

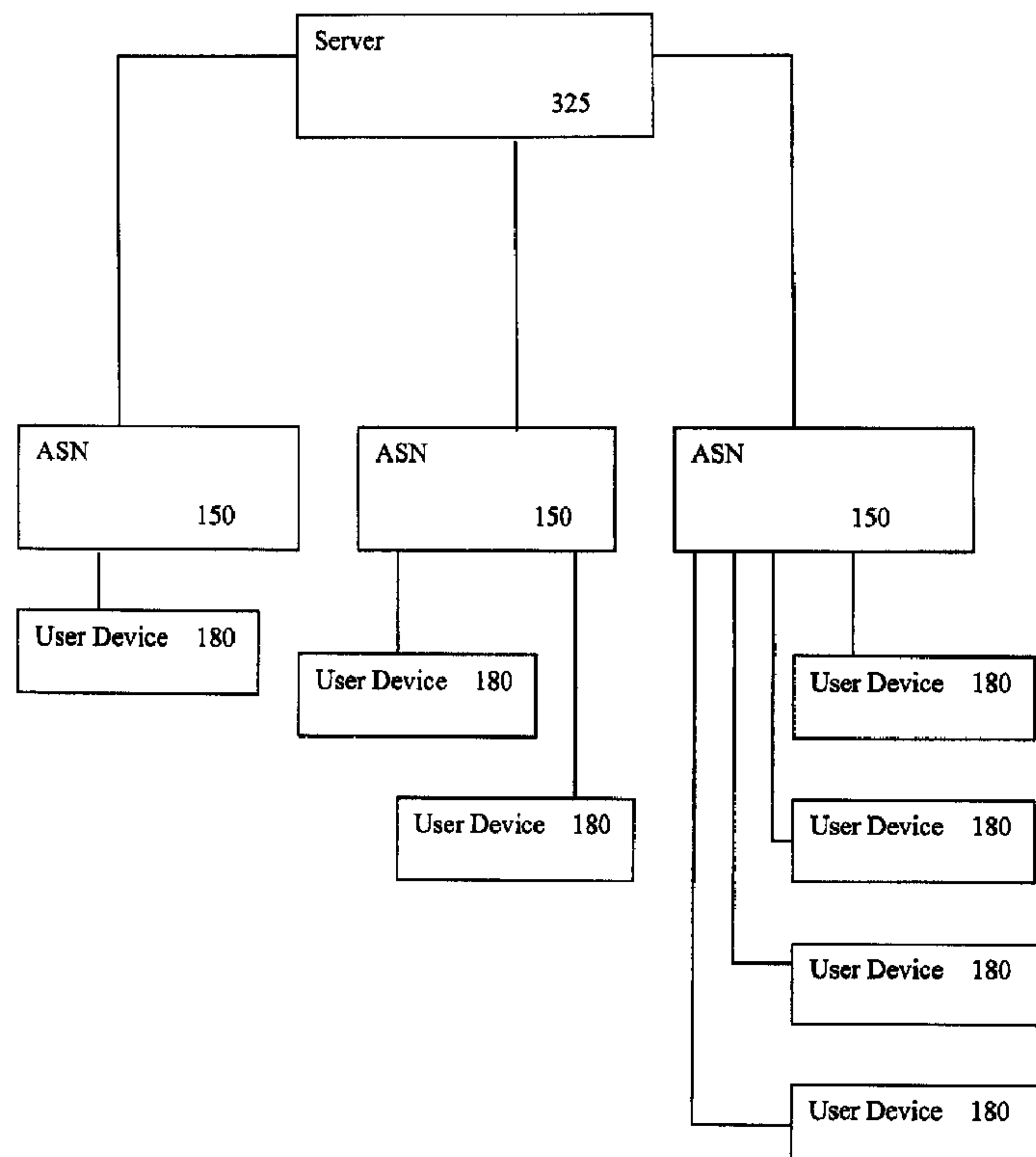


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(54) Titre : SYSTEME ET PROCEDE DE CALCUL INFORMATISE EN MICRONUAGE
(54) Title: METHOD AND SYSTEM FOR PROCESSING MULTI-MEDIA CONTENT

FIG. 2



(57) Abrégé/Abstract:

A method and system for micro-cloud computing is described. An application serving node, which is a specifically configured piece of customer premises equipment such as a set-top box, is the server for a micro-cloud network. Various user devices that form part



(57) **Abrégé(suite)/Abstract(continued):**

of the micro-cloud network, such as television sets and smart phones, communicate with the application serving node. The application serving node is configured with software that allows various heterogeneous types of data to be obtained and streamed to the user devices in multiple ways. The application serving node performs much of the processing necessary for such content streaming itself and thus represents an edge-based network architecture.

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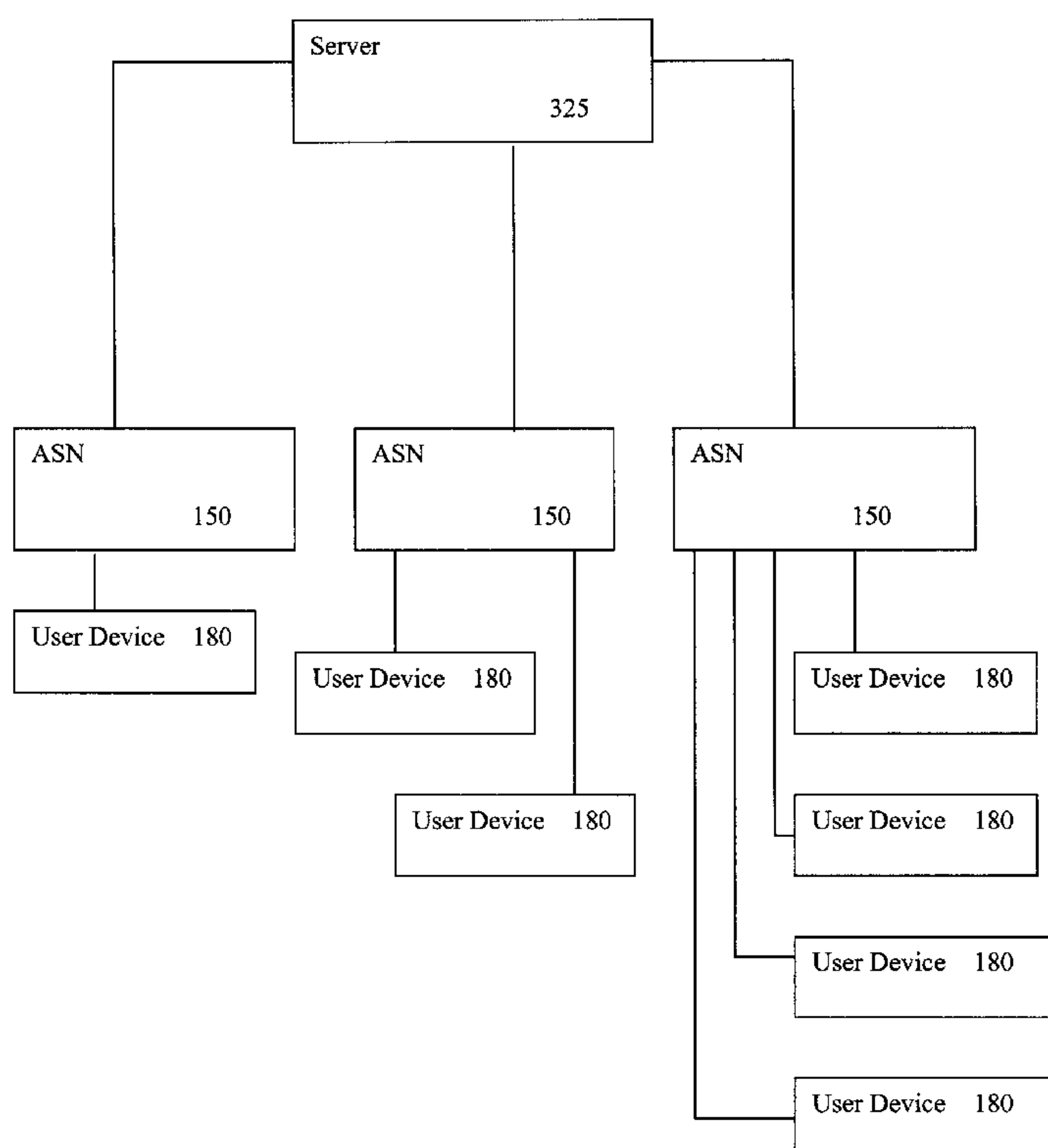
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[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR MICRO-CLOUD COMPUTING

FIG. 2



(57) Abstract: A method and system for micro-cloud computing is described. An application serving node, which is a specifically configured piece of customer premises equipment such as a set-top box, is the server for a micro-cloud network. Various user devices that form part of the micro-cloud network, such as television sets and smart phones, communicate with the application serving node. The application serving node is configured with software that allows various heterogeneous types of data to be obtained and streamed to the user devices in multiple ways. The application serving node performs much of the processing necessary for such content streaming itself and thus represents an edge-based network architecture.

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riod (Rule 26bis.3)

METHOD AND SYSTEM FOR PROCESSING MULTI-MEDIA CONTENT

RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Patent Application No. 61/246,290, filed on September 28, 2009, and U.S. Provisional Patent Application No. 61/314,729, filed on March 17,
5 2010, both of which are hereby incorporated by reference in their entirety.

TECHNICAL FIELD

The present disclosure is directed at a system and method for micro-cloud computing. More particularly, the present disclosure is directed at a system and method for micro-cloud computing that facilitate content distribution to consumer devices across broadband networks.

10 BACKGROUND

The growth in data transmitted over wireless and cable networks has been driving consolidation of broadband operators, and creating a highly competitive global broadband service provision market. “Broadband operator” means an operator of a high-speed network that offers data transfer services over one or more types of networks (e.g.: mobile networks and other wireless networks, wired
15 networks, or a combination of the preceding). “Broadband service” includes content delivered over a network; the network may be wired, wireless, cable, DSL, or other digital communication systems, or any combination thereof.

Telephone, cable, satellite, and mobile network operators (collectively, “operators”) are evolving and becoming broadband service providers. Triple or quad operators means operators that provide
20 three or four services, such as residential Internet service, residential phone service, residential television, and mobile data services, which may in turn, include voice, Internet, and television. Data usage over both wireless, DSL and cable networks around the world is growing. Operators may grow revenue by offering users a variety of services, and by reducing the cost of their network operation centers (“NOCs”) and cost of their data links. Today, operators are offering more
25 services and applications, meaning managing larger NOCs, which in turn translates to higher operating costs for the operators and therefore lower average revenue per user (“ARPU”). Operators are looking for solutions that allow them to run smaller NOCs, offer services suited to

CLAIMS

WHAT IS CLAIMED:

1. A system for processing of multi-media content for a user device independent of the user device location, comprising:

a. a serving node configured to receive the multi-media content from a content provider via a network and configured to deliver said multi-media content to a plurality of user devices registered with said serving node; each of said user devices associated with at least one user selected from a plurality of users; each of said users associated with a record in a database accessible by said serving node; said database including content characterization of said user and preferences of said user, said content characterization and preferences of each of said user variable depending on said user device said user is using;

b. wherein when the content is received by said serving node, said content is reformatted for display on one of said user devices selected by one of said users.

2. The system of claim 1 wherein said serving node multiplexes the content to a plurality of user devices.

3. The system of claim 1 wherein said serving node determines a location associated with said user device, and if said user device is closer to a second serving node associated with the network, said serving node instructs said second serving node to deliver the content to said user device.

4. The system of claim 1 wherein if said user uses a second user device while experiencing the content, said serving node reformats the content for said second user device and displays the content on said second user device.

5. The system of claim 1 wherein said serving node stores data about usage patterns related to said plurality of users and said plurality of user devices in said database.

6. The system of claim 1 wherein said serving node has a plurality of television tuners for receiving a plurality of video streams, and displays at least two of said video streams simultaneously on said user device.

7. The system of claim 3 wherein said first and second serving nodes each have a television tuner and the content is a television signal.
8. The system in claim 1, wherein to associate a user and a plurality of user devices with a serving node, said user obtains an account with said serving node by registering said user with said serving node and said plurality of user devices with said serving node.
9. The system in Claim 1, wherein said serving node uniquely distinguished each of said plurality of users by:
 - a. said user devices redirecting requests to said serving node through an unique identifier URL, said identifier URL including a MAC address, a physical location, and a serial number of said user device;
 - b. verifying a unique id that associated with said user device a username and a password; and
 - c. determining a type of network through an interface at which a request was received.
10. A method of processing multi-media content targeted for a user device independent of the user device location, comprising:
 - a. a serving node receiving said multi-media content from a content provider via a network and configured to deliver said content to a plurality of user devices registered to said serving node, said serving node collecting information by:
 - i. identifying characteristics of said content;
 - ii. inspecting each received packet of said content from the network layer to the application layer;
 - iii. inspecting a URL associated with said content, and identifying if the content is manually requested by said user device or automatically generated as a sub URL within the main original URL that was requested;
 - iv. identifying if said URL is a crawler or static main;
 - v. identifying the content type as video, image, text, audio or RSS feed
 - vi. if said content is text, comparing said content against a keyword dictionary database;

vii. storing said information in a database.

11. A method for processing of multi-media content targeted for a user device independent of the device location, providing a serving node configured to receive multi-media content from a content provider via a network and further configured to deliver the content to a plurality of user devices registered with said serving node, comprising the steps of:

- a. identifying a user associated with one of said user devices;
- b. identifying a type of device that said user is using for access;
- d. identifying a network said user device is using for connectivity to said serving node;
- e. identifying a state of said user,
- f. recording a time and date of access;
- g. identifying the type of content that the user device is requesting;
- h. identifying the location of the user device by receiving GPS location
- i. determining characteristics of said user within that context (state) based on current behaviour and past history, and
- j. updating a user characteristics identifier table

12. A method for processing of multi-media content targeted for a user device independent of the device location, comprising

- a. providing a serving node configured to receive multi-media content from a content provider via a network and deliver the content to a plurality of user devices registered with said serving node; said serving node:
 - i. identifying a screen capability, memory, processing ability and player of said user device;
 - ii. determining acceptable formats of said player;

- iii. identifying a type of network by which said user device is connected;
- iv. identifying a type of content;
- v. converting said multimedia content to a format acceptable to said player;
- vi. converting a long page to multiple decks of page with page numbers on the bottom; and
- vii. rearranging and resizing said content to fit a screen of said user device;

13. A method of processing multi-media content targeted for a user device independent of the device location, comprising:

- a. providing a serving node configured to receive multi-media content from a content provider via a network and to deliver said content to a plurality of user devices registered to said serving node, said serving node:
 - i. receiving said content as a native TV input in a format;
 - ii. decoding said input to a RAW picture frame;
 - iii. converting said RAW picture frame to a RGB32 format picture frame;
 - iv. identifying a screen layout and player of said user device;
 - v. identifying a type of network by which said user device can receive said content
 - vi. extracting additional content from a source to include in said content;
 - vii. overlaying said additional content to said RGB32 Raw picture frame;
 - viii. encoding said RGB32 Raw picture frame to a video stream supported by said user device; and
 - ix. sending said video stream to said user device.

