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A telecommunications system with a plurality of radio cells

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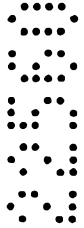
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Abstract

The invention relates to a telecommunications (telecommunications system (1) with a plurality of radio cells , wherein in each radio cell (CTS1...CTS6) a base station (BS1...BS6) is provided for coordinating the telecommunications connection between a base station (BS1) of a radio cell (CTS1) and a radio telephone (2) located in the radio cell (CTS1). To be able to transfer a radio telephone (2) from one radio cell (CTS1) of the telecommunications system (1) to another radio cell (CTS2) of the telecommunications system (1) in the shortest possible time, it is proposed that, for the exchange of system control information, the base stations (BS1...BS6) of the telecommunications system (1) are connected to a central exchange (PABX) and that the system control information is known to the radio telephone (2) prior to a handoff into another radio cell (CTS2).

(Figure 2)



AUSTRALIA

Patents Act 1990

**ORIGINAL
COMPLETE SPECIFICATION
STANDARD PATENT**

Invention Title: 'A telecommunication system with a plurality of radio cells'

The following statement is a full description of this invention, including the best method of performing it known to us:

A telecommunications system with a plurality of radio cells

Field of the invention

The present invention relates to a telecommunications (TC) system with a plurality of radio cells (cordless telephone system, CTS) wherein in each radio cell a base station is provided for coordinating the telecommunications (TC) connection between a base station of a radio cell and a radio telephone located in the radio cell. The invention further relates to a method for transferring a radio telephone from one radio cell (cordless telephone system, CTS) of a telecommunications (TC) system to another radio cell of the TC system.

Background of the invention

Such TC systems enable a subscriber to make a wireless TC connection both within limited zones and also nationally and internationally. In contrast to classical radio transmission, transmitter and receiver are not directly connected to one another but communicate via a network of stationary base stations. Each base station coordinates the TC connection within a spatially limited area, the so-called radio cell.

The cellular construction of the TC system requires that provisions be made within the TC system to allow the transfer of a subscriber's radio telephone from one radio cell to another radio cell when the subscriber moves from the one radio cell to the other. The transfer must function securely and reliably, both without an active TC connection (so-called roaming) and with an active TC connection (so-called handover).

TC systems operating in accordance with the Global System for Mobile Communications (GSM) standard are known for example from the prior art. In GSM-TC systems, the information to be transmitted is sent in accordance with the Time Division Multiple Access (TDMA) transmission method in transmission frames comprising a plurality of time slots to achieve a better utilization of available transmission capacities. The transmission frames of GSM-TC systems are normally divided into eight time slots. A time slot contains data to be transmitted between the base station and a specific radio telephone. In a transmission frame, the data for a plurality of independent data transmission connections can thus be transmitted in a plurality of time slots. In the receiving radio telephone, the information to be transmitted is then reconstructed from the data of the corresponding time slots of a plurality of transmission frames.

In accordance with the GSM standard, the transmission frames each comprise eight time slots. At least one time slot in a transmission frame of a radio cell is reserved for the transmission of system control information (broadcast channel, BC). The system control information comprises for example the number of radio cells of a TC system and the configuration of the individual radio cells. The configuration of the radio cells comprises for example the transmission frequency, the type of interleaving or the type of scrambling of the time slots of the transmission frame. To be able to establish a TC connection between the base station of a radio cell and a radio telephone located in the radio cell, it is essential for the system control information to be known to the radio telephone. The user data can be transmitted in the remaining time slots of the transmission frames.

As only a limited number of radio telephones can be operated in each radio cell, in GSM-TC systems different sized radio cells are used depending upon the volume of telecommunications (TC) traffic. The GSM-TC systems are normally operated in the open (outdoor), where the radio cells have a range of approximately 10 to 30 km (large cell), 1 to 3 km (small cell), or 100 to 300 m (micro-cell).

However it is also known from the prior art to operate TC systems of the type described in the introduction within enclosed areas (for example on a factory site, in office buildings, in factory buildings or in private households). GSM-TC systems which are operated within enclosed areas (indoor) are also known. These internal GSM-TC systems must transmit at a substantially lower transmission power level compared to the external TC systems in order to avoid disturbance to the external TC systems. For this reason, the radio cells of the internal TC systems are also considerably smaller than those of the external TC systems. As soon as an enclosed area in which an internal TC system is installed is entered from the exterior by a subscriber with his radio telephone, the radio telephone logs onto the nearest base station of the internal TC system to check-in and is authenticated and registered in the base station. The internal TC systems facilitate considerably more cost-efficient telephone calls within the enclosed areas than would be possible via an external TC system. In addition, the advantage is achieved that the subscribers can be reached via the same radio telephone with the same subscriber number both in the open (outdoor) via external TC systems and also within enclosed areas (indoor) via internal TC systems.

