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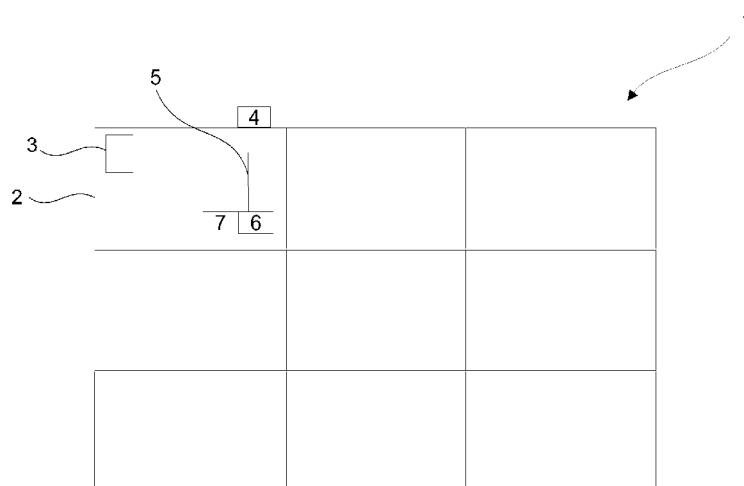
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Figure 1



(57) Abstract: The present invention relates to a system and method for arranging the screens that will display the image content via the media inputs in a video wall system (1) which comprises a plurality of image display devices (2) in connection with a control unit (3) that process source files to be displayed on a plurality of image display devices (2).

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Description**A VIDEO WALL SYSTEM DISPLAY ARRANGEMENT METHOD**

- [0001] The present invention relates to a connection system for the display arrangement in a video wall display system which comprises a plurality of image display devices in connection with a control unit that processes source files to be displayed on a plurality of image display devices.
- [0002] Image display devices present images on screens thereof, and combination of multi-display devices in order to form a large screen display environment called a video wall is one of the functions achievable through combination and simultaneous operation of a plurality of individual image display devices. The term video wall generally refers to the generation of a combined image from a single video input by means of a plurality of image display devices as a single video wall image. The video wall may typically be arranged in the form of 1x4, 2x2, 3x3, 4x4 or much larger screen formats.
- [0003] Video walls are basically preferred due to their capability to generate a very large screen whose tile layout can be customized by which a greater screen area and greater pixel density per unit cost can be achieved, which is advantageous due to manufacturing costs of single screens, hence allowing an unusual resolution when combined.
- [0004] Video walls are conventionally used in large public venues such as stadiums. Video walls can be driven from multi-monitor video cards, but complex arrangements require special video processors capable to manage large video walls. Software based video wall controllers however use PCs and networking equipment.
- [0005] In video wall applications, each image display device of the system requires individual cable installation for effecting data communication with a central computer.
- [0006] The video distribution is possible through different methods. One of the methods includes a central video distributor system and each image to be displayed on a single image display device is distributed by the central video distributor system. The image is accordingly divided by the central system. Thus, although independent, the screens can be joined together

and can display images as a whole. By dividing the image and displaying the same in display combinations in different numbers and positions in certain arrangements in said systems composed of a plurality of image display devices, content suitable for a great number of screen formats, and screen sizes can be created as per the preference and the position of the user. In order to arrange the division of the image to be watched in the video wall system, each of the image display devices in the system must be commanded and activated. These preferences can be generally realized via an external command center, by activating each image display device by means of a controller or by physically installing the connections of the image display devices in the system. These operations are difficult to do for the user and require a lot of time. As the number of image display devices in the video wall system increases, the time and labor spent also increases and necessary arrangements require the intervention of a service personnel.