14. A method for processing multi-media content for a user device independent of the device location, comprising:

- a. said device requesting content from a serving node with which said device is registered;
- b. said serving node passing a location of said device to a server within the network;
- c. said server identifying a one or more serving nodes within said network having said content;
- d. said server calculating a closest path from said user device to a serving node having said content, wherein said user device is not registered to said serving node having said content;
- e. said server sending a request for direct content distribution to said serving node having a closest path to said user device, and the location and access address of said serving node to which said user device is registered;
- f. said server sending a notification to the serving node to which said user device is registered of the location and access address of the serving node having said content;
- g. said serving node having said content sending said content to said serving node to which said user device is registered; and
- h. said serving node to which said user device is registered redirecting said content to said user device;

15. A method for a user to view content on a first user device and transition to viewing content on a second user device, comprising:

- a. said user viewing content on said first user device, said first user device connected and registered to a serving node, said content transmitted to said user device through said serving node;
- b. said user selects a menu option to continue said content on a second user device;

- c. said serving node continuing to stream said content to said second user device, and if necessary, reformatting, transcoding and transrating said content for said second user device.
16. A method for tagging multimedia content by a user operating a user device for storage on a serving node, said user device registered with said serving node, comprising the steps of:
- a. said user selecting a portion of said content by indicating a selection;
 - b. said serving node receiving a request for said selection;
 - c. said serving node inserting a pointer reference to a frame sequence number associated with said selection;
 - d. said serving node obtaining a start point and an end point of said portion;
 - e. storing said content and said start point and end point in a database associated with said user;
 - f. when said serving node receives a request to view said portion on a second user device, then reformatting, transcoding and transrating said content to provide said portion.
17. A method of collecting information about usage patterns of a plurality of users and a plurality of user devices, each of said users and user devices registered with a serving node, said serving node configured to receive content via a network, and deliver said content to said plurality of user devices, comprising the steps of:
- a. said serving node handling all content traffic between said user devices over Wi-Fi, Ethernet, and broadband networks;
 - b. said serving node collecting usage information by performing deep packet inspection, deep content inspection and content filtering to determine requested content on all of said content traffic;

c. said serving node providing said usage information, a user id, user device id, content type, start time and end time to a server.

18. A method of interacting with a television display through a mobile device by utilizing a mobile device keyboard and mouse, comprising the steps of:

- a. providing a serving node to which said television display and said mobile device are registered, said serving node having a web portal having a keyboard and mouse presentation;
- b. connecting said mobile device to said web portal on said serving node;
- c. presenting, on a screen of said mobile device, a keyboard and mouse interface fit to said screen of said mobile device;
- d. using said web portal keyboard and mouse presentation to type, move and interact with said television display.

19. A method of adapting a bit rate for a mobile user device having GPS, comprising:

- a. A client application on said user device obtaining GPS coordinates and differential coordinates;
- b. transmitting said GPS coordinates and differential coordinates to a serving node to which said user device is registered;
- c. said serving node calculating a speed of said mobile user device;
- d. using said speed to calculate a probable data transmission error rate and packet loss rate; and
- e. adjusting a content transmission bit rate to said user device based on said estimated data transmission error rate and packet loss rate.

20. A method of obtaining television content from a serving node having a plurality of television tuners, an active tuner for a channel being viewed on a user device registered to said serving node, and a plurality of available tuners, comprising:

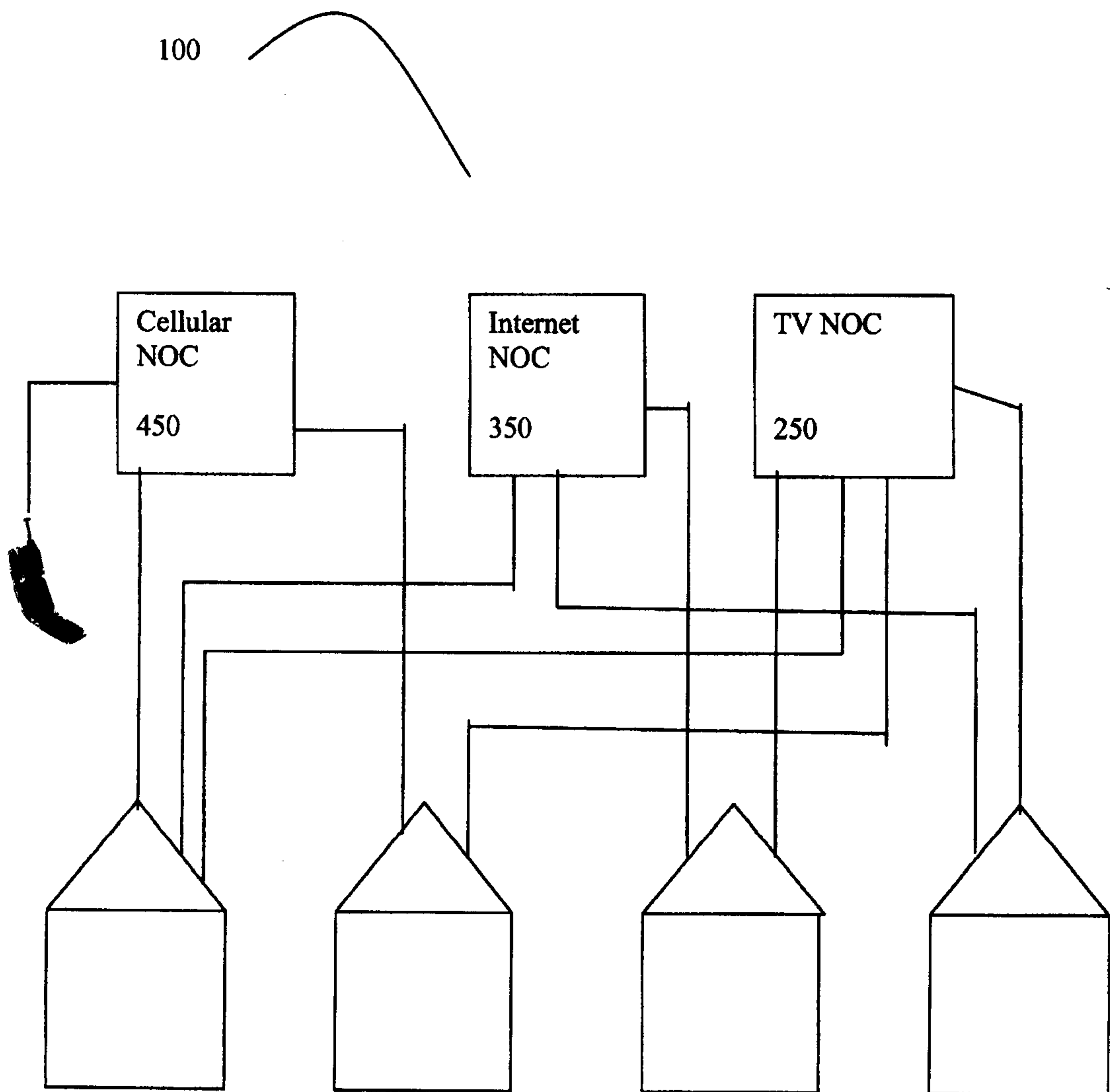
- a. A module in said serving node configured to provide storing and forwarding in real-time of content received by said available tuners for viewing on other user devices whilst allowing the recording of said content at the same time as well.
 - b. said serving node receiving a request for a specific channel display;
 - c. if any of said TV tuners are receiving the requested channel:
 - i. if said active TV tuner is receiving said requested TV channel then said serving node storing TV content associated with said requested TV channel in small blocks that are transmitted to a requesting user device;
 - ii. if said active TV tuner is not receiving said requested channel then
 - 1. said serving node sending a request for said channel to a server;
 - 2. said server determining a second serving node, said second serving node receiving said requested channel;
 - 3. said server facilitating handshaking between said first and second serving nodes;
 - 4. said second serving node transcoding and transrating said content provided by said requested channel for transmission to said first serving node;
 - 5. said first serving node receiving said transcoded and transrated content and providing said content to said requesting user device.
21. A method unscrambling a multiplicity of television channels on a single bandwidth, comprising:
- a. receiving, at a TV tuner, said bandwidth frequency; all channels offered by a video source within said bandwidth; each of said plurality of channels differentiated by a code;
 - b. on a request from a user device for a channel to a serving node, providing said serving node with said code;

- c. using said code to separate said requested TV channel;
- d. on receipt of a second request from a second user device for a second channel;
- e. receiving a code for said second channel and applying said code to separate said second channel concurrently with said first channel;
- f. providing said first channel to said first user device and said second channel to said second user device.

22. A method of watching first and second video streams from first and second video sources on a user device, in different areas of a display of said user device, comprising the steps of:

- a. streaming a live TV stream from a serving node to said user device;
- b. invoking a second TV stream from a second video source on a menu;
- c. said serving node locating said second video source and transcoding and transrating said second TV stream;
- d. said serving user device having a user interface, said user interface being provided coordinates for said second video stream,
- e. said serving node providing said transcoded and transrated video stream to said user device; said interface providing a player redirecting said first video stream and said second video stream based on said coordinates; the available TV stream and the video contents to each X, Y coordinates and portion of screen

FIG. 1



(Prior Art)

FIG. 2

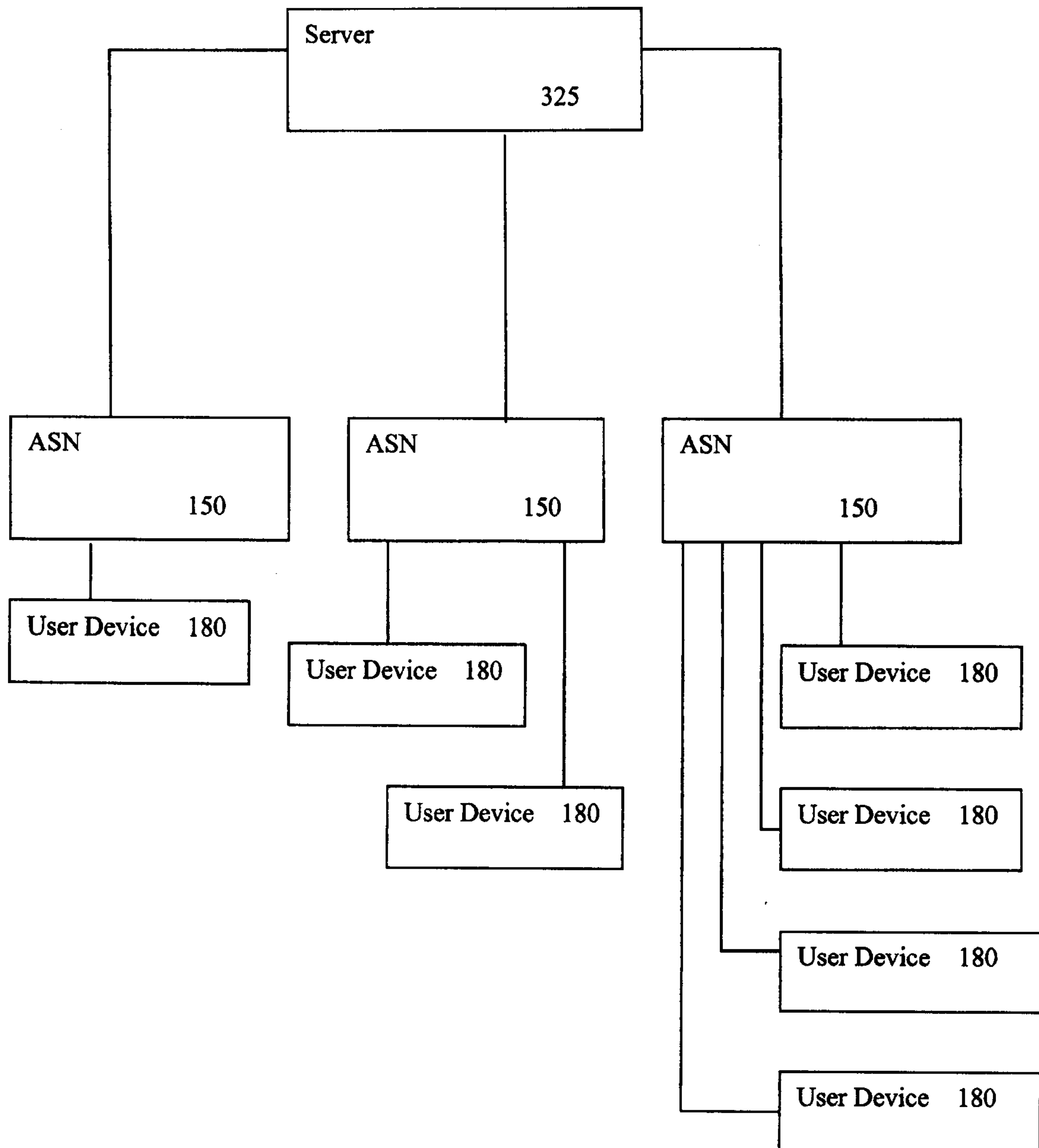
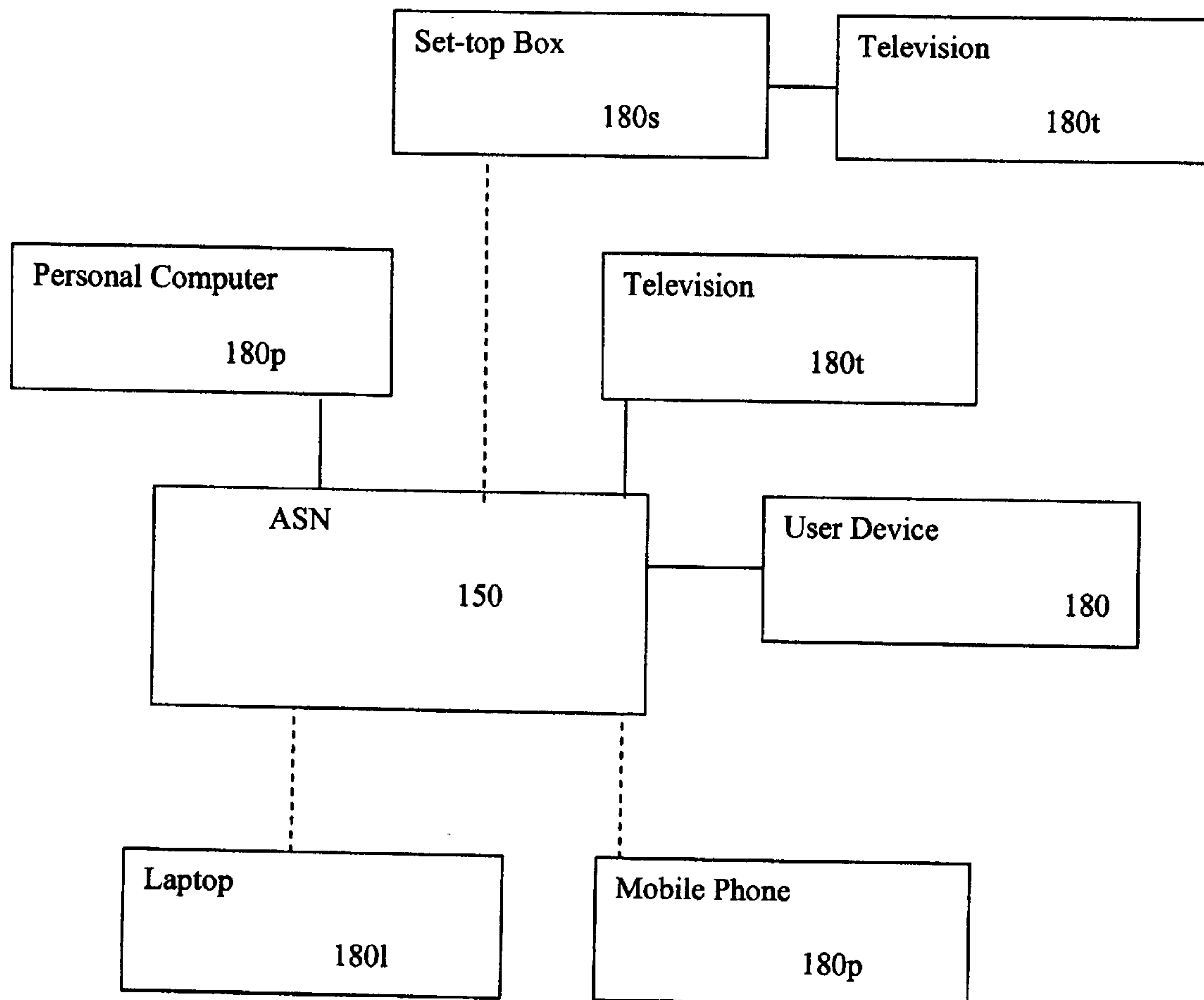


