



- (51) International Patent Classification:
H04N 7/20 (2006.01) *H01Q 1/12* (2006.01)
- (21) International Application Number:
PCT/EP2015/054270
- (22) International Filing Date:
2 March 2015 (02.03.2015)
- (25) Filing Language: English
- (26) Publication Language: English
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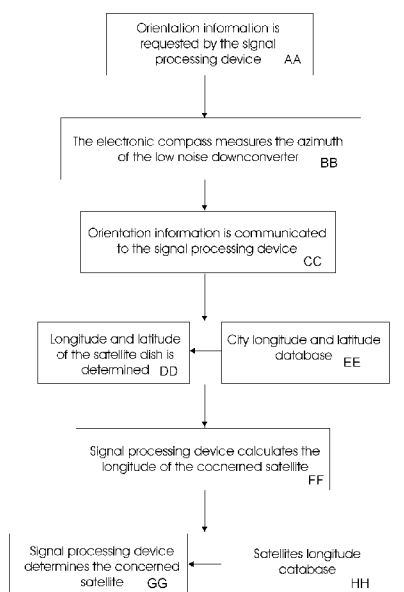
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- (81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,

[Continued on next page]

- (54) Title: SYSTEM FOR FACILITATED SCANNING OF ACCESS CONTENTS IN AN IMAGE DISPLAY DEVICE

Fig. 1



(57) Abstract: The present invention relates to an image display device with an accelerated initial setup stage, effecting creating or updating of the channel list in a substantially facilitated manner. The present invention more particularly relates to a satellite receiver system comprising a low-noise block downconverter coupled to a satellite dish and a signal processing device in signal communication with the low-noise block downconverter, the signal processing device comprising a digital TV processor effecting displaying of satellite broadcasting services on a display unit.





SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,
TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,

DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT,
LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE,
SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

Description**SYSTEM FOR FACILITATED SCANNING OF ACCESS CONTENTS IN AN
IMAGE DISPLAY DEVICE**

- [0001] The present invention relates to an image display device with an accelerated initial setup stage, effecting creating or updating of the channel list in a substantially facilitated manner.
- [0002] Digital and interactive TV systems provide a comprehensive amount of TV channels and programs leading to the general outcome that conventional methods for configuring the operation of the image display device from among a plurality of setting parameters may become inefficient to the extent that it is unperformable in a time-saving manner.
- [0003] Considering the fact that a large number of television and multimedia services are being made available to consumers today, methods for enabling the host, i.e. an image display device such as a TV set with a digital receiver-decoder to satisfactorily process the received services are required. An image display device may receive programs via cable or satellite broadcasting in the form of separate subscription formats.
- [0004] A transponder typically receives a television signal on the ground from satellite uplink stations and processes the signal by encoding, amplifying and rebroadcasting the same. Satellite receivers then transmit the same to a digital receiver of an end-user so that it is decoded and displayed on an image display device.
- [0005] Users can initiate auto-scan function to automatically retrieve channel-specific information, generally based on a preloaded frequency range or transponder information.
- [0006] During the auto-scan or blind scan operation, the preloaded frequency ranges are scanned or the transponder list is created or updated. It is to be noted that configuring the initial setup parameters of an image display prior to network scan can become a troubling task for some users. Therefore, it is desirable that the scanning operation is performed without requiring the user to input any parameters such as transponder frequency, polarization, symbol rate etc. Particularly, older people or technically challenged people can experience difficulties in configuring the system parameters and even

in determining the specific satellite name prior to the scanning operation.

[0007] Therefore, the present invention is devised under the recognition that the initial setup or network scanning operation should be fully automatically accomplished without requiring the user to specify a satellite name or even select from a preloaded list of satellite names the specific satellite the satellite dish is oriented.

[0008] Accordingly, configuration of initial setup or network scanning parameters can be better managed and users can be offered a less troublesome viewing experience without having to manually provide information. The present invention therefore substantially facilitates and accelerates configuration of network scanning parameters and the initial setup.

