

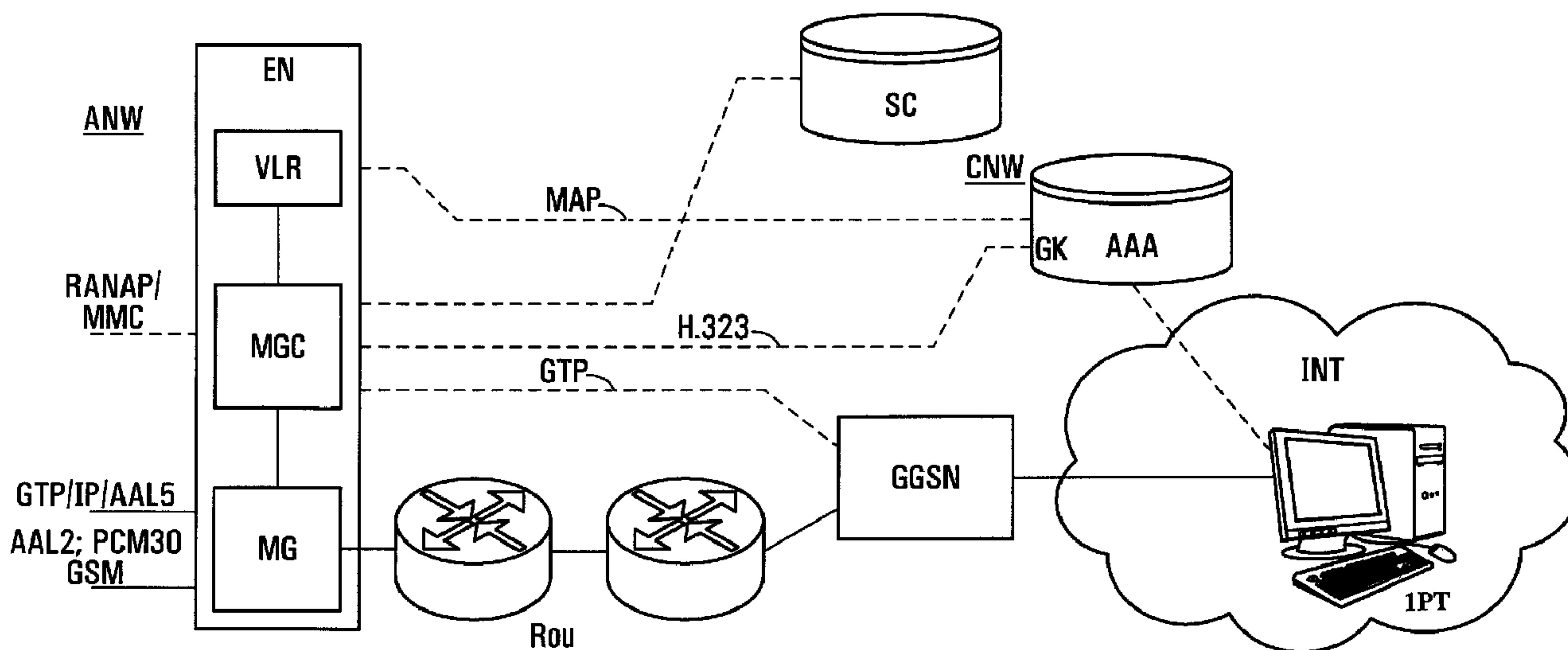


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(54) Titre : METHODE ET SYSTEME DE COMMUNICATIONS PERMETTANT DE TRAITER UN SERVICE DE TRANSMISSION PAR PAQUETS

(54) Title: METHOD AND COMMUNICATIONS SYSTEM FOR HANDLING A PACKET SERVICE



(57) Abrégé/Abstract:

The invention relates to a method and a communications system for handling a packet service with a packet-based core network (CNW) and an access network (ANW). According to the subject-matter of the invention, the control node (EN) which is arranged at an interface between the core network (CNW) and access network (ANW) can control the transmission of multimedia data in the packet data and integrate it into the data transmission from and to the mobile communications device (MS) via the radio interface of the access network. The advantage of the invention is that the control node can actively intervene in the signaling of the transmission of the multimedia data as packet data, i.e. this signaling no longer needs to be carried out transparently with respect to the mobile communications device. A further advantage is that as a result of the integration of the supervision of the multimedia data transmission, the data streams can be better adapted to the radio resources and/or to the requirements of the mobile communications device.