FIG. 3



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FIG. 4

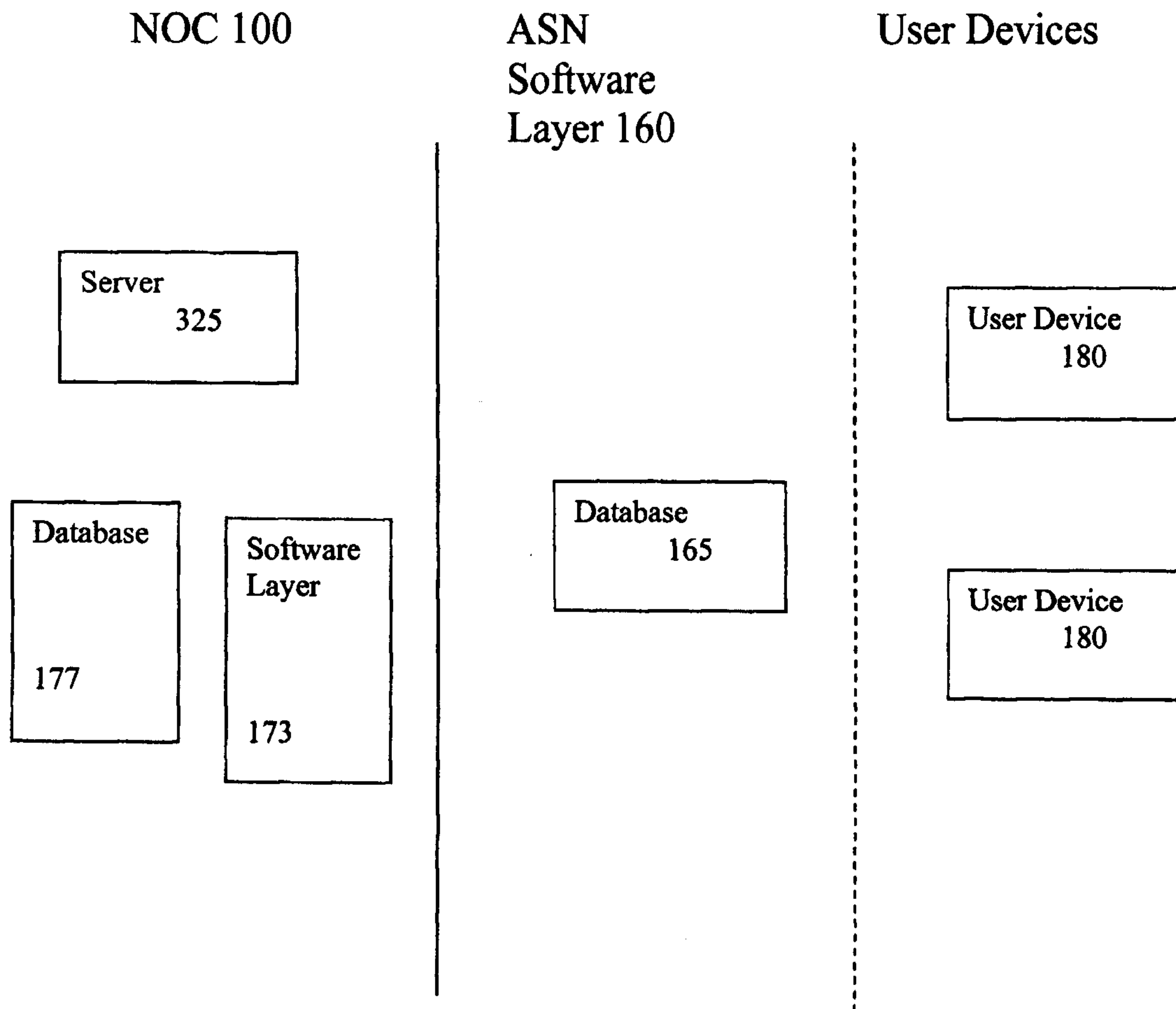


FIG. 5

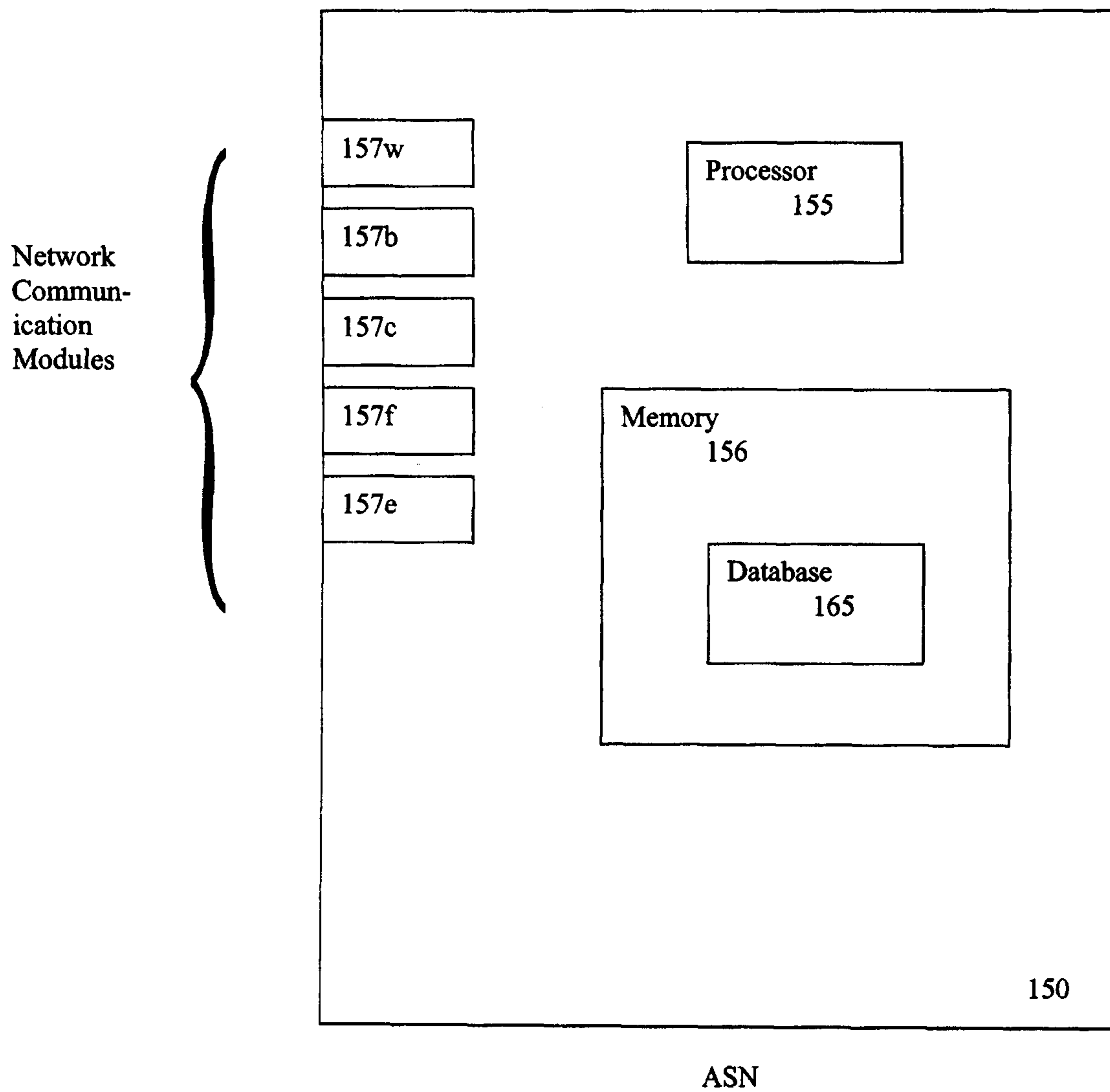


FIG. 6

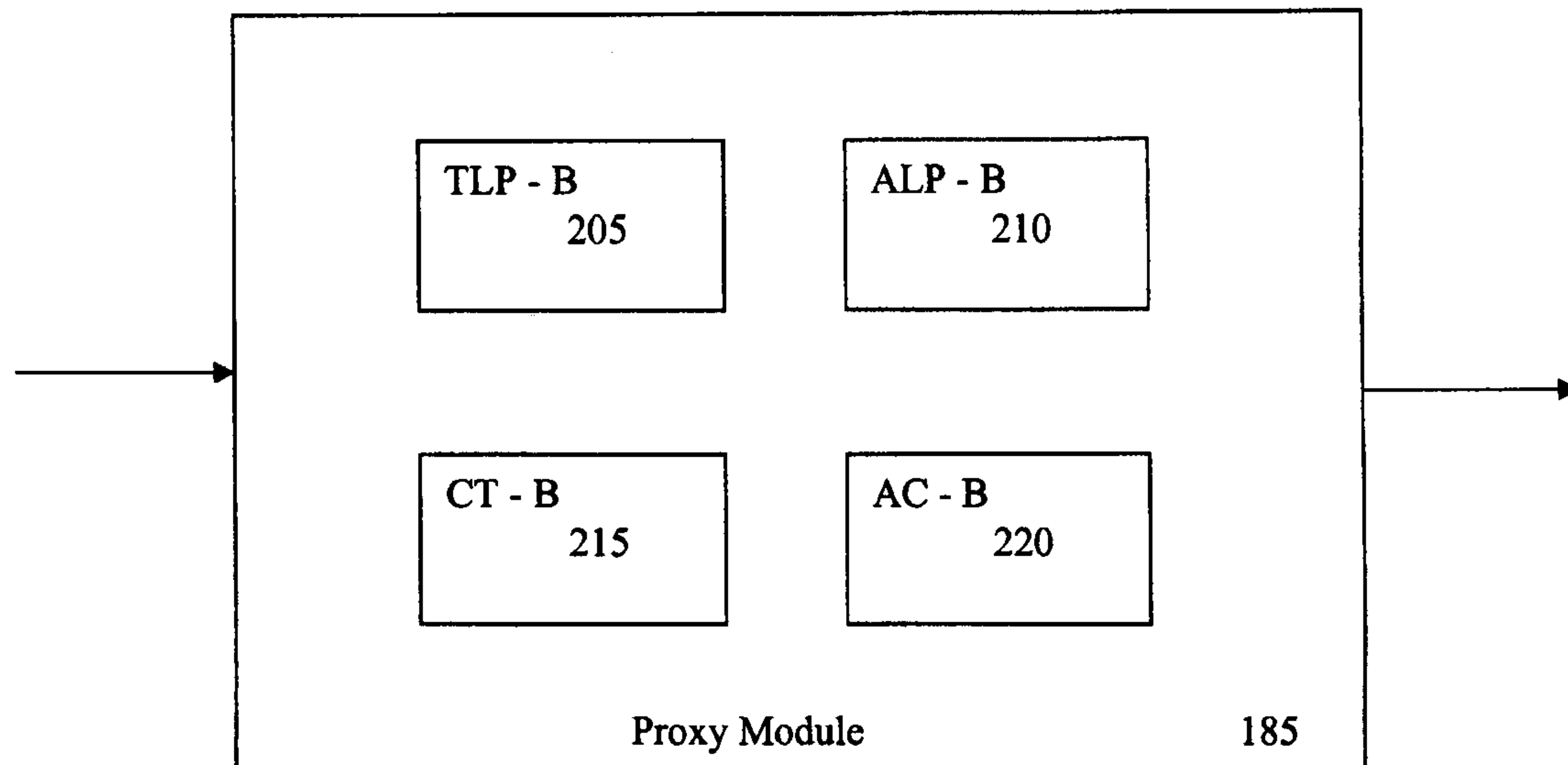


FIG. 7

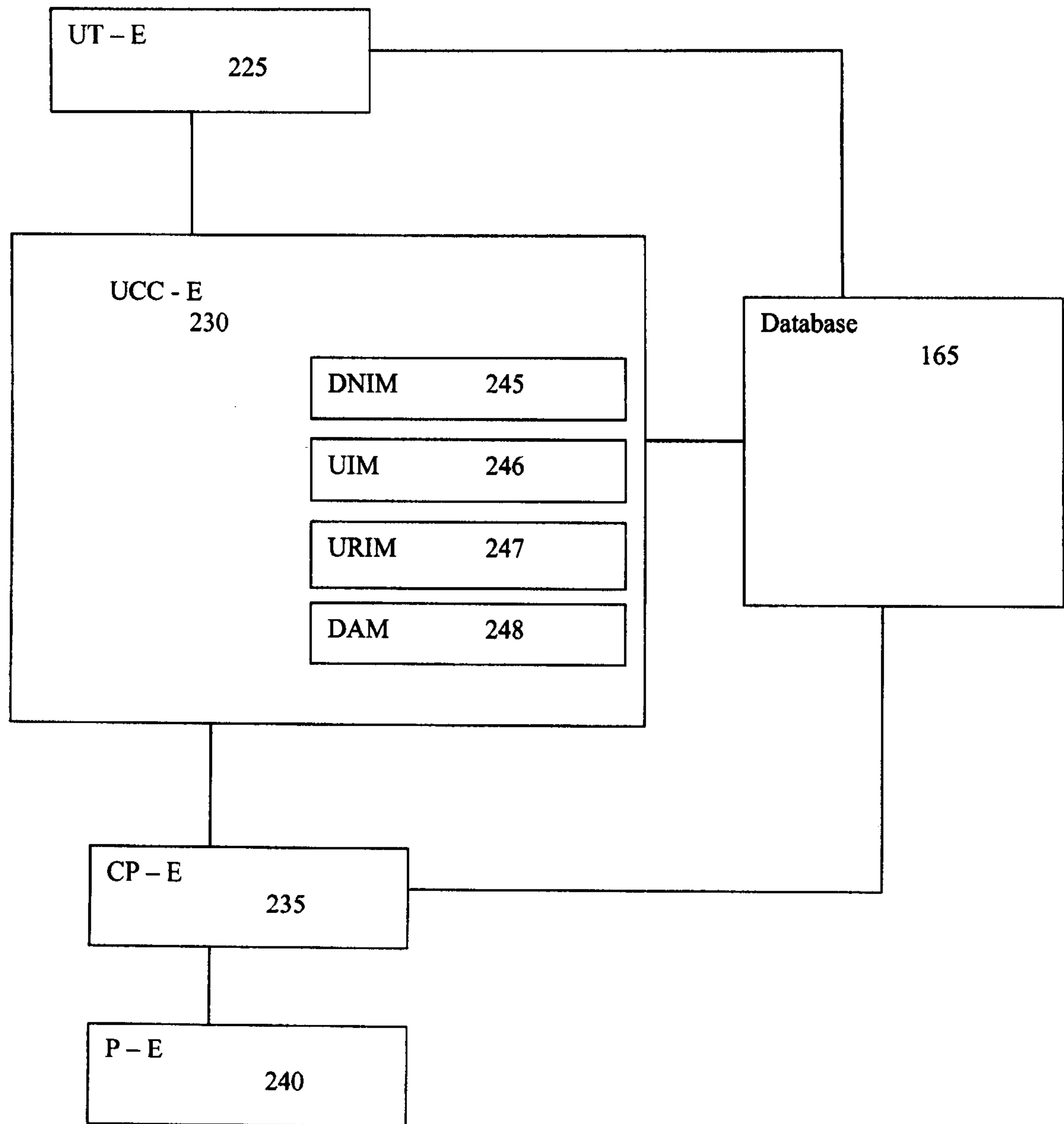
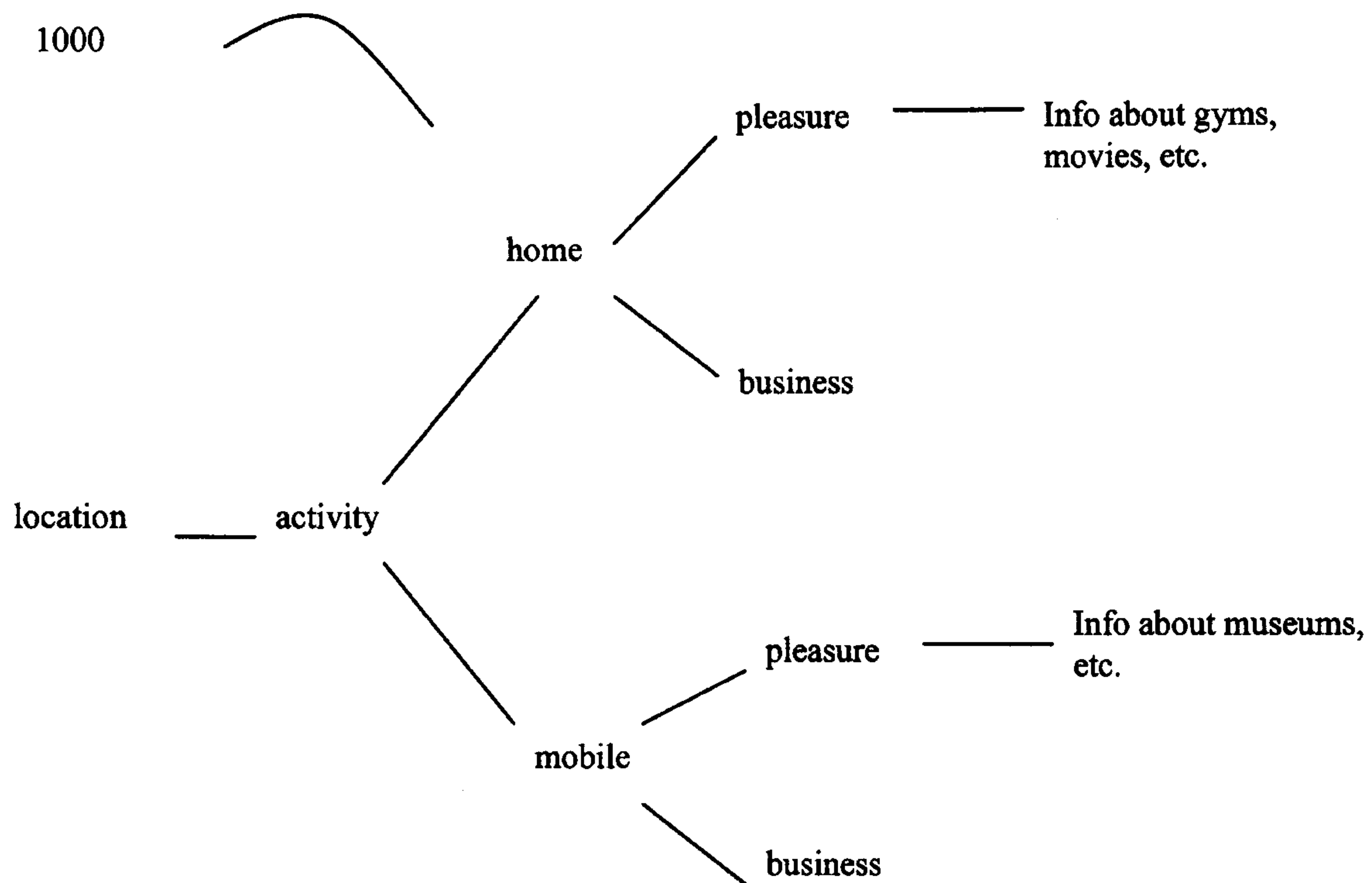


