The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 336 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Jungmin LYU, Seongnam-si, KOREA, REPUBLIC OF;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.
PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail
Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE if required. Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

34510 7590 02/01/2016
KED & ASSOCIATES, LLP
P.O. Box 8638
Reston, VA 20195

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE addressed above, or being facsimile transmitted to the USPTO (571) 273-885, on the date indicated below.

(Depositor's name)

(Signature)

(Date)

APPLICATION NO. FILING DATE FIRST NAMED INVENTOR ATTORNEY DOCKET NO. CONFIRMATION NO.
13/104,364 05/10/2011 Jungmin LYU RPL-0424 1076

TITLE OF INVENTION: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

<table>
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<th>EXAMINER</th>
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<tr>
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1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.563).
   - [ ] Change of correspondence address or Change of Correspondence Address form PTO/SB/122 attached.
   - [ ] "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list:
   (1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
   (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

   (A) NAME OF ASSIGNEE
   Humax Co., Ltd.

   (B) RESIDENCE: (CITY and STATE OR COUNTRY)
   Seongnam-si, Korea

   Please check the appropriate assignee category or categories (will not be printed on the patent):
   - [ ] Individual
   - [X] Corporation or other private group entity
   - [ ] Government

4a. The following fee(s) are submitted:
   - [X] Issue Fee
   - [ ] Publication Fee (No small entity discount permitted)
   - [ ] Advance Order - # of Copies

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)
   - [ ] A check is enclosed.
   - [X] Payment by credit card schedule appears below.
   - [ ] The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 16-0607 (enclose a copy of this form).

5. Change in Entity Status (from status indicated above)
   - [ ] Applicant certifying micro entity status. See 37 CFR 1.29
   - [ ] Applicant asserting small entity status. See 37 CFR 1.27
   - [ ] Applicant changing to regular undiscounted fee status.

   NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

   NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

   NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

   This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature

Typed or printed name David C. Oren

Date 04/27/2016
Registration No. 38,694
# Electronic Patent Application Fee Transmittal

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## Filing Fees for Utility under 35 USC 111(a)

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<td>METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL</td>
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The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
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/EQ/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.
NOTICE OF ALLOWANCE AND FEE(S) DUE

34610 7590 02/10/2016
KED & ASSOCIATES, LLP
P.O. Box 8638
Reston, VA 20195

EXAMINER
PARRA, OMAR S

ART UNIT 2421
PAPER NUMBER

DATE MAILED: 02/01/2016

APPLICATION NO. 13/104,364
FILING DATE 05/10/2011
FIRST NAMED INVENTOR Jungmin L.YU
ATTORNEY DOCKET NO. RPL-0424
CONFIRMATION NO. 1076

TITLE OF INVENTION: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

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THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above).

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee’s responsibility to ensure timely payment of maintenance fees when due.
PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail
Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

or Fax
(571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

34610 7590 02/01/2016
KED & ASSOCIATES, LLP
P.O. Box 8638
Reston, VA 20195

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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

34610 7590 02/01/2016
KED & ASSOCIATES, LLP
P.O. Box 8638
Reston, VA 20195

APPLICATION NO. 13/104,364
FILING DATE 05/10/2011
FIRST NAMED INVENTOR Jungmin LYU
ATTORNEY DOCKET NO. RPL-0424
CONFIRMATION NO. 1076

TITLED OF INVENTION: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

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EXAMINER PARRA, OMAR S
ART UNIT 2421
CLASS-SUBCLASS 725-027000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
   - Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
   - "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
   - (1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
   - (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)
   - PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.
   - (A) NAME OF ASSIGNEE
   - (B) RESIDENCE: (CITY and STATE OR COUNTRY)

   Please check the appropriate assignee category or categories (will not be printed on the patent):
   - Individual
   - Corporation or other private group entity
   - Government

4. The following fee(s) are submitted:
   - Issue Fee
   - Publication Fee (No small entity discount permitted)
   - Advance Order - # of Copies

4b. Payment of Fee(s) (Please first reapply any previously paid issue fee shown above)
   - A check is enclosed.
   - Payment by credit card. Form PTO-2038 is attached.
   - The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number ____________ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)
   - Applicant certifying micro entity status. See 37 CFR 1.29
   - Applicant asserting small entity status. See 37 CFR 1.27
   - Applicant changing to regular undiscounted fee status.
   - NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
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   - Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

   NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature ___________________________ Date ____________

Typed or printed name ___________________________ Registration No. ______
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KED & ASSOCIATES, LLP  
P.O. Box 8638  
Reston, VA 20195

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**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.
OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number’s legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. 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 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. 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.

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.
Notice of Allowability

Applicant No. 13/104,364
Applicant(s) LYU, JUNGMIN
Examiner OMAR S. PARRA
Art Unit 2421
AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--
All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application, If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS. This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 10/23/2015.
   □ A declaration(s)/affidavit(s) under 37 CFR 1.130(b) was/were filed on______.

2. □ An election was made by the applicant in response to a restriction requirement set forth during the interview on ______; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-3,6-9 and 11. As a result of the allowed claim(s), you may be eligible to benefit from the Patent Prosecution Highway program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

4. □ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   
   Certified copies:
   a) ☑ All  b) □ Some  c) □ None of the:
   1. ☑ Certified copies of the priority documents have been received.
   2. □ Certified copies of the priority documents have been received in Application No. _____.
   3. □ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE “MAILING DATE” of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. □ CORRECTED DRAWINGS (as “replacement sheets”) must be submitted.

   □ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
   
   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. □ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. □ Notice of References Cited (PTO-892)

2. □ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____

3. □ Examiner's Comment Regarding Requirement for Deposit of Biological Material

4. □ Interview Summary (PTO-413), Paper No./Mail Date _____.

/OMAR S PARRA/
Examiner, Art Unit 2421

U.S. Patent and Trademark Office
PTOL-37 (Rev. 08-13)
DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Allowable Subject Matter

2. Claims 1-3, 6-9 and 11 are allowed.

3. The following is an examiner’s statement of reasons for allowance:
The prior art of record fails to either disclose or sufficiently suggest the combination and sequence of features and/or steps as claimed and arranged by applicant. Applicant’s arguments are persuasive in light of the applicant’s amendments filed on 10/23/2015.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Any inquiry concerning this communication or earlier communications from the examiner should be directed to OMAR S. PARRA whose telephone number is (571)270-1449. The examiner can normally be reached on 9-6 PM (M-F, every other Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/OMAR S PARRA/
Examiner, Art Unit 2421
### EAST Search History

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OMAR S PARRA/
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*OMAR S PARRA*
Examiner Art Unit 2421

(Primary Examiner)

01/18/2016

Total Claims Allowed:

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7

O.G. Print Figure:

1

U.S. Patent and Trademark Office
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.PN.  | US-PGPUB; USPAT; USOCR; DERMWENT  | OR                             | OFF               | 2016/01/18 11:19 |
In the United States Patent and Trademark Office

In re Application of: Jungmin LYU

Serial No.: 13/104,364

Filed: May 10, 2011

Confirmation No.: 1076

Group Art Unit: 2421

Examiner: Omar S. PARRA

Customer No.: 34610

For: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

AMENDMENT

U.S. Patent and Trademark Office
Customer Window, Mail Stop Amendment
Randolph Building
401 Dulany Street
Alexandria, Virginia 22314

Sir:

In reply to the Office Action dated July 23, 2015, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims.

Remarks begin after the listing of the claims.
AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for receiving a viewing-restricted channel in a broadcast receiver without a conditional access system (CAS) module, comprising:
   determining whether a requested channel is a viewing-restricted channel during a channel switching operation by a user;
   when the viewing-restricted channel is requested during the channel switching operation, transmitting, to a second broadcast receiver equipped with the CAS module through a network, a command requesting for decoding broadcast signals of the viewing-restricted channel into broadcast data and transmitting the decoded broadcast data and switching an operation mode from a tuner mode to an input mode;
   receiving the broadcast data from the second broadcast receiver through the network; and
   processing the broadcast data to audio/video signals.

2. (Previously Presented) The method of claim 1, wherein virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels are managed as a viewing-restricted channel list, and a
determination whether the requested channel is a viewing-restricted channel is based on the viewing-restricted channel list.

3. (Currently Amended) The method of claim 1, wherein the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a conditional access system (CAS) module.

4.-5. (Canceled)

6. (Previously Presented) The method of claim 1, wherein the broadcast data is transcoded data with a different bit rate, and the receiving and the processing of the broadcast data comprises decoding the transcoded broadcast data.

7. (Currently Amended) An apparatus for receiving a viewing-restricted channel without a conditional access system (CAS) module, comprising:

   a communication module for connecting to a broadcast receiver through a network;

   a signal processing module for processing broadcast data transmitted through broadcast signals or a network; and

   a controller for generating a command requesting for decoding and transmitting broadcast signals of a viewing-restricted channel into broadcast data and
transmitting the decoded broadcast data when a requested channel is the viewing-restricted channel during a channel switching operation by a user, switching an operation mode of the apparatus from a tuner mode to an input mode, transmitting the command to the second broadcast receiver equipped with the CAS module through the network and receiving the broadcast data from the second broadcast receiver through the network by controlling the communication module, and playing the received broadcast data by controlling the signal processing module.

8. (Previously Presented) The apparatus of claim 7, further comprising a storage for storing virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels as a viewing-restricted channel list, the controller determining whether the requested channel is a viewing-restricted channel based on the viewing-restricted channel list in the storage.

9. (Currently Amended) The apparatus of claim 7, wherein the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a conditional access system (CAS module).

10. (Canceled)
11. (Currently Amended) The apparatus of claim 7, wherein the controller, when broadcast data transcoded at a different bit rate by the second broadcast receiver are received, plays the transcoded broadcast data after decoding the data by controlling the signal processing module.
REMARKS

Claims 1-3, 6-9 and 11 are pending in this application. By this Amendment, claims 1, 3, 7, 9 and 11 are amended. Various amendments may be made for clarity, and may be unrelated to issues of patentability.

The Office Action rejects claims 1, 3, 6, 7, 9 and 11 under 35 U.S.C. §103(a) over U.S. Patent Publication 2004/0250273 to Swix et al. (hereafter Swix) in view of newly-cited U.S. Patent Publication 2012/0017250 to Tirasirikul et al. (hereafter Tirasirikul). The Office Action also rejects claims 2 and 8 under 35 U.S.C. §103(a) over Swix in view of Tirasirikul and U.S. Patent Publication 2003/0046100 to Yamauchi (hereafter Yamauchi). The rejections are respectfully traversed with respect to the pending claims.

Independent claim 1 recites determining whether a requested channel is a viewing-restricted channel during a channel switching operation by a user. Independent claim 1 also recites when the viewing-restricted channel is requested during the channel switching operation, transmitting, to a second broadcast receiver equipped with the CAS module through a network, a command requesting for decoding broadcast signals of the viewing-restricted channel into broadcast data and transmitting the decoded broadcast data and switching an operation mode from a tuner mode to an input mode. Independent claim 1 also recites receiving the broadcast data from the second broadcast receiver through the network, and processing the broadcast data to audio/video signals.
The applied references do not teach or suggest all the features of independent claim 1. More specifically, the applied references do not teach or suggest features related to a channel switching operation and/or switching an operation mode from a tuner mode to an input mode, as recited in independent claim 1.

The Office Action (on page 4) states that Swix does not teach determining whether a requested channel is a viewing-restricted channel during a channel switching operation by a user, and switching an operation mode from a tuner mode to an input mode.

The Office Action (on page 4) states that Tirasirikul’s FIG. 7 and paragraphs [0036] and [0037] teach that the master settop box reformats the received content, encapsulates the data and sends it to the receiving device 707.

Tirasirikul’s paragraphs [0036] and [0037] are as follows:

Theater systems high definition (DTS-HD) audio. Thus, content processing device 700 may be configured to encapsulate data into a proper format with required credentials before transmitting onto one or more of the networks of FIG. 1 and de-encapsulate incoming traffic to dispatch data to display 705 and/or audio system 709.

[0037] In an exemplary embodiment, display 705 and/or audio system 709 may be configured with internet protocol (IP) capability (i.e., includes an IP stack, or is otherwise network addressable), such that the functions of content processing device 700 may be assumed by display 705 and/or audio system 709. In this manner, an IP ready, HDTV display or DTS-HD audio system may be directly connected to one or
Tirasirikul’s paragraph [0036] only discloses that a master STB 201 encapsulates received content and dispatches the encapsulated data to display 705 and/or audio system 709 (not to the child STB 203).

Tirasirikul’s paragraph [0037] discloses that display 705 and/or audio system 709 may be configured with internet protocol (IP) capability. Tirasirikul does not disclose that display 705 and/or audio system 709 include the tuning function of the child STB 203.

Further, the master 201 sends only a message, to a child STB 203, containing granting or denying a child STB’s request for viewing certain program. Tirasirikul does not provide the encapsulated data to a child STB 203.

Tirasirikul does not disclose providing encapsulated data to a child STB 203. Tirasirikul does not teach or suggest switching an operation mode from a tuner mode to an input mode, as recited in independent claim 1.

For at least these reasons, Swix and Tirasirikul do not teach or suggest all the features of independent claim 1. Yamauchi does not teach or suggest the missing features of independent claim 1. Independent claim 1 therefore defines patentable subject matter.

Independent claim 7 recites a communication module for connecting to a broadcast receiver through and a network, a signal processing module for processing broadcast data transmitted through broadcast signals or a network. Independent claim 7 also recites a controller for generating a command requesting for decoding and transmitting broadcast signals of a viewing-restricted channel into broadcast data and transmitting the decoded
broadcast data when a requested channel is the viewing-restricted channel during a channel switching operation by a user, switching an operation mode of the apparatus from a tuner mode to an input mode, transmitting the command to the second broadcast receiver equipped with the CAS module through the network and receiving the broadcast data from the second broadcast receiver through the network by controlling the communication module, and playing the received broadcast data by controlling the signal processing module.

The applied references do not teach or suggest all the features of independent claim 7. More specifically, Swix, Tirasirikul and Yamauchi do not teach or suggest a controller for generating a command requesting for decoding and transmitting broadcast signals of a viewing-restricted channel into broadcast data and transmitting the decoded broadcast data when a requested channel is the viewing-restricted channel during a channel switching operation by a user, switching an operation mode of the apparatus from a tuner mode to an input mode, transmitting the command to the second broadcast receiver equipped with the CAS module through the network and receiving the broadcast data from the second broadcast receiver through the network by controlling the communication module, as recited in independent claim 7. Independent claim 7 therefore defines patentable subject matter.

For at least the reasons set forth above, each of independent claims 1 and 7 defines patentable subject matter. Each of the dependent claims depends from one of the independent claims and therefore defines patentable subject matter at least for this reason.
In addition, the dependent claims recite features that further and independently distinguish over the applied references.

**CONCLUSION**

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Favorable consideration and prompt allowance of claims 1-3, 6-9 and 11 are earnestly solicited. If the Examiner believes that any additional changes would place the application in better condition for allowance, the Examiner is invited to contact the undersigned attorney at the telephone number listed below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,
KED & ASSOCIATES, LLP

[Signature]
David C. Oren
Registration No. 38,694

Correspondence Address:
P.O. Box 8638
Reston, VA 20195
703 766-3777 DCO/ka

Please direct all correspondence to Customer Number 34610
**Electronic Acknowledgement Receipt**

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<td>Jungmin LYU</td>
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Submitted with Payment: no

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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.
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Jungmin LYU

Serial No: 13/104,364

Filed: May 10, 2011

For: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

U.S. Patent and Trademark Office
Customer Window, MAIL STOP AMENDMENT
Randolph Building
401 Dulany Street
Alexandria, Virginia 22314

Dear Sir:

Transmitted herewith is an Amendment and/or Reply in the above identified application.

☑ No additional fee is required.
☐ Also attached:

The fee has been calculated as shown below:

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TOTAL FEE DUE $0.00

☑ The Commissioner is hereby authorized to charge payment of any fees associated with this communication or credit any overpayment, to Deposit Account No. 16-0607, including any filing fees under 37 C.F.R.§1.16 for presentation of extra claims and any patent application processing fees under 37 C.F.R. §1.17.

Respectfully submitted,
KED & ASSOCIATES, LLP

David C. Oren
Registration No. 38,694

Correspondence Address:
P.O. Box 8638
Reston, VA 20195
(703) 766-3777 DCO/iah

Please direct all correspondence to Customer Number 34610
**APPLICATION AS FILED – PART I**

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□ APPLICATION SIZE FEE (37 CFR 1.16(c))

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**APPLICATION AS AMENDED – PART II**

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□ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(g))

**TOTAL ADD’L FEE**

LIE /GWENDOLYN MYERS/

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" in this space is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" in this space is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. 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 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.
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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):
ked-docket@ked-iplaw.com
mydocket@icloud.com
keddocket@gmail.com
Office Action Summary

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication. Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☑ Responsive to communication(s) filed on 11/27/2013.
2a) ☐ A declaration(s)/affidavit(s) under 37 CFR 1.130(b) was/were filed on ______.
2b) ☑ This action is FINAL.
3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ______; the restriction requirement and election have been incorporated into this action.
4) ☐ Since this application is in condition for allowance 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.

Disposition of Claims*

5) ☑ Claim(s) 1-3, 6-9 and 11 is/are pending in the application.
   5a) Of the above claim(s) ______ is/are withdrawn from consideration.
6) ☐ Claim(s) ______ is/are allowed.
7) ☑ Claim(s) 1-3, 6-9 and 11 is/are rejected.
8) ☐ Claim(s) ______ is/are objected to.
9) ☐ Claim(s) ______ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the Patent Prosecution Highway program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10) ☐ The specification is objected to by the Examiner.
11) ☐ The drawing(s) filed on ______ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All   b)☐ Some**   c)☐ None of the:
   1.☐ Certified copies of the priority documents have been received.
   2.☐ Certified copies of the priority documents have been received in Application No. ______.
   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
   Paper No(s)/Mail Date 11/12/2014

3) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date: ______.

4) ☐ Other: ______.
DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant’s submission filed on 11/27/2013 has been entered.

Response to Arguments

3. Applicant’s arguments with respect to claims 1-3, 6-9 and 11 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

4. The following is a quotation of pre-AIA 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.

Regarding claim 1, Swix teaches a method for receiving a viewing-restricted channel (the home network system - Digital Residential Entertainment system, DRES, [0017]- includes a Broadband Multimedia Gateway, BMG, [0019], which transmits requested channel streams to multiple receiving settop boxes, [0043]. BMG can include a Content Access System, CAS, [0047]; [0053], that controls/restricts content/channels to be sent to a given settop box, [0053]). comprising:

when the viewing-restricted channel is requested during the channel switching operation (the user transmits or selects content or channel through a settop box device using a remote control, [0023]; [0024]. The requested content/channel can be a restricted content, i.e. pay-per-view content/channel, [0053]), transmitting, to a broadcast receiver through a network, a command requesting for decoding broadcast signals of the viewing-restricted channel into broadcast data ([0023]; [0024], where the receiver settop box sends a request to the BMG for tuning to a given channel, which as indicated above, can be an access-restricted channel, [0053]) and transmitting the decoded broadcast data receiving the broadcast data from the broadcast receiver through the network (the BMG can tune to the received video stream and transmit the stream to the settop box through the local network for
further decoding, [0041]; [0042]; [0085]; [0086]);

and

processing the broadcast data to audio/video signals ([0084]-[0086]).

On the other hand, Swix does not explicitly teach

determining whether a requested channel is a viewing-restricted channel during a channel switching operation by a user;
and switching an operation mode from a tuner mode to an input mode.

However, in an analogous art, Tirasirikul teaches a home network with multiple settop boxes and devices, having a master device and multiple child devices. ([0016]; [0021]) Tirasirikul teaches that when a child device is concurrently scanning for programming (channel switching) and if the channel or content is restricted as a PPV or by parental control, a request is sent from the child device to the master device through the local network ([0032]-[0034]). The master device receives the request and sends the approval or denial to the child device ([0034]). Additionally, Tirasirikul teaches that if the user wants the content to be transmitted to a display device, the content can be received by the master device and sent to said device. The master settop box reformats the received content, encapsulates the data and sends it to the receiving device 707 (Fig. 7, [0036]; [0037]). Instead of receiving or presenting the content from the child device’s tuner, the content is encapsulated and transmitted through the LAN device.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Swix’s invention with Tirasirikul’s feature of switching the an operation mode from a tuner mode to an input mode and determining that a requested channel is a viewing-restricted channel for the benefit of giving the user
the option to watch a content on a third mobile device and for knowing if the user has
the right to watch said content, respectively.

Regarding claims 3 and 9, Swix and Tirasirikul teach wherein the viewing-
restricted channel is a pay channel and the broadcast receiver is equipped with a
conditional access system (CAS) module (Swix: [0047]; [0053], where the CAS can
be placed at the settop box receiver, CAS 705, Fig. 7; [0087]. Tirasirikul:
authentication module 711, [0038]).

Regarding claims 6 and 11, Swix and Tirasirikul teach wherein the broadcast
data is transcoded data with a different bit rate and the receiving and the processing of
the broadcast data comprises decoding the transcoded broadcast data (Swix: the BMG
can receive the content at a different/higher rate and is able to provide it to the
requesting settop box at a playback rate for the device to display the content,
[0069]; [0070]).

For claim 11, the receiver plays the transcoded broadcast data after decoding the
data by controlling the signal processing module (Swix: [0084]-[0086]).

Regarding claim 7, Swix teaches an apparatus for receiving a viewing-restricted
channel (a settop box receiver, 300, Fig. 1, and further described in detail as 799
on Fig. 7, requests content to the Broadband Media Gateway BMG. The content
can be restricted content), comprising:
a communication module for connecting to a broadcast receiver through a network (Network I/O 701, Fig. 7; which connects settop box receiver to the BMG through local network 95);

a signal processing module for processing broadcast data transmitted through broadcast signals or a network (702, 703, 705 and 707, Fig. 7; [0085]-[0087]); and

a controller for generating a command requesting for decoding and transmitting broadcast signals of a viewing-restricted channel into broadcast data and transmitting the decoded broadcast data when a user requests receiving the viewing-restricted channel (the user transmits or selects content or channel through a settop box device using a remote control, [0023]; [0024]. The requested content/channel can be a restricted content, i.e. pay-per-view content/channel, [0053]), transmitting the command to the broadcast receiver through the network ([0023]; [0024], where the receiver settop box sends a request to the BMG for tuning to a given channel, which as indicated above, can be an access-restricted channel, [0053]) and receiving the broadcast data from the broadcast receiver through the network by controlling the communication module (the BMG can tune to the received video stream and transmit the stream to the settop box through the local network for further decoding, [0041]; [0042]; [0085]; [0086]), and playing the received broadcast data by controlling the signal processing module ([0084]-[0086]).

On the other hand, Swix does not explicitly teach

a requested channel is the viewing-restricted channel during a channel switching operation by a user, switching an operation mode of the apparatus from a tuner mode to an input mode.
However, in an analogous art, Tirasirikut teaches a home network with multiple
settop boxes and devices, having a master device and multiple child devices. ([0016];
[0021]) Tirasirikut teaches that when a child device is concurrently scanning for
programming (channel switching) and if the channel or content is restricted as a PPV or
by parental control, a request is sent from the child device to the master device through
the local network ([0032]-[0034]). The master device receives the request and sends the
approval or denial to the child device ([0034]). Additionally, Tirasirikut teaches that if the
user wants the content to be transmitted to a display device, the content can be
received by the master device and sent to said device. The master settop box reformatsthe
received content, encapsulates the data and sends it to the receiving device 707
(Fig. 7, [0036]; [0037]). Instead of receiving or presenting the content from the child
device’s tuner, the content is encapsulated and transmitted through the LAN device.

Therefore, it would have been obvious to one of ordinary skill in the art at the
time of the invention to have modified Swix’s invention with Tirasirikut’s feature of
switching the an operation mode from a tuner mode to an input mode and determining
that a requested channel is a viewing-restricted channel for the benefit of giving the user
the option to watch a content on a third mobile device and for knowing if the user has
the right to watch said content, respectively.

6. Claims 2 and 8 are rejected under pre-AIA 35 U.S.C. 103(a) as being
unpatentable over Swix et al. (hereinafter ‘Swix’, Pub. No. 2004/0250273) in view of

Regarding claims 2 and 8, although Swix and Tirasirikul teach that the device that implements the conditional access reads information regarding viewing restricted programs/channels from memory or from a CAS card (Swix: [0047]; [0050]; [0053]), they do not explicitly teach wherein virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels are managed as a viewing-restricted channel list, and a determination whether the requested channel is a viewing-restricted channel is based on the viewing-restricted channel list.

However, in an analogous art, Yamauchi teaches a device (server) that implements conditional access includes a service list describing a list of draw-up channels and their identification information ([00107]-[0108]). The server controller reads information from the IC card 44, and controls the receiver 43 in program view restrictions, [0070]; [0077]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Swix and Tirasirikul's invention with Yamauchi's feature of having a list with the restricted content for the benefit of easily and promptly identifying a service/channel or program that needs restricted access.
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to OMAR S. PARRA whose telephone number is (571)270-1449. The examiner can normally be reached on 9-6 PM (M-F, every other Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/OMAR S PARRA/
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## Notice of References Cited

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### Search Notes

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### U.S. PATENT APPLICATIONS

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### OTHER ART (Including Author, Title, Date, Pertinent Pages, Publisher, Place of Publication, Etc.)

A gateway for coupling a local area network to a plurality of peripheral devices at a customer premises to one or more external networks that deliver analog signals bearing analog video such as regularly scheduled CATV, terrestrial or satellite C-band broadcasts, or modulated with digital video-on-demand data, or IP packets bearing IP telephony data or data from the internet. The preferred construction is modular so that single expansion modules to interface only to DSL lines or only to a satellite dish or only to HFC, or some combination thereof may be added as needed. The gateway may be a standalone circuit also with hardwired interfaces to one or more external network types. The incoming analog signals are either digitized, compressed and distributed on the local area network or the digital data thereon is recovered and packetized as an IP packet if not already so packetized and distributed via a router process to the device that requested the data via the local area network.
Description

Field of use

[0001] The invention finds applicability in the distribution of digital video on demand services and other digital services throughout a consumer's location.

[0002] With the advent of cable modems, there is the ability to deliver digital data at high rates from content providers and the internet over cable TV systems. Many different services will be delivered digitally, one of which is video on demand and high definition TV digital data. Another digital service which is useful at least for business establishments is video conferencing. Other digital services that will be becoming more and more useful in the future are high speed contact with the corporate LAN from home for telecommuters, high speed internet access, distance learning, multimedia presentations to remote and/or dispersed audiences, etc.

[0003] The development of cable modems has enabled the delivery of high speed data over 10 MB/sec channels to customer premises over hybrid fiber coaxial cable TV distribution networks. But once the digital data reaches a customer premise, it still must be distributed and converted to a proper format for use by the user on a TV, a telephone, a video phone, a computer, a network computer a fax, a DVD recorder or other peripherals that will be developed in the future.

[0004] Concurrently, the telephone companies have developed digital subscriber line technologies such as Asymmetrical Digital Subscriber Line (ADSL), High Bit Rate Digital Subscriber Line technology, ISDN and IS-DSL, Rate Adaptive Digital Subscriber Line (RDSL), Symmetric Digital Subscriber Line (SDSL), Very High Speed DSL (VDSL). These different technologies are described in Muller, Desktop Encyclopedia of Telecommunications, p. 93-96 (McGraw Hill 1998) ISBN 0-07-044467-9, and Clayton, Illustrated Telecommunications Dictionary, (McGraw Hill 1998) ISBN 0-07-01251-9-3, and Horak, Communications Systems and Networks, Voice, Data and Broadband Technologies, (M&T Books, Foster City, Ca. 1997) ISBN 1-55851-485-6, the entirety of all these publications being hereby incorporated by reference. These digital subscriber line technologies will soon be capable of delivering digital voice, data and image information to different services as well as by high speed internet access to the subscriber premises over standard telephone copper twisted pairs which are already in the ground and which everybody already has. Some of these technologies are fast enough to also deliver video on demand, which typically requires about 2 megabits/sec data rate.

[0005] The also were introduced in 1994, digital broadcast satellite services (DBS) as DirecTV (offered by Hughes Electronics and Thomson Multimedia). DBS services already can or soon will provide video on demand, Internet connectivity and multimedia applications all with the high picture quality that digital technology provides. Video conferencing via DirecPC service may also soon be provided. DirecTV delivers 175 channels of digital-quality programming through an 18 inch dish antenna, a digital set-top decoder box and a remote control. An access card allows billing information to be captured by the set-top decoder box and downloaded by the PSTN to a billing center for pay-per-view programs ordered by a user. In addition, DirecPC technology allows high speed (400 KB/sec) internet access to PCs in the customer premises using the DBS dish and coaxial cable distribution network. An expansion card couples the PC's I/O bus to the coaxial cable distribution network of the DBS system. A modem is used by the PC to make a dial-up connection to the internet service provider (ISP) which then sends internet data to the PC via an uplink to the satellite and then down to the user's disk.

[0006] One problem that consumers of digital data delivery services will soon face is as follows. There is great uncertainty as to which subscription data delivery services will provide the most reliable, best performing and least expensive version of each type service. Thus, there is a need for a way for a user to be able to couple to all the different subscription service data delivery options available to her and to distribute the data cheaply throughout her premises to all the different peripherals that need it like television sets, computers, telephones, video phones etc. To do this, it will be necessary to have some sort of circuit that can interface with all the different subscription service digital data delivery networks and at least one local area network running throughout the user's home and do any necessary protocol conversions and packet, cell or frame reassembly and encapsulation into packets of the type used on the LAN.

[0007] ADSL routers such as the Remote 810 ADSL Router manufactured by 3Com currently exist. These routers can couple an Ethernet local area network to ADSL lines so that POTS voice conversations can occur simultaneously while searching the Internet. The Remote 810 ADSL Router has an integrated 4-port 10Base-T hub to couple multiple PCs can share the same ADSL line. The router supports up to 16 simultaneous concurrent connections to multiple destinations on the Internet and can perform bridging functions. 3Com also manufactures ADSL routers like the Office-Connect Remote 840 ADSL, which can support applications that require high bandwidth in both directions such as video conferencing, remote training, Web hosting, e-commerce and other multimedia applications.

[0008] Other prior art, such as the 3Com PathBuilder S700 WAN switch, exists which concentrates, aggregates and switches traffic over wide area networks. The PathBuilder S700 WAN can converge voice, video and data applications -- including Frame Relay, ATM and SONET -- onto a common network. Up to 100 interfaces are supported. Advanced traffic management features such as traffic shaping, priority queuing and multicasting, guarantee the right amount of bandwidth for each
application and let you build and manage your WAN infrastructure. The switch features a future-proof chassis with a modular construction to protect the initial investment and provide a migration path to accommodate future growth. The switch has individual application modules that provide native interfaces to a variety of campus networking technologies such as LANs, muxes, routers, SNA applications, business video and PBXs. Each application module adapts communications traffic to the cell-based backbone and transports it across the PathBuilder S700 switch cell bus to the appropriate trunk interface connections which offer a comprehensive range of campus and wide area interface types. A T1/JUNI module supports inverse Multiplexing for ATM at speeds ranging from 1.5 Mbps to 16 Mbps. An 18-slot chassis supports migration to T3/E3 or OC-3 services as bandwidth requirements increase. Distributed processing implemented by placing a RISC processor on each application module to provide scalable performance and wire speed communications.

However, the 3COM PathBuilder S700 WAN Switch lacks the capability to interface with ADSL lines, cable modems, satellite dishes, wireless local loops, terrestrial microwave links or other subscription network services that may become available in the future such as digital data delivery over the power lines. The 3COM PathBuilder S700 WAN Switch is not a professional level switch which is not affordable for the average home network consumer. In short, it is believed that no gateways or routers currently exist which can couple a local area network such as an Ethernet to each of the public service telephone network, and which combine the technology of ADSL modems, cable modems, and satellite DirectPC decoder boxes with IP video and IP telephony interfaces and switching, routing and protocol conversion capability.

In the current climate of deregulation, fierce competition for provision of telecommunication services to consumers has arisen. Many alternative distribution networks for digital data have either already been developed or under development. For example, in the near future, the digital data delivery services just described which are delivered by the PSTN and CATV HFC distribution facilities will also be computing with wireless local loop delivery networks provided by Personal Communication Service (PCS) companies and data delivery services under development by the electric power utilities.

The problem is that the consumer has no way to know which services will provide the most reliable, highest quality and least expensive delivery mechanism for telephone and FAX service, e-mail, distance learning, video conferencing, high speed world wide web access, video on demand, remote LAN for telecommuters and multimedia services. Further, over time, as each of the subscription networks evolve and competitive pressures force lowering of prices, it is possible that what was once the best provider of, for example, video-on-demand (hereafter VOD), is no longer the best provider but some other technology is. As another example, ADSL does not have sufficient upstream bandwidth if video telephony becomes a popular application whereas cable modems do. However, variable bit-rate MPEG2 and advances in video compression technology might save ADSL if video conferencing becomes big, and High Speed ADSL may be adequate to service this application. The problem this raises for consumers is that they do not want to invest in technology for their home networks that only interfaces to ADSL or cable modems and then be faced with the prospect of an expensive replacement of their home network equipment in order to interface their LAN with a new subscription service digital data delivery network.

Another example involves supplying Plain Old Telephone Service (POTS) to consumers via cable modem versus ADSL. Cutting of a CATV line in the street or losing an above ground cable during a windstorm will cut service to the entire neighborhood. That means that everybody in the neighborhood who obtains their telephone service via cable modem, will be left without phone service until the break is repaired. In contrast, ADSL is a point-to-point technology which causes only one customer to lose phone service if her line is broken.

A well maintained HFC CATV network may obviate some of these problems, but that is unclear because there has not been a great deal of field experience gained yet in POTS over HFC.

Thus, a consumer will not know whether to buy a gateway that can interface to an ADSL modem or an HDSL modem or a cable modem until the bugs are worked out and competitive factors come into play and make it clear which delivery network provides the best, lowest cost service for this application.

