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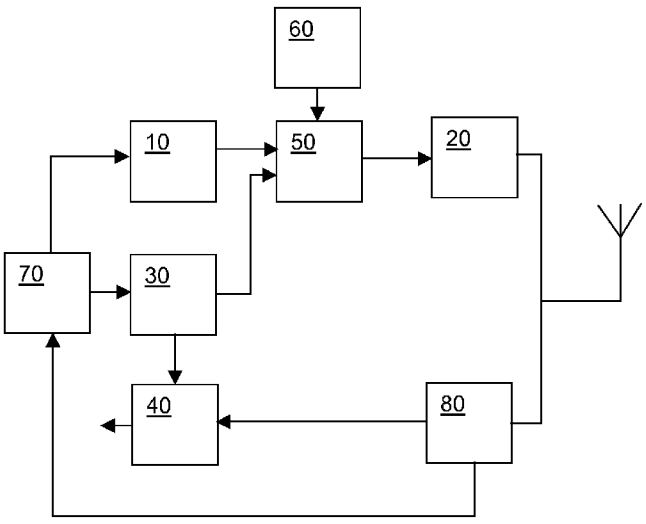
(54) Title: METHODS OF TRANSMITTING AND RECEIVING DATA, AND APPARATUS THEREFOR



10 Signal selection stage
20 Transmitter
30 Identifier derivation stage
40 Decoder
50 Encoder
60 Validity store
70 Data store
80 Receiver

Radio communication device device (100)

(57) Abstract: Data is transmitted from a radio communication device (100) by selecting a signal dependent on data to be transmitted, transmitting to a radio communication station (200) the selected signal as a random access transmission, deriving an identifier dependent on the data, and employing the identifier to identify a subsequently received signal intended for the radio communication device (100). The data is received at a radio communication station (200) by receiving the random access signal which is indicative of the data to be received, determining the data indicated by the random access signal, deriving an identifier dependent on the determined data, and including the identifier in a subsequent transmission from the radio communication station (200) to identify the intended recipient of the subsequent transmission.

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METHODS OF TRANSMITTING AND RECEIVING DATA, AND APPARATUS THEREFOR

TECHNICAL FIELD

The invention relates to a radio communication apparatus and to a method of operating a radio communication apparatus. The invention also relates to a radio communication system comprising the apparatus and to a method of operating the radio communication system. The invention has application in, for example but not exclusively, mobile communication systems.

BACKGROUND ART

Mobile communication systems require a random access mechanism by which mobile terminals can access a network. In one example of a random access mechanism which is under consideration for the UMTS LTE (Universal Mobile Telecommunication System Long Term Evolution) a mobile terminal transmits a signature on an asynchronous random access channel (RACH). The mobile terminal selects a particular signature from a larger set (e.g. of 64), which enables a few bits (e.g. 6) of information to be conveyed. One requirement is that the collision probability (i.e. probability that two mobile terminals use the same signature at the same time) should be sufficiently low. A further requirement is that the resulting waveforms have low cross-correlation.

The bit pattern defining the signature can be considered in terms of one or more data fields. Some examples of the potential contents of the data fields are:

- Pseudo-random data (in the form of a temporary mobile terminal identity to reduce the risk of collision)
- Channel quality indicator (CQI) or pathloss measurement
- Reason for RACH access.

The CQI and Reason fields may also help to reduce collisions if they are sufficiently uncorrelated between terminals.

Following the detection of the signature by the network, or more specifically the access point, further signalling takes place in both uplink (mobile terminal to network)

and downlink (network to mobile terminal), for example to allocate resources for data transmission.

The access point needs channel state information in order to choose transmission characteristics (e.g. rate, power, beamforming, pre-coding) in order to maximize the efficiency of the downlink transmissions in the final stages of the random access process, and later. The example mechanism described provides only a small number of useful data bits which can be sent in the first transmission, and so the channel cannot be described very accurately. It is also desirable to minimise the potential collision probability.

DISCLOSURE OF INVENTION

An object of the invention is to enable an improved random access mechanism.

According to a first aspect of the invention there is provided a method of transmitting data from a radio communication device, comprising:

- selecting a signal dependent on data to be transmitted;
- transmitting to a radio communication station the selected signal as a first random access transmission;
- deriving an identifier dependent on the data; and
- employing the identifier to identify a subsequently received signal intended for the radio communication device.

