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Datasheet for the decision of 27 October 2011

Case Number: T 1522/08 - 3.5.05

Application Number: 06009847.2

Publication Number: 1855423

IPC: H04L 12/56

Language of the proceedings: EN

Title of invention:
Decentralized multi-user link adaptation for QoS support

Applicant:
NTT DoCoMo, Inc.

Headword:
Decentralized multi-user link adaptation for QoS support/NTT

Relevant legal provisions:
EPC Art. 106, 107, 108, 123(2)
RPBA Art. 12(2), 13

Relevant legal provisions (EPC 1973):
EPC Art. 56, 111(1)

Keyword:
"Main request - inventive step (no)"
"Auxiliary request - remittal to the department of first instance"

Decisions cited:
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Catchword:
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Case Number: T 1522/08 - 3.5.05

D E C I S I O N
of the Technical Board of Appeal 3.5.05
of 27 October 2011

Appellant: NTT DoCoMo, Inc.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 3 April 2008 refusing European patent application No. 06009847.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: A. Ritzka
Members: M. Höhn
G. Weiss

Summary of Facts and Submissions

I. This appeal is against the decision of the examining division, dispatched on 3 April 2008, refusing European patent application No. 06009847.2 based on Article 56 EPC 1973 having regard to the disclosures of

D1: EP 1 526 685 A1,

D2: EP 1 628 446 A1 and

D3: OMIYI P E ET AL: "Maximising Spectral Efficiency in 4th Generation OFDM/TDMA TDD Hybrid Cellular Mobile/Ad-Hoc Wireless Communications" VEHICULAR TECHNOLOGY CONFERENCE, 2004. VTC 2004-SPRING. 2004 IEEE 59TH MILAN, ITALY 17-19 MAY 2004, PISCATAWAY, NJ, USA,IEEE, US, vol. 4, 17 May 2004, pages 2052-2056, ISBN: 0-7803-8255-2.

II. The notice of appeal was received on 30 May 2008. The appeal fee was paid on the same day. The statement setting out the grounds of appeal was received on 15 July 2008. The appellant requested that the appealed decision be set aside and that a patent be granted on the basis of claims 1 to 28 as submitted with letter dated 5 February 2008, a copy of which was attached to the statement setting out the grounds of appeal. Oral proceedings were requested on an auxiliary basis.

A summons to oral proceedings to be held on 27 October 2011 was issued on 28 July 2011. In an annex accompanying the summons the board expressed the preliminary opinion that claim 1 appeared to lack clarity according to Article 84 EPC 1973 and that the subject-matter of the independent claims did not appear

to fulfil the requirement of inventive step (Article 56 EPC 1973) in the light of the disclosures of D1 and D2.

The board gave its reasons for the objections and why the appellant's arguments were not convincing.

III. With a letter dated 26 September 2011 the appellant submitted an amended main request and an auxiliary request, together with arguments in support of inventive step in respect of the independent claims of both requests.

IV. Oral proceedings were held on 27 October 2011. During them, the appellant filed a new main request.

Independent claim 1 according to the main request reads as follows:

"1. Communication system comprising a transmitter apparatus (100) having a transceiver functionality, and a transceiver (200) transmitting a busy signal, the transmitter apparatus (100) comprising,
a transmitter module (110) having an adjustable transmitter characteristic for transmitting a payload signal in a predefined payload signal time slot of a first radio frame and for transmitting an adjusted payload signal in the predefined payload signal time slot of a second radio frame;
a busy signal receiver (120) for receiving the busy signal in a predefined busy signal time slot associated with the predefined payload signal time slot, wherein the busy signal is variable and includes

link adaptation information being dependent on an actual reception quality of the transceiver (200) transmitting the busy signal; and
a controller module (130) for adjusting the adjustable transmitter characteristic, wherein the controller module is adapted to adjust the adjustable transmitter characteristic on the basis of the link adaptation information in the busy signal.[sic]
where in [sic] the transmitter apparatus is configured to cooperate with the transceiver (200) transmitting the busy signal; and
wherein the control module (130) is adapted to adjust the adjustable transmitter characteristic such that the reception quality of the payload signal at the transceiver (200) transmitting the busy signal is improved or a payload data rate of the payload signal is decreased, when the link adaptation information indicates a link adaptation towards a first reception quality, which is lower than a second reception quality, or
wherein the controller module (130) is adapted to adjust the adjustable transmitter characteristic such that the reception quality at the transceiver (200) transmitting the busy signal is reduced or the payload data rate of the payload signal is increased, when the link adaptation information indicates link adaptation towards the second reception quality, where the second reception quality is higher than the first reception quality."