However, one thing is clear: the above identified services will be in demand, and the consumer would like to be able to take advantage of the best delivery mechanism for each service and be able to switch easily between delivery services as competition forces adjustments in prices.

Since these services will arrive on many different media, possibly in many different packet formats or using many different protocols, a problem is created for the user in deciding what type of home network data distribution system to buy and install. For example, there may be different packet and cell sizes and different header structures, different type of compression and different protocols will be used. The user only wants to inexpensively and conveniently distribute data encoding each of these services throughout her premises to the various peripherals like digital VCRs, DVD recorders/players, TVs, FAX machines, computers, telephones etc. that need the data without having to have a different gateway and local area network for each type of data delivery service. Further, the user may want to use ADSL for some services and cable modem for other services and wireless local loops or satellite downlinks or some other data delivery network option for other serv-
ices.

[0016] A related problem is in the area of videoconferencing. Currently, videophone offered by AT&T have been a commercial failure because of the low picture quality of 2 frames per second deliverable over standard twisted pairs. ISDN circuits can be used for videoconferencing and ISDN videophones are available, and their details are hereby incorporated by reference. However, the higher cost of ISDN and its lesser availability to all homes has slowed the acceptance of ISDN videoconferencing. Switched 56Kbps circuits can also be used for videoconferencing by bonding or grouping into multiple channels. Switched 38.4Kbps connectivity can also be provided on the basis of fractional DS1 or through ISDN PRI channels in a channel group known as an HO. However, the cost and availability issues that are slowing ISDN teleconferencing also exist for switched 56Kbps and switched 38.4Kbps services as well.

[0017] Likewise, DS-1 facilities support full-motion, high-quality videoconferencing over dedicated networks at rates of up to 2.048 Mbps for E1 and 1.544 Mbps for T1. However, DS-1 facilities are costly and not widely deployed and, although they are affordable for large organizations with DS-1 backbones, they are out of reach for the home network consumer.

[0018] Broadband networks such as ADSL, B-ISDN, HFC and cable modems, satellite etc. are likely to be much more convenient and affordable ways of delivering videoconferencing services via ATM operating at DS-1 or DS-3 or higher speeds.

[0019] Thus, a need has arisen for a system which interface to many different subscription service data delivery networks and can distribute digital data throughout a customer premises in an economical fashion to all the peripheral devices that need the data using a uniform protocol and addressing scheme. Preferably, the system will have an economical and reliable local area network on the consumer premises side and have the flexibility to couple to many different subscription service data delivery network media types and translate from whatever packet/cell/frame type and protocols are used by the data delivery network without substantial expense to reconfigure or buy new equipment or software each time a data delivery network option appears that is better, cheaper or more reliable than the consumer's current service provider.

Summary of the Invention

[0020] According to a first aspect of the invention there is provided a gateway apparatus the characteristic features of which are recited in claim 1.

[0021] According to a second aspect of the invention there is provided a gateway apparatus the characteristic features of which are recited in claim 18.

[0022] According to a third aspect of the invention there is provided a gateway apparatus the characteristic features of which are recited in claim 34.

[0023] According to a second aspect of the invention there is provided a network adapter the characteristic features of which are recited in claim 35.

[0024] A home network system within the genus of the invention would have a host bus and host computer programmed to do management and control functions and a routing function, one or more local area network interfaces and one or more external network interfaces.

[0025] An important subgenus within the overall genus would be characterized by a modular, expandable gateway construction which interfaced any one of a number of external networks and subscription services to peripheral devices in a customer premises coupled to the gateway by one or more local area networks. Such a modular gateway would have as many shared components as possible including a network interface to drive a local area network that communicates digital data of various services and a routing protocol and possibly an IP packetization process running on the host computer. However, expandability would be provided by interfacing the gateway to one or more external networks using modular plug-in expansion circuits or modules to implement the unique interfaces with various types of data delivery networks. Some of the expansion modules are receivers capable of receiving analog signals and digitizing and compressing them and supplying the compressed data to said host computer. Others are receivers for receiving and recording video and other data in digital form which has been modulated onto a downstream carrier for transmission to said customer premises and supplying the recovered digital data to said host computer. Others of the expansion modules are transceivers capable of receiving analog signals and digitizing and compressing them and supplying the compressed data to said host computer or receiving and recovering video and other data in digital form which has been modulated onto a downstream carrier for transmission to said customer premises and supplying the recovered digital data to said host computer. These transceivers include an upstream transmitter for receiving digital data from said host computer, preferably as an IP format packet, and transmitting it outbound on an external network to a headend modem, a DSL central office, a server connected to the Internet at the location of an Internet service provider via a dialup connection or to a satellite uplink facility via a dialup or direct connection.

[0026] For example, in a species using an Ethernet local area network, the gateway would have a shared Ethernet Network Interface Card (hereafter NIC) and an Ethernet protocol stack. This hardware and software drives one or more 10BaseT, Fast Ethernet, or 100BaseT local area networks coupled to the gateway that function to distribute downstream data to various devices such as telephones, computers, televisions, FAX machines etc. scattered throughout the customer premises. The local area network(s) also collect upstream data from the various peripherals spread throughout the consumer premises and transfer this data...
ta to the gateway. Other shared functions would include the power supply, bus structure and the host processor and routing process, an IP packetization process, possibly MPEG compression and decompression, possibly DES or other encryption and decryption processes, MAC layer and/or IP address resolution, and, possibly, IP telephony and/or PBX processes to control IP telephony and/or PBX expansion modules. Some data delivery networks use MPEG compression and others do not and some services use encryption and others do not. Thus, depending upon the external network and subscription or service involved, the expansion module that interfaces the gateway to the external network may include whatever compression/decompression, address resolution and encryption/decryption functions necessary to successfully communicate with these data delivery networks.

[0027] Generally, the plug-in external network interface modules that interface to each external network will include all those circuits and software processes such as protocol stack peculiar to communication with that particular external network and a particular subscription service. These circuits can include any necessary line coding and decoding, demodulation, detection, demultiplexing, encoding, compression, access control and other circuitry such as decryption and re-encryption circuitry necessary for receiving data from or transmitting data to the particular external network and subscription service the interface is designed to work with.

[0028] One of the advantages of the modular structure is, for example, if a consumer is getting their digital data delivery services by ADSL using one particular ADSL modem line coding, and another service provider with a different line coding provides a better service which the consumer wants to take advantage of, the consumer need only buy an ADSL interface board having the appropriate line coding to switch services and does not need to buy an entirely new gateway.

[0029] However, the modular construction is not an essential element of the invention. For example, the teachings of the invention also contemplate a subgenus of simple stand-alone, nonexpandable gateways which only include one or more external network interface circuits which are always present. These types of gateways can be used by customers who know exactly which external networks and subscription services they will use and who have no need or desire to change. Figures 4A and 4B are supposed to symbolize a species within this subgenus which happens to include external network interfaces to an ADSL line, C-band and Ku band satellite dishes, an HFC drop line and a terrestrial TV antenna.

Brief Description of the Drawings

[0030] Figure 1 is a diagram of a prior art connection between the internet and a home local area network through an ADSL modem.

[0031] Figure 2 is a diagram of a prior art connection between the internet and a home local area network through an ADSL modem.

[0032] Figure 3 is a diagram of a home network having a gateway within the genus of the invention which couples any one of a number of different subscriber service data delivery networks which are external to a customer premises to one or more local area networks that deliver digital data from said external networks to one or more devices in said customer premises coupled to said local area networks. The gateway does the necessary protocol conversions and translations between the protocols and packet formats of the local area network and the protocols and packet formats of the subscriber service data delivery external networks.

[0033] Figures 4A and 4B are a detailed diagram of a gateway having ADSL, satellite, cable and broadcast TV antenna interface circuitry.

[0034] Figure 5 is a block diagram of a video adapter for coupling a local area network to a television.

[0035] Figures 6A-6E are a flowchart of a pull technology video on demand process.

[0036] Figure 7 is a flowchart of a wideband Internet access process.

[0037] Figure 8 is a block diagram of a modular construction for the gateway.

Detailed Description of the Preferred and Alternative Embodiments

[0038] Figure 1 is a diagram of a prior art connection between the internet and a home local area network through a cable modem and the HFC of a CATV system. The internet is shown as cloud 11. An IP router 13 in the headend factory 15 of an internet service provider bidirectionally couples IP packets to the internet using the TCP transport protocol. An optional local proxy server 17. The proxy server is coupled to the IP router and provides local content as well as caching certain very popular web pages such as Yahoo or CNN news etc., so that they can be sent to cable modem subscribers with greater speed. A control circuit 18 concentrates all IP traffic from the subscribers coupled to the HFC network and sends it to the IP router 13 and distributes packets from the IP router to the various fiber optic links of which line 21 is typical. The fiber optic links couple the headend to fiber nodes of which node 26 is typical. Each fiber node couples the fiber optic link to a coaxial cable feeder branch of which branch 26 is typical. Each feeder branch has at least one bidirectional amplifier, of which amplifier 27 is typical. Each feeder branch is coupled to a plurality of drop lines, of which drop 29 is typical, which couples the branch to a cable modem at the subscriber premises. Cable modem 31 is typical and can be any of the cable modems identified below. The cable modem has a 10Base-T output port which is coupled to an Ethernet LAN 33 which runs throughout the home to peripherals such as TV 35, telephone 37 and personal computer 39.
A typical example of cable modem 31 is the U.S. Robotics Cable Modem CMX. This modem will work on any cable system that complies with the MCNS data-over-cable specification. This cable modem comes with an EtherLink network interface card and is compatible with the Windows and Macintosh operating systems.

[0039] Referring to Figure 2, there is shown a prior art connection between the internet and a local area network in a home via the telephone system using ADSL modems. The internet 11 is coupled to IP router 13 via DS 1 (1.544 Mbps supporting 5 or more continuous users or up to 65 users with 10% usage), DS 3 (45 Mbps supporting up to 1500 subscribers) or CC-3 connections. Optional proxy server 17 serves the same function as a proxy server 17 serves the same function in the cable modem system of Figure 1. ADSL modems 41 and 43 at the subscriber premises 45 and central office 47 couple to the twisted copper wire pair that was originally used for POTS. A POTS splitter, not shown, forwards the analog voice transparently to the POTS central office in a frequency below the ADSL domain. The ADSL modem 41 connects directly to the Ethernet port of a personal computer or to an Ethernet hub. The access switch 53 serves to concentrate access lines from the ADSL modems such as 43 into router ports of IP router 13. Access adapter 53 is likely to include ATM switch fabric. The ADSL modem 41 can be the 3Com HomeConnect ADSL Modern Ethernet or any equivalent ADSL modem.

[0040] Referring to Figure 3, there is shown a diagram of a home network having a gateway within the genus of the invention which couples any one of a number of different subscriber service data delivery networks which are external to a customer premise to one or more local area networks that deliver digital data from said external networks to one or more devices in said customer premise coupled to said local area networks. The gateway does the necessary protocol conversions and translations between the protocols and packet formats of the local area network and the protocols and packet formats of the subscriber service data delivery external networks. The home network is useful for distribution of digital data that encodes video on demand, distance learning, video conferencing, telephone service, internet web pages and FTP download files, e-mail and other digital subscriber services to multiple devices in one or more local area network that runs throughout a customer premise. Digital data or analog signals implementing the subscriber service (subscriber service is used loosely to mean all signals whether analog or digital transmitted to the customer premises via an external network of any type including a TV antenna) is transmitted to the customer premises. Gateway 14 converts the incoming signals to digital data in Ethernet packets and transmits it to the requesting device coupled to the local area network.

[0041] The gateway 14 functions to do all the physical layer interfacing and protocol conversions necessary to couple one or more local area networks that run through the customer premises to digital data distribution services delivered via the Hybrid Fiber Coax (HFC) of a cable television system, or a digital satellite data distribution network or the phone lines of the public service telephone network. Hereafter, these digital data delivery networks external to the customer premises will be called the subscription networks or the digital data delivery networks even though some or all of them may also deliver analog signals as well as digital data. For example, the cable TV subscription network 16 will deliver analog CATV signals in addition to the digital data carried on its upstream and downstream carriers. Likewise, the satellite dish 56 will deliver broadcast TV signals as well as digital data modulated on the downstream carrier. The Public Service Telephone Network (PSTN) telephone lines 58 will also deliver analog telephone signals in addition to digital data modulated onto the upstream and downstream carriers of the ADSL service.

[0042] The gateway 14 is typically a Pentium or Celeron class personal computer host with protocol conversion and switching control programs that cooperate with the operating system to control the operations of various interface circuits and having one or more network interface circuits that drive the media of the local area network(s). In some embodiments, the interface circuits can be built on the motherboard with the host microprocessor. However, in the preferred embodiment, each interface circuit is a separate expansion card that plugs into the system bus of the host and has a connector suitable to interface with the physical media of the particular digital data delivery service. Likewise, the network interface to the local area network(s) can be an expansion card. However, it is preferable for the local area network interface circuit to be built into the motherboard so as to not consume an expansion slot. In this modular type construction, the circuits and software that are common to all the expansion modules that interface to the various subscription networks are shared by the expansion module interface circuits. Thus, the host microprocessor, hard disk, RAM, CD-ROM/DVD, power supply, network interface circuits for the LAN(s), display and keyboard are all shared as are the operating system, management software and any protocol conversion software layers that are common to all network interface circuits. Likewise, the gateway 14 is going to have a packet switching process and a crossbar switch or other switching circuitry controlled by the switching process to route packets received from the subscription providers to the appropriate LAN and vice versa based upon the IP or other addresses in the headers of the packets. These two elements can also be shared by the expansion module interface cards as the switching services need to be shared by all the subscription network interface cards in the gateway. The circuits and software that are specific to any particular subscription network such as MPEG compression or decompression, tuning, detection and demodulation, carrier and clock recovery,
video decoding, A/D or D/A conversions etc. are located on the expansion module interface card dedicated to that subscription network.

[0043] This preferred modular construction has two significant advantages. First, it protects the subscriber's investment in the gateway by providing flexibility to couple the gateway to any subscriber network that turns out to be the most reliable, least expensive, most flexible or easiest to use or least aggravating subscriber network for supplying any particular digital data based service desired by the user. For example, if ADSL turns out to be the best provider of telephone and video telephony services, but HFC turns out to be the best provider of video on demand or distance learning services, and these are the only services the user is interested in purchasing, the user can simply buy expansion modules to interface with these two subscription services. There is no need to invest in a gateway that has hardware and software to provide high speed Internet access as well as these other services since the user is not interested in purchasing high speed Internet access. This first advantage also extends to the situation where the user later changes his mind and decides that high speed Internet access is useful, but determines that satellite delivery by DirecPC™ is the best way of obtaining this service. In such a case, the user does not have to buy an entirely new gateway, but can simply buy an additional modular expansion card for interfacing to a satellite dish.

[0044] The second advantage of the modular construction of the gateway is the property that has of protecting the subscriber's investment in the gateway by decoupling the physical structure and software of the shared components of the gateway from changes in the particular subscription networks. As these subscription networks evolve, there are likely to be changes in the protocols, physical media, packet structure etc. which are unpredictable in nature. Further, it may evolve over time with competitive forces similar to those acting on the long distance carriers that competition alters the picture as to which subscription network is the best provider of each particular service which the subscriber is interested in. If ADSL no longer is the best provider of telephony services, and the HFC networks offer a better deal, the consumer does not have to buy an entirely new gateway, but can simply remove the ADSL interface card and substitute a cable modem card to interface with the HFC network if a cable modem card is not already present. Likewise, if ADSL with Carrierless Amplitude/Phase modulation (CAP) give way to Discrete Multitone (DMT) modulation as the new standard, the user can simply swap out the CAP based ADSL expansion module for a DMT based module.

[0045] The structure of one embodiment of the gateway 14 will be discussed in more detail later. However, the genius of gateways 14 which are within the teachings of the invention is defined by the following characteristics which all will share:

a programmed host computer with an operating system, and one or more protocol conversion processes and a switching control process that controls a packet switch to route packets between the one or more subscription service networks and the local area network(s) to which the gateway is coupled; one or more interface circuitry for the particular local area network(s) coupled to the packet switch to drive packets out onto the physical media of the LAN(s); either a single interface circuit that can interface to all of HFC, PSTN and satellite digital data delivery networks which is either on the motherboard of the host or separate from the motherboard and coupled to the host system bus, or a plurality of expansion slots for coupling individual subscription network interface modules to the host system bus as desired so that each module can share the common facilities of the host needed to support the module: and wherein the common elements of the host that can be shared by all the subscription network interface circuits for all the subscription networks to which the gateway is coupled are shared, with examples of such shared circuits being: the host microprocessor, hard disk, RAM, CD-ROM/DVD, power supply, network interface circuits for the LAN(s), display and keyboard, the operating system, any management software and any protocol conversion software layers that are common to all network interface circuits and a packet switching process and a crossbar switch or other switching circuitry.

[0046] The gateway 14 will have a cable modem circuit either on a modular expansion card or as part of the subscription network interface circuits board. This cable modem circuitry can be any of the cable modems that are known in the prior art which are identified herein or any new cable modem design that surfaces after this application is filled since the details of the cable modem are not believed to be present at the present time to be critical to the invention.

[0047] Likewise, the gateway 14 will have as part of its interface circuit board or as an expansion card module, an ADSL modem (or SDSL or HDSL modem) to receive incoming digital data modulated onto a downstream carrier and output it as Ethernet packets on LAN(s) 18 and 20. In some alternative embodiments, LANs 18 and 20 could be ATM LANs or one could be ATM and the other Ethernet or some other technology such as Fibre Channel Arbitrated Loop with suitable adjustments in the gateway 14 to packetize the data properly and use appropriate circuitry and protocols at all levels from the physical layer, MAC and network or routing layers up to the application layer for the particular LANs in use. ATM LAN switches and routers are available in the prior art and the details of their construction are hereby incorporated by reference.

[0048] Likewise, the ADSL modem receives Ethernet
packets with digital data encoding voice, pictures, video etc. and modulates that data onto an upstream carrier. ADSL carves up the local loop bandwidth (the bandwidth of the twisted pair telephone line from the consumer premises to the Central Office) into several independent frequency channels suitable for any combination of services including voice, ISDN, VOD programming and interactive gaming. Downstream data rates vary from 1.544 to 6.144 Mbps with upstream rates from 16 to 640 Kbps. The gateway ADSL interface circuit will also have a voice splitter if regular analog telephones are to be supported in addition to the LAN-connected video phones 60 and 82 or other data-consuming phones or FAX machines like FAX 64 which receive and transmit voice and pictures or caller ID or other data in digital form. Such other data can include such things as a background information file on the person identified by caller ID data transmitted by an application on the PC 22 which supports the fans. Any conventional ADSL (or SDSL or HDSL) modem design such as the known ADSL modem manufactured by 3COM (specifically identified below and incorporated by reference herein) may be used for the PSTN ADSL interface circuitry or the ADSL expansion module as the details of the ADSL interface circuitry are not believed to be critical to the invention. The 3COM ADSL modem couples to a twisted pair carrying ADSL services and has an Ethernet 10Base-T output for coupling to the LAN(s) 18 or 20 through the shared packet switching circuitry of the gateway.

The gateway 14 also includes as part of its subscription network interface circuit board or as part of its satellite network expansion module a decoder box. This satellite decoder box is of known design suitable for receiving, demultiplexing, detecting, and decompress (if necessary) digital data transmitted by satellite to the gateway. This digital data may be transmitted via a service such as DirecTV or other by-dish-based, digital data delivery service. It may be available in the future, and the interface circuitry necessary to receive satellite data is known and is hereby incorporated by reference. Typically, such satellite interface circuitry includes a tuner, a QPSK demodulator, a transport demultiplexer and a conditional access circuit. If the satellite interface circuit is being used to receive digital video signals that are compressed, the satellite circuitry may incorporate circuitry to decompress the digitized video back to its original state (or close to its original state if lossy compression such as MPEG is used). However, since uncompressed broadcast quality standard NTSC video requires a bit rate of slightly over 22 Mbps, whether the satellite interface circuitry of the gateway includes decompression circuits depends upon the bandwidth of the local area network(s) coupled to the gateway. If the LAN(s) are 10Base-T or 100Base-T, the video digital data will be left compressed and can be transferred over the LAN(s) with quite acceptable quality at T1 speeds of 1.544 Mbps. MPEG compression and decompression is known in the art and is incorporated by reference herein. MPEG compression is lossy compression which uses a 7-tap filter for averaging 7 neighboring pixels or lines; color space conversion; scaling to the presentation resolution before digitization; transforms such as the Discrete Cosine Transform, vector quantization, fractal transform and wavelet compression; and quantization or compaction encoding to reduce the number of bits needed to represent a color pixel such as run-length encoding, Huffman coding, and arithmetic coding; and interframe compression to transmit only the pixels that change between frames. Many compression standards exist such as P64, JPEG, MPEG 1 and 2 (MPEG 2 with transmission rates of 4 to 100 Mbps is already in use for digital video transmission via satellite services such as DirecTV and MPE 4 (a low bit rate standard intended for videophones and other small screen devices). The compression and decompression circuitry for all these standards is hereby incorporated by reference.  

Further, the satellite interface circuitry or satellite expansion module should also include a conversion telephone modem for making dial up access to the internet via the PSTN for upstream data transmissions through the server of the internet service provider. Downloads from the internet or a video server or some other digital service server are beamed up to the satellite and retransmitted on the downlink addressed to the specific user that requested the downlink. hit. All other decoder boxes coupled to satellite dishes that received the same broadcast reject the packets so received as not addressed to them.

In the embodiment shown in Figure 3, a cabble modem 12 is shown externally to the gateway with the output IP or Ethernet packets encapsulating IP packets or ATM cells on bus 16 for coupling into the packet switching process inside the gateway. The preferred embodiment however is as shown in Figures 4A and 4B with the cable modem circuitry inside the gateway such as shown at 70. The particular cable modem shown at 70 is labelled as DOCSIS 1.2 compatible, but it can be any known cable modem design as can the external cable modem.

Referring to Figures 4A and 4B, we turn now to more specific information about each of the possible subscription services digital data delivery networks and the interface circuitry in the gateway 14 needed to couple each said external network to the LAN at the customer site. The gateway 14 can be a standalone circuit with all the interface circuits needed to interface to one or more external networks included as a permanent part thereof with no plug-in expansion capability as opposed to the preferred modular construction shown in Figure 6 where external network interface circuits may be added as needed.

First, digital data services may be delivered by a coaxial cable 10 which represents the drop line in a cable TV HFC network (not shown). The cable TV net-
work has a head end modem (not shown) which couples the HFC cable CATV plant to wide area networks such as the Internet as well as the public service telephone network (hereafter PSTN) through one or more routers, bridges or gateways (not shown). The head end modem may also couple the HFC to local services such as VOD servers.

[0054] Digital data encoding video signals, telephone service, data being received from the Internet etc. is modulated by the head end cable modem onto one or more downstream channels for simultaneous transmission on the HFC cable plant with regular analog cable TV programming. The cable TV channels each have their own frequency so as not to conflict with each other. The downstream digital services data is modulated onto a carrier that has a frequency that does not conflict with the frequencies of the cable TV programming nor with upstream data which is modulated onto a different upstream carrier frequency. Data from different sources is multiplexed on both the downstream and upstream channels by any known means including time division multiplexing, code division multiplexing, synchronous code division multiplexing or frequency division multiplexing.

[0055] Digital data can be delivered over the HFC using Asynchronous Transfer Mode (ATM) or ATM over B-ISDN type services adapted for HFC and the particular type of transmitters, modulation and multiplexing being used. ATM and B-ISDN (Broadband ISDN) are inexorably linked, and there are a plurality of standards set by ITU-T that are in existence which are incorporated by reference herein. Those standards are: 1.113; 1.121; 1.150; 1.211; 1.311; 1.321; 1.327; 1.361; 1.362; 1.363; 1.413; 1.432; 1.555; and 1.610. ATM Forum Implementation Documents of significance that are incorporated by reference herein are: ATM User-Network Interface (UNI) Specification for PVCs; ATM Broadband Intercarrier Interface (B-UNI) Specification and ATM Date Exchange Interface (DXI) Specification; Internet Engineering Task Force Requests for Comment (RFC) that are incorporated by reference are: RFC 1483: Definition of Multi-protocol Encapsulation over AALS; and RFC 1577: Definition of Internet IP over ATM.

[0056] ATM is the delivery mechanism of choice since its small 48-octet payload and 5-octet header in each cell lends itself well to video, image, facsimile, voice or data. Further, the fixed cell size gives routers and switches the advantage of predictability, as compared to a variable length frame. These two considerations yield decreased delay as data moves through the switching system and across the transmission links in frequent little blasts. No long frames need to be transmitted lying up switch ports and thereby causing delays for frames from other sources that need to use the same ports. ATM also has the advantage of being able to adjust the amount of bandwidth required to support a session during the session. However, ATM networks do not provide either error detection and correction or protocol conversions. Those functions are left up to the user.

[0057] Likewise, digital data may be delivered over HFC using Discrete Multi Tone (DMT) technology typically used in ADSL but adapted to HFC and the particular type of transmitters, modulation, multiplexing being used. DMT is a new technology developed for ADSL delivered via twisted pairs that uses DSPs to pump more than 6 Mbps of video, data, image and voice signals over today's existing one pair copper wiring, but it could also be used to transmit data over HFC cable plants. DMT provides 4 asymmetric "A" channels at 1.5 Mbps each of which can provide an VCR quality signal and which can be ganged together such that two A channels can deliver a "sports" quality video channel and all four A channels operating together can deliver digital Extended Definition TV signals. DMT also delivers one "H zero" channel at 384 Kbps to deliver Northern Telecom's multi-rate ISDN Dialable Wideband service or equivalent. This channel can also be used for work-at-home telecommuters for high bandwidth access to the corporate LAN using Northern Telecom's DataSPAN or other frame relay services. DMT also delivers one ISDN Basic Rate channel containing two "B," channels at 64 Kbps and one "D" channel at 16 Kbps. The Basic Rate channels allow access to a wide range of emerging ISDN services with out requiring a dedicated copper pair or the expense of a dedicated NT1 unit at home. These channels also permits the extension of Northern Telecom's VISIT personal video teleconferencing services to the home at fractional T-1 rates (Pxs4). DMT also delivers one signalling and control channel operating at 16 Kbps giving the home user VCR type control over VOD movies and other services including fast-forward, reverse, search and pause functions. Finally, DMT also delivers embedded operations or overhead channels for administration, internal system maintenance, audits etc. All this is delivered without interrupting the POTS service if it is delivered over a copper pair. HFC could also potentially deliver POTS, but without a dedicated pair to each home, such service would be subject to congestion and loss of POTS to entire neighborhoods served by a single cable in case of a failure of the cable.

[0058] In the embodiment shown in Figure 3, digital data on the HFC drop line is recovered by any known cable modem 12. One example of a suitable cable modem using SCDMA upstream multiplexing is given in PCT publication WO 87/08861, published 6 March 1987, which is hereby incorporated by reference. One example of software and hardware in the cable modem 12 is the Dacel 1.2 compatible is given in the following U.S. patent applications, all of which are hereby incorporated by reference: serial number 09/743,638, filed 5/9/98 entitled APPARATUS AND METHOD FOR Synchronizing an SCDMA upstairs or any Other Type upstream to a MCNS Downstream or any Other Type downstream with a different clock rate than the upstream; serial number 09/152,645, filed 9/14/98, en-
titled METHOD AND APPARATUS OF USING A BANK OF FILTERS FOR EXCISION OF NARROW BAND INTERFERENCE SIGNAL FROM CDMA SIGNAL; serial number 09/182,645, filed 9/14/98, entitled TWO DIMENSIONAL INTERLEAVE PROCESS FOR CDMA TRANSMISSIONS OF ONE DIMENSIONAL TIMESTRETCH DATA; serial number 09/337,167, filed 9/21/98, entitled MIXED DOCSIS 1.0 TDMA BURSTS WITH SCDMA TRANSMISSION IN THE SAME FREQUENCY CHANNEL; serial number 08/780,412, filed 12/8/95, entitled LOWER OVERHEAD METHOD FOR DATA TRANSMISSION USING ATM AND SCDMA OVER HYBRID FIBER COAX CABLE PLANT published as PCT publication WO 97/34421 on 18 Sept. 1997. The PCT publication WO 97/34421 published on 18 Sept. 1997 explains hardware and software for transmitting IP packets received from the internet over HFC using ATM cells and virtual channels to a remote unit cable modem and distributing the data to peripherals via a local area network. Specifically, WO 97/34421 teaches:

- receiving Internet Protocol packets directed to an entity having an IP address out on a LAN at a customer premises and looking up Ethernet source and destination addresses mapped to that IP address and generating an Ethernet header and appending it to the IP packet;
- adding RFC 1483 bits and CRC bits and sufficient pad bits to make up an integer number of ATM cell payload section of 48 bytes to result in an AAL5 format packet;
- parsing the resulting AAL5 packet into a plurality of ATM cell payload sections of 48 bytes each;
- adding a standard 5 byte ATM cell header to each ATM cell;
- encoding the PTI field of the ATM cell header with a bit which signals which cell is the last cell in the packet;
- outputting the ATM cells to a formatter circuit in the head end cable modem as an OC3 TDMA stream;
- optimizing ATM cell headers to reduce the size of the headers down to two bytes comprising the 16 least significant bits of the PPI/VCI field and encoding the last cell data into two 9-bit sections of the downstream optimized ATM cell header;
- encoding the 8th bits of each of the first eight "bytes" (byte here is used in the sense of a 9-bit entity) parsing the optimized ATM downstream cell into 9-bit bytes and sending them as a TDM stream to the headend cable modem downstream transmitter for transmission (this transmitter can be any conventional transmitter but preferably is an SCDMA transmitter which divides each 9-bit byte into three tribits and interleaves them into elements of an information vector that correspond to virtual channels assigned to the particular modem to which each 9-bit byte is directed, and spreading the spectrum of the information vector using one or more spreading codes assigned to the one or more assigned virtual channels);
- headend cable modem transmitter encodes the 9-bit bytes and modulates them onto a downstream carrier for transmission over virtual channels from a headend over HFC to a remote unit (RU) cable modem.

[0059] The optimized system uses a two level addressing scheme and a mapping between each logical channel and the assigned RU for that channel. The two byte header in the downstream optimized ATM cell identifies the single logical channel upon which the data is to be transmitted, and this single logical channel corresponds to a single one of the multiple RUs. The Ethernet address of the particular process or peripheral at the RU to which the payload data is to be directed once it arrives at the RU is included as several bytes in the payload data.

[0060] At the RU cable modem (12 in Figure 3 or 70 in Figure 4A), the 9-bit bytes are recovered, reassembled into AAL5 packets and encapsulated into one or more Ethernet packets for transmission over the LAN. Specifically, the RU cable modem carries out the following processing:

- the incoming signals from the cable drop 10 are demodulated, demultiplexed and detected in accordance with whatever multiplexing and modulation schemes that were used by the headend downstream transmitter for the transmission on separate logical channels so as to recover the 9-bit bytes; a formatter circuit finds the ATM cell boundaries by examining the 9th bits for the start code and reassembles the 50-byte optimized downstream ATM cell;
- the formatter in each RU examines the 2-byte header in each ATM cell to determine if the ATM cell is directed to that RU and discards the cell if it is directed to another RU (RU and cable modem at the customer premises are used interchangeably herein) and forwards it to a segmentation and reassembly circuit (SAR) as a Utopia data stream if the cell is directed to this RU;
- the SAR recovers the AAL5 packet boundaries by finding the RFC 1483 bits and the last cell code and reassembles the AAL5 packet and error checks it using CRC bits and stores the corrected AAL5 packet in memory for retrieval by an Ethernet controller and passes a pointer to the packet to the Ethernet controller;
- the Ethernet controller retrieves the AAL5 packet pointed to by each pointer and strips off the RFC 1483 bits and sends the remaining bits as an Ethernet packet (after stripping the RFC 1483 bits, the remainder is an Ethernet header followed by a payload section).
In the embodiment of Figure 3, if the cable modem 12 has the structure and functionality just described, gateway 14 receives the downstream Ethernet packet on line 16 and simply couples them through a packet switching process on the gateway onto the appropriate LAN subnet (if more than one LAN is used in the customer premise). If only one LAN is used, the Ethernet packets can simply be delivered to an Ethernet Network Interface Card in the gateway for driving out onto the LAN. Likewise, Ethernet packets received from the LAN having IP addresses indicating they are directed to processes coupled to the wide area networks to which cable modem 12 is routed are couples through the gateway to the cable modem 12. There, they are transmitted on an upstream channel assigned to cable modem 12 and recovered by the head end and modem and coupled to the Internet through a router at the head end.

[0061] Other examples of high speed data modems which could be used for cable modem 12 are given in Azzam, High Speed Cable Modems, (McGraw Hill 1997), ISBN 0-07-006841-7, which is hereby incorporated by reference.

[0062] Typically, the local area networks 18 and 20 are T-1 Base-T phones lines or Cat. 5, 4 or 5 UTP (twisted pair) type LANs with any topology. These LANs are expensive and there are many sources of inexpensive network adapters, hubs and peripherals. The physical medium of the LANs 18 and 20 can be provisioned as a twisted pair phone line with which the customer premises is already wired or it can be CAT 5 wiring, or an RF or infrared wireless LAN system, or the coax of the cable TV system that runs through the house can be used for a ThickNet (10Base-5) or ThinNet (10Base-2) LAN. The latter case assumes the coax has been disconnected from the standard CATV drop line feed and is coupled to TV set peripherals only indirectly through the cable modem 12. However, it is also possible to maintain the connection of coaxial cable running through the premises to the HFC cable drop 10 for delivery of FDMA analog CATV programming channels to various TVs and VCRs in the house and use the T-1 Base-T or wireless LAN for delivery of digital services to the various peripherals through network adapter circuits.

[0063] Figure 3 shows gateway 14 as coupled to two LANs 18 and 20 one of which is high speed and the other of which is low speed. The high speed LAN may be 10Base-T and is used to deliver high bandwidth consuming services such as video conferencing, video on demand, high speed internet access. There may be one or more LANs coupled to the gateway. If there is more than one LAN, the gateway 14 also provides a routing function to get the Ethernet packets onto the appropriate LAN to which the peripheral having the IP address in the packet is coupled.