According to a second aspect of the invention there is provided a method of receiving data at a radio communication station, comprising:

- receiving from a radio communication device a first random access signal indicative of data to be received;
- determining the data indicated by the first random access signal;
- deriving an identifier dependent on the determined data;
- including the identifier in a subsequent transmission from the radio communication station to identify the radio communication device as the intended recipient of the subsequent transmission.

Additional steps may be:

- deriving a transmission parameter dependent on the determined data; and
- employing the derived transmission parameter for a transmission to the radio communication device.

The invention also provides a method of operating a communication system comprising operating a radio communication device in accordance with the first aspect of the invention and operating a radio communication station in accordance with the second aspect of the invention.

According to a third aspect of the invention there is provided a radio communication device for transmitting data, comprising:

- means adapted to select a signal dependent on data to be transmitted;
- means adapted to transmit to a radio communication station the selected signal as a first random access transmission;
- means adapted to derive an identifier dependent on the data; and
- means adapted to employ the identifier to identify a subsequently received signal intended for the radio communication device.

According to a fourth aspect of the invention there is provided a radio communication station for receiving data, comprising:

- means adapted to receive from a radio communication device a first random access signal indicative of data to be received;
- means adapted to determine the data indicated by the first random access signal;
- means adapted to derive an identifier dependent on the determined data;
- means adapted to include the identifier in a subsequent transmission from the radio communication station to identify the radio communication device as the intended recipient of the subsequent transmission.

Additional features may be:

- means adapted to derive a transmission parameter dependent on the determined data; and
- means adapted to employ the derived transmission parameter for a transmission to the radio communication device.

The invention also provides a communication system comprising a radio communication device in accordance with the third aspect of the invention and a radio communication station in accordance with the fourth aspect of the invention.

Thus the invention involves a radio communication device (e.g. mobile terminal) assuming a temporary identifier which is linked to, or at least partly derived from, data. The radio communication device transmits the identifier and the data by selecting a signal according to the data. The radio communication station (e.g. base station or other network

apparatus) receives the signal, determines the data from the signal, and determines the identifier from the data. The use of an identifier derived from the data avoids any need to transmit an explicit further indication of the identifier; the data conveys the identifier implicitly. In this way system efficiency can be improved.

An indication of the identifier may be included in a subsequent transmission from the radio communication device for identifying the source of transmission, enabling the radio communication station to identify the source of the subsequent transmission, and an indication of the identifier may be included in a subsequent transmission from the radio communication station to identify the destination of the transmission. Such a subsequent transmission from the radio communication device may be a random access transmission. Such subsequent use of the temporary identifier enables communication to proceed without requiring additional signalling to establish a predetermined identifier of the radio communication device. In this way system efficiency can be further improved.

The data may comprise an indication of at least one of:

- signal quality of a received signal;
- signal quality of a plurality of frequencies or frequency bands;
- signal quality for a plurality of antennas;
- a channel transfer function;
- number of receive antennas available at the radio communication apparatus;
- a (pre-assigned) identifier of a selected radio communication station to which the random access transmission is directed;
- a pre-coding matrix;
- number of spatial streams supportable by the radio communication device;
- location of the radio communication device;
- angle of a propagation path from the radio communication device to a radio communication station to which the random access transmission is directed;
- angular spread or uncertainty of the angle of a propagation path from the radio communication device to a radio communication station to which the random access transmission is directed;
- number of previous transmissions of the random access transmission;
- requested data rate.

The random access transmissions from the radio communication device may include an indication of the validity of a stored parameter held by the radio

communication station and relating to the radio communication device. In response to receiving this indication, the radio communication station may control subsequent communication with the radio communication device dependent on the stored parameter, for example it may derive a transmission parameter dependent on the stored parameter. This feature can enable the radio communication station to re-use information that it has stored relating to the radio communication device, thereby avoiding any need to re-acquire such information, and avoiding any need for the radio communication device to retransmit information that the radio communication station already holds which is currently valid.