In the known internal TC systems, the transfer of a radio telephone from one radio cell of the TC system to another radio cell of the TC system can take place in different ways. Firstly, the radio telephone must determine when a handover or roaming must be implemented. In GSM-TC systems the radio telephone checks the level (RXlev) and bit error rate (RXqual) of an active TC connection, for example periodically, and determines a transfer criterion therefrom. If the call quality is inadequate, a handover of the TC connection to another radio cell must take place. The handover must be effected with as short as possible an interruption in the TC connection which is at least inaudible to the subscriber. A transfer criterion is determined in a similar manner. In roaming, although there is no active TC connection whose quality could be checked, the radio telephone and the base station periodically exchange a so-called beacon signal, on the basis of the quality of which a transfer criterion can be determined.

In preparation for a handover, the mobile telephone requests information from the base stations of other radio cells of the TC system to find a suitable radio cell to which the radio telephone can be transferred. A suitable radio cell must i.a. have free transmission capacities and a strong level. As soon as a suitable radio cell has been found, the system control information of this radio cell must be sent to the radio telephone to enable the radio telephone to establish and hold a TC connection with the base station of the new radio cell. Then the radio telephone establishes a TC connection to the base station of the new radio cell using the transmitted system control information. The establishment of the TC connection comprises the check-in, the registration of the radio telephone in the base station of the new radio cell, and a synchronisation of the radio telephone with the new base station. Optionally, the authentication of the radio telephone and/or the subscriber is checked and the previous TC connection is disestablished.

The known method for transferring a radio telephone from one radio cell to another has the disadvantage however of being very time-consuming. In particular, the synchronisation constitutes a substantial part of the time requirement of 500 ms to 1 s for the overall transfer. Such a long time period has proved particularly impractical in internal TC systems as in internal TC systems a substantially faster transfer of the radio telephone can be necessary in specific situations. This is the case for example when the subscriber enters a shielded room in a building, and a steel door or lift door slams shut behind him within a few milliseconds. Without

a particularly fast transfer of the radio telephone, the TC connection is interrupted in such situations.

Summary of the invention

According to a first aspect of the present invention there is provided a telecommunications (TC) system with a plurality of radio cells, wherein in each radio cell a base station is provided for coordinating the telecommunications connection between a base station of a radio cell and a radio telephone located in the radio cell, characterised in that, for the exchange of system control information, the base stations of the TC system are connected to a central exchange, and that the system control information are known to the radio telephone prior to a handoff into another radio cell.

In the TC system according to an embodiment of the invention, the base stations are networked with the central exchange so that they can exchange system control information with one another. The system control information comprises for example the number and topology of the radio cells of the TC system and the configuration of the individual radio cells. The configuration of the radio cells comprises for example the transmission frequency, the type of interleaving or the type of scrambling of the time slots of a transmission frame. The system control information can differ for each radio cell.

The radio telephone is registered in the base station of one of the radio cells of the TC system. Via this base station, incoming calls are transmitted to the radio telephone and outgoing calls are transmitted from the radio telephone. As soon as an area in which the TC system is installed is entered from outside the TC system by a subscriber with a switched-on radio telephone, or as soon as a subscriber switches on his radio telephone in this area, the radio telephone logs onto the nearest base station of the TC system to check-in, and is registered in the base station. When the subscriber then moves out of the radio cell into another radio cell with his radio telephone, a transfer of the radio telephone from the base station of the original radio cell to the base station of the other radio cell is implemented. As, in the TC system according to the invention, the system control information is known to the radio telephone prior to a handoff into another radio cell, it is possible to dispense with the time-consuming

transmission of the system control information in the course of the transfer of the radio telephone to another radio cell.

In the TC system according to an embodiment of the invention, the transfer of a radio telephone from one radio cell to another can take place in a particularly rapid and yet reliable manner. A handover can take place with a particularly short interruption in the TC connection which is inaudible to the subscriber.

The TC system according to the invention is preferably operated as an internal TC system within an enclosed area (e.g. on a factory site, in an office building, in a factory building or in a private household). The time period required for the transfer of the radio telephone to another radio cell is so short that, even in the special situation in which the subscriber enters a shielded room in a building and a steel door or lift door slams shut behind him within a few milliseconds, a secure and reliable transfer of the radio telephone is possible without an interruption in the TC connection audible to the subscriber.

The radio telephone can be registered in a radio cell of an internal TC system even when it is simultaneously registered in an external TC system (Public Land Mobile Network, PLMN). For a subscriber, this means that he can utilize the advantages of internal TC systems in the range of an internal TC system, but can still be reached via the external TC system (PLMN). This is made possible in that the radio telephone regularly monitors a broadcast channel of an external TC system (PLMN) and when necessary establishes a TC connection in the external TC system (PLMN). The radio telephone also monitors the broadcast channel when it is registered in a radio cell of an internal TC system.

