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(54) **RECEIVER AND SYSTEM USING AN ELECTRONIC QUESTIONNAIRE FOR ADVANCED BROADCAST SERVICES**

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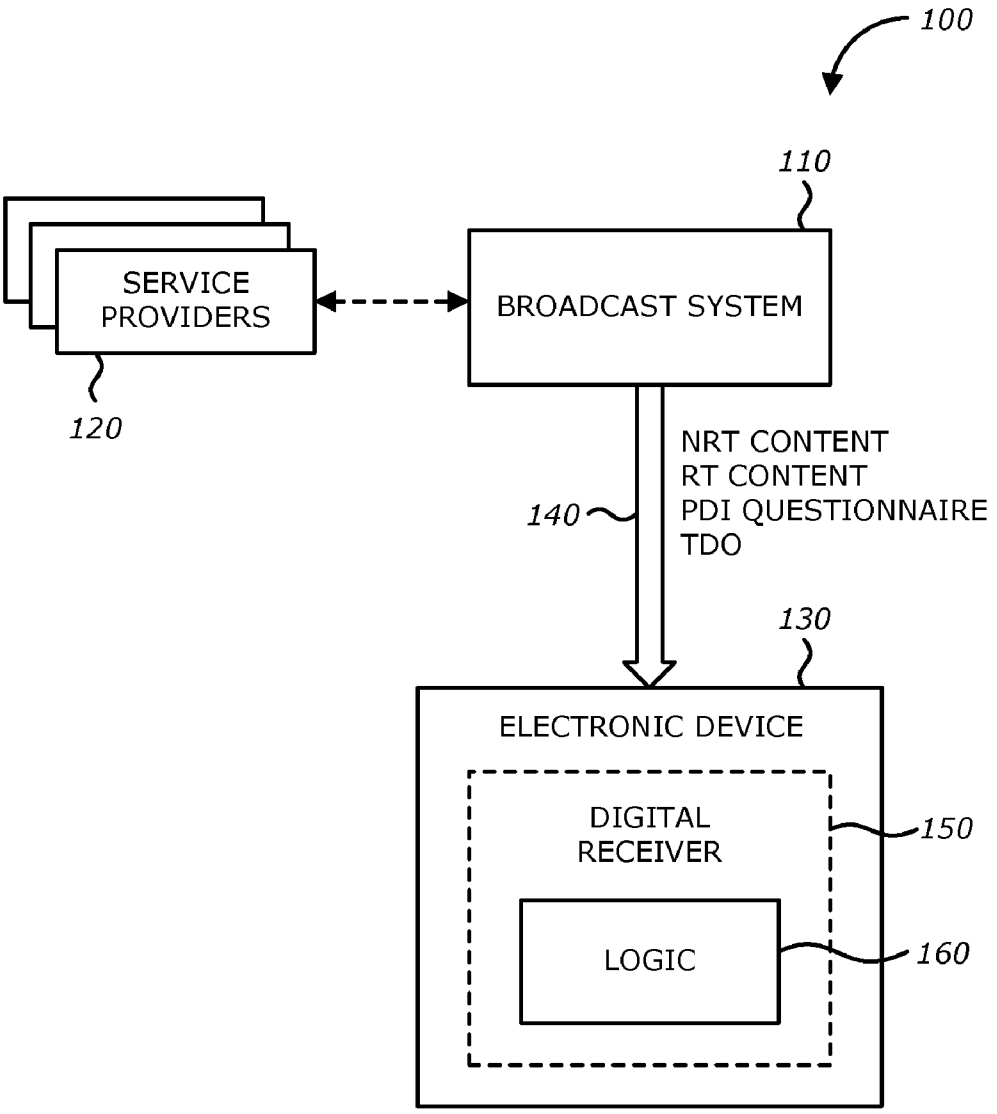
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(57) **ABSTRACT**

According to one embodiment of the invention, a computer-implemented method for a digital broadcast system is described. The method involves an operation of receiving an electronic questionnaire that includes a plurality of questions registered to avoid duplication of any one of the plurality of questions. The electronic questionnaire, when processed by a receiver of the digital broadcast system, generates for display a plurality of questions. The receiver acquires answers to the electronic questionnaire, where the answers are used in adjusting content subsequently downloaded to the receiver.



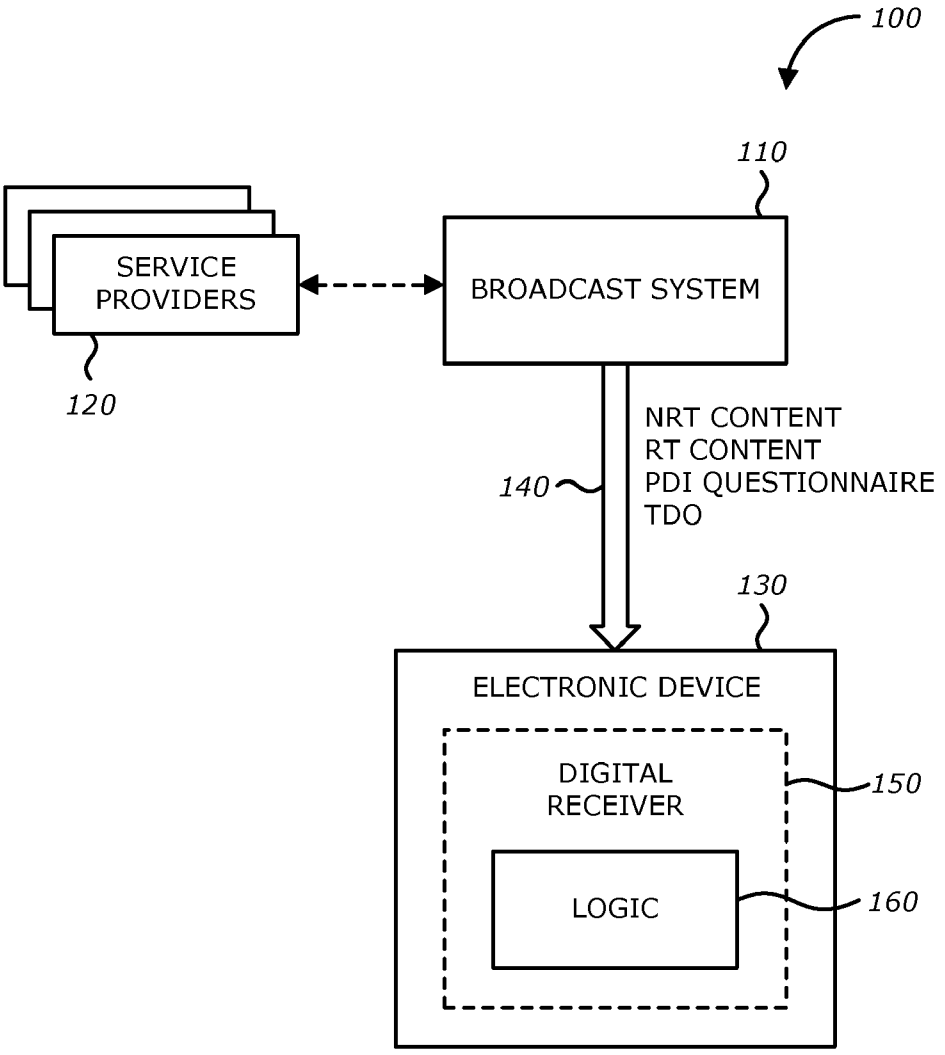

100
110
SERVICE PROVIDERS
120
BROADCAST SYSTEM
140
NRT CONTENT
RT CONTENT
PDI QUESTIONNAIRE
TDO
130
ELECTRONIC DEVICE
DIGITAL RECEIVER
150
LOGIC
160

