the same time. A server requires access to several LNB signals simultaneously, thus requiring several cables.

[0006]U.S. Pat. No. 6,134,419, incorporated herein by reference, by Williams assigned to Hughes Electronics, addresses part of the problem. The Williams patent recognizes that the bandwidth of the signal from each of the two polarizations is too broad to be transmitted over standard RG-6 or RG-59 cable, particularly when combined with the cable CATV signal. Williams addresses this problem using a transmodulator, by demodulating and remodulating to a different modulation scheme the RHCP and LHCP signals using a tuner, decoder, packetizer, cable encoder, and up converter for each of 32 transponder channels. The transmodulator outputs a signal with a higher-level modulation scheme to reduce the bandwidth occupied by the satellite signals. In the example provided, the QPSK signals from the LNBs are transmodulated to 128-QAM, reducing the bandwidth from 1000 MHz to 192 MHz. At the set top box (STB) the 128 QAM signal is demodulated and processed to produce an NTSC analog video signal sent to a television set.

[0007]One problem with the Williams approach is the circuit complexity due to the 32 tuner paths required in the transmodulator. For an increase in the number of satellite signals, this problem becomes more pronounced. Williams discloses modulation using 128-QAM, which requires a higher signal to noise ratio (SNR) than QPSK and is it more susceptible to impairment from multipath present in a cable environment.

[0008]U.S. Pat. No. 5,959,592 incorporated herein by reference, by Petruzzelli addresses combining both the left hand circular polarized (LHCP) and right hand circular polarized (RHCP) signals into one signal that is transmitted from the ODU. In the disclosed band stacking approach, the output of two low noise amplifiers (LNAs), each 500 MHz wide, are frequency translated to different IF frequencies and summed into a signal with a bandwidth of more than 1000 MHz. In one example disclosed, the different IF bands are 950 to 1450 MHz and 1550 to 2050 MHz. The problem with this approach is that the resulting bandwidth is very wide and becomes impractical when the number of LNB signals increases because each LNB output requires 500 MHz of bandwidth on the cable.

[0009]Satellite systems are described generally in G. E. Lewis, "Communication Services via Satellite" Butterworth-Heinemann Ltd. 1992.

SUMMARY OF THE INVENTION

[0010]A channel selecting and combining solution is used in the outdoor unit where one or more transponder channels are selected from each LNB output. The transponder channel or channels needed from each LNB are selected by a filter. Each selected transponder signal may be translated to a new channel frequency. The selected transponder channels are combined to form a composite signal. All of the selected, translated, and combined transponder channels are transmitted over a single cable to a gateway unit that extracts the channels to distribute to the IRDs. The gateway can frequency translate each transponder channel to its original frequency. Alternatively, the IRDs connect directly from the cable or through a splitter and tune the desired transponder channels. A channel translation mapping table is used to coordinate the channel assignment between the original channels and new channels. In another alternative embodiment, the gateway transmits the video information over a digital data network.

[0011]LNB outputs can be sampled by a broadband A/D converter and filtered with a digital filter to select a transponder channel. Alternatively, a tuner can select a transponder channel. The selecting process extracts from the wide band LNB output a narrow band transponder channel.

[0012]Each IRD communicates the channels it needs to receive, directly or indirectly, to the signal selector. This information is used to select the transponder channel to combine in the signal selector output signal, the ODU downlink. New IRD designs can incorporate a signaling channel that uses unoccupied regions of the frequency spectrum of the cable, or a wireless communication link, to communicate the channel information. To provide compatibility with existing IRDs, the channel information can be communicated by an IR or RF auxiliary channel to the gateway or outdoor unit.

[0013]Many newer homes have coaxial cable installed that runs to a central location. In the present invention a gateway is located at the central location that receives the combined signal from the outdoor unit and distributes the signals to the IRDs. An IRD requests a channel through an IR or RF signal communicated to the gateway. The RF communication can be in the cable connecting the IRD to the gateway or a wired or wireless signal.

[0014]The present invention requires only one cable wire to be routed from the outdoor unit to inside the building or to a gateway. Additional IRDs can be added without any installation effort needed on the outdoor unit. In certain configurations the invention eliminates the cross point switch.

[0015]The present invention can be used along with other signals transmitted on the distribution cable. The combined transponder signal can occupy a predetermined region of the frequency spectrum while another service, such as CATV can occupy a different region. Another example of shared use of the cable is along with a single or band stacked satellite signal. In this example, frequencies such as 950[ndash]1450 and 1550[ndash]2050 are used by a conventional satellite system, and frequencies outside and between these frequency bands are occupied with a combined transponder signal according to the present invention.

DRWDESC:

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]FIG. 1 Shows a prior art configuration of a satellite TV installation.

[0017]FIG. 2 shows a satellite TV installation according to the present invention.

[0018]FIG. 3 shows a block diagram of a selector and combiner according to the present invention.

[0019]FIG. 4 Shows a diagram of the frequency spectrum of individual LNB output signals according to the prior art.

[0020]FIG. 5 shows a diagram of the frequency spectrum of individual LNB output signals and the frequency spectrum of the composite RF signal comprising selected transponder signals in accordance with the present invention.

[0021]FIG. 6 shows an embodiment of the present invention wherein the sampled data is distributed digitally to channel selector filters.

[0022]FIG. 7 shows an embodiment of the present invention wherein the selected channel data is distributed digitally to the up converters.

[0023]FIG. 8 shows an embodiment of the present invention wherein the each LNB has a dedicated selector and up converter.

[0024]FIG. 9 shows an embodiment of the present invention wherein tuners and up converter are used to select and combine transponder channels.

[0025]FIG. 10 shows an embodiment wherein selected channel are processed by an MPEG transport stream demultiplexer and combined as data packets for digital LAN transmission.

[0026]FIG. 11 shows a satellite TV installation according to the present invention providing compatibility with existing installed STBs and new STBs and using a server/gateway.

[0027]FIG. 12 shows details of an outdoor unit providing compatibility with new and existing STBs.

[0028]FIG. 13 shows the frequency spectrum of signals at various points in the signal processing.

[0029]FIG. 14 shows the frequency spectrum of signals in another embodiment of the invention using base band processing.

[0030]FIG. 15 shows the frequency spectrum of signals filtered and combined with excess bandwidth.

[0031]FIG. 16 shows the frequency spectrum of conventional LNB signals combined with selected transponder channels in accordance with the present invention.

[0032]FIG. 17 shows one example of a frequency translator and filter.

DETDESC:

DETAILED DESCRIPTION OF THE INVENTION

[0033]Referring to FIG. 2, a satellite TV installation according to the present invention is shown. Signal selector 250, part of satellite outdoor unit 210, extracts the needed transponder channels from each of the LNB outputs and combines the channels into one composite signal transmitted on cable 220. Gateway 230 receives the signals and provides distribution to the IRDs located in the building. Controller 255 is responsible for communicating channel map, control, and status information with gateway 230 and IRDs 240. Controller 255 also tunes filters and local oscillators in the signal selector and maintains the channel map specifying the assigned frequency slots for transponder channels. Alternatively, the channel map can be maintained by gateway 230.

[0034]Gateway 230 can be a simple power splitter/summer allowing the IRDs to connect directly to the cable. Gateway 230 would be located inside the home in a convenient location that allows connection to the IRDs 240. Gateway 230 is designed to pass signaling from IRDs 240 to ODU 210 that contains the channel selection information.

[0035]Each LNB output signal is applied to a signal selector that extracts zero, one, or more transponder channels to be combined into a composite signal.

[0036]Refer to FIG. 3. In an embodiment of the present invention, a quadrature down converter is used to produce I and Q analog signals. The down converter is comprised of a local oscillator 382, phase splitter 384 to produce an in-phase and quadrature-phase LO, two mixers 310, and two filters 320. The filters 320 reject the undesired mixing products. The I and Q signals are sampled by high-speed broadband A/D converters 330 to create I and Q

digital samples. The samples are N bits wide, where N is selected to limit the degradation to the signal to an acceptable level. The entire 500 MHz band is digitized by this operation. All further digital processing is done using complex operations applied to the I and Q digital samples. The sample rate is 500 MHz or higher.

[0037]The resolution of the A/D converters is in the range of 4 to 12 bits. To sample and reproduce a QPSK signal 6 to 8 bits would be adequate. More bandwidth efficient modulation such as 8PSK would require more bits of resolution. The selection of resolution is based on considering power consumption, SNR, and cost.

[0038]A coherent LO generated by carrier tracking is not needed since the sampled data is not decoded in the ODU. An unknown carrier offset is present between the LO and the carrier of the received signal. A small additional carrier offset is introduced by the down conversion process but will be removed in the carrier recovery operation in the IRD. It is desirable that the LO carrier noise be low enough to be tracked out by the carrier loop in the IRD.

[0039]Digital filtering 340 is used to select one or more of the transponder output signals. The digital filter may operate by applying a band pass filter transfer function to the broadband signal to isolate a single transponder channel. The filter uses known digital architectures such as finite impulse response (FIR) or infinite impulse response (IIR). The filter is tuned by programming a set of filter coefficients to select a specific pass band. Frequency domain filter can also be employed using FFT or DFT architectures. Other filtering techniques include polyphase filter structure. These filtering techniques are well known in the digital signal processing field. References covering digital filtering include Thomas J. Cavicchi "Digital Signal Processing" John Wiley & Sons, 2000; Sanjit K. Mitra, "Digital Signal processing, a Computer Based Approach" McGraw-Hill, 2001; Proakis and Manolakis, "Introduction to Digital Signal Processing", Macmillan Publishing, 1988; DSP and applications, Analog Devices.

[0040]Referring again to FIG. 3, the selected transponder channel is then frequency translated to a new carrier frequency. The selected and frequency translated digital signal is converted to an analog signal using a D/A converter for the I and Q components. One approach is to convert the digitally filtered signal to the analog domain using a D/A converter 350, then using a quadrature modulator with mixers 360, phase splitter 388, LO 386, and summer 380. Alternatively, this can be done by a digital mixing operation where a rotating phasor is multiplied by the data samples to translate their frequency, then converting the frequency shifted digital signal to an analog signal with a D/A.

[0041]LO 386 is variable to allow the selected channel to be frequency translated to any of the channels available in the band. Alternatively, the LO can be fixed at different a frequency for each of the channel selectors.

[0042]Alternatively, a single transponder channel can be selected by translating the spectrum down in frequency to place the selected channel at base band then applying a low pass filter transfer function to isolate a single channel. The translation can be done by a digital mixing operation wherein the sample data is multiplied by a data sequence representing a carrier frequency. A post-mixing filter rejects the undesired mixing terms.

[0043]FIG. 14 shows the frequency spectrum of the signal as it is processed. The original spectrum 1 is frequency translated to locate the selected transponder channel at base band, as shown in spectrum 2. A low pass filter then passes one transponder channel and removes signal information from the other transponder channels, shown in spectrum 3. This signal is then converted to an analog signal, mixed to a new frequency, and summed with other channels in the analog domain.

[0044]One summer input is provided for each signal selectors. This is a broadband signal

comprising up to 16 or 32 channels. Alternatively, a summer combines the analog I and Q signals from all the signal selectors.

[0045]Two basic approaches to combining are possible. One approach is to combine digitally filtered signals in the digital domain. This can be achieved with all filtered transponder channels to be combined presented at a sample rate equal to the composite output rate. The other approach is to combine the selected signals in the analog domain. This leads to two possible approaches to filtering. One is to implement filters with the same input and output sample rate. The other approach is to filter with an output sample rate that differs from the input sample rate.

[0046]An example of a digital combining embodiment, a 500 msps broadband sampling of the LNB output could be filtered to produce a 500 msps output stream representing one or more transponder channels. Each transponder channel may be frequency translated to the desired new carrier frequency, then filtered to produce a single transponder signal that can be combined with other similarly selected transponder channels.

[0047]FIG. 13 shows the frequency spectrum of a sample stream as it is processed. The original spectrum 1 is frequency translated to locate the selected transponder channel at the desired frequency, as shown in spectrum 2. A band pass filter then passes one transponder channel and removes signal information from the other transponders channels, shown in spectrum 3. This filtering operation selects one transponder. In this example transponder channel B is selected. The sample stream for the selected channel is added to the sample stream from other filtering sections, represented in spectrum 4, to produce a composite sample stream in spectrum 5. Other selected channels are represented by channels labeled X.

[0048]FIG. 17 shows a block diagram of the processing elements to perform these steps. Local oscillator (LO) 1710 feeds mixer 1720 and is then band pass filtered by filter. LO is variable to allow the selected channel to be frequency translated to any of the channels available in the band. Filter 1730 has a programmable pass band frequency, tuned by loading different filter coefficients. Summer 1740 adds the sample stream to other sample streams. Several transponder channels are selected, each requiring one input to an adder. One embodiment uses a two input adder for each filter channel to implement a pipeline adder. The time delay introduced by a pipeline adder does not present a problem to the system because the receivers are each demodulating one transponder and the relative time delay is not apparent.

[0049]The frequency translation can occur either before or after the filtering operation. An advantage to translating first followed by filtering is that the filter removes the unwanted mixing terms generated. In either case, a rotating phasor is multiplied by the data samples to translate their frequency.

[0050]An example of an analog-combining embodiment, the digital filters may have an output sample rate that differs from the input sample rate. This can be inherent in the filtering operation or result from a down sampling done after filtering. Down sampling after the selecting filter is possible because the single channel the bandwidth is narrower than the A/D output and fewer samples are needed to represent the signal.

[0051]The spectrum is placed at the desired RF frequency by choosing the LO frequency driving the up converters. One example would be 950 to 1450 MHz, a standard IF frequency for DBS systems. This frequency band is compatible with standard set top box (STB) hardware. Other IF frequencies could be used. Using this technique, standard STB hardware can receive the new composite signal and demodulate and decode the video and audio signals. Specific TV channels are located at new transponder frequencies. A mapping table allows the IRD/STB to tune to the correct transponder channel. The bandwidth of the

spectrum can be 500 MHz for a 16-transponder system, 1000 MHz for a 32-transponder system, or other bandwidths according to the number of transponder channels present on the cable. If the system uses band stacking, the A/D converter can directly sample the 1000 MHz IF signal, with or without a frequency translation, or the two LNB polarizations can be separated into two 500 MHz signals each digitized with separate A/D converters.

[0052]Alternatively, the IF signal from the LNB can be directly band pass sampled by a single A/D converter. The IF signal can be frequency translated to a different IF frequency before band pass sampling. Band pass sampling requires a higher speed A/D converter than base band sampling, but only a single A/D.

[0053]One pair of A/D converters is provided for each LNB output. Alternatively, the LNB output can be band pass sampled using a single A/D converter. At a given point in time some LNB outputs may not be accessed by a user. If no transponder channel is selected from a particular LNB output, the A/D converters associated with that LNB output may be switched off to reduce power consumption and heat generation, or reallocated to process another LNB output.

[0054]The A/D digitizes the entire LNB output signal; therefore all transponder channels are available in the sampled data. More than one transponder channel may be selected from the A/D data to be combined in the composite signal. When all A/D are powered up any combination of transponder channels from any LNB output can be combined into the composite signal for distribution to the gateway and STBs.

[0055]FIG. 5 shows a frequency spectrum of the composite signal. Each of the available channels can be occupied with any transponder channel of any polarization from any LNB. One or more channels are used by each active IRD connected to the system. The number of transponder channels in the composite signal can be from as few as 2 to as many as 32, depending on the number of simultaneous channels needed in the system.

[0056]In general, the selecting and combining process will result in transponder channels located at different frequencies than where originally found. A translation table maps original channel locations on the selector input to new channel locations on the selector output. This map created and maintained by a controller located in the ODU or the gateway and is communicated to the IRDs or other devices in the network.

[0057]The channel selector performs a frequency selective filtering operation to select the desired transponder frequency. The transition band of this filter is steep, passing the selected transponder channel and rejecting adjacent transponder channels. The transition region available is derived from the guard band between channels. This can be as small a few Mega-Hertz. If the LNB carrier offset is large, a shift in the spectrum will result in the selecting filter cutting off part of the desired spectrum and passing part of an adjacent channel. For this reason a carrier offset estimate is desirable. Since all transponder channels from a given LNB will have approximately the same offset, it is only necessary to monitor one transponder channel from each LNB to determine the offset for all channels. Any of several know techniques for estimating the carrier offset may be employed. One example is two use two filters each approximately half the transponder bandwidth. By measuring the ratio of power from each filter output, an estimate of the carrier offset can be determined. Once the carrier offset is estimated, the sampled signal can be multiplied by a rotating phasor value to digitally shift the spectrum back to the nominal position. Alternatively, this frequency offset correction can be done in the analog domain, or a combination of digital and analog approaches.

[0058]Another approach to addressing the unknown carrier offset in the LNB is to use a wider filter to select transponder channels, wherein the bandwidth of the filter passes the selected transponder and part of the adjacent spectrum. In this way, if the transponder

signal is not centered in the filter bandwidth the band edges will not be attenuated by the filter roll off. This excess bandwidth will allow some energy from the neighboring transponder signals. A wider channel separation is needed on the combined signal, for example the selected transponders can be spaced twice the conventional spacing. This approach makes less efficient use of the cable spectrum but simplifies the hardware implementation by reducing the requirement of or eliminating the carrier offset correction. Additionally, a less steep filter roll off is possible.

[0059]FIG. 15 shows the signal spectrum as it is processed. Spectrum 1 is a representative original spectrum. Spectrum 2 shows the filter pass band characteristic, which is wider than one transponder channel. Spectrum 3 is the result of filtering one transponder channel. Spectrum 4 is a composite of several transponder channels. A region between the selected channels is unused. The exact shape of the unused spectrum will be dependent on the filter roll-off characteristics, but is not significant. The objective is to pass the selected transponder signal without distortion.

[0060]The approach of using a filter with excess bandwidth technique is also useful for implementing the invention using an analog approach. A filter with a stop band substantially wider than the transponder channel allow using filters with more gradual transition band, and is therefore simpler to implement. The excess bandwidth can range from less than 5% to 100% wider than the transponder bandwidth.

[0061]FIG. 6 shows a variation of the present invention that uses a cross point switch or shared bus 640 to distribute data from the A/Ds to the channel selecting filters. The cross point switch, also called crossbar switch, allows any signal input to be passed to any output. It can take the form of a data selector or multiplexer. Implemented as a shared bus, data sinks receive signals from data source using a time-multiplexed bus. Either a cross point switch or a shared bus can be unidirectional or bidirectional. The cross point principle applies to digital signals and analog signals. LNB outputs are quadrature down converted 620 and sampled by dual A/D converters 630. The parallel data is routed through cross point switch 640 so that any filter has access to any A/D data. Filter/selector 650 selects the desired transponder channel that is then up converted by quadrature modulator 660. All selected channels are combined in summer 670.

[0062]FIG. 7 shows a variation where the cross point switch 740 is located after the selecting filter 720. In this configuration the selecting filter 720 may also include a down sampler to reduce the bus traffic bandwidth in the cross point switch 740. Down sampling is possible because after selecting a single desired channel the bandwidth is narrower and fewer samples are needed to represent the signal. One or more selecting filters 720 may be connected to the output of each A/D, each filter 720 selecting one transponder channel.

[0063]FIG. 8 shows a configuration wherein each LNB has a dedicated selecting filter and up converter. The selecting filter may digitally select multiple channels from the broadband A/D data to drive the up converter and DAC.

[0064]FIG. 9 shows another alternative where analog tuners 930 select desired transponder channels that are up converted by up converter 940. All signals are combined by summer 950 to drive the signal cable 970 from the ODU. A multiport switch 920 allows any tuner to connect to any LNB output. The number of signal selecting paths comprising tuner 930 and up converter 940 is selected based on the maximum number of simultaneous users. A multiple-tuner personal video recorder would use more than one signal. Controller 960 receives channel select information either from the cable or a separate data channel such as infrared (IR) or wireless RF link or other source. Channel select information from the controller 960 programs the tuner 930 and up converter 940 LO. Channel select information can come to the controller over a wireless remote control signal or using signaling sent over the cable.

[0065]Up converters 940 can operate at a fixed LO frequency with one up converter 940 being assigned to each user connected on the cable. The various LO frequencies are unique. Alternatively, the down conversion process of each tuner 930 can be set to down convert directly to a predetermined IF frequency which is unique for each selected signal, thereby eliminating a separate up converter. A simplified IRD can be used with this approach wherein the IRD needs only tune to a single selectable IF frequency. The tuning range is narrower than a convention 500 MHz tuner and the channel selection is limited to as few as four choices compared to up to 16 or more in a convention IRD tuner.

[0066]FIG. 10 shows another alternative where signal selector 1010 selects a transponder channel. MPEG transport stream demultiplexer 1020 extracts a specific video program that is combined by data combiner 1030. Several MPEG streams are multiplexed as needed, and packets are formatted for transmission on a digital network. A digital LAN 1040 connects directly to the ODU. Channel information is communicated to the ODU through the LAN.

[0067]FIG. 11 shows another alternative used where new STBs are used with existing STBs. ODU 1110 supplies a signal to each of the connected cables according to the type of STB attached to the cable. Existing legacy STBs 1120 are supplied with an IF signal as in a conventional system, and the STBs 1120 will tune to a single transponder channel. New STBs 1140 will be supplied with a composite signal according to the present invention comprising all the transponder channels that are selected; the new STB 1140 will tune and decode the requested channel.

[0068]A new STB 1140 can be installed in place of an existing STB 1130 by simply connecting the new STB 1140 to the cable in place of the existing STB 1130. More than one new STB 1140 can be installed by using a signal splitter 1150 to provide a signal to multiple STBs. New STBs use a signaling system for selecting transponder channels that passes through the splitter to the ODU. Existing STBs will each have a dedicated connection to the ODU, as provided in the original installation. This is required because existing STBs use voltages or other control means to select LNB outputs that do not support multiple STBs on a single cable.