## Abstract

Method and communications system for handling a packet service

The invention relates to a method and a communications system for handling a packet service with a packet-based core network (CNW) and an access network (ANW). According to the subject-matter of the invention, the control node (EN) which is arranged at an interface between the core network (CNW) and access network (ANW) can control the transmission of multimedia data in the packet data and integrate it into the data transmission from and to the mobile communications device (MS) via the radio interface of the access network. The advantage of the invention is that the control node can actively intervene in the signaling of the transmission of the multimedia data as packet data, i.e. this signaling no longer needs to be carried out transparently with respect to the mobile communications device. A further advantage is that as a result of the integration of the supervision of the multimedia data transmission, the data streams can be better adapted to the radio resources and/or to the requirements of the mobile communications device.

Fig. 2

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Method and communications system for handling a packet  
5 service

Field of the Invention

The invention relates to a method and a communications  
10 system for handling a packet service with a packet-  
based core network and an access network.

Background

15 It is generally known to transmit data as packet data  
according to a packet service either only in a line-  
bound communications network or only in a  
communications network with a radio interface to and  
from a communications device. The architecture for the  
20 handling of the packet service is based on the  
assumption that there is an access network with a radio  
interface which controls a mobile communications  
terminal, used by a subscriber, and makes available the  
wire-free transmission of data in both directions of  
25 transmission. Furthermore, an access of the access  
network to a packet-based core network - for example  
the Internet - which at least partially transmits the  
data as packet data and supports a specific packet data  
protocol - for example the Internet protocol - are  
30 necessary.

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A problem when handling packet services according to the above architecture is that the signaling of a packet data transmission passes from the packet-based core network to the mobile communications device, and vice versa, in a transparent fashion. It is not possible to adapt data streams to the available radio resources of the access network and/or to the requirements of the mobile communications device. This has a particularly disadvantageous effect if broadband services with multimedia data are to be operated over the usually scarce, and thus expensive radio resources.

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Summary

The invention is therefore based on the object of disclosing a method and a communications system for handling a packet service by means of which the most efficient use possible of the packet data transmission is also achieved for mobile communications devices.

Therefore, according to one aspect of the present invention, there is provided a method for handling a packet service, the method comprising packet data being transmitted via at least part of a packet-based core network (CNW), the packet data being transmitted in wire-free fashion from and to at least one mobile communications device (MS) via an access network (ANW) with a radio interface, in which the transmission of multimedia data in the packet data being controlled by a control node (EN) arranged as an interface between the core network (CNW) and access network (ANW) and being integrated into the data transmission from and to the mobile communications device (MS) via the radio interface of the access network (ANW), characterized in that the control node (EN) terminates a signaling protocol of the packet-based core network (CNW) and maps it onto a signaling protocol of the access network (ANW) with radio interface.

In another aspect of the present invention, there is provided a communications system for handling a packet service, the system comprising a packet-based core network (CNW) for at least partially transmitting data as packet data, an access network (ANW) with a radio interface for the wire-free transmission of the packet data from and to at least one mobile communications device (MS), the communications system additionally having a control node (EN) which is arranged at an interface between the core network (CNW) and access network (ANW) and has the purpose

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of controlling the transmission of multimedia data in the packet data and of integrating it into the data transmission from and to the mobile communications device (MS) via the radio interface of the access network (ANW), characterized  
5 in that said control node (EN) is further configured to terminate a signaling protocol of the packet-based core network (CNW) and to map it onto a signaling protocol of the access network (ANW) with radio interface.

According to the subject-matter of the invention,  
10 the transmission of multimedia data in the packet data can be controlled by the control node arranged at the interface between the core network and access network, and said data can be integrated into the data transmission from and to the mobile communications device via the radio interface of the  
15 access network. The advantage of the invention is that the control node can actively engage in the signaling of the transmission of the multimedia data as packet data, i.e., this signaling no longer needs to be carried out transparently with respect to the mobile communications  
20 device. A further advantage is that as a result of the integration of the supervision of the multimedia data transmission into the functions of the access network with radio interface, the data streams can be better adapted to the radio resources and/or to the requirements of the mobile  
25 communications device.

According to one development of the invention, the control node checks the contents of the packet data. The knowledge of the type of transmitted packet data - in particular multimedia data - makes it easier for the control  
30 node to control and execute particular services. Thus, handling operations which are specific to individual multimedia data streams can take place, individual toll

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billing operations can be carried out and subscriber-related and/or network-related services can be provided.