FIG. 1

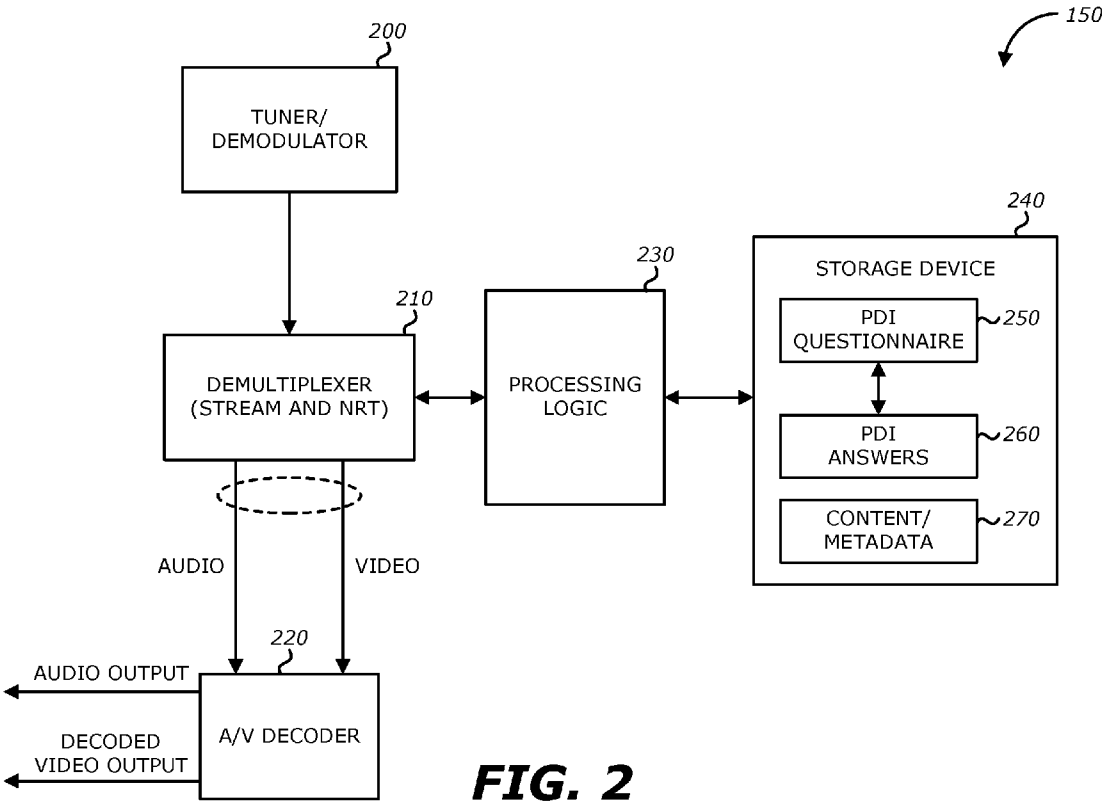

150
200
TUNER/
DEMODULATOR
240
STORAGE DEVICE
230
210
PDI
QUESTIONNAIRE
250
DEMULTIPLEXER
(STREAM AND NRT)
PROCESSING
LOGIC
PDI
ANSWERS
260
CONTENT/
METADATA
270
AUDIO
VIDEO
220
AUDIO OUTPUT
DECODED
VIDEO OUTPUT
A/V DECODER

FIG. 2

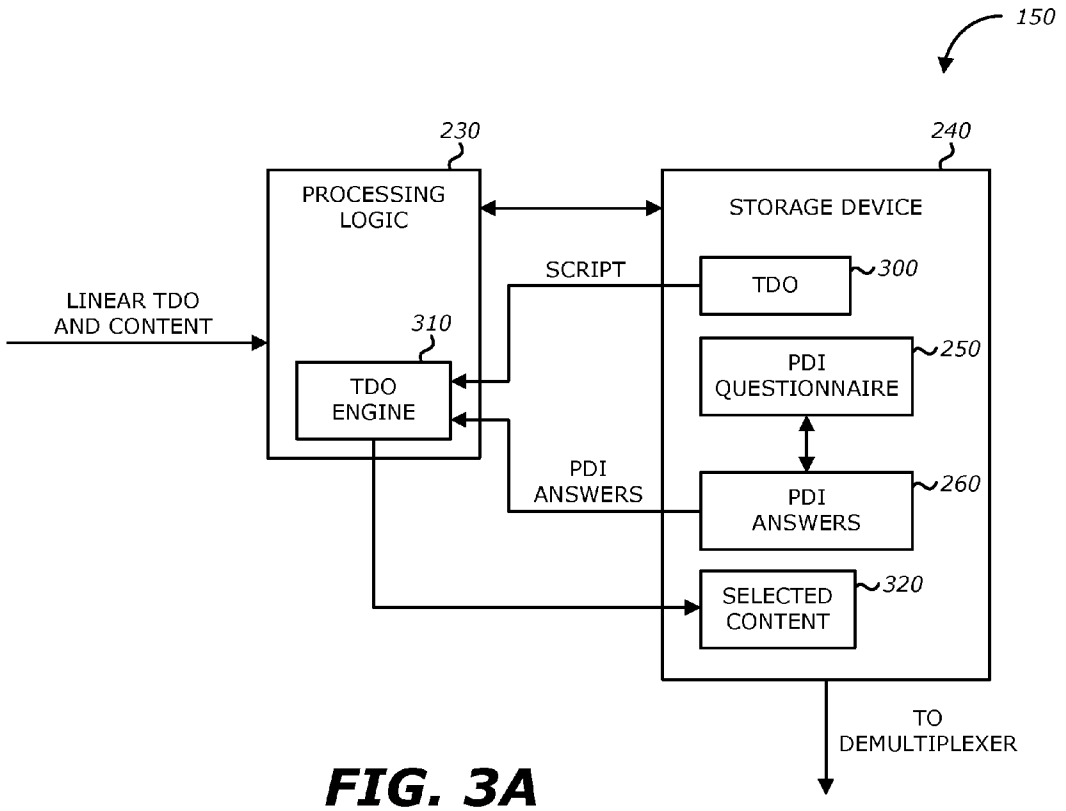

150
230
240
PROCESSING LOGIC
STORAGE DEVICE
SCRIPT
TDO
300
LINEAR TDO AND CONTENT
310
TDO ENGINE
PDI QUESTIONNAIRE
250
PDI ANSWERS
PDI ANSWERS
260
SELECTED CONTENT
320
TO DEMULTIPLEXER

FIG. 3A

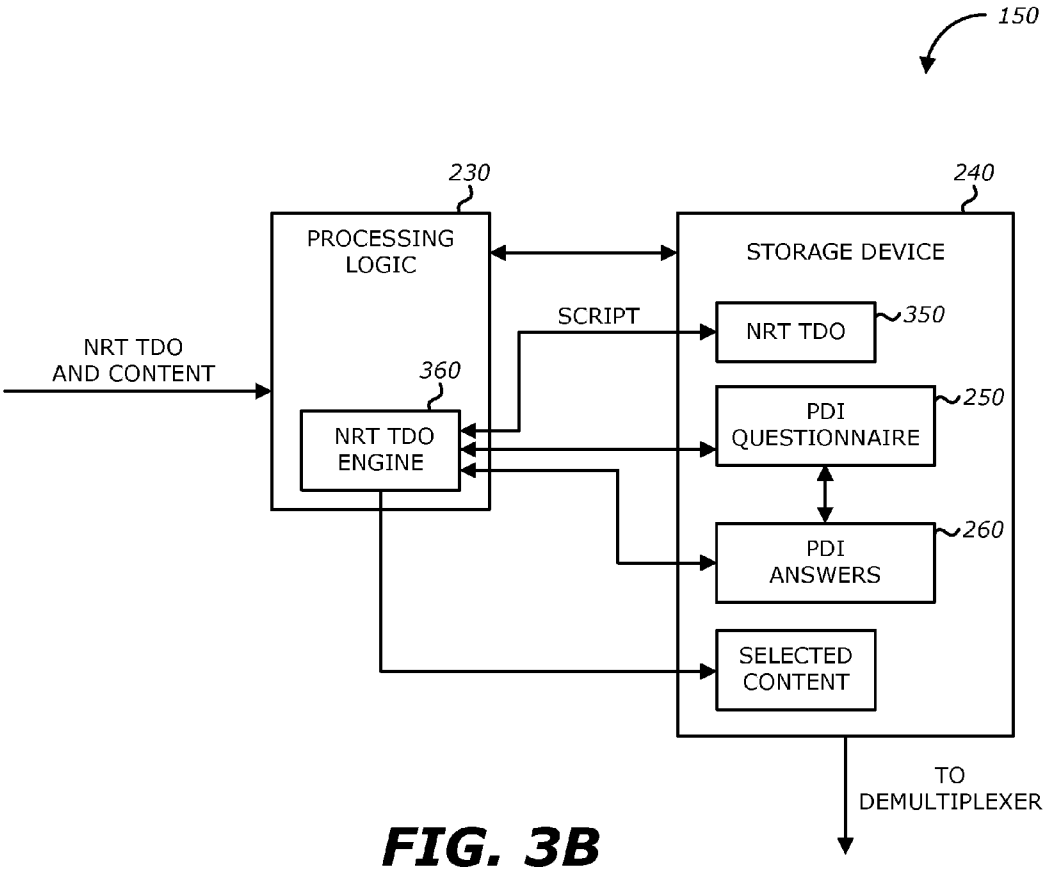

150
230
240
PROCESSING LOGIC
STORAGE DEVICE
SCRIPT
NRT TDO
350
NRT TDO AND CONTENT
360
NRT TDO ENGINE
PDI QUESTIONNAIRE
250
PDI ANSWERS
260
SELECTED CONTENT
TO DEMULTIPLEXER

