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(54) **PROCEDE POUR INSCRIRE DES APPAREILS DE TELECOMMUNICATION DANS DES STATIONS DE BASE POUVANT ETRE RELIEES AUXDITS APPAREILS DE TELECOMMUNICATION, DANS DES SYSTEMES DE TELECOMMUNICATION SANS FIL, NOTAMMENT POUR INSCRIRE DES UNITES MOBILES DECT DANS DES STATIONS DE BASE DECT DE SYSTEMES DECT**

(54) **METHOD AND CIRCUIT CONFIGURATION FOR COMPENSATING VARIATIONS IN THE CMOS IMAGE SENSORS RESULTING FROM TEMPERATURE, VOLTAGE AND PRODUCTION**

(57) L'invention vise à améliorer l'inscription d'appareils de télécommunication dans des stations de base pouvant être reliées auxdits appareils de télécommunication, dans des systèmes de télécommunication sans fil, notamment l'inscription d'unités mobiles DECT dans des stations de base DECT de systèmes DECT. A cet effet, toutes les stations de base émettant des messages radio, ayant fixé et transmis le bit "a44", sont mémorisées dans l'unité mobile comme jusqu'à présent, puis une procédure d'inscription connue est lancée au moyen d'une station de base sélectionnée selon des critères de réception prédéterminés. Si cette procédure d'inscription ne donne aucun résultat, cette station de base est marquée comme étant "non valable" et la même opération, y compris la procédure d'inscription, est effectuée avec une autre station de base. Selon l'invention, on tire profit du fait que, lors de l'inscription, un numéro d'identification personnel et/ou un code d'identification sont demandés. Si ce numéro d'identification personnel et/ou ce code d'identification sont faux, la demande d'inscription est rejetée. Dans le cas contraire, si ce numéro d'identification personnel et/ou ce code d'identification sont corrects, l'unité mobile est inscrite auprès de la station de base.

(57) Disclosed are a method and a circuit configuration designed to compensate variations resulting from temperature, voltage and production by means of CMOS image sensors which are exposed to radiation and generate, depending on the radiation intensity, electrical output signals below a logarithmic curve. The inventive method comprises the following steps: at least two reference CMOS sensors, which are maintained at the same temperature as the CMOS image sensors to be compensated but are not irradiated, are used to generate two reference signals, one of which corresponds to a reference dark value and the other, as a result of electric power application thereupon, to a reference light value. The reference signals are amplified separately from each other in such a way that the amplification conditions are identical to those needed for amplifying the output signals to be compensated. Said reference signals are sent to an A/D converter with a thermal regime identical to that of the electrical output signals from the CMOS image sensors to be compensated. For each CMOS image sensor point at least one correction value is stored in a memory unit. The correction value, which enables variations resulting from temperature, voltage and production to be compensated, is fed into the system to correct the output signal to be compensated and obtain FPN=(fixed-pattern-noise)-corrected output signals. The FPN-corrected output signals and the reference signals received ared fed to the A/D converter, where the output signals from the CMOS image sensors are compensated and converted into digital signals. The circuit configuration according to the invention is so designed as to allow implementation of the method described.

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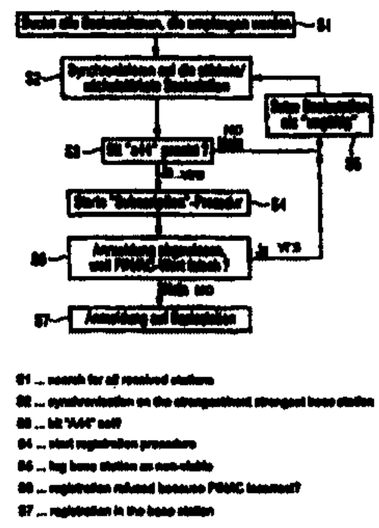
(54) Title: METHOD AND CIRCUIT CONFIGURATION FOR COMPENSATING VARIATIONS IN THE CMOS IMAGE SENSORS RESULTING FROM TEMPERATURE, VOLTAGE AND PRODUCTION

(54) Bezeichnung: VERFAHREN ZUM SUBSKRIPIEREN VON TELEKOMMUNIKATIONSGERÄTEN BEI MIT DEN TELEKOMMUNIKATIONSGERÄTEN DURCH DRAHTLOSE TELEKOMMUNIKATION VERBINDBAREN GEGENSTATIONEN IN DRAHTLOSEN TELEKOMMUNIKATIONSSYSTEMEN, INSBESONDERE VON DECT–MOBILTEILEN BEI DECT–BASISSTATIONEN IN DECT–SYSTEMEN

(57) Abstract

Disclosed are a method and a circuit configuration designed to compensate variations resulting from temperature, voltage and production by means of CMOS image sensors which are exposed to radiation and generate, depending on the radiation intensity, electrical output signals below a logarithmic curve. The inventive method comprises the following steps: at least two reference CMOS sensors, which are maintained at the same temperature as the CMOS image sensors to be compensated but are not irradiated, are used to generate two reference signals, one of which corresponds to a reference dark value and the other, as a result of electric power application thereupon, to a reference light value. The reference signals are amplified separately from each other in such a way that the amplification conditions are identical to those needed for amplifying the output signals to be compensated. Said reference signals are sent to an A/D converter with a thermal regime identical to that of the electrical output signals from the CMOS image sensors to be compensated. For each CMOS image sensor point at least one correction value is stored in a memory unit. The correction value, which enables variations resulting from temperature, voltage and production to be compensated, is fed into the system to correct the output signal to be compensated and obtain FPN=(fixed–pattern–noise)–corrected output signals. The FPN–corrected output signals and the reference signals received ared fed to the A/D converter, where the output signals from the CMOS image sensors are compensated and converted into digital signals. The circuit configuration according to the invention is so designed as to allow implementation of the method described.



(57) Zusammenfassung

Um das Subskripieren von Telekommunikationsgeräten bei mit den Telekommunikationsgeräten durch drahtlose Telekommunikation verbindbaren Gegenstationen in drahtlosen Telekommunikationssystemen, insbesondere von DECT–Mobilteilen bei DECT–Basisstationen in DECT– Systemen, zu verbessern, werden alle empfangenen Funknachrichten sendenden Basisstationen, welche das "a44"–Bit gesetzt und übertragen haben, wie bisher im Mobilteil gespeichert, und mit einer nach vorgegebenen Empfangskriterien ausgewählten Basisstation eine bekannte Anmeldeprozedur gefahren. Schlägt diese Anmeldeprozedur fehl, so wird diese Basisstation als "ungültig" markiert und der gleiche Vorgang einschliesslich der Anmeldeprozedur mit einer anderen Basisstation durchgeführt. Dabei wird ausgenutzt, dass bei der Anmeldung ein PIN–Wort und/oder ein AC–Wort abgefragt wird. Ist das PIN–Wort/AC–Wort falsch, so wird der Anmeldeversuch abgewiesen. Im anderen Fall, wenn das PIN–Wort/AC–Wort richtig ist, ist das Mobilteil erfolgreich bei der Basisstation angemeldet.

METHOD FOR SUBSCRIBING TELECOMMUNICATION DEVICES AT COOPERATING STATIONS CONNECTABLE TO THE TELECOMMUNICATION DEVICES BY WIRELESS TELECOMMUNICATION IN WIRELESS TELECOMMUNICATION SYSTEMS, PARTICULARLY DECT MOBILE PARTS AT DECT BASE STATIONS IN DECT SYSTEMS

In message systems with a message transmission link between a message source and a message sink, transmission and reception devices are employed for the message processing and transmission, whereby

1) the message processing and message transmission can ensue in a privileged transmission direction (simplex mode) or in both transmission directions (duplex mode),
2) the message processing is analog or digital,
3) the message transmission via the long-distance transmission link is wire-bound or ensues wirelessly on the basis of various message transmission methods FDMA (Frequency Division Multiple Access) and/or CDMA (Code Division Multiple Access) -- for example according to radio standards such as DECT, GSM, WACS or PACS, IS-54, PHS, PDC, etc. [see IEEE Communications Magazine, January 1995, pages 50 through 57; D. D. Falconer et al., "Time Division Multiple Access Methods for Wireless Personal Communication"].

"Message" is a higher-ranking term that stands both for the signification (information) as well as for the physical representation (signal). Despite the same signification of a message – i.e. the same information –, different signal forms can occur. Thus, for example, a message relating to a subject matter can be transmitted

(1) in the form of an image,
(2) as spoken word,
(3) as written word,
(4) as encrypted word or image.

The transmission mode according to (1) ... (3) is thereby normally characterized by continuous (analog) signals, whereas discontinuous signals (for example pulses, digital signals) usually arise given the transmission mode according to (4).

Proceeding from this general definition of a message system, the invention is directed to a method for subscribing telecommunication devices at cooperating stations connectable to the telecommunication devices by wireless telecommunication in wireless telecommunication systems, particularly DECT mobile parts at DECT base stations in DECT systems according to the preamble of patent claim 1.