[0009] Among others, one of the prior art disclosures in the technical field of the present invention can be referred to as US6055431, which defines a method for controlling the operation of multiple beam antenna systems in communication with satellite transponders. The method controls the coverage area assignments, frequency assignments, transmitted power level assignments, and component allocation assignments of these multiple beam antenna transponders in response to the existing and time varying demands for satellite resources. The method manages the operation of the satellite transponders to optimize the overall capacity of the communication satellite.

[0010] The present invention provides a system and method by which an image display device is operable so as to automatically manage configuration of initial setup or network scanning parameters in a substantially accelerated and non-intrusive manner without requiring additional actions on the part of the user, as provided by the characterizing features defined in Claim 1.

[0011] Primary object of the present invention is to provide a system and method by which management of initial setup or network scanning parameters in an image display device is carried out automatically without requiring intervention of the user.

[0012] The present invention proposes an image display device in connection with a receiver or alternatively comprising a built-in receiver unit receiving a plurality of broadcasting services while at least one satellite tuner

supplies transport streams to be processed.

[0013] Therefore, a signal processing device in the form of an image display device or a receiver is proposed, a digital TV processor of which is configured to automatically retrieve the information in relation to a given satellite name by determining the orientation of a low-noise block downconverter. This is accomplished by way of measuring the azimuth of a low-noise block downconverter by means of an electronic compass integrated to the satellite dish.

[0014] When the azimuth of the low-noise block downconverter is determined, the longitude of the satellite is calculated based on the latitude and longitude of the satellite dish. Therefore, the satellite receiver system comprises an electronic compass integrated to the satellite dish and the information in relation to the orientation of the low-noise block downconverter is communicated to the signal processing device to effectuate calculation of the longitude of the concerned satellite.

[0015] Accompanying drawings are given solely for the purpose of exemplifying a system and method by which an image display device is operable, whose advantages over prior art were outlined above and will be explained in brief hereinafter.

[0016] The drawings are not meant to delimit the scope of protection as identified in the claims nor should they be referred to alone in an effort to interpret the scope identified in the claims without recourse to the technical disclosure in the description of the present invention.

[0017] Fig. 1 demonstrates a general flow diagram according to which the signal processing device of the invention executes a method according to the present invention.

[0018] The present invention proposes a signal processing device in the form of an image display device or a set-top box receiving programs via cable, terrestrial antenna or satellite broadcasting in the form of separate subscription formats. A set-top box typically contains at least one tuner input, operating in connection with an image display device. Alternatively, the image display device itself can receive programs using cable, satellite or over-the-air (terrestrial) built-in tuners.

- [0019] Digital and interactive TV systems provide a comprehensive amount of TV channels and programs. A conventional structure receiving program contents receives a transport stream via a tuner, the receiver-decoder having a plurality of tuners typically ensuring viewing a first program content and processing a second program content.
- [0020] The signal processing device in the form of an image display device in accordance with the invention is connectible to a set-top box, the latter having at least one satellite tuner. The image display device itself or the receiver (set-top box) conventionally has a demodulator suitable for receiving broadcast multimedia content. In this regard, receivers capable of receiving and tuning to signals of different generations (DVB-S and DVB-S2) can be in use. Satellite broadcasting involves a frequency band of 10.7 – 12.75 GHz while the Low-Noise Block (LNB) converts the signal into a 950 – 2200 MHz frequency band as supported by the receiver.
- [0021] Conventionally, signal received from a satellite dish is converted to IF signal (Intermediate frequency), which can then be processed by the demodulator. The demodulator typically outputs transport streams to a digital TV processor, which accordingly processes the transport streams and retrieves channel information for all the channels.
- [0022] Image display devices can be generally factory-configured to have a satellite's transponder list. When processing the signal received from a satellite dish, specific transponder information of each channel is retrieved. A transponder receives a television signal from the satellite uplink stations on the ground, encoding, amplifying and rebroadcasting the same. Transponder parameters typically involve satellite name, transponder frequency in MHz, polarization, symbol rate in Ksym/s etc.
- [0023] According to the present invention, the user, while configuring the initial setup parameters of the image display device prior to the initiation of the network scan, is not required to specify a satellite name among a plurality of alternatives. The image display device itself automatically retrieves the correct information in relation to the concerned satellite by determining the orientation of the low-noise block (LNB) without the user selecting the satellite name.