- [0007] In the state of the art Patent Document No. JP2013064802, a video wall system is disclosed, comprising, in a multiple screen system composed of a plurality of image display devices, the steps of directly identifying and activating the device by means of an identifier assigned to the image display device in order to determine the location of the image display device.
- [0008] The state of the art Patent Document No. JPH0722359 discloses the method of dividing and displaying the image to be display depending on the time signal to be received from a video player in a certain screen configuration in the system in a video wall system composed of a plurality of image display devices.
- [0009] By means of the present invention, a system and method is realized, wherein the screen matrices identified to the inputs with the selection of input lines by means of the connection lines so as to divide and display the image to be displayed in screen combinations in different matrices among the image display devices in a video wall system are activated.
- [0010] The video wall system realized in order to attain the aim of the present invention, explicated in the first claim and respective claims thereof

comprises a plurality of image display devices with a serial video transmission line therebetween that are connected to each other through the serial video transmission line transferring an image or video signal to an adjacent image display device; a control unit that controls the operation of the image display device and that is in data communication with at least one image display device; a multiplexer that enables the media data received from a source to be fed to a plurality of image display devices, and a data bus that provides the transmission of the data received from the multiplexer to the image display devices.

[0011] The video wall system of the present invention comprises the control unit that activates the data bus with the command of the user, thus enabling the media data to be shared only among the selected image display devices. The video wall systems are generally matrix screen structures formed with image display devices positioned adjacent to each other horizontally and vertically. The image display device can be a television or a monitor. When the number of screens in the matrix structures is decreased, the size of the image to be displayed is displayed in a smaller area, and when said number is increased, said image is displayed in a larger area. The command given by the control unit provides the activation of the parallel data buses created with the image display devices formed in a matrix structure that are determined by the multiplexer for the broadcast or the content for the most used different screen sizes by taking into consideration the number of image display devices in the video wall system. By means of the buses created with a plurality of data inputs in the image display devices via a plurality of multiplexers, the matrix structures assigned to each bus can be accessed by activating the relevant buses. The user can define this selection by a command to be entered beforehand in the control unit. For example, when two data input lines are used in a video wall system of 3x3 matrix, two separate buses are formed between the multiplexer and said lines. When the first bus is selected with the command entered in the control unit, the buses of the image display devices determined to form a 2x2 matrix can be activated. The image display devices related to a separate matrix structure to be

identified to the second bus are activated, and thus, the image is displayed in these screens. After this identification is performed by the user once, the image is enabled to be shared the relevant screens only by changing the selection of the bus. Thus, the need for creating or removing any physical connection is eliminated. Moreover, ease of use and efficiency is provided since quick transition among screen sizes can be made.

[0012] In an embodiment of the present invention, the video wall system comprises a plurality of multiplexers. The multiplexers can be fed with a plurality of data channels. In order to watch a part of the image content received from a data channel, a selection is made among the buses formed by transmitting the data received from the bus to be created with the data inputs of the relevant image display devices via a multiplexer and from another data channel to another input of the image display devices via another multiplexer, thus image contents can be shared among screens. For example, since the Internet content received from an external player is low resolution, watching the same in a large screen may pose a problem. By identifying the image content received from such a player to be played in a matrix structure composed of a small number of image display devices identified in the video wall system and by identifying the image content received from a high resolution broadcast source to be played in a matrix structure composed of a high number of image display devices in order to form a larger image area, an improved screen selection method is obtained.

[0013] In an embodiment of the present invention, the video wall system comprises an HDMI input on the image display device that provides transfer of HDMI (High Definition Multimedia Interface) data, and a data bus that provides the HDMI data transfer. The broadcast can be watched on the screens by means of the connection formed via the HDMI inputs on the image display devices. A plurality of data buses can be defined for each image display device by means of a plurality of HDMI inputs provided on the image display device, and thus, screen matrix combinations in a number equal to the number of inputs can be provided. HDMI data transfer can be realized via the buses formed between the broadcast source and

the HDMI inputs. The HDMI data transfer prevents the deterioration of the broadcast quality and provides quick data transmission, thus improving the viewing quality. The command generated by the control unit is suitable for being transmitted via HDMI data buses and activating the image display devices. Thus, the user makes a selection among the HDMI inputs and can easily access the broadcast content displayed in compliance with the screen sizes in different defined matrix structures.