For example, the indication of validity may take the form of a flag (e.g. a single bit) to indicate one or more of the following:

- whether previously transmitted data (e.g. relating to channel quality) remains valid;
- whether the identifier is currently known and associated with the radio communication device in the radio communication station (e.g. base station or other network device);
- whether a further identifier, for example relating to a higher layer protocol, is currently assigned to the radio communication device and associated with the identifier;
- whether other parameters related to the radiocommunication device are currently known to the radio communication station and associated with the identifier, such as radio transmission or reception capability, a supported or active application or data rate, a number of antennas, a quality of service level, a latency requirement, or a resource allocation requirement.

Correspondingly, the stored parameter held by the radio communication station may be:

- a further identifier, for example relating to a higher layer protocol;
- a radio transmission or reception capability;
- supported or active application or data rate;
- number of antennas;
- quality of service level;
- latency requirement;
- or a resource allocation requirement.

BRIEF DESCRIPTION OF DRAWINGS

The invention will now be described, by way of example only, with reference to the accompanying drawings wherein:

- Fig.1 is a block schematic diagram of a radio communication device for transmitting data; and
- Fig.2 is a block schematic diagram of a radio communication station for receiving data.

MODES FOR CARRYING OUT THE INVENTION

Embodiments of the invention will be described with reference to a mobile communication system in which the radio communication device 100 of Fig.1 is a mobile terminal, such as a mobile phone, and the radio communication station 200 of Fig.2 is a base station, or access point, in a network.

According to the invention a mobile terminal 100 assumes a temporary identity which may be linked to, or at least partly derived from, channel state or other information about the mobile terminal or network. Then this identity is transmitted by selecting a signature signal according to the identity by means of a signal selection stage 10.

This means that when a particular signature is received by the receiver 110 of the access point 200, the temporary identity can be determined by an identifier derivation stage 130 and the associated values of channel state or other parameters established. These can then be used to derive suitable parameters for subsequent downlink transmissions when stored in a parameter store 160.

For mobile terminals with no previous or recent connection to the network, the mobile terminal may derive its own temporary identity based on a suitable procedure with help of an identifier derivation stage 30. For example, taking the most significant bits of quantised channel state parameters, and optionally adding some more bits to distinguish between mobile terminals with similar channel states.

Despite the selection of the signature signal, there is still a possibility of a collision, i.e. the access point receives two identical signatures from different radio communication devices. Therefore some additional steps in the procedure may be added to enable collision resolution. Such steps are well known in the art and are not described herein.

When the mobile terminal 100 has established a connection to the access point 200, a temporary identity may be assigned by the network at some convenient time. This temporary identity is retained by the mobile terminal 100 in a data store 70 for potential later use. Preferably this identity would be compatible with the identity used for first access, which was based on channel state information or other type of data. One way of doing this is to make part of the identity based on the same channel state information, or other type of data, but as known or determined at the access point. A second part of the identity may consist of randomly generated additional bits to avoid the possibility of two mobile terminals having the same identity.

An example embodiment of the invention applied to UMTS LTE is as follows. Using UMTS terminology, a mobile terminal 100 is termed a User Equipment (UE) and a base station 200 is termed a Node B. We assume that a set of 64 signatures is assigned to the Node B 200 with which the UE 100 is attempting to communicate. In the example, the access point has multiple transmit antennas (e.g. 4 in a linear array), each transmitting orthogonal pilot sequences. The UE 100 selects one of these signatures based on a six bit temporary identity by means of its signal selection stage 10.

For the case of a UE with no previous or recent connection to the network the identity is derived as follows. Three most significant bits are obtained by measuring the angle to the access point with respect to a reference direction. This may be determined by measurement at the UE 100 of pilot transmissions from each of the antennas at the access point. This information enables design of a transmitter beamformer. Three least significant bits are derived from downlink channel quality information, based on expected SNR (signal to noise ratio) or SIR (signal to interference ratio) determined by measuring downlink pilots. Since the channel quality information depends approximately on distance from the access point the combined information represents a crude measurement of UE location.

When the receiver 110 of the access point 200 receives the signature, then subsequent downlink transmissions, for example to allocate resources for further uplink transmissions, can be made using a power, data rate and beamforming pattern which are appropriate for the UE channel, based on the values of angle and channel quality information determined from the signature.

In a further embodiment, if the angle to the UE 100 can be determined by the access point 200 by making measurements on the uplink (i.e. from the RACH signature),

for instance by means of a transmission parameter derivation stage 190, then it may not be necessary to transmit the angle in the uplink signature. In this case the angle information described above may be replaced by another parameter such as the angular uncertainty or angular spread. This enables the design of a robust beamformer for subsequent downlink transmissions.

