(54) Title: DATA TRANSMISSION BETWEEN A FIRST MOBILE SERVICES SWITCHING CENTER OF A FIRST MOBILE RADIO SYSTEM AND A SECOND MOBILE SERVICES SWITCHING CENTER OF A SECOND MOBILE RADIO SYSTEM
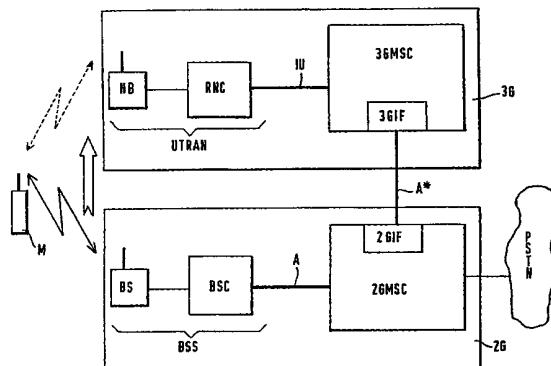
(57) Abstract: On the basis of the existing mobile radio systems of the so-called second generation, such as the GSM, new mobile radio systems are being developed for the so-called third generation, such as the UMTS, which should be characterized by a higher and flexible transmission rate and should include a package-oriented exchange technology, particularly ATM. In order to create a connection between the different mobile radio systems, a transmission of data between a first mobile services switching center (2GMSC) of a first mobile radio system (2G) and a second mobile services switching center (3GMSC) of a second mobile radio system (3G) is proposed, whereby the mobile services switching centers are connected through an interface (A*), via which useful data is transmitted at a variable useful data transmission rate, in which the useful data is transmitted within data frameworks including a definite pre-determined number of data fields, whereby, depending on the amount of useful data to be transmitted, at least one part of the data fields is first specified with the useful data and then the remaining part of the data fields is specified with dummy bits. In this way, a transmission channel which uses a fixed gross transmission rate (e.g., 64kbit/s), but a variable useful data transmission rate (0-57.6kbit/sec) is created.

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Data Transmission between a First Mobile Services Switching Center of a
First Mobile Radio System and a Second Mobile Services Switching Center
of a Second Mobile Radio System

On the basis of the existing mobile radio systems belonging to the so-called
second generation, such as the familiar mobile radio system GSM (Global
System for Mobile Communications), new mobile radio systems are being
developed for the so-called third generation, such as the UMTS (Universal
Mobile Telecommunications System) mobile radio system, which is being
developed and standardized at present through a cooperation of the
worldwide telecommunications industry. In comparison to previous mobile
radio systems, especially to the GSM, the UMTS should be characterized by
a higher and flexible transmission rate. A package-oriented exchange
technology, particularly ATM, should also preferably be included in the
UMTS. In contrast, service-oriented exchange technology is primarily used
in the existing mobile radio systems.

In the article "Mobilfunk der dritten Generation" [Mobile Radio of the Third
Generation] by M. Kien and S. Gneiting, which was published in the journal
"Funkshau" [Radio Show], volume 7/99, WEKA-Verlag, Poing, Germany,
the authors write that the new mobile radio system UMTS should be
constructed and developed as an addition to the existing mobile radio
systems. This would not mean a simple coexistence of the different mobile
radio systems. Rather the different generations of mobile radio systems
should be linked so that one and the same wireless subscriber unit can be

operated in the different mobile radio systems. Such a subscriber unit is known as a "multi-mode capable" subscriber unit. Not only should it be possible to operate the unit in the different mobile radio systems, but it should also be possible to hand the unit over from one mobile radio system to another during operation, particularly during a conversation or while data is being transmitted.

The goal of the present invention is to propose a procedure and equipment through which different mobile radio systems can be connected together as simply as possible, and which will fulfill the technical requirements mentioned at the beginning.

This goal is achieved by a procedure with the characteristics in accordance with Claim 1 and by mobile services switching centers as well as by interface switches with the characteristics of one of the subordinate claims.

Accordingly, a procedure for data transmission between a first mobile services switching center of a first mobile radio system and a second mobile services switching center of a second mobile radio system is proposed, whereby the mobile services switching centers are connected by an interface, via which useful data are transmitted at a variable useful data transmission rate, in which the useful data are transmitted within data frameworks including a definite pre-determined number of data fields, whereby, depending on the amount of useful data to be transmitted, at least one part of the data fields is first encoded with the useful data and then the remaining part of the data fields is encoded with dummy bits.