V. Independent claim 1 according to the auxiliary request I reads as follows:

"1. Receiver apparatus (200) having a transceiver functionality, comprising:
a receiver module (210) for receiving a payload signal during a payload signal time slot of a first radio frame and an adjusted payload signal during the payload signal time slot of a second radio frame;
a quality estimator (220) for estimating a reception quality of the received payload signal; and
a busy signal transmitter (230) for transmitting a variable busy signal in a predefined busy signal time slot associated with the payload signal time slot, when the reception quality is above a quality threshold, the busy signal transmitter being adapted for generating the variable busy signal such that the busy signal includes link adaptation information being dependent on an actual reception quality,
wherein the busy signal transmitter (230) is adapted for transmitting a busy signal in the busy signal time slot even when a payload signal in the associated payload signal time slot is received with a poor reception quality, wherein the busy signal in this busy signal time slot includes link adaption information requesting a reduction of the transmission rate,
wherein the busy signal transmitter (230) is adapted for continuing this process until a payload signal in a later payload signal time slot within a maximum time-out limit is received with an acceptable reception quality, and wherein this process is stopped when a payload signal is not received with an acceptable quality within the maximum time-out limit, and
wherein, when the payload signal in the later payload

signal time slot is received with the acceptable quality within the maximum time-out limit, the busy signal associated with the later payload signal time slot includes link adaption information requesting a maintaining or increase of the transmission rate."

VI. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 26 (main request) submitted at the oral proceedings on 27 October 2011 or, in the alternative, of claims 1 to 12 (auxiliary request) filed with letter dated 26 September 2011.

VII. After due deliberation on the basis of the written submissions and the appellant's arguments presented during the oral proceedings, the board announced its decision.

Reasons for the Decision

1. *Admissibility*

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

Main Request

Inventive step - Article 56 EPC 1973

2. D1 is considered to be the closest prior art on file, since it is directed to the busy-tone concept (see e.g. paragraph [0027]) as is the present invention.

2.1 D1 discloses a communication system comprising a transmitter and a receiver, both having transceiver functionality (see e.g. figures 1 and 2 showing mobile stations and base stations, both having transmission and reception capabilities). It is common ground that D1 discloses the following features of claim 1: a transmitter for transmitting payload data in a predefined payload signal time slot of a first and a second radio frame (see figure 2, DTS1 to DTS3; see also paragraphs [0022] to [0026]); the transmitter has a busy signal receiver for receiving a busy signal in a predefined busy signal slot associated with the predefined payload signal (see separate indicator time slots ITS1 to ITS3 in figure 2; see also paragraph [0027] of D1). In particular, the busy signal in the ITS slots is variable, because D1 discloses the emitting of different indicator values as an alternative (see paragraph [0025], lines 10 and 11).

The choice between two different "reservation indicator values", i.e. types of busy signal, is a variable busy signal according to claim 1. The board does not agree with the appellant's argument that this disclosure had to be regarded as an isolated feature (see letter dated 26 September 2011, page 2, penultimate paragraph), because there are several other parts of D1 also disclosing this feature (see e.g. paragraph [0016] and claim 4 of D1).

2.2 The board agrees with the appellant's argument that the two possibilities of "transmitting" and "not transmitting" as disclosed in D1 (and as illustrated in figure 1 submitted by the appellant in the annex to the grounds of appeal) are not to be regarded as transmitting with two different characteristics (see point 12 of the grounds of appeal) as required according to claim 1. The board further agrees with the appellant that the technical effect of using an adjustable transmitter characteristic (such as adjusting transmission power) is a more flexible link adaptation (see grounds of appeal, page 3, first paragraph) and thereby causes an enhanced system performance.

2.3 The subject-matter of claim 1 hence differs from the disclosure of D1 in the adjustable transmitter characteristic for transmitting an adjusted payload signal; in that the busy signal includes link adaptation information being dependent on an actual reception quality of the transceiver transmitting the busy signal; and
in a controller module for adjusting the adjustable

transmitter characteristic, wherein the controller module is adapted to adjust the adjustable transmitter characteristic on the basis of the link adaptation information in the busy signal, where the transmitter apparatus is configured to cooperate with the transceiver transmitting the busy signal; and
wherein the control module is adapted to adjust the adjustable transmitter characteristic such that the reception quality of the payload signal at the transceiver transmitting the busy signal is improved or a payload data rate of the payload signal is decreased, when the link adaptation information indicates a link adaptation towards a first reception quality, which is lower than a second reception quality, or
wherein the controller module is adapted to adjust the adjustable transmitter characteristic such that the reception quality at the transceiver transmitting the busy signal is reduced or the payload data rate of the payload signal is increased, when the link adaptation information indicates link adaptation towards the second reception quality, where the second reception quality is higher than the first reception quality.

