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(54) **SYSTEM AND METHOD FOR TRANSMITTING RANDOM ACCESS DATA USING ORTHOGONAL FREQUENCY DIVISION MULTIPLE ACCESS**

SYSTEM UND VERFAHREN ZUM SENDEN VON DIREKTZUGRIFFSDATEN DURCH VERWENDUNG VON ORTHOGONAL-FREQUENZMULTIPLEX-MEHRFACHZUGRIFF

SYSTEME ET PROCEDE POUR TRANSMETTRE DES DONNEES D'ACCES ALEATOIRE EN UTILISANT UN ACCES MULTIPLE PAR REPARTITION ORTHOGONALE DE LA FREQUENCE

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- **KIM, Kwang-Soon**
Daejeon-City, 305-345 (KR)
- **RYU, Byung-Han**
Daejeon-City, 305-755 (KR)

(30) Priority: **11.12.2003 KR 2003090149**

(74) Representative: **Betten & Resch**
Patentanwälte
Postfach 10 02 51
80076 München (DE)

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(73) Proprietor: **Electronics and Telecommunications Research Institute**
Daejeon 305-350 (KR)

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(72) Inventors:
• **JUNG, Soo-Jung**
DaeJeon-City 305-308 (KR)

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Description

Technical Field

[0001] The present invention relates to a system and method for transmitting random access data using OFDMA (orthogonal frequency division multiple access.) More specifically, the present invention relates to a system and method for transmitting random access data using OFDMA for allowing a plurality of mobile stations to transmit burst-characterized data through an uplink common channel for the purpose of effective usage of resources.

Background Art

[0002] A wireless mobile communication system divides a total resource such as frequency bands or data rates into many smaller ones, schedules them according to respective users' requests, and thus shares the resource by using multiple access methods such as time division, frequency division, and code division.

[0003] The method for a plurality of mobile stations to transmit intermittent data through an uplink common channel for the purpose of effective usage of resources is a random access method for allowing all the mobile stations to have transmission rights and transmit data randomly.

[0004] One of the random access methods is to allow a mobile station to transmit a preamble to a base station in advance. The preamble is generated by using a randomly selected code from among distinguishable codes. After having received a corresponding access grant on the preamble from the base station, the mobile station transmits the actual random access data.

[0005] The above-noted method for transmitting random access data allows the preamble and the data to be transmitted through a common random access channel, and additionally requires resource assignment.

[0006] Further, one of methods for responding to the preamble transmitted from the mobile station is to use the code, which is received when an access grant signal is generated, and re-transmit the preamble. Another one is to use code and channel information, which is captured at the time of receiving the preamble.

[0007] Since a lesser amount of resources is needed for transmitting the preamble, it is allowable to assign a lesser amount of resources irrespective of a random access request by the mobile station. However, it is inefficient to assign the transmission resource for transmission of random access data irrespective of a random access request by the mobile station.

[0008] Prior art document WO 00/56102 relates to a CDMA cellular communication system, whereby a subscriber unit comprises means for entering a multiple cell access mode. It furthermore comprises means for transmitting two preamble parts of a preamble message to two different base stations when in this mode. The sub-

scriber unit subsequently detects acknowledge signals from the two base stations and controls means for transmitting a message part of the access message in response to these acknowledge messages. Specifically, the transmit power levels of the message part is set to enable communication to the corresponding base station if only one message is received and to both base stations if two acknowledge signals are received.

[0009] Document DE 198 00 953 C1 describes an OFDMA communication system between a base station and mobile stations, whereby each mobile station measures the quality of different frequency segments, determines the most favourable segment and transmits this information to the base station. The base station evaluates the received information from each mobile station and assigns a frequency segment to a mobile station. The information about the assigned frequency segment is transmitted to the mobile station.

20 Disclosure of Invention

Technical Problem

[0010] It is an advantage of the present invention to transmit ACK/NACK information including a scheduling ID when a base station responds to a preamble of a random access mobile station.

[0011] It is another advantage of the present invention to provide a system and method for transmitting random access data using OFDMA for allowing a base station to assign a specific ID to each preamble when receiving the preamble, variably assign a channel for transmitting random access data according to resource assigned conditions, and notify a mobile station of assignment of the channel resource by using ID.

Technical Solution

[0012] In one aspect of the present invention, provided is a random access data transmission system using OFDMA between a mobile station and a base station, wherein the mobile station comprises: a resource selector for randomly selecting a preamble transmission channel and a code; a preamble transmitter for generating a preamble based on the transmission resource information selected by the resource selector and transmitting the preamble to the base station through a preamble transmission channel; a preamble access grant processor for receiving and processing acknowledgment or non-acknowledgment information including a scheduling ID contained in the preamble access grant from the base station; and a data transmitter for transmitting random access data through a data transmission channel assigned to the mobile station based on the information processed by the preamble access grant processor.

[0013] In another aspect of the present invention, provided is a random access data transmission system using OFDMA (orthogonal frequency division multiple access)

between a mobile station and a base station wherein the base station comprises: a preamble receiving processor for receiving a preamble from the mobile station and extracting corresponding preamble information; an ID manager for assigning a specific scheduling ID to each mobile station and managing the specific scheduling ID so that the mobile station may use a assigned data transmit channel; a scheduler for scheduling a data transmission time, and a transmission quantity of the mobile station with the scheduling ID assigned to the mobile station by the ID manager according to channel environments and requirements of the mobile stations; an access grant processor for determining an acknowledgment/non-acknowledgment status based on the preamble information of the preamble receiving processor and the scheduling ID of the ID manager, and transmitting preamble access grant configuring information including the scheduling ID to the mobile station; and a data receiving processor for receiving the random access data through a assigned data transmission channel from the mobile station according to a transmission result of the access grant processor, and processing them.

[0014] The ID manager recovers the scheduling ID assigned to the mobile station when the data receiving processor finishes receiving of transmitted random access data.

[0015] In still another aspect of the present invention, provided is a random access data transmission method using OFDMA between a mobile station and a base station, wherein the procedure of mobile station comprises: (a) selecting a preamble transmission channel and a transmission radio resource related to a code used for transmitting a preamble for a random access to the base station; (b) generating a preamble and transmitting the preamble to the base station using the transmission radio resource selected in(a(c) receiving preamble access grant configuring information including a scheduling ID and acknowledgment/non-acknowledgment information assigned by the base station with respect to the preamble transmitted in (b), and checking a success or failure in transmission of the preamble, and the scheduling ID; and (d) allowing the mobile station to check an assignment of the data transmission channel by using the mobile station's scheduling ID included in a control channel according to a checking result in (c), and transmitting random access data to the base station through the data transmission channel assigned to the mobile station.