Fig. 8



User Characterization Tree

FIG. 9

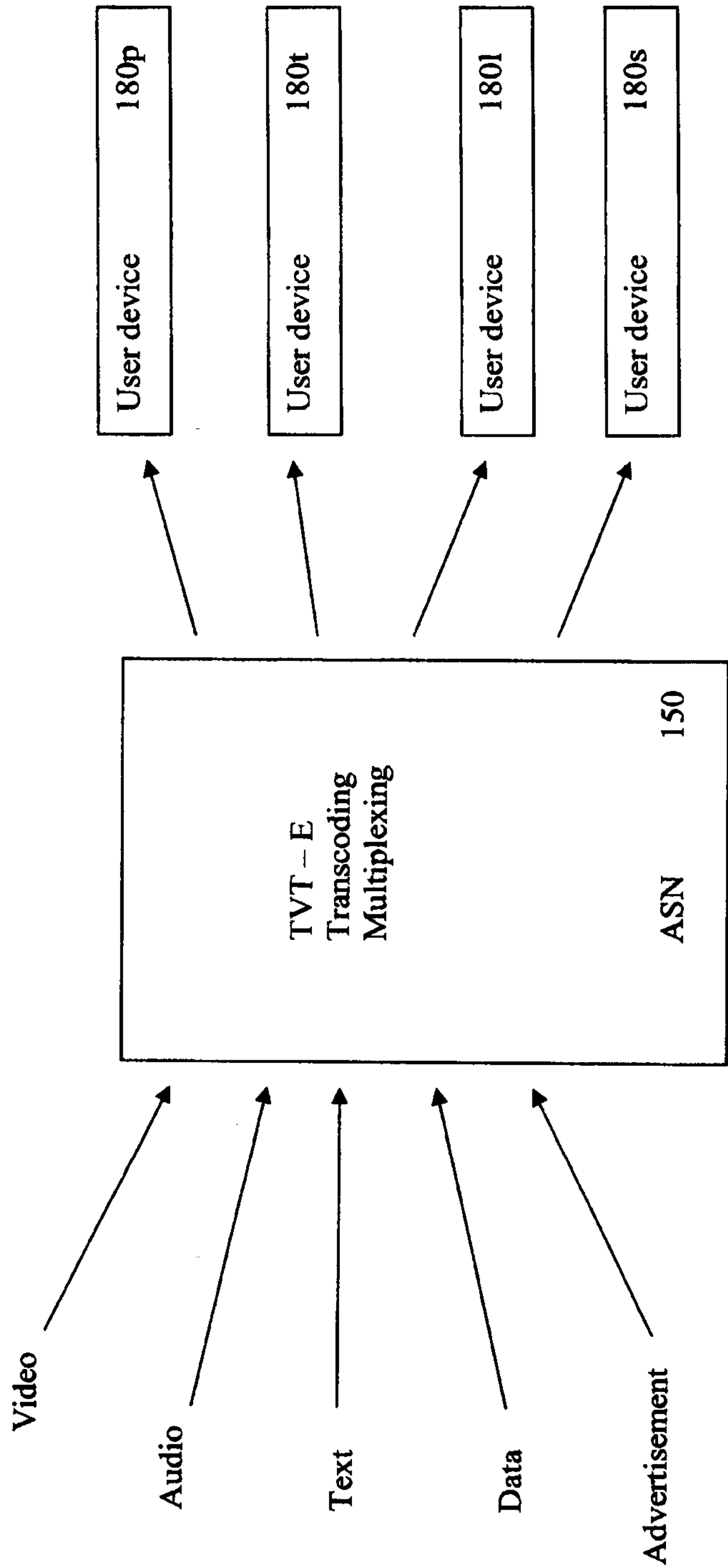


FIG. 10

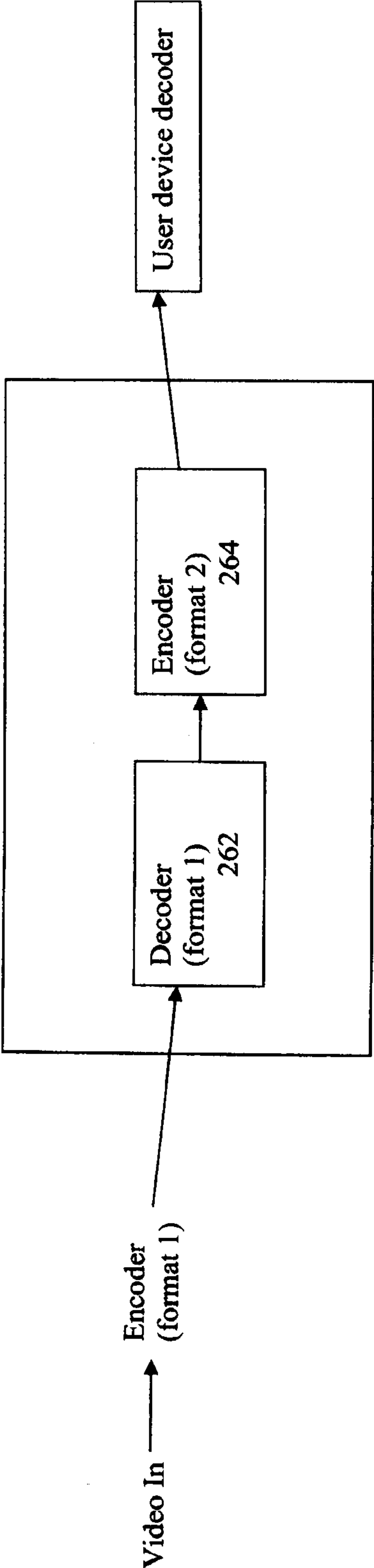


FIG. 11

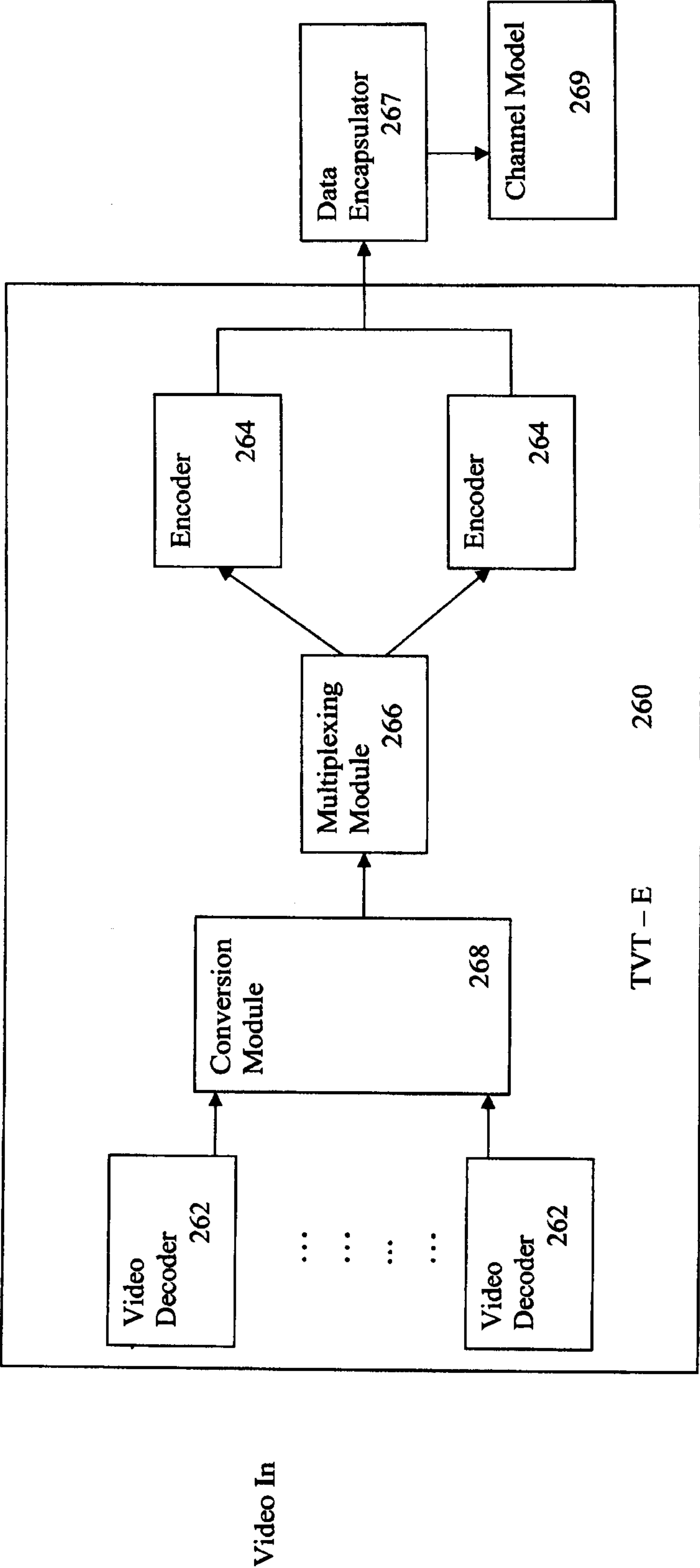


FIG. 12

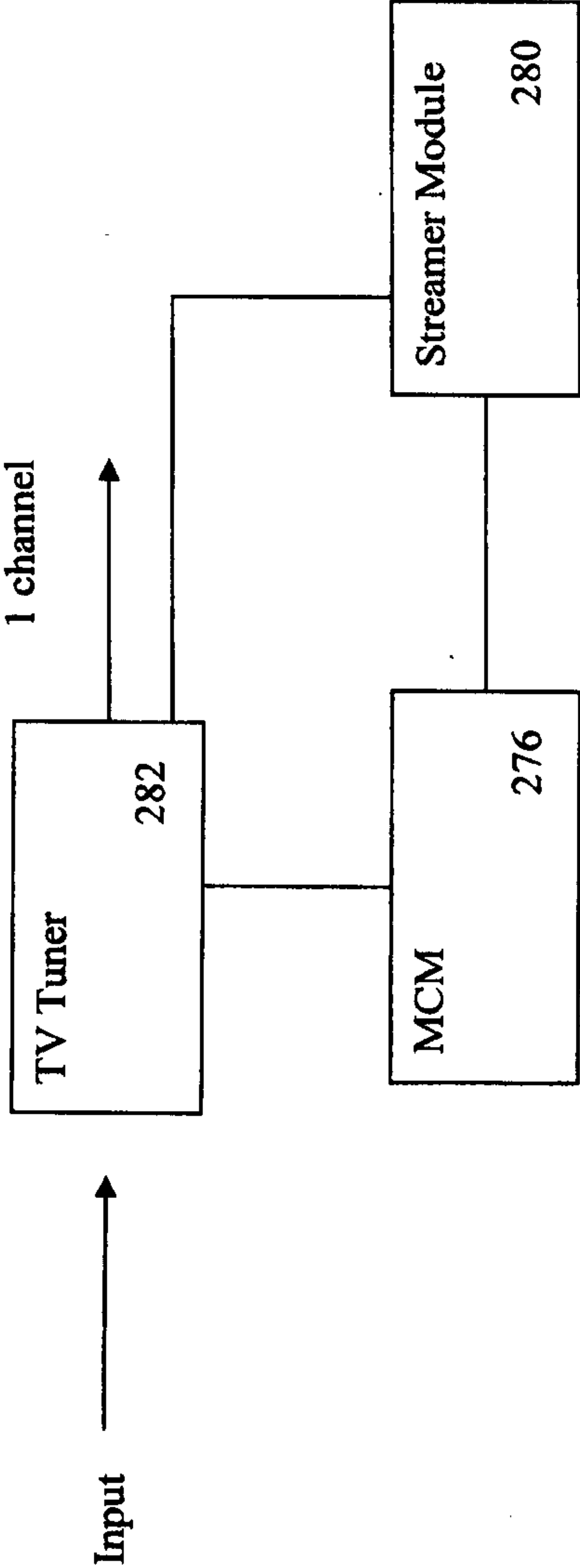


FIG. 13