Telecommunication systems of the above-defined species are, for example, DECT systems [Digital Enhanced (previously: European) Cordless Telecommunication; see (1): Nachrichtentechnik Elektronik 42 (1992) Jan./Feb. No. 1, Berlin, DE; U. Pilger, "Struktur des DECT-Standards" pages 23 through 29 in conjunction with the ETSI Publication ETS 300175-1...9, October 1992; (2): Telcom Report 16 (1993), No. 1, J. H. Koch, "Digitaler Komfort für schnurlose Telekommunikation – DECT-Standard eröffnet neue Nutzungsgebiete", pages 26 and 27; (3): tec 2/93 – the technical magazine of Ascom, "Wege zur universellen mobilen Telekommunikation", pages 35 through 42; (4): Philips Telecommunication Review, Vol. 49, No. 3, Sept. 1991, R. J. Mulder, "DECT, a universal cordless access system"; (5) WO 93/21719 (Figures 1 through 3 with appertaining description)] or GAP systems (Generic Access Profile; see ETSI Publication ETS 300444, December 1995, ETSI, FR). The GAP standard is a subset of the DECT standard that has the job of assuring the interoperability of the DECT air interface for telephone applications.

According to the DECT/GAP standard, it is possible, in accordance with the illustration in Figure 1, to set up at a DECT/GAP base station ES a maximum of 12 connections according to the TDMA/FDMA/TDD method (Time Division Multiple Access/Frequency Division Multiple Access/Time Division Duplex) in parallel to DECT/GAP mobile parts MT1. . .MT12 over a

DECT/GAP air interface configured for the frequency range between 1.88 and 1.90 GHz. The number 12 results from the number "k" of time slots or telecommunications channels (k = 12) available for the duplex mode of a DECT/GAP system. The connections here may be internal and/or external. When there is an internal connection, two mobile parts registered at the base station ES, for example the mobile part MT2 and the mobile part MT3, can communicate with one another. To set up an external connection, the base station ES is connected to a telecommunications network TKN, for example in line-bound form via a telecommunications connection unit TAE and/or a private branch exchange system NStA with a line-bound telecommunications network or, in accordance with WO 95/05040 in wireless form as a repeater station with a superordinate telecommunications network. When there is an external connection, it is possible to use a mobile part, for example the mobile part MT1, to communicate with a subscriber in the telecommunications network TKN via the base station BS, the telecommunications connection unit TAE or the private branch exchange system NStA. If the base station BS has - as in the case of the Gigaset 951 (Siemens cordless telephone, cf. Telcom report 16, (1993) Issue 1, pages 26 and 27) - only one connection to the telecommunications connection unit TAE and/or to the private branch exchange system NStA, only one external connection can be set up. If the base station ES has - as in the case of the Gigaset 952 (Siemens cordless telephone; cf. Telcom report 16, (1993), issue 1, pages 26 and 27) - two connections to the telecommunications network TKN, a further external connection, in addition to the external connection to the mobile part MT1, is possible from a line-bound telecommunications terminal TKE which is connected to the base station BS. In this context, it is in principle also conceivable for a second mobile part, for example the mobile part MT12, to use the second port for an external connection, instead of the telecommunications terminal TKE. While the mobile parts MT1. . .MT12 are operated with a battery or an accumulator, the base station BS which is designed as a cordless small-scale exchange is connected to a voltage network SPN via a mains connection unit NAG.

Figure 2 shows, on the basis of the publication Components 31 (1993), Issue 6, pages 215 to 218; S.Althammer, D. Brückmann: "Hochoptimierte IC's fur DECT-Schnurlostelefone", the basic circuitry design of the base station BS and of the mobile part MT. According to the latter, the base station BS and the mobile part MT have a radio component FKT with an antenna ANT which is assigned to transmitting and receiving radio signals, a signal processing device SVE and a central controller ZST which are connected to one another in the illustrated way. The radio component FKT contains essentially the known devices such as a transmitter SE, a receiver EM and a synthesizer SYN. The signal processing device SVE contains, inter alia, a coding/decoding device CODEC. The central controller ZST has a microprocessor μP both for the base station BS and for the mobile part NT, with a program module PGM, set up according to the OSI/ISO layer model [cf. (l): Unterrichtsblätter - Deutsche Telekom, Vol. 48, 2/1995, pages 102 to 111; (2): ETSI publication ETS 300175-1...9, October 1992], a signal control component SST and a digital signal processor DSP, which are connected to one another in the way illustrated. Of the layers defined in the layer model, only the directly essential first four layers are illustrated for the base station BS and the mobile part MT. The signal control component SST is designed as a Time Switch Controller TSC in the base station BS and as a Burst Mode Controller BMC in the mobile part MT. The essential difference between the two signal control components TSC, BMC consists in the fact that the base station-specific signal control component TSC additionally assumes switching functions in comparison with the mobile part-specific signal control component BMC.

The principal method of operation of the circuit units specified above is described for example in the publication Components 31 (1993), Issue 6, pages 215 to 218, cited above.

The described circuitry design according to Figure 2 is supplemented in the base station BS and the mobile part MT in accordance with their function in the DECT/GAP system according to Figure 1 by means of additional function units.

The base station BS is connected to the telecommunications network TKN via the signal processing device SVE and the telecommunications connection unit TAX or the private branch exchange system NStA. As an option, the base station BS can also have a user interface (functional units shown with broken lines in Figure 2), which comprises, for example, an input device EE designed as a keypad, a display device AZ designed as a display, a hand-held unit SHE designed as a handset with microphone MIF and earphone HK, as well as a ringer TRK.

The mobile part MT has a user interface which is possible with the base station BS as an option and which has the control elements described above, which are associated with this user interface.

Figure 3 shows, based on the publication "Nachrichtentechnik Elektronik 42 (1992) Jan./Feb., No. 1, Berlin, DE; U. Pilger: "Struktur des DECT-Standards", pages 23 to 29 in conjunction with ETS 300175-1.. .9, October 1992", the TDMA structure of the DECT/GAP system DGS. The DECT/GAP system is a hybrid system in terms of the multiple access methods in which, in accordance with the FDMA principle, it is possible to transmit radio telecommunications on ten frequencies in the frequency band between 1.88 and 1.90 GHz from the base station BS to the mobile part MT and from the mobile part MT to the base station BS (Time Division Duplex Mode) according to the TDMA principle in accordance with Figure 3 in a prescribed time sequence. The time sequence is determined here by a multiple time frame MZR, which occurs every 160 ms and which has 16 time frames ZR, each with a time period of 10 ms. Information which relates to a C-, M-, N, P-, Q-channel defined in the DECT Standard is transmitted separately to the base station BS and mobile part MT in these time frames ZR. If information for a plurality of these channels is transmitted in one time frame ZR, the transmission takes place according to a priority list where M > C > N and P > N. Each of the 16 time frames ZR of the multiple time frame MZR is divided in turn into 24 time slots ZS, each with a time period of 417 μs, of which 12 time slots ZS (time slots 0... 11) are intended for the transmission direction "base station BS –

mobile part NT" and a further 12 time slots ZS (time slots 12 ... 23) are intended for the transmission direction "mobile part MT → base station BS". In each of these time slots ZS, information with a bit length of 480 bits is transmitted in accordance with the DECT Standard. Of these 480 bits, 32 bits are transmitted as synchronization information in a SYNC field and 388 bits are transmitted as payload information in a D field. The remaining 60 bits are transmitted as additional information in a Z field and as protective information in a "guard time" field. The 388 bits of the D field which are transmitted as useful information are in turn divided into a 64 bit-long A field, a 320 bit-long B field and a 4 bit-long "X-CRC" word. The 64 bitlong A field is composed of an 8 bit-long data header, a 40 bit-long data record with data for the C-, Q-, M-, N-, P- channels and a 16 bit-long "A-CRC" word.

Figure 4 shows, taking the DECT system according to Figure 1 as a starting point, a cellular DECT/GAP multisystem CMI (Cordless Multicell Integration), in which a plurality of the DECT/GAP systems DGS described above, each with one base station ES and one or more mobile parts MT are present at a given geographical location, for example concentrated - in a "hot spot" arrangement - in an administration building with large open-plan offices. However, instead of an "enclosed"geographical location, such as the administration building, an "open" geographical location with strategic telecommunication significance, for example squares in large cities with a high traffic volume, a large collection of commercial units and large volumes of people moving, is also possible for the installation of a cellular DECT/GAP multisystem CMI. A number of the base stations BS arranged in the open-plan office are designed here, in contrast to the base stations according to WO 95/10764 shown in Figures 1 and 2, as antenna diversity base stations. The concentration of the DECT/GAP systems DGS is so marked here (uninterrupted radio coverage of the geographical location), that individual DECT/GAP systems DGS operate in the same area as a result of the overlapping cellular DECT/GAP radio cells FB.

Depending on the degree of overlapping, the same area may mean here that

a) a first base station BS1 of a [...] preferably as first DECT/GAP system DGS1 is arranged in a first radio cell FB1 and a second base station BS2 of a second system DGS2 is arranged in a second radio cell FB2 and can set up telecommunications connections to at least one mobile part $MT_{1,2}$,

b) a third base station BS3 of a third DECT/GAP system DGS3 and a fourth base station BS4 of a fourth DECT/GAP system DGS4 are arranged in a common third radio cell FB3 and can set up telecommunications connections to at least one mobile part $MT_{3,4}$.

