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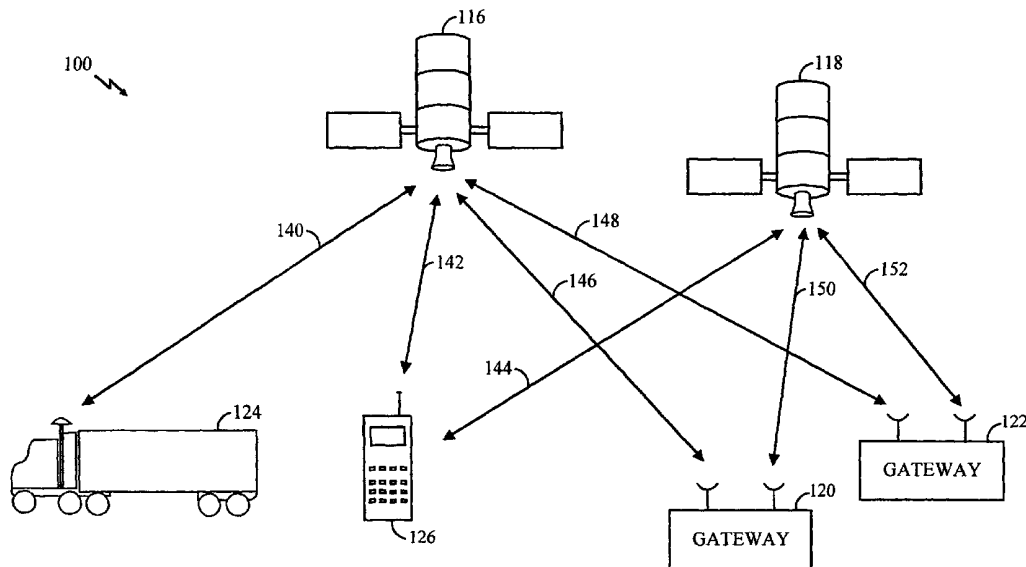
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR DEEP PAGING



(57) Abstract: A method for deep paging in a communication system employing orthogonal channelizing codes, such as Walsh sequences, of predetermined length m , that does not require a high powered paging channel. The method includes the steps of generating a paging channel message which is combined with a Walsh sequence having a length greater than or equal to $2m$, and transmitting the paging channel message at a data rate of less than 480 bits per second (bps). By transmitting the paging channel message at a low data rate and integrating collected energy over a period longer by a factor on the order of 1000, the message is able to penetrate buildings and other structures or high attenuation environments, thereby allowing one to successfully page a user terminal that is inside such a structure or area. Preferably, the paging channel message is formed using an auxiliary Walsh sequence on the order of 65536 chips in length, and the data rate is less than 10 bps.



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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/22734

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B7/185

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04B

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, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98 32290 A (STANFORD TELECOMMUNICATIONS) 23 July 1998 (1998-07-23) claims 1-5; figures 1-4 ---	1-18
A	US 5 659 545 A (SOWLES ET AL.) 19 August 1997 (1997-08-19) claims 1-23 ---	1-23
A	EP 0 776 100 A (NOKIA MOBILE PHONES) 28 May 1997 (1997-05-28) claims 1-21 ---	1-23
A	US 5 742 908 A (DENT PAUL W) 21 April 1998 (1998-04-21) column 2, line 8 - line 63 ---	19-23
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- * & * document member of the same patent family

Date of the actual completion of the international search

5 June 2001

Date of mailing of the international search report

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Name and mailing address of the ISA

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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	EP 0 901 240 A (ICO SERVICES LTD) 10 March 1999 (1999-03-10) claims 1-7 -----	24-26
A	EP 0 848 506 A (ICO SERVICES LTD) 17 June 1998 (1998-06-17) column 1, line 1 -column 4, line 36 -----	24-26
A	US 5 936 570 A (GHAZVINIAN FARZAD ET AL) 10 August 1999 (1999-08-10) column 2, line 7 - line 62 -----	24-26

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/22734

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-18

A method for deep paging with a paging channel message in a communication system in which communication channels are generated using a set of orthogonal binary sequences of pre-selected length m and data is transferred at a minimum data rate of D bits per second, comprising the steps of: forming at least one deep paging channel using an additional orthogonal sequence of length Nm , N being a positive integer, generated from the one of said set of orthogonal sequences, and transmitting said paging channel message on said paging channel at a data rate of less than D bits per second.

The problem is to penetrate buildings and other structures or high attenuation environments.

The solution is the generation of a paging channel message which is combined with a Walsh sequence and transmitting the message at a low data rate.

2. Claims: 19-23

A method for compensating for the Doppler effect in a communication system where messages are transmitted at a low data rate to a user terminal that is inside a building.

The problem is that with a satellite on a non geo-synchronous orbit, the frequency shifts and phase changes due to the Doppler effect, have a higher impact on a lower data rate transfer. This results decreases the ability to perform coherent signal reception.

The solution to this is the acquisition of a pilot signal prior to the user terminal entering the building, placing the user terminal into a deep paging mode prior to the user terminal entering the building, tracking the Doppler. An auxiliary paging channel is monitored after activation of a deep paging mode.

3. Claims: 24-26

A method for compensating for the Doppler effect in a communication system where messages are transmitted at a low data rate to a user terminal that is inside a building.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

The problem is that with a satellite on a non geo-synchronous orbit, the frequency shifts and phase changes due to the Doppler effect, have a higher impact on a lower data rate transfer. This results decreases the ability to perform coherent signal reception.

The solution consists in receiving at the user terminal ephemeris messages transmitted from a gateway, storing these messages at the user terminal, determining the location of the user, determining the Doppler based on said location and ephemeris data stored in the user terminal and acquiring a pilot signal.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/22734

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9832290 A	23-07-1998	US 5910777 A	08-06-1999
		AU 722715 B	10-08-2000
		AU 5928598 A	07-08-1998
		EP 0954912 A	10-11-1999

US 5659545 A	19-08-1997	NONE	

EP 776100 A	28-05-1997	GB 2307627 A	28-05-1997
		JP 9261150 A	03-10-1997
		US 5867124 A	02-02-1999

US 5742908 A	21-04-1998	AU 693272 B	25-06-1998
		AU 3729695 A	29-03-1996
		BR 9506495 A	07-10-1997
		CA 2174938 A	21-03-1996
		CN 1135813 A	13-11-1996
		EP 0728385 A	28-08-1996
		FI 962027 A	13-05-1996
		JP 9510067 T	07-10-1997
		WO 9608882 A	21-03-1996

EP 0901240 A	10-03-1999	GB 2332111 A	09-06-1999
		JP 11154897 A	08-06-1999

EP 0848506 A	17-06-1998	GB 2320385 A	17-06-1998
		JP 10209941 A	07-08-1998

US 5936570 A	10-08-1999	AU 3450199 A	20-09-1999
		EP 1060577 A	20-12-2000
		WO 9945659 A	10-09-1999
		US 6127967 A	03-10-2000
