Motorola Mobility, Inc. v. Apple, Inc.,

Case No. 1:10-CV-23580-UU (S.D. Fla.)

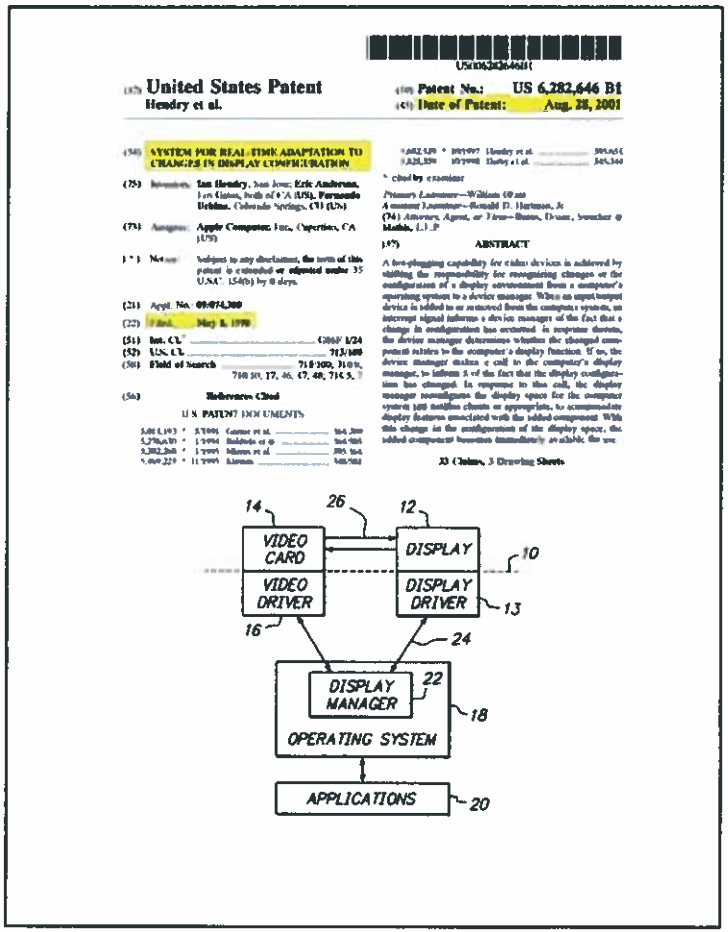
Technology Tutorial
Apple Patents-in-Suit

’646 and ’116 Patents

Real-Time Adaptation to Changes in Display Configuration

The ’646 Patent

’646 & ’116 Patents



United States Patent
Hendry et al.

Patent No.: US 6,282,646 B1
Date of Patent: Aug. 28, 2001

SYSTEM FOR REAL-TIME ADAPTATION TO CHANGES IN DISPLAY CONFIGURATION

ABSTRACT

(12) **United States Patent**
Hendry et al.

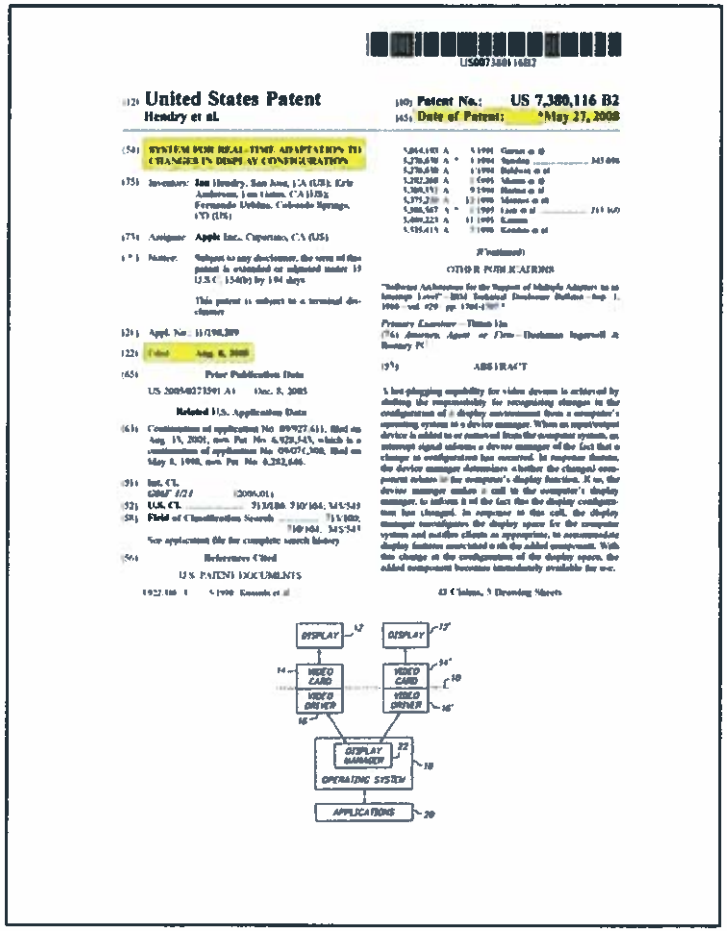
(54) **SYSTEM FOR REAL-TIME ADAPTATION TO CHANGES IN DISPLAY CONFIGURATION**

(75) Inventors: **Ian Hendry**, San Jose; **Eric Anderson**, Los Gatos, both of CA (US); **Fernando Urbina**, Colorado Springs, CO (US)

- **Issued: Aug. 28, 2001**
- **Filing Date: May 8, 1998**
- **Claims at issue: 1, 10, 13, 14, 16, 32**
- **Accused products: HDMI compatible phones and tablets (e.g. Droid X, Atrix, and Xoom)**
- **Identified products: Powerbook G4 and subsequent products**

The ’116 Patent

’646 & ’116 Patents



(12) **United States Patent**
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(54) **SYSTEM FOR REAL-TIME ADAPTATION TO CHANGES IN DISPLAY CONFIGURATION**

(75) Inventors: **Ian Hendry**, San Jose, CA (US); **Eric Anderson**, Los Gatos, CA (US); **Fernando Urbina**, Colorado Springs, CO (US)

- **Issued: May 27, 2008**
- **Effective Filing Date: May 8, 1998 (continuation of ’646 patent)**
- **Claims at issue: 1, 8-10, 16, 18-20, 27, 33, 36-38, 42**
- **Accused products: HDMI compatible phones and tablets (e.g. Droid X, Atrix, and Xoom)**
- **Identified products: Powerbook G4 and subsequent products**

Goal: Use an External Monitor

'646 & '116 Patents

- Due to the limited screen size on laptops, some users wanted the ability to display onto a larger external monitor.

Computer display could be mirrored, or cloned, on larger display…

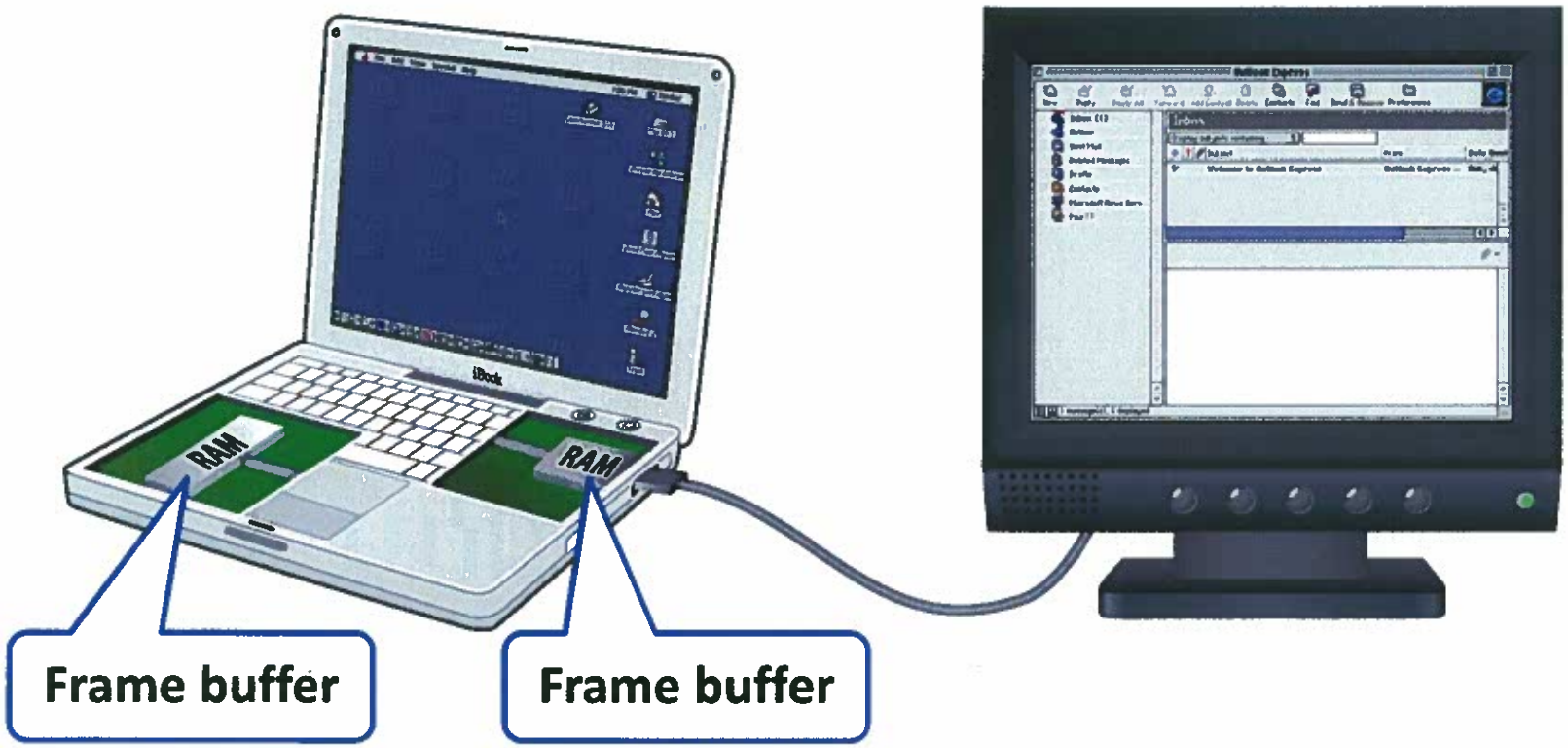
Goal: Use an External Monitor

'646 & '116 Patents

- Due to the limited screen size on laptops, some users wanted the ability to display onto a larger external monitor.

The Inventions of the '646 and '116 Patents

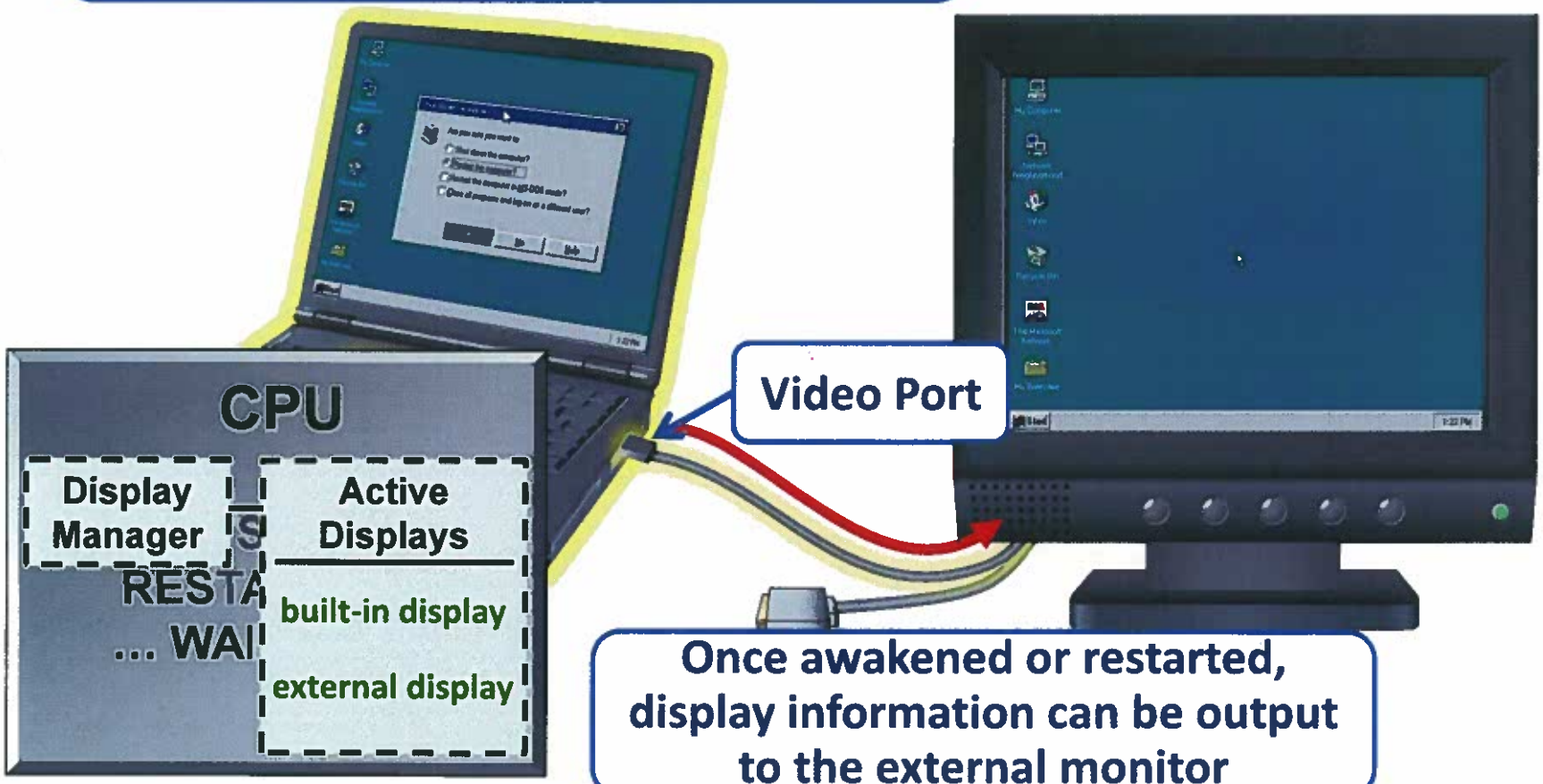
- Each video card includes a frame buffer (Random Access Memory) to store pixel data for its display.



Problem: Need to Reboot to Use External Monitor

'646 & '116 Patents

Upon connection, the computer is unable to output display information to the external monitor

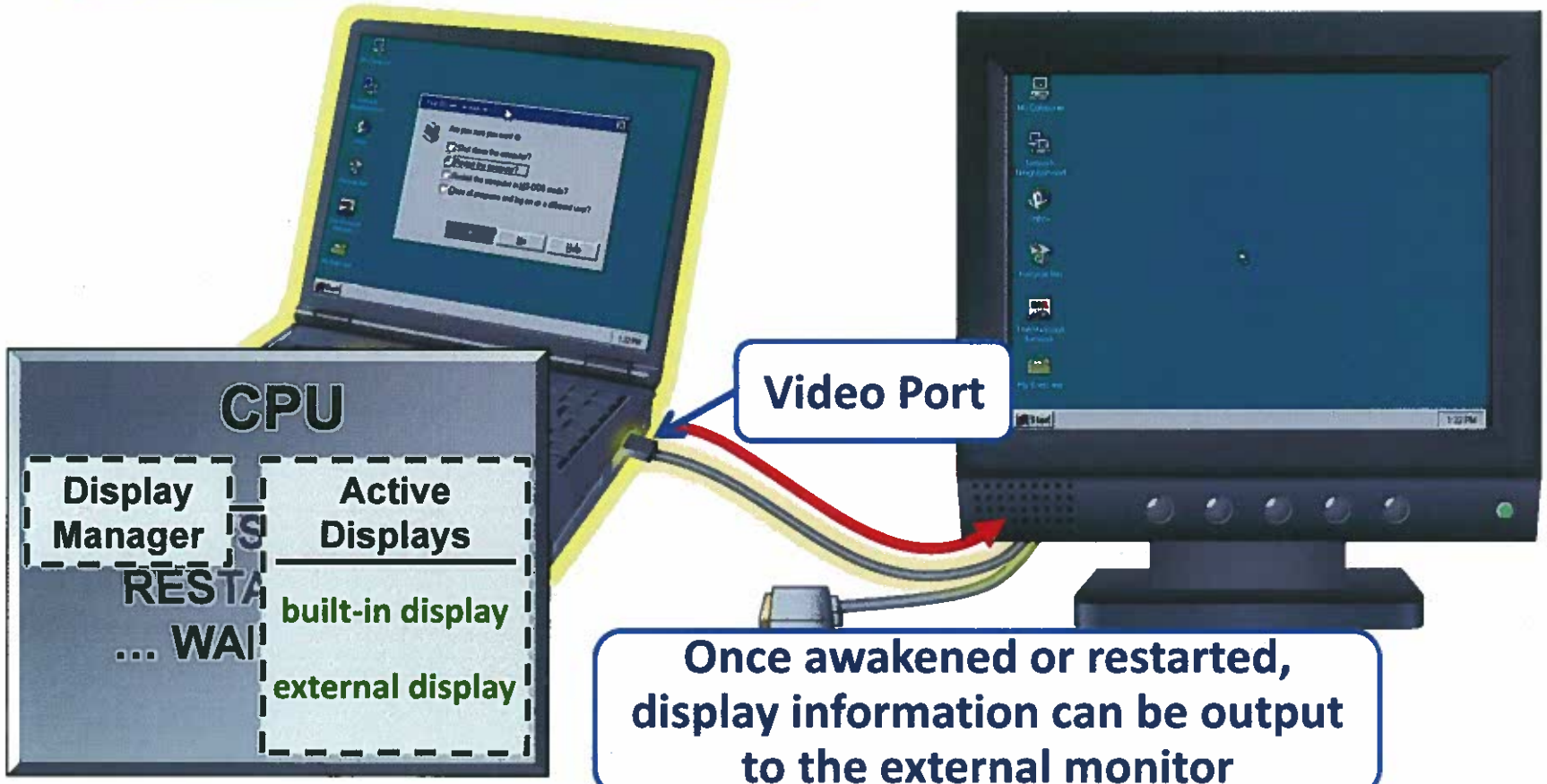


Once awakened or restarted, display information can be output to the external monitor