According to the publication, "*Presentation of A. Elberse, M. Barry, G. Fleming on the topic, "DECT Data Services - DECT in Fixed and Mobile Networks", 17/18 June 1996, Hotel Sofitel, Paris, pages 1 through 12 and Summary*, the cordless telecommunication scenario shown in Figures 1 through 4, whereby DECT mobile parts are connectable via a DECT air interface to a private (residential) DECT base station (Figure 1) or, respectively, to one or more private or public DECT base stations (Figure 4), can be expanded to the effect that the DECT mobile parts are connectable via the DECT air interface to private and public DECT base stations.

According to WO 95/05040 (see Figures 3 through 8 with the respectively appertaining description) this scenario can in turn be expanded in view of a "Universal Mobile Telecommunication System" (UMTS) to the effect that picocell-related cordless telecommunication systems (for example, the previously discussed DECT systems) be linked under CTM points of view *(Cordless Terminal Mobility; see ETSI Publications (1): "IN Architecture and Functionality for the support of CTM", Draft Version 1.10, September 1995; (2): "Cordless Terminal Mobility (CTM) - Phase 1, Service Description", Draft DE/NA-010039, Version 6, 2 October 1995)* into a higher-ranking network infrastructure (for example, ISDN, PSTN, GSM and/or satellite networks) for accesses (*see ETSI Publications "CTM Access Profile (CAP)", prETS 300824, November 1996*).

According to patent claim 1 of WO95/05040, this can be achieved by a DECT base station fashioned as DECT repeater. In a universal mobile telecommunication system, DECT is mainly understood as a "network access technology" for mobile communication services *(see Presentation of A. Elberse, M. Barry, G. Fleming on the topic, "DECT Data Services - DECT in Fixed and Mobile Networks", 17/18 June 1996, Hotel Sofitel, Paris, pages 1 through 12 and Summary)* and not as a network.

Standing for the above-presented scenario, Figure 5 -- proceeding from the publications *"Nachrichtentechnik Elektronik, Berlin 45 (1995) No. 1, pages 21 through 23 and No. 3, pages 20 and 30" as well as IEE Colloquium 1993, 173; (1993), pages 29/1 - 29/7; W. Hing, F. Halsall, "Cordless access to the ISDN basic rate service"* on the basis of a DECT/ISDN Intermediate Systems DIIS according to the *ETSI Publication prETS 300822, February 1997* – shows an "ISDN - DECT Telecommunication scenario ID-TSZ(Integrated Services Digital Network - Digital Enhanced Cordless Telecommunication) with an ISDN telecommunication network I-TKN [*see the publication "Nachrichtentechnik Elektronik, Berlin 41-43, Part: 1 through 10, P1: (1991) No. 3, pages 99 through 102; P2: (1991) No. 4, pages 138 through 143; P3: (1991) No. 5, pages 179 through 182 and No. 6, pages 219 through 220; P4: (1991) No. 6, pages 220 through 222 and (1992) No. 1, pages 19 through 20; P5: (1992) No. 2, pages 59 through 62 and (1992) No. 3, pages 99 through 102; P6: (1992) No. 4, pages 150 through 33; P9: (1993) No. 2, pages 65 through 97 and (1993) No. 3, pages 129 through 135; P10: (1993) No. 4, pages 187 through 190"*] and a DECT telecommunication system D-TKS connected to the ISDN telecommunication network I-TKN.

As to be explained in greater detail later, the DECT telecommunication system D-TKS can thereby by a component part of a DECT/ISDN intermediate system DIIS or, respectively, of an RLL/WLL telecommunication sub-system RW-TTS. The DECT telecommunication system and, thus, the DECT/ISDN intermediate system DIIS or, respectively, the RLL/WLL

telecommunication sub-system are preferably bases on a DECT/GAP system DGS as shown, for example, in Figure 1.

Alternatively, the DECT/ISDN intermediate system DIIS or, respectively, the RLL/WLL telecommunication sub-system RW-TTS can also be based on a GSM system (Groupe Spéciale Mobile or Global System for Mobile communication; see Informatik Spektrum 14 (1991) June, No. 3, Berlin, DE; A. Mann, "Der GSM-Standard – Grundlage für europäische Mobilfunknetze", pages 137 through 152). Instead, it is also possible in the framework of a UMTS scenario that the ISDN telecommunication network I-TKN is fashioned as GSM network or as PSTN network (Public Switched Telecommunications Network).

Coming into consideration over and above this as further possibilities for the realization of the DECT/ISDN intermediate system DIIS or, respectively, RLL/WLL telecommunication sub-system RW-TTS or of the ISDN telecommunication network I-TKN are the initially cited systems/networks that are based on the known multiple access methods FDMA, TDMA, CDMA (Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Access) and hybrid multiple access methods formed therefrom.

The employment of radio channels (for example, DECT channels) in classic, line-bound telecommunication systems such as the ISDN (for example, RLL/WLL scenario) is gaining in significance, particularly as viewed in front of the background of future, alternative network operators without their own complete wire network.

For example, the wireless connection technology RLL/WLL (Radio in the Local Loop/Wireless in the Local Loop) given the RLL/WLL telecommunication sub-system RW-TTS, should make ISDN services available to the ISDN subscriber at standard ISDN interfaces, for example upon involvement of the DECT system DS (see Figure 4).

In the "ISDN – DECT telecommunication scenario ID-TSZ of Figure 4, a first telecommunication subscriber (user) TCU1 (Tele-Communication

User) has his terminal equipment TE (Terminal Endpoint; Terminal Equipment) linked into the ISDN world with the services available therein, for example via a standardized S-interface (S-BUS), the DECT/ISDN intermediate system DIIS – preferably DECT-specific and contained in the RLL/WLL telecommunication sub-system RW-TTS – fashioned as local message transmission loop, a further standardized S-interface (S-BUS), a network termination NT (Network Termination) and a standardized U-interface of the ISDN telecommunication network I-TKN, as is, on the other hand, a second telecommunication user TCU2 as ultimate user of the DECT/ISDN intermediate system DIIS.

The DECT/ISDN intermediate system DIIS is composed essentially of two telecommunication interfaces, a first telecommunication interface DIFS (DECT Intermediate Fixed System) and a second telecommunication interface DIPS (DECT Intermediate Portable System) that are wirelessly connected to one another, for example via a DECT air interface. Due to the quasi location-bound first telecommunication interface DIFS, the DECT/ISDN intermediate system DIIS forms the local message transmission loop defined above in this context. The first telecommunication interface DIFS contains a radio fixed part RFP (Radio Fixed Part), an interworking unit IWU1 (InterWorking Unit) and an interface circuit INC1 (INterface Circuitry) to the S-interface. The second telecommunication interface DIPS contains a radio portable part RPP (Radio Portable Part) and an interworking unit IWU2 (InterWorking Unit) and an interface circuit INC2 (INterface Circuitry) to the S-interface. The radio fixed part RFP and the radio portable part RPP thereby form the known DECT/GAP system DGS.

As already mentioned, Figure 5 – first (1st possibility), as typical RLL/WLL scenario -- shows how the DECT/ISDN intermediate system DIIS is linked into the ISDN telecommunication network I-TKN as local message transmission loop in the framework of the RLL/WLL telecommunication sub-system RW-TTS, and -- second (2nd possibility –how the DECT/ISDN intermediate system DIIS is connected to the ISDN telecommunication

network I-TKN only at the network side from CAP points of view (Cordless terminal mobility Access Profile). In the 2nd possibility, the interface circuit INC2 of the second telecommunication interface DIPS to the S-interface is not active or not even present at all. In order to graphically show this situation overall and substantiate it, the interface circuit INC2 of the second telecommunication interface DIPS is shown with broken lines. Whereas the second telecommunication interface DIPS in the 1st possibility is not fashioned, for example, mobile part-specifically, i.e. with user interface, the second telecommunication interface DIPS in the 2nd possibility is fashioned as typical mobile part with a user interface.

For example, the procedure described below is provided for the setup of telecommunication connections between the base station/stations BS and the mobile parts MT in the DECT systems according to Figures 1 through 5 according to the DECT standard.

Given an "on-air subscription", i.e. the logon of a DECT mobile part or other DECT terminal at a corresponding DECT base station over the "air", mobile part, terminal and base station are previously brought into a logon-ready condition.

When the base station is brought into the logon-ready condition on the basis of an operator procedure, then it broadcasts this by setting the "high layer capability" bit "a-44" [see ATSI Publication ETS 300 175-5, October 1992, Annex F].

This occurs in that the base station BS (Radio Fixed Part RFP) according to Figures 1 through 5 sends broadcast information via the DECT air interface at regular time intervals on simplex transmission paths, what are referred to as dummy bearers, these broadcast information being received by the mobile part MT (Radio Portable Part RPP) according to Figures 1 through 5 and serving this mobile part MT for the synchronization and the connection setup with the base station. The broadcast information need not necessarily be sent on a dummy bearer.