FIG. 3B

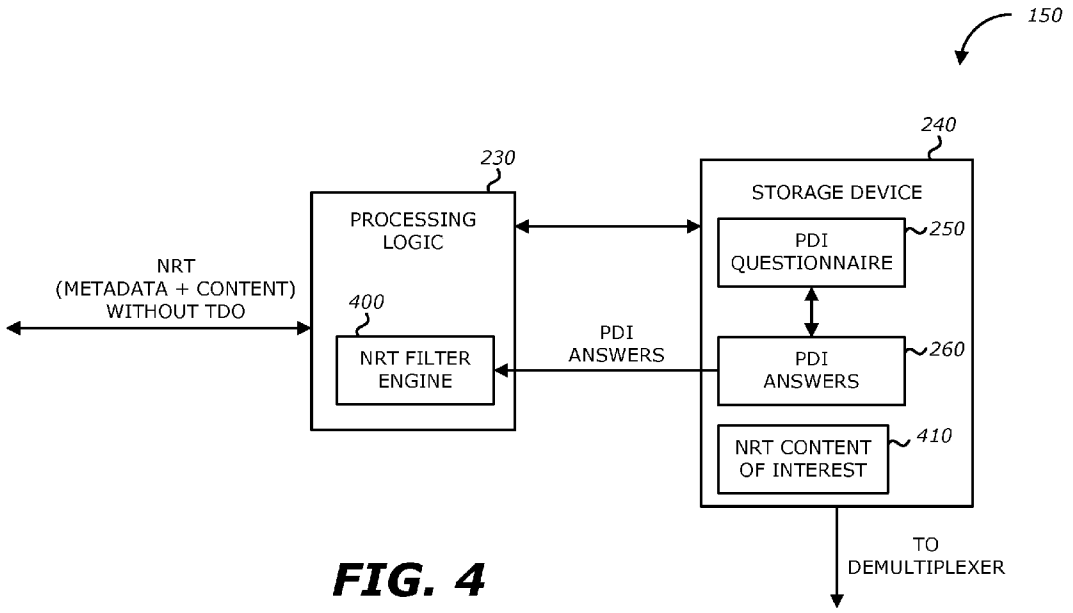

150
240
230
STORAGE DEVICE
PROCESSING LOGIC
250
PDI QUESTIONNAIRE
NRT (METADATA + CONTENT) WITHOUT TDO
400
PDI ANSWERS
260
NRT FILTER ENGINE
PDI ANSWERS
410
NRT CONTENT OF INTEREST
TO DEMULTIPLEXER

FIG. 4

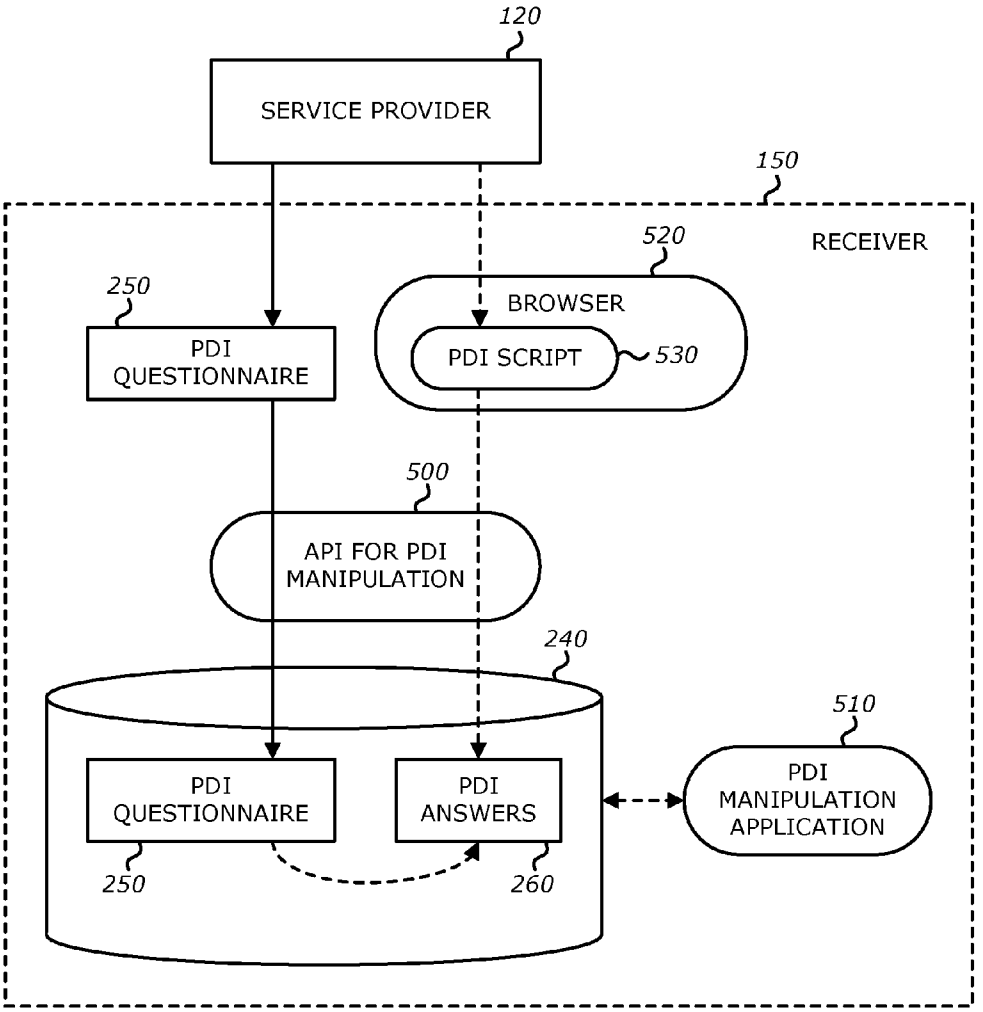

120
SERVICE PROVIDER
150
RECEIVER
520
BROWSER
PDI SCRIPT
530
250
PDI QUESTIONNAIRE
500
API FOR PDI MANIPULATION
240
PDI QUESTIONNAIRE
250
PDI ANSWERS
260
510
PDI MANIPULATION APPLICATION

FIG. 5

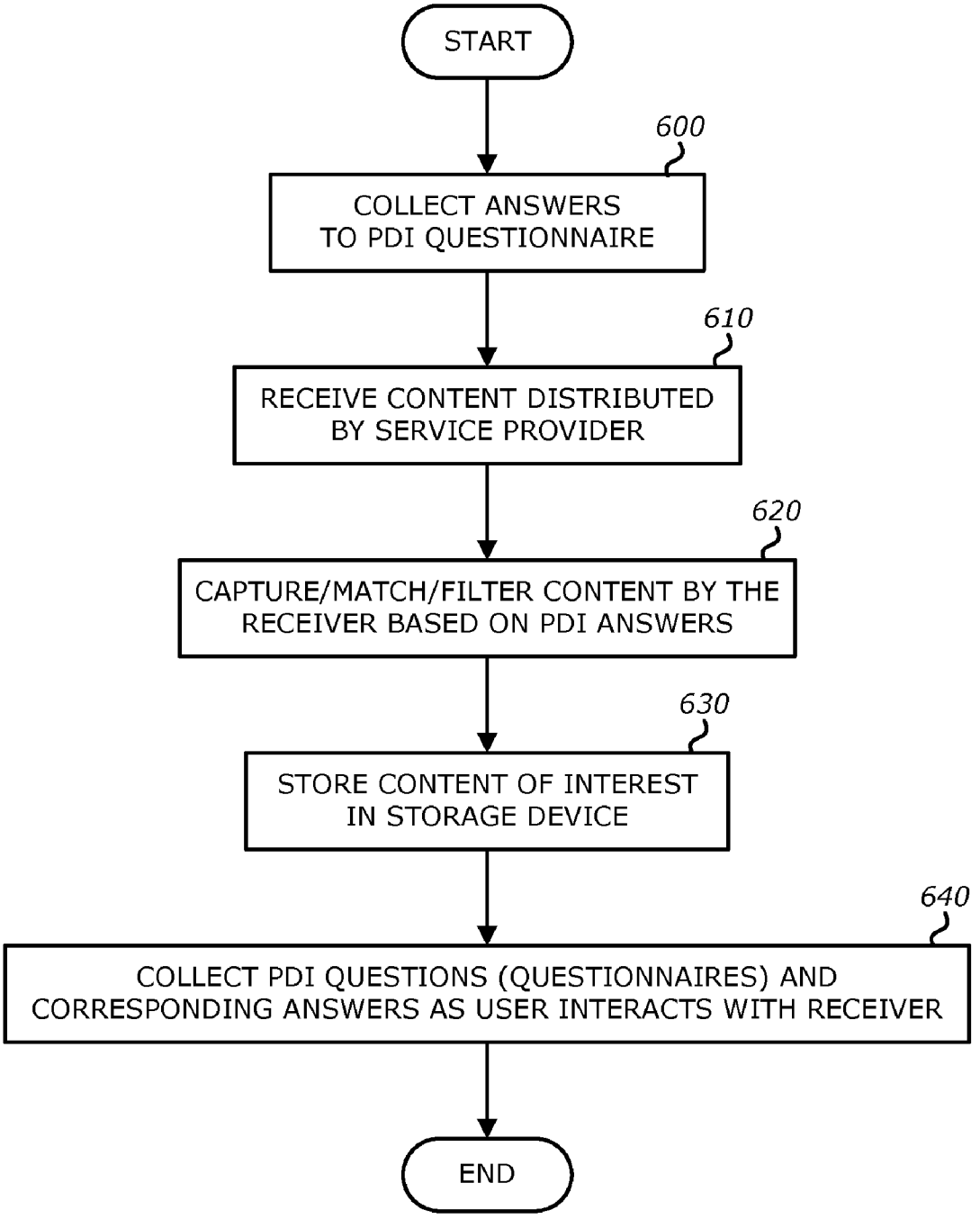

START
600
COLLECT ANSWERS TO PDI QUESTIONNAIRE
610
RECEIVE CONTENT DISTRIBUTED BY SERVICE PROVIDER
620
CAPTURE/MATCH/FILTER CONTENT BY THE RECEIVER BASED ON PDI ANSWERS
630
STORE CONTENT OF INTEREST IN STORAGE DEVICE
640
COLLECT PDI QUESTIONS (QUESTIONNAIRES) AND CORRESPONDING ANSWERS AS USER INTERACTS WITH RECEIVER
END