[0064] The local area networks 18 and 20 also serve the dual purpose of allowing the computers on the network to communicate with each other and share resources such as shared hard disks, printers etc. For example, PC 22, which is typically a Windows-based personal computer but which may also be a Macintosh or other workstation, can communicate with network computers 24 and 26 to allow files created on the hard disk of PC 22 to be accessed by the network computers or to have documents created on the network computers 24 and 26 stored on the hard disk of PC 22. Through the gateway 14 and an internal ADSL modem or the cable modem, the network computers can also access the Internet and download web pages, send e-mail etc.

[0065] Television set 28 is coupled to the local area network 18 via a network adapter 30 which functions to convert the compressed digital data in received Ethernet packets to video signals on line 32. The TV may be used in interactive communications so upstream data can be sent through the use of an infrared or RF wireless keyboard 34. Such data might include the title or number of a VOD movie to be ordered or upstream text to be sent in a multimedia interactive presentation. In addition, an infrared or RF remote control 80 can be used to transmit commands to the network adapter 30 such as play, pause, slow motion, stop, rewind etc. to control video on demand services. Information the consumer wishes to send is entered on the keyboard and communicated to the network adapter 30 via infrared or RF transmission from the keyboard 34 and remote control 80. The data transmissions are received, demodulated and detected to recover the data and the data is addressed and packetized into IP packets encapsulated inside Ethernet packets by an infrared and RF receiver 82 in the network adapter 30 (see Figure 5 which is a block diagram of the network adapter 30). The Ethernet packets containing the upstream VOD request data are addressed to the gateway 14. These packets are launched onto the LAN 20 by a network interface card 84 which does the media access control and physical layer protocols of whatever LAN is in use such as CSMA/CD in the case of Ethernet LANs.

[0066] The IP packet encapsulating each VOD request is addressed to the particular video server which will supply the data. Standard mouse or touchpad type technology in the infrared keyboard and/or remote control 80 sends pointer information to receiver 82 so that the user can request menus from each video server and point to a video selection from each menu displayed on the TV. In one embodiment, the remote control 80 or IR keyboard 34 has function keys that may be pushed to request menus of VOD selections from the satellite, HFC and ADSL video servers. When these function keys are pressed, the receiver 82 converts the request into an IP packet addressed to the appropriate video server requesting transmission of the current menu data. The menu data listing currently available selections is sent as downstream IP packets addressed to the video adapter having the IP address that was the source address of the menu request packet. These IP packets reach the IP video circuit 242 where they are recognized and routed via bus 87 to the 2/3D Graphics circuit 83.
which converts the data into graphics data signals on line 85 which will be used to display the menus.

[0067] When the user points to a particular menu selection on a displayed menu, this pointing information is transmitted to the receiver 82 and converted to graphics commands which are transmitted via line 81 to optional 2/3D graphics circuit 83. The graphics circuit 83 creates graphics for overlay on the TV display, and the pointer information is converted to a graphics image such as a pointer or hand which the user can move on the displayed menu by use of a mouse or touchpad. When the user points to a VOD selection and gives an "order" command, the menu in which the pointer lies is transmitted via bus 81 to the receiver 82 and the position on that menu where the pointer currently is located is determined by graphics circuit 83 and transmitted to the receiver 82. The menu and current position data so determined are mapped to an IP address of a particular server and a particular VOD selection available from that server. The receiver 82 then uses the IP address of the video server as a destination address and its own IP address as a source address and the requested selection to create an IP packet bearing the VOD request. This packet is then encapsulated into an Ethernet packet addressed to gateway 14 and sent to the gateway via the NIC 84 and the LAN 20. The gateway strips off the Ethernet header and routes the IP packet to the appropriate video server via the appropriate upstream media for that video server.

[0068] In alternative embodiments, the user may simply type in the number of a category of video from a displayed menu of available categories and the number of a video selection on the displayed menu. The menu number and program number are then converted into a VOD request IP packet by the receiver 82 and then encapsulated into an Ethernet packet addressed to the gateway 14. The gateway 14 then processes the VOD request as described above.

[0069] When the upstream VOD request packet reaches the gateway 14, it is processed by the Ethernet (or other LAN protocol) IP protocol conversion and routing process (hereafter referred to as the routing circuit) carried out by the host computer circuitry and the software processes symbolized by block 86 in Figure 4A (Figures 4A-4B together are a block diagram of one embodiment of the gateway). The routing circuit 86 then routes the VOD request packet to the appropriate subscription service data delivery network for delivery to the processor/target device named in the IP destination address.

[0070] The routing circuit 86 is shown as a separate logical block in Figure 4A from the host microprocessor 126 and its associated peripherals: random access memory 129, nonvolatile memory 131 to store the bios, hard disk controller 133 and the hard disk 135 it controls, display adapter 137 and display 139, keyboard interface 141 and keyboard 143. All of these peripheral devices are conventional. In an actual circuit, the routing circuit 86 is usually the host microprocessor programmed to do the IP to Ethernet and vice versa protocol conversions, routing table construction and packet routing functions along with any other functions necessary for a router including network interfaces and any other functions required of the routing process described in the flowcharts herein. Descriptions of gateways, routers, the Internet Protocol and IEEE 802.3 Ethernet local area networks are found in Tanenbaum, Computer Networks, 2nd Ed. (Prentice Hall 1989) ISBN 0-13-612959-X, and Stallings, Data and Computer Communications, 4th Ed., (MacMillan Publishing 1994) ISBN 0-02-415441-5, which are both hereby incorporated by reference.

[0071] The function of the gateway is to provide protocol conversion, packet format conversion, video, voice and data demodulation, detection and demultiplexing services, conditional access control to prevent non subscribers from receiving services they have not subscribed to. The gateway 14 performs the functions of a cable modem and a set-top decoder box for a satellite digital data subscription service such as DirectPC and performs the functions of an ADSL modem. As part of this Interface circuitry, the gateway performs MPEG encoding services, IP video. IP video comprises the processes of recovering downstream IP packets and sending them to an input port of a routing process and receiving Ethernet upstream packets and converting them to IP packets and sending them upstream. The gateway also performs IP telephony services (similar to the IP video services except for telephony over the internet) as well as switching and routing services. More details about the structure and operation of the gateway will be included below.

[0072] It is up to the network interface cards of the peripherals to receive the Ethernet packets from LAN 18, determine if they are directed to the Ethernet address of that peripheral. convert the payload data to a format useable by the peripheral, and to transfer the data to the process having the IP address in the packet.

[0073] Assuming that the service being carried by the home network requires bidirectional data transfer and ATM is to be used upstream, the upstream data transmission process from the peripheral to the Internet via the cable modem 12 is as follows assuming the cable modem is of the type defined in PCT publication WO 97/34421 which is incorporated by reference herein:

the application process that needs to send upstream data outputs one or more Ethernet packets onto the LAN 18 which include the IP address of the entity on the Internet to which the data is directed; each Ethernet packet gets routed through the gateway 14 to the cable modem 12 if it has an IP address which indicates it is directed to an entity on the Internet to which the gateway is coupled through the cable modem 12; the SAR in the RJ cable modem adds pad bits to each Ethernet packet, computes CRC-32 error de-
tection bits, and adds RFC 1483 bits such that the resulting packet is an integer multiple of 48 bytes; the SAR parses the packet into multiple 48-byte ATM cell payload sections with no header bytes, adds standard 5-byte ATM cell headers to each payload section using a virtual link identifier which identifies the virtual upstream channel assigned to that RU to construct the VPI/VCI fields and using last cell, normal cell and idle cell information to construct the PTI field and calculates a HEC field and transmits the resulting ATM cells to a formatter as a V.114 stream; the formatter adds a 5th bit to each byte in the cell and encodes the 5th bits with a start code, last cell, normal cell and idle cell codes using the information in the PTI field of each ATM cell header; the formatter strips off the 5-byte header of each ATM cell while saving the information and then parses each upstream ATM cell into 9-bit bytes and places one 9-bit byte into each timeslot of an upstream information vector which corresponds to the virtual channel assigned to this RU modem and transmits the information vector to the upstream transmitter in the RU cable modem 12 using the information in the VPI/VCI field of the header to identify which virtual channel in which each 9-bit byte from each ATM cell is to be transmitted; the upstream transmitter of the RU modem transmits the upstream data in the appropriate virtual channel such as by spreading the spectrum of the 9-bit bytes using one or more spreading codes assigned to the virtual channel(s) assigned to the RU; the spread spectrum data is then transmitted on the upstream carrier; the receiver in the headend cable modem receives the upstream transmissions from each RU and demodulates, demultiplexes and detects the transmitted data of each 9-bit byte and places the recovered 9-bit bytes into the timeslots on a TDMA bus which correspond to the logical channel on which the data was received; a formatter process in the headend modem demultiplexes the TDMA stream and reassembles the 48-byte optimized upstream ATM cells using the signalling data in the 9th bits and places each ATM cell in a portion of a cell buffer dedicated to storing ATM cells from the RU which generated the data using the timeslots data to determine from which RU each ATM cell arrived; a cell output controller process then retrieves each 48-byte ATM cell and generates a standard V.114 header and transmits the standard 53-byte ATM cell in an OC3 format data stream to a segmentation and reassembly circuit in a router in the headend cable modem; the SAR error checks the 53-byte ATM cell using the HEC field and strips off the header bytes while retaining the VPI/VCI and the PTI field information and reconstructs the AAL5 sequence using RFC 1483 bits and the last cell data encoded in the PTI field to find the packet boundaries and by concatenating 48-byte payload sections of the ATM cells and error checks the packet using CRC bits; if no errors are found, the RFC 1483 bits and the CRC bits and pad bits are stripped off to leave an Ethernet packet header, an IP header and a payload stream and the result is sent to a router for routing on the appropriate subnet to get to the destination having the IP address somewhere out on the wide area network.

If the cable modem 12 has the architecture of any of the cable modems described in Azzam, High Speed Cable Modems, suitable modifications to the above described downstream and upstream processes described above can be made, or the upstream and downstream processes used in those modems can be used for delivery of the same digital services they have used in the prior art to deliver. For example, any of the cable modem hardware and software structures known in the prior art which have been used in the actual field trials identified in Azzam, High Speed Cable Modems, Chapter 14, Section 14.2, pp. 512-518 (McGraw Hill 1997), ISBN 0-07-008417-2, may be used, and all of these modem designs are hereby incorporated by reference. The cable modems whose circuitry and software is incorporated by reference herein include: the LANicky Parsonet; Hybrid Networks Cable Client Modern 211; Zenith HomeWorks Elite; Motorola CyberSurf; General Instruments SURFBoard 6B1000; Hewlett-Packard QuickBurst; Comt1 ComPort; Toshiba and any cable modem that conforms to the IEEE 802.14 standard.

[0074] Typically, the IEEE 802.14 compliant cable modem will contain species which have the following characteristics:

downstream data contained in one of the 6-MHz TV channels that occupy the spectra above 550 MHz; upstream channel assigned bandwidth and purchased at 5 MHz; 84-QAM downstream modulation delivering over 30 Mbps data rate; upstream channel using QPSK modulation or a combination TDMA and synchronous code division multiple access multiplexing techniques and QAM modulation delivering from 2 to 10 Mbps in each upstream channel; a media access control software layer to mediate upstream access between multiple users sharing the same cable medium; a MAC protocol which is ATM friendly using the ATM cell transport concept and possibly involving segmentation of ATM cells into smaller segments to improve system performance;
status and control information looped back from the upstream to the downstream to provide remote cab-
le modems with status and control information to
determine peaking order;
the upstream channel divided into frequency chan-
nels that are allocated to individual users or com-
bining two multiplexing methods such as TDMA and
Synchronous CDMA or CDMA.

[0075] Cable modems within this genus include cir-
cuits and software to achieve time synchronization
where frame alignment is necessary for proper mul-
tiplexing. Although not required to be within the genus,
the better modems in the genus also include time syn-
chronization coupled with TDMA and CDMA to lower in-
tersymbol interference as well as power alignment and
adaptive equalization to minimize other forms of inter-
ference. These better modems will also include encryp-
tion such as pseudorandom scrambling or DES encryp-
tion for privacy and a MAC layer protocol that assures
fairness in upstream bandwidth access.

[0076] These cable modems have been used to de-
 deliver residential online subscription services that include
Internet access, Email, world news, shopping, local
content covering city government, schools, libraries and
other news of the community, multimedia services, cam-
pus networking, distance learning and telemedicine, in-
ternet access to schools, Prodigy, Jones Internet Chan-
nel and work at home programs.

Details Of Gateway Interfaces To Downstream
Cable, Satellite, And ADSL.

[0077] Referring to Figure 4, there is shown a block
diagram of one embodiment of gateway 14 configured
as a standalone circuit where interfaces to the satellite,
HFC and PSTN networks are all implemented on the
circuit board. This circuitry may be an expansion card
in a personal computer or it may be integrated into the
motherboard of a personal computer. The other known
components of the personal computer are not shown in
Figure 4 for simplicity, but suffice it to say that the host
CPU of the PC is coupled to circuitry shown in Figure 4
by the address, data and control buses of the PC such
that the circuits that need control inputs or data from
the host CPU may receive it. The control and data inputs
needed by each circuit will be described when that cir-
cuit is described.

[0078] The embodiment of the gateway 14 shown in
Figure 4 includes the entire circuitry of a DOCSIS1.2 ca-
ble modem 70 therein. Turning first to the interface cir-
cuity to couple HFC to the LAN, HFC drop line 10 is
coupled to an upstream and downstream combiner and
isolation circuit 90. There, upstream modulated RF car-
rier signals on line 62 from upstream isolation amplifier
or coupler 94 are coupled onto the cable 10 and down-
stream modulated RF signals are received from cable
10 and placed on line 96. Typically, combiner 90 will in-
clude a bandpass filter to prevent upstream RF signals
from entering line 96 and may optionally include a ter-
minal for line 92 to prevent reflections. Isolation cir-
cuit 96, typically a buffer amplifier or capacitor or other
circuitry such as a lighting arrester protects the internal
circuitry of the gateway from any unwanted DC signals
or lightning strikes on the HFC.

[0079] In the embodiment shown in Figure 4, three
tuners 100, 102 and 104 are used. Tuner 100 is tuned
to one of the conventional CATV analog video channels
in NTSC, PAL or SECAM format. Typically, the total
bandwidth of the HFC will be divided up into different
frequency bands for CATV FDM analog video chan-
nels, an upstream DOCSIS data and management and
control signals band, a digital VOD signals band and a
downstream DOCSIS data band. The frequency band
for upstream data and management and control signals
extends from 0 to about 50 MHz. Within this band, up-
stream DOCSIS data will be modulated onto one carrier
frequency and management and control data will be
modulated onto another carrier frequency. There may
be multiple upstream management and control chan-
nels at different frequencies or in different timeslots or
on the same frequency with the data of each manage-
ment and control channel having its spectrum spread
with a different spreading code. Typically, the frequency
band from 50 to 500 MHz will be reserved for FDM 6
MHz wide analog CATV video signals. Digital/video data
such as for VOD or teleconferencing etc., is typically
modulated onto one of a plurality of different
frequency channels in a band above 500 MHz with each channel
being about 8 MHz wide and containing a plurality of
video, audio and associated data subchannels separat-
ed by TDMA. Downstream DOCSIS data such as web
pages which are downloaded during high speed internet
access is typically modulated onto a carrier having a fre-
quency somewhere above the video on demand carrier
frequencies.

[0080] One of the functions of the gateway 14 is to
deliver requested services to all the peripherals in the
customer premises seamlessly over a shared LAN
thereby eliminating the need for separate coaxial cable
wiring to deliver CATV analog signals, a digital network
to deliver digital data, telephone wires to deliver con-
ventional telephone service. All these services are delivered
via a single digital data distribution system comprised of
one or more LANs. To that end, even CATV signals that
are analog when they arrive are digitized, compressed,
turned into IP packets and then into Ethernet packets
and transmitted to the various television via a LAN.

Reception and Distribution of Analog CATV Signals

[0081] Tuner 100 starts this process by receiving con-
trol data from microprocessor 128 defining which CATV
analog video channel which has been requested. Users
request analog CATV broadcast channels via their IR
keyboards 34 or remote controls 80 in Figure 3. These
requests are encapsulated into management and control Ethernet packets addressed to host CPU 128 by network adapter 30. The host CPU receives them and generates a bus packet on bus 156 addressed to tuner 100 telling it which channel to tune. The host bus 156 may be a PCI bus in a Windows based personal computer, but high traffic loads may bring such a bus to its knees since only two devices may use the bus to communicate at any particular time. In alternative embodiments, a high capacity multiplexed bus like an H.100 standard TDMA bus coupled by suitable bus drivers to the host bus in a computer with sufficient expansion slots for all the necessary expansion modules to implement a flexible gateway may be used. In other words, in smaller bandwidth consumption embodiments where only one or two of the expansion modules shown in Figure 8 are present, a Windows based personal computer with a PCI or ISA bus and one or two expansion slots may be sufficient. However, in higher bandwidth consumption embodiments where many or all of the expansion modules shown in Figure 8 are present or might be added as the number of services and external networks to be used grows, the gateway 14 may also take the configuration of one or more personal computers, each with a fast microprocessor and a PCI or some other fast bus, each running one or more of the software processes symbolized by Figure 8 to divide up the labor. These servers would be coupled to the LANs by one or more NICs with their one or more host buses coupled to another expansion module interface circuit board by one or more high capacity buses such as an H.100 TOMA bus, a Firewire or even FDDI or Fibre Channel Arbitrated Loop LAN technology. The expansion module interface circuit board would have a plurality of expansion slots interfaced to the high capacity bus(es) or LAN(s) coupling the expansion module interface circuit board to the one or more servers. Each expansion slot would be available to couple one of the expansion modules shown in Figure 8 to the shared software and hardware facilities of the servers. For simplicity of expression, all of these various alternative bus or LAN type interconnections between the server(s) and the modules in the expansion slots will be simply referred to as the host bus or the PCI bus 156. There will also be descriptions of circuits to the effect of placing data in PCI bus or host bus packets addressed to a particular circuit to which they are to be sent such as the IP video circuit 158 or the routing process 88. This is to be understood as actually placing the data into a packet with a destination address set to the destination circuit or process or seizing control of the host bus and writing the address of the destination circuit onto its control lines and placing the data to be transferred on the data lines and activating any necessary control signals to latch the address and strobe the data into a data register or other memory.

The RF output of tuner 100 on bus 134 is then digitized by an analog-to-digital converter in A/D matrix 130. The digital samples on line 136 are input to a video demodulator 138 which functions in the digital domain to demodulate the digitized analog video signal by removing the RF component. The video demodulator 138 outputs digital data on line 166 which represents a conventional baseband NTSC, PAL or SECAM format video signal.

The digital data on line 166 is at too high a bit rate to send over the LAN since uncompressed broadcast video is at 221 Mbps. Therefore, the video data must be compressed. MPEG II compression is preferred, but any known form of compression currently known or to be developed in the future will suffice since the form of compression is not critical. MPEG II compression circuitry is well known, and is used for MPEG encoder 148. However, MPEG compression does not compress NTSC, PAL or SECAM format signals. They must first be converted to YUV format luminance and chrominance signals. This conversion is done in video decoder 142, which is a known type of circuit in any video system that uses MPEG II compression.

The compressed video data is encapsulated into PCI (or other type) bus packets addressed to IP video circuit 158. There, the compressed video data is encapsulated into IP packets addressed to the network adapter of the TV where the CATV video channel is to be viewed. The IP video circuit 158 determines which IP destination address to use in constructing the IP packets from data received from the host microprocessor 128. When the original request was received, the host microprocessor 128, in addition to telling the tuner 100 which channel to tune, also determines from the Ethernet packet source address which TV's network adapter requested the data. The IP address of this network adapter is encapsulated into a PCI bus packet and transmitted via host bus 156 to the IP video circuit. The IP packets encapsulating the digitized CATV channel are then transmitted via bus 160 to the routing process 86.

The routing process 86 is a conventional IP to Ethernet routing process which examines the IP packet destination addresses and looks up the corresponding Ethernet addresses. The IP packets are then encapsulated into Ethernet packets and routed to the appropriate LAN network interface card for LAN 18 or 20 depending upon the Ethernet destination address of each packet. The process works in reverse for incoming Ethernet packets from the LAN(s).

When the IP packets reach the network adapter of the TV that requested the CATV channel, they are converted to a video signal that can be displayed by the TV by the circuitry described below in conjunction with the discussion of Figure 6.

Video on Demand

One disadvantage of watching CATV broadcast channels is that there is no facility to have VCR like controls such as pause, rewind, play, slow motion or
step over the incoming video. This is one reason why VOD is more advantageous. We turn now to an overview discussion of VOD delivered via cable modem. Later, VOD delivered by ADSL modem or satellite dish will be discussed. The discussions herein regarding delivery of VOD however apply equally to delivery of video conferencing services, home shopping, distance learning and other multimedia services involving video, images or other multimedia data. Also, there is great similarity in the functions and structure of the circuitry for receiving, recovering and distributing digital VOD via satellite so there will be some common replication of the discussions that follow. First, a quick overview.

[0088] The VOD downstream frequency band has multiple video channels, each at a different carrier frequency. Each video channel carries multiple TDMA channels of MPEG II compressed video with its associated audio, and sometimes with one or more additional TDMA subchannels devoted to associated data.

[0089] The tuner 102 is commanded by the host microprocessor 128 to tune to a particular VOD channel. The customer will order a particular VOD program using the IR keyboard 94 or remote control 80. The microprocessor 128 receives the order information via management and control Ethernet packet generated by the network adapter 30 and driven onto the LAN 20. As an example of how the video, audio and associated data subchannels of a VOD program are used, suppose the tuner 102 is tuned to a home shopping VOD channel where a plurality of customers wish to buy an item being shown by the video data on a first subchannel and being described in the associated audio data subchannel. There may be multiple customers who wish to buy the item and need to talk to an operator. These multiple customers can have their telephone calls digitized into IP packets on digital telephones such as 62 in Figure 1 with each packet addressed to the IP address corresponding to the telephone number shown on the screen. These packets get encapsulated into Ethernet packets and transmitted on the LAN 18 or 20 to the gateway 14. There, they are received by the switching processor 86 and the Ethernet headers are stripped and the IP packets are sent to DOCSIS modem for transmission on an upstream channel.

[0090] At the headend modem, the IP telephony packets are recovered and routed to the IP address where the operators are standing by. Suppose, three callers are talking to the item being shown and described. The three different operators handling these calls have their speech digitized into IP packets addressed to the digital telephone being used by the caller they are talking to. These IP packets addressed to the telephones of the three different callers are OAM modulated by the headend modem modulator transmitting the VOD program and sent downstream as associated data on three different TDMA subchannels associated with the video and audio subchannels of the home shopping presentation.

[0091] The host microprocessor 128 tells tuner 102 which channel in the VOD band to tune to via control data transmitted via data, address and control bus 156 (also referred to as the host bus). The RF tuner 102 tunes to that channel and rejects all other signals.

[0092] The RF output of the tuner 102 is digitized by A/D matrix 130.

[0093] Then the video, audio and associated values for each video, audio and data OAM modulated constellation point is recovered by the QAM demodulator 148.

[0094] The recovered data values are then separated by transport demultiplexer 146 into video, audio and associated data streams on lines 150, 152 and 154. The transport demultiplexer receives control data from the host microprocessor via data, address and control bus 156 which tells it which subchannels to separate out in the demultiplexing process.

[0095] A conventional conditional access circuit 126 then decrypts the recovered data to prevent any unauthorized access thereto. The decryption process can be the same process used in current Ku band satellite digital video delivery or any other conventional encryption process. Since VOD subchannels are sent to only particular users, the data can be encrypted by PGP using the public key of the user to which the data is directed. That user then uses her private key to decrypt the data.

[0096] The conditional access circuit has a conventional PCI or other bus interface circuit. Typically the gateway is implemented as one or more circuit boards on a personal computer such as a Pentium class or PowerPC Macintosh which has a system bus. Any system bus which is fast enough to carry the worst case system load bit rate will suffice. The worst case system load is based upon the number and type of peripherals in the house. Typically, a compressed digital video channel can be delivered with good picture quality at 2 Mbps, so if a household has 4 TVs all of which are tuned to a different VOD channel and one video conference going on, 10 Mbps should be adequate. PCI buses have maximum bit rates much above 10 Mbps so a PCI bus for system bus 156 is adequate for most applications. The conditional access circuit's bus interface packetizes the decrypted video, audio and associated data into PCI bus packets which are addressed to an IP video circuit 158 and placed on bus 156 via line 160.

[0097] The IP video circuit receives the PCI bus packets and encapsulates the video and audio data into IP packets addressed to the network adapter 30 which ordered the VOD program. The associated data is encapsulated into IP packets addressed to telephone 62 (or whatever telephone is being used to converse with the operator). The IP packets are then transmitted via line 160 to the routing process 86.

[0098] The routing process 86 is a conventional IP to Ethernet routing process which examines the IP packet destination addresses and looks up the corresponding Ethernet addressess. The IP packets are then encapsulated into Ethernet packets and routed to the appropriate...
LAN network interface card for LAN 18 or 20 depending upon the Ethernet destination address of each packet. The process works in reverse for incoming Ethernet packets from the LAN(s).  

[0099] We now turn to a more detailed discussion of the process carried out by the system to receive VOD via either satellite, HFC or ADSL. 

[0100] Figures 6A-6E together comprise a flowchart of the preferred embodiment of the processing which occurs in the system to order a VOD selection via either HFC, satellite or ADSL modem. Referring jointly to Figures 4A and 4B, 5 and 6A-6E, a user orders a particular video program via the IR keyboard 34 or remote control 60 acting as a pointing device to point to a displayed menu selection on TV 29 in Figure 3. That selection is received by the IR or RF receiver 82 in Figure 5, as symbolized by step 106 in Figure 6A. The video selection along with the IP address of network adapter 30 is encapsulated in an IP packet and then encapsulated in an Ethernet packet by network adapter 30 and launched onto LAN 20 (step 108). The IP packet has the IP address of network adapter 30 as its source address and the IP address of the VOD server as its destination address. The IP address will usually be different depending upon whether the VOD selection has been ordered via HFC, satellite or ADSL since each network probably has its own video server. The user typically picks the VOD selection from a menu displayed on her screen for each network, so by pointing to the selected channel on the menu of the ADSL network, for example, the IP address is set to the IP address of the video server for the ADSL network. 

[0101] The network adapter encapsulates the IP packet requesting the video selection in an Ethernet packet (step 106). The Ethernet packet destination address is the routing process 86 in the gateway. The IP packet payload message identifies the movie or other video program desired and, in some embodiments, identifies the particular VOD channel and subchannel the gateway's VOD tuner will be tuned to (step 108). MPEG II compressed video is transmitted on two or more subchannels (one video, one associated data and zero or more associated video subchannels), and this is done regardless of whether the delivery medium is HFC, satellite or ADSL. Step 108 represents the preferred process wherein the headend of the HFC, satellite network or ADSL central office monitors the channels and subchannels for load and sends downstream balancing messages indicating which channels and subchannels are free. These load balancing messages are monitored by the gateways, and the channels and subchannels that are available are selected by the gateways for "camping" thereby helping balance the load across the network. In other embodiments however, the video server and/or headend may simply put the requested video selection on any unused subchannels of a channel that is not fully occupied and sends a downstream management and control message to the gate-
sponding circuitry in a satellite or ADSL VOD network) to get the requested video data to the correct modulator which is transmitting on the VOD channel to which the gateway coupled to the requesting IP address is tuned. The channel and subchannel data included in the upstream message is also used to control that modulator to put the video and associated audio data on the subchannel to which the gateway is tuned.

[0106] Continuing with the discussion of Figure 6A, the Ethernet packet is received by switching process 86 (after it passes through the network adapter card of the host computer and up through the Ethernet protocol layers where the Ethernet header is stripped off as symbolized by step 110). The switching process looks up the destination address of the IP packet in a lookup table and determines from the destination address of the IP packet that it is directed to a VOD server coupled to the headend modem via HFC 10 or the headend circuitry driving the uplink to the satellite or to the ADSL central office (step 112).

[0107] Step 116 represents the general process of transmitting the IP packet containing the VOD program request to the appropriate video server over the appropriate transmission media. The following paragraphs discuss the various cases individually, and step 116 is to be interpreted as covering each of these individuated cases depending upon which video server is addressed by the IP packet. The following discussion assumes the gateway is equipped with HFC, satellite and ADSL expansion modules so that VOD can be ordered from any of these three networks. The gateway however may have only one subcombination of one or more of the HFC, satellite or ADSL modem expansion cards, so step 116 will only represent routing the IP request packet to one video server or possibly a selected one of two different video servers delivering VOD over two different networks.

[0108] In the case of an IP request packet addressed to a video server coupled to the HFC 10 via the headend modem for delivery of a VOD selection via the HFC, step 116 represents the following sub-process. The IP packet gets routed to DOCSIS modem 70 and transmitted on an upstream management and control channel. In the preferred embodiment, the management and control channel used to transmit the upstream request is the channel designated in a downstream load balancing message from the headend modem indicating which channels and subchannels are available and which upstream channels the gateways are to use. In indicating they have camped on one of the available channels and subchannels. The IP packet is recovered from the HFC and coupled directly or via the Internet to the video server to which it is addressed. The video server may be coupled directly to headend modem or indirectly via the Internet in which case the IP request packet is sent by a router at the headend over the Internet to the video server.

[0109] In the case of an IP request packet addressed to a video server coupled to the satellite uplink headend circuitry, the upstream channel is over the PSTN so step 116 represents the following. The IP packet gets routed to the ADSL modem 182 or the DOCSIS modem 70 for upstream transmission over the phone lines. If routed to the ADSL modem, it transmits the IP packet request message upstream over the PSTN lines to the ADSL central office where it gets routed to the video server coupled to the satellite uplink over a connection to the Internet at the CO or a dial-up connection over the PSTN to the video server directly.

[0110] If the IP packet addressed to a video server that delivers VOD over the satellite network is routed to the DOCSIS modem, the IP packet gets transmitted over the HFC to the headend DOCSIS modem. There, the packet gets recovered and reassembled (if necessary) and sent to a router for delivery over the internet or other WAN to the video server to which the packet is addressed. Alternatively, the headend DOCSIS modem may make a dial up connection over the PSTN to the video server and use IP telephony to deliver the packet to the video server via IP telephony circuitry coupled to the Internet at the video server.

[0111] If the IP VOD request packet is addressed to a video server that delivers ADSL, step 116 represents the following. Routing process 86 routes the IP packet to the ADSL modem 182 where it is transmitted via the ADSL upstream channel to the ADSL modem at the CO. The CO then routes the IP VOD request packet to a video server directly coupled to the CO or gives it to a router connected to the Internet for routing to a video server coupled to the CO via the Internet (the term Internet means the internet or any other wide area network currently in existence or which may come into existence in the future). Alternatively, the CO may make a dial up connection to the video server over the PSTN and send the IP VOD request packet over the dial up connection or may communicate with another CO where a video server is located by a T1 line or DS1 or other high speed telephone lines. The processing and circuitry for ADSL delivery of video demand taught in U.S. patent 5,247,347 may be used, and that patent is hereby incorporated by reference.

[0112] Step 120 represents the optional step of authentication and/or conditional access gating carried out at the headend prior to routing the IP request packet to the video server. In some embodiments, the IP packet bearing the VOD request is routed to the video server only if the user making the request is authenticated and/or is an authorized subscriber to the requested service. This is typically by using the source address as a search key to search a lookup table of authorized users. The manner in which the requested services such as VOD are monitored so that they are delivered only to authorized subscribers is not critical to the invention, and the lookup function mentioned as part of step 120 can be replaced with any known manner of gating services only to authorized users. The gating function can also be
done at the gateways after transmission of the VOD data downstream, and the gateway 14 shows conditional access modules 126 and 186 representing these embodiments. In these embodiments where the conditional access gating function is performed at the gateway, step 120 is not needed. Processes for performing conditional access gating at the customer premises are well known in C band and Ku band subscription-based analog and digital video broadcasting, and need not be detailed here. To implement this known type of conditional access at the customer premises, each gateway has a decryption module (128, 188 and similar circuitry in ADSL modem 182) with a key or password stored therein. This key or password is used by the video server or other service provider to encrypt the VOD data or other data encoding the requested service using the authorized subscriber's public key. Only the subscriber can decrypt the data using his private key. The conditional access modules 126 and 186 in Figure 4A are intended to symbolize any of these known prior art structures and processes for blocking access by unauthorized persons to services. [0113] After the IP packet reaches the video server, it reads the IP packet and opens the file storing the data of the requested movie or other video production (step 124). The video server then begins transmitting the video data in IP packets addressed to the TV and network adapter 30 that requested the movie (step 124). The IP packets contain compressed video data, typically by MPEG II compression. Step 124 is intended to represent one of the following three subprocesses of delivery of the video data bearing IP packets depending upon the video server to which the original IP packet bearing the VOD request was directed and whether the IP video data packets are to be delivered over HFC, via satellite or via a DSL connection. Step 124 is not intended to represent delivery of the VOD data by all three networks. The discussion of each subprocess is labeled by a header, and three different lines of steps are shown in Figures 6A-6E for the three different delivery networks since each delivery network is coupled to different circuitry in the gateway 14. [0114] First, in the case of HFC delivery, step 124 represents the process of transmitting the IP VOD packets to the modulator in the headend modem which is transmitting downstream on the channel identified in the original request packet. Transmission to the modulator can be by a local direct connection, or via the Internet or other WAN or by a T1 or DS1 leased line or possibly by other high speed PSTN connection such as DSL. [0115] The video data is compressed in any known manner and is encrypted before transmission. The preferred manner of implementing conditional access is to do the gating function at the video server end of the connection to avoid wasting downstream bandwidth on requests by unauthorized users. [0116] In the HFC delivery case, the compressed video and audio data (and possibly associated data such as IP telephony packets) is transmitted by the headend on the channel and subchannels identified in the camping data given in the original request message and arrives at the gateway 14 via line 10 (step 136). In alternative embodiments, the video server and headend will cooperate to put the VOD data on unused subchannels of a channel that is not fully utilized and send a downstream management and control message telling the gateway where to find the VOD program it requested (step 136). [0117] Upon reaching the gateway on the HFC connection 10, the RF downstream signal is coupled through coupler 90 to buffer isolation circuit 98 and reaches tuners 100, 102 and 104. Tuners 100 and 104 reject it because they have been instructed by the host CPU 128 of the gateway to listen on the analog video and DOCSIS data carrier frequencies, respectively. Tuner 102 however has been instructed by host microprocessor 128 (henceforth, the "host") to tune to the channel on which the VOD data is modulated. In tuner 102, the RF signal is received, the RF component is removed and a baseband signal is output on line 190. In some embodiments, the tuner 102 outputs an IF signal on line 190 which is digitized in A/D matrix 130 with the IF mixed down to baseband by QAM demodulator 148 prior to demodulation of the constellation points. Also, in some embodiments, conventional carrier recovery and clock recovery is performed in tuner 102, and the RF component is removed using a local carrier synchronized in frequency and phase with the transmitter's carriers to reduce the RF signal to I and Q baseband signals on lines 190 and 191. [0118] The VOD data bearing RF carrier is QAM modulated, so the tuner outputs a complex analog baseband signal on line 190 with an inphase and a quadrature component, each having multiple sample periods each of which defines the I and Q values for one constellation point. Both components are sent to A/D matrix 130 for sampling with one sample per constellation point on each of the I and Q signals. [0119] The A/D matrix is comprised of either two or three A/D converters depending upon whether the DOCSIS modem 70 has A/D conversion circuitry therein. Typically, it does, so the output of the DOCSIS data tuner 104 on line 192 is shown as passing the baseband signal straight through the matrix 120 without any sampling thereby. [0120] The samples of the baseband analog I and Q signals on lines 190 and 191 containing VOD data constellation points are output on bus 136. The process of receiving the RF downstream VOD signal and demodulating and digitizing each constellation point's I and Q values is symbolized by step 136. In the preferred embodiment, the clock signal embedded in the data (or transmitted on a separate channel in some embodiments) defining the boundaries of each constellation point is recovered by tuner 100 and is made available to any of the other circuits that need it to deal with
video data.  