[0069]Also in FIG. 11, server/gateway 1160 receives the composite transponder signal, decodes specific programs, and distributes the program information in packetized MPEG over a digital local area network (LAN) 1170 to STBs 1180. Ethernet or other LAN technology is suitable for this function.

[0070]A new STB operating in accordance with the present invention is provided with a means of communication with the signal selector and combiner in the ODU. At power up or at periodic intervals the ODU or the STB initiates communication over the attached cable. This communication can be an in band or out of band signal. The ODU polls the STBs connected to determine if the STB is a conventional STB or new design STB. Because conventional STBs will not respond to the polling request, the absence of response is an indication of a conventional STB. A new STB will respond to the polling request and establish communication with the ODU.

[0071]The means of communication on the cable can be a TDMA frame structure with slots assigned to each STB, a frequency division multiplex (FDM) approach with unique frequencies assigned to each STB, or any other known technique for two-way communication by multiple devices over a signal channel. An extension of DiSEqC protocol commonly used for satellite dish control can be used for this communication. DiSEqC uses a gated 22 kHz carrier to communicate binary data and can be adapted for use to transfer data needed. The data rates are low for this communication path. Device configuration, channel mapping, and channel requests are among the types of data communicated between the ODU and STB.

[0072]Referring to FIG. 12, signal selector and combiner 1220 taps the signals output from each LNB to provide the transponder selection function. Switch 1220 is under control of the signal selector and combiner 1210. Switch 1220 will be actuated to supply either a conventional signal from multiport switch 1260 or the composite transponder signal from signal selector and combiner 1210. Switch 1220 can be a solid-state device or electromechanical relay.

[0073]Referring to FIG. 16, another application of the present invention is to provide selected transponder signals along with other services transmitted on the same cable wiring. The selected transponder signals can be transmitted in unoccupied regions of the cable, such as above, below, or between broadband satellite signals. The number of transponder channels transmitted can be adapted to the available spectrum. In one example, 950 MHz to 1450 MHz is used by one conventional LNB output signal; 1550 MHz to 2050 MHz is used by another conventional LNB output, leaving 1450 MHz to 1550 MHz available. One or more selected transponder channels from any LNB can be inserted into this region. Suitable guard bands need to be provided to prevent interference, for example 3 transponder channels at 31.25 MHz spacing uses 93.75 MHz. Another example of this application is to combine a standard CATV signal occupying 50 to 750 MHz with selected satellite transponder channels that are combined and transmitted at frequencies above the CATV band.

[0074]Using the present invention, any number of transponder channels can be selected and combined. Conventional IRD tuners are designed to tune channels anywhere in a 500 MHz or 1000 MHz range, requiring a wide tuning range for the front-end filter and LO. In an application where few channels are needed, the tuner range can be narrower, thus simplifying the design and lower cost. For example, a residential installation may typically have four television sets, some tuning only one channel at a time; others tune two channels in the case of picture in picture (PIP) or personal video recorder (PVR). This application would require 4 to 8 channels be distributed in the house simultaneously. A tuner would be required to tune over a 125 MHz to 250 MHz range.

[0075]Several variations in architecture are possible using the present invention. At each stage in the signal path, alternatives are available for implementation. Specific functions can be implemented in the analog domain or digital domain. Dedicated resources can be provided for each possible connection, or a pool of resources can be used. Dedicated resources insure that the peak demand can be satisfied unconditionally, but leads to unused capacity. Pooling enables a trunking efficiency to be realized and exploits statistical properties of usage to address most requirements.

[0076]A pool of A/D converters that can accept a signal from any LNB output through an RF crossbar switch. The number of simultaneous LNB signals that can be processed is limited to the number of A/D converters provided. Alternatively, dedicated A/D converters, one connected to each LNB output allows all LNBs to be processed if needed.

[0077]A pool of filter/selectors connected to a common bus, the pool size dictating the number of simultaneous transponder channels that can be selected. Alternatively, a predetermined number of filters can be attached to each A/D converter.

[0078]The filters/selectors can be grouped with each LNB or can be a common resource available to process any signal from any LNB. This choice trades off circuit complexity of implementing more filters with circuit complexity of routing LNB outputs through a crossbar switch.

[0079]Each of the operations of mixing, filtering, and combining can be done as an analog operation or digital operation.

[0080]Partitioning of functions can take a number of forms. The circuitry can be implemented

in a monolithic integrated circuit (IC), a hybrid, discrete components, or a combination of technologies.

[0081]Another application of the present invention is to simplify upgrades to an existing system. A dual tuner STB that enables viewing and recording of two different channels requires two input cables to allow any combination of LNB signals to be received. A single cable input would be limited to viewing and recording two channels from the same LNB output. When the upgrade is performed, the installation of an additional cable is difficult. By selecting and combining the desired channels at the ODU a single cable can be used to transmit all channels. A re-map of channel locations occurs. A conventional dual tuner STB can be used with this approach by providing a splitter at the input to the STB that supplies the composite signal to both cable inputs. A software upgrade to the STB may be needed to support the channel re-mapping.

[0082]Other implementations for signal processing include: No cross point switch, digitize, digital filter select, frequency translate, RF combine; cross point switch, analog tuner select, frequency translate, RF combine; digitize, digital filter select, digital network combine; digitize, digital filter select, decode, MPEG stream over a network; digitize, digital filter select, decode, MPEG to analog, restack channels, RF combine. One skilled in the art will recognize that many variations are possible to implement the present invention of selecting signals and combining onto a signal cable.

[0083]Another property of the present invention is that the process of digitizing, selecting, and combining is modulation independent. Either a digital or analog selecting and combining approach can be designed to process any form of phase/amplitude modulation. Although the dominant modulation type in direct broadcast satellite systems is QPSK, alternatively BPSK, 8-PSK or multi-level QAM and PSK signals can be distributed in the same way.

ENGLISH-CLAIMS:
Return to Top of Patent

What is claimed is:

1. A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising: a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals from at least one broadband LNB signal based on the transponder select information;a frequency translator coupled to the signal selector that is capable of shifting the selected transponder signals to new carrier frequencies to produce RF signals; anda signal combiner coupled to at least one frequency translator capable of combining at least two RF signals to produce a composite signal;wherein the modulation of the composite signal is the same as the modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable;whereby the composite signal is transmitted to the IRD.

2. The signal distribution system of claim 1 further comprising a plurality of IRDs and wherein the composite signal is transmitted on a single cable connected to the ODU and all IRDs receive channels extracted from the composite signal.

3. The signal distribution system of claim 1 wherein the signal selector comprises an analog to digital converter and a digital filter.

4. The signal distribution system of claim 1 wherein the signal selector comprises a tuner.

5. The signal distribution system of claim 1 further comprising an integrated receiver decoder (IRD) connected to the coaxial cable with a plurality of tuners within the IRD, wherein each tuner within the IRD receives the composite signal and each tuner uses at least one transponder signal.

6. The signal distribution system of claim 1 wherein transponder select information is transmitted over the same cable as the composite signal.

7. The signal distribution system of claim 1 wherein transponder select information is transmitted over a wireless link.

8. A signal distribution system for distributing signals comprising a plurality of channels from a plurality of sources between a first unit and a second unit over a communication medium comprising: means in the first unit responsive to information transmitted by the second unit for extracting selected channels from each of the plurality of sources and combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; andmeans in the second unit for receiving the composite signal and demodulating and decoding at least one channel; andmeans in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

9. The signal distribution system of claim 8 wherein the control information comprises channel selection requests originating from the second unit and the control information comprises channel mapping information originating from the first unit.

10. The signal distribution system of claim 8, further comprising a means in the first unit for carrier offset correction.

11. The signal distribution system of claim 8 wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.

12. The signal distribution system of claim 11 wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.

13. The signal distribution system of claim 12 wherein the means for communicating uses the same communication medium as the composite signal.

14. A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of: communicating a transponder request signal to the ODU from the IRD;in the ODU, selecting a plurality of transponder signals extracted from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals;combining selected transponder signals into a composite signal;transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

15. The method of claim 14 wherein the step of selecting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal.

16. The method of claim 14 wherein the step of combining comprises frequency translating the selected transponder channels to a variable frequency before combining.

17. The method of claim 15 further comprising frequency translating the selected

transponder channels to a predetermined frequency before combining.

18. The method of claim 14 further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.

19. The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD and all IRDs receive the same composite signal.

20. The method of claim 14 wherein the transponder request signal is transmitted over a wireless link to the ODU.

21. The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining; andsplitting the composite signal inside a home and distributing to a plurality of IRDs.

22. The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.

23. The method of claim 21 wherein the transponder request signal is transmitted over a wireless link to the ODU.

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California Inventors Develop Broadband Content Distribution Signal Combiner US Fed News November 7, 2006 Tuesday 5:59 AM EST

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US Fed News

November 7, 2006 Tuesday 5:59 AM EST

LENGTH: 243 words

HEADLINE: California Inventors Develop Broadband Content Distribution Signal Combiner

BYLINE: US Fed News

DATELINE: Alexandria, Va.

BODY:

ALEXANDRIA, Va., Nov. 7 -- Itzhak Gurantz and Michael Landry, both of San Diego, and Ladd El Wardani of La Jolla, Calif., have developed a signal selector and combiner for broadband content distribution.

According to the U.S. Patent & Trademark Office: "In a satellite receiving system, program channels are selected from one or more broadband signals and combined with other selected channels and transmitted from a first unit, for example an outdoor unit, to a second unit, for example a gateway, server, or set-top box, using a single cable. Channels can be selected by digitizing the broadband signal then digitally filtering to isolate the desired channels. The outputs of several low noise amplifier and block converters can be selected and combined into one signal. Multiple set-top boxes can receive independent signals over a single cable from the outdoor unit."

The inventors were issued U.S. Patent No. **7,130,576** on Oct. 31.

The patent has been assigned to Entropic Communications Inc., San Diego.

The original application was filed on Nov. 6, 2002, and is available at:

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=**7,130,576.**PN.&OS=PN/**7,130,576**&RS=PN/**7,130,576**.

For more information about US Fed News federal patent awards please contact: Myron Struck, Managing Editor/US Bureau, US Fed News, Direct: 703/866-4708, Cell: 703/304-1897, Myron@targetednews.com.

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JUVENILE PROSTITUTION DIFFICULT TO FIGHT;SEX RING LEADER SENTENCED, BUT PLAGUE NOT ERASED Saint Paul Pioneer Press (Minnesota) July 14, 2000 Friday

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July 14, 2000 Friday

SECTION: LOCAL; Pg. 1B

LENGTH: 828 words

HEADLINE: JUVENILE PROSTITUTION DIFFICULT TO FIGHT;
SEX RING LEADER SENTENCED, BUT PLAGUE NOT ERASED

BYLINE: Ruben Rosario Staff Columnist

BODY:
The guilty verdicts had just been read.

After 20 years of brazenly exporting mostly juvenile Minnesota and Wisconsin runaway girls like indentured sex slaves to 24 states and across the Canadian border, the gig was finally up for six members of "The Family."

LeVorn Evans, one of six Twin Cities men most responsible for running the largest juvenile prostitution ring ever prosecuted by the federal government, turned to his chief adversary seated at the prosecutor's table.

"Hey, Joe," Evans said.

Detective Sgt. Joe Delia of the Maryland Heights, Mo., Police Department looked his way. It was Delia, with the help of Minneapolis Police Sgt. Andrew Schmidt, who built the case and persuaded federal officials in St. Louis to prosecute it after two juvenile prostitutes from Minnesota were pulled over July 7, 1997, on a routine traffic stop in Maryland Heights.

"Yeah, Vern," the cop replied, using the convicted man's nickname.

"You brought the big man down," Evans said. "You brought the big man down. You partying tonight? I would if I had won."

Evans' pimping and partying days of $10,000 fur coats and luxury cars have been put on ice. The man whom authorities called the ring's leader was sentenced Thursday to 45 years in prison, a little more than three years after the case began.

Most folks think this kind of depraved child exploitation doesn't happen here. If it does, then it's because these girls, probably poor, promiscuous, minority and from the inner city,

willingly went along for the sex, the money or both. These are not our kids, they say. They're someone else's.

The Evans case proved them wrong. A good number of the girls who testified came from either the suburbs or small towns. Some were from good, middle-class families. Most were white. Many ran away from abuse, lack of love or other troubles at home only to find worse. Sometimes, we are the pimp's greatest allies without realizing it.

The Evans case provided a blueprint for how law enforcement at the local and federal level can team up and put a serious hurting on interstate pimps. The question we should now ask is: Will Minnesota take the very real problem of juvenile prostitution seriously enough to make it a top crime priority?

Prosecuting pimps has rarely been a top policy concern with local or federal law enforcement, as it also generally isn't in most areas of the country.

"I think the citizenry is largely ignorant about the problem because it is painful to recognize what is happening to our children," said Suzanne Peterson, policy coordinator for Family and Children's Services, a local nonprofit organization that runs a counseling program for juvenile and adult prostitutes.

"The Evans case has had a tremendous impact in Minnesota because it prevents us from denying that this doesn't exist."

The Legislature this year set aside $150,000 to train cops and prosecutors statewide about the juvenile prostitution problem. It also earmarked $3 million to finance desperately needed emergency housing for prostituted juveniles and at-risk runaways. It also increased felony prison terms of up to 20 years for those who prostitute minors 18 and under. But any law is only as good as its enforcement.

Delia believes a statewide task force with local and federal prosecutorial teeth is what Minnesota needs.

"We have task forces for gangs and for drugs and we find all kinds of money and resources for child pornography and other crimes on the Internet," says Delia. "I'm not saying that isn't good, but what about these girls, who have been abused and denigrated every which way imaginable? As much as the kid on the Internet, these are children, too."

The juvenile meat market continues to thrive. A runaway girl from a rock-solid family in Brainerd, Minn., was recently reunited with her parents after a local pimp took her to Florida.

Schmidt, a former vice cop reassigned to Minneapolis' Organized Crime Task Force, encountered a 15-year-old girl working the streets of south Minneapolis a few weeks ago. The man accused of working as her pimp is a teen-age nephew of LeVorn Evans.

"It's still out there," Schmidt says.

The sentences
Fifteen members of a Minneapolis-based prostitution ring known as "The Family" were convicted after being indicted in 1999.

The ring operated mostly as a mobile service supplying girls and young women at hotels and motels. Most of the 50 women and girls identified in the investigation were recruited in Minneapolis.

Sentences of key members convicted during trial in St. Louis:

LeVorn Evans, 52, 45 years

Derry Evans, 28, 85 years

Monroe Evans, 50, 33 years

Terrence Roberts, 28, 36 years

Clem Evans, 54, 20 years

Johnny Lee Evans, 45, a sixth key defendant, will be sentenced next week.

Nine other members of the ring earlier pleaded guilty before the trial and have been sentenced.

Ruben Rosario can be reached at rrosario@pioneerpress.com or (651) 228-5454.

NOTES: See related story: Sex ring's leader gets 45 years on Page 3B.

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Business in Brief Sarasota Herald-Tribune (Florida) July 13, 2000, Thursday,

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July 13, 2000, Thursday, ENGLEWOOD EDITION

SECTION: MAIN STREET ENGLEWOOD, Pg. 17

LENGTH: 306 words

HEADLINE: Business in Brief

BODY:
Network at Noon

The next Englewood Area Chamber of Commerce "Network at Noon" will be July 20 at the Lock and Key Restaurant, 2045 N. Beach Road on Manasota Key.

Chamber members can meet to help each other build their businesses through information sharing, exchanging business cards and discussing current events affecting local business.

The guest speaker is Marilyn Schott with "30 Second Commercials." The luncheon is scheduled to start at 11:30 a.m.

Cost is $ 8 per person and reservations are required.

For more information or to make a reservation, call Network chairman John Maurer, 474-3059, or contact the chamber at 474-5511.

Tips for small business growth

The Manasota Chapter of SCORE, the Service Corps of Retired Executives, is hosting a workshop on "How to Make Your Small Business Grow," in Venice on July 29.

The workshop is part of a series of small business development forums SCORE is hosting in Sarasota and Venice. Registration is $ 25 per person, which includes seminar materials, counseling before and after the workshop.

The event is scheduled for 9:30 a.m. to 12:40 p.m. at the Venice Public Library, 300 S. Nokomis Ave.

To register or for more information about SCORE workshops, call 941-955- 1029, fax 955-5581 or e-mail to score116@gte.net

Retired service corps hopes to diversify staff

The Manasota Chapter of SCORE, the Service Corps of Retired Executives, is looking for more women and minority volunteers to participate in its business counseling programs.

In conjunction with the Small Business Administration, SCORE offers free counseling to current and prospective small business owners or people working in a business field from Englewood to Bradenton.

To volunteer or inquire about counseling, call the SCORE office at 955-1029 or e-mail score@116gte.net.

GRAPHIC: PHOTO (C;

In late June, Tom Moore and Cherie Selman opened Clothes Horse Tropical Imports at 443 W. Dearborn Street. The shop imports home accessories, clothing and gift items from Malaysia, Indonesia, and Java.;

The couple operated Tropical Imports in the Gulf Gate area of Sarasota for more than a year, but they decided to relocate the shop to Englewood to be closer to their two Clothes Horse Consignment shops on Indiana Avenue and Placida Road.;

Tropical Imports offers wood-carved figures, mirrors, and women's apparel at wholesale prices.;

Along with the import shop, Moore also opened the Tom Moore Salon, a hair styling boutique at the Dearborn Street shop. Moore has been a hair stylist in Englewood for 18 years.;

Staff Photo/Rodney Crouther

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Source: Command Searching > **News, All (English, Full Text)**
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NO HEADLINE Pittsburgh Post-Gazette (Pennsylvania) July 12, 2000, Wednesday,

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Pittsburgh Post-Gazette (Pennsylvania)

July 12, 2000, Wednesday, WEST EDITION

SECTION: SPORTS, Pg. W-10, LOOKING BACK

LENGTH: 94 words

HEADLINE: NO HEADLINE

BODY:
(Past sports highlights in the PG West area, July 12-18)

10 YEARS AGO

July 16, 1990 -- Moon American Legion pitcher Tom Morrow raised his record to 9-0, scattering six hits in a 7-1 win over Crafton-Ingram-Thornburg.

July 16, 1990 -- Langley graduate Jeff Bachner hit two home runs, pacing West Pittsburgh to a 4-1 win over Mt. Lebanon in Federation League semipro baseball play. 15 YEARS AGO

July 16, 1985 -- Tim Bruzdewicz struck out 18 batters in a seven-inning American Legion baseball game, leading West Allegheny to a 6-0 win over Brookline.

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Workstation and PLC are combined in one unit.; programmable logic controllers; Nematron ULTRA CIM; product announcement I&CS (Instrumentation & Control Systems) March 1, 1989

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I&CS (Instrumentation & Control Systems)

March 1, 1989

SECTION: Pg. p78(1) Vol. V62 No. N3 ISSN: 0746-2395

ACC-NO: 7130576

LENGTH: 992 words

HEADLINE: Workstation and PLC are combined in one unit.; programmable logic controllers; Nematron ULTRA CIM; product announcement

BYLINE: Hall, John

BODY:

ABSTRACT

Officials of Nematron announce the ULTRA CIM, a system that combinesProgrammable Logic Controller (PLC) control functions with an industrial computer and operator interface. The system is not a true PLC replacement device, but is to be used in applications where PLC functions are not the primary factor. The ULTRA CIM is based on 80286-80386 microprocessors, the IBM PC-AT bus architecture and a multitasking DOS shell. A major component of the system is its common data base and memory for all functions. The ULTRA CIM is available in a number of configurations. The smallest configuration is an 80286-based model that uses a PLC-emulating coprocessor and operator interface; it costs approximately $12,900.

Workstation and PLC are combined in one unit The Nematron ULTRA CIM combines PLC control functions with an industrial computer and operator interface in one unit that integrates control, communications, information processing, and operator interface.

The ULTRA CIM is targeted for applications requiring data collection and management, process control, man/machine interface, graphic displays, and small amounts of PLC logic control. It is not intended as a true PLC replacement device, but as a better solution when PLC requirements are not the driving

factor.

Based on 80286/80386 microprocessors, the IBM PC/AT bus architecture, and a multitasking DOS shell, it uses plug-in cards for scanning traditional PLC remote I/O, and makes use of independent coprocessorsfor PLC ladder-logic functions. As an alternative, PLC-emulating software can be run on the host processor.

The system consists of a PC/AT-compatible industrial computer withadditional hardware for performing PLC functions. Models are also available with built-in displays and keyboards. The unit can communicate with remote PLC I/O using scanner cards from Allen-Bradley, Modicon, Digitronics Sixnet or GE Fanuc Automation's GEnius I/O. It can also work with such remote I/O processors as Transition Technology's TransPort I/O or Opto-22's OptoMUX I/O, communicating with them via a serial port.

Vital to the machine is a common data base and memory for all functions. The PLC I/O data base can be linked with programs running on the industrial computer, using the system's common data bus for communication.

All data used or generated in an ULTRA CIM application will, at the user's option, be quickly and easily available to any ULTRA CIM function without the need for external/internal communications or additional programming. This allows one unit to perform tasks that would otherwise be done by combining several devices. For example, ladder logic, ASCII/BASIC communications, nonladder logic control such as PIDand motion control, and traditional computer functions including MIS, SPC/SQC, can all be done in the one machine.

Hardware features include a 40M byte hard disk, 80286/386 CPU, CGA/EGA or VGA display, a printer port, two isolated communications ports, a multitasking operating system, process control software for loopcontrol, data base management, statistical process control, graphics, a man-machine interface, and full documentation.