Problem: Need to Reboot to Use External Monitor

'646 & '116 Patents

In order to add the monitor, the computer had to be either cycled through a sleep state or restarted

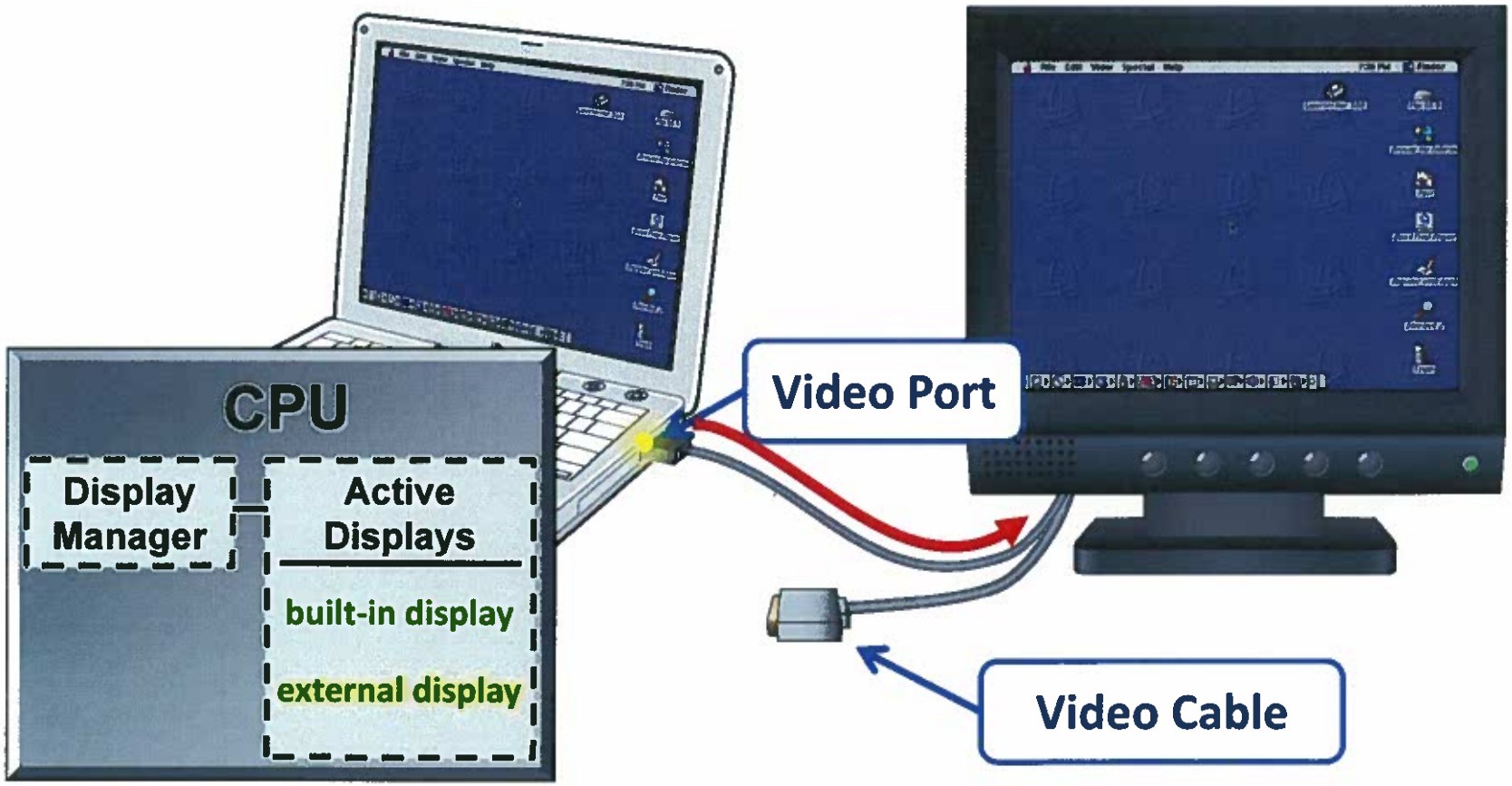


Once awakened or restarted, display information can be output to the external monitor

Invention: Plug-and-Play Monitor

'646 & '116 Patents

- Computer automatically adds display device and outputs display information



The Accused Motorola Xoom Tablet

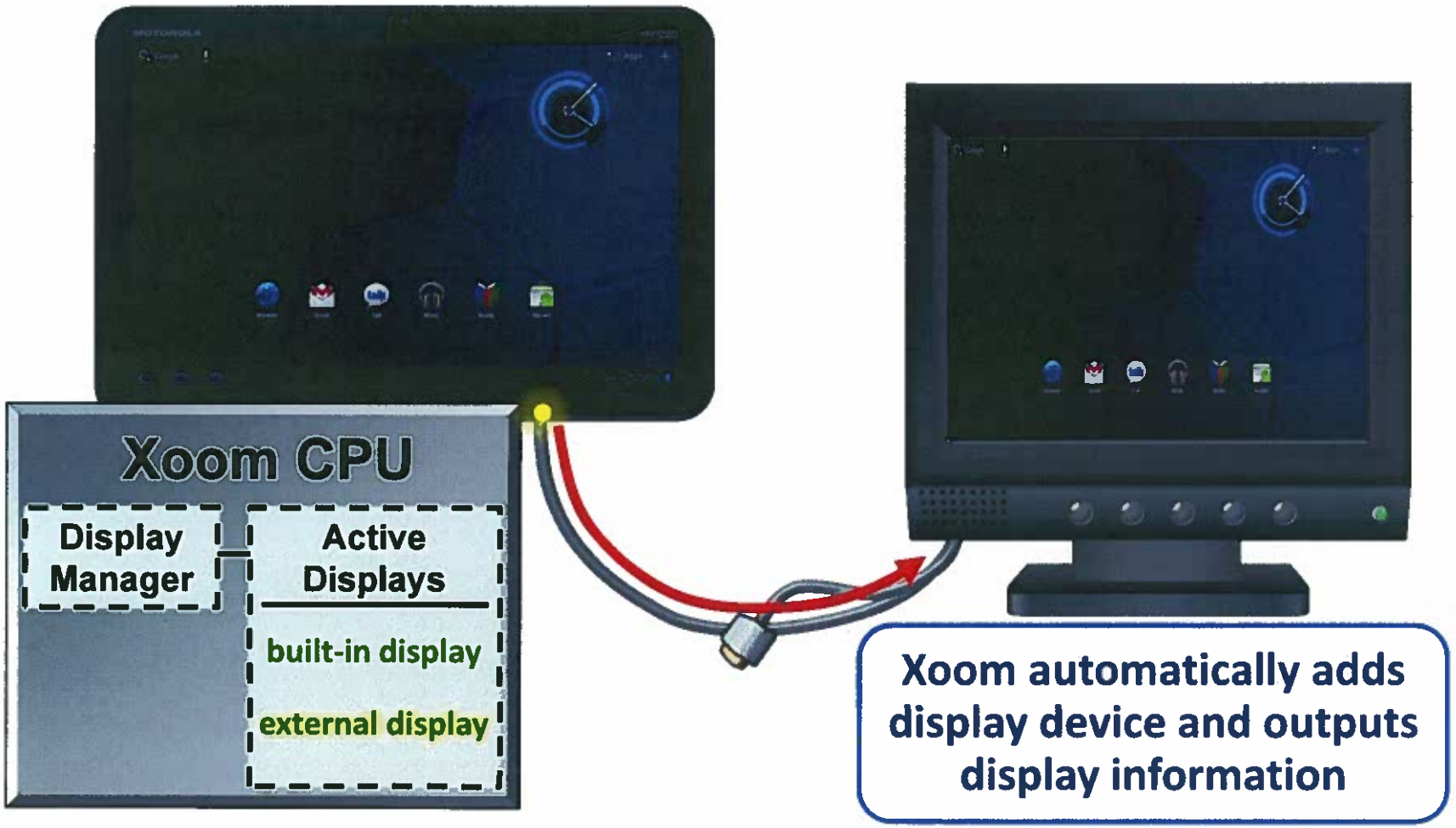
'646 & '116 Patents

Motorola Xoom

The Accused Motorola Xoom Tablet

'646 & '116 Patents

Motorola Xoom



Xoom automatically adds display device and outputs display information

The Accused Motorola Products

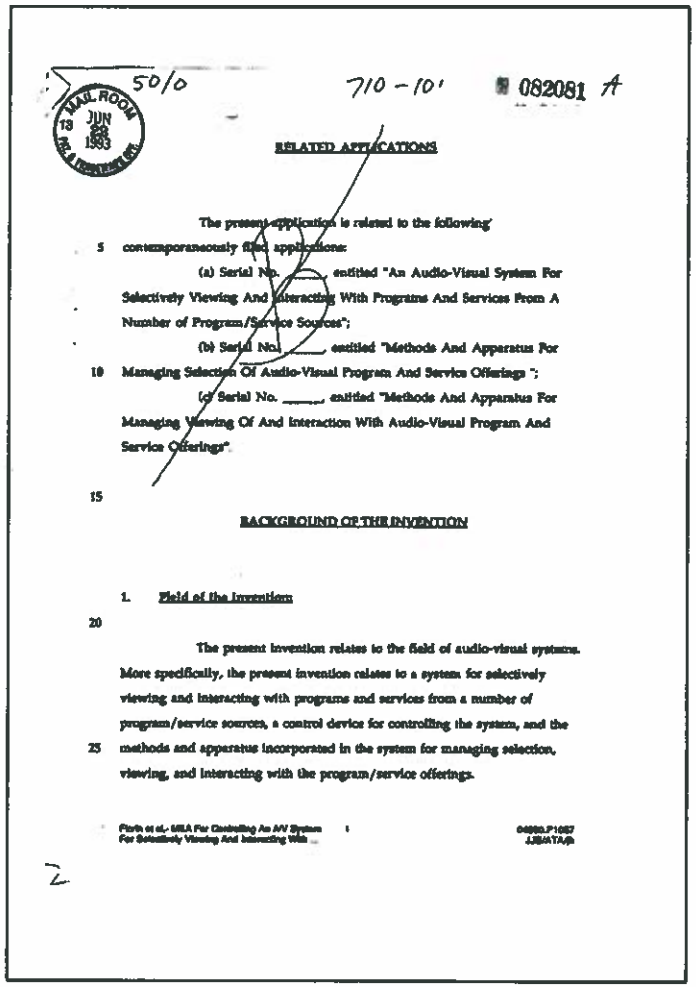
'646 & '116 Patents

- **The relevant code in the accused products is implemented by Motorola as: [1] a shared Service; [2] a Java library; and [3] a native library, which are all part of the operating system**

’560, ’509 and ’456 Patents

Interactive Program Guide

’560, ’509, and ’456 Patents



5/0 710-10 082081 A

MAIL ROOM 13 JUN 28 1993

RELATED APPLICATIONS

The present application is related to the following contemporaneously filed applications:

(a) Serial No. _____, entitled "An Audio-Visual System For Selectively Viewing And Interacting With Programs And Services From A Number of Program/Service Sources";

(b) Serial No. _____, entitled "Methods And Apparatus For Managing Selection Of Audio-Visual Program And Service Offerings ";

(c) Serial No. _____, entitled "Methods And Apparatus For Managing Viewing Of And Interaction With Audio-Visual Program And Service Offerings".

BACKGROUND OF THE INVENTION

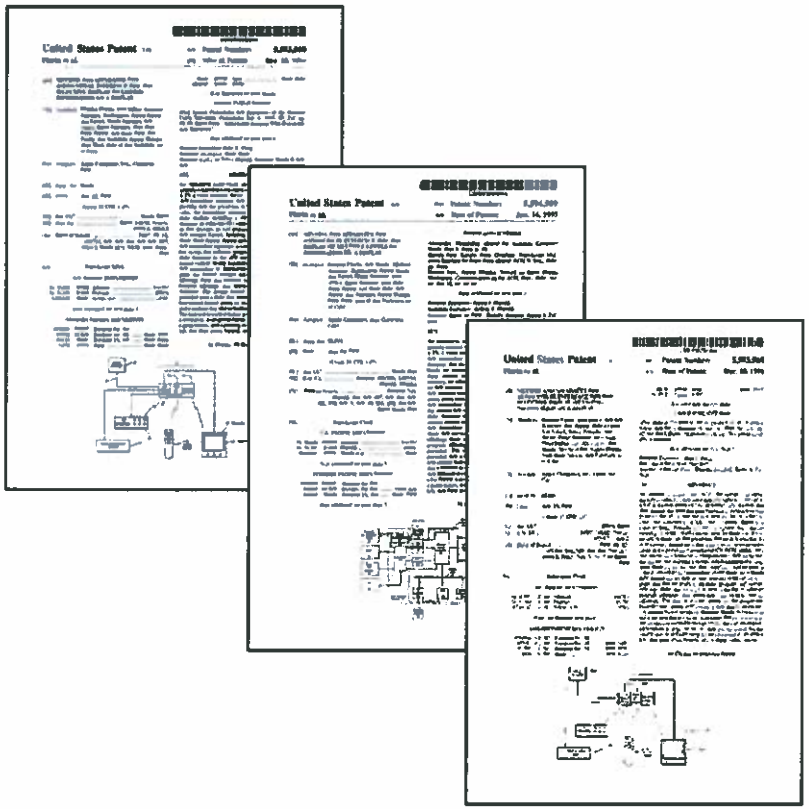
1. Field of the Invention

The present invention relates to the field of audio-visual systems. More specifically, the present invention relates to a system for selectively viewing and interacting with programs and services from a number of program/service sources, a control device for controlling the system, and the methods and apparatus incorporated in the system for managing selection, viewing, and interacting with the program/service offerings.

Firth et al.- MEA For Controlling An AV System For Selectively Viewing And Interacting With ... 1 04900.P1057 JJBATA/jb

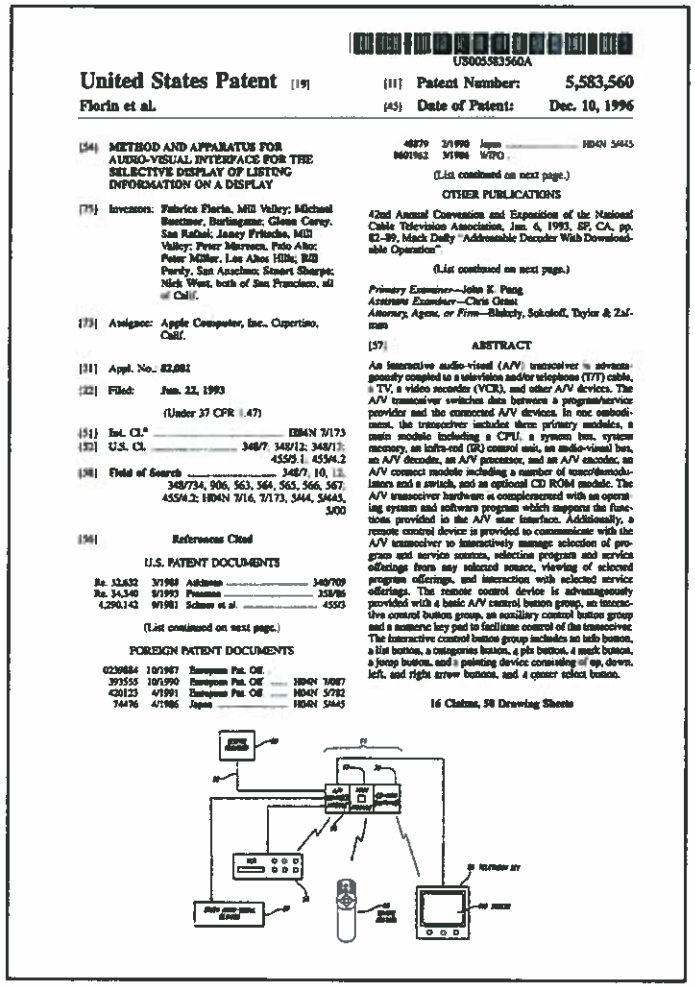
2

- **The IPG patents claim priority to the same application and share the same specification.**



’560 Patent

IPG Patents



US005583560A

United States Patent [19]
Florin et al.

[11] **Patent Number: 5,583,560**
[45] **Date of Patent: Dec. 10, 1996**

[54] METHOD AND APPARATUS FOR AUDIO-VISUAL INTERFACE FOR THE SELECTIVE DISPLAY OF LISTING INFORMATION ON A DISPLAY

[75] Inventors: Fabrice Florin, Mill Valley; Michael Buettner, Burlingame; Glenn Corey, San Rafael; Janey Fritsche, Mill Valley; Peter Maresca, Palo Alto; Peter Miller, Los Altos Hills; Bill Purdy, San Anselmo; Stuart Sharpe; Nick West, both of San Francisco, all of Calif.

[73] Assignee: Apple Computer, Inc., Cupertino, Calif.

[21] Appl. No.: 82,081

[22] Filed: Jun. 22, 1993

(Under 37 CFR 1.47)

[51] Int. Cl.[6] H04N 7/173

[52] U.S. Cl. 348/7; 348/12; 348/13; 455/5.1; 455/4.2

[58] Field of Search 348/7, 10, 12, 13, 734, 906, 563, 564, 565, 566, 567; 455/4.2; H04N 7/16, 7/173, 5/44, 5/445, 5/00

[56] References Cited

U.S. PATENT DOCUMENTS

Re. 32,632	3/1988	Atkinson	340/709
Re. 34,340	8/1993	Freeman	358/86
4,290,142	9/1981	Schnee et al.	455/3

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393555	10/1990	European Pat. Off.	H04N 7/087
420123	4/1991	European Pat. Off.	H04N 5/782
74476	4/1986	Japan	H04N 5/445
48879	2/1990	Japan	H04N 5/445
8601962	3/1986	WIPO .	

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42nd Annual Convention and Exposition of the National Cable Television Association, Jun. 6, 1993, SF, CA, pp. 82–89, Mack Dally "Addressable Decoder With Downloadable Operation".

(List continued on next page.)

