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Datasheet for the decision of 24 June 2008

Case Number: T 0620/05 - 3.5.05

Application Number: 02252543.0

Publication Number: 1298829

IPC: H04L 1/06

Language of the proceedings: EN

Title of invention:
HARQ techniques for multiple antenna systems

Applicant:
Lucent Technologies Inc.

Opponent:
-

Headword:
HARQ/LUCENT

Relevant legal provisions:
EPC Art. 56, 84, 113(1), 116(1), 123(2)
EPC R. 111(1)
RPBA Art. 15(3)+(6)

Keyword:
Added subject-matter (main request - yes); Inventive step (auxiliary request - no)

Decisions cited:
-

Catchword:
-

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Case Number: T 0620/05 - 3.5.05

D E C I S I O N
of the Technical Board of Appeal 3.5.05
of 24 June 2008

Appellant: Lucent Technologies Inc.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 18 February 2005 refusing European application No. 02252543.0 pursuant to Article 97(1) EPC 1973.**

Composition of the Board:

Chairman: D. H. Rees
Members: A. Ritzka
P. Schmitz

Summary of Facts and Submissions

I. This appeal is against the decision of the examining division dispatched 18 February 2005, refusing European patent application No. 02 252 543.0 for the reasons that claim 5 did not satisfy the requirements of Article 84 EPC and that claim 1 did not involve an inventive step having regard to the disclosure of

D5: US 6 144 711 A and

D7: Daniel J. Costello, Jr. et al.: "Application of Error Control Coding", IEEE Transactions on Information Theory, Vol. 44, No. 6, October 1998, pages 2531 to 2560.

II. Notice of appeal was filed on 4 April 2005 with letter of 1 April 2005. The appeal fee was paid on the same day. The statement of grounds of appeal was filed on 3 May 2005 with letter of 29 April 2005. The appellant requested that the appealed decision be set aside and that a patent be granted based on claims 1 to 20 filed with the statement of grounds of appeal.

III. The board issued an invitation to oral proceedings accompanied by a communication. In the communication the board expressed the preliminary view that claims 2 to 4 were not clear, claims 1 and 5 did not appear to be supported by the application as originally filed, contravening Article 123(2) EPC and claims 1, 5, 11 and 17 did not appear to involve an inventive step.

IV. With its letter of 27 May 2008, in response to the communication, the appellant filed a new set of twenty claims labelled "Primary request", replacing the set of

claims on file as a main request, and a set of nine claims as an auxiliary request.

V. The appellant announced that it would not attend the oral proceedings set for 24 June 2008 and requested that the oral proceedings be cancelled and the procedure continued in writing. The board informed the appellant that the oral proceedings would take place as scheduled.

VI. Oral proceedings took place as scheduled on 24 June 2008. Neither the appellant nor its representative attended the hearing. The appellant had requested in writing that the decision under appeal be set aside and a patent be granted based on the main request (claims 1 to 20) or the auxiliary request (claims 1 to 9) filed with letter dated 27 May 2008. After deliberation on the basis of the submissions and requests of 27 May 2008 the board announced its decision.

VII. Claim 1 of the main request reads as follows:

" A method of processing a block of information, the method comprising:

forming at least two error control coded streams from the block of information, using a separate error code encoder for each stream, each of the formed at least two error control coded streams being transmitted in response to a confirmation message, wherein a first error control coded stream of the at least two error control coded streams is independently transmitted by a first antenna of a multiple antenna system and a second error control coded stream of the at least two error

control coded streams is independently transmitted by a second antenna of the multiple antenna system."

Claim 9 reads as follows:

" A method of processing received error control coded streams that are formed separately using respective separate error control code encoders, the method comprising:

performing independent error detection of at least two of the received error control coded streams in a multiple antenna system, wherein at least one confirmation message is transmitted in response to the performed independent error detection, a first error control coded stream of the at least two received error control coded streams having been independently transmitted by a first antenna of the multiple antenna system and a second error control coded stream of the at least two received error control coded streams having been independently transmitted by a second antenna of the multiple antenna system."