It is also possible that no dummy bearer is present because the base station is already maintaining at least one telecommunication connection, what is referred to as a traffic bearer, to another mobile prat and then sends the necessary broadcast information on this. In this case, the mobile part MT, RPP that would like to have a telecommunication connection to the base station BS, RFP can receive the broadcast information as in the case of transmission of the broadcast information on the dummy bearer.

According to ETSI Publication ETS 300175-3, October 1992, Chapter 9.1.1.1, the broadcast information contain information about access rights, system information and paging information.

The mobile part, terminal MT, RPP, scans for base stations BS, RFP that have set this bit "a44" and, after a successful search or, respectively, after a successful scan procedure, sets up a radio connection to this base station BS, RFP.

The connection setup by the mobile part MT, RPP ensues according to the rules of channel selection (see ETSI Publication ETS300175-5, October 1992, Chapter 9, and, in particular, Chapter 9.3), in accord wherewith a new channel is selected for the setup of a new connection and a connection request (CC-SETUP) is delivered to the base station BS, RFP.

If more than one base station has simultaneously set these "a44" bit and, as described, broadcast, then the probability is great that an incorrect base station for which the mobile part MT, RPP has no access authorization will be selected by the mobile part MT, RPP and, accordingly, the logon miscarries.

This result of a logon attempt of the mobile part or, respectively, terminal MT, RPP at the base station BS, RFP particularly occurs where, for example, private base stations and public base stations are adjacent or, respectively, private systems/private networks/radio cells of the private base stations and public systems/public networks/radio cells of the public base stations overlap (see Figure 6).

Figure 6 shows, for example, a first radio cell FZ1 of a private base station (residential base station) R-BS and a second radio cell FZ2 of a public

base station P-BS that overlaps/intersect. In this overlap or, respectively, intersection area (area shaded diagonally upward), for example, a private mobile part (residential mobile) part R-MT is located.

In the illustrated constellation, the user of the mobile part R-MT attempts to log his handset on at his private base station R-BS, for example according to the DECT standard on the basis of mutual transmission of radio messages RM between the mobile part R-MT and the base station R-BS. Moreover, the public base station P-BS to which there is also the indicated radio traffic is attached to a light pole LM.

Whereas the private base station R-BS sends the "a44" bit in the radio message FN in order to indicate that it is ready to log on, the same bit is also sent for the same purpose by the public base station P-BS. Since the public base station P-BS constantly emits the "a44" bit, this is always ready to log on by definition. This results therein that the user of the private mobile part R-MT may potentially attempt in vain to log his handset on at the private base station and ultimately gives up.

As an alternative to the described case, to wit that the mobile part R-MT is located in the overlap or, respectively, intersection area of the two radio cells FZ1, FZ2, it is also possible that a further (smaller) overlap or, respectively, intersection area (area shaded diagonally up and down) arises as a result of further radio cells, for example a third radio cell FZ3 with a further public base station P-BS arranged therein and a fourth radio cell FZ4 likewise having another public base station P-BS arranged therein, the mobile part R-MT being capable of receiving the radio messages FN with the "a44" bits therein from said base stations R-BS, P-BS.

Mobile parts that are currently commercially available are fashioned, for example, such that - according to Figure 7 - a plurality of transmitting base stations are sought in a first step S1, and that, in a second step S2, the one having the highest field strength is then taken for the logon attempt of the mobile part, whereby the field strength serves as reception criterion for the selection. Alternatively, however, other reception criteria are also possible for

the selection such as, for example, CRC values or a combination of CRC values and field strength values.

In a following, third step S3, the mobile part checks whether the base station selected in this way has set the "a44" bit and, as described, broadcasts over the "air".

When this is the case, then the logon (subscription) is started according to ETS-Publication ETS300175-5, October 1992, Chapter 3; see German Patent Application 19643658, which does not enjoy prior publication).

When this is not the case, then the selected base station is marked as "invalid" in a fifth step S5, and, subsequently, that base station of the transmitting base stations having the highest field strength is taken in the second step S2 for a further logon attempt of the mobile part - viewed overall, thus, the next-strongest base station.

What this is intended to achieve is that the handset always finds the closest base station. Since public base stations, however, usually work directional antennas, it is never possible - given a scenario illustrated in Figure 6 - to log the handset on at the private base station R-BS.

There are currently three possible methods in order to counter the technical problem that has been set forth:

i) in the private domain, the problem can be alleviated in that the private base station beams out the "a44" bit only for a limited time, for example 30 seconds, after activation of the logon procedure. In this way, the user can designationally logon in this limited time window; this method, however, cannot be used for the above-described scenario.

ii) Evaluation of the field strength. A plurality of base stations are found, whereby the base station having the highest field strength is sought out. In the above-described scenario, this leads to continuous miscarries of the logon.

iii) Application of the message "manual input of the PARK identifier" (Manual entry of PARK). The identity of the base station is thereby input into the handset by the user; the handset intentionally seeks only

for this base station. This method, however, is not utilized in the illustrated scenario because the user does not even know the identity of the base station.

The object underlying the invention is comprised in improving the subscription of telecommunication devices at cooperating stations connectable to the telecommunication devices by wireless telecommunication in wireless telecommunication systems, particularly DECT mobile parts at DECT base stations in DECT systems, to the affect that the probability that the telecommunication devices, particularly the DECT mobile parts, can be logged on designationally at an intended cooperating station is increased from a respective plurality of simultaneously logon-ready cooperating stations, particularly the DECT base stations.

Proceeding from the method defined in the preamble of patent claim 1, this object is achieved by the features recited in the characterizing part of patent claim 1.

The idea underlying the invention is comprised in subscribing telecommunication devices at cooperating stations connectable to the telecommunication devices on the basis of wireless telecommunication in wireless telecommunication systems of the species initially outlined, particularly DECT mobile parts at DECT base stations in DECT systems, such that all base stations sending receiving (found) radio messages that have set the "a44" bit and transmitted it are, for example, stored in the mobile part as hitherto, and a known logon procedure is implemented with a base station selected according to predetermined reception criteria. When this logon procedure miscarries, then this base station, for example, is marked "invalid" in a list and the same procedure - including the logon procedure - is implemented with a different base station.

What is thereby utilized is that a PIN word (personal identify number) and/or an AC word (Authentication Code) is interrogated in the logon. When the PIN word/AC word is incorrect, then the logon attempt is rejected.

Otherwise, when the PIN word/AC word is correct, the mobile part has successfully logged on at the base station.

The expansion compared to the prior methods (Figure 7) is shown in Figure 8. The outlay deriving with the realization thereof is far, far higher than one may expect at first sight because - according to the DECT air interface protocol - the DECT protocol layer "3" is also involved in the log on repetition in addition to the DECT protocol air "2".

Dependent on how many base stations sending the radio messages are received by the mobile part, it can last rather long under certain circumstances until a log on procedure has been successfully terminated. This time can definitely be unacceptable for a user. It is therefore advantageous according to claim 2, that the time duration for a subscription can be set by the user or, respectively, is predetermined by the system.

Further advantageous developments of the invention are recited in the other subclaims.

An exemplary embodiment of the invention is explained with reference to Figure 8.

Proceeding from Figure 7, Figure 8 shows an expanded logon method for subscription of, for example, DECT mobile parts R-MT at, for example, DECT base stations R-BS, P-BS. The two methods particularly differ in that an interrogation is made in a sixth step S6 given the log on method according to Figure 8 to see whether a PIN word (personal identity number) and/or AC word (authentication code) input at the mobile part is incorrect or correct.

When the PIN word and/or AC word is incorrect, then the selected base station is marked as "invalid" in the fifth step S5, and that base station among the transmitting base stations that has the highest field strength - the next-strongest base station, thus, viewed overall - was subsequently taken in the second step S2 for a further logon attempt of the mobile part.

When, by contrast, the PIN word and/or AC word is correct, then the logon procedure has been ended and the mobile part is logged on at the base station.

Dependent on how many base stations R-BS, P-BS sending the radio messages are received by the mobile part R-MT, it can last rather long under certain circumstances until a log on procedure has been successfully ended. This time can definitely be unaccepted to the user.

Based on Figure 2, a time counter ZZ is therefore present, particularly in the mobile part R-MT. This time counter ZZ fashioned in a traditional way can be loaded with a defined time duration by the user via the user interface (can be set) and/or can be prescribed by the system via the base station R-BS, P-BS that, for this purpose, likewise comprises a time counter ZZ or, respectively, a memory SP based on Figure 2, and can be intermediately stored in a memory SP of the mobile part R-MT, based on Figure 2.

The memory SP in the mobile part - over and above this - also serves the purpose of storing the receiving (found) base stations on the basis of base-station-specific information and of storing the base stations marked as invalid for the logon procedures shown in Figures 7 and 8.