Furthermore, a mobile services switching center is proposed for a mobile radio system with an interface switch, which exchanges the useful data with another mobile services switching center of another mobile radio system, in that the interface switch sends and receives the useful data at a variable useful data transmission rate within data frameworks, whereby each data framework includes a definite pre-determined number of data fields, of which, depending on the amount of useful data to be transmitted, at least

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one part is first encoded with useful data and then the remaining part is encoded with dummy bits.

The present invention also proposes an interface switch for a mobile services switching center of a mobile radio system which exchanges useful data with another mobile services switching center of another mobile radio system, in that the interface switch sends and receives the useful data at a variable useful data transmission rate within data frameworks, whereby each data framework includes a definite pre-determined number of data fields, of which, depending on the amount of useful data to be transmitted, at least one part is first encoded with useful data and the remaining part is then encoded with dummy bits.

Through the measures proposed in the present invention, the mobile services switching centers of the different mobile radio systems are able to exchange useful data at a variable useful data transmission rate, that is at a variable net transmission rate, however whereby data frameworks with a definite pre-determined number of data fields are used. On the other hand, a connection with a fixed gross transmission rate determined by the number of data fields is created between the mobile services switching centers. This connection can be switched using a service-oriented switching technology, whereby it is also possible to use simpler and mostly older mobile services switching centers. By filling the data fields either with the useful data to be transmitted or with dummy bits, the data framework is only generally filled with payload to the point necessary for the momentary useful data transmission rate. This produces a connection with a variable net transmission rate, which can be adjusted to a package-oriented technology at little expense. The present invention is especially well suited for handing over a wireless subscriber unit from one mobile radio system to another, especially when the hand over involves a change from a service-oriented technology to a package-oriented technology.

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One especially advantageous embodiment of the invention results from the subordinate claims:

According to these claims, it is especially advantageous to combine at least two consecutive data frameworks, whereby a signal bit in the relevant data framework indicates whether it is the first or the second of the two data frameworks. This creates double or multiple frameworks with a larger number of writeable data fields, producing a greater range of variation for the net transmission rate.

Another particular advantage is created if, beginning with the first data field of the first data framework, the data fields of the combined data frameworks are successively encoded with the useful data to be transmitted, and if the remaining data fields are encoded with dummy bits when necessary, and if the display bits of the first data framework together with those of the second data framework indicate an address marking the position up to which the combined data frameworks are encoded with useful data. Through these measures, the useful data are encoded in an interconnected data block, whose beginning is known and whose end is determined by the amount of useful data. In order to access the transmitted useful data, it is only necessary to mark the end of the data block with display bits.

Furthermore a particular advantage is created if a wireless subscriber unit being operated in the second mobile radio system is handed over to the first mobile radio system, in that the useful data sent and received by the wireless subscriber unit via the interface is transmitted transparently, whereby the display bits indicate those data fields which are encoded with the useful data to be transmitted and/or indicate those data fields which are encoded with dummy bits. These measures allow for a quick hand over from a system using service-oriented switching technology to a system using package-oriented switching technology.

Another advantage is created if a wireless subscriber unit operated in the second mobile radio system is handed over to one operated in the first mobile radio system, in that the useful data sent and received by the wireless subscriber unit via the interface are transmitted non-transparently and according to a data link protocol selected from various data link protocols, and if control bits indicating the selected data link protocol with which the data fields of the data framework are encoded with the useful data, are input in the data framework. These measures allow for a quick hand over from a system using package-oriented switching technology to a system using service-oriented switching technology.

The present invention is now described in more detail using examples of the embodiment as illustrated in the following figures:

Fig. 1   shows the two linked mobile radio systems and the one
             subscriber unit which is being handed over;

Fig. 2   shows a flow chart of the procedure for data transmission during
             a hand over in accordance with the present invention;

Fig. 3a/b shows the setup of a duplicate data framework for
             transparent data transmission;

Fig. 4   shows the setup of a data framework for non-transparent
             data transmission.

Figure 1 shows a first and a second mobile radio system 2G and 3G, which are connected to one another via an interface A* in accordance with the present invention. Furthermore, Figure 1 shows a wireless subscriber unit M, which is multi-mode capable and is initially handled by the first mobile

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radio system 2G and is then handed over to the second mobile radio system 3G. The first mobile radio system 2G in this example is a mobile radio system based on the GSM standard with base stations BS, to which base station controls BSC are attached, and to which mobile services switching centers 2GMSC are attached. For the sake of simplification, only one of each of these facilities is shown here.

