



(11) **EP 2 965 477 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
14.08.2019 Bulletin 2019/33

(21) Application number: **14760640.4**

(22) Date of filing: **07.03.2014**

(51) Int Cl.:
H04L 12/813 (2013.01)

(86) International application number:
PCT/KR2014/001904

(87) International publication number:
WO 2014/137191 (12.09.2014 Gazette 2014/37)

(54) **METHOD AND APPARATUS FOR CONTROLLING TRAFFIC IN WIRELESS COMMUNICATION SYSTEM**

VERFAHREN UND VORRICHTUNG ZUR STEUERUNG VON DATENVERKEHR IN DRAHTLOSKOMMUNIKATIONSSYSTEM

PROCÉDÉ ET APPAREIL POUR COMMANDER LE TRAFIC DANS UN SYSTÈME DE COMMUNICATION SANS FIL

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **07.03.2013 KR 20130024306**

(43) Date of publication of application:
13.01.2016 Bulletin 2016/02

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Description

[Technical Field]

5 **[0001]** The present disclosure relates generally to a method and apparatus for controlling traffic in a wireless communication system, and more particularly, to a method and apparatus for efficiently scheduling video packets.

[Background Art]

10 **[0002]** An Evolved Packet Core (EPC) has been defined as an Internet Protocol (IP)-based core network in 3rd Generation Partnership Project (3GPP) Release 8. In the EPC, Traffic Detection Function (TDF) or Policy and Charging Enforcement Function with Application Detection Control (PCEF with ADC) have been standardized, which is equipment for controlling the subscriber policy for each application individually. The TDF or a Packet Data Network (PDN) Gateway (P-GW) (or PCEF with ADC) may detect application traffic, and transmit the detected traffic information to a policy server or Policy Control and Charging Rules Function (PCRF), and the PCRF may provide the subscriber policy for the detected traffic to the TDF or the P-GW, allowing the TDF or the P-GW to perform a traffic control function (e.g., gating, shaping, redirection, and the like) for the traffic detected for each application.

15 **[0003]** However, since specific ways to perform Hyper Text Transfer Protocol (HTTP) detection is not defined in the conventional EPC standard, the operator needs to depend on implementation of the TDF equipment in order to create rules for an HTTP-based protocol which is not supported by the conventional TDF. At present, most of the traffic is transmitted through the default bearer, and even though a Radio Access Network (RAN) intends to apply the differentiated scheduling scheme for transmission of video traffic, the RAN may not divide IP flows which are transmitted through the same bearer, and may need a signaling procedure for creating a separate bearer in order to apply the differentiated scheduling scheme for IP flows. In addition, in the structure where TDF and P-GW are separated, an index for separate RAN scheduling or additional scheduling information may not be transmitted to the RAN, for an IP flow separated through an application detection function. A way to use Differentiated Service Code Point (DSCP) has been discussed to solve this problem, but the use of DSCP may decrease the number of bits that can be processed, and make it impossible to transmit additional parameters.

20 **[0004]** In WO2011/109821 A2, policy rules in the form of filtering rules are installed in a gateway before the RAN such that the gateway can filter e.g. Youtube packets and allows certain Quality of Service to take place for those filtered packets.

25 **[0005]** The above information is presented as background information only to assist with an understanding of the present disclosure. No determination has been made, and no assertion is made, as to whether any of the above might be applicable as prior art with regard to the present disclosure.

30 [Summary of Invention]

[Technical Solution]

35 **[0006]** To address the above-discussed deficiencies, it is a primary object of the invention to provide a method for identifying and controlling traffic per claim 1 and a corresponding gateway apparatus per claim 5. Dependent claims further define the invention.

40 **[0007]** Other aspects, advantages, and salient features of the disclosure will become apparent to those skilled in the art from the following detailed description, which, taken in conjunction with the annexed drawings, discloses example embodiments of the disclosure.

45 **[0008]** Before undertaking the DETAILED DESCRIPTION below, it may be advantageous to set forth definitions of certain words and phrases used throughout this patent document: the terms "include" and "comprise," as well as derivatives thereof, mean inclusion without limitation; the term "or," is inclusive, meaning and/or; the phrases "associated with" and "associated therewith," as well as derivatives thereof, may mean to include, be included within, interconnect with, contain, be contained within, connect to or with, couple to or with, be communicable with, cooperate with, interleave, juxtapose, be proximate to, be bound to or with, have, have a property of, or the like; and the term "controller" means any device, system or part thereof that controls at least one operation, such a device may be implemented in hardware, firmware or software, or some combination of at least two of the same. It should be noted that the functionality associated with any particular controller may be centralized or distributed, whether locally or remotely. Definitions for certain words and phrases are provided throughout this patent document, those of ordinary skill in the art should understand that in many, if not most instances, such definitions apply to prior, as well as future uses of such defined words and phrases.

[Description of Drawings]

[0009] For a more complete understanding of the present disclosure and its advantages, reference is now made to the following description taken in conjunction with the accompanying drawings, in which like reference numerals represent like parts:

FIG. 1 illustrates a configuration of a wireless communication system performing scheduling according to an embodiment of the present disclosure;

FIG. 2 illustrates a process of installing an HTTP packet filter according to an embodiment of the present disclosure;

FIG. 3 illustrates a process of extracting and transmitting HTTP packet filtering and RAN scheduling parameters according to an embodiment of the present disclosure;

FIG. 4 illustrates a scheduling policy index and its parameters according to an embodiment of the present disclosure;

FIG. 5 illustrates a process of extracting and transmitting HTTP packet filtering and RAN scheduling parameters according to another embodiment of the present disclosure;

FIG. 6 illustrates a video traffic session release (or teardown) process according to an embodiment of the present disclosure;

FIG. 7 illustrates a configuration of a wireless communication system performing scheduling according to another embodiment of the present disclosure;

FIG. 8 illustrates a TDF-GTP session creation process during IP-CAN session creation according to an embodiment of the present disclosure; and

FIG. 9 illustrates a TDF-GTP session creation process during application detection according to an embodiment of the present disclosure.

[0010] Throughout the drawings, like reference numerals will be understood to refer to like parts, components, and structures.

[Mode for Invention]

[0011] FIGURES 1 through 9, discussed below, and the various embodiments used to describe the principles of the present disclosure in this patent document are by way of illustration only and should not be construed in any way to limit the scope of the disclosure. Those skilled in the art will understand that the principles of the present disclosure may be implemented in any suitably arranged system and method. The following description with reference to the accompanying drawings is provided to assist in a comprehensive understanding of example embodiments of the disclosure as defined by the claims and their equivalents. It includes various specific details to assist in that understanding but these are to be regarded as merely examples. Accordingly, those of ordinary skill in the art will recognize that various changes and modifications of the embodiments described herein can be made without departing from the scope of the disclosure. In addition, descriptions of well-known functions and constructions may be omitted for clarity and conciseness.

