ISSUE NOTIFICATION

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 51 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):

Jonghun LEE, Yongin-si, KOREA, REPUBLIC OF;
HUMAX CO., LTD., 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 Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

or Fax (571)-273-8855

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)

2292 7590 07/18/2014

BIRCH STEWART KOLASCH & BIRCH, LLP
PO BOX 747
FALLS CHURCH, VA 22040-0747

APPLICATION NO. 13/678,060
FILING DATE 11/15/2012
FIRST NAMED INVENTOR Jonghun LEE
ATTORNEY DOCKET NO. 1630-1121PUS1
CONFIRMATION NO. 9807

TITLE OF INVENTION: METHOD FOR CONTROLLING INTERFACE

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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" indicator (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
   Humax Co., Ltd.

   (B) RESIDENCE: (CITY and STATE OR COUNTRY)
   Seongnam-Si, Republic of Korea

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

   4a. 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.

   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.

Authorized Signature ____________________________ Date AUG 13 2014

Typed or printed name ____________________________ Registration No. 40,953

Page 2 of 3

**Electronic Patent Application Fee Transmittal**

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<td>Jonghun LEE</td>
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<td>Filer:</td>
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**Utility under 35 USC 111(a) Filing Fees**

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The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
- Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)
- Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)
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**Warnings:**

**Information:**

Total Files Size (in bytes): 129695

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.
NOTICE OF ALLOWANCE AND FEE(S) DUE

2292  7590  07/18/2014
BIRCH STEWART KOLASCH & BIRCH, LLP
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER
RABOVIANSKI, JIVKA A

ART UNIT  PAPER NUMBER
2426

DATE MAILED: 07/18/2014

APPLICATION NO.  FILING DATE  FIRST NAMED INVENTOR  ATTORNEY DOCKET NO.  CONFIRMATION NO.
13/678,060  11/15/2012  Joaehan LEE  1630-1121PUS1  9807

TITLE OF INVENTION: METHOD FOR CONTROLLING INTERFACE

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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)-273-885

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)

2292 7590 07/18/2014
BIRCH STEWART KOLASCH & BIRCH, LLP
PO BOX 747
FALLS CHURCH, VA 22040-0747

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BIRCH STEWART KOLASCH & BIRCH, LLP
PO BOX 747
FALLS CHURCH, VA 22040-0747

APPLICATION NO. 13/678,060
FILING DATE 11/15/2012
FIRST NAMED INVENTOR Jonghun LEE
ATTORNEY DOCKET NO. 1630-1121PUS1
CONFIRMATION NO. 9807

TITLE OF INVENTION: METHOD FOR CONTROLLING INTERFACE

APPLICATION TYPE nonprovisional
ENTITY STATUS UNDISCOUNTED
ISSUE FEE DUE $960
PUBLICATION FEE DUE $0
REV. PAID ISSUE FEE $0
TOTAL FEE(S) DUE $960
DATE DUE 10/20/2014

EXAMINER RABOVIANSKI, JIVKA A
ART UNIT 2426
CLASS-SUBCLASS 725-127000

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) ______

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

4a. 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 certifying 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, as applicable.

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

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

   □ Absent a valid certification of Regular Entity Status, issue fee payment in the regular entity amount will not be accepted at the risk of application abandonment.

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

   □ 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. __________

Page 2 of 3

PTOL-85 Part B (10-13) Approved for use through 10/31/2013.

OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.
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

Application No. 13/678,060
Examiner JIVKA RABOVIAŃSKI
Applicant(s) LEE, JONGHUN
Art Unit 2426
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 06/06/2014.
   ☐ 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, 4 - 12. 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) 5. ☑ Examiner’s Amendment/Comment
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
   6. ☑ Examiner’s Statement of Reasons for Allowance
3. ☑ Examiner’s Comment Regarding Requirement for Deposit of Biological Material 7. ☐ Other _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date _____.
1. The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

EXAMINER’S AMENDMENT

2. An examiner’s amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner’s amendment was given in a telephone interview with Sang Cho Reg. No 70794 on 07/07/2014.

The application has been amended as follows:

1. (Currently Amended) A method for controlling interface, comprising:
   
   detecting a state of connection with one or more sink devices and one or more source devices which are connected to input and output ports of a multimedia interface module;
   
   identifying one or more operation modes at least one operation mode available for the detected connection state; and
   
   transmitting device information of the one or more sink devices to the one or more source devices, the device information being selectively edited in accordance with a requested operation mode among the identified operation modes at least one operation mode,
   
   wherein the one or more operation modes at least one operation mode,
mode include includes at least one of Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange, and

wherein the operation modes at least one operation mode including Through, Convert, Switch and Mix are available when two or more source devices and one sink device are connected, the operation modes at least one operation mode including Through, Convert, Distribute and Duplicate are available when one source device and two or more sink devices are connected, and the operation modes at least one operation mode including Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange are available when two or more source devices and two or more sink devices are connected.

2. (Canceled)

3. (Canceled)

4. (Currently Amended) The method of claim 1, wherein the step of transmitting device information further comprises steps of:

transmitting, when the at least one operation mode is Through, information on a format of a best quality for the sink device to the source device; and

receiving A/V signal from the source device and transmitting the signal to the sink device.

5. (Currently Amended) The method of claim 1, wherein the step of transmitting device information further comprises steps of:

generating, when the at least one operation mode is Convert, information on a format that a repeater can handle by referring to the device
information of the sink device, and transmitting the information to the source device; and

receiving A/V signal from the source device, converting the signal to the format appropriate for the device information of the sink device, and transmitting the converted signal to the sink device.

6. (Currently Amended) The method of claim 1, wherein the step of transmitting device information further comprises steps of:

selecting, when the at least one operation mode is Switch, one from the two or more source devices connected, and transmitting the device information of the sink device to the selected source device; and

receiving A/V signal from the selected source device and transmitting the signal to the sink device.

7. (Currently Amended) The method of claim 1, wherein the step of transmitting device information further comprises steps of:

editing, when the at least one operation mode is Mix, the device information of the sink device in a format which is available to the sink device and common to two or more source devices connected, and transmitting the edited device information to the two or more source devices; and

receiving A/V signal from the two or more source devices, mixing the signal, and transmitting the mixed signal to the sink device.

8. (Currently Amended) The method of claim 1, wherein the step of transmitting device information further comprises steps of:

transmitting, when the at least one operation mode is Mix, optimal format information of the sink device to a first source device, and
transmitting format information which is lower than the optimal format information to the second source device; and

mixing A/V signal from the first source devices as a main display and A/V signal from the second source devices as a sub display, and transmitting the mixed signal to the sink device.

9. (Currently Amended) The method of claim 1, wherein the step of transmitting device information further comprises steps of:

selecting, when the at least one operation mode is Distribute, one from two or more sink devices connected, and transmitting the device information of the selected sink device to the source device; and

receiving A/V signal from the source device and transmitting the signal to the selected sink device.

10. (Currently Amended) The method of claim 1, wherein the step of transmitting device information further comprises steps of:

transmitting, when the at least one operation mode is Duplicate, information on a format which is common to two or more sink devices to the source device; and

receiving A/V signal from the source device and transmitting the signal to the sink device.

11. (Currently Amended) The method of claim 1, wherein the step of transmitting device information further comprises steps of:

transmitting, when the at least one operation mode is Exchange, the device information of the connected sink device to two or more source devices; and

receiving A/V signal from the source device and transmitting the
signal to the sink device connected.

12. (Currently Amended) A repeater comprising:
   a multimedia interface module having a plurality of input ports and output ports for connecting source devices and sink devices; and
   a control unit configured to detect a connection state of one or more sink devices and one or more source devices respectively connected to the input ports and output ports, identify one or more operation modes at least one operation mode available for the detected connection state, selectivity edit device information of the one or more sink devices according to a requested operation mode among the identified operation modes at least one operation mode, and transmit the edited information to the one or more source devices,

   wherein the operation modes at least one operation mode include includes at least one of Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange, and

   wherein the operation modes at least one operation mode including Through, Convert, Switch and Mix are available when two or more source devices and one sink device are connected, the operation modes at least one operation mode including Through, Convert, Distribute and Duplicate are available when one source device and two or more sink devices are connected, and the operation modes at least one operation mode including Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange are available when two or more source devices and two or more sink devices are connected.

13. (Canceled)
14. (Canceled)

**Reasons for Allowance**

3. The following is an examiner’s statement of reasons for allowance: Claims 1, 4 and 5 -12 are considered allowable since when reading the claims in light of the specification (MPEP § 211.01) or In re Sneed, 710 F.2d 1544, 1548, 218 USPQ 385, 388 (Fed. Cir. 1983), none of the references of record alone or in combination disclose or suggest the combination of limitations specified in independent claim 1, including the at least one operation mode including Through, Convert, Switch and Mix are available when two or more source devices and one sink device are connected, the at least one operation mode including Through, Convert, Distribute and Duplicate are available when one source device and two or more sink devices are connected, and the at least one operation mode including Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange are available when two or more source devices and two or more sink devices are connected. Inter alia, independent claim 12 is allowable for similar reasons.

The closest prior art (Ito, USPPGPubN 20080244649) teaches input/source devices Fig. 2/ items 3, 4 and 5 are connected through repeater device Fig. 2/ items 2 to the output devices sink such as television set, an video home system and a component terminal, Fig. 2/ items 1, 16a-
16c [0041], [0048], Fig. 4, table 1 and 2 and based on its own physical address the connection state is determined, [0083] - [0087], Fig. 7. Ito does not teach the device information being selectively edited in accordance with a requested operation mode among the identified operation modes. The reference of (Seita, USPPGPubN 20070280646) teaches the higher resolution is elected for the sink device, [0070], Fig. 4. None of the references of record alone or in combination disclose or suggest the combination of limitations specified in independent claims 1 and 12 including that the at least one operation mode including Through, Convert, Switch and Mix are available when two or more source devices and one sink device are connected, the at least one operation mode including Through, Convert, Distribute and Duplicate are available when one source device and two or more sink devices are connected, and the at least one operation mode including Through, Convert, Mix, Distribute, Duplicate and Exchange are available when two or more source devices and two or more sink devices are connected.

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."

Contact
4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jivka Rabovianski whose telephone number is (571)270-1845. The examiner can normally be reached on Monday-Friday from 8:30-5:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Nasser Moazzami can be reached on (571) 272-4195. 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.

/JIVKA RABOVIANSKI/

Primary Examiner, Art Unit 2426

July 10, 2014
Examiner-Initiated Interview Summary

All participants (applicant, applicant’s representative, PTO personnel):

(1) JIVKA RABOVIANSKI.
(2) Sang Cho Reg. No 70794.
(3) ____.
(4) ____.

Date of Interview: 07 July 2014.

Type: [ ] Telephonic [ ] Video Conference
[ ] Personal [copy given to: [ ] applicant [ ] applicant’s representative]

Exhibit shown or demonstration conducted: [ ] Yes [ ] No.
If Yes, brief description: ____.

Issues Discussed: [ ] 101 [ ] 112 [ ] 102 [ ] 103 [ ] Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: Yes.
Identification of prior art discussed: Ito USPPGPubN.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The applicant’s representative and the Examiner discussed the claim limitations in claim 1. The applicant’s representative and the Examiner agreed that the claims need amendment to move the application forward.

Applicant recodarion instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recodarion instructions: Examiners must summarize the substance of any interview of record. A complete and proper recodarion of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recodarion including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

[ ] Attachment

JIVKA RABOVIANSKI
Primary Examiner, Art Unit 2426
EAST Search History

EAST Search History (Prior Art)

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EAST Search History (Interference)

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**APPLICANTS**
HUMAX CO., LTD., Seongnam-si, KOREA, REPUBLIC OF

**INVENTORS**
Jonghun LEE, Yongin-si, KOREA, REPUBLIC OF;

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

**FOREIGN APPLICATIONS ***********************
REPUBLIC OF KOREA 10-2011-0139342 12/21/2011

** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **
12/07/2012

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**ADDRESS**
BIRCH STEWART KOLASCH & BIRCH, LLP
PO BOX 747
FALLS CHURCH, VA 22040-0747
UNITED STATES

**TITLE**
METHOD FOR CONTROLLING INTERFACE

FILING FEE RECEIVED
1390

FEES: Authority has been given in Paper
No.__________ to charge/credit DEPOSIT ACCOUNT
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- All Fees
- 1.16 Fees (Filing)
- 1.17 Fees (Processing Ext. of time)
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**Examiner**

JIVKA RABOVIANSKI

**Art Unit**

2426

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(Primary Examiner) JIVKA RABOVIANSKI/ 07/10/2014

(Primary Examiner) 07/10/2014

**Total Claims Allowed:**

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O.G. Print Claim(s) O.G. Print Figure

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**None**

(Primary Examiner)  
(J IVKA RABOVIANSKI)  
Primary Examiner Art Unit 2426  

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(Primary Examiner)  
(Assistant Examiner)  

(Date)  
07/10/2014
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(Primary Examiner) (Date)

/JIVKA RABOVIANSKI/
Primary Examiner. Art Unit 2426

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application of:
Jonghun LEE

Application No.: 13/678,060  Confirmation No.: 9807

Filed: November 15, 2012  Art Unit: 2426

For: METHOD FOR CONTROLLING INTERFACE  Examiner: J. A. RABOVIANSKI

AMENDMENT UNDER 37 C.F.R. § 1.111

MS AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

INTRODUCTORY COMMENTS
In reply to the Office Action dated March 07, 2014, the following amendments and remarks are respectfully submitted in connection with the above-identified application.

Amendments to the Claims; and

Remarks.
AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for controlling interface, comprising:
   detecting a state of connection with one or more sink devices and one or more source
   devices which are connected to input and output ports of a multimedia interface module;
   identifying one or more operation modes available for the detected connection state; and
   transmitting device information of the one or more sink devices to the one or more
   source devices, the device information being selectively edited in accordance with a requested
   operation mode among the identified operation modes,
   wherein the one or more operation modes include at least one of Through, Convert,
   Switch, Mix, Distribute, Duplicate and Exchange, and
   wherein the operation modes including Through, Convert, Switch and Mix are available
   when two or more source devices and one sink device are connected, the operation modes
   including Through, Convert, Distribute and Duplicate are available when one source device and
   two or more sink devices are connected, and the operation modes including Through, Convert,
   Switch, Mix, Distribute, Duplicate and Exchange are available when two or more source devices
   and two or more sink devices are connected.

2. (Canceled)

3. (Canceled)

4. (Currently Amended) The method of claim 1[[2]], wherein the step of transmitting
   device information further comprises steps of:
   transmitting, when the operation mode is Through, information on a format of a best
   quality for the sink device to the source device; and
   receiving A/V signal from the source device and transmitting the signal to the sink
   device.
5. (Currently Amended) The method of claim 1[[2]] wherein the step of transmitting device information further comprises steps of:

   generating, when the operation mode is Convert, information on a format that a repeater can handle by referring to the device information of the sink device, and transmitting the information to the source device; and

   receiving A/V signal from the source device, converting the signal to the format appropriate for the device information of the sink device, and transmitting the converted signal to the sink device.

6. (Currently Amended) The method of claim 1[[2]] wherein the step of transmitting device information further comprises steps of:

   selecting, when the operation mode is Switch, one from the two or more source devices connected, and transmitting the device information of the sink device to the selected source device; and

   receiving A/V signal from the selected source device and transmitting the signal to the sink device.

7. (Currently Amended) The method of claim 1[[2]], wherein the step of transmitting device information further comprises steps of:

   editing, when the operation mode is Mix, the device information of the sink device in a format which is available to the sink device and common to two or more source devices connected, and transmitting the edited device information to the two or more source devices; and

   receiving A/V signal from the two or more source devices, mixing the signal, and transmitting the mixed signal to the sink device.

8. (Currently Amended) The method of claim 1[[2]], wherein the step of transmitting device information further comprises steps of:

   transmitting, when the operation mode is Mix, optimal format information of the sink device to a first source device, and transmitting format information which is lower than the optimal format information to the second source device; and

   mixing A/V signal from the first source devices as a main display and A/V signal from
the second source devices as a sub display, and transmitting the mixed signal to the sink device.

9. (Original) The method of claim 1, wherein the step of transmitting device information further comprises steps of:

selecting, when the operation mode is Distribute, one from two or more sink devices connected, and transmitting the device information of the selected sink device to the source device; and

receiving A/V signal from the source device and transmitting the signal to the selected sink device.

10. (Currently Amended) The method of claim 1[[2]], wherein the step of transmitting device information further comprises steps of:

transmitting, when the operation mode is Duplicate, information on a format which is common to two or more sink devices to the source device; and

receiving A/V signal from the source device and transmitting the signal to the sink device.

11. (Currently Amended) The method of claim 1[[2]], wherein the step of transmitting device information further comprises steps of:

transmitting, when the operation mode is Exchange, the device information of the connected sink device to two or more source devices; and

receiving A/V signal from the source device and transmitting the signal to the sink device connected.

12. (Currently Amended) A repeater comprising:

a multimedia interface module having a plurality of input ports and output ports for connecting source devices and sink devices; and

a control unit configured to detect a connection state of one or more sink devices and one or more source devices respectively connected to the input ports and output ports, identify one or more operation modes available for the detected connection state, selectively edit device information of the one or more sink devices according to a requested operation mode among the
identified operation modes, and transmit the edited information to the one or more source devices.

  wherein the one or more operation modes include at least one of Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange, and

  wherein the operation modes including Through, Convert, Switch and Mix are available when two or more source devices and one sink device are connected, the operation modes including Through, Convert, Distribute and Duplicate are available when one source device and two or more sink devices are connected, and the operation modes including Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange are available when two or more source devices and two or more sink devices are connected.

13. (Canceled)

14. (Canceled)
REMARKS

Status of the Claims

The non-final Office Action dated March 7, 2014 has been received and reviewed. By this reply, claims 2, 3, 13, and 14 have been canceled. Thus, claims 1 and 4-12 are now present in this application. Claims 1 and 12 are independent. The claims have been amended herein. Among others, independent claims 1 and 12 have been amended to include the allowable subject matter of claims 3 and 14, respectively, and their respective intervening claims. No new matter is added, as original claims 2, 3, 13, and 14 have been incorporated into independent claim 1 or 12. Reconsideration of this application, as amended, is respectfully requested.

Priority under 35 U.S.C. § 119

Applicant thanks the Examiner for acknowledging Applicant’s claim for foreign priority under 35 U.S.C. § 119, and receipt of the certified priority document.