[0014] In an embodiment of the present invention, the video wall system comprises the data bus created by connecting the image content with a SCART (21-pin video content input) input that is arranged in the image display device and that provides the transmission of media content. The broadcast can be watched on the screens by means of the connection formed via the SCART inputs on the image display devices. The command generated by the control unit is suitable for being transmitted via SCART data buses and activating the image display devices. Thus, the user can easily access the broadcast content displayed in compliance with the screen sizes preferred among the input options in a different matrix structure that can be identified to the SCART input.

[0015] In another embodiment of the present invention, the video wall system comprises the control unit that provides the generation of a command via a menu where the user can select the image display devices wherein the image content is to be displayed. By means of a remote control, control buttons on the video wall system or touch controls displayed on the image display devices, the user can generate a command of displaying the image by being divided among the selected image display devices, that will be sent to various buses that are created with various inputs on the image display devices and that can be selected to activate the relevant image display devices. Thus, a different screen matrix combination can be identified for the input suitable for any image content transmission, that is provided on the image display device. After the identification, the user, only by selecting the inputs on the image display devices, enables the image content to be displayed in predetermined screen sizes. Said matrix combination identifications performed via the menu can be also made as

factory default settings.

- [0016] In another embodiment of the present invention, in a video wall system comprising a plurality of data buses created with a plurality of image display devices and at least two HDMI inputs provided on each image display device, at least one multiplexer providing the simultaneous data transmission to each HDMI input and a control unit that controls the operation of the image display devices, with the command of the user, the control unit executes a method comprising the steps of activating different image display devices and sharing and displaying a portion of the image data via each multiplexer in the activated image display devices (Figure 2). Thus, by making a selection among HDMI inputs, image transition can be made in different screen sizes.
- [0017] By means of the present invention, a video wall system with customizable image display area and facilitated control is realized.
- [0018] The video wall system realized in order to attain the aim of the present invention is illustrated in the attached figures, where:
- [0019] Figure 1 - is the schematic view of the video wall system in an embodiment of the present invention.
- [0020] Figure 2 - is the schematic view of the video wall system in another embodiment of the present invention.
- [0021] The elements illustrated in the figures are numbered as follows:
- [0022] 1. Video wall system
- [0023] 2. Image display device
- [0024] 3. Control unit
- [0025] 4. Multiplexer
- [0026] 5. Data bus
- [0027] 6. HDMI input
- [0028] 7. SCART input
- [0029] 102. First image display device
- [0030] 202. Second image display device
- [0031] 302. Third image display device
- [0032] 105. First data bus
- [0033] 205. Second data bus

- [0034] 305. Third data bus
- [0035] 106. First HDMI input
- [0036] 206. Second HDMI input
- [0037] 306. Third HDMI input
- [0038] The video wall system (1) operates according to a method of serial transmission of the video content to obtain an overall image in a much larger size that a single image display device (2) cannot display by way of dividing the main image into a plurality of image portions for display on separate image display devices (2).
- [0039] In an embodiment of the present invention, the video wall system (1) comprises the control unit (3) that activates the data bus (5) with the command of the user, thus enabling the related media data to be shared only among the selected image display devices (2). By means of the data bus (5) that provides the transmission of the data received from the multiplexer (4) to the image display devices (2) and the control unit (3) that activates said data bus (5) with the command of the user, thus enabling the related media data to be shared only among the selected image display devices (2), the image can be displayed in the desired screen size. Thus, ease of use is provided thanks to the screen size options to be defined to the existing data buses (5).
- [0040] In an embodiment of the present invention, the video wall system (1) comprises a plurality of multiplexers (4). By means of different data channels to be defined to each multiplexer (4), the user is enabled to make a selection with the command he/she enters into the control unit (3) via a plurality of data buses (5). The multiplexer (4) simultaneously feeds a broadcast or image content to a plurality of image display devices (2). With the command of the control unit (3), it is determined how many image display device (2) screens the video wall system (1) will use for displaying the entire image and which part of the image will be created on the screen of which image display device (2). Since there will be a plurality of sources for the image data in the case there are a plurality of multiplexers (4), the data buses (5) formed by each multiplexer (4) are controlled with the command of the control unit (3), and a plurality of contents can be

simultaneously played on different image display devices (2).