Patent Claims

1. Method for subscribing telecommunication devices at cooperating stations connectable to the telecommunication devices by wireless telecommunication in wireless telecommunication systems, particularly DECT mobile parts at DECT base stations in DECT systems, whereby the telecommunication devices (R-MT)

(a) search for primary cooperating stations (R-BS, P-BS) at their locations in the wireless telecommunication systems and from which wireless the transmitted messages (FN) are received,

(b) determine at least first primary cooperating stations on the basis of location-specific reception criteria from among the primary cooperating stations (R-BS, P-BS), whereat the telecommunications devices (R-MT) attempt to log on,

(c) check whether first information ("a44" bit) are contained in the messages (FN) transmitted from the first primary cooperating stations,

(d) attempt, when the checks show that the first information ("a44" bit) are not present, to log on to different first primary cooperating stations than the first primary cooperating stations already checked,

(e) start predetermined subscription procedures for subscribing at the checked, first primary cooperating stations when the checks show that the first information ("a44 bit") are present,

(f) send second information (PIN) during the course of the subscription procedures to the checked, first primary cooperating stations, with which the subscription authorizations of the telecommunication devices (R-MT) are identified at the checked, first primary cooperating stations,

(g) are logged on at the checked, first primary cooperating stations when it is found that the second information (PIN) are correct for logon at the checked, first primary cooperating stations

characterized in that the telecommunication devices (R-MT) - when it is found that the second information (PIN) for log on at the checked, first primary cooperating stations are not correct - attempt to synchronous onto first primary

cooperating stations other than the first primary cooperating stations already checked.

2. Method according to claim 1, characterized in that a subscription time duration is prescribed and/or can be set for the subscribing of the telecommunication device (R-MT) at the first primary cooperating stations or, respectively, primary cooperating stations (R-BS, P-BS).

3. Method according to claim 1 or 2, characterized by application in DECT systems, whereby the telecommunication devices (R-MT) are DECT devices, and the cooperating stations (R-BS, P-BS) are DECT base stations and/or DECT repeaters.

4. Method according to claim 3, characterized in that the DECT devices are DECT mobile parts of DECT network termination means.

5. Method according to claim 3 or 4, characterized in that the messages are DECT air interface-specific protocol messages.

6. Method according to one of the claims 3 or 5, characterized in that the location-specific reception criterion is formed of field strength and/or CRC values.

7. Method according to claim 5, characterized in that the first information are NWK/DLC protocol layer-related ("more significant") bit information ("a44 bit") that are transmitted in MAC layer broadcast messages.

8. Method according to one of the claims 3 or 7, characterized in that the second information is a PIN word.

9. Method according to one of the claims 3 or 8, characterized in that the second information is an AC word.

10. Method according to claim 1 or 2, characterized by application in GSM networks, whereby the telecommunication devices (R-MT) are GSM devices, and the cooperating stations (R-BS, P-BS) are GSM base stations with allocated, central switching equipment.

11. Method according to claim 1 or 2, characterized by application in networks that are hybrid with respect to CDMA-/FDMA-/TDMA multiple

access methods, whereby the telecommunication devices (R-MT) are hybrid devices and the cooperating stations (R-BS, P-BS) are hybrid base stations.

FIG 1

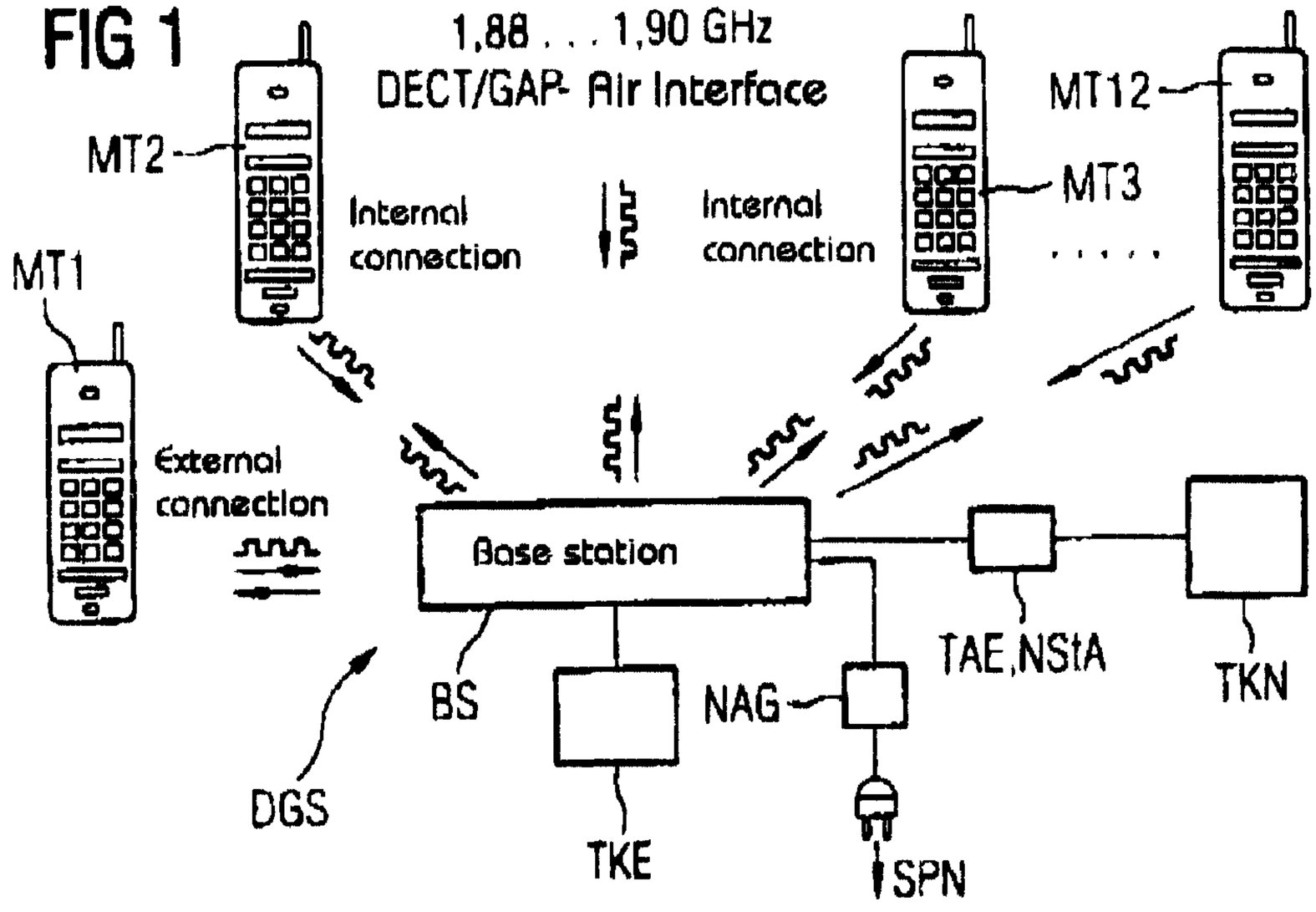
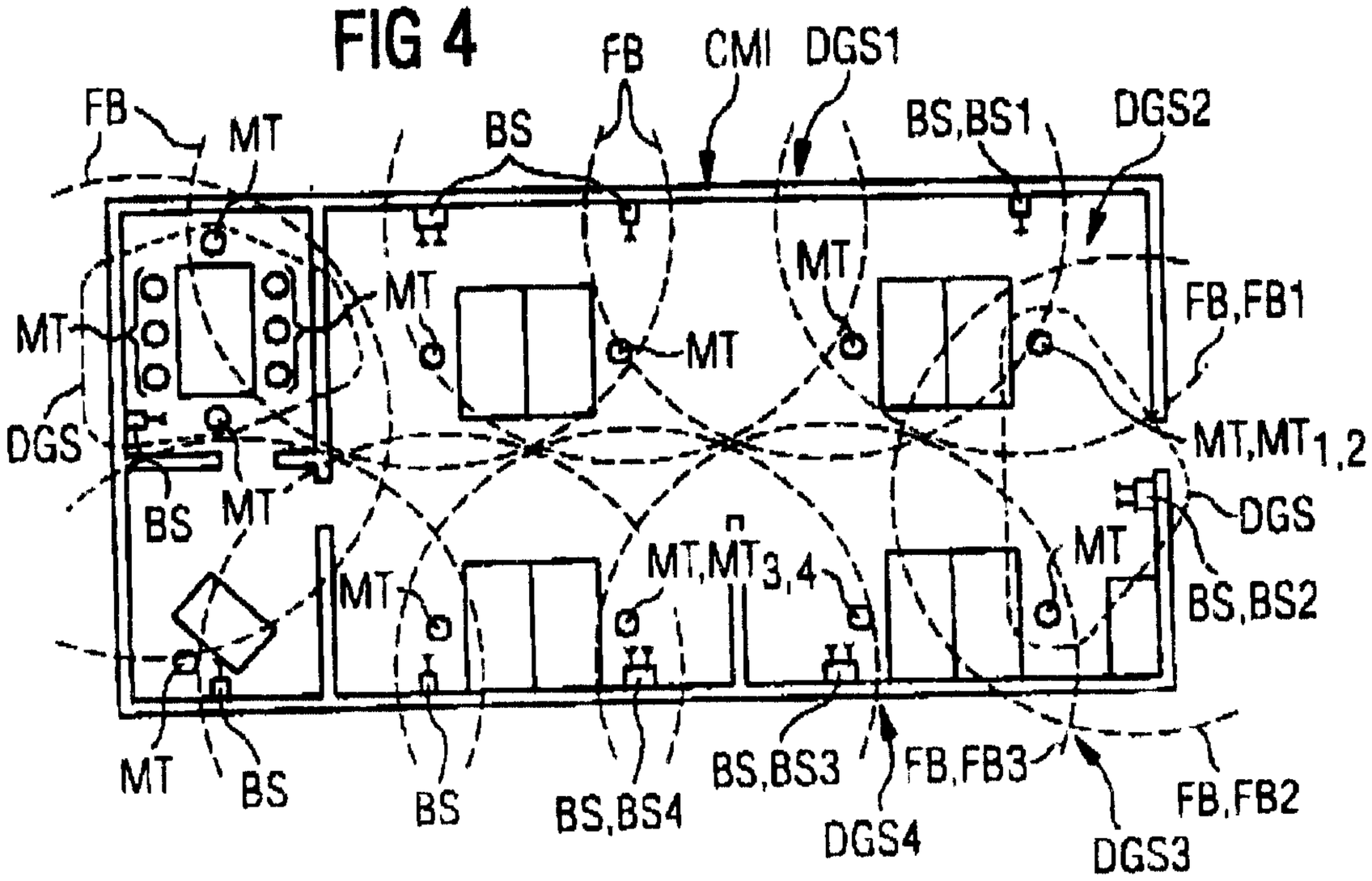