[0016] In step (d), the mobile station uses extracted transmission control information related to timing, a frequency, and power from the access grant information received in (c) to transmit random access data.

[0017] In still yet another aspect of the present invention, provided is a random access data transmission method using OFDMA between a mobile station and a base station, wherein the procedure of base station comprises: (a) allowing the base station to receive and analyze a preamble transmitted from the mobile station, and assigning a specific scheduling ID when the mobile sta-

tion can be scheduled; (b) determining an acknowledgment or a non-acknowledgment and forming preamble access grant configuring information according to the preamble information analyzed in (a) and an assigned status of the scheduling ID, and transmitting the preamble access grant configuring information to the mobile station; (c) allowing the base station to schedule a data transmission time, a transmission channel, and a transmission quantity of each mobile station according to the mobile stations' channel environments and requirements, and notifying the mobile station of scheduled results by using scheduling ID; and (d) receiving random access data from the mobile station corresponding to the scheduling ID determined in (c) through the data transmission channel, and processing the random access data.

[0018] The step (d) comprises recovering the scheduling ID assigned to the mobile station when the reception of the random access data transmitted from the mobile station is finished.

Advantageous Effects [17]

[0019] Description of Drawings [18] The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate an embodiment of the invention, and, together with the description, serve to explain the principles of the invention: [19] FIG. 1 shows a configuration diagram of a random access data transmission system using OFDMA according to a preferred embodiment of the present invention; [20] FIG. 2 shows a configuration of an uplink frame according to a preferred embodiment of the present invention; [21] FIG. 3 shows a configuration of a downlink frame according to a preferred embodiment of the present invention; and [22] FIG. 4 shows a data transmission process of the random access data transmission method using OFDMA according to a preferred embodiment of the present invention.

[0020] Best Mode [23] In the following detailed description, only the preferred embodiment of the invention has been shown and described, simply by way of illustration of the best mode contemplated by the inventor (s) of carrying out the invention. As will be realized, the invention is capable of modification in various obvious respects, all without departing from the invention. Accordingly, the drawings and description are to be regarded as illustrative in nature, and not restrictive. To clarify the present invention, parts, which are not described in the specification, are omitted.

[0021] A random access data transmission system using OFDMA according to the preferred embodiment of the present invention will be described in detail with reference to FIG. 1.

[0022] FIG. 1 shows a configuration diagram of a random access data transmission system using OFDMA according to a preferred embodiment of the present invention, FIG. 2 shows a configuration of an uplink frame according to a preferred embodiment of the present inven-

tion, and FIG. 3 shows a configuration of a downlink frame according to a preferred embodiment of the present invention.

[0023] As shown in FIG. 1, when using the random access method including the case in which a mobile station registers to a cell for the first time, the case in which the mobile station requests a state transition, and the case in which the mobile station requests a handover from one cell to another, the random access data transmission system using OFDMA assigns a scheduling ID included in downlink access grant transmitted by the base station 200 to the uplink preamble transmitted by the mobile station 100 so that the mobile station may transmit the random access data to the base station 200 through a data transmission channel assigned to the scheduling ID.

[0024] For this purpose, the mobile station 100 comprises a resource selector 110, a preamble transmitter 120, a preamble access grant receiving processor 130, and a data transmitter.

[0025] The resource selector 110 selects transmission radio resources like codes, preamble transmission channel for transmitting the preamble for a random access to the base station codes.

[0026] The preamble transmitter 120 generates a preamble by using information on the transmission radio resource selected by the resource selector 110, and transmits the corresponding preamble to the base station through the preamble transmission channel.

[0027] In the OFDMA/FDD system which uses different frequency bands for uplinks and downlinks, the preamble transmitter 120 fixes a specific slot in an uplink frame for an available time of preamble transmission. An uplink frame is made up a plurality of slots. Radio frequency resources of the specific slot are divided into a plurality of subchannels. The preamble transmitter 120 transmits the preamble, which is generated by using the code, which is distinguishable from among the different codes through the subchannel randomly selected from among the subchannels.

[0028] In this instance, slots of the uplink frame except the slot which is fixed for transmitting the preamble are divided into control information transmission channels and data transmission channels, and the random access data are loaded on part of the data transmission channel and transmitted to the base station 200.

[0029] As shown in FIG. 2, the uplink frame having a predetermined length of Tframe comprises a plurality of slots where the length of the slots is Tslot, excluding the final slot having length of Tslot'.

[0030] The possibility of each slot's transmission of the random access preamble is determined according to the position of the slot in the frame. When the preamble transmission position is defined to be the final slot within the frame, the final slot of the frame is fixed to the time for transmitting the preamble, and the radio resources of the slots are divided into subchannels and are then used.

[0031] The mobile station 100 randomly selects one

of the radio resources, which are divided as the subchannels at the time of transmitting the preamble, uses the code, which is distinguishable by different codes, and transmits the generated preamble to the base station 200.

[0032] The slots except the final slot are divided into control information transmission channels and data transmission channels. A channel for transmitting the random access data is not classified as a separate transmission channel, and the random access data are transmitted by using part of the data transmission channels.

[0033] The preamble access grant receiving processor 130 receives a preamble access grant including a scheduling ID and ACK/NACK information on the preamble from the base station 200 according to the transmission by the preamble transmitter 120, and processes them.

[0034] The data transmitter 140 transmits the random access data to the base station 200 through the data transmission channel of the scheduling ID assigned to the mobile station 100 based on the information processed by the preamble access grant receiving processor 130.

[0035] The base station 200 comprises a preamble receiving processor 210, an ID manager 220, a scheduler 230, an access grant processor 240, and a data receiving processor 250.

[0036] The preamble receiving processor 210 receives preambles from the respective mobile stations 100, and extracts preamble information including codes, timing, and power through the preambles.

[0037] The ID manager 220 assigns a specific scheduling ID to each mobile station 100 and manages it so that the mobile station 100 may use a data transmission channel specified by the base station 200, and also recovers and manages the scheduling ID assigned to the mobile station when the data receiving processor 250 finishes receiving of transmitted random access data.

[0038] The scheduler 230 assigns the resources of the packet service, and in detail, it considers requirements including a channel environment and QoS of the mobile stations, and determines transmission times and quantities of the mobile stations to which the scheduling IDs are given according to a scheduling algorithm.