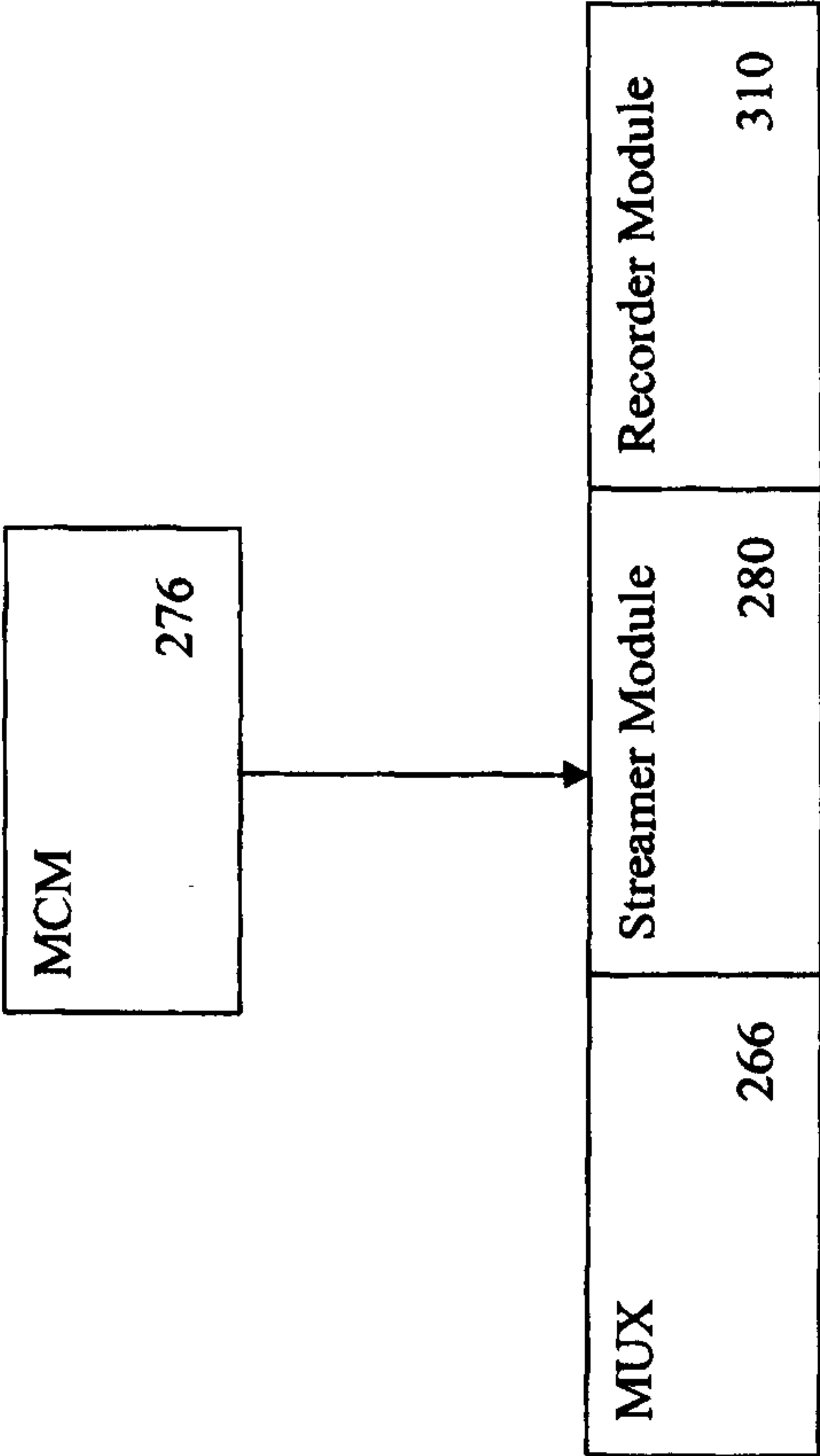


FIG. 14

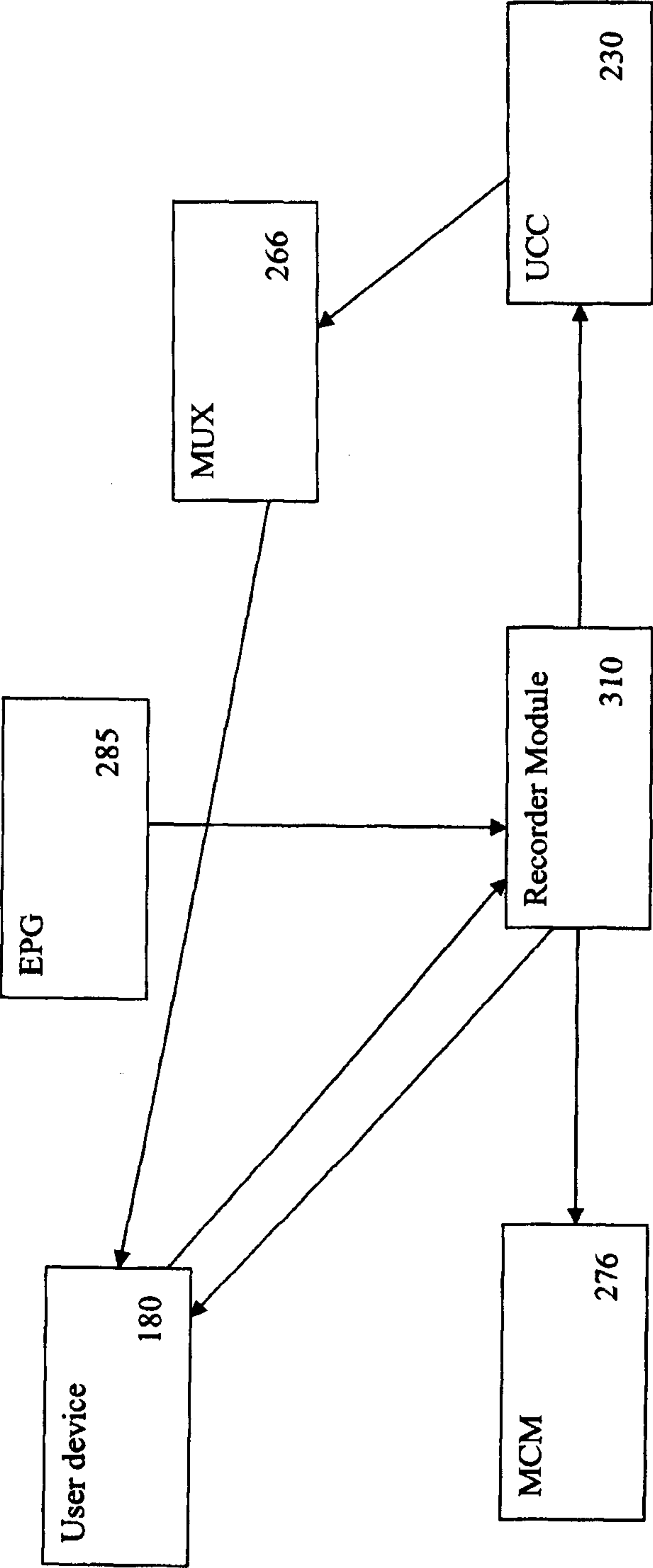


FIG. 15

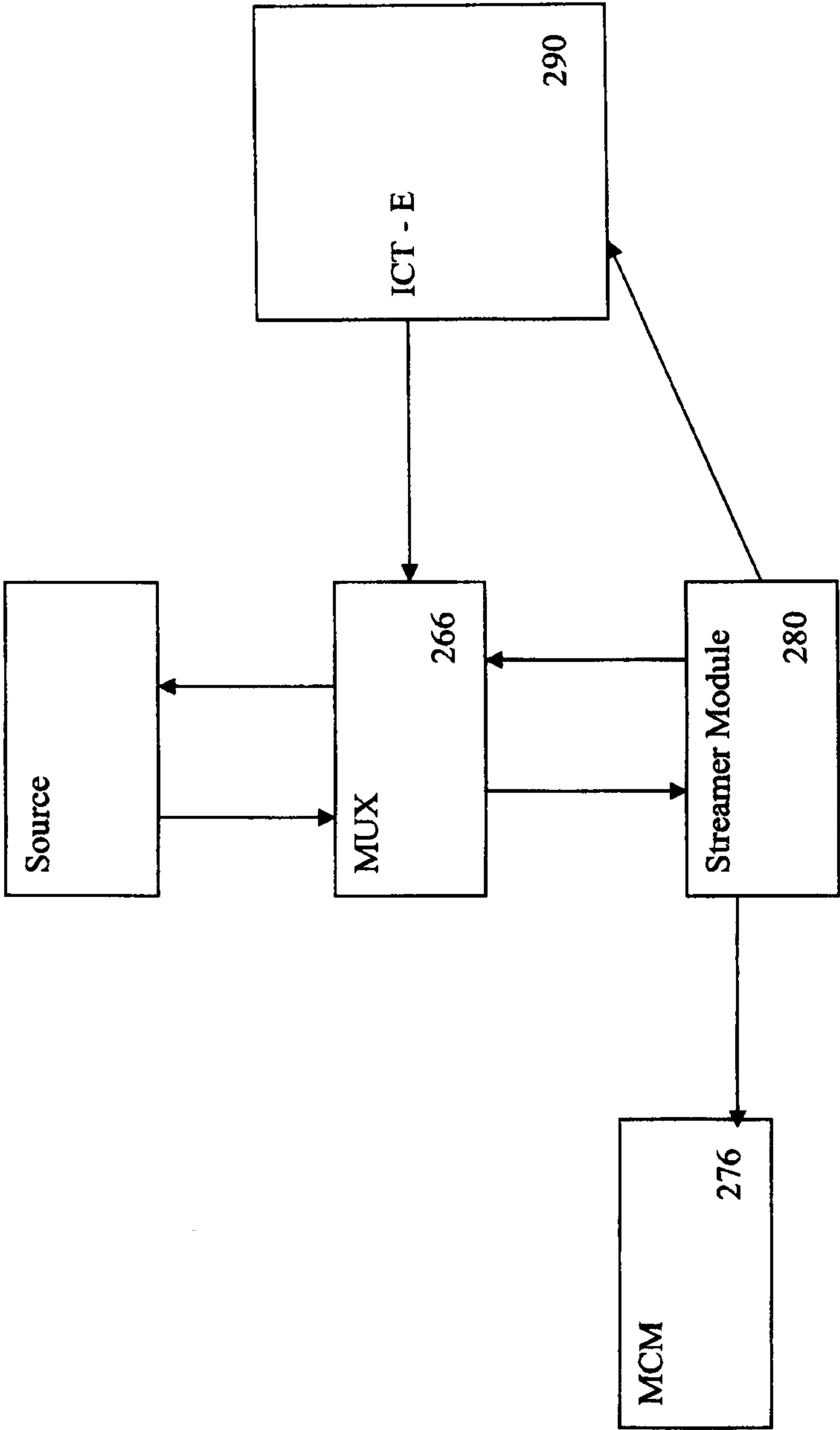


FIG. 16

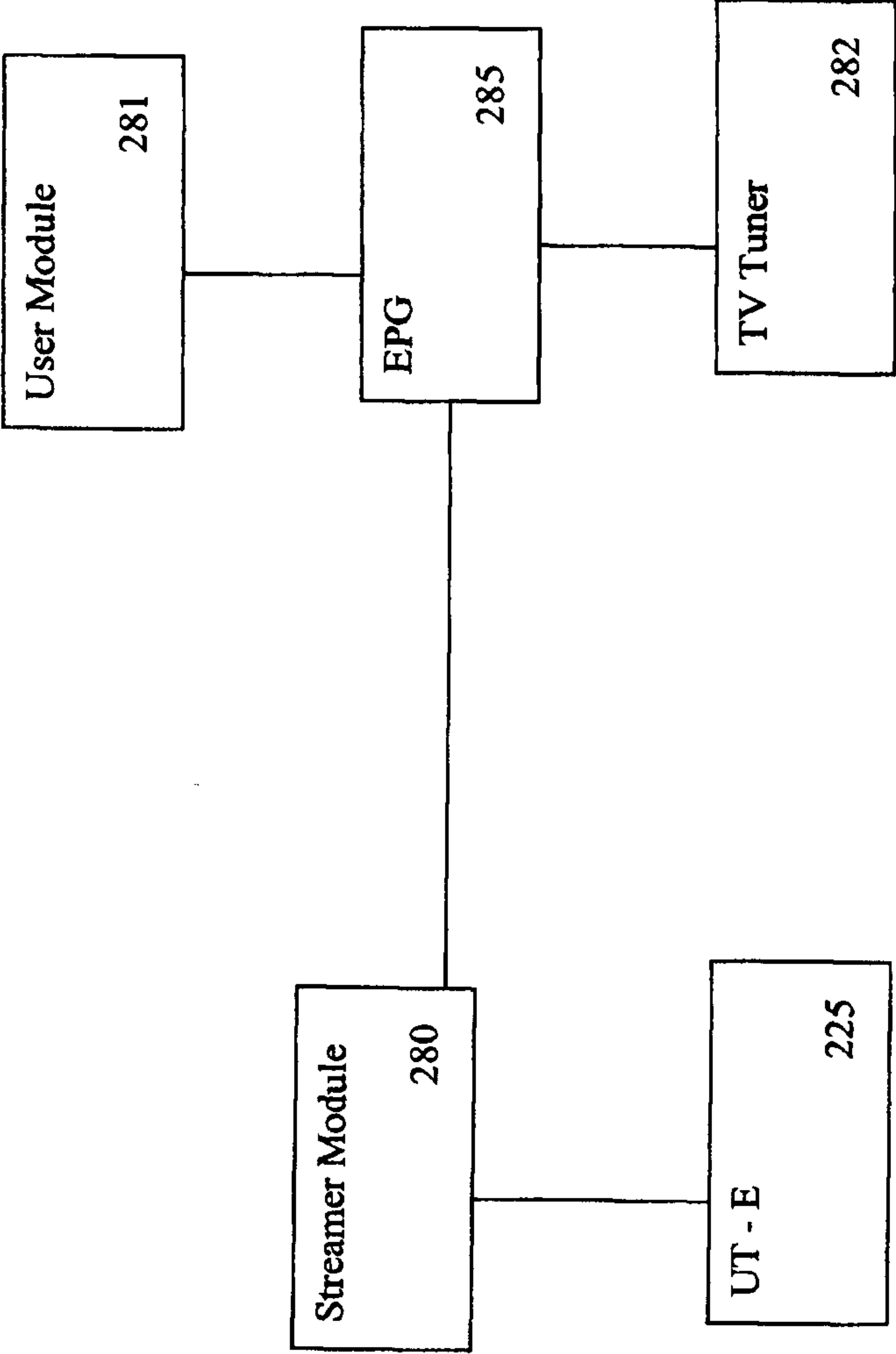


FIG. 17

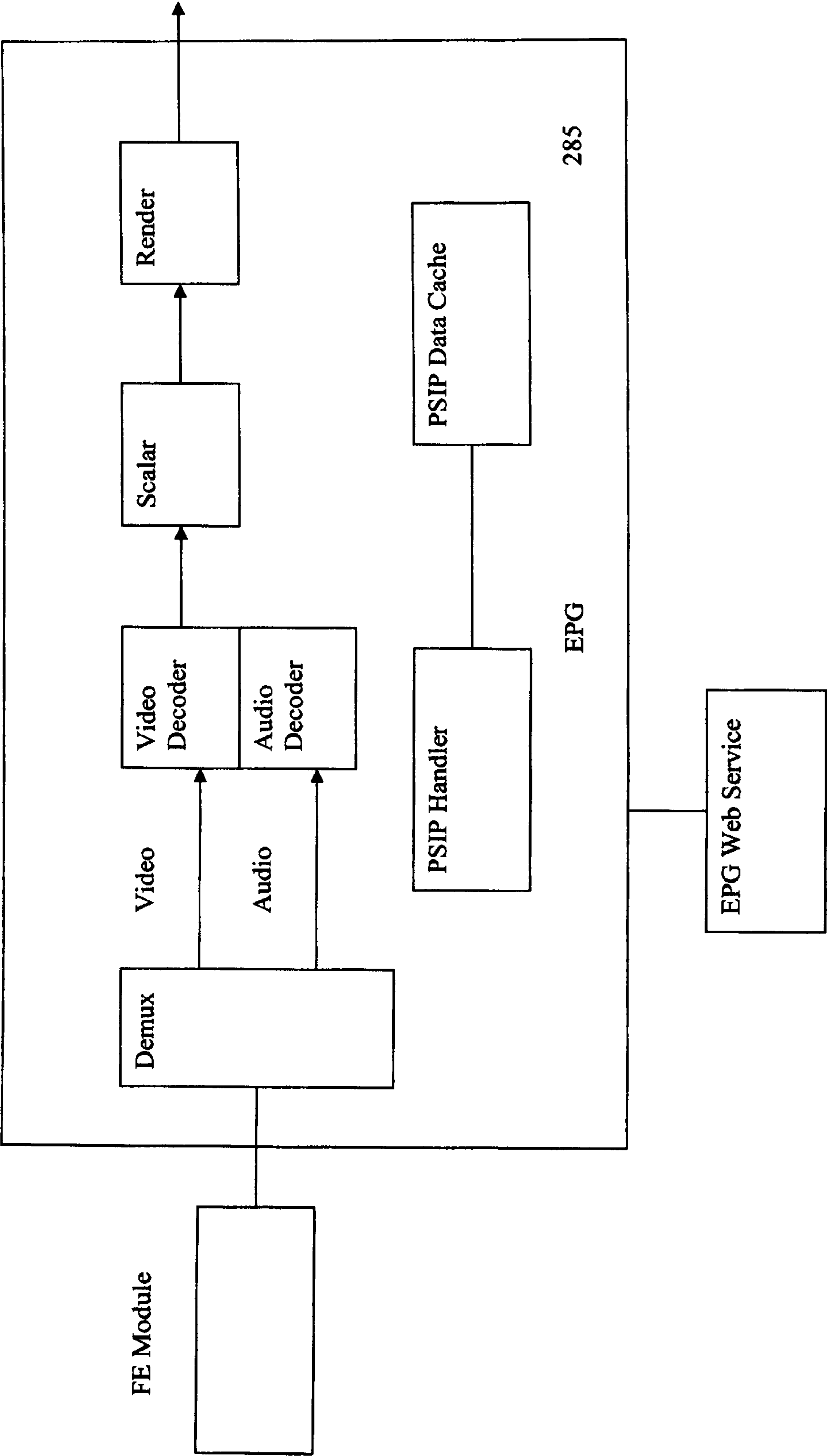