In accordance with an advantageous further development of the present invention, it is proposed that the base stations of the individual radio cells are synchronised with one another. In particular, the base stations are time-synchronised with one another. However it is also conceivable for the transmission frequencies and/or other transmission parameters of the base stations to be synchronised with one another. Like the exchange of system control information, the synchronisation of the base stations takes place via connection lines between the base stations of the radio cells of the TC system and the central exchange. Due to the synchronisation of the base stations of the individual radio cells one with one another, upon the transfer of a radio telephone from one radio cell of the TC system to another radio cell it is possible to dispense with a time-consuming synchronisation of the radio telephone with the base station of

the new radio cell. In this way, the transfer of the radio telephone can be implemented in a shorter period of time. Furthermore, due to the omission of the synchronisation, it is possible to reduce the volume of radio traffic between the radio telephone and the base station of the radio cell to which the handoff is taking place. This leads to a reduced incidence of interference and thus to fewer disturbances to other radio connections.

In accordance with a preferred embodiment of the invention, it is proposed that the transmission frames in a radio cell of the TC system are offset by at least one time slot relative to the transmission frames at least of the adjacent radio cells of the TC system, and that the number of time slots by which the transmission frames are mutually offset is known to the radio telephone as system control information. A transmission method comprising transmission frames divided into a plurality of time slots is for example the Time Division Multiple Access (TDMA) method. The number of time slots by which the transmission frames are mutually offset is known to the radio telephone as system control information prior to a handoff into another radio cell. On the basis of the mutually offset transmission frames of the various radio cells, it is possible for the radio telephone to differentiate between the base stations of the individual radio cells and, in the course of the transfer of the radio telephone to another radio cell, to purposively address a base station and establish a TC connection thereto.

If the TC system comprises more radio cells with the same transmission frequency than the transmission frames have time slots, at least the transmission frames of the adjacent radio cells with the same transmission frequency are offset by one or more time slot(s). Here the same transmission frequency is to be understood both as the same continuous frequency and as the same frequency specified by a hopping algorithm. As a result, although the radio telephone cannot differentiate between all the radio cells, it can however differentiate between the adjacent radio cells which are important for a transfer of the radio telephone.

Advantageously, the TC system comprises at the maximum as many radio cells with the same transmission frequency as the transmission frames have time slots. The transmission frames of a radio cell of the TC system are offset by at least one time slot relative to the transmission frames of the other radio cells.

In accordance with a particularly preferred embodiment, the transmission frames of the radio cells are offset relative to transmission frames of a virtual reference transmission frame

structure. In this way it is easily possible to indicate the number of time slots by which the individual transmission frames are mutually offset.

According to a first aspect of the present invention there is provided a method for transferring a radio telephone from one radio cell of a telecommunications (TC) system to another radio cell of the TC system, wherein system control information is sent to the radio telephone prior to the transfer of the radio telephone from the one radio cell to the other radio cell, and the radio telephone is registered in the other radio cell using the system control information.

The transfer of the radio telephone can function securely and reliably without an active TC connection (so-called roaming) or with an active TC connection (so-called handover). As, in the method according to an embodiment of the invention, the system control information is known to the radio telephone before a handoff to another radio cell, it is possible to dispense with a time-consuming transmission of the system control information in the course of the transfer of the radio telephone to another radio cell.

In accordance with a preferred further development of the present invention, the system control information is sent to the radio telephone in the course of the registration in the TC system. As soon as an area in which the TC system is installed is entered from outside the TC system by a subscriber with a switched-on radio telephone, or as soon as a subscriber switches on his radio telephone in this area, the radio telephone logs onto the nearest base station of the TC system to check-in and is registered in the base station. In the course of this registration, the system control information is sent to the radio telephone.

Preferably, the system control information is sent to the radio telephone in the course of the registration in a radio cell. When the radio telephone has been registered in the TC system and the subscriber moves out of the radio cell into another radio cell with his radio telephone, a transfer of the radio telephone from the base station of the original radio cell to the base station of the other radio cell is implemented. In the course of the transfer of the radio telephone, the radio telephone is registered i.a. in the new radio cell. In the course of this registration, thus upon each handoff of the radio cell, the system control information can be sent to the radio telephone.

It is conceivable for the transfer of the radio telephone from the one radio cell to another radio cell to take place without an active telecommunications (TC) connection. Such a transfer is referred to as roaming.

In accordance with a preferred embodiment of the invention, the radio telephone is transferred from the one radio cell to the other radio cell during a TC connection. The TC connection can consist either of an active TC connection (in the case of handover) or a so-called beacon signal (in the case of roaming). Such a transfer is referred to as handover. By means of the method according to the invention, the handover can take place within the shortest possible time and without an interruption in the TC connection audible to the subscriber.

In accordance with an advantageous further development of the present invention, it is proposed that the information to be transmitted in the course of the TC connection is transmitted in accordance with the Time Division Multiple Access (TDMA) transmission method in transmission frames comprising a plurality of time slots, and that the system control information is sent to the radio telephone in a system control window of the transmission frame.

To achieve a better utilization of available transmission capacities, in accordance with the invention it is further proposed that the information to be transmitted in the course of the TC connection is transmitted in accordance with the Time Division Multiple Access (TDMA) transmission method in transmission frames comprising a plurality of time slots, and that the system control information is transmitted to the radio telephone in a user data window of the transmission frame.