In a time division duplex (TDD) system, reciprocity may be exploited, so that measurements of channel parameters may be made at either receiver. It may be assumed that the instantaneous channel state is similar for uplink and downlink.

In the case of frequency division duplex (FDD) operation, the uplink and downlink are at different frequencies, so instantaneous channel states are likely to be different. However, channel statistics may be similar. This means that an average in time or frequency domain is required for FDD operation. A wide signal bandwidth would allow frequency domain averaging, and this may be more suitable for the case of RACH access.

The invention can be applied to different channel state metrics. For example:

- Channel transfer function
- CQI for more than one frequency or frequency band
- CQI for more than one antenna
- Average CQI for more than one antenna
- Different CQI between antennas
- Preferred pre-coding matrix
- Preferred pre-coding vector
- Channel rank (number of supported spatial streams)
- Location of the UE
- Angle of the path from the UE to the access point
- Angular spread or uncertainty
- Number of receiver antennas available

In the case where a temporary UE identity is derived from the channel state information, this will only be useful for further RACH access attempts as long as the channel state does not change significantly, or as long as another means for indicating channel state information has not been established. This is because channel state information embedded in the identity could be used by the access point. Therefore some means of updating the UE identity may be provided, such as signalling to request a

change. This could be done for example by a validity store 60 indicating the validity of a stored parameter. Alternatively a new identity can be created for a new RACH access when necessary. Subsequent signalling may delete the old one.

Alternatively or additionally a flag, for example a single bit, could indicate whether the RACH access is using a new identity, for which the channel state information is valid, but the identity of the UE is not known to the access point, or an old identity, where the identity of the UE is also known to the access point.

Alternatively a single bit flag may indicate whether the channel state information in the identity is valid or not.

In the present specification and claims the word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. Further, the word "comprising" does not exclude the presence of other elements or steps than those listed.

The inclusion of reference signs in parentheses in the claims is intended to aid understanding and is not intended to be limiting.

From reading the present disclosure, other modifications will be apparent to persons skilled in the art. Such modifications may involve other features which are already known in the art of radio communication and which may be used instead of or in addition to features already described herein.

INDUSTRIAL APPLICABILITY

Wireless communication systems, for example UMTS LTE or other cellular systems such as UMTS WCDMA (Wideband Code Division Multiple Access).

CLAIMS

1. A method of transmitting data from a radio communication device (100), comprising:

- selecting a signal dependent on data to be transmitted;
- transmitting to a radio communication station (200) the selected signal as a first random access transmission;
- deriving an identifier dependent on the data; and
- employing the identifier to identify a subsequently received signal intended for the radio communication device.

2. A method of transmitting data as claimed in claim 1, comprising including an indication of the identifier in a subsequent transmission from the radio communication device (100) for identifying the source of transmission.

3. A method of transmitting data as claimed in claim 2, wherein the subsequent transmission is a subsequent random access transmission.

4. A method of transmitting data as claimed in any one of claims 1 to 3, wherein the data comprises at least one of:

- signal quality of a received signal;
- signal quality of a plurality of frequencies or frequency bands;
- signal quality for a plurality of antennas;
- a channel transfer function;
- number of receive antennas available at the radio communication device (100);
- an identifier of a selected radio communication station (200) to which the random access transmission is directed;
- a pre-coding matrix;
- number of spatial streams supportable by the radio communication device (100);
- location of the radio communication device (100);

- angle of a propagation path from the radio communication device (100) to a radio communication station (200) to which the random access transmission is directed;
- angular spread or uncertainty of the angle of a propagation path from the radio communication device (100) to a radio communication station (200) to which the random access transmission is directed;
- number of previous transmissions of the random access transmission;
- requested data rate.

5. A method of transmitting data as claimed in claim 1, 2, 3 or 4, wherein the first random access transmission includes an indication of the validity of a stored parameter held by the radio communication station (200) and relating to the radio communication device (100).

6. A method of receiving data at a radio communication station (200), comprising:

- receiving from a radio communication device (100) a first random access signal indicative of data to be received;
- determining the data indicated by the first random access signal;
- deriving an identifier dependent on the determined data;
- including the identifier in a subsequent transmission from the radio communication station (200) to identify the radio communication device (100) as the intended recipient of the subsequent transmission.