- [0024] The present invention ensures that the orientation of the low-noise block downconverter being typically mounted on the satellite dish to collect the radio waves from the dish is determined by means of an electronic compass. As is known to the skilled worker, an electronic compass is an instrument in the form of a geomagnetic field sensor in combination with an accelerometer. The electronic compass determines the position of the satellite dish relative to the magnetic North by 3-axis measurements by means of geomagnetic field sensors and accelerometers, returning multi-dimensional arrays of sensor values. Accelerometers are typically needed because the magnetic field sensors must extend horizontally, perpendicular to the gravity vector of the Earth. Therefore, the orientation of the low-noise block downconverter relative to the horizontal axis is calculated by the electronic compass based on measurements by accelerometers. Electronic compasses with the necessary hardware and software are commercially available in the market. Such products for instance include those by Honeywell® or Freescale®.
- [0025] When the electronic compass is integrated to the satellite dish so as to determine the orientation of the low-noise block downconverter, the longitude of the satellite is calculated based on the following formula:

[0026]

$$\lambda_{satellite} = \lambda_{dish} - \tan^{-1}(\sin \varphi * \tan(Az - 180))$$

$\lambda_{satellite}$: Satellite longitude(degrees)

λ_{dish} : Dish longitude(degrees)

φ : Dish latitude(degrees)

Az : Dish azimuth (degrees)

- [0027] Therefore the longitude of the satellite is calculated based on the latitude and longitude of the satellite dish as well as the azimuth of thereof.
- [0028] While the azimuth of the satellite dish is determined by the electronic compass as explained above, the information in relation to the longitude and latitude of the satellite can be supplied by the user during the initial setup. Considering the fact that this information may not be available to the user, the longitude and latitude values are selected based on a preloaded list of locations/cities. Alternatively, the city information can be made automatically available through other channels such as Internet.
- [0029] In this manner, the signal processing device itself determines the orientation of the low-noise block downconverter based on the data obtained from the electronic compass, which is communicated to the signal processing device, i.e. the image display device or the satellite receiver through a communication protocol such as DiSEqC 2.0. The communication is typically accomplished through a coaxial cable between the signal processing device and the low-noise block downconverter, providing that the signal processing device determines the longitude of the satellite as well as the specific satellite associated with that longitude in a preloaded database.
- [0030] To this end, the signal processing device of the present invention initiates the setup stage by executing the method of retrieving channel information after the specific satellite is automatically determined. The network scan automatically progresses based on the preloaded transponder list associated with the specified satellite. Television broadcasting signals are searched and parameters such as frequency, symbol rate and polarization of a transponder are typically fed to the demodulator to verify whether signal lock is achieved. Alternatively, a so-called blind search can be carried out in the manner that the signal processing device steps through a range of transponders. The tuner conventionally scans the entire frequency bandwidth vertically and horizontally until the channel information retrieving operation is terminated.
- [0031] In summary, the present invention proposes a signal processing device for

receiving a plurality of satellite broadcasting services in communication with a low-noise block downconverter coupled to a satellite dish, the signal processing device comprising a digital TV processor and a tuner in association with a demodulator which supplies transport streams, the signal processing device being further able to communicate with a display unit.

- [0032] In one embodiment of the present invention, the digital TV processor is configured to effect initiation of a channel information retrieving operation in the manner that the digital TV processor previously automatically retrieves the information in relation to a given satellite name by determining the orientation of the low-noise block downconverter in communication.
- [0033] In one embodiment of the present invention, the orientation of the low-noise block downconverter is determined by measurement of the azimuth of the low-noise block downconverter by means of an electronic compass integrated to the satellite dish.
- [0034] In one embodiment of the present invention, the digital TV processor is configured to calculate the longitude of the satellite based on the latitude and longitude of the satellite dish as well as the azimuth of the low-noise block downconverter.
- [0035] In one embodiment of the present invention, the digital TV processor initiates the channel information retrieving operation in the manner that the tuner carries out the scanning operation based on preloaded transponder information in relation to the satellite.
- [0036] The present invention also proposes a satellite receiver system comprising a low-noise block downconverter coupled to a satellite dish and a signal processing device in signal communication with the low-noise block downconverter, the signal processing device comprising a digital TV processor effecting displaying of satellite broadcasting services on a display unit.
- [0037] In one embodiment of the present invention, the satellite receiver system comprises an electronic compass integrated to the satellite dish to measure the azimuth of the low-noise block downconverter and the digital