Primary Examiner—John K. Peng
Assistant Examiner—Chris Grant
Attorney, Agent, or Firm—Blakely, Sokoloff, Taylor & Zafman

[57] ABSTRACT

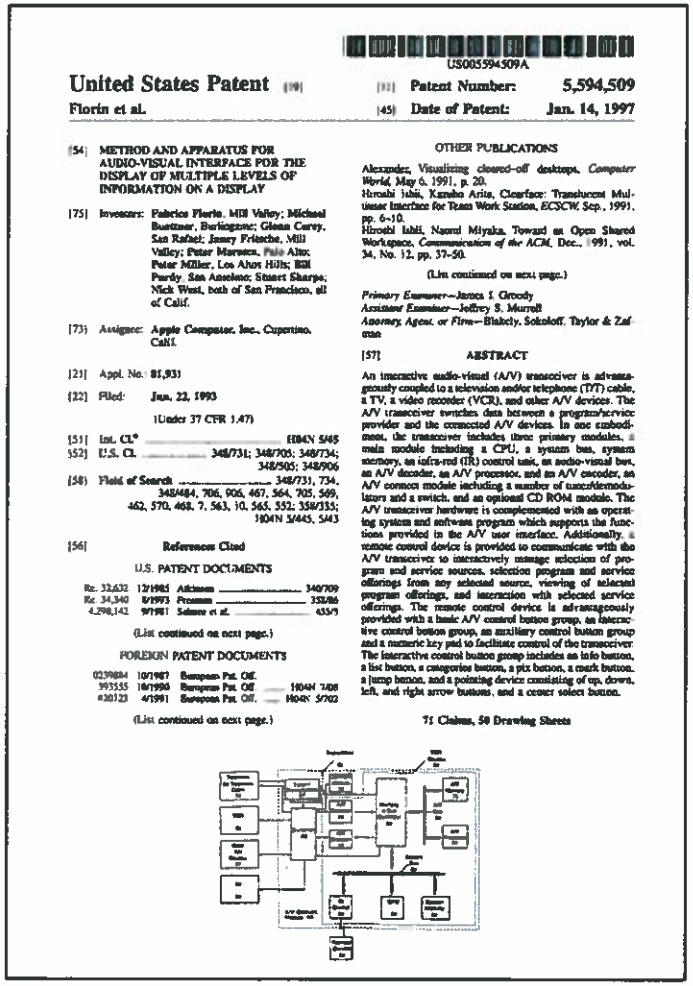
An interactive audio-visual (A/V) transceiver is advantageously coupled to a television and/or telephone (T/T) cable, a TV, a video recorder (VCR), and other A/V devices. The A/V transceiver switches data between a program/service provider and the connected A/V devices. In one embodiment, the transceiver includes three primary modules, a main module including a CPU, a system bus, system memory, an infra-red (IR) control unit, an audio-visual bus, an A/V decoder, an A/V processor, and an A/V encoder, an A/V connect module including a number of tuner/demodulators and a switch, and an optional CD ROM module. The A/V transceiver hardware is complemented with an operating system and software program which supports the functions provided in the A/V user interface. Additionally, a remote control device is provided to communicate with the A/V transceiver to interactively manage selection of program and service content, selection program and service offerings from any selected source, viewing of selected program offerings, and interaction with selected service offerings. The remote control device is advantageously provided with a basic A/V control button group, an interactive control button group, an auxiliary control button group and a numeric key pad to facilitate control of the transceiver. The interactive control button group includes an info button, a list button, a categories button, a pix button, a mail button, a jump button, and a pointing device consisting of up, down, left, and right arrow buttons, and a enter select button.

16 Claims, 58 Drawing Sheets

- **Filed: June 22, 1993**
- **Issued: December 10, 1996**
- **Asserted claims: 1, 2, 4-6, 8, 9, 11-13, 15-16**
- **Accused products: Motorola set-top boxes with interactive program guides**
- **Related Apple project: EZTV interactive television guide**

’509 Patent

IPG Patents



US005594509A

United States Patent [19]

Florin et al.

[11] Patent Number: 5,594,509

[45] Date of Patent: Jan. 14, 1997

[54] METHOD AND APPARATUS FOR AUDIO-VISUAL INTERFACE FOR THE DISPLAY OF MULTIPLE LEVELS OF INFORMATION ON A DISPLAY

[75] Inventors: Fabrice Florin, Mill Valley; Michael Buettner, Burlingame; Glenn Corey, San Rafael; Janey Fritsche, Mill Valley; Peter Maresca, Palo Alto; Peter Miller, Los Altos Hills; Bill Purdy, San Anselmo; Stuart Sharpe; Nick West, both of San Francisco, all of Calif.

[73] Assignee: Apple Computer, Inc., Cupertino, Calif.

[21] Appl. No.: 81,931

[22] Filed: Jun. 22, 1993

[Under 37 CFR 1.47]

[51] Int. Cl.[6] H04N 5/445

[52] U.S. Cl. 348/731; 348/705; 348/734; 348/505; 348/906

[58] Field of Search 348/731, 734, 348/484, 706, 906, 467, 564, 705, 569, 462, 570, 468, 7, 563, 10, 565, 552; 358/335; H04N 5/445, 5/43

[56] References Cited

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Re. 34,340 8/1993 Freeman 358/86
4,298,142 9/1981 Salmon et al. 455/5

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Hiroshi Ishii, Kazuho Arita, Clearface: Translucent Multiuser Interface for Team Work Station, *ECSCW*, Sep., 1991, pp. 6-10.

Hiroshi Ishii, Naomi Miyake, Toward an Open Shared Workspace, *Communication of the ACM*, Dec., 1991, vol. 34, No. 12, pp. 37-50.

(List continued on next page.)

Primary Examiner—James J. Groody
Assistant Examiner—Jeffrey S. Murrell
Attorney, Agent, or Firm—Blakely, Sokoloff, Taylor & Zafman

[57] ABSTRACT

An interactive audio-visual (A/V) transceiver is advantageously coupled to a television and/or telephone (T/T) cable, a TV, a video recorder (VCR), and other A/V devices. The A/V transceiver switches data between a program/service provider and the connected A/V devices. In one embodiment, the transceiver includes three primary modules, a main module including a CPU, a system bus, system memory, an infra-red (IR) control unit, an audio-visual bus, an A/V decoder, an A/V processor, and an A/V encoder, an A/V connect module including a number of cards/demodulators and a switch, and an optional CD ROM module. The A/V transceiver hardware is complemented with an operating system and software program which supports the functions provided in the A/V user interface. Additionally, a remote control device is provided to communicate with the A/V transceiver to interactively manage selection of program and service sources, selection program and service offerings from any selected source, viewing of selected program offerings, and interaction with selected service offerings. The remote control device is advantageously provided with a basic A/V control button group, an interactive control button group, an auxiliary control button group and a numeric key pad to facilitate control of the transceiver. The interactive control button group includes an info button, a list button, a categories button, a pix button, a mark button, a jump button, and a pointing device consisting of up, down, left, and right arrow buttons, and a center select button.

71 Claims, 50 Drawing Sheets

United States Patent [19]

Florin et al.

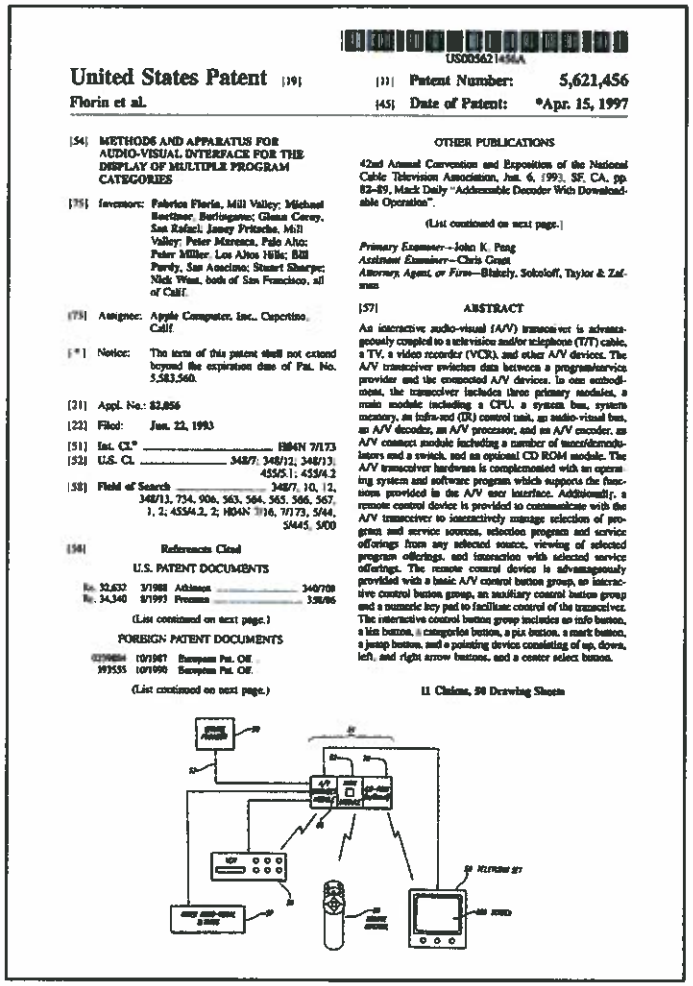
[54] METHOD AND APPARATUS FOR AUDIO-VISUAL INTERFACE FOR THE DISPLAY OF MULTIPLE LEVELS OF INFORMATION ON A DISPLAY

[75] Inventors: **Fabrice Florin**, Mill Valley; **Michael Buettner**, Burlingame; **Glenn Corey**, San Rafael; **Janey Fritsche**, Mill Valley; **Peter Maresca**, Palo Alto; **Peter Miller**, Los Altos Hills; **Bill Purdy**, San Anselmo; **Stuart Sharpe**; **Nick West**, both of San Francisco, all of Calif.

- **Filed: June 22, 1993**
- **Issued: January 14, 1997**
- **Asserted claims: 7-8, 10-11, 14-20, 22-27, 43-52, 54-58, 60-63**
- **Accused products: Motorola set-top boxes with interactive program guides**
- **Related Apple project: EZTV interactive television guide**

’456 Patent

IPG Patents



US005621456A

United States Patent [19]
Florin et al.

[11] Patent Number: 5,621,456
[45] Date of Patent: *Apr. 15, 1997

[54] METHODS AND APPARATUS FOR AUDIO-VISUAL INTERFACE FOR THE DISPLAY OF MULTIPLE PROGRAM CATEGORIES

[75] Inventors: Fabrice Florin, Mill Valley; Michael Buettner, Burlingame; Glenn Corey, San Rafael; Janey Fritsche, Mill Valley; Peter Maresca, Palo Alto; Peter Miller, Los Altos Hills; Bill Purdy, San Anselmo; Stuart Sharpe; Nick West, both of San Francisco, all of Calif.

[73] Assignee: Apple Computer, Inc., Cupertino, Calif

[*] Notice: The term of this patent shall not extend beyond the expiration date of Pat. No. 5,583,560.

[21] Appl. No.: 82,856

[22] Filed: Jun. 22, 1993

[51] Int. Cl.* H04N 7/173
[52] U.S. Cl. 348/7; 348/12; 348/13; 455/5.1; 455/4.2
[58] Field of Search 348/7, 10, 12, 348/13, 734, 906, 563, 564, 563, 566, 567, 1, 2; 455/4.2, 2; H04N 7/16, 7/173, 5/44, 5/445, 5/00

[56] References Cited

U.S. PATENT DOCUMENTS

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Re. 34,340 8/1993 Freeman 358/86

(List continued on next page.)

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0239884 10/1987 European Pat. Off.
393535 10/1990 European Pat. Off.

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[57] ABSTRACT

An interactive audio-visual (A/V) transceiver is advantageously coupled to a television and/or telephone (T/T) cable, a TV, a video recorder (VCR), and other A/V devices. The A/V transceiver switches data between a program/service provider and the connected A/V devices. In one embodiment, the transceiver includes three primary modules, a main module including a CPU, a system bus, system memory, an infra-red (IR) control unit, an audio-visual bus, an A/V decoder, an A/V processor, and an A/V encoder, an A/V connect module including a number of interface/multiplexers and a switch, and an optional CD ROM module. The A/V transceiver hardware is complemented with an operating system and software program which supports the functions provided in the A/V user interface. Additionally, a remote control device is provided to communicate with the A/V transceiver to interactively manage selection of program and service sources, selection programs and service offerings from any selected source, viewing of selected program offerings, and interaction with selected service offerings. The remote control device is advantageously provided with a basic A/V control button group, an interactive control button group, an auxiliary control button group and a numeric key pad to facilitate control of the transceiver. The interactive control button group includes an info button, a list button, a categories button, a pix button, a mark button, a jump button, and a pointing device consisting of up, down, left, and right arrow buttons, and a center select button.

11 Claims, 20 Drawing Sheets

United States Patent [19]

Florin et al.

[54] **METHODS AND APPARATUS FOR AUDIO-VISUAL INTERFACE FOR THE DISPLAY OF MULTIPLE PROGRAM CATEGORIES**

[75] Inventors: **Fabrice Florin**, Mill Valley; **Michael Buettner**, Burlingame; **Glenn Corey**, San Rafael; **Janey Fritsche**, Mill Valley; **Peter Maresca**, Palo Alto; **Peter Miller**, Los Altos Hills; **Bill Purdy**, San Anselmo; **Stuart Sharpe**; **Nick West**, both of San Francisco, all of Calif.

- **Filed: June 22, 1993**
- **Issued: April 15, 1997**
- **Asserted claims: 1-2, 4-10**
- **Accused products: Motorola set-top boxes with interactive program guides**
- **Related Apple project: EZTV interactive television guide**

Background

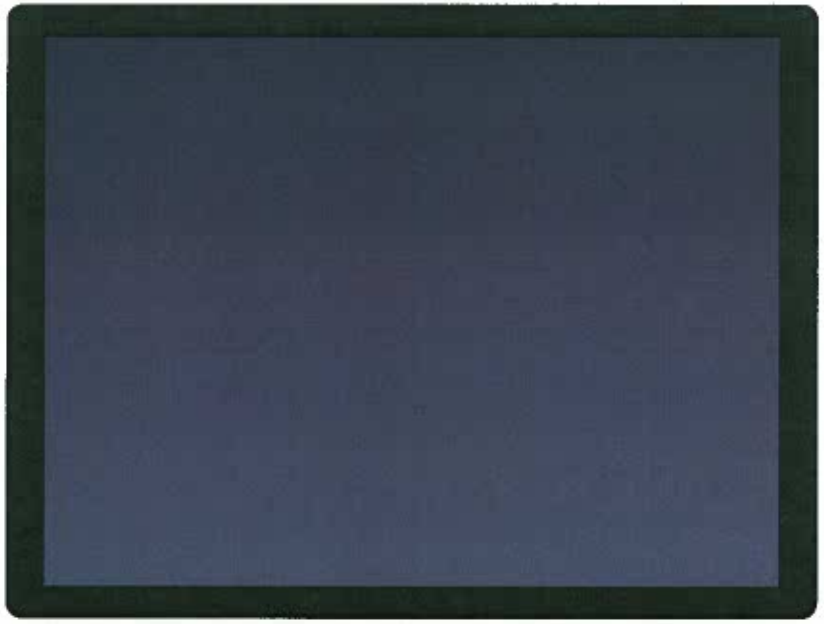
Prior Art

- **The name "set-top box" was derived from the common location of a user's cable box on top of a television set.**

Prior Art

IPG Patents

- **The name "set-top box" was derived from the common location of a user's cable box on top of a television set.**
- **Modern flat screen TVs are too thin to allow this configuration.**



Set-Top Box

Problem: Lack of Interactive Interface

- Interactive television systems lacked a user-friendly interface for television and other multi-media.

> It is known that consumers desire interactive television and multi-media applications for home use. One of the biggest challenges for an interactive television service is the design of an interface that is easy and fun to use by average consumers.