The system will be available in several configurations. Smallest is an 80286-based model that uses a PLC-emulating coprocessor and operator interface. This unit can handle up to 2048 I/O, scans in 3-5 ms, and has 1M byte of RAM for the host and 8K for the coprocessor. It will sell for about $12,900. A similar unit, with an 80386 CPU, 20MHz clock, 1M byte of host RAM and 8K of coprocessor RAM, will sell for about $13,950.

An alternate configuration uses PLC-emulating host software, an I/O scanner that plugs into the PC bus, and an operator interface. Thismodel handles 1024 I/O, scans in 5-10 ms, and has 1M byte of RAM. It will sell for about $13,850. An 80386-based version, with up to 16M bytes of RAM, will be priced starting at $14,900.

The units allow the use of canned and bundled industrial control software to supplement ladder-logic functions. The software can be used for analog control; acquisition, storage, and analysis of production data; and remote communications and networking. Software for the man-machine interface could include such packages as ScreenWare2 fromComputer Technology Corp.--Nematron, Ann Arbor, MI, (313) 994-0501.

BOOTH 730

The ATCOM 64 real-time controller provides 64 digital I/O, four analog inputs, and four analog outputs, each with 12-bit resolution. This analog capability, a high-level language, and comprehensive instructions set provide P, PI, and PID functions for control. Up to fourloops can be handled simultaneously, and the digital I/O provides upto 64 unique alarm conditions. The micro-programmable controller isthe first to combine single loop control with digital control.--Automatic Timing and Controls Co., Inc., King of Prussia, PA.

BOOTH 754

Intelligent, independent modules make true distributed control a reality. The SYNERGY system puts independent, real-time, multitaskingpower at each critical machine or operation point. It is composed of Intel's BITBUS, FORTH's programming language, and a fully integrated programming environment. Each module can access the host computer's storage, console, printer, and so on. Their use can improve efficiency, reduce costs, and increase productivity.--Encoder Products Co.,Sandpoint, ID 83864.

BOOTH 830

A new operator interface technology is changing operator workstation construction. The ACCESS4000 eliminates hardwiring with a single coaxial cable and saves up to 50-70% of workstation costs. Also displayed: ScreenWare2, a PC-based operator's interface software package used to monitor/control machine or process operations; and IPS2000, a modular, microprocessor-based system that provides standard, cost-effective alternative to custom hardwired panels.--Computer Technology Corp., Milford, OH 45150.

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illustration

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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24244 7590 06/16/2008

MICHAEL W LANDRY
5098 SEACHASE STREET
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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

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SAN DIEGO, CA 92130

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/008,389*.

PATENT NO. *7130576*.

ART UNIT *3992*.

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

PTOL-465 (Rev.07-04)

Office Action in Ex Parte Reexamination	Control No. 90/008,389	Patent Under Reexamination 7130576	
	Examiner Fred Ferris	Art Unit 3992	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

a☒ Responsive to the communication(s) filed on *23 May 2007*. b☐ This action is made FINAL.
c☐ A statement under 37 CFR 1.530 has not been received from the patent owner.

A shortened statutory period for response to this action is set to expire 2 month(s) from the mailing date of this letter. Failure to respond within the period for response will result in termination of the proceeding and issuance of an *ex parte* reexamination certificate in accordance with this action. 37 CFR 1.550(d). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).** If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☐ Notice of References Cited by Examiner, PTO-892.
2. ☐ Information Disclosure Statement, PTO/SB/08.
3. ☐ Interview Summary, PTO-474.
4. ☐ _____.

Part II SUMMARY OF ACTION

1a. ☒ Claims *1-23* are subject to reexamination.
1b. ☐ Claims _____ are not subject to reexamination.
2. ☐ Claims _____ have been canceled in the present reexamination proceeding.
3. ☐ Claims _____ are patentable and/or confirmed.
4. ☒ Claims *1-23* are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ The drawings, filed on _____ are acceptable.
7. ☐ The proposed drawing correction, filed on _____ has been (7a)☐ approved (7b)☐ disapproved.
8. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).
   a)☐ All b)☐ Some* c)☐ None of the certified copies have
   1☐ been received.
   2☐ not been received.
   3☐ been filed in Application No. _____.
   4☐ been filed in reexamination Control No. _____.
   5☐ been received by the International Bureau in PCT application No. _____.
   * See the attached detailed Office action for a list of the certified copies not received.
9. ☐ Since the proceeding appears to be in condition for issuance of an *ex parte* reexamination certificate except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte* Quayle, 1935 C.D. 11, 453 O.G. 213.
10. ☐ Other: _____

cc: Requester (if third party requester)

DETAILED ACTION

I. Summary

This Office Action addresses the claims for which reexamination has been requested and a substantial new question of patentability has been determined to exist. Specifically, claims 1-23 of U.S. 7,130,576 issued to Gurantz et al. Claims 1-23 now stand rejected in view of newly disclosed prior art.

II. Notice Regarding Certain Reexamination Issues

The patent owner is reminded of the continuing responsibility under 37 CFR 1.565(a), to apprise the Office of any litigation activity, or other prior or concurrent proceeding, involving Patent No. 7,130,576 throughout the course of this reexamination proceeding. See MPEP §§ 2207, 2282 and 2286.

Extensions of time under 37 CFR 1.136(a) will not be permitted in these proceedings because the provisions of 37 CFR 1.136 apply only to "a Patent Applicant" and not to parties in a reexamination proceeding. Additionally, 35 U.S.C. 305 requires that reexamination proceedings "will be conducted with special dispatch" (37 CFR 1.550(a)). Extension of time in *ex parte* reexamination proceedings are provided for in 37 CFR 1.550(c).

Where the IDS citations are submitted but not described, the examiner is only responsible for cursorily reviewing the references. MPEP 2256 recites the following: "Where patents, publications, and other such items of information are submitted by a party (patent owner or requester) in compliance with the requirements of the rules, the requisite degree of consideration to be given to such information will be normally limited by the degree to which the party filing the information citation has explained the content and relevance of the information.

The initials of the examiner placed adjacent to the citations on the form PTO /SB /08A and 08B or its equivalent, without an indication to the contrary in the record, do not signify that the information has been considered by the examiner any further than to the extent noted above."

Accordingly, the IDS submissions have been considered by the Examiner only with the scope required by MPEP 2256.

III. References Cited in the Request

"INFORMATION FOR INSTALLERS OF HOT BIRD TM DVB-S SYSTEMS, VERSION 1.0" (hereinafter "Eutelsat Installers Guide"), EUTELSAT, dated June 7, 1999;

"DIGITAL SATELLITE EQUIPMENT CONTROL (DiSEqC TM) UPDATE AND RECOMMENDATIONS FOR IMPLEMENTATION, VERSION 2.0" (hereinafter "Eutelsat DiSEqC Specification"), EUTELSAT, dated April 18, 1997;

United States Patent No. 6,437,837 to Seo (hereinafter "Seo");

United States Patent No. 5,073,390 to Green et al. (hereinafter "Green");

United States Patent No. 6,005,861 to Humplemann (hereinafter "Humplemann");

"A SINGLE CHIP UNIVERSAL DIGITAL SATELLITE RECEIVER WITH 480-Mhz IF INPUT" (hereinafter the "Broadcom Paper");

"PHILLIPS DATA SHEET FOR UAA3202M FREQUENCY SHIFT KEYING RECEIVER", (hereinafter the "Phillips Data Sheet");

United States Patent No. 5,654,774 to Pugel et al. (hereinafter "Pugel");

United States Patent No. 4,953184 to Simone (hereinafter "Simone");

European Patent No. 1009113 (hereinafter "EPO '113 Patent");

European Patent No. 0757489 (hereinafter "EPO '489 Patent");

United States Patent No. 5,285,284 to Takashima et al. (hereinafter "Takashima");

United States Patent No. 6,353,463 to Seo (hereinafter "Seo")

"RCA DIR CTTV RECEIVER WITH ULTIMATETV SERVICE SETUP GUIDE (hereinafter the "RCA Setup Guide");

United States Patent No. 5,278,837 to Kelley (hereinafter "Kelley").

IV. Background and Overview

The '576 patent is drawn to a method and system for a satellite receiving system where program channels are selected from one or more broadband signals, and combined with other selected channels and transmitted from a first unit, for example an outdoor unit, to a second unit, for example a gateway, server, or set-top box, using a single cable. Channels can be selected by digitizing the broadband signal then digitally filtering to isolate the desired channels. The outputs of several LNBs can be selected and combined into one signal. Multiple set-top boxes can receive independent signals over a single cable from the outdoor unit.

During prosecution of the '576 patent, the examiner ultimately passed the case to allowance responsive to patent owners arguments that the claimed invention "include[s] the limitation of transponder selection responsive to a signal transmitted by an IRD." And that in the claimed "invention, a single cable can run from the selector and combiner, which can be in the ODU, to the inside of the building. The signal is split inside the building using a gateway or splitter device to distribute a composite signal to IRDs. The IRD commands to the selector requests individual transponder signals from satellite signals output by any one of the LNBs. The signal selector selects the transponder signals requested from each IRD, combines all of the selected transponder signals into a composite signal, then transits the composite signal, sent preferably

over a single cable, and tunes its requested transponder signal for decoding and display on a television connected to the IRD. The composite signal changes based on collection of transponder select signals from each IRD .... [W]hereas in the applicant's invention and claim, the frequency translator operates on the signal output from the LNB[.]" (See: Amendment arguments 7/10/2006) Against this backdrop the examiner submits that these features are disclosed in newly cited prior art as set forth in the rejections appearing below.

V. Claim Rejections – Relevant Statutes

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

VI. Detailed Analysis

The requester in the reexamination of the '576 Patent has proposed multiple rejections of the claims that were requested for reexamination as set forth in the Claim Charts. While the

examiner generally concurs that the references all "read on" the claims requested for rexamination, the teachings appear to be cumulative of the prior art teachings set forth in the rejections appearing below. In the interest of simplifying issues in the case only selected references have been used in the examiners' rejection.

1. Claims 1, 6, 8, 9, 11-14, 16, 18, 19, 21 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by the Eutelsat Installers Guide.

The Eutelsat Installer's Guide discloses every element of claim 1 of the '576 patent as follows:

a. A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising

The Eutelsat Installer's Guide discloses a signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD). Figure 11 (page 20) is a diagram illustrating an example architecture for an RF distribution system including a satellite antenna having a low noise amplifier and block converter (LNB) that sends signals to a satellite receiver (i.e., a set top box or IRD). The LNB is illustrated as a Quad LNB with four output lines to accommodate each of the four band/polarization LNB signals.

For confirmation that the illustrated satellite receiver is an IRD as recited in the claims, the Eutelsat Installer's Guide refers to the satellite receiver as an IRD (integrated receiver decoder) in the description of Figure 11 at page 20, and again at page 27.

Note: Figure 11 reproduced below demonstrates similar architecture to Figure 8 with the addition of a signaling capability between the IRD and the upstream equipment for remote channel selection.

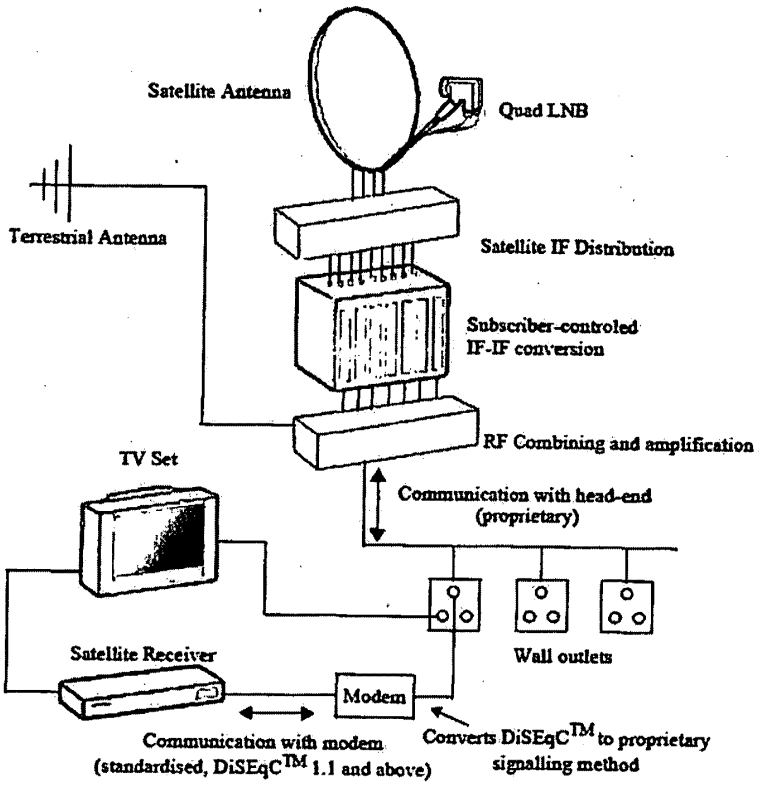


Figure 11 : Architecture of a System with a Remote Controlled Head-End

b. a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals

The Eutelsat Installers Guide teaches a signal selector that receives a plurality of broadband LNB signals and selects one or more transponder channels. For example, at Figure 11, the Eutelsat Installers Guide teaches a Satellite IF Distribution unit and subscriber-controlled IF-IF

converters configured to receive the broadband LNB outputs. The Eutelsat Installers Guide further discloses that the satellite transmissions received by the various receive architectures comprise two frequency bands and two polarizations. See, page 26, second and third paragraphs. These broadband signals each have a plurality of transponders signals. To illustrate this, the Eutelsat Installers Guide shows the satellite transmission bands in Figure 7 (reproduced below). As this figure illustrates, the satellite spectrum is comprised of four broadband signals each having a plurality of transponder signals (the polygons). Each element of the quad LNB receives the satellite transmission and outputs its respective broadband LNB signal. The LNB also amplifies the signal and converts the satellite RF (10.7 to 12.75 GHz in this case) to an intermediate frequency, or IF (hence the name, low noise amplifier and block converter). Note that Figure 7 does not show this RF to IF conversion performed by the LNBs. However, RF to IF conversion is not part of the claims, and is nonetheless well known as part of satellite receiver systems. As evidence of this, see the Background Section of the '576 patent, which, in discussing the "Prior Art" Figure 1, describes the RF to IF conversion performed by the LNBs.

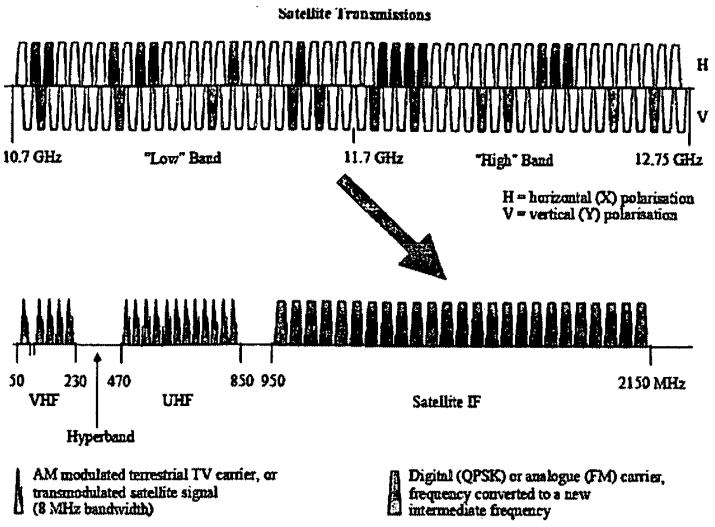


Figure 7 : Broadband Signal Spectrum for an IF-IF Distribution Network

Note that Figure 7 describes IF to IF conversion. Figure 7 is described with reference to Figure 8, which is for channelized IF-IF conversion, rather than for subscriber controlled IF-IF conversion. However, the Eutelsat Installers Guide at page 19, last paragraph, states that the architecture shown in Figure 11 is "similar to that shown in Figure 8 ... except that there must be communication ... so that remote channel selection can be carried out." Therefore, as the only stated difference is that of the remote channel selection, the architecture of Figure 11 is configured to receive the same broadband signals as the architecture of Figure 8.

c. the signal selector is responsive to transponder select information transmitted by an IRD

The Eutelsat Installers Guide discloses that the signal selector is responsive to transponder select information transmitted by an IRD. Particularly, Figure 11 of the Eutelsat Installers Guide illustrates a Satellite Receiver (IRD) that communicates with the head-end (Outdoor Unit) for

channel selection. This is illustrated in Figure 11 by the DiSEqC communications. Additionally, the Eutelsat Installers Guide at page 19 specifies that there is communication between the terminal (IRD) and the head-end (signal selector) "so that remote channel selection can be carried out." (Page 19, last sentence (emphasis added). Additionally, Section 3.5.1.c of the Eutelsat Installers Guide (page 27) describes one signaling protocol that can be used to communicate information from the IRD to the signal selector. The Eutelsat Installers Guide reference refers to the standardized DiSEqC protocol6 that is used to provide selection information to the outdoor unit. At page 27, the Eutelsat Installers Guide states that the "DiSEqC TM system uses the satellite receiver (IRD) as a single master terminal controlling a number of remote devices such as LNBs." The Eutelsat Installers Guide further states that DiSEqC "allows for the switching and control of compatible units such as LNBs, switches and positioners..." *Id.* at 27.

d. and selects a plurality of transponder signals from at least one broadband LNB signal based on the transponder select information;

As stated above, Figure 11 illustrates a receive architecture that allows remote channel selection. As stated above, page 19 of the Eutelsat Installers Guide, specifies that there is communication between the terminal (IRD) and the head-end (selector) "so that remote channel selection can be carried out." Id., at page 19, last sentence. Additionally, the second-to-last paragraph on page 19 states that the user's terminal (IRD) can remotely tune to a channel by controlling an IF-IF converter.

Thus, the Eutelsat Installers Guide teaches that the Subscriber-controlled IF-IF conversion unit (signal selector) selects the appropriate transponder signal(s) from the selected LNB band, based on a DiSEqC command from the IRD.

e. a frequency translator coupled to the signal selector that is capable of shifting the selected transponder signals to new carrier frequencies to produce RF signals;

Figure 11 (above) of the Eutelsat Installers Guide illustrates a Subscriber controlled IF-IF conversion box. As the name suggests, the IF-IF converters convert, or frequency translate, an incoming IF signal at one carrier frequency to an IF signal at another carrier frequency. This IF-IF conversion takes the selected transponder signals (Channels) at the received IF frequency, and converts them to a different IF frequency for placement in a composite signal and distribution to the set top box (IRD).

Additionally, Section 3.4.1.c at page 15 states that the IF-to-IF conversion systems rebuild the satellite IF spectrum so that it is suitable for distribution via a single cable. In other words, the selected transponder signals arrive from the LNBs at a given IF center frequency and are relocated to a new IF center frequency for placement on the composite signal. Although 3.4.1 .c is for channelized IF-to-IF conversion, the IF-IF conversion in Figure 11 operates the same, except that it is remote controlled (See, page 19, last paragraph).

Figure 7 (above) provides an example of frequency translation wherein selected transponder signals (the individually shaded polygons) are translated from their original broadband frequencies to the new IF carrier frequencies suitable for placement in a composite signal.

The Eutelsat Installers Guide also teaches the signal combiner as recited in Claim 1. Particularly, at Figure 11, the Eutelsat Installers Guide discloses an RF Combining and Amplification unit

that accepts multiple RF signals from the Subscriber-controlled IF-IF conversion, and combines them into a single composite output signal.

g. wherein the modulation of the composite signal is the same as the modulation of the broadband LNB signals;

The Eutelsat Installers Guide teaches this element of claim 1. Particularly, the Eutelsat Installers Guide discloses architectures that receive QPSK modulated signals, perform the IF-IF frequency translation and provide QPSK signals. Support for this can also be found at Figure 7, which illustrates QPSK signals from the satellite transmission, and selected QPSK transponder signals combined on the composite signal.

h. and wherein the composite signal is transmitted on the coaxial cable;

The Eutelsat Installers Guide teaches that the composite signal is transmitted on the coaxial cable. At Figure 11, the Eutelsat Installers Guide shows the composite signal routed to the IRDs via a signal path. One of ordinary skill in the art would have understood that satellite TV signals are routed on coaxial cable. Indeed, the Eutelsat Installers Guide reference specifically refers to this signal path of Figure 11 as coaxial cable. Particularly, at page 27, the Eutelsat Installers Guide references the DiSEqC signaling path as using a coaxial cable. As stated above, this DiSEqC signaling path is the same path as the composite signal path. As such, the Eutelsat Installers Guide teaches that the composite signal path is a coaxial cable.

i. whereby the composite signal is transmitted to the IRD

The Eutelsat Installers Guide teaches that the composite signal is transmitted to the IRD. Still referring to Figure 11, the output of the RF combiner (a composite signal) is sent to the satellite

receiver (set top box or IRD). Accordingly, each element of claim 1 of the '576 patent is anticipated by the Eutelsat Installers Guide reference.

Per claim 6:

a. The signal distribution system of claim 1 wherein the transponder select information is transmitted over the same cable as the composite signal

The Eutelsat Installers Guide teaches that the channel select information is sent over the same cable as the composite signal. Referring still to Figure 11, the Eutelsat Installers Guide discloses that the DiSEqC signaling information that is used to select the channels (i.e., to select the transponders) is sent over the same cable as the composite signal.

Also note that the Eutelsat Installers Guide teaches that with conventional signaling systems, the received satellite signals (composite signal) and the control signals are sent over the same cable (page 26, first paragraph after bullets), and that DiSEqC is compatible with these conventional methods (page 27, second-to-last paragraph).

Accordingly, Claim 6 of the '576 patent anticipated by the Eutelsat Installers Guide reference.

Per claim 8:

a. A signal distribution system for distributing signals comprising a plurality of channels from a plurality of sources between a first unit and a second unit over a communication medium comprising:

As stated previously, the Eutelsat Installers Guide reference is directed toward a plurality of receiver system architectures and signaling protocols for satellite TV systems.