[0041] In an embodiment of the present invention, the video wall system (1) comprises at least one HDMI input port (6) on the image display device (2) that provides transfer of HDMI data, and the data bus (5) that provides the HDMI data transfer. The media content is transmitted to the image display device (2) by means of the data bus (5) formed by means of the HDMI input (6) provided on each image display device (2). The HDMI input (6) can be changed to the active or passive position with the command of the control unit (3). The image display screen matrix defined to the selected HDMI input (6) is activated at the moment the HDMI input (6) is selected, and the image is enabled to be divided and displayed only in the defined screens. Thus, the user can easily change the screen size for displaying the image without changing the connections of the image display devices (2).

[0042] In an embodiment of the present invention, the video wall system (1) comprises the data bus (5) created by connecting the image content with a SCART input (7) that is arranged in the image display device (2) and that provides the transmission of media content. The media content is transmitted to the image display device (2) by means of the data bus (5) formed by means of the SCART input (7) provided on each image display device (2). The SCART input (7) can be changed to the active or passive position with the command of the control unit (3). The image display screen matrix defined to the selected SCART input (7) is activated at the moment the SCART input (7) is selected, and the image is enabled to be divided and displayed only in the defined screens. Thus, the user can easily change the screen size for displaying the image without changing the connections of the image display devices (2).

[0043] In an embodiment of the present invention, the video wall system (1) comprises the control unit (3) that provides the generation of a command via a menu where the user can select the image display devices (2) wherein the image content is to be displayed. In order to easily change to the screen sizes he/she prefers to watch with the menu controls, the user can enter a command into the control unit (3) and can assign the

information of the screen matrix he/she desires to be formed to the data buses (5). After said assignment, the user selects the data input source in order to activate the desired data buses (5) and enables the image to be displayed in compliance with the defined screen matrix. Thus, without any external connection, the control process can be carried out.

[0044] In another embodiment of the present invention, the video wall system (1) comprises a plurality of data buses (105, 205, 305...) created with a plurality of image display devices (102, 202, 302...) and at least two HDMI inputs (106, 206, 306...) provided on each image display device (102, 202, 302...), and at least one multiplexer (4) providing the simultaneous data transmission to each HDMI input (106, 206, 306...). With the command of the user, the control unit (3) executes a method comprising the steps of activating different image display devices (102, 202, 302...) and sharing and displaying a portion of the image data via each multiplexer (4) in the activated image display devices (102, 202, 302...). Thus, image transition among different screen sizes can be provided by making a selection among the HDMI inputs (106, 206, 306...).

[0045] By means of the present invention, a video wall system (1) with increase efficiency is realized, wherein the image display devices (2) to be used actively to form the screen size desired for displaying the image can be determined by making a selection among media inputs.

Claims

1. A video wall system (1) **comprising** a plurality of image display devices (2) with a serial video transmission line therebetween that are connected to each other through the serial video transmission line transferring an image or video signal to an adjacent image display device (2); a control unit (3) that controls the operation of the image display device (2) and that is in data communication with at least one image display device (2); a multiplexer (4) that enables the media data received from a source to be fed to a plurality of image display devices (2), a data bus (5) that provides the transmission of the data received from the multiplexer (4) to the image display devices (2), **characterized by** the control unit (3) that activates the data bus (5) with the command of the user, thus enabling the media data to be shared only among the selected image display devices (2).
2. A video wall system (1) as in Claim 1, comprising a plurality of multiplexers (4), **characterized by** the control unit (3) that enables the user to make a selection among a plurality of data buses (5) by means of different data channels to be defined to each multiplexer (4).
3. A video wall system (1) as in any one of the above claims, **characterized by** at least one HDMI input port (6) on the image display device (2) that provides transfer of HDMI data, and the data bus (5) that provides the HDMI data transfer.
4. A video wall system (1) as in any one of the above claims, **characterized by** the data bus (5) created by connecting the image content with a SCART input (7) that is arranged in the image display device (2) and that provides the transmission of media content.
5. A video wall system (1) as in any one of the above claims, **characterized by** the control unit (3) that provides the generation of a command via a menu where the user can select the image display devices (2) wherein the image content is to be displayed.
6. A method executed by the control unit (3) comprising the steps of activating different image display devices (102, 202, 302...) and sharing and displaying a portion of the image data via each multiplexer (4) in the activated image display devices (102, 202, 302...) in a video wall system (1) comprising a