Claim 1 of the auxiliary request reads as follows:

"A method of processing blocks of information, the method comprising:

independently encoding, modulating, and formatting at least two first bit streams according to a re-transmission protocol using a separate error code encoder for each first bit stream, each first bit stream being derived from a first block of information;

independently transmitting said at least two first bit streams using at least one antenna of a multiple antenna system;

receiving at least two acknowledgment signals corresponding to said at least two first bit streams, each acknowledgment signal corresponding to at least one of the first bit streams;

retransmitting at least one first bit stream in response to determining that said at least one of the acknowledgment signals is a negative acknowledgment signal indicating that at least one of the first bit streams was not successfully decoded; and

independently encoding, modulating, and formatting at least two second bit streams derived from a second block of information in response to determining that said at least two acknowledgment signals are positive acknowledgment signals indicating that said at least two first bit streams have been successfully decoded."

Claim 6 of the auxiliary request reads as follows:

"A method of processing blocks of information, the method comprising:

receiving at least two first bit streams, each of said at least two first bit streams having been independently encoded, modulated, and formatted according to a retransmission protocol using a separate error code encoder for each first bit stream, each first bit stream being derived from a first block of information;

independently attempting to decode said at least two first bit streams;

transmitting at least two acknowledgement signals corresponding to said at least two first bit streams;

receiving a retransmission of at least one first bit stream in response to transmitting at least one negative acknowledgment signal indicating that at least

one of the first bit streams was not successfully decoded; and

receiving at least two second bit streams derived from a second block of information in response to transmitting at least two positive acknowledgment signals indicating that said at least two first bit streams have been successfully decoded."

Reasons for the Decision

1. *Procedural matters*

According to Article 116(1) EPC, oral proceedings shall take place either at the instance of the European Patent Office if it considers this to be expedient or at the request of any party to the proceedings. Oral proceedings are considered as an effective way to discuss cases mature for decision, because the appellant is given the opportunity to present its concluding comments on the outstanding issues (Article 113(1) EPC), and a decision based on the appellant's requests may be given at their end (Rule 111(1) EPC).

The need for procedural economy requires that the board should reach its decision as quickly as possible while giving the appellant a fair chance to argue its case.

The appellant gave no reasons to support the request to cancel the oral proceedings scheduled by the board and to continue the procedure in writing. The board considered that, despite the appellant's announced intention not to attend, the twin requirements of

fairness and procedural economy were still best served by holding the oral proceedings as scheduled. The request to cancel oral proceedings and to continue in writing was therefore refused.

Article 15(3) RPBA stipulates that the Board shall not be obliged to delay any step in the proceedings, including its decision, by reason only of the absence at the oral proceedings of any party duly summoned who may then be treated as relying only on its written case. Allowing an appellant to delay a decision by filing amended requests which are not allowable and not attending oral proceedings at which they could be discussed, would also be contrary to Article 15(6) RPBA, which stipulates that a Board shall ensure that each case is ready for decision at the conclusion of the oral proceedings, unless there are special reasons to the contrary. An appellant's request to continue the procedure in writing without giving reasons for not attending the oral proceedings already arranged, does not comply with this regulation.

In the present case, the amendments filed contain several deficiencies as outlined below. Due to the appellant's absence in the oral proceedings these deficiencies could not be discussed with him. Since the aim of oral proceedings is to come to a final decision by its end and since the appellant did not appear in order to explain why these amendments should be allowable the board can only rely on the appellant's written submissions filed together with the amendments on 27 May 2008. By filing amended claims shortly before the oral proceedings and subsequently not attending these proceedings, the appellant must expect that the

board will have to examine whether the amendments newly introduced in the claims comply with the provisions of Articles 123(2) and 84 EPC and further whether the objections which had been communicated earlier are overcome with respect to the amended claims.

However, the submissions filed together with the amendments on 27 May 2008 are not convincing, for the following reasons (see points 2 and 3).

2. *Main request*

2.1 Article 123(2) EPC

Independent claims 1 and 9 refer to "at least two error control coded streams". In the letter of 27 May 2008 the appellant stated that support for the main set of claims might be found in Figure 3 and between lines 16 to 26 on page 6 of the specification.