As also stated above with respect to Claim 1, the Eutelsat Installers Guide discloses a plurality of signal distribution systems for satellite TV. The Eutelsat Installers Guide teaches various architectures for distributing signals (Satellite TV signals) comprising a plurality of channels from a plurality of sources between a first unit (the Outdoor Unit) and a second unit (the IRD). One example of such an architecture is that illustrated in Figure 11 of the Eutelsat Installers Guide (reproduced above with reference to claim 1).

b. means in the first unit [ODU] responsive to information transmitted by the second unit [IRD] for extracting selected channels from each of the plurality of sources

The Eutelsat Installers Guide reference teaches this element of claim 1. Particularly, the Eutelsat Installers Guide reference teaches that the IRD is configured to send information to the outdoor unit to perform channel selection from satellite signals. Specifically, the Eutelsat Installers Guide at page 29 states that the architecture shown in Figure 11 provides "communication, preferably two-way, between each terminal and the head-end so that remote channel selection can be carried out." (See the last sentence of page 29).

c. and combining the selected channels into a composite signal

The Eutelsat Installers Guide also teaches combining the selected channels into a composite signal. As discussed above with respect to Claim 1, Figure 11 of the Eutelsat Installers Guide discloses an RF Combining and Amplification unit that accepts multiple RF signals from the Subscriber-controlled IF-IF conversion unit, and combines these IF signals into

a composite output signal.

d. without demodulating channels and without changing the modulation of the channels

The Eutelsat Installers Guide discloses that the signals are selected and combined without changing the modulation of the channels. As discussed above with respect to claim 1, the Eutelsat Installers Guide discloses that QPSK signals are received from the satellite and the signals are distributed to the satellite receiver (IRD) as QPSK signals. As such, no transmodulation is performed. Additionally, the signals are not demodulated either, as they remain QPSK-modulated signals.

e. and transmitting the composite signal over the medium;

The Eutelsat Installers Guide teaches that the composite signal is transmitted to the IRD. At Figure 11, the Eutelsat Installers Guide shows the composite signal routed to the IRDs via a coaxial cable signal path.

f. and means in the second unit [IRD] for receiving the composite signal and demodulating and decoding at least one channel;

The IRD is defined by the Eutelsat reference as a satellite receiver. Receivers are well known to those of ordinary skill in the art to receive communication signals and to demodulate and decode the signals. Indeed, the Eutelsat Installers Guide discloses that the output of the Satellite Receiver is connected to the television set. As such, one of ordinary skill in the art would have understood that the satellite receiver must demodulate and decode the signal, as television sets

are not configured to handle satellite signals in the IF spectrum as distributed from the combiner. As further evidence of what one of ordinary skill in the art would have understood regarding satellite television receivers, reference is made to the Background Section of the '576 patent. At Column 1, lines 39 - 44, with reference to the "Prior Art" Figure 1, the IRD (Integrated Receiver Decoder) is described as tuning, demodulating and decoding the received satellite signal.

g. and means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

The Eutelsat Installers Guide teaches bidirectional communication between the IRD and the switching equipment. Figure 11 (above) illustrates a bidirectional communication path between the IRD (through the wall jack) and the switching equipment. Additionally, Section 3.5.1.c of the Eutelsat Installers Guide at page 27 discloses Two-way (bidirectional) signaling.

Accordingly, Claim 8 of the '576 patent anticipated by the Eutelsat Installers Guide reference.

Per claim 9:

a. The signal distribution system of claim 8 wherein the control information comprises channel selection requests originating from the second unit

The Eutelsat Installers Guide reference teaches control information comprising channel selection requests. Particularly, at page 19, the Eutelsat Installers Guide reference states that communication "between each terminal and the head end so that remote channel selection can be carried out." *Id.*, at 19 (emphasis added).

b. and the control information comprises channel mapping information originating from the first unit.

The Eutelsat Installers Guide reference teaches that the control information also comprises channel mapping information from the switching equipment to the IRD. For example, at page 27 the Eutelsat Installers Guide reference discloses that "[t]wo-way DiSEqC TM (DiSEqC TM 2.0/2.1) further enhances the standard by allowing remote units to report their possible and actual configurations.

One of ordinary skill in the art would have understood that configuration information can include, for example, an identification of the LNB local oscillator frequency or an identification of the frequencies used by one or more of the IF-IF converters so the IRD can determine which frequency to tune to receive the converter output in the composite signal.

As evidence of what one of ordinary skill in the art would have understood at the time of the purported invention, reference is made to United States Patent No. 5,073,930, to Green et. al., which teaches that the term frequency mapping is used to map the conversion of an IF signal in a wideband LNB output to an IF signal at a translated frequency for placement in the composite signal. See, Green at Column 10, lines 4 - 43. As such, one of ordinary skill in the art at the time would have understood that configuration information for the IF-IF converters includes information regarding channel mapping.

Accordingly, Claim 9 of the '576 patent is anticipated by the Eutelsat Installers Guide reference.

Per claim 11:

a. The signal distribution system of claim 8 wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.

The Eutelsat Installers Guide reference teaches an outdoor unit and a satellite integrated receiver decoder unit (IRD). Figure 11 of the Eutelsat Installers Guide reference discloses a Satellite Receiver. The Satellite Receiver is referenced in various places in the Eutelsat Installers Guide reference as an IRD. For example, page 20 refers to the communication between the wall outlet and the "IRD." Likewise, Section 3.5.1 .c states that the signaling systems uses the "satellite receiver (IRD)..." *Id.*, at 27.

Figure 11 (above) also illustrates the LNBs and other switching and distribution equipment, which one of ordinary skill in the art would understand to be outdoor equipment. Also, at the top of page 27, the reference refers to the two-way communications between the IRD and the selection units as signaling "between the outdoor and indoor units."

Furthermore, as further evidence of what was understood by one of ordinary skill in the art at the time, Figure 1 of the '576 patent (labeled as "Prior Art") and the accompanying description disclose that the satellite antenna, LNBs and switches are an outdoor unit, and the description accompanying prior art Figure 1 describes the IRD as a set top box located inside a building. Accordingly, Claim 11 of the '576 patent is anticipated by the Eutelsat Installers Guide reference.

Per claim 12:

a. The signal distribution system of claim 11 wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.

As discussed above with respect to Claim 1, the Eutelsat Installers Guide at page 27 teaches that the communication medium over which the signal is distributed is a coaxial cable. Accordingly, Claim 12 of the '576 patent is anticipated by the Eutelsat Installers Guide reference.

Per claim 13:

a. The signal distribution system of claim 12 wherein the means for communicating uses the same communication medium as the composite signal

In this claim, "means for communicating" refers to the bi-directional communication of control information as recited in the preamble of independent claim 8 from which this claim ultimately depends. The Eutelsat Installers Guide reference teaches that the control information is communicated along the same signal path as the composite signal. This was discussed above with respect to claim 1, for which Figure 11 of the Eutelsat Installers Guide reference was cited as showing bi-directional signaling capabilities along the same signal path as the composite signal.

Accordingly, Claim 13 of the '576 patent is anticipated by the Eutelsat Installers Guide reference.

Per claim 14:

a. A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of."

The Eutelsat Installers Guide reference teaches communicating a plurality of transponder signals from a satellite outdoor unit that receives satellite broadband signals and communicates these signals to an IRD over a single cable connected to the outdoor unit. As discussed above with respect to Claim 1, Figure 11 shows a satellite antenna, LNBs and switching equipment that makes up an outdoor unit for receiving satellite broadband signals. The switching equipment selects a plurality of transponder signals in response to DiSEqC commands from the satellite

receiver (IRD) and communicates the selected transponder signals to the IRD.

b. communicating a transponder request signal to the ODU from the IRD;

Figure 11 of the Eutelsat Installers Guide reference illustrates signaling information between the satellite receiver (IRD) and the switching equipment (ODU). Additionally, the Eutelsat Installers Guide reference discloses a signaling protocol referred to as DiSEqC signaling that can provide one-way or two-way communication between the IRD and ODU. The Eutelsat Installers Guide also states that this communication allows "remote channel selection" to be carried out. See, page 19, last sentence.

Later in this claim 14, the transponder signals extracted from the broadband LNB signal are selected based on the transponder request signal. As such, the transponder request signal is taught by the Eutelsat Installers Guide reference to the DiSEqC signal used to carry out remote channel selection.

c. in the ODU, selecting a plurality of transponder signals extracted from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals;

The Eutelsat Installers Guide reference teaches selecting transponder signals, or channels. As discussed above with respect to claim 1, and with reference to Figures 7 and 11, the transponder signals are extracted from the received satellite broadband signal.

As also discussed above with respect to claim 1, the selection of the transponder signals is in response to signals from the IRD (transponder request signals).

d. combining selected transponder signals into a composite signal;

The Eutelsat Installers Guide reference teaches combining selected transponder signals into a composite signal. As discussed above with respect to claim 1, Figure 11 of the Eutelsat Installers Guide reference illustrates an RF combining and amplification unit that combines the selected transponder signals into a composite output on a single communication path from the combiner to the IRD(s).

e. transmitting the composite signal over the single cable from the ODU to the IRDs,

The Eutelsat Installers Guide reference teaches transmitting the composite signal over the single cable from the ODU to the IRDs. As discussed above with respect to Claim 1, the composite signal is illustrated in Figure 11 as being transmitted over a single communication path to the IRD(s). As also discussed above, Figure 11 illustrates multiple wall outlets. One of ordinary skill in the art reading the Eutelsat Installers Guide reference would understand that a satellite receiver, or IRD, can be hooked up to each wall outlet.

f. wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

The Eutelsat Installers Guide reference teaches that the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting. As discussed above with respect to Claim 1, the Eutelsat Installers Guide reference teaches that a QPSK-modulated signal is received from the satellite, and that the selected transponder signals, or channels, are distributed to the IRD(s) as QPSK modulated signals. As such, a system that does not alter the

modulation is taught.

Accordingly, Claim 14 of the '576 patent is anticipated by the Eutelsat Installers Guide reference.

Per claim 16:

a. The method of claim 14 wherein the step of combining comprises frequency translating the selected transponder channels to a variable frequency before combining.

The Eutelsat Installers Guide reference teaches frequency translating the selected transponder channels to a variable frequency before combining. As discussed above with respect to claim 1, the Eutelsat Installers Guide reference shows in Figure 7 that the transponder channels are frequency translated from their respective center frequencies in the broadband satellite signal to their new respective center frequencies in the satellite IF distribution channel.

One of ordinary skill in the art would understand that the frequency translation would occur before combination as the signals will need to be reassigned to their new frequency allocation within the bandwidth of the composite signal. One of ordinary skill in the art would also understand that the assignment would be variable to accommodate allocation of multiple selected signals into the available bandwidth.

Accordingly, Claim 16 of the '576 patent is anticipated by the Eutelsat Installers Guide reference.

Per claim 18:

a. The method of claim 14 further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.

The Eutelsat Installers Guide reference teaches splitting the composite signal inside a home and distributing to a plurality of IR s. Particularly, Figure 11 illustrates that the composite signal is

split out to a plurality of wall units and distributed to each of the wall units. As stated above, one of ordinary skill in the art would understand that, as in the first unit, an IRD can be connected to each of the other wall units. As such, Figure 11 illustrates splitting the signal and distributing it to a plurality of IRDs. Also note that the claim references splitting the signal inside a home. Figure 11 illustrates that the signal is split prior to distribution to the wall units. One of ordinary skill in the art would understand that the wall outlets are in the walls of the building (whether it be a home, office, or other building), and that the splitting can occur inside the home. Accordingly, Claim 18 of the '576 patent is anticipated by the Eutelsat Installers Guide reference.

Per claim 19:

a. The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD

The Eutelsat Installers Guide reference teaches the transponder request signal is transmitted over the cable from an IRD. As discussed above with respect to claim 2, Figure 11 illustrates that the DiSEqC signal (transponder request signal) is transmitted over the cable from the IRD to the switching equipment.

b. and all IRDs receive the same composite signal

The Eutelsat Installers Guide reference teaches that all IRDs receive the same composite signal. As discussed above with respect to claim 2, Figure 11 illustrates that the composite signal is distributed via a single cable to the wall outlets, and that an IRE) can be connected to each wall outlet. Accordingly, Claim 19 of the '576 patent is anticipated by the Eutelsat Installers Guide

reference.

Per claim 21:

a. The method of claim 14 further comprising the steps of frequency translating the selected transponder channels to a variable frequency before combining;

As discussed above with respect to claim 16, the Eutelsat Installers Guide reference teaches translating the selected transponder channels to a variable frequency before combining.

b. and splitting the composite signal inside a home and distributing to a plurality of IRDs.

As discussed above with respect to claim 18, the Eutelsat Installers Guide reference teaches splitting the composite signal inside a home and distributing to a plurality of IRDs.

Accordingly, Claim 21 of the '576 patent is anticipated by the Eutelsat Installers Guide reference.

Per claim 22:

a. The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.

Claim 21 from which this claim depends, is taught by the Eutelsat Installers Guide as described with reference to Claim 21. As discussed above with respect to claim 19, The Eutelsat Installers Guide reference teaches that the transponder request signal is transmitted over the cable from an IRD. (Fig. 11) Accordingly, Claim 22 of the '576 patent is anticipated by the Eutelsat Installers Guide reference.

2. Claim 2 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over the Eutelsat Installers Guide reference in view of Humpleman.

Per claim 2:

a. The signal distribution system of claim l further comprising a plurality of IRDs

The Eutelsat Installers Guide teaches that a plurality of IRDs can be provided. Particularly, Figure 11 illustrates multiple wall outlets. One of ordinary skill in the art would have understood that multiple wall outlets are used to support additional IRDs. For example, one IRD can be connected to each additional wall outlet, just as the illustrated IRE) is connected to the first wall outlet.

b. and wherein the composite signal is transmitted on a single cable connected to the ODU

Figure 11 also illustrates that the composite signal from the combiner is transmitted on a single cable.

c. and all IRDs receive channels extracted from the composite signal

Figure 11 also illustrates that the IRDs receive channels from the composite signal. As illustrated, the composite signal is distributed to the IRDs. Particularly, the composite signal is distributed to all the wall outlets (each of which can support an IRD) so that all IRDs connected thereto receive the channels in the composite signal.

Accordingly, Claim 2 of the '576 patent anticipated by the Eutelsat Installers Guide reference.

In the alternative, claim 2 is rejected under 103(a) as being obvious in view of Humpleman. The alternative rejection is necessitated the limitation reciting "channels extracted form the composite signal" that, in an alternate interpretation, could be interpreted to include gateway functionality. (See: '576 at 2:62)

Analogous art Humpleman, discloses a multimedia network architecture for in-premises distribution of satellite television signals. Humpleman teaches that cable or satellite television signals (Col. 3, lines 28-31) are received at the home and distributed by network 10 to one or more televisions 12, 14 or other video equipment (VCR 16). With reference to Figure 1, Humpleman discloses that a network interface unit 32 (i.e., Gateway) receives an external satellite broadcast signal (Col. 3, lines 21 - 35), and that the external signals are distributed via a network 34 (Col. 3, lines 49 - 55). With particular regard to television signals, Humpleman teaches with reference to Figure 4 that the network interface unit (NIU) 32, or gateway, receives the external video signal and distributes it to the set top box 40 (Column 7, lines 18 - 34). Humpleman also teaches that the gateway (NIU 32) can extract channels from the composite signal before the signal is distributed throughout the home to the set top boxes. See, for example, Column 7, lines 35 - 52, where Humpleman discloses demultiplexing the channel from a multiple channel stream.

A skilled artisan would have knowingly modified the teachings of the Eutelsat Installer Guide to include the gateway teachings of Humpleman since using a gateway for channel extraction would have been part of the ordinary capabilities of a skilled artisan and there would have been a reasonable expectation of success based on similar uses of gateways in the same technological arena.

Accordingly, Claim 2 of the '576 patent is rendered obvious by Humpleman's teachings of a gateway in combination with the Eutelsat Installers Guide reference.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Eutelsat Installers Guide in view of Kelly.

Per claim 3: As cited above, the Eutelsat Installers Guide teaches every element of independent claim 1.

Eutelsat Installers Guide does not explicitly disclose a digital filter.

Analogous art Kelley, teaches a digital receiver with digital channel selection. At Figure 8, Kelley teaches a digital receiver with an analog to digital converter ADC 106 that digitizes the RF input signal and provides it to a digital tuner. Col. 6, lines 31-34. The output of mixer 18 is provided to a digital IF filter 34 to isolate the desired IF signal. Col. 7, lines 34 - 40.

A skilled artisan would have knowingly modified the teachings of the Eutelsat Installer Guide to include the digital filter teachings of Kelly since using a digital filter and analog to digital converter would have been part of the ordinary capabilities of a skilled artisan and there would have been a reasonable expectation of success based on similar uses of the devices in the same technological arena. Accordingly, Claim 3 of the '576 patent is rendered obvious by the Eutelsat Installers Guide in combination with Kelley.

4. Claims 4, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Eutelsat Installers Guide in view of Green.

Per claim 4:

a. The signal distribution system of claim 1 wherein the signal selector comprises a tuner.

As cited above, the Eutelsat Installers Guide teaches every element of independent claim 1. However, the Eutelsat Installers Guide does not explicitly disclose a tuner to select the transponder signals. Tuners for channels selection in television receivers are notoriously well known.

Analogous art Green et. al., discloses a satellite receiver system that uses a tuner to perform IF channel selection, and combining a plurality of selected channels into a composite signal for transmission to a set top box. At Figure 1A, Green discloses a plurality of broadband LNB output signals 104, 106 having a plurality of transponder channels. IF-IF converters 113 are comprised of a plurality of transponder processors 112 that each receive a broadband LNB signal from which one of the constituent transponder signals will be chosen. Thus, these transponder processors 112 are signal selectors. These signal selectors are described with reference to Figure 3 as including a tuner.

A skilled artisan would have knowingly modified the teachings of the Eutelsat Installer Guide to include the tuner teachings of Green since using tuners for channels selection in television receivers is notoriously well known would have been part of the ordinary capabilities of a skilled artisan. Accordingly, Claim 3 of the '576 patent is rendered obvious by the Eutelsat Installers Guide in combination with Kelley.

Per claim 10

a. The signal distribution system of claim 8, further comprising a means in the first unit for carrier offset correction.

The Eutelsat Installers Guide reference teaches every element of claim 8 as cited above. However, the Eutelsat Installers Guide does not explicitly teach carrier offset correction. Analogous art Green, et al., teaches carrier offset correction in a satellite receiver system. At Column 12, lines 40 - 45, Green discloses carrier offset correction to correct for frequency errors. Note that one would have looked to Green when implementing satellite receiver system architectures. Particularly, Figure 1A of Green illustrates a plurality of selected broadband satellite signals on a bus 110 are sent to transponder units 112 for channel selection, and that the selected transponder channels are then combined by combiners 114. Figure 2 of Green illustrates that the selected transponder channels are mapped into and combined into a single composite signal (labeled as transponder bank output). This is directed toward solving the same goal of channel selection in a satellite receiver system as are the '576 patent and the Eutelsat Installers Guide. Hence, a skilled artisan would have knowingly modified the teachings of the Eutelsat Installer Guide to include carrier offset correction teachings of Green and there would have been a reasonable expectation of success. Accordingly, Claim 10 of the '576 patent is rendered obvious by the Eutelsat Installers Guide in combination with Green.

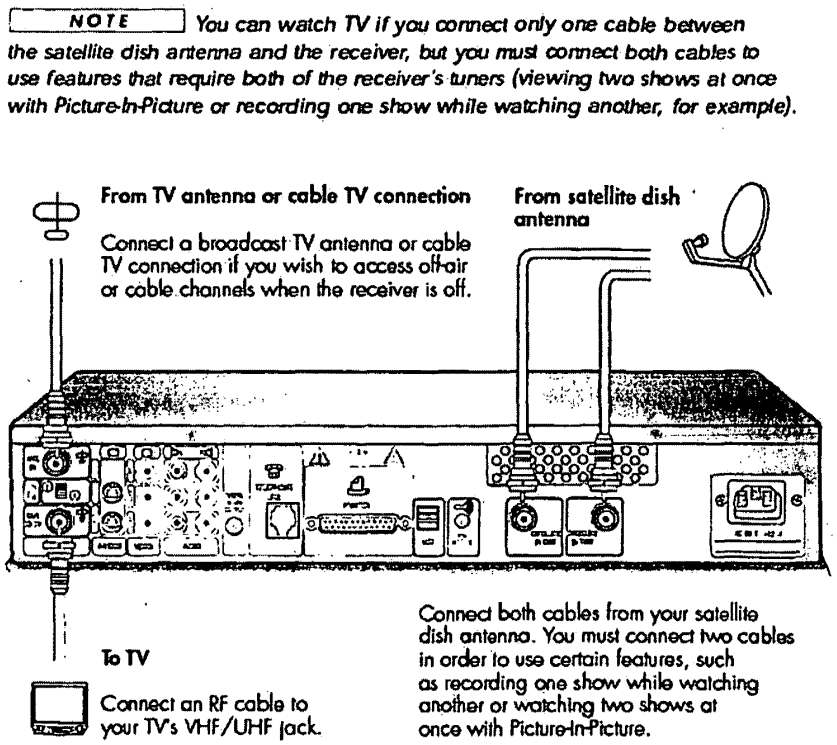
5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Eutelsat Installers Guide in view of the RCA Setup Guide.

Per claim 5:

a. The signal distribution system of claim l further comprising an integrated receiver decoder (IRD) connected to the coaxial cable with a plurality of tuners within the IRD, wherein each tuner within the IRD receives the composite signal and each tuner uses at least one transponder signal.