In accordance with a preferred embodiment of the invention, it is proposed that the transmission frames in a radio cell of the TC system are offset by at least one time slot relative to the transmission frames at least of the adjacent radio cells with the same transmission frequency, and that the number of time slots by which the transmission frames are mutually offset is sent to the radio telephone as system control information.

It is further proposed that the TC system at the maximum comprises as many radio cells with the same transmission frequency as the transmission frames have time slots, and that the transmission frames of a radio cell of the TC system are offset by at least one time slot relative to the transmission frames of the other radio cells with the same transmission frequency.

To be able to indicate, in the simplest possible way, the number of time slots by which the individual transmission frames are mutually offset, it is proposed that a virtual reference transmission frame structure be defined. The transmission frames of the radio cells are offset relative to the transmission frames of the reference transmission frame structure. The offset of the transmission frames relative to the transmission frames of the reference transmission frame structure can vary from radio cell to radio cell between zero time slots and the maximum number of time slots of the transmission frames. The offset is communicated to the radio telephone as system control information.

In accordance with an advantageous further development of the present invention, it is proposed that at least one transmission parameter of the TC connection is changed in accordance with a specific algorithm, the algorithm at least of the adjacent radio cells being sent to the radio telephone as system control information. In this further development, the number of radio cells with the same transmission frequency is subject to no restrictions on the basis of the number of time slots of the transmission frames. Primarily it is not the mutual offset of the transmission frames by one or more time slot(s) which is used to differentiate the transmission frames of the individual radio cells, but rather the algorithm (so-called hopping algorithm) in accordance with which at least one of the transmission parameters of the TC connection is changed. In addition to the hopping algorithm, the transmission frames of the radio cells can be offset by one or more time slot(s).

Advantageously, the transmission frequency is changed in accordance with a specific algorithm, the algorithm at least of the adjacent radio cells being sent to the radio telephone as system control information. The algorithm in accordance with which the transmission frequency is changed is also referred to as frequency hopping algorithm.

In accordance with another advantageous further development of the present invention, statistics are kept on the other radio cell into which a radio cell preferentially changes-over, the preferred handoffs being sent to the radio telephone as system control information. The statistics can be held in the central exchange or in a base station of a radio cell. With knowledge of the preferred handoffs from a radio cell, in the case of an imminent transfer of the radio telephone (handover or roaming) from this radio cell the radio telephone can purposively address the preferred other radio cells without firstly having to find a suitable radio cell. In this way it is possible to further accelerate the transfer of the radio telephone from one radio cell into another.

Moreover, by means of the statistics, it is possible to dispense with the communication with adjacent cells to determine a suitable radio cell into which the handoff can take place. The radio cell to which, viewed statistically, the handoff is to take place can be purposively addressed. The volume of radio traffic between the radio telephone and the base stations of the radio cells can thereby be reduced. This leads to a reduced incidence of interference and thus to fewer disturbances of other radio connections, in particular other radio networks.

In accordance with a preferred embodiment, the system control information is sent to the radio telephone upon request by the radio telephone. Alternatively, it is proposed that the system control information is sent periodically to the radio telephone with a specific beacon frequency.

It should be noted that where in the specification or claims the terms "comprised" or "comprising" are used those terms should be interpreted inclusively rather than exclusively.

Brief description of the drawings

A preferred exemplary embodiment of the present invention will be explained in detail in the following with reference to the drawings in which:

Figure 1 illustrates the structure of a telecommunications (TC) system according to the invention in the form of a preferred embodiment;

Figure 2 illustrates the schematic construction of the TC system according to Figure 1; and

Figure 3 illustrates a frame structure in which the information to be transmitted is transmitted in the TC system according to Figures 1 and 2.

Detailed description of the embodiments

In Figure 1 and Figure 2 a telecommunications (TC) system according to the invention in the form of a preferred embodiment has been provided with the overall reference 1. The TC system 1 comprises six radio cells (cordless telephone system) CTS1...CTS6. A base station BS1...BS6 is provided in each radio cell CTS1...CTS6. The base station BS1...BS6 of a radio cell CTS1...CTS6 coordinates a telecommunications (TC) connection between the base station BS1...BS6 and a radio telephone 2 located in the radio cell CTS1...CTS6 (see Figure 2).

The TC system 1 operates in accordance with the Global System for Mobile Communications (GSM) standard. In the GSM-TC system 1, the information to be transmitted is transmitted in accordance with the Time Division Multiple Access (TDMA) transmission method in transmission frames 5 comprising eight time slots to achieve a better utilization of available transmission capacities. A time slot contains data to be transmitted between the base station BS1...BS6 and a specific radio telephone 2. In a transmission frame 5, the data for a plurality of independent data transmission connections can thus be transmitted in a plurality of time slots. In the receiving radio telephone 2, the information to be transmitted is then reconstructed from the data of the corresponding time slots of a plurality of transmission frames 5.