[0121] The digitized, compressed VOD data is typically QAM-64 modulated. This means that the video and audio data is transmitted in the form of constellation points each point transmitted during a different time on the quadrature carriers with video, audio and associated data constellation points transmitted during different timeslots on the same channel. Each video, audio or associated data point takes the form of a complex number having a phase and an amplitude value. QAM demodulator 146 determines the complex value of video, audio and corresponding data points of the compressed VOD data that correspond to each constellation point (step 140).

[0122] Transport demultiplexer 148 functions to demultiplex the video, audio and associated data points from their respective subchannel timeslots (or codas in embodiments where the subchannels are COMA multiplexed) as symbolized by step 144. The video demultiplexer receives a control data input from the microprocessor 129 that tells the demultiplexer which subchannel timeslots (or codas) to use in retrieving the requested VOD data.

[0123] The retrieved video, audio and associated data is output in compressed form on buses 150, 152 and 154 to a conditional access circuit 126. This optional circuit decrypts the data if the user is authorized to receive the program ordered or does not receive known types of conditional access gating if the conditional access function has not already been done at the headend (step 192). If the user is authorized to receive the VOD data, the video, audio and associated data points are encapsulated into bus packets used on the host bus 166 and sent over the bus to an IP video encapsulation process 156. Typically, the host bus is a PCI bus so known PCI bus interface circuits in conditional access circuit 126 encapsulates the VOD data into PCI bus packets addressed to the video encapsulation circuit (step 192).

[0124] The IP video circuit monitors the bus 158 for packets addressed to it and when it finds one, it takes the PCI bus packets that together comprise an IP packet of VOD data and reassembles the VOD data therein into and IP packet payload. In cases where the VOD data was never put into an IP packet format at the headend, the VOD video and audio data are assembled into IP packets addressed to the network adapter that requested the VOD program. Any associated data is encapsulated into an IP packet addressed to the appropriate peripheral such as the PC 22 or the telephone 80 in Figure 3. Usually, the IP destination address to which the video, audio and associated data are bound is included within the data itself, and if an IP packet was broken up into, for example octets or ATM cells for transmission, the original IP source and destination addresses are preserved such as by the methods described previously herein.

[0125] In the preferred embodiment, the IP source and destination addresses in the IP packet data within the PCI bus packets are used to assemble an IP packet header upon reassembly of the IP packet. The resulting IP packets are transmitted over line 160 to the routing process 86 (step 184). In embodiments where the VOD video, audio and associated data was never placed into an IP packet format, the host 128 keeps track of where each VOD request came from on the LAN and the addresses of the video server to which each is addressed. When the data arrives from that video server (as determined by the source address of the data on the network, channel and subchannel on which the data arrived), the host sends data to the IP video circuit 158 telling it the IP address of the network adapter the video and audio data are to be addressed to and the IP address of any other peripheral to which any associated data is to be sent. The case where the VOD data is not originally encapsulated into an IP packet could happen where a video server is coupled directly to a headend modem or a satellite uplink facility or an ADSL CO. Step 194 is to be also interpreted as covering this alternative case of constructing IP packets using IP addresses supplied from the host 128 which is monitoring all outgoing VOD requests.

[0126] The routing process 86 receives the VOD IP packets and reads the IP destination address and determines that the IP address is mapped to the Ethernet address of network adapter 30 in Figure 3. The IP packets addressed to this network adapter are then encapsulated into Ethernet packets addressed to the network adapter 30 and sent to the appropriate network interface circuit in routing circuit 86 for launching onto LAN 20 (step 196). The household might have multiple TV sets, each with its own network adapter. In such a case, the IP destination address in the VOD data will be used to determine which network adapter ordered the program and that network adapter's Ethernet address will be used in the Ethernet packet headers of the Ethernet packets into which the VOD data IP packets are encapsulated. The routing circuitry will then determine which LAN and NIC to use to get the data to the right TV.

[0127] What happens to the VOD data when it gets to the network adapter will be discussed below after the discussion of the ADSL and satellite delivery cases.

DSL Network Delivery

[0128] In the case of ADSL delivery (or delivery by any digital subscriber line service with adequate bandwidth), the IP packets are transmitted from the video source to an ADSL central office within approximately 3 miles of the subscriber by a T1 or DS1 line typically although an ADSL downstream connection might be used if the possible maximum load of VOD data being sent to this particular CO is light enough (step 198, Fig. 6B).

[0129] From the ADSL central office, the video data IP packets are FDMA multiplexed onto the ADSL downstream carrier and transmitted to the gateway of the re-
Satellite Network Delivery

In the case of satellite delivery of the video data, the video server for the satellite network delivers the VOD data packets to the satellite uplink facility by any suitable means such as a T1 or DS1 leased line or by direct connection to the uplink transmitter if the video server is located at the uplink facility (step 203).

A transponder on the satellite then received the IP packets and QPSK modulates them (or using some other suitable modulation scheme) onto a DirectPC or VOD downlink carrier and transmits them to all the dishes in its footprint area on the surface of the earth (step 212).

The 180 (Fig. 4A) receives the RF signal and does conventional carrier and clock recovery so that the recovered carrier and clock signals can be used in demodulating, detecting and demultiplexing the signals as was the case for the preferred embodiment of tuner 102. Tuner 180 receives data from host 128 via host bus 156 that tells it which downstream channel to which it should tune, and it tunes out all other RF signals. The VOD downlink quadrature carriers are then demodulated and I and Q baseband signals are output on lines 216 and 218 (step 214).

Analog to digital conversion can happen anywhere after the tuner 180 and prior to the IP packetization circuit 158. However, for parallelism with the HFC case, we will assume that A/D conversion happens in the QPSK demodulating 220 prior to the constellation point demodulation process. The recovered clock from the tuner 180 is used to synchronize the demodulation and A/D conversion processes in circuit 220. The I and Q values of the QPSK constellation points are then demodulated to their original analog or digital values to yield a stream of video, audio and associated data points on bus 222 (step 224). If they are demodulated to analog values, these analog values for the I and Q values of each constellation point are later digitized.

The satellite VOD delivery system is much like the HFC system in that video programs are delivered over channels each having a different downlink frequency and each having a plurality of TMAs or CO/Ms subchannels. It is the function of transport demultiplexer 184 to receive data from host 128 telling it which subchannels to recover and to demultiplex the video, audio and associated data points from their respective subchannels (step 228). The transport demultiplexer 184 has any conventional TDMA or CO/M demultiplexing structure that can receive data indicating which subchannels to recover and recover them and can be the same structure as transport demultiplexer 148.

The recovered video, audio and any associated data are output to a conditional access circuit 166 via buses 228, 230 and 232. The optional conditional access circuit 166 functions to decrypt or otherwise get the VOD data to the subscriber who requested it only if she is a legitimate subscriber and if this gating function was not performed at the satellite uplink facility or the video server (step 234). The conditional access circuit can have any of the known structures to perform this function.

The conditional access circuit has a host bus interface circuit (not separately shown) which forwards the data from the VOD IP packets (usually the IP packets bearing VOD data are broken up for transmission over the channel) and encapsulates the data into bus packets of the type used on the host bus 156, e.g., PCI bus packets. These packets are addressed to the IP video circuit 158 (step 236).

The IP video circuit functions as previously described. Basically, it takes packet addressed to it off the host bus 156 and either reassembles the IP packet if it was originally an IP packet but was broken up for transmission (such as in ATM cells) or encapsulates the data into an IP packet if it never was in an IP packet format (step 238). Presumably, the incoming VOD data includes the IP destination address in it. However, in some embodiments, the host 128 will tell the IP video circuit 158, "If you receive data from conditional access circuit 166, it is to be addressed to the IP address of network adapter xx which requested it." One way or another, the IP video circuit 158 assembles an IP packet header for each packet that tells the routing circuit 86 where the packet is to be sent on the LAN. The resulting IP packets are sent to the routing circuit 86 via bus 160 (step 238).

The routing circuit 86 looks up the Ethernet address bound to the IP address, encapsulates each IP packet into an Ethernet packet and routes it to the appropriate network interface circuitry in router 86 for the
LAN to which the network adapter is coupled which ordered the VOD program (step 240).

[0142] Note that if there is associated data with the VOD program which needs to go to the personal computer 22 or to IP telephone 60 in Figure 3, that data has its IP address set to the PC or the telephone as the case may be and the router 85 addresses the Ethernet packets containing this associated data to the Ethernet address of the PC or telephone or other peripheral as the case may be and this is true regardless of whether the VOD data is delivered by ADSL, HFC or satellite (steps 286 and 154).

The Network Adapter Structure and Subprocess For Video on Demand Processing

[0143] Regardless of which network was used to transmit the VOD program, the data that encodes the program has now been encapsulated into Ethernet packets and put onto the LAN. A block diagram of a typical network adapter 30 in Figure 3 is shown in Figure 5. The function of the network adapter is to pick the appropriate Ethernet packets off the LAN, strip out the video and audio data and convert it to an NTSC or PAL, or SECAM signal or to a video signal which can be fed into a video input of a TV.

[0144] Each network adapter has a network interface card 84 which couples the network adapter to the physical media of the LAN. Network interface circuits for Ethernet are well known, and will not be described further herein. Each NIC on the LANs 18 and 20 has a unique Ethernet address which maps to one or more IP addresses. Thus, when an IP packet addressed to the IP address of network adapter 30 arrives at the gateway, the gateway's routing tables will map this IP address to the Ethernet address of the network adapter. The entire IP packet, header and all, will then be encapsulated into an Ethernet packet with the destination address of the Ethernet packet being that of the network adapter.

[0145] All Ethernet packets are received by NIC 84, but only packets addressed to the network adapter 30 are kept. When an Ethernet packet addressed to network adapter 30 is received, it is examined to determine if the Ethernet address matches the address of the network adapter, and, if so, the packet is passed through the Ethernet protocol stack where the Ethernet header is stripped off and error detection and correction are done on the packet. The resulting IP packet is then passed to the IP video circuit 242 (step 244). For outbound packets such as menu requests and VOD request packets, the Ethernet protocol stack in NIC 84 performs the CSMA/CD transmission and collision detection protocol and transmits the packet on the LAN.

[0146] The IP packets from the NIC 84 are examined by the IP video circuit 242 to determine if they are addressed to the network adapter and whether they are graphics data or video data. The IP packet header is stripped off and payloads of packets that contain compressed video/audio data are transmitted as a bit stream to MPEG decoder 246, and packets that contain graphics data are transmitted as a bit stream to 2D graphics circuit 83 (step 248). In some embodiments, the menus will not be sent as separate data but will simply be video frames which are digitized and compressed. In such embodiments, bus 87 is not necessary.

[0147] The MPEG decoder 246 decompresses the compressed video and audio data bits and generates and uncompressed audio bit stream on line 250 and an uncompressed video bit stream on line 252 (step 258).

[0148] The audio bit stream is enhanced (for stereo and filtered and then converted to an analog signal in any conventional audio processor 254 (step 258). In alternative embodiments, the uncompressed audio data not processed to enhance it or convert it to stereo or filter it and is simply converted to an audio signal.

[0149] The data output on line 252 is a digitized YUV format video signal. Video processor 258 filters the video signal to enhance it (step 258). The combination of the video processor 258 and the 2D Graphics circuit 83 are commercially available in integrated circuit form from ATi or C3.

[0150] The digitized YUV format video signal on line 252 or 254 if video processor 258 is not used, is converted by video encoder 260 into an NTSC, PAL, SECAM or composite format video signal which can be displayed on a TV (step 252). If the output signal format is composite video, the composite video signal is input to the TV's video input via line 266 (step 262). Likewise, the audio processor converts the digitized uncompressed audio data into an audio signal on line 270 for coupling into the audio input of a TV (step 272). If the output signal from the video encoder 260 is NTSC, PAL or SECAM format, the signal is modulated onto an RF carrier at some locally unused frequency such as channel 3 by a video modulator 275 (step 274).

Wideband Internet Access

[0151] Dial-up Internet connections through modems are very slow. It is much more useful to surf the Internet with a much wider bandwidth at least downstream.

[0152] Referring to Figures 7A-7B, there is shown a flowchart of the process of high bandwidth surfing of the Internet using one of the HFC, satellite delivered Direct-PC or DSL networks. In step 276, the personal computer 22 in Figure 3 or network computer (hereafter sometimes referred to as NC) 24 or 26 launches its browser and enters a URL of a web page to be viewed. The network computers 24 and 26 do not have any local hard drives, so they execute their browsers from the hard disk of the personal computer via known techniques of executing shared software on a server over the network or over a WAN such as the Internet. Typically, the network computers indicate which program they want to run by double clicking an icon on their desktops. This action is converted to a request to download the program from a
server on the LAN or WAN into the RAM of the network computer. This request is converted by the NIC of the network computer into an Ethernet packet directed to the server on the LAN. The server NIC picks up the packet, opens the file, and generates one or more Ethernet packets directed to the network computer which receives the packets and loads the browser program or other application that needs internet access into RAM and begins executing it.

[0153] If the program to be run is resident on a server on the internet, the step of double clicking the icon of the program to be run is converted by TCP/IP protocol software layers in the network computer (typically stored in nonvolatile flash EEPROM or ROM) into an IP packet addressed to the server storing the application program to be run. The IP packet is then encapsulated into an Ethernet packet by the NIC of the NC addressed to the gateway 14. At the gateway, the Ethernet packet is received by the NIC and the Ethernet headers are stripped off by the routing process 86. The packet is then routed to the appropriate transmitter for the upstream medium the user has a subscription for or which is cheaper for Internet access if the user has DSL, satellite and HFC modules installed or some combination thereof (least cost routing process). In other words, the IP packet will be routed to the DOCSIS modem 70 for upstream transmission over the HFC 10 or to the ADSL modem 12 if the ADSL service or to conventional modem 280 (which may also be a conventional FAX/data modem) if satellite downloading service via DirectPC is to be used. The IP packet is sent by one of these media to the headend, ADSL CO or by dialup connection to the satellite uplink facility. At the destination, the IP packet is recovered and routed by a router at the destination to the Internet server storing the application to be executed.

[0154] The Internet server then sends the program to be executed to the network computer by encapsulating the data of the program into IP packets addressed to the NC that requested it. These IP packets arrive at the gateway and are recovered by the DOCSIS modem, ADSL modem or satellite reception circuitry to be described below and sent to the routing process 86. There, they are encapsulated into Ethernet packets addressed to the NIC of the NC that requested the program and launched on the LAN. The NC receives the packets, strips out the date of the program, stores in its RAM and begins executing it.

[0155] The user then enters the URL of the web site she wants to visit (step 278). The browser or other application then passes this URL down to TCP/IP protocol software processes in execution on the computer which turn the URL into an IP packet requesting that the web page be sent to the URL be downloaded to the computer that asked for it, as identified by the source address of the IP packet (step 282). This IP packet is then encapsulated into an Ethernet packet addressed to the gateway 14 by the NIC of the NC or PC (step 284).

[0156] The gateway's NIC (not shown separately in Figure 4A) receives the Ethernet packet, strips off the Ethernet header after error detection and correction and passes the IP packet up to the routing process layers. The router looks up the destination address in its routing tables and forwards the packet to one of the upstream transmitters (step 286). If the user has only one network interface such as an HFC interface only or an ADSL interface only installed (as determined by either a discovery process carried out by the router or by configuration data), the IP packet is forwarded to that upstream transmitter. However, if user has more than one network interface installed, the router may forward the IP packet to an upstream transmitter based upon any criteria such as user choice as indicated by a management and control packet sent to the gateway or a field in the IP packet, by a random or round robin selection process or by a least-cost routing algorithm that automatically picks the cheapest service for widebandwidth Internet access. Step 286 is intended to represent any of these methods of selecting the upstream transmitter.

[0157] If the upstream transmitter is the DOCSIS modem 70, the IP packet is transmitted upstream over a virtual channel devoted to this gateway or assigned to it on the fly by the headend. The virtual channel can be established by TDMA, OCDMA or CDMA or possibly by FDMA. The CO modem recovers the IP packet and passes it to a router coupled to the headend (step 288).

[0158] If the upstream transmitter is the ADSL modem 12, the IP packet is modulated onto the upstream carrier and transmitted over the PSTN local loop 58 to the ADSL modem at the CO. There, it is recovered and passed to a router coupled to the Internet (step 288).

[0159] If the downstream modem is going to be the satellite downlink, the upstream transmitter is the conventional modem 280. This modem dials a modem at the satellite uplink facility and transmits the IP packet there. The IP packet is received and passed to a router coupled to the Internet (step 288).

[0160] The router sends the IP packet to the web server at the URL (step 290) which opens the web page identified in the URL and begins sending the web page data back to the router as a series of IP packets (step 292).

[0161] The IP packets arrive at the router and are sent to the appropriate downstream transmitter. Step 294 is intended to represent downstream transmission over any of the HFC, DSL or satellite media. In the case of HFC delivery, the downstream transmitter will be the headend modem. The downstream modem will either broadcast the IP packet on the downstream carrier to all gateways or transmit it on a virtual downstream channel assigned to the gateway at the premises of the PC or NC that requested the web page (step 294).

[0162] If the downstream media is the satellite downlink, the router sends the IP packets to the uplink transmitter which transmits them to the satellite. A transponder on the satellite receives the packets and re-broadcasts them on the downlink channel (step 294).

[0163] If the downstream media is a DSL local loop,
the router at the CO sends the IP packets to the ADSL modem at the CO which modulates them onto the downstream carrier (step 294).

[0164] Step 296 is the recovery of the IP packets at the gateway, regardless of the downstream media, transmission to the router, protocol conversion and routing and transmission out on the appropriate LAN. The details of how this happens in the gateway for each downstream media follows.

[0165] In the case of HFC downstream delivery, tuner 104 filters out all but the DOCSIS downstream carrier and removes the RF component. The resulting baseband signal is passed through the A/D matrix on line 132 to the DOCSIS modem 70. There, the IP packets are recovered and sent to the routing circuit 86 via bus 300. Although this is shown as a separate bus, it may actually be the host bus 156 in some embodiments with the IP packets being sent to host microprocessor 128 by encapsulation in PCI bus packets addressed to the host. Likewise for all other buses shown in Figure 4A going into or coming out of the routing circuit 86. The router 86 looks up the destination address in the IP packets and determines they are addressed to PC 22 or one of NC 24 or 26. The router then encapsulates the IP packets into Ethernet packets addressed to the appropriate PC or NC and directs them to the NIC for the proper LAN connected to the PC or NC that requested the data (step 296).

[0166] In the case of satellite downstream delivery, tuner 302 in Figure 4B is directed by host 128 to tune to the DirectPC downstream QPSK modulated carrier. The tuner rejects all other signals and recovers the carrier and synchronizes a local oscillator to generate two coherent reference signals which are phase and frequency matched to the two quadrature carriers used to transmit the downstream IP packets. These local reference signals supply two correlators in the tuner, one for the in-phase channel and one for the quadrature channel. Each correlator is comprised of a multiplier and an integrator. Digital QPSK transmission and transmitters and receivers therefore as well as other modulation and multiplexing schemes and carrier and clock recovery circuits are described in Haykin, Communication Systems, 3rd Ed. (Wiley & Sons 1994) ISBN 0-471-57178-8 which is hereby incorporated by reference. The digital satellite receiver channel is not limited to QPSK modulation, and any modulation and/or multiplexing scheme used today or subsequently for downstream transmissions may be used with suitable adjustments to the gateway satellite digital data receiver.

[0167] The output of receiver 302 is coupled via I and Q buses 306 and 310 to a QPSK demodulator 304 which functions to recover the IP packets data and encapsulate it into bus packets for the host bus addressed to the routing circuit 86. The QPSK demodulator 304 is typically comprised of a decision device that receives the baseband I and Q channel signals and compares them to decision threshold of zero volts. If the I channel voltage is greater than zero, a decision of logic 1 is made but if its voltage is less than zero, a decision of logic 0 is made. If the Q channel voltage is greater than zero, a decision of logic 1 is made but if its voltage is less than zero, a decision of logic 0 is made. Finally, the two binary bit sequences defining the IP packets coming out of the decision circuit are recombined in a multiplexer in demodulator 304 and sent to bus interface circuitry in demodulator 304 for encapsulation into bus packets and transmission via bus 312 and the host bus 156 to the router 86. The router receives them, strips off the host bus packet headers, looks up the IP destination address and finds they are addressed to the PC 22 or one of the NCs. The IP packets are then encapsulated into Ethernet packets (or whatever other packet format is used on the LANs 18 or 20) addressed to the PC or NC that ordered the data and sent to the proper NIC (step 298). (0168) If the downstream media is an ADSL local loop, a conventional ADSL modem 182 in Figure 4A recovers the IP packets and sends them on bus 188 to the router 86. The router receives them, strips off the host bus packet headers (if bus 186 is actually the host bus 156), looks up the IP destination address and finds they are addressed to the PC 22 or one of the NCs. The IP packets are then encapsulated into Ethernet packets (or whatever other packet format is used on the LANs 18 or 20) addressed to the PC or NC that ordered the data and sent to the proper NIC (step 298).

[0169] The NIC of the PC or NC that ordered the data receives the Ethernet packets, does error correction and strips off the Ethernet headers. The resulting IP packets are passed up the TCP/IP protocol layers where the IP packet headers are stripped off and the TCP protocol makes sure all the packets have been received. The payload data is then sent to the application that requested it for display (step 306). Processing by the PC or NC of the IP packet data and Ethernet packets is the same as in PCs on a LAN that share modems and dial up connections to the Internet through ISPs, and that technology is incorporated by reference.

Reception and Distribution of Analog Video Broadcasts Via Satellite Or Terrestrial Antenna

[0170] One of the advantages of the gateway 14 is that it may also be used to distribute analog TV broadcasts to TVs throughout the house using the LAN thereby eliminating the need for separate wiring.

[0171] Tuner 314 starts this process by receiving control data from microprocessor 128 defining which C-band analog video channel has been requested by the user. Tuner 314 can be any conventional C-band satellite tuner modified so as to accept digital control data from the host 128 to control which satellite and which transponder to tune to as opposed to receiving this information directly from a remote control or front panel switches. In the home network described herein, users request C-band broadcast channels via their IR key-
boards 34 or remote controls 30 in Figure 5. Those requests are encapsulated into management and control Ethernet packets addressed to host CPU 128 by network adapter 30. The host CPU receives them and generates a PCI bus packet on bus 168 addressed to tuner 314 telling it which channel to tune, i.e., which satellite to turn the dish to and which transponder or channel in the downstream broadcast to tune to.

[0172] The RF (or IF) output of tuner 314 on bus 134 is then digitized by an analog-to-digital converter 318. The digital samples on line 318 are input to a video demodulator 320 which functions in the digital domain to demodulate the digitized analog video signal by removing the RF component. The video demodulator 320 outputs digital data on line 322 which represents a conventional baseband NTSC, PAL or SECAM format video signal.

[0173] The digital data on line 322 is at too high a bit rate to send over the LAN since uncompressed broadcast video consumes about 221 Mbps of bandwidth. Therefore, the video data must be compressed. MPEG II compression is preferred, but any known form of compression currently known or to be developed in the future will suffice since the form of compression is not critical. MPEG II compression circuitry is well known, and is used for MPEG encoder 326. However, MPEG compression does not compress NTSC, PAL or SECAM format signals. They must first be converted to YUV format luminance and chrominance signals. This conversion is done in video decoder 324, which is a known type of circuit in any video system that uses MPEG II compression.

[0174] The compressed video data is encapsulated into a PCI (or other type) bus packets addressed to IP video circuit 158 on Figure 4A. There, the compressed video data is encapsulated into IP packets addressed to the network adapter of the TV where the request originated and the satellite C-band video channel is to be viewed. The IP video circuit 158 determines which IP destination address to use in constructing the IP packets via data received from the host microprocessor 128. When the original request was received, the host microprocessor 128, in addition to telling the tuner 314 which channel to tune, also determines from the source address of the Ethernet packet bearing the request which TV's network adapter requested the data. The IP address of this network adapter is encapsulated into a PCI bus packet and transmitted via host bus 156 to the IP video circuit. The IP packets encapsulating the digitized C-band video channel are then transmitted via bus 168 to the routing circuit 86. Bus 168 may simply be the host bus 156 in embodiments where the routing process is carried out in software on the host 128.

[0175] The routing process 85 is a conventional IP to Ethernet routing process which examines the IP packet destination addresses and looks up the corresponding Ethernet addresses. The IP packets are then encapsulated into Ethernet packets and routed to the appropriate LAN network interface card for LAN 18 or 20 depending upon the Ethernet destination address of each packet. The process works in reverse for incoming Ethernet packets from the LAN(s).

[0176] When the IP packets reach the network adapter of the TV that requested the CATV channel, they are converted to a video signal that can be displayed by the TV by the circuitry described above in conjunction with the discussion of Figure 5.

**Terrestrial Broadcast Reception**

[0177] Reception and distribution of standard TV broadcasts received over an antenna coupled to the gateway 14 is very similar. A standard TV antenna 328 is coupled to the gateway by a coax or twin lead wire 330. A TV tuner 332 tunes the requested channel and outputs the desired channel as an RF or IF signal. Tuner 332 can be a conventional TV tuner modified to receive digital control data from the host computer 128 which controls which analog TV broadcast channel the tuner selects.

[0178] A/D converter 334 samples the output RF or IF and feeds the samples to a video demodulator 338. The signal is demodulated in the digital domain to remove the RF component. As is the case for all the analog signal receiver circuits for both HFC and satellite, the analog-to-digital conversion can happen anywhere along the line of circuits including just before the MPEG encoder.

[0179] The output 338 is a digitized version of an NTSC or PAL or SECAM signal. It is fed to a video decoder 340 which converts it to a YUV format signal. The YUV signal is then compressed by MPEG encoder 342 and output into the IP packets of the format used on the host bus 156 (typically PCI) and addressed to the IP video circuit 158.

[0180] The IP video circuit strips off the bus packet headers (and performs error detection and correction) and encapsulates the compressed video data from the PCI bus packets into IP packets addressed to the network adapter of the TV set where the requested channel is to be viewed. The IP packets are then sent to the router 86 where the destination address is looked up and the IP packets are encapsulated into Ethernet packets addressed to the same network adapter and launched onto the appropriate LAN.

**LAN Alternative Embodiments**

[0181] Video is isochronous or stream-oriented. On the other hand, traditional LAN traffic is more bursty. LANs were not developed to support streaming traffic, and it is therefore possible that a 10 Mbps 10Base-T Ethernet LAN will not have sufficient streaming traffic to support the load, especially where there are multiple TVs each requesting a different channel along with other simultaneous traffic sharing the 10 Mbps bandwidth. Video is highly bandwidth intensive so even 100 Mbps...
LANs have trouble supporting high quality video intermingled with more traditional LAN data traffic. [0182] Accordingly, it is within the scope of the genus of the invention to use higher capacity LANs for LANs 18 and 20. Specifically, these LANs can be Fast Ethernet, Switched Ethernet, FDDI, ATM and Fiber Channel Arbitrated Loop. Such LANs are described in Tanenbaum and Horak, supra, and Kembel, Arbitrated Loop, Connectivity Solutions, a division of Northwest Learning Associates, Inc of Tucson, Az, (1997) ISBN 0-87186-82-4.

Reception and Distribution of DirecTV Digital Video Broadcasts

[0183] The gateway will include a bus slot for a module which can receive regularly scheduled DirecTV and other formats of digital video broadcasts on downlinks from a satellite. A tuner 344 serves to receive digital control information from the microprocessor as to which channel on the downlink a user has requested. The tuner then tunes to this channel and rejects all other signals and a QAM demodulator demodulates the signal to recover the transmitted data and outputs a complex baseband signal on line 348. Conventional QAM modulated digital data receivers are taught in Lee & Messerschmitt, Digital Communications, 2d Ed., (Kluwer Academic Publishers 1994) ISBN-7223-9391-0, Section 6.4.3, pp. 203-208 and Figures 6-18 and 6-19, the entirety of this book being hereby incorporated by reference. Typically, the tuner 344 will be comprised of a bandpass filter to tune the desired channel and reject out-of-band signals and doubling as an anti-aliasing filter. Typically, the signal is then digitized and a phase splitter (a filter that passes only frequency components in the positive half of the Fourier spectrum and rejects Fourier components in the negative half) acts in the discrete time domain to remove the negative half Fourier frequency components of the received spectrum to output an analytic signal. Then the positive half frequency components of the received signals are demodulated, i.e., the RF carrier component is removed by mixing with a local carrier which is synchronized to the transmitted carrier. [0184] Figure 6-18 of Lee et al. at p.204 illustrates three different configurations for a QAM tuner.

[0185] The function of the QAM demodulator 346 is to detect the actual symbols sent. This is typically done by sampling and slicing. A complete QAM tuner to get the received signal back to baseband and demodulator to recover the transmitted symbols is shown in Figure 6-18(b) of Lee & Messerschmitt for the real valued case and is comprised of two mixers which move the received spectrum back to baseband by multiplying by quadrature shifted local carriers and two receive bandpass filters to reject out of band signals and pass only the positive half Fourier components of inphase and quadrature signals. The I and Q signals are then sampled at the symbol rate and passed through a slicer to recover the symbols actually transmitted. A more complete representation of a practical QAM receiver including both precorrection equalization and postcorrection equalization and carrier and timing recovery is shown in Figure 6-23 of Lee & Messerschmitt. Preferably there will also be an error detection and correction circuit as well (not shown).

[0186] After the symbols of the compressed video program are recovered, a conventional transport demultiplexer 350 receives direct control input from the host as to which subchannel on which to find the video program which has been ordered and demultiplexes the audio, video and any associated data from those subchannels.

[0187] To help manage the load on the LAN, an optional transcoder 352 is used to translate the bit rate of the compressed video down to a lower rate when necessary because of current loading conditions on the LAN. Transcoders are known and are commercially available from Imedia in San Francisco, California and now from the assignee of the present invention.

[0188] The output data of the transcoder is supplied to a conventional conditional access circuit 354 which decrypts the data if the subscriber is authorized to receive the program. Alternatively, the conditional access circuit 354 may function to encrypt the original encoded data if the user is an unauthorized subscriber and then re-encrypt the data before transmission on the LAN using the new C5 encryption standard. The re-encrypted data is then packetized into bus packets and transmitted over the host bus 158 to the IP video circuit 159. There it is encapsulated into IP video packets addressed to the network adapter that requested the program and sent over data path 150 to the routing circuit/processor 89. The routing process looks up the destination address and maps it to the LAN address of the network adapter and encapsulates the data into Ethernet packets and sends them to the correct NIC for transmission over the LAN. At the network adapter, the packets are processed as previously described in connection with the description of Figure 5 to convert the data to NTSC, PAL or SECAM video signals and the corresponding synchronized audio. If C5 encryption is used, the data remains encrypted at all stages until it is converted to analog video and audio signals.

[0189] A conventional DirecTV receiver modified to receive digital control data telling it which channel and subchannel to tune can be substituted for tuner 344, QAM demodulator 346 and transport demultiplexer 350.

[0190] Alternatively, the satellite receiver taught in U.S. Patent 5,983,071 may be used but modified to remove the audio decoder 160, the D/A converter 164, the video decoder 170 and the NTSC encoder 174. Those functions all happen at the network adapter after distribution over the LAN. If the receiver of U.S. patent 5,983,071 is substituted for the tuner 344, QAM demodulator 346 and transport demultiplexer 158 and the conditional access circuit 354, the audio and video output stream on lines
162 and 172 of the patent will be supplied to the transcoding 352. The receiver taught in U.S. patent 5,983,071 may also be used in place of tuner 102, A/D matrix 130, QAM demodulator 146, conditional access circuit 126, and transport demultiplexer 148. Again, this receiver will be modified to remove the following components taught in the patent: audio decoder 160, the D/A converter 164, the video decoder 170 and the NTSC encoder 174. Those functions all happen at the network adapter after distribution over the LAN. A transcoder may also optionally substitute into the HFC digital video receiver module circuit that includes tuner 102, and the conditional access circuit 126 and 186 may both be modified as described above to re-encrypt the recovered data under the CS standard to prevent digital copying from being made. If the receiver of U.S. patent 5,983,071 is substituted for the tuner 102, QAM demodulator 130 and transport demultiplexer 148 and the conditional access circuit 126, the audio and video output stream on lines 162 and 172 of the patent will be supplied to either a transcoder, if present, or to bus interface circuitry (not shown) which packetizes it and sends it to the IP video circuit 158 over the host bus.

