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**D E C I S I O N**  
**of 23 March 2006**

**Case Number:** T 0585/04 - 3.5.03

**Application Number:** 91900460.6

**Publication Number:** 0500775

**IPC:** H04B 7/14

**Language of the proceedings:** EN

**Title of invention:**

Soft handoff in a CDMA cellular telephone system

**Patentee:**

QUALCOMM INCORPORATED

**Opponent:**

Nortel Networks Limited

**Headword:**

Soft handoff/QUALCOMM

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step - main request (yes) "

**Decisions cited:**

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**Catchword:**

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Case Number: T 0585/04 - 3.5.03

**D E C I S I O N**  
of the Technical Board of Appeal 3.5.03  
of 23 March 2006

**Appellant:** QUALCOMM Incorporated  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 2 February 2004  
revoking European patent No. 0500775 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** A. S. Clelland  
**Members:** F. van der Voort  
R. Moufang

## Summary of Facts and Submissions

- I. This appeal is against the decision of the opposition division revoking European patent No. 0 500 775. Oppositions against the patent as a whole and on the grounds pursuant to Article 100(a) to (c) EPC had been filed. In the course of the opposition proceedings three of the five opponents withdrew their oppositions.
- II. In their decision the opposition division particularly referred to the following documents:

OD01: JP 64 58134 A;  
OD01': an English translation of OD01;  
OD01'': US 5 095 531 A, a family member of OD01;  
OD02: EP 0 265 178 A; and  
OD04: US 4 222 115 A

The opposition division held that the subject-matter of claim 1 of a main request, i.e. claim 1 as granted, did not involve an inventive step having regard to OD01 as representing the closest prior art, and taking into account the teaching of OD02. The objections based on the grounds for opposition pursuant to Article 100(b) and (c) EPC, the former ground having been raised, *inter alia*, by opponent V, were rejected. Further, it was held that the subject-matter of claim 1 of an auxiliary request lacked an inventive step having regard to OD01 as representing the closest prior art, and taking into account the teaching of OD04.

- III. The proprietor (appellant) lodged an appeal against the decision and with the statement of grounds of appeal requested that the decision be set aside and the patent

be maintained either as granted (main request) or on the basis of claims of an auxiliary request. Oral proceedings were conditionally requested.

IV. In response to the statement of grounds of appeal, respondent I (opponent I) requested that the appeal be dismissed and conditionally requested oral proceedings.

V. Respondent II (opponent V) did not file any reply.

VI. The parties were summoned by the board to oral proceedings. In a communication accompanying the summons, the board gave a preliminary opinion and drew attention to issues to be discussed at the oral proceedings. Reference was made to the above-mentioned documents (see point II) as well as to the following documents, also cited in the course of the opposition proceedings:

OD08: JP 63 233623 A; and

OD08': an English translation of OD08.

VII. In response to the summons, the appellant filed, with a letter dated 24 October 2005, an amended set of claims 1 to 26 by way of a revised auxiliary request. He requested that the impugned decision be set aside and the patent be maintained either as granted (main request) or on the basis of the claims of the revised auxiliary request.

VIII. In response to the summons, respondent II informed the board that he would not be represented at the scheduled oral proceedings.

- IX. With a letter received on 25 October 2005 respondent I (opponent I) withdrew his opposition, leaving respondent II (opponent V) as the sole respondent.
- X. During the oral proceedings the appellant withdrew all pending requests and requested that the decision be set aside and the patent be maintained on the basis of claim 1 as filed during the oral proceedings and claims 2 to 26 as filed with the letter dated 24 October 2005. At the end of the oral proceedings it was decided that the proceedings would be continued in writing.
- XI. In a subsequent communication the board raised objections under Articles 84 and 123(2) EPC in respect of claim 1 as filed during the oral proceedings.
- XII. In the submission in response dated 17 February 2006 the appellant requested that the decision be set aside and the case be remitted to the department of first instance on the basis of either claim 1 of a main request or claim 1 of an auxiliary request, both as filed with the submission, and claims 2 to 26 as granted.
- XIII. The respondent (opponent V) has not commented on the board's communication subsequent to the oral proceedings or on the appellant's response and revised requests.
- XIV. Claim 1 of the main request reads as follows:
- "A system for directing communication links (20a, 20b, 22a, 22b, 24a, 24b) between a mobile system unit (18)