As cited above, the Eutelsat Installers Guide teaches every element of independent claim 1. Also, as illustrated in Figure 19 (page 26), the Eutelsat Installers Guide discloses a satellite receiver or IRD connected to the coaxial cable. However, the Eutelsat Installers Guide does not explicitly disclose a plurality of tuners within the IRD.

The concept of two tuners in a television receiver was well known at the time of the purported invention to allow features such as picture-in-picture and watch-and-record. As evidence of what would be known by one of ordinary skill in the art the RCA Setup Guide discloses a satellite set top box, or IRD, with multiple tuners. For example, the Figure on page 6 and the accompanying note teaches two tuners to enable picture-in-picture or watch-and-record capabilities.



A skilled artisan would have knowingly modified the teachings of the Eutelsat Installer Guide to include the multiple tuner teachings as evidenced by the RCA Setup Guide since using multiple tuners was notoriously well known in the art and would have been part of the ordinary capabilities of a skilled artisan. Accordingly, Claim 5 of the '576 patent is rendered obvious by the Eutelsat Installers Guide in combination with the RCA Setup Guide.

6. Claims 7, 20, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Eutelsat Installers Guide in view of the Philips Data Sheet.

Per claims 7 and 20:

a. (claim 7) The signal distribution system of claim 1 wherein the transponder select information is transmitted over a wireless link.

b. (claim 20) The method of claim 14 wherein the transponder request signal is transmitted over a wireless link to the ODU.

As cited above, the Eutelsat Installers Guide teaches every element of claims 1 and 14. However, the Eutelsat Installers Guide does not explicitly state that the transponder select information or request signal (i.e., the DiSEqC command) can be sent over a wireless link. Wireless communications as an alternative to wired communications were very well known at the time of the invention.

The Philips Data Sheet for the UAA3202M Frequency Shift Keying Receiver illustrates a single-chip wireless receiver for VHF and UHF systems. (See, General Description on page 2.) Described applications for the wireless receiver are listed as remote control systems, telemetry systems and wireless data transmission (page 2). As such, it would have been obvious to use this or other commonly available wireless technology to communicate transponder select information over a wireless link. Hence, a skilled artisan would have knowingly modified the teachings of the

Eutelsat Installer Guide to include the wireless technology of the Philips Data Sheet since this technology would have been part of the capabilities of a skilled artisan at the time of the invention. Accordingly, claims 7 and 20 of the '576 patent are rendered obvious by the Eutelsat Installers Guide in combination with the Philips Data Sheet.

Per claim 23:

a. The method of claim 21 wherein the transponder request signal is transmitted over a wireless link to the ODU.

Claim 21 elements are taught by the Eutelsat Installers Guide as previously cited above. As also cited above, the Philips Data Sheet for the UAA3202M Frequency Shift Keying Receiver illustrates a single-chip wireless receiver for VHF and UHF systems. (See, General Description on page 2.) Described applications for the wireless receiver are listed as remote control systems, telemetry systems and wireless data transmission (page 2). As such, it would have been obvious to use this or other commonly available wireless technology to communicate transponder select information over a wireless link. Hence, a skilled artisan would have knowingly modified the teachings of the Eutelsat Installer Guide to include the wireless technology of the Philips Data Sheet since this technology would have been part of the capabilities of a skilled artisan at the time of the invention. Accordingly, claim 23 is rendered obvious by the Eutelsat Installers Guide in combination with the Philips Data Sheet.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Eutelsat Installers Guide in view of the Broadcom Digital Satellite Receiver Paper.

Per claim 15:

a. The method of claim 14 wherein the step of selecting a transponder signal comprises the step of filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% TO 100% wider than the bandwidth of the transponder signal

The Eutelsat Installers Guide reference teaches every element of claim 14, from which claim 10 depends. The Broadcom Digital Satellite Receiver Paper discloses a 55Mhz bandwidth filter (page 1639, bottom of Col. 1) that is used in a digital satellite receiver capable of supporting variable symbol rates of 1 - 45 Mbaud (i.e., 1 - 45 MHz). Thus, depending on the chosen operating symbol rate, the bandwidth of the filter can range from approximately 20% wider than the signal bandwidth to well more than 100% wider. A skilled artisan would have knowingly modified the teachings of the Eutelsat Installer Guide to include the filter teachings of the Broadcom Digital Satellite Receiver Paper the use of filters is very well known in the art and would have been part of the ordinary capabilities of a skilled artisan. Further, a skilled artisan implementing a filter for the transponder signal would have had a reasonable expectation of success. Accordingly, Claim 15 of the '576 patent is rendered obvious by the Eutelsat Installers Guide in combination with Broadcom Digital Satellite Receiver Paper.

8. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Eutelsat Installers Guide in view of Broadcom Digital Satellite Receiver in further view of Green.

Per claim 17:

a. The method of claim 15 further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.

As discussed above, The Eutelsat Installers Guide and Broadcom references teach every element of claim 15. Additionally, as discussed above with respect to claim 1, the Eutelsat Installers

Guide teaches frequency translating the selected transponder channels (for example, Figure 19 illustrates that the IF to IF frequency translation occurs prior to the signal combining). However, it is unclear if the translation is to a predetermined frequency before combining.

Green specifically teaches translation of transponder channels to a predetermined frequency prior to combining. Figure 1A of Green illustrates a plurality of selected broadband satellite signals on a bus 110 are sent to transponder units 112 for channel selection, and that the selected transponder channels are then combined by combiners 114. Figure 2 of Green illustrates that the selected transponder channels are mapped into and combined into a single composite signal (labeled as transponder bank output). Although the transponder processor can map to a variable frequency (as discussed with respect to Claim 16), Green also teaches that once a mapping of transponder channels into the combined signal is decided, the processors can be preprogrammed to output on a given frequency. See, Column 10, lines 20 - 23. Thus, the processors translate to a predetermined frequency prior to signal combining. Accordingly, Claim 17 of the '576 patent is rendered obvious by the Eutelsat Installers Guide reference in combination with Green.

VII. Conclusion

In order to ensure full consideration of any amendments, affidavits or declarations, or other documents as evidence of patentability, such documents must be submitted in response to this Office action. Submissions after the next Office action, which is intended to be a final action, will be governed by the requirements of 37 CFR 1.116, after final rejection and 37 CFR 41.33 after appeal, which will be strictly enforced.

Any paper filed with the USPTO, i.e., any submission made, by either the Patent Owner or the Third Party Requester must be served on every other party in the reexamination proceeding, including any other third party requester that is part of the proceeding due to merger of the reexamination proceedings. As proof of service, the party submitting the paper to the Office must attach a Certificate of Service to the paper, which sets forth the name and address of the party served and the method of service. Papers filed without the required Certificate of Service may be denied consideration. 37 CFR 1.903; MPEP 2666.06.

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From: Lester J. Anderson

Re: U.S. Patent No.: 7,130,576

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L. de la Garza
Linda M. de la Garza

1. Amendment and Response to Office Action in Ex Parte Reexamination

In re Patent Application of:	Gurantz, et al.	
Title:	SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION	
Patent No.:	7,130,576	Filed: February 06, 2007
Examiner:	Ferris III, Fred O.	Group Art Unit: 3992
Our Docket No.:	05JM-139053	**Date Faxed: August 14, 2008**
Client:	Entropic Communications, Inc.	**Date Due: August 16, 2008**
Atty/Sec.:	Yannuzzi/de la Garza	

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In re Patent Application of: Gurantz, *et al.*	Attorney Docket No.: 05JM-139053
Control No.: 90/008,389 Patent No.: 7,130,576	Confirmation No.: 3367
Filed: February 06, 2007	Art Unit: 3992
For: Signal Selector and Combiner for Broadband Content Distribution	Examiner: Ferris III, Fred O.

Amendment and Response to Office Action in Ex Parte Reexamination

Via facsimile

Box Reexamination
(571) 273-9900
Central Reexamination Unit

INTRODUCTORY COMMENTS

This is in response to the Office Action in Ex Parte Reexamination mailed June 16, 2008, time for response to which is set to expire August 16, 2008. The considered claims, claims 1-23, stand rejected. Careful consideration has been given to the grounds for rejection, and the following amendment and discussion are offered in response. Reconsideration is respectfully requested.

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

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Application No.: 90/008,389 Docket No.: 05JM-139053

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising:

a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals and digitizes the received broadband LNB signals, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals in the digital domain from at least one broadband LNB signal based on the transponder select information;

a frequency translator coupled to the signal selector that is [capable of shifting] configured to shift the selected transponder signals to new carrier frequencies and a converter configured to convert the shifted selected transponder signals to produce RF signals; and

a combiner communicatively coupled to at least one frequency translator, the combiner configured to combine[capable of combining] at least two of the shifted selected RF signals to produce a composite signal;

wherein the modulation of the composite signal is the same as modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable;

whereby the composite signal is transmitted to the IRD.

2. (Original) The signal distribution system of claim 1 further comprising a plurality of IRDs and wherein the composite signal is transmitted on a single cable connected to the ODU and all IRDs receive channels extracted from the composite signal.

3. (Original) The signal distribution system of claim 1 wherein the signal selector comprises an analog to digital converter and a digital filter.

4. (Original) The signal distribution system of claim 1 wherein the signal selector comprises a tuner.

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5. (Original) The signal distribution system of claim 1 further comprising an integrated receiver decoder (IRD) connected to the coaxial cable with a plurality of tuners within the IRD, wherein each tuner within the IRD receives the composite signal and each tuner uses at least one transponder signal.

6. (Original) The signal distribution system of claim 1 wherein transponder select information is transmitted over the same cable as the composite signal.

7. (Original) The signal distribution system of claim 1 wherein transponder select information is transmitted over a wireless link.

8. (Currently Amended) A signal distribution system for distributing signals comprising a plurality of satellite transponder channels of a broadband signal from a plurality of sources between a first unit and a second unit over a communication medium comprising:

means in the first unit for digitizing the broadband signal from each of the plurality of sources;

means in the first unit responsive to information transmitted by the second unit for extracting selected channels from [each of the plurality of sources] the digitized broadband signals in the digital domain; and

means in the first unit for combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; and

means in the second unit for receiving the composite signal and demodulating and decoding at least one channel; and

means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

9. (Original) The signal distribution system of claim 8 wherein the control information comprises channel selection requests originating from the second unit and the control information comprises channel mapping information originating from the first unit.

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10. (Original) The signal distribution system of claim 8, further comprising a means in the first unit for carrier offset correction.

11. (Original) The signal distribution system of claim 8 wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.

12. (Original) The signal distribution system of claim 11 wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.

13. (Original) The signal distribution system of claim 12 wherein the means for communicating uses the same communication medium as the composite signal.

14. (Currently Amended) A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of:

communicating a transponder request signal to the ODU from the IRD;

in the ODU, digitizing the plurality of satellite broadband signals, selecting and extracting a plurality of transponder signals [extracted] from the received digitized satellite broadband signals, wherein the selecting is responsive to the transponder request signals;

combining extracted selected transponder signals into a composite signal;

transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

15. (Currently Amended) The method of claim 14 wherein the step of selecting and extracting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal.

16. (Currently Amended) The method of claim 14 wherein the step of combining comprises frequency translating the selected and extracted transponder channels to a variable frequency before combining.

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36. (Newly Added) The method of claim 14, wherein the combining is performed in the digital domain.

37. (Newly Added) The method of claim 17, wherein frequency translating comprises using a digital mixer to apply a rotating phasor to the data samples to translate their frequency.

38. (Newly Added) The method of claim 14, further comprising frequency translating the digitized broadband signal prior to selecting and extracting transponder signal.

39. (Newly Added) The method of claim 38, wherein frequency translating comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband.

40. (Newly Added) The method of claim 14, further comprising maintaining a channel translation table at the outdoor unit, the channel translation table specifying assigned frequency slots for transponder channels in the composite signal.

41. (Newly Added) The method of claim 38, further comprising providing the channel translation table to the IRD to allow the IRD to tune to a desired selected translated transponder channel.

42. (Newly Added) The method of claim 14, wherein selecting and extracting comprises low-pass filtering the translated digitized broadband signal thereby substantially removing signal information from non-selected transponder channels.

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17. (Currently Amended) The method of claim 15, further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.

18. (Original) The method of claim 14 further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.

19. (Original) The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD and all IRDs receive the same composite signal.

20. (Original) The method of claim 14 wherein the transponder request signal is transmitted over a wireless link to the ODU.

21. (Original) The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining; and splitting the composite signal inside a home and distributing to a plurality of IRDs.

22. (Original) The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.

23. (Original) The method of claim 21 wherein the transponder request signal is transmitted over a wireless link to the ODU.

24. (Newly Added) The signal distribution system of claim 1, wherein the signal selector comprises a digital filter configured to apply a pass band filter transfer function to the digitized broadband signal to isolate a transponder channel.

25. (Newly Added) The signal distribution system of claim 1, wherein the converter comprises a digital-to-analog converter configured to convert the selected and frequency translated signal to an analog signal prior to combining.

26. (Newly Added) The signal distribution system of claim 1, wherein the frequency translator comprises a digital mixer configured to apply a rotating phasor to the data samples to translate their frequency.

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27. (Newly Added) The signal distribution system of claim 1, wherein shifting a selected transponder signal to a new carrier frequency comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband.

28. (Newly Added) The signal distribution system of claim 1, wherein the channels combined in the composite signal are combined at a sample rate substantially equal to the composite output rate.

29. (Newly Added) The signal distribution system of claim 1, further comprising a controller to control the signal selector, frequency translator and converter and combiner.

30. (Newly Added) The signal distribution system of claim 29, wherein the controller, signal selector, frequency translator and combiner are part of a satellite outdoor unit.

31. (Newly Added) The signal distribution system of claim 29, further comprising a channel translation table maintained by the controller and specifying assigned frequency slots for transponder channels in the composite signal.

32. (Newly Added) The signal distribution system of claim 31, wherein the channel translation table is provided to the IRD to allow the IRD to tune to a desired selected translated transponder channel.

33. (Newly Added) The signal distribution system of claim 1, wherein the new carrier frequencies to which the selected transponder channels are shifted is determined such that the translated channels are placed at respective center frequencies where they will be positioned in the composite signal.

34. (Newly Added) The method of claim 14, wherein selecting and extracting comprises applying a pass band filter transfer function to the digitized broadband signal.

35. (Newly Added) The method of claim 14, further comprising converting the selected signal to an analog signal using a digital to analog converter prior to combining.

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Application No.: 90/008,389 Docket No.: 05JM-139053

REMARKS

Upon entry of the foregoing amendments, claims 1 - 41 are pending in the application. Claims 1, 8 and 14 – 17 are amended and new claims 24 – 42 are added by the above amendments. These changes are believed to introduce no new matter, and their entry is respectfully requested. Support for the above amendments can be foundat Column 4, line 28 through Column 6, line 50, *inter alios*, and in the drawings accompanying that description.

In view of the above amendments and following remarks, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejections of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

The Original claims were rejected under 35 U.S.C. § 102(b) and under 35 U.S.C. § 103 as being anticipated or rendered obvious. The above amendments to the claims render these grounds of rejection moot. The currently pending claims are patentably distinct from cited references, whether taken either alone or in combination, for at least the reasons set forth below.

In responding to the rejection, the Patentee adopts the same shorthand definitions set forth in the Office Action. These are reproduced below for convenience:

> "INFORMATION FOR INSTALLERS OF HOT BIRD TM DVB-S SYSTEMS,VERSION 1.0" (hereinafter "Eutelsat Installers' Guide"), EUTELSAT, dated June 7, 1999;
>
> "DIGITAL SATELLITE EQUIPMENT CONTROL (DiSEqC TM) UPDATE AND RECOMMENDATIONS FOR IMPLEMENTATION,

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VERSION 2.0" (hereinafter "Eutelsat DiSEqC Specification"), dated April 18, 1997;

United States Patent No. 6,437,837 to Seo (hereinafter "Seo");

United States Patent No. 5,073,390 to Green et al. (hereinafter "Green");

United States Patent No. 6,005,861 to Humplemann (hereinafter "Humplemann");

"A SINGLE CHIP UNIVERSAL DIGITAL SATELLITE RECEIVER WITH480-Mhz IF INPUT" (hereinafter the "Broadcom Paper");

"PHILLIPS DATA SHEET FOR UAA3202M FREQUENCY SHIFT KEYING RECEIVER", (hereinafter the "Phillips Data Sheet");

United States Patent No. 5,654,774 to Pugel et al. (hereinafter "Pugel");

United States Patent No. 4,953184 to Simone (hereinafter "Simone");

European Patent No. 1009113 (hereinafter "EPO '113 Patent");

European Patent No. 0757489 (hereinafter "EPO '489 Patent");

United States Patent No. 5,285,284 to Takashima et al. (hereinafter "Takashima");

United States Patent No. 6,353,463 to Seo (hereinafter "Seo")

"RCA DIR CTTV RECEIVER WITH ULTIMATETV SERVICE SETUP GUIDE (hereinafter the "RCA Setup Guide");

United States Patent No. 5,278,837 to Kelley (hereinafter "Kelley").

1. **Rejection of claims Claims 1, 6, 8, 9, 11-14, 16, 18, 19, 21 and 22 under 35 U.S.C. 102(b) as being anticipated by the Eutelsat Installers Guide.**

A patent claim is anticipated under 35 U.S.C. § 102 if and only if each and every limitation of that claim is found either expressly or inherently in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). However, where inherency is relied on, such inherency may not be established by 'probabilities or possibilities.' *Continental Can Co. USA v. Monsanto Co.,*

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948 F.2d 264, 1268 (Fed. Cir. 1991). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Furthermore, for a rejection to be proper under 35 U.S.C. § 102, the reference must describe the claimed invention with sufficient clarity and detail to establish that the invention existed and was known by those of ordinary skill in the art. *Diversitech Corp. v. Century Steps, Inc., 850* F.2d 675, 677 (Fed. Cir. 1988). Such a person of ordinary skill must perceive 'no difference between the claimed invention and the reference disclosure.' *Suzuki Motor Co.,* at 1236-37.

a. Independent Claims 1, 8 and 14 and Their Respective Dependent Claims, 2-7, 9-13, and 15-23.

Independent Claims 1 and 14 have been amended to recite that the system or method includes digitizing the broadband signal and the claims as amended are generally directed toward systems and methods of signal distribution of a plurality of satellite transponder channels of a broadband signal, wherein the broadband signal is digitized, and desired transponder channels are translated and selected in the digital domain. This is in contrast to the cited references, which do not teach or suggest digitizing the broadband satellite signal and operating on that digitized content.

i. Claim 1 and its Originally Dependent Claims, Claims 2-7

Claim 1, as amended, now recites that the signal selector also "digitizes the received broadband LNB signals" and that the channel selection is performed "in the digital domain." These features of digitizing the broadband signal and performing channel selection in the digital domain represent a significant departure from the prior art at the time of the invention, which only taught operating in the RF and IF domains. Moreover, the digitization of the broadband signal – *i.e.*, digitizing a complete band – is not obvious in light of the prior art because broadband digitization results in an architecture that is substantially different from that achievable through conventionally known technologies such as those found in the cited art. These differences in architecture represent a significant departure from conventional

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implementations. For example, digitization of the broadband signal prior to channel selection enables an architecture that can be implemented without the costly, large and maintenance-intensive matrix switches. It also allows for simplification of translation, and channel selection (filtering). Also, digitizing a complete band allows the avoidance of channel-by-channel digitization, which would require duplication of hardware to perform this digitization for each channel. As yet another distinction, prior art teachings, such as IF-IF conversion require down conversion and up conversion, which requires multiple local oscillators. Digitizing the broadband signal allows frequency translation to be performed using digital mixing without requiring multiple local oscillators to convert a transponder channel to its position in the composite signal.

As noted above, these features – digitizing the broadband LNB signals and performing channel selection in the digital domain – are neither taught nor suggested by the cited references or by the other references presented in the original reexamination request. Indeed, these patentable features stand in stark contrast to the teachings of the art at the time of the invention. For example, the Eutelsat references teach reception systems performing channel selection and combining in the RF and/or IF domains, and do not teach or suggest broadband digitization of the incoming signal combined with channel selection from that digitized signal in the digital domain. Particularly, the Eutelsat Installers' Guide describes, in Section 3.4, the six contemplated collective reception architectures: FM/QPSK to AM re-modulation; Switched IF Systems, IF – IF conversion; IF – RF – IF conversion; Remote controlled head-ends; and QPSK to QAM re-modulation. The FM/QPSK to AM re-modulation, IF – IF conversion, IF – RF – IF conversion and QPSK to QAM remodulation architectures perform distribution, channelization and combining in the RF and/or IF domains. The Switched IF systems do not perform channelization and combining, but instead distribute multiple broadband signals in "parallel" to a plurality of IRDs. This deficiency is not cured by the Eutelsat DiSEqC Specification reference, which only describes the specifications and operation of the DiSEqC commands and switches.

Indeed, the only discussion relating to the digital domain in the Eutelsat references is limited to the remote control of the head end via the DiSEqC ™ (Digital Satellite Equipment Control) signal that is used by the IRDs to control the LNBs. *See,* Eutelsat Installers' Guide,

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pp 26 – 27. However, this is only the control-signaling methodolgy between the IRD and the LNBs and, as stated above, distribution, channelization and combining are still performed in the RF and/or IF domains.

None of the other references cited in these reexamination proceedings teach or suggest a signal distribution system for distributing a plurality of LNB signals from a satellite outdoor unit to an integrated receiver decocer (IRD) that includes a signal selector that digitizes the received broadband LNB signals in response to transponder select information transmitted by the IRD and that selects a plurality of transponder signals in the digital domain from a broadband LNB signal based on the transponder select information.

Accordingly, for at least these reasons, Claim 1 of the '576 patent recites patentable subject matter and respondents respectfully request that the Examiner pass Claim 1 and the claims that depend therefrom to allowance.