'560 Patent, col. 1:47-51

1993 State of the Art: Prevue Channel

- **Simple, continuously scrolling TV Guide**
- **Not interactive**
- **Picture-in-picture not linked to previously selected channel**

Prevue Channel – November 7, 1993 (video)

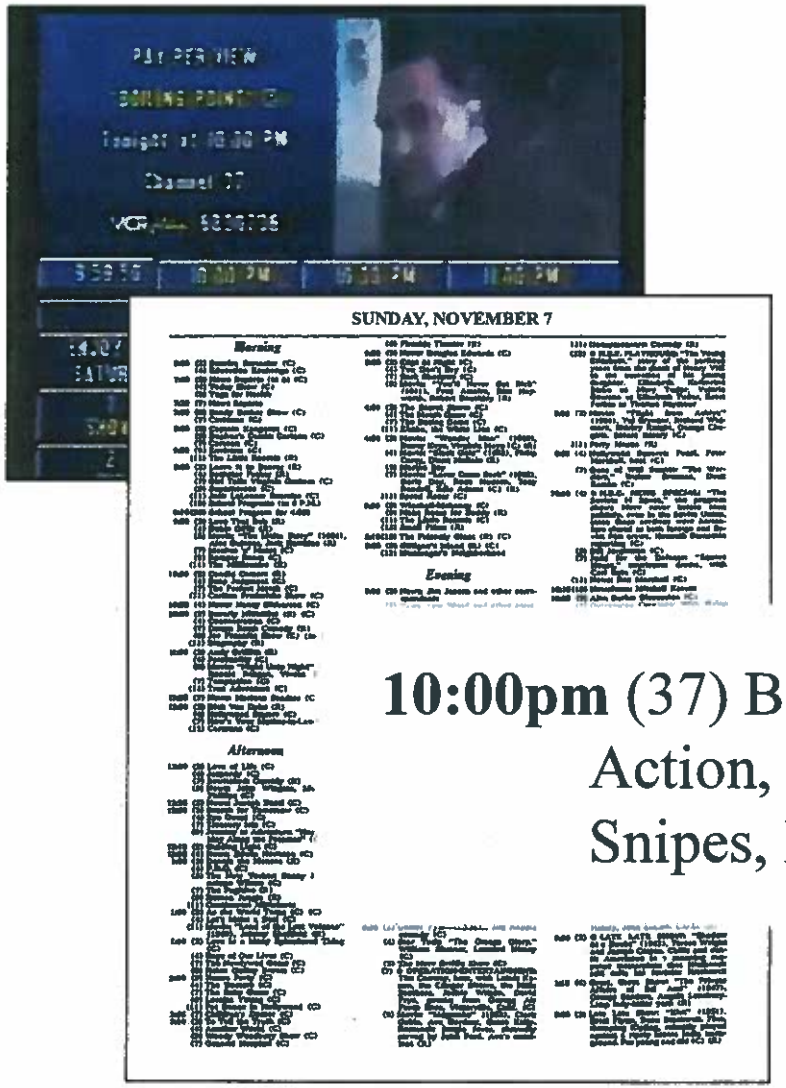
1993 State of the Art: Prevue Channel

IPG Patents

- No multiple levels of information
- No future programming
- No selectable categories
- No user-friendly recording
- No reminder function
- No shopping interface

1993 State of the Art: Program Information

IPG Patents



Could not identify:

- Program information in different time slot or on a different day
- Additional program information such as description, actors, year

10:00pm (37) BOILING POINT:
Action, drama – Wesley
Snipes, Dennis Hopper [R]

1993 State of the Art: Recording Programs

In 1993, recording programs on VCR was tedious:

- Identify program of interest on Prevue Channel
- Look up program in paper local TV listings
- Use buttons on VCR to manually program the VCR

1993 State of the Art: Missing Functionality

- **Set-top boxes could not:**
  - **Display multiple levels of information**
  - **Display future programming**
  - **Filter programming by selectable categories of programming**
  - **Generate reminders with ability to switch to that program**
  - **Handle on-screen shopping**

Apple's EZTV Project

- **EZTV project led by Fabrice Florin**

Newsweek, April 6, 1992

Fabrice Florin, John Sculley, and others demonstrated EZTV in the early 1990s

Apple's EZTV Project

- **Apple's experience with computers and user interfaces laid the groundwork for EZTV**

Apple's EZTV Project

- **Apple's goal with EZTV was to design a set-top box with:**
  - **User-selectable features**

> As will be described, the present invention provides methods and apparatus for presenting an improved audio-visual user interface, which includes various user-selectable features for viewing and controlling a television, video tape recorder (VCR) and other audio-visual devices.

'560 Patent, col. 2:1-7

Apple's EZTV Project

- **Apple's goal with EZTV was to design a set-top box with:**
  - **User-selectable features**
  - **Easy-to-use interface for multiple devices**

> As will be disclosed, the present invention's user interface provides a user-friendly mechanism for consumers to view, record, and play back TV and A/V programs, as well as control other A/V home entertainment devices using a remote control device.

'560 Patent, col. 2:7-11

Apple's EZTV Project

- **Apple's goal with EZTV was to design a set-top box with:**
  - **User-selectable features**
  - **Easy-to-use interface for multiple devices**
  - **Access to information related to programs**
  - **Controller for interactive programs and services**

> Furthermore, information such as TV program listings and additional information related to programs as well as selecting and controlling categories of interactive programs and services may be provided through the user interface of the present invention.

'560 Patent, col. 2:11-16

Apple's EZTV

- **Apple submitted an EZTV demonstration video to the patent office with its applications.**

Clips from EZTV demo, December 1992 (video)

Apple's EZTV

- **Many set-top functions we take for granted today were invented by Apple in the early 1990s**
  - **Interactive program guide**
  - **User-friendly recording of television programs**
  - **Reminders**
  - **Video-on-demand**

1993

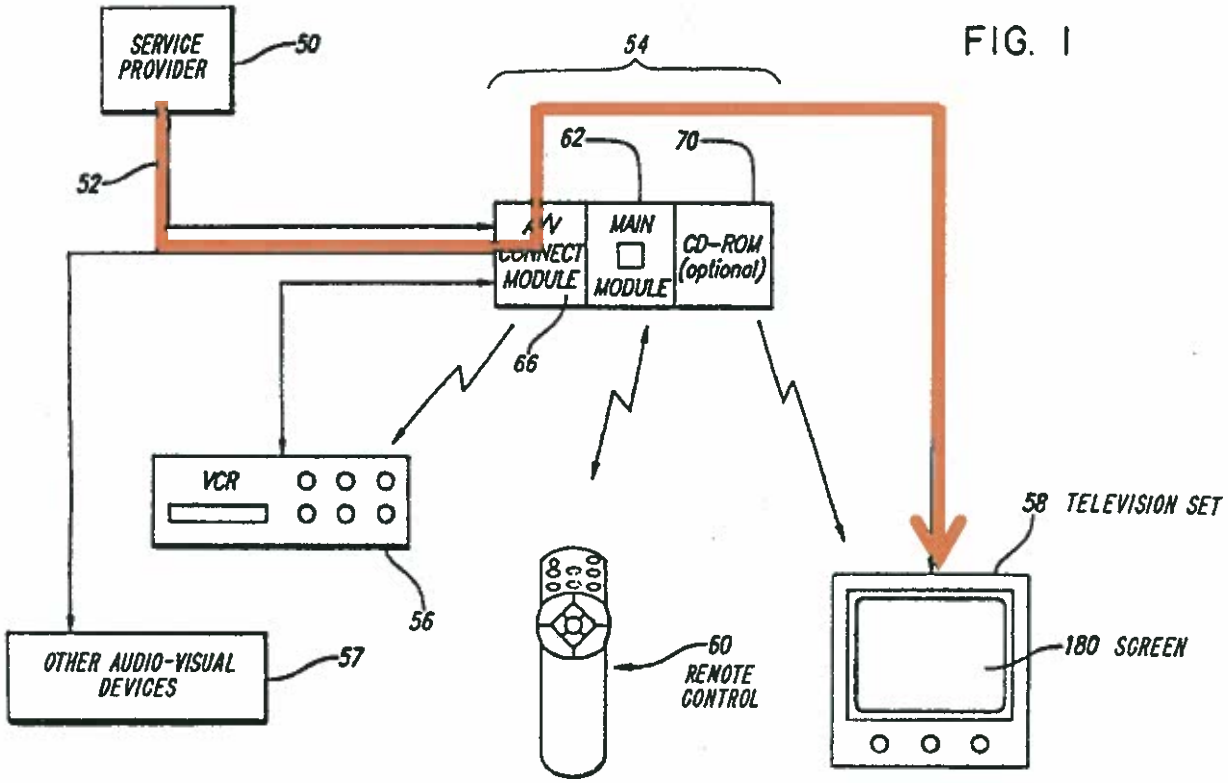
- Last days of George Bush Sr. presidency
- Bill Clinton started his presidency
- Boris Yeltsin elected president of Russia
- Dawn of the Internet, Mosaic 1.0 Browser
- David Letterman starts hosting "Tonight Show"
- Recovering from Hurricane Andrew

Set Top Box Overview

Set-Top Box Functionality

IPG Patents

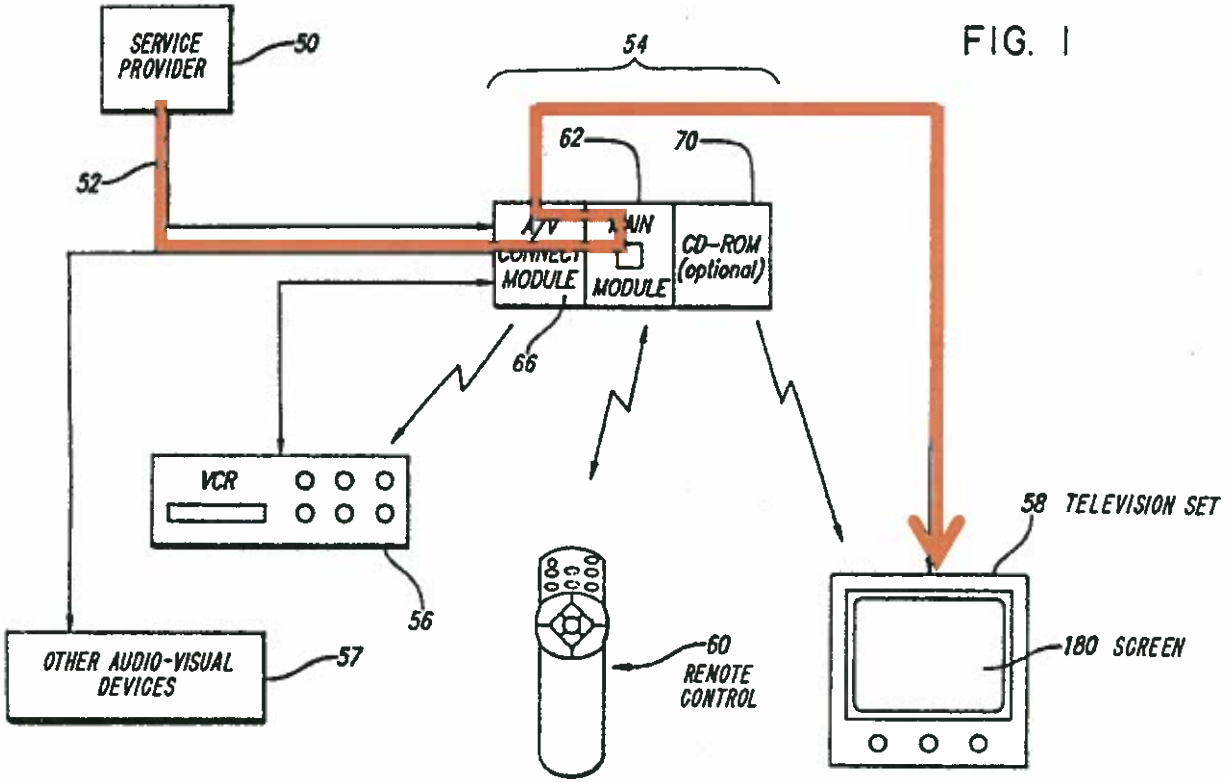
- **View programs on TV.**



Set-Top Box Functionality

IPG Patents

- **View programming guide.**



Set-Top Box Functionality

- **Record programs.**

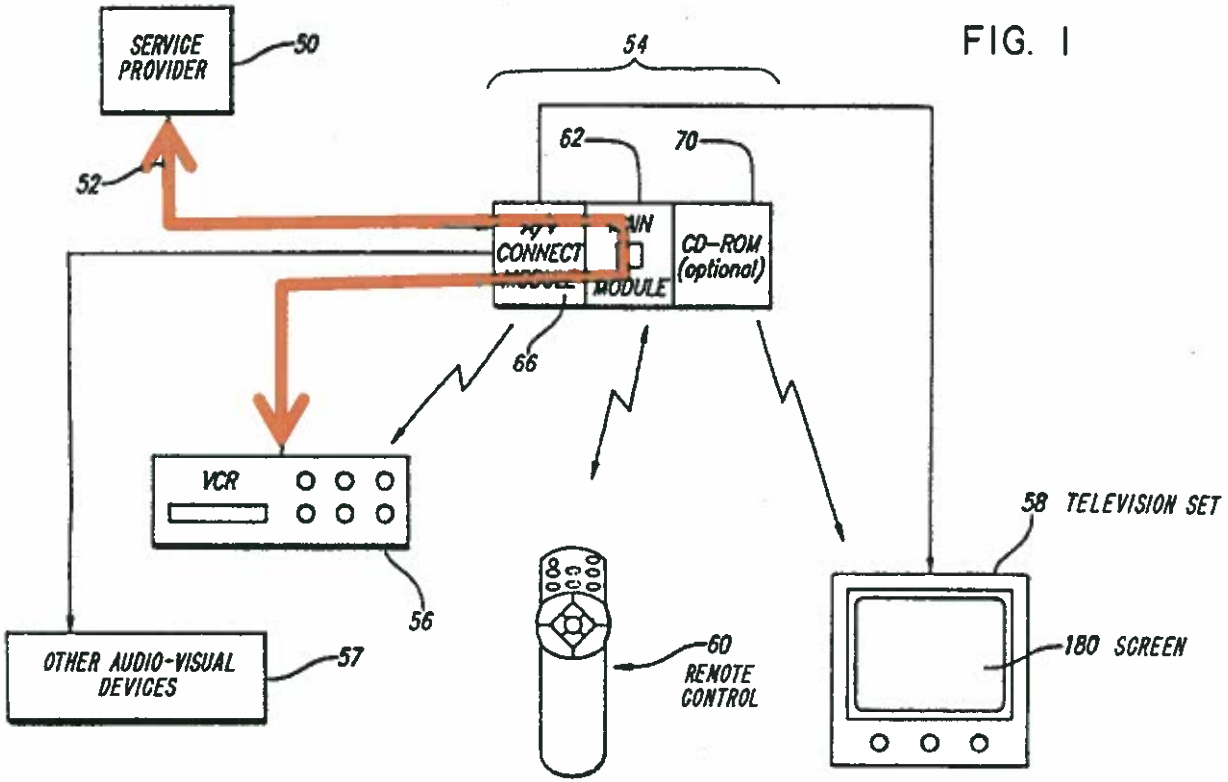
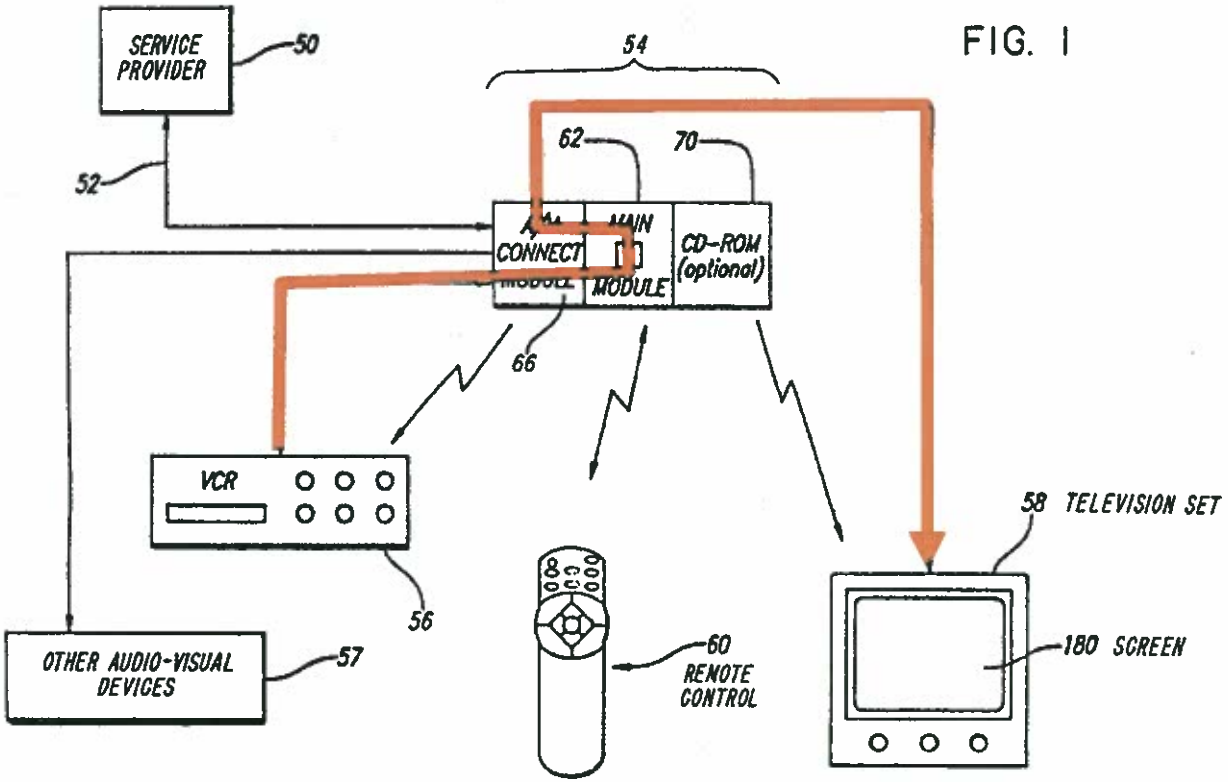