At page 6, lines 18 and 19 the specification says that the re-transmission technique is performed on at least two error coded streams of bits. Figure 3 shows a block diagram of a communications system with several encoders/modulators, a MIMO encoder and a MIMO decoder and several demodulators/decoders.

Neither the passage at page 6, lines 16 to 26 nor figure 3 or any other part of the description provide a basis for error control coded streams. In the description as originally filed only the term "error coded streams" is used.

No arguments that the terms "error coded streams" and "error control coded streams" might refer to identical items were presented. However, as the appellant deliberately reformulated the claims of the main request to refer to error control coded streams whereas the description refers (as it always did) to error coded streams, the board assumes that these terms are intended to specify different features.

Thus, claims 1 and 9 do not comply with the provisions of Article 123(2) EPC. For this reason the main request is not allowable. However, the board notes the following further defects.

2.2 Article 84 EPC

Moreover, as the term "error control coded streams" is not supported by the description, claims 1 and 9 do not comply with the provisions of Article 84 EPC.

2.3 Inventive step

Even if, for the sake of argument, the term "error control coded streams" were interpreted as error coded streams, claim 1 would lack an inventive step having regard to the disclosure of D5.

D5 discloses processing input data, i.e. a block of information, into a coded symbol stream, see column 5, lines 36 to 41 and 52 to 60. After further processing steps the symbol stream is fed into a transmitter space-frequency pre-processor which splits the symbol stream into a set of parallel bins, i.e. error coded streams, see column 6, lines 28 to 32.

In an alternative embodiment a separate encoder is foreseen for each space subchannel, see column 25, lines 55 to 58, figure 21 and column 26, lines 1 to 3. Thus, D5 discloses referring to figure 21 forming at least two error coded streams from the block of information, using a separate error code encoder for each stream.

Coding involves an ARQ code that recognizes Reed Salomon codeword errors at the receiver in the Receiver ARQ Buffer Control and requests a codeword retransmission from the Transmitter ARQ Buffer Control The retransmission request is made through a Reverse Link Control Channel, see column 23, lines 36 to 42. The skilled person would understand that an ARQ method in which retransmission is based on the recognition of a codeword error at the receiver implies that each of the formed at least two error coded streams is transmitted in response to a confirmation message.

The final step in the transmission process of D5 is to radiate the transmitted signal using a transmit antenna array, see column 7, lines 36 and 37. The receiver system comprises an antenna array as well, see column 7, lines 54 to 57. Although the description of the embodiment disclosed with reference to figure 21, which involves a separate encoder for each available space frequency subchannel, see column 26, lines 1 to 3, does not explicitly refer to the final step, the skilled person would understand that this final step is applicable to all the embodiments disclosed in D5. Moreover, the use of multiple transmitter antennas and multiple receiver antennas for providing a spatial

isolation between any two spatial subchannels was generally known from the prior art teaching referred to in D5, column 1, lines 45 to 63. The skilled person would understand that the spatial isolation is due to the use of different antennas for transmitting the streams. This implies that a first error coded stream of the at least two error coded streams is independently transmitted by a first antenna of a multiple antenna system and a second error coded stream of the at least two error coded streams is independently transmitted by a second antenna of the multiple antenna system.

Thus, the subject-matter of claim 1 does not involve an inventive step.

Similar arguments apply to claim 9, which is directed to the corresponding method at the receiver.

Turning to the appellant's argument that D5 did not disclose using a separate encoder for each available space subchannel, since D5, column 1, lines 45 to 59 taught that space channel frequency subchannels are formed using transmissions from multiple antennas along different air interface pathways, the board notes that the cited passage merely refers to the background of the invention and the prior art teaching and that D5 at column 26, lines 1 to 3 explicitly discloses an embodiment involving a separate encoder for each available space frequency subchannel. The skilled person would understand that the different air interface pathways are a result of the transmission over separate antennas and that each available space

frequency subchannel may be transmitted over a separate antenna.

3. *Auxiliary request*

3.1 Inventive step

D5 discloses processing input data, i.e. blocks of information, into a coded symbol stream, see column 5, lines 36 to 41 and 52 to 60. After further processing steps the symbol stream is fed into a transmitter space-frequency pre-processor which splits the symbol stream into a set of parallel bins, i.e. at least two first bit streams, each first bit stream being derived from a first block of information, see column 6, lines 28 to 32.