Information Disclosure Citation

Applicant thanks the Examiner for considering the references supplied with the Information Disclosure Statement filed November 6, 2013, and for providing Applicant with an initialed copy of the PTO-SB08 form filed therewith.

Drawings

Applicant thanks the Examiner for indicating that the drawings are accepted.

Rejections under 35 U.S.C. § 103

Claims 1, 2, 4-7, 9, and 11-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ito and further in view of Seita. Further, claim 8 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ito in view of Seita and further in view of Chang.

As noted above, independent claims 1 and 12 have been amended to include the allowable subject matter of claims 3 and 14, respectively and are thus in condition for allowance.
Allowable Subject Matter

The Examiner states that claims 3 and 14 would be allowable if rewritten into independent form.

Applicant thanks the Examiner for the early indication of allowable subject matter in this application. As set forth above, the limitations of objected-to claims 3 and 14 have been added into independent claims 1 and 12, along with intervening claims 2 and 13, and therefore independent claims 1 and 12 should be in condition for allowance. Also, claims 4-11 depend, either directly or indirectly, from independent claim 1, and are therefore allowable based on their dependence from claim 1 which is believed to be allowable.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all present rejections and that they be withdrawn. It is believed that a full and complete response has been made to the Office Action, and as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Sang Cho, Registration No. 70794, at the telephone number of the undersigned below to conduct an interview in an effort to expedite prosecution in connection with the present application.
If necessary, the Director is hereby authorized to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

Dated: JUN 06 2014

Respectfully submitted,

By

[Signature]

Esther H. Chong
Registration No.: 40953
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road, Suite 100 East
P.O. Box 747
Falls Church, VA 22040-0747
703-205-8000
## Electronic Acknowledgement Receipt

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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.
AMENDMENT TRANSMITTAL LETTER

Application No. 13/678,060 - Conf. #9807
Filing Date November 15, 2012
Examiner J. A. RABOVIANSKI
Art Unit 2426

Applicant(s): Jonghun LEE

Invention: METHOD FOR CONTROLLING INTERFACE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Transmitted herewith is an amendment in the above-identified application.

The fee has been calculated and is transmitted as shown below.

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TOTAL ADDITIONAL FEE FOR THIS AMENDMENT: 0.00

x Large Entity    [ ] Small Entity    [ ] Micro Entity

x No additional fee is required for this amendment.

[ ] Please charge Deposit Account No. 02-2448 in the amount of $ 0.00.

[ ] A check in the amount of $ 0.00 is enclosed.

[ ] Payment by credit card. Form PTO-2038 is attached.

x The Director is hereby authorized to charge and credit Deposit Account No. 02-2448 as described below.

[ ] Credit any overpayment.

[ ] Charge any additional filing or application processing fees required under 37 C.F.R. §§ 1.16 and 1.17.

Esther H. Chong
Attorney Reg. No.: 40953

BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road, Suite 100 East
P.O. Box 747
Falls Church, VA 22040-0747
703-205-8000

Dated: JUN 06 2014
# PATENT APPLICATION FEE DETERMINATION RECORD

**Application or Docket Number**: 13/678,060  
**Filing Date**: 11/15/2012  
**To be Mailed**: 

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**"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.

**LIE**  
/DIANA BATES/

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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):

mailroom@bskb.com
**Office Action Summary**

---

**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 **11/15/2012**.
   - 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) 1-14 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, 2, 4 - 13 is/are rejected.

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

9) □ Claim(s) 3 and 14 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 **11/15/2012** 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)).

**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 ______.

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

4) □ Other: ______.
1. The present application is being examined under the pre-AIA first to invent provisions.

**DETAILED ACTION**

*Claim Rejections - 35 USC § 103*

2. 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 negated by the manner in which the invention was made.

3. Claims 1 – 2, 4 – 7, 9 and 11 - 13 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Ito (USPGPUBN 20080244649, referred to as Ito), and further in view of Seita (USPGPUBN 20070280646, referred to as Seita).

   Regarding claim 1:

   A method for controlling interface, comprising:

   Ito teaches detecting a state of connection with one or more sink devices and one or more source devices which are connected to input and output ports of a multimedia interface module (Ito, input/source devices Fig. 2/ items 3, 4 and 5 are connected through repeater device Fig. 2/ items 2 to the output devices sink such as television set, an video home system and a
component terminal, Fig. 2/ items 1, 16a-16c [0041], [0048], Fig. 4, table 1 and 2);

Ito teaches identifying one or more operation modes available for the detected connection state (Ito, based on its own physical address the connection state is determined, [0083] - [0087], Fig. 7); and

Ito teaches transmitting device information of the one or more sink devices to the one or more source devices, (Ito, the information of the sink device/ID is read by the repeater and after that the [0099], [0102] - [0105], Fig. 7. Ito does not specifically teach the device information being selectively edited in accordance with a requested operation mode among the identified operation modes. However, Seita teaches s the higher resolution is elected for the sink device, [0070], Fig. 4. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Seita with the teaching of selection of resolution which is the display format into the invention of Ito for the purpose of determining the sink device and its resolution.

Regarding claims 2 and 13:

Ito teaches the one or more operation modes include at least one of Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange, (Ito, when the television controller receives a command to display the input selection list/ source device on the display by e.g. the operation of the
remote control by the user the appropriate source device is selected after operations which is the operation "Through", [0118] – [0127], Figs. 9 and 10; the switcher 22 selects one of the source devices – operation "Switch", Figs. 2 and 11; the operation Mix is related to the optimal format which is discussed in claim 1 above taught by Ito; operation distribute is related to the distribution of the signal from the source device to the sink device Figs. 1 and 12 – operation "distribution"; the device information of the television set is transmitted to one of the source device which is operation "Exchange", [0018]).

Ito in view of Seita teaches when the format is the same for more than one sink device then there is operation "Duplicate" as shown in Seita, Figs. 4 and 5.
Regarding claim 4:

The method of claim 2, wherein the step of transmitting device information further comprises steps of:

Ito in view of Seita teaches transmitting, when the operation mode is Through, information on a format of a best quality for the sink device to the source device (Seita, setting processing unit sets the format of audio data and the resolution of video data to be output to the input/output unit based on the result obtained by the EDID decode unit 212, the acquired EDID data, Fig. 1, [0046], [0048], [0049]); and

Ito in view of Seita teaches receiving A/V signal from the source device and transmitting the signal to the sink device (Seita, teaches s the higher resolution is elected for the sink device, [0034], [0051], [0070], Fig. 4).

Regarding claim 5:

The method of claim 2 wherein the step of transmitting device information further comprises steps of:

Ito in view of Seita teaches generating, when the operation mode is Convert, information on a format that a repeater can handle by referring to the device information of the sink device, and transmitting the information to the source device (Seita, the acquired formats of the audio/video data that can be reproduced by each of the reproduction devices, abstract, [0015], [0030], [0034]) and
Ito in view of Seita teaches receiving A/V signal from the source device, converting the signal to the format appropriate for the device information of the sink device, and transmitting the converted signal to the sink device (Seita, selecting a format appropriate for the sink device, Fig. 4, [0030], [0045], [0046]).

**Regarding claim 6:**

The method of claim 2 wherein the step of transmitting device information further comprises steps of:

Ito teaches of transmitting device information further comprises steps of selecting, when the operation mode is Switch, one from the two or more source devices connected, and transmitting the device information of the sink device to the selected source device (Ito, the user makes a selection of the input device displayed on the screen shown in Fig. 3 this information is transmitted to the input device and appropriate device is selected, Fig. 3, [0065], [0066], [0117], Fig. 9); and

Ito teaches selecting A/V signal from the selected source device and transmitting the signal to the sink device (Ito, when the user selects an input device, the signal of connection is sent to the receiver/sink device).

**Regarding claim 7:**

The method of claim 2, wherein the step of transmitting device information further comprises steps of:
Ito in view of Seita teaches editing, when the operation mode is Mix, the device information of the sink device in a format which is available to the sink device and common to two or more source devices connected, and transmitting the edited device information to the two or more source devices (Seita, the audio data (format) and video data (resolution) output from the device 1 (generally referred to as a source device in relation to the sink devices and repeater devices) are compared with each other, and thus it is checked whether or not there is any format or resolution that is common to all the sink devices or repeater devices, [0049], [0057], [0063], Figs. 3 and 4); and

Ito in view of Seita receiving A/V signal from the two or more source devices, mixing the signal, and transmitting the mixed signal to the sink device (Seita, the encoder unit 50 can supply an analog-digital converted digital video signal or digital audio signal to a video mixing unit, [0027]).

**Regarding claim 9:**

The method of claim 1, wherein the step of transmitting device information further comprises steps of:

Ito in view of Seita teaches selecting, when the operation mode is Distribute, one from two or more sink devices connected, and transmitting the device information of the selected sink device to the source device (Seita, a predetermined number of HDMI terminals (transmitters) 311, 321,
. . . 3n1 (n is a natural number) that can supply audio data and video data whose audio format and resolution are respectively set, to a predetermined number of output devices, [0047] – [0048], Fig. 1; and

Ito in view of Seita teaches receiving A/V signal from the source device and transmitting the signal to the selected sink device (Seita, HDMI terminals received the signals and redistributes the signal to the predetermined sink device, [0047] – [0048], Fig. 1).

Regarding claim 10:

The method of claim 2, wherein the step of transmitting device information further comprises steps of:

Ito in view of Seita teaches transmitting, when the operation mode is Duplicate, information on a format which is common to two or more sink devices to the source device (Seita, an output signal processing unit that supplies the audio/video data to be reproduced to the first and second audio and video reproduction devices in accordance with the extracted common format, [0016]; and

Ito in view of Seita teaches receiving A/V signal from the source device and transmitting the signal to the sink device, (Seita, the signals with the specified resolution were received by the output devices as shown in Fig. 1, [0049], [0057], [0063], [0070], [0073], Figs. 3 and 4).

Regarding claim 11:
The method of claim 2, wherein the step of transmitting device information further comprises steps of:

Ito teaches transmitting, when the operation mode is Exchange, the device information of the connected sink device to two or more source devices (Ito, the device information of the television set is transmitted to one of the source device which is operation “Exchange”, [0018]); and

Ito teaches receiving A/V signal from the source device and transmitting the signal to the sink device connected (Ito, the television set receives the signal from the source device, abstract, Fig. 13, [0007], [0015]).

4. Claim 8 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Ito (USPPGPubN 20080244649, referred to as Ito), in view of Seita (USPPGPubN 20070280646, referred to as Seita), and further in view of CHANG (USPPGPubN 20100033621, referred to as CHANG).

Regarding claim 8:

The method of claim 2, wherein the step of transmitting device information further comprises steps of:

Ito in view of Seita does not teach transmitting, when the operation mode is Mix, optimal format information of the sink device to a first source device, and transmitting format information which is lower than the optimal
format information to the second source device. However, Chang teaches multiple source devices wherein the signal for at least two sources are mixed wherein the format/resolution for one of the sources is less than the resolution of the other, [0016], Table, 6 – 8. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Chang with the teaching of mixing two signals from different sources with different resolution into the invention of Ito for the purpose of presenting a picture from two different sources.

Ito in view of Seita in view of Chang teaches mixing A/V signal from the first source devices as a main display and A/V signal from the second source devices as a sub display, and transmitting the mixed signal to the sink device (Chang, the mixer blends the processed signal S1 and the processed signal S2 when the display mode indicates displaying two signal sources simultaneously, for example, when the display mode belongs to a PIP (picture in picture) or POP (picture of picture) mode and transmits the mixed signal to the display device, Fig. 2, [0014], [0016]).

**Allowable Subject Matter**

5. Claims 3 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Contact**
6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jivka Rabovianski whose telephone number is (571)270-1845. The examiner can normally be reached on Monday-Friday from 8:30-5:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Nasser Moazzami can be reached on (571) 272-4195. 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.

/JIVKA RABOVIANSKI/

Primary Examiner, Art Unit 2426

February 28, 2014
**Notice of References Cited**

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*Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages*

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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.
### EAST Search History

#### EAST Search History (Prior Art)

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**EAST Search History (Interference)**

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**Examiner**

/Jivka Rabovianski/

**Date Considered**

02/28/2014

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This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, 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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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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### Search Notes

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**APPLICANTS**
HUMAX CO., LTD., Seongnam-si, KOREA, REPUBLIC OF

**INVENTORS**
Jonghun LEE, Yongin-si, KOREA, REPUBLIC OF;

**CONTINUING DATA**

**FOREIGN APPLICATIONS**
REPUBLIC OF KOREA 10-2011-0139342 12/21/2011

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12/07/2012

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**ADDRESS**
BIRCH STEWART KOLASCH & BIRCH, LLP
PO BOX 747
FALLS CHURCH, VA 22040-0747
UNITED STATES

**TITLE**
METHOD FOR CONTROLLING INTERFACE

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| **EFS ID:** | 17312893 |
| **Application Number:** | 13678060 |
| **International Application Number:** | |
| **Confirmation Number:** | 9807 |
| **Title of Invention:** | METHOD FOR CONTROLLING INTERFACE |
| **First Named Inventor/Applicant Name:** | Jonghun LEE |
| **Customer Number:** | 2292 |
| **Filer:** | Esther Hyeri Chong/Stephen Leon |
| **Filer Authorized By:** | Esther Hyeri Chong |
| **Attorney Docket Number:** | 1630-1121PUS1 |
| **Receipt Date:** | 06-NOV-2013 |
| **Filing Date:** | 15-NOV-2012 |
| **Time Stamp:** | 16:45:50 |
| **Application Type:** | Utility under 35 USC 111(a) |

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REPEATER APPARATUS AND METHOD FOR CONTROLLING THE SAME

In a home theater system having a source apparatus, a repeater apparatus and a sink apparatus connected in the recited order, when connected to a sink apparatus, whatever type it is, the repeater apparatus provides the source apparatus with video and audio signal format information that allows correct transmission. A control part 210 of the repeater apparatus 200 reads EDID information from memory 321 of the connected sink apparatus 300, and analyzes video and audio signal formats that can be processed by the sink apparatus 300, and when any format that cannot be handled by the repeater apparatus 200 itself is included, the repeater apparatus deletes information concerning that format to reconstruct the EDID information, and stores the reconstructed information into memory 221 in order to cause the source apparatus 100 to reference the stored information as EDID information of the repeater apparatus itself.
Description

Technical Field

[0001] The present invention relates to repeater apparatuses having interfaces for transmitting digital video and audio signals, and relaying video/audio signals to construct a home network.

Background Art

[0002] In recent years, mainly in the field of consumer video/sound equipment, general practice has been to connect an output apparatus such as a DVD player to a receiving apparatus such as a display via a network, and to view content, which is reproduced and outputted by the output apparatus, on the output apparatus.

[0003] As an interface standard for transmitting digital video and audio signals between the output apparatus and the receiving apparatus, a standard called "High-Definition Multimedia Interface" (hereinafter, referred to as the "HDMI"; see Non-Patent Document 1) is established.

[0004] Because the HDMI standard makes it possible to transmit video and audio data in high-quality and un-compressed form, and the audio data is transmitted along with a video signal with a blanking period in which the audio data is superimposed (hereinafter, such a signal is referred to as the "HDMI signal"), the HDMI standard has advantages, for example, in that it is not necessary to separate an audio output terminal and a video output terminal as is required conventionally. Furthermore, the standard is expected to come into wide use in the future because the HDMI signal being transferred is encoded and thus copyright-protected.

[0005] In the HDMI, basically, a plurality of apparatuses are connected in series via cables conforming to the HDMI standard (hereinafter, referred to as the "HDMI cables"), and signals are transmitted between the apparatuses in one direction. The apparatuses are classified into three types:

(1) "Source" for transmitting signals (hereinafter, referred to as the "source apparatus");
(2) "Sink" for receiving signals (hereinafter, referred to as the "sink apparatus"); and
(3) "Repeater" disposed between the source apparatus and the sink apparatus and having abilities to receive and retransmit signals as well as, for example, a 1-input/1-output or multi input/multi output selector function for selecting the source apparatus or the sink apparatus (hereinafter, referred to as the "repeater apparatus").

[0006] Note that the repeater apparatus does not simply pass the signals therethrough, but has in itself abilities both as the sink apparatus and as the source apparatus, and functions for reproducing a video signal and an audio signal by decoding a received HDMI signal, and reconveting these signals into an HDMI signal before retransmission.

[0007] The repeater apparatus is not only used as a selector, but also can be used as one of the apparatuses for constructing a home theater system in which, for example, the repeater apparatus itself has an audio reproduction and output ability, allowing the repeater apparatus to output an audio signal, which is received from a source apparatus such as a DVD player, from its own audio reproduction equipment, and retransmit a video signal to a sink apparatus for displaying the signal on a display.

[0008] Note that the sink apparatus at least stores information called "Extended Display Identification Data" (hereinafter, referred to as the "EDID"; see Non-Patent Document 2) for defining formats of video and audio signals, and the source apparatus can reference the EDID information in the sink apparatus by reading it via a serial signal line called a "DDC" in the HDMI cable.

[0009] The EDID information is information concerning formats of video and audio signals that can be reproduced after being received by the sink apparatus. By using the EDID information, the source apparatus can transmit a signal after automatically determining an optimal format of the signal in accordance with the sink apparatus connected thereto.

[0010] For example, when the EDID Information indicates that the format of the video signal is compatible with 480p and 1080i, and the format of the audio signal is a linear PCM 2-channel format and compatible with sampling frequencies of up to 192 kHz*, the source apparatus can operate in such a manner as "not to use 720p but to output audio of up to 192 kHz without limiting the audio at 48 kHz".*

[0011] Accordingly, in order to ensure the aforementioned mechanism, the repeater apparatus is required to perform control in such a manner that the EDID information in the sink apparatus connected thereto can be referenced by the source apparatus as EDID information of the repeater apparatus itself.

[0012] Note that 480p, 1080i, and 720p as mentioned above denote video signal display formats, where numerals denote the number of scanning lines, p denotes progressive scanning mode, and i denotes interlaced scanning mode.


Disclosure of the Invention

Problem To be Solved by the Invention

[0013] In the above-described control by the repeater apparatus, i.e., the control for allowing the source appa-
ratus to reference the EDID information in the sink apparatus connected to the repeater apparatus as the EDID information of the repeater apparatus itself, when receiving and transmitting an HDMI signal, the repeater apparatus might not be able to process part of the formats that can be processed by the connected sink apparatus because of constraints of employed devices such as LSIs.