[0012] The terms and words used in the following description and claims are not limited to the bibliographical meanings, but, are merely used by the inventor to enable a clear and consistent understanding of the disclosure. Accordingly, it should be apparent to those skilled in the art that the following description of example embodiments of the present disclosure is provided for illustration purpose only and not for the purpose of limiting the disclosure as defined by the appended claims and their equivalents.

[0013] It is to be understood that the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to "a component surface" includes reference to one or more of such surfaces.

[0014] By the term "substantially" it is meant that the recited characteristic, parameter, or value need not be achieved exactly, but that deviations or variations, including for example, tolerances, measurement error, measurement accuracy limitations and other factors known to those of skill in the art, may occur in amounts that do not preclude the effect the characteristic was intended to provide.

[0015] The present disclosure may provide a method in which a gateway extracts scheduling profile and parameters for efficiently transmitting video traffic in a Radio Access Network (RAN) by using a Hyper Text Transfer Protocol (HTTP) packet filter and transmitting the extracted parameters to the RAN when servicing video streaming through an HTTP protocol in a wireless communication network.

[0016] FIG. 1 illustrates a configuration of a wireless communication system performing scheduling according to an embodiment of the present disclosure. Although an embodiment of the present disclosure will be described herein below with reference to a 3rd Generation Partnership Project (3GPP) Evolved Packet Core (EPC) by way of example, it should be noted that the scheduling method proposed in the present disclosure is not limited to the 3GPP EPC. Referring to FIG. 1, a User Equipment (UE) 110 may receive video traffic from a content server 150 according to the scheduling by

a RAN 120. The RAN 120 may represent, for example, an evolved Node B (eNB) or a Radio Network Control (RNC). In a 3GPP Policy and Charging Control (PCC) structure, a policy server 140 is the same as a Policy Control and Charging Rules Function (PCRF), and may control policies related to charging. The policy server 140 may establish, in a gateway, an HTTP packet filter and a RAN scheduling policy in a gateway in an Internet Protocol (IP) session creation (or IP-CAN Session Establishment) process for a UE. In a 3GPP structure, a gateway (GW) 130 may be the same as a Packet Data Network (PDN) Gateway (P-GW) having Application Detection Control (ADC) rules or a P-GW including TDF. The GW 130 may be connected to the policy server 140 through a reference point Gx, and may detect a Transmission Control Protocol (TCP) session, create 5-tuple-based packet content, and determine whether headers of an HTTP Request message and an HTTP Response message match with an HTTP packet filter. The GW 130 may set a relevant index by applying the scheduling policy of the RAN 120 to a TCP session coinciding with an installed HTTP packet filter, extract parameters additionally needed in the RAN 120 from HTTP header information, create GPRS Tunneling Protocol (GTP) extension, and transmit the created GTP extension to the RAN 120. The RAN 120 may distinguish between parameters for a general packet and parameters for a video packet by GTP extension, and then perform scheduling appropriate thereto.

[0017] Next, reference will be made to FIG. 2 to describe a process of installing an HTTP packet filter according to an embodiment of the present disclosure. Referring to FIG. 2, the UE 110 may send an IP Connectivity Access Network (IP-CAN) Bearer Request message to the GW 130 in operation 201, and upon receiving the IP-CAN Bearer Request message, the GW 130 may send an IP-CAN Session Establishment message to the policy server 140 in operation 203. The policy server 140 may determine the policy in operation 205, and establish an ADC rule corresponding to subscriber information using an 'Acknowledgement of IP-CAN Session Establishment' message in operation 207. The policy server 140 may install HTTP packet filter (HPF) information together. Upon receiving the 'Acknowledgement of IP-CAN Session Establishment' message, the GW 130 may send an Acknowledgement message to the policy server 140 in operation 209, and send an 'Establishment IP-CAN Bearer Response' message to the UE 110 in operation 211.

[0018] The HTTP packet filter information that the policy server 140 transmits to the GW 130 in operation 207 is defined in Table 1 below.

[Table 1]

AVP name	Description	Example
HTTP Packet Filter	This AVP represents the match condition for the HTTP Request and HTTP Response. The device (for example the PCEF with ADC or TDF) installing this filter, After parsing the HTTP request and response, the device (for example, the PCEF with ADC or PCEF) compares the HTTP request and the HTTP response with the received the HTTP Packet Filter and determines the appropriate action specified with the rule. One example action can map the appropriate bearer and its scheduling parameter index	<pre> http.request.uri =~ /*.youtube.com/ AND http.request.uri.param =~ /*videoplayback*/ http.response.content-type == "video/mp4" http.response.statuscode == "200 OK" </pre>
RAN Scheduling Info	This AVP represents the RAN scheduling policy index and its extracted parameters for example, chunk date size, maximum delay for transmission.	Scheduling Policy Index = 1 (Chunk data size, max delay) = (300kB, 500 ms)

[0019] FIG. 3 illustrates a process of extracting and transmitting HTTP packet filtering and RAN scheduling parameters according to an embodiment of the present disclosure.

[0020] Referring to FIG. 3, a procedure for creating a TCP session for transmission of video packets may be performed through the GW 130 between the UE 110 and the content server 150 in operations 301 to 305. In operation 307, the GW 130 may create a TCP proxy for a newly created TCP session, and register a new entry for the TCP session using 5-tuple information of the TCP session between the UE 110 and the content server 150. Upon receiving an HTTP Request message from the UE 110 in operation 309, the GW 130, in operation 311, may check an installed HTTP packet filter and determine whether the checked HTTP packet filter coincides (or matches) with the received HTTP Request message. If it is determined that the HTTP Request message coincides with the HTTP packet filter and there is an HTTP packet filter item for an HTTP Response, the GW 130 may send an HTTP Request to the content server 150 in operation 313 and receive an HTTP Response from the content server 150 in operation 315. Thereafter, in operation 317, the GW 130 may determine whether the HTTP Response message coincides with the HTTP packet filter. If both of the HTTP Request message and the HTTP Response message coincide with the HTTP packet filter, and an ADC rule is formed to make a report to the policy server 140, the GW 130 may report the detected TDF information to the policy sever 140 in operation 319, and then receive an ACK message from the policy server 140 in operation 321.

[0021] If it is determined in operation 311 that the HTTP Request message does not coincide with the HTTP packet filter, the GW 130 may proceed to operation 319 without performing operations 313 to 317. If it is determined in operation 317 that the HTTP Response message does not coincide with the HTTP packet filter, the GW 130 may transmit HTTP Response packets to the UE 110 without performing the subsequent operations.

[0022] In operation 323, the GW 130 may extract parameters needed for scheduling by analyzing the HTTP Response and content. The parameters needed for scheduling may include, for example, video chunk size, duration, required network bandwidth, deadline and the like. After extracting the parameters needed for scheduling, the GW 130 may transmit the extracted parameters to the RAN 120 using a GTP extension header in operation 325, and the RAN 120 may schedule video packets depending on the received scheduling parameters and transmit the scheduled video packets to the UE 110. In the case of the 3GPP EPC structure, a P-GW may transmit the scheduling parameters to a Severing Gateway (S-GW).