FIG. 18

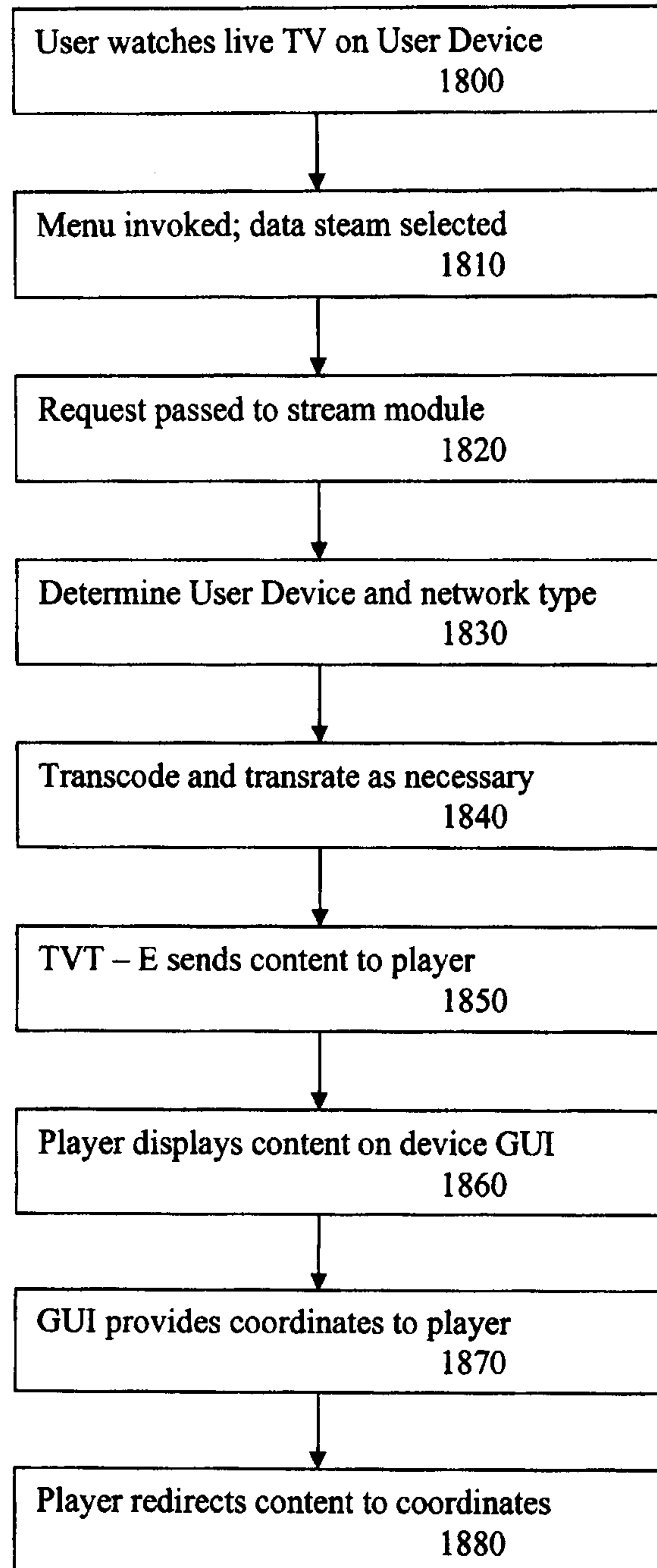


FIG. 19

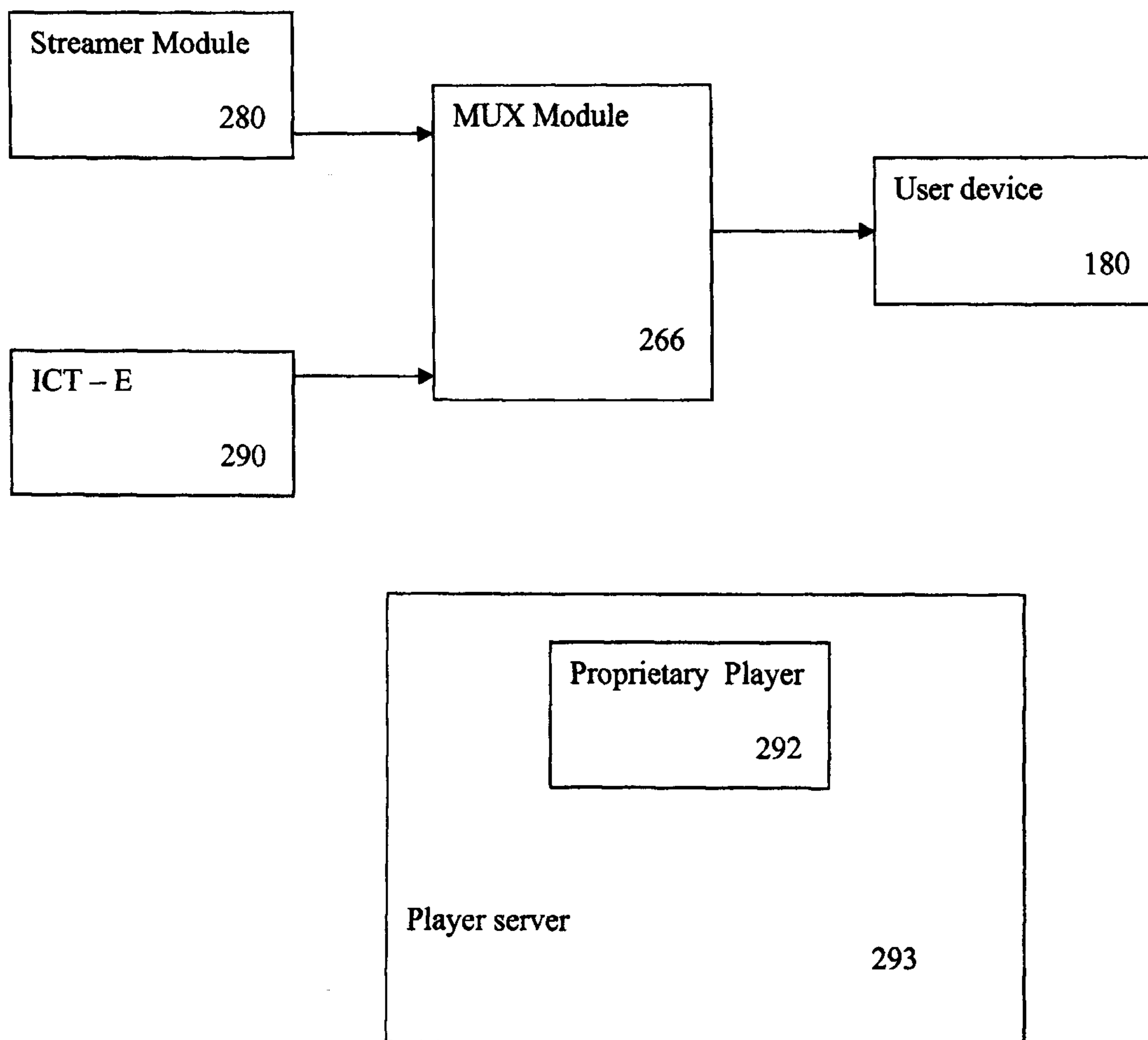


FIG. 20

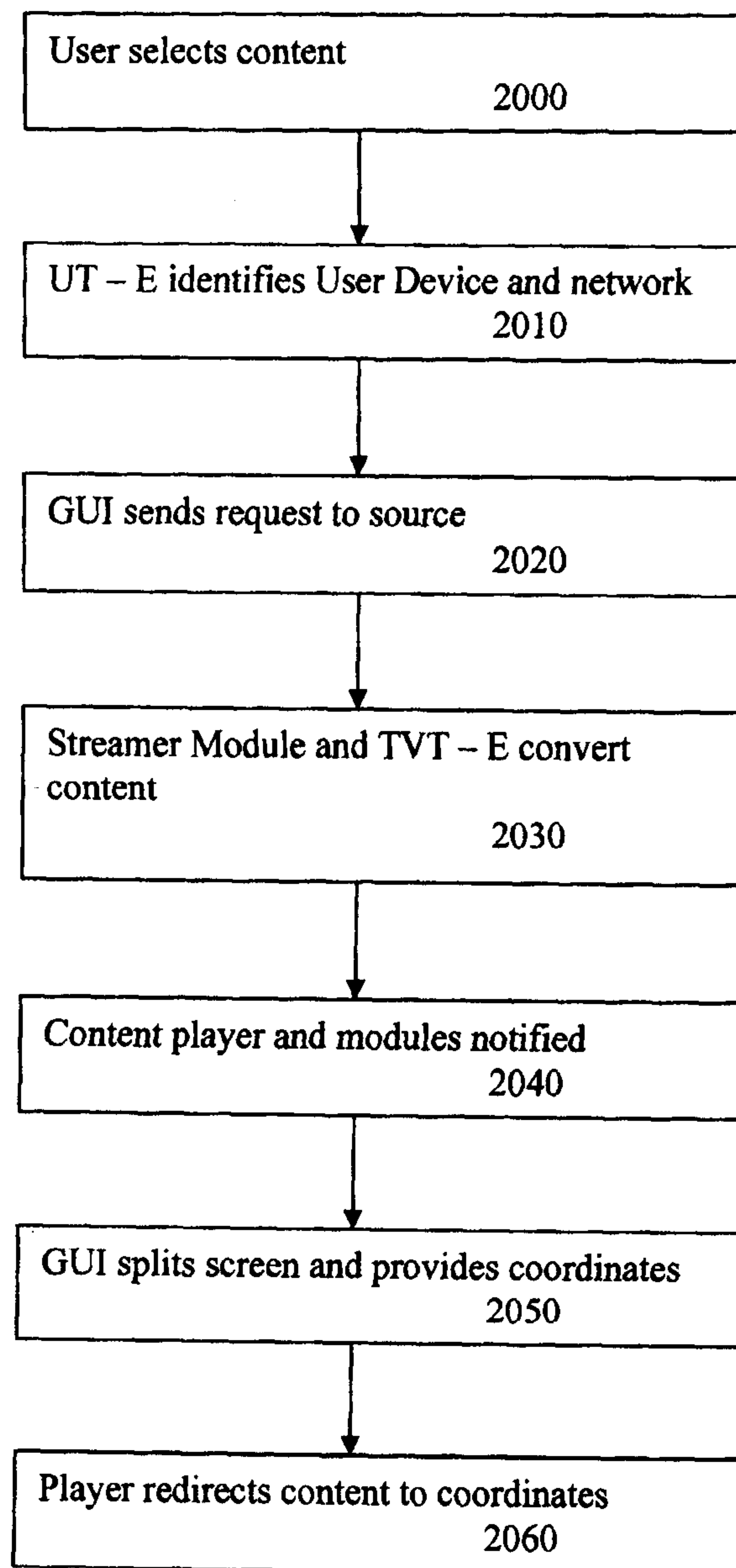


FIG. 21

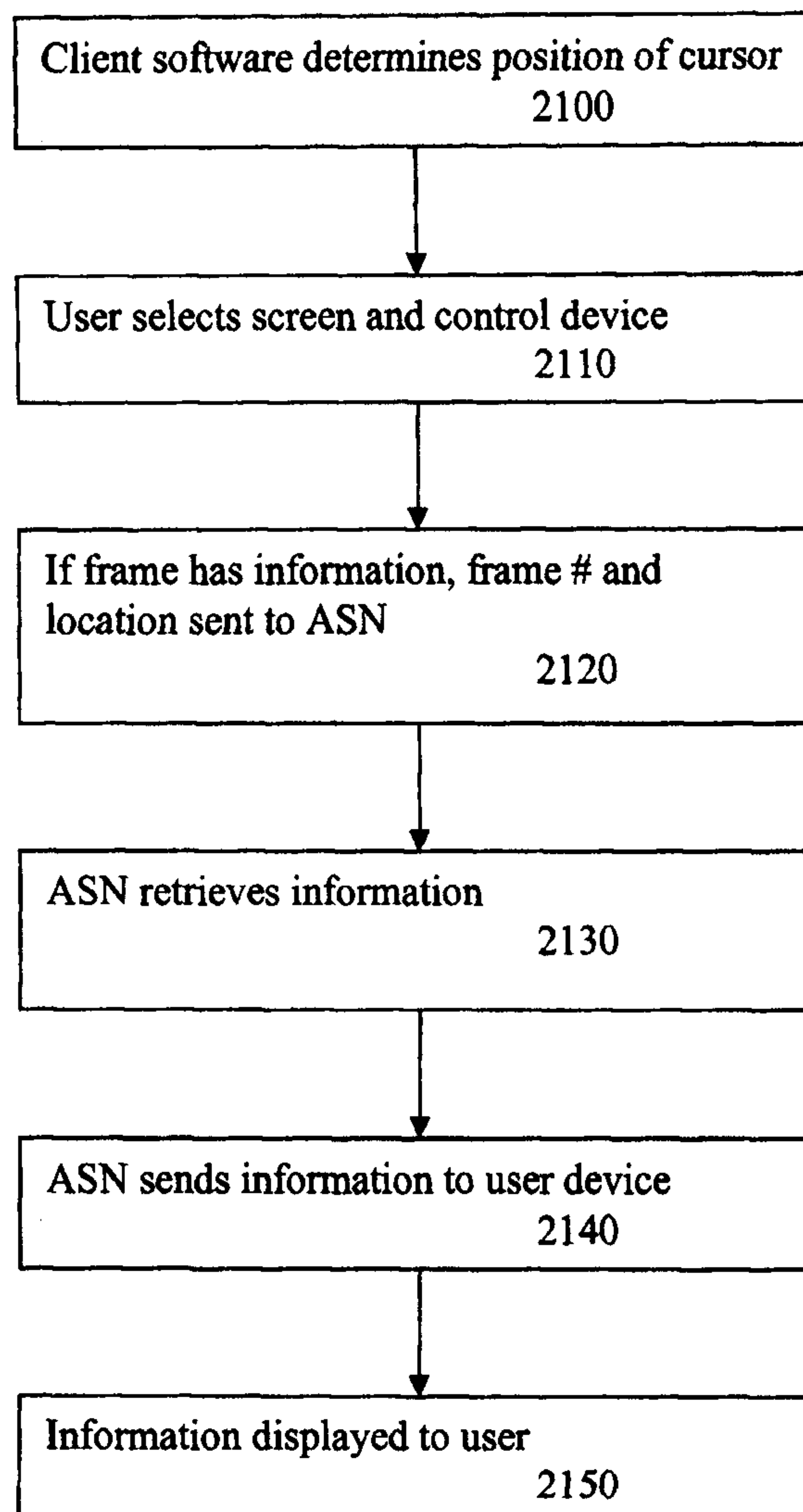


FIG. 22

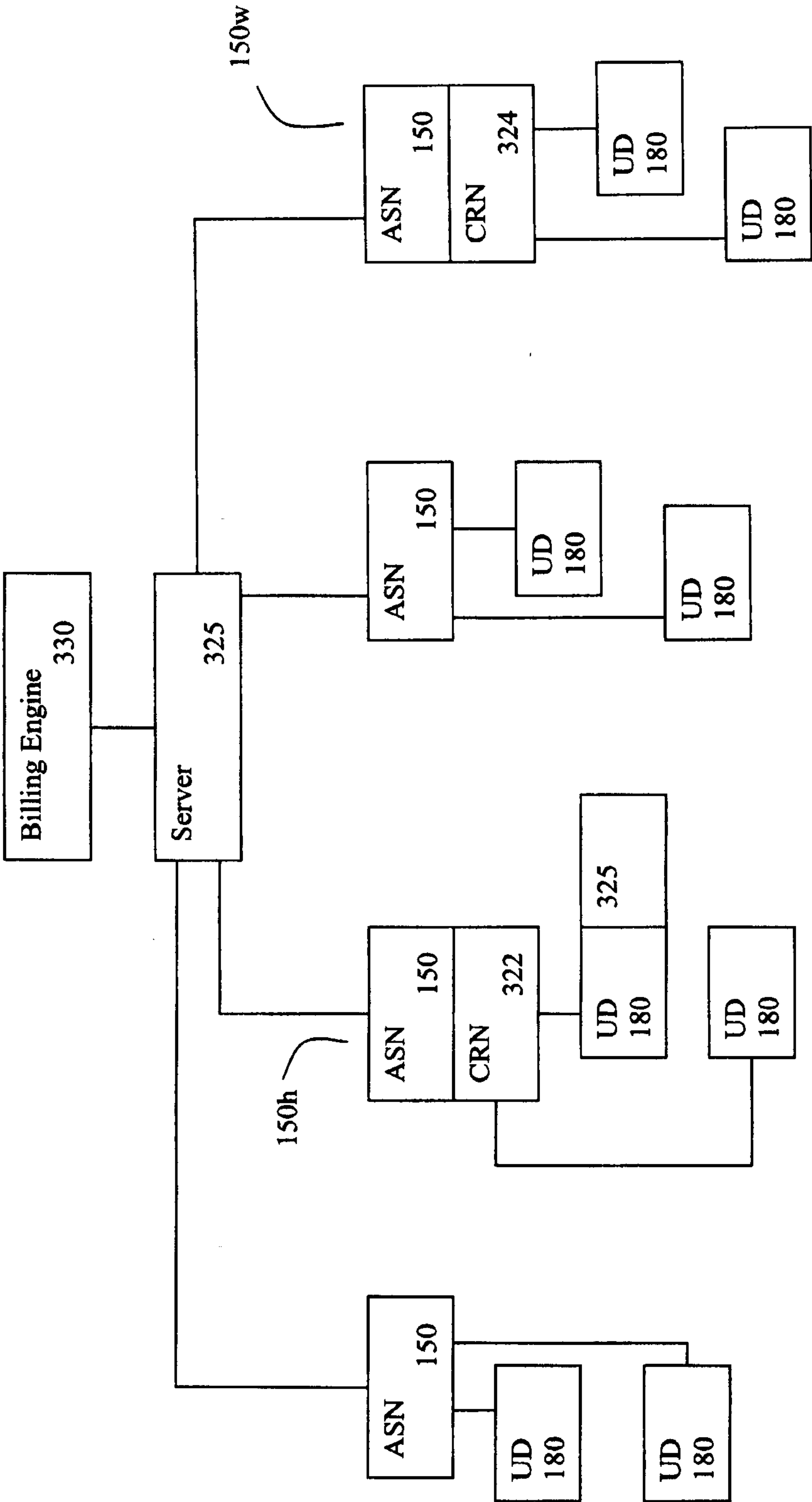