The base station BS and the base station control BSC form the so-called base station subsystem BSS, which is connected to the mobile services switching center 2GMSC via an interface A. This in turn produces the connection to the public telecommunications network PSTN, which mainly uses service-oriented switching technology.

The second mobile radio system 3G shown in Figure 1 is a mobile radio system based on the UMTS standard with base stations NB, to which radio network controls RNC are attached, which are connected to the mobile services switching centers 3GMSC. Only one of each of these facilities is shown here.

The base station NB together with the radio network control RNC form the subsystem UTRAN, which is connected to the mobile services switching center 3GMSC via an interface IU. This in turn can produce a connection to the public telecommunications network, which is predominantly based on package-oriented switching technology. Package-oriented data transmission is carried out on the interface IU using the so-called AAL2 (ATM adaptation layer 2).

The two mobile radio systems are now connected via an interface A* in accordance with the present invention. The first mobile services switching center 2GMSC has an interface switch 2GIF and the second mobile services switching center 3GMSC has an interface switch 3GIF. Both interface switches are connected via a 64 kbit/s line.

In accordance with the present invention, which is described in more detail later, data is transmitted between the two mobile radio frameworks. This is especially the case if the wireless subscriber unit M is supposed to be handed over from one mobile radio system 2G or 3G to the other 3G or 2G.

Figure 1 shows a diagram of the wireless subscriber unit M being handed over from the first mobile radio system 2G to the second mobile radio system 3G. The subscriber unit M is initially in radio contact with the first mobile radio system 2G. A connection to the public telecommunications network PSTN is produced through the first mobile services switching center 2GMSC. If the subscriber unit M changes from the coverage area of the first mobile radio system 2G to the coverage area of the second mobile radio system 3G, the connection to the public telecommunications network PSTN should be maintained. The first mobile services switching center 2GMSC therefore functions as a so-called "anchor MSC."

Handing over therefore involves an end-to-end connection between the wireless subscriber unit M and a subscriber unit of the public telecommunications network PSTN. After the hand over, this connection is routed through the second mobile services switching center 3GMSC and via the connection A* to the first mobile services switching center 2GMSC, which remains connected to the public telecommunications network PSTN.

To this end, data, especially the useful data received and sent by the subscriber unit M, are transmitted via interface A* according to the procedure described in more detail in Figure 2:

Figure 2 shows a flow chart of the procedure in accordance with the present invention for the transmission of data between the two mobile radio frameworks 2G and 3G shown in Fig. 1. This procedure 100 includes steps 111 to 130. After the start S of the procedure, the first step 111 is carried out, in which the first mobile services switching center 2GMSC produces a connection via A* to the second mobile services switching center, which in

turn produces a connection to the new radio network control RNC. In doing so, signaling channels are first switched, through which the subscriber unit M can pick up a new connection to the second mobile radio system 3G in order to register itself there. After successful registration, the connection between the first mobile services switching center and the base station control BSC is disconnected in the next step 112, so that the useful data are now transmitted via the second mobile radio system 3G and the interface A*. The transmission of the useful data takes place in the next step 120, which is divided into sub-steps 121 to 126:

The data frameworks used in the transmission of data for F1 and F2 are shown in Figures 3a and 3b. The following information refers to these figures. In the first sub-step 121, double frameworks are created, each of which consists of two data frameworks F1 and F2. Each data framework contains a head field, which are encoded with display bits N1, N2... and answer-back bits M1, SB. A double framework is created by setting the answer-back bit M1 in the first framework F1 to logical ZERO and the answer-back bit M1 in the second data framework F2 to logical ONE. The answer-back bit therefore indicates whether it is in the first or second data framework. Furthermore, the display bits N1 to N5 of the first data framework F1 are combined with the display bits N6 to N10 of the second data framework F2 to form a 10-valued data item corresponding to an address. The function of this address is described in more detail under sub-step 124.

In the next sub-step 122, the data fields of the double framework are now filled with useful data, beginning with the first data field 1D1 of the first data framework F1. Since both of the data frameworks F1 and F2 contain data fields 1D1 to 8D36 equaling 288 bits, there are therefore 2x288 bits = 576 bits available. These data fields are filled with the useful data bits. In the example in Figure 3a, only the data fields 1D1 up to and including 4D19 are filled, yielding a connected data block I with a total of (3x36+19) bits = 127 bits. Block II, for which there are no more useful data bits available, is composed of the remaining data fields and is connected to

data block I. Therefore only 127/576 = 22% of the capacity of the double framework shown in Figure 3 is utilized. In terms of the gross quantity of 640 bits per double framework, this value amounts to only 127/640 = 19.8%. However, this utilization can be adjusted to the necessary useful data transmission rate.