[0023] FIG. 4 illustrates a scheduling policy index 401 and its parameters according to an embodiment of the present disclosure. In FIG. 4, the extracted scheduling parameters may be recorded in 'Next Extension Header' 412.

[0024] The GW 130 may transmit HTTP Response packets to the UE 110 in operation 327, and receive TCP fragments from the content server 150 in operation 329.

[0025] FIG. 5 illustrates a process of extracting and transmitting HTTP packet filtering and RAN scheduling parameters according to another embodiment of the present disclosure.

[0026] Referring to FIG. 5, if a TCP session is newly created between the UE 110 and the content server 150 in operation 501, the GW 130 may newly create a TCP Proxy entry in operation 503. Upon receiving an HTTP Request from the UE 110 in operation 505, the GW 130 may determine in operations 507 to 513 whether the HTTP Request and the HTTP Response coincide with the HTTP packet filter, like in FIG. 3. Thereafter, the GW 130 may determine in operation 515 whether the HTTP Request sent by the UE 110 is a request for the next chunk of the same content as the previously requested content, based on the HTTP Request/Response and registered session information. If the HTTP Request is a request for the same content, the GW 130 may determine in operation 517 whether the scheduling and related parameters are the same as those for the existing session. If it is determined that the scheduling and related parameters are the same as those for the existing session, the GW 130 may transmit the previously used scheduling parameters to a RAN (not shown) without extracting the scheduling parameters, and send an HTTP Response to the UE 110, in operations 519 and 521. If the HTTP Request sent by the UE 110 is a request for content different from the previously requested content, the GW 130 may operate according to operations 319 to 329 in FIG. 3 in the future.

[0027] FIG. 6 illustrates a video traffic session release (or teardown) process according to an embodiment of the present disclosure.

[0028] Referring to FIG. 6, if the UE 110 closes a TCP session to the content server 150 through the GW 130 in operation 601, the GW 130 may delete TCP Proxy Entry in operation 603, and provide information about stop of the detected application session to the policy server 140 in operation 605. The GW 130 may report, to the policy server 140, the information (e.g., time, scheduling policy index, applied packet count and the like) about scheduling which has been performed on the session.

[0029] FIG. 7 illustrates a configuration of a wireless communication system performing scheduling according to another embodiment of the present disclosure.

[0030] Referring to FIG. 7, a TDF 760 may be implemented as a standalone, e.g., an equipment separate from a GW 730, and connected to a policy server 740 through a reference point Sd. In this structure, the TDF 760 may receive an HTTP packet filter from the policy server 740, and determine whether Request/Response for an HTTP session coincident with the HTTP packet filter, and if there are scheduling parameters associated therewith, the TDF 760 may transmit the scheduling parameters to a RAN 720 through the GW 730. To this end, the TDF 760 may create a TDF GTP session to the GW 730. The GTP session may be created during IP-CAN session creation or during application detection. The TDF 760 may transmit traffic for the detected session through the created TDF GTP session.

[0031] FIG. 8 illustrates a TDF-GTP session creation process during IP-CAN session creation according to an embodiment of the present disclosure.

[0032] Referring to FIG. 8, the UE 710 may perform IP-CAN Session Establishment through the GW 730 in operations 801 and 803. The GW 730 may transmit information indicating availability of TDF GTP binding to the policy server 740. The policy server 740 may determine a policy and select a TDF in operation 805, and send a TDF Session Establishment message to the selected TDF 760 in operation 807. The policy server 740 may transmit an address of the GW 730 together with the TDF Session Establishment message. In operation 809, the TDF 760 may send a Create TDF GTP Session Request to the GW 730, for the created IP-CAN session, thereby creating a TDF GTP session. The TDF 760 may transmit a Tunnel End-point Identifier (TEID) together with the Create TDF GTP Session Request. After successfully creating the TDF GTP session, the GW 730 may and transmit the TEID carried on a response message to the TDF 760 in operation 811. In this manner, a TDF GTP session is completely created between the GW 730 and the TDF 760. The TDF 760 may inform the policy server 740 of the completed creation of the TDF GTP session in operation 813, and the policy server 740 may inform the GW 730 of the completed creation of the IP-CAN session in operation 815 and receive

an ACK message in operation 817. The GW 730 may send an IP-CAN Bearer Response message to the UE 710 in operation 819.

[0033] If the IP-CAN session is successfully created, the TDF 760 may detect the creation of a session between the UE 710 and a content server 750, and upon receiving a packet coinciding with the scheduling policy associated with this session, the TDF 760 may transmit the packet to the GW 730 through the created TDF GTP session. The GW 730 may receive GTP supplement information received from the TDF 760, and additional scheduling parameters, and transmit them to a RAN (not shown).

[0034] FIG. 9 illustrates a TDF-GTP session creation process during application detection according to an embodiment of the present disclosure.

[0035] Referring to FIG. 9, if the TDF 760 performs application detection in operation 901 after an IP-CAN session is created among the UE 710, the TDF 760 and the content server 750, the TDF 760 may request creation of a TDF GTP session from the GW 730 in operation 903, and receive a response thereto in operation 905, thereby creating the TDF GTP session. Thereafter, the TDF 760 may map the detected traffic to its relevant GTP session and transmit the traffic to the GW 730, and the GW 730 may transmit information related to the RAN (not shown) through a GTP header based on the received GTP information.

[0036] Although the internal structure of the gateway has not been described in detail in this specification, the gateway may include a transceiver for transmitting and receiving signals, and a controller for performing actual operations of the gateway.

[0037] As is apparent from the foregoing description, according to an embodiment of the present disclosure, a scalable HTTP packet filter may be installed in the gateway by generalizing the HTTP packet filter. In addition, according to an embodiment of the present disclosure, the gateway may detect an HTTP packet stream carrying video traffic, extract a RAN scheduling method and scheduling parameters suitable to the detected HTTP packet stream, and transmit the extracted parameters to the RAN, such that scheduling suitable for video is possible in a RAN. Further, even if the gateway and the TDF are implemented as separate equipments, the TDF may transmit scheduling parameters for detected video traffic to the RAN via the gateway.

[0038] Although the present disclosure has been described with an example embodiment, various changes and modifications may be suggested to one skilled in the art. It is intended that the present disclosure encompass such changes and modifications as fall within the scope of the appended claims.