The base stations BS1...BS6 of the TC system 1 are connected to a central exchange PABX via connection lines 3 for the exchange of system control information. The system control information comprises for example the number of radio cells CTS1...CTS6 of a TC system 1 and the configuration and topology of the individual radio cells CTS1...CTS6. The configuration of the radio cells CTS1...CTS6 comprises for example the transmission frequency, the type of interleaving or the type of scrambling of the time slots of the transmission frame 5. The exchange PABX is connected via an ISDN-, a PSTN- or another interface 4 to an analogue or digital telecommunications (TC) network. In addition to the base stations BS1...BS6, other terminals EG are also connected to the central exchange PABX. The terminal EG has the form, for example, of a conventional wire-bound telephone device, fax device and/or modulator/demodulator (modem) for a computer. A time-synchronisation of the base stations BS1...BS6 of the TC system 1 also takes place via the connection lines 3.

To be able to establish a TC connection between the base station BS1...BS6 of a radio cell CTS1...CTS6 and a radio telephone 2 located in the radio cell CTS1...CTS6, it is essential for the system control information to be known to the radio telephone 2. In the present TC system 1, the system control information is transmitted to the radio telephone 2 prior to a handoff into another radio cell CTS1...CTS6, or to be more precise, in the course of the registration of the radio telephone 2 in the TC system 1. As soon as an area in which the TC system 1 is installed is entered from outside the TC system 1 by a subscriber with a switched-on radio telephone 2, or as soon as a subscriber switches on his radio telephone 2 in this area, the

radio telephone 2 logs onto the nearest base station BS1 (see Figure 2) of the TC system 1 to check-in and is registered in the base station BS1.

It is also conceivable for the system control information to be transmitted in the course of the registration of the radio telephone 2 in the base station BS1..BS6 of a radio cell CTS1...CTS6. When the radio telephone 2 has been registered in the radio cell CTS1 in the TC system 1 (see Figure 2) and the subscriber moves out of the radio cell CTS1 along the broken-line arrow 6 into another radio cell CTS2 with his radio telephone 2, a transfer of the radio telephone 2 from the base station BS1 of the original radio cell CTS1 to the base station BS2 of the other radio cell CTS2 is implemented. The location of the transfer is referenced 7 in Figure 2. In the course of the transfer of the radio telephone 2, the radio telephone 2 is registered i.a. in the new radio cell CTS2. In the course of this registration, thus upon each handoff of the radio cell CTS1...CTS6, the system control information is transmitted to the radio telephone 2. The same procedure is followed in the case of a handoff from the radio cell CTS2 into the radio cell CTS3 and from the radio cell CTS3 into the radio cell CTS4.

Due to the fact that the system control information is known to the radio telephone 2 of the TC system 1 prior to a handoff into another radio cell CTS1...CTS6, it is possible to dispense with a time-consuming transmission of the system control information in the course of the transfer of the radio telephone 2 to another radio cell CTS1...CTS6. The transfer can therefore take place particularly rapidly and, in the case of an active TC connection, without an interruption in the TC connection audible to the subscriber.

The transmission frames 5 (see Figure 3) in a radio cell CTS1 of the TC system 1 are offset by at least one time slot relative to the transmission frames 5 of the other radio cells CTS2...CTS6 of the TC system 1. To be more precise, the transmission frames 5 of a radio cell CTS1...CTS6 are offset relative to virtual transmission frames 8 of a reference transmission frame structure Ref. Thus for example the transmission frames 5 of the radio cell CTS1 are offset by two time slots, those of the radio cell CTS2 by four time slots, those of the radio cell CTS3 by six time slots, those of the radio cell CTS4 by one time slot, those of the radio cell CTS5 by three time slots, and those of the radio cell CT6 by five time slots, relative to the virtual transmission frames 8. The number of time slots by which the transmission frame 5 of a radio cell CTS1...CTS6 is offset relative to the transmission frames 8 is sent to the radio telephone 2 as part of the system control information. On the basis of the mutually offset

transmission frames 5 of the various radio cells CTS1...CTS6, it is possible for the radio telephone 2 to differentiate between the base stations BS1...BS6 of the individual radio cells CTS1..CTS6 and, for example, in the course of the transfer of the radio telephone 2 from the radio cell CTS1 into the radio cell CTS2, to purposively address the base station BS2 and
5 establish a TC connection thereto.

The transmission frequency f_{11} , f_{12} ,..., f_{63} , f_{64} of the transmission frames 5 of the individual radio cells CTS1...CTS6 is changed in accordance with a specific algorithm, the so-called frequency hopping algorithm. The frequency hopping algorithm at least of the adjacent radio cells CTS2, CTS6 is transmitted to the radio telephone 2 in the radio cell CTS1 as system control information. In addition to the frequency hopping algorithm, other transmission parameters can also be sent to the radio telephone 2 prior to a handoff from one radio cell CTS1 into another radio cell CTS2.
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In the TC system 1 according to the invention, the radio telephone 2 always knows the time at which the transmission frames 5 of the radio cells CTS1...CTS6 of the TC system 1, at least however the transmission frames 5 of the adjacent radio cells CTS2, CTS6, commence. Additionally, the radio telephone 2 knows the transmission parameters, in particular the frequency hopping algorithm, in accordance with which the transmission of the information takes place in the individual radio cells CTS1...CTS6, at least however in the adjacent radio cells CTS2, CTS6. In this way the transfer of the radio telephone 2 from one radio cell CTS1 to another radio cell CTS2 can be decisively shortened.
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It will be understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text or drawings. All of these different combinations constitute various alternative aspects of the invention.