[0039] The access grant processor 240 loads preamble access grant information in a specific slot of the downlink frame including a plurality of slots, and transmits the same to the mobile station 100.

[0040] As shown in FIG. 3, the downlink frame includes a plurality of slots having a constant length Tframe, and it has the same length as that of the uplink frame.

[0041] The slots of the downlink frame comprises a slot T slot' for synchronization and cell search, and downlink traffic slots Tslot which include a transmission time of data traffic and a transmission time of control signal traffic.

[0042] The period of physical channels for transmitting the control signal traffic can be a multiple of the frame period, which represents that the data configured by

block units are partially divided and transmitted for each slot.

[0043] The data transmitted to the downlink through the channel at the transmission time of the control signal traffic include broadcasting information, paging information, state management information, and data transmission control information.

[0044] Since control signal information channels for transmitting the control signal information divide and use the orthogonal frequencies because of characteristics of the OFDMA system, a preamble access grant channel for transmitting access grants on the preamble transmission can be configured with N subchannels from among the channel.

[0045] It is required to use the restricted radio resources with an appropriate ratio and purpose, and the assignment ratio of the resources is varied according to the cell configuration in the OFDMA system.

[0046] Therefore, it is desirable for the base station to separately notify the mobile station of configuration information of a preamble access grant channel, use the configuration information of the preamble access grant channel, and allow the mobile station to check the preamble acknowledgements ACK/NACK so that the base station may effectively manage the channel for transmitting the access grant of the preamble, compared to the method for fixing part of the control signal information channel to be a preamble access grant channel in consideration of the maximum value of the random access request available in the existing cell.

[0047] The data receiving processor 250 receives and processes the random access data transmitted by the mobile station 100, which has received the access grant of the access grant processor 240.

[0048] An operation of the random access data transmission system using OFDMA according to a preferred embodiment will now be described with reference to a drawing.

[0049] FIG. 4 shows a data transmission process of the random access data transmission method using OFDMA according to the preferred embodiment of the present invention.

[0050] As shown in the random access data transmission method using OFDMA, the resource selector 110 of the mobile station 100 initially selects a transmission radio resource used for transmitting the preamble in step S1.

[0051] The preamble transmitter 120 receives information on the transmission radio resource selected by the resource selector 110, generates a preamble, and transmits it to the base station 200 through a preamble transmission channel in step S2.

[0052] The preamble receiving processor 210 of the base station 200 analyzes the preamble received through the preamble transmitter 120, extracts preamble information including codes, timing, and power, and the ID manager 220 assigns a scheduling ID to the mobile station to be scheduled in step S3.

[0053] The access grant processor 240 determines ac-

knowledgment/non-acknowledgment status on the preamble provided from the mobile station according to the preamble information extracted from the preamble receiving processor 210 and assigned status of the scheduling ID provided by the ID manager 220.

[0054] The access grant processor 240 configures preamble access grant configuring information by using the scheduling ID information, ACK/NACK information, and preamble information extracted from the preamble, and transmits the preamble access grant configuring information which is access grant information to the mobile station

100 through the control information transmission channel specified by the base station

200 in step S4.

[0055] The preamble access grant receiving processor 210 of the mobile station 100 receives the preamble access grant configuring information from the access grant processor 240 through the preamble acknowledgement channel, and checks successful preamble transmission status and the scheduling ID in step S5.

[0056] When finishing transmission of the preamble access grant configuring information, the base station 200 transmits assignment information of the data transmission channel determined after scheduling together with the scheduling ID assigned to a random access mobile station 100 by the scheduler 230 to the mobile station 100 through the control information transmission channel in steps S6 and S7.

[0057] The random access mobile station 100 checks assigned status of the data transmission channel of the scheduling ID transmitted through the control channel in step S8, and transmits the random access data through the data transmission channel assigned to the mobile station 100 in step S9.

[0058] In this instance, the mobile station 100 minimizes the influence given to the data transmitted to the base station by another mobile station by using transmission control information including timing, a frequency, and a power received through the preamble access grant configuring information, and transmits the random access data through the data transmission channel.

[0059] When the base station 200 finishes receiving the random access data through the data receiving processor 250, the ID manager 220 recovers and manages the scheduling ID assigned to the corresponding mobile station in step S10.

[0060] As described, the base station 200 assigns data transmission channels for variably transmitting the random access data according to assigned resource status to the access grant of the preamble transmitted from the mobile station.

[0061] To achieve this, the base station 200 provides a specific scheduling ID for each preamble when transmitting an access grant on the preamble received from the mobile station to the downlink, and notifies the mobile station of assignment information on the data transmission channel determined through the scheduling ID.

[0062] It is desirable to use the scheduling ID as an identifier of the mobile station used by the scheduler 230 and use the same for the physical layer and the MAC layer.

[0063] In consideration of the channel condition and QoS of each mobile station, the scheduler 230 selects a mobile station to which the data transmission channel will be assigned, and transmits corresponding assignment information through the data transmission control channel, and hence, the mobile station checks the assignment information in the data transmission control channel through the scheduling ID assigned to the mobile station, and transmits the random access data through the data transmission channel.

[0064] In this instance, the data transmission channel is a channel for allowing the mobile station which is registered to the base station and is in the active state to transmit the data.

[0065] After receiving the random access data from the mobile station, the base station 200 transmits them to the system through a path other than that of the data of the registered mobile station. Therefore, the OFDMA-based random access data transmission system and method according to the preferred embodiment improves conventional inefficient usage of the transmission resources through assigning a separate random access data transmission channel. While this invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the scope of the appended claims.

[0066] As described in the OFDMA-based random access data transmission system and method, the base station loads the mobile station's transmission control information and the scheduling ID information into the access grant of the preamble received from the mobile station and transmits them so that the mobile station may transmit the random access data through the data transmission channel without an additional separated channel, thereby enabling effective usage of the radio resources, and transmitting the data without influencing data transmission of other mobile stations by using the transmission control information.

Claims

1. A random access data transmission system using OFDMA, orthogonal frequency division multiple access, between a mobile station (100) and a base station (200), wherein the mobile station comprising: a resource selector (110) for selecting a preamble transmission channel and a code-related resource for transmitting a preamble for a random access to the base station; a preamble transmitter (120) for

using the transmission resource information selected by the resource selector (110) to generate a preamble and transmitting the preamble to the base station (200) through a preamble transmission channel; a preamble access grant processor (130) for receiving acknowledgment or non-acknowledgment information including a scheduling ID in the preamble access grant from the base station (200) according to the transmission by the preamble transmitter, and processing the same; and a data transmitter (140) for transmitting random access data through a data transmission channel of the scheduling_ID assigned to the mobile station based on the information processed by the preamble access grant processor (130).