1,88 . . . 1,90 GHz
DECT/GAP- Air Interface
MT2
MT12
MT3
MT1
Internal connection
Internal connection
External connection
Base station
BS
NAG
TAE,NStA
TKN
DGS
TKE
SPN

FIG 4


FB
MT
BS
FB
CMI
DGS1
BS,BS1
DGS2
MT
MT
MT
MT
FB,FB1
DGS
MT,MT1,2
BS
MT
DGS
MT
MT,MT3,4
BS,BS2
MT
BS
BS
BS,BS4
BS,BS3
FB,FB3
FB,FB2
DGS4
DGS3

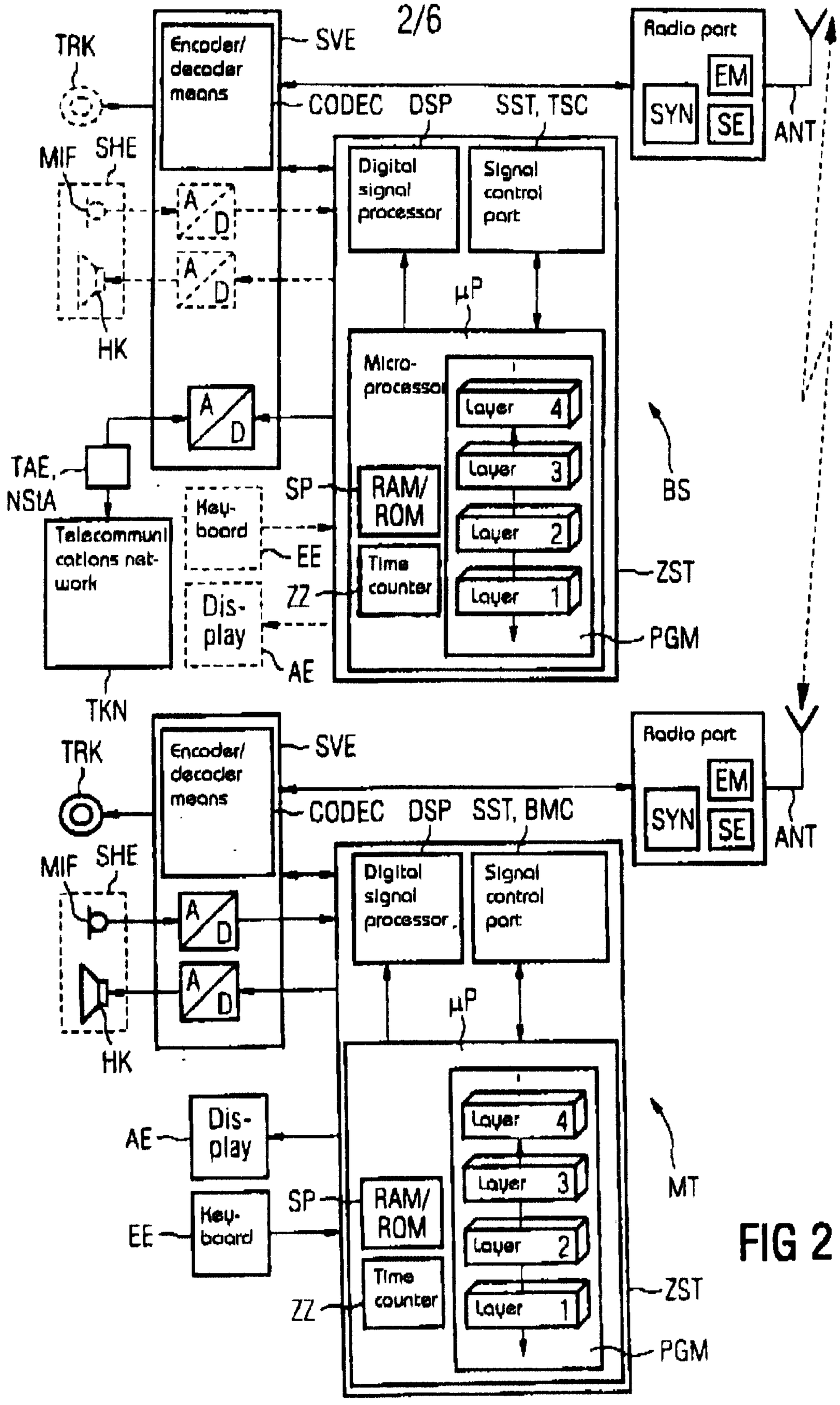

TRK
Encoder/ decoder means
SVE
Radio part
EM
SYN
SE
ANT
CODEC DSP SST, TSC
MIF SHE
A D
Digital signal processor
Signal control part
µP
HK
Micro-processor
Layer 4
Layer 3
Layer 2
Layer 1
BS
TAE, NSIA
SP
RAM/ ROM
Key-board
Telecommuni cations net-work
EE
Time counter
ZZ
ZST
Dis-play
AE
PGM
TKN
TRK
Encoder/ decoder means
SVE
Radio part
EM
SYN
SE
ANT
CODEC DSP SST, BMC
MIF SHE
A D
Digital signal processor
Signal control part
µP
HK
Layer 4
Layer 3
Layer 2
Layer 1
MT
AE
Dis-play
EE
Key-board
SP
RAM/ ROM
Time counter
ZZ
ZST
PGM