and geographically separated cell-sites (12, 14, 16) each defining a geographic service area as said mobile system unit changes service areas in a cellular telephone system comprising:

a plurality of cell-sites each serving a respective one of said geographic service areas and being so located that there is a transition region between adjacent cell-sites, which plurality cell-sites *[sic]* all transmit direct sequence code division spread spectrum signals in a common frequency band, the direct sequence code division spread spectrum signals transmitted by each cell-site including a cell-site identifying pilot signal, the pilot signals transmitted by the cell-sites being of the same spreading code but with a different code phase offset; and

said mobile system unit, in which said mobile system unit comprises an analog receiver tuned to the common carrier frequency band in order to receive direct sequence code division spread spectrum signals simultaneously from each cell-site in whose geographic service area the mobile system unit is located, digital scanning receiver means (44) for receiving cell-site transmitted pilot signals, measuring signal strength of each of said received pilot signals, comparing the relative signal strengths and providing a signal strength signal indicative of received pilot signals of greatest signal strength, and two or more digital data receivers (40, 42) for processing the signals received by the analog receiver for extraction of information from the direct sequence code division spread spectrum signals, in which said mobile system unit (18) communicates user information signals with another system unit via a system controller (10) connected to said cell-sites (12, 14, 16), said user information

signals being communicated as said direct sequence code division spread spectrum signals along said communication links,

said system for directing communication links comprising:

said digital scanning receiver means (44) and further comprising

processing means (46) in said mobile system unit (18) for, while said mobile system unit (18) is in a service area of one cell-site (12) and communicates said user information signals with said another system unit via a communication link with said one cell-site (12), determining a transition of said mobile system unit (18) from said one cell-site service area to a service area of another cell-site (14) by receiving said signal strength signal and providing, when the signal strength of the received pilot signal of said another cell-site is greater than that of the pilot signal of said one cell-site, an indication identifying said another cell-site (14);

means (100) at said system controller (10) responsive to said indication for further coupling communication of said user information signals between said mobile system unit (18) and said another system unit via a communication link with said another cell-site (14) while said mobile system unit (18) also remains in said communication with said another system unit via said communication link with said one cell-site (12) and extracts user information from said user information signals; and

means (46; 78; 100) at said mobile system unit (18) and at said system controller (10) responsive to said coupling of communication between said mobile system unit (18) and said another system unit via said

communication link with said another cell-site (14) for terminating said communication of user information signals between said mobile system unit (18) and said another system unit via said communication link with said one cell-site (12) while continuing said communication of said user information signals between said mobile system unit (18) and said another system unit via said communication link with said another cell-site (14)."

Claims 8 and 20 are independent claims respectively directed to a method for directing communication links and a mobile system unit for use in a system for directing communication links.

- XV. In view of the board's decision on the main request, the claims of the auxiliary request are not reproduced.

## **Reasons for the Decision**

### *1. Interpretation of claim 1 of the main request*

Claim 1 of the main request is directed to a system for directing communication links between a mobile unit and base stations (i.e. cell-sites) as the mobile unit moves from one cell (i.e. a service area) to another cell of a cellular telephone system. The redirection of communication links under these circumstances is known in the art as "handoff" (cf. paragraph 0001 of the patent as published). According to claim 1, the communication link with the old cell-site is terminated only once the communication link with the new cell-site has been established. This is referred to as "soft



handoff", i.e. a make-before-break switching function (see the patent as published, paragraphs 0026, 0027 and 0047). Further, the claimed system for directing communication links is suitable for use in a direct sequence code division spread spectrum (DS-CDSS) cellular telephone system, also referred to as a code division multiple access (CDMA) cellular telephone system and comprises the means as defined in the last four paragraphs of claim 1. It is implicit that the soft handoff is initiated by the mobile unit since the indication identifying the new cell-site is provided by processing means in the mobile unit and is on the basis of a signal strength signal which is provided by digital scanning receiver means of the mobile unit.