2. The random access data transmission system of claim 1, wherein the preamble transmitter fixes a specific slot with a preamble transmittable time from among an uplink frame comprising a plurality of slots, randomly selects one of subchannels of a radio resource of the specific slot, uses a code which is distinguishable from other codes, and transmits the preamble generated through the selection of the subchannel and usage of the code.
3. The random access data transmission system of claim 2, wherein the slots of the uplink frame except the slot which is fixed with the preamble transmittable time are classified as a control information transmission channel and a data transmission channel, and random access data are loaded on part of the data transmission channel and transmitted to the base station.
4. A random access data transmission system using OFDMA, orthogonal frequency division multiple access, between a mobile station (100) and a base station (200) wherein the base station comprising: a preamble receiving processor (210) for receiving a preamble from the mobile station (100) and extracting corresponding preamble information; an ID manager (220) for assigning a specific scheduling ID to each mobile station and managing the specific scheduling ID so that the mobile station may use an assigned data transmission channel; a scheduler (230) for scheduling a data transmission time, and a transmission quantity of the mobile station together with the scheduling ID assigned to the mobile station by the ID manager according to channel environments and requirements of the mobile stations; an access grant processor (240) for using the preamble information of the preamble receiving processor and the scheduling_ID of the ID manager to determine an acknowledgment/non-acknowledgment status, and transmitting preamble access grant configuring information including the scheduling ID to the mobile station; and a data receiving processor (250) for re-

- ceiving the random access data through a assigned data transmission channel from the mobile station (100) according to a transmission result of the access grant processor (240), and processing them.
5. The random access data transmission system of claim 4, wherein the preamble information of the preamble receiving processor (210) includes information on a code, timing, and power used for transmitting the preamble by the mobile station (100). 5
 6. The random access data transmission system of claim 4, wherein the ID manager (220) recovers the scheduling_ID assigned to the mobile station (100) when the data receiving processor (250) finishes reception of the random access data. 10
 7. The random access data transmission system of claim 4, wherein the access grant processor (240) loads the preamble access grant configuring information on a specific slot of a downlink frame comprising a plurality of slots, and transmits the same to the mobile station (100). 15
 8. The random access data transmission system of claim 7, wherein the specific slot is assigned for synchronization and base station search and other slots are assigned for downlink traffic slots in the downlink frame. 20
 9. The random access data transmission system of claim 8, wherein the downlink traffic slots are classified as a data traffic transmission time and a control signal traffic transmission time so that the random access data may be divided into part of each slot and then be transmitted. 25
 10. A random access data transmission method using OFDMA, orthogonal frequency division multiple access, between a mobile station and a base station, the procedure of mobile station comprising: (a) selecting a preamble transmission channel and a transmission radio resource related to a code used for transmitting a preamble for a random access to the base station; (b) using the transmission radio resource selected in (a) to generate a preamble and transmitting the preamble to the base station; (c) receiving preamble access grant configuring information including a scheduling ID assigned by the base station and acknowledgment/non-acknowledgment information with respect to the preamble transmitted in (b), and checking a successful status of transmission of the preamble, and the scheduling_ID ; and (d) allowing the mobile station to check an assignment of the data transmission channel by using the mobile station's scheduling ID included in a control channel according to a checking result in (c), and transmitting random access data to the base station 30
 11. The random access data transmission method of claim 10, wherein (d) comprises allowing the mobile station to extract transmission control information including timing, a frequency, and power through the access grant information received in (c), and transmitting random access data by using the transmission control information. 35
 12. The random access data transmission method of claim 10, wherein (b) comprises fixing a specific slot with a preamble transmittable time from among an uplink frame including a plurality of slots, and transmitting a preamble generated by randomly selecting any one of the radio resources of the corresponding slot and using a code which is distinguishable from other codes. 40
 13. A random access data transmission method using OFDMA, orthogonal frequency division multiple access, between a mobile station and a base station, the procedure of base station comprising: (a) allowing the base station to receive and analyze a preamble transmitted from the mobile station, and assigning a specific scheduling ID when the mobile station can be scheduled; (b) determining an acknowledgment or a non-acknowledgment and forming preamble access grant configuring information according to the preamble information analyzed in (a) and an assigned status of the scheduling ID, and transmitting the preamble access grant configuring information to the mobile station; (c) allowing the base station to schedule a data transmission time, a transmission channel, and a transmission quantity of each mobile station together with the scheduling_ID assigned to each mobile station according to the mobile station's channel environments and requirements, and notifying the mobile station of scheduled results; and (d) receiving random access data from the mobile station corresponding to the scheduling_ID through the data transmission channel determined in (c), and processing the random access data. 45
 14. The random access data transmission method of claim 13, wherein (d) comprises recovering the scheduling_ID assigned to the mobile station when the reception of the random access data from the mobile station is finished. 50
 15. The random access data transmission method of claim 13, wherein (b) comprises distributing the preamble access grant configuring information to part of a specific slot of a downlink frame comprising a plurality of slots, and transmitting it to the mobile station. 55
- through the data transmission channel assigned to the mobile station.

Patentansprüche

1. . Direktzugriffs-Datenübertragungssystem, das OFDMA (Orthogonal-Frequenzteilungs-Mehrfachzugriff zwischen einer Mobilstation (100) und einer Basisstation (200) verwendet, wobei die Mobilstation umfaßt: einen Ressourcenselektor (110) zum Auswählen eines Dateianfangsetikett-Übertragungskanals und einer Code-bezogenen Ressource zum Übertragen eines Dateianfangsetiketts für einen Direktzugriff an die Basisstation; einen Dateianfangsetikett-Transmitter (120) zum Verwenden der vom Ressourcenselektor (110) ausgewählten Übertragungsressourcen-Informationen, um ein Dateianfangsetikett zu erzeugen und das Dateianfangsetikett über einen Dateianfangsetikett-Übertragungskanal an die Basisstation (200) zu übertragen; einen Dateianfangsetikett-Zugriffsgewährungsprozessor (130) zum Empfangen von Bestätigungs- oder Nicht-Bestätigungs-Informationen einschließlich einer Planungs-ID in der Dateianfangsetikett-Zugriffsgewährung von der Basisstation (200) gemäß der Übertragung durch den Dateianfangsetikett-Transmitter, und Verarbeitung derselben; und einen Datentransmitter (140) zum Übertragen von Direktzugriffsdaten über einen Datenübertragungskanal der Planungs-ID, die der Mobilstation basierend auf den Informationen zugewiesen wurde, die vom Dateianfangsetikett-Zugriffsgewährungsprozessor (130) verarbeitet wurden.

