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(71) Applicant *(for all designated States except US)*: **ERICSSON INC.** [US/US]; 6300 Legacy Drive, Plano, TX 75024 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **DENT, Paul** [GB/US]; 637 Eagle Point Road, Pittsboro, NC 27312 (US). **ZANGI, Kambiz** [US/US]; 6 Colton Court, Durham, NC 27713 (US).

(74) Common Representative: **ERICSSON INC.**; c/o David E. Bennett, Coats & Bennett, P.L.L.C., P.O. Box 5, Raleigh, NC 27602 (US).

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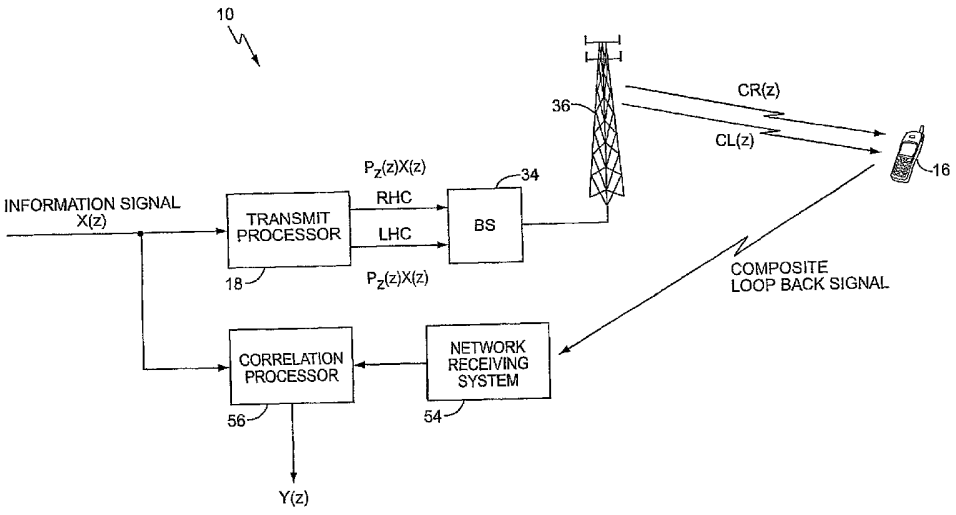
Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations*

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations*

[Continued on next page]

(54) Title: TRANSMIT DIVERSITY AND SEPARATING MULTIPLE LOOPBACK SIGNALS



(57) Abstract: A wireless communication network processes composite loop-back signals received at one or more network antennas (54) from a plurality of mobile stations (16), each transmitting an individual, mobile-specific loop-back signal. Using its knowledge of the prior network-transmitted signal(s) from which the mobile stations derive their individual loop-back signals, and its knowledge of the mobile-specific loop-back signal modifications made by each of the mobile stations, the network derives mobile-specific downlink channel information based on processing the composite loop-back signals. That is, use of the mobile-specific loop-back signals enables the network to determine downlink channel estimates as between each participating network antenna and each participating mobile station to be used for transmit signal interference and/or power precompensation, for example. Mobile stations incorporate loop-back signal sample processors used to impart mobile-specific modifications to signal samples obtained from network-transmitted signals. The modified signal samples, thus "imprinted," are then transmitted back to the network.

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— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*
— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

Published:
— *with international search report*

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14 July 2005

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.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/03911

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) : H04B 17/00
US CL : 455/67.11
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)
U.S. : 455/67.11, 67.16, 63.1, 69, 70

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 practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,181,739 B1 (RYDE et al) 30 January 2001 (30.01.2001), column 2 lines37-60.	60
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Y		61-65
Y	US 5,509,052 A (CHIA et al) 16 April 1996 (16.04.1996), column 1 lines 28-42.	61-65
Y	US 5,237,612 A (RAITH) 17 August 1993 (17.08.1993), column 4 lines 65-66.	65
A	US 5,940,741 A (BRIANCON et al) 17 August 1999 (17.08.1999), whole document.	1-37 and 60-69
A	US 2002/0036996 A1 (OZLUTURK et al) 28 March 2002 (28.03.2002), whole document.	1-37 and 60-69

☐ Further documents are listed in the continuation of Box C. ☐ 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

"E" earlier application or patent 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
07 March 2005 (07.03.2005)

Date of mailing of the international search report
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Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
Facsimile No. (703)305-3230

Authorized officer
Raymond B. Persino
Telephone No. (703) 308-7528

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INTERNATIONAL SEARCH REPORT

International application No.
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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation 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.: 1-37 and 60-69

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/03911

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-37 and 60-69, drawn to generating a loop-back signal at a mobile station using a mobile-specific modification of sampled received signals.

Group II, claim(s) 38-59, drawn to estimating uplink and downlink channel characteristics for a plurality of mobile stations by a wireless communication network using predicted and received loop-back signals.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-37 and 60-69, drawn to generating a loop-back signal at a mobile station using a mobile-specific modification of sampled received signals.

Group II, claim(s) 38-59, drawn to estimating uplink and downlink channel characteristics for a plurality of mobile stations by a wireless communication network using predicted and received loop-back signals.