[0014] In such a case, if the EDID information in the sink apparatus is used without any modification as the EDID information of the repeater apparatus itself, the repeater apparatus cannot process a signal outputted based on EDID information referenced by the source apparatus, and therefore there arises a situation where video and audio signals cannot be transmitted in a format that can be processed by the sink apparatus.

The present invention aims to solve the above traditional problem and provide a repeater apparatus capable of presenting, to the source apparatus, information regarding formats that can be processed by both the sink apparatus and the repeater apparatus.

Means for Solving the Problem

[0015] To attain the above object, the present invention provides a repeater apparatus comprising:

- a receiving part for decoding video and audio signals in a predetermined format that have been encoded by a source apparatus;
- a transmitting part for re-encoding at least the video signal out of the decoded video and audio signals for transmission to a sink apparatus; and
- a control part for controlling operations of the receiving part and the transmitting part, and storing information into memory, the information being acquired from the sink apparatus and defining a plurality of formats that can be processed by the sink apparatus,

wherein the control part newly sets a format that can be processed by the repeater apparatus, the newly set format being an overlap between the formats that can be processed by the sink apparatus and formats that can be processed by the repeater apparatus, and the control part replaces the format defining information stored in the memory with information defining the newly set format.

[0016] The repeater apparatus of the present invention may further comprise an audio reproducing part having at least an audio signal processing part and an amplifier part, the audio signal decoded by the receiving part may be inputted to the audio reproducing part so as to be reproduced as audio, and the video signal decoded by the receiving part may be inputted to the transmitting part so as to be re-encoded and transmitted to the sink apparatus.

[0017] Also, a soundless audio signal may be generated by the audio signal processing part, and transmitted to the sink apparatus after being encoded by the transmitting part, along with the video signal.

[0018] In addition, in the repeater apparatus of the present invention, it is preferred that the receiving part is capable of receiving a signal conforming to an HDMI standard, and the transmitting part is capable of transmitting the signal conforming to the HDMI standard. Also, it is preferred that the information defining the formats of the video and audio signals is information conforming to an EDID standard.

[0019] In addition, the present invention provides a method for controlling the repeater apparatus, which is a repeater apparatus controlling method for decoding video and audio signals in a predetermined format that have been encoded by a source apparatus, and thereafter re-encoding the signals for transmission to a sink apparatus, wherein for at least one of the video and audio signals, information defining a plurality of formats that can be processed by the sink apparatus is acquired from the sink apparatus, and the acquired information and information defining formats that can be processed by a repeater apparatus are analyzed to set an overlapping format as a new format that can be processed by the repeater apparatus.

Effect of the Invention

[0020] The repeater apparatus of the present invention is capable of allowing the source apparatus to recognize only video and audio signal formats falling within the range that can be processed by the repeater apparatus based on whatever ability owned by a sink apparatus connected thereto, and therefore the source apparatus can output a signal after automatically determining an optimal format in accordance with the ability of the sink apparatus.

Brief Description of the Drawings

[0021] FIG. 1 is a block diagram illustrating a configuration of a home theater system in Embodiment 1 of the present invention. FIG. 2 is an explanatory diagram illustrating video signal formats that can be processed by each apparatus in Embodiment 1. FIG. 3 is an explanatory diagram illustrating audio signal formats that can be processed by each apparatus in Embodiment 1. FIG. 4 is a flowchart illustrating a process for editing EDID information in Embodiment 1. FIG. 5 is a flowchart illustrating a process for editing EDID information in Embodiment 2 of the present invention.

Best Mode for Carrying Out the Invention

[0022] Hereinafter, embodiments of the present inven-
The sink apparatus 300 includes a control part 310, an HDMI receiving part 320, and a video/audio reproducing part 330, and the HDMI receiving part 320 and the video/audio reproducing part 330 are controlled by the control part 310. The video signal inputted to and decoded by the HDMI receiving part 320 is processed by a video signal processing part 331, and thereafter displayed on a display part 332.

Note that an audio signal processing part 333, an amplifier part 334 and internal loudspeakers 335 of the video/audio reproducing part 330 are used for reproducing audio in the sink apparatus 300, and are functionally the same as the audio signal processing part 241, the amplifier part 242 and the external loudspeakers 243, respectively, of the repeater apparatus 200, but in the present embodiment, audio reproduction is performed by the external loudspeakers 243 of the repeater apparatus 200, and therefore their descriptions will be omitted herein.

The source apparatus 100 and the repeater apparatus 200 are connected by an HDMI cable 300, and the repeater apparatus 200 and the sink apparatus 300 are connected by another HDMI cable 300. The HDMI cable 300 include at least an HDMI signal line 401, a DCC 402, and a HotPlug signal line 403. The HDMI signal line 401 is used for transferring the HDMI signal on which a video signal and an audio signal are superimposed. The DCC 402 is used for transferring the EDID information, which is information defining formats of the video and audio signals. The HotPlug signal line 403, on the other hand, is connected to the control part of each apparatus via the HDMI transmitting part and the HDMI receiving part. When the apparatuses are connected by the HDMI cable and the EDID information in the sink apparatus is in a readable state, a High signal is applied, whereas when the apparatuses are disconnected, a Low signal is applied.

In the present embodiment, the repeater apparatus 200 and the sink apparatus 300 include memory 221, 321 in the EDID receiving part 220, 320, and the memory has stored therein EDID information defining video and audio signal formats. In addition, the control part 210 of the repeater apparatus 200 has functions of reading EDID information defining video and audio signal formats that can be processed by the sink apparatus 300 from the memory 321 of the sink apparatus 300 via the DDC 402; and analyzing and editing the read EDID information and the EDID information that is stored in the memory 221 of the repeater apparatus 200, thereby reconstructing the EDID information, which is stored to the memory 221.

The control part 110 of the source apparatus 100, on the other hand, recognizes formats that can be processed by the apparatuses connected to the source apparatus 100 by reading and referencing the EDID information from the memory 221 of the repeater apparatus 200 via the DDC 402, and the recognized formats are used as criteria to decide formats of video and audio sig-
nals that are to be transmitted. The EDID information that is to be stored in the memory 221 is written by the control part 210 of the repeater apparatus 200.

[0034] FIG. 2 illustrates video signal formats that can be processed by each of the source apparatus 100, the repeater apparatus 200 and the sink apparatus 300. In the present embodiment, the source apparatus 100 can process five formats A, B, C, D and E, the repeater apparatus 200 can process three formats B, C and D, and the sink apparatus 300 can process three formats A, B and D.

[0035] In the case where the format A is, for example, 1080i, “being capable of processing the format A” means that, as for the source apparatus 100, the content signal processing part 120 can reproduce a video signal from a recording medium, such as an optical disk, in 1080i format. In addition, it means that, as for the repeater apparatus 200, the HDMI receiving part 220 can reproduce an HDMI signal, which is transmitted from the source apparatus 100, as a video signal in 1080i format, and thereafter the HDMI transmitting part 230 can convert the video signal into an HDMI signal for transmission. Also, it means that, as for the sink apparatus, the HDMI receiving part 320 can reproduce an HDMI signal, which is transmitted from the repeater apparatus 200, as a video signal in 1080i format, which is thereafter displayed on the display part 332.

[0036] Regarding the information that is to be stored to the memory 221 of the repeater apparatus 200, in the case as shown in (a) of FIG. 2, where EDID information 31, which is stored in the memory 321 of the sink apparatus 300 and defines the formats A, B and D, is stored to the memory 221 as EDID information 21 of the repeater apparatus 200 without any modification, the source apparatus 100 recognizes the repeater apparatus 200 connected thereto as being capable of processing the format A, despite the fact that the repeater apparatus 200 cannot process the format A.

[0037] Therefore, as shown in (b) of FIG. 2, the control part 210 of the repeater apparatus 200 reads and analyzes the EDID information 31 of the sink apparatus 300, and performs an edit to delete EDID information regarding the format A that cannot be processed by the repeater apparatus 200, thereby reconstructing and changing the EDID information into information defining the formats B and D that can be handled by both the repeater apparatus 200 and the sink apparatus 300, the information being used as EDID information 22 of the repeater apparatus 200, so that the source apparatus 100 can recognize that the apparatus connected thereto cannot handle the format A.

[0038] Next, FIG. 3 illustrates audio signal formats that can be processed by each of the source apparatus 100, the repeater apparatus 200 and the sink apparatus 300. In the present embodiment, the source apparatus 100 and the repeater apparatus 200 can process a PCM 2-CH format G with a sampling frequency from 32 to 192 kHz, and the sink apparatus 300 can process a PCM 2-CH format F with a sampling frequency of 48 kHz.

[0039] In the present embodiment, audio reproduction is performed by the audio reproducing part 240 of the repeater apparatus 200, and therefore the source apparatus 100 reproduces an audio signal stored in an optical disk or the like at a sampling frequency supported by the format G, the HDMI transmitting part 130 converts the reproduced signal to an HDMI signal and transmits the HDMI signal to the repeater apparatus 200. In the repeater apparatus 200, the HDMI receiving part 220 decodes the inputted HDMI signal to reproduce the audio signal, and the external loudspeakers 243 of the audio reproducing part 240 reproduce audio.

[0040] As shown in (a) of FIG. 3, the format F that can be processed by the sink apparatus 300 is a PCM 2CH format with a sampling frequency of 48 kHz, and therefore if EDID information 32 of the sink apparatus 300 is stored as EDID information 23 of the repeater apparatus 200 without any modification as in the case of (a) of FIG. 2, transmission from the source apparatus 100 is performed only in the format F, despite the fact that the format G that can be processed by the repeater apparatus 200 is a PCM 2-CH format with a sampling frequency from 32 to 192 kHz.

[0041] Therefore, as shown in (b) of FIG. 3, even if the repeater apparatus 200 recognizes the EDID information 32 of the sink apparatus 300, the repeater apparatus 200 stores information defining the format G as the EDID information 24 of the repeater apparatus itself for reference by the source apparatus 100. The source apparatus 100 recognizes that the EDID information defining the format G is stored in the memory 221, and reproduces the audio signal in the format G, so that audio reproduction can be performed fully utilizing the ability of the audio reproducing part 240 of the repeater apparatus 200.

[0042] As described above, the control part 210 of the repeater apparatus 200 reads the EDID information from the memory 321 of the sink apparatus 300, and analyzes and edits the information in accordance with the methods as shown in FIGS. 2 and 3 to reconstruct the information before storing the information to the memory 221 as the EDID information of the repeater apparatus 200 itself, thereby making it possible to allow the source apparatus 100 to recognize video formats that can be processed by both the repeater apparatus 200 and the sink apparatus 300.

[0043] FIG. 4 is a flowchart illustrating a process for editing the EDID Information in the repeater apparatus 200. The editing of the EDID information will be described below with reference to FIG. 4. Initially, the control part 210 of the repeater apparatus 200 detects that the sink apparatus 300 is connected via the HotPlug signal line 403 (step S1). Upon detection of the connection with the sink apparatus 300 (YES in S1), the control part 210 sets the HotPlug signal line 15 at Low level, and notifies the source apparatus 100 that reading the EDID information in the repeater apparatus 200 is not allowed because there is a possibility that the
EDID information might be changed (S2). Thereafter, pieces of EDID information 31 and 32 regarding video and audio signals are read from the memory 321 of the sink apparatus 300 (S3), and analyzed to confirm video and audio signal formats that can be processed by the sink apparatus 300 (S4).

Next, when the video signal formats that can be processed by the sink apparatus 300 include any format that cannot be processed by the repeater apparatus 200 (YES in S5), corresponding EDID information is deleted (S6). When any format that cannot be processed by the repeater apparatus 200 is not included (NO in S5) or after the EDID information is edited in step S6, the control part 210 updates the EDID information concerning the audio signal formats to information concerning the formats that can be processed by the audio reproducing part 240 of the repeater apparatus 200 (S7). The control part 210 reconstructs the EDID information with the thus-updated information regarding video and audio signal formats to generate pieces of EDID information 22 and 24 (S8), which are stored to the memory 221 of the repeater apparatus 200 (S9).

Lastly, the control part 210 brings the HotPlug signal line 403 back to High level in order to notify the control part 110 of the source apparatus 100 that the EDID information in the repeater apparatus 200 has become readable (S10). Thereafter, each time the connection status of the sink apparatus 300 is changed, the processing will be executed from step S1.

Note that in the present embodiment, since the repeater apparatus 200 reproduces the audio signal, and the sink apparatus 300 reproduces only the video signal, the repeater apparatus 200 is not required to transmit the audio signal to the sink apparatus 300. In such a case, it is typical to instruct the control part 310 of the sink apparatus 300 to mute the output from the amplifier part 334 in order not to reproduce audio from the loudspeakers 335, but it is also possible to provide a change-over switch (not shown) in the audio signal processing part 241 of the repeater apparatus 200, so that the control part 210 can command the audio signal processing part 241 to operate the change-over switch so as to output the audio signal as a soundless signal.

Thus, according to the present embodiment, when the sink apparatus reproduces a video signal, it is possible to provide the source apparatus with EDID information defining formats that can be processed by both the sink apparatus and the repeater apparatus, and therefore the source apparatus can automatically determine an optimal format from the formats that can be processed by the repeater apparatus and the sink apparatus that are connected to the source apparatus, whereby the source apparatus can output the video signal in accordance with that format.

FIG. 5 is a flowchart illustrating a process for editing the EDID information in a repeater apparatus according to Embodiment 2 of the present invention. The present embodiment differs from Embodiment 1 in that audio is reproduced from the internal loudspeakers 335 of the sink apparatus 300, rather than from the external loudspeakers 243 of the repeater apparatus 200. Because other features are similar to those in Embodiment 1, and the configuration of the home theater system is not changed from that shown in FIG. 1, the operation of the present embodiment will be described with reference to FIGS. 1 and 5.

In FIG. 5, steps for performing the same processing as that in FIG. 4 are denoted by the same characters. Features different from those in FIG. 4 are steps S11 and S12 that are added in place of step S7 between steps S6 and S8 of FIG. 4.

Initially, the control part 210 of the repeater apparatus 200 detects that the sink apparatus 300 is connected via the HotPlug signal line 403 (step S1). Upon detection of the connection with the sink apparatus 300 (YES in S1), the control part 210 sets the HotPlug signal line 15 at Low level, and notifies the source apparatus 100 that reading the EDID information in the repeater apparatus 200 is not allowed because there is a possibility that the EDID information might be changed (S2). Thereafter, pieces of EDID information 31 and 32 regarding video and audio signals are read from the memory 321 of the sink apparatus 300 (S3), and analyzed to confirm video and audio signal formats that can be processed by the sink apparatus 300 (S4).

In step S5, when the video signal formats that can be processed by the sink apparatus 300 include any format that cannot be processed by the repeater apparatus 200 (YES in S5), the control part 210 deletes corresponding EDID information (S6). The processing up to here is the same as that in FIG. 4.

Next, when the audio signal formats that can be processed by the sink apparatus 300 include any format that cannot be processed by the repeater apparatus 200 (YES in S11), the control part 210 deletes EDID information concerning the format that cannot be processed, as in the case of the video signal (S12). On the other hand, when there is no audio signal format that cannot be handled by the repeater apparatus 200, the EDID information is reconstructed with updated information defining the video and audio signal formats (S9), and stored to the memory 221 of the repeater apparatus 200.

Lastly, the control part 210 brings the HotPlug signal line 403 back to High level, and notifies the source apparatus 100 that the EDID information in the repeater apparatus 200 has become readable. Thereafter, each time the connection status of the sink apparatus 200 is changed, the processing will be executed from step S1.

In this manner, according to the present embodiment, when the sink apparatus reproduces not only the video signal but also the audio signal, it is possible to provide the source apparatus with EDID information defining video and audio signal formats that can be proc-
essed by both the sink apparatus and the repeater apparatus, and therefore the source apparatus can automatically determine an optimal format in accordance with the repeater apparatus and the sink apparatus that are connected to the source apparatus, so that the source apparatus can output the video and audio signals in accordance with that format.

Note that video and audio signal formats, EDID information defining the video and audio signal formats, interface forms, etc., as described in the above embodiments are illustrative, and are not to be construed as restrictive.

Also, in the above embodiments, the memory for storing the EDID information is provided in the HDMI receiving part, but this is not restrictive and it may be provided in, for example, the control part.

In addition, in Embodiment 1, the repeater apparatus includes means for reproducing audio, and transmits the video signal to the sink apparatus, but on the other hand, it is also possible that the repeater apparatus itself includes means for reproducing video, such as a display, and transmits the audio signal to the sink apparatus. In such a case, when the audio signal is transmitted to the sink apparatus, it is necessary to transmit the video signal at the same time because the audio signal uses a clock of the video signal, and the video signal may be a black screen signal, for example.

Industrial Applicability

The repeater apparatus of the present invention eliminates the necessity of any digital signal reception/transmission LSIs that support all video signal formats, and also eliminates the necessity of converting video and audio signal formats within the repeater apparatus. Furthermore, whatever sink apparatus is connected, the repeater apparatus makes it possible to allow the source apparatus to recognize processable video and audio signal formats, and therefore is capable of wide industrial applicability.

Claims

1. A repeater apparatus comprising:

- a receiving part for decoding video and audio signals in a predetermined format that have been encoded by a source apparatus;
- a transmitting part for re-encoding at least the video signal out of the decoded video and audio signals for transmission to a sink apparatus; and
- a control part for controlling operations of the receiving part and the transmitting part, and storing information into memory, the information being acquired from the sink apparatus and defining a plurality of formats that can be processed by the sink apparatus,

wherein the control part newly sets a format that can be processed by the repeater apparatus, the newly set format being an overlap between the formats that can be processed by the sink apparatus and formats that can be processed by the repeater apparatus, and the control part replaces the format defining information stored in the memory with information defining the newly set format.

2. The repeater apparatus according to claim 1, further comprising an audio reproducing part having at least an audio signal processing part and an amplifier part, wherein the audio signal decoded by the receiving part is inputted to the audio reproducing part so as to be reproduced as audio, and the video signal decoded by the receiving part is inputted to the transmitting part so as to be re-encoded and transmitted to the sink apparatus.

3. The repeater apparatus according to claim 2, wherein a soundless audio signal is generated by the audio signal processing part, and transmitted to the sink apparatus after being encoded by the transmitting part, along with the video signal.