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According to another development of the invention, a multimedia access controller detects the presence of multimedia data and assigns corresponding radio resources of the access network for the transmission of the multimedia data via the radio interface.

The multimedia access controller preferably controls a setup and release of carrier channels in accordance with the radio resources necessary for the transmission of the packet data. Thus, the entire bandwidth of the available carrier channels can be used as real-time transmission of bandwidth multimedia data (Internet Protocol Bearer) as packet data, whereas part of the carrier channels is sufficient for the transmission of voice data as packet data.

According to a further refinement of the invention, it has proven favorable that the control node terminates a signaling protocol of the packet-based core network and maps it onto a signaling protocol of the core network with radio interface. In this case it is advantageous if at least part of the signaling protocol of the core network is replaced by the signaling protocol of the core network.

25

#### Brief Description of the Drawings

The invention will be explained in more detail below with reference to an exemplary embodiment illustrated in the drawings, in which:

Fig. 1 shows a block circuit diagram of the basic architecture of the communications system for handling a packet service, and

Fig. 2 shows a signaling and the transfer of the packet data between the devices involved in the handling of the packet service.



Detailed Description

The architecture of a communications system for handling a packet service is clarified with reference to Fig. 1, which shows a mobile communications device MS (for example a mobile station) - which can be used by a subscriber and an access network ANW which controls the mobile station and has a radio interface - operated for example according to one of the known TDMA, CDMA or FDMA access methods or any desired combination of the access methods derived therefrom - as the mobile radio-specific elements of the communications system. The packet-service-specific elements of the communications system, composed of a packet-based core network CNW for transmitting the packet data and a packet data network INT - for example the Internet - with a further communications device IPT - for example an Internet terminal - making available the packet data. As an alternative to the packet data network INT of the communications network - for example the line-switched network ISDN - could also be connected to the corresponding communications device.

A control node EN (edge node) is arranged at the interface between the core network CNW and access network ANW, which control node EN controls the transmission of multimedia data in the packet data and integrates it into the data transmission from and to the mobile communications device MS via the radio interface of the access network ANW. In particular, the control node EN checks the contents of the packet data so that the knowledge of the type of transmitted packet data - in particular when the multimedia data is present in the form of, for example, audio data and/or video data - makes it easier for the control node to control and execute certain services. Thus, handling operations which are specific to individual multimedia data streams can take place, individual toll billing operations can be carried out and subscriber-related and/or network-related services can be provided.

It is possible to use, for example:

- subscriber-related services for the mobile subscriber using the communications device MS when voice is transmitted over the Internet (VoIP, Voice over IP Calls) in the same way as they are also possible for circuit switched voice transmission (circuit switched calls), for example supplementary services such as call divert, intelligent services etc.,
- network-related services such as priorities for network transport, routing, reservation of resources.

The network node EN of the communications network (CNW) which controls the mobile communications device MS and has access to the network ANW advantageously intervenes actively into the signaling for the multimedia data transmission, i.e. this signaling is not passed on transparently with respect to the communications device MS. The network node EN uses this information to control existing or newly introduced network devices - for example a multimedia access device including a transcoding device and a multimedia access controller.

At the end of the network access of the communications network CNW to the communications network INT, ISDN there are one or more access devices GW, for example a switching device, a multimedia access device and a packet data access device which provide interfaces in accordance with the type of external network connected.

The particular advantages of the architecture according to the invention are as follows, the access network ANW with radio interface being equivalent to a mobile radio network:

- integration of the supervision of the packet data, in particular of the multimedia data transmission into functions of the mobile radio network,

- at least partial termination of multimedia protocols in the control node EN and mapping onto mobile radio-specific signaling,
- 5 - replacement and/or conversion of at least parts of the signaling protocol used in the communications network CNW
  - for example of the multimedia standard protocol H.323 - by already existing functions of the mobile
  - 10 radio network - for example the existing signaling protocol - between the mobile communications device MS and the core communications network CNW
  - mobile radio network-specific transfer protocols for
  - 15 signaling and data,
  - error-robust coding of synchronization information for various multimedia data streams,
  - 20 - use of the network architecture to the same extent for handling voice data (VoIP) and for handling packet services, in particular for transmitting multimedia data in the packet data to the mobile communications device.
  - 25 - mapping functions of the mobile radio network onto functions of the packet-based core communications network (CNW), and vice versa.
- 30 The block circuit diagram according to Fig. 2 shows the signaling - in each case represented as interrupted lines - and the transfer of the packet data - in each case represented as continuous lines - between the devices which are involved according to the invention
- 35 in the handling of the packet service. These are:

