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Datasheet for the decision of 8 May 2013

Case Number: T 1561/10 - 3.5.05

Application Number: 04250903.4

Publication Number: 1460791

IPC: H04L 1/08, H04L 1/18

Language of the proceedings: EN

Title of invention:
Transmission methods for communication systems supporting a multicast mode

Applicant:
Alcatel-Lucent USA Inc.

Headword:
Multicast retransmissions/ALCATEL-LUCENT

Relevant legal provisions:
EPC Art. 56, 123(2)
RPBA Art. 13(1)

Keyword:
"Inventive step - main request (no), auxiliary request (yes)"

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1561/10 - 3.5.05

D E C I S I O N
of the Technical Board of Appeal 3.5.05
of 8 May 2013

Appellant: (Applicant)
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Decision under appeal:
Decision of the Examining Division of the European Patent Office posted 12 January 2010 refusing European patent application No. 04250903.4 pursuant to Article 97(2) EPC.

Composition of the Board:

Chair: A. Ritzka
Members: P. Cretaine
D. Prietzel-Funk

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division, posted on 12 January 2010, refusing European patent application No. 04250903.4 on the grounds that the claims lacked inventive step (Article 56 EPC), having regard to the disclosure of

D1: J. L. Wang et al.: "Optimal Adaptive Multireceiver ARQ Protocols", IEEE Transactions on Communications, IEEE Inc. NEW YORK, US, vol. 41, no. 12, 1 December 1993, pages 1816 to 1829.

II. Notice of appeal was received on 5 March 2010 and the appeal fee was paid on the same day. The statement setting out the grounds of appeal was received on 17 May 2010. The appellant requested that the decision of the examining division be set aside and that a patent be granted on the basis of claims 1 to 3 on which that decision was based.

III. A summons to oral proceedings scheduled for 8 May 2013 was issued on 25 February 2013. In an annex to this summons, the board expressed its preliminary opinion on the appeal pursuant to Article 15(1) RBPA. An objection of lack of clarity was raised against claim 1 and the appellant was informed how the board construed this claim for the assessment of inventive step. At the same time, the board expressed the opinion that the claims did not meet the requirements of Article 56 EPC, having regard to the disclosure of D1.

IV. With a letter of reply dated 5 April 2013, the appellant filed two sets of claims according to a first and a second auxiliary request and argued that these claims complied with the requirements of Articles 56, 84, and 123(2) EPC.

V. Oral proceedings were held as scheduled on 8 May 2013. The appellant submitted new claims 1 to 4 as an auxiliary request, and explained that this new auxiliary request substituted the two auxiliary requests submitted with the letter dated 5 April 2013. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request submitted with the letter dated 27 November 2009, or on the basis of the auxiliary request submitted in the oral proceedings before the board. After deliberation by the board, the decision was announced at the end of the oral proceedings.

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

"A method of retransmitting a multicast message, comprising:
changing, in a network element (110), a number of retransmissions of the multicast message by fixing the number (S408) of retransmissions based on a group size (S) of a group of receivers (105) receiving the multicast message (S4 12), if said group size (S) equals or exceeds a threshold (Th); and
receiving at least one of an acknowledgement (ACK) and a negative acknowledgement (NACK) to request further transmissions of the multicast message only after sending the fixed number of retransmissions if said group size (S) equals or exceeds a threshold (Th)."

Claim 1 of the auxiliary request reads as follows:

"A method of retransmitting a multicast message, comprising:
changing, in a network element (110), a number (N) of retransmissions of the multicast message by fixing the number (S408) of retransmissions based on a group size (S) of a group of receivers (105) receiving the multicast message (S412),
such that,
if said group size (S) equals or exceeds a threshold (Th) (S406);
a rate of data packets corresponding to the retransmissions is higher than a rate of signaling packets received from a receiver (105) of the group in response to the data packets,
wherein the receiver (105) transmits one signaling packet (S410) in response to a plurality of N retransmissions of a data packet corresponding to the multicast message. [*sic*]
wherein a signaling packet comprises at least one of an acknowledgement (ACK) and a negative acknowledgement (NACK) to request further transmissions."