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2. . Direktzugriffs-Datenübertragungssystem nach Anspruch 1, bei dem der Dateianfangsetikett-Transmitter aus einem Uplink-Frame, der eine Vielzahl von Slots umfaßt, einen spezifischen Slot mit einer übertragbaren Dateianfangsetikett-Zeit versieht, zufällig einen Subkanal einer Funkressource des spezifischen Slots auswählt, einen Code verwendet, der von anderen Codes unterscheidbar ist, und das durch die Auswahl des Subkanals und die Verwendung des Codes erzeugte Dateianfangsetikett überträgt.

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3. . Direktzugriffs-Datenübertragungssystem nach Anspruch 2, bei dem die Slots des Uplink-Frames, mit Ausnahme des mit der übertragbaren Dateianfangsetikett-Zeit versehenen Slots, als Steuerinformationen-Übertragungskanal und als Datenübertragungskanal klassifiziert werden, und die Direktzugriffsdaten auf einen Teil des Datenübertragungskanals geladen und an die Basisstation übertragen werden.

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4. . Direktzugriffs-Datenübertragungssystem, das OFDMA (Orthogonal-Frequenzteilungs-Mehrfachzugriff zwischen einer Mobilstation (100) und einer Basisstation (200) verwendet, wobei die Basisstation umfaßt: einen Dateianfangsetikett-Empfangsprozessor (210) zum Empfangen eines Dateianfangsetiketts von der Mobilstation (100), und zum Extrahieren entsprechender Dateianfangsetikett-Informationen; einen ID-Manager (220) zum Zuweisen einer spezifischen Planungs-ID zu jeder Mobilstation, und zum Verwalten der spezifischen Planungs-ID, so dass die Mobilstation einen zugewiesenen Datenübertragungskanal verwenden kann; einen Planer (230) zum Planen einer Datenübertragungszeit und einer Übertragungsquantität der Mobilstation zusammen mit der Planungs-ID, die der Mobilstation durch den ID-Manager gemäß den Kanalumgebungen und den Anforderungen der Mobilstationen zugewiesen wurde; einen Zugriffsgewährungs-Prozessor (240) zum Verwenden der Dateianfangsetikett-Informationen des Dateianfangsetikett-Empfangsprozessors und der Planungs-ID des ID-Managers, um einen Bestätigungs-/Nicht-Bestätigungs-Zustand zu ermitteln, und zum Übertragen der Dateianfangsetikett-Zugriffsgewährungs-Konfigurationsinformationen einschließlich der Planungs-ID an die Mobilstation; und einen Daten-Empfangsprozessor (250) zum Empfangen der Direktzugriffsdaten von der Mobilstation (100) über einen zugewiesenen Datenübertragungskanal gemäß einem Übertragungsergebnis des Zugriffsgewährungs-Prozessors (240), und Verarbeitung derselben.

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5. . Direktzugriffs-Datenübertragungssystem nach Anspruch 4, bei dem die Dateianfangsetikett-Informationen des Dateianfangsetikett-Empfangsprozessors (210) Informationen über einen Code, Zeitgebung und Leistung aufweisen, die zur Übertragung des Dateianfangsetiketts durch die Mobilstation (100) verwendet werden.

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6. . Direktzugriffs-Datenübertragungssystem nach Anspruch 4, bei dem der ID-Manager (220) die der Mobilstation (100) zugewiesene Planungs-ID wiederherstellt, wenn der Daten-Empfangsprozessor (250) den Empfang der Direktzugriffsdaten beendet.

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7. . Direktzugriffs-Datenübertragungssystem nach Anspruch 4, bei dem der Zugriffsgewährungs-Prozessor (240) die Dateianfangsetikett-Zugriffsgewährungs-Konfigurationsinformationen auf einen spezifischen Slot eines Downlink-Frames lädt, der eine Vielzahl von Slots umfaßt, und dieselben an die Mobilstation (100) überträgt.

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8. . Direktzugriffs-Datenübertragungssystem nach Anspruch 7, bei dem der spezifische Slot zur Synchronisation und Basisstationssuche bestimmt ist und andere Slots für Downlink-Verkehrsslots im Downlink-Frame bestimmt sind.

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9. . Direktzugriffs-Datenübertragungssystem nach Anspruch 8, bei dem die Downlink-Verkehrsslots als

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eine Datenverkehr-Übertragungszeit und eine Steuersignalverkehr-Übertragungszeit klassifiziert sind, so dass die Direktzugriffsdaten in einen Teil jedes Slots aufgeteilt und dann übertragen werden können.

10. . Direktzugriffs-Datenübertragungsverfahren, das OFDMA (Orthogonal-Frequenzteilungs-Mehrfachzugriff) zwischen einer Mobilstation und einer Basisstation verwendet, wobei das Vorgehen der Basisstation die Schritte umfaßt: (a) Auswählen eines Dateianfangsetikett-Übertragungskanals und einer Übertragungsfunkressource, die mit einem Code in Zusammenhang steht, der zur Übertragung eines Dateianfangsetiketts für einen Direktzugriff an die Basisstation verwendet wird; (b) Verwenden der im Schritt (a) ausgewählten Übertragungsfunkressource, um ein Dateianfangsetikett zu erzeugen und das Dateianfangsetikett an die Basisstation zu übertragen; (c) Empfangen der Dateianfangsetikett-Zugriffsgewährungs-Konfigurationsinformationen einschließlich einer Planungs-ID, die durch die Basisstation zugewiesen wurde, und Bestätigungs-/Nicht-Bestätigungsinformationen bezüglich des im Schritt (b) übertragenen Dateianfangsetiketts, und Überprüfen eines erfolgreichen Status der Übertragung des Dateianfangsetiketts und der Planungs-ID; und (d) Zulassen, dass die Mobilstation unter Verwendung der Planungs-ID der Mobilstation, die in einem Steuerkanal gemäß einem Überprüfungsergebnis im Schritt (c) beinhaltet ist, eine Zuweisung des Datenübertragungskanals überprüft, und Übertragen von Direktzugriffsdaten an die Basisstation über den der Mobilstation zugewiesenen Datenübertragungskanal.
11. . Direktzugriffs-Datenübertragungsverfahren nach Anspruch 10, bei dem Schritt (d) umfaßt, es der Mobilstation zu ermöglichen, Übertragungs-Steuerinformationen einschließlich Zeitgebung, einer Frequenz und Leistung durch die im Schritt (c) erhaltenen Zugriffsgewährungsinformationen zu extrahieren und die Direktzugriffsdaten unter Verwendung der Übertragungs-Steuerinformationen zu übertragen.
12. . Direktzugriffs-Datenübertragungsverfahren nach Anspruch 10, bei dem Schritt (b) umfaßt, einen spezifischen Slot mit einer übertragbaren Dateianfangsetikett-Zeit aus einem Uplink-Frame zu versehen, der eine Vielzahl von Slots aufweist, und ein Dateianfangsetikett zu übertragen, das durch zufällige Auswahl irgendeiner der Funkressourcen des entsprechenden Slots und unter Verwendung eines Codes erzeugt wurde, der sich von anderen Codes unterscheidet.
13. . Direktzugriffs-Datenübertragungsverfahren, das