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- the access network ANW with the radio interface to the mobile communications device (not illustrated). Here, a signaling protocol RANAP

(Radio Access Network Application Part) for the mobile radio-specific functions and a multimedia protocol MMC (Multi Media Control) are supported. The transfer of the packet data takes place by means of various connections which can be, on the one hand, packet based according to GTP (General Packet Radio System Tunnel Protocol) or IP (Internet Protocol) or AAL5 (ATM Adaption Layer No. 5) and on the other hand circuit-switched according to AAL2 (ATM Adaptation Layer No. 2) or according to PCM30 (Pulse code modulation) or according to GSM (Global System for Mobile Communication).

- the control node EN with a subscriber database VLR (Visitor Location Register) for registering and storing the data of mobile subscribers or mobile communications devices in accordance with a mobile radio network, with a multimedia access controller MGC (Media Gateway Controller) for executing the control functions on the signaling path, and with a multimedia access device MG (Media Gateway) for the transfer of the packet data on the connecting path. The multimedia access controller MGC detects the presence of multimedia data in the received packet data and assigns corresponding radio resources of the access network ANW for the transmission of multimedia data via the radio interface. Furthermore, the setting up and release of carrier channels is controlled by it in accordance with the radio resources necessary for transmitting the packet data.

- a service controller SC which is connected to the control node EN in order to control and bring about, as an alternative to the multimedia access controller MGC, the execution of the previously described services given knowledge of the multimedia data streams - which particularly contain broadband data such as audio data and video data.

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- A multimedia access device GK (Gatekeeper) for the packet data signaling and the execution of functions AAA such as authentication, authorization

and billing (accounting). In the present example, this multimedia access device GK permits access from/to the core communications network CNW to/from the Internet INT including the communications device IPT, composed  
5 of an Internet terminal, and in doing so supports the H.323 signaling protocol for multimedia data transmission in pure IP-based Internet protocol networks. Furthermore, the multimedia access device GK can also support the MAP signaling protocol (Mobile  
10 Application Part) which performs and controls mobile radio network-specific functions.

- a packet data access device GGSN (Gateway GPRS Service Node) which permits access from/to the core  
15 communications network CNW to/from the Internet INT including the communications device IPT, composed of an Internet terminal, and in doing so supports the GTP signaling protocol (GPRS Tunnel Protocol) for the transmission of packet data according to the GPRS  
20 service. The packet data transmission takes place via a tunnel, switching over to another tunnel being possible and as a result a new transmission path being produced through the communications network.

25 - one or more routing devices ROU in the form of routers or switching devices for the transfer of the packet data, in particular of the multimedia data, from/to the multimedia access device MG of the network node EN.

30 For outgoing connections, the mobile communications device MS sets up a multimedia connection to the communications device IPT. The information relating to the multimedia data is contained in the signaling MMC  
35 between the communications device MS MS and the control node EN. The entire standard protocol is set up by the control node EN to the communications device IPT.

For multimedia connections to the mobile communications device MS, for example from the Internet INT, the IP address of the mobile communications device MS is determined by means of the corresponding access  
5 function which is associated with the access network ANW, and which is performed by the access device GK (Gatekeeper), for example. Here, a corresponding address of the control node EN which is used for the mobile communications device MS is made available for  
10 the multimedia signaling. The control node EN is thus capable of detecting, modifying, passing on or terminating the multimedia control information.

For transmission between the mobile communications device MS and the control node EN, the signaling  
15 channel which is present for the mobile communications device MS is expanded with the multimedia control information in accordance with the signaling protocol RANAP. In this way, in addition to the control  
20 possibility, a secure transmission and a rapid connection set-up can be achieved.

In order to guarantee the quality of service (QoS), the control node EN can remain as an anchor in the  
25 connection so long as there is a multimedia data stream. If there are no longer any data streams present, if the subscriber using the communications device MS is mobile it is possible to change over to another control node. Only the access device GGSN  
30 remains fixed here.

As a result of the supervision of the multimedia signaling, the multimedia access device MGC can adapt  
35 the setting up and release of carrier channels (bearer services) in an optimum way to the requirements of the multimedia communications devices and to the existing radio resources of the access network ANW. It is possible here to use the entire bandwidth of the



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available carrier channels: real time IP channels via AAL5 but also circuit-switched voice channels via AAL2 if there is only voice data transmission or

passing on of connections (handover) in voice mobile radio networks with a small bandwidth or restriction to voice because of scarcity of resources.