plurality of data buses (105, 205, 305...) created with a plurality of image display devices (102, 202, 302...) and at least two HDMI inputs (106, 206, 306...) provided on each image display device (102, 202, 302...); at least one multiplexer (4) providing the simultaneous data transmission to each HDMI input (106, 206, 306...), and a control unit (3) that controls the operation of the image display device (2).

Figure 1

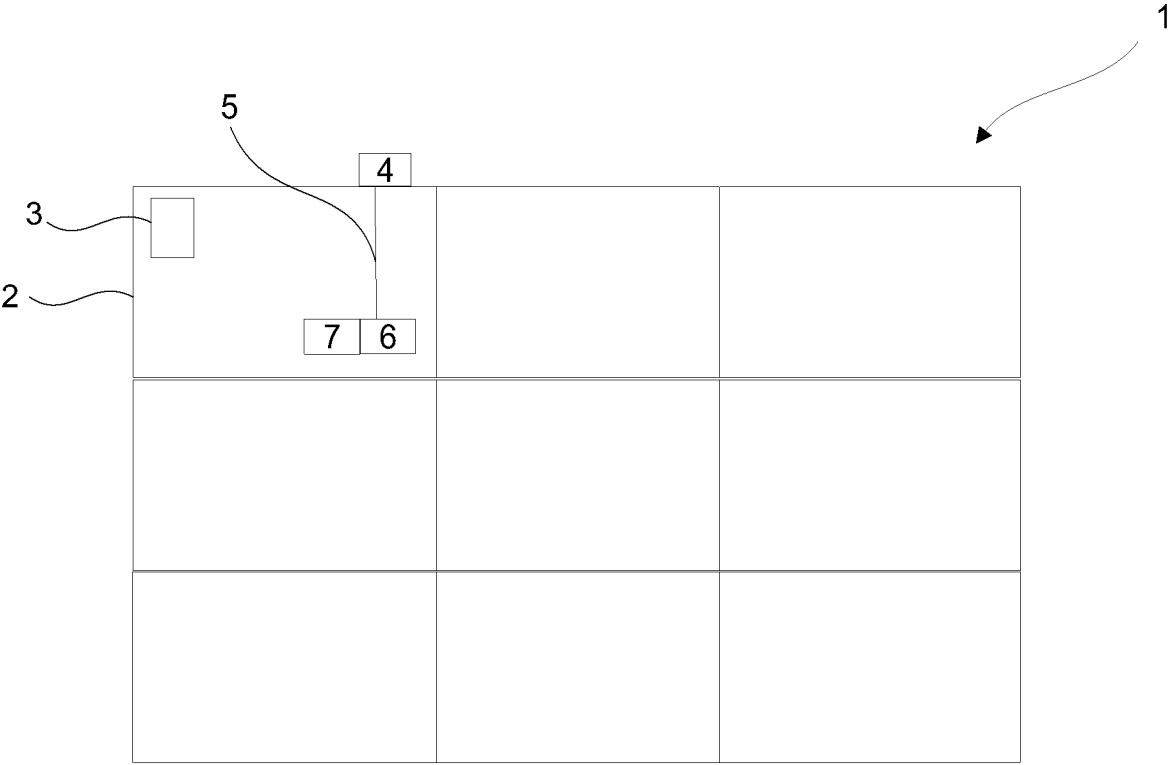
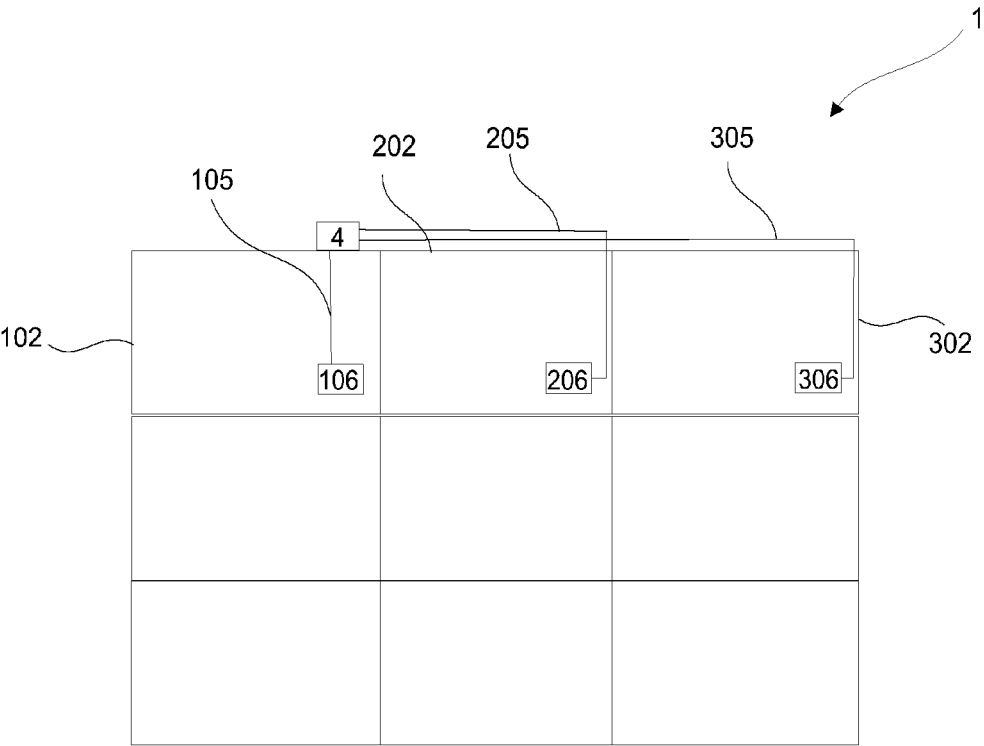