Claims

1. A method for identifying and controlling traffic in a wireless communication system, the method comprising:

receiving (207), by a gateway (130), a rule corresponding to a policy and packet filter information; wherein said packet filter information includes match conditions for an HTTP request and an HTTP response, a RAN scheduling policy index, and scheduling parameters; from a policy server in response to receiving (201) an internet protocol, IP, session establishment request from a user equipment, UE; installing (207), by the gateway, a packet filter based on the packet filter information; and after a transmission control protocol, TCP, session is established between the UE and a content server, identifying, by the gateway, traffic using the packet filter and transmitting the identified traffic to a radio access network, RAN, to schedule packet in response to receiving a hyper text transfer protocol, HTTP, request from the UE, wherein the transmitting the identified traffic to the RAN comprises:

comparing (311) the HTTP request received from the UE with the packet filter and forwarding (313) the HTTP request to the content server; receiving (315) an HTTP response from the content server, and comparing the received HTTP response with the packet filter; identifying (317), if the HTTP request and the HTTP response match with the packet filter, a video packet from the HTTP response; transmitting the identified video packet to the RAN; extracting (323) scheduling policy and scheduling parameters for scheduling video packets from HTTP header information; and transmitting (325) the extracted scheduling policy and scheduling parameters to the RAN.

2. The method of claim 1, wherein the extracted scheduling policy and scheduling parameters are transmitted to the

RAN via a general packet radio service tunneling protocol, GTP, extension header.

3. The method of claim 1, wherein the extracting of the scheduling parameters further comprises transmitting traffic detection function, TDF, information to the policy server.

4. The method of claim 1, further comprising creating a tunnel for transmitting the identified traffic between the gateway and a traffic detection function, TDF, for detecting traffic, if the TDF is provided separately from the gateway.

5. A gateway apparatus (130) for identifying and controlling traffic in a wireless communication system, the gateway apparatus comprising:

a transceiver configured to receive a rule corresponding to a policy and packet filter information; wherein said packet filter information includes match conditions for an HTTP request and an HTTP response, a RAN scheduling policy index, and scheduling parameters; from a policy server in response to receiving an internet protocol, IP, session establishment request from a user equipment, UE; and a controller configured to install a packet filter based on the packet filter information, and identify traffic using the packet filter in response to receiving a hyper text transfer protocol, HTTP, request from the UE after a transmission control protocol, TCP, session is established between the UE and a content server, wherein the controller is configured to; compare the HTTP request received from the UE with the packet filter and forward the HTTP request to the content server; compare an HTTP response received from the content server with the packet filter; if the HTTP request and the HTTP response match with the packet filter, extract, from the HTTP response, a video packet, scheduling policy and scheduling parameters for scheduling video packets from HTTP header information, and control the transceiver to transmit the video packet, the extracted scheduling policy and scheduling parameters to the RAN.

6. The gateway apparatus of claim 5, wherein the controller is configured to transmit the extracted scheduling policy and scheduling parameters to the RAN through a general packet radio service, GPRS, tunneling protocol, GTP, extension header.

7. The gateway apparatus of claim 5, wherein the controller is configured to control the transceiver to transmit traffic detection function, TDF, information to the policy server.

8. The gateway apparatus of claim 5, wherein the controller is configured to create a tunnel for transmitting the identified traffic between the gateway and a traffic detection function, TDF, for detecting traffic, if the TDF is provided separately from the gateway.

Patentansprüche

1. Verfahren zum Identifizieren und Steuern des Verkehrs in einem drahtlosen Kommunikationssystem, wobei das Verfahren Folgendes umfasst:

Empfangen (207), durch ein Gateway (130), einer Regel entsprechend einer Richtlinien- und Paketfilter-Information; wobei genannte Paketfilter-Informationen Übereinstimmungsbedingungen für eine HTTP-Anfrage und eine HTTP-Antwort, einen RAN-Planungsrichtlinienindex und Planungsparameter umfassen; von einem Richtlinienserver, als Antwort auf den Empfang (201) eines Internetprotokolls (IP)- Sitzungserrichtungswunsch, von einem Benutzergerät, UE; Installieren (207), durch das Gateway eines Paketfilters basierend auf den Paketfilterinformationen; und nachdem eine Übertragungssteuerungsprotokoll (TCP)-Sitzung zwischen dem UE und einem Inhaltsserver eingerichtet wurde, Identifizieren des Verkehrs durch das Gateway unter Verwendung des Paketfilters und Übertragung des identifizierten Verkehrs an ein Funkzugangnetz, RAN, um ein Paket als Antwort auf den Empfang einer Hypertext-Übertragungsprotokoll (HTTP)-Anfrage von dem UE zu planen, wobei die Übertragung des identifizierten Verkehrs an das RAN Folgendes umfasst:

Vergleichen (311) der von dem UE empfangenen HTTP-Anfrage mit dem Paketfilter und Weiterleiten (313)

- der HTTP-Anfrage an den Inhaltsserver;
 Empfangen (315) einer HTTP-Antwort von dem Inhaltsserver und Vergleichen der empfangenen HTTP
 -Antwort mit dem Paketfilter;
 wenn die HTTP-Anfrage und die HTTP-Antwort mit dem Paketfilter übereinstimmen, Identifizierung (317)
 eines Videopakets von der HTTP-Antwort; Übertragen des identifizierten Videopakets an das RAN;
 Extrahieren (323) der Planungsrichtlinien und Planungsparameter zur Planung von Videopaketen aus
 HTTP-Headerinformationen; und
 Übertragen (325) der extrahierten Planungsrichtlinien und Planungsparameter an das RAN.
- 10 2. Verfahren nach Anspruch 1, wobei die extrahierten Planungsrichtlinien und Planungsparameter mittels eines GTP
 (General Packet Radio Service Tunneling Protocol)-Erweiterungsheaders an das RAN übertragen werden.
- 15 3. Verfahren nach Anspruch 1, wobei das Extrahieren der Planungsparameter des Weiteren die Übertragung der
 Verkehrserkennungsfunktion (TDF)-Informationen an den Richtlinienserver umfasst.
4. Verfahren nach Anspruch 1, das des Weiteren die Erzeugung eines Tunnels für die Übertragung des identifizierten
 Verkehrs zwischen dem Gateway und einer Verkehrserkennungsfunktion, TDF, erfasst, zum Erkennen von Verkehr,
 wenn die TDF separat von dem Gateway vorgesehen ist.
- 20 5. Gateway-Vorrichtung (130) zum Identifizieren und Steuern von Verkehr in einem drahtlosen Kommunikationssystem,
 wobei die Gateway-Vorrichtung Folgendes umfasst:
- einen Transceiver, der zum Empfang einer Regel entsprechend einer Richtlinien- und Paketfilter-Information
 konfiguriert ist; wobei die genannten Paketfilter-Informationen Übereinstimmungsbedingungen für eine HTTP-
 Anfrage und eine HTTP-Antwort, einen RAN-Planungsrichtlinienindex und Planungsparameter umfassen; von
 einem Richtlinienserver, als Antwort auf den Empfang eines Internetprotokolls (IP)- Sitzungserrichtungswunsch,
 von einem Benutzergerät, UE; und
 eine Steuerung, die konfiguriert ist, um einen Paketfilter basierend auf den Paketfilterinformationen zu instal-
 lieren, und Identifizieren des Verkehrs unter Verwendung des Paketfilters als Antwort auf den Empfang einer
 Hypertext-Übertragungsprotokoll (HTTP)-Anfrage von dem UE, nachdem die Übertragungssteuerungssteue-
 rungsprotokoll (TCP)-Sitzung zwischen dem UE und einem Inhaltsserver eingerichtet wird,
 wobei die Steuerung für Folgendes konfiguriert ist;
 Vergleichen der von dem UE empfangenen HTTP-Anfrage mit dem Paketfilter und Weiterleiten der HTTP-
 Anfrage an den Inhaltsserver;
 Vergleichen einer von dem Inhaltsserver empfangenen HTTP -Antwort mit dem Paketfilter;
 wenn die HTTP-Anfrage und die HTTP-Antwort mit dem Paketfilter übereinstimmen, Extrahieren eines Video-
 pakets aus der HTTP-Antwort, Planungsrichtlinien und Planungsparameter zur Planung von Videopaketen aus
 den HTTP-Headerinformationen, und Steuern des Transceivers zur Übertragung des Videopakets,
 der extrahierten Planungsrichtlinien und Planungsparameter an das RAN.
- 40 6. Gateway-Vorrichtung nach Anspruch 5, wobei die Steuerung konfiguriert ist, um die extrahierten Planungsrichtlinien
 und Planungsparameter durch einen GPRS (General Packet Radio Service)-GTP(Tunneling Protocol)-Erweite-
 rungsheader an das RAN zu übertragen.
- 45 7. Gateway-Vorrichtung nach Anspruch 5, wobei die Steuerung konfiguriert ist, um den Transceiver zu steuern, um
 Verkehrserkennungsfunktion (TDF)-Informationen an den Richtlinienserver zu übertragen.
8. Gateway-Vorrichtung nach Anspruch 5, wobei die Steuerung konfiguriert ist, um einen Tunnel zur Übertragung des
 identifizierten Verkehrs zwischen dem Gateway und einer Verkehrserkennungsfunktion, TDF, zu erzeugen, zum
 Erkennen von Verkehr, wenn die TDF separat von dem Gateway vorgesehen ist.
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Revendications