In the next sub-step 123, block II is filled with dummy bits. All data fields within the double framework are therefore encoded.

In the next sub-step 124, the display bits N1 to N10 are now set so that they indicate the address for the data field D4D19 within the first data framework F1. The address marks the end of the useful data block I. The address enables the receiver of the double framework to immediately access the useful data stored there.

The structure of data frameworks F1 and F2 is different from the so-called A-TRAU framework of the GSM standard. In contrast to the A-TRAU framework, the frameworks shown here are only filled up to the necessary amount with useful data bits. The N1 to N10 bits described here only function as "level indicators." Each framework can be filled flexibly with 0 to 288 bits of useful data. In addition, because of the variable filling, no so-called NIC (network independent clocking) bits are required as in the GSM standard. Moreover, the double frameworks described here are used for both transparent and non-transparent data transmission. In order to differentiate it from the A-TRAU framework structure, the new framework structure should be labeled "A-TRAU*."

In sub-step 125, the double framework is then sent through interface A* shown in Figure 1. Due to the fixed number of existing data fields, in this case 288 bits per framework, the gross transaction rate is also pre-defined. Here it amounts to 64 kbit/s. Accordingly, 100 double frameworks of 640 bits each are transmitted every second. Since the data fields are filled with useful data as required, the net transaction rate is flexible and can lie between 0 and 57.6 kbit/s.

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In sub-step 126, the receiver receives the double framework F1 + F2, and instantly knows how large the useful data block I is by the display bits N1 to N10. The recipient can therefore immediately access the useful data. The dummy bits are rejected. This marks the end of the transmission of the double-framework in accordance with sub-step 120 of procedure 100 in the present invention. This step is carried out repeatedly for each additional double framework, until there is no more useful data to be transmitted and the connection is terminated.

Then in step 130, the connection between the subscriber unit M and the second mobile radio system 3G is terminated. This step completes the procedure.

The procedure shown in Figure 2 refers to the handing over of the subscriber unit from the first mobile radio system 2G to the second mobile radio system 3G.

As another embodiment of the present invention, Figure 4 shows data framework F for the transmission of data via interface A* in accordance with the present invention, during the hand over of the subscriber unit from the second mobile radio system 3G to the first mobile radio system 2G. In this case, the useful data are now encoded in the data framework according to a different scheme. Data framework F contains control bits C1 to C4, which are encoded in the head field of the data framework and which indicate a certain data link scheme. The data link scheme used here is named after the GSM standard "radio connection protocol," or RLP for short. According to this protocol, so-called RLP frameworks are transmitted as 576 bits or 240 bits. When transferring a long RLP framework, two single frameworks of 288 bits are completely filled. For a short framework with a length of 240 bits, only one single framework is partially filled.

Control bits C1 to C4 now indicate which one of the two data link mechanisms is used. In this example, the RLP protocol (on OSI layer 2) is used, i.e., data fields 1D1 to 7D24 are encoded with 240 bits of useful data. These data fields form the first data block I. The remaining data fields 7D25 to 8D36 are encoded with dummy bits and form the second data block II. Through these measures, it is possible to use a data link mechanism with a framework length of 240 bits in accordance with the RLP protocol for the non-transparent transmission of data. Furthermore it is also possible to use the RLP protocol with a framework length of 576 bits as a data link mechanism, whereby two consecutive frameworks are each encoded with 576 bits of useful data. Control bits C1 to C4 indicate which one of the different data link mechanisms is used. The selected type of data link mechanism in accordance with the RLP protocol, that is, the selected length of the RLP framework, depends on the protocol used on the physical layer (OSI layer 1). Here, either the so-called V.110 protocol or the A-TRAU protocol is used. Control bits C1 to C4 are set accordingly. The additional C5 bit is reserved for error detection.

The transmission of the data is essentially carried out by the two interface switches 2GIF and 3GIF shown in Figure 1. In the case of a hand over from the first system 2G to the second system 3G, interface 2GIF is carried out in the form of a so-called inter-working function (IWF). The other interface 3GIF is essentially located in a transcoder (TC).

However, the present invention is not limited to handing over multi-mode capable wireless subscriber units. Rather the procedures and equipment in accordance with the present invention can be used for any type of data transmission between different systems.