FIG. 6

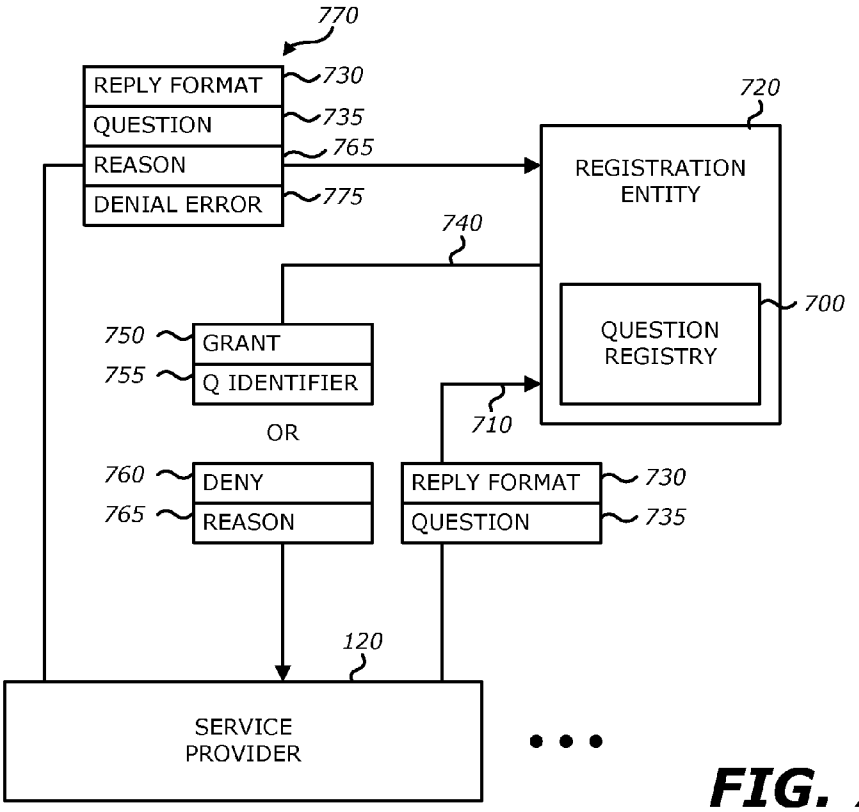

770
REPLY FORMAT
730
QUESTION
735
REASON
765
DENIAL ERROR
775
720
REGISTRATION ENTITY
740
700
QUESTION REGISTRY
750
GRANT
755
Q IDENTIFIER
OR
710
760
DENY
765
REASON
REPLY FORMAT
730
QUESTION
735
120
SERVICE PROVIDER

FIG. 7A

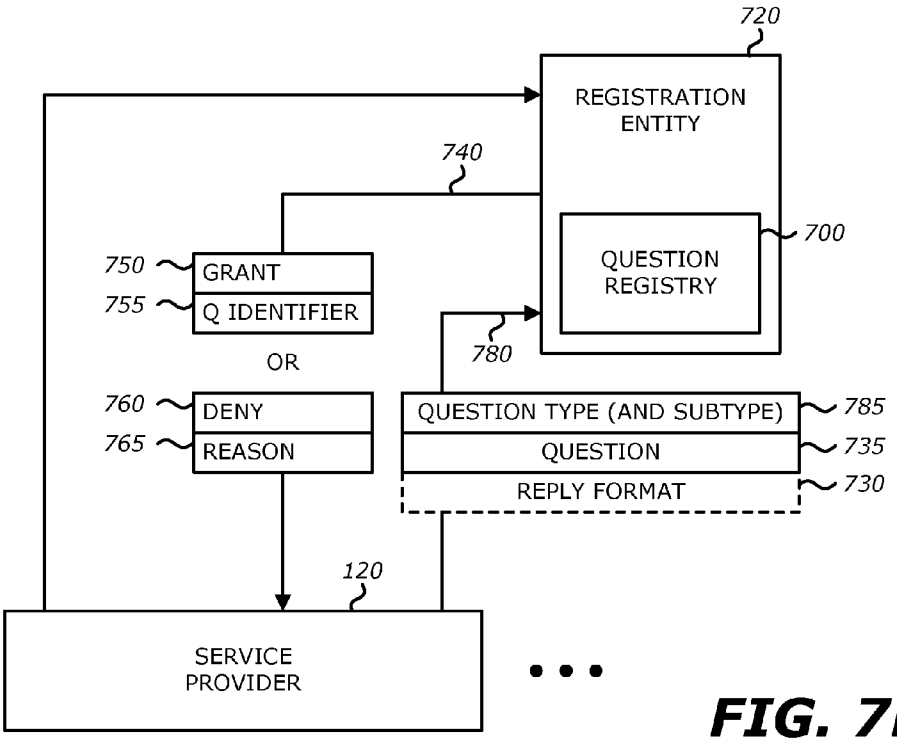

720
REGISTRATION ENTITY
740
700
QUESTION REGISTRY
750
GRANT
755
Q IDENTIFIER
OR
780
760
DENY
765
REASON
QUESTION TYPE (AND SUBTYPE)
785
QUESTION
735
REPLY FORMAT
730
120
SERVICE PROVIDER

FIG. 7B

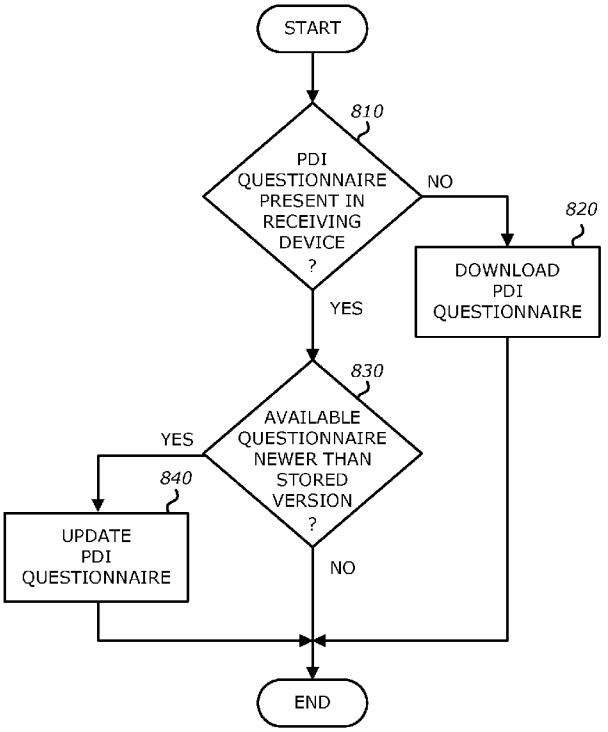

START
810
PDI QUESTIONNAIRE PRESENT IN RECEIVING DEVICE ?
NO
820
DOWNLOAD PDI QUESTIONNAIRE
YES
830
AVAILABLE QUESTIONNAIRE NEWER THAN STORED VERSION ?
YES
840
UPDATE PDI QUESTIONNAIRE
NO
END

FIG. 8A

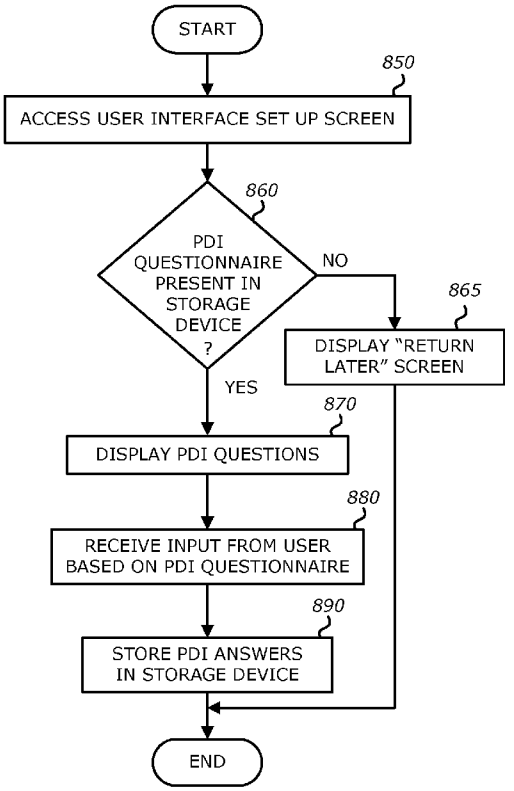

START
850
ACCESS USER INTERFACE SET UP SCREEN
860
PDI QUESTIONNAIRE PRESENT IN STORAGE DEVICE ?
NO
865
DISPLAY "RETURN LATER" SCREEN
YES
870
DISPLAY PDI QUESTIONS
880
RECEIVE INPUT FROM USER BASED ON PDI QUESTIONNAIRE
890
STORE PDI ANSWERS IN STORAGE DEVICE
END