Pay Per View Push Technology Gateway Compatibility

[0190] The gateway 14 can also be used to receive pay per view or free regularly scheduled broadcasts of digital or analog video programs. Push technology means a video server at a coupled to the HFC headend, ADSL CO or satellite uplink has a regular schedule of video programs that it outputs at specific times on specific channels. A menu displayed on the television set in the manner described elsewhere herein or publication is used by the user to select the program the user wishes to view. The user selects the program she wishes to view at the time the program is supposed to start by entering the program number (the program number can be mapped to the service provider and the video server IP address or that information can be entered manually) on her remote control 80 or keyboard 40. That program number is encapsulated into an Ethernet request packet and transmitted to the gateway where it is routed to the host. The host 128 then sends the appropriate command data over the host bus to tuner 102, or 100 or 150 or 314 or 344 or 352 or ADSL modem 182 to tune to the appropriate channel, depending upon which medium the program will be arriving. In the case of digital video, the host also sends control packets to the transport demultiplexer 350 or 184 or 148 to control them to demultiplex the compressed video and audio signals off the correct subchannels. If transcoding is used in the digital or analog video receiver modules, the host will monitor the load status of the LAN in any known way and send appropriate control packets to the transcoders over the host bus to control the bit rate of the compressed video transmitted over the LAN so as to not exceed the available bandwidth under varying load conditions.

IP Telephony

[0191] Since there is a LAN to run through the customer premises, it is useful to use the LAN to distribute video and audio and FAX telephony data to the video phones, telephones, FAX machines and FAX modems throughout the premises. Also, since all these physical telephony devices are coupled to a computer, it is useful to include an IP and/or PBX telephony module 352 in the gateway to provide functionality that the user could not formerly obtain from POTS service. POTS service can provide conference calling, call forwarding, caller ID, voice mail and pager notification of voice mail messages as well as other services through facilities such as Centrex provided by the CO switch. However, these services all cost extra money, and can be implemented locally in the gateway through use of "PBX on a card" expansion circuitry to extend the functionality of the host. Such telephony circuitry 352 to extend the functionality of DOS and Windows based personal computers to include PBX functionality, voice mail and a host of other features is commercially available as the VS1 and Incline systems from Picazo Communications, Inc. of San Jose, California and from Netphone, Inc. of Marlborough, Mass., and Alligen Communications, Inc., the details of which are hereby incorporated by reference. The Netphone PBX on a card technology which can be used to implement circuit 352 is described in U.S. patent 5,876,224 which is hereby incorporated by reference. This patent basically to allows a PBX circuit on an expansion card that is plugged to the host bus of a network server. The PBX card can establish and maintain telephone calls and do normal PBX call control functions. The PBX card can be controlled from telephony enabled applications on the server/gateway or by telephony enabled applications running on PCs via the LAN connection to the gateway. Any known expansion circuitry to add PBX functionality to a LAN server regardless of whether it is implemented on one or more than one may be used for circuit 352.

[0192] Typically, the circuit 352 will have its own switching circuit for connecting phone calls from extension phones coupled to conventional phone lines to CO trunk lines 58 and vice versa.

[0193] In some embodiments, the PBX functionality alone may be sufficient. However, use of the Internet for telephony is a growing market, and websites such as www.net2phone.com already exist to allow long distance telephone conversations to take place over the Internet regardless of distance for 10 cents per minute. To allow users to take advantage of these services, PCs on LANs 18 and 20 will need to be equipped with microphones and speakers. In such a class of embodiments, the IP & PBX telephony circuit 352 will include circuitry to digitize analog voice signals arriving from the exten-
sion phones via conventional phone lines 354. The IP & PBX telephony circuit 352 may also include packetization circuitry in some embodiments to receive Ethernet packets carrying digitized voice from the PCs on LANs 18 or 20 from router 86 via bus 356 and packetize them into IP packets addressed to the Internet server providing the IP telephony services. These IP packets are then sent back over bus 358 to router 86 where they are routed to the server identified in the destination address of the IP packet. The routing can be least cost routing if multiple high bandwidth upstream media such as HFC and ADSL upstream high speed internet access modules such as DOCSIS modem 70 and ADSL modem 182 are present in the gateway. In other embodiments, the PBX expansion module 352 will do call control switching and provide other services between extension lines 354 and the CO trunk lines, and analog telephone signals from the extension phones on line 354 will be digitized and packetized into an IP packet addressed to an IP telephony server on the Internet whose IP address is fixed and known to be the IP address to which the telephone data from the conventional POTS telephones is to be directed.

[0194] Then, instead of sending data from Ethernet packets bearing telephony data from PCs, telephones and FAX machines on the LAN for encapsulation into IP packets by the IP & PBX telephony module 352, the IP packet encapsulation will be done at the source. In other words, if PC 22 or NC 24 or phone 80 or FAX 84 at the customer premises wants to send data to an IP telephony server on the Internet, the digital data generated by the source device will be encapsulated by the source device into IP packets addressed to the IP telephony server on the Internet. These packets will then be encapsulated into Ethernet packets and sent to the gateway 14. The gateway 14 will then strip off the Ethernet packet headers and rout the enclosed IP packets to the server on the Internet to which they are addressed via the DOCSIS modem 70, the ADSL modem 182 or possibly by the conventional modem 280 in Figure 4A (although use of the conventional modem would only make sense if higher bandwidth upstream media was not available).

Modular Construction of Gateway

[0195] Referring to Figure 6, there is shown a block diagram illustrating the software architecture and modular construction of the gateway/LAN server 14. As mentioned above, in alternative embodiments, the gateway 14 may actually be comprised of two or more servers to divide the labor but each coupled to the expansion modules by a bus/LAN structure 156. For example, one server may run only the PBX control software and IP telephony software and another server may run only the management and control and routing processes needed for the push and pull video applications and high speed internet access and perform any routing functions needed for IP telephony by the first server.

[0196] The software processes in the host or server run in conjunction with the operating system 358 and use its application programmatic interfaces (API) for message transfers between processes and to send data to the LAN interface or NIC 350 and the host bus 158. The data paths between the various software processes and between the various processes and NICs 352 and 354 and the host bus 156 through the operating system are symbolized by data path 356. This data path represents any of the typical methods and apparatus for transferring data between processes or between processes and circuits in the gateway. For example, NIC #1 352 may receive an Ethernet packet bearing a request for a video-on-demand program that is addressed to the management and control process. One way NIC 352 can transfer that packet to the routing process 86 by writing the data into on-board scratchpad RAM and invoking a software interrupt for the routing process 86 and passing it a pointer to the message in RAM. The routing process then executes an interrupt service routine for that interrupt and reads the data from the scratchpad RAM at the address passed with the interrupt or at some preassigned address stored in an interrupt table. Processes and circuits can also pass messages by writing them into predetermined locations in shared address space in RAM 129 with the destination circuit or process and then setting an interrupt bit and storing an interrupt number in a register. The interrupt bit causes the host to execute a generic interrupt service routine to retrieve the interrupt number and then look up the interrupt number in an interrupt vector table. The table would return the address of the beginning of an interrupt service routine for that number. Each circuit or process would have an interrupt number and an associated interrupt service routine. The service routine pointed to by the vector table would then be executed and retrieve the data and return it to the process or circuit associated with that interrupt. Each of the expansion modules could pass data or IP packets to the routing process 86 or the IP video process 158 in this way.

[0197] A management and control process 358 receives video-on-demand and other requests for services and data as described in the detailed descriptions of each module. These other requests can include the numbers of CATV or terrestrial channels to tune in or requests for DirecPC or ADSL or HFC high speed internet access. Other data the management and control process will receive in alternative embodiments is LAN available bandwidth status and other network management data. In response, the management and control process sends out the appropriate control data to the tuners, transport demultiplexers, transcoders, conditional access circuits, IP video process and other circuits or processes to manage retrieving the requested data and distributing it to the right peripheral or to transmit data upstream on particular upstream channels. These upstream channels may be preassigned or assigned by.
downstream control messages from the headend or ADSL CO or satellite uplink server.

The routing process 86 translates between IP and Ethernet or other LAN protocols and functions as previously described. The IP video process 158 encapsulates data sent to the host bus into IP packets addressed to the proper peripheral device.

The IP telephony and other telephony enabled and PBX processes represented by block 570 control the IP and PBX telephony expansion module to implement PBX functions, carry out IP telephony etc. For example, there may be 5 conventional or LAN telephones in the home each of which is primarily answered by one person in the family. One of the processes of block 570 may implement direct inward dialing such that each telephone has its own virtual telephone number which an outsider can dial when, for example, they want to talk to teenager Judy without the inconvenience of accidentally talking to her father. Likewise, two extension phones may wish to have a conference call with a phone in some other state. The PBX control software controls the switch in the PBX module 572 to implement any of these desired PBX functions. The IP telephony process carries out IP telephony, by, for example, receiving digital data from conventional POTS phones via telephony module 372 and encapsulates it into IP packets which are passed to router 86 and vice versa. IP packets received from LAN enabled telephones 60 and 62 are just passed directly to the router 86.

Likewise, a database program or word processing program being run on a PC or NC on the LAN may be telephony enabled. For example, a rolodex file made by a word processing program may contain telephone numbers and the user may look up a person by name and then double click on the phone number. This double click will be converted by the telephony enabled application into an Ethernet packet requesting that the telephone number be dialed. This Ethernet packet is sent to NIC 352 or 354 and is passed up to the router 86. The router strips the Ethernet header off and passes the data of the request to a PBX application represented by block 370. The PBX application makes a function call to a library program of the OS 558 through the standard TAPI Interface 374.

The TAPI Interface represents a collection of predefined Windows function calls, each of which invokes a library program from a telephony dynamic linked library of programs. The TAPI function calls provide a standard telephony programmatic interface to applications that want to perform telephone functions. The basic level of functions allow application programs to carry out basic inbound and outbound voice and data calls by providing programs that can be invoked to initialize and open and close TAPI lines, read and write various parameters that control a line device, handle the details of placing an outbound voice or data call or answer an inbound voice or data call, recognize, translate and or build telephone "addresses" or dialing strings, manipulating call handles etc. Other programs in the TAPI library provide more advanced functions such as digit or tone generation and detection, call acceptance and rejection, redirection, call forwarding, park, hold, conference, etc. If the TAPI telephony libraries are called supplemental telephony services and allow multiple telephone handsets or other line devices to share one or more telephony lines in a PBX type arrangement. The trunk lines can be analog, T1, ISDN or DSL. Because TAPI also supports the logical construct of phone devices, the NCs and PCs out on the network with TAPI libraries can actually have multi-line virtual telephones implement in code running there for so that every room with a PC in it can also have a multi-line phone capable of speakerphone, conference, hold, park, call forwarding and other advanced capabilities not normally on standard home telephones.

TAPI services focus on "line devices" as a means for transporting information from one place to another. A line device can be a standard telephone handset, a fax box, a data modem, a telephony card or any physical device coupled to a telephone line. In the system depicted in Figure 8, the ADSL modem module 378, conventional modem module 380 and IP and PBX telephony module 372 are all line devices. Because a line device is a logical construct, TAPI can see multiple line devices all coupled to the same physical telephone line. A TAPI call control program (dialer.exe) can accept multiple simultaneous TAPI service requests from, for example, the PBX application, the IP telephony application and other telephony enabled applications all represented by block 570 and queue them all for service in order.

Communications between the application programs and the TAPI library are via the Windows messaging function using predefined TAPI data structures. TAPI libraries of other operating system may be substituted for the Windows TAPI library and the data structures and messaging functions of the operating system in use can be substituted.

How TAPI is structured and how application programs can be written to utilize this resource are all defined in Amundson, MAPI, SAPI & TAPI Developer's Guide, (SAMS Publishing 1998) ISBN 0-7821-30928-9, which is hereby incorporated by reference.

Returning to the current example, the TAPI program executes and makes a function call to the telephone service provider process 376 and passes it the number to be dialed. The TSP layer 376 isolates the TAPI library program from needing to know the details of the specific hardware installed and it isolates the particular hardware which is installed from having to be designed for the specific telephony enabled application programs which are present. It is translator between the TAPI world and the hardware world. In other words, the TSP layer 376 implements the TAPI functions that are used by TAPI implementation. Each TSP then uses whatever interface is appropriate to control the telephony hardware to which it is connected. The TSP layer
378 and the PBX card driver layer 378 actually can be combined in some embodiments, and in other embodiments, the TSP layer can be used to interface to other telephony hardware such as a FAX modem expansion module 380 at the gateway by which FAXes may be sent using data frames from PCs that do not have FAX modems or connections to telephone lines available at their location on the network.

[0206] Assuming the TSP and PBX card drivers are separate processes, either TSP 378 or TAPI program 374 then invokes the proper function call of a PBX card driver process 378 and passes it the number to be dialed. The PBX card driver speaks the specific language of the IP and PBX telephony module 372 and sends it a properly formatted message to control the switch and other circuitry thereon to seize a CO trunk line and generate the appropriate DTMF tones to dial the requested number when a dial tone is detected.

[0207] When the person answers, the voice is digitized by a codec in the PBX card 372 and the data is passed back to the PBX card driver which then passes it back up through all the layers to the router. The router encapsulates the data into an Ethernet packet addressed to the telephone or other line device that made the call and passes the packets to the appropriate NIC. From the NIC, the packets are transmitted via LAN to the network adapter of the telephone or PC or NIC that originated the call. The reverse thing happens for voice going out from the PC, NC or telephone which originated the call to the person who answered the phone.

[0208] The host bus is coupled via bus connectors and expansion slots to one or more expansion modules which implement the transmitter and receiver circuitry and other interface circuitry necessary to interface the gateway to the satellite. HFC, POTS or DSL media or any other media such as the power lines or wireless local loops which may be developed in the future. Modules are shown for currently existing technologies only, but newer upstream and downstream media are sure to follow, and the genius of the Invention includes expansion modules of whatever type are needed to interface to these newer media.

[0209] The ADSL modem module 376 may be any conventional ADSL modem 182 or SDSL modem or any other modem to interface to any type of digital subscriber line local loop which can be digitally controlled by the host 128. It will include any connectors and isolation circuitry 204 needed to connect to the DSL CO trunk line.

[0210] The FAX Data Modem module 380 can be any conventional FAX data modem or simple data modem for coupling via suitable connectors and isolation circuitry 205 to extension phone lines 354 within the customer premises as well as DSL CO trunk lines 58 and which can be digitally controlled by the host 128.

[0211] The IP & PBX telephony module 372 can be any known or future developed "PBX on a card" including one or more expansion cards which give a conventional personal computer host 128 running any operating system PBX capabilities and which can be digitally controlled by the host 128. It can include any needed additional known circuitry and software needed to implement IP telephony functions.

[0212] A DOCIS modem module can be any known or future developed cable modem that conforms to the DOCIS standard or any new standard for modems that allow high speed data transfers from a customer premise to a headend cable modem and/or the Internet over a CATV HFC cable plant, and which can be digitally controlled by the host 128.

[0213] An HFC digital video module 388 can be any digital video receiver which can be digitally controlled by the host 128 and is compatible with reception of digitized compressed video data transmitted over HFC. In the system of Figure 4A, for example, the HFC digital video module 388 would typically include tuner 108, an A/D converter included in matrix 130, QAM demodulator 146, transport demultiplexer 148 and conditional access circuit 126 to communicate with the shared IP video process 153 running in software on the host. It may also include the upstream and downstream combiner and isolation circuits 90 and 98 although this combiner and isolation circuitry may be shared by all HFC interface modules in some embodiments.

[0214] An HFC analog video module 390 can be any receiver capable of receiving regularly scheduled analog CATV transmissions over HFC which can digitize and compress the data for transmission over the LAN and which can be digitally controlled by the host 128. In the exemplary embodiment of Figure 4A and 4B, the module 390 typically would include tuner 100, an A/D converter from matrix 130, video demodulator 138, video decoder 114 and MPEG encoder 147. It may also include the upstream and downstream combiner and isolation circuits 90 and 98 although this combiner and isolation circuitry may be shared by all HFC interface modules in some embodiments.

[0215] In some species within the genus of the Invention, all HFC interface modules such as 386, 388 and 390 may be combined into one HFC interface module. Likewise for all expansion modules that interface to the PSTN and extension phone lines or all modules that interface with the satellite dish.

[0216] A satellite digital video-on-demand module 392 can be any satellite receiver which can be digitally controlled by the host 128 to tune in and receive a specifically requested compressed digital video-on-demand broadcast from a satellite. In the embodiment of Figures 4A and 4B, it includes tuner 180, QPSK demodulator 220, transport demultiplexer 164 and conditional access circuit 186.

[0217] A satellite analog video module 394 can be any conventional C-band satellite receiver modified to receive tuning commands digitally from the host 128 and modified to digitize and compress the video program for distribution on a LAN. In the embodiment of Figures 4A and 4B, it would include tuner 314, A/D converter 316,
video demodulator 320, video decoder 324 and MPEG encoder 328.

[0218] A satellite DirectPC module 396 can be any conventional DirectPC receiver or any equivalent receiver for receiving IP packetized data transmitted from a satellite capable of being digitally controlled by a host computer and send the recovered IP packets to a routing process being run by the host. In the embodiment of Figures 4A and 4B, it would include tuner 302 and QPSK demodulator 304.

[0219] A satellite DirectTV module 398 can be any conventional DirectTV receiver or equivalent digital satellite TV broadcast receiver which can receive regularly-scheduled, compressed, digital TV broadcasts from a satellite but modified to be controlled digitally by the host 128 to tune to a requested broadcast channel. In the embodiment of Figures 4A and 4B, this module would include tuner 344, CAM demodulator 346, transport demultiplexer 350, optionally transcoder 352 and conditional access circuit 354.

[0220] A terrestrial analog NTSC or PAL or SECAM module 400 can be any receiver capable of being digitally tuned by the host computer which can receive regularly-scheduled analog TV broadcasts via an antenna and digitize and compress them for distribution over a LAN. In the embodiment of Figures 4A and 4B, it would include tuner 332, A/D converter 334, video demodulator 336, video decoder 340 and MPEG encoder 342.

[0221] Any of the modules defined above which recover or generate digital data for transmission on the LAN can optionally include a transcoder to translate the original bit rate to a lower bit rate where needed because of network loading. Likewise, any module that recovers digital data that encodes copyrighted materials such as video or audio programs may include a CS standard encryption circuit to re-encode the digital data before transmission on the LAN to prevent perfect, unauthorized digital copies which could happen if the digital data were to be transmitted in the clear.

[0222] Although the invention has been disclosed in terms of the preferred and alternative embodiments disclosed herein, those skilled in the art will appreciate possible alternative embodiments and other modifications to the teachings disclosed herein which do not depart from the spirit and scope of the invention. All such alternative embodiments and other modifications are intended to be included within the scope of the claims appended hereto.

Claims

1. A gateway apparatus, characterized in that it comprises:

- a host computer having a host bus;
- one or more local area network interfaces coupling said host computer to one or more local area networks that carry data between said gateway and one or more devices located within a customer premises; and
- one or more external network interface circuits coupled to said host bus for interfacing said host computer to one or more networks external to said customer premises which deliver analog and/or digital video and other digital data to said customer premises;

wherein said host computer is programmed to implement an IP packetization process to receive data from said external network interface circuits and packetize it into IP packets, and programmed with a routing process to receive IP packets from said IP packetization process and encapsulate them into local area network packets and transmit them on the appropriate local area network via one or more of said local area network interfaces and for receiving local area network packets from devices coupled to said local area networks and stripping off the local area network packet headers and routing the encapsulated IP packets to the appropriate external network interface circuit for transmission over an external network, and a management and control process for receiving requests for data from said devices coupled to said local area networks and sending digital control data to said external network interface circuits to control them to obtain said data.

2. The gateway apparatus of claim 1, characterized in that said IP packetization process controls said host computer to receive data from said one or more external network interface circuits which is not already in the form of an internet protocol packet and packetizing said data into an internet protocol formatted packet addressed to a device coupled to one or more of said local area networks.

3. The gateway apparatus of claim 1, characterized in that said routing process controls said host computer to receive internet protocol formatted packets either from said IP packetization process or directly from an external network interface circuit end, with said network interface, look up the Ethernet address of the device coupled to said local area network that corresponds to the internet protocol packet's destination address, and do all the protocol conversions necessary to encapsulate each said Internet protocol packet into one or more Ethernet local area network packets addressed to a device which requested data in said Internet protocol packet and transmit same over the appropriate local area network to the device which requested said data, and further controls said host computer to receive Ethernet packets from devices coupled to said local area networks that include Internet protocol packets
via said local area network interface(s) and do all the protocol converters necessary to strip off the Ethernet packet header and route the encapsulated internet protocol packet to the appropriate external network interface circuit for transmission on an external network to the server to which the internet protocol packet is addressed.

4. The gateway apparatus of claim 1, characterised in that said management and control process is structured to control said host computer to receive Ethernet packets from devices coupled to said local area network(s) which contain requests to download specific web pages at URLs identified in said packet or to receive and distribute regularly scheduled video broadcasts over a CATV hybrid fiber coaxial cable system, a satellite downlink or a terrestrial broadcast, or to request a video program to be delivered over said CATV hybrid fiber coaxial cable system or said satellite downlink or via a digital subscriber line local loop, and generating and sending appropriate control data to the appropriate one of said external network interface circuits to cause the requested data or video broadcast or video-on-demand program to be received.

5. The gateway apparatus of claim 1, characterised in that said one or more external network interface circuits comprises a digital subscriber line modem.

6. The gateway apparatus of claim 1, characterised in that said one or more external network interface circuits comprises a conventional POTS line fax and/or data modem.

7. The gateway apparatus of claim 1, characterised in that said one or more external network interface circuits comprises an internet protocol telephony circuit to interface said gateway to plain old telephone service and/or digital subscriber line phone lines from a public service telephone network central office.

8. The gateway apparatus of claim 1, characterised in that said one or more external network interface circuits comprises a private branch exchange (PBX) telephony circuit for interfacing said gateway to one or more plain old telephone service (POTS) telephone lines which are internal or external to said customer premises and/or one or more digital subscriber line (DSL) phone lines from a public service telephone network central office, said PBX telephony circuit including a switch controlled by a plurality of processes controlling said host computer to implement PBX telephony functions for line devices such as telephones coupled to said one or more POTS or DSL lines or to said local area network, said processes including a PBX application process, one or more processes implementing a TAPI dynamic linked library and a PBX card driver process.

9. The gateway apparatus of claim 1, characterised in that said one or more external network interface circuits comprises a cable modem for interfacing said gateway to a CATV hybrid fiber coaxial cable system connection.

10. The gateway apparatus of claim 9, characterised in that said cable modem is compatible with the DOCSIS 1.2 national standard for cable modems as that standard existed as of the filing date of this patent application.

11. The gateway apparatus of claim 1, characterised in that said one or more external network interface circuits comprises a receiver for interfacing said gateway to a CATV hybrid fiber coaxial cablo system connection, said receiver capable of receiving and demodulating and recovering digitized, compressed video-on-demand program data modulated onto a downstream carrier requested by a device coupled to said local area network and demultiplexing the audio and video components and transmitting the recovered data to said IP packetization process via said host bus.

12. The gateway apparatus of claim 1, characterised in that said one or more external network interface circuits comprises a receiver for interfacing said gateway to a CATV hybrid fiber coaxial (HFC) cable system connection, said receiver capable of receiving analog video transmissions on said HFC requested by a device coupled to said local area network and digitizing and demodulate said analog video transmissions and then encoding the resulting data into a format in which it can be compressed, and then compressing the data and transmitting it via said host bus to said IP packetization process.

13. The gateway apparatus of claim 1, characterised in that said one or more external network interface circuits comprises a receiver for interfacing said gateway to a satellite dish and receiving compressed digital data encoding a regularly scheduled television program modulated onto a downlink carrier requested by a device coupled to said local area network and demodulating and recovering said digital data and demultiplexing the audio and video data therefrom and transmitting said recovered digital data via said host bus to said IP packetization process.

14. The gateway apparatus of claim 1, characterised in that said one or more external network interface circuits comprises a receiver for interfacing said gateway to a satellite dish and receiving com-
pressed digital data encoding a video-on-demand television program modulated onto a downlink carrier requested by a device coupled to said local area network and demodulating and recovering said digital data and demultiplexing the audio and video data therefrom and transmitting said recovered digital data via said host bus to said IP packetization process.

15. The gateway apparatus of claim 1, characterized in that said one or more external network interface circuits comprises a receiver for interfacing said gateway to a satellite dish and receiving analog signals and digitizing said television signals and encoding the digital data into a format that can be compressed and compressing said digital data and transmitting said compressed digital data via said host bus to said IP packetization process.

16. The gateway apparatus of claim 1, characterized in that said one or more external network interface circuits comprises a receiver for interfacing said gateway to a satellite dish and receiving digital data encoding a web page or other information from the Internet and encapsulating into internet protocol packets requested by a device coupled to said local area network and that have been modulated onto a downlink carrier and demultiplexing and recovering said internet protocol packets and transmitting them via said host bus to said routing process.

17. The gateway apparatus of claim 1, characterized in that said one or more external network interface circuits comprises a receiver for interfacing said gateway to a conventional terrestrial broadcast television antenna and receiving a regularly scheduled television program signal requested by a device coupled to said local area network and modulated onto a terrestrial broadcast carrier and demultiplexing said signals digitizing said signals and encoding the digital data into a format that can be compressed and compressing the digital data and transmitting said compressed digital data via said host bus to said IP packetization process.

18. A gateway apparatus, characterized in that it comprises:

a host computer having a host bus;
one or more local area network interface means for coupling said host computer to one or more local area networks than carry data between said gateway and one or more devices located within a customer premises;
one or more external network receiver means coupled to said host bus for interfacing said host computer to one or more networks external to said customer premises by receiving analog signals and digitizing and compressing them and supplying the compressed data to said host computer or receiving and recovering video and other data in digital form which has been modulated onto a downstream carrier for transmission to said customer premises and supplying the recovered digital data to said host computer;

and one or more external network transceiver means coupled to said host bus for interfacing said host computer to one or more networks external to said customer premises by receiving analog signals and digitizing and compressing them and supplying the compressed data to said host computer or receiving and recovering video and other data in digital form which has been modulated onto a downstream carrier for transmission to said customer premises and supplying the recovered digital data to said host computer and include an upstream transmitter for receiving digital data from said host computer and transmitting it outbound on an external network;

wherein said host computer is programmed to implement an IP packetization process to receive packets from said external network interface circuits and packetize it into internet protocol (IP) formatted packets, and programmed with a routing process to receive IP packets from said IP packetization process and encapsulate them into local area network packets and transmit them on the appropriate local area network via one or more of said local area network interfaces and for receiving local area network packets from devices coupled to said local area networks and stripping off the local area network packet headers and routing the encapsulated IP packets to the appropriate external network interface circuit for transmission over an external network, and an IP telephony and other processes to control said host computer to control line devices coupled to standard or DSL telephone lines or local area networks coupled to said gateway or line devices and other external network interface circuits coupled to said host computer via said host bus to implement IP telephony functions, and a management and control process for receiving requests for data from said devices coupled to said local area networks and sending digital control data to said external network interface circuits and/or line devices to control them to obtain said data.

19. The gateway apparatus of claim 18, characterized in that said one or more local area network interface
means are Ethernet local area network interface cards and wherein said routing process controls said host computer to receive internet protocol formatted packets either from said IP packetization process or directly from an external network interface circuit and, with said network interface, look up the Ethernet address of the device coupled to said local area network that corresponds to the internet protocol packet's destination address, and do all the protocol conversions necessary to encapsulate each said internet protocol packet into one or more Ethernet local area network packets addressed to a device which requested data in said internet protocol packet and transmit same over the appropriate local area network to the device which requested said data, and further controls said host computer to receive Ethernet packets from devices coupled to said local area networks that include internet protocol packets via said local area network interface(s) and do all the protocol conversions necessary to strip off the Ethernet packet header and route the encapsulated internet protocol packet to the appropriate external network transceiver means for transmission on an external network to the server to which the internet protocol packet is addressed.

20. The gateway apparatus of claim 18, characterized in that said one or more external network transceiver means comprises a private branch exchange (PBX) telephony means for interfacing said gateway to one or more plain old telephone service (POTS) telephone lines which are internal or external to said customer premises and/or one or more digital subscriber line (DSL) phone lines from a public service telephone network central office, said PBX telephony means including a switch controlled by a plurality of processes controlling said host computer to implement PBX telephony functions for line devices such as telephones coupled to said one or more POTS or DSL lines or to said local area network, said processes controlling said host computer including a PBX application process, one or more processes implementing a TAPI dynamic linked library and a PBX card driver process.

21. The gateway apparatus of claim 18, characterized in that said management and control process is structured to control said host computer to receive Ethernet packets from devices coupled to said local area network(s) which contain requests to download specific web pages at URLs identified in said packet or to receive and distribute regularly scheduled video broadcasts over a CATV hybrid fiber coaxial cable system, a satellite downlink or a terrestrial broadcast, or to request a video program to be delivered over said CATV hybrid fiber coaxial cable system or said satellite downlink or via a digital subscriber line local loop, and generating and sending appropriate control data to the appropriate one of said external network transceiver means to cause the requested data or video broadcast or video-on-demand program to be received.

22. The gateway apparatus of claim 18, characterized in that said one or more external network transceiver means comprises a digital subscriber line modem means for interfacing said gateway to a digital subscriber line local loop.

23. The gateway apparatus of claim 18, characterized in that said one or more external network transceiver means comprises a conventional POTS line fax and/or data modem means for interfacing said gateway to said conventional POTS telephone line to the central office of the public service telephone network.

24. The gateway apparatus of claim 18, characterized in that said one or more external network transceiver means comprises an internet packet telephony means for interfacing said gateway to plain old telephone service and/or digital subscriber line phone lines from a public service telephone network central office.

25. The gateway apparatus of claim 18, characterized in that said one or more external network transceiver means comprises a cable modem means for interfacing said gateway to a CATV hybrid fiber coaxial cable system connection.

26. The gateway apparatus of claim 25, characterized in that said cable modem is compatible with the DOCSIS 1.2 national standard for cable modems as that standard existed as of the filing date of this patent application.

27. The gateway apparatus of claim 18, characterized in that said one or more external network transceiver means comprises means for interfacing said gateway to a CATV hybrid fiber coaxial cable system connection to request a specified video-on-demand program via an upstream message and for receiving and demultiplexing and recovering digitized, compressed video-on-demand program data modulated onto a downstream carrier requested by a device coupled to said local area network and demultiplexing the audio and video components and transmitting the recovered data to said IP packetization process via said host bus.

28. The gateway apparatus of claim 16, characterized in that said one or more external network receiver means comprises means for interfacing said gateway to a CATV hybrid fiber coaxial (HFC) cable sys-
item connection to make said gateway capable of receiving analog video transmissions on said HFC requested by a device coupled to said local area network and digitizing and demodulating said analog video transmissions and then encoding the resulting data into a format in which it can be compressed, and then compressing the data and transmitting it via said host bus to said IP packetization process.

33. The gateway apparatus of claim 18, characterised in that said one or more external network receiver means comprises means for interfacing said gateway to a conventional terrestrial broadcast television antenna and receiving a regularly scheduled television program signal requested by a device coupled to said local area network and modulated onto a terrestrial broadcast carrier and demodulating said signals digitizing said signals and encoding the digital data into a format that can be compressed and compressing the digital data and transmitting said compressed digital data via said host bus to said IP packetization process.

34. A gateway apparatus, characterised in that it comprises:

a host bus;
a plurality of expansion card connectors electrically coupled to said host bus;
one or more expansion module printed circuit boards coupled to said host bus through one or more of said expansion card connectors, each expansion module including the appropriate circuitry to receive signals from an external network media comprised of either a hybrid fiber coaxial cable of a CATV system, a digital subscriber line local loop, an analog plain old telephone service line or a satellite dish, and to either recover digital data transmitted via said external network media or to receive analog signals transmitted via said external network media and generate digital data therefrom, and, depending upon the type of external network media to which each expansion module is coupled, to also transmit digital data modulated on a carrier output on said external network media;
one or more network interface adapters for coupling said gateway to one or more local area networks which convey digital data throughout a customer premises;
a host computer having a central processing unit or microprocessor coupled to said host bus and programmed to perform at least a management and control process to receive requests transmitted from users to said gateway via one or more of said local area networks for data or video or audio programs transmitted on a regularly scheduled or on-demand basis on one of said external network media and to react there-
to by appropriately controlling said one or more expansion modules via data transmitted over said host bus to retrieve the requested data or video or audio program, and to perform an IP packetization process to receive digital data from one or more of said expansion modules and said management and control process and encapsulate said data into an Internet protocol packet addressed to the device on a local area network coupled to said gateway which requested said data, and to perform a routing process to receive network packets containing Internet protocol packets and to strip off the network packet header and to route said Internet protocol packet to the appropriate expansion module for upstream transmission on an external network media and to receive Internet protocol packets from one or more of said expansion modules or said Internet protocolization process and to look up the IP destination address and map it to a local area network address corresponding thereto and encapsulate the Internet protocol packet in a local area network packet addressed to the device owning said IP destination address and route it to said device via the appropriate network adapter, and programmed with one or more IP telephony and/or PBX and/or other telephony enabled application programs to implement IP telephony and/or PBX functions through a TAPI dynamic linked library of programs which control said host computer to carry out standard and advanced telephony functions which can be invoked through a standard TAPI application programmatic interface and one or more telephony service provider programs and/or PBX expansion module programs which convert messages from one or more TAPI library programs to digital data sent over said host bus to one or more of said expansion modules to carry out one or more telephony functions.