- 55 1. Procédé d'identification et de contrôle du trafic dans un système de communication sans fil, le procédé comprenant :
- recevoir (207), par une passerelle (130), une règle correspondant à une politique et à des informations de
 filtrage de paquets ; où lesdites informations de filtrage de paquets comprennent des conditions de correspon-

dance pour une demande HTTP et une réponse HTTP, un indice de politique de programmation RAN, et des paramètres de programmation ; à partir d'un serveur de politique en réponse à la réception (201) d'une demande d'établissement de session de protocole d'Internet, IP, provenant d'un équipement d'utilisateur, UE ; installer (207), par la passerelle, un filtre de paquets sur la base des informations de filtrage de paquets ; et après qu'une session de protocole de contrôle de transmission, TCP, est établie entre l'UE et un serveur de contenu, identifier, par la passerelle, le trafic utilisant le filtre de paquets et transmettre le trafic identifié à un réseau d'accès radio, RAN, pour programmer un paquet en réponse à la réception d'une demande de protocole de transfert hypertexte, HTTP, provenant de l'UE, où la transmission du trafic identifié vers le RAN comprend :

comparer (311) la demande HTTP reçue de l'UE avec le filtre de paquets et transférer (313) la demande HTTP au serveur de contenu ; recevoir (315) une réponse HTTP du serveur de contenu et comparer la réponse HTTP reçue au filtre de paquets ; identifier (317), si la demande HTTP et la réponse HTTP correspondent au filtre de paquets, un paquet vidéo à partir de la réponse HTTP ; transmettre le paquet vidéo identifié au RAN ; extraire (323) une politique de programmation et des paramètres de programmation afin de programmer des paquets vidéo à partir d'informations d'en-tête HTTP; et transmettre (325) la politique de programmation et les paramètres de programmation extraits au RAN.

2. Procédé selon la revendication 1, où la politique de programmation et les paramètres de programmation extraits sont transmis au RAN via un en-tête d'extension de protocole de tunnelisation de service général de paquets radio, GTP.

3. Procédé selon la revendication 1, où l'extraction des paramètres de programmation comprend, en outre, transmettre des informations de la fonction de détection de trafic, TDF, au serveur de politique.

4. Procédé selon la revendication 1, comprenant, en outre, créer un tunnel pour transmettre le trafic identifié entre la passerelle et une fonction de détection de trafic, TDF, pour détecter du trafic, si la TDF est fournie séparément de la passerelle.

5. Dispositif de passerelle (130) pour identifier et contrôler le trafic dans un système de communication sans fil, le dispositif de passerelle comprenant :

un émetteur-récepteur configuré pour recevoir une règle correspondant à une politique et à des informations de filtrage de paquets ; où lesdites informations de filtrage de paquets comprennent des conditions de correspondance pour une demande HTTP et une réponse HTTP, un indice de politique de programmation RAN, et des paramètres de programmation ; à partir d'un serveur de politique en réponse à la réception d'une demande d'établissement de session de protocole d'internet, IP, provenant d'un équipement d'utilisateur, UE; et un contrôleur configuré pour installer un filtre de paquets sur la base des informations de filtrage de paquets, et identifier le trafic à l'aide du filtre de paquets en réponse à la réception d'une demande de protocole de transfert hypertexte, HTTP, provenant de l'UE après qu'une session de protocole de contrôle de transmission, TCP, est établie entre l'UE et un serveur de contenu, où le contrôleur est configuré pour :

comparer la demande HTTP reçue de l'UE au filtre de paquets et transférer la demande HTTP au serveur de contenu; comparer une réponse HTTP reçue du serveur de contenu au le filtre de paquets ; si la demande HTTP et la réponse HTTP correspondent au filtre de paquets, extraire de la réponse HTTP un paquet vidéo, une politique de programmation et des paramètres de programmation afin de programmer des paquets vidéo à partir des informations d'en-tête HTTP, et contrôler l'émetteur-récepteur pour transmettre le paquet vidéo, la politique de programmation et les paramètres de programmation extraits vers le RAN.

6. Dispositif de passerelle selon la revendication 5, où le contrôleur est configuré pour transmettre, au RAN, la politique de programmation et les paramètres de programmation extraits par l'intermédiaire d'un en-tête d'extension de protocole de tunnelisation de service général de paquets radio, GPRS, GTP.

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7. Dispositif de passerelle selon la revendication 5, où le contrôleur est configuré pour contrôler l'émetteur-récepteur afin de transmettre des informations de la fonction de détection de trafic, TDF, au serveur de politique.
8. Dispositif de passerelle selon la revendication 5, où le contrôleur est configuré pour créer un tunnel afin de transmettre le trafic identifié entre la passerelle et une fonction de détection de trafic, TDF, pour détecter du trafic, si la TDF est fournie séparément de la passerelle.