OFDMA (Orthogonalfrequenzteilungs-Mehrfachzugriff) zwischen einer Mobilstation und einer Basisstation verwendet, wobei das Vorgehen der Basisstation die Schritte umfaßt: (a) Ermöglichen, dass die Basisstation ein Dateianfangsetikett empfängt und analysiert, das von der Mobilstation übertragen wurde, und Zuweisen einer spezifischen Planungs-ID, wenn die Mobilstation geplant werden kann; (b) Ermitteln einer Bestätigung oder Nicht-Bestätigung und Erzeugen von Dateianfangsetikett-Zugriffsgewährungs-Konfigurationsinformationen gemäß der die im Schritt (a) analysierten Dateianfangsetikett-Informationen und einem zugewiesenen Status der Planungs-ID, und Übertragen der Dateianfangsetikett-Zugriffsgewährungs-Konfigurationsinformationen an die Mobilstation; (c) Ermöglichen, dass die Basisstation eine Datenübertragungszeit, einen Übertragungskanal und eine Übertragungsquantität jeder Mobilstation zusammen mit der Planungs-ID planen kann, die jeder Mobilstation gemäß den Kanalumgebungen und Anforderungen der Mobilstation zugewiesen wurden, und Mitteilen der geplanten Ergebnisse an die Mobilstation; und (d) Empfangen von Direktzugriffsdaten von der Mobilstation entsprechend der Planungs-ID über den in Schritt (c) ermittelten Datenübertragungskanal, und Verarbeiten der Direktzugriffsdaten.

14. . Direktzugriffs-Datenübertragungsverfahren nach Anspruch 13, bei dem Schritt (d) umfaßt, die Planungs-ID, die der Mobilstation zugewiesen wurde, wiederherzustellen, wenn der Empfang der Direktzugriffsdaten von der Mobilstation beendet ist.

15. . Direktzugriffs-Datenübertragungsverfahren nach Anspruch 13, bei dem Schritt (b) umfaßt, die Dateianfangsetikett-Zugriffsgewährungs-Konfigurationsinformationen an einen Teil eines spezifischen Slots eines Downlink-Frames zu verteilen, der eine Vielzahl von Slots umfaßt, und dieselben an die Mobilstation zu übertragen.

Revendications

1. Système de transmission de données à accès aléatoire utilisant un accès multiple par répartition orthogonale de la fréquence, OFDMA, entre une station mobile (100) et une station de base (200), dans lequel la station mobile comporte : un sélecteur de ressources (110) permettant de sélectionner un canal de transmission de préambule et une ressource connexe à un code en vue de transmettre un préambule destiné à un accès aléatoire à la station de base ; un émetteur de préambule (120) pour utiliser les informations de ressources de transmission sélectionnées par le sélecteur de ressources (110) de manière à générer un préambule et à transmettre le préam-

- bule à la station de base (200) par le biais d'un canal de transmission de préambule ; un processeur d'octroi d'accès au préambule (130) permettant de recevoir des informations d'accusé de réception ou d'accusé de non réception incluant un identifiant de planification dans l'octroi d'accès au préambule de la station de base (200) selon la transmission par l'émetteur de préambule, et de traiter lesdites informations ; et un émetteur de données (140) pour transmettre des données d'accès aléatoire par le biais d'un canal de transmission de données de l'identifiant de planification affecté à la station mobile, sur la base des informations traitées par le processeur d'octroi d'accès au préambule (130).
2. Système de transmission de données à accès aléatoire selon la revendication 1, dans lequel l'émetteur de préambule définit une tranche spécifique avec un temps de transmission possible de préambule à partir d'une trame en liaison montante comportant une pluralité de tranches, sélectionne de manière aléatoire l'un parmi des sous-canaux d'une ressource radio de la tranche spécifique, utilise un code qui peut être distingué d'autres codes, et transmet le préambule généré par l'intermédiaire de la sélection du sous-canal et de l'utilisation du code.
 3. Système de transmission de données à accès aléatoire selon la revendication 2, dans lequel les tranches de la trame en liaison montante, à l'exception de la tranche qui est définie avec le temps de transmission possible de préambule, sont classées en qualité de canal de transmission d'informations de commande et de canal de transmission de données, et les données d'accès aléatoire sont chargées sur une partie du canal de transmission de données et transmises à la station de base.
 4. Système de transmission de données à accès aléatoire utilisant un accès multiple par répartition orthogonale de la fréquence, OFDMA, entre une station mobile (100) et une station de base (200), dans lequel la station de base comporte : un processeur de réception de préambule (210) permettant de recevoir un préambule à partir de la station mobile (100) et d'extraire des informations de préambule correspondantes ; un gestionnaire d'identifiants (220) pour affecter un identifiant de planification spécifique à chaque station mobile et gérer l'identifiant de planification spécifique de sorte que la station mobile peut utiliser un canal de transmission de données affecté ; un planificateur (230) permettant de planifier un temps de transmission de données, et une quantité de transmission de la station mobile avec l'identifiant de planification affecté à la station mobile par le gestionnaire d'identifiants selon des exigences et des environnements de canal des stations mobiles ; un processeur d'octroi d'accès (240) pour utiliser les informations de préambule du processeur de réception de préambule et l'identifiant de planification du gestionnaire de planification en vue de déterminer un état d'accusé de réception / accusé de non réception, et transmettre des informations de configuration d'octroi d'accès au préambule comportant l'identifiant de planification à la station mobile ; et un processeur de réception de données (250) permettant de recevoir les données d'accès aléatoire par le biais d'un canal de transmission de données affecté à partir de la station mobile (100) selon le résultat de transmission du processeur d'octroi d'accès (240), et de traiter lesdites données.
 5. Système de transmission de données à accès aléatoire selon la revendication 4, dans lequel les informations de préambule du processeur de réception de préambule (210) comportent des informations relatives à un code, à une synchronisation et à une puissance utilisée pour transmettre le préambule par le biais de la station mobile (100).
 6. Système de transmission de données à accès aléatoire selon la revendication 4, dans lequel le gestionnaire d'identifiants (220) récupère l'identifiant de planification affecté à la station mobile (100) lorsque le processeur de réception de données (250) met fin à la réception des données d'accès aléatoire.
 7. Système de transmission de données à accès aléatoire selon la revendication 4, dans lequel le processeur d'octroi d'accès (240) charge les informations de configuration d'octroi d'accès au préambule sur une tranche spécifique d'une trame en liaison descendante comportant une pluralité de tranches, et transmet lesdites informations à la station mobile (100).
 8. Système de transmission de données à accès aléatoire selon la revendication 7, dans lequel la tranche spécifique est affectée pour une synchronisation et une recherche de station de base et d'autres tranches sont affectées pour des tranches de trafic en liaison descendante dans la trame en liaison descendante.
 9. Système de transmission de données à accès aléatoire selon la revendication 8, dans lequel les tranches de trafic en liaison descendante sont classées sous la forme d'un temps de transmission de trafic de données et d'un temps de transmission de trafic de signaux de commande, de sorte que les données d'accès aléatoire peuvent être divisées en une partie de chaque tranche et être ensuite transmises.
 10. Procédé de transmission de données d'accès aléatoire utilisant un accès multiple par répartition orthogonale de la fréquence, OFDMA, entre une station