Additionally, Claim 1 as amended further recites a converter configured to convert the shifted selected transponder signals back into the analog domain prior to combining them into the composite signal. This feature is also neither taught nor suggested by the prior art references, which, as outlined above, are limited to performing their operations in the RF and/or IF domains.

Accordingly, for at least this additional reason, Claim 1 of the '576 patent recites patentable subject matter and respondents respectfully request that the Examiner pass Claim 1 and the claims that depend therefrom to allowance.

i. Claim 8 and its Originally Dependent Claims, Claims 9-13

Claim 8 as amended recites a signal distribution system for distributing signals comprising a plurality of satellite transponder channels of a broadband signal that includes a means for digitizing the broadband signal from each of a plurality of sources and a means for extracting selected channels from the digitized broadband signals in the digital domain. As described above with reference to Claim 1, broadband digitization and digital channel

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selection represent a significant departure from the prior art. As also stated above, the Eutelsat references teach reception systems performing channel selection and combining in the RF and/or IF domains, and do not teach or suggest broadband digitization of the incoming signal combined with channel selection from that digitized signal in the digital domain. Particularly, the Eutelsat Installers' Guide describes, in Section 3.4, the six contemplated collective reception architectures, none of which teach or suggest digitizing the broadband signal from each of a plurality of sources and a means for extracting selected channels from the digitized broadband signals in the digital domain.

None of the other references cited in these reexamination proceedings teach or suggest a signal distribution system for distributing signals comprising a plurality of satellite transponder channels of a broadband signal from a plurality of sources between a first unit and a second unit over a communication medium that includes a means in the first unit for digitizing the broadband signal from each of the plurality of sources, and a means in the first unit for combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium.

Accordingly, for at least these reasons, Claim 8 of the '576 patent recites patentable subject matter and respondents respectfully request that the Examiner pass Claim 8 and the claims that depend therefrom to allowance.

ii. Claim 14 and its Originally Dependent Claims, Claims 15-23

Claim 14 as amended recites a method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) to an integrated receiver decoder (IRD) where the method includes "digitizing the plurality of satellite broadband signals," and "selecting and extracting a plurality of transponder signals from the received digitized satellite broadband signals." As described above with reference to Claim 1, broadband digitization and digital channel selection represent a significant departure from the prior art. As also stated above, the Eutelsat references teach reception systems performing channel selection and combining

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in the RF and/or IF domains, and do not teach or suggest broadband digitization of the incoming signal combined with channel selection from that digitized signal in the digital domain. Particularly, the Eutelsat Installers' Guide describes, in Section 3.4, the six contemplated collective reception architectures, none of which teach or suggest digitizing the broadband signal from each of a plurality of sources and a means for extracting selected channels from the digitized broadband signals in the digital domain.

None of the other references cited in these reexamination proceedings teach or suggest a method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, that includes communicating a transponder request signal to the ODU from the IRD; in the ODU, digitizing the plurality of satellite broadband signals, selecting and extracting a plurality of transponder signals from the received digitized satellite broadband signals, wherein the selecting is responsive to the transponder request signals; combining extracted selected transponder signals into a composite signal; transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

Accordingly, for at least these reasons, Claim 14 of the '576 patent recites patentable subject matter and respondents respectfully request that the Examiner pass Claim 14 and the claims that depend therefrom to allowance.

b. Newly Added Claims 24 - 42

Patentee has added new dependent claims 24 – 42. Claims 24 – 33 directly or indirectly depend from Independent Claim 1. New Claims 34 – 42 directly or indirectly depend from Independent Claim 14. Because each of these claims depends from and adds additional limitiations to their respective base claim (Claim 1 or Claim 14) these new claims also recite patentable subject matter and should be passed to allowance.

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Application No.: 90/008,389 Docket No.: 05JM-139053

CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 18-1953 referencing 19-1853 Docket No. 05JM-139053. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Dated: August 14, 2008

Respectfully submitted,

By: _____
Lester J. Anderson
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EXAMINER	
ART UNIT	PAPER NUMBER

DATE MAILED: 01/07/2009

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Notice Of Defective Paper In Ex Parte Reexamination	Control Number	Patent Under Reexamination
	90/008,389	7130576
	Examiner	Art Unit
	Fred Ferris	3992

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

1. ☐ Since no proof of service was included with the paper filed on _____ , it fails to comply with 37 CFR 1.248 and 1.540. Proof of service is required within ONE (1) MONTH or THIRTY (30) DAYS from the mailing date of this letter, whichever is longer. Failure to provide proof of service may result in a refusal to consider the paper. If the failure to comply with this requirement results in a patent owner failure to file a timely and appropriate response to any Office action or any written statement of an interview required under 37 CFR 1.560(b), the prosecution of the reexamination proceeding will be terminated under 37 CFR 1.550(d).

2. ☐ The paper filed on _____ is unsigned. A duplicate paper or ratification, properly signed, is required within ONE (1) MONTH or THIRTY (30) DAYS from the mailing date of this letter, whichever is longer. Failure to comply with this requirement will result in the paper not being considered. If the failure to comply results in a patent owner failure to file a timely and appropriate response to any Office action or any written statement of an interview required under 37 CFR 1.560(b), the prosecution of the reexamination proceeding will be terminated under 37 CFR 1.550(d).

3. ☐ The paper filed on _____ is signed by _____ , who is not of record. A duplicate paper or ratification signed by a person of record, a person made of record by way of a new power of attorney, is required within ONE (1) MONTH or THIRTY (30) DAYS from the mailing date of this letter, whichever is longer. Failure to comply with this requirement will result in the paper not being considered. If the failure to comply results in a patent owner failure to file a timely and appropriate response to any Office action or any written statement of an interview required under § 1.560(b), the prosecution of the reexamination proceeding will be terminated under 37 CFR 1.550(d).

4. ☒ The Amendment filed on *14 August 2008* does not comply with 37 CFR 1.530(d)-(j). Patent owner is given ONE (1) MONTH or THIRTY (30) DAYS from the mailing date of this letter, whichever is longer to correct this informality; otherwise, the prosecution of the the reexamination proceeding will be terminated under (37 CFR 1.550(d)).

5. ☐ The amendment filed by patent owner on _____, does not comply with 37 CFR ☐1.20(c)(3) and/or ☐1.20(c)(4), as to excess claim fees. Patent owner is given a time period of ONE (1) MONTH or THIRTY (30) DAYS from the mailing date of this letter, whichever is longer, to correct this fee deficiency, or the prosecution of the reexamination proceeding will be terminated under 37 CFR 1.550(d), to effect the "abandonment" set forth in 37 CFR 1.20(c)(5).

6. ☒ Other :

By the amendment of 14 August 2008 Patent owner has now added new claims 24-42 and amended claims 1, 8, and 14-17. Patent owner's response merely broadly refers to col. 4, line 26 to col. 6, line 50 of the specification and the drawings (all) as support for these new limitations. (See: page 6, first paragraph) This is insufficient to meet the requirements of CFR 1.530(e) which requires an explanation of the support in the disclosure for changes made to the claims.

NOTE: EXTENSION OF TIME ARE GOVERNED BY 37 CFR 1.550(c). If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.

/fferris/	CEL	ESK

cc: Requester (if third party requester)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Gurantz, *et al.*	Attorney Docket No.: 05JM-139053
Control No.: 90/008,389 Patent No.: 7,130,576	Confirmation No.: 3367
Filed: February 06, 2007	Art Unit: 3992
For: Signal Selector and Combiner for Broadband Content Distribution	Examiner: Ferris III, Fred O.

Amendment and Response to Office Action in *Ex Parte* Reexamination

Mail Stop Reexamination
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

INTRODUCTORY COMMENTS

This is in response to the Office Action in *Ex Parte* Reexamination mailed January 7, 2009, time for response to which is set to expire February 9, 2009. The considered claims, claims 1-23, stand rejected. Careful consideration has been given to the grounds for rejection, and the following amendment and discussion are offered in response. Reconsideration is respectfully requested.

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Previously presented) A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising:

a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals and digitizes the received broadband LNB signals, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals in the digital domain from at least one broadband LNB signal based on the transponder select information;

a frequency translator coupled to the signal selector that is configured to shift the selected transponder signals to new carrier frequencies and a converter configured to convert the shifted selected transponder signals to produce RF signals; and

a combiner communicatively coupled to at least one frequency translator, the combiner configured to combine at least two of the shifted selected RF signals to produce a composite signal;

wherein the modulation of the composite signal is the same as modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable;

whereby the composite signal is transmitted to the IRD.

2. (Currently amended) The signal distribution system of claim 1, further comprising a plurality of IRDs and wherein the composite signal is transmitted on a single cable connected to the ODU and all IRDs receive channels extracted from the composite signal.

3. (Currently amended) The signal distribution system of claim 1, wherein the signal selector comprises an analog to digital converter and a digital filter.

4. (Currently amended) The signal distribution system of claim 1, wherein the signal selector comprises a tuner.

5. (Currently amended) The signal distribution system of claim 1, further comprising an integrated receiver decoder (IRD) connected to the coaxial cable with a plurality of tuners within the IRD, wherein each tuner within the IRD receives the composite signal and each tuner uses at least one transponder signal.

6. (Currently amended) The signal distribution system of claim 1, wherein transponder select information is transmitted over the same cable as the composite signal.

7. (Currently amended) The signal distribution system of claim 1, wherein transponder select information is transmitted over a wireless link.

8. (Previously presented) A signal distribution system for distributing signals comprising a plurality of satellite transponder channels of a broadband signal from a plurality of sources between a first unit and a second unit over a communication medium comprising:

means in the first unit for digitizing the broadband signal from each of the plurality of sources;

means in the first unit responsive to information transmitted by the second unit for extracting selected channels from the digitized broadband signals in the digital domain; and

means in the first unit for combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; and

means in the second unit for receiving the composite signal and demodulating and decoding at least one channel; and

means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

9. (Currently amended) The signal distribution system of claim 8, wherein the control information comprises channel selection requests originating from the second unit and the control information comprises channel mapping information originating from the first unit.

10. (Original) The signal distribution system of claim 8, further comprising a means in the first unit for carrier offset correction.

11. (Currently amended) The signal distribution system of claim 8, wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.

12. (Currently amended) The signal distribution system of claim 11, wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.

13. (Currently amended) The signal distribution system of claim 12, wherein the means for communicating uses the same communication medium as the composite signal.

14. (Previously presented) A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of:

communicating a transponder request signal to the ODU from the IRD;

in the ODU, digitizing the plurality of satellite broadband signals, selecting and extracting a plurality of transponder signals [extracted] from the received digitized satellite broadband signals, wherein the selecting is responsive to the transponder request signals;

combining extracted selected transponder signals into a composite signal;

transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

15. (Currently amended) The method of claim 14, wherein the step of selecting and extracting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal.

16. (Currently amended) The method of claim 14, wherein the step of combining comprises frequency translating the selected and extracted transponder channels to a variable frequency before combining.

17. (Previously presented) The method of claim 15, further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.

18. (Currently amended) The method of claim 14, further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.

19. (Currently amended) The method of claim 14, wherein the transponder request signal is transmitted over the cable from an IRD and all IRDs receive the same composite signal.

20. (Currently amended) The method of claim 14, wherein the transponder request signal is transmitted over a wireless link to the ODU.

21. (Currently amended) The method of claim 14, further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining; and splitting the composite signal inside a home and distributing to a plurality of IRDs.

22. (Currently amended) The method of claim 21, wherein the transponder request signal is transmitted over the cable from an IRD.

23. (Currently amended) The method of claim 21, wherein the transponder request signal is transmitted over a wireless link to the ODU.

24. (Previously presented) The signal distribution system of claim 1, wherein the signal selector comprises a digital filter configured to apply a pass band filter transfer function to the digitized broadband signal to isolate a transponder channel.

25. (Previously presented) The signal distribution system of claim 1, wherein the converter comprises a digital-to-analog converter configured to convert the selected and frequency translated signal to an analog signal prior to combining.

26. (Previously presented) The signal distribution system of claim 1, wherein the frequency translator comprises a digital mixer configured to apply a rotating phasor to the data samples to translate their frequency.

27. (Previously presented) The signal distribution system of claim 1, wherein shifting a selected transponder signal to a new carrier frequency comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband.

28. (Previously presented) The signal distribution system of claim 1, wherein the channels combined in the composite signal are combined at a sample rate substantially equal to the composite output rate.

29. (Previously presented) The signal distribution system of claim 1, further comprising a controller to control the signal selector, frequency translator and converter and combiner.

30. (Previously presented) The signal distribution system of claim 29, wherein the controller, signal selector, frequency translator and combiner are part of a satellite outdoor unit.

31. (Previously presented) The signal distribution system of claim 29, further comprising a channel translation table maintained by the controller and specifying assigned frequency slots for transponder channels in the composite signal.

32. (Previously presented) The signal distribution system of claim 31, wherein the channel translation table is provided to the IRD to allow the IRD to tune to a desired selected translated transponder channel.

33. (Previously presented) The signal distribution system of claim 1, wherein the new carrier frequencies to which the selected transponder channels are shifted is determined such that the translated channels are placed at respective center frequencies where they will be positioned in the composite signal.

34. (Previously presented) The method of claim 14, wherein selecting and extracting comprises applying a pass band filter transfer function to the digitized broadband signal.

35. (Previously presented) The method of claim 14, further comprising converting the selected signal to an analog signal using a digital to analog converter prior to combining.

36. (Previously presented) The method of claim 14, wherein the combining is performed in the digital domain.

37. (Previously presented) The method of claim 17, wherein frequency translating comprises using a digital mixer to apply a rotating phasor to the data samples to translate their frequency.

38. (Previously presented) The method of claim 14, further comprising frequency translating the digitized broadband signal prior to selecting and extracting transponder signal.

39. (Previously presented) The method of claim 38, wherein frequency translating comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband.

40. (Previously presented) The method of claim 14, further comprising maintaining a channel translation table at the outdoor unit, the channel translation table specifying assigned frequency slots for transponder channels in the composite signal.

41. (Previously presented) The method of claim 38, further comprising providing the channel translation table to the IRD to allow the IRD to tune to a desired selected translated transponder channel.

42. (Previously presented) The method of claim 14, wherein selecting and extracting comprises low-pass filtering the translated digitized broadband signal thereby substantially removing signal information from non-selected transponder channels.

REMARKS

Claims 1-4, 6-8, 10-15, 17-20, 22-33, 35, 46-53, 55-63, and 65 are pending in the application. Claims 5, 9, 16, 21, 34, 36-45, 54, and 64 were canceled in a previous response. Claims 2-7, 9, and 15-23 have been amended to correct informalities in the punctuation of the claims. No new matter has been added. In view of the above amendments, the following remarks, and the remarks in the previous Response to the Office Action that was mailed November 21, 2008, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejections of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

Objection based on 37 C.F.R. § 1.530(e)

The Notice of Defective Paper in *Ex Parte* Reexamination objects to the support provided for the amendments to claims 1, 8, and 14-17, stating that the support "is insufficient to meet the requirements of CFR 1.530(e) which requires an explanation of the support in the disclosure for changes made to the claims." This explanation is provided below on a claim-by-claim basis.

The Applicants would like to thank the Examiner for taking the time to discuss the Office Action in *Ex Parte* Reexamination mailed January 7, 2009. During that discussion the requirements of 37 CFR § 1.530(e) were clarified for the Applicants. The Examiner stated

that more specific cites to each of the claim amendments were needed. This response is believed to comply with those requirements.

Claim 1

Claim 1 includes the recitation of "a signal selector that . . . digitizes the received broadband LNB signals." Support for this recitation is found in the specification in at least column 7, lines 25-31; Figures 6, 7, and 8; and column 4, lines 60-61.

Claim 1 includes the recitation of "select[ing] a plurality of transponder signals in the digital domain." Support for this recitation is found in the specification in at least column 6, lines 1-5 and lines 11-18; and Figures 6, 7, and 8.

Claim 1 includes the recitation of "a frequency translator coupled to the signal selector that is configured to shift the selected transponder signals to new carrier frequencies." Support for this recitation is found in the specification in at least claim 1 of U.S. 7,130,576, which includes the recitation "capable of shifting"; and Figure 3, mixer 360.

Claim 1 includes the recitation of "a converter configured to convert the shifted selected transponder signals to produce RF signals." Support for this recitation is found in the specification from at least column 8, line 61 to column 9, line 25; and the upconverters in Figures 8 and 9.

Claim 1 includes the recitation of "a combiner communicatively coupled to at least one frequency translator, the combiner configured to combine at least two of the shifted selected RF signals to produce a composite signal." Support for this recitation is found in the specification in at least claim 1 of U.S. 7,130,576 "capable of combining"; combiner 1030, Figure 10; and combiner 1220, Figure 12.

Claim 8

Claim 8 includes the recitation "signal distribution system for distributing signals comprising a plurality of satellite transponder channels of a broadband signal from a plurality of sources between a first unit and a second unit over a communication medium." Support for this recitation is found in the specification in at least column 10, lines 19-45; and Figure 12.

Claim 8 includes the recitation "means in the first unit for digitizing the broadband signal from each of the plurality of sources." Support for this recitation is found in the specification in at least column 7, lines 25-31; column 4, lines 60-61; and Figures 6, 7, and 8.

Claim 8 includes the recitation "means in the first unit responsive to information transmitted by the second unit for extracting selected channels from the digitized broadband signals in the digital domain." Support for this recitation is found in the specification in at least column 4, lines 60-61.

Claim 8 includes the recitation "means in the first unit for combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium." Support for this recitation is found in claim 8 of U.S. 7,130,576 "means in the first unit" and the specification in at least column 6, lines 26-30; and Figures 5, 13, and 17.

Claim 14

Claim 14 includes the recitation "digitizing the plurality of satellite broadband signals, selecting and extracting a plurality of transponder signals [extracted] from the received digitized satellite broadband signals, wherein the selecting is responsive to the transponder request signals." Support for this recitation is found in the specification in at

least column 7, lines 25-31; Figures 6, 7, and 8; and column 4, lines 60-61. Support is also found in claim 14 of U.S. 7,130,576 "extracted."

Claim 14 includes the recitation "combining extracted selected transponder signals into a composite signal." Support for this recitation is found in the specification in at least column 4, lines 30-33, 49-50; column 9, lines 27-29; and Figures 2 and 10. Support is also found in claim 14 of U.S. 7,130,576 "extracted."

Claim 15

Claim 15 includes the recitation "selecting and extracting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal." Support for this recitation is found in the specification in at least column 4, lines 30-33, 49-50; column 9, lines 27-29; and Figures 2 and 10. Support is also found in claim 14 of U.S. 7,130,576 "extracted."

Claim 16

Claim 16 includes the recitation "extracted transponder channels to a variable frequency before combining." Support for this recitation is found in the specification in at least column 4, lines 30-33, 49-50; column 9, lines 27-29; and Figures 2 and 10. Support is also found in claim 14 of U.S. 7,130,576 "extracted."

Claim 17

The amendment of claim 17 involved a change in punctuation. No new matter was submitted by this change.

Claim 24

Claim 24 includes the recitation "signal selector comprises a digital filter configured to apply a pass band filter transfer function to the digitized broadband signal to isolate a transponder channel." Support for this recitation is found in the specification in at least column 5, lines 12-29; column 6, lines 36-38; and column 5, lines 15 and 50.

Claim 25

Claim 25 includes the recitation of a "converter comprises a digital-to-analog converter configured to convert the selected and frequency translated signal to an analog signal prior to combining." Support for this recitation is found in the specification in at least column 5, lines 30-38, and lines 66-67; and Figure 3, 350 and 380.

Claim 26

Claim 26 includes the recitation of a "frequency translator comprises a digital mixer configured to apply a rotating phasor to the data samples to translate their frequency." Support for this recitation is found in the specification in at least column 5, lines 37-41 and column 6, lines 49-50.

Claim 27

Claim 27 includes the recitation of "shifting a selected transponder signal to a new carrier frequency comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband." Support for this recitation is found in the specification in at least column 5, lines 46-54 and column 6, lines 47-49.

Claim 28

Claim 28 includes the recitation of "channels combined in the composite signal are combined at a sample rate substantially equal to the composite output rate." Support for this recitation is found in the specification in at least column 6, lines 1-5.

Claim 29

Claim 29 includes the recitation of "a controller to control the signal selector, frequency translator and converter and combiner. Support for this recitation is found in the specification in at least column 7, line 45, column 9, lines 9-11; column 9, lines 6-13; column 4, lines 34-40; and Figure 2, 255 and Figure 9, 960.

Claim 30

Claim 30 includes the recitation of a "controller, signal selector, frequency translator and combiner are part of a satellite outdoor unit." Support for this recitation is found in the specification in at least Figure 2, 210 and column 4, lines 31-41.

Claim 31

Claim 31 includes the recitation of "a channel translation table maintained by the controller and specifying assigned frequency slots for transponder channels in the composite signal." Support for this recitation is found in the specification in at least column 4, lines 35-41 and column 7, lines 42-47.

Claim 32

Claim 32 includes the recitation of a "channel translation table is provided to the IRD to allow the IRD to tune to a desired selected translated transponder channel." Support for this recitation is found in the specification in at least column 4, lines 35-41; column 6, line 67 to column 7, lines 1-2; and column 7, lines 42-47.

Claim 33

Claim 33 includes the recitation of "new carrier frequencies to which the selected transponder channels are shifted is determined such that the translated channels are placed at respective center frequencies where they will be positioned in the composite signal."

Support for this recitation is found in the specification in at least column 4, lines 47-49; column 5, line 31-32; column 8, line 19-35; column 9, lines 39-43; and Figures 5 and 15.