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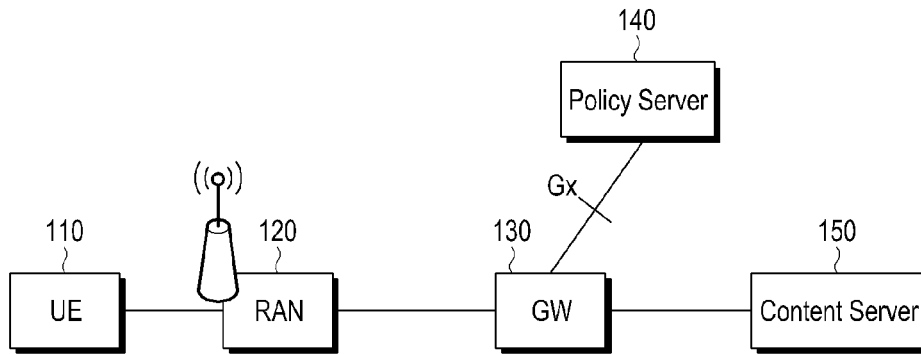
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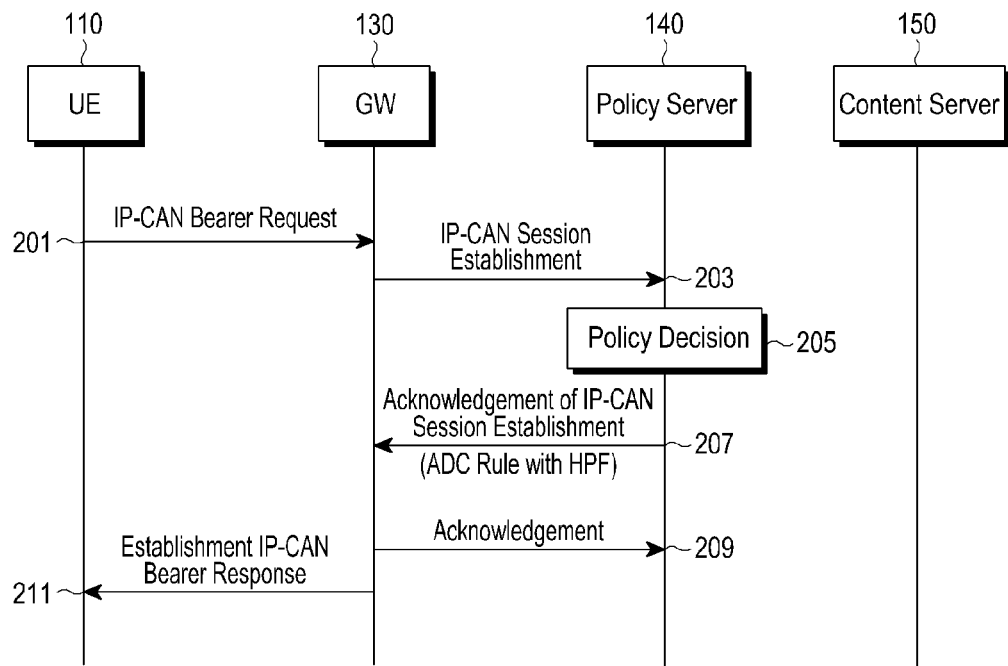
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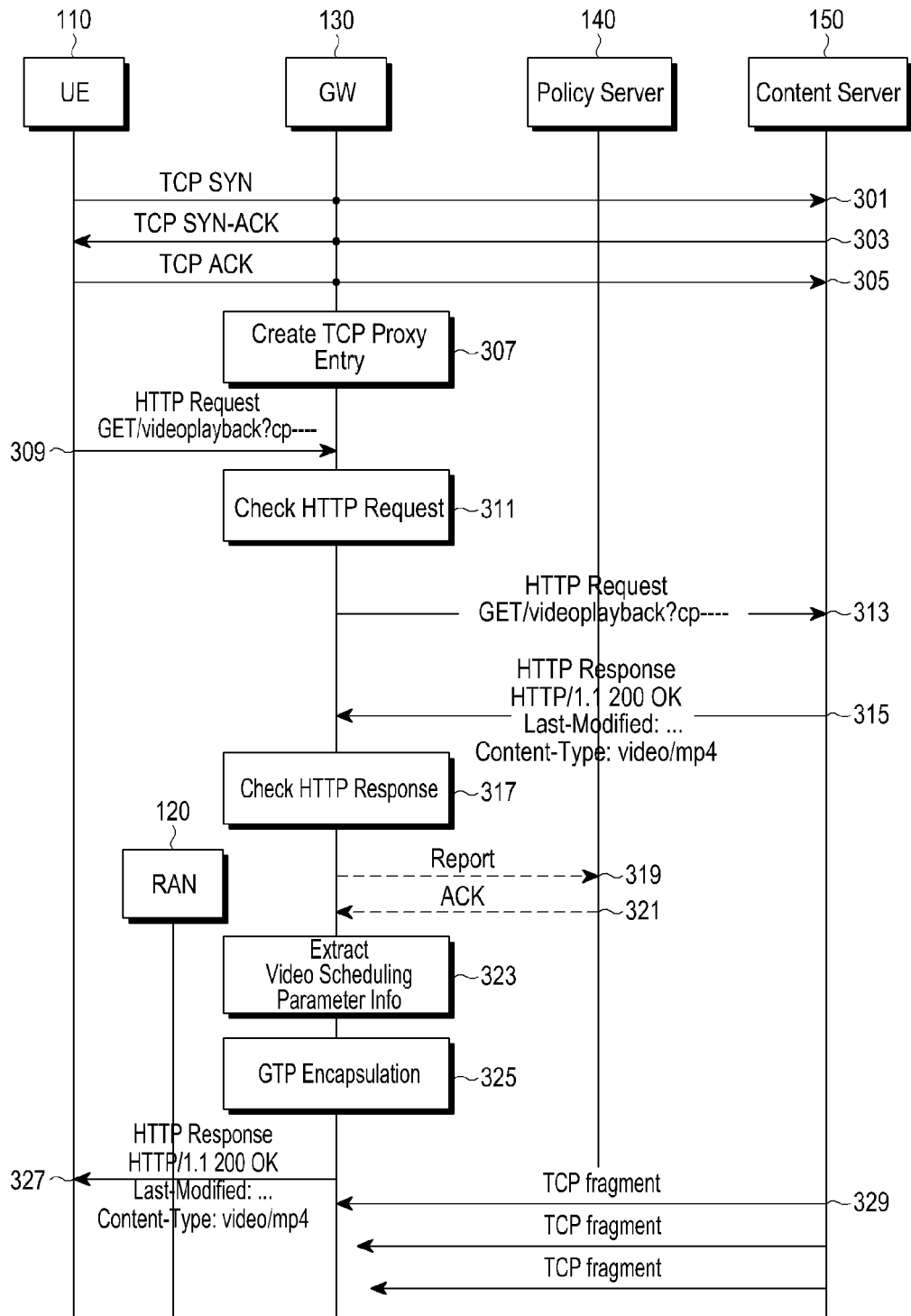
[Fig. 1]