FIG. 8B

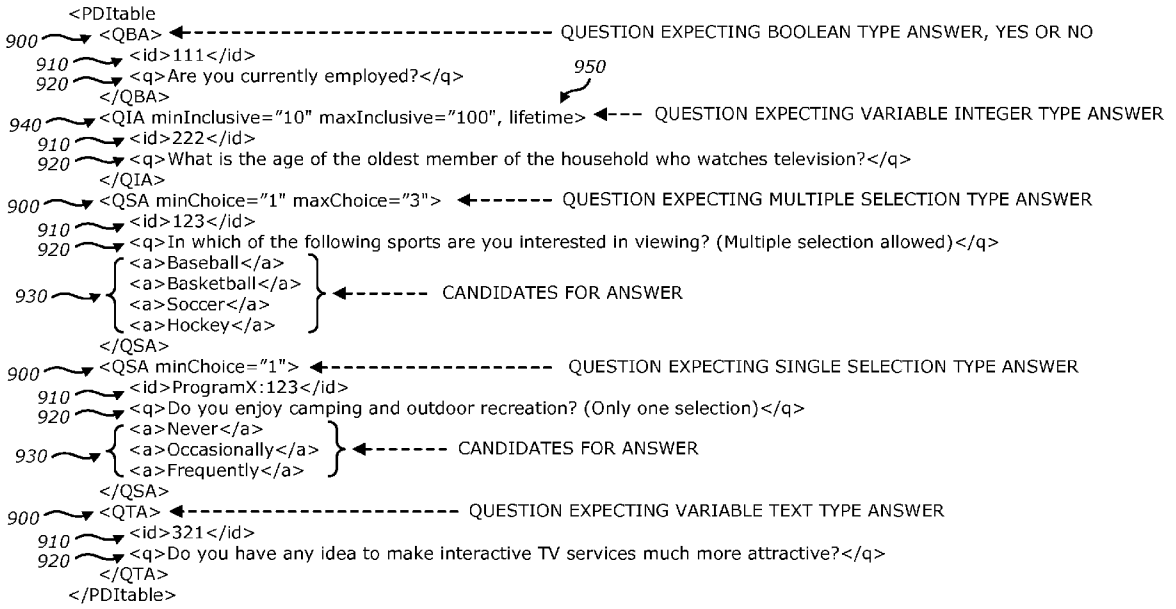

<PDItable
900 <QBA> QUESTION EXPECTING BOOLEAN TYPE ANSWER, YES OR NO
910 <id>111</id>
920 <q>Are you currently employed?</q>
950
</QBA>
940 <QIA minInclusive="10" maxInclusive="100", lifetime> QUESTION EXPECTING VARIABLE INTEGER TYPE ANSWER
910 <id>222</id>
920 <q>What is the age of the oldest member of the household who watches television?</q>
</QIA>
900 <QSA minChoice="1" maxChoice="3"> QUESTION EXPECTING MULTIPLE SELECTION TYPE ANSWER
910 <id>123</id>
920 <q>In which of the following sports are you interested in viewing? (Multiple selection allowed)</q>
930 <a>Baseball
<a>Basketball
<a>Soccer
<a>Hockey
CANDIDATES FOR ANSWER
</QSA>
900 <QSA minChoice="1"> QUESTION EXPECTING SINGLE SELECTION TYPE ANSWER
910 <id>ProgramX:123</id>
920 <q>Do you enjoy camping and outdoor recreation? (Only one selection)</q>
930 <a>Never
<a>Occasionally
<a>Frequently
CANDIDATES FOR ANSWER
</QSA>
900 <QTA> QUESTION EXPECTING VARIABLE TEXT TYPE ANSWER
910 <id>321</id>
920 <q>Do you have any idea to make interactive TV services much more attractive?</q>
</QTA>
</PDItable>

FIG. 9

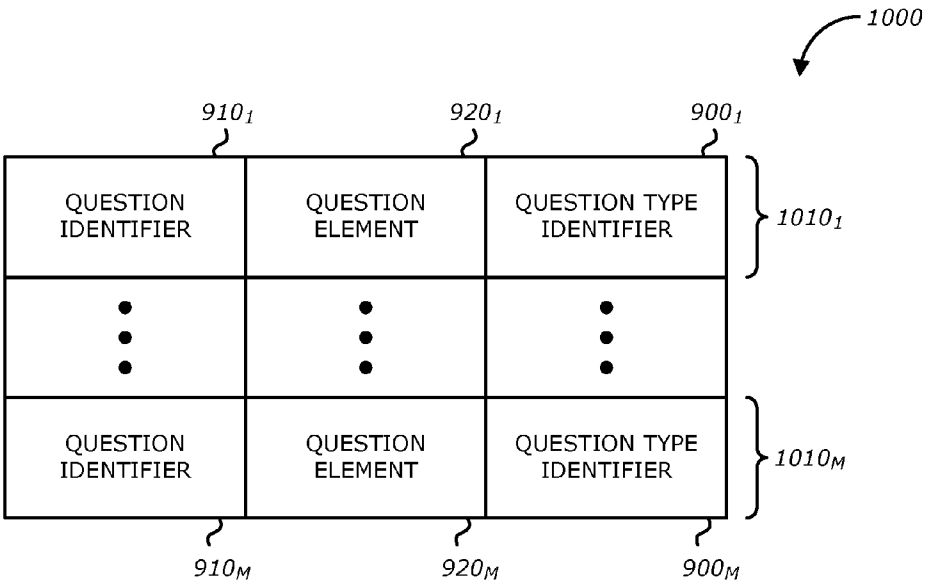

1000
910_1
920_1
900_1
QUESTION IDENTIFIER
QUESTION ELEMENT
QUESTION TYPE IDENTIFIER
1010_1
QUESTION IDENTIFIER
QUESTION ELEMENT
QUESTION TYPE IDENTIFIER
1010_M
910_M
920_M
900_M

FIG. 10

RECEIVER AND SYSTEM USING AN ELECTRONIC QUESTIONNAIRE FOR ADVANCED BROADCAST SERVICES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is based upon and claims the benefit of priority from U.S. Provisional Patent Application No. 61/319,873 filed Apr. 1, 2010 and U.S. Provisional Patent Application No. 61/354,498 filed Jun. 14, 2010, the entire contents of which are incorporated herein by reference.

FIELD

[0002] Embodiments of the present invention relate to the field of communications, and in particular an advanced digital television receiver and a corresponding method of distributing and responding to a preference, demographic and/or interest (PDI) questionnaire.

BACKGROUND

[0003] Traditional media distribution systems such as broadcasting lack the ability to effectively characterize and respond to consumer preferences in order to provide customized media content, namely content that includes targeted advertising or marketing material directed to interests of a particular user. In other words, conventional broadcasting does not account for situations where different viewers have different interests, and thus, their preferences with respect to programming and information differ vastly. For example, some viewers may want to watch sports broadcasting while other viewers may prefer a different genre (e.g. home improvement, historical fact based programs, etc.).

[0004] Furthermore, due to geographic location, some viewers may not be interested in certain media content. For example, a particular advertisement for local services may be suitable for viewers living in the geographic area served by the advertiser, but may not be suitable for viewers living in a different area.

[0005] Currently, there are no standardized methods to specify how viewers might customize their viewing preferences with respect to the content and services they receive. Existing systems may typically filter out program content based on viewer preference settings established in the receiver by the manufacturer of that receiver, with no input from the service provider as to the types of filtering criteria that might be suitable for the particular service.

[0006] Also, service providers do not have access to the viewer preference settings, and thus are unable to directly tailor the user's experience of the service based on those settings. Yet, even if service providers had access to viewer preferences, there is no mechanism that is configured to avoid redundant inquiries to learn about the viewer's preferences, as different service providers may solicit the same information through different, but highly similar inquiries.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Embodiments of the present invention are illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which:

[0008] FIG. **1** is a block diagram illustrating one embodiment of a digital broadcasting system.

[0009] FIG. **2** is a block diagram illustrating one embodiment of a digital receiver implemented within an electronic device of the digital broadcasting system.

[0010] FIG. **3**A is a block diagram illustrating one embodiment of a receiver receiving a triggered declarative object (TDO).

[0011] FIG. **3**B is a block diagram illustrating one embodiment of a receiver receiving non-real time (NRT) triggered declarative objects (TDOs).

[0012] FIG. **4** is a block diagram illustrating another embodiment of a receiver that is adapted to receive non-real time (NRT) content

[0013] FIG. **5** is a block diagram illustrating one embodiment of a system for storing and manipulating a PDI questionnaire in a receiver.

[0014] FIG. **6** is a block diagram illustrating one embodiment of a system for altering content based on answers to a PDI questionnaire in a receiver.

[0015] FIG. **7**A is an exemplary diagram illustrating a first embodiment directed to the registration of questions within a PDI questionnaire.

[0016] FIG. **7**B is an exemplary diagram illustrating a second embodiment directed to the registration of questions within a PDI questionnaire.

[0017] FIG. **8**A is an exemplary diagram illustrating one embodiment of a system and method for receiving a PDI questionnaire.

[0018] FIG. **8**B is an exemplary diagram illustrating one embodiment of a system and method for interacting with the viewer to receive answers to the PDI questionnaire at a receiver.