Patent Claims

1. A procedure (100) for data transmission between a first mobile services switching center (2GMSC) of a first mobile radio system (2G) and a second mobile services switching center (3GMSC) of a second mobile radio system (3G), in which the mobile services switching centers (2GMSC, 3GMSC) are connected (110) via an interface (A*) through which useful data are transmitted at a variable useful data transmission rate, in which the useful data are transmitted (120) within data frameworks (F1, F2), which includes a definite pre-determined number of data fields (1D1 ... 1D36; 2D1 ... 2D36; .... ; 8D1 ... 8D36), whereby at first, depending on the amount of useful data to be transmitted, at least one part (1D1 .... 4D19) of the data fields is first encoded with the useful data (122) and afterwards the remaining part (4D20 .... 8D36) of the data fields is encoded with dummy bits (123).

2. A procedure (100) in accordance with Claim 1, in which display bits (N1, N2, ...) are input (124) in each data framework (F1), indicating the part (1D1 .... 4D19) of the data fields which is encoded with the useful data to be transmitted, and/or the remaining part (4D20 .... 8D36) of the data fields which is encoded with dummy bits.

3. A procedure (100) in accordance with Claim 2, in which, beginning with the first data field (1D1), the data fields are filled is succession with the useful data to be transmitted (122) and, if necessary, the remaining data fields (4D20 .... 8D36) are filled with dummy bits (123), in which each data framework (F1) contains a head field in which the display bits (N1, N2, ...) are entered (124), which indicate an address marking the point within the data framework (F1) up to which the data framework (F1) is filled with useful data.

4. A procedure (100) in accordance with Claim 1, in which at least two consecutive data frameworks (F1, F2) are combined (121), in which a signal bit (M1) is entered into each of the data frameworks (F1, F2), indicating whether it is the first (F1) or the second (F2) of the two data frameworks.

5. A procedure (100) in accordance with Claims 3 and 4, in which, beginning with the first data field (1D1) of the first data framework (F1), the data fields of the combined data frameworks (F1, F2) are filled, one after another, with the useful data to be transmitted (122) and, if necessary, the remaining data fields are filled with dummy bits (123), and in which the display bits (N1, N2, ...) of the first data framework (F1) together with the display bits (N6, N7, ...) of the second data framework (F2) indicate an address marking the point up to which the combined data frameworks (F1, F2) are filled with useful data.

6. A procedure (100) in accordance with Claim 1, in which a wireless subscriber unit (M) operated through the first mobile radio system (2G) is handed over to the second mobile radio system (3G), in that the useful data sent and received by the wireless subscriber unit (M) via the interface (A*) is transmitted (120) transparently and within the data frameworks (F1, F2), whereby the display bits (N1, N2, ...) indicate the data field (1D1 .... 4D19) which is encoded with the useful data to be transmitted and/or the data field (4D20 .... 8D36) which is encoded with the dummy bits.

7. A procedure in accordance with Claim 1 in which a wireless subscriber unit (M) operated through the second mobile radio system (3G) is handed over to the first mobile radio system (2G), in that the useful data sent and received by the wireless subscriber unit (M) via the interface (A*) is transmitted non-transparently and using a data link protocol which can be selected from various data link protocols (RLP), whereby the control bits (C1, C2, ...) are entered in the data framework (F), indicating the selected data link protocol (V110), and in which the data fields (1D1... 8D36) of the data framework (F) are encoded with the useful data using the selected data link protocol (RLP).

8. A mobile services switching center (2GMSC) for a first mobile radio system (2G) with an interface switch (2GIF), which exchanges useful data with a second mobile services switching center (3GMSC) of a second mobile radio system (3G), in that the interface switch (2GIF) sends and receives the useful data at a variable useful data transmission rate within data frameworks (F1, F2), whereby each data framework (F1) includes a definite pre-determined number of data fields (1D1 ... 1D36; 2D1 ... 2D36; .... ; 8D1 ... 8D36), of which, depending on the amount of useful data to be transmitted, at least one part (1D1 .... 4D19) is encoded with the useful data and the remaining part (4D20 .... D36) is encoded with dummy bits.

9. A mobile services switching center (3GMSC) for a second mobile radio system (3G) with an interface switch (3GIF), which exchanges useful data with a first mobile services switching center (2GMSC) of a first mobile radio system (2G), in that the interface switch (3GIF) sends and receives the useful data at a variable useful data transmission rate within data frameworks (F1, F2), whereby each data framework (F1) includes a definite pre-determined number of data fields (1D1 ... 1D36; 2D1 ... 2D36; .... ; 8D1 ... 8D36), of which, depending on the amount of useful data to be transmitted, at least one part (1D1 .... 4D19) is encoded with useful data and the remaining part (4D20 .... 8D36) is encoded with

dummy bits.