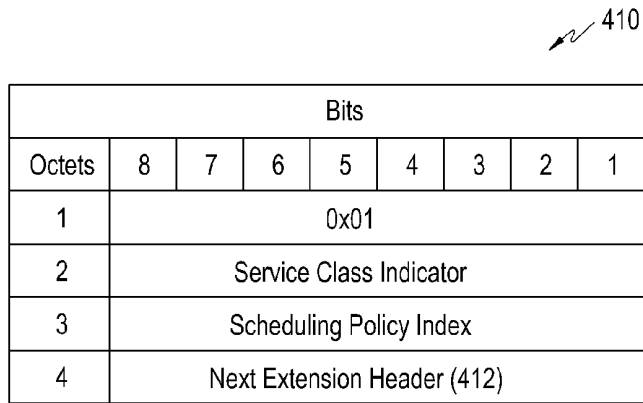
[Fig. 2]



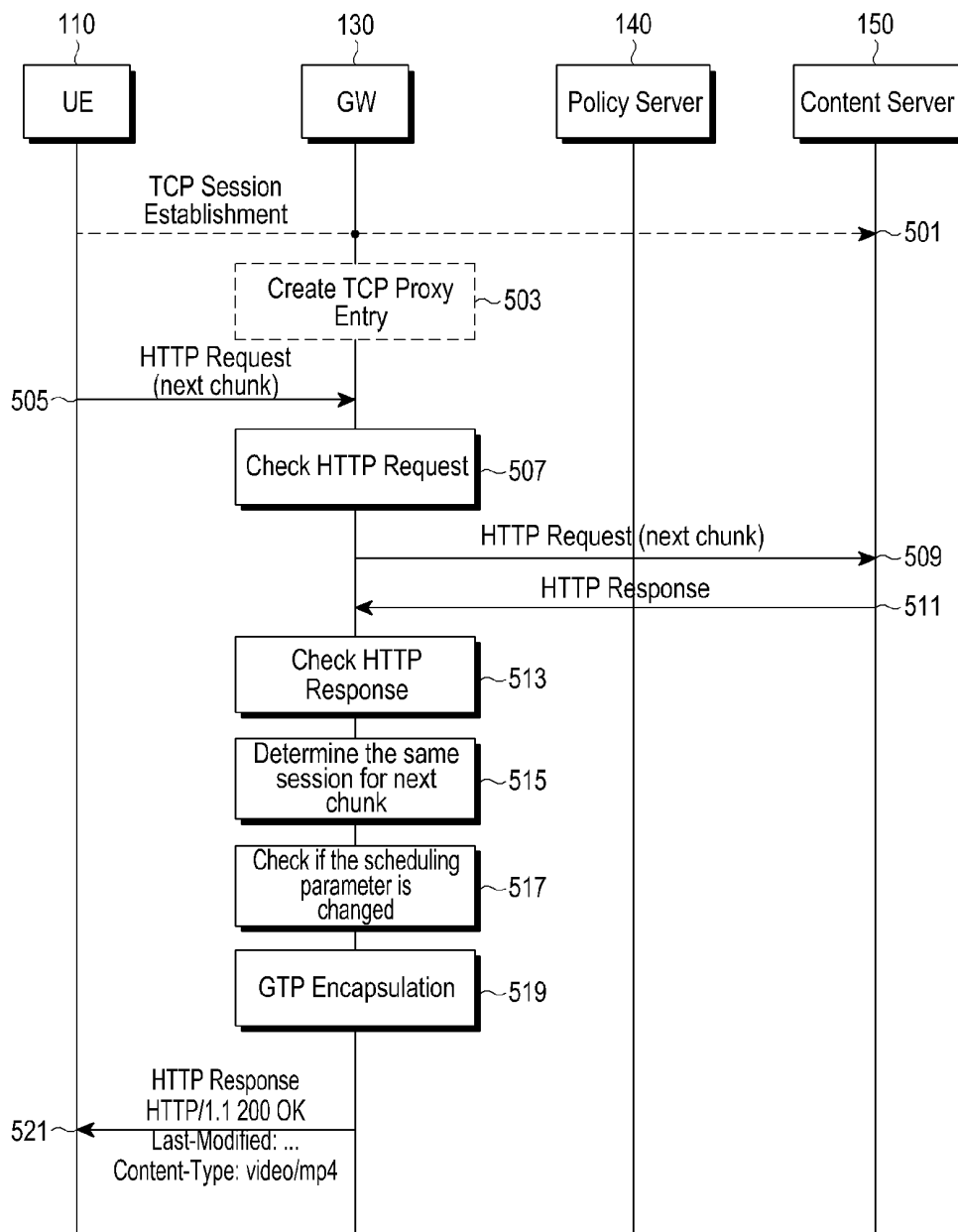
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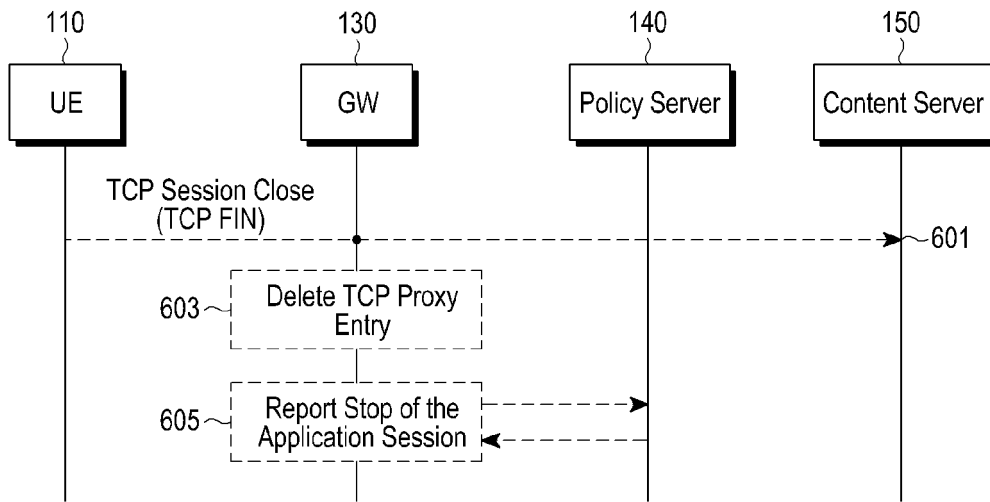
[Fig. 4]