[0019] FIG. **9** is an illustration of an example of a data structure in XML format for representation of PDI questions. As illustrated, standardization of preferences, demographics, and interests (PDIs) involve definition of a standard format for a representation of a downloadable questionnaire.

[0020] FIG. **10** is a block diagram illustrating one embodiment of a PDI container.

DETAILED DESCRIPTION

[0021] One embodiment of the invention relates to a digital receiver described herein. According to this embodiment of the invention, the digital receiver comprises a storage device and logic. The storage device is configured to store both (i) questions received from at least one service provider of a digital broadcast system and (ii) answers to the questions by one or more users. The logic is configured to process data received from the at least one service provider based on answers provided by the user(s).

[0022] Herein, according to one embodiment of the invention, the questionnaire and answers are stored locally. As an example, a first eXtensible Markup Language (XML) schema may be configured to represent a first set of questions and associated answer formats registered and accessible to all service providers. Similarly, a second XML schema may be configured for answers to the first set of questions for at least one user of the digital receiver. It is contemplated that the questions set forth in the first XML schema may be subject to public redistribution to avoid duplicative questions from being posed to the user during set-up, immediately after power-on, or at another point in time while the receiver is in operation.

[0023] Alternatively, it is contemplated that the first XML schema may represent (i) the first set of registered questions

that are accessible to all service providers, (ii) a second set of registered questions that are service provider specific and have access restrictions (e.g., only accessible by the specific service provider), and (iii) answers formats for both sets of questions.

[0024] Herein, certain terminology is used to describe features of the invention. For example, the term "logic" is generally defined as hardware and/or software. As hardware, logic may include processing circuitry (e.g., a microprocessor, a programmable gate array, a controller, an application specific integrated circuit, etc.), semiconductor memory, combinatorial logic, or the like. As software, the logic may be one or more software modules, such as executable code in the form of an application, an application programming interface (API), an applet, a routine, or one or more instructions. These software modules may be stored in any type of a suitable non-transitory storage medium such as a programmable circuit, a semiconductor memory such as a volatile memory (e.g., random access memory (RAM), etc.) or non-volatile memory (e.g., read-only memory, power-backed RAM, flash memory, etc.), a hard disk drive, an optical disk drive, a portable memory device (e.g., a Universal Serial Bus "USB" flash drive, optical disc, etc.), or the like.

[0025] An "electronic device" generally represents electronics with information processing capabilities such as a digital receiver for example. As optional features, electronic device may include a display (e.g., liquid crystal diode ("LCD"), organic LCD (OLCD), plasma, etc.) and speakers to support video/audio playback.

[0026] An "interconnect" is generally defined as a communication pathway established over an information-carrying medium. This information-carrying medium may be a physical medium (e.g., electrical wire, optical fiber, cable, bus traces, etc.), a wireless medium (e.g., air in combination with wireless signaling technology) or a combination thereof.

[0027] A "service provider" generally represents a source and/or distributor of content. Examples of a service provider may include, but are not limited or restricted to a television network operator (e.g. local network television station, affiliate, cable television provider, telco, terrestrial, satellite TV provider, Internet service provider, etc.), an entity supplying access to stored content (e.g., Netflix®, etc.), or the like.

[0028] Certain details are set forth below in order to provide a thorough understanding of various embodiments of the invention, albeit the invention may be practiced through many embodiments other that those illustrated. Well-known logic and operations are not set forth in detail in order to avoid unnecessarily obscuring this description.

[0029] FIG. **1** is an exemplary block diagram illustrating one embodiment of a digital television service system **100**. A broadcast system **110** receives content from one or more service providers **120**, and thereafter, transmits such content to an electronic device **130** over interconnect **140**.

[0030] According to one embodiment of the invention, the transmitted content includes one or more of the following: non-real-time (NRT) content, real-time or linear content, metadata associated with content, a questionnaire, and a triggered declarative object (TDO).

[0031] Herein, the NRT content comprises content that may be delivered faster or slower than real-time or may be delivered based on a request. For instance, according to one embodiment of the invention, the NRT content may include video and/or audio, images, text (e.g., descriptions of available video and/or audio for download), and/or hyperlinks to websites that can be displayed by a web browser executed by electronic device **130**.

[0032] According to one embodiment of the invention, a user can select NRT content from a list of NRT content stored at service provider **120** for later download. The user can also navigate and select NRT content from among previously downloaded content or the downloading of content may be performed in accordance with advanced services.

[0033] According to one embodiment of the invention, "advanced services" may include user-controlled downloading of non-real time content, user interactivity with the downloaded content, or any user-controlled feature supported by Advanced Television Systems Committee (ATSC) or other specifications developed for digital television transmission over terrestrial, cable and satellite networks. Of course, the invention may be applicable to advanced services in compliance with other data conveyance standards, including Internet Protocol Television (IPTV).

[0034] Herein, advanced services associated with NRT content may be request-based or automated where electronic device **130**, at least including a digital receiver, updates content associated with a service. For automated services, the receiver caches service-related content and automatically updates files as new versions are made available. For request-based "push" service, content that has been preloaded is displayed.

[0035] Metadata associated with content describes the available content and services.

[0036] The electronic questionnaire is adapted to allow users to specify various items of information about themselves, which allows electronic device **130** to tailor advanced services based on the users' individual interests and preferences. According to one embodiment of the invention, the questionnaire includes a data structure having a standardized format of preferences, demographics, and/or interests (PDIs) common to one or more service providers. For example, the format of the PDI questionnaire includes questions, each with an answer in a predefined format. Possible answer formats could include yes/no or true/false, text string (with maximum length), multiple choice, integer (with range limits), checklist, among others. FIG. **9** illustrates an example of a format and data structure of an example PDI questionnaire.

[0037] A TDO is a downloadable object created by one of service providers **120** in a content distribution chain, ranging from an original creator or source of the content to the manufacturer of the electronic device adapted to receive the content. According to one embodiment of the invention, a TDO comprises declarative content (e.g., scripts, text, descriptive markup, graphics, etc.) whose function and behavior are tied in some way to the television programming they accompany. For example, a TDO may be adapted with multiple functions such as to collect user response data such as voting on a game show or contest, feedback on televised programming or commercials, feedback on anticipated future events by the user (e.g. activities, upcoming purchases, etc.), or the like.

[0038] Referring still to FIG. **1**, according to one embodiment of the invention, electronic device **130** may be implemented as a set-top box or a display device (e.g., television) that comprises a digital receiver **150**. Digital receiver **150** includes logic **160** configured to process content received from broadcast system **110** as further described below. In one embodiment, logic **160** includes a processor capable of han-

dling services broadcast according to Advanced Television Systems Committee (ATSC) standards.

[0039] FIG. **2** is a block diagram illustrating one embodiment of digital receiver **150** implemented within electronic device **130**. Digital receiver **150** is adapted to receive both real-time television broadcasts and NRT content. Receiver **150** includes a tuner/demodulator **200**, a demultiplexer **210**, an audio/video decoder **220**, processing logic **230**, and a storage device **240**.

[0040] Tuner **200** receives a modulated input signal, tunes and demodulates the signal to produce an output transport stream. Demultiplexer **210** demultiplexes the stream to produce data to processing logic **230**. In the case of conventional real-time (linear) TV content, audio and video packets from tuner/demodulator **200** are supplied, via demultiplexer **210**, to A/V decoder **220** for decoding. A/V decoder **220** supplies an audio output signal and a video output signal to audio and video circuitry of the display device (not shown).

[0041] Content including audio/video, PDI questionnaires, NRT files, metadata, and TDOs received at demultiplexer **210** is routed via processing logic **230** to storage device **240**. According to one embodiment of the invention, storage device **240** stores one or more PDI questionnaires **250**, answers **260** to PDI questionnaire(s) **250**, as well as content and metadata **270**. Herein, a PDI questionnaire **250** is a downloadable list of questions that is generated by at least one service provider and has a standardized data structure. These questions can be presented to the user as selective, displayable images or as audio.

[0042] Storage device **240** may include a disc drive, a non-volatile memory, or any other types of data storage device. When a user instructs the system to play a selected item of NRT content, that content is then processed by processing logic **230** and the processed content is demultiplexed by demultiplexer **210** to provide audio and video packets to A/V decoder **220**. These audio and video packets are eventually presented to the user.

[0043] FIG. **3**A is an exemplary block diagram illustrating one embodiment of receiver **150** receiving triggered declarative objects (TDOs). As previously discussed, TDOs are downloadable objects configured to interact with a user to enhance his/her viewing experience. A user may be notified that an enhanced (interactive) experience is being offered and accompanies a given program.

[0044] For instance, according to one illustrative example, a user viewing an advertisement is offered the option to visit a website pertinent to the product or service being advertised. If the questionnaire includes an entry for "what is your zip code," a Detailed Product Info TDO can condition the response to the user's interest in the product or service on that viewer's physical location. Thus, if the user lives on the west side of the city, the link could take him or her to a dealer located on the west side of the city, or if he or she lives somewhere else, to a different web page.

[0045] In another example, the playback of NRT content can be conditioned on answers to the PDI questionnaire. Again using the zip code as an item of personal information known to the system, when the user plays NRT content, specific items of content can be selected based on the viewer's physical location. Thus, an advertisement for a car dealer located in the viewer's neighborhood can be placed into the output stream for that viewer, while other viewers residing in different locations could get alternative advertisements as appropriate.