25 The foregoing describes embodiments of the present invention and modifications, obvious to those skilled in the art can be made thereto, without departing from the scope of the present invention.

Claims

1. A telecommunications system with a plurality of radio cells, wherein in each radio cell a base station is provided for coordinating the telecommunications connection between a base station of a radio cell and a radio telephone located in the radio cell, characterised in that, for the exchange of system control information, the base stations of the TC system are connected to a central exchange, and that the system control information are known to the radio telephone prior to a handoff into another radio cell.

2. A telecommunications system according to Claim 1, wherein the base stations of the individual radio cells are synchronised with one another.

3. A telecommunications system according to Claim 1 or 2, wherein the transmission frames in a radio cell of the telecommunications system are offset by at least one time slot relative to the transmission frames at least of the adjacent radio cells of the telecommunications system, and that the number of time slots by which the transmission frames are mutually offset is known to the radio telephone as system control information.

4. A telecommunications system according to Claim 3, wherein the telecommunications system comprises at the maximum as many radio cells with the same transmission frequency as the transmission frames have time slots, and that the transmission frames of a radio cell of the telecommunications system are offset by at least one time slot relative to the transmission frames of the other radio cells with the same transmission frequency.

5. A telecommunications system according to Claim 3 or 4, wherein the transmission frames are offset relative to transmission frames of a virtual reference transmission frame structure.

6. A method for transferring a radio telephone from one radio cell of a telecommunications system to another radio cell of the telecommunications system, wherein system control information is sent to the radio telephone prior to the transfer of the radio telephone from the one radio cell to the other radio cell, and the radio telephone is registered in the other radio cell using the system control information.

7. A method according to Claim 6, wherein the system control information is sent to the radio telephone in the course of the registration in the telecommunications system.

8. A method according to Claim 6 or 7, wherein the system control information is sent to the radio telephone in the course of the registration in a radio cell .

9. A method according to any one of Claims 5 to 8, wherein the radio telephone is transferred from the one radio cell to the other radio cell during a telecommunications connection.

10. A method according to any one of Claims 5 to 9, wherein the information to be transmitted in the course of the telecommunications connection is transmitted in accordance with the Time Division Multiple Access transmission method in transmission frames comprising a plurality of time slots, and that the system control information is sent to the radio telephone in a system control window (broadcast channel, BC) of the transmission frame .

11. A method according to any one of Claims 5 to 9, wherein the information to be transmitted in the course of the telecommunications connection is transmitted in accordance with the Time Division Multiple Access transmission method in transmission frames comprising a plurality of time slots, and that the system control information is sent to the radio telephone in a user data window of the transmission frame .

12. A method according to Claim 10 or 11, wherein the transmission frames in a radio cell of the telecommunications system are offset by at least one time slot relative to the transmission frames at least of the adjacent radio cells with the same transmission frequency, and that the number of time slots by which the transmission frames are mutually offset is sent to the radio telephone as system control information.

13. A method according to Claim 12, wherein the telecommunications system comprises at the maximum as many radio cells with the same transmission frequency as the transmission frames have time slots, and that the transmission frames of a radio cell of the telecommunications system are offset by at least one time slot relative to the transmission frames of the other radio cells with the same transmission frequency.

14. A method according to Claims 12 or 13, wherein the transmission frames are offset relative to transmission frames of a virtual reference transmission frame structure .

15. A method according to any one of Claims 5 to 14, wherein at least one transmission parameter of the telecommunications connection is changed in accordance with a

specific algorithm, the algorithm at least of the adjacent radio cells being sent to the radio telephone.

16. A method according to Claim 15, wherein the transmission frequency is changed in accordance with a specific algorithm, the algorithm at least of the adjacent radio cells being sent to the radio telephone .

17. A method according to any one of Claims 5 to 16, wherein statistics are kept on the other radio cell into which a handoff from a radio cell preferentially takes place, and that the preferred handoffs are sent to the radio telephone as system control information.

18. A method according to any one of Claims 5 to 17, wherein the system control information is sent to the radio telephone upon the request of the radio telephone .

19. A method according to any one of Claims 5 to 18, wherein the system control information is sent periodically to the radio telephone with a specific beacon frequency.