FIG. 23

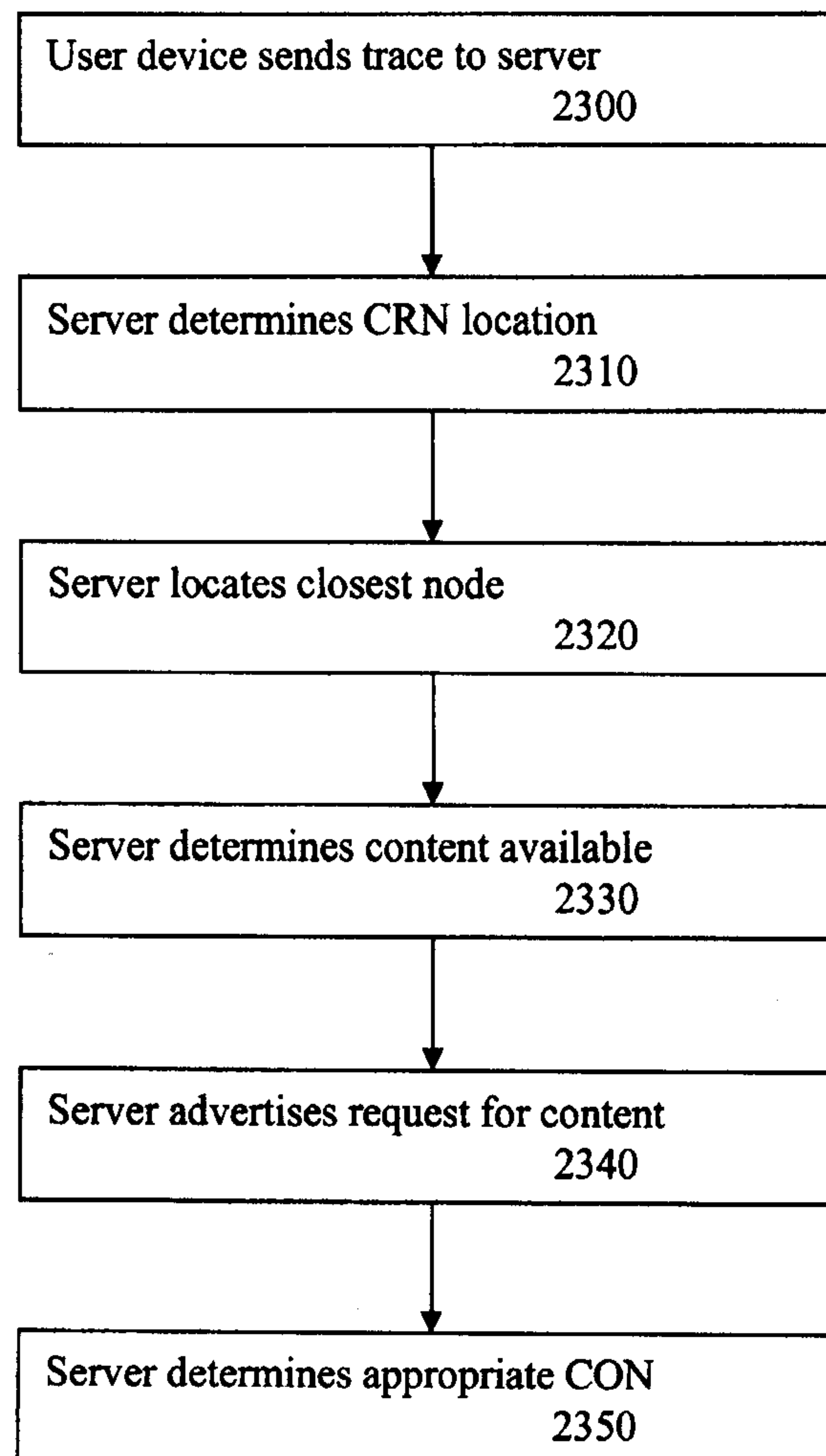
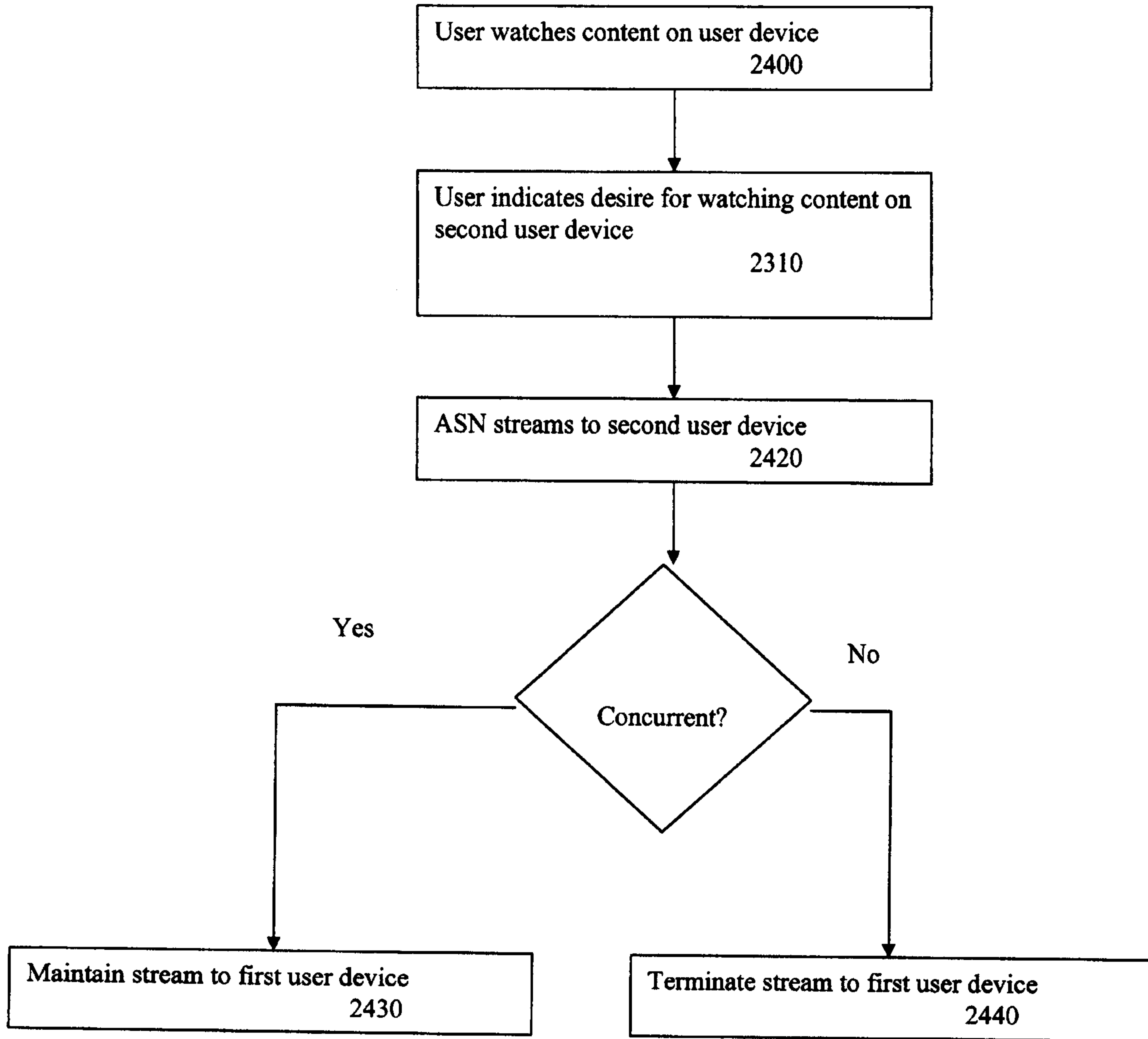


FIG. 24



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FIG. 25

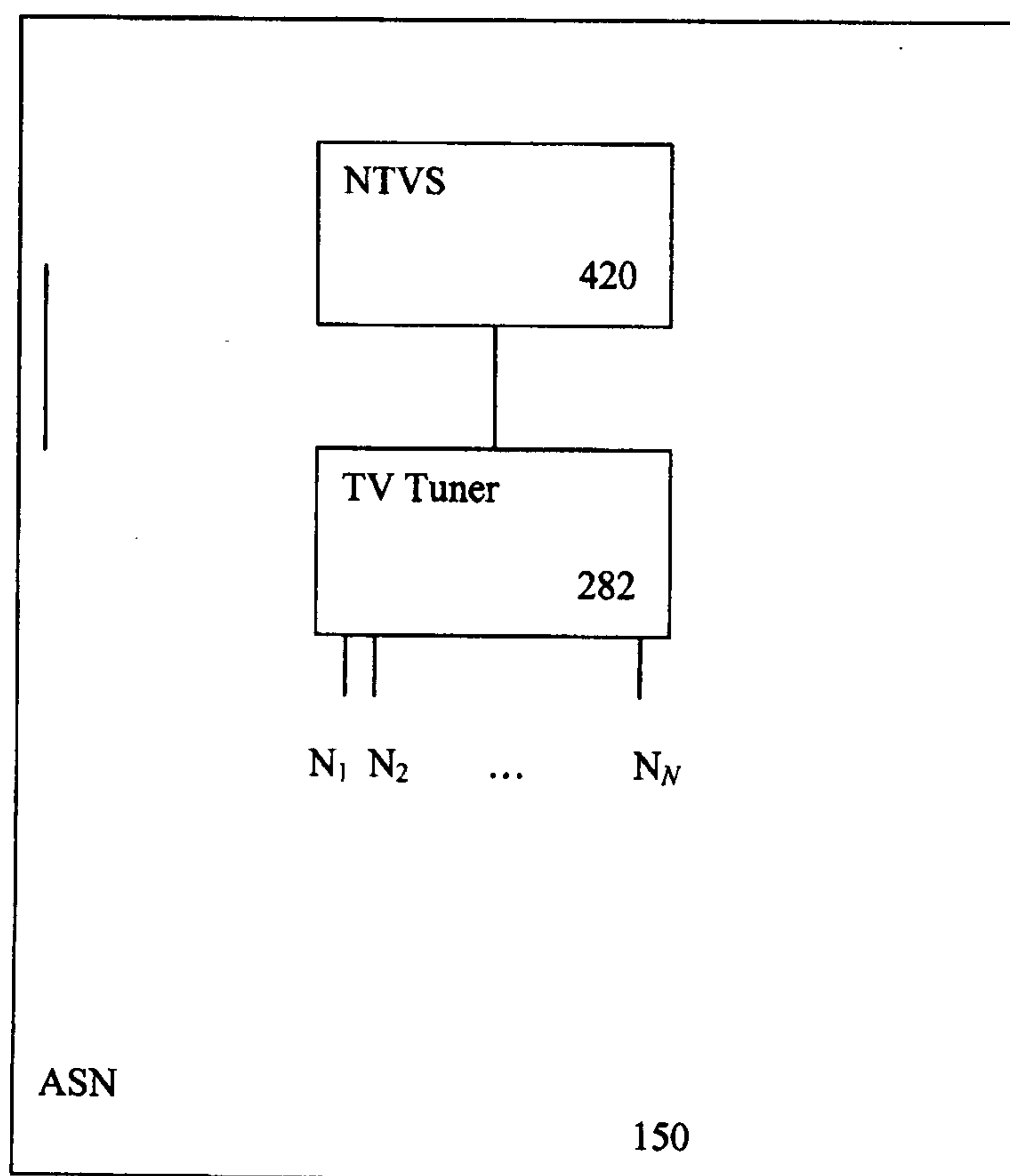
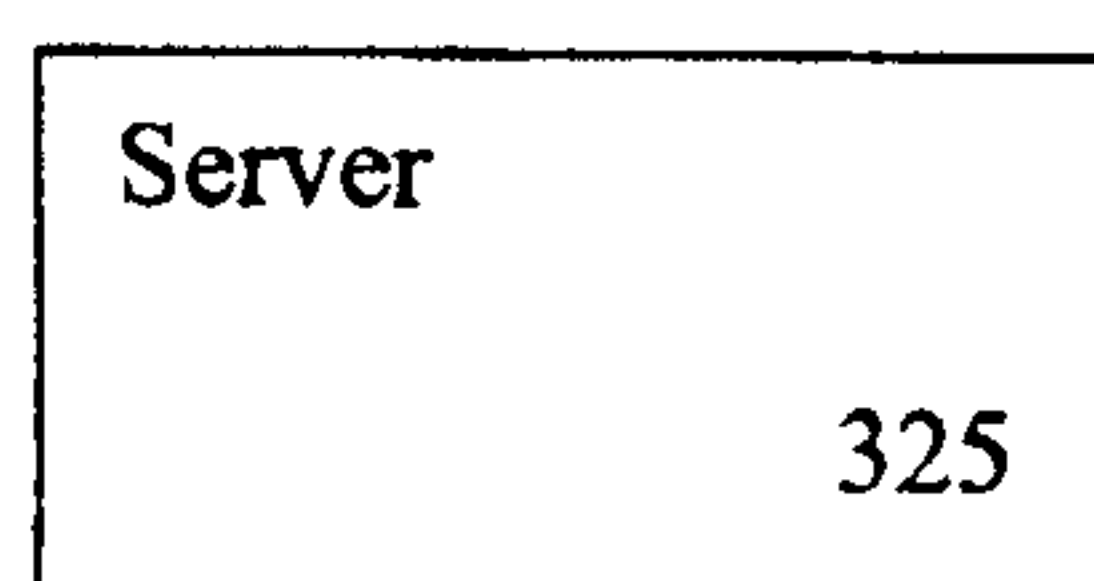