5 For real time IP carrier channels it is possible to use, in addition to the multimedia transcoding in the access device MG, specific narrow protocol stacks which do not transmit specific layers on the radio interface and thus advantageously significantly shorten the  
10 packet header of the packet data.

It is also possible to dispense with an error-prone transmission of synchronization information when there are a plurality of multimedia data streams possible if  
15 said multimedia data streams are synchronized in the access device MG. With respect to the communications device, the synchronous information is added again at the network end, the average transit time fluctuations and transit times of the radio interface being taken  
20 into account.

The knowledge of the existing multimedia data streams is utilized in the access controller MGC for the execution of specific services. Without this multimedia  
25 information, the streams would only be distinguishable with respect to their bandwidth and of their QoS parameters. Examples are supplementary services introduced in the GMS standard, IN services etc. Different billing algorithms can also be used, for  
30 example billing of voice according to time and video according to data volume.

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CLAIMS:

1. A method for handling a packet service, the method comprising
  - packet data being transmitted via at least part  
5 of a packet-based core network (CNW),
  - the packet data being transmitted in wire-free fashion from and to at least one mobile communications device (MS) via an access network (ANW) with a radio interface, in which
  - 10 - the transmission of multimedia data in the packet data being controlled by a control node (EN) arranged as an interface between the core network (CNW) and access network (ANW) and being integrated into the data transmission from and to the mobile communications device  
15 (MS) via the radio interface of the access network (ANW),  
  
characterized in that  
  
the control node (EN) terminates a signaling protocol of the packet-based core network (CNW) and maps it onto a signaling protocol of the access network (ANW) with  
20 radio interface.
2. The method as claimed in claim 1, in which the control node (EN) checks the content of the packet data.
3. The method as claimed in claim 2, in which a  
25 multimedia access controller (MGC) detects the presence of multimedia data and assigns corresponding radio resources of the access network (ANW) for the transmission of the multimedia data via the radio interface.

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4. The method as claimed in claim 3, in which the multimedia access controller (MGC) controls a setup and release of carrier channels in accordance with the radio resources necessary for the transmission of the packet data.

5 5. The method as claimed in claim 2, in which, in the event of multimedia data being present, the control node (EN) carries out a handling operation which is specific for particular multimedia data streams.

6. The method as claimed in claim 5, in which in each  
10 case the individual toll billing is carried out for the multimedia data streams.

7. The method as claimed in claim 5 or 6, in which in each case subscriber-related services are carried out for the multimedia data stream.

15 8. The method as claimed in any one of claims 5 to 7, in which in each case network-related services are carried out for the multimedia data streams.

9. The method as claimed in claim 1, in which at least part of the signaling protocol of the core network  
20 (CNW) is replaced by the signaling protocol of the access network (ANW).

10. The method as claimed in any one of claims 1 to 9, in which the control node (EN) maps functions of the packet-based core network (CNW) onto functions of the access  
25 network (ANW) with a radio interface, and vice versa.

11. A communications system for handling a packet service, the system comprising

- a packet-based core network (CNW) for at least partially transmitting data as packet data,

- an access network (ANW) with a radio interface for the wire-free transmission of the packet data from and to at least one mobile communications device (MS),

the communications system additionally having

5           - a control node (EN) which is arranged at an interface between the core network (CNW) and access network (ANW) and has the purpose of controlling the transmission of multimedia data in the packet data and of integrating it into the data transmission from and to the mobile  
10 communications device (MS) via the radio interface of the access network (ANW),

characterized in that

said control node (EN) is further configured to terminate a signaling protocol of the packet-based core  
15 network (CNW) and to map it onto a signaling protocol of the access network (ANW) with radio interface.