2.4 Based on the technical effect of these distinguishing features, i.e. a more flexible link adaptation, the underlying objective technical problem when starting with D1 is considered to be to enhance the system performance.

2.5 The board does not agree with the appellant's argument (see e.g. page 6, last paragraph of the grounds of appeal) that according to claim 1 link adaptation information has to be provided "immediately". This is not a feature of claim 1. And even if this was an

inherent property of the busy signal, it has to be considered that D1 also discloses busy signals and therefore would have to be regarded as disclosing the same alleged distinguishing feature.

2.6 The board agrees with the appealed decision that the skilled person would consider combining the teachings of D1 and D2, without the need for inventive skills, for the following reasons.

D2 discloses sending a link quality notification including link adaptation information to the transmitter (see e.g. paragraph [0022] "If the control unit 7 of the receiving device 2 recognizes that the link/reception quality diverges from these required QoS parameter values, it immediately responds by sending a respective link quality notification through the communication link 3 to the transmitting device 1 in order to keep the transmitting device 1 informed about the current link quality").

Moreover, D2 discloses that the transmitter uses this notification for either adapting the data rate/transmission power (see the abstract or paragraph [0026] "the receiving device 2 monitors the reception quality of the communication link 3 and informs the transmitting device 1 on the current link quality. If found necessary, the receiving device 2 in particular instructs the transmitting device 1 to change its data rate and/or its transmit power in order to improve the link quality") or dropping the transmission (see e.g. paragraph [0009]; see also paragraphs [0006] "The notification sent by the receiving device to the transmitting device may comprise information on an

action to be taken by the transmitting device to improve the reception quality, such as changing the data rate or the transmit power etc. Preferably, the notification regarding the reception quality/link quality also includes particular values for transmission parameters to be adjusted accordingly by the transmitting device" and [0007] "According to a preferred embodiment of the present invention, it is not only the transmitting device which is aware of pre-defined QoS parameter values required for the transmission of the information with a given quality, but both the transmitting device and the receiving device are aware of these QoS parameter values which may comprise a mean data rate, a peak data rate, a jitter bound, a latency/delay bound or a maximum error rate or a token bucket size/maximum burst size etc.").

D2 hence discloses an adjustable transmitter characteristic for transmitting an adjusted payload signal and that there is provided a controller module for adjusting this transmitter characteristic on the basis of the link adaptation information and for cooperating with the receiver sending the link quality notification according to the respective features of claim 1. The board interprets the afore-mentioned disclosure in D2 to correspond to the alternative of the further distinguishing features of claim 1, according to which the control module is adapted to adjust the adjustable transmitter characteristic such that the payload data rate of the payload signal is decreased, when the link adaptation information indicates a link adaptation towards a first reception quality, which is lower than a second reception quality, or is adapted to adjust the adjustable transmitter

characteristic such that the payload data rate of the payload signal is increased, when the link adaptation information indicates link adaptation towards the second reception quality, where the second reception quality is higher than the first reception quality.

2.7 The skilled person learns from D2 that there is an alternative to dropping the transmission as taught by D1 by adapting e.g. the data rate or transmission power (see e.g. paragraph [0009] of D2). The board considers this option to be a motivation for the skilled person to adapt the transmission scheme of D1 by adjusting the data rate or transmission power dependent on information regarding the link quality.

2.8 D1 explicitly suggests the use of the busy-tone concept in order to avoid overhead over the air interface (see e.g. paragraphs [0003] and [0005] of D1). The appellant did not present a convincing argument why the skilled person should give up the busy-signal concept with the conflict-signalling indicator time slots ITS of D1 (as shown in figure 2 of D1) in favour of transmitting a link quality notification as part of a data packet through the communication link (as argued by the appellant, point 9 of the grounds; see in particular page 6, third paragraph of the grounds of appeal), which would definitely cause more overhead (see e.g. figure 2 of D2). This would even be an additional burden for the skilled person in contrast to keeping the busy-signal-time-slot-concept of the closest prior art D1.

In the light of the motivation to keep the busy-signal concept in order to avoid overhead, the board does not

see any reason why the skilled person would not be able to adapt the busy signal concept of D1 accordingly by including the link notification information in the busy signal. Also, the appellant's argument that different signalling protocols with different layers were used in D1 and D2 and were therefore not compatible does not convince. These design aspects are not considered to be obstacles to be overcome with the need for inventive skills, but to be within the routine skills of a person skilled in implementing protocols in telecommunications knowing about the OSI layered structure. In addition, the board notes that claim 1 does not explicitly specify on which layer the communication takes place.