TV processor is configured to calculate the longitude of the satellite based on the latitude and longitude of the satellite dish as well as the azimuth of the low-noise block downconverter.

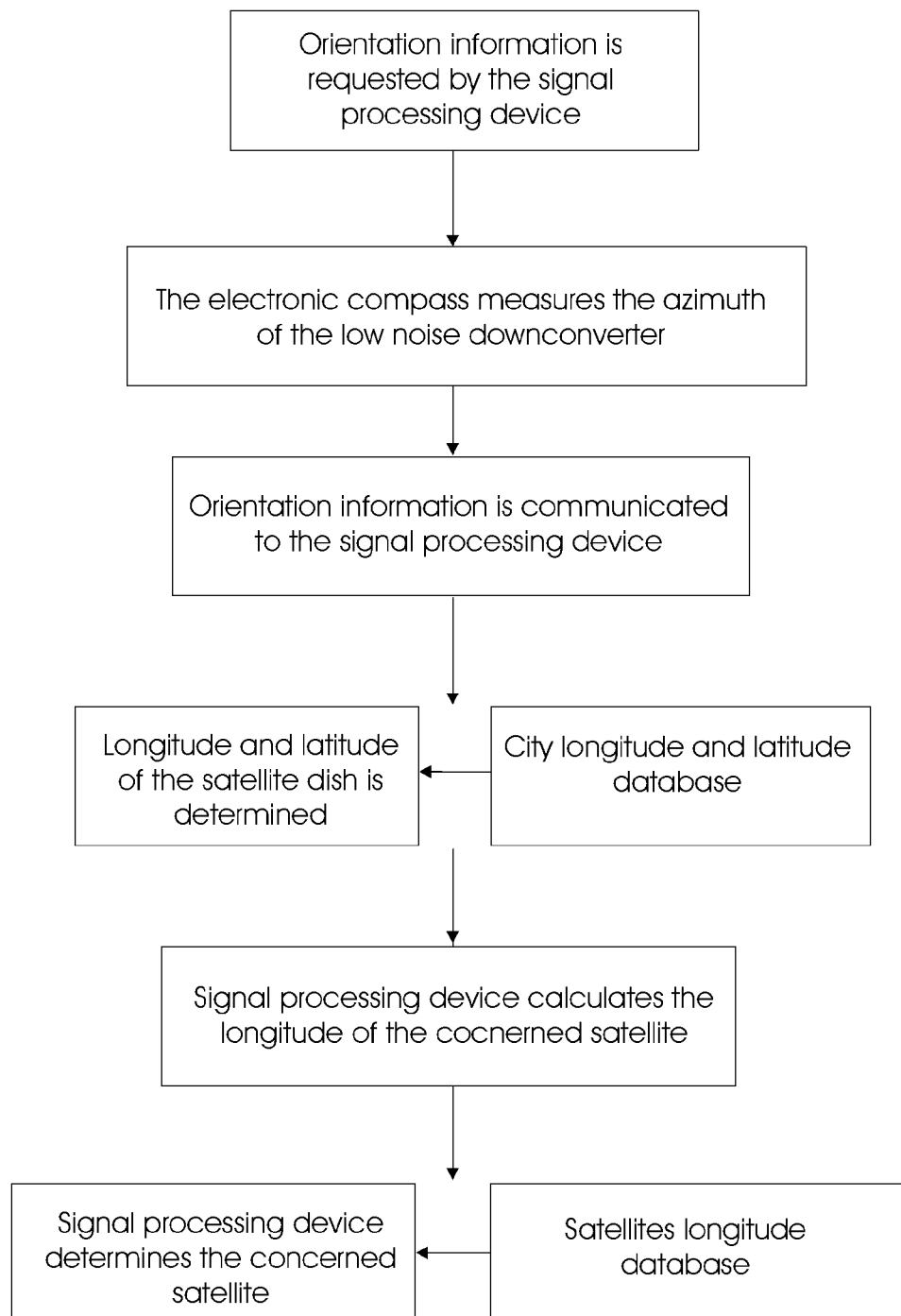
- [0038] According to a further embodiment of the present invention, the longitude and latitude of the satellite dish are selectable based on a preloaded list of locations.
- [0039] According to a further embodiment of the present invention, the information in relation to the orientation of the low-noise block downconverter is communicated to the signal processing device through DiSEqC communication protocol.
- [0040] According to a further embodiment of the present invention, the tuner is a DVB-S or DVB-S2 tuner.
- [0041] According to a further embodiment of the present invention, the signal processing device is an image display device or a set-top box.
- [0042] Accordingly, the present invention ensures that configuration of channel information settings can be better managed in a less intrusive and substantially facilitated manner such that users are offered a less troublesome viewing experience without having to manually input the specific satellite name for initiation of the automatic network scan task.