2. *Amendments - claim 1 of the main request*

- 2.1 Claim 1 of the main request is based on claims 1 and 2 as originally filed, to which further features have been added which are based on the description as filed, in particular page 1, lines 7 to 11 (re. system for directing communication links), page 4, lines 13 and 14 (re. transition region), page 13, lines 18 to 21 (re. direct sequence), page 3, lines 31 and 32 (re. common frequency band), page 5, lines 12 to 15 (re. different code phase offset), page 13, lines 9 to 21 and Figure 2 (re. analog receiver), page 14, lines 5 and 6 and line 30 to page 15, line 2 (re. digital scanning receiver means), page 14, lines 5 to 9 (re. two or more digital data receivers), page 15, lines 3 to 9 (re. processing means), page 6, lines 23 to 34 and Figure 4 (re. coupling means at the system controller) and page 7, lines 7 to 13 (re. terminating means at the mobile system unit and at the system controller).

2.2 Claim 1 of the main request is composed of claim 1 as granted which was amended exclusively by the insertion of further limiting features and the deletion of "for" in "for providing" in the third last paragraph. This deletion does not extend the protection conferred by claim 1 as granted since the processing means (46) is thereby defined as being suitable to provide the indication identifying the another cell-site as part of the transition determination.

2.3 The board is therefore satisfied that claim 1 does not give rise to objections under Article 123(2) and (3) EPC. The amendments to claim 1 do not give rise to objections under Article 84 EPC either. Further, in relation to this claim, the board sees no reason to deviate from the opposition division's view that the patent discloses the invention in a manner which is sufficiently clear and complete for it to be carried out by a person skilled in the art. The board notes that the respondent (opponent V) did not pursue the objection based on Article 100(b) EPC during the appeal proceedings; indeed, he made no requests and gave no reasons for dismissing the appeal.

3. *Inventive step - claim 1 of the main request*

3.1 As a preliminary remark the board notes that during the appeal proceedings the appellant considered OD01' to be a faithful translation of OD01. The board sees no reason to raise any doubts in this respect. Text passages referred to in this decision in relation to OD01 therefore derive from OD01'.

3.2 The subject-matter of claim 1 involves an inventive step having regard to each, or any combination, of OD01, OD02, OD04 and OD08 for the following reasons.

3.3 OD01 is considered to represent the closest prior art since it relates to a system conceived for the same purpose as the claimed subject-matter, namely directing communication links due to movement of a mobile radio device (see OD01', page 22, penultimate paragraph), and has most technical features of claim 1 in common. It is noted that in OD01' handoff is referred to as both (communication) channel handover and changeover (see, e.g., page 24, last line, page 48, point (5) and page 66, last paragraph).

3.4 More specifically, OD01 discloses a system for directing communication links between a mobile system unit (see Figures 9 and 1I; mobile radio device 50D) and geographically separated cell-sites (Figure 1A; radio base stations 30-1, ..., 30-n), each defining a geographic service area (Figure 8; zones Z1 - Z16), as the mobile device 50D changes service areas in a cellular telephone system (Figures 1A and 9).

Each cell-site 30 of the cellular telephone system serves a respective one of the geographic service areas Z and is so located that there is a transition region between adjacent cell-sites (Figure 9). The cell-sites all transmit frequency division multiple access (FDMA) signals (see Figure 1E, page 38, 3rd paragraph, and page 86, 2nd paragraph) including cell-identifying pilot signals (out-of-band control signals including base station ID numbers; see page 35, lines 5 to 8,

page 50, lines 10 to 15, page 58, 4th paragraph, page 83, lines 10 to 13, and Figure 2(a)).

The mobile device 50D includes an analog receiver 68-1, ..., 68-n (Figure 1I) for simultaneously receiving signals from each cell-site in whose geographic service area the mobile system unit is located (page 40, 1st to 3rd paragraph ("diversity"), and page 49, lines 9 to 11), digital receiver means (page 41, 2nd paragraph) for receiving the pilot signals (page 50, 3rd paragraph) and a plurality of digital data receivers for processing the signals received by the analog receiver for extraction of user information from the FDMA signals (Figures 1H and 1I and page 40, lines 1 to 9). The mobile device communicates user information signals with another mobile device via a radio system controller 20 (Figure 1A) connected to the cell-sites. The user information signals are communicated as frequency division signals along the communication links.

The cell sites 30 include means for measuring signal strength of signals transmitted from the mobile unit (page 66, last paragraph). The radio system controller 20 compares the relative signal strengths and provides a signal strength signal indicative of a signal of greatest signal strength ("best", see page 66, last paragraph).