[0046] TDO **300** (e.g., scripts and associated data such as graphics, text, audio files, HTML, etc.) may be stored in storage device **240**. Processing logic **230** executes an operation of TDO **300** with a TDO engine **310**. For example, processing logic **230** executes a script of Detailed Product Info TDO to display the option to visit websites in which further information about a product or service may be found.

[0047] Storage device **240** also includes one or more PDI questionnaires **250** and PDI answers **260**. PDI answers **260** contain answers to the questions in PDI questionnaire(s) **250** such as, for this example, the viewer's zip code. PDI questionnaire(s) **250** and answers **260** may be in a standardized data structure format common to various service providers.

[0048] According to one embodiment of the invention, when executed by TDO engine **310**, TDO **300** accesses PDI answers **260** through an Application Programming Interface (API) and exhibits actions and behaviors conditionally based on responses recorded in PDI answers **260**. A script in TDO **300** could, for example, create one user experience if the age of the oldest TV-watching member of the household is 35 or less and a different experience otherwise. Different user experiences can include display of different text or graphics, branching to different audio/video content, and including different choices in a list.

[0049] In another embodiment of the invention, selected content **320** from the TDO **300** in response to PDI answers **260** may be stored within storage device **240**.

[0050] FIG. **3**B is an exemplary block diagram illustrating one embodiment of receiver **150** receiving non-real time (NRT) triggered declarative objects (TDOs). Similarly, processing logic **230** executes a script from NRT TDO **350** with a NRT TDO engine **360**. For example, NRT TDO **350** includes all the functionality of a regular TDO **300** of FIG. **3**A, and in addition may include references to NRT content and scripted control objects that, if activated, cause receiver **150** to set up a future download of an NRT content item, and/or hyperlinks that allow playback of previously downloaded content.

[0051] In one embodiment, when executed in engine **360**, the script in NRT TDO **350** accesses PDI questionnaire **250** and PDI answers **260** through an API and behaves based on PDI answers **260**. For example, a script in a NRT TDO **350** could offer the user with a choice to select and purchase a baseball game program for a particular team based the user's interest in sports and baseball as captured in PDI answers **260** (assuming questions in these categories are included in the questionnaire).

[0052] FIG. **4** is a block diagram illustrating another embodiment of receiver **150** that is adapted to receive non-real time (NRT) content. Processing logic **230** filters content according to PDI answers **260** to PDI questionnaire **250** using a content filter/matching engine **400** in lieu of TDOs. For example, processing logic **230** matches a local advertisement based on a geographic region of the user as specified in his/her PDI answers **260**. Metadata received at processing logic **230** is tied to questions within PDI questionnaire **250** that are assigned an ID value. As such, filter engine **400** is able to know which PDI answer relates to the PDI question directed to the geographic location of the user.

[0053] In one embodiment, processing logic **230** filters and stores NRT content of interest **410** based on the interest of the user. For example, movie previews or trailers matching the

preference (e.g., action, drama, comedy, etc. . . .) of the user as set forth in PDI answers **260** are stored in storage device **240**.

[0054] FIG. **5** is a block diagram illustrating one embodiment of a system for storing and manipulating PDI questionnaires in a receiver. A service provider **120** generates a PDI questionnaire **250** that is transmitted to digital receiver **150**. An API for PDI manipulation **500** allows for receiver **150** to store PDI questionnaire **250** in storage device **240**. A user (e.g., viewer) is able to generate, update, and delete PDI answers **260** to questions within PDI questionnaire **250** via PDI manipulation application **510**. In one example, PDI manipulation application **510** takes the form of a set-up screen on a display device coupled to receiver **150**.

[0055] In another embodiment, a web browser **520** of receiver **150** includes a script **530** configured to write and generate PDI answers **260** to PDI questionnaire **250**.

[0056] FIG. **6** is a block diagram illustrating one embodiment of a system for altering content based on answers to a PDI questionnaire in a receiver. At block **600**, the PDI questionnaire is displayed via the user's interaction with one or more set-up screens to solicit answers pertaining to preferences, demographics and interests of one or more users of the electronic device.

[0057] Thereafter, when in operation, the digital receiver within the electronic device receives content from a service provider (block **610**). The receiver captures, matches, or filters such content based on PDI answers (block **620**). The content of interest (e.g. content that matches the preferences of the user as specified in the PDI answers) can be stored in the storage device **240** (block **630**).

[0058] It is contemplated that these PDI questions and corresponding answers may be collected as the user interacts with the receiver via a set-up menu, and may be stored in the receiver for use by provider-supplied applications, including the TDOs (block **640**). This collection (and subsequent registration) of PDI questions/answers provide a platform to avoid duplicate query questions from multiple service providers.

[0059] One technique for avoiding question duplication is to utilize a registration entity and registration process for questions (and the associated answer format). Once registered, a question is assigned a question identifier. As a result, service providers can use the same question identifier to solicit the desired information in lieu of issuing substantially similar questions. This avoids the need for the digital receiver to recognize and handle duplicate questions, and eliminates the possibility that a user would be asked multiple times essentially the same question in different ways (or in exactly the same way).

[0060] FIG. **7**A is an exemplary diagram illustrating a first embodiment directed to the registration of questions within a PDI questionnaire. Herein, according to one embodiment of the invention, in efforts to develop a question registry **700**, service provider **120** transmits a question inquiry request **710** to a registration entity **720**. The "registration entity" may be a governmental agency, a third-party entity (e.g., Advanced Television Systems Committee "ATSC" or other standards body, bank or trusted institution, etc.) or any entity assigned the responsibility of receiving questions that are to be used for a PDI questionnaire, checking for duplicates, and (assuming the request is accepted) assigning question identifiers for each of these questions.

[0061] Question inquiry request **710** is information that identifies a proposed question for registration and subsequent inclusion in the PDI questionnaire downloaded to (or stored by manufacturer within) receivers. As an example, question inquiry request **710** comprises (i) information **730** that identifies a reply format to the question (e.g., Boolean, integer type, single/multiple selection, variable text, etc.), and (ii) the proposed question **735**.

[0062] In response to question inquiry request **710**, service provider **120** receives a returned response **740** that identifies whether the question inquiry request **710** has been granted or denied. In particular, upon granting the request, response **740** includes (i) information **750** to identify whether the request has been granted, and (ii) a question identifier **755** that uniquely identifies the registered question. For instance, question identifier **755** may include a registration number for question **735**.

[0063] Alternatively, upon denying the request, response **740** includes (i) information **760** to identify whether the request has been denied, and (ii) information **765** to identify the reason(s) for the denial. For instance, information **765** may be a code value that indicates that the question has already been registered, and perhaps the unique question identifier of the pre-existing item may be provided. Alternatively, information **765** may be a code value that indicates that the question contains inappropriate language or subject matter and is denied registration for this reason.

[0064] It is contemplated that, as an optional feature, registration entity **720** may be adapted to receive an appeal inquiry **770** that includes information within inquiry request **710** (e.g., reply format information **730** and proposed question **735**), information **765** to identify the reason(s) for the denial, and information **775** provided by service provider as to the errors associated with the denial. Information may be a code value (e.g., mistaken relatedness with proposed question, etc.) or may include a textual description of the registration error. Appeal inquiry **770** can be evaluated separately (and in more detail) than inquiry requests.

[0065] Referring now to FIG. **7**B, an exemplary diagram illustrating a second embodiment directed to the registration of questions within the PDI questionnaire is shown. Herein, question registry **700** is developed similar to the operations set forth in FIG. **7**A. However, question inquiry request **780** features a different format. More specifically, question inquiry request **780** comprises (i) optional information **730** that identifies a reply format to the question (e.g., Boolean, integer type, single/multiple selection, variable text, etc.), (ii) the proposed question **735**, and (iii) information **785** to identify particulars (e.g. question types and sub-types) of question **735** such as the following: type of question (e.g. what preference, demographic or interest), or question sub-type (e.g., is question directed to racial inquiries with respect to demographics, is question directed to financial means with respect to demographics, is question directed to preference such as sports one likes to watch, etc.). These particulars **785** are used to categorize the question inquiry requests received from the receiver to assist in producing more timely (and accurate) responses to these requests.

[0066] Referring now to FIG. **8**A, an exemplary diagram illustrating one embodiment of a portion of a system and method for receiving a PDI questionnaire at a receiver is shown. At decision block **810**, the receiver checks to see if any PDI questionnaire is present in storage in the receiving device. If not, the questionnaire is retrieved and the process

completes (block **820**). If a PDI questionnaire was downloaded previously, the receiver checks to see if a newer version is available (block **830**). If not, the process completes, otherwise the existing stored questionnaire is updated to overwrite it with the new version (block **840**).

[0067] Referring now to FIG. **8**B, an exemplary diagram illustrating one embodiment of processing of the PDI questionnaire in the receiver is shown. Herein, at block **850**, a receiver accesses and sends a signal for displaying a set-up or preference screen. The receiver determines whether a PDI questionnaire is available at block **860**. If the receiver does not currently have a PDI questionnaire in storage, the receiver displays a screen indicating that personalization cannot occur until a later time, and the process ends.