Claim 34

Claim 34 includes the recitation of "selecting and extracting comprises applying a pass band filter transfer function to the digitized broadband signal." Support for this recitation is found in the specification in at least column 2, line 54 to column 3, line 4.

Claim 35

Claim 35 includes the recitation of "converting the selected signal to an analog signal using a digital to analog converter prior to combining." Support for this recitation is found in the specification in at least column 5, lines 66-67; column 6, lines 5-10; Figure 3, 350, 380; and Figures 6, 7, 8.

Claim 36

Claim 36 includes the recitation wherein "combining is performed in the digital domain." Support for this recitation is found in the specification in at least column 5, lines 66-67; column 6, lines 1-5 and 11-18.

Claim 37

Claim 37 includes the recitation wherein "frequency translating comprises using a digital mixer to apply a rotating phasor to the data samples to translate their frequency." Support for this recitation is found in the specification in at least column 5, lines 37-41; column 6, lines 49-50.

Claim 38

Claim 38 includes the recitation of "frequency translating the digitized broadband signal prior to selecting and extracting transponder signal." Support for this recitation is found in the specification in at least column 5, lines 12-29; and column 6, lines 46-49.

Claim 39

Claim 39 includes the recitation of "frequency translating compris[ing] translating the original digitized broadband signal to locate a selected transponder channel at baseband." Support for this recitation is found in the specification in at least column 5, lines 46-63; and Figure 14.

Claim 40

Claim 40 includes the recitation of "maintaining a channel translation table at the outdoor unit, the channel translation table specifying assigned frequency slots for transponder channels in the composite signal." Support for this recitation is found in the specification in at least column 2, line 66 to column 3, line 2; column 4, lines 29-39, lines 35-41, and lines 48-50; and column 7, lines 42-47.

Claim 41

Claim 41 includes the recitation of "providing the channel translation table to the IRD to allow the IRD to tune to a desired selected translated transponder channel." Support for this recitation is found in the specification in at least column 4, lines 35-41 and column 7, lines 42-47.

Claim 42

Claim 42 includes the recitation of "selecting and extracting comprises low-pass filtering the translated digitized broadband signal thereby substantially removing signal

information from non-selected transponder channels." Support for this recitation is found in the specification in at least column 2, line 54 to column 3, line 4; column 4, lines 48-49; and column 5, lines 12-29 and 46-54.

CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 18-1953 referencing Docket No. 05JM-139053. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Dated: February 6, 2009

Respectfully submitted,

By: _____

Lester J. Anderson
Registration No.: 45,833

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Certificate of Service

I Lester J. Anderson hereby certify that on the 6 day of February, 2009, I caused a copy of the Amendment and Response to be served, by hand, on the following:

Daniel N. Yannuzzi
12275 El Camino Real
Suite 200
San Diego, CA 92130

by:

Date: 02/06/2009

Electronic Acknowledgement Receipt	
EFS ID:	4753274
Application Number:	90008389
International Application Number:	
Confirmation Number:	3367
Title of Invention:	SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION
First Named Inventor/Applicant Name:	7130576
Customer Number:	24244
Filer:	Daniel N. Yannuzzi/Linda de la Garza
Filer Authorized By:	Daniel N. Yannuzzi
Attorney Docket Number:	05JM-127751
Receipt Date:	06-FEB-2009
Filing Date:	06-FEB-2007
Time Stamp:	19:13:48
Application Type:	Reexam (Patent Owner)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		139053-Amendmnt.pdf	169749 e536f5a716df13c1c6b94bd79ee452e633cee09f	yes	19

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Response after Ex Parte Quayle Action	2	19
Warnings:			
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	Total Files Size (in bytes):	169749	

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

AMENDMENT TRANSMITTAL LETTER (Small Entity) Applicant(s): **Gurantz, et al.**					Docket No. **05JM-139053**
Application No. **90/008,389**	Filing Date **11-06-2002**	Examiner **Ferris III, Fred O.**	Customer No. **30764**	Group Art Unit **3992**	Confirmation No. **3367**

Invention: **SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION**

COMMISSIONER FOR PATENTS:

Transmitted herewith is an amendment in the above-identified application.

☒ Applicant claims small entity status. See 37 CFR 1.27

The fee has been calculated and is transmitted as shown below.

CLAIMS AS AMENDED

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST # PREV. PAID FOR		NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE
TOTAL CLAIMS	42	-	42	=	0	x $26.00	$0.00
INDEP. CLAIMS	3	-	3	=	0	x $110.00	$0.00
Multiple Dependent Claims (check if applicable) ☐							$0.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT							$0.00

☒ No additional fee is required for amendment.

☐ Please charge Deposit Account No. in the amount of

☐ A check in the amount of to cover the filing fee is enclosed.

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- ☐ Any additional filing fees required under 37 C.F.R. 1.16.
- ☐ Any patent application processing fees under 37 CFR 1.17.

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Signature

Dated: **February 6, 2009**

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I certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/008,389	02/06/2007	7130576	05JM-127751	3367

24244 7590 05/12/2009

MICHAEL W LANDRY
5098 SEACHASE STREET
SAN DIEGO, CA 92130

EXAMINER	
ART UNIT	PAPER NUMBER

DATE MAILED: 05/12/2009

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

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DANIEL N. YANNUZZI

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12275 EL CAMINO REAL, SUITE 200

SAN DIEGO, CA 92130

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/008,389*.

PATENT NO. *7130576*.

ART UNIT *3992*.

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

PTOL-465 (Rev.07-04)

Notice of Intent to Issue Ex Parte Reexamination Certificate	Control No.	Patent Under Reexamination	
	90/008,389	7130576	
	Examiner	Art Unit	
	Fred Ferris	3992	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☒ Prosecution on the merits is (or remains) closed in this *ex parte* reexamination proceeding. This proceeding is subject to reopening at the initiative of the Office or upon petition. *Cf.* 37 CFR 1.313(a). A Certificate will be issued in view of
   - (a) ☒ Patent owner's communication(s) filed: *06 February 2009*.
   - (b) ☐ Patent owner's late response filed: _____.
   - (c) ☐ Patent owner's failure to file an appropriate response to the Office action mailed: _____.
   - (d) ☐ Patent owner's failure to timely file an Appeal Brief (37 CFR 41.31).
   - (e) ☐ Other: _____.

   Status of *Ex Parte* Reexamination:
   - (f) Change in the Specification: ☐ Yes ☒ No
   - (g) Change in the Drawing(s): ☐ Yes ☒ No
   - (h) Status of the Claim(s):
     - (1) Patent claim(s) confirmed: ~~1-42~~. ESK
     - (2) Patent claim(s) amended (including dependent on amended claim(s)): *1-23*
     - (3) Patent claim(s) cancelled: _____.
     - (4) Newly presented claim(s) patentable: 24-42.
     - (5) Newly presented cancelled claims: _____.

2. ☒ Note the attached statement of reasons for patentability and/or confirmation. Any comments considered necessary by patent owner regarding reasons for patentability and/or confirmation must be submitted promptly to avoid processing delays. Such submission(s) should be labeled: "Comments On Statement of Reasons for Patentability and/or Confirmation."

3. ☐ Note attached NOTICE OF REFERENCES CITED (PTO-892).

4. ☐ Note attached LIST OF REFERENCES CITED (PTO/SB/08).

5. ☐ The drawing correction request filed on _____ is: ☐ approved ☐ disapproved.

6. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).
   a)☐ All b)☐ Some* c)☐ None of the certified copies have
   - ☐ been received.
   - ☐ not been received.
   - ☐ been filed in Application No. _____.
   - ☐ been filed in reexamination Control No. _____.
   - ☐ been received by the International Bureau in PCT Application No. _____.

   * Certified copies not received: _____.

7. ☒ Note attached Examiner's Amendment.

8. ☐ Note attached Interview Summary (PTO-474).

9. ☐ Other: _____.

cc: Requester (if third party requester)

STATEMENT OF REASONS FOR PATENTABILITY AND/OR CONFIRMATION

Summary

This is an *ex parte* reexamination of U.S. Patent 7,130,576 issued to Gurantz et al.

The status of the claims is as follows:

Amended claims: 1, 8, 14-17

Newly added claims: 24-42

Claims patentable as amended: 1-23

Patentable new claims: 24-42

Claims not subject to reexamination: None

Cancelled claims: None

Response to Arguments and Amendment to the claims

Patent owner's amendment to the claims and supporting arguments are persuasive in overcoming the prior art of record. Accordingly, the prior art rejections cited in the previous Office actions are hereby withdrawn.

However, it is first noted that the amendment of 6 February 2008, which was intended to correct 37 CFR 1.530 (e) defects (see: NINA 1/7/09), incorrectly identifies the status of the claims. (page 8, para:1) Since this error appears to unintentional, the status of the claims is taken as noted above. Further, the amendment filed 6 February 2009 in not fully compliant with 37 CFR 1.530 as follows:

37 CFR 1.530 (f) recites the following:

"(f) Changes shown by markings. Any changes relative to the patent being reexamined which are made to the specification, including the claims, must

include the following markings:
(1) The matter to be omitted by the reexamination proceeding must be enclosed in brackets; and
(2) The matter to be added by the reexamination proceeding must be underlined."

It is further noted that Patent owner's amendment of 14 August 2008, while not compliant under 37 CFR 1.530 (e), IS compliant under 37 CFR 1.530 (f) with regard to the listing of the claims. In order to prevent any further delay of the reexamination proceeding and to ensure that it is conducted with special dispatch, the examiner makes the following Examiner's Amendment of record in order to correct the noted unintentional defects and to expedite the issuance of a Notice of Intent to Issue Ex Parte Reexamination Certificate.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. ES K

Claims 1, 8, 14-~~16~~ 17 are amended and new claims 24-42 are added to reflect the changes as set forth in Patent owner's amendment dated 14 August 2008 which is attached to this Office Action. (See attachment)

Reasons for Patentability/ Confirmation

The following is an examiner's statement of reasons for patentability and/or confirmation of the claims found patentable in this reexamination proceeding:

Patent owner has now amended independent claim 1, 8, and 14 and dependent claims 15 and 16.

As now amended, independent claim 1 requires a signal selector that receives broadband LNB signals comprising transponder signals that digitizes the received broadband LNB signals and subsequently selects the transponder signals in the digital domain from the LNB signal. The claim further requires a frequency translator coupled to a signal selector that is configured to shift the selected transponder signal to a new carrier frequency and a converter configured to convert the shifted selected transponder signals to produce RF signals. Additionally, the amended claim now requires a combiner coupled to a frequency translator that is configured to combine at least two of the shifted selected RF signals. In other words, the claim requires that the digitization of the broadband signal occurs prior to channel selection. Digitizing the broadband signal allows frequency translation to be performed using digital mixing and does not require multiple local oscillators such as those suggested in the Eutelsat Installers' Guide (Section 3.4) Amended claim 1 is therefor distinguishable over the Eutelsat reference for at least these reasons.

Independent claim 8 similarly requires a signal distribution system comprising satellite transponder channels of a broadband signal from a plurality of sources between a first unit and a second unit with a means in the first unit for digitizing the broadband signals from each of the plurality of sources and the first unit being responsive to information transmitted by the second unit for extracting selected channels from the digitized broadband signals in the digital domain. However, while the Eutelsat Installers' Guide describes at least six contemplated reception architectures (See: Section 3.4), none of these architectures appear to digitizing the broadband

signal from each source and a means for extracting selected channels from the digitized broadband signals in the digital domain as now required by amended claim 8.

As with independent claims 1 and 8, independent claim 14 also requires that the signals form the ODU to the IDU include digitizing the plurality of satellite broadband signals and selecting and extracting the transponder signals from received digitized satellite broadband signals. Accordingly, independent claim 14 is likewise distinguished over the Eutelsat Installers' Guide for at lease the same reasons set forth above.

Prior art Humpleman teaches distribution of satellite television signals via a digital network (e.g. a gateway), but appears to be silent with regard to actually digitizing the satellite broadband signals and selecting and extracting the transponder signals from received digitized satellite broadband signals as now required by the amended claims.

Prior art Kelly indeed teaches a digital receiver with digital channel selection, digital filter, and an ADC. (Fig. 8) However, Kelly is specific to AM and FM radio receiver ands is again silent with regard to actually digitizing the satellite broadband LNB signals from and ODU to an IRD and selecting and extracting the transponder signals from received digitized satellite broadband signals as now required by the amended claims.

The remaining prior art of record does not appear to suggest or render obvious the specific combination of method steps, or arrangement of apparatus elements for distribution of and communicating transponder signals from a satellite ODU receiving satellite broadband signals to an IRD and subsequently digitizing the satellite broadband signals and extracting transponder signals from received digitized satellite signals as now required by amended claims 1, 8, and 14.

Dependent claims are deemed patentable as being dependent either directly or indirectly from claims 1, 8, and 14 respectively.

Any comments considered necessary by PATENT OWNER regarding the above statement must be submitted promptly to avoid processing delays. Such submission by the patent owner should be labeled: "Comments on Statement of Reasons for Patentability and/or Confirmation" and will be placed in the reexamination file.

Conclusion

Any paper filed with the USPTO, i.e., any submission made, by either the Patent Owner or the Third Party Requester must be served on every other party in the reexamination proceeding, including any other third party requester that is part of the proceeding due to merger of the reexamination proceedings. As proof of service, the party submitting the paper to the Office must attach a Certificate of Service to the paper, which sets forth the name and address of the party served and the method of service. Papers filed without the required Certificate of Service may be denied consideration. 37 CFR 1.903; MPEP 2666.06.

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401 Dulany Street
Alexandria, VA 22314

Any inquiry concerning this communication or earlier communications from the examiner, or as to the status of this proceeding, should be directed to the Central Reexamination Unit at telephone number (571) 272-7705.

Fred Ferris
Primary Examiner
AU 3992

Conferees:

CJS
ESK

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising:

a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals and digitizes the received broadband LNB signals, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals in the digital domain from at least one broadband LNB signal based on the transponder select information;

a frequency translator coupled to the signal selector that is [capable of shifting] configured to shift the selected transponder signals to new carrier frequencies and a converter configured to convert the shifted selected transponder signals to produce RF signals; and

a combiner communicatively coupled to at least one frequency translator, the combiner configured to combine[capable of combining] at least two of the shifted selected RF signals to produce a composite signal;

wherein the modulation of the composite signal is the same as modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable;

whereby the composite signal is transmitted to the IRD.

2. (Original) The signal distribution system of claim 1 further comprising a plurality of IRDs and wherein the composite signal is transmitted on a single cable connected to the ODU and all IRDs receive channels extracted from the composite signal.

3. (Original) The signal distribution system of claim 1 wherein the signal selector comprises an analog to digital converter and a digital filter.

4. (Original) The signal distribution system of claim 1 wherein the signal selector comprises a tuner.

PAGE 3/18 * RCVD AT 8/14/2008 7:33:27 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/20 * DNIS:2738900 * CSID:858 509 3691 * DURATION (mm-ss):07-06

5. (Original) The signal distribution system of claim 1 further comprising an integrated receiver decoder (IRD) connected to the coaxial cable with a plurality of tuners within the IRD, wherein each tuner within the IRD receives the composite signal and each tuner uses at least one transponder signal.

6. (Original) The signal distribution system of claim 1 wherein transponder select information is transmitted over the same cable as the composite signal.

7. (Original) The signal distribution system of claim 1 wherein transponder select information is transmitted over a wireless link.

8. (Currently Amended) A signal distribution system for distributing signals comprising a plurality of satellite transponder channels of a broadband signal from a plurality of sources between a first unit and a second unit over a communication medium comprising:

means in the first unit for digitizing the broadband signal from each of the plurality of sources;

means in the first unit responsive to information transmitted by the second unit for extracting selected channels from [each of the plurality of sources] the digitized broadband signals in the digital domain; and

means in the first unit for combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; and

means in the second unit for receiving the composite signal and demodulating and decoding at least one channel; and

means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

9. (Original) The signal distribution system of claim 8 wherein the control information comprises channel selection requests originating from the second unit and the control information comprises channel mapping information originating from the first unit.

10. (Original) The signal distribution system of claim 8, further comprising a means in the first unit for carrier offset correction.

11. (Original) The signal distribution system of claim 8 wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.

12. (Original) The signal distribution system of claim 11 wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.

13. (Original) The signal distribution system of claim 12 wherein the means for communicating uses the same communication medium as the composite signal.

14. (Currently Amended) A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of:

communicating a transponder request signal to the ODU from the IRD;

in the ODU, digitizing the plurality of satellite broadband signals, selecting and extracting a plurality of transponder signals [extracted] from the received digitized satellite broadband signals, wherein the selecting is responsive to the transponder request signals;

combining extracted selected transponder signals into a composite signal;

transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

15. (Currently Amended) The method of claim 14 wherein the step of selecting and extracting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal.

16. (Currently Amended) The method of claim 14 wherein the step of combining comprises frequency translating the selected and extracted transponder channels to a variable frequency before combining.

17. (Currently Amended) The method of claim 15, further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.

18. (Original) The method of claim 14 further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.

19. (Original) The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD and all IRDs receive the same composite signal.

20. (Original) The method of claim 14 wherein the transponder request signal is transmitted over a wireless link to the ODU.

21. (Original) The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining; and splitting the composite signal inside a home and distributing to a plurality of IRDs.

22. (Original) The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.

23. (Original) The method of claim 21 wherein the transponder request signal is transmitted over a wireless link to the ODU.

24. (Newly Added) The signal distribution system of claim 1, wherein the signal selector comprises a digital filter configured to apply a pass band filter transfer function to the digitized broadband signal to isolate a transponder channel.

25. (Newly Added) The signal distribution system of claim 1, wherein the converter comprises a digital-to-analog converter configured to convert the selected and frequency translated signal to an analog signal prior to combining.

26. (Newly Added) The signal distribution system of claim 1, wherein the frequency translator comprises a digital mixer configured to apply a rotating phasor to the data samples to translate their frequency.

27. (Newly Added) The signal distribution system of claim 1, wherein shifting a selected transponder signal to a new carrier frequency comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband.

28. (Newly Added) The signal distribution system of claim 1, wherein the channels combined in the composite signal are combined at a sample rate substantially equal to the composite output rate.

29. (Newly Added) The signal distribution system of claim 1, further comprising a controller to control the signal selector, frequency translator and converter and combiner.

30. (Newly Added) The signal distribution system of claim 29, wherein the controller, signal selector, frequency translator and combiner are part of a satellite outdoor unit.

31. (Newly Added) The signal distribution system of claim 29, further comprising a channel translation table maintained by the controller and specifying assigned frequency slots for transponder channels in the composite signal.

32. (Newly Added) The signal distribution system of claim 31, wherein the channel translation table is provided to the IRD to allow the IRD to tune to a desired selected translated transponder channel.

33. (Newly Added) The signal distribution system of claim 1, wherein the new carrier frequencies to which the selected transponder channels are shifted is determined such that the translated channels are placed at respective center frequencies where they will be positioned in the composite signal.

34. (Newly Added) The method of claim 14, wherein selecting and extracting comprises applying a pass band filter transfer function to the digitized broadband signal.

35. (Newly Added) The method of claim 14, further comprising converting the selected signal to an analog signal using a digital to analog converter prior to combining.

36. (Newly Added) The method of claim 14, wherein the combining is performed in the digital domain.

37. (Newly Added) The method of claim 17, wherein frequency translating comprises using a digital mixer to apply a rotating phasor to the data samples to translate their frequency.

38. (Newly Added) The method of claim 14, further comprising frequency translating the digitized broadband signal prior to selecting and extracting transponder signal.

39. (Newly Added) The method of claim 38, wherein frequency translating comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband.

40. (Newly Added) The method of claim 14, further comprising maintaining a channel translation table at the outdoor unit, the channel translation table specifying assigned frequency slots for transponder channels in the composite signal.

41. (Newly Added) The method of claim 38, further comprising providing the channel translation table to the IRD to allow the IRD to tune to a desired selected translated transponder channel.

42. (Newly Added) The method of claim 14, wherein selecting and extracting comprises low-pass filtering the translated digitized broadband signal thereby substantially removing signal information from non-selected transponder channels.

PAGE 8/18 * RCVD AT 8/14/2008 7:33:27 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/20 * DNIS:2738300 * CSID:858 509 3691 * DURATION (mm-ss):07-06

Reexamination	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/008,389	7130576
	Certificate Date	Certificate Number
		C1

Requester Correspondence Address:	☐ Patent Owner	☒ Third Party

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LITIGATION REVIEW ☒	FOF (examiner initials)	6/3/08 (date)
Case Name		Director Initials
None		Eric Keasel for GM

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CONFIRMATION NO. 3367

SERIAL NUMBER	FILING OR 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/008,389	02/06/2007 RULE	455	3992	05JM-127751

APPLICANTS

7130576, Residence Not Provided;
Entropic Communications Inc.(OWNER), San Diego, CA;
RF Magic(3RD PTY REQ), San Diego, CA;
Daniel N. Yannuzzi, San Diego, CA

**** CONTINUING DATA ***************************

This application is a REX of 10/289,011 11/06/2002 PAT 7,130,576
which claims benefit of 60/345,965 11/07/2001
and claims benefit of 60/333,722 11/27/2001
and claims benefit of 60/358,817 02/22/2002

verified ESK 5/11/09

**** FOREIGN APPLICATIONS *********************

none ESK 5/11/09

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ yes ☒ no			23	3
35 USC 119 (a-d) conditions met ☐ yes ☒ no ☐ Met after Allowance				
Verified and Acknowledged Examiner's Signature: Lin Haseel For Ferris ESK Initials				

ADDRESS
24244

TITLE
SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
2520	No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Issue Classification	Application/Control No. 90/008,389	Applicant(s)/Patent under Reexamination 7130576
	Examiner Fred Ferris	Art Unit 3992

ISSUE CLASSIFICATION

ORIGINAL		INTERNATIONAL CLASSIFICATION									
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
455	3.02	H	04	H	1	/00				/	

CROSS REFERENCES											
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)										
455	3.01	3.04	427				/				/
725	71	78					/				/
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(Assistant Examiner) (Date)

(Legal Instruments Examiner) (Date)

Fred Ferris
5/08/2009

(Primary Examiner) (Date)

Total Claims Allowed: 42

O.G. Print Claim(s)	O.G. Print Fig.
1	2

☒ **Claims renumbered in the same order as presented by applicant** ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		31		61		91		121		151		181
	2		32		62		92		122		152		182
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	4		34		64		94		124		154		184
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	29		59		89		119		149		179		209
	30		60		90		120		150		180		210

Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination	
	90/008,389	7130576	
	Examiner	Art Unit	
	Fred Ferris	3992	

SEARCHED			
Class	Subclass	Date	Examiner
455	3.02	5/8/2009	FOF

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
Reveiwed prior art of record	5/8/2009	FOF

PTO/SB/122 (11-08)
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Application Number	90/008,389
Filing Date	02/06/2007
First Named Inventor	7,130,576
Art Unit	3992
Examiner Name	Ferris III, Fred O.
Attorney Docket Number	05JM-139053

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☑ Assignee of record of the entire interest.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

☐ Attorney or agent of record. Registration Number _____.