mobile et une station de base, la procédure de station mobile comportant les étapes ci-après consistant à : (a) sélectionner un canal de transmission de préambule et une ressource radio de transmission connexe à un code utilisé pour transmettre un préambule en vue d'un accès aléatoire à la station de base ; (b) utiliser la ressource radio de transmission sélectionnée à l'étape (a) pour générer un préambule et transmettre le préambule à la station de base; (c) recevoir des informations de configuration d'octroi d'accès au préambule comportant un identifiant de planification affecté par la station de base et des informations d'accusé de réception / accusé de non réception relativement au préambule transmis à l'étape (b), et vérifier un état de transmission réussie du préambule, et l'identifiant de planification ; et (d) autoriser la station mobile à vérifier une affectation du canal de transmission de données en faisant appel à l'identifiant de planification de la station mobile inclus dans un canal de commande selon un résultat de vérification à l'étape (c), et transmettre des données d'accès aléatoire à la station de base par le biais du canal de transmission de données affecté à la station mobile.

11. Procédé de transmission de données d'accès aléatoire selon la revendication 10, dans lequel l'étape (d) comporte l'étape consistant à autoriser la station mobile à extraire des informations de commande de transmission, telles que la synchronisation, une fréquence, et une puissance via les informations d'octroi d'accès reçues à l'étape (c), et l'étape consistant à transmettre des données d'accès aléatoire en faisant appel aux informations de commande de transmission.

12. Procédé de transmission de données d'accès aléatoire selon la revendication 10, dans lequel l'étape (b) comporte l'étape consistant à définir une tranche spécifique avec un temps de transmission possible de préambule à partir d'une trame en liaison montante incluant une pluralité de tranches, et l'étape consistant à transmettre un préambule généré en sélectionnant de manière aléatoire l'une quelconque des ressources radio de la tranche correspondante et en utilisant un code qui peut être distingué d'autres codes.

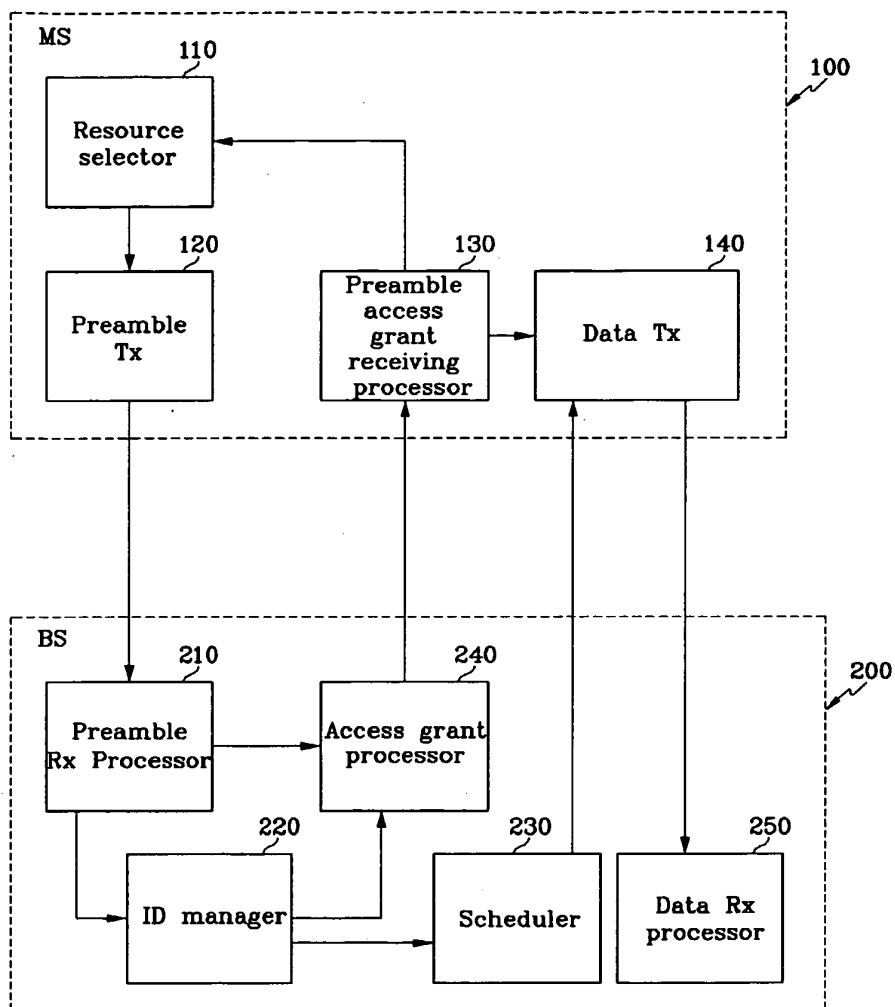
13. Procédé de transmission de données d'accès aléatoire utilisant un accès multiple par répartition orthogonale de la fréquence, OFDMA, entre une station mobile et une station de base, la procédure de station de base comportant les étapes ci-après consistant à ; (a) autoriser la station de base à recevoir et analyser un préambule transmis à partir de la station mobile, et affecter un identifiant de planification spécifique lorsque la station mobile peut être planifiée; (b) déterminer un accusé de réception ou un accusé