As described at page 66, 2nd and 3rd full paragraphs, and page 67, 1st paragraph, the system for directing communication links includes a S/N monitor 22 at the radio system controller 20 for, while the mobile device is in a service area of one cell-site, e.g. 30-1, and

communicates the user information signals with the another mobile device via a communication link with the one cell-site, determining a transition of the mobile device from the one cell-site service area to a service area of another cell-site, e.g. 30-n, by means of the signal strength signal received from the base station 30-1, which measured the signal strength of the signal received from the mobile unit, and providing, when the signal strength of the signal received from another cell-site is greater than that of the signal of the one cell-site, an indication identifying this other cell-site. The system controller 20 is responsive to this indication for further coupling communication of the user information signals between the mobile device and the other mobile device via a communication link with the other cell-site while the mobile devices also remain in communication via the communication link with the one cell-site and extracts user information from the user information signals (page 67, 1st and 2nd paragraph). Further, the system controller 20 is responsive to the coupling of communication between the mobile devices via the communication link with the other cell-site and capable of terminating the communication of user information signals between the mobile devices via the communication link with the one cell-site while continuing the communication of the user information signals between the mobile devices via the communication link with the other cell-site (page 68, last paragraph). Thereby, a soft handoff, which was initiated by the system controller 20, is completed.

3.5 The subject-matter of claim 1 particularly differs from the system for directing communication links known from OD01 in that according to claim 1:

- the cell-sites transmit DS-CDSS signals, i.e. the system is suitable for use in a CDMA cellular telephone system, in which the pilot signals are of the same spreading code but with a different code phase offset; and in that

- the mobile unit includes a digital scanning receiver means and processing means for determining the cell transition and providing the indication identifying the new cell-site, in which the indication is based on measuring and comparing the signal strength of pilot signals received by the mobile unit, i.e. the soft handoff is initiated by the mobile unit.

3.6 Whereas in an FDMA cellular telephone system the capacity is limited by the number of radio channels available, in a spread spectrum system, e.g. a CDMA system, the limiting factor is the interference caused by other users, since the frequency spectrum can be reused multiple times (see the patent as published, column 1, lines 41 to 46, and OD02, page 16, lines 21 to 23). This may result in what is known in the art as "graceful degradation" (see, e.g., OD04, column 15, lines 36 to 44). Therefore, in a CDMA system a handoff does not require a radio channel to be idle in the neighbouring cell as in case of an FDMA system and a failure in handoff due to no idle channel being available is avoided (cf. the patent as published, column 1, lines 47 to 56, column 2, lines 33 to 38).

- Further, a handoff initiated by the mobile unit has the advantage that a delay in determining a transition, which would be present if a transition were to be determined by the system controller via the cell-sites, is avoided (see the patent, paragraph 0058).
- 3.7 Starting out from OD01, the problem underlying the claimed subject-matter may therefore be seen in modifying the known system such as to avoid failing handoffs due to an idle channel not being available at the transition time at the new cell-site.
- 3.8 A person skilled in the art facing this problem and seeking for a solution would thus consider other prior art documents relating to handoff in a cellular telephone system.
- 3.9 **OD04** discloses a cellular telephone system (Figure 1) in which the communication signals are time-frequency coded (TFC) spread spectrum signals, i.e. sequences of frequency-hopped carrier signals onto which message data is modulated (column 6, lines 3 to 6 and 13 to 19). Each base station transmits a locally unique TFC spread spectrum signal, referred to as downstream control channel (DCS), as a power control and vehicle locator beacon (column 4, lines 47 to 50, and column 12, lines 59 to 64). Each mobile unit (Figure 2) has a power control/mobile locator system which includes a plurality of demodulators 1 - P (Figure 13). Each demodulator measures the power of a corresponding one of seven DCS's (column 13, lines 1 to 13). The most positive signal is used for estimating which base station is the nearest to the mobile unit (column 13, lines 43 to 47). Periodically, the mobile unit makes a

decision as to which cell it is most probably in (column 5, lines 28 to 36). If the decision is different from its predecessor, the mobile unit initiates a cell transfer request, i.e. a handoff request.

Since OD04 explicitly mentions the above-mentioned problem encountered in cellular FDMA systems and provides a solution for it (see column 2, lines 25 and 26 and column 15, lines 27 to 30, 39 to 44 and 52 to 58), a person skilled in the art starting out from OD01 and facing this problem would consider OD04.