FIG. 1

Set-Top Box Functionality

IPG Patents

- **Playback recorded programs.**



Set-Top Box Functionality

IPG Patents

- **Access other A/V devices to play and/or display.**

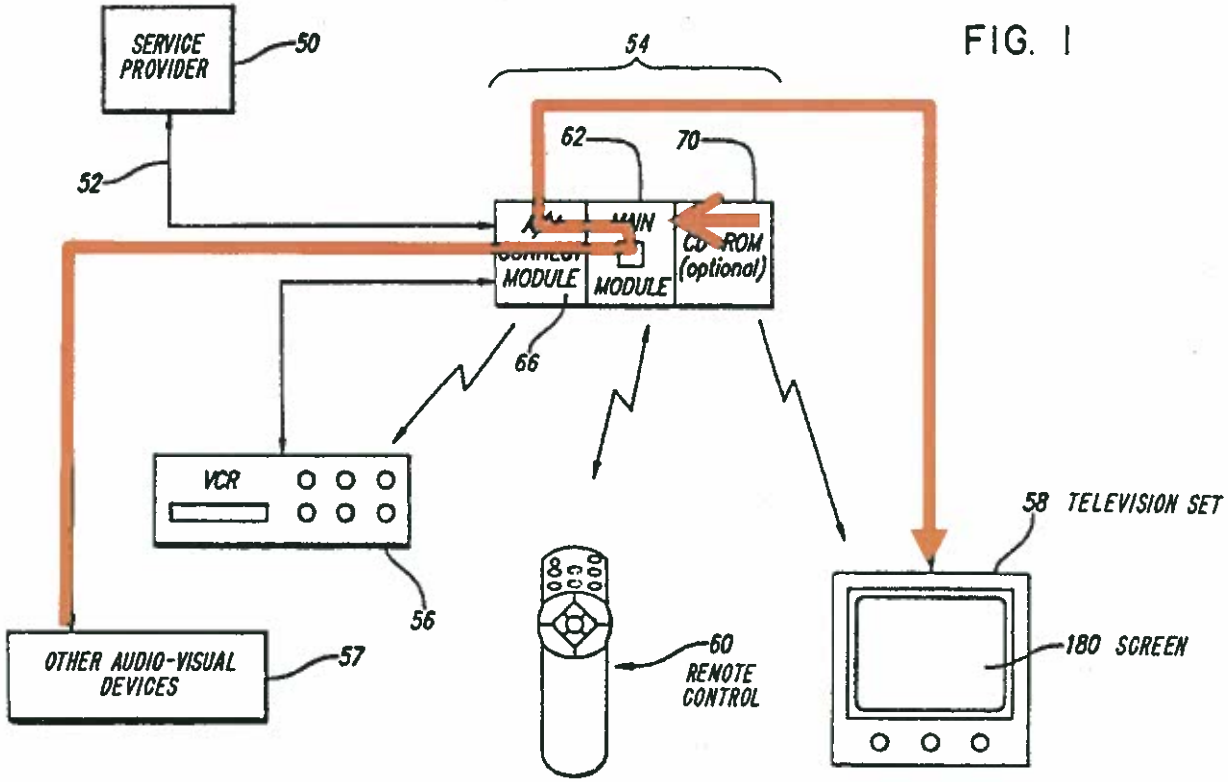
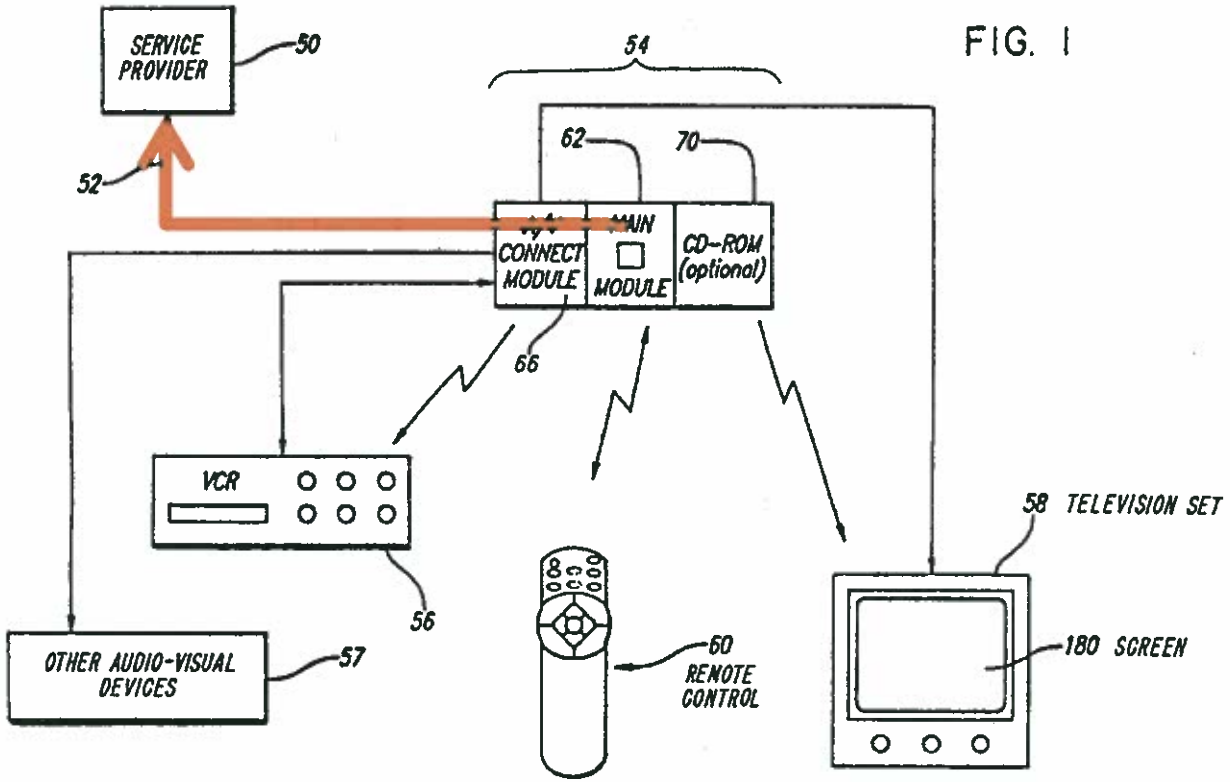


FIG. 1

Set-Top Box Functionality

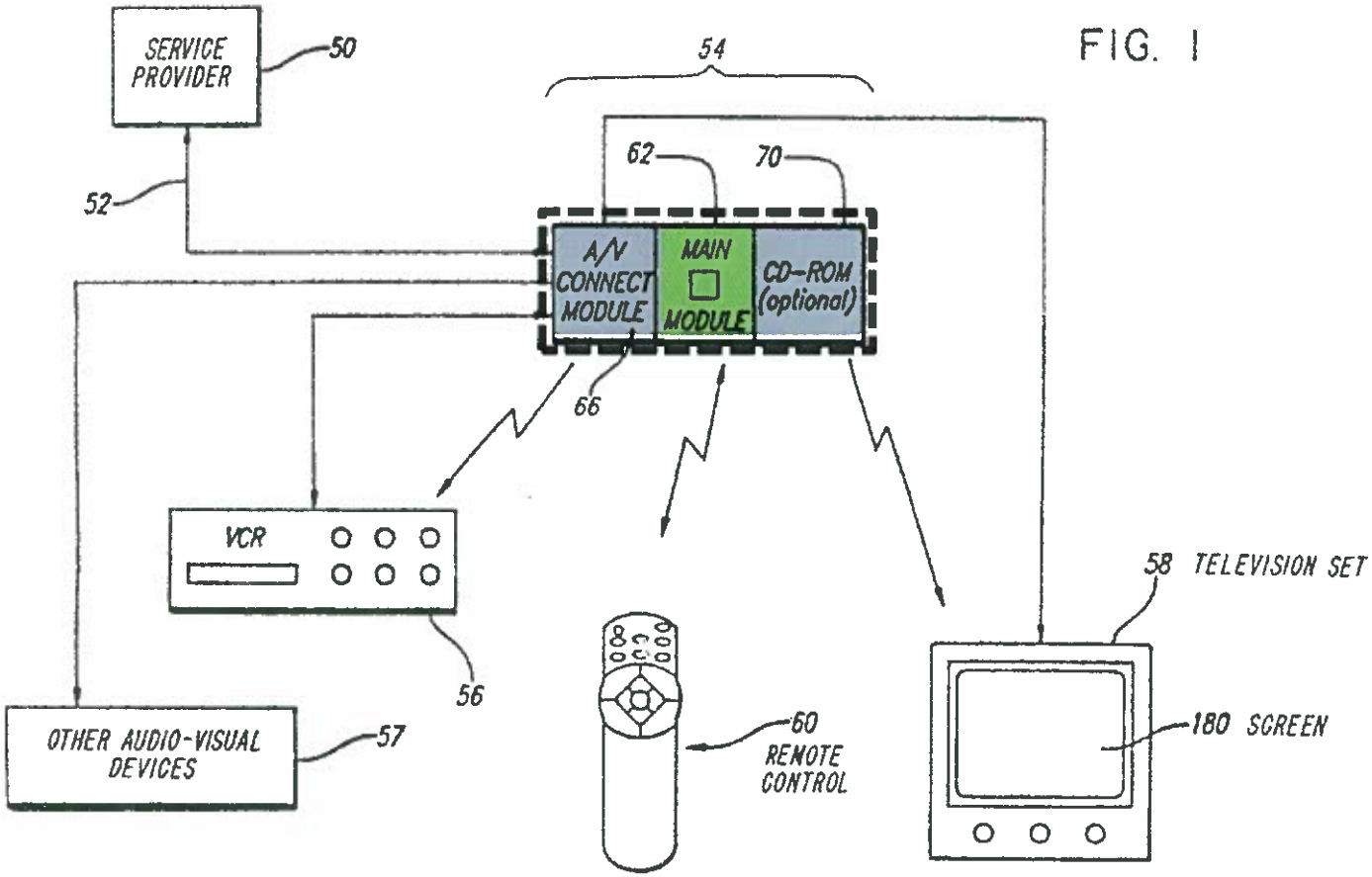
IPG Patents

- **Order video on demand and on screen shopping items.**



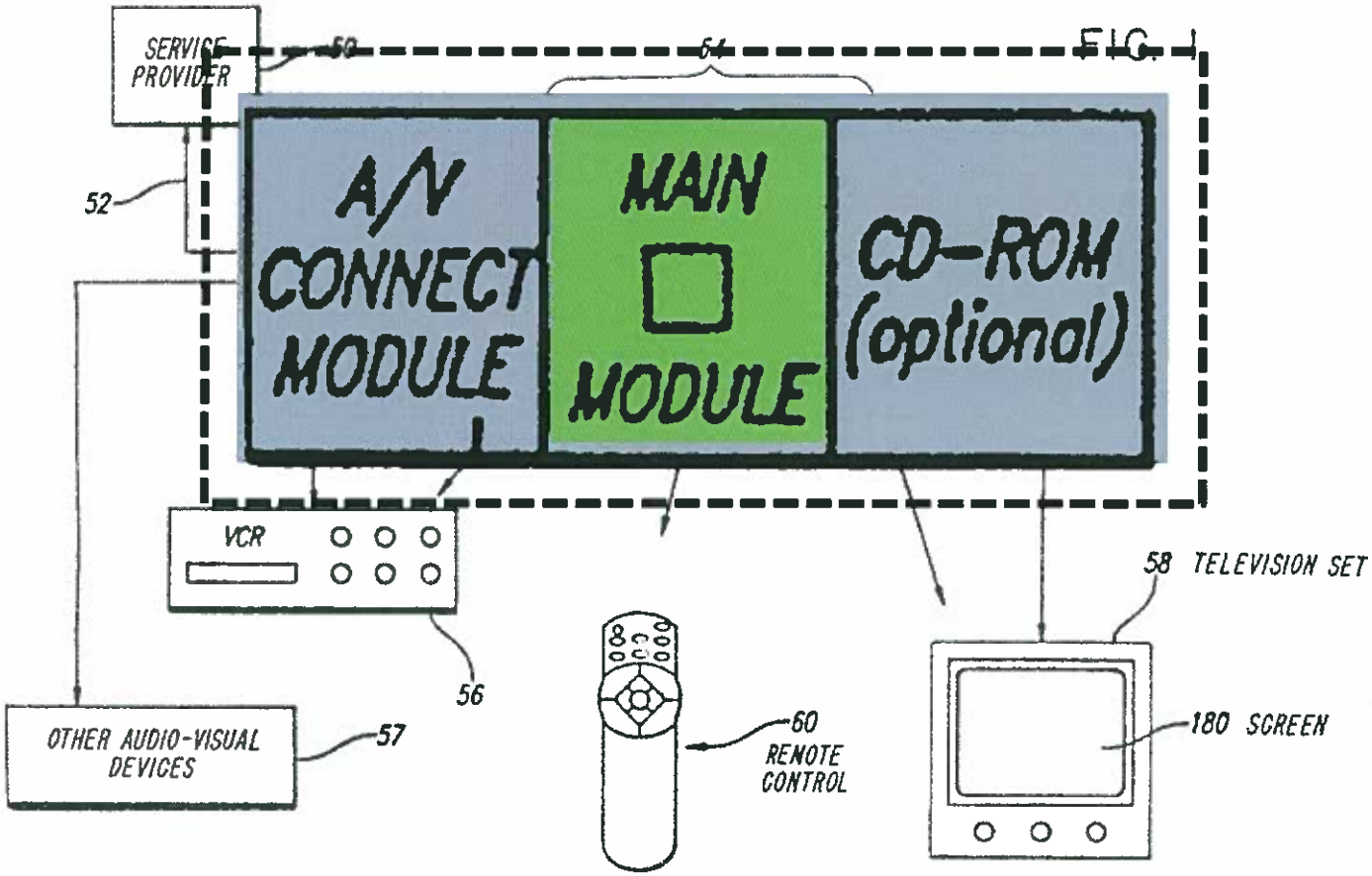
Set-Top Box Technology Fundamentals

IPG Patents



Set-Top Box Technology Fundamentals

IPG Patents



Set-Top Box Technology Fundamentals

IPG Patents

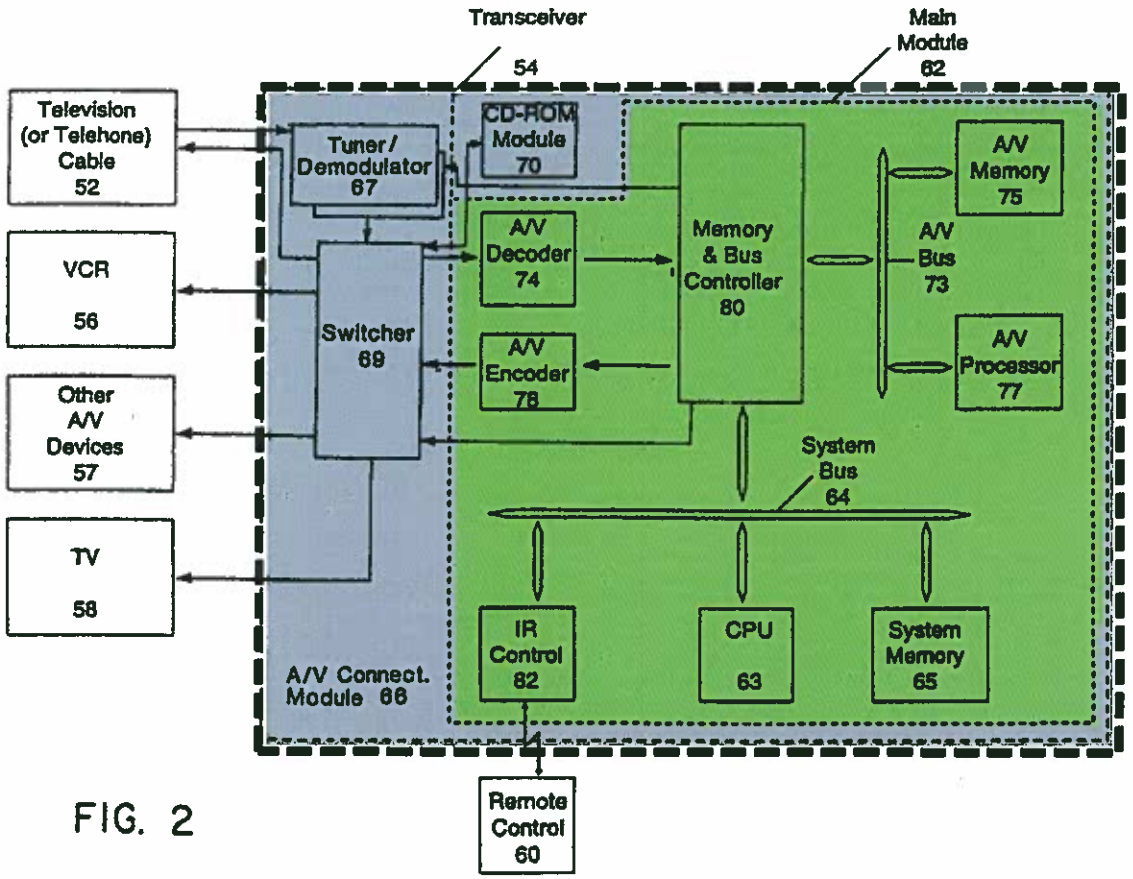


FIG. 2

- **Fig. 2 shows more details of the STB.**

Components

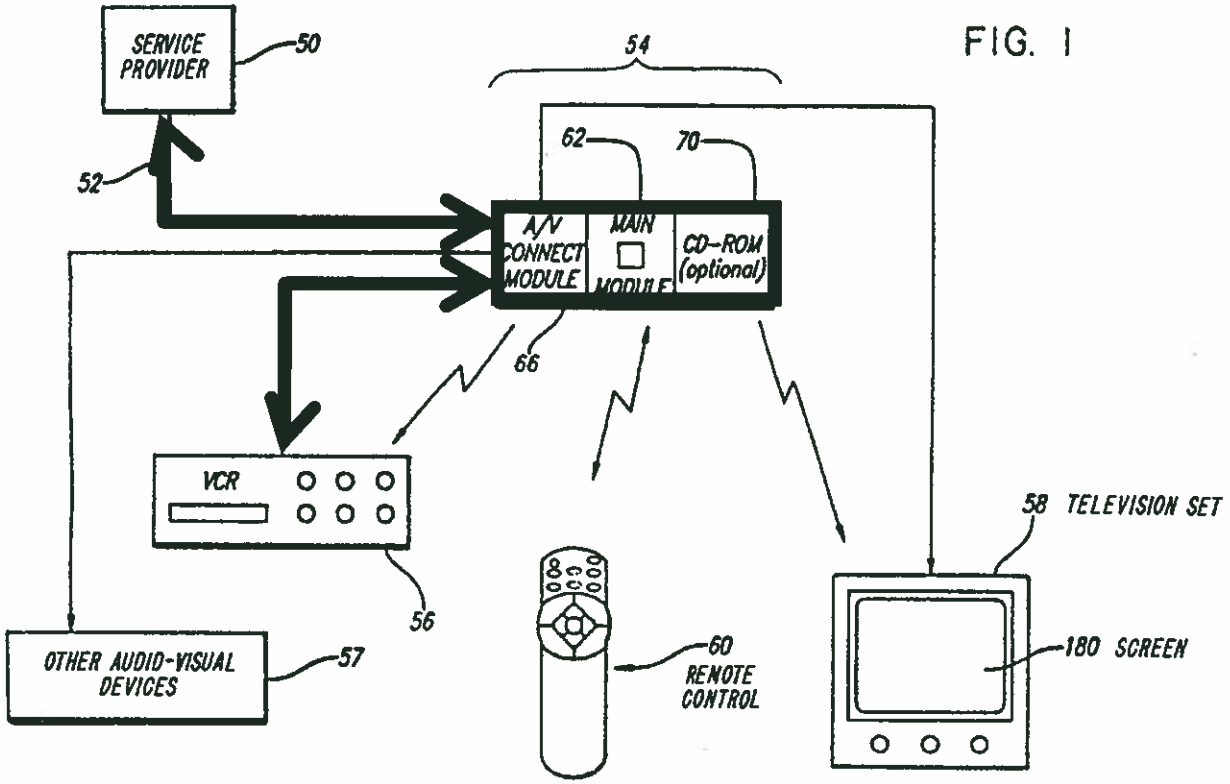
Set-Top Box Technology Fundamentals

IPG Patents

- Transceiver
- Electronic signal spectrum
- Tuner
- Demodulator
- Bus
- Memory and bus controller
- A/V decoder and A/V encoder
- Switcher