35. A network adapter for coupling a conventional television to a local area network, characterised in that it comprises:

- a network interface circuit having an input coupled to a local area network and having an output at which digital data encoding a compressed video appears and functioning to receive local area network packets encapsulating Internet protocol format packets but only outputting Internet protocol format packets encapsulated in local area network packets addressed to this particular network interface circuit;
- means for receiving infrared or radio frequency commands and data from a wireless remote control or a wireless keyboard and for packetizing the data and commands into packets suitable for transmission over said local area network;
- an Internet protocol video circuit coupled to said network interface circuit for receiving Internet protocol format packets from said network interface circuit and determining if the packet contains video or graphics data and stripping off the Internet protocol format header and outputting graphics data at a graphics data output and outputting video data at a video data output;
- a decompression circuit coupled to said video data output for decompressing the video data and outputting uncompressed video data in a YUV format at a first output and uncompressed audio data at second output;
- an audio processor means coupled to receive said uncompressed audio data and process it to convert it to an analog audio signal;
- a graphics circuit coupled to said graphics output for receiving graphics data and generating graphics data signals at a graphics output; and
- means coupled to receive said uncompressed video data and said graphics data signals and process both said graphics data signals and said uncompressed video data into NTSC, PAL or SECAM or composite format analog video signal which can be displayed on a television if coupled to a video input of said television.

36. A network adapter according to claim 35, characterised in that it comprises a video modulator for receiving said analog video signal and said analog audio signal and modulating them onto an radio frequency carrier at the frequency of a locally unused channel.
VIDEO ON DEMAND PROCESS
"PULL" TECHNOLOGY

USER'S VIDEO ON DEMAND
SELECTION IS RECEIVED
BY NETWORK ADAPTER 30

VIDEO SELECTION AND IP ADDRESS
OF NETWORK ADAPTER 30 IS ENCAPSULATED
INTO AN IP PACKET HAVING IP ADDRESS OF
NETWORK ADAPTER 30 AS THE SOURCE
ADDRESS AND THE IP ADDRESS OF THE VIDEO-
ON-DEMAND SERVER AS THE DESTINATION
ADDRESS, AND THE IP PACKET IS
ENCAPSULATED INTO AN ETHERNET PACKET
ADDRESSED TO GATEWAY AND LAUNCHED
ONTO LAN. THE IP PACKET IDENTIFIES THE
DESIRED MOVIE OR OTHER VIDEO SELECTION.
THE GATEWAY ListENS TO MANAGEMENT
AND CONTROL BROADCAST MESSAGES
INDICATING WHICH VIDEO CHANNELS AND
SUBCHANNELS ARE AVAILABLE, AND PICKS
ONE TO CAMP ON AND COMMANDS THE
APPROPRIATE VIDEO-ON-DEMAND TUNERS
TO TUNE TO THAT CHANNEL AND COMMANDS
THE APPROPRIATE TRANSPORT
DEMULTIPLEXER TO DEMULTIPLEX THE
APPROPRIATE SUBCHANNEL. THE GATEWAY
THEN ADDS THE IDENTITY OF THE
DOWNSTREAM VIDEO-ON-DEMAND CHANNEL
AND SUBCHANNEL THE GATEWAYS
VIDEO-ON-DEMAND TUNER AND VIDEO
DEMULTIPLEXER WILL BE TUNED
TO THE IP PACKET REQUESTING THE VIDEO
DATA

NETWORK INTERFACE CARD OF GATEWAY 14
RECEIVES ETHERNET PACKET AND PASSES IT
UP THROUGH INTERMEDIARY ETHERNET
SOFTWARE PROTOCOL LAYERS TO IP PACKET
SWITCHING/Routing PROCESS

ROUTING PROCESS LOOKS UP
DESTINATION IP ADDRESS OF
PACKET AND DETERMINES THAT
IT IS ADDRESSED TO A VIDEO-
ON-DEMAND SERVER COUPLED
TO HEADEND MODEM THAT IS
DRIVING HFC 10 OR THE HEADEND
CIRCUITRY DRIVING THE UPLINK
TO THE SATELLITE NETWORK OR
THE ADSL CENTRAL OFFICE

THE IP PACKET GETS ROUTED
TO THE DOCISIS MODEM OR THE
ADSL MODEM. FROM THERE IT
GETS TRANSMITTED OVER THE
HFC OR THE PSTN TO THE
HEADEND, AND, FROM THE
HEADEND, THE IP PACKET
POSSIBLY GETS ROUTED OVER
INTERNET AND/OR T1 OR DS1
LINES OF THE PSTN TO THE VIDEO
SERVER TO WHICH IT IS
ADDRESS.

OPTIONAL: HEADEND VERIFIES
USER IS AN AUTHORIZED
SUBSCRIBER TO THE REQUESTED
SERVICE PRIOR TO ROUTING TO
THE VIDEO SERVER

TO FIG. 6B

COMPOSITION KEY
6A
6B 6C
6D 6E

FIG. 6A
VIDEO SERVER READS IP PACKET OF REQUEST, OPENS APPROPRIATE FILE AND STARTS TRANSMITTING VIDEO DATA AS IP PACKETS ADDRESSED TO NETWORK ADAPTER 30 THAT REQUESTED VIDEO. VIDEO DATA IS COMPRESSED AND ENCRYPTED BEFORE TRANSMISSION.

SATELLITE DELIVERY OPTION

FROM
FIG. 6A

VOD DATA PUT ON CHANNEL AND SUBCHANNEL IDENTIFIED IN CAMPING DATA GIVEN IN ORIGINAL REQUEST. ALTERNATIVELY, VIDEO SERVER AND HEADEND PUT IT ON UNUSED SUBCHANNELS OF AN UNDERUTILIZED CHANNEL AND SEND DOWNSTREAM MANAGEMENT AND CONTROL MESSAGES INDICATING WHERE VOD DATA CAN BE FOUND. GATEWAY INSTRUCTS TUNER 100 AND TRANSPORT DEMULTIPLEXER WHERE TO FIND VOD DATA. TUNER 102 REJECTS ALL OTHER RF SIGNALS AND DEMODULATES THE SIGNAL TO REMOVE THE RF CARRIER COMPONENT AND PASSES VIDEO-ON-DEMAND DATA BEARING I AND Q BASEBAND SIGNALS TO A/D MATRIX 130 WHERE I AND Q VALUES ARE SAMPLED FOR EACH CONSTELLATION POINT

TO
FIG. 6D

FIG. 6B

VIDEO SERVER FOR ADSL NETWORK SENDS VOD DATA TO AN ADSL CO WITHIN 3 MILES OF SUBSCRIBER VIA T1, DS1 OR OTHER HIGH SPEED LINE OR VIA ADSL DOWNSTREAM CONNECTION

VOD DATA BEARING IP PACKETS ARE FDMA MULTIPLIED ONTO ADSL DOWNSTREAM CARRIER AND SENT FROM CO TO GATEWAY OF REQUESTER BY APPROPRIATE LOCAL LOOP AND ARE RECEIVED BY ADSL MODEM IN GATEWAY

IP PACKETS ARE SENT TO ROUTING CIRCUITRY FROM ADSL MODEM WHERE THE ETHERNET ADDRESS THAT CORRESPONDS TO IP DESTINATION ADDRESS IS LOOKED UP. IP PACKETS ARE ENCAPSULATED INTO ETHERNET PACKETS AND SENT TO APPROPRIATE INTERFACE CIRCUITRY OF LAN TO WHICH THE NETWORK ADAPTER WHICH ORDERED THE VOD PROGRAM IS COUPLED

TO
FIG. 6D
FROM Fig. 6B

VIDEO, AUDIO AND ASSOCIATED DATA POINTS (IF ANY) ARE DEMULTIPLEXED FROM SUBCHANNEL EACH SET OF POINTS IS ARRIVING ON

CONDITIONAL ACCESS GATING IS DONE IF NOT ALREADY DONE AT HEADEND AND VIDEO, AUDIO AND ASSOCIATED DATA ARE ENCAPSULATED IN HOST BUS PACKETS AND ADDRESSED TO IP VIDEO ENCAPSULATION PROCESS

IP VIDEO CIRCUITRY REASSEMBLES IP PACKET FROM HOST BUS PACKETS OR ENCAPSULATES VIDEO AND AUDIO DATA INTO IP PACKETS ADDRESSED TO NETWORK ADAPTER AND ENCAPSULATES ASSOCIATED DATA INTO IP PACKET ADDRESSED TO APPROPRIATE PERIPHERAL SUCH AS TELEPHONE OR P.C. IP PACKETS THEN SENT TO ROUTING PROCESS CIRCUITRY

ROUTING PROCESS CIRCUITRY LOOKS UP ETHERNET ADDRESS THAT CORRESPONDS TO IP ADDRESS OF VOD DATA AND ENCAPSULATES IP PACKETS INTO ETHERNET PACKETS AND SENDS TO NIC FOR LAN COUPLED TO TV WHERE PROGRAM TO BE SHOWN

Fig. 6D
NETWORK INTERFACE CIRCUIT OF NETWORK ADAPTER 30 AT TV WHERE VOD PROGRAM IS TO BE DISPLAYED CARRIES RECEIVES ALL ETHERNET PACKETS AND KEEPS PACKETS ADDRESSED TO NETWORK ADAPTER. ETHERNET HEADER IS STRIPPED OFF AND ERROR DETECTION AND CORRECTION ARE DONE AND RESULTING IP PACKET IS TRANSMITTED TO IP VIDEO CIRCUIT

IP VIDEO CIRCUIT FILTERS OUT JUST IP PACKETS ADDRESSED TO NETWORK ADAPTER, STRIPS OFF IP HEADER AND, Optionally, ROUTES MENU DATA PACKETS TO 2/3 D GRAPHICS CIRCUIT AND COMPRRESSED VIDEO AND AUDIO PACKETS TO MPEG DECODER

COMPRESSED BIT STREAM IS UNCOMPRESSED INTO VIDEO BIT STREAM REPRESENTING YUV FORMAT VIDEO SIGNAL AND AN AUDIO BIT STREAM, EACH OF WHICH IS OPTIONALLY ENHANCED

VIDEO ENCODER RECEIVES DIGITIZED YUV SIGNAL AND CONVERTS IT TO AN NTSC, PAL OR SECAM OR COMPOSITE FORMAT ANALOG VIDEO SIGNAL FOR DISPLAY BY A TV

AUDIO PROCESSOR CONVERTS AUDIO DATA TO AUDIO SIGNAL FOR COUPLING INTO AUDIO INPUT OF TV

IF RF INPUT OF TV TO BE USED, NTSC, PAL OR SECAM OUTPUT OF VIDEO ENCODER IS MODULATED ONTO AN UNUSED CHANNEL FREQUENCY SUCH AS CHANNEL 3

FIG. 6E
WIDEBAND INTERNET ACCESS PROCESS

PERSONAL COMPUTER 22 OR NETWORK COMPUTER 24 OR 26 LAUNCHES BROWSER OR OTHER APPLICATION THAT NEEDS INTERNET ACCESS (OR DOWNLOADS IT FROM LAN SERVER OR WAN SERVER ON WHICH IT IS RESIDENT) AND ENTERS A URL FOR A WEB PAGE TO ACCESS.

URL PASSED TO TCP/IP PROTOCOL PROCESSES AND CONVERTED TO IP PACKET REQUESTING DOWNLOADING OF THAT WEB PAGE.

IP PACKET IS ENCAPSULATED IN ETHERNET PACKET ADDRESSED TO GATEWAY.

GATEWAY RECEIVES ETHERNET PACKET, STRIPS OFF ETHERNET HEADER, LOOKS UP DESTINATION ADDRESS OF IP PACKET IN ROUTING TABLES AND FORWARDS TO APPROPRIATE UPSTREAM TRANSMITTER.

IP PACKET IS RECOVERED BY THE HEADEND MODEM OR ADSL MODEM AT THE CO OR THE SATELLITE UPLINK FACILITY AND PASSED TO A ROUTER COUPLED TO THE INTERNET.

ROUTER SENDS IP PACKET TO WEB SERVER IDENTIFIED IN URL.

WEB SERVER OPENS UP WEB PAGE IDENTIFIED IN URL AND BEGINS SENDING DATA THEREOF BACK TO ROUTER AS A SERIES OF IP PACKETS.

ROUTER ROUTS IP PACKETS TO DOWNSTREAM TRANSMITTER WHICH TRANSMITS IP PACKETS TO GATEWAY AT PREMISES OF PC OR NC THAT ORDERED WEB PAGE.

IP PACKETS ARE RECOVERED AT GATEWAY AND SENT TO ROUTING CIRCUIT WHERE THEY ARE ROUTED AND ENCAPSULATED INTO ETHERNET PACKETS ADDRESSED TO THE PC OR NC THAT REQUESTED THE DATA, AND TRANSMITTED ON APPROPRIATE LAN.

PC OR NC NIC RECEIVES THE ETHERNET PACKETS, DOES ERROR CORRECTION, PASSES THE IP PACKETS UP TO THE TCP/IP PROTOCOL LAYERS, IP PACKET HEADERS ARE STRIPPED OFF AND TCP PROTOCOL MAKES SURE ALL PACKETS ARRIVED. PAYLOAD DATA IS THEN SENT TO APPLICATION PROCESS THAT REQUESTED IT FOR DISPLAY.

FIG. 7
**Electronic Acknowledgement Receipt**

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**Title of Invention:**
METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

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<tr>
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<td>Daniel Y.J. Kim/Radmila Percy</td>
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<td>Daniel Y.J. Kim</td>
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<td>RPL-0424</td>
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**Warnings:**

**Information:**
Information:

This is not an USPTO supplied IDS fillable form

Information:

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/R0/105) 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.
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of Jungmin LYU

Confirmation No.: 1076

Group Art Unit: 2421

Serial No.: 13/104,364

Examiner: Omar S. PARRA

Filed: May 10, 2011

Customer No.: 34610

For: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

INFORMATION DISCLOSURE STATEMENT

U.S. Patent and Trademark Office
Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, Virginia 22314

Sir:

Pursuant to 37 C.F.R. §1.56, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO-1449. One copy of each non-U.S. reference is attached. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the reference(s) be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

Applicants have listed publication dates on the attached PTO-1449 based on information presently available to the undersigned. However, the listed publication dates should not be construed as an admission that the information was actually published on the indicated date. Applicants reserve the right to establish the patentability of the claimed invention over any of the information provided herewith, and/or to prove that this information may not be prior art, and/or to prove that this information may not be enabling for the teachings purportedly offered. This statement should not be construed as a representation that a search has been made, that information cited in the statement is considered to be and/or is material to patentability, or that information more material to the examination of the present patent application does not exist. The Examiner is specifically requested not to rely solely on the material submitted herewith. It is further understood that the Examiner will consider information that was cited or submitted to the U.S. Patent and Trademark Office in a prior application relied on under 35 U.S.C. §120. 1138 OG 37, 38 (May 19, 1992).

☐ 1. This Information Disclosure Statement is being filed (i) within three months of the U.S. filing date of a U.S. application other than a CPA continued prosecution application under §1.53(d) OR (ii) within three months of the date of entry of the national stage as set forth in §1.491 in an international application OR (iii) before the mailing date of a first Office Action on the merits OR (iv) before the mailing of a first Office Action after the filing of a Request for continued examination under §1.114. No certification or fee is required. 37 C.F.R. §1.97(b).

☐ 2. This Information Disclosure Statement is being filed more than three months after the U.S. filing date AND after the mailing date of the first Office Action on the merits, but before the mailing date of a Final Rejection OR Notice of Allowance OR an action that otherwise closes prosecution in the application. 37 C.F.R. §1.97(e).

☐ a. I hereby state that each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart foreign application or from the U.S. Patent Office in a related U.S. application, not more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. §1.97(e)(1). No fee is required.

☐ b. I hereby state that no item of information in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application and, to my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. §1.56(c) more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. §1.97(e)(2).
c. Please charge our Credit Card in the amount of $180.00 in payment of the fee under 37 C.F.R. §1.17(p) per the attached PTO 2038 form. Please credit or debit Deposit Account No. 16-0607 as needed to ensure consideration of the disclosed information.

3. This Information Disclosure Statement is being filed after the mailing date of a Final Rejection OR Notice of Allowance OR an action that otherwise closes prosecution in the application, but on or before payment of the Issue Fee. Please charge our Credit Card in the amount of $180.00 in payment of the fee under 37 C.F.R. §1.17(p) per the attached PTO 2038 form. Please credit or debit Deposit Account No. 16-0607 as needed to ensure consideration of the disclosed information. 37 C.F.R. §1.97(d).

a. I hereby state that each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart foreign application or from the U.S. Patent Office in a related U.S. application, not more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. §1.97(e)(1).

b. I hereby state that no item of information in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. §1.56(c) more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. §1.97(e)(2).

4. The references were cited in a corresponding European application. An English language version of the European Search Report dated October 23, 2014 issued by the European Patent Office is attached for the Examiner’s information.

5. To the extent necessary, a petition for an extension of time under 37 C.F.R. §1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,

KED & ASSOCIATES, LLP

David C. Oren
Registration No. 38,694

Correspondence Address:
P.O. Box 8638
Reston, VA 20195
Telephone: (703) 766-3777

Please direct all correspondence to Customer Number 34610

\l\ked2\Documents\2028\2028-434\477628.docx
REQUEST FOR CONTINUED EXAMINATION (RCE)
TRANSMITTAL UNDER 37 C.F.R. §1.114

DOCKET NUMBER: RPL-0424
Prior Appln Serial No.: 13/104,364
Filed: May 10, 2011
Inventor(s): Jungmin LYU
Confirmation No.: 1076
Group Art Unit: 2421
Examiner: Yemaine A. GEBRU

U.S. Patent and Trademark Office
Customer Service Window, Mail Stop RCE
Randolph Building
401 Dulany Street
Alexandria, Virginia 22314

Sir:


1. Submission required under 37 C.F.R. §1.114
   a. ☐ Previously submitted
      i. ☐ Consider the amendment(s)/reply under 37 C.F.R. §1.116 previously filed on ______
         (Any unentered amendment(s) referred to above will be entered).
      ii. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on ______
      iii. ☐ Other: ______
   b. ☒ Enclosed
      i. ☒ Amendment/Reply
      ii. ☐ Affidavit(s)/Declaration(s)
      iii. ☐ Information Disclosure Statement (IDS)
      iv. ☐ Other: ______

2. Miscellaneous
   a. ☐ Suspension of action on the above-identified application is requested under 37 C.F.R. §1.103(c) for a period of ______ months. Fee amount $130.00 under 37 C.F.R. §1.17(f) enclosed. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R.§1.17(f) required).
   b. ☐ Other: ______

3. Fees ☒ RCE fee required under 37 C.F.R. §1.17(e); Small Entity $600.00, other than small entity $1,200.00. The RCE fee under 37 C.F.R. §1.17(e) is required by 37 C.F.R. §1.114 when the RCE is filed.
   ☐ Extension of time fee (37 C.F.R. §§1.136 and 1.17)
   Payment by:
      ☒ Please charge my Credit Card.
      ☐ Direct Deposit
      ☐ Other: ______

The Commissioner is hereby authorized to charge payment of any deficiency in the above fees associated with this communication or credit any overpayment to Deposit Account No. 16-0607.

Respectfully submitted,
KED & ASSOCIATES, LLP

David C. Oren
Registration No. 38,694

Correspondence Address:
P.O. Box 8638
Reston, VA 20195
(703) 766-3777 DCO/kah
Date: November 27, 2013
Please direct all correspondence to Customer Number 34610
Docket No.: RPL-0424

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Jungmin LYU

Serial No.: 13/104,364 Group Art Unit: 2421
Confirmation No.: 1076 Examiner: Yemaine A. GEBRU
Filed: May 10, 2011 Customer No.: 34610

For: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

AMENDMENT AND/OR SUBMISSION
UNDER 37 C.F.R. §1.114

U.S. Patent and Trademark Office
Customer Window, Mail Stop AF
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

In reply to the Office Action dated August 28, 2013, please amend the above-
identified application as follows:

Amendments to the Claims are reflected in the listing of claims.

Remarks begin after the listing of the claims.
AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for receiving a viewing-restricted channel, comprising:

   receiving a request for receiving a viewing-restricted channel from a user;
   determining whether a requested channel is a viewing-restricted channel during a channel switching operation by a user;
   when the viewing-restricted channel is requested during the channel switching operation, transmitting, to a broadcast receiver through a network, a command requesting for decoding broadcast signals of the viewing-restricted channel into broadcast data and transmitting the decoded broadcast data and switching an operation mode from a tuner mode to an input mode;
   receiving the broadcast data from the broadcast receiver through the network;
   and
   processing the broadcast data to audio/video signals.

2. (Previously Presented) The method of claim 1, wherein virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels are managed as a viewing-restricted channel list, and a
determination whether the requested channel is a viewing-restricted channel is based on the viewing-restricted channel list.

3. (Previously Presented) The method of claim 1, wherein the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a conditional access system (CAS) module.

4.-5. (Canceled)

6. (Currently Amended) The method of claim 1, wherein the broadcast data is transcoded data with a different bit rate, and the receiving and the processing of the broadcast data comprises decoding the transcoded broadcast data.

7. (Currently Amended) An apparatus for receiving a viewing-restricted channel, comprising:

   a communication module for connecting to a broadcast receiver through a network;

   a signal processing module for processing broadcast data transmitted through broadcast signals or a network; and

   a controller for generating a command requesting for decoding and transmitting broadcast signals of a viewing-restricted channel into broadcast data and
transmitting the decoded broadcast data when a requested channel is the viewing-restricted channel during a channel switching operation by a user requests receiving the viewing-restricted channel, switching an operation mode of the apparatus from a tuner mode to an input mode, transmitting the command to the broadcast receiver through the network and receiving the broadcast data from the broadcast receiver through the network by controlling the communication module, and playing the received broadcast data by controlling the signal processing module.

8. (Previously Presented) The apparatus of claim 7, further comprising a storage for storing virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels as a viewing-restricted channel list, the controller determining whether the requested channel is a viewing-restricted channel based on the viewing-restricted channel list in the storage.

9. (Previously Presented) The apparatus of claim 7, wherein the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a conditional access system (CAS module).

10. (Canceled)
11. (Previously Presented) The apparatus of claim 7, wherein the controller, when broadcast data transcoded at a different bit rate by the broadcast receiver are received, plays the transoded broadcast data after decoding the data by controlling the signal processing module.
REMARKS

This Amendment is being filed simultaneously with a Request for Continued Examination (RCE). This Amendment serves as a Submission under 37 C.F.R. §1.114.

Claims 1-3, 6-9 and 11 are pending in this application. By this Amendment, claims 1, 6 and 7 are amended. Various amendments may be made for clarity, and may be unrelated to issues of patentability.

The Office Action rejects claims 1, 3, 6, 7, 9 and 11 under 35 U.S.C. §102(b) by newly-cited U.S. Patent Publication 2004/0250273 to Swix et al. (hereafter Swix). The Office Action also rejects claims 2 and 8 under 35 U.S.C. §103(a) over Swix in view of U.S. Patent Publication 2003/0046100 to Yamauchi (hereafter Yamauchi). The rejections are respectfully traversed with respect to the pending claims.

Independent claim 1 recites checking determining a requested channel is a viewing-restricted channel during a channel switching operation by a user, and when the viewing-restricted channel is requested during the channel switching operation, transmitting, to a broadcast receiver through a network, a command requesting for decoding broadcast signals of the viewing-restricted channel into broadcast data and transmitting the decoded broadcast data and switching an operation mode from a tuner mode to an input mode. Independent claim 1 also recites receiving the broadcast data from the broadcast receiver through the network, and processing the broadcast data to audio/video signals.

The applied references do not teach or suggest all the features of independent claim
1. More specifically, Swix and Yamauchi do not teach or suggest features related to a channel switching operation (by a user) and/or switching an operation mode from a tuner mode to an input mode, as recited in independent claim 1.

The Office Action primarily cites Swix, such as Swix’s paragraphs [0023]-[0024], [0041]-[0043], [0047], [0053], and [0084]-[0086]. However, the cited paragraphs do not teach or suggest switching an operation mode from a tuner mode to an input mode, as recited in independent claim 1.

For at least these reasons, Swix does not teach or suggest all the features of independent claim 1. Yamauchi does not teach or suggest the missing features of independent claim 1. Independent claim 1 therefore defines patentable subject matter.

Independent claim 7 recites a communication module for connecting to a broadcast receiver through a network, and a signal processing module for processing broadcast data transmitted through broadcast signals or a network. Independent claim 7 also recites a controller for generating a command requesting for decoding and transmitting broadcast signals of a viewing-restricted channel into broadcast data and transmitting the decoded broadcast data when a requested channel is the viewing-restricted channel during a channel switching operation by a user, switching an operation mode of the apparatus from a tuner mode to an input mode, transmitting the command to the broadcast receiver through the network and receiving the broadcast data from the broadcast receiver through the network.
by controlling the communication module, and playing the received broadcast data by controlling the signal processing module.

The applied references do not teach or suggest all the features of independent claim 7. More specifically, Swix and Yamauchi do not teach or suggest a controller for generating a command requesting for decoding and transmitting broadcast signals of a viewing-restricted channel into broadcast data and transmitting the decoded broadcast data when a requested channel is the viewing-restricted channel during a channel switching operation a user, and switching an operation mode of the apparatus from a tuner mode to an input mode, as recited in independent claim 7. Swix’s cited paragraphs do not teach features related to switching an operation mode of the apparatus from a tuner mode to an input mode. Independent claim 7 therefore defines patentable subject matter.

For at least the reasons set forth above, each of independent claims 1 and 7 defines patentable subject matter. Each of the dependent claims depends from one of the independent claims and therefore defines patentable subject matter at least for this reason. In addition, the dependent claims recite features that further and independently distinguish over the applied references.

CONCLUSION

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Favorable consideration and prompt allowance of claims 1-3, 6-9 and 11 are earnestly solicited. If the Examiner believes that any additional changes would
place the application in better condition for allowance, the Examiner is invited to contact the undersigned attorney at the telephone number listed below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,
KED & ASSOCIATES, LLP

[Signature]

David C. Oren
Registration No. 38,694

Correspondence Address:
P.O. Box 8638
Reston, VA 20195
703 766-3777 DCO/kah

Date: November 27, 2013
Please direct all correspondence to Customer Number 34610
**Electronic Patent Application Fee Transmittal**

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<td>METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL</td>
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<tr>
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<td>Jungmin LYU</td>
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**Total Files Size (in bytes):** 358392

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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.
**PATENT APPLICATION FEE DETERMINATION RECORD**

Substitute for Form PTO-875

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**APPLICATION AS AMENDED – PART II**

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** If the “Highest Number Previously Paid For” in THIS SPACE is less than 20, enter “20”.
*** If the “Highest Number Previously Paid For” in THIS SPACE is less than 3, enter “3”.

The “Highest Number Previously Paid For” (Total or Independent) is the highest number found in the appropriate box in column 1.

This application of information is required by 37 CFR 1.16. 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 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.
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34610  7590  08/28/2013
KED & ASSOCIATES, LLP
P.O. Box 8638
Reston, VA 20195

**EXAMINER**
PARRA, OMAR S

**ART UNIT**
PAPER NUMBER
2421

**MAIL DATE**
DELIVERY MODE
08/28/2013  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.
Office Action Summary

--- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABBANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 03/05/2013.
   - A declaration(s)/affidavit(s) under 37 CFR 1.130(b) was/were filed on _____.
2a) ☒ This action is FINAL. 2b) ☑ This action is non-final.
3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
4) ☑ Since this application is in condition for allowance 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.

Disposition of Claims

5) ☒ Claim(s) 1-3,6-9 and 11 is/are pending in the application.
   - Of the above claim(s) _____ is/are withdrawn from consideration.
6) ☑ Claim(s) _____ is/are allowed.
7) ☑ Claim(s) 1-3,6-9 and 11 is/are rejected.
8) ☐ Claim(s) _____ is/are objected to.
9) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the Patent Prosecution Highway program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10) ☑ The specification is objected to by the Examiner.
11) ☐ The drawing(s) filed on _____ is/are: a) ☑ accepted or b) ☐ objected to by the Examiner.
   - Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
   - Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12) ☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☑ All b) ☐ Some * c) ☐ None of the:
   1. ☑ Certified copies of the priority documents have been received.
   2. ☑ Certified copies of the priority documents have been received in Application No. _____.
   3. ☑ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
3) ☑ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.
4) ☐ Other: _____.

U.S. Patent and Trademark Office
PTOL-326 (Rev. 05-13) Office Action Summary Part of Paper No./Mail Date 20130813
DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-3, 6-9 and 11 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of pre-AIA 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.

2. Claims 1, 3, 6, 7, 9 and 11 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Swix et al. (hereinafter ‘Swix’, Pub. No. 2004/0250273).

Regarding claim 1, Swix teaches a method for receiving a viewing-restricted channel (the home network system - Digital Residential Entertainment system, DRES, [0017]- includes a Broadband Multimedia Gateway, BMG, [0019], which transmits requested channel streams to multiple receiving settop boxes, [0043]. BMG can include a Content Access System, CAS, [0047]; [0053], that controls/ restricts content/channels to be sent to a given settop box, [0053]), comprising:

receiving a request for receiving a viewing-restricted channel from a user (the user transmits or selects content or channel through a settop box device using a
remote control, [0023]; [0024]. The requested content/channel can be a restricted content, i.e. pay-per-view content/channel, [0053]);

transmitting to a broadcast receiver through a network, a command requesting for decoding broadcast signals of the viewing-restricted channel into broadcast data and transmitting the decoded broadcast data ([0023]; [0024], where the receiver settop box sends a request to the BMG for tuning to a given channel, which as indicated above, can be an access-restricted channel, [0053]);

receiving the broadcast data from the broadcast receiver through the network (the BMG can tune to the received video stream and transmit the stream to the settop box through the local network for further decoding, [0041]; [0042]; [0085]; [0086]); and

processing the broadcast data to audio/video signals ([0084]-[0086]).

Regarding claims 3 and 9, Swix teaches wherein the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a conditional access system (CAS) module ([0047]; [0053], where the CAS can be placed at the settop box receiver, CAS 705, Fig. 7; [0087]).

Regarding claims 6 and 11, Swix teaches wherein the broadcast data is transcoded data with a different bit rate and the receiving and processing comprises decoding the transcoded broadcast data (the BMG can receive the content at a
different/higher rate and is able to provide it to the requesting settop box at a playback rate for the device to display the content, [0069]; [0070]).

For claim 11, the receiver plays the transcoded broadcast data after decoding the data by controlling the signal processing module ([0084]-[0086]).

Regarding claim 7, Swix teaches an apparatus for receiving a viewing-restricted channel (a settop box receiver, 300, Fig. 1, and further described in detail as 799 on Fig. 7, requests content to the Broadband Media Gateway BMG. The content can be restricted content), comprising:

a communication module for connecting to a broadcast receiver through a network (Network I/O 701, Fig. 7; which connects settop box receiver to the BMG through local network 95);

a signal processing module for processing broadcast data transmitted through broadcast signals or a network (702, 703, 705 and 707, Fig. 7; [0085]-[0087]); and

a controller for generating a command requesting for decoding and transmitting broadcast signals of a viewing-restricted channel into broadcast data and transmitting the decoded broadcast data when a user requests receiving the viewing-restricted channel (the user transmits or selects content or channel through a settop box device using a remote control, [0023]; [0024]. The requested content/channel can be a restricted content, i.e. pay-per-view content/channel, [0053]), transmitting the command to the broadcast receiver through the network ([0023]; [0024], where the receiver settop box sends a request to the BMG for tuning to a given channel,
which as indicated above, can be an access-restricted channel, [0053]) and receiving the broadcast data from the broadcast receiver through the network by controlling the communication module (the BMG can tune to the received video stream and transmit the stream to the settop box through the local network for further decoding, [0041]; [0042]; [0085]; [0086]), and playing the received broadcast data by controlling the signal processing module ([0084]-[0086]).

Claim Rejections - 35 USC § 103

3. The following is a quotation of pre-AIA 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.


Regarding claims 2 and 8, although Swix teaches that the device that implements the conditional access reads information regarding viewing restricted programs/channels from memory or from a CAS card ([0047]; [0050]; [0053]), Swix does not explicitly teach

wherein virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels are managed as a viewing-restricted channel list, and a determination whether the requested channel is a viewing-restricted channel is based on the viewing-restricted channel list.
However, in an analogous art, Yamauchi teaches a device (server) that implements conditional access includes a service list describing a list of draw-up channels and their identification information ([00107]-[0108]). The server controller reads information from the IC card 44, and controls the receiver 43 in program view restrictions, [0070]; [0077]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Swix's invention with Yamauchi's feature of having a list with the restricted content for the benefit of easily and promptly identifying a service/channel or program that needs restricted access.

**Conclusion**

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to OMAR S. PARRA whose telephone number is (571)270-1449. The examiner can normally be reached on 9-6 PM (M-F, every other Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Jason Chung can be reached on (571) 272-3845. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/O. S. P./
Examiner, Art Unit 2421
/JASON J CHUNG/
Primary Examiner, Art Unit 2423
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**Examiner**

| Parra, Omar | Art Unit | 2421 |

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Examiner Art Unit 2421
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8/20/2013 6:52:37 PM
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For: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

AMENDMENT

U.S. Patent and Trademark Office
Customer Window, Mail Stop Amendment
Randolph Building
401 Dulany Street
Alexandria, Virginia 22314

Sir:

In reply to the Office Action of December 6, 2012, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims.

Remarks begin after the listing of the claims.
AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for receiving a viewing-restricted channel, comprising:
   
   receiving a request for receiving a viewing-restricted channel from a user; and
   
   generating a command requesting for decoding and transmitting broadcast signals of the viewing-restricted channel and transmitting the generated command to a broadcast receiver through a network, a command requesting for decoding broadcast signals of the viewing-restricted channel into broadcast data and transmitting the decoded broadcast data;
   
   receiving the broadcast data from the broadcast receiver through the network; and
   
   processing the broadcast data to audio/video signals.

2. (Currently Amended) The method of claim 1, wherein virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels are managed as a viewing-restricted channel list, and it is checked a determination whether the requested channel is a viewing-restricted channel is based on the viewing-restricted channel list.
3. (Currently Amended) The method of claim 1, wherein the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a conditional access system (CAS) module.