FIG 2

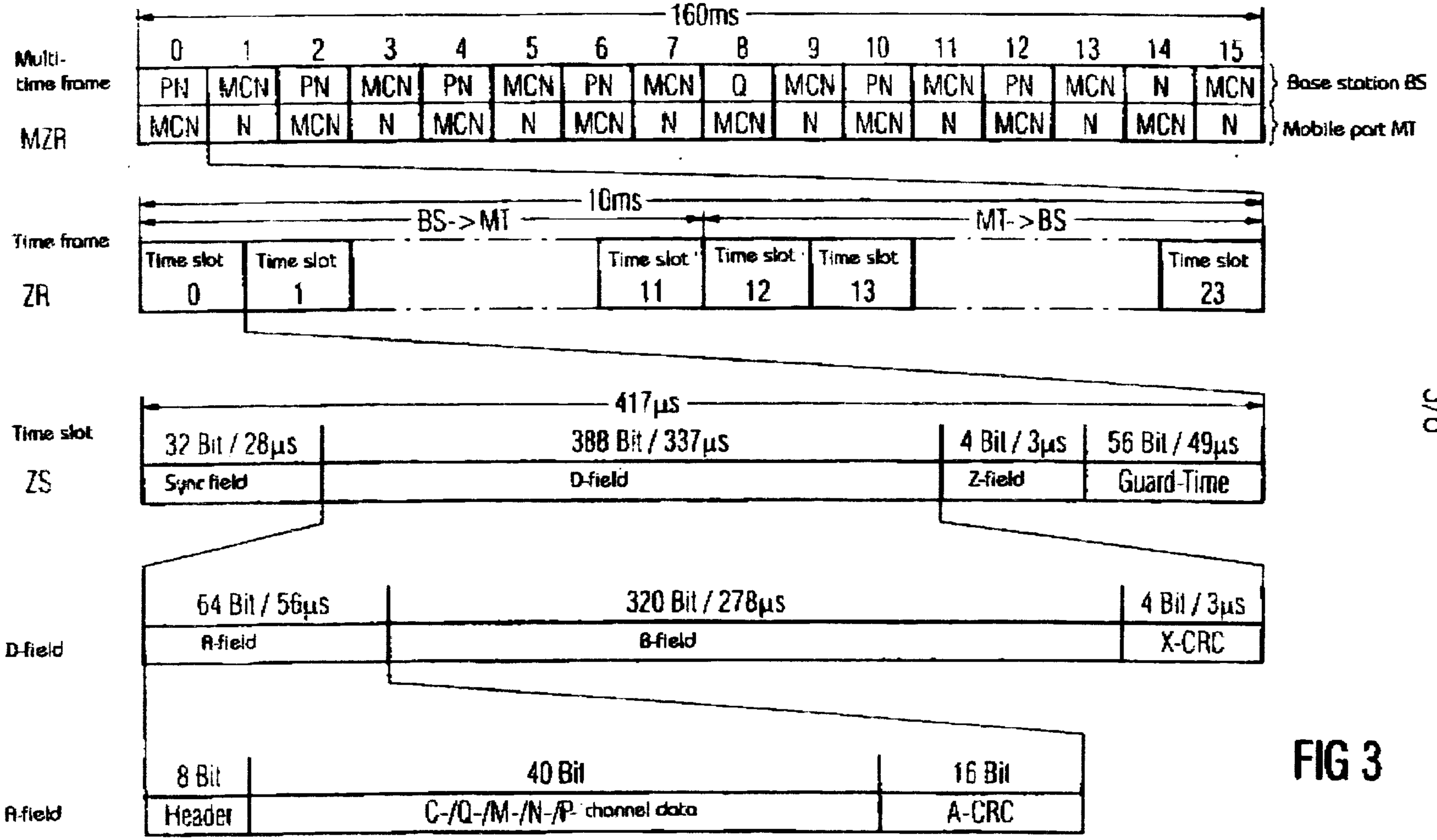


FIG 3

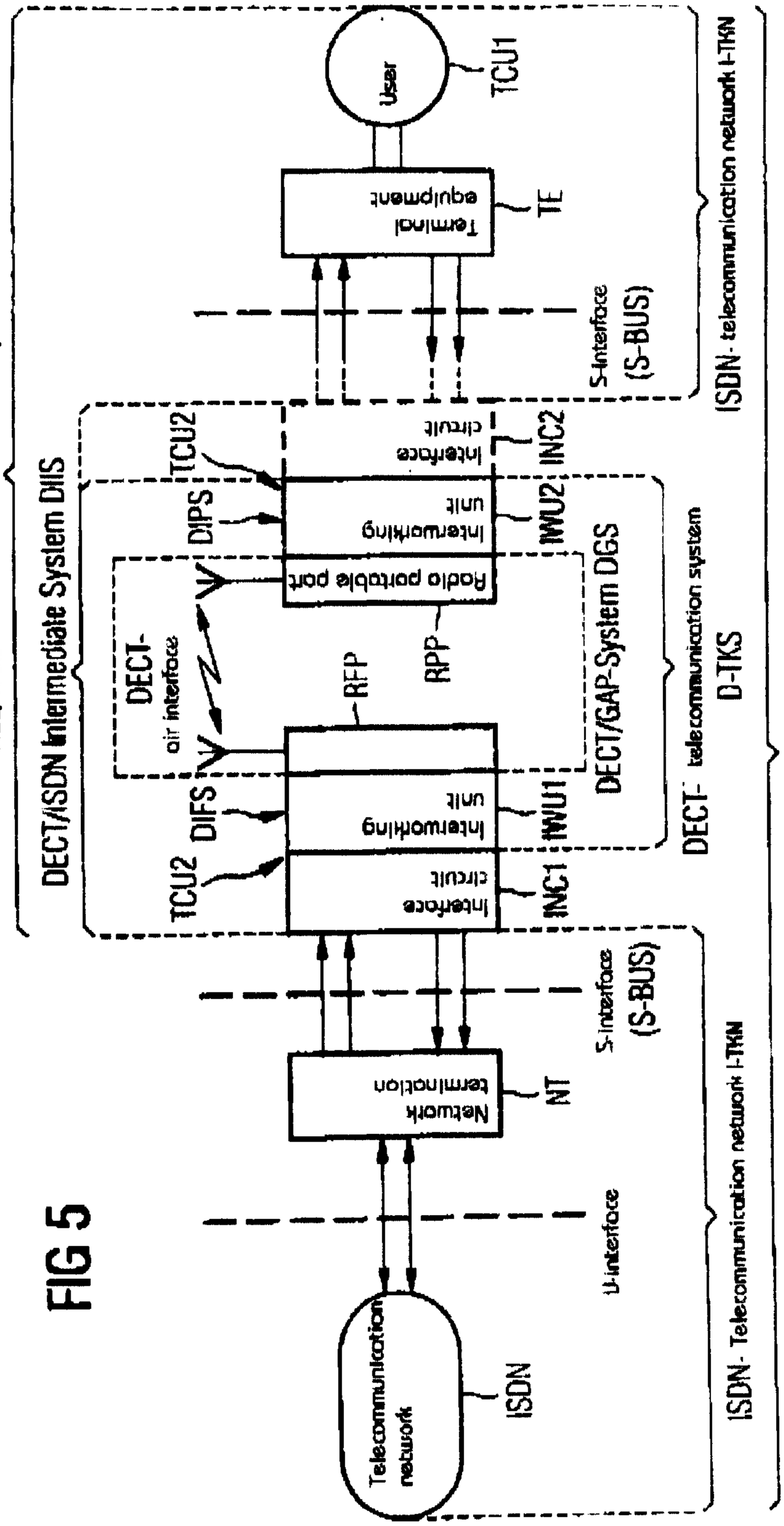

RLL/WLL- Telecommunication sub-system RW-TTS
DECT/ISDN Intermediate System DIS
DECT- telecommunication system
D-TKS
ISDN- telecommunication network I-TKN
User
TCU1
Terminal equipment
TE
S-interface (S-BUS)
INC2
Interface circuit
TCU2
DIPS
IWU2
Interworking unit
Radio portable port
DECT-air interface
RFP
RPP
DECT/GAP-System DGS
DIFS
IWU1
TCU2
INC1
Interface circuit
S-interface (S-BUS)
NT
Network termination
U-interface
Telecommunication network
ISDN
ISDN- Telecommunication network I-TKN
"ISDN ⟷ DECT"- telecommunication scenario ID TS2