Transceiver

- **The Set-top box 54 is a transceiver because it transmits and receives signals.**



Electronic Spectrum of Signals

IPG Patents

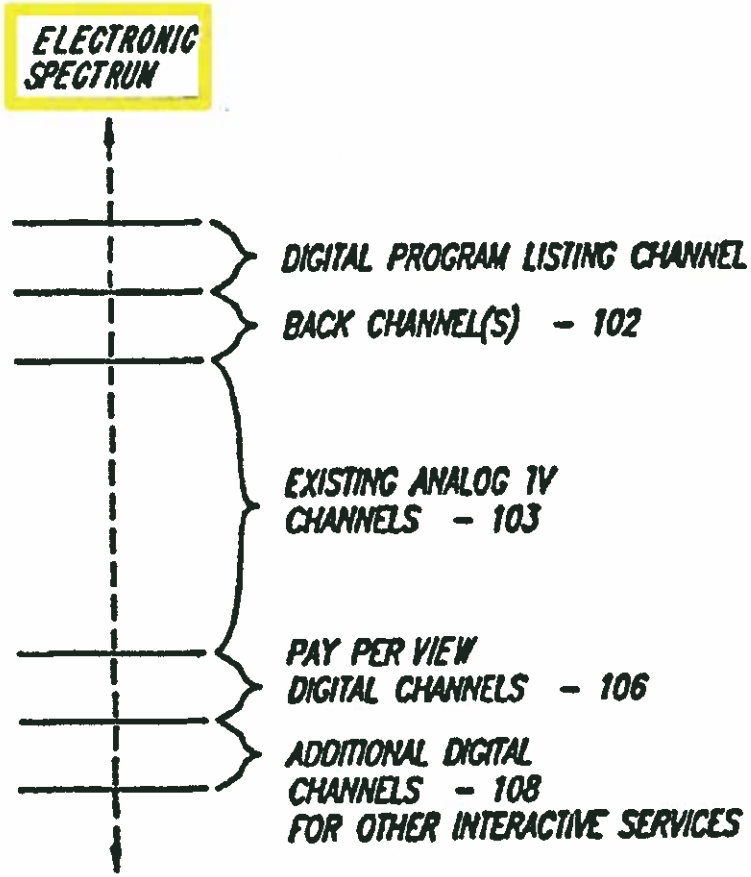
PROGRAM INFORMATION
- Show times
- Captions
- Duration
- Categories
- Channel numbers

TELEVISION CHANNELS

PAY PER VIEW

Other Interactive Services

Electronic spectrum of signals is a collection of channels sent by the cable provider.



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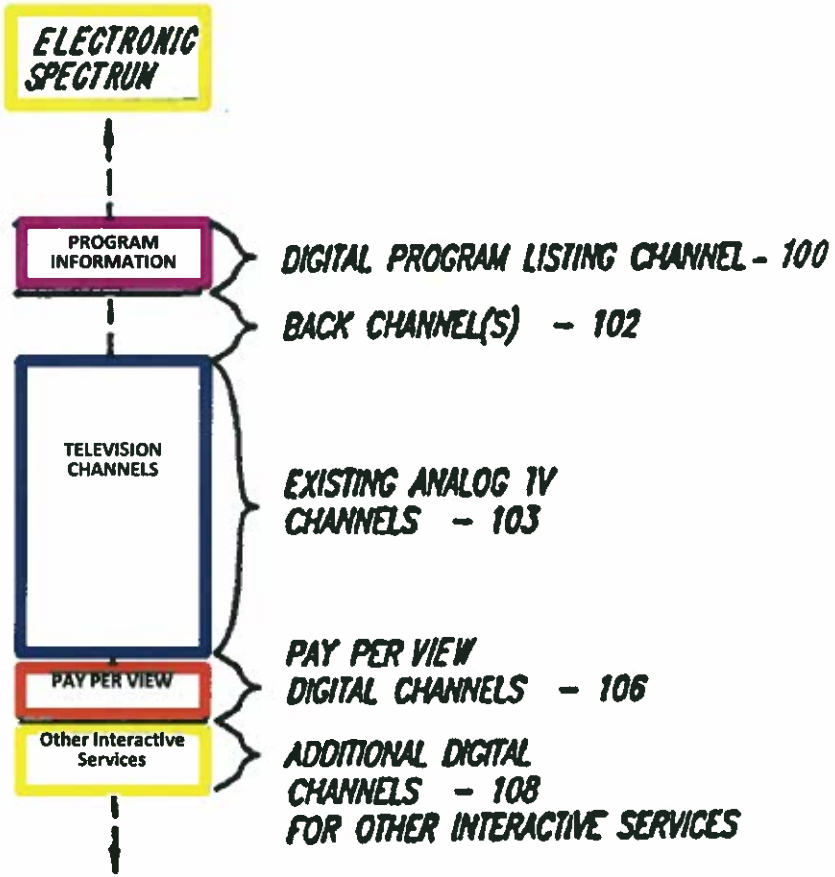

Electronic Spectrum of Signals

IPG Patents

PROGRAM INFORMATION
- Show times
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TELEVISION CHANNELS

PAY PER VIEW

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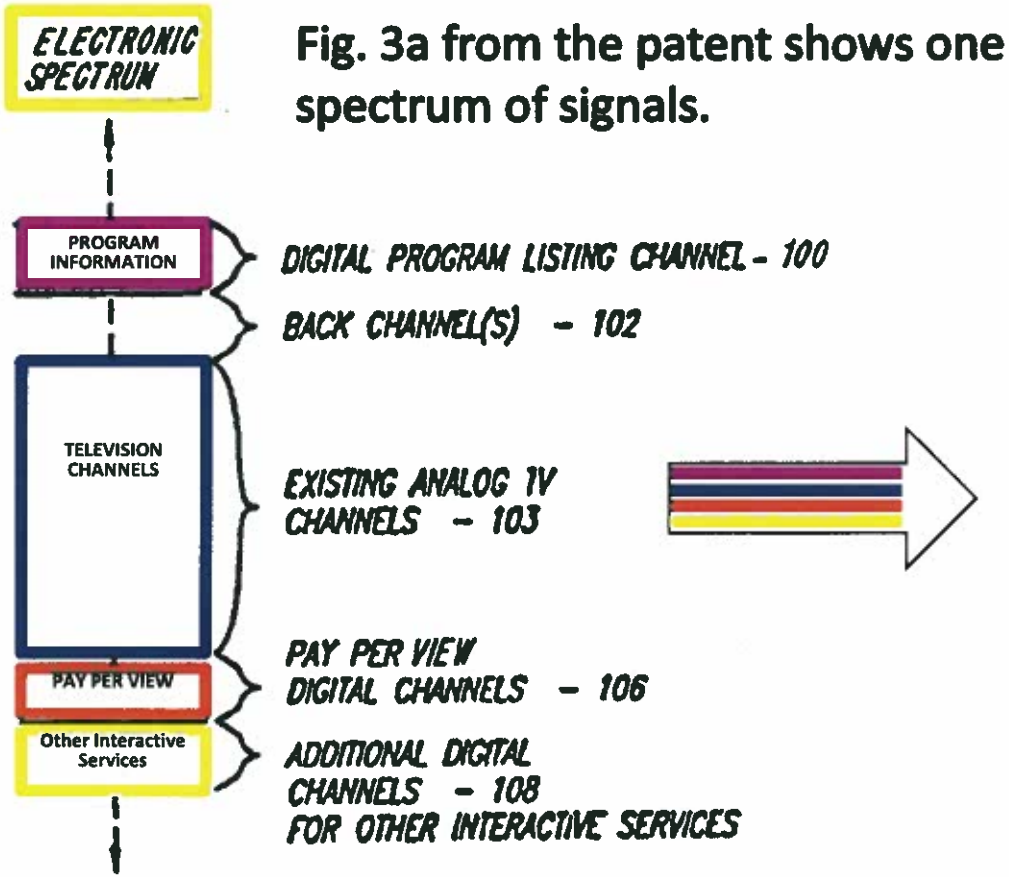


Electronic spectrum of signals is a collection of channels sent by the cable provider.

Fig. 3a from the patent shows one possible spectrum of signals.

Tuner/Demodulator

IPG Patents

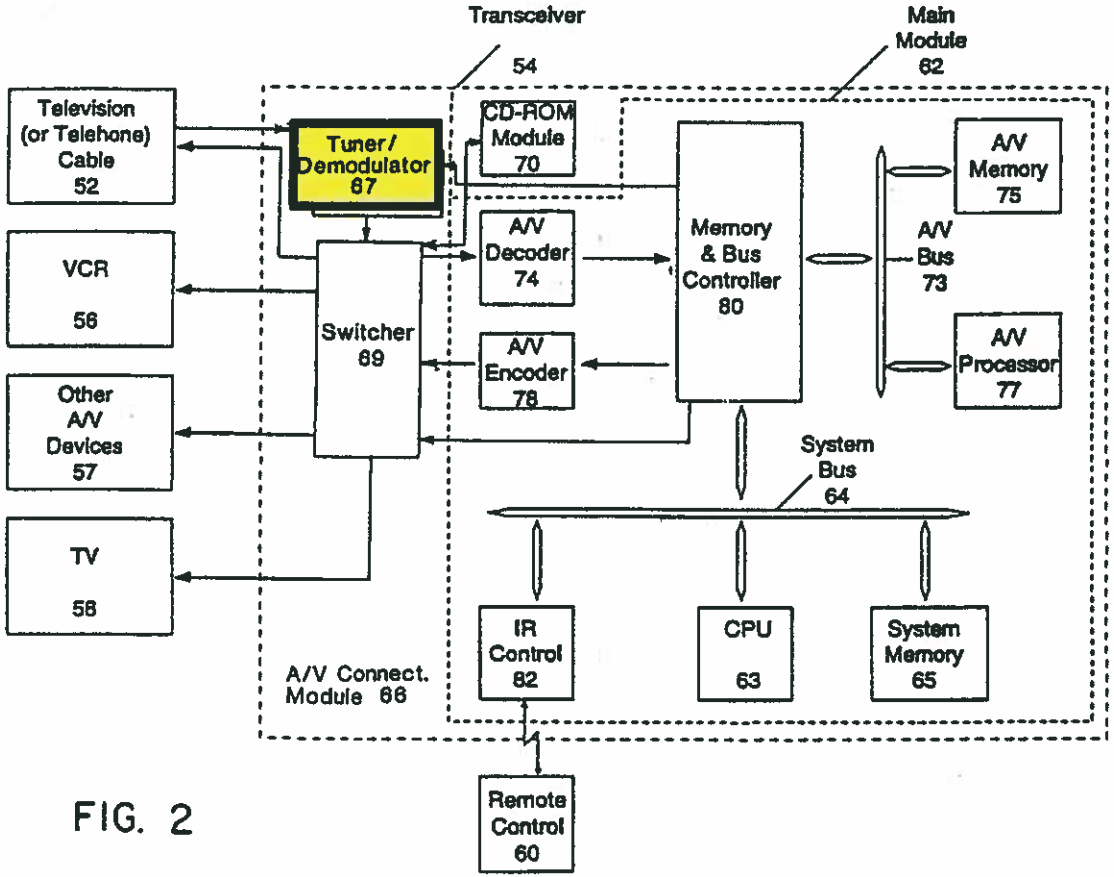


FIG. 2

Demodulator takes electronic spectrum of signals and recovers individual signal.

Tuner tunes to particular channel from among the demodulated TV channels.

Tuner

IPG Patents

- **Tuner tunes to selected channel for display.**

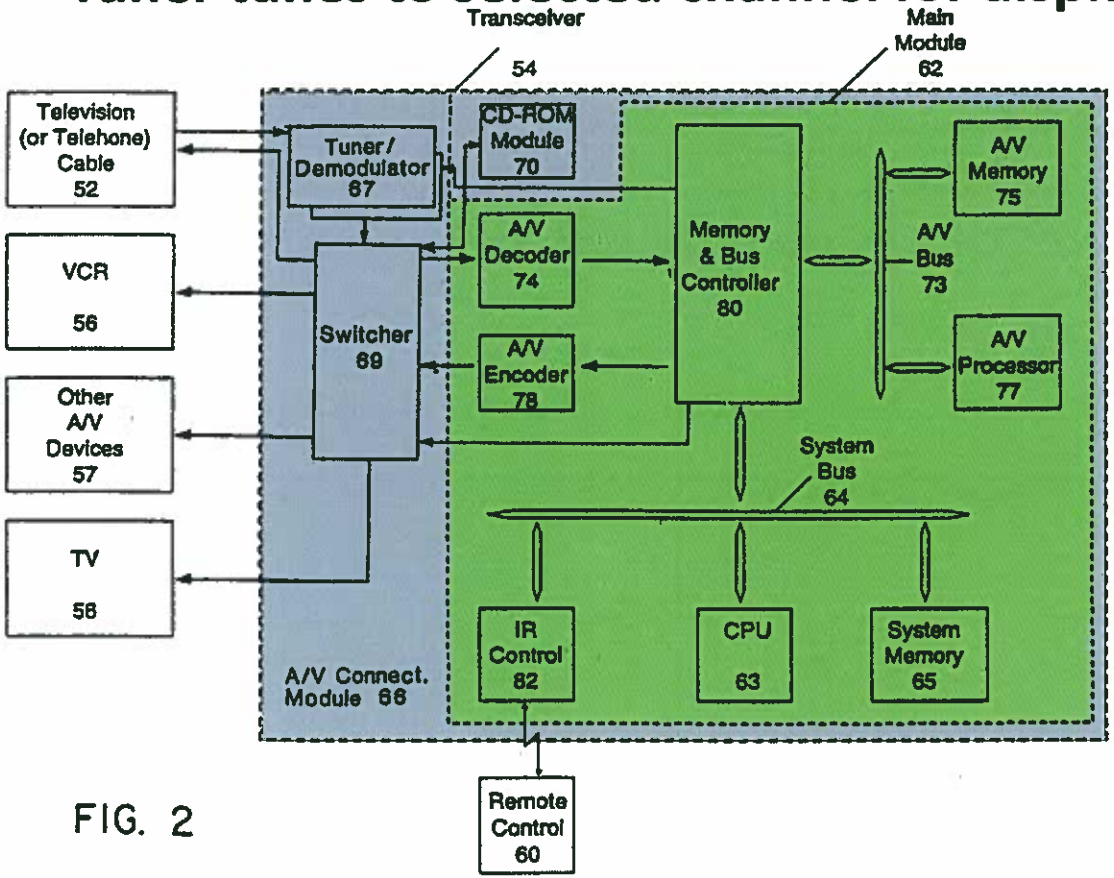


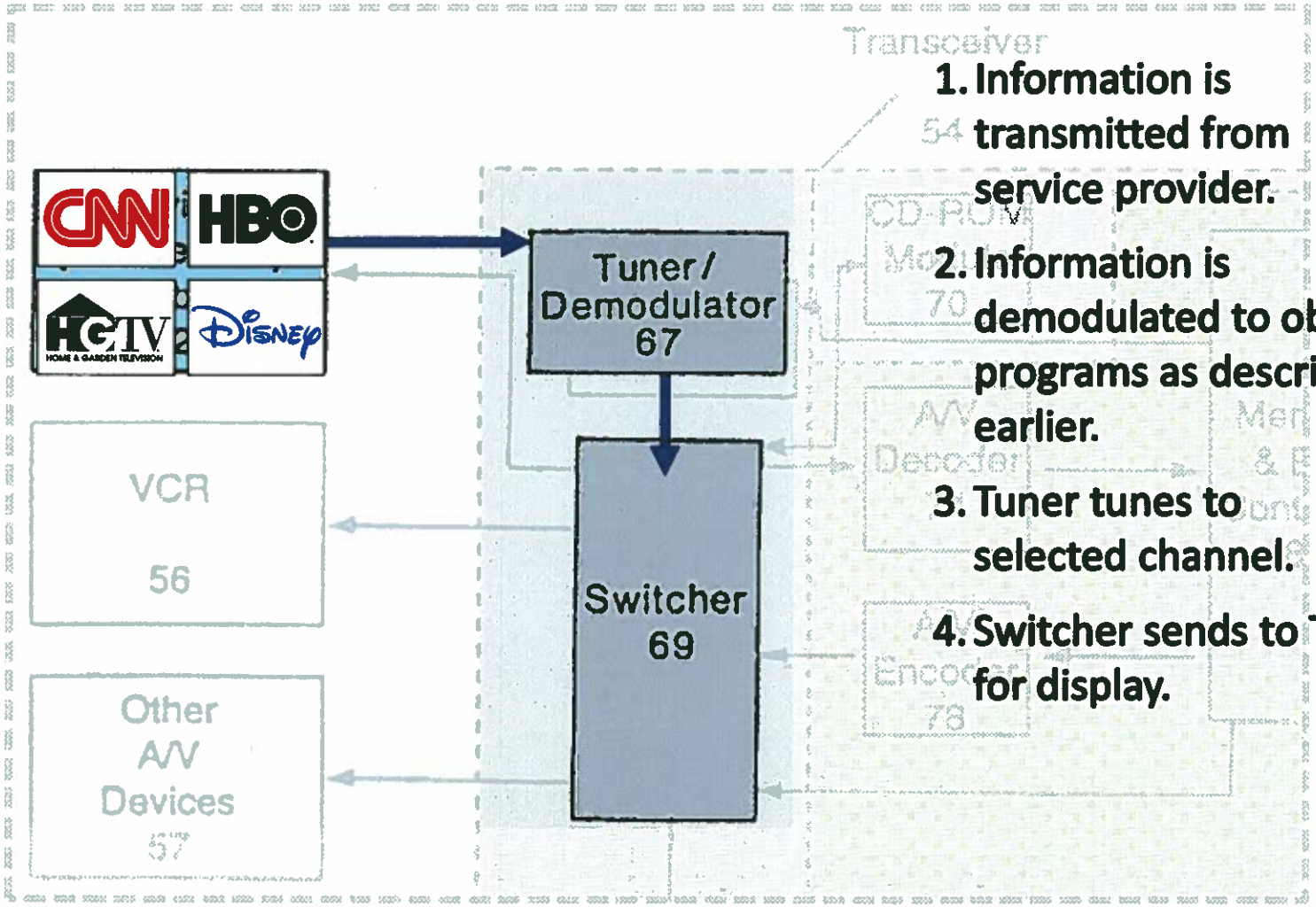
FIG. 2

1. Information is transmitted from service provider.
2. Information is demodulated to obtain programs as described earlier.
3. Tuner tunes to selected channel.
4. Switcher sends to TV for display.

