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Datasheet for the decision of 7 July 2021

Case Number: T 1601/18 - 3.5.05

Application Number: 08153723.5

Publication Number: 1976175

IPC: H04L1/16, H04L1/18

Language of the proceedings: EN

Title of invention:
Apparatus and method for asynchronous control message transmission for data retransmission in wireless relay communication system

Applicant:
Samsung Electronics Co., Ltd.

Headword:
Scheduling of ARQ data retransmissions in a multihop relay wireless communication system, in case transmission errors have been detected

Relevant legal provisions:
EPC Art. 56
RPBA 2020 Art. 13(2)

Keyword:

Inventive step - after amendment (yes)
Amendment after summons - cogent reasons (yes)

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Case Number: T 1601/18 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 7 July 2021

Appellant: (Applicant)	Samsung Electronics Co., Ltd. 129, Samsung-ro Yeongtong-gu Suwon-si, Gyeonggi-do, 443-742 (KR)
Representative:	Grünecker Patent- und Rechtsanwälte PartG mbB Leopoldstraße 4 80802 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 22 December 2017 refusing European patent application No. 08153723.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

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

Summary of Facts and Submissions

I. The appeal is directed against the examining division's decision dated 22 December 2017 refusing European patent application No. 08153723.5.

II. The documents referred to by the examining division included:

D1 "HARQ with Relays ; C80216j-06_197r1", IEEE DRAFT; 7 November 2006, XP017629070

D2 "Pipeline HARQ for multi-relay system ; C80216j-07_185r2", IEEE DRAFT; 6 March 2007, XP017630375

III. The examining division decided that the application did not meet the requirements of Article 123(2) EPC (main request) and Article 56 EPC (auxiliary requests 1 and 2).

IV. In its statement setting out the grounds of appeal, the appellant (applicant) requested that a patent be granted on the basis of the claims according to a main request or one of a first and a second auxiliary request, all submitted with the statement setting out the grounds of appeal.

V. The board issued a summons to oral proceedings and set out its provisional opinion on the case in an annex (Article 15(1) RPBA 2020).

The board noted that the amendments according to the **main request** did not meet the requirements of Article 123(2) EPC.

With respect to the **first auxiliary request**, the board considered that it contained the same amendments as the main request. Furthermore, it did not meet the

requirements of Articles 54 and 56 EPC having regard to documents **D2** and **D1**, respectively.

The board noted that the **second auxiliary request** contained the same amendments as the main request and that it did not meet the requirements of Article 54 EPC in view of document **D2**.

VI. In a reply dated 4 June 2021, the appellant replaced all the pending requests with a new main request and auxiliary requests 1-3.

VII. Oral proceedings were held on 7 July 2021. The appellant's final request was that the decision under appeal be set aside and that a patent be granted on the basis of the claims of a sole, main request filed during the oral proceedings.

VIII. **Claim 1** of the sole, main request reads as follows:

A retransmission method of a relay station, RS (110, 120), in a wireless relay communication system, the method comprising:

determining (903) whether data received from an upper node contains an error;

if the data contains the error,

generating a message, wherein the message comprises unique identifier, ID, information corresponding to the RS and a negative acknowledgement, NACK, corresponding to the data provided from the upper node; and

sending (911) the message to the upper node at a time point that is not pre-appointed with the upper node,

if the data does not contain the error,

transmitting (905) the data to a lower node;

if a NACK and additional information informing which node sends the NACK and which data the NACK pertains to is received from the lower node, forwarding (915) the NACK to the upper node; and

when receiving scheduling information for a retransmission of the data,

retransmitting (905) the data to the lower node based on the scheduling information if the additional information indicates that the data is corrupted at the lower node, and

forwarding the scheduling information to the lower node if the additional information indicates that the data is corrupted at another lower node.

Independent **claim 9** is directed to a corresponding relay station.

Reasons for the Decision

1. The application concerns scheduling of ARQ data retransmissions in a multihop relay wireless communication system if transmission errors have been detected.

2. *Admission of the sole, main request (Article 13(2) RPBA)*

The main request was filed by the appellant during the oral proceedings before the board. The board decided to admit this request into the proceedings since it was based on the first auxiliary request submitted with the statement setting out the grounds of appeal, and that auxiliary request had addressed the inventive-step objections in the decision under appeal. It constituted a fair response to the objections raised for the first

time in the preliminary opinion of the board and during the oral proceedings.