☐ Registered practitioner named in the application transmittal letter in an application without an executed oath or declaration. See 37 CFR 1.33(a)(1). Registration Number_____.

Signature

Typed or Printed Name: Bruce W. Greenhaus

Date	Telephone
5-20-09	(858) 625-3200 x3679

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Electronic Acknowledgement Receipt	
EFS ID:	5367589
Application Number:	90008389
International Application Number:	
Confirmation Number:	3367
Title of Invention:	SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION
First Named Inventor/Applicant Name:	7130576
Customer Number:	24244
Filer:	Daniel N. Yannuzzi/Linda de la Garza
Filer Authorized By:	Daniel N. Yannuzzi
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Change of Address	139053-ChangeofCorr.pdf	36364 25417a7e00091c6ef136c9756d3beb53c375d5fd	no	1
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CONFIRMATION NO. 3367

SERIAL NUMBER	FILING OR 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/008,389	02/06/2007 RULE	455	3992	05JM-127751

APPLICANTS

7130576, Residence Not Provided;
Entropic Communications Inc.(OWNER), San Diego, CA;
RF Magic(3RD PTY REQ), San Diego, CA;
Daniel N. Yannuzzi, San Diego, CA

**** CONTINUING DATA ***************************

This application is a REX of 10/289,011 11/06/2002 PAT 7,130,576
which claims benefit of 60/345,965 11/07/2001
and claims benefit of 60/333,722 11/27/2001
and claims benefit of 60/358,817 02/22/2002

**** FOREIGN APPLICATIONS *********************

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ yes ☐ no			23	3
35 USC 119 (a-d) conditions met ☐ yes ☐ no ☐ Met after Allowance				
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TITLE

SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
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(12) EX PARTE REEXAMINATION CERTIFICATE (6993rd)

United States Patent

Gurantz et al.

(10) Number: US 7,130,576 C1

(45) Certificate Issued: Aug. 11, 2009

(54) SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION

(75) Inventors: **Itzhak Gurantz**, San Diego, CA (US); **Ladd El Wardani**, La Jolla, CA (US); **Michael Landry**, San Diego, CA (US)

(73) Assignee: **Entropic Communications Inc.**, San Diego, CA (US)

Reexamination Request:
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Patent No.:	**7,130,576**
Issued:	**Oct. 31, 2006**
Appl. No.:	**10/289,011**
Filed:	**Nov. 6, 2002**

Related U.S. Application Data

(60) Provisional application No. 60/345,965, filed on Nov. 7, 2001, provisional application No. 60/333,722, filed on Nov. 27, 2001, and provisional application No. 60/358,817, filed on Feb. 22, 2002.

(51) **Int. Cl.**
H04H 1/00 (2006.01)

(52) **U.S. Cl.** **455/3.02**; 455/3.01; 455/3.04; 455/427; 725/71; 725/78

(58) **Field of Classification Search** 455/3.02
See application file for complete search history.

(56) **References Cited**

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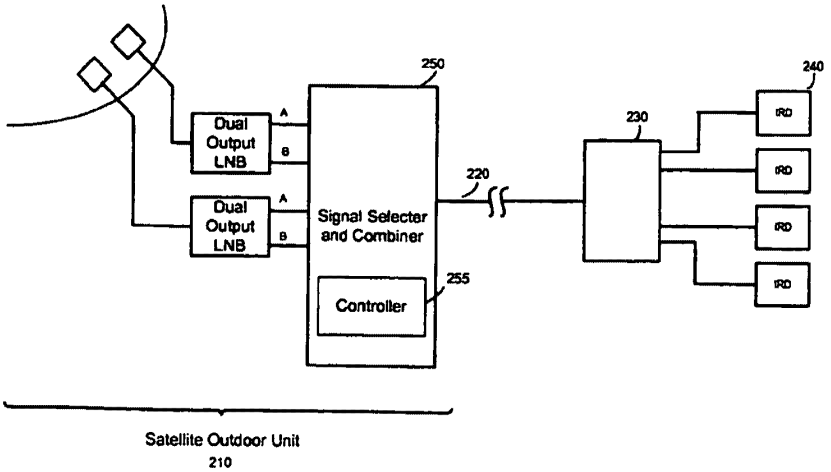
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Primary Examiner—Fred Ferris

(57) **ABSTRACT**

In a satellite receiving system, program channels are selected from one or more broadband signals and combined with other selected channels and transmitted from a first unit, for example an outdoor unit, to a second unit, for example a gateway, server, or set-top box, using a single cable. Channels can be selected by digitizing the broadband signal then digitally filtering to isolate the desired channels. The outputs of several LNBs can be selected and combined into one signal. Multiple set-top boxes can receive independent signals over a single cable from the outdoor unit.



EX PARTE REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

Claims **1**, **8**, **14**, **15**, **16** and **17** are determined to be patentable as amended.

Claims **2–7**, **9–13** and **18–23**, dependent on an amended claim, are determined to be patentable.

New claims **24–42** are added and determined to be patentable.

1. A signal distribution system for distributing a plurality of low noise amplifier and block converter (LNB) signals from a satellite outdoor unit (ODU) over a coaxial cable to an integrated receiver decoder (IRD) comprising:

a signal selector that receives a plurality of broadband LNB signals comprising a plurality of transponder signals *and digitizes the received broadband LNB signals*, the signal selector is responsive to transponder select information transmitted by an IRD and selects a plurality of transponder signals *in the digital domain* from at least one broadband LNB signal based on the transponder select information;

a frequency translator coupled to the signal selector that is [capable of shifting] *configured to shift* the selected transponder signals to new carrier frequencies *and a converter configured to convert the shifted selected transponder signals* to produce RF signals; and

a signal combiner *communicatively* coupled to at least one frequency translator [capable of combining], *the combiner configured to combine* at least two *of the shifted selected* RF signals to produce a composite signal;

wherein the modulation of the composite signal is the same as the modulation of the broadband LNB signals and wherein the composite signal is transmitted on the coaxial cable;

whereby the composite signal is transmitted to the IRD.

8. A signal distribution system for distributing signals comprising a plurality of *satellite transponder* channels *of a broadband signal* from a plurality of sources between a first unit and a second unit over a communication medium comprising:

means in the first unit for digitizing the broadband signal from each of the plurality of sources;

means in the first unit responsive to information transmitted by the second unit for extracting selected channels from [each of the plurality of sources] *the digitized broadband signals in the digital domain;* and

means in the first unit for combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; and

means in the second unit for receiving the composite signal and demodulating and decoding at least one channel; and

means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

14. A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of:

communicating a transponder request to the ODU from the IRD;

in the ODU, *digitizing the plurality of satellite broadband signals,* selecting *and extracting* a plurality of transponder signals [extracted] from the received *digitized* satellite broadband signals, wherein the selecting is responsive to the transponder request signals;

combining *extracted* selected transponder signals into a composite signal;

transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

15. The method of claim **14** wherein the step of selecting *and extracting* a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal.

16. The method of claim **14** wherein the step of combining comprises frequency translating the selected *and extracted* transponder channels to a variable frequency before combining.

17. The method of claim **15**, further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.

24. The signal distribution system of claim 1, wherein the signal selector comprises a digital filter configured to apply a pass band filter transfer function to the digitized broadband signal to isolate a transponder channel.

25. The signal distribution system of claim 1, wherein the converter comprises a digital-to-analog converter configured to convert the selected and frequency translated signal to an analog signal prior to combining.

26. The signal distribution system of claim 1, wherein the frequency translator comprises a digital mixer configured to apply a rotating phasor to the data samples to translate their frequency.

27. The signal distribution system of claim 1, wherein shifting a selected transponder signal to a new carrier frequency comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband.

28. The signal distribution system of claim 1, wherein the channels combined in the composite signal are combined at a sample rate substantially equal to the composite output rate.

29. The signal distribution system of claim 1, further comprising a controller to control the signal selector, frequency translator and converter and combiner.

30. The signal distribution system of claim 29, wherein the controller, signal selector, frequency translator and combiner are part of a satellite outdoor unit.

31. The signal distribution system of claim 29, further comprising a channel translation table maintained by the controller and specifying assigned frequency slots for transponder channels in the composite signal.

32. The signal distribution system of claim 31, wherein the channel translation table is provided to the IRD to allow the IRD to tune to a desired selected translated transponder channel.

33. The signal distribution system of claim 1, wherein the new carrier frequencies to which the selected transponder channels are shifted is determined such that the translated channels are placed at respective center frequencies where they will be positioned in the composite signal.

34. The method of claim 14, wherein selecting and extracting comprises applying a pass band filter transfer function to the digitized broadband signal.

35. The method of claim 14, further comprising converting the selected signal to an analog signal using a digital to analog converter prior to combining.

36. The method of claim 14, wherein the combining is performed in the digital domain.

37. The method of claim 17, wherein frequency translating comprises using a digital mixer to apply a rotating phasor to the data samples to translate their frequency.

38. The method of claim 14, further comprising frequency translating the digitized broadband signal prior to selecting and extracting transponder signal.

39. The method of claim 38, wherein frequency translating comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband.

40. The method of claim 14, further comprising maintaining a channel translation table at the outdoor unit, the channel translation table specifying assigned frequency slots for transponder channels in the composite signal.

41. The method of claim 38, further comprising providing the channel translation table to the IRD to allow the IRD to tune to a desired selected translated transponder channel.

42. The method of claim 14, wherein selecting and extracting comprises low-pass filtering the translated digitized broadband signal thereby substantially removing signal information from non-selected transponder channels.

* * * * *

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The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	6/5/15
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Title	Chief Finanical Officer		

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International Application Number:	
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First Named Inventor/Applicant Name:	7130576
Customer Number:	77882
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STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Itzhak Gurantz, Ladd El Wardani, Michael Landry

Application No./Patent No.: 90/008,389 Filed/Issue Date: 02/06/2007

Titled: SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION

Entropic Communications, LLC , a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.

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/Christopher C. Winslade/ 06/15/2015

Signature Date

Christopher C. Winslade, Reg. No. 36308 Attorney for Applicant

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/008,389	02/06/2007	7130576	E010004USREX1	3367

77882 7590 06/16/2015
Sheppard Mullin Richter & Hampton LLP
12275 El Camino Real, Suite 200
San Diego, CA 92130

EXAMINER
FERRIS III, FRED O

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
06/16/2015	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

Doc Code: N572

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SHEPPARD MULLING RICHTER & HAMPTON LLP
12275 EL CAMINO REAL
SUITE 200
SAN DIEGO, CA 92130

90/008389

Cc: MCANDREWS HELD & MALLOY, LTD.
500 WEST MADISON STREET
SUITE 3400
CHICAGO, IL 60661

Date Mailed: 06/16/15

DENIAL OF REQUEST FOR POWER OF ATTORNEY IN A REEXAMINATION PROCEEDING

The request for Power of Attorney filed 06/15/15 is acknowledged. However, the request cannot be granted at this time for the reason stated below.

☐ The power of attorney you provided did not comply with 37 CFR 1.32. See 69 Fed. Reg. 29865 (May 26, 2004).

The revocation is not signed by the applicant, the assignee of the entire interest, or one particular principal attorney having the authority to revoke.

The power of attorney is from an assignee and the statement required by 37 CFR 3.73(b) has not been received.

☐ The person signing for the assignee has omitted their empowerment to sign on behalf of the assignee.

☐ The inventor(s) is/are without authority to appoint attorneys since the assignee has intervened as provided by 37 CFR 3.71.

☐ The signature(s) of _____, co-inventor(s) in this application, has/have been omitted. The power of attorney will be entered upon receipt of confirmation signed by said co-inventor(s).

☐ The person(s) appointed in the power of attorney is/are not registered to practice before the U.S. Patent and Trademark Office.

XX The correspondence address in the request for power of attorney is different than the address for the **patent** that is currently of record in the patent file. Pursuant to 37 CFR 1.33, any paper attempting to change the correspondence address in a reexamination proceeding to other than that of record in the patent file is ineffective. See MPEP 2224, 2624. Since the power of attorney will not be separately processed from the change of correspondence address, the power of attorney is ineffective. The correspondence address in the reexamination proceeding is the address of record in the patent file as listed at the top of this letter.

Note: to properly change the correspondence address in the reexamination proceeding, a change of correspondence address **must first (or concurrently) be filed in the patent file**, for example, through form PTO/SB/123. Note that patent owner may designate a separate address solely for payment of maintenance fees through form PTO/SB/47, also along with **Certificate of Service** when 3rd party in Reexamination.

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Questions relating to this Notice should be directed to the Central Reexamination Unit at (571) 272-7705.

PTO/SB/81B (08-12)
Approved for use through 11/30/2014. OMB 0651-0035
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REEXAMINATION OR SUPPLEMENTAL EXAMINATION – PATENT OWNER POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS FOR REEXAMINATION OR SUPPLEMENTAL EXAMINATION AND PATENT

Control Number(s)	
Filing Date(s)	
First Named Inventor	
Title	
Patent Number	
Examiner Name	
Attorney Docket No(s)	

I. Power of Attorney. This form may be used to change the Power of Attorney in a reexamination or supplemental examination proceeding (or multiple proceedings where merged). This form may also be used to change the Power of Attorney in the patent file; in such a case, a copy of this form will be placed in both the patent file and the reexamination or supplemental examination proceeding.

A. Revocation of Previous Power of Attorney. I hereby revoke all previous patent owner powers of attorney, if any, given:

☐ in the above-identified reexamination or supplemental examination proceeding control number(s) (more than one may be changed only if the proceedings are merged).

☐ in the file of the above-identified patent.

(check BOTH boxes if change in BOTH the patent file and the reexamination or supplemental examination proceeding is requested).

B. Designation of Power of Attorney.

☐ A Power of Attorney is submitted herewith.

OR

☐ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) to prosecute the proceeding(s)/patent identified above and selected in section I(A), and to transact all business in the United States Patent and Trademark Office connected therewith:

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the proceeding(s) identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Authorization for the Power of Attorney is provided by the signature on page 2 of this form.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

II. Change of Correspondence Address

Please recognize or change the correspondence address for the above-identified reexamination or supplemental examination proceeding control number(s) (more than one may be changed **only** if they are merged proceedings) **and for the file of the above-identified patent** to be:

☐ The address associated with the above-identified Customer Number.
OR
☐ The address associated with the Customer Number identified in the box at right:
OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

NOTE: THE CORRESPONDENCE ADDRESS FOR THE REEXAMINATION OR SUPPLEMENTAL EXAMINATION PROCEEDING CONTROL NUMBER(S) MUST BE THE SAME AS THAT FOR THE PATENT. SEE 37 CFR 1.33.

III. Authorization for Power of Attorney and (if selected) Change of Correspondence Address

I am the:
☐ Inventor, having ownership of the patent being reexamined.
OR
☐ Patent owner.
Statement under 37 CFR 3.73(c) (Form PTO/SB/96) submitted herewith or filed on _____.

Signature of Inventor or Patent Owner		Date	
Name		Telephone	
Title and Company			

NOTE: Signatures of all the inventors or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☐ A total of _____ forms are submitted. *If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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PTO/SB/80 (11-08)
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☑ Practitioners associated with the Customer Number: 23446

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☑ The address associated with Customer Number: 23446

OR

☐ Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

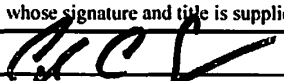
Assignee Name and Address:

Entropic Communications, LLC
5966 La Place Court, Suite 100
Carlsbad, CA 92008

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date 10/10/16
Name	Adam C. Spice	Telephone 949-333-0092
Title	Chief Financial Officer	

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt	
EFS ID:	35721686
Application Number:	90008389
International Application Number:	
Confirmation Number:	3367
Title of Invention:	SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION
First Named Inventor/Applicant Name:	7130576
Customer Number:	77882
Filer:	Christopher C. Winslade/Brenda Campillo
Filer Authorized By:	Christopher C. Winslade
Attorney Docket Number:	E010004USREX1
Receipt Date:	15-APR-2019
Filing Date:	06-FEB-2007
Time Stamp:	10:28:12
Application Type:	Reexam (Patent Owner)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73	29399US05_S373b.pdf	428255 0ed85a0f01bfb2638f522a9dd6dc3edd1a8b39ed	no	2

Warnings:

Information:					
2	Power of Attorney	Entropic_MxL_PreAIA_POA.pdf	130279 b2865feee1de6b03326acadca7e3660514a43c2a	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	558534	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/96 (07-09)
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STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Entropic Communications, LLC

Application No./Patent No.: 90/008,389 Filed/Issue Date: 02/06/2007

Titled: Signal Selector and Combiner for Broadband Content Distribution

Entropic Communications, LLC , a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;

2. ☐ an assignee of less than the entire right, title, and interest in (The extent (by percentage) of its ownership interest is _____ %); or

3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy therefore is attached.

OR

B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: EXCALIBUR ACQUISITION CORPORATION;I To: ENTROPIC COMMUNICATIONS, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 035704 , Frame 0504 , or for which a copy thereof is attached.

2. From: ENTROPIC COMMUNICATIONS, INC.;EXCA To: ENTROPIC COMMUNICATIONS, LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 035706 , Frame 0188 , or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____ , Frame _____ , or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Christopher C. Winslade/ April 15, 2019

Signature Date

Christopher C. Winslade Attorney/Agent of Record

Printed or Typed Name Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
90/008,389	02/06/2007	7130576	E010004USREX1

CONFIRMATION NO. 3367

POA ACCEPTANCE LETTER

23446
MCANDREWS HELD & MALLOY, LTD
500 WEST MADISON STREET
SUITE 3400
CHICAGO, IL 60661

OC000000107780836

Date Mailed: 04/30/2019

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/15/2019.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/tplovelace/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
90/008,389	02/06/2007	7130576	E010004USREX1

CONFIRMATION NO. 3367

POWER OF ATTORNEY NOTICE

77882
Sheppard Mullin Richter & Hampton LLP
650 Town Center Drive, 4th Floor
Costa Mesa, CA 92626

OC000000107780820

Date Mailed: 04/30/2019

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/15/2019.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/tplovelace/

PTO/AIA/80 (07-17)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[X] Practitioners associated with Customer Number: 23,446

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number: 23,446

OR

[ ]

Firm or individual name		
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: ENTROPIC COMMUNICATIONS, LLC
1345 AVENUE OF THE AMERICAS, 46TH FLOOR
NEW YORK, NY 10105

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature /Andrea L. Gothing/	Date 2021-05-04
Name Andrea L. Gothing	Telephone 415-830-0613
Title Licensing Officer and Authorized Signatory, Entropic Communications, LLC	

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt	
EFS ID:	43328420
Application Number:	90008389
International Application Number:	
Confirmation Number:	3367
Title of Invention:	SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION
First Named Inventor/Applicant Name:	7130576
Customer Number:	23446
Filer:	Ronald H. Spuhler/Deborah Wilson
Filer Authorized By:	Ronald H. Spuhler
Attorney Docket Number:	E010004USREX1
Receipt Date:	23-JUL-2021
Filing Date:	06-FEB-2007
Time Stamp:	12:01:15
Application Type:	Reexam (Patent Owner)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73	29399US05_373c_Statement_AIA-96.pdf	124383 3c943bb2ad7a40be7b4f1ef1b37d35d1ad1bc5ce	no	3

Warnings:

Information:					
2	Power of Attorney	Entropic-POA_General_Assignee_EntropicCommunications_ALG.pdf	487892 51444e06ae84b241bfc127dc47c5d6c646944dd7	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	612275	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/96 (08-12)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: ENTROPIC COMMUNICATIONS, LLC

Application No./Patent No.: 90/008,389 Filed/Issue Date: 2007-02-06

Titled: SIGNAL SELECTOR AND COMBINER FOR BROADBAND CONTENT DISTRIBUTION

ENTROPIC COMMUNICATIONS, LLC, a limited liability company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Itzhak Gurantz, Ladd El Wardani, Michael Landry To: ENTROPIC COMMUNICATIONS, INC.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 014140, Frame 0486, or for which a copy thereof is attached.

2. From: EXCALIBUR ACQUISITION CORPORATION, ENTROPIC COMMUNICATIONS, INC. To: ENTROPIC COMMUNICATIONS, INC.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 035704, Frame 0504, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: ENTROPIC COMMUNICATIONS, INC., EXCALIBUR SUBSIDIARY, LLC To: ENTROPIC COMMUNICATIONS, LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 035706, Frame 0188, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Ronald H. Spuhler/	2021-07-23
Signature	Date
Ronald H. Spuhler	52245
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.