4. The repeater apparatus according to claim 1, wherein the receiving part is capable of receiving a signal conforming to an HDMI standard, and the transmitting part is capable of transmitting the signal conforming to the HDMI standard.

5. The repeater apparatus according to claim 1, wherein the information defining the formats of the video and audio signals is information conforming to an EDID standard.

6. A repeater apparatus controlling method for decoding video and audio signals in a predetermined format that have been encoded by a source apparatus, and thereafter re-encoding the signals for transmission to a sink apparatus, wherein for at least one of the video and audio signals, information defining a plurality of formats that can be processed by the sink apparatus is acquired from the sink apparatus, and the acquired information and information defining formats that can be processed by a repeater apparatus are analyzed to set an overlapping format as a new format that can be processed by the repeater apparatus.

7. The repeater apparatus controlling method according to claim 6, wherein of the decoded video and audio signals, the audio signal is reproduced as audio by an internal audio reproducing part, and the video signal is re-encoded and transmitted to the sink apparatus.

8. The repeater apparatus controlling method accord-
ing to claim 6, wherein the re-encoded video and audio signals are signals conforming to an HDMI standard.

9. The repeater apparatus controlling method according to claim 6, wherein the information defining the formats of the video and audio signals is information conforming to an EDID standard.
Fig. 4

Start

S1
Connection with sink apparatus has been detected?

YES
S2
Set HotPlug signal at low to indicate to source apparatus that EDID information is not readable

S3
Read EDID information in sink apparatus

S4
Confirm format processable by sink apparatus based on read EDID information

S5
Any video signal format unprocessable by repeater apparatus is present?

YES
S6
Delete EDID information for unprocessable format

NO
S7
Update EDID information for audio signal with information concerning formats processable by audio processing part of repeater apparatus

S8
Reconstruct EDID information with updated video and audio signal information

S9
Store reconstructed EDID information into memory

S10
Set HotPlug at high to indicate to source apparatus that EDID information is readable
Start

S1: Connection with sink apparatus has been detected?

YES: S2

NO: S11

S2: Set HotPlug signal at low to indicate to source apparatus that EDID information is not readable

S3: Read EDID information in sink apparatus

S4: Confirm format processable by sink apparatus based on read EDID information

S5: Any video signal format unprocessable by repeater apparatus is present?

YES: S6

NO: S11

S6: Delete EDID information for unprocessable format

S11: Any audio signal format unprocessable by repeater apparatus is present?

YES: S12

NO: S8

S12: Delete EDID information for unprocessable format

S8: Reconstruct EDID information with updated video and audio signal information

S9: Store reconstructed EDID information into memory

S10: Set HotPlug at high to indicate to source apparatus that EDID information is readable
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
   H04N5/44 (2006.01),  H04N5/45 (2006.01),  H04N5/45 (2006.01),  H04N5/44 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
   H04N5/44 (2006.01),  H04N5/45 (2006.01),  H04N5/45 (2006.01),  H04N5/44 (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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<tbody>
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Further documents are listed in the continuation of Box C.

See patent family annex.

Date of the actual completion of the international search
09 February, 2006 (09.02.06)

Date of mailing of the international search report
21 February, 2006 (21.02.06)

Name and mailing address of the ISA
Japanese Patent Office

Authorized officer

Facsimile No.

Form PCT/ISA/210 (second sheet) (April 2005)
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<thead>
<tr>
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REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

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- ENHANCED EXTENDED DISPLAY IDENTIFICATION DATA STANDARD Release A, Revision 1 VESA, 2002 [0012]
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application of:
Jonghun LEE

Application No.: 13/678,060

Confirmation No.: 9807

Filed: November 15, 2012

Art Unit: 2426

For: METHOD FOR CONTROLLING INTERFACE

Examiner: RABOVIANSKI, JIVKA A.

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

Applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the attached PTO/SB/08.

II. COPIES

☑ a. Copies of foreign patent documents, non-patent literature and other information are provided.

☐ b. REFERENCES PREVIOUSLY CITED OR SUBMITTED: Copies of any information not provided can be found in one or more of the following applications which has been relied upon for an earlier filing date under 35 U.S.C. § 120:
III. CONCISE EXPLANATION OF THE RELEVANCE/OTHER INFORMATION

☐ a. NON-ENGLISH LANGUAGE DOCUMENTS: A concise explanation of the relevance of all non-English language patents, publications, or other information listed is as follows:

☑ b. ENGLISH LANGUAGE SEARCH REPORT OR FOREIGN PATENT OFFICE COMMUNICATION: An English language version of the search report or Foreign Patent Office communication that indicates the degree of relevance is attached.

☑ c. OTHER: The following additional information is provided.

A copy of the Extended European Search Report for corresponding European Application No. 12193534.0 dated March 14, 2013, is provided.

IV. STATEMENT UNDER 37 C.F.R. § 1.97(e)

The undersigned hereby states that:

☐ a. Each item of information contained in the IDS was first cited in any communication from a foreign patent office in a counterpart foreign application not more than 30 days prior to the filing of this IDS. This statement does not relate to English language counterparts not listed in a communication from the foreign patent office. Such English language counterparts are provided to aid the Examiner’s consideration of non-English items first cited in the communication from the foreign patent office; or

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c. No item of information contained in the IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS; or

d. Some of the items of information in the IDS were cited in a communication from a foreign patent office. Such items were first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS. This statement does not relate to English language counterparts not listed in a communication from the foreign patent office. Such English language counterparts are provided to aid the Examiner’s consideration of non-English items first cited in the communication from the foreign patent office. As to the remaining items of information, to the knowledge of the person signing the certification after making reasonable inquiry, such remaining items were not known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

V. STATEMENT UNDER 37 C.F.R. § 1.704(d)(1)

Patent Term Adjustment Reduction Should Not Apply

The undersigned hereby states:

This Information Disclosure Statement is in compliance with 37 C.F.R. §§ 1.97 and 1.98 and will not be considered a failure to engage in reasonable efforts to conclude prosecution (processing or examination) of the present application under 37 C.F.R. § 1.704(c)(6), (c)(8), (c)(9), or (c)(10), because each item of information contained in the Information Disclosure Statement:

(i) Was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office, and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the information disclosure statement; or
(ii) Is a communication that was issued by a patent office in a counterpart foreign or international application or by the Office, and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the information disclosure statement.

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☐ a. This Information Disclosure Statement is being filed concurrently with the filing of a new patent application or Request for Continued Examination. No fee is required.

☐ b. This Information Disclosure Statement is being filed within three months of the filing date of an application. No fee is required.

☑ c. This Information Disclosure Statement is being filed before the mailing date of a first Action on the merits. No fee is required. If a first Office Action on the merits has issued, please consider this IDS under 37 C.F.R. § 1.97(e) and see the statement under 37 C.F.R. § 1.97(e) above. If no statement has been made, charge our deposit account for the required fee.

☐ d. This Information Disclosure Statement is being filed before the mailing date of a Final Office Action or before the mailing date of a Notice of Allowance or before an action that otherwise closes prosecution in the application (see 37 C.F.R. § 1.97(c)(1)).

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or

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e. This Information Disclosure Statement is being filed after the mailing date of a Final Office Action or after the mailing date of a Notice of Allowance or after an action that otherwise closes prosecution in the application (see 37 C.F.R. § 1.97(d)), see the statement above. The fee as required by 37 C.F.R. § 1.17(p) is provided.

VII. PAYMENT OF FEES

☐ The required fee is listed on the attached Fee Transmittal.

☑ No fee is required.
If the Examiner has any questions concerning this IDS, please contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the USPTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 02-2448.

Dated: November 6, 2013

Respectfully submitted,

By

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Attachment(s):
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☑️ Document(s)
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☑️ Foreign Search Report(s)
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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: 10-2011-0139342

Filing Date: 2011년 12월 21일
(12월 21, 2011)

Applicant(s): Humax Co., Ltd.

Commissioner: [Signature]
제출 일자 : 2011-12-21

【서지사항】

【서류명】 특허출원서
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대리인 특허법인로말 (서명 또는 인)

【수수료】
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[명세서]

[발명의 명칭]

인터넷 케이스 제어 장치 및 방법 (Interface Control Apparatus and Method)

[기술분야]

본 발명은, 예를 들어, 멀티미디어 인터페이스인 HDMI, DVI, D-Sub 등의 장비 성능 정보를 IIC 통신 등을 통해 외부 기기에 보낼 수 있는 인터페이스 제어 장치 및 방법에 관한 것이다.

[배경기술]

일반적으로 멀티미디어 인터페이스로서 HDMI, DVI, D-Sub 등 사용되고 있는 데, 예를 들어, HDMI 모듈이 구비된 리피터(Repeater)는, 멀티어 중계기 등과 같은 다양한 명칭으로 일컬어지기도 한다.

한편, 도 1에 도시한 바와 같이, 상기 리피터(200)에는, HDMI 입력(In) 포트를 통해 디지털 플레이어(DVD-Player) 등과 같이 오디오 및 비디오 신호를 제공하는 다양한 유형의 소스(Source) 디바이스(300)가 연결 접속된다.

또한, 상기 리피터(200)에는, HDMI 출력(Out) 포트를 통해 디지털 멀티비전(D-TV) 등과 같이 오디오 및 비디오를 출력 표시하는 다양한 유형의 싱크(Sink) 디바이스가 연결 접속된다.

그리고, 상기 리피터(200)에서는, 장비 성능(Video/Audio 등)을 설정할 때이
터로시, 예를 들어, 상기 상크 디바이스의 EDID(Extended Display Identification Data) 정보를 HDMI의 CEC(Consumer Electronic Control) 라인을 통해, 상기 소스 디바이스(300)로 전달하게 된다.

한편, 상기 소스 디바이스(300)에서는, 상기 EDID 정보를 참조하여, 상기 상크 디바이스(100)에 최적한 오디오 및 비디오 신호를 출력하게 되는 데, 예를 들어, 상기 EDID 정보에는, 상기 상크 디바이스(100)에서 출력 표시할 수 있는 최적의 A/V(Audio/Video) 포맷 등에 관한 정보(예: Native Format)가 포함되어 있다.

예를 들어, 상기 소스 디바이스(300)에서 출력 가능한 비디오 포맷이 Full HD급이더라도, 상기 EDID 정보를 참조하여, 상기 상크 디바이스(100)에 표시 가능한 최적의 비디오 포맷이, HD급이라고 판별되면, Full HD급의 비디오 대신 HD급의 비디오를 출력하게 된다.

한편, 최근에는, 여러 개의 입력 포트들과 출력 포트들이 마련된 HDMI 모듈이 구비된 리피터가 개발 출시되어 상용화되고 있는 데, 예를 들어, 도 2에 도시한 바와 같이, 상기 리피터(200)에는, HDMI 모들의 입력 포트들을 통해, 디브이디 플레이어(DVD-Player), 그리고 비디 플레이어(BD-Player) 등과 같은 여러 개의 소스 디바이스들(300a~300n)이 연결 접속될 수 있다.

또한, 상기 리피터(200)에는, HDMI 모들의 출력 포트들을 통해, 디지털 빌레비전(D-TV), 그리고 고선명 디지털 빌레비전(HD-TV) 등과 같은 여러 개의 상크 디
바이스들(100~1002)이 연결 접속될 수 있다.

예를 들어, 도 3에 도시한 바와 같이, 리피터의 HDMI 모듈에 마련된 다수의 입력 포트(예: 11~13)와 출력 포트(예: 01~03)에는, 각각 하나의 소스 디바이스(Source #1)와 싱크 디바이스(Sink #1)가 연결 접속되거나, 여러 개의 소스 디바이스(예: Source #1~#3)와 하나의 싱크 디바이스(Source #1)가 연결 접속될 수 있다.

또한, 상기 리피터의 HDMI 모듈에 마련된 다수의 입력 포트와 출력 포트에는, 하나의 소스 디바이스(Source #1)와 여러 개의 싱크 디바이스(예: Sink #1~#3)가 연결 접속되거나, 여러 개의 소스 디바이스(예: Source #1~#3)와 싱크 디바이스(예: Source #1~#3)가 각각 연결 접속될 수 있다.

이에 따라, 상기 리피터에서는, 각 소스 디바이스들과 싱크 디바이스들 간의 인터페이스 동작을, 보다 다양한 프로세스(Process)들로 구분하여 실행시킬 수 있게 되는 데, 이를 위한 각 프로세스별 인터페이스 채어 방안이 아직 마련되어 있지 않은 실정이다.

【발명의 내용】

【해결하려는 과제】

본 발명은, 예를 들어, HDMI, DVI, D-Sub 등과 같은 멀티미디어 인터페이스 모듈에 연결된 소스 디바이스와 싱크 디바이스의 접속 상태를 확인하여, 다수의 실행 가능한 프로세스들을 설정함과 아울러, 각 프로세스의 종류에 따라 싱크 디바이스
스의 기기 정보를 선택적으로 편집한 후, 소스 디바이스로 전달하여, 각 프로세스별 고유의 인터페이스 동작을 실행함으로써, 다양한 각 프로세스들을 보다 효율적으로 구분하여 실행시킬 수 있도록 하기 위한 인터페이스 제어 장치 및 방법을 제공하기 위한 것이다.

【과제의 해결 수단】

본 발명에 따른 인터페이스 제어 방법은, 멀티미디어 인터페이스의 포트를 통해 연결된 하나 이상의 디바이스의 접속 상태를 감지하는 1단계; 상기 검출된 접속 상태에 따라, 다수의 실행 가능한 프로세스들 중 요청된 프로세스의 종류를 확인하는 2단계; 및 상기 확인된 프로세스의 종류에 따라, 디바이스의 기기 정보를 선택적으로 편집하여, 인터페이스 동작을 실행하는 3단계를 포함하여 이루어지는 것을 특징으로 하며,

또한, 상기 2단계는, 상기 검출된 접속 상태에 따라, 다수의 실행 가능한 프로세스들로서, 동과, 변환, 결합, 합성, 분배, 복사, 교환 중 적어도 2 개 이상을 설정한 후, 임의의 한 프로세스의 실행이 요청되면, 해당 프로세스의 종류를 확인하는 것을 특징으로 하며,

또한, 상기 다수의 실행 가능한 프로세스는, 오에스디(OSD) 화면을 통해 표시된 후, 사용자의 선택에 의해 임의로 변경 설정되는 것을 특징으로 하며,

또한, 상기 3단계는, 상기 확인된 프로세스의 종류가, 통과인 경우, 싱크 디
바이스의 기기 정보를, 소스 디바이스로 전달하고, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 성크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며,

<18> 또한, 상기 3단계는, 상기 확인된 프로세스의 종류가, 변환인 경우, 성크 디바이스의 기기 정보를, 최적 비디오 포맷에 대응되게 변환하여, 소스 디바이스로 전달하고, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 성크 디바이스의 A/V 포맷으로 변환한 후, 상기 성크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며,

<19> 또한, 상기 3단계는, 상기 확인된 프로세스의 종류가, 절환인 경우, 다수의 소스 디바이스 중 하나를 선택한 후, 성크 디바이스의 기기 정보를, 상기 선택된 소스 디바이스로 전달하고, 상기 선택된 소스 디바이스의 A/V 신호를 수신하여, 상기 성크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며,

<20> 또한, 상기 3단계는, 상기 확인된 프로세스의 종류가, 협성인 경우, 하나의 성크 디바이스의 기기 정보와, 다수의 소스 디바이스의 기기 정보를 확인한 후, 상기 성크 디바이스에서 수용 가능함과 동시에, 상기 다수의 소스 디바이스의 공동된 A/V 포맷으로, 상기 성크 디바이스의 기기 정보를 전달하고, 상기 편집된 기기 정보를, 상기 다수의 소스 디바이스로 전달한 후, 상기 다수의 소스 디바이스의 A/V 신호를 수신하여 협성한 후, 상기 성크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며,

<21> 또한, 상기 3단계는, 상기 확인된 프로세스의 종류가, 분배인 경우, 다수의
싱크 디바이스 중 하나를 선택한 후, 상기 선택된 싱크 디바이스의 기기 정보를, 소스 디바이스로 전달하고, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 선택된 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며.

또한, 상기 3단계는, 상기 확인된 프로세스의 종류가, 복사인 경우, 다수의 싱크 디바이스의 공통된 A/V 포맷을 추출한 후, 이들 중 최고 해상도를 선택하여, 상기 디바이스의 기기 정보를 편집하고, 상기 편집된 기기 정보를 소스 디바이스로 전달한 후, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 다수의 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며.

또한, 상기 3단계는, 상기 확인된 프로세스의 종류가, 교환인 경우, 다수의 싱크 디바이스의 기기 정보를 캡처하여 저장한 후, 소스 디바이스와 교환 연결시, 연결된 싱크 디바이스의 기기 정보를 추출하여, 상기 소스 디바이스로 전달하고, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 연결된 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며.

또한, 본 발명에 따른 인터페이스 세이 복사 는, 소스 디바이스와 싱크 디바이스가 연결되는 다수의 입력 포트와 출력 포트가 마련된 멀티미디어 인터페이스 모듈: 및 상기 멀티미디어 인터페이스 모듈에 연결된 소스 디바이스와 싱크 디바이스의 접속 상태에 따라, 다수의 실행 가능한 프로세스들을 설정하기 위한 세이복사를 포함하여 구성되며, 상기 세이복사는, 입력의 한 프로세스의 실행이 요청되면, 해당 프로세스의 종류에 따라, 싱크 디바이스의 기기 정보를 선택적으로 편집하여, 소스 디바이스로 전달하는 각 프로세스별 고유의 인터페이스 동작을 실행하는 것을 특징
으로 하며,

또한, 상기 제어부는, 상기 검출된 접속 상태에 따라, 다수의 실행 가능한 프로세스들로서, 통과, 변환, 결합, 합성, 분배, 목사, 교환 중 적어도 2 개 이상을 설정한 후, 임의의 한 프로세스의 실행이 요청되면, 해당 프로세스의 종류를 확인하는 것을 특별히 하며,

또한, 사용자 선택이 가능한 오에스디 화면을 생성하기 위한 오에스디 생성부를 더 포함하여 구성되며 아울러, 상기 다수의 실행 가능한 프로세스는, 상기 오에스디( OSD) 화면을 통해 표시된 후, 사용자의 선택에 의해 임의로 변경 설정되는 것을 특별히 하며,

또한, 상기 제어부는, 상기 확인된 프로세스의 종류가, 통과인 경우, 싱크 디바이스의 기기 정보를, 소스 디바이스로 전달하고, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특별히 하며,

또한, 상기 제어부는, 상기 확인된 프로세스의 종류가, 변환인 경우, 싱크 디바이스의 기기 정보를, 최적 비디오 포맷에 대응되게 변환하여, 소스 디바이스로 전달하고, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 싱크 디바이스의 A/V 포맷으로 변환한 후, 상기 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특별히 하며,

또한, 상기 제어부는, 상기 확인된 프로세스의 종류가, 결합인 경우, 다수의
소스 디바이스 중 하나를 선택한 후, 싱크 디바이스의 기기 정보를, 상기 선택된 소스 디바이스로 전달하고, 상기 선택된 소스 디바이스의 A/V 신호를 수신하여, 상기 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며.