3. *Interpretation of the claims*

The board holds that the last two method steps of **claim 1** (*"retransmitting"* and *"forwarding"*) are conditional method steps. Only one of these method steps is performed on a specific occasion, depending on which of the - mutually exclusive - "if" conditions is met. Since the claimed method is specified as being a *"method of a relay station"*, the board considers it to be implied that the relay station determines by itself which of said conditions is met. To interpret the claim differently would result in the determination step being performed by another entity, which - by definition - cannot be comprised in a *"method of a relay station".*

The same considerations apply analogously to **claim 9**.

4. *Patentability over document **D1***

4.1 Novelty (Article 54(1) EPC)

Document **D1** discloses the following features of **claim 1** (the references in parentheses are to **D1**; ~~strike-through~~ is used to mark features it does not disclose):

A retransmission method of a relay station, RS, in a wireless relay communication system *(see page 0, abstract)*, the method comprising:

determining whether data received from an upper node contains an error *(see page 5, case 3)*;

if the data contains the error *("packet ... failed at RS2", see page 5, case 3)*,

generating a message, wherein the message comprises unique identifier, ID, information corresponding to the RS and a negative acknowledgement, NACK, corresponding to the data provided from the upper

node; and
("RS2 will transmit original NAK code sequence defined for 1st hop (C_1) to RS1", see page 5, case 3)

sending the message to the upper node
("RS2 will transmit original NAK code sequence defined for 1st hop (C_1) to RS1", see page 5, case 3)
at a time point that is not pre-appointed with the upper node,
(implied, since the "sending" is controlled by RS2)

if the data does not contain the error,
("received successfully by RS1", see page 5, case 3)

transmitting the data to a lower node;
(implied by "failed at RS2", see page 5, case 3)

if a NACK and additional information informing which node sends the NACK and which data the NACK pertains to is received from the lower node,
("RS2 will transmit original NAK code sequence defined for 1st hop (C_1) to RS1", see page 5, case 3)
forwarding the NACK to the upper node;
("RS1 ... will ... transmit 2nd hop code sequence (C_2) as defined in table 3a ... to upstream node", see page 5, case 3, and page 3, table 3a)
and

~~when receiving scheduling information for a retransmission of the data,~~

~~retransmitting the data to the lower node based on the scheduling information if the additional information indicates that the data is corrupted at the lower node, and~~

~~forwarding the scheduling information to the lower node if the additional information indicates that the data is corrupted at another lower node~~.

Hence the difference between the subject-matter of **claim 1** and that of document **D1** resides in the struck-through features above.

The subject-matter of **claim 1** is therefore novel over what is known from document **D1**.

4.2 Inventive step (Article 56 EPC)

The distinguishing features achieve the technical effect that it is determined at the relay station, on the basis of the additional information, at which node the data is corrupted. Unlike the system of document **D1**, in the method according to claim 1 the base station does not need to know in which node the data is corrupted and no signalling to the base station indicating the node in which the data is corrupted is needed. Thus the signalling required for retransmission in a wireless relay system is simplified.

The objective technical problem may thus be formulated as how to modify what is known from document **D1** to allow for simplifying the signalling required for retransmission in a wireless relay system.

Document **D1** teaches that the base station, in advance, reserves resources for transmitting packets. These resources are also used for the retransmissions *("keep the resources reserved", see page 4, last four lines; "same resources ... are reserved", see lines 5-6 of "case 3" on page 5)*. Moreover, the resources are reserved specifically for each relay station *("...resources reserved on the 3rd hop", see page 4, last four lines; "RS1 assumes that the same resources that he used to transmit the packet to RS2 are reserved*

for the next retransmission", see lines 5-6 of "case 3" on page 5) and have to be signalled for the specific relay station. Therefore, when trying to solve the above problem, the skilled person might consider different ways of simplifying the system, e.g. by simplifying the *"Vector Indices"* (see table 3a, 3b) used to uniquely identify the failed link.

Apart from this, the skilled person could change the persistent scheduling of resources disclosed in document **D1** such that resources for retransmission are only reserved when needed. Additionally, the skilled person could change the scheduling of resources such that the respective relay station is enabled to determine itself whether it requires resources, rather than the base station making this determination, as in document **D1**. This way, the skilled person could arrive at the distinguishing features. However, the skilled person finds no motivation to do so in document **D1** and to assume the contrary would be based on an *ex post facto* analysis. Thus, although the skilled person could implement said changes, the board is not convinced that they would do so. Therefore the board considers that the distinguishing features are not obvious in view of what is disclosed in document **D1**.