10. An interface switch (2GIF) for a mobile services switching center (2GMSC)
    of a first mobile radio system (2G), which exchanges useful data with a
    second mobile services switching center (3GMSC) of a second mobile
    radio system (3G), in that the interface switch (2GIF) sends and receives
    the useful data at a variable useful data transmission rate within data
    frameworks (F1, F2), whereby each data framework (F1) includes a
    definite pre-determined number of data fields (1D1 ... 1D36; 2D1 ...
    2D36; .... ; 8D1 ... 8D36), of which, depending on the amount of useful
    data to be transmitted, at least one part (1D1 .... 4D19) is encoded with
    useful data and the remaining part (4D20 .... 8D36) is encoded with
    dummy bits.

11. An interface switch (3GIF) for a mobile services switching center (3GMSC)
    of a second mobile radio system (3G), which exchanges useful data with a
    first mobile services switching center (2GMSC) of a first mobile radio
    system (2G), in that the interface switch (3GIF) sends and receives the
    useful data at a variable useful data transmission rate within data
    frameworks (F1, F2), whereby each data framework (F1) includes a
    definite pre-determined number of data fields (1D1 ... 1D36; 2D1 ...
    2D36; .... ; 8D1 ... 8D36), of which, depending on the amount of useful
    data to be transmitted, at least one part (1D1 .... 4D19) is encoded with
    useful data and the remaining part (4D20 .... 8D36) is encoded with
   dummy bits.

