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**Datasheet for the decision
of 30 November 2021**

Case Number: T 2629/17 - 3.5.03

Application Number: 13787061.4

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H04W28/02, H04J3/02, H04L5/22

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Title of invention:
SETUP AND MAINTENANCE FRAMEWORK FOR FLEXIBLE TIME DIVISION
DUPLIX OPERATION IN HETEROGENEOUS NETWORK

Applicant:
Nokia Technologies Oy

Headword:
Flexible TDD in HetNet/NOKIA

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (no)



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Case Number: T 2629/17 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 30 November 2021

Appellant: Nokia Technologies Oy
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 25 July 2017
refusing European patent application No.
13787061.4 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair K. Schenkel
Members: J. Eraso Helguera
C. Almberg

Summary of Facts and Submissions

I. The appeal was lodged by the applicant against the decision of the examining division to refuse the present European patent application for *inter alia* lack of inventive step (Article 56 EPC) with respect to the independent claims of a main request and for added subject-matter (Article 123(2) EPC) with respect to the independent claims of an auxiliary request.

II. During the examination proceedings, the examining division referred *inter alia* to the following prior-art documents:

D2: US 2010/0097965 A1;

D3: US 2011/0149813 A1.

III. Oral proceedings before the board were held on 30 November 2021 by videoconference.

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims of a **sole request** filed with their reply to the board's communication issued pursuant to Article 15(1) RPBA 2020.

At the end of the oral proceedings, the board's decision was announced.

IV. Claim 1 of the **sole request** reads as follows:

"A method for a heterogenous network where base stations operable in a flexible time division duplex mode can adjust their time frames without assumption of

a same frame structure being used by all base stations in an area, comprising:

receiving (502), by a first base station, an indication for a second base station to use the flexible time division duplex mode;

assessing, by the first base station, an amount of interference that will be caused by the second base station in dependence on the receiving;

deciding, by the first base station, (509) how to adjust a transmission power of subframes of the second base station which are not following the same uplink/downlink configuration as the first base station in dependence on said assessing; and

sending, by the first base station, (510) the second base station instructions to adjust the transmission power in dependence on said deciding."

Reasons for the Decision

1. *Claim 1 - inventive step (Article 56 EPC)*

1.1 **D2** concerns a heterogeneous network in which a plurality of femtocell base stations may exist in a minimal cell coverage area of a single master base station, e.g. a macrocell base station. A femtocell base station apparatus may perform data communication with a mobile terminal under control of the master base station using a time division duplex (TDD) method (see e.g. paragraphs [0008] and [0080]). The appellant agreed about the suitability of this document as a starting point for the assessment of inventive step.

1.2 Using the wording of claim 1, **D2** discloses (board's outline and highlighting):

- (a) A method for a heterogenous network ([0008]: "*A plurality of femtocell base station apparatuses may exist in a minimal cell coverage area of a single master base station...*")
- (b) where base stations operable in a ~~flexible~~ time division duplex mode ([0080]: "*... time division duplex (TDD) method ...*") ~~can adjust their time frames without assumption of a same frame structure being used by all base stations in an area,~~ comprising:
 - (c) receiving, by a first base station ([0059]: "*... the master base station 220 includes a receiving unit 221 ...*"), an indication for a second base station ([0059]: "*... femtocell base station apparatus 210 ...*"; [0068], last sentence: "*... receiving unit 221 may receive the first control information from at least one femtocell base station apparatus 210.*") ~~to use the flexible time division duplex mode;~~
 - (d) assessing, by the first base station, an amount of interference that will be caused by the second base station in dependence on the receiving ([0069]: "*... master base station 220 may generate the second control information that controls an operation of the femtocell base station apparatus 210 based on the received first control information.*"; [0079]: "*Accordingly, ... spectrum interference between the femtocell base station apparatus 210 and the master base station 220 may be reduced or eliminated.*"), the interference reduction achieved by the second control information implies that the master base station assessed the amount of interference possibly caused by the second base station);
 - (e) deciding, by the first base station, how to adjust a transmission power ~~of subframes~~ of the second

~~base station which are not following the same uplink/downlink configuration as the first base station in dependence on said assessing ([0074]: "... to control the operation of the femtocell base station apparatus 210, the control information generating unit 222 may determine cell parameters, such as ... a permitted maximum transmission power ...");~~

(f) sending, by the first base station, the second base station instructions to adjust the transmission power in dependence on said deciding ([0077]: "The transmitting unit 223 of the master base station 220 transmits the second control information to the femtocell base station apparatus 210 ...").

1.3 The subject-matter of claim 1 thus differs from the disclosure of **D2** in the following features:

- the base stations operable in a flexible time division duplex mode can adjust their time frames without assumption of a same frame structure being used by all base stations in an area (feature **(b)**);

- the indication received by the first base station is to use the flexible time division duplex mode (feature **(c)**);

- deciding by the first base station how to adjust a transmission power of subframes of the second base station which are not following the same uplink/downlink configuration as the first base station in dependence on said assessing (feature **(e)**).