[0068] At block **870**, questions from the PDI questionnaire are displayed to the user. At block **880**, the user inputs answers in response to the PDI questions. At block **890**, the PDI answers are stored in a storage device of the receiver.

[0069] Herein, according to this embodiment of the invention, the registration entity provides unique identifiers for each submitted question/answer format. For this embodiment of the invention, the registration entity is publicly accessible so that if another provider wishes to ask the same question, the question identifier associated with the desired question can be used as a reference. The registration process also allows service providers to use common wording for a given question.

[0070] FIG. **9** is an illustration of an example of a data structure in XML format for representation of PDI questions. As illustrated, standardization of preferences, demographics, and interests (PDIs) involve definition of a standard format for a downloadable questionnaire. The format of the questionnaire may include, but are not limited or restricted to question type identifier **900**, question identifier **910**, question **920**, and candidate answer(s) **930** for the question.

[0071] Question type identifier **900** identifies possible reply formats such as yes/no or true/false (QBA—Question Boolean Answer), text string (with maximum length) (QTA—Question Text Answer), multiple choice (QSA—Question Selection Answer), integer (with range limits) (QIA—Question Integer Answer), checklist, etc. Moreover, each question type identifier may further include an optional lifetime parameter to denote a lifetime of the answer to the question (or perhaps the question itself).

[0072] For instance, as shown in FIG. **9**, QIA **940** concerning the oldest member of the household includes a lifetime attribute **950** that may be used to identify the number of time units (e.g., minutes, hours, days, weeks, months, years, etc.) before the applicability of the answer expires. Of course, lifetime attribute **950** alternatively may be used to identify the duration of the question. Upon expiration of the question, the PDI questionnaire may be updated to seek alternative questions for use in subsequent filtering of content.

[0073] The checklist reply format allows a user to provide a yes/no response to a number of different small items. For example, as shown in FIG. **9**, the query string might be "in which of the following sports are you interested in viewing?" The checklist might include baseball, basketball, soccer, and hockey. Each of the items in the checklist may be selected or not selected. As previously discussed, access by receiver applications and TDOs to the PDI answers are made available via an API.

[0074] Question identifier **910** allows the receiver to identify the question. For example, a question common to all service provider may feature a predetermined range (e.g., identification value$\leqq$255). Furthermore, question identifier **910** allows a question to be associated with a particular service provider. For example, a service provider may be interested in asking if the user has any ideas to make interactive TV services more valuable or attractive. Likewise, question identifier **910** (id value$\geqq$256) allows the service provider to uniquely identify and associate the question with one or more service provider.

[0075] Question element "q" **920** includes the actual question (e.g. "are you currently employed?").

[0076] Candidate answers **930** associated with question **920** are listed. For instance, a multiple choice reply format would allow the user to select from among a fixed number of identified choices or a single choice. As an example, a query string could be "Do you enjoy camping and outdoor recreation?" The corresponding multiple choice answer might include the possibilities "Never," "Occasionally," or "Frequently."

[0077] It is noted that, for questions having multiple section or checklist formats, each answer may be associated with an identifier as well. For instance, the sport "hockey" may be identified by an answer value "**413**" while "baseball" may be identified by an answer value "**411**". These values may be used to produce an answer compilation for the question. Alternatively, in lieu of the specific answers themselves, the collection of answers (e.g. candidate answers **930**) may be assigned an answer value.

[0078] FIG. **10** is a block diagram illustrating one embodiment of a structure of a PDI container **1000**. Generated and manipulated through an API implemented on the receiver, PDI container **1000** comprises a plurality of PDI data structures $\mathbf{1010}_1$-$\mathbf{1010}_M$ (M$\geqq$2). More specifically, according to this embodiment of the invention, each PDI data structure $\mathbf{1010}_i$ (1$\leqq$i$\leqq$M) includes defined syntax, representation and matching schema utilized by one or more service providers. For instance, PDI data structure $\mathbf{1010}_M$ comprises a question identifier value $\mathbf{910}_M$ that is used to identify the particular question registered with registration entity **920** of FIG. **9**. It is further contemplated that PDI data structure $\mathbf{1010}_M$ may further comprise at least q-element $\mathbf{920}_M$ that identifies the question per se, and question type identifier $\mathbf{900}_M$ that identifies possible reply formats such as Boolean answers (QBA), text string (QTA), multiple choice (QSA), integer (QIA), checklist, etc.

[0079] It is contemplated that PDI container **1000** may be configured with a format for the storage of PDI answers. As an example, each of the PDI data structures (e.g., data structure $\mathbf{1010}_M$) may include, but are not limited or restricted to question type identifier $\mathbf{900}_M$, question identifier $\mathbf{910}_M$, and an answer value (not shown). The answer value represents those items selected by the user at the receiver.

[0080] It is to be understood that the above description is intended to be illustrative, and not restrictive. Many other embodiments will be apparent to those of skill in the art upon reading and understanding the above description. The scope of the invention should, therefore, be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

What is claimed is:

1. A computer-implemented method for a digital broadcast system, the method comprising:

receiving an electronic questionnaire by a digital receiver of the digital broadcast system, the electronic question-

naire includes a plurality of questions that are registered to avoid duplication of any one of the plurality of questions;

processing the electronic questionnaire to generate for display a plurality of questions; and

acquiring answers to the electronic questionnaire by the receiver, the answers being used in adjusting content subsequently downloaded to the receiver.

2. The computer-implemented method of claim **1**, wherein the electronic questionnaire comprises a plurality of questions targeted to solicit information from a viewer and a unique question identifier for each of the plurality of registered questions.

3. The computer-implemented method of claim **2**, wherein the electronic questionnaire further comprises a reply format identifier that identifies an answer format that comprises at least one of a Boolean type answer, a variable integer type answer, a multiple selection type answer, a single selection type answer, and a variable text type answer.

4. The computer-implemented method of claim **1** wherein the plurality of questions are registered to formulate the electronic questionnaire by submitting a question inquiry request and receiving a response that identifies whether the question inquiry request either has been granted or has been denied, the question inquiry request comprises (i) a proposed question and (ii) information that identifies a reply format to the proposed question.

5. The computer-implemented method of claim **4**, wherein the response comprises information to identify whether the request has been granted or denied, and either (i) a question identifier that uniquely identifies a registered question identical or similar to the proposed question when the request has been granted so as to avoid registration of duplicate questions from different service providers, or (ii) information to identify one or more reasons for a denial of the request.

6. A digital receiver comprising:

a storage device configured to store (i) an electronic questionnaire received from at least one service provider of a digital broadcast system and (ii) answers directed to questions within the electronic questionnaire; and

a processing logic coupled to the storage device, the processing logic configured to process information within the electronic questionnaire to generate one or more displayable images including a plurality of questions that are unique and registered for universal access by multiple service providers including the at least one service provider, the plurality of questions being adapted to prompt the answers to the displayed question for use in altering content received by the receiver.

7. The digital receiver of claim **6**, wherein each question for the electronic questionnaire comprises a question identifier and a question associated with the question identifier.

8. The digital receiver of claim **7** wherein the electronic questionnaire further comprises a reply format identifier that comprises at least one of a Boolean type answer, a variable integer type answer, a multiple selection type answer, a single selection type answer, and a variable text type answer.

9. The digital receiver of claim **6** wherein the plurality of questions are registered to formulate the electronic questionnaire by submitting a question inquiry request and receiving a response that identifies whether the question inquiry request either has been granted or has been denied, the question inquiry request comprises (i) a proposed question and (ii) information that identifies a reply format to the proposed question.

10. The digital receiver of claim **9**, wherein the response comprises information to identify whether the request has been granted or denied, and either (i) a question identifier that uniquely identifies a registered question identical or similar to the proposed question when the request has been granted so as to avoid registration of duplicate questions from different service providers, or (ii) information to identify one or more reasons for a denial of the request.

11. A broadcast system, comprising:

a digital receiver; and

a registration entity in communication with a digital receiver, the registration entity adapted to receive a question inquiry request being information that identifies a proposed question for registration and subsequent inclusion in an electronic questionnaire, the electronic questionnaire being downloaded to the digital receiver for subsequent display so that information pertaining to answers to the displayed questions within the electronic questionnaire is routed to the service provider in order to tailor content transmitted to the digital receiver.

12. The broadcast system of claim **11**, wherein the question inquiry request received by the registration entity comprises (i) information that identifies a reply format to the proposed question and (ii) the proposed question.

13. The broadcast system of claim **12**, wherein the reply format to the proposed question includes at least one of a Boolean and an integer type.

14. The broadcast system of claim **11**, wherein the electronic questionnaire comprises a question identifier and a question associated with the question identifier.

15. The broadcast system of claim **14** wherein the electronic questionnaire further comprises a type of answer identifier that comprises at least one of a Boolean type answer, a variable integer type answer, a multiple selection type answer, a single selection type answer, and a variable text type answer.

16. The broadcast system of claim **11**, wherein the response comprises information to identify whether the request has been granted or denied, and either (i) a question identifier that uniquely identifies a registered question identical or similar to the proposed question when the request has been granted so as to avoid registration of duplicate questions from different service providers, or (ii) information to identify one or more reasons for a denial of the request.

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