PSTN

3G

3GMSC

3GIF

2GIF

2GMSC

2G

A*

IU

A

RNC

BSC

UTRAN

BSS

NB

BS

M

Fig. 1

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Fig. 2   100
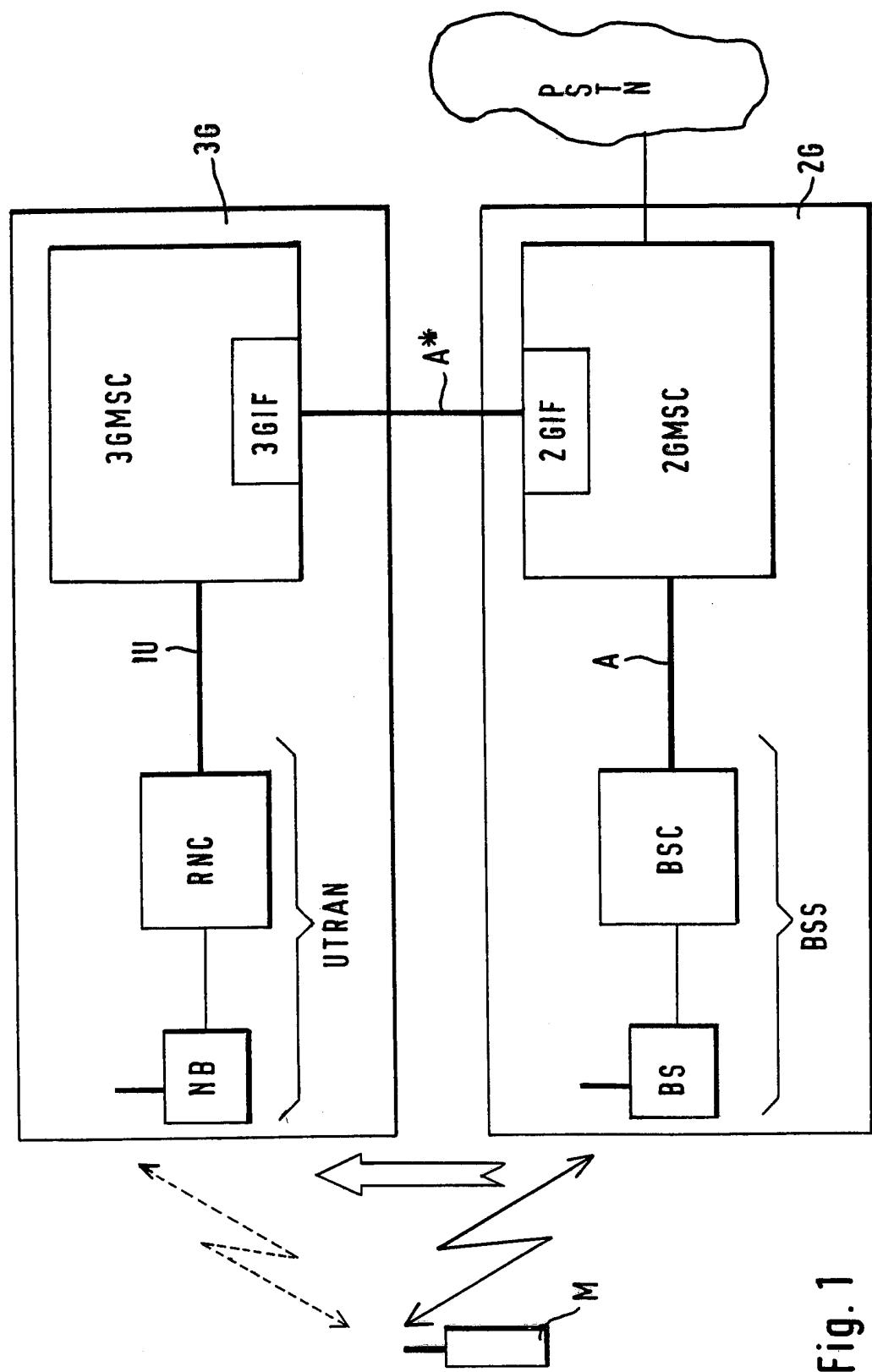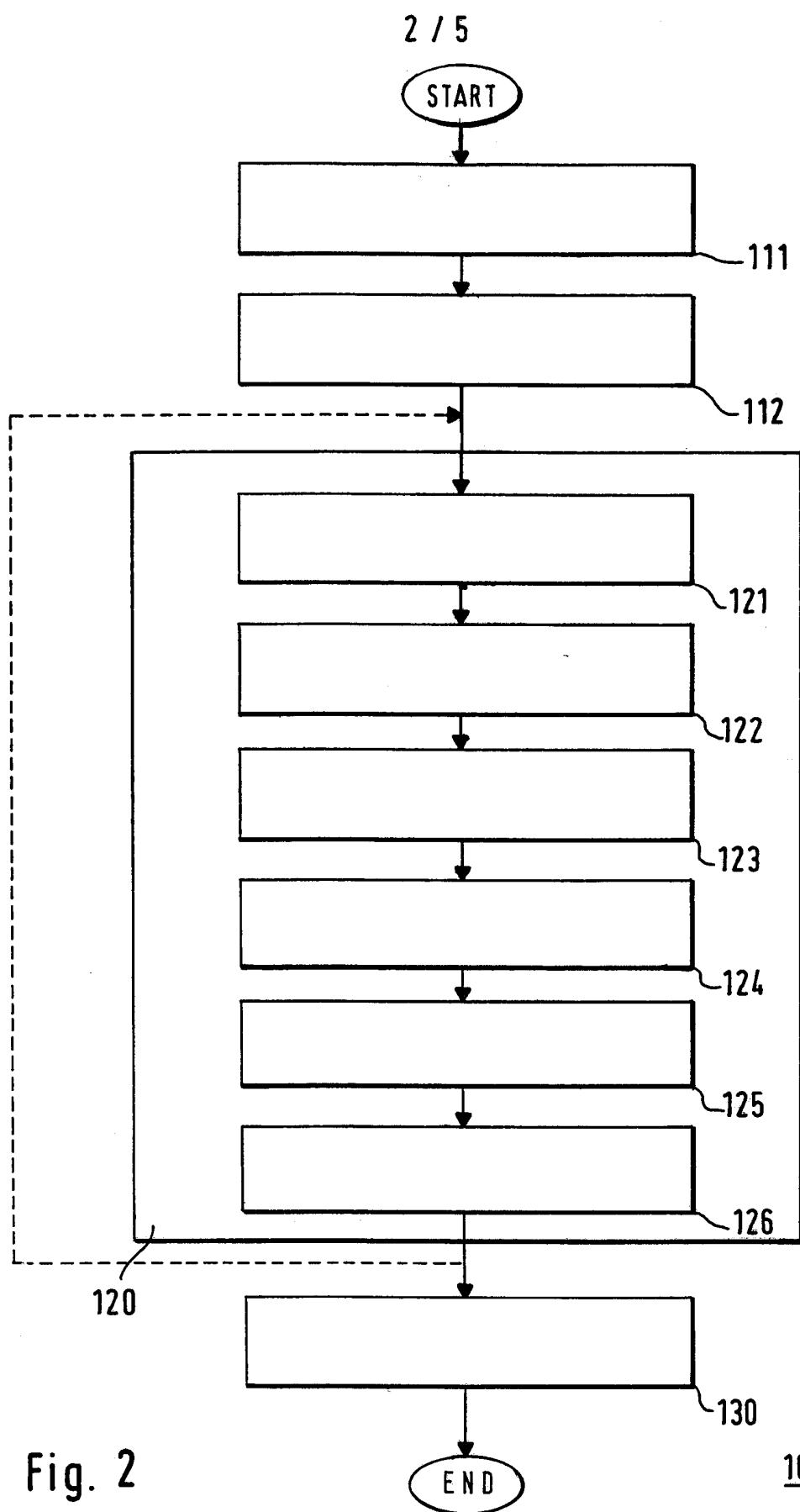
Bit No.