4.-5. (Canceled)

6. (Currently Amended) The method of claim [[4]]1, wherein the broadcast data received by the broadcast receiver is transcoded data with a different bit rate[[3]], and the receiving and playing processing comprises decoding the transcoded broadcast data.

7. (Currently Amended) An apparatus for receiving a viewing-restricted channel, comprising:

   a communication module for connecting to a broadcast receiver through a network;

   a signal processing module for processing broadcast data transmitted through broadcast signals or a network; and

   a controller for generating a command requesting for decoding and transmitting broadcast data signals of a viewing-restricted channel into broadcast data and transmitting the decoded broadcast data when a user requests receiving the viewing-restricted channel, and transmitting the command to the broadcast receiver through the network and receiving the broadcast data from the broadcast receiver through the network.
by controlling the communication module, and playing the received broadcast data by controlling the signal processing module.

8. (Currently Amended) The apparatus of claim 7, further comprising a storage for storing virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels as a viewing-restricted channel list, the controller checking determining whether the requested channel is a viewing-restricted channel based on the viewing-restricted channel list managed in the storage.

9. (Currently Amended) The apparatus of claim 7, wherein the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a conditional access system (CAS module).

10. (Canceled)

11. (Currently Amended) The apparatus of claim [[10]]7, wherein the controller, when broadcast data transcoded at a different bit rate by the broadcast receiver are received, plays the transcoded broadcast data after decoding the data by controlling the signal processing module.
REMARKS

Claims 1-3, 6-9 and 11 are pending in this application. By this Amendment, claims 1, 2, 6-8 and 11 are amended and claims 4-5 and 10 are canceled without prejudice or disclaimer. Various amendments may be made for clarity and are unrelated to issues of patentability.

The Office Action rejects claims 1-5 and 7-10 under 35 U.S.C. §102(b) by U.S. Patent Publication 2003/0046100 to Yamauchi (hereafter Yamauchi). The Office Action also rejects claims 6 and 11 under 35 U.S.C. §103(a) over Yamauchi in view of U.S. Patent Publication 2008/0141303 to Walker et al. (hereafter Walker). The rejections are respectfully traversed with respect to the pending claims.

Independent claim 1 recites receiving a request for receiving a viewing-restricted channel from a user, and transmitting, to a broadcast receiver through a network, a command requesting for decoding broadcast signals of the viewing-restricted channel into broadcast data and transmitting the decoded broadcast data. Independent claim 1 also recites receiving the broadcast data from the broadcast receiver through the network, and processing the broadcast data to audio/video signals.

The applied references do not teach or suggest all the features of independent claim 1. More specifically, Yamauchi does not teach or suggest transmitting, to a broadcast receiver through a network, a command requesting for decoding broadcast signals of the viewing-restricted channel into broadcast data and transmitting the decoded broadcast data,
receiving the broadcast data from the broadcast receiver through the network, and
processing the broadcast data to audio/video signals, as recited in independent claim 1.

When discussing independent claim 1 and dependent claim 4, the Office Action (on
page 4) cites Yamauchi’s FIGs. 4 and 5 and paragraphs [0073]-[0074] and [0081]-[0082].

Yamauchi generally discloses that when a restricted program is designated by a
viewer, receiver identification information for identifying a receiver of a viewer is associated
with the restricted program, and view restriction information is broadcasted together with
the restricted program in a broadcasting time range of the restricted program. At the
receiver, the view restriction information is captured, and display of the restricted program is
restricted when the receiver identification information included in the view restriction
information matches that set at the receiver. See Yamauchi’s Abstract and paragraphs [0037]-
[039]. Accordingly, Yamauchi prevents a receiver from displaying a view restricted program.

Yamauchi’s receiver transmits, to a broadcasting service provider, a request for
broadcasting a restricted program with view restriction information including the receiver
identification information. This does not teach or suggest transmitting, to a broadcast
receiver (through a network), a command requesting for decoding broadcast signals of the
viewing-restricted channel into broadcast data and transmitting the decoded broadcast data,
as recited in independent claim 1.
Yamauchi also broadcasts a restricted program. This does not teach or suggest transmitting the decoded broadcast data and receiving the broadcast data (from the broadcast receiver) through the network.

Yamauchi’s paragraphs [0073] and [0074] disclose that the receiver that has received broadcast program decodes video and audio data (using a video/audio decoder 43e) and sends the decoded data to a monitor with a speaker. This does not teach or suggest receiving the broadcast data from the broadcast receiver through the network, as recited in independent claim 1.

For at least these reasons, Yamauchi does not teach or suggest all the features of independent claim 1. Walker does not teach or suggest the missing features of independent claim 1. Independent claim 1 therefore defines patentable subject matter.

Independent claim 7 recites a communication module for connecting to a broadcast receiver through a network, and a signal processing module for processing broadcast data transmitted through broadcast signals or a network. Independent claim 7 also recites a controller for generating a command requesting for decoding and transmitting broadcast signals of a viewing-restricted channel into broadcast data and transmitting the decoded broadcast data when a user requests receiving the viewing-restricted channel, transmitting the command to the broadcast receiver through the network and receiving the broadcast data from the broadcast receiver through the network by controlling the communication module, and playing the received broadcast data by controlling the signal processing module.
The applied references do not teach or suggest all the features of independent claim 7. More specifically, Yamauchi and Walker do not teach or suggest a controller for generating a command requesting for decoding and transmitting broadcast signals of a viewing-restricted channel into broadcast data and transmitting the decoded broadcast data when a user requests receiving the viewing-restricted channel, as recited in independent claim 7. Yamauchi and Walker also do not teach or suggest transmitting the command to the broadcast receiver through the network and receiving the broadcast data from the broadcast receiver through the network by controlling the communication module, as recited in independent claim 7. Independent claim 7 therefore defines patentable subject matter.

For at least the reasons set forth above, each of independent claims 1 and 7 defines patentable subject matter. Each of the dependent claims depends from one of the independent claims and therefore defines patentable subject matter at least for this reason. In addition, the dependent claims recite features that further and independently distinguish over the applied references.

CONCLUSION

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Favorable consideration and prompt allowance of claims 1-3, 6-9 and 11 are earnestly solicited. If the Examiner believes that any additional changes would place the application in better condition for allowance, the Examiner is invited to contact the undersigned attorney at the telephone number listed below.
To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,
KED & ASSOCIATES, LLP

David C. Oren
Registration No. 38,694

Correspondence Address:
P.O. Box 8638
Reston, VA 20195
703 766-3777 DCO/kah

Date: March 5, 2013
Please direct all correspondence to Customer Number 34610
## Electronic Acknowledgement Receipt

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**Title of Invention:** METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

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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.
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Jungmin LYU

Serial No: 13/104,364

Filed: May 10, 2011

Confirmation No.: 1076
Group Art Unit: 2421
Examiner: Yemaine A. GEBRU
Customer No.: 34610

For: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

U.S. Patent and Trademark Office
Customer Window, MAIL STOP AMENDMENT
Randolph Building
401 Dulany Street
Alexandria, Virginia 22314

Dear Sir:

Transmitted herewith is an Amendment and/or Reply in the above identified application.
☐ No additional fee is required.
☐ Also attached:

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If multiple claims newly presented, add $460.00       $0.00
Fee for extension of time                             $0.00
TOTAL FEE DUE                                         $0.00

☐ The Commissioner is hereby authorized to charge payment of any fees associated with this communication or credit any overpayment, to Deposit Account No. 16-0607, including any filing fees under 37 C.F.R. §1.16 for presentation of extra claims and any patent application processing fees under 37 C.F.R.§ 1.17.

Respectfully submitted,
KED & ASSOCIATES, LLP

David C. Oren
Registration No. 38,694

Correspondence Address:
P.O. Box 8638
Reston, VA 20195
(703) 766-3777 DCO/kah
Date: March 5, 2013

Please direct all correspondence to Customer Number 34610
This collection of information is required by 37 CFR 1.16. 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 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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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.
**Office Action Summary**

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**Examiner**

YEMANE GEbru

| Art Unit | 2421 |

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**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) [x] Responsive to communication(s) filed on 05/10/2011.

2a) [ ] This action is FINAL.

2b) [x] This action is non-final.

3) [ ] An election was made by the applicant in response to a restriction requirement set forth during the interview on ____;

the restriction requirement and election have been incorporated into this action.

4) [ ] Since this application is in condition for allowance 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.

**Disposition of Claims**

5) [x] Claim(s) 1-11 are pending in the application.

5a) Of the above claim(s) ____ is/are withdrawn from consideration.

6) [ ] Claim(s) ____ is/are allowed.

7) [x] Claim(s) 1-11 are rejected.

8) [ ] Claim(s) ____ is/are objected to.

9) [ ] Claim(s) ____ are subject to restriction and/or election requirement.

**Application Papers**

10) [ ] The specification is objected to by the Examiner.

11) [x] The drawing(s) filed on ____ is/are: a) [x] accepted or b) [ ] objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12) [ ] The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

13) [x] Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a) [x] All   b) [ ] Some *   c) [ ] None of:

   1. [x] Certified copies of the priority documents have been received.

   2) [ ] Certified copies of the priority documents have been received in Application No. ____.

   3) [ ] Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) [x] Notice of References Cited (PTO-892)

2) [ ] Notice of Draftsperson’s Patent Drawing Review (PTO-948)

3) [ ] Information Disclosure Statement(s) (PTO/SB/08)

   Paper No(s)/Mail Date ____.

4) [ ] Interview Summary (PTO-413)

   Paper No(s)/Mail Date ____.

5) [ ] Notice of Informal Patent Application

6) [ ] Other: ____.
DETAILED ACTION

1. This action is responsive to the application filed 05/10/2011.

2. Claims 1-11 have been examined. Claims 1 and 5 are independent claims.

   Priority

3. The priority date considered for this application is 09/07/2010.

   Oath/Declaration

4. The Office acknowledges receipt of a properly signed oath/declaration filed on 05/10/2011.

   Drawings

5. The drawings filed on 05/10/2011 are accepted by the examiner.

Claim Rejections - 35 USC § 102

6. 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.

7. Claims 1-5 and 7-10 are rejected under 35 U.S.C. 102 (b) as being anticipated by

Yamauchi, Atsushi (U.S. Pub. No. US 20030046100 A1) hereinafter referred to as “Yamauchi”

   Regarding claim 1, Yamauchi discloses a method for receiving a viewing-restricted

channel (The receiver 43 may, for example, be a television set, a video
deck or a BS (Broadcasting Satellite) tuner, paragraph 0052), comprising:

   receiving a request for receiving a viewing-restricted channel from a user (45-Fig.5;
The viewer uses the remote controller 45 to choose the view restricted
program, paragraph 0075); and
generating a command requesting for decoding and transmitting broadcast signals (43-Fig.4 and 43a-Fig.5) of the viewing-restricted channel and transmitting the generated command to a broadcast receiver through a network (81 & 82-Fig.4; The communication interface 61f is connected to the network 82. 61f sends and receives data to and from other computers. The telephone modem 61g, which is connected to the network 81, sends and receives data to and from the receiver 43 via the network 8, paragraph 0081).

As for claim 2, Yamauchi further discloses the method of claim 1, wherein virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels are managed as a viewing-restricted channel list (The service list descriptor is a description of a list of the draw-up channel and its identification information, paragraph 0107-0108) and it is checked whether the requested channel is a viewing-restricted channel based on the viewing-restricted channel list (The controller 43a reads information from the IC card 44, and controls the receiver 43 such as the program view restriction, paragraph 0070 and 0077).

As for claim 3, Yamauchi further discloses the method of claim 1, wherein the viewing-restricted channel is a pay channel and the broadcast receiver (the persons who pay the service fee can receive the pay programs, paragraph 0048) is equipped with a CAS module (44-Fig.5; issued by BS-conditional Access Systems (B-CAS), paragraph 0053).
As for claim 4, Yamauchi further discloses the method of claim 1, further comprising receiving broadcast data decoded by the broadcast receiver through the network and playing the received broadcast data (Fig.5, see Monitor Output; paragraph 0073-0074).

As for claim 5, Yamauchi further discloses the method of claim 4, wherein the receiving and playing comprises processing the decoded broadcast data to audio/video signals (43d-Fig; a controller 43a, to which are connected a tuner 43b, a descrambler 43c, a TS (Transport Stream) decoder 43d, a video/audio decoder 43e, a character display unit 43f, a key input unit 43g and a telephone modem 43h. 5).

Regarding claim 7, Yamauchi discloses an apparatus for receiving a viewing-restricted channel (repeat the same limitations of claim 1), comprising:

a communication module for connecting to a broadcast receiver through a network (43-Fig.5);

a signal processing module for processing broadcast data transmitted through broadcast signals (the receiver 43 creates EMM data, which is transmitted directly to the broadcasting service provider, paragraph 0156) or a network (81 & 82-Fig.4); and

a controller for generating a command requesting for decoding and transmitting broadcast data of a viewing-restricted channel when a user requests receiving the viewing-restricted channel (repeat the same limitations of claim 1), and transmitting the command to a broadcast receiver through the network by controlling the communication module (repeat
the same limitations of claim 1).

As for claim 8, Yamauchi further discloses the apparatus of claim 7, further comprising a storage for storing virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels as a viewing-restricted channel list (repeat the same limitations of claim 2), the controller checking whether the requested channel is a viewing-restricted channel based on the viewing-restricted channel list managed in the storage (repeat the same limitations of claim 2).

As for claim 9, Yamauchi further discloses the apparatus of claim 7, wherein the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a CAS module (repeat the same limitations of claim 3).

As for claim 10, Yamauchi further discloses the apparatus of claim 7, wherein the controller receives the broadcast data decoded by the broadcast receiver by controlling the communication module (Fig.5; the receiver 43 is controlled by a controller 43a, to which are connected a tuner 43b, a descrambler 43c, a TS (Transport Stream) decoder 43d, a video/audio decoder 43e, a character display unit 43f, a key input unit 43g and a telephone modem 43h, paragraph 0069) and plays the received broadcast data by controlling the signal processing module (Fig.5; the video/audio decoder 43e decodes the video and audio data that have been encoded in the given format, and sends the decoded data to a monitor with a speaker; paragraph 0073).
Claim Rejections - 35 USC § 103

8. 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.

9. The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.


As for claim 6, Yamauchi further discloses the method of claim 4, wherein the broadcast data received by the broadcast receiver is transcoded data with a different bit rate; and the receiving and playing comprises decoding the transcoded broadcast data (The video/audio decoder 43e decodes the video and audio data that have been encoded in the given format, and sends the decoded data to a monitor with a speaker; paragraph 0072 -0073).

Yamauchi however fails to disclose transcoded data with a different bit rate.
In an analogous art, Walker discloses transcoded data with a different bit rate (the network server may be able decode streaming content and re-encode the streaming content at a higher or lower bit rate, paragraph 0230).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Yamauchi to include transcoded data with a different bit rate as taught by Walker for the benefit of users to provide a view restriction method, a view restriction setting method, a receiver and a device and a program for setting view restriction capable of surely blocking a program voluntarily designated by a viewer from view (Yamauchi: paragraph 0012).

As for claim 11, Yamauchi further discloses the apparatus of claim 10, wherein the controller (43a-Fig.5), if broadcast data transcoded at a different bit rate by the broadcast receiver are received (43e-Fig.5), plays the transcoded broadcast data after decoding the data by controlling the signal processing module (The video/audio decoder 43e decodes the video and audio data that have been encoded in the given format, and sends the decoded data to a monitor with a speaker; paragraph 0073). Yamauchi however fails to disclose transcoded data with a different bit rate.

In an analogous art, Walker discloses broadcast data transcoded data with a different bit rate (the network server may be able decode streaming content and re-encode the streaming content at a higher or lower bit rate, paragraph 0230).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Yamauchi to include transcoded data with a different bit rate as taught by Walker for the benefit of users to provide a view restriction method, a view restriction setting method, a receiver and a device and a program for
setting view restriction capable of surely blocking a program voluntarily
designated by a viewer from view (Yamauchi: paragraph 0012).

**Conclusion**

11. The prior art made of record and not relied upon is considered pertinent to applicant's
disclosure. Scott et al. (US 20090300671 A1) and Craib et al. (US 20100146527 A1) are all cited to
show systems which are considered pertinent to the claimed invention.

12. Any inquiry concerning this communication or earlier communications from the examiner
should be directed to YEMANE GEBRU whose telephone number is (571)272-3860. The examiner
can normally be reached on Monday-Friday, ALT Friday 7:30am-5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor,
KRISTINE L. KINCAID can be reached on (571)272-4063. The fax phone number for the
organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application
Information Retrieval (PAIR) system. Status information for published applications may be obtained
from either Private PAIR or Public PAIR. Status information for unpublished applications is available
through Private PAIR only. For more information about the PAIR system, see http://pair-
direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the
Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a
USPTO Customer Service Representative or access to the automated information system, call 800-
786-9199 (IN USA OR CANADA) or 571-272-1000.

/Y. G./
Examiner, Art Unit 2421

/KRISTINE KINCAID/
Supervisory Patent Examiner, Art Unit 2421
**Notice of References Cited**

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**FOREIGN PATENT DOCUMENTS**

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*Note: A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).) Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.*
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**BIB DATA SHEET**

**CONFIRMATION NO. 1076**

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**APPLICANTS**
Jungmin LYU, Seongnam-si, KOREA, REPUBLIC OF;

**CONTINUING DATA**

**FOREIGN APPLICATIONS**
REPUBLIC OF KOREA 10-2010-0087248 09/07/2010

**IF REQUIRED, FOREIGN FILING LICENSE GRANTED**
05/20/2011

<table>
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Verified and Acknowledged

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**ADDRESS**
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P.O. Box 8638
Reston, VA 20195
UNITED STATES

**TITLE**
METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

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This is to certify that the following application annexed hereto is a true copy from the records of the Korean Intellectual Property Office.

Application Number: 10-2010-0087248

Filing Date: SEP. 07, 2010

Applicant(s): Humax Co., Ltd.

2012년 04월 23일  

COMMISSIONER
제출 연자 : 2010-09-07

【서지사항】

【서류명】 특허출원서
【출원구분】 특허출원
【출원인】
【명칭】 (주)휴맥스
【출원인코드】 1-2009-054963-1
【대리인】
【명칭】 특허법인로얄
【대리인코드】 9-2007-100122-0
【포괄위임등록번호】 2009-099050-4
【발명의 근본명칭】 유료 채널의 방송 수신 장치 및 방법
【발명의 영문명칭】 Apparatus and method for receiving broadcasting signal of pay channel

【발명자】
【성명】 유정민
【성명의 영문표기】 LYU, Jung Min
【주민등록번호】 741010-1XXXXX
【우편번호】 464-727
【주소】 경기도 광주시 태진동 장용 아파트 302동 901호
【국적】 KR
【취지】 위와 같이 특허청장에게 제출합니다.

대리인  특허법인로얄  (서명 또는 인)

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【명세서】
【발명의 명칭】
유료 채널의 방송 수신 장치 및 방법 {Apparatus and method for receiving broadcasting signal of pay channel}
【기술분야】
<p>&lt;1&gt; 본 발명은, 예를 들어, 암호화된 유료 채널의 방송 수신 기능이 구비되어 있는 지 않은 셋탑 박스(STB) 또는 디지털 텔레비전(D-TV) 등과 같은 다양한 유형의 방송 수신기에 적용되는 유료 채널의 방송 수신 장치 및 방법에 관한 것이다.
【배경기술】
<p>&lt;2&gt; 일반적으로 셋탑 박스(STB) 또는 디지털 텔레비전(D-TV) 등과 같은 다양한 유형의 방송 수신기가 널리 보급되어 사용되고 있는 데, 예를 들어, 상기 셋탑 박스(STB)에서는, 디지털 방송 채널을 통해 수신되는 MPEG 데이터 스트림의 방송 프로그램을 오디오 및 비디오 데이터로 디코딩한 후, 텔레비전을 통해 출력 표시하게 된다.
<p>&lt;3&gt; 한편, 암호화된 유료 채널의 방송 수신 기능이 구비된 셋탑 박스에는, 예를 들어, 카스(CAS: Conditional Access System) 모듈과 디스크램블러(Descrambler) 등이 추가로 포함 구성되는 데, 상기 카스 모듈에는, 널리 알려진 바와 같이, 유료 채널의 방송 수신을 위한 사용자 인증 카드의 하나로서, 스마트 카드(Smart Card)
또한, 상기 스마트 카드가 삽입된 카스 모듈에서는, 암호화된 유료 채널의 방송 스트림을 디스크램블(Desramble) 처리하기 위한 키(Key) 값의 하나로서, 컨트롤 워드(Control Word)를 생성하게 되고, 상기 디스크램블러에서는, 상기 컨트롤 워드를 이용하여, 암호화된 유료 채널의 방송 스트림을 디스크램블 처리하는 일련의 동작을 수행하게 된다.

이에 따라, 상기 카스 모듈과 디스크램블러 등이 추가로 구성된 셋탑 박스의 사용자는, 암호화된 유료 채널을 통해 제공되는 다양한 방송 프로그램을 정상적으로 수신하여 시청할 수 있게 된다.

한편, 최근에는, 유료 채널의 방송 수신 기능이 구비된 메인 셋탑 박스(Main STB)와, 유료 채널의 방송 수신 기능이 구비되어 있지 않은 적어도 하나 이상의 서브 셋탑 박스(Sub STB)를, 유선 또는 무선 네트워크를 통해 연결 사용하는 사례가 급증하고 있다.

또한, 상기 유료 채널의 방송 수신 기능이 구비되어 있지 않은 서브 셋탑 박스에서, 상기 유료 채널의 방송 수신 기능이 구비된 메인 셋탑 박스와 인터페이스 통롯을 수행하여, 암호화된 유료 채널의 방송 신호를 정상적으로 수신할 수 있도록 하기 위한 효율적인 해결 방안 마련이 시급히 요구되고 있는 실정이다.

【발명의 내용】
【해결하려는 과제】

본 발명은, 예를 들어, 유료 채널의 방송 수신 기능이 구비되어 있지 않은 서브 방송 수신기에서, 유료 채널의 방송 수신 기능이 구비된 데인 방송 수신기와 인터페이스 동작을 수행하여, 암호화된 유료 채널의 방송 신호를 정상적으로 수신할 수 있도록 하기 위한 유료 채널의 방송 수신 장치 및 방법을 제공하기 위한 것이다.

【과제의 해결 수단】

본 발명에 따른 유료 채널의 방송 신호 수신 방법은, 유료 채널 방송 수신 기능이 구비되지 않은 서브 방송 수신기를, 유료 채널 방송 수신 기능이 구비된 데인 방송 수신기와, 네트워크를 통해 연결 접속하는 단계; 상기 서브 방송 수신기에 서 유료 채널 방송 수신이 요청되면, 상기 유료 채널 방송을 복호화하여 전송한 것을 요구하는 커플링을 생성하여, 상기 네트워크를 통해 연결 접속된 데인 방송 수신기로 전송하는 단계; 및 상기 데인 방송 수신기에서 전송 및 복호화된 유료 채널 방송 신호를, 상기 서브 방송 수신기에서 네트워크를 통해 수신하는 단계를 포함하여 이루어지는 것을 특징으로 하며.

또한, 상기 서브 방송 수신기에서는, 카스 모듈(CAS Module)이 구비되어 있지 않고, 상기 데인 방송 수신기에는, 카스 모듈이 구비되어 있는 것을 특징으로 하며.
또한, 상기 서브 방송 수신기에는, 적어도 하나 이상의 유료 채널에 대응되는 가상 채널 번호와 해당 방송국 명이, 유료 채널 리스트로 저장 관리되는 것을 특징으로 하며.

또한, 상기 서브 방송 수신기에서는, 유료 방송 채널 수신이 요청되면, 메인 방송 수신기와의 통신 중임을 알리는 안내 메시지를 출력 표시하고, 이후, 상기 메인 방송 수신기에서 선국 및 복호화된 유료 채널 방송 신호를 수신하여 오디오 및 비디오 신호로 처리하거나, 또는 메시지를 출력 표시하는 것을 특징으로 하며.

또한, 본 발명에 따른 유료 채널 방송 신호 수신 장치는, 유료 채널 방송 수신 기능이 구비되지 않은 서브 방송 수신기를, 유료 채널 방송 수신 기능이 구비된 메인 방송 수신기와, 네트워크를 통해 연결 접속하기 위한 접속수단; 상기 서브 방송 수신기에서 유료 채널 방송 수신이 요청되면, 상기 유료 채널 방송을 복호화하여 전송할 것을 요구하는 컨트롤을 생성하여, 상기 메인 방송 수신기로 전송하기 위한 제어수단; 및 상기 메인 방송 수신기에서 선국 및 복호화된 유료 채널 방송 신호가, 상기 접속수단을 통해 서브 방송 수신기로 수신되며, 상기 유료 채널 방송 신호를 오디오 및 비디오 신호로 처리하기 위한 처리수단을 포함하여 구성되는 것을 특징으로 하며.

또한, 상기 서브 방송 수신기에는, 카스 모듈(CAS Module)이 구비되어 있지 않고, 상기 메인 방송 수신기에는, 카스 모듈이 구비되어 있는 것을 특징으로 하며.
또한, 상기 서브 방송 수신기에는, 적어도 하나 이상의 유료 채널에 대응되는 가능 채널 번호와 해당 방송국 명을 유료 채널 리스트로 저장하기 위한 저장수단이 포함 구성되는 것을 특징으로 하며,

또한, 상기 서브 방송 수신기에는, 유료 방송 채널 수신이 요청되며, 메인 방송 수신기와의 통신 중임을 알리는 안내 메시지를 생성하여 표시하기 위한 생성수단이 포함 구성되는 것을 특징으로 한다.

【발명의 효과】

본 발명에 따른 유료 채널의 방송 수신 장치 및 방법은, 유료 채널의 방송 수신 기능이 구비되어 있지 않은 서브 방송 수신기에서, 유료 채널의 방송 수신 기능이 구비된 메인 방송 수신기와 인터페이스 통로를 수행하여, 암호화된 유료 채널의 방송 신호를 정상적으로 수신할 수 있게 되므로, 예를 들어, 카스 모듈과 디스 크롭볼러 등이 추가로 구비되어 있지 않은 서브 방송 수신기의 사용자가, 원하는 유료 채널의 방송 프로그램을 정상적으로 수신하여 시청할 수 있게 된다.

【도면의 간단한 설명】

도 1은 본 발명이 적용되는 메인 셋탑 박스와 서브 셋탑 박스들이 네트워크를 통해 연결 접속된 실시예를 도시한 것이다.

도 2는 본 발명이 적용되는 메인 셋탑 박스와 서브 셋탑 박스에 대한 실시예

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의 구성을 도시한 것이고,

도 3은 본 발명이 적용되는 서브 셋탑 박스 내에 저장 관리되는 유료 채널 리스트에 대한 실시예를 도시한 것이고,

도 4는 본 발명이 적용되는 서브 셋탑 박스에 의해 출력 표시되는 안내 메시지와 유료 채널의 방송 화면에 대한 실시예를 도시한 것이고,

도 5는 본 발명이 적용되는 서브 셋탑 박스에서의 동작 흐름도에 대한 실시예를 도시한 것이고,

도 6은 본 발명이 적용되는 메인 셋탑 박스에서의 동작 흐름도에 대한 실시예를 도시한 것이다.

【발명을 실시하기 위한 구체적인 내용】

<19> 이하, 본 발명에 따른 유료 채널의 방송 수신 장치 및 방법에 대한 바람직한 실시예에 대해, 정부된 도면을 참조하여 상세히 설명한다.

<20> 우선, 본 발명에 따른 유료 채널의 방송 수신 장치 및 방법은, 디지털 방송을 수신하는 셋탑 박스(STB) 또는 디지털 텔레비전(D-TV) 등과 같은 다양한 유형의 방송 수신기에 적용된다.

<21> 한편, 본 발명이 적용되는 방송 수신기, 예를 들어, 셋탑 박스(STB)는, 텔레비전(TV)과 연결 사용되며, 또한 유선 또는 무선 네트워크(Network)를 통해 다른 셋탑 박스(STB)들과 연결 접속될 수 있다.

<22> 예를 들어, 도 1에 도시한 바와 같이, 암호화된 유료 채널의 방송 수신을 위
한 카스(CAS) 모듈이 구비된 메인 셋탑 박스(Main STB)(20)는, 카스 모듈이 구비되어 있지 않은 적어도 하나 이상의 서브 셋탑 박스들(Sub STB)(21, 22, 23)과 유선 또는 무선 네트워크를 통해 연결 접속될 수 있다.

또한, 상기 메인 셋탑 박스(20)에는, 예를 들어, 도 2에 도시한 바와 같이, 튜너(200), 디믹스(201), 디스크램블러(203), MPEG 디코더(203), A/V 프로세서(204), 메모리(205), 컨트롤러(206), 오디오 생성부(207), 네트워크 모듈(208), 그리고 카스 모듈(300)이 포함 구성되며, 상기 카스 모듈(300)에는, 유료 채널의 방송 수신을 위한 사용자 인증 카드의 하나로서, 스마트 카드(301)가 삽입된다.

반면, 상기 서브 셋탑 박스(21)에는, 예를 들어, 도 2에 도시한 바와 같이, 튜너(210), 디믹스(211), MPEG 디코더(212), A/V 프로세서(213), 메모리(214), 컨트롤러(215), 오디오 생성부(216), 그리고 네트워크 모듈(217)이 포함 구성될 수 있다.

즉, 상기 서브 셋탑 박스(21)는, 유료 채널의 방송 수신에 필요한 카스(CAS) 모듈이 별도로 구성되어 있지 않으므로, 상기 메인 셋탑 박스(20)에 비해 저가적으로 제조 생산될 수 있다.

한편, 상기 서브 셋탑 박스의 메모리(214)는, 예를 들어, 플래시(Flash) 메모리 또는 이어피플(EEPROM) 등과 같은 비휘발성 메모리가 사용될 수 있으며, 상기 메모리(214)에는, 예를 들어, 도 3에 도시한 바와 같이, 유료 채널 리스트가 저장 관리될 수 있다.

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그리고, 상기 유료 채널 라이스트에는, 예를 들어, 상기 서브 셋탑 박스(21)에서 독립적으로 수신 및 복호화할 수는 없지만, 상기 메인 셋탑 박스(20)와의 인터페이스를 통해 수신 및 복호화할 수 있는 유료 채널 번호들, 사용자가 선택 지정할 수 있도록 가상 채널 번호(Virtual Channel Number)로서 저장 관리하게 된다.

또한, 상기 가상 채널 번호에는, 해당 채널의 방송국 명이 연계 저장될 수 있는 데, 상기 방송국 명은, 각 방송국을 식별하기 위한 고유의 식별 코드로 연계 저장될 수 있다.

그리고, 상기 서브 셋탑 박스의 컨트롤러(215)에서는, 예를 들어, 사용자가 입력의 한 유료 채널 번호를 선택 지정하게 되면, 상기 네트워크 모듈(217)을 동작 제어하여, 상기 메인 서브 셋탑 박스(20)와의 인터페이스 동작을 수행하게 된다.

또한, 상기 컨트롤러(215)에서는, 상기 오에스디 생성부(216)를 동작 제어하여, 그에 상응하는 안내 메시지를 출력 표시하게 되는 데, 예를 들어, 도 4에 도시한 바와 같이, 상기 안내 메시지에는, 메인 셋탑 박스(Main STB)와 통신 중이므로 잠시 대기해 줄 것을 요청하는 메시지가 표시될 수 있다.

그리고, 상기 컨트롤러(215)에서는, 상기 유료 채널의 방송 신호를 선출 및 복호화하여 전송할 것을 요구하는 커맨드(Command)를 생성한 후, 상기 메인 셋탑 박스(20)로 전송하고, 이후 상기 메인 셋탑 박스(20)에 의해 선출 및 복호화된 유료 채널의 방송 신호를 수신하여, 텔레비전을 통해 출력 표시하게 되는 데, 이에 대해 상세히 설명하면 다음과 같다.
도 5 및 도 6은, 본 발명에 따른 유료 채널의 방송 수신 방법에 대한 실시예의 동작 흐름도를 도시한 것으로, 예를 들어, 도 5에 도시한 바와 같이, 상기 서브셋탑 박스(21)에서는, 플래시 메모리 또는 아이피플 등과 같은 비휘발성 메모리(214) 내에, 가상 채널 번호와 방송국 명이 연계된 유료 채널 리스트를 저장 관리하게 된다(S10).

한편, 상기 컨트롤러(215)에서는, 사용자의 키 입력에 따라, 상기 튜너(210)와 디럭스(211)를 동작 제어하여, 사용자가 원하는 방송 채널을 선택하게 되는데, 예를 들어, 상기 컨트롤러(215)에서는, 사용자의 키 입력에 의해 방송 채널 결정 동작이 요청되면(S11), 상기 요청된 방송 채널이 암호화된 유료 채널에 해당하는 지를 확인하게 된다(S12).

그리고, 상기 확인 결과, 유료 채널이 아니면, 상기 튜너(210)와 디럭스(211)를 동작 제어하여, 해당 방송 채널을 선정한 후, 상기 MPEG 디코더(212)와 A/V 프로세서(213)를 동작 제어하여, 상기 방송 채널을 통해 수신되는 MPEG 데이터스트림의 방송 데이터를 디코딩한 후, 오디오 및 비디오 신호로 처리하는 열린의 동작을 수행하게 된다.

반면, 상기 확인 결과, 유료 채널이면, 상기 컨트롤러(215)에서는, 상기 네트워크 모듈(217)을 동작 제어하여, 유선 또는 무선 네트워크를 통해 연결 접속된 메인 셋탑 박스(20)와 인터페이스 동작을 수행함과 아울러, 도 4를 참조로 전출한
같이, 상기 오에스디 생성부(216)를 동작 제어하여, 메인 셋탑 박스와 동신 즐이스트로 장비 대기해 줄 것을 요청하는 안내 메시지를 출력 표시하게 된다.