Claims

1. A signal processing device for receiving a plurality of satellite broadcasting services in communication with a low-noise block downconverter coupled to a satellite dish, the signal processing device comprising a digital TV processor and a tuner in association with a demodulator which supplies transport streams, the signal processing device being further able to communicate with a display unit, **characterized in that**
 - the digital TV processor is configured to effect initiation of a channel information retrieving operation in the manner that the digital TV processor previously automatically retrieves the information in relation to a given satellite name by determining the orientation of the low-noise block downconverter in communication,
 - the orientation of the low-noise block downconverter is determined by measurement of the azimuth of the low-noise block downconverter by means of an electronic compass integrated to the satellite dish,
 - the digital TV processor is configured to calculate the longitude of the satellite based on the latitude and longitude of the satellite dish as well as the azimuth of the low-noise block downconverter and
 - the digital TV processor initiates the channel information retrieving operation in the manner that the tuner carries out the scanning operation based on preloaded transponder information in relation to the satellite.
2. A satellite receiver system comprising a low-noise block downconverter coupled to a satellite dish and a signal processing device in signal communication with the low-noise block downconverter, the signal processing device comprising a digital TV processor effecting displaying of satellite broadcasting services on a display unit, **characterized in that**
 - the satellite receiver system comprises an electronic compass integrated to the satellite dish to measure the azimuth of the low-noise block downconverter and
 - the digital TV processor is configured to calculate the longitude of the satellite based on the latitude and longitude of the satellite dish as well as the azimuth of the low-noise block downconverter.
3. A signal processing device as in Claim 1 or 2, **characterized in that the**

longitude and latitude of the satellite dish are selectable based on a preloaded list of locations.

4. A signal processing device as in Claim 1 or 2, **characterized in that** the information in relation to the orientation of the low-noise block downconverter is communicated to the signal processing device through DiSEqC communication protocol.
5. A signal processing device as in Claim 2, **characterized in that** the tuner is a DVB-S or DVB-S2 tuner.
6. A signal processing device as in any preceding Claims, **characterized in that** the signal processing device is an image display device or a set-top box.

Fig. 1

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/054270

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N7/20 H01Q1/12
ADD.

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)
H04N H01Q

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)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 585 804 A (RODEFFER CHARLES E [US]) 17 December 1996 (1996-12-17) column 5, line 4 - column 6, line 49 column 8, line 12 - column 9, line 18 column 10, line 34 - column 13, line 33 figures 1-6	1-6
Y	EP 0 963 067 A2 (HANDAN BROADINFOCOM [KR]) 8 December 1999 (1999-12-08) paragraph [0117] - paragraph [0167] figures 1,2,5-8,12	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

17 November 2015

Date of mailing of the international search report

23/11/2015

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2015/054270

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5585804	A	17-12-1996	NONE
EP 0963067	A2	08-12-1999	NONE