5. *Patentability over document **D2***

5.1 Novelty (Article 54(1) EPC)

Document **D2** discloses the following features of **claim 1** (the references in parentheses are to **D2**; ~~strike-through~~ is used to mark features it does not disclose):

A retransmission method of a relay station, RS, in a wireless relay communication system *(see pages 2-3, figure 1)*, the method comprising:

determining whether data received from an upper node contains an error;
("packet transmission failure", see page 2, 2nd par.)

if the data contains the error,

generating a message, wherein the message comprises unique identifier, ID, information corresponding to the RS and a negative acknowledgement, NACK, corresponding to the data provided from the upper node; and
("failure shall be reported", see page 2, 2nd par.)

sending the message to the upper node at a time point that is not pre-appointed with the upper node,
("The time period required for MR-BS to collect all NACKs ... depends on the packet processing delay at each RS", see page 7, lines 2-4)

if the data does not contain the error,

transmitting the data to a lower node;
(see pages 2-3, figure 1)

if a NACK and additional information informing which node sends the NACK and which data the NACK pertains to is received from the lower node, forwarding the NACK to the upper node; and
("Each time RS receives an ACK/NACK sent from the successor, the RS shall forward the received ACK/ NACK to the predecessor", see page 3, lines 3-4 and figure 1; the "information ... which data the ... NACK pertains to" is implicitly disclosed, see item "buffer" on page 2, 7th line from bottom)

when receiving scheduling information for a retransmission of the data,
("MR-BS ... schedules the bandwidth for

retransmissions on all effected links", see page 3, lines 4-6)

retransmitting the data to the lower node based on the scheduling information ~~if the additional information indicates that the data is corrupted at the lower node~~, and

forwarding the scheduling information to the lower node ~~if the additional information indicates that the data is corrupted at another lower node~~.

Hence the difference between the subject-matter of **claim 1** and that of document **D2** resides in the struck-through features above.

The subject-matter of **claim 1** is therefore novel over what is known from document **D2.**

5.2 Inventive step (Article 56 EPC)

Again, unlike in document **D2,** the base station does not need to know and have signalled at which node the data is corrupted in the method of claim 1. Thus the distinguishing features achieve the technical effect that the signalling required for retransmission in a wireless relay system is simplified.

The objective technical problem may thus be formulated as how to modify what is known from document **D2** to allow for simplifying the signalling required for retransmission in a wireless relay system.

Document **D2** teaches that the *"MR-BS ... schedules the bandwidth for retransmissions on all effected links"* (see page 3, lines 4-6).

This implies that the scheduling information provided to the relay stations carries this information, since otherwise the relay stations would be unable to recognise which link particular scheduling information

pertains to. Consequently, the relay stations are only involved in the scheduling by forwarding the NACK messages. Notably, the base stations do not maintain a record of the NACK messages that were forwarded. This is, however, a prerequisite for determination by the relay stations of whether the conditions constituting the distinguishing feature are met.

Thus, when attempting to solve the objective technical problem, the skilled person could make the relay stations keep track of the NACK messages that were forwarded. The same applies here as set out under 4.2 above, namely that additionally the skilled person could change the scheduling of resources such that the respective relay station is enabled to determine itself whether it requires resources, rather than the base station making this determination, as in document **D2**. This way, the skilled person could arrive at the distinguishing features. However, the skilled person finds no motivation to do so in document **D2** either, and to assume the contrary would be based on an *ex post facto* analysis. Thus, although the skilled person could implement said changes, the board is not convinced that they would do so. Therefore the board considers that the distinguishing features are not obvious in view of what is disclosed in document **D2** either.

6. Hence the subject-matter of **claim 1** is inventive over the cited prior art (Article 56 EPC).

Equally, the relay station claimed in independent **claim 9** is inventive (Article 56 EPC) because it comprises means which are specifically adapted to perform the method steps of claim 1. Consequently, the same arguments apply *mutatis mutandis*.

7. In view of the above, the appeal is allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the examining division with the order to grant a patent based on claims 1 to 17 of the main request submitted during the oral proceedings before the board and a description and drawings to be adapted.

The Registrar: The Chair:

K. Götz-Wein A. Ritzka

Decision electronically authenticated