Independent claim 4 of the auxiliary request reads as follows:

"A method of receiving a multicast message at a receiver (105) of a group of receivers receiving the multicast message, the method comprising:
receiving (S408), at the receiver (105), data packets corresponding to a number (N) of retransmissions of the multicast message, wherein the number (S408) of

retransmissions is based on a group size (S) of the group of receivers (105); and
if said group size (S) equals or exceeds a threshold (Th);
transmitting (S410), in response to the received data packets, a signaling packet comprising at least one of an acknowledgement (ACK) and a negative acknowledgement (NACK) to request further transmissions of the multicast message, such that a rate of the data packets corresponding to the retransmissions is higher than a rate of signaling packets in response to the data packets."

Reasons for the Decision

1. Admissibility of the appeal

The appeal complies with the provisions of Articles 106 to 108 EPC (cf. point II above) and is therefore admissible.

2. Admissibility of the appellant's auxiliary request

The auxiliary request was filed during the oral proceedings before the board and is based on the first auxiliary request filed with the letter dated 5 April 2013, in response to the summons to oral proceedings.

Claims 1 to 4 of this request find support in paragraphs [0029] to [0032] and Figure 4 of the published application and thus meet the requirements of Article 123(2) EPC.

Moreover, independent claims 1 and 4 substantially define that each receiver of the group transmits **one** signalling packet in response to a plurality of N retransmissions of the same multicast message, whereas the claims on which the decision was based do not limit to one the number of acknowledgements sent by a receiver in response to the N retransmissions. The board thus notes that the added features are aimed at overcoming the inventive-step objection raised in the annex to the summons to oral proceedings (see point 3.3 below) and that the auxiliary request seeks protection for subject-matter which is limited with respect to the subject-matter of the claims on which the impugned decision was based.

In view of the foregoing, the board, exercising its discretion under Article 13(1) RPBA, decided to admit the auxiliary request into the proceedings.

3. Inventive step

3.1 Prior art

D1 discloses a multicast scheme wherein multiple copies of the multicast message are sent successively, instead of just one copy as in conventional multicast schemes. The optimum number of copies is dynamically determined and based on how many receivers have not yet received the message (see right-hand column, page 1817). This scheme can be applied to known ARQ protocols(stop-and-wait, go-back N, selective repeat). Table I on page 1821 indicates the calculated optimum number of copies n^* as a function of:

- the round-trip delay defined by N = number of messages that can be sent during a round-trip propagation time between the sender and the receivers (see page 1817, left-hand column, lines 38-39),
- K' = number of receivers among the K receivers in the multicast group which have not yet successfully responded by sending an ACK,
- p_i = probability that a data frame is correctly received by a receiver, all the receivers being considered as identical.

It is furthermore specified that K and K' are interchangeable in Table I.

For a given channel, N and p_i are fixed. Table I then gives the optimum number of copies n* for a range of receivers K = a to K= b, with K smaller than 100.

At the first transmission of a multicast message, it is obvious that K = K'.

3.2 Main request

3.2.1 Although claim 1 is directed to a method performed by a transmitter for retransmitting a multicast message to a group of receivers, its last step involves not only functionalities of the transmitter but also functionalities of the receivers, since the time at which the transmitter receives the acknowledgement messages mainly depends on the time at which the receivers send these acknowledgement messages.

Therefore for assessing the inventive step of the subject-matter of claim 1, the board considered that claim 1 had to be construed as being directed to a method performed by a multicasting system comprising a transmitter and a plurality of receivers.

3.2.2 Since Table I of D1 indicates the optimum number n* of copies for different ranges of K from 0 to 100, D1 discloses the claimed feature of retransmitting a multicast message comprising changing, in a network element (the transmitter), a number of retransmissions of the multicast message by fixing the number of retransmissions (n*-1) based on a group size (K) of a group of receivers. Moreover, when the number n* of copies is chosen in Table I, it is always smaller than the round-trip delay N expressed in terms of the number of possible message transmissions. As a consequence, any ACK or NACK transmitted in that case will always be received by a receiver only after the sending of the n* copies, whatever the number of receivers in the group may be. Thus, D1 implicitly discloses the claimed feature of receiving at least one of an acknowledgement and a negative acknowledgement to request further transmissions of the multicast message only after sending the fixed number of retransmissions if the group size equals or exceeds a threshold.