FIG. 26

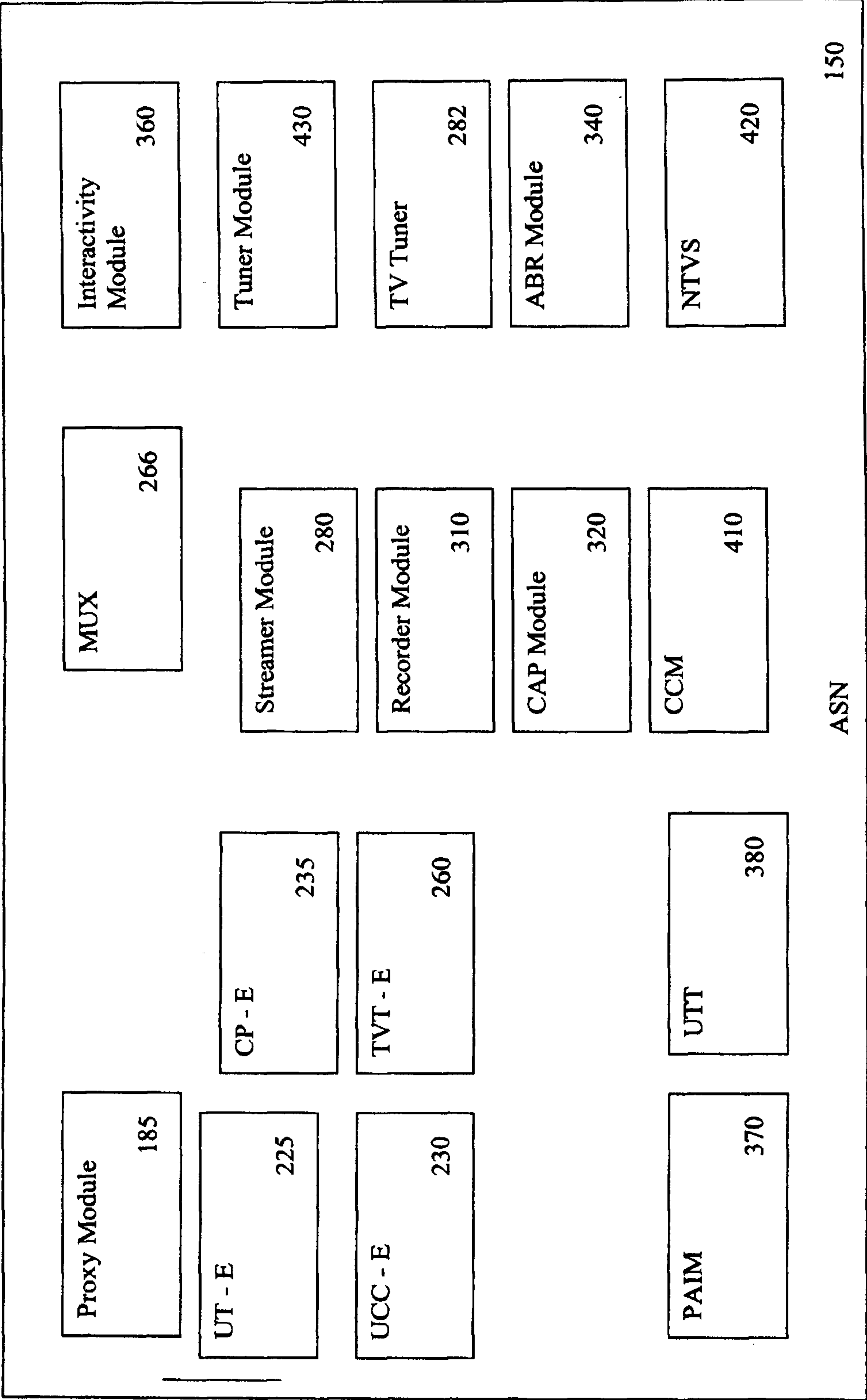


FIG. 27

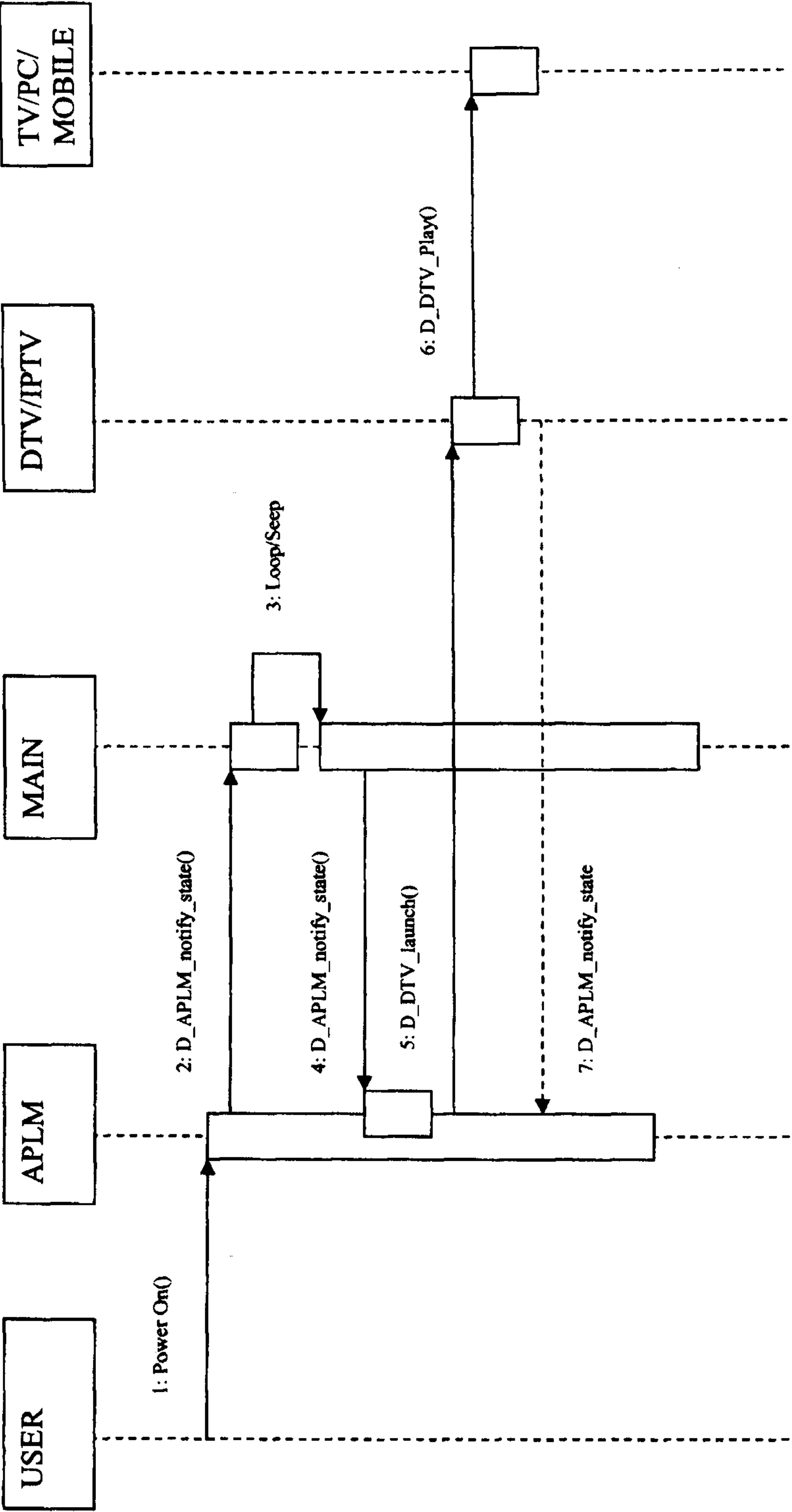


FIG. 28

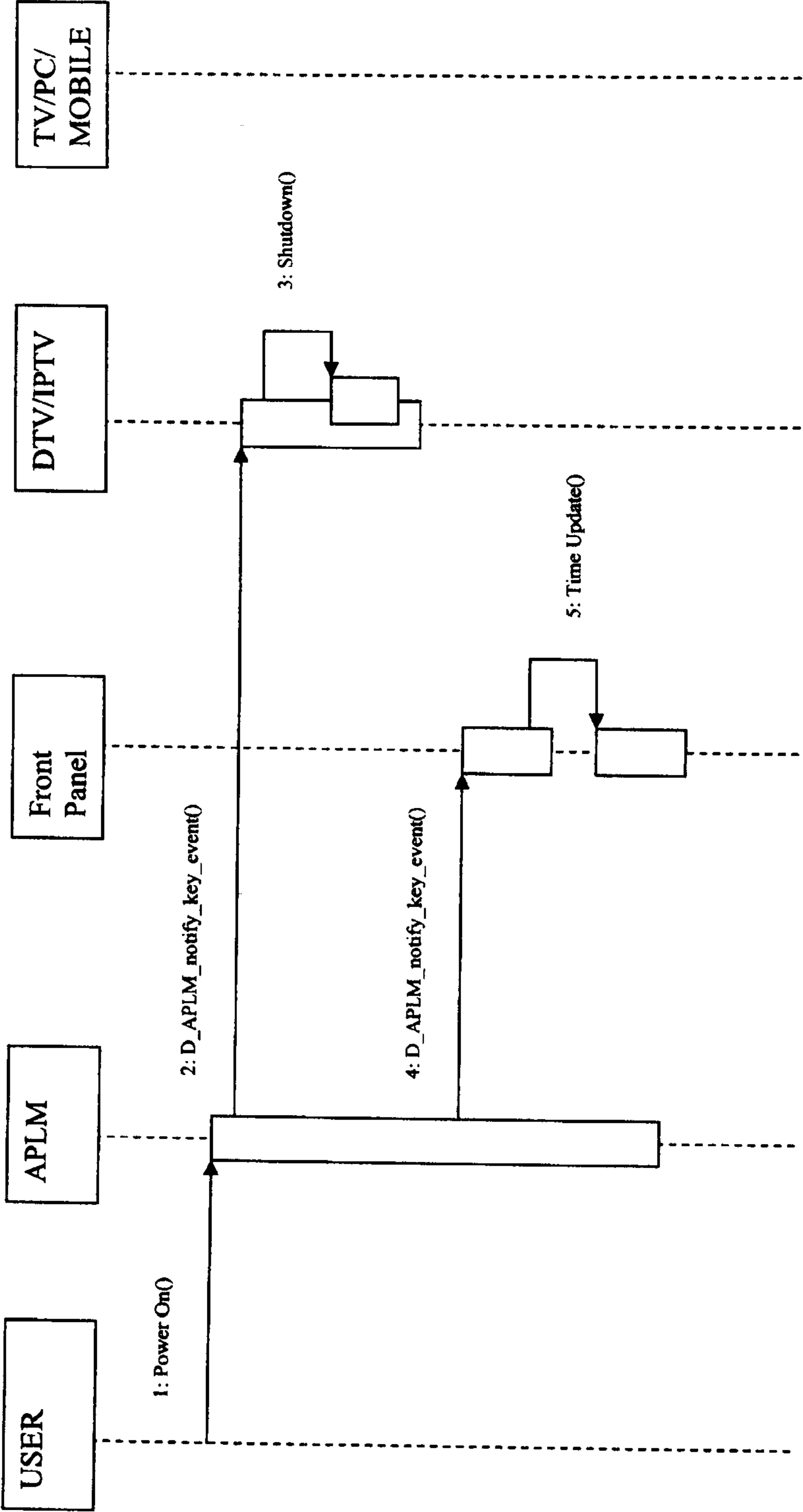


FIG. 29

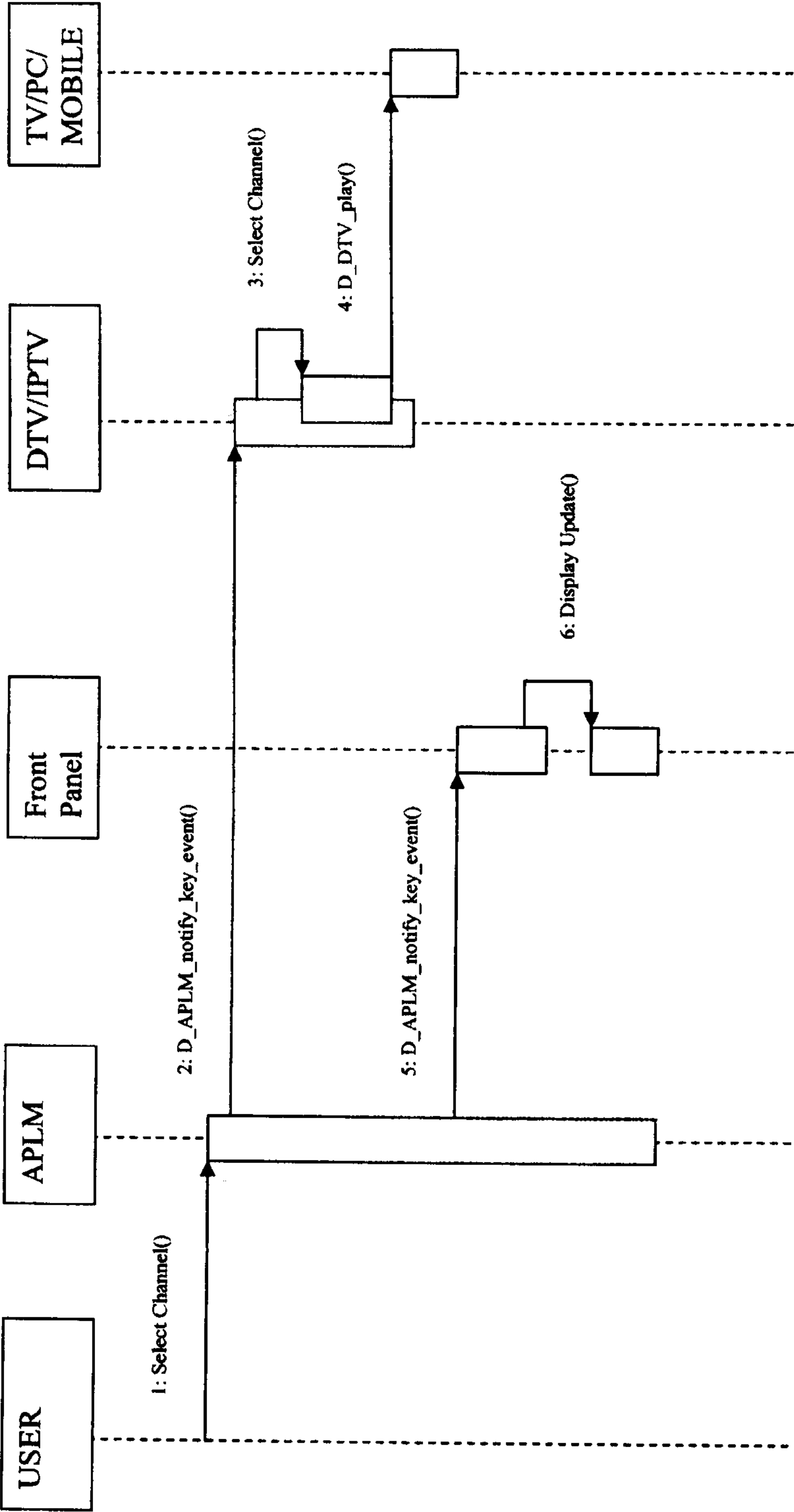


FIG. 2