또한, 소스 디바이스로부터 수신되는 비디오 신호를 신호 처리하기 위한 비디오 처리부를 더 포함하여 구성됨과 아울러, 상기 제어부는, 상기 확인된 프로세스의 종류가, 합성된 경우, 하나의 싱크 디바이스의 기기 정보와, 다수의 소스 디바이스의 기기 정보를 확인한 후, 상기 싱크 디바이스에서 수용 가능함과 동시에, 상기 다수의 소스 디바이스의 공통된 A/V 포맷으로, 상기 싱크 디바이스의 기기 정보를 편집하고, 상기 편집된 기기 정보를, 상기 다수의 소스 디바이스로 전달한 후, 상기 다수의 소스 디바이스의 A/V 신호가 수신되면, 상기 비디오 처리부를 동작 제어하여, 합성한 후, 상기 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며.

또한, 상기 제어부는, 상기 확인된 프로세스의 종류가, 복제된 경우, 다수의 싱크 디바이스 중 하나를 선택한 후, 상기 선택된 싱크 디바이스의 기기 정보를, 소스 디바이스로 전달하고, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 선택된 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며.

또한, 상기 제어부는, 상기 확인된 프로세스의 종류가, 복사된 경우, 다수의 싱크 디바이스의 공통된 A/V 포맷을 추출한 후, 이들 중 최고 해상도를 결정하여, 싱크 디바이스의 기기 정보를 편집하고, 상기 편집된 기기 정보를 소스 디바이스로 전달한 후, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 다수의 싱크 디바이스의 공통된 A/V 포맷으로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하며.
스로 전달하는 인터페이스 동작을 실행하는 것을 특정으로 하며,

또한, 상기 제어부는, 상기 확인된 프로세스의 종류가, 교환인 경우, 다수의 싱크 디바이스의 기기 정보를 캡처하여 저장한 후, 소스 디바이스와 교환 연결시, 연결된 싱크 디바이스의 기기 정보를 추출하여, 상기 소스 디바이스로 전달하고, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 연결된 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특정으로 한다.

【발명의 효과】

본 발명에 따른 인터페이스 제어 장치 및 방법은, 예를 들어, HDMI, DVI, D-Sub 등과 같은 멀티미디어 인터페이스 모듈에 연결된 소스 디바이스와 싱크 디바이스의 접속 상태를 확인하여, 다수의 실행 가능한 프로세스들을 설정하고, 각 프로세스의 종류에 따라, 싱크 디바이스의 기기 정보를 선택적으로 전달한 후, 소스 디바이스로 전달하는 각 프로세스별 고유의 인터페이스 동작을 실행함으로써, 통과, 변환, 접합, 합성, 분배, 복사, 교환 등과 같은 다양한 각 프로세스들을 보다 효율적으로 구분하여 실행시킬 수 있게 되므로, 사용자의 편의성을 향상시킬 수 있고, 싱크 디바이스와 소스 디바이스 간의 인터페이스 성능을 향상시킬 수 있게 된다.

【도면의 간단한 설명】

도 1은 일반적인 디피터의 HDMI 모듈에 하나의 소스 디바이스와 싱크 디바이
스가 연결 접속된 실시예를 도시한 것이고,

도 2는 일반적인 리피터의 HDMI 모듈에 다수의 소스 디바이스와 상크 디바이스가 연결 접속된 실시예를 도시한 것이고,

도 3은 일반적인 HDMI 모듈의 입력 포트와 출력 포트에 적어도 하나 이상의 소스 디바이스와 상크 디바이스가 연결 접속된 실시예를 도시한 것이고,

도 4는 본 발명에 따른 각 프로세스별 인터페이스 제어 장치 및 방법이 적용되는 리피터에 대한 실시예의 구성을 도시한 것이고,

도 5는 본 발명에 따라 다수의 실행 가능한 프로세스들이 설정된 실시예를 도시한 것이라고.

도 6 내지 도 12는 본 발명에 따른 리피터에서의 각 프로세스별 인터페이스 제어 방법에 대한 실시예의 동작 흐름도를 도시한 것이다.

【발명을 실시하기 위한 구체적인 내용】

이하, 본 발명에 따른 인터페이스 제어 장치 및 방법에 대한 바람직한 실시예에 대해, 참조된 도면을 참조하여 상세히 설명한다.

우선, 본 발명에 따른 인터페이스 제어 장치 및 방법은, 예를 들어, 다수의 입력 포트와 출력 포트가 마련된 멀티미디어 인터페이스 모듈(예: HDMI 모듈)이 구비된 리피터(Repeater) 등에 적용되며, 상기 리피터는, 전송한 바와 같이, 미디어 중재기 등으로 연결되어도 되고.

또한, 상기 리피터는, 하나의 독립된 전자기기로 제작되거나, 홈 미디어 시
비(Home Media Server) 또는 아이피 셋탑 박스(IP-STB) 등과 같은 특정 기기 내에 포함 구성될 수 있다.

한편, 본 발명이 적용되는 리피터에는, 예를 들어, 도 4에 도시한 바와 같이, HDMI 모듈\(20\), 오디오 처리부\(21\), 비디오 처리부\(22\), 제어부\(23\), 메모리\(24\), 오에스디(OSD: On Screen Display) 생성부\(25\), 그리고 EDID 편집부\(26\) 등이 포함 구성될 수 있다.

그러고, 상기 메모리\(24\)는, 플래시(Flash) 메모리 또는 아이피روم(EEPROM) 등과 같은 비휘발성 메모리가 사용될 수 있으며, 상기 EDID 편집부\(26\)는, 상기 제어부\(23\)와는 독립된 별도의 구성 수단으로 포함 구성되거나, 또는 상기 제어부\(23\) 내에서 실행되는 소프트웨어 등으로 구현될 수도 있다.

한편, 상기 제어부\(23\)에서는, 상기 HDMI 모듈\(20\)의 입력 포트에 연결된 소스 디바이스와 출력 포트에 연결된 상크 디바이스의 접속 상태를 감지한 후, 상기 검출된 접속 상태에 따라, 다수의 실행 가능한 프로세스들을 자동으로 설정하게 되는 데, 예를 들어, 통과(Through), 변환(Convert), 결합(Switch), 합성(Mix), 분배(Distribute), 복사(Duplicate), 교환(Exchange) 등의 7 가지 프로세스들 중 적어도 2 가지 이상의 프로세스를 자동으로 설정하게 된다.

예를 들어, 도 5에 도시한 바와 같이, HDMI 모듈의 입력 포트에 하나의 소스 디바이스가 접속되고, 출력 포트에도 하나의 상크 디바이스가 접속된 경우, 실행 가능한 프로세스로서, 통과(Through)와 변환(Convert) 프로세스를 설정하게 된다.
반면, HDMI 모듈의 입력 포트에 N 개의 소스 디바이스가 결속되고, 출력 포트에 하나의 싱크 디바이스가 결속된 경우, 실행 가능한 프로세스로서, 통과 (Through), 변환(Convert), 결환(Switch), 합성(Mix) 프로세스를 설정하게 된다.

또한, HDMI 모듈의 입력 포트에 하나의 소스 디바이스가 결속되고, 출력 포트에 N 개의 싱크 디바이스가 결속된 경우, 실행 가능한 프로세스로서, 통과 (Through), 변환(Convert), 분배(Distribute), 복사(Duplicate) 프로세스를 설정하게 된다.

그리고, HDMI 모듈의 입력 포트에 N 개의 소스 디바이스가 결속되고, 출력 포트에 N 개의 싱크 디바이스가 결속된 경우, 실행 가능한 프로세스로서, 통과 (Through), 변환(Convert), 결환(Switch), 합성(Mix), 분배(Distribute), 복사 (Duplicate), 교환(Exchange) 프로세스를 모두 설정하게 된다.

한편, 상기 제어부(23)에서는, 상기와 같이 자동으로 설정된 각 프로세스들을 사용자가 용이하게 확인 또는 변경할 수 있도록, 상기 오디오 생성부(25)를 동작 제어하여, 임의의 한 싱크 디바이스 또는 사전에 설정된 특정 싱크 디바이스에 오디오 화면으로 표시하게 된다.

그리고, 상기 오디오 화면을 통해, 사용자가 프로세스의 변경을 요청하는 경우, 상기 설정된 임의의 프로세스의 실행을 중지시키게 되며, 이후 각 프로세스의 종류에 따라, 싱크 디바이스의 EDID 정보를 선택적으로 편집한 후, 소스 디바이스로 전달하는 각 프로세스별 고유의 인터페이스 동작을 실행하게 되는 데, 이에
대해 상세히 설명하면 다음과 같다.

도 6 내지 도 12는, 본 발명에 따른 인터페이스 제어 방법에 대한 실시예의 동작 흐름도를 도시한 것으로, 예를 들어, 상기 제어부(23)에서는, 시스템 전원이 온(ON)되거나, 또는 사용자의 요청 등에 따라, HDMI 입력출력(I/O) 설정 모드에 진입하게 된다(S10).

그리고, 상기 제어부(23)에서는, 상기 HDMI 모듈(20)의 입력 포트와 출력 포트에 연결된 소스 디바이스와 싱크 디바이스의 접속 상태를 검출한 후(S11), 도 5를 참조로 전송한 바와 같이, 상기 검출된 접속 상태에 따라, 실행 가능한 프로세스들을 자동으로 설정하게 되며, 이후 상기 오에스디 생성부(25)를 동작 제어하여, 상기 설정된 프로세스들, 업의 한 싱크 디바이스 또는 사용에 설정된 싱크 디바이스에 오에스디 화면으로 표시하게 된다(S12).

또한, 상기 제어부(23)에서는, 사용자가, 상기와 같이 차동으로 설정된 프로세스의 변경을 요청하는 경우(S13), 해당 프로세스의 실행을 중지시키는 일련의 프로세스 변경 설정 동작을 수행하게 된다(S14).

예를 들어, HDMI 모듈에 M 개의 소스 디바이스와 N 개의 싱크 디바이스가 접속되어 있는 경우, 상기 제어부(23)에서는, 실행 가능한 프로세스로서, 동과, 변환, 접합, 합성, 분배, 복사, 교환 프로세스를 모두 자동으로 설정하여, 사용자가, 예를 들어, 교환 프로세스의 실행 중지를 요청하면, 상기 교환 프로세스를 제
의한 나머지 6 개의 프로세스만을 실행 가능한 프로세스로 변경 설정하게 된다.

그리고, 상기 제어부(23)에서는, HDMI 입/출력 설정 모드를 해제하게 되며(S15), 이후, 입력의 한 프로세스의 실행이 요청되는 경우(S16), 해당 프로세스의 종류를 확인하게 되는 데, 예를 들어, 제1 소스 디바이스와 제1 시크 드바이스 간의 통과(Through) 프로세스를 실행하는 경우(S17), HDMI 모듈의 입력 포트에 연결된 제1 시크 드바이스(Sink #1)의 EDID 정보를 독출하여, HDMI 모듈의 출력 포트에 연결된 제1 소스 디바이스(Source #1)로 전달하게 된다(S18).

한편, 상기 제1 소스 디바이스(Source #1)에서는, 상기 EDID 정보를 참조하여, 상기 제1 시크 드바이스(Sink #1)에서 수용할 수 있는 최적의 A/V 신호를 출력하게 되며, 상기 제어부(23)에서는, 상기 A/V 신호를 수신하여, 상기 제1 시크 드바이스(Sink #1)로 전달하는 통과 프로세스의 인터페이스 제어 동작을 수행하게 되며(S19), 이후 사용자가 요청하는 입력의 해당 동작을 수행하게 된다(S20).

반면, 도 7에 도시한 바와 같이, 예를 들어, 제1 소스 데바이스와 제1 시크 드바이스 간의 변환(Convert) 프로세스를 실행하는 경우(S21), 상기 제어부(23)에서는, HDMI 모듈의 입력 포트에 연결된 제1 시크 드바이스(Sink #1)의 EDID 정보를 독출하여, 임시 저장하게 된다.

그리고, 상기 EDID 편집부(26)를 동작 제어하여, 레퍼터에서 수용 가능한 최적의 비디오 포맷에 맞도록, 상기 임시 저장된 EDID 정보를 편집한 후, 상기 HDMI 모듈의 입력 포트에 연결된 제1 소스 디바이스(Source #1)로, 상기 편집된 EDID 정보를 전달하게 된다(S22).
한편, 상기 제1 소스 디바이스(Source #1)에서는, 상기 편입된 EDID 정보를 참조하여, 상기 리피터에서 수용할 수 있는 최적의 A/V 신호를 출력하게 되는 데, 예를 들어, 상기 제1 싱크 디바이스의 최적 비디오 포맷이 SD 급이고, 상기 리피터의 최적 비디오 포맷이 HD 급이고, 상기 제1 소스 디바이스의 최적 비디오 포맷이 Full HD 급인 경우, 상기 제1 소스 디바이스에서는, 상기 편입된 EDID 정보를 참조하여, HD급의 비디오 신호를 출력하게 되며, 상기 리피터에서는, 상기 HD 급의 비디오 신호를 SD급의 비디오 신호로 변환한 후, 상기 제1 싱크 디바이스로 전달하게 된다.

즉, 상기 제어부(23)에서는, 상기 오디오 처리부(21)와 비디오 처리부(22)를 동작 제어하여, 상기 제1 소스 디바이스에서 수신된 A/V 신호를, 상기 제1 싱크 디바이스에서 수용할 수 있는 최적의 A/V 신호를 변환한 후, 상기 제1 싱크 디바이스로 전달하는 변환 프로세스의 인터페이스 제어 동작을 수행하게 된다(S23).

한편, 도 8에 도시한 바와 같이, 예를 들어, 여러 개의 소스 디바이스 중 어느 하나와 제1 싱크 디바이스 간의 결합(Switch) 프로세스를 실행하는 경우(S24), 상기 제어부(23)에서는, HDMI 모듈의 입력 포트에 연결된 여러 개의 소스 디바이스들 중 어느 하나를 선택하게 된다(S25).

예를 들어, 여러 개의 소스 디바이스 중 제2 소스 디바이스(Source #2)가 선택되면, 상기 제1 싱크 디바이스(Sink #1)의 EDID 정보를 독출하여, 상기 제2 소스 디바이스(Source #2)로 전달하게 된다(S26).

그리고, 상기 제2 소스 디바이스(Source #2)에서는, 상기 EDID 정보를 참조
하하여, 상기 제1 싱크 디바이스(Sink #1)에서 수용할 수 있는 최적의 A/V 신호를 출력하고, 상기 제어부(23)에서는 이를 수신하여, 상기 제1 싱크 디바이스(Sink #1)로 전달하는 절환 프로세스의 인터페이스 제어 동작을 수행하게 된다(S27).

한편, 도 9에 도시한 바와 같이, 예를 들어, 제1 및 제2 소스 디바이스와 제1 싱크 디바이스 간의 합성(Mix) 프로세스를 실행하는 경우(S28), 상기 제어부(23)에서는, 상기 제1 싱크 디바이스(Sink #1)의 EDID 정보와 A/V 포맷을 확인함과 아울러, 상기 제1 및 제2 소스 디바이스(Source #1, #2)의 EDID 정보와 A/V 포맷을 확인하게 된다(S29).

그리고, 상기 제1 및 제2 소스 디바이스에 공통된 A/V 포맷에 맞도록, 상기 제1 싱크 디바이스의 EDID 정보를 편집하게 되는 데, 예를 들어, 제1 싱크 디바이스의 최적 비디오 포맷이 HD 급이고, 제1 소스 디바이스의 최적 비디오 포맷이 Full HD 급이고, 제2 소스 디바이스의 최적 비디오 포맷이 SD 급인 경우, 상기 제어부(23)에서는, 상기 제1 싱크 디바이스에서 수용할 수 있으며에서 상기 제1 소스 디바이스와 제2 소스 디바이스에서 공통되는 SD 급의 비디오 포맷을 선택한 후, 상기 EDID 정보를 SD 급에 맞도록 편집한 후, 상기 편집된 EDID 정보들, 상기 제1 소스 디바이스와 제2 소스 디바이스에 전달하게 된다(S30).

또한, 상기 제1 소스 디바이스와 제2 소스 디바이스에서는, 상기 편집된 EDID 정보를 참조하여, 상기 제1 싱크 디바이스에서 수용할 수 있는 최적의 A/V 신호를 출력하게 되는 데, 이때의 비디오 포맷은 SD 급이 된다.

그리고, 상기 제어부(23)에서는, 상기 비디오 처리부(22)를 동작 하여,
상기 제1 소스 디바이스와 제2 소스 디바이스로부터 수신된 SD급의 비디오 신호를 합성한 후, 상기 제1 싱크 디바이스로 전달하는 합성 프로세스의 인터페이스 제어 동작을 수행하게 된다(S31).

한편, 도 10에 도시한 바와 같이, 예를 들어, 여러 개의 싱크 디바이스 중 어느 하나와 제1 소스 디바이스 간의 분배(Distribute) 프로세스를 실행하는 경우(S32), 상기 제어부(23)에서는, HDMI 모듈의 출력 포트에 연결된 여러 개의 싱크 디바이스들 중 어느 하나를 선택하게 된다(S33).

예를 들어, 제2 싱크 디바이스(Sink #2)가 선택되면, 상기 선택된 제2 싱크 디바이스의 EDID 정보를 독출하여, 상기 제1 소스 디바이스(Source #1)로 전달하게 되고(S34), 상기 제1 소스 디바이스(Source)에서는, 상기 EDID 정보를 참조하여, 상기 제2 싱크 디바이스(Sink #2)에 최적한 A/V 신호를 출력하고, 상기 제어부(23)는, 상기 A/V 신호를 제2 싱크 디바이스로 전달하는 분배 프로세스의 인터페이스 제어 동작을 수행하게 된다(S35).