Figure 2



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/078602

A. CLASSIFICATION OF SUBJECT MATTER
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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)
G06F G09G

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 339 838 A1 (CHRISTIE DIGITAL SYSTEMS USA [US]) 29 June 2011 (2011-06-29) paragraph [0025] - paragraph [0076]; figures 1-8	1-6
A	----- US 2002/163513 A1 (TSUJI RYUHEI [JP]) 7 November 2002 (2002-11-07) paragraph [0002] - paragraph [0028] paragraph [0061] - paragraph [0122]; figures 3-13	1-6
A	----- US 2014/035795 A1 (PARK SANG-JUN [KR] ET AL) 6 February 2014 (2014-02-06) paragraph [0037] - paragraph [0123]; figures 1-6	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2339838	A1	29-06-2011	EP 1995958 A1 26-11-2008
			EP 2337344 A1 22-06-2011
			EP 2339838 A1 29-06-2011
			EP 2357807 A1 17-08-2011
			EP 2357808 A2 17-08-2011
			JP 5653985 B2 14-01-2015
			JP 2009080455 A 16-04-2009
			JP 2013080229 A 02-05-2013
			US 2008284675 A1 20-11-2008
			US 2011148741 A1 23-06-2011
			US 2011148742 A1 23-06-2011
US 2002163513	A1	07-11-2002	AU 6788901 A 14-01-2002
			CA 2383635 A1 10-01-2002
			CN 1383538 A 04-12-2002
			EP 1298632 A1 02-04-2003
			EP 1816630 A1 08-08-2007
			JP 5098129 B2 12-12-2012
			JP 5704119 B2 22-04-2015
			JP 2012208503 A 25-10-2012
			KR 100563716 B1 28-03-2006
			TW 582015 B 01-04-2004
			US 2002163513 A1 07-11-2002
			US 2005179616 A1 18-08-2005
			WO 0203365 A1 10-01-2002
US 2014035795	A1	06-02-2014	CN 103577136 A 12-02-2014
			EP 2693424 A2 05-02-2014
			KR 20140017906 A 12-02-2014
			US 2014035795 A1 06-02-2014