Octet No.	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0
2	1	N1	N2	N3	N4	N5	M1=0	SB
3	Z1	1D1	1D2	1D3	...	...	...	...
4	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...
7	...	...	1D34	1D35	1D36	Z2	2D1	2D2
8	2D3	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	2D34
12	2D35	2D36	Z3	3D1	3D2	3D3	...	...
13	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...
16	...	...	...	...	3D34	3D35	3D36	Z4
17	4D1	4D2	4D3	...	...	...	...	...
18	...	...	...	...	...	...	...	...
19	...	...	4D19	4D20	...	...	...	...
20	...	...	...	...	...	...	...	...
21	...	4D34	4D35	4D36	Z5	5D1	5D2	5D3
22	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	5D34	5D35
26	5D36	Z6	6D1	6D2	6D3	...	...	...
27	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...
30	...	...	...	6D34	6D35	6D36	Z7	7D1
31	7D2	7D3	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...
35	7D34	7D35	7D36	Z8	8D1	8D2	8D3	...
36	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...
39	...	...	...	...	...	8D34	8D35	8D36

F1

I

II

Fig. 3 A

Octet No. \ Bit No.	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0
2	1	N6	N7	N8	N9	N10	M1=I	X
3	Z1	1D1	1D2	1D3	...	...	...	...
4	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...
7	...	...	1D34	1D35	1D36	Z2	2D1	2D2
8	2D3	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	2D34
12	2D35	2D36	Z3	3D1	3D2	3D3	...	...
13	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...
16	...	...	...	...	3D34	3D35	3D36	Z4
17	4D1	4D2	4D3	...	...	...	...	...
18	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...
21	...	4D34	4D35	4D36	Z5	5D1	5D2	5D3
22	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	5D34	5D35
26	5D36	Z6	6D1	6D2	6D3	...	...	...
27	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...
30	...	...	...	6D34	6D35	6D36	Z7	7D1
31	7D2	7D3	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...
35	7D34	7D35	7D36	Z8	8D1	8D2	8D3	...
36	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...
39	...	...	...	...	...	8D34	8D35	8D36

F2

II

Fig. 3B

RLP — Bit No.

Octet No.	0	1	2	3	4	5	6	7	
0	0	0	0	0	0	0	0	0	F
1	0	0	0	0	0	0	0	0	
2	1	C1	C2	C3	C4	C5	M1	M2	
3	Z1	1D1	1D2	1D3	...	...	...	...	
4	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	
7	...	...	1D34	1D35	1D36	Z2	2D1	2D2	
8	2D3	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	2D34	
12	2D35	2D36	Z3	3D1	3D2	3D3	...	...	
13	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	
16	...	...	...	...	3D34	3D35	3D36	Z4	
17	4D1	4D2	4D3	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	
21	...	4D34	4D35	4D36	Z5	5D1	5D2	5D3	
22	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	5D34	5D35	
26	5D36	Z6	6D1	6D2	6D3	...	...	...	
27	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	
30	...	...	...	6D34	6D35	6D36	Z7	7D1	
31	7D2	7D3	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	7D24	7D25	
34	...	...	...	...	...	...	...	...	
35	7D34	7D35	7D36	Z8	8D1	8D2	8D3	...	
36	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	8D34	8D35	8D36	

I (rows 3–32), II (rows 33–39)

Fig. 4

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   H04L12/28   H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   H04L   H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

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|X| Further documents are listed in the continuation of box C. |X| Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 January 2001	01/02/2001

Name and mailing address of the ISA	Authorized officer
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Int tional Application No
PCT/EP 00/07956

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