de non réception et former des informations de configuration d'octroi d'accès au préambule selon les informations de préambule analysées à l'étape (a) et un état affecté de l'identifiant de planification, et transmettre les informations de configuration d'octroi d'accès au préambule à la station mobile ; (c) autoriser la station de base à planifier un temps de transmission de données, un canal de transmission, et une quantité de transmission de chaque station mobile avec l'identifiant de planification affecté à chaque station mobile selon les exigences et l'environnement de canal de la station mobile, et indiquer à la station mobile les résultats planifiés ; et (d) recevoir des données d'accès aléatoire à partir de la station mobile correspondant à l'identifiant de planification via le canal de transmission de données déterminé à l'étape (c), et traiter les données d'accès aléatoire.

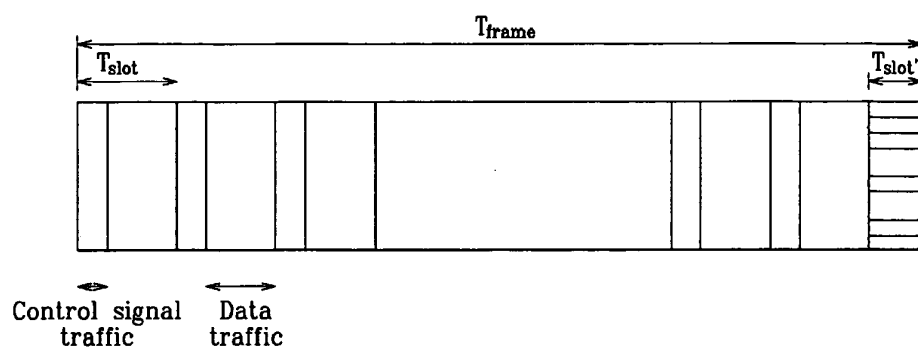
14. Procédé de transmission de données d'accès aléatoire selon la revendication 13, dans lequel l'étape (d) comporte l'étape consistant à récupérer l'identifiant de planification affecté à la station mobile lorsque la réception des données d'accès aléatoire à partir de la station mobile est terminée.

15. Procédé de transmission de données d'accès aléatoire selon la revendication 13, dans lequel l'étape (b) comporte l'étape consistant à distribuer les informations de configuration d'octroi d'accès au préambule à une partie d'une tranche spécifique d'une trame en liaison descendante comportant une pluralité de tranches, et l'étape consistant à transmettre lesdites informations à la station mobile.

FIG. 1



[Fig. 2]



[Fig. 3]

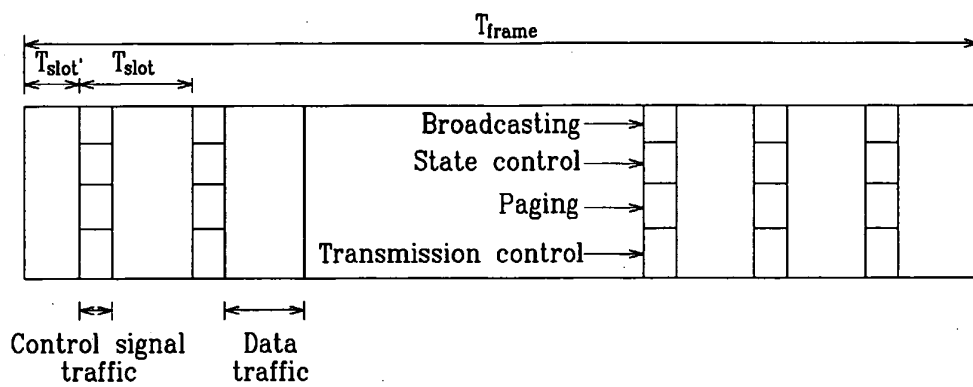
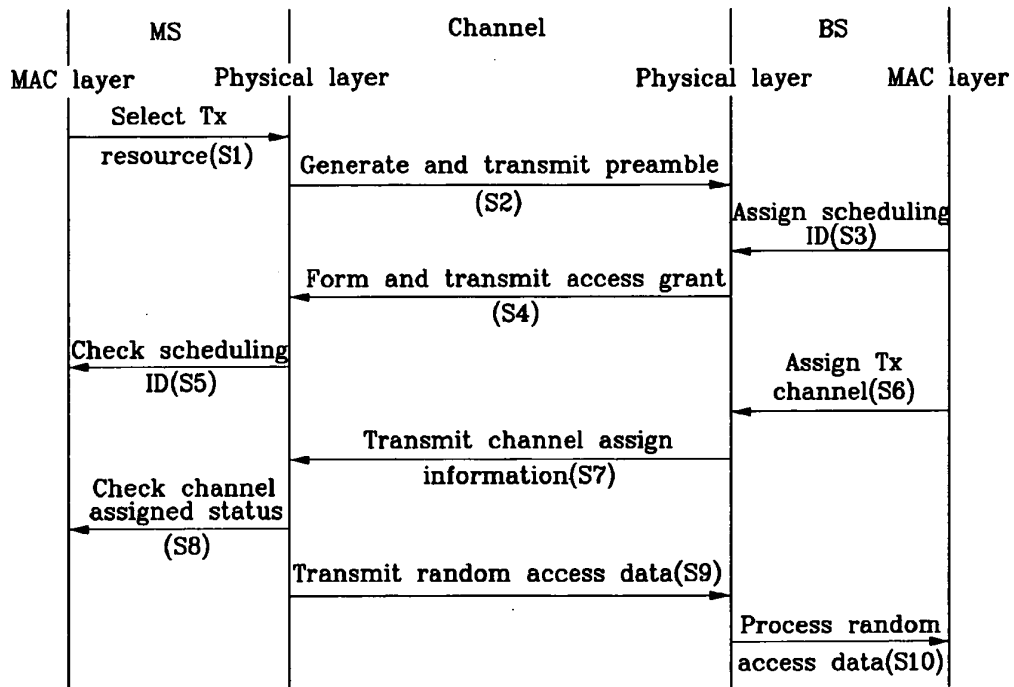


FIG.4



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REFERENCES CITED IN THE DESCRIPTION

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