Tuner

IPG Patents

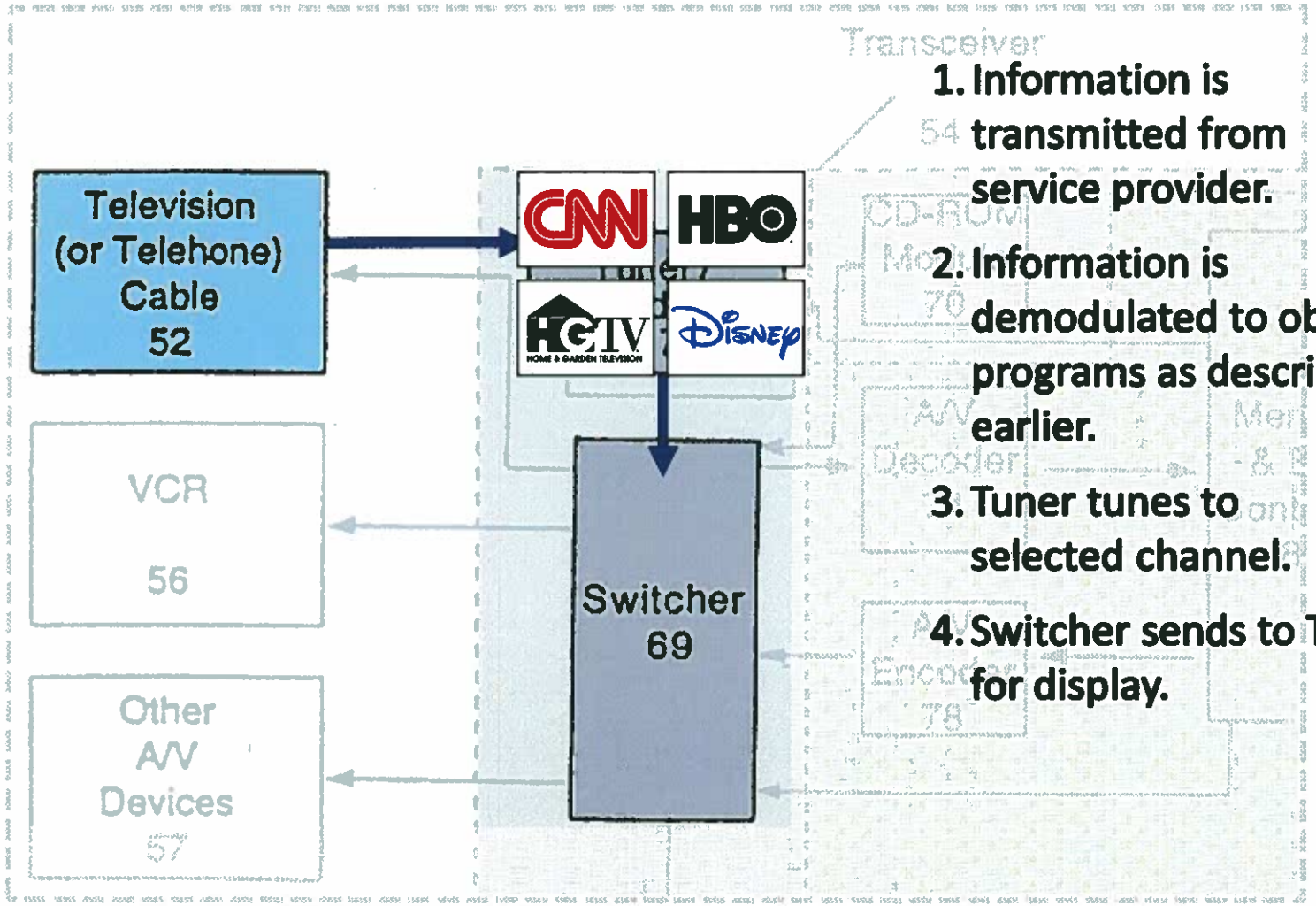
- **Tuner tunes to selected channel for display.**



Tuner

IPG Patents

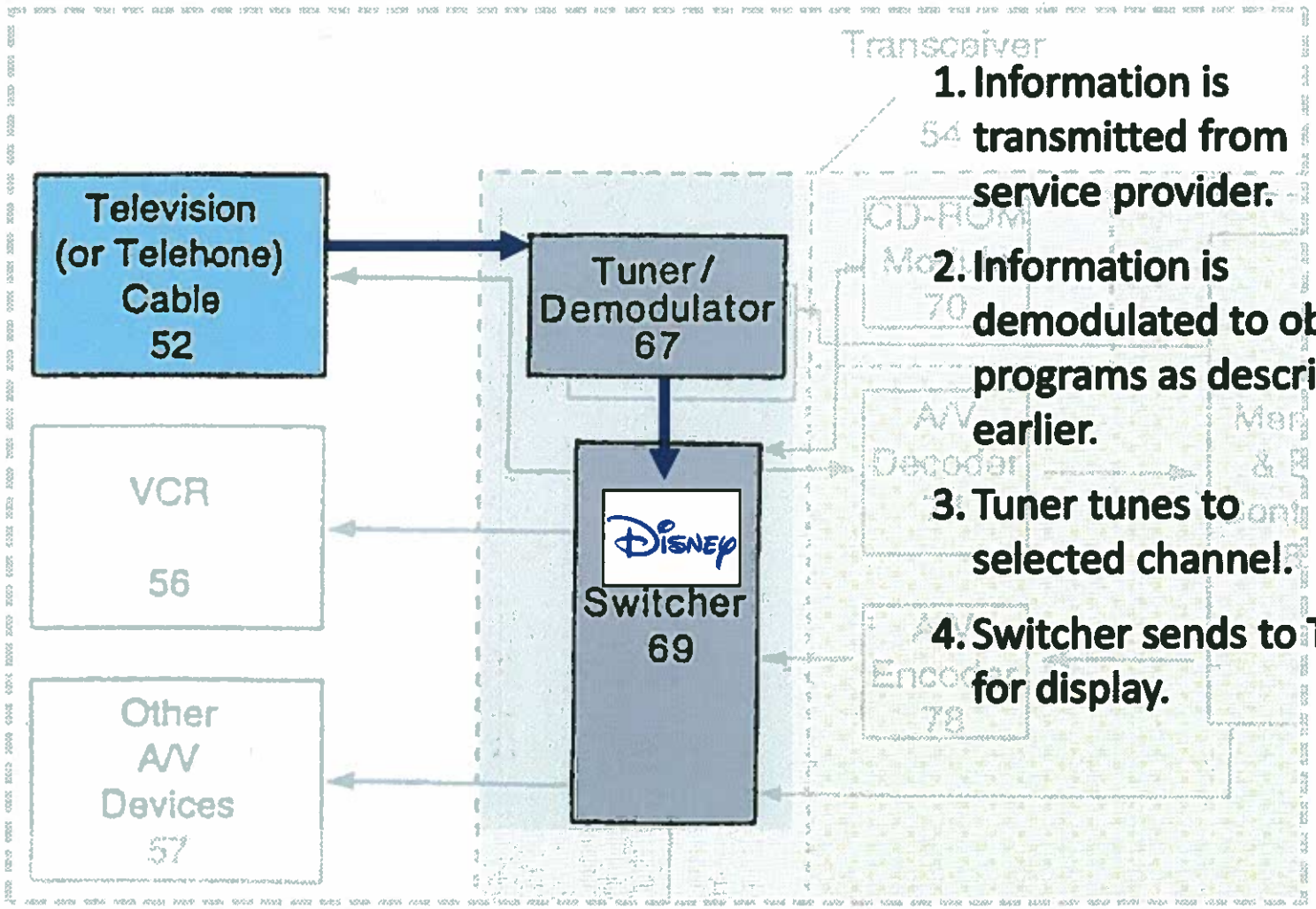
- **Tuner tunes to selected channel for display.**



Tuner

IPG Patents

- **Tuner tunes to selected channel for display.**



Demodulator

IPG Patents

- **Demodulator demodulates the received signal to obtain original data.**

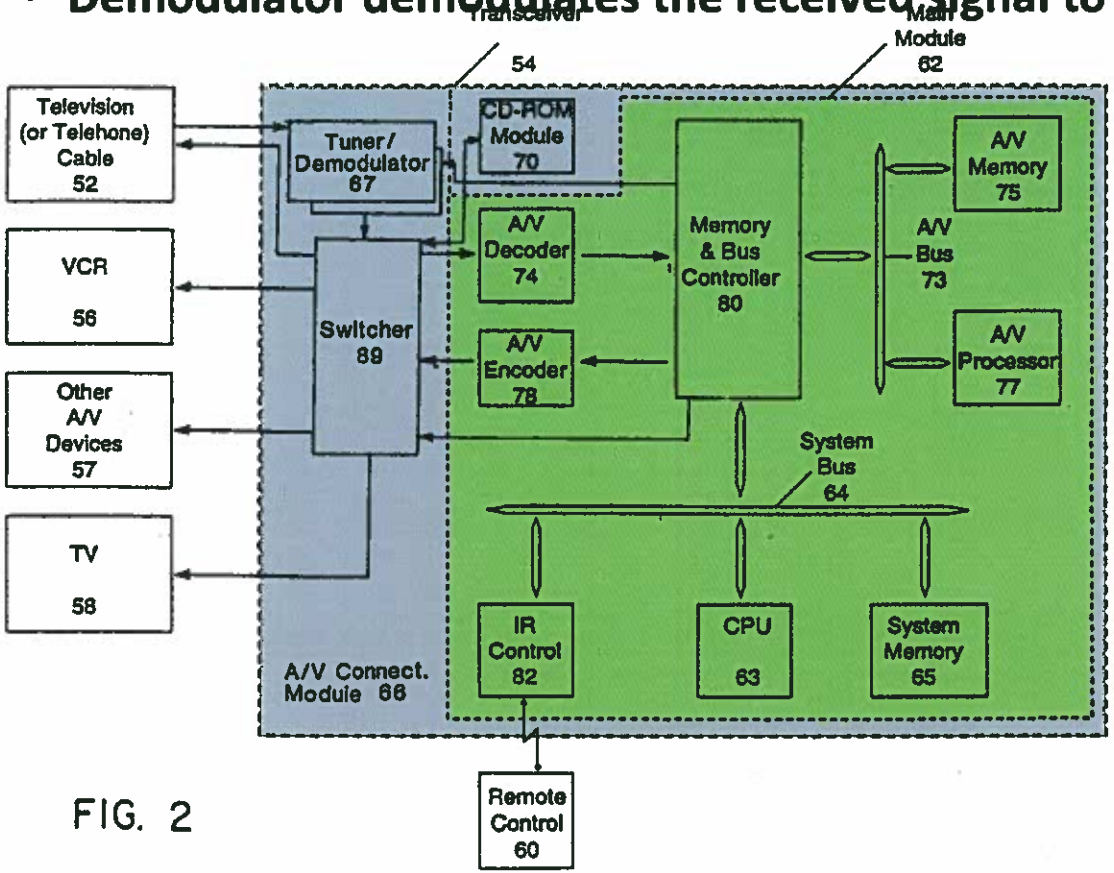


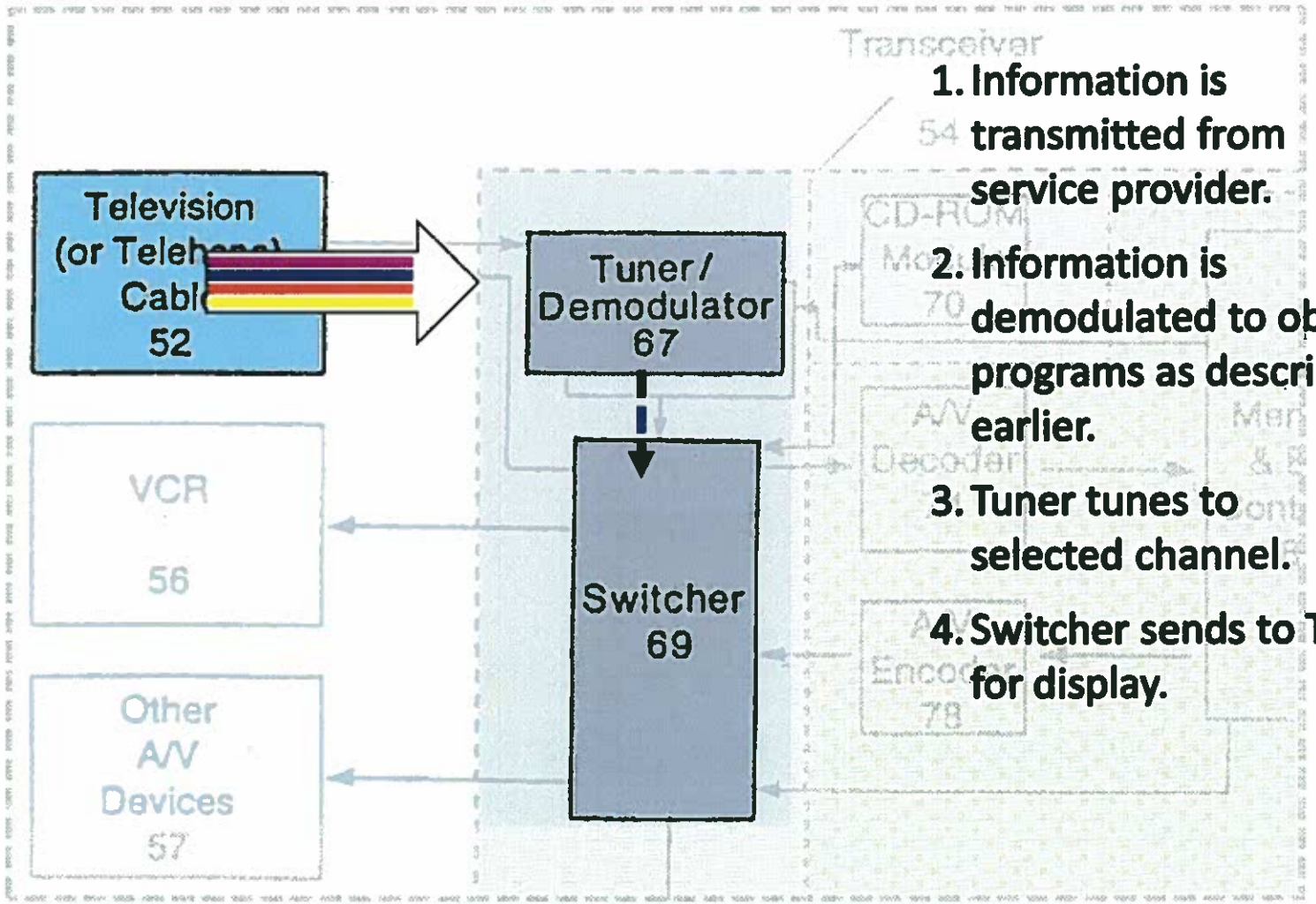
FIG. 2

1. Information is transmitted from service provider.
2. Information is demodulated to obtain programs as described earlier.
3. Tuner tunes to selected channel.
4. Switcher sends to TV for display.