7. A method of receiving data as claimed in claim 6, comprising:

- deriving a transmission parameter dependent on the determined data; and
- employing the derived transmission parameter for a transmission to the radio communication device (100).

8. A method of receiving data as claimed in claim 6 or 7, comprising employing the identifier to identify the source of a subsequently received signal.

9. A method of receiving data as claimed in claim 8, wherein the subsequently received signal is a subsequently received random access signal.

10. A method of receiving data as claimed in any one of claims 6 to 9, wherein the data comprises at least one of:

- signal quality of a received signal;
- signal quality of a plurality of frequencies or frequency bands;
- signal quality for a plurality of antennas;
- a channel transfer function;
- number of receive antennas available at the radio communication device (100);
- an identifier of the radio communication station (200);
- a pre-coding matrix;
- number of spatial streams supportable at the radio communication device (100);
- location of the radio communication device (100);
- angle of a propagation path from the radio communication device (100) to the radio communication station (200);
- angular spread or uncertainty of the angle of a propagation path from the radio communication device (100) to the radio communication station (200);
- number of previous transmissions of the random access transmission;
- requested data rate.

11. A method of receiving data as claimed in claim 6, 7, 8, 9 or 10, wherein the first random access transmission includes an indication of the validity of a stored parameter held by the radio communication station (200) and relating to the radio communication device (100), the method further comprising, in response to the indication, controlling subsequent communication with the radio communication device (100) dependent on the stored parameter.

12. A method of receiving data as claimed in claim 11, wherein controlling the subsequent communication comprises deriving the transmission parameter dependent on the stored parameter.

13. A method of receiving data as claimed in claim 11 or 12, wherein the stored parameter comprises at least one of:

- a further identifier;

- a radio transmission or reception capability;
- a supported application;
- a supported data rate;
- a number of antennas;
- a quality of service level;
- a latency requirement;
- a resource allocation requirement.

14. A method of operating a radio communication system comprising operating a radio communication device (100) in accordance with any one of claims 1 to 5 and operating a radio communication station (200) in accordance with any one of claims 6 to 13.

15. A radio communication device (100) for transmitting data, comprising:

- means (10) adapted to select a signal dependent on data to be transmitted;
- means (20) adapted to transmit to a radio communication station (200) the selected signal as a first random access transmission;
- means (30) adapted to derive an identifier dependent on the data; and
- means (40) adapted to employ the identifier to identify a subsequently received signal intended for the radio communication device (100).

16. A radio communication device (100) as claimed in claim 15, comprising means (50) adapted to include an indication of the identifier in a subsequent transmission from the radio communication device (100) for identifying the source of transmission.

17. A radio communication device (100) as claimed in claim 16, wherein the subsequent transmission is a subsequent random access transmission.

18. A radio communication device (100) as claimed in any one of claims 15 to 17, wherein the data comprises at least one of:

- signal quality of a received signal;
- signal quality of a plurality of frequencies or frequency bands;
- signal quality for a plurality of antennas;

- a channel transfer function;
- number of receive antennas available at the radio communication apparatus;
- an identifier of a selected radio communication station to which the random access transmission is directed;
- a pre-coding matrix;
- number of spatial streams supportable by the radio communication device;
- location of the radio communication device;
- angle of a propagation path from the radio communication device to a radio communication station to which the random access transmission is directed;
- angular spread or uncertainty of the angle of a propagation path from the radio communication device to a radio communication station to which the random access transmission is directed;
- number of previous transmissions of the random access transmission;
- requested data rate.

19. A radio communication device (100) as claimed in claim 15, 16, 17 or 18, comprising means (50) adapted to include in the first random access transmission an indication (60) of the validity of a stored parameter held by the radio communication station and relating to the radio communication device.

20. A radio communication station (200) for receiving data, comprising:

- means (110) adapted to receive from a radio communication device a first random access signal indicative of data to be received;
- means (140) adapted to determine the data indicated by the first random access signal;
- means (130) adapted to derive an identifier dependent on the determined data;
- means (150) adapted to include the identifier in a subsequent transmission from the radio communication station to identify the radio communication device as the intended recipient of the subsequent transmission.