그리고, 상기 유료 채널의 방송 신호를 신서 및 복호화하여 전송할 것을 요구하는 커맨드(Command)를 생성한 후(S14), 상기 메인 셋탑 박스(20)로 전송하게 되는 테(S15), 예를 들어, 상기 커맨드에는, 상기 유료 채널에 부상되는 채널 번호와 방송국 명, 그리고 상기 서브 셋탑 박스(21)에 부여된 고유의 네트워크 식별 정보(예: 시리얼 번호)가 포함될 수 있다.

한편, 상기 컨트롤러(215)에서는, 상기와 같이 메인 셋탑 박스(20)로 커맨드를 전송하고 나면, 서브 셋탑 박스의 동작 모드를 튜너 모드에서 외부 입력 모드로 자동 점하는 후(S16), 상기 메인 셋탑 박스(20)에 의해 신서 및 복호화된 유료 채널의 방송 신호가, 상기 네트워크 모듈(217)을 통해 수신되는 지를 확인하게 된다(S17).

그리고, 상기 확인 결과, 상기 복호화된 유료 채널의 방송 신호가 수신되지 않으면, 상기 오에스디 생성부(216)를 동작 제어하여, 그에 상응하는 에러 메시지를 출력 표시하게 되는 데, 예를 들어, 상기 에러 메시지에는, 네트워크 연결이 차단된 상태임을 알리거나, 메인 셋탑 박스의 전원이 오프된 상태임을 알리거나, 카스 모듈에서의 사용자 인증 실패 등을 알리는 다양한 메시지가 포함 표시될 수 있다.

반면, 상기 확인 결과, 상기 복호화된 유료 채널의 방송 신호가 수신되면, 오디오 및 비디오 신호 처리 동작을 수행한 후, 텔레비전을 통해 출력 표시하게 되
는 데(S19), 예를 들어, 메인 셋탑 박스(20) 내의 디스크램블러(202)와 MPEG 디코더(203)를 모두 가진 A/V 메이터가 수신되며, 서브 셋탑 박스 내의 A/V 프로세서(213)만을 동작 체어하여, 오디오 및 비디오 신호 처리 동작이 수행되도록 한다.

그리고, 상기 메인 셋탑 박스(20) 내의 디스크램블러(202)를 거치되, MPEG 디코더(203)를 거치지 않은 MPEG 데이터가 수신되면, 서브 셋탑 박스 내의 MPEG 디코더(212)와 A/V 프로세서(213)를 동작 체어하여, MPEG 디코딩 동작과 오디오 및 비디오 신호 처리 동작이 수행되도록 한다.

한편, 도 6에 도시한 바와 같이, 상기 메인 셋탑 박스(20)의 컨트롤러(206)에서는, 상기 네트워크 모듈(203)을 통해 연결 접속된 서브 셋탑 박스(21)로부터, 요구 컨트롤러가 수신되면(S30), 상기 요구 컨트롤러가, 유료 채널의 방송 신호를 복호화하여 전송할 것을 요구하는 복호화 요구 컨트롤러를 확인하게 된다(S31).

그리고, 상기 확인 결과, 상기 복호화 요구 컨트롤러가 아니면, 그에 상응하는 임의의 해당 동작을 수행하고(S32), 상기 확인 결과, 상기 복호화 요구 컨트롤러이면, 예를 들어, 상기 요구 컨트롤러에 포함된 가상 채널 번호와 방송국 명 등을 참조한 후, 상기 브나리(200)와 디럭스(201)를 동작 체어하여, 그에 해당하는 유료 채널을 신호하게 된다(S33).

또한, 상기 컨트롤러(206)에서는, 상기 카스 모듈(300)을 동작 체어하여 (S34), 암호화 기 값의 하나로서, 컨트롤 워드(Control Word)를 생성하는 일련의 동작을 수행하게 되는 데, 예를 들어, 상기 카스 모듈(300)에 삽입된 스마트 카드 (301)가, 상기 유료 채널의 방송 신호를 정상적으로 수신하는 데 부적합한

24-13
경우(예: 사용자 인증 실패), 유호한 컨트롤 워드가 생성되지 않을 수 있다.

그러므로, 상기 컨트롤러(206)에서는, 상기 컨트롤 워드가 정상적으로 생성되지 않으면(S35), 그에 상응하는 에러 메시지를, 상기 서브 셋탑 박스(21)로 출력하게 되고(S36), 상기 컨트롤 워드가 정상적으로 생성되면, 상기 컨트롤 워드를 디스크램블러(202)로 출력하여, 암호화된 유료 채널의 방송 신호가, 상기 디스크램블러(202)에 의해 디스크램블 처리되도록 한다(S37).

또한, 상기 MPEG 디코더(203)와 A/V 프로세서(204)를 동작 제어하여, 상기 디스크램블러 처리된 유료 채널의 방송 신호를 MPEG 디코딩 및 A/V 신호 처리한 후, 상기 네트워크 모듈(208)을 통해 연결 접속된 서브 셋탑 박스(21)로 출력하게 되는데, 상기 서브 셋탑 박스(21)는, 예를 들어, 상기 요구 컨텐츠에 포함 수신된 서브 셋탑 박스(21)의 고유 네트워크 식별 정보(예: 시리얼 번호)에 의해 구별될 수 있다.

한편, 상기 메인 셋탑 박스(20)에서, 일반 방송 채널을 수신하는 동안, 상기 서브 셋탑 박스(21)로부터 무료 채널 복호화 동작이 요청되면, 상기 메인 셋탑 박스에서 현재 사용하고 있지 않은 카스 모듈(300)과 디스크램블러(202)를, 상기 서브 셋탑 박스(21)에서, 네트워크를 통해 원격으로 공유하도록 할 수도 있다.

예를 들어, 상기 서브 셋탑 박스(21)에서, 튜너(210)와 디믹스(211)를 동작 제어하여, 사용자가 요청하는 유료 채널을 선호하여, 상기 유료 채널을 통해 수신되는 암호화된 방송 신호가, 상기 메인 셋탑 박스(20)로 전송하여, 상기 카스 모듈(306)에서 컨트롤 워드(Control Word)를 생성하도록 한다.
그리고, 상기 메인 셋탑 박스의 디스크램블러(202)에서, 상기 컨트롤 위드를 이용하여, 상기 서브 셋탑 박스(21)로부터 수신되는 암호화된 방송 신호를 디스크램블 처리하도록 한 후, 상기 디스크램블 처리된 방송 신호를, 상기 서브 셋탑 박스에서 다시 수신 받아, MPEG 디코딩 및 A/V 신호 처리할 수도 있다.

이상, 전술한 본 발명의 바람직한 실시예는, 예시의 목적을 위해 개시된 것으로, 당업자라면, 이하 참부된 특허청구범위에 개시된 본 발명의 기술적 사상과 그 기술적 범위 내에서, 또는 다른 다양한 실시예들을 개량, 변경, 대체 또는 부가 등이 가능한 것이다.

【부호의 설명】

10-13 : 빌레비전  20-23 : 셋탑 박스
200,210 : 튜너  201,211 : 디렉스
202 : 디스크램블러  203,212 : MPEG 디코더
204,213 : A/V 프로세서  205,214 : 메모리
206,215 : 컨트롤러  207,216 : 오에스디 생성부
208,217 : 네트워크 모듈  300 : 카스 모듈
301 : 스마트 카드
【복합청구범위】

【청구항 1】

유료 채널 방송 수신 기능이 구비되지 않은 서브 방송 수신기로, 유료 채널 방송 수신 기능이 구비된 메인 방송 수신기와, 네트워크를 통해 연결 접속하는 단계:

상기 서브 방송 수신기에서 유료 채널 방송 수신이 요청되면, 상기 유료 채널 방송을 복호화하여 전송할 것을 요구하는 커맨드를 생성하여, 상기 네트워크를 통해 연결 접속된 메인 방송 수신기로 전송하는 단계; 및

상기 메인 방송 수신기에서 전송 및 복호화된 유료 채널 방송 신호를, 상기 서브 방송 수신기에서 네트워크를 통해 수신하는 단계를 포함하여 이루어지는 것을 특징으로 하는 유료 채널의 방송 신호 수신 방법.

【청구항 2】

제 1항에 있어서.

상기 서브 방송 수신기에는, 카스 모듈(CAS Module)이 구비되어 있지 않고, 상기 메인 방송 수신기에는, 카스 모듈이 구비되어 있는 것을 특징으로 하는 유료 채널의 방송 신호 수신 방법.

【청구항 3】

제 1항에 있어서.

상기 서브 방송 수신기에는, 적어도 하나 이상의 유료 채널에 대응되는 가상
체널 번호와 해당 방송국 명이, 유료 채널 리스트로 저장 관리되는 것을 특경으로 하는 유료 채널의 방송 신호 수신 방법.

【청구항 4】

제 1항에 있어서.

상기 서브 방송 수신기에서는, 유료 방송 채널 수신이 요청되면, 메인 방송 수신기와의 통신 중단을 알리는 안내 메시지를 출력 표시하고.

이후, 상기 메인 방송 수신기에서 선곡 및 북호환된 유료 채널 방송 신호를 수신하여 오디오 및 비디오 신호로 처리하거나, 또는 에러 메시지를 출력 표시하는 것을 특경으로 하는 유료 채널의 방송 신호 수신 방법.

【청구항 5】

유료 채널 방송 수신 기능이 구비되지 않은 서브 방송 수신기를, 유료 채널 방송 수신 기능이 구비된 메인 방송 수신기와, 네트워크를 통해 연결 접속하기 위한 접속수단.

상기 서브 방송 수신기에서 유료 채널 방송 수신이 요청되면, 상기 유료 채널 방송을 북호환하여 전송할 것을 요구하는 키맨드를 생성하여, 상기 메인 방송 수신기로 전송하기 위한 제어수단.

상기 메인 방송 수신기에서 선곡 및 북호환된 유료 채널 방송 신호가, 상기 접속수단을 통해 서브 방송 수신기로 수신되면, 상기 유료 채널 방송 신호를 오디오 및 비디오 신호로 처리하기 위한 처리수단을 포함하여 구성되는 것을 특경으로
하는 유료 채널의 방송 신호 수신 장치.

【청구항 6】

제 5항에 있어서.

상기 서브 방송 수신기에는, 카스 모듈(CAS Module)이 구비되어 있지 않고, 상기 메인 방송 수신기에는, 카스 모듈이 구비되어 있는 것을 특징으로 하는 유료 채널의 방송 신호 수신 장치.

【청구항 7】

제 5항에 있어서.

상기 서브 방송 수신기에는, 적어도 하나 이상의 유료 채널에 대응되는 가장 채널 번호와 해당 방송국 명을 유료 채널 리스트로 저장하기 위한 저장단위가 포함 구성되는 것을 특징으로 하는 유료 채널의 방송 신호 수신 장치.

【청구항 8】

제 5항에 있어서.

상기 서브 방송 수신기에는, 유료 방송 채널 수신이 요청되며, 메인 방송 수신기와의 통신 중립을 알리는 안내 메시지를 생성하여 표시하기 위한 생성단위가 포함 구성되는 것을 특징으로 하는 유료 채널의 방송 신호 수신 장치.
본 발명의 다른 유료 채널의 방송 수신 장치 및 방법은, 유료 채널의 방송 수신 기능이 구비되어 있지 않은 시브 방송 수신기에서, 유료 채널의 방송 수신 기능이 구비된 메인 방송 수신기와 인터페이스 통작을 수행하여, 암호화된 유료 채널의 방송 신호를 정상적으로 수신할 수 있게 되므로, 예를 들어, 카스 모듈과 디스 크램블러 등이 추가로 구비되어 있지 않은 시브 방송 수신기의 사용자가, 원하는 유료 채널의 방송 프로그램을 정상적으로 수신하여 시청할 수 있게 된다.

【대표도】

도 2
【도면】

【도 1】

10. Main STB
20. DBS
11. TV
21. Sub STB 1
12. TV
22. Sub STB 2
13. TV
23. Sub STB 3

Network

DBS
DBS
DBS
### 도 3

**유료 채널 리스트**

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### 도 4

Main STB의 통신 중입니라
장시 대기하여 주세요.

![Diagram](image_url)
Title: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL
Publication No: US-2012-0060179-A1
Publication Date: 03/08/2012

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO’s publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101
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* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" in this space is less than 20, enter "20".
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Applicant(s)
Jungmin LYU, Seongnam-si, KOREA, REPUBLIC OF;

Power of Attorney: The patent practitioners associated with Customer Number 34610

Domestic Priority data as claimed by applicant

Foreign Applications (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.)
REPUBLIC OF KOREA 10-2010-0087248 09/07/2010

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Projected Publication Date: 03/08/2012

Non-Publication Request: No

Early Publication Request: No
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UTILITY PATENT APPLICATION TRANSMITTAL UNDER 37 C.F.R. §1.53(b)

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Randolph Building
401 Dulany Street
Alexandria, VA  22314

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Sir:

Transmitted herewith for filing is the patent application of
INVENTORS:  Jungmin, LYU

FOR:  METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

Enclosed are:
1.  19 pages of specification, claims, abstract
2.  5 sheets of FORMAL drawings
3.  2 pages of newly executed Declaration & Power of Attorney (copy or original)
4.  Priority claimed to Appln. No(s) 10-2010-0087248 filed on September 7, 2010 in Korea, whose entire disclosure is incorporated herein by reference.
5.  Applicant claims Small Entity Status
6.  Information Disclosure Statement, Form PTO-1449 and references

7.  □ Assignment papers for HUMAX Co., Ltd. cover sheet, assignment and assignment fee (To Follow)
9.  □ Two (2) return postcards
   □ Stamp & Return with Courier
   □ Prepaid postcard-stamped filing date & returned with unofficial Serial Number
10. □ Authorization under 37 C.F.R. §1.136(a)(3)
11. □ Application Data Sheet under 37 C.F.R. §1.76
13. □ Other:  

CLAIMS AS FILED

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APPLICATION SIZE FEE

Number of Pages: X .75

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UTILITY EXAMINATION FEE: $220.00

TOTAL FILING FEE: $1,090.00

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Respectfully submitted,
KED & ASSOCIATES, M.P.

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Date: May 10, 2011

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Q:\Documents\2028-434\278720
METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

BACKGROUND

Field

[0001] This document relates to a method for receiving viewing-restricted channel. More specifically, this document relates to a method for receiving broadcast signals of a pay channel in an apparatus not equipped with a function of receiving encoded broadcast signals of a pay channel.

Related Art

[0002] Various types of digital broadcast receivers such as a set-top box (STB) and a digital television (D-TV) are now in wide use. The set-top box decodes broadcast programs in the form of MPEG data streams received through a broadcast channel into audio and video data and outputs the decoded broadcast programs to a television.

[0003] A set-top box equipped with a function of receiving broadcast signals of a viewing-restricted channel (e.g., a pay channel) further comprises a conditional access system (CAS) module and a descrambler. As is well known, a smart card is inserted to the CAS module to be used as a user
authentication card for receiving broadcast signals of a pay channel.

[0004] Also, the CAS module to which the smart card is inserted generates a control word to be used as a key code for descrambling encoded broadcast streams of a pay channel; the descrambler, by using the control word, carries out a series of operations for descrambling encoded broadcast streams of a pay channel.

[0005] Accordingly, the user of a set-top box additionally equipped with the CAS module and the descrambler can watch an encoded broadcast program provided through a pay channel in a normal manner.

[0006] Recently, the number of cases is increasing, where people use a main set-top box (STB) equipped with a function of receiving broadcast signals of a pay channel together with one or more sub-STBs not equipped with a function of receiving broadcast signals of the pay channel through a wired or wireless network.
SUMMARY

[0007] An aspect of this document is to provide a method for receiving and playing broadcast programs of a viewing-restricted channel.

[0008] A method for receiving a viewing-restricted channel according to one embodiment of the present invention comprises receiving a request for receiving a viewing-restricted channel from a user; and generating a command requesting for decoding and transmitting broadcast signals of the viewing-restricted channel and transmitting the generated command to a broadcast receiver through a network.

[0009] In one embodiment, virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels are managed as a viewing-restricted channel list and based on the viewing-restricted channel list, it can be checked whether the requested channel is a viewing-restricted channel.

[0010] In one embodiment, the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a CAS module.

[0011] In one embodiment, the method further comprises receiving broadcast data decoded by the broadcast receiver through the network and playing the received broadcast data.
[0012] In one embodiment, the receiving and playing can comprise processing the decoded broadcast data to audio/video signals.

[0013] In one embodiment, the broadcast data received by the broadcast receiver is transcoded data with a different bit rate; and the receiving and playing can comprise decoding the transcoded broadcast data.

[0014] An apparatus for receiving a viewing-restricted channel according to another embodiment of the present invention comprises a communication module for connecting to a broadcast receiver through a network; a signal processing module for processing broadcast data transmitted through broadcast signals or a network; and a controller for generating a command requesting for decoding and transmitting broadcast data of a viewing-restricted channel when a user requests receiving the viewing-restricted channel, and transmitting the command to a broadcast receiver through the network by controlling the communication module.

[0015] Therefore, the user can watch a broadcast program of a pay channel through an apparatus not additionally equipped with a CAS module and a descrambler.
BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The implementation of this document will be described in detail with reference to the following drawings in which like numerals refer to like elements.

[0017] FIG. 1 illustrates an embodiment to which the present invention is applied, where a main set-top box and sub set-top boxes are connected to each other through a network;

[0018] FIG. 2 illustrates an embodiment of structure where a main set-top box and sub set-top boxes to which the present invention is applied;

[0019] FIG. 3 illustrates an embodiment of a pay channel list managed in a sub set-top box to which the present invention is applied;

[0020] FIG. 4 illustrates an embodiment of a guide message output by a sub set-top box and a broadcast screen of a pay channel to which the present invention is applied;

[0021] FIG. 5 illustrates a flow diagram in a sub set-top box to which the present invention is applied; and

[0022] FIG. 6 illustrates a flow diagram in a main set-top box to which the present invention is applied.
In what follows, preferred embodiments of a method for receiving a viewing-restricted channel according to the present invention will be described in detail with reference to appended drawings.

A method for receiving a viewing-restricted channel according to the present invention can be applied to various types of broadcast receivers such as a set-top box (STB) or a digital television (D-TV) receiving digital broadcast signals. In addition, the present invention can be applied to an apparatus comprising a communication module and a signal processing module for receiving and playing broadcast data transmitted by a broadcast receiver.

An apparatus to which the present invention is applied, e.g., a broadcast receiver such as an STB, can be used being connected to a television and also be connected to other STBs through a wired or wireless network.

For example, as shown in FIG. 1, a main STB 20 equipped with a CAD module for receiving broadcast signals of a viewing-restricted channel (e.g., a pay channel) can be connected to at least one or more sub-STBs 21, 22, 23 not equipped with the CAS module through a wired or wireless network.
The main STB 20, for example, as shown in FIG. 2, can comprise a tuner 200, a demux 201, a descrambler 203, an MPEG decoder 203, an A/V processor 204, a memory 205, a controller 206, an OSD generation unit 207, a network module 208, and a CAS module 300. A smart card 301 is inserted to the CAD module to be used as a user authentication card for receiving broadcast signals of a play channel.

On the other hand, the sub-STB 21, for example, as shown in FIG. 2, can comprise a tuner 210, a demux 211, an MPEG decoder 212, an A/V processor 213, a memory 214, a controller 215, an OSD generation unit 216, and a network module 217.

In other words, since the sub-STB 21 is not equipped with a separate CAS module needed for receiving broadcast signals of a pay channel, it can be manufactured in a relatively lower cost than the main STB 20.

The memory of the sub-STB 214, for example, can employ a non-volatile memory such as a flash memory or EEPROM and as shown in FIG. 3, a pay channel list can be stored in the memory 214.

The pay channel list manages a pay channel number as a virtual channel number with which the user can select the pay channel number which can be played by receiving broadcast
data through an interface to the main STB 20 although the data cannot be decoded independently in the sub-STB 21.

[0032] Also, the broadcast station name of the corresponding channel can be stored in association with the virtual channel number, where the broadcast station name can be used as a unique identification code for identifying each broadcast station.

[0033] The controller 215 of the sub-STB 215, if the user selects a pay channel number, carries out interface operation with the main STB 20 by controlling the network module 217.

[0034] The controller 215 controls the OSD generation unit 216 and outputs a guide message corresponding thereto; for example, as shown in FIG. 4, the guide message can display a message requesting a brief standby due to communication with the main STB.

[0035] Also, the controller 215 generates a command requesting tuning in to the broadcast signals of the pay channel and decoding and transmission of the broadcast signals; and transmits the command to the main STB 20. Afterwards, the controller 215 receives broadcast signals of the pay channel encoded by the main STB 20 and outputs the received broadcast signals through a television, which will be described in more detail below.
FIGS. 5 and 6 illustrate flow diagrams of a method for receiving broadcast signals of a pay channel according to the present invention.

As shown in FIG. 5, the sub-STB 21 manages a pay channel list in a non-volatile memory 214 such as a flash memory or EEPROM, where a virtual channel number and a broadcast station name are associated with each other S501.

The controller 215, by controlling the tuner 210 and the demux 211 according to the key inputs of the user, tunes into a broadcast channel desired by the user; for example, the controller 215, if broadcast channel switching operation is requested by the key inputs of the user S502, checks whether the requested broadcast channel corresponds to an encoded pay channel.

If it is found that the requested broadcast channel is not a pay channel, the controller 215, by controlling the tuner 210 and the demux 211, tunes into the corresponding broadcast channel and by controlling the MPEG decoder 212 and the A/V processor 213, decodes broadcast data in the form of MPEG data streams received through the broadcast channel into audio and video signals S504.

On the other hand, if it is found that the request broadcast channel is a pay channel, the controller 215, by
controlling the network module 217, carries out interface operation with the main STB 20 connected through a wired or wireless network and at the same time, as described with reference to FIG. 4, by controlling the OSD generation unit 216, displays a guide message requesting a brief standby due to communication with the main STB.

[0041]Next, the controller 215 generates a command requesting tuning in to the broadcast signals of the pay channel and decoding and transmission of the broadcast signals; and transmits the generated command to the main STB 20, S505; for example, the command can comprise a channel number and a broadcast station name corresponding to the pay channel; and a unique network identification information (e.g., serial number or IP address) assigned to the sub-STB 21.

[0042]The controller 215, after transmitting the command to the main STB 20 as described above, automatically switches the operation mode of the sub-STB from a tuner mode to an external input mode S506 and checks whether broadcast signals of a pay channel selected and decoded by the main STB 20 are received through the network module 217, S507.

[0043]The controller 215, if the decoded broadcast signals of the pay channel are not received, by controlling the OSD generation unit 216, displays an error message corresponding
to the situation S508; the error message can include various messages informing of disconnection to a network, power-off of the main STB, user authentication failure at the CAS module, and so on.

[0044] Meanwhile, if the decoded broadcast signals of the pay channel are received, the controller 215 carries out audio and video signal processing operation and outputs the processed signals through a television S509; for example, if A/V data which have passed all through the descrambler 202 and the MPEG decoder 203 in the main STB 20 are received, the controller 215 controls the A/V processor 213 in the sub-STB to carry out audio and video signal processing operation.

[0045] The controller 215, if MPEG data which have passed the descrambler 202 in the main STB 20 but not the MPEG decoder 203 are received, controls the MPEG decoder 212 and the A/V processor 213 in the sub-STB to carry out MPEG decoding operation; and audio and video signal processing operation.

[0046] Meanwhile, as shown in FIG. 6, if a request command is received from the sub-STB 21 connected through the network module 208, S601, the controller 206 of the main STB 20 checks whether the request command is a decoding request command which requests decoding and transmission of broadcast signals of a pay channel S602.
The controller 206, if the checking result is not to the decoding request command, carries out operation corresponding thereto S603, while if the checking result is the decoding request command, based on the virtual channel number and the broadcast station name included in the request command, controls the tuner 200 and the demux 201; and tunes in to a pay channel corresponding thereto.

Also, the controller 206, by controlling the CAS module 300, carries out operation of generating a control word used as an encoding key S605; for example, if the smart card 301 inserted in the CAS module 300 is turned out to be inappropriate for receiving broadcast signals of the pay channel in a normal manner (e.g., user authentication failure), chances are that a valid control word may not be generated.

The controller 206, if the control word is not generated normally S606, outputs an error message corresponding to the situation to the sub-STB 21, S607 while if the control word is generated normally, outputting the control word to the descrambler 202 so that encoded broadcast signals of a pay channel is descrambled by the descrambler 202, S608.

In addition, the controller 206, by controlling the MPEG decoder 203 and the A/V processor 204, processes the
descrambled broadcast signals by applying MPEG decoding and
A/V signal processing; and outputs the result to the sub-STB
21 connected through the network module 208, S609; for
example, the sub-STB 21 can be identified by a unique network
identifying information (e.g., serial number) of the sub-STB
21 received being included in the request command.

[0051] Also, the main STB 20, by further comprising the MPEG
encoder, can encode A/V data which have undergone
descrambling and MPEG decoding with a different bit rate
(which is transcoding of broadcast signals) and transcoded
broadcast data to the sub-STB 21 through the network module
208.

[0052] The sub-STB 21, if broadcast signals are transcoded and
transmitted from the main STB 20, can decodes the received,
transcoded broadcast data through the MPEG decoder 212 or a
different decoding processing unit in an appropriate way and
play the decoded broadcast data.

[0053] Meanwhile, the main STB 20, if pay channel decoding
operation is requested from the sub-STB 21 while receiving
broadcast data from an ordinary broadcast channel, can make
the CAS module 300 and the descrambler 202 not currently used
at the main STB shared with the sub-STB 21 remotely through a
network.
For example, the sub-STB 21, by controlling the tuner 210 and the demux 211, tunes in to a pay channel requested by the user and at the same time, the sub-STB 21 transmits encoded broadcast signals received through the pay channel to the main STB 20, thus making the CAS module 306 of the main STB 20 generate a control word.

In the same way, the sub-STB 21, by using the control word, can make the descrambler 202 of the main STB descramble encoded broadcast signals received from the sub-STB 21; receive again the descrambled broadcast signals; and apply MPEG decoding and A/V signal processing thereto.

The preferred embodiments of the present invention described above have been introduced for the purpose of illustration. Therefore, it should be understood that various kinds of improvement, modification, and substitution of the embodiments; and addition thereof are possible to those skilled in the art within the technical principles and scope of the present invention defined by appended claims.
What is claimed is:

1. A method for receiving a viewing-restricted channel, comprising:

   receiving a request for receiving a viewing-restricted channel from a user; and

   generating a command requesting for decoding and transmitting broadcast signals of the viewing-restricted channel and transmitting the generated command to a broadcast receiver through a network.

2. The method of claim 1, wherein virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels are managed as a viewing-restricted channel list and it is checked whether the requested channel is a viewing-restricted channel based on the viewing-restricted channel list.

3. The method of claim 1, wherein the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a CAS module.
4. The method of claim 1, further comprising receiving broadcast data decoded by the broadcast receiver through the network and playing the received broadcast data.

5. The method of claim 4, wherein the receiving and playing comprises processing the decoded broadcast data to audio/video signals.

6. The method of claim 4, wherein the broadcast data received by the broadcast receiver is transcoded data with a different bit rate; and the receiving and playing comprises decoding the transcoded broadcast data.

7. An apparatus for receiving a viewing-restricted channel, comprising:

   a communication module for connecting to a broadcast receiver through a network;

   a signal processing module for processing broadcast data transmitted through broadcast signals or a network; and

   a controller for generating a command requesting for decoding and transmitting broadcast data of a viewing-restricted channel when a user requests receiving the viewing-restricted channel, and transmitting the command to a
broadcast receiver through the network by controlling the communication module.

8. The apparatus of claim 7, further comprising a storage for storing virtual channel numbers and corresponding broadcast station names corresponding to at least one or more viewing-restricted channels as a viewing-restricted channel list, the controller checking whether the requested channel is a viewing-restricted channel based on the viewing-restricted channel list managed in the storage.

9. The apparatus of claim 7, wherein the viewing-restricted channel is a pay channel and the broadcast receiver is equipped with a CAS module.

10. The apparatus of claim 7, wherein the controller receives the broadcast data decoded by the broadcast receiver by controlling the communication module and plays the received broadcast data by controlling the signal processing module.

11. The apparatus of claim 10, wherein the controller, if broadcast data transcoded at a different bit rate by the
broadcast receiver are received, plays the transcoded broadcast data after decoding the data by controlling the signal processing module.
ABSTRACT OF THE DISCLOSURE

A method for receiving a viewing-restricted channel is disclosed. In one embodiment of the present invention, if a user makes a request for receiving a viewing-restricted channel, a command requesting decoding and transmitting broadcast signals of the viewing-restricted channel is generated and transmitted to a broadcast receiver equipped with a CAS module through a network, and broadcast data decoded at the broadcast receiver is received through the network and played after being processed as audio/video signals. If broadcast signals transcoded in a different bit rate at the broadcast receiver is received, the transcoded broadcast data can be decoded in an appropriate way and played.
### FIG. 3

List of pay channels

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<th>Virtual Channel Number</th>
<th>BS Name</th>
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### FIG. 4

Communication with main STB is in progress. Please wait awhile
FIG. 5

Start

Manage pay channel list

Request for channel switching?

Pay channel?

NO

Tune in to requested channel and process signals

Generate command requesting decoding of pay channel and transmit command

Switch to external input mode

Received signal of pay channel?

NO

Display error message

YES

Process A/V data of pay channel and output processed data to TV

End
FIG. 6

Start

Received command?
- NO

Decoding command?
- YES

Carry out requested operation

Tune in to requested pay channel

 Carry out CAS operation

Control word generated normally?
- NO

Output error message to sub-STB

Descramble broadcast data of pay channel

Output decoded A/V data to sub-STB

End
DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter claimed and for which a patent is sought on the invention entitled METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL, the specification of which


was filed on ______________ as Application Serial No. ______________ and was

amended on ____________________ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

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I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s):

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I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

Prior U.S. Application or PCT Parent Number:

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<th>Parent Patent Number (if applicable)</th>
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the attorney(s) and/or agent(s) associated with Customer Number 34610 to prosecute this application and transact all business in the Patent and Trademark Office.

Direct all correspondence to Customer Number 34610
Full name of sole or first inventor: Jungmin, LYU
Inventor's signature: [Signature]
Date: 04/22/2021

Mailing Address: Woohim APT 103-203, Taejeon-dong, Gwangju-st, Gyeonggi-do, 464-110 Republic of Korea
Citizenship: Republic of Korea
Residence Address
(only if different from mailing address):

Full name of joint inventor(s):
Inventor's signature: [Signature]
Date: 

Mailing Address:
Citizenship:
Residence Address
(only if different from mailing address):

Full name of joint inventor(s):
Inventor's signature: [Signature]
Date: 

Mailing Address:
Citizenship: Republic of Korea
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(only if different from mailing address):

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Inventor's signature: [Signature]
Date: 

Mailing Address:
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Inventor's signature: [Signature]
Date: 

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Inventor's signature: [Signature]
Date: 

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(only if different from mailing address):

Full name of joint inventor(s):
Inventor's signature: [Signature]
Date: 

Mailing Address:
Citizenship:
Residence Address
(only if different from mailing address):
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of Jungmin, LYU

Customer No.: 34610

Serial No.: New U.S. Patent Application

Filed: May 10, 2011

For: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

AUTHORIZATION TO TREAT A REPLY AS INCORPORATING AN EXTENSION OF TIME UNDER 37 C.F.R. §1.136(a)(3)

U.S. Patent and Trademark Office
Customer Service Window, Mail Stop Patent Application
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

The U.S. Patent and Trademark Office is hereby authorized to treat any concurrent or future reply that requires a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time under 37 C.F.R. §1.136(a)(3). The U.S. Patent and Trademark Office is hereby authorized to charge all required extension of time fees to our Deposit Account No. 16-0607, if such fees are not otherwise provided for in such reply.

Respectfully submitted,
KED & ASSOCIATES, LLP

Daniel Y.J. Kim
Registration No. 36,186

Correspondence Address:
P.O. Box 8638
Reston, VA 20195
703 766-3777 DYKlllp
Date: May 10, 2011
Please direct all correspondence to Customer Number 34610
Application Data Sheet 37 CFR 1.76

Title of Invention: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1


Prefix  Given Name  Middle Name  Family Name  Suffix

Jungmin  LYU

Residence Information (Select One): ○ US Residency  ○ Non US Residency  ○ Active US Military Service

City: Seongnam-si  Country of Residence: KR

Citizenship under 37 CFR 1.41(b): KR

Mailing Address of Applicant:

Address 1: HUMAX CO., LTD. of Humax village

Address 2: 1-4, Sunae-dong, Bundang-gu

City: Seongnam-si, Gyeonggi-do  State/Province:


All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

☐ An Address is being provided for the correspondence information of this application.

Customer Number: 34610

Email Address: ked-docket@ked-iplaw.com  Add Email  Remove Email

Application Information:

Title of the Invention: METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL

Attorney Docket Number: RPL-0424  Small Entity Status Claimed:

Application Type: Nonprovisional

Subject Matter: Utility

Suggested Class (if any):

Sub Class (if any):

Suggested Technology Center (if any):

Total Number of Drawing Sheets (if any): 5  Suggested Figure for Publication (if any):
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### Publication Information:

- [ ] Request Early Publication (Fee required at time of Request 37 CFR 1.219)
- [ ] Request Not to Publish. I hereby request that the attached application not be published under 35 U.S. C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

### Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

- Please Select One: [ ] Customer Number  [ ] US Patent Practitioner  [ ] Limited Recognition (37 CFR 11.9)

Customer Number: 34610

### Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

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Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.

### Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

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Additional Foreign Priority Data may be generated within this form by selecting the Add button.

### Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1
**Application Data Sheet 37 CFR 1.76**

| Title of Invention | METHOD FOR RECEIVING VIEWING-RESTRICTED CHANNEL |

If the Assignee is an Organization check here. [ ]

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**Signature:**

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

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<td>Daniel Y.J.</td>
<td>KIM</td>
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This collection of information is required by 37 CFR 1.76. 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 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet 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.
## Electronic Patent Application Fee Transmittal

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**Total Files Size (in bytes):** 3030742
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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.