20. A telecommunications system substantially as hereinbefore described with reference to the accompanying drawings.

21. A method for transferring a radio telephone from one radio cell of a telecommunications system to another radio cell of the telecommunications system substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 23rd day of March 2000

ALCATEL

by its attorneys

Freehills Patent Attorneys

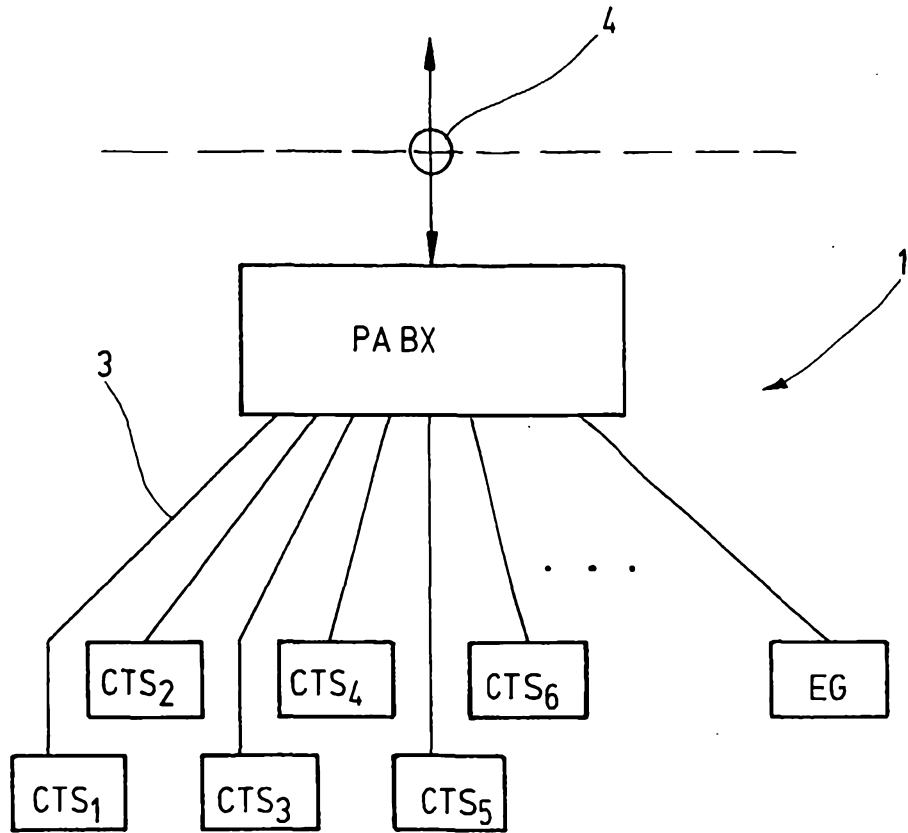


Fig. 1



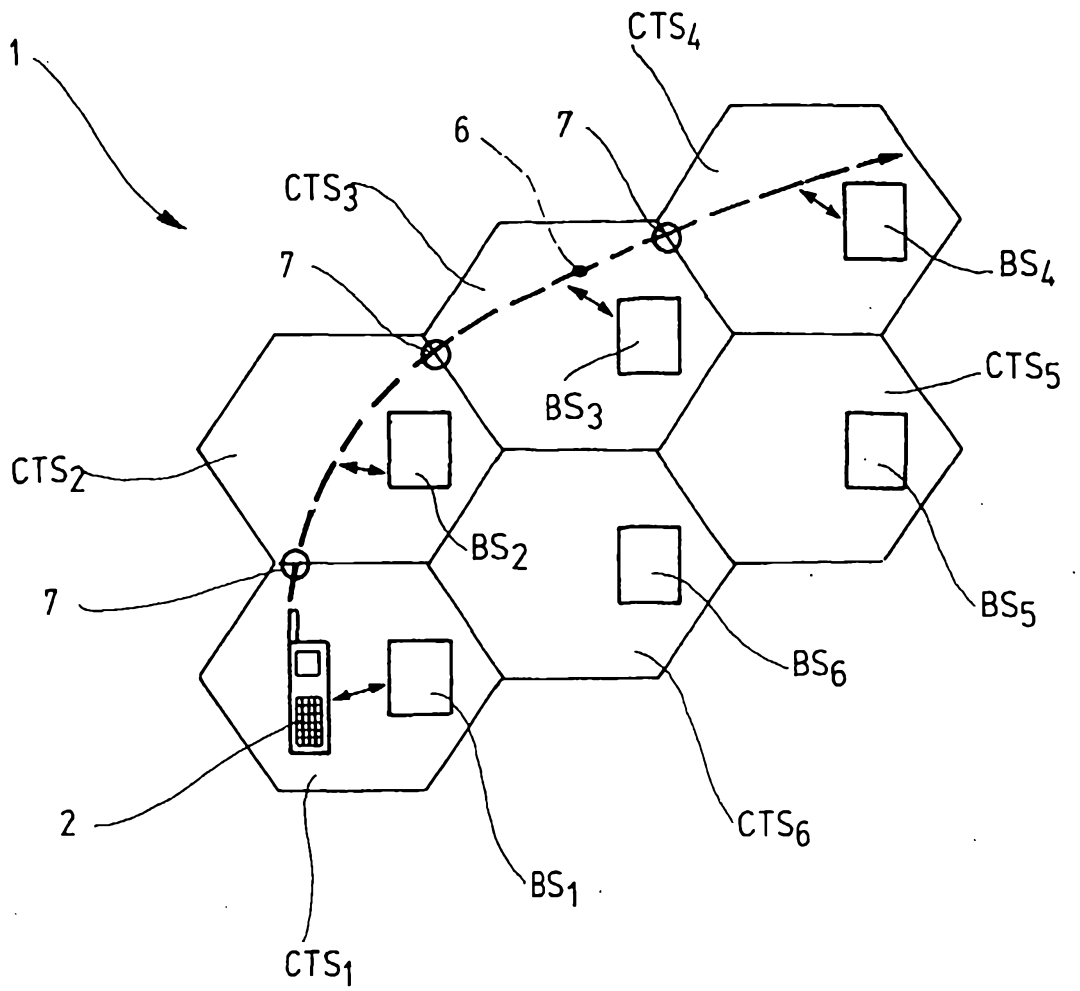
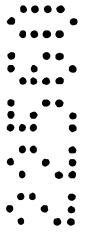