21. A radio communication station (200) as claimed in claim 20, comprising:

- means (190) adapted to derive a transmission parameter dependent on the determined data; and

- means (120) adapted to employ the derived transmission parameter for a transmission to the radio communication device.

22. A radio communication station (200) as claimed in claim 20 or 21, comprising means (140) adapted to employ the identifier to identify the source of a subsequently received signal.

23. A radio communication station (200) as claimed in claim 22, wherein the subsequently received signal is a subsequently received random access signal.

24. A radio communication station (200) as claimed in any one of claims 20 to 23, wherein the data comprises at least one of:

- signal quality of a received signal;
- signal quality of a plurality of frequencies or frequency bands;
- signal quality for a plurality of antennas;
- a channel transfer function;
- number of receive antennas available at the radio communication device (100);
- an identifier of the radio communication station (200);
- a pre-coding matrix;
- number of spatial streams supportable at the radio communication device (100);
- location of the radio communication device (100);
- angle of a propagation path from the radio communication device (100) to the radio communication station (200);
- angular spread or uncertainty of the angle of a propagation path from the radio communication device (100) to the radio communication station (200);
- number of previous transmissions of the random access transmission;
- requested data rate.

25. A radio communication station (200) as claimed in claim 20, 21, 22, 23 or 24, wherein the first random access transmission includes an indication of the validity of a stored parameter (150) held by the radio communication station (200) and relating to the radio communication device (100), the radio communication station (200) further comprising means (150) adapted to, in response to the indication, control subsequent

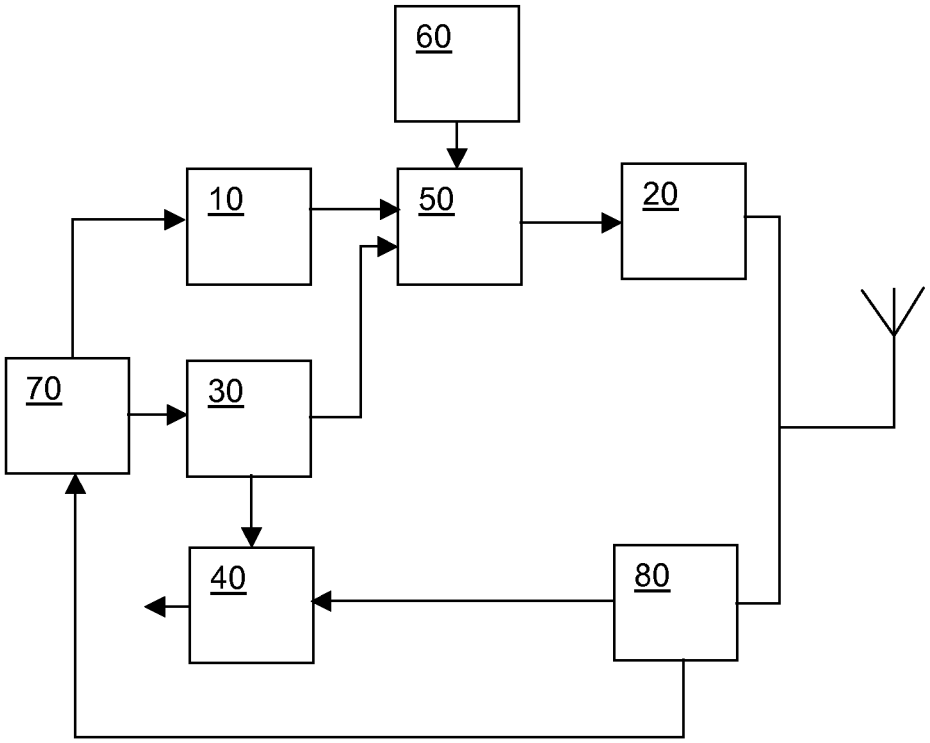
communication with the radio communication device (100) dependent on the stored parameter.

26. A radio communication station (200) as claimed in claim 25, wherein the means (150) adapted to control the subsequent communication is adapted to derive the transmission parameter dependent on the stored parameter.