Demodulator

IPG Patents

- **Demodulator demodulates the received signal to obtain original data.**



Demodulator

IPG Patents

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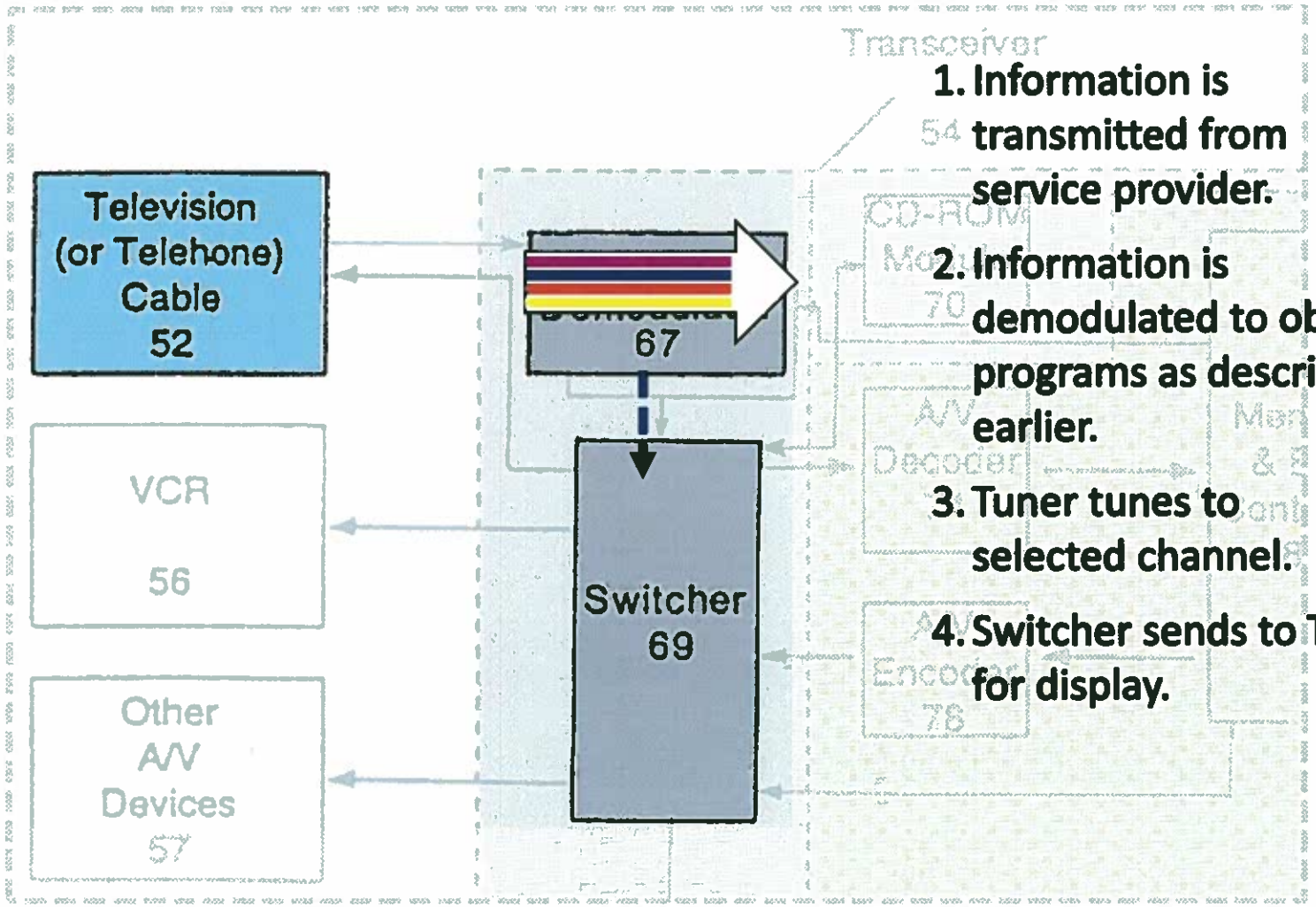

Memory and Bus Controller

IPG Patents

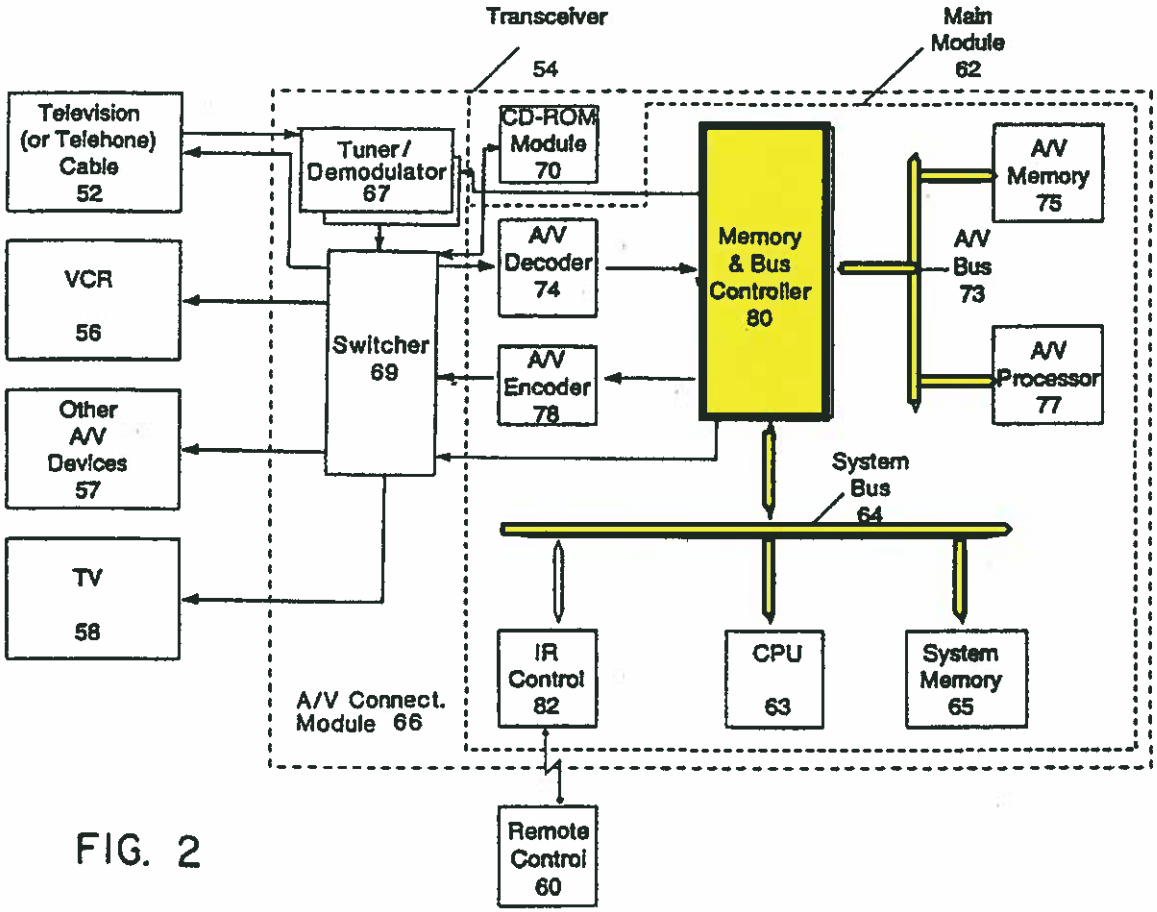

FIG. 2

Acts like a "traffic cop" to control data flow on the buses.

Bus

IPG Patents

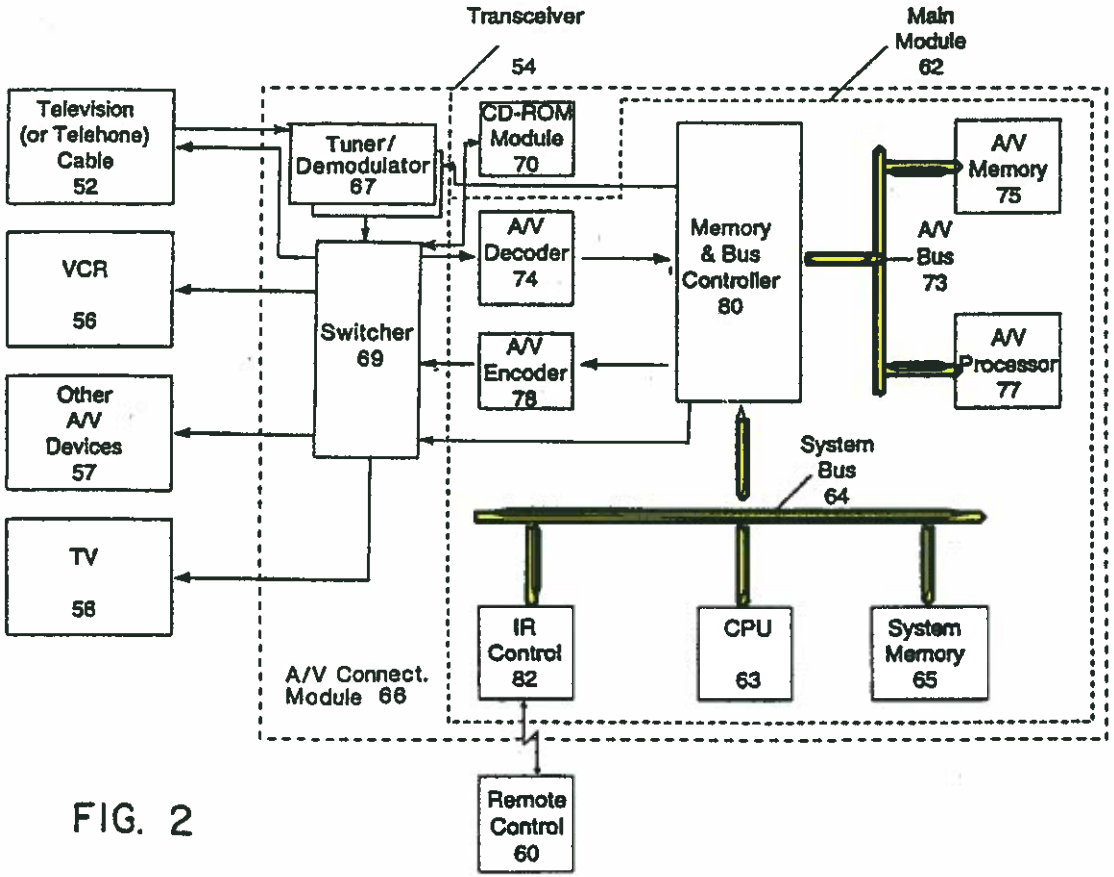

FIG. 2

Buses, such as the system bus and A/V bus, route data in the set-top box.

A/V Decoder

IPG Patents

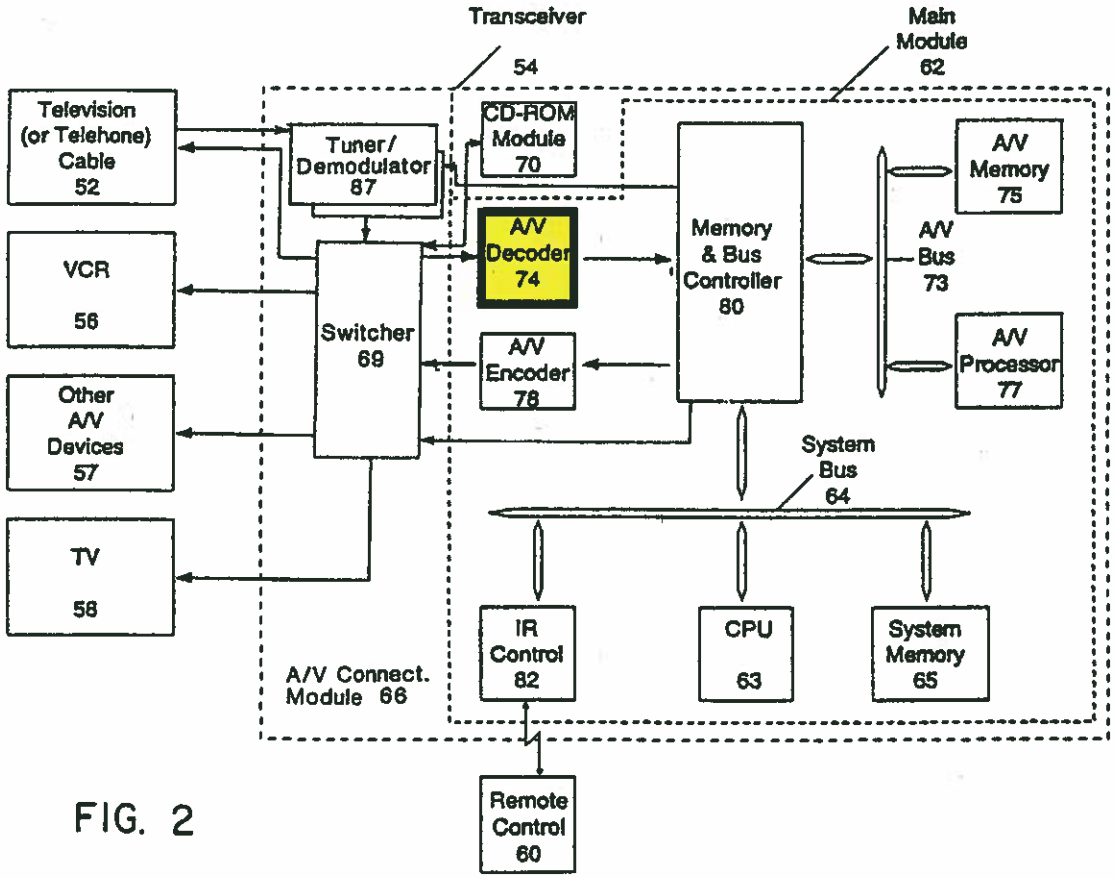

FIG. 2

Decodes audio and video data from the cable provider, for example:

- **Convert analog A/V data to digital**
- **Decompress A/V data such as MPEG**
- **Decode special information sent on analog TV channels**

May resize TV signal for picture-in-picture

A/V Encoder

IPG Patents

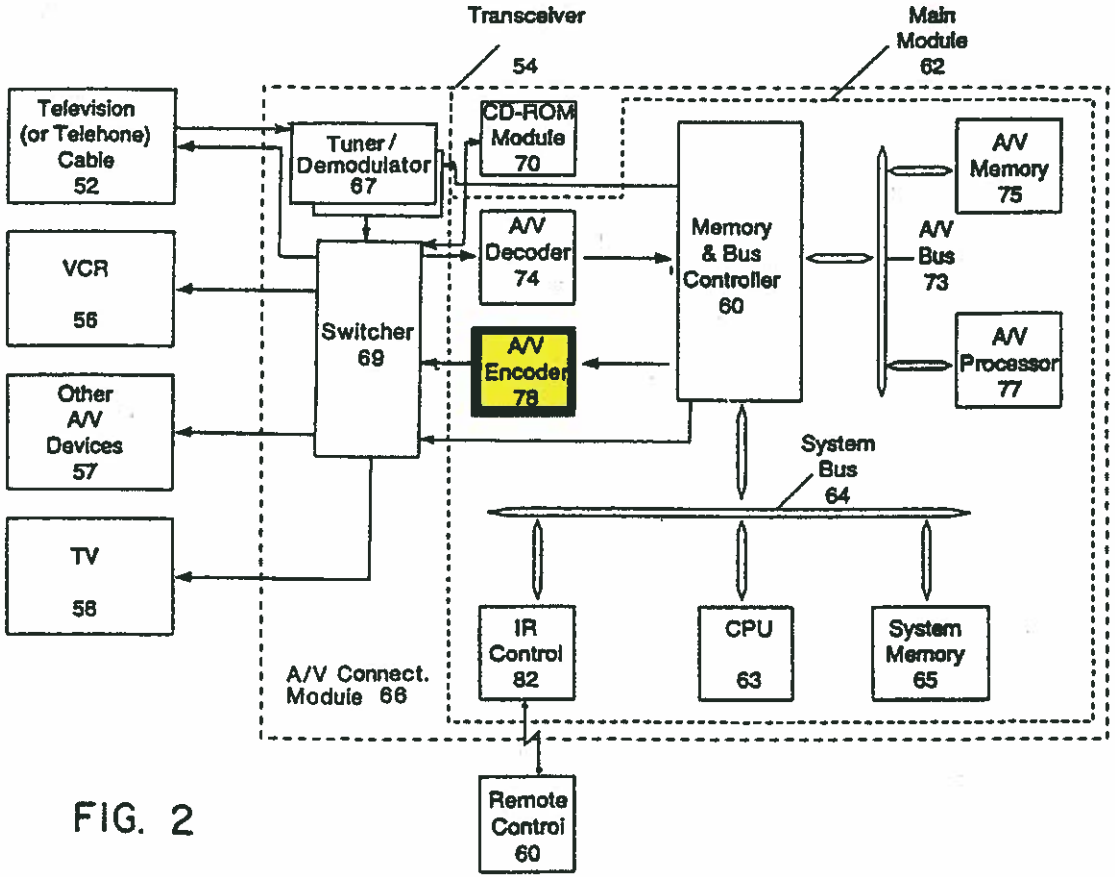

FIG. 2

A/V encoder changes audio and video data into the format used by the selected output device (TV, VCR, or other A/V device).

May be used to encode other data such as order information for transmission to the service provider.

Switcher

IPG Patents

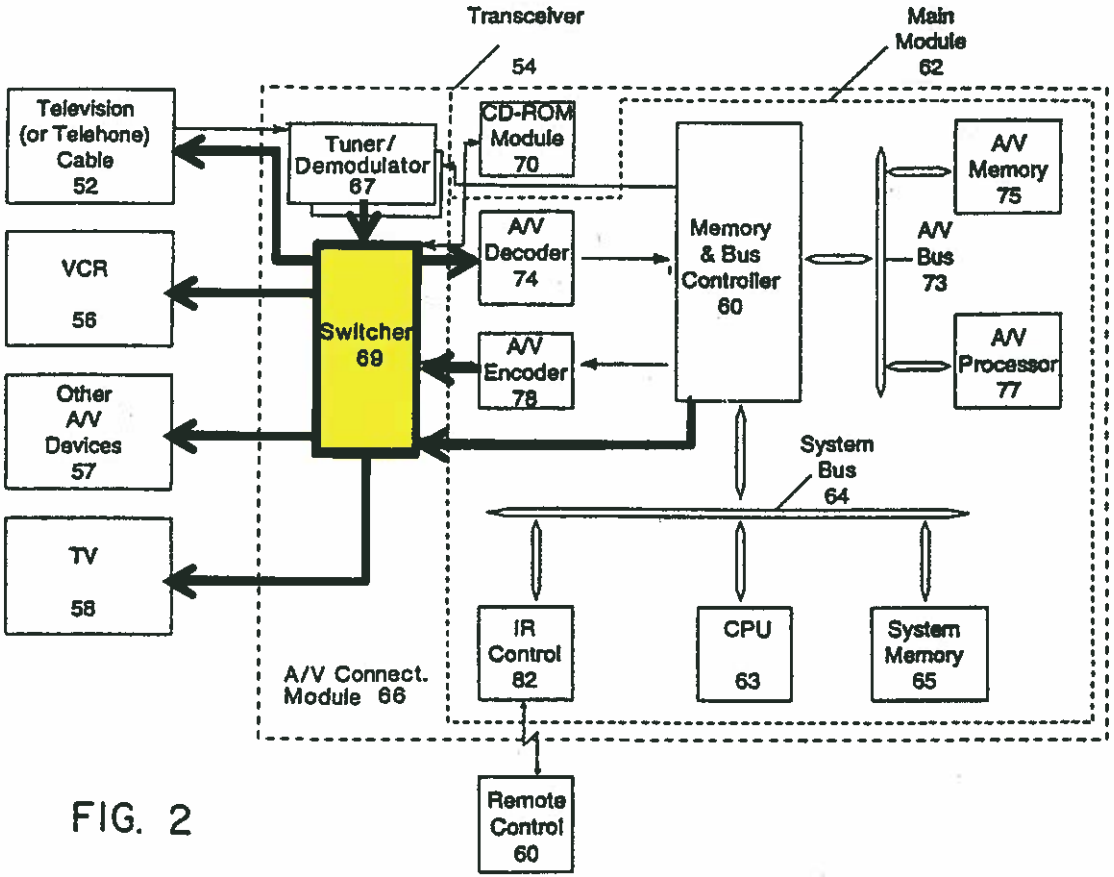

FIG. 2

Receives various inputs and directs the data to the appropriate outputs.