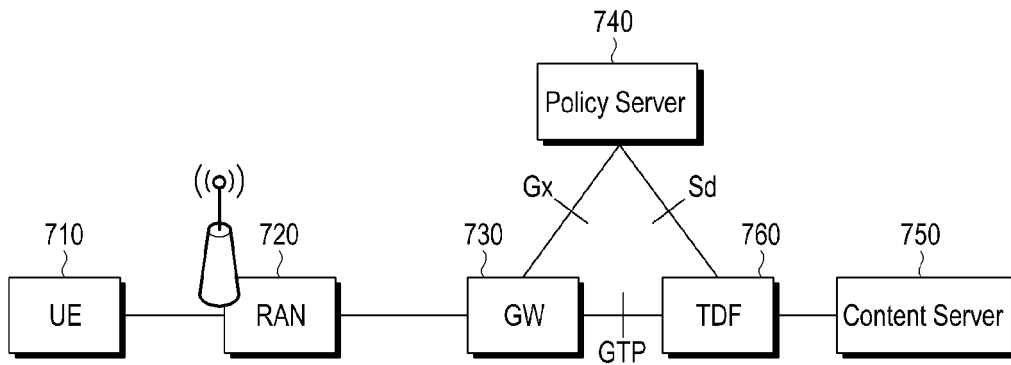
[Fig. 5]



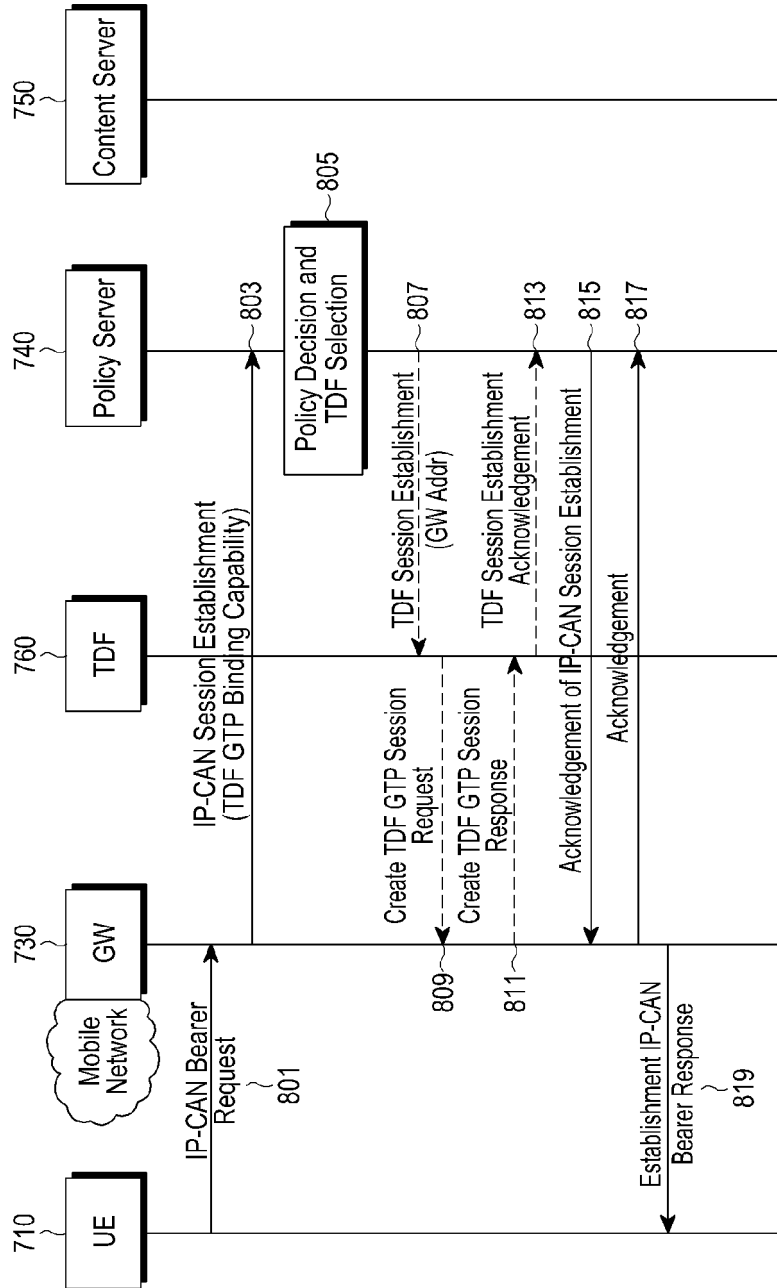
[Fig. 6]



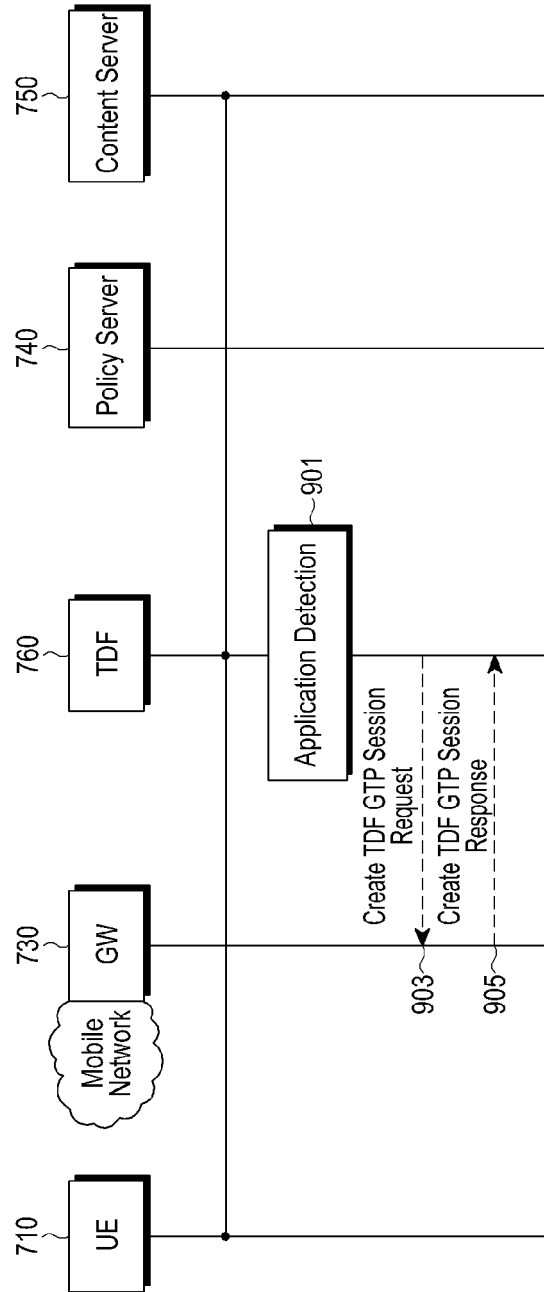
[Fig. 7]



[Fig. 8]



[Fig. 9]



REFERENCES CITED IN THE DESCRIPTION

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