Therefore, the subject-matter of claim 1 differs from the disclosure of D1 in that a fixing of the number of retransmissions based on the group size of the receivers occurs only if the group size equals or exceeds a threshold, whereas in D1 such a fixing is always made for every value of the group size (K), based on Table I.

The technical effect of this feature is that the claimed method steps are applied only to multicast systems having a group size equal to or greater than a given threshold.

The objective technical problem may thus be formulated as how to simplify the method disclosed in D1 with respect to Table I.

The skilled person, by looking further in Table I of D1, would notice that, in most of the channel conditions as defined by N and p_i, the optimum number of copies n* is equal to 1 (which means that a single copy of the multicast message is sent, according to a conventional multicast scheme) for small groups of receivers. The skilled person would thus consider that the sending of multiple copies could be avoided if the group size is small. In order to simplify the method disclosed in D1, the skilled person would thus obviously set a threshold for the group size, under which the calculation of an optimum number n* of copies according to Table I, and thus of a number of retransmissions, is not performed.

For these reasons the board judges that the subject-matter of claim 1 does not involve an inventive step, having regard to the disclosure of D1 (Article 56 EPC).

3.3 Auxiliary request

3.3.1 Claim 1 contains the further limitations, with respect to claim 1 according to the main request, that:
- the rate of data packets corresponding to the retransmissions is higher than a rate of signalling packets received from a receiver of the group, wherein
- the receiver transmits one signalling packet in response to a plurality of N retransmissions of a data packet corresponding to the multicast message, wherein

a signalling packet comprises at least one of an acknowledgement (ACK) and a negative acknowledgement (NACK) to request further transmissions.

Independent claim 4 relates to a corresponding method of receiving a multicast message.

3.3.2 These features are not disclosed in D1, which explicitly teaches that each receiver in the group sends an ACK packet or a NACK packet in response to each data frame, i.e. each copy of the multicast message, received from the transmitter (see page 1817, left-hand column, lines 21 to 33 and right-hand column, lines 15 to 19; page 1818, left-hand column, lines 39 to 44).

3.3.3 The technical effect of these distinguishing features is that the number of signalling packets related to a single multicast message is reduced, in comparison to the scheme disclosed in D1, by a factor equal to the number of retransmissions of the multicast message. As mentioned in paragraph [0010] of the published application (see column 3, lines 10 to 13), these signalling packets may cause collisions or severe interference between packets, if the number of the receivers in a multicast group is substantial. The objective technical problem can thus be formulated as how to reduce the transmission errors due to traffic on the communication link between transmitter and receivers and thus improve the overall throughput of the system.

3.3.4 The skilled person starting from D1 as closest prior art would not be motivated to leave the framework of

the system environment defined in part II of D1 (see point 3.3.1 above) and stipulating that each received copy of the multicast message has to be acknowledged by each receiver of the group, either through an ACK signalling packet if it is successfully decoded, or through a NACK signalling packet if it is not. On the contrary, the whole teaching of D1 is focussed on the maximisation of the throughput of such a system by using a definitely different approach consisting in dynamically determining the optimum number of copies of a multicast message to be transmitted, based on the channel conditions and the number of receivers which have not yet received the multicast message. In the board's view, the skilled person starting from D1 and trying to improve the system throughput would only consider refining the adaptive protocols of D1, thereby adjusting the number of copies of the multicast message, rather than decreasing the number of signalling packets by modifying the receiver's signalling functionality as foreseen by independent claims 1 and 4.

For these reasons the board judges that the subject-matter of independent claims 1 and 4 involves an inventive step having regard to the disclosure of D1 (Article 56 EPC).

Claims 2 and 3 are dependent on claim 1 and therefore also meet the requirements of Article 56 EPC.

4. Conclusion

The board therefore judges that the main request is not allowable (Article 56 EPC) and decides to remit the case to the department of first instance with the order

to grant a patent on the basis of the auxiliary request, with a description and drawings to be adapted accordingly.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent on the basis of the claims 1 - 4 of the auxiliary request submitted in the oral proceedings before the board.

The Registrar The Chair

K. Götz A. Ritzka