Fig. 2



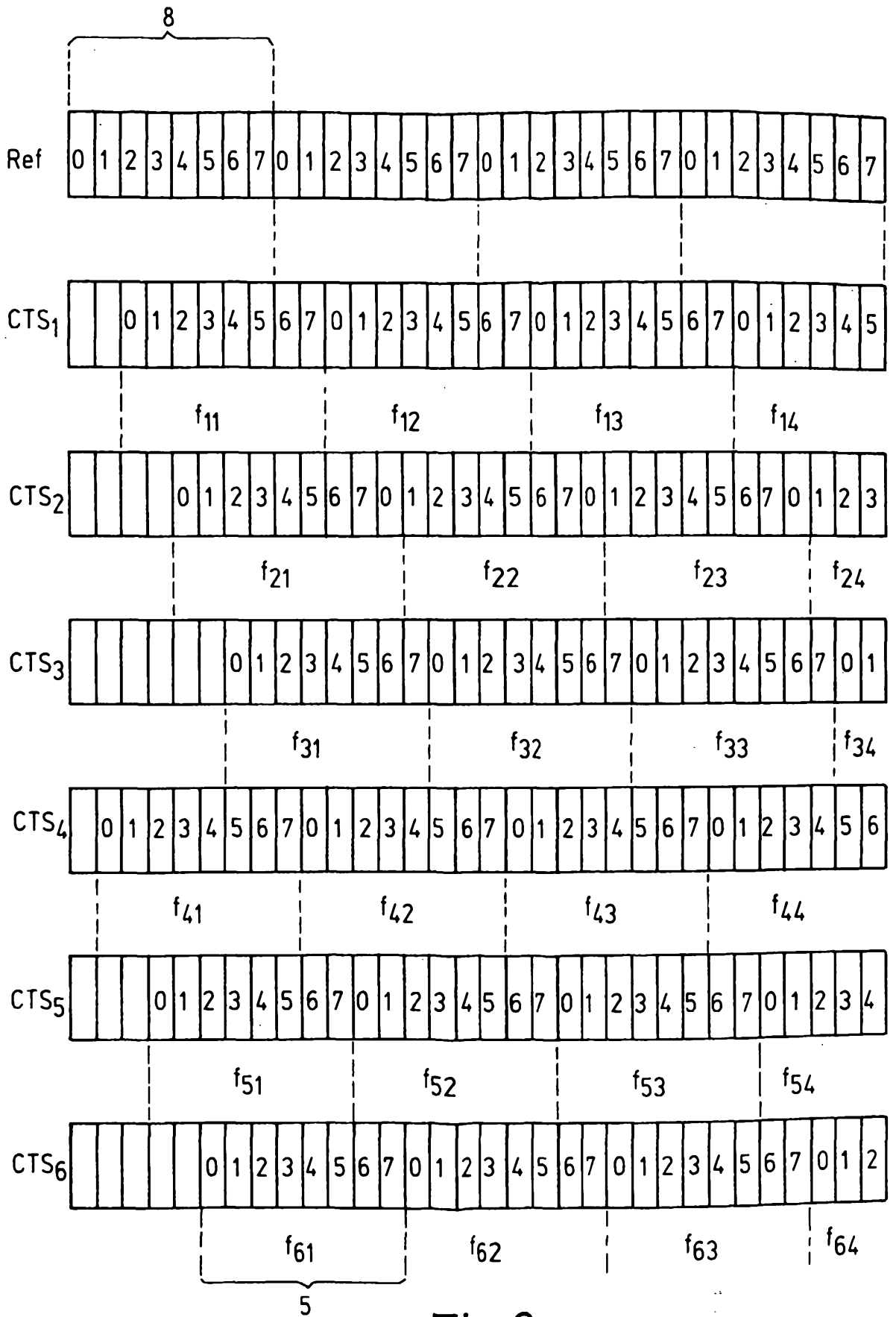


Fig. 3