In an alternative embodiment a separate encoder is foreseen for each space subchannel, see column 25, lines 55 to 58, figure 21 and column 26, lines 1 to 3. Thus, D5 discloses referring to figure 21 using a separate error code encoder for each first bit stream.

Coding involves an ARQ code that recognizes Reed Salomon codeword errors at the receiver in the Receiver ARQ Buffer Control and requests a codeword retransmission from the Transmitter ARQ Buffer Control. The retransmission request is made through a Reverse Link Control Channel, see column 23, lines 36 to 42. From D5, column 5, lines 52 to 60 it is clear that when this document refers to encoding it means error code encoding. Thus, the skilled person would understand that the separate encoder for each space subchannel of figure 21 would include an error code encoder, thus a

separate error code encoder would be used for each first bit stream.

The final step in the transmission process of D5 is to radiate the transmitted signal using a transmit antenna array, see column 7, lines 36 and 37. Although the description of the embodiment disclosed with reference to figure 21, which involves a separate encoder for each available space frequency subchannel, see column 26, lines 1 to 3, does not explicitly refer to the final step, the skilled person would understand that this final step is applicable to all the embodiments disclosed in D5. Moreover, the use of multiple transmitter antennas and multiple receiver antennas for providing a spatial isolation between any two spatial subchannels was generally known from the prior art teaching referred to in D5, column 1, lines 45 to 63. The skilled person would understand that the spatial isolation is due to the use of different antennas for transmitting. This implies independently transmitting said at least two first bit streams using at least one antenna of a multiple antenna system.

The skilled person would understand that ARQ methods return ACK or NACK signals to the transmitter based on the recognition of a codeword error at the receiver. This implies (the transmitter) receiving at least two acknowledgement signals corresponding to the at least two first bit streams, each acknowledgment signal corresponding to at least one of the first bit streams and retransmitting at least one first bit stream in response to determining that said at least one of the acknowledgment signals is a negative acknowledgment

signal indicating that at least one of the first bit streams was not successfully decoded.

The last step of claim 1 refers to a second block of information treated in the same way as the first block of information, once the two first bit streams have been successfully decoded. D5 discloses processing input data without referring to a first block of information and a second block of information. However, it is a general feature of ARQ that after successful reception of a first block of information a second block of information is treated in the same way as the first block of information. Thus, it lies within the normal professional activity of a skilled person to independently encode, modulate, and format at least two second bit streams derived from a second block of information in response to determining that said at least two acknowledgement signals are positive acknowledgement signals indicating that said at least two first bit streams have been successfully decoded.

Thus, the subject-matter of claim 1 does not involve an inventive step.

Similar arguments apply to claim 6, which is directed to the corresponding method at the receiver.

The appellant argued that D5 did not describe any technique for splitting up the information in a single block into multiple data streams that can be transmitted independently and acknowledged independently by the receiver. The board notes that this argument applies to novelty rather than to inventive step. However, D5 discloses at column 26,

lines 1 to 3 using a separate encoder for each available space frequency subchannel. Moreover, D5 at column 23, lines 36 to 53 discloses that coding involves an ARQ code that recognizes Reed Solomon codeword errors at the receiver in the Receiver ARQ Buffer Control and requests a codeword retransmission from the Transmitter ARQ Buffer Control using the Reverse Link Control Channel. D5 states that reverse control channel, the operation of the RS encoder and decoder and the ARQ system are well known to one skilled in the art, that any combination of known coding schemes may be employed with advantageous results and that the transmitter end and receiver end would then include the necessary encoder and decoder, respectively.

The skilled person would thus understand, that each separate encoder involves ARQ in the embodiment involving separate encoders for each available space frequency subchannel. The skilled person would further understand that the first block of information can not be reassembled at the receiver before all the bit streams formed from the first block of information have been decoded. Retransmitting individual bit streams until all the bit streams formed from a first block of information have been decoded is thus considered to be a matter of implementation which lies within the normal professional activity of the skilled person.

4. There being no allowable requests, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

K. Götz D. H. Rees