However, on applying the teaching of OD04 to OD01, i.e. modifying the system of OD01 such as to make it suitable for processing TFC spread spectrum signals, the skilled person would not arrive at the claimed subject-matter, since the claimed system uses direct sequence coded waveforms and not TFC coded waveforms as in OD04. More specifically, according to OD04, the demodulators 1 - P (see Figure 13) of the power control/mobile locator system of the mobile unit each include bandpass filters 136 having centre frequencies corresponding to the frequencies of the carrier bursts that make up the TFC signal (see Figures 13 and 14, column 14, lines 3 to 6, and column 12, lines 8 to 11 and 27 to 32).

Neither OD01 nor OD04 contains a teaching which would lead the skilled person to subsequently modify the mobile unit so as to replace the TFC receivers as described in OD04 by a digital scanning receiver means for receiving cell-site transmitted pilot signals which



are direct sequence spread spectrum signals of the same spreading code but with a different code phase offset.

3.10 **OD02** discloses a DS-CDMA cellular and satellite telephone system in which the system capacity is increased by employing means for producing marginal isolation (page 4, lines 40 to 43, page 7, lines 31 and 32, and page 9, lines 27, 28 and 43 to 47). OD02 teaches that the limiting factor on the system capacity is interference caused by other users (page 16, lines 21 to 23) and that assigning each user to a specific (frequency) channel as in an FDMA system is no longer necessary (page 10, lines 50 to 54, and page 3, lines 15 to 30). Only in passing does OD02 mention the problem of a call failing abruptly at cell borders in an FDMA system if a channel is unavailable in an adjacent cell during handoff (page 3, lines 24 to 27).

In relation to the disclosed CDMA cellular telephone system, OD02 is silent as to how, if at all, handoff is carried out. Nor does OD2 provide any details of what is referred to as a "switch over" of a communication link from a satellite repeater to a terrestrial repeater as the user moves closer to the terrestrial repeater, whereby local users may be "offloaded" from the satellite repeater (page 13, lines 1 to 10).

Hence, OD02 does not address the above-mentioned problem and would therefore not be considered by the skilled person. If, for the sake of argument, the skilled person were to apply the teaching of OD02 to the system of OD01 he would, in any case, not arrive at the claimed subject-matter, since OD02 does not disclose or suggest providing the mobile device (cf.

- OD02, Figure 10, user terminal 130) with a scanning receiver means for receiving cell-site transmitted pilot signals of the same spreading code but with a different code phase offset, and making the mobile device capable of initiating the handoff.
- 3.11 The disclosure of **OD08**, which is a patent application filed a few months before the filing of OD01 and which mentions the same inventor as in OD01, is no more relevant than the disclosure of OD01. The system disclosed in OD08 is essentially the same as the one disclosed in OD01; the number of transmitter-receiver components installed in the mobile device is however fixed at two (see OD08', page 2, claims 1 and 2).
- 3.12 It follows from the above that the subject-matter of claim 1 is not rendered obvious having regard to each, or any combination, of OD01, OD02, OD04 and OD08.
- 3.13 As stated above, the respondent (opponent V) made no requests and gave no reasons for dismissing the appeal.
- 3.14 The board therefore concludes that the appeal is allowable and that the impugned decision is to be set aside.
4. *Procedural matters*
- 4.1 Claims 2 to 26 of the main request, i.e. claims 2 to 26 as granted, which include an independent method claim 8 and an independent claim 20 directed to a mobile system unit, have not yet been adapted to the wording of claim 1 of the main request. The board notes moreover that the impugned decision is silent as to these claims.

- 4.2 The board further notes that the description has not been adapted to the wording of claim 1 of the main request, although this appears to be necessary in order for the patent to be maintained. In particular, amendments appear to be necessary in the summary of the invention, i.e. paragraphs 0024 to 0047 of the patent as published, paragraph 0056, which relates to cell-site initiated handoff, paragraph 0063, in which a mobile unit with a single data receiver is described, and the final paragraph 0095.
- 4.3 The board therefore decides, in accordance with the appellant's main request, to remit the case to the department of first instance for further prosecution.
- 4.4 In view of the foregoing, it has not proved necessary to consider the auxiliary request.

**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.

The Registrar:

The Chairman:

D. Magliano

A. S. Clelland