1.4 The technical effect associated with these distinguishing features is that the femtocell base

station of **D2** can profit from the known benefits associated with the flexible TDD mode, such as improved performance with TDD UL-DL reconfiguration based on traffic adaptation, without creating additional interference.

The board thus accepts, in the appellant's favour, the objective technical problem formulated by the appellant, namely "how to enable the femtocell base station of D2 to efficiently use flexible resources without creating additional interference." The skilled person tasked to solve that problem is versed in the field of cellular mobile communications.

- 1.5 The subject-matter of claim 1 does not involve an inventive step starting out from **D2** for the following reasons:
 - 1.5.1 The skilled person entrusted with the task of modifying **D2** so as to enable the femtocell base station to efficiently use flexible resources would have been immediately led to the use of flexible TDD on account of its known benefits: each femtocell base station can change its UL-DL configuration autonomously depending on its individual demands of UL and DL data transmission. It was (and still is) apparent that this autonomous behaviour potentially leads to situations in which, in a given TDD subframe, the femtocell base station may not be following the same uplink/downlink configuration as the master base station. This creates cross-direction interference with the master base station.
 - 1.5.2 When looking for possible solutions to this problem, the skilled person would have come across **D3**, which also relates to the use of "flexible subframes" in a

TDD system. **D3** teaches that a flexible subframe can be used for uplink or downlink transmissions as needed or desired (see paragraph [0045]). Base stations exchange information about their intended usage of flexible subframes to enable a mechanism for avoiding inter-cell interference (see paragraphs [0046], [0047] and [0049]).

1.5.3 Hence, the skilled person would have modified **D2** so as to use flexible TDD and have the femtocell station inform the master base station about the intended usage of flexible TDD mode. Then, to decide the permitted maximum transmission power of the femtocell base station, the skilled person would have had to modify the master base station to consider the interference caused by those "flexible subframes" of the femtocell which are not following the same uplink/downlink configuration as the master base station, thereby arriving at the introduction of the distinguishing features into **D2** without the involvement of any inventive skills.

1.6 The appellant submitted that **D2** did not relate to "subframes" as in the current invention. This document disclosed in paragraphs [0012] and [0013] first control information being sent by the femtocell base station, but this was not, in the appellant's view, an indication to start using flexible TDD. The second control information sent by the master base station according to paragraph [0014] comprised maximum transmission power permitted in the frequency band rather than in a specific TDD subframe. Furthermore, **D3** taught away from the claimed solution. There was no sending of power control instructions to control possible interference. Rather, the teaching of **D3** was that use of the contradicting subframes should be

avoided, as explained on paragraph [0046]. The appellant argued that if this teaching was applied to the HetNet arrangement underlying the claimed solution, this would mean that the first station should avoid transmitting during the flexible subframes in response to the indication from the second station. Similarly, in D2 the master station should avoid transmitting in DL in the indicated subframe. In either case, the power of the base station wanting to use flexible TDD would not be affected at all by the D3 interference avoidance scheme. Instead, this base station would be creating exactly the same amount of additional interference. In the appellant's view, the efficiency of the master station of D2, or the first station of the claims, would however suffer as they could not transmit at all during those subframes, if following the teaching of D3.

1.7 This is not convincing.

1.7.1 First, the master base station of **D2** relies on the femtocell base station sending the so-called "first control information" to determine the "second control information" which includes the transmission power set for the femtocell base station. The "first control information" is meant to include any pertinent information that is relevant for the decision-making in the master base station. Notifying the master base station of the use of flexible TDD mode would constitute just an additional piece of information that the femtocell base station of **D2** would seamlessly introduce into the existing reports and that the master base station could not obtain elsewhere if the femtocell base station changed UL-DL configurations autonomously. Without this knowledge, the master base

station could not effectively tackle spectrum interference within its cell coverage area.

- 1.7.2 Second, the teaching of paragraph [0046] of **D3**, according to which BS2 avoids scheduling downlink transmissions after being informed of BS1's intention to use a flexible subframe for uplink transmission constitutes a mere non-limiting example within the general context of inter-cell coordination introduced at the beginning of the same paragraph ("Appropriate flexible subframe use may be directed using inter-cell coordination mechanisms where the cells exchange information about their intended usage of the subframes...", see also paragraph [0049]: "... The eNBs can include macro and micro eNBs that communicate over an X2 interface. These inter-cell communication/ coordination messages are suggestions from one base station to another base station, possibly influencing the scheduling and/or UL and/or DL transmission ...". The skilled person starting out from D2 would have considered the transmission of instructions to adjust the transmission power of the femtocell base as an equally valid, if not more efficient, manner of "influencing the DL transmission" of the femtocell base station to avoid or mitigate interference.

- 1.8 Hence, the sole request is not allowable under Article 56 EPC.

2. Since there is no allowable claim request on file, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chair:



B. Brückner

K. Schenkel

Decision electronically authenticated