한편, 도 11에 도시한 바와 같이, 예를 들어, 제1 소스 디바이스와 여러 개의 싱크 디바이스 간의 복사(Duplicate) 프로세스를 실행하는 경우(S36), 상기 제어부(23)에서는, HDMI 모듈의 출력 포트에 연결된 여러 개의 싱크 디바이스들로부터 EDID 정보를 독출하여 임시 저장한 후, 상기 여러 개의 싱크 디바이스들에서 사용 가능한 공통된 비디오 포맷을 추출하게 된다(S37).

예를 들어, 제1 싱크 디바이스의 최적 비디오 포맷이 Full HD급이고, 제2 싱크 디바이스의 최적 비디오 포맷이 HD급인 경우, 공통된 비디오 포맷으로 HD급
을 추출한 후, 상기 임시 저장된 EDID 정보를 HD 큐에 맞도록 편집하고, 이후 상기 편집된 EDID 정보를, 상기 제1 소스 디바이스로 전달하게 된다(S38).

그리고, 상기 제1 소스 디바이스에서는, 상기 편집된 EDID 정보를 참조하여, 상기 제1 싱크 디바이스와 제2 싱크 디바이스에서 모두 수용 가능한 A/V 신호를 출력하게 되는 데, 이때의 비디오 신호는 HD 급이 되며, 상기 제어부(23)에서는, 상기 A/V 신호를 수신하여, 상기 제1 싱크 디바이스와 제2 싱크 디바이스로 전달하는 복사 프로세스의 인터페이스 제어 동작을 수행하게 된다(S39).

한편, 도 12에 도시한 바와 같이, 예를 들어, 여러 개의 소스 디바이스와 여러 개의 싱크 디바이스 간의 교환(Exchange) 프로세스를 실행하는 경우(S40), 상기 제어부(23)에서는, HDMI 포트의 입력 포트와 출력 포트에 연결된 여러 개의 소스 디바이스와 싱크 디바이스와 EDID 정보들을 검색하여 저장하게 된다(S41).

그리고, 상기 제어부(23)에서는, 입출력의 소스 디바이스와 싱크 디바이스를 실시간으로 연결하게 되는 데, 이때, 실시간 연결된 싱크 디바이스의 EDID 정보를 추출하여, 해당 소스 디바이스로 전달하게 된다(S42).

또한, 상기 해당 소스 디바이스에서, 상기 EDID 정보를 참조하여, 해당 싱크 디바이스에 최적한 A/V 신호를 출력하게 되며, 상기 제어부(23)에서는, 상기 A/V 신호를 수신하여, 상기 실시간 연결된 해당 싱크 디바이스로 전달하는 교환 프로세스의 인터페이스 제어 동작을 수행하게 된다(S43).

이에 따라, 통과, 변환, 결합, 합성, 분배, 복사, 교환 등과 같은 다양한 각
프로세스들을 보다 효율적으로 구분하여 실행시킬 수 있게 되므로, 사용자의 편의성을 향상시킬 수 있게 되며, 또한, 리퍼터의 미디어 중계 성능을 효율적으로 향상시킬 수 있게 된다.

참고로, 전술한 바와 같이, 상기 HDMI 모듈은, 멀티미디어 인터페이스 모듈의 하나로서, DVI, D-Sub 등과 같은 멀티미디어 인터페이스 모듈이 사용될 수 있으며, 상기 EDID 정보는, 오디오/비디오 등에 대한 장비 성능을 식별하기 위한 식별 데이터의 하나이다.

이상, 전술한 본 발명의 바람직한 실시에는, 예시의 목적을 위해 개시된 것으로, 당연한 라면, 이와 정부된 특허정규범위에 개시된 본 발명의 기술적 사상과 그 기술적 범위 내에서, 또다른 다양한 실시예들을 개량, 변경, 대체 또는 부가 등이 가능할 것이다.

【부호의 설명】

100 : 싱크 디바이스  
200 : 리퍼터  

300 : 소스 디바이스  
20 : HDMI 모듈  

21 : 오디오 처리부  
22 : 비디오 처리부  

23 : 제어부  
24 : 메모리  

25 : 오에스디 생성부  
26 : EDID 편집부
【복지청구방위】

【청구항 1】

멀티미디어 인터페이스의 포트를 통해 연결된 하나 이상의 디바이스의 접속 상태를 검출하는 1단계;

상기 검출된 접속 상태에 따라, 다수의 실행 가능한 프로세스들 중 요청된 프로세스의 종류를 확인하는 2단계; 및

상기 확인된 프로세스의 종류에 따라, 디바이스의 기기 정보를 선택적으로 변집하여, 인터페이스 동작을 실행하는 3단계를 포함하여 이루어지는 것을 특징으로 하는 인터페이스 제어 방법.

【청구항 2】

제 1항에 있어서.

상기 2단계는, 상기 검출된 접속 상태에 따라, 다수의 실행 가능한 프로세스들로서, 통과, 변환, 결합, 합성, 분배, 복사, 교환 중 적어도 2 개 이상을 설정한 후, 임의의 한 프로세스의 실행이 요청되면, 해당 프로세스의 종류를 확인하는 것을 특징으로 하는 인터페이스 제어 방법.

【청구항 3】

제 1항에 있어서.

상기 다수의 실행 가능한 프로세스는, 오디오타(OSD) 화면을 통해 표시된 후, 사용자의 선택에 의해 임의로 변경 설정되는 것을 특징으로 하는 인터페이스
제어 방법.

【청구항 4】

제 1항에 있어서.

상기 3단계는, 상기 확인된 프로세스의 종류가, 통과인 경우, 싱크 디바이스의 기기 정보를, 소스 디바이스로 전달하고.

상기 소스 디바이스의 A/V 신호를 수신하여, 상기 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하는 인터페이스 제어 방법.

【청구항 5】

제 1항에 있어서.

상기 3단계는, 상기 확인된 프로세스의 종류가, 변환인 경우, 싱크 디바이스의 기기 정보를, 최적 비디오 포맷에 대응되게 전적하며, 소스 디바이스로 전달하고.

상기 소스 디바이스의 A/V 신호를 수신하여, 상기 싱크 디바이스의 A/V 포맷으로 변환한 후, 상기 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하는 인터페이스 제어 방법.

【청구항 6】

제 1항에 있어서.

상기 3단계는, 상기 확인된 프로세스의 종류가, 결환인 경우, 다수의 소스 디바이스 중 하나를 선택한 후, 싱크 디바이스의 기기 정보를, 상기 선택된 소스
디바이스로 전달하고,

상기 선택된 소스 디바이스의 A/V 신호를 수신하여, 상기 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특정으로 하는 인터페이스 제어 방법.

【청구항 7】

제 1항에 있어서,

상기 3단계는, 상기 확인된 프로세스의 종류가, 합성한 경우, 하나의 싱크 디바이스의 기기 정보와, 다수의 소스 디바이스의 기기 정보를 확인한 후, 상기 싱크 디바이스에서 수용 가능함과 동시에, 상기 다수의 소스 디바이스의 공통된 A/V 포맷으로, 상기 싱크 디바이스의 기기 정보를 전달하고,

상기 전달된 기기 정보를, 상기 다수의 소스 디바이스로 전달한 후, 상기 다수의 소스 디바이스의 A/V 신호를 수신하여 합성한 후, 상기 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특정으로 하는 인터페이스 제어 방법.

【청구항 8】

제 1항에 있어서,

상기 3단계는, 상기 확인된 프로세스의 종류가, 분배인 경우, 다수의 싱크 디바이스 중 하나를 선택한 후, 상기 선택된 싱크 디바이스의 기기 정보를, 소스 디바이스로 전달하고.

상기 소스 디바이스의 A/V 신호를 수신하여, 상기 선택된 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특정으로 하는 인터페이스 제어 방법.
【정구항 9】

제 1항에 있어서.

상기 3단계는, 상기 확인된 프로세스의 종류가, 복사인 경우, 다수의 싱크 디바이스의 공통된 A/V 포맷을 추출한 후, 이들 중 최고 해상도를 선정하여, 싱크 디바이스의 기기 정보를 편집하고,

상기 편집된 기기 정보를 소스 디바이스로 전달한 후, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 다수의 센크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특정으로 하는 인터페이스 제어 방법.

【정구항 10】

제 1항에 있어서.

상기 3단계는, 상기 확인된 프로세스의 종류가, 교환인 경우, 다수의 싱크 디바이스의 기기 정보를 캡쳐하여 저장한 후, 소스 디바이스와 교환 연결시, 연결된 센크 디바이스의 기기 정보를 추출하여, 상기 소스 디바이스로 전달하고,

상기 소스 디바이스의 A/V 신호를 수신하여, 상기 연결된 센크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특정으로 하는 인터페이스 제어 방법.

【정구항 11】

소스 디바이스와 센크 디바이스가 연결되는 다수의 입력 포트와 출력 포트가 마련된 멀티미디어 인터페이스 모듈; 및

상기 멀티미디어 인터페이스 모듈에 연결된 소스 디바이스와 센크 디바이스
의 접속 상태에 따라, 다수의 실행 가능한 프로세스들을 설정하기 위한 제어부를 포함하여 구성되며, 

상기 제어부는, 임의의 한 프로세스의 실행이 요청되면, 해당 프로세스의 종류에 따라, 상크 디바이스의 기기 정보를 선택적으로 전달하여, 소스 디바이스로 전달하는 각 프로세스별 고유의 인터페이스 동작을 실행하는 것을 특정으로 하는 인터페이스 제어 장치.

【청구항 12】

제 11항에 있어서, 

상기 제어부는, 상기 접속된 접속 상태에 따라, 다수의 실행 가능한 프로세스들로서, 통과, 변환, 접합, 합성, 분배, 복사, 교환 등 적어도 2 개 이상을 설정한 후, 임의의 한 프로세스의 실행이 요청되면, 해당 프로세스의 종류를 확인하는 것을 특정으로 하는 인터페이스 제어 장치.

【청구항 13】

제 11항에 있어서, 

사용자 선택이 가능한 오에스디 화면을 생성하기 위한 오에스디 생성부를 더 포함하여 구성됨과 아울러, 

상기 다수의 실행 가능한 프로세스는, 상기 오에스디(OSD) 화면을 통해 표시된 후, 사용자의 선택에 의해 임의로 변경 설정되는 것을 특정으로 하는 인터페이스 제어 장치.
【정구항 14】

제 11항에 있어서,

상기 제어부는 상기 확인된 프로세스의 종류가, 통과한 경우, 싱크 디바이스의 기기 정보를, 소스 디바이스로 전달하고,

상기 소스 디바이스의 A/V 신호를 수신하여, 상기 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하는 인터페이스 제어 장치.

【정구항 15】

제 11항에 있어서.

상기 제어부는, 상기 확인된 프로세스의 종류가, 변환한 경우, 싱크 디바이스의 기기 정보를, 총적 비디오 포맷에 대응되게 변환하여, 소스 디바이스로 전달하고,

상기 소스 디바이스의 A/V 신호를 수신하여, 상기 싱크 디바이스의 A/V 포맷으로 변환한 후, 상기 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하는 인터페이스 제어 장치.

【정구항 16】

제 11항에 있어서.

상기 제어부는, 상기 확인된 프로세스의 종류가, 절환한 경우, 다수의 소스 디바이스 중 하나를 선택한 후, 싱크 디바이스의 기기 정보를, 상기 선택된 소스 디바이스로 전달하고.
상기 선택된 소스 디바이스의 A/V 신호를 수신하여, 상기 신크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특정으로 하는 인터페이스 제어 장치.

【헌구항 17】

제 11항에 있어서,

소스 디바이스로부터 수신되는 비디오 신호를 신호 처리하기 위한 비디오 처리부를 더 포함하여 구성될 수 있음.

상기 제어부는, 상기 확인된 프로세스의 종류가, 행성인 경우, 하나의 신크 디바이스의 기기 정보와, 다수의 소스 디바이스의 기기 정보를 확인한 후, 상기 신크 디바이스에서 수용 가능함과 동시에, 상기 다수의 소스 디바이스의 공동된 A/V 포맷으로, 상기 신크 디바이스의 기기 정보를 편집하고.

상기 편집된 기기 정보를, 상기 다수의 소스 디바이스로 전달한 후, 상기 다수의 소스 디바이스의 A/V 신호가 수신되면, 상기 비디오 처리부를 동작 제어하여, 합성한 후, 상기 신크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특정으로 하는 인터페이스 제어 장치.

【헌구항 18】

제 11항에 있어서,

상기 제어부는, 상기 확인된 프로세스의 종류가, 분배인 경우, 다수의 신크 디바이스 중 하나를 선택한 후, 상기 선택된 신크 디바이스의 기기 정보를, 소스 디바이스로 전달하고.
상기 소스 디바이스의 A/V 신호를 수신하여, 상기 선택된 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하는 인터페이스 제어 장치.

【정구항 19】

제 11항에 있어서,

상기 제어부는, 상기 확인된 프로세스의 종류가, 복사인 경우, 다수의 싱크 디바이스의 공통된 A/V 포맷을 추출한 후, 이를 중 최고 해상도를 설정하여, 싱크 디바이스의 기기 정보를 편집하고,

상기 편집된 기기 정보를 소스 디바이스로 전달한 후, 상기 소스 디바이스의 A/V 신호를 수신하여, 상기 다수의 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하는 인터페이스 제어 장치.

【정구항 20】

제 11항에 있어서,

상기 제어부는, 상기 확인된 프로세스의 종류가, 교환인 경우, 다수의 싱크 디바이스의 기기 정보를 캡처하여 저장한 후, 소스 디바이스와 교환 연결시, 연결된 싱크 디바이스의 기기 정보를 추출하여, 상기 소스 디바이스로 전달하고,

상기 소스 디바이스의 A/V 신호를 수신하여, 상기 연결된 싱크 디바이스로 전달하는 인터페이스 동작을 실행하는 것을 특징으로 하는 인터페이스 제어 장치.
본 발명에 따른 인터페이스 제어 장치 및 방법은, 예를 들어, HDMI, DVI, D-Sub 등과 같은 멀티미디어 인터페이스 모듈에 연결된 소스 디바이스와 싱크 디바이스의 접속 상태를 확인하여, 다수의 실행 가능한 프로세스들을 설정하고, 각 프로세스의 종류에 따라, 싱크 디바이스의 기기 정보를 선택적으로 명령한 후, 소스 디바이스로 전달하는 각 프로세스별 고유의 인터페이스 동작을 실행함으로써, 동화, 변환, 절환, 합성, 분배, 복사, 교환 등과 같은 다양한 각 프로세스들을 보다 효율적으로 구분하여 실행시킬 수 있게 되므로, 사용자의 편의성을 향상시키며 이울러, 싱크 디바이스와 소스 디바이스 간의 인터페이스 성능을 향상시킬 수 있게 된다.

【대표도】

도 5
도 6

Start

1. HDMI I/O 설정 모드 진입
2. Source/Sink 접속 상태 검출
3. 실행 가능한 Process 자동 설정 및 표시
4. 사용자 변경 요청?
   - YES: Process 변경 설정
   - NO: HDMI I/O 설정 모드 해제
5. Process 실행 요청?
   - YES: Through Process
   - NO: A
6. Sink의 EDID를 Source로 전달
7. Source의 A/V 신호를 Sink로 전달
8. 사용자가 요청하는 화당 동작 수행

End
【도 7】

A

Convert Process ?

YES

S21 NO

B

S22

Repeater의 최적 Video 포맷에 맞게 Sink의 EDID를 변경하여 Source로 전달

S23

Source의 A/V 신호를 Sink의 A/V 포맷으로 변환하여 전달

【도 8】

B

Switch Process ?

YES

S24 NO

C

S25

여러개의 Source들 중 하나를 선택

S26

선택된 Source로 Sink의 EDID를 변경

S27

선택된 Source의 A/V 신호를 Sink로 전달

E
[도 9]

Mix Process?

YES

Sink의 EDID & A/V 포맷과 여러개의 Source의 EDID & A/V 포맷 확인

여러개의 Source에서 공통된 A/V 포맷으로 Sink의 EDID를 전달하여 전달

여러개의 Source의 A/V 신호를 합쳐서 Sink로 전달

NO

[도 10]

Distribute Process?

YES

여러개의 Sink들 중 하나를 선택

선택된 Sink의 EDID를 Source로 전달

Source의 A/V 신호를 선택한 Sink로 전달

NO
【도 11】

Duplicate Process？

YES

여러개의 Sink들의 공통된 Video 포맷 추출

S37

NO

이들 중 최고 해상도를 선정하여 EDID를 원점한 Source로 전달

S38

Source의 A/V 신호를 여러개의 Sink로 전달

S39

H

【도 12】

Exchange Process？

YES

각 Sink들의 EDID 캐시 및 저장

S41

NO

실시간 연결된 Sink의 EDID를 추출하여 해당 Source로 전달

S42

Source의 A/V 신호를 실시간 연결된 해당 Sink로 전달

S43

H
Title: METHOD FOR CONTROLLING INTERFACE

Publication Date: 06/27/2013

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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.

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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 10-2011-0139342 12/21/2011

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Early Publication Request: No

Title

METHOD FOR CONTROLLING INTERFACE

Preliminary Class

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The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

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, facilitate, and accelerate 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.
NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/07/2012.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/ysun/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101
# PATENT APPLICATION FEE DETERMINATION RECORD

**Application or Docket Number:** 13/678,060

## APPLICATION AS FILED - PART I

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*If the difference in column 1 is less than zero, enter “0” in column 2.

**APPLICATION AS AMENDED - PART II**

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| **AMENDMENT B** | **CLAIMS REMAINING AFTER AMENDMENT** | **HIGHEST NUMBER PREVIOUSLY PAID FOR** | **PRESENT EXTRA** | **RATE($)** | **ADDITIONAL FEE($)** | **RATE($)** | **ADDITIONAL FEE($)** |
| | Total (37 CFR 1.16(i)) | * | Minus | ** | | | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | | | |
| Application Size Fee (37 CFR 1.16(s)) | | | | | | | |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | |
| | TOTAL ADD'L FEE | | | | | | |

* 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 found in the appropriate box in column 1.
POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in the attached transmittal letter.