FIG 5

FIG 6

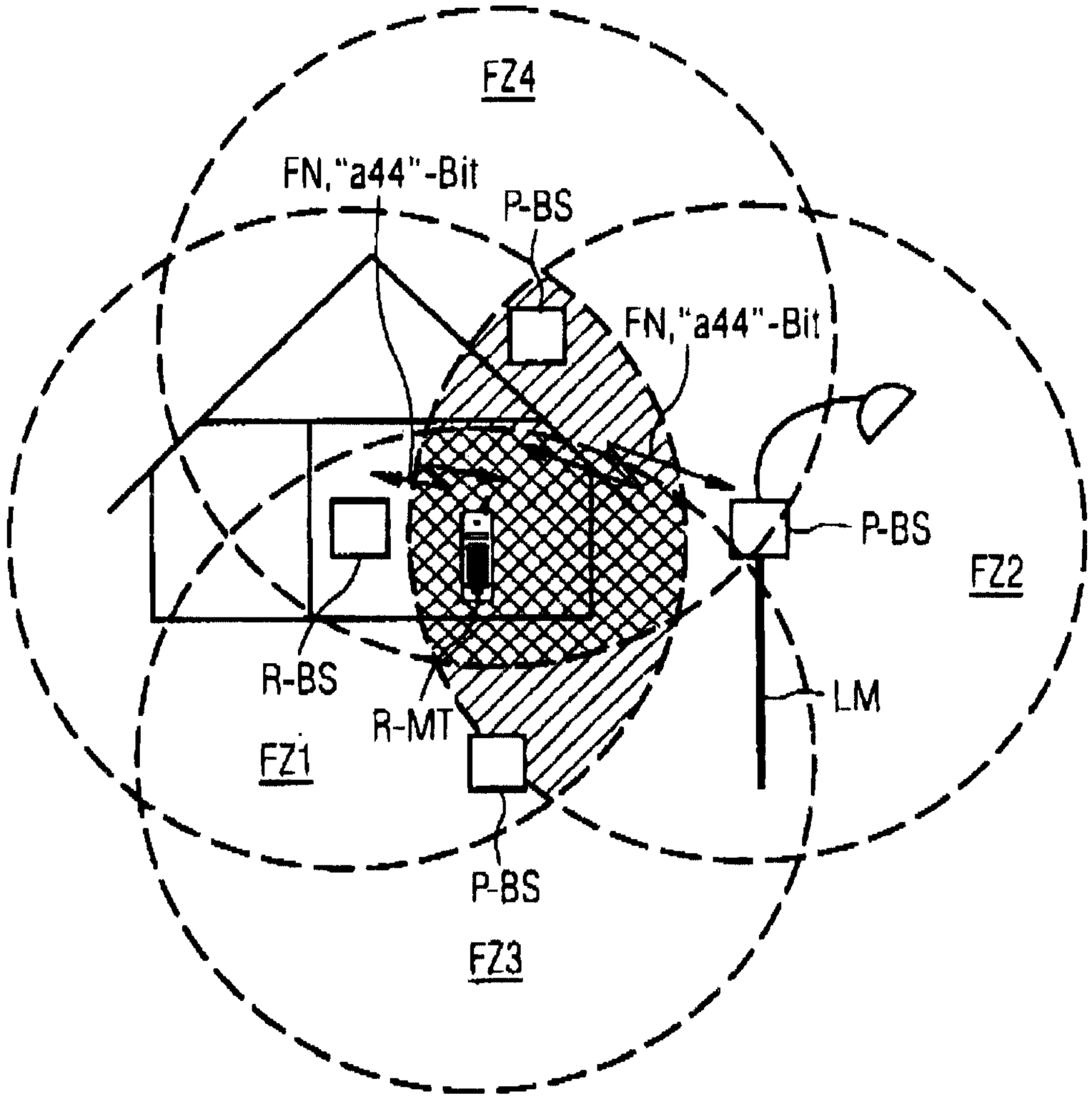


FIG 7

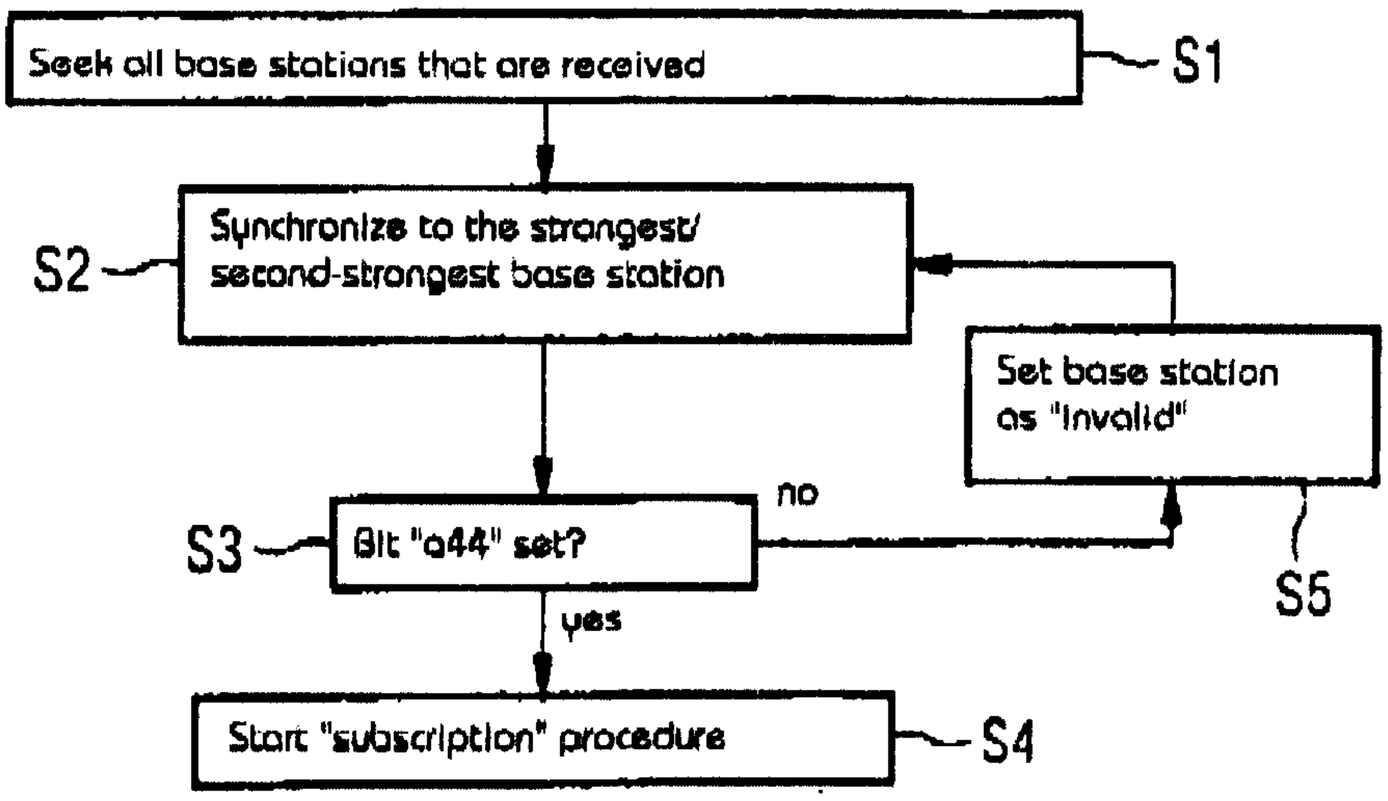
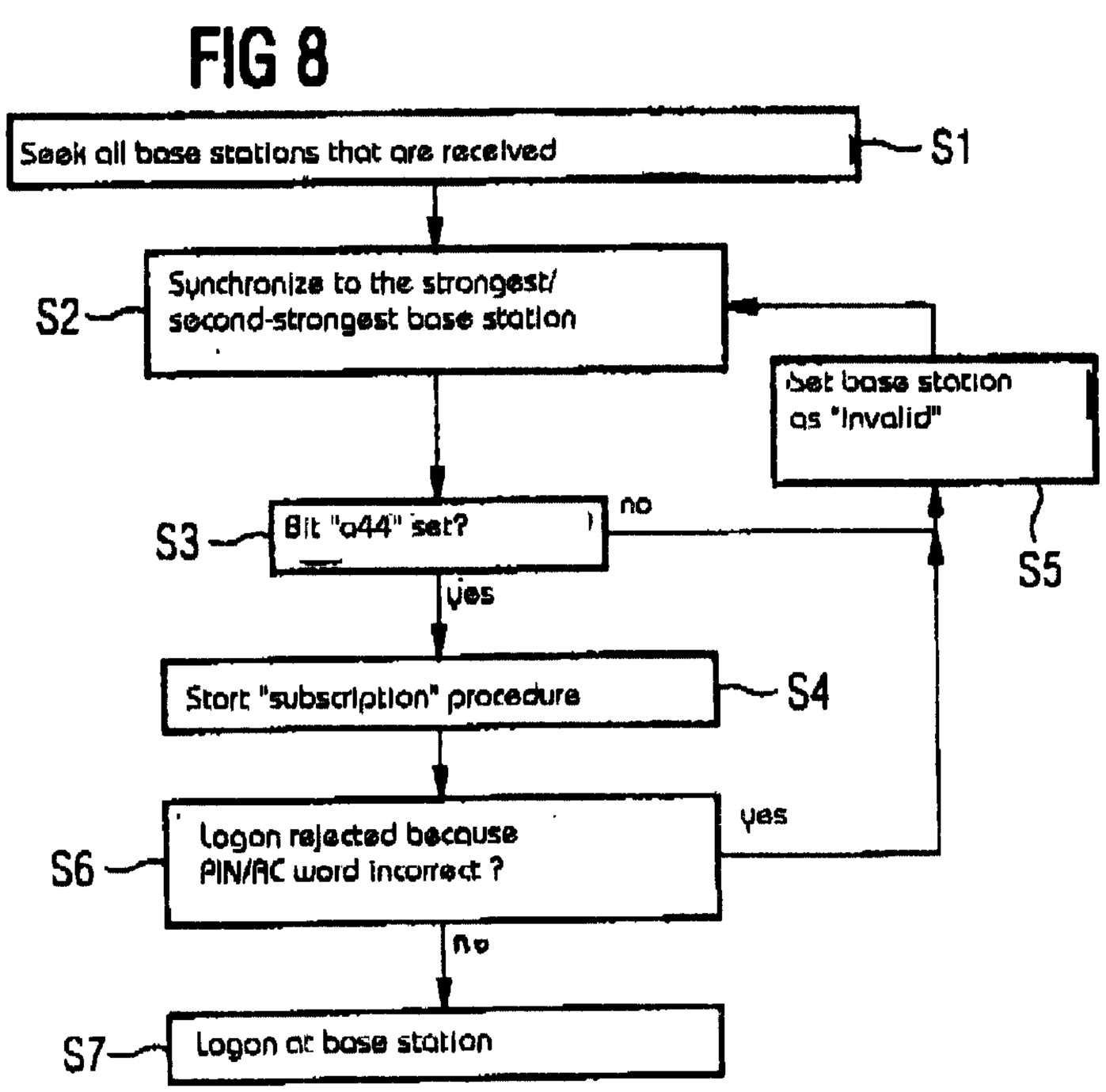

Seek all base stations that are received
S1
Synchronize to the strongest/ second-strongest base station
S2
Set base station as "invalid"
no
Bit "a44" set?
S3
S5
yes
Start "subscription" procedure
S4

FIG 8


Seek all base stations that are received
S1
Synchronize to the strongest/ second-strongest base station
S2
Set base station as "invalid"
no
Bit "a44" set?
S3
S5
yes
Start "subscription" procedure
S4
yes
Logon rejected because PIN/AC word incorrect ?
S6
no
Logon at base station
S7