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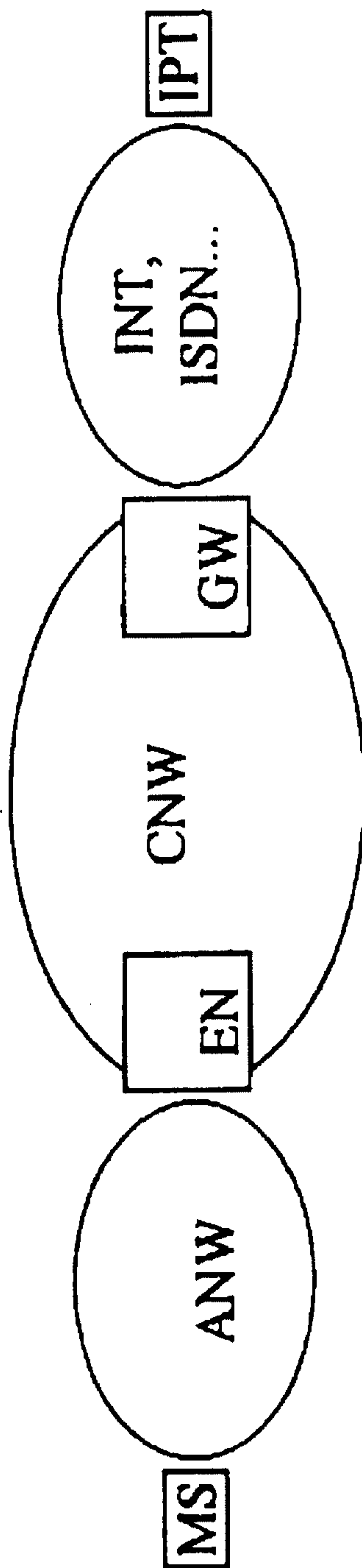


Fig. 1

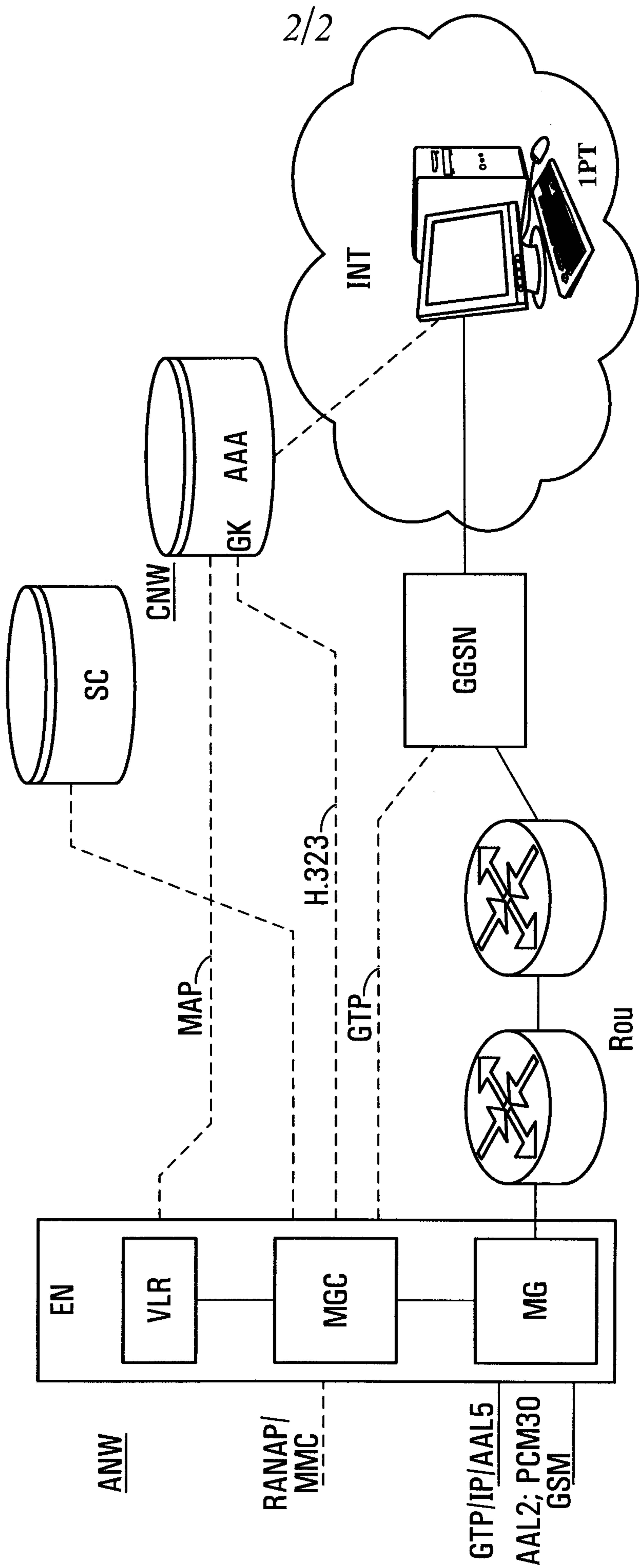


FIG. 2