☑ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

02292

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

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</table>

Please recognize or change the correspondence address for the application identified in the attached transmittal letter to:

☑ The address associated with the above-mentioned Customer Number.

OR

☐ The address associated with Customer Number: 02292

OR

☐ Firm or Individual Name:

Address:

City:
State:
Zip:

Country:
Telephone:
Email:

I am the Applicant:

☐ Inventor or Joint Inventor

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document)

SIGNATURE of Applicant for Patent

Signature:

Date: 11/21/21

Name:

Title and Company:

Telephone:

HUMAX CO., LTD.

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms for more than one signature, see below *.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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

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<td><strong>Confirmation Number:</strong></td>
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<th>METHOD FOR CONTROLLING INTERFACE</th>
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<td>1630-1121PUS1</td>
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**Payment information:**

Submitted with Payment: no

**File Listing:**

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**Warnings:**

**Information:**

Total Files Size (in bytes): 294267

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

Patent Application of:  
Jonghun LEE et al

Application No.: 13/678,060

Filed: November 15, 2012

For: METHOD FOR CONTROLLING INTERFACE

Confirmation No.: 9807

Art Unit: Not Yet Assigned

Examiner: Not Yet Assigned

SUBMISSION OF ADDITIONAL DOCUMENTS AND/OR FEES FOR COMPLETION OF FILING REQUIREMENTS

MS MISSING PARTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

The following documents are submitted in connection with the above-identified application:

☐ The Notice to File Missing Parts of Non-provisional Application.
☐ The Notification of Missing Requirements (371 Formalities Letter).
☐ The Notice to File Missing Parts of Provisional Application.
☐ The Notice to File Missing Parts of Reissue Application.
☐ The Notice to File Corrected Application Papers.
☐ Notice of Omitted Items.
☐ Notice of Incomplete Application Papers.
☐ The Notice of Defective Response.
☐ Executed Declaration and Assignment.
☑ Power of Attorney.
☑ Power of Attorney (PTO/AIA/82A).
☐ Substitute Statement.
☐ The undersigned hereby declares that “Attorney Docket No. 1630-1121PUS1” on page 1 of the attached Declaration corresponds to Application No. 13/678,060, filed November 15, 2012 entitled “METHOD FOR CONTROLLING INTERFACE.”
☐ Attached is an accurate English language translation of the above-identified application that was filed in a foreign language, which should be used as the copy for examination purposes.
☐ Assent of Assignee and Statement under 37 C.F.R. 3.73(c) establishing ownership.
☐ Preliminary Amendment.
☐ Substitute specification that complies with 37 C.F.R. § 1.52. The substitute specification does not contain new matter.
☐ Substitute Sequence Listing (paper and electronic copy).
☐ The attached sheet(s) of drawing(s), including Figure(s), should be substituted for the corresponding sheet(s) of drawing(s) on file.
☐ Corrected Provisional Application Cover Sheet identifying the city and state or city and foreign country of the residence of each inventor.
☐ Application Data Sheet (ADS).
☐ Claims small entity status under 37 C.F.R. § 1.27.
☐ Petition for Extension of Time.
☐ Fee transmittal listing the required fees.
☐ All filing requirements were met in a previous submission on . Copies of previously submitted documents are readily available in PAIR.
If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

Dated: December 7, 2012

Respectfully submitted,

By

Esther H. Chong
Registration No.: 40953
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road, Suite 100 East
P.O. Box 747
Falls Church, VA 22040-0747
703-205-8000
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application of:
Jonghun LEE et al

Application No.: 13/678,060
Confirmation No.: 9807

Filed: November 15, 2012
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Respectfully submitted,

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BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road, Suite 100 East
P.O. Box 747
Falls Church, VA 22040-0747
703-205-8000
DECLARATION AND ASSIGNMENT
FOR PATENT AND DESIGN APPLICATIONS

UNITED STATES PATENT RIGHTS, OR
UNITED STATES PLUS ALL FOREIGN PATENT RIGHTS

Title of Invention

⇒ METHOD FOR CONTROLLING INTERFACE

As a below named inventor (hereinafter designated as the undersigned), I hereby declare that:

Application not Attached

⇒ This declaration is directed to the application attached hereto. If the application is not attached hereto, the application is as identified by the attorney docket number as set forth above and/or the following:

Enter Appln. No.

⇒ United States Application Number or PCT International Appln. No. 13/678,060

Enter Filing Date

⇒ filed on November 15, 2012

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the above-identified application, including the claims.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations § 1.56.

WHEREAS, the undersigned has invented certain new and useful improvements described in the application identified.

⇒ WHEREAS, HUMAX CO., LTD.

Insert Name of Assignee

⇒ of Humax Village 11-4, Sunae-dong, Bundang-gu, Seongnam-si, Gyeonggi-do 463-825, Republic of Korea

its heirs, successors, legal representatives and assigns (hereinafter designated as the Assignee) is desirous of acquiring the entire right, title and interest in and to said invention and in and to any Letters Patent(s) that may be granted therefor in the United States of America and

⇒ in any foreign countries.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, the undersigned has sold, assigned and transferred, and by these presents does (do) sell, assign and transfer unto said Assignee the full and exclusive right to the said invention in the United States of America, its territories, dependencies and possessions and the entire right, title and interest in and to any and all Letters Patent(s) which may be granted therefor in the United States of America, its territories, dependencies and possessions, and if the box above is designated, in any and all foreign countries; and to any and all divisions, reissues, continuations, conversions and extensions thereof for the full term or terms for which the same may be granted.
The undersigned agrees to execute all papers necessary in connection with this application and any continuing, divisional, conversion or reissue applications thereof and also to execute separate assignments in connection with such applications as the Assignee may deem necessary or expedient.

The undersigned agrees to execute all papers necessary in connection with any interference which may be declared concerning this application or continuation, division, conversion or reissue thereof or Letters Patent(s) or reissue patent issued thereon and to cooperate with the Assignee in every way possible in obtaining and producing evidence and proceeding with such interference.

The undersigned agrees to execute all papers and documents and to perform any act which may be necessary in connection with claims or provisions of the International Convention for the Protection of Industrial Property or similar agreements.

The undersigned agrees to perform all affirmative acts which may be necessary to obtain a grant of (a) valid United States of America patent(s) or a grant of (a) valid United States of America and any foreign patent(s) to the Assignee and to vest all rights therein hereby conveyed to said Assignee as fully and entirely as the same would have been held by the undersigned if this Assignment and sale had not been made.

The undersigned hereby authorizes and requests the Patent and Trademark Office Officials in the United States of America and in any foreign countries to issue any and all Letters Patent(s) resulting from said application or any continuing, divisional conversion or reissue applications thereof to the said Assignee, as Assignee of the entire interest, and hereby covenants that he has the full right to convey the entire interest herein assigned, and that he has not executed, and will not execute, any agreement in conflict herewith.

The undersigned hereby grants the law firm of Birch, Stewart, Kolasch & Birch, LLP the power to insert any further identification which may be necessary or desirable in order to comply with the rules of the U.S. Patent and Trademark Office.

The undersigned hereby covenants that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this assignment.

The undersigned hereby acknowledges that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

In witness whereof, executed by the undersigned on the date opposite the undersigned name.

LEGAL NAME OF INVENTOR

Inventor’s Name  * Inventor: Jonghun LEE  Date: 2012.11.21

Inventor’s Signature  * Signature: [Signature]

An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use a separate form for each inventor; or check the box below and complete the attached page(s) to list additional inventors.

□ Additional inventors are being named on the ___ supplemental sheet(s) attached hereto.
TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B or equivalent) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5. If the Power of Attorney by Applicant form is not accompanied by this transmittal form or an equivalent, the Power of Attorney will not be recognized in the application.

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SIGNATURE of Applicant or Patent Practitioner

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

☑  *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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UTILITY
PATENT APPLICATION
TRANSMITTAL
(Only for new nonprovisional applications under 37 CFR 1.53(b))

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents.

1. [x] Fee Transmittal Form.
   (PTO/SB/17 or equivalent)
2. □ Applicant claims small entity status.
   See 37 CFR 0.47.
3. [x] Specification. [Total Pages 25]
   Both the claims and abstract must start on a new page.
   (For information on the preferred arrangement, see MPEP § 600.01(a))
4. [x] Drawing(s). (35 U.S.C. 113) [Total Sheets 7]
5. Inventor's Oath or Declaration. [Total Sheets 1]
   (indicating availability statements under 37 CFR 1.14 and assignments serving as an
   oath or declaration under 37 CFR 1.63(e)(f))
   a. □ Newly executed (original or copy)
   b. □ A copy from a prior application (37 CFR 1.63(d))
   See 37 CFR 1.76 (PTOA/IA/14 or equivalent)
7. □ CD-ROM or CD-R.
   In duplicate, if only table or Computer Program (Appendix)
   □ Landscape Table on CD
8. Nucleotide and/or Amino Acid Sequence Submission.
   (if applicable, items a. – c. are required)
   a. □ Computer Readable Form (CRF)
   b. □ Specification Sequence Listing on:
      i. □ CD-ROM or CD-R (2 copies); or
      ii. □ Paper
   c. □ Statements verifying identity of above copies

*Notes:
(1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 must be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an
assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary
interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

The address associated with Customer Number: 02292 OR □ Correspondence address below

Name
Address
City State Zip Code
Country Telephone Email

Signature

Date November 15, 2012

Name (Print/Type) Esther H. Chong
Registration No. 40953

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DAVID A. BILODEAU
USPTO #42,325
**FEE TRANSMITTAL**

Complete if known

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**TOTAL AMOUNT OF PAYMENT** ($1,390.00)

**METHOD OF PAYMENT** (check all that apply)

- [x] Check  
- [ ] Credit Card  
- [ ] Money Order  
- [ ] None  
- [x] Other (please identify): Bish, Stewart, Kolaski & Birch, LLP

**Deposit Account**  02-2448  **Deposit Account Name:**  Bish, Stewart, Kolaski & Birch

For the above-identified deposit account, the Director is hereby authorized to (check all that apply):

- [x] Charge fees indicated below  
- [ ] Charge fee(s) indicated below, except for the filing fee  
- [x] Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17  
- [x] Credit any overpayment of fee(s)

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**FEE CALCULATION**

**1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

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**2. EXCESS CLAIM FEES**

**Fee Description**

- Each claim over 20 (including Reissues)
- Each independent claim over 3 (including Reissues)
- Multiple dependent claims

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**3. APPLICATION SIZE FEE**

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $320 ($150 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

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**4. OTHER FEE(S)**

- Non-English specification, $130 fee (no small entity discount)
- Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small entity)
- Other (e.g., late filing surcharge): Declaration

| Fees Paid ($) | 0.00 |

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METHOD FOR CONTROLLING INTERFACE

BACKGROUND

1. Field

[0001] The present invention relates to a method for controlling interface and, more particularly, to a method for controlling input and output of multimedia interface that can transmit device information to other devices.

2. Description of the Related Art

[0002] HDMI, DVI and D-Sub are generally used as multimedia interface. For example, the repeater, often referred to as a media relay or other names, connects source devices and output devices through HDMI.

[0003] As illustrated in Fig. 1, various types of source devices providing audio or video signals such as a DVD player 300 are connected to the repeater 200 through HDMI input port.

[0004] Also, various types of sink devices outputting audio and/or video signals such as digital TV (D-TV) can be connected to the repeater 200 through HDMI output port.

[0005] Then, the repeater 200 transmits EDID (Extended Display Identification Data), which is a type of data base structure including data on the sink device (such as audio and video formats that can be output by the sink device) to the source device 300 through CEC (Consumer Electronic Control) line of HDMI, and the source device 300, by referencing the EDID,
outputs audio and/or video signal which is optimal to the sink device 100. For example, the EDID information can include information on the native format, or the optimal A/V (Audio/Video) format that can be output from the sink device 100.

[0006] If HD level is detected, by referencing the EDID, as the optimal video format that can be displayed on the sink device 100, the source device 300 outputs video in the format of HD level instead of full HD level even though the source device 300 can output video data in the video format up to full HD level.

[0007] Recently, repeaters equipped with a HDMI module having a plurality of input and output ports have been commercialized, in which, as illustrated in Fig. 2, various types of source devices (3001-300n) such as a DVD player and BD player can be connected to the repeater 200 through input ports of HDMI module, and various types of sink devices (1001-100m) such as a digital TV (D-TV) and high definition digital TV (HD-TV) can be connected to the repeater through output ports of the HDMI module digital TV (D-TV).

[0008] For example, in the repeater, as illustrated in Fig. 3, one source device (Source #1) and one sink device (Sink #1) can be connected respectively to a plurality of input ports (e.g., I1-I3) and output ports (e.g., O1-O3) installed on the HDMI module of the repeater, or multiple source devices (e.g., Source #1-#3) and one sink device (Source #1) can be connected.
[0009] Also, one source device (Source #1) and multiple sink devices (e.g., Sink #1-#3) can be connected to a plurality of input and output ports installed on the HDMI module of the repeater, or multiple source devices (e.g., Source #1-#3) and sink devices (e.g., Source #1-#3) can be connected. In other words, various combinations of connections are possible depending on the number of the source devices and sink devices connected to the input and output ports.

[0010] Although various operation modes are available to the repeater for performing relay operation between the source and sink devices, a method for efficiently controlling each operation mode according to the combination of the devices connected through the input and output ports has not been provided.

[0011] The present invention has been designed to solve the above mentioned problems, and aims to prevent compatibility problems in configuring audio/video setting between devices when one or more source devices and sink devices are connected to the repeater.

[0012] Another objective of the present invention is to provide a method for controlling operation modes taking consideration of the combination of source and sink devices connected to the repeater.
The method for controlling interface according to one embodiment of the present invention comprises detecting state of connection with one or more sink devices and one or more source devices which are connected to input and output ports of a multimedia interface module; identifying one or more operation modes available for the detected connection state; and transmitting device information of the one or more sink devices to the one or more source devices, the device information being selectively edited in accordance with a requested operation mode among the identified operation modes.

The repeater according to one embodiment of the present invention comprises: a multimedia interface module having a plurality of input ports and output ports for connecting source devices and sink devices; and a control unit configured to detect a connection state of one or more sink devices and one or more source devices respectively connected to the input ports and output ports, identify one or more operation modes available for the detected connection state, selectively edit device information of the one or more sink devices according to a requested operation mode among the identified operation modes, and transmit the edited information to the one or more source devices.

In another embodiment of the present invention, the one or more operation modes include at least one of Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange.
[0016] In yet another embodiment of the present invention, the operation modes including Through, Convert, Switch and Mix are available when two or more source devices and one sink device are connected, the operation modes including Through, Convert, Distribute and Duplicate are available when one source device and two or more sink devices are connected, and the operation modes including Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange are available when two or more source devices and two or more sink devices are connected.

[0017] In yet another embodiment of the present invention, when the operation mode is Through, the information on the format of the best quality for the sink device is transmitted to the source device; and A/V signal is received from the source device and transmitted to the sink device.

[0018] In yet another embodiment of the present invention, when the operation mode is Convert, the information on the formats that the repeater can handle is generated by referring to the device information of the sink device, and transmitted to the source device; and A/V signal is received from the source device, converted to the format appropriate for the device information of the sink device, and transmitted to the sink device.

[0019] In yet another embodiment of the present invention, when the operation mode is Switch, one source device is selected from the two or more source devices connected, and the device information of the sink device is transmitted to the selected
source device; and A/V signal is received from the selected source device and transmitted to the sink device.

[0020] In yet another embodiment of the present invention, when the operation mode is Mix, the device information of the sink device is edited in the format which is available to the sink device and common to two or more source devices connected, and transmitted to the two or more of source devices; and A/V signal is received from the two or more of source devices, mixed, and transmitted to the sink device.

[0021] In yet another embodiment of the present invention, when the operation mode is Mix, the optimal format information of the sink device is transmitted to a first source device, and format information which is lower than the optimal format information is transmitted to the second source device; and the A/V signals from the first source devices and the second source devices are mixed to a main display and a sub display respectively, and transmitted to the sink device.

[0022] In yet another embodiment of the present invention, when the operation mode is Distribute, one sink device is selected from two or more sink devices connected, and the device information of the selected sink device is transmitted to the source device; and A/V signal is received from the source device and transmitted to the selected sink device.

[0023] In yet another embodiment of the present invention, when said operation mode is Duplicate, the information on the format
which is common to two or more of sink devices is transmitted to the source device; and A/V signal is received from the source device and transmitted to the sink device.

[0024] In yet another embodiment of the present invention, when the operation mode is Exchange, the device information of the connected sink device is transmitted to two or more source devices; and A/V signal is received from the source device and transmitted to the sink device connected.

[0025] Therefore, various operation modes such as Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange can be chosen for effective operation, thereby enhancing the convenience of the user and increasing the performance of interface between the sink device and source device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] Fig. 1 illustrates the state where a source device and a sink device are connected to the HDMI module of a repeater;

[0027] Fig. 2 illustrates the state where multiple source devices and sink devices are connected to the HDMI module of a repeater;

[0028] Fig. 3 illustrates the state where at least one source device and at least one sink device are connected to the input and output port of a repeater;

[0029] Fig. 4 illustrates the construction of the repeater according to one embodiment of the present invention, in which methods control for each operation mode are applied;
[0030] Fig. 5 is the table defining the operation modes according to one embodiment of the present invention, which are available for combinations of connections between source devices and sink devices; and

[0031] Figs. 6 through 12 illustrate the flow of operation of the control method for each operation mode in the repeater according to one embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0032] Preferred embodiments of the device and method for controlling interface according to the present invention will be described below with reference to the drawings attached.

[0033] First, the method for controlling interface according to the present invention can be applied to a repeater, or a media relay as it is often referred to, equipped with, for example, a multimedia interface module (such as HDMI module) including a plurality of input and output ports.

[0034] Also, the repeater can be manufactured as an independent electronic device, or built in specific devices such as Home Media Server or IP set-top box (IP-STB).

[0035] The repeater according to the present invention can determine optimal output condition for each operation mode (or process) and provide the information to the source device, in which data format such as EDID, which provides performance information of the sink device, can be used to provide the source
device with the format which is optimal to the format and/or operation mode available to the sink device.

[0036] For example, the repeater using the method of the present invention can comprise, as shown in Fig. 4, a HDMI module 20, an audio processor 21, a video processor 22, a control unit 23, memory 24, an OSD (On Screen Display) generator 25 and an EDID editor.