27. A radio communication station (200) as claimed in claim 25 or 26, wherein the stored parameter comprises at least one of:

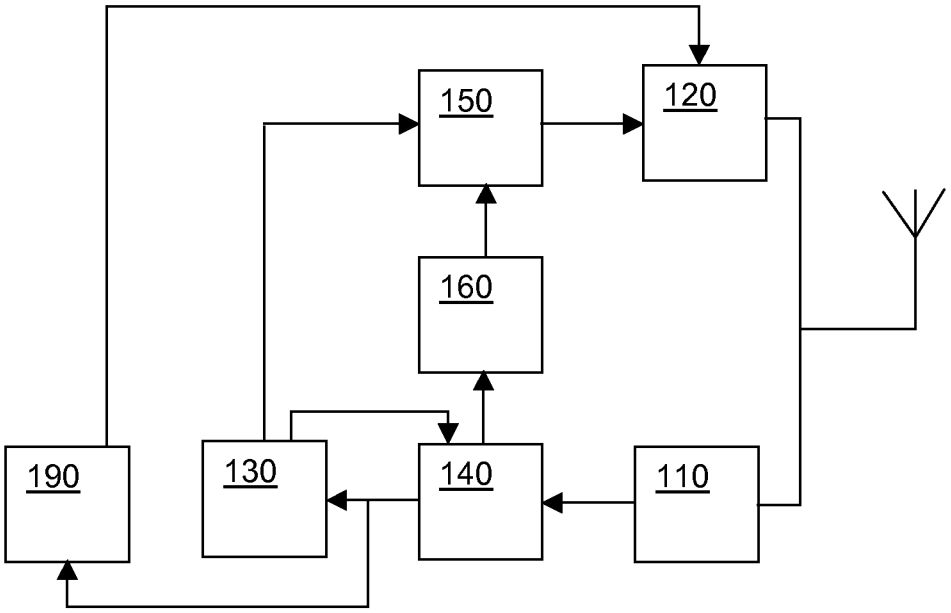
- a further identifier;
- a radio transmission or reception capability;
- a supported application;
- a supported data rate;
- a number of antennas;
- a quality of service level;
- a latency requirement;
- a resource allocation requirement.

28. A radio communication system comprising a radio communication device (100) in accordance with any one of claims 15 to 19 and a radio communication station (200) in accordance with any one of claims 20 to 27.



10 Signal selection stage
20 Transmitter
30 Identifier derivation stage
40 Decoder
50 Encoder
60 Validity store
70 Data store
80 Receiver

Fig. 1 Radio communication device device (100)



110 Receiver
120 Transmitter
130 Identifier derivation stage
140 Decoder
150 Encoder
160 Parameter store
190 Transmission parameter derivation stage

Fig. 2 Radio communication station (200)

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2007/053315

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04B7/04 H04Q7/38

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04B H04Q

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/233870 A1 (WILLENEGGER SERGE [CH] ET AL) 25 November 2004 (2004-11-25) paragraph [0005]; figure 1 paragraph [0007] paragraph [0011] paragraph [0015] - paragraph [0017] paragraph [0032] paragraph [0034] - paragraph [0037]; figures 2A,2B	1-3,5-9, 11-17, 19-23, 25-28
A	US 2002/025812 A1 (AHLSTRAND SUSANNE [SE] ET AL) 28 February 2002 (2002-02-28) paragraph [0005] - paragraph [0006] paragraph [0027] paragraph [0030] - paragraph [0032] paragraph [0039] - paragraph [0041]	1-28

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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

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Date of the actual completion of the international search	Date of mailing of the international search report
11 January 2008	21/01/2008

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INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 810 258 B1 (VIALEN JUKKA [FI]) 26 October 2004 (2004-10-26) column 1, line 36 - column 2, line 16 column 2, line 36 - line 50	1-28

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2007/053315

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004233870 A1	25-11-2004	AU 3918000 A	09-10-2000
		CN 1344474 A	10-04-2002
		EP 1166584 A1	02-01-2002
		HK 1042808 A1	29-12-2006
		JP 2002540693 T	26-11-2002
		JP 2007124687 A	17-05-2007
		JP 2007267400 A	11-10-2007
		WO 0057663 A1	28-09-2000
US 2002025812 A1	28-02-2002	NONE	
US 6810258 B1	26-10-2004	AU 1970299 A	02-08-1999
		FI 980063 A	15-07-1999
		WO 9937114 A2	22-07-1999