2.9 The appellant's argument presented with regard to the disclosure of paragraph [0029] of D1 is not convincing either. The appellant argued that this passage of D1 taught that the concept disclosed in it resulted in "a wasted slot allocation", but that this was "generally unavoidable without some dedicated signalling" which was exactly what was taught in D2 (with reference to figure 2 of D2). The skilled person would therefore prefer to keep the dedicated signalling of D2 in order to overcome the disadvantage of wasted slot allocation. The board does not agree with this argument. The problem of wasted slot allocation results from the fact that the scenario of paragraph [0029] of D1 is a conflict of two transmitters sending to one receiver at the same time. In case of such a conflict and since the busy tone is a broadcast signal, a corresponding payload time slot is not used, resulting in a wasted slot allocation. Dedicated signalling is mentioned with regard to the fact that the broadcast signal, i.e. the busy tone, would have to be made a dedicated signal for

addressing specific transmitters in order to stop only one transmitter and to use the corresponding time slot for the other transmitter so that the time slot is not wasted any longer. Making the busy tone dedicated therefore addresses a different problem than the objective technical problem of claim 1 of this request. The passage of D1 referred to by the appellant rather motivates the skilled person to enhance the busy tone concept by adding further addressing bits to the busy signal which, according to the board's view, is obvious also for including link quality information in the busy signal.

2.10 The appellant is correct when arguing (see grounds of appeal, page 3, first sentence) that D1 disclosed a transmission scheme using a kind of positive acknowledgement ACK, because only in case of a sufficient reception quality was a reservation indicator returned to the transmitter. However, according to D1 (see paragraph [0028], step 7) the last packet would never be acknowledged. This inherently leads to the problem of negative acknowledgement transmissions (as it is the case in D2, see e.g. paragraph [0022]), where a packet, which has not been received by the receiver, will not be acknowledged by a NACK, leaving the transmitter uncertain as to whether the packet has arrived correctly at the receiver, if only a single packet is to be transmitted. The skilled person, however, is familiar with these problems and knows about the advantages and disadvantages of ACK/NACK communication and the corresponding solutions from his common general knowledge. The board judges it to be obvious for the skilled person to just abolish step 7 of paragraph [0028] of D1 in order to avoid

problems when transmitting single packets such as for mouse clicks etc. In addition, since D1 also discloses the use of a different indicator value for indicating a collision in a data time slot (see paragraph [0025] of D1), this can be considered a negative acknowledgement NACK which, in case of a single packet transmission, would ensure that an acknowledgement would be sent anyway also when only a single data packet is transmitted and received with a bad quality not allowing correct decoding of the data packet. The skilled person therefore finds a solution to this scenario already in D1.

2.11 For the afore-mentioned reasons, in particular those given in section 2.8, the subject-matter of claim 1 of the main request is considered to lack an inventive step with regard to D1 combined with D2 in the light of the skilled person's common general knowledge of communications.

Auxiliary Request

3. Claim 1 of this request has the following added features:

"wherein the busy signal transmitter (230) is adapted for transmitting a busy signal in the busy signal time slot even when a payload signal in the associated payload signal time slot is received with a poor reception quality, wherein the busy signal in this busy signal time slot includes link adaption information requesting a reduction of the transmission rate,

wherein the busy signal transmitter (230) is adapted for continuing this process until a payload signal in a later payload signal time slot within a maximum time-out limit is received with an acceptable reception quality, and wherein this process is stopped when a payload signal is not received with an acceptable quality within the maximum time-out limit, and
wherein, when the payload signal in the later payload signal time slot is received with the acceptable quality within the maximum time-out limit, the busy signal associated with the later payload signal time slot includes link adaption information requesting a maintaining or increase of the transmission rate."

3.1 Article 123(2) EPC

The board agrees with the appellant's reasoning that the added features of claim 1 of this request are originally disclosed in the description on page 21, line 28, to page 22, line 28. The requirements of Article 123(2) EPC are therefore fulfilled.

3.2 Remittal

The added features were taken from the description and were not claimed before, during the examination or appeal procedure. Despite having been filed late in the appeal proceedings, only after the summons for oral proceedings was sent and therefore non compliant with Article 12(2) RPBA, the board notes that the added features serve the purpose of overcoming objections raised or dealt with in the annex to the summons for oral proceedings. The set of claims according to the

auxiliary request was therefore admitted into the proceedings pursuant to Article 13 RPBA.

However, since the amendment was taken from the description and claimed for the first time, the board cannot be sure whether the subject-matter of the added features was actually included in the search for prior art. The board therefore prefers to exercise its discretion under Article 111(1) EPC 1973 to remit the case for further prosecution to the examining division, which is in a better position to consider whether a further search for the added subject-matter is required.

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 for further prosecution on the basis of claims 1 to 12 filed as auxiliary request.

The Registrar The Chair

K. Götz A. Ritzka