[0037] Additionally, non-volatile memory such as flash memory or EEPROM can be used for the memory 24, and the EDID editor 26 can be included as a separate constituting device independent of the control unit 23, or implemented by software executed in the control unit 23.

[0038] The control unit 23 detects connection states of the source devices and sink devices connected to input ports and output ports of the HDMI module 20 respectively, and automatically identifies the available operation mode for the combination of input and output devices detected above, the available operation mode being selected from, for example, a group of 7 operation modes (processes) consisted of Through, Convert, Switch, Mix, Distribue, Duplicate and Exchange.

[0039] For example, in the case of combination where, as illustrated in Fig. 5, one source device is connected to the input port of the HDMI module and one sink device is connected to the output port (1:1 IO), the control unit 23 identifies Through and Convert as the available operation modes.
In the case of combination where N source devices are connected to the input ports of the HDMI module and one sink device is connected to the output port (N:1 IO), Through, Convert, Switch and Mix are identified as the available operation modes.

Also, In the case of combination where one source device is connected to the input port of the HDMI module and N sink devices are connected to the output ports (1:N IO), Through, Convert, Distribute and Duplicate are identified as the available operation modes.

Finally, In the case of combination where M source devices are connected to the input ports of the HDMI module and N sink devices are connected to the output ports (M:N IO), all the 7 operation modes of Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange are identified as the available operation modes.

The control unit 23 controls the OSD generator 25 to display available operation modes on an arbitrary sink device or on a predetermined sink device through OSD screen so that a user can easily check the available operation modes for the combination of connected source and sink devices, or change the current operation mode to other one.

If the user requests change of operation mode through OSD screen, the control unit 23 stops the execution of the process for currently set operation mode, selectively edits the EDID
information of the sink device according to operation mode to be changed, and executes the interface operation of transmitting the information to the source device, which will be described in more detail below.

[0045] Figs. 6 through 12 illustrate the flow of operation of the control method according to one embodiment of the present invention.

[0046] When the system is turned on or requested by a user, for example, the control unit 23 makes the device enter the HDMI input/output (I/O) configuration mode (S10).

[0047] Then, the control unit 23 detects the connection state of the source and sink devices connected to the input and output ports of the HDMI module 20 (S11), identifies available operation modes (or processes) based on the combination of connected input and output devices by using the method described above with reference to Fig. 5, and controls the OSD generator 25 to display the available processes identified above on the screen of an arbitrary or predetermined sink device (S12). The control unit 23 can automatically set one operation mode from the identified operation modes as the current operation mode and display the mode on the OSD screen.

[0048] If a user requests execution of certain operation mode or change of the process set to current operation mode (S13), the control unit 23 stops execution of the corresponding process, identifies the type of requested process, and performs the
operation of setting the process as current operation mode (S14).

[0049] And when a certain process is requested to be executed later (S15), if the requested process corresponds to, for example, the Through process between the first source device and the first sink device (S16), the control unit 23 reads out the EDID information of the first sink device (Sink #1) connected to the output port of the HDMI module and transmits the information to the first source device (Source #1) connected to the input port of the HDMI module (S17), in which step the highest resolution of the first sink device (Sink #1) can be selected and transmitted to the first source device (Source #1).

[0050] The first source device (Source #1) outputs optimal A/V signal which is acceptable to the first sink device (Sink #1) by referring to the EDID information, and the control unit 23, upon receiving the A/V signal, performs the interface control operation of the Through process by transmitting the signal to the first sink device (Sink #1) (S18), and then performs an arbitrary operation requested by the user (S19).

[0051] In the case where the requested process corresponds to the operation of Convert between the first source device and the first sink device, as illustrated in Fig. 7 (S21), the control unit 23 reads out and temporarily stores the EDID information of the first sink device (Sink #1) connected to the output port of the HDMI module, controls the EDID editor 26 to
edit the temporarily stored EDID information to the video format that can be handled by the repeater, and transmits the information to the first source device (Source #1) connected to the input port of the HDMI module (S22).

[0052] The first source device (Source #1) outputs A/V signal which can be handled by the repeater by referring to the edited EDID information, and if, for example, the optimal video format of the first sink device is SD level, the video format that the repeater can handle is HD level and the optimal video format of the first source device is full HD level, the first source device outputs video signal of HD level by referring the edited EDID information, and the repeater converts the video signal of HD level to the video signal of SD level and transmits the signal to the first sink device.

[0053] In other words, the control unit 23 performs the interface control operation of the Convert process by controlling the audio processor 21 and the video processor 22 to convert the A/V signal received from the first source device to the optimal A/V signal which is acceptable at the first sink device, and transmitting the signal to the first sink device (S23).

[0054] For example, in the case where Switch process between one of the multiple source devices and the first sink device is executed, as illustrated in Fig. 8 (S24), the control unit 23 selects one source device from the multiple source devices connected to the input port of the HDMI module (S25),
[0055] If the second source device (Source #2) is selected from the multiple source devices, for example, the EDID information of the first sink device (Sink #1) is read out and transmitted to the second source device (Source #2) (S26).

[0056] Then, the second source device (Source #2) outputs optimal A/V signal which is acceptable to the first sink device (Sink #1), and the control unit 23 performs the interface control operation of the Switch process by receiving the signal and transmitting the signal to the first sink device (Sink #1) (S27).

[0057] For example, if Mix process between the first and second source devices and the first sink device is executed, as illustrated in Fig. 9 (S28), the control unit 23 identifies the EDID information and A/V format of the first sink device (Sink #1), and also identifies the EDID information and A/V format of the first and second source devices (Source #1, #2) (S29).

[0058] Then, the EDID information of the first sink device is edited to match the A/V format common to both the first and second source devices. For example, if the optimal video format of the first sink device is HD level, the optimal video format of the first source device is full HD level, and the optimal video format of the second source device is SD level, then the control unit 23 selects the video format of SD level that is acceptable to the first sink device and, at the same time, common to the first and second source devices, and edits the EDID information
to match SD level, and then transmits the edited EDID information to the first and second source devices (S30).

[0059] Also, the first and second source devices outputs optimal A/V signal that is acceptable to the first sink device, which is a video format of SD level, by referring to the edited EDID information.

[0060] Then, the control unit 23 controls the video processor 22 performs the interface control operation of the Mix process by mixing the video signal of SD level received from the first and second source devices and transmitting the signal to the first sink device (S31).

[0061] Meanwhile, the Mix process may corresponds to the case where the first sink device outputs the contents supplied by different source devices in the PIP (Picture In Picture) mode. If image of the first source device is displayed on the main screen of the first sink device and image of the second source device is displayed on the sub screen, the control unit 23 provides the first source device with the video format information optimal to the first sink device, and provides the second source device with the video format information which is lower than the one provided to the first source device.

[0062] For example, in the case where Distribute process between one of the multiple sink devices and the first source device, as illustrated in Fig. 10 (S32), the control unit 23 selects one of the multiple sink devices connected to the output of the
HDMI module (S33),

[0063] If the second sink device (Sink #2) is selected, for example, the EDID information of the selected second sink device is read out and transmitted to the first source device (Source #1) (S34), and then the first source device (Source #1) outputs A/V signal which is optimal to the second sink device (Sink #2) by referring to the EDID information, and the control unit 23 performs the interface control operation of the Distribute process by transmitting the A/V signal to the second sink device (S35).

[0064] For example, in the case where, as illustrated in Fig. 11, Duplicate process between the first source device and multiple sink devices is executed (S36), the control unit 23 reads out and temporarily stores the EDID information of multiple sink devices connected to the output port of the HDMI module, and selects out a common video format which is acceptable to the multiple sink devices (S37).

[0065] For example, if the optimal video format of the first sink device is full HD level and the optimal video format of the second sink device is HD level, HD level is selected as a common video format, the EDID information is edited to match the selected HD level, and the edited EDID information is transmitted to the first source device (S38).

[0066] Then, the first source device outputs A/V signal which is acceptable to both the first and second sink devices by
referring to the EDID information edited as above, in which case the video signal becomes HD level, and the control unit 23, upon receiving the A/V signal, performs the interface control operation of the Duplicate process by transmitting the signal to the first and second sink devices (S39).

[0067] For example, when Exchange process between multiple source devices and multiple sink devices is executed as illustrated in Fig. 12 (S40), the control unit 23 captures and stores EDID information of the multiple source and sink devices connected to the input and output ports of the HDMI module (S41).

[0068] Then, the control unit 23 connects an arbitrary source device and sink device in real time, in which step the EDID information of the sink device connected in real time is read out and transmitted to the corresponding source device (S42).

[0069] Also, the corresponding source device outputs A/V signal which is optimal to the corresponding sink device by referring to the EDID information, and the control unit 23 performs the interface operation of receiving the A/V signal and transmitting the signal to the connected sink device (S43).

[0070] Therefore, various operation modes such as Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange can be chosen for effective operation, thereby enhancing the convenience of the user and increasing the performance of multimedia relay of the repeater.

[0071] Meanwhile, the HDMI module is, as described above, one
example of multimedia interface modules, and other multimedia interface module such as DVI or D-Sub can be used. Also, the EDID information is one example of identification data for identifying the performance of audio/video devices.

5 [0072] Preferred embodiments of the present invention have been disclosed above for the purpose of illustrating the technical idea of the invention, and it will be recognized that those skilled in the art to which the present invention belongs could make improvement, modification, substitution or addition to the embodiments of the invention within the scope of the invention as described in claims without departing from the technical idea of the present invention.
What is claimed is:

1. A method for controlling interface, comprising:
   
   detecting a state of connection with one or more sink devices and one or more source devices which are connected to input and output ports of a multimedia interface module;
   
   identifying one or more operation modes available for the detected connection state; and
   
   transmitting device information of the one or more sink devices to the one or more source devices, the device information being selectively edited in accordance with a requested operation mode among the identified operation modes.

2. The method of claim 1, wherein the one or more operation modes include at least one of Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange.

3. The method of claim 2, wherein the operation modes including Through, Convert, Switch and Mix are available when two or more source devices and one sink device are connected, the operation modes including Through, Convert, Distribute and Duplicate are available when one source device and two or more sink devices are connected, and the operation modes including Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange are available when two or more source devices and two
or more sink devices are connected.

4. The method of claim 2, wherein the step of transmitting device information further comprises steps of:

transmitting, when the operation mode is Through, information on a format of a best quality for the sink device to the source device; and

receiving A/V signal from the source device and transmitting the signal to the sink device.

5. The method of claim 2 wherein the step of transmitting device information further comprises steps of:

generating, when the operation mode is Convert, information on a format that a repeater can handle by referring to the device information of the sink device, and transmitting the information to the source device; and

receiving A/V signal from the source device, converting the signal to the format appropriate for the device information of the sink device, and transmitting the converted signal to the sink device.

6. The method of claim 2 wherein the step of transmitting device information further comprises steps of:
selecting, when the operation mode is Switch, one from the two or more source devices connected, and transmitting the device information of the sink device to the selected source device; and

receiving A/V signal from the selected source device and transmitting the signal to the sink device.

7. The method of claim 2, wherein the step of transmitting device information further comprises steps of:

editing, when the operation mode is Mix, the device information of the sink device in a format which is available to the sink device and common to two or more source devices connected, and transmitting the edited device information to the two or more source devices; and

receiving A/V signal from the two or more source devices, mixing the signal, and transmitting the mixed signal to the sink device.

8. The method of claim 2, wherein the step of transmitting device information further comprises steps of:

transmitting, when the operation mode is Mix, optimal format information of the sink device to a first source device, and transmitting format information which is lower than the optimal format information to the second source device; and
mixing A/V signal from the first source devices as a main display and A/V signal from the second source devices as a sub display, and transmitting the mixed signal to the sink device.

9. The method of claim 1, wherein the step of transmitting device information further comprises steps of:

selecting, when the operation mode is Distribute, one from two or more sink devices connected, and transmitting the device information of the selected sink device to the source device;

and

receiving A/V signal from the source device and transmitting the signal to the selected sink device.

10. The method of claim 2, wherein the step of transmitting device information further comprises steps of:

transmitting, when the operation mode is Duplicate, information on a format which is common to two or more sink devices to the source device; and

receiving A/V signal from the source device and transmitting the signal to the sink device.

11. The method of claim 2, wherein the step of transmitting device information further comprises steps of:
transmitting, when the operation mode is Exchange, the
device information of the connected sink device to two or more
source devices; and

receiving A/V signal from the source device and
transmitting the signal to the sink device connected.

12. A repeater comprising:

a multimedia interface module having a plurality of input
ports and output ports for connecting source devices and sink
devices; and

a control unit configured to detect a connection state
of one or more sink devices and one or more source devices
respectively connected to the input ports and output ports,
identify one or more operation modes available for the detected
connection state, selectively edit device information of the
one or more sink devices according to a requested operation mode
among the identified operation modes, and transmit the edited
information to the one or more source devices.

13. The repeater of claim 12, wherein the one or more
operation modes include at least one of Through, Convert, Switch,
Mix, Distribute, Duplicate and Exchange.
14. The repeater of claim 13, wherein the operation modes including Through, Convert, Switch and Mix are available when two or more source devices and one sink device are connected, the operation modes including Through, Convert, Distribute and Duplicate are available when one source device and two or more sink devices are connected, and the operation modes including Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange are available when two or more source devices and two or more sink devices are connected.
ABSTRACT

The method for controlling interface according to one embodiment of the present invention comprises the steps of: detecting the state of connection with one or more sink devices and one or more source devices which are connected to input and output ports of a multimedia interface module; identifying one or more operation modes available for the detected connection state; and transmitting device information of the one or more sink devices to the one or more source devices, the device information being selectively edited in accordance with a requested operation mode among the identified operation modes. Therefore, various operation modes such as Through, Convert, Switch, Mix, Distribute, Duplicate and Exchange can be chosen for effective operation, thereby enhancing the convenience of the user and increasing the performance of interface between the sink devices and source devices.
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| Title of Invention: | METHOD FOR CONTROLLING INTERFACE |

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

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- **Deposit Account**: 022448
- **Authorized User**: CHONG, ESTER H.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

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- Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)
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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.
Application Data Sheet 37 CFR 1.76

Attorney Docket Number 1630-1121PUS1
Application Number

Title of Invention: METHOD FOR CONTROLLING INTERFACE

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.)

Inventor Information:

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Mailing Address of Inventor:

| Address 1     | 301/1001, Dodam Village Umi 1 cha, 1261 |
| Address 2     | Jukjeong-dong, Suji-gu                   |
| City          | Yongin-si, Gyeonggi-do                   | State/Province |
| Postal Code   | 449-160                                  | Country       | KR |

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 | 02292            |
| Email Address   | mailroom@bskb.com |
Application Data Sheet 37 CFR 1.76

Title of Invention: METHOD FOR CONTROLLING INTERFACE
Application Information:

Title of the Invention: METHOD FOR CONTROLLING INTERFACE
Attorney Docket Number: 1630-1121PUS1
Application Type: Nonprovisional
Subject Matter: Utility
Suggested Class (if any): N/A
Sub Class (if any): N/A
Suggested Technology Center (if any): N/A
Total Number of Drawing Sheets (if any): 7
Suggested Figure for Publication (if any): N/A
Publication Information:

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). Either enter 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: 02292

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.

Foreign Priority Information:
Application Data Sheet 37 CFR 1.76

Title of Invention: METHOD FOR CONTROLLING INTERFACE

This section allows 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.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

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Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.
**Application Data Sheet 37 CFR 1.76**

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### Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

- **Assignee**
- **Legal Representative under 35 U.S.C. 117**
- **Person to whom the inventor is obligated to assign.**
- **Person who shows sufficient proprietary interest**

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

**Name of the Deceased or Legally Incapacitated Inventor:**

If the Assignee is an Organization check here. **X**

**Organization Name**: Humax Co., Ltd.

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Additional Applicant Data may be generated within this form by selecting the Add button.

### Signature:

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

**Signature** /David Biodeau/  
**Date** (YYYY-MM-DD) 2012-11-15

**First Name** David  
**Last Name** Biodeau  
**Registration Number** 42325

Additional Signature may be generated within this form by selecting the Add button.
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.
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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 inspections 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.
[Fig. 4]

Repeater

23
Controller

20
HDMI Module

24
Memory

21
Audio Processor

25
OSD Generator

22
Video Processor

26
EDID Editor

[Fig. 5]

<table>
<thead>
<tr>
<th>I/O</th>
<th>Through</th>
<th>Convert</th>
<th>Switch</th>
<th>Mix</th>
<th>Distribute</th>
<th>Duplicate</th>
<th>Exchange</th>
</tr>
</thead>
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</tr>
</tbody>
</table>
[Fig. 6]

Start

Enter mode of HDMI I/O configuration

Detect connection state of Source/Sink Devices

Display available processes

Is there request for change of process?

YES -> Change process

NO -> S15

Is there request for execution of process?

YES -> Through Process?

YES -> Transmit EDID of Sink to Source

YES -> Transmit A/V signal of Source to Sink

Perform the operation requested by the user

End

S10

S11

S12

S13

S14

S15

S16

S17

S18

S19
[Fig. 7]

A

Convert Process?

YES

NO

S21

B

Edit EDID of Sink to video format that can be processed by Repeater, and transmit to Source

S22

Convert A/V signal to format of Sink and Transmit

S23

H

[Fig. 8]

B

Switch Process?

YES

NO

S24

C

Select one Source from multiple Sources

S25

Transmit EDID of Sink to selected Source

S26

Transmit A/V signal of selected Source to Sink

S27

H
[Fig. 9]

C

Mix Process?

YES

Identify EDID & A/V format of Sink, and Identify EDID & A/V format of multiple Sources

NO

S28

D

S29

Edit EDID of Sink to A/V format common to multiple Sources and Transmit

S30

Combine A/V signals from multiple Sources, and Transmit to Sink

S31

H

[Fig. 10]

D

Distribute Process?

YES

Select one Sink from multiple Sinks

NO

S32

E

S33

Transmit EDID of selected Sink to Source

S34

Transmit A/V signal of Source to selected Sink

S35

H
[Fig. 11]

Duplicate Process?

YES

Select out video formats common to multiple Sinks

NO

Select highest resolution from video formats, Edit EDID, and Transmit to Source

Transmit A/V signal of Source to multiple Sinks

H

[Fig. 12]

Exchange Process?

YES

Capture and Store EDID of each Sink

Select out EDID of Sink connected in real time, and Transmit to corresponding Source

Transmit A/V signal of Source to corresponding Sink

H