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**Datasheet for the decision
of 11 June 2015**

Case Number: T 0143/12 - 3.5.04

Application Number: 00306264.3

Publication Number: 1075142

IPC: H04N7/00, G06F3/00

Language of the proceedings: EN

Title of invention:

Methods and apparatus for providing a direct frequency hopping wireless interface with a personal computer

Applicant:

Alcatel-Lucent USA Inc.

Headword:

Relevant legal provisions:

EPC 1973 Art. 56

RPBA Art. 13

Keyword:

Inventive step - (no)

Late-filed request - admitted (no)

Decisions cited:

T 1019/99

Catchword:



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Chambres de recours**

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Case Number: T 0143/12 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 11 June 2015

Appellant: Alcatel-Lucent USA Inc.
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 10 August 2011
refusing European patent application
No. 00306264.3 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman B. Müller
Members: R. Gerdes
M. Paci

Summary of Facts and Submissions

I. The appeal is directed against the decision to refuse European patent application No. 00 306 264.3, published as EP 1 075 142 A2.

II. The patent application was refused by the examining division on the grounds that the subject-matter of all claims of the sole request did not involve an inventive step. Inter alia, the following documents were cited in the decision:

D3: JP 06258255 A, and D3T being a machine translation thereof,

D4: EP 856812 A2,

D6: US 5,274,836 A,

D7: WO 95/01020 A.

D6 was considered as the closest prior art with respect to the claimed subject-matter.

III. The applicant appealed against this decision and indicated in the statement of grounds of appeal that it wished to proceed based on the claims underlying the decision under appeal as a main request. In addition, it submitted claims of a first auxiliary request.

IV. In a communication annexed to a summons to oral proceedings the board expressed doubts whether the claimed subject-matter according to both requests involved an inventive step (Article 56 EPC 1973). The board cited the following documents in support of its view that the additional feature of claim 1 of the first auxiliary request related to a well-known technology:

D8: GB 2 261 141 A, and
D9: Stranneby, Dag and Källquist, Per: Adaptive Frequency Hopping in HF Environments, Proceedings of the Annual Military Communications Conference (MILCOM), Oct. 11-14, 1993, pp. 338-341, XP-002114566.

The board also raised objections under Article 84 EPC 1973 and Article 123(2) EPC against the claims of both requests.

- V. The appellant replied with a letter dated 5 May 2015. The appellant did not provide arguments with respect to the objections under Article 84 EPC 1973 and Article 123(2) EPC, but submitted new auxiliary requests 2 to 4 in order to address the issues identified in the board's communication.
- VI. Oral proceedings were held before the board on 11 June 2015. During the oral proceedings the appellant presented claims 1 to 10 according to an auxiliary request 5. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims according to the main request or first to fifth auxiliary requests, in this order of preference.
- VII. Claim 1 of the main request reads as follows:

"A system (100) comprising a base station (20) for providing a frequency hopped radio frequency (RF) communication link between a fixed unit (30) producing a video signal and a remote terminal (10), the base station comprising:

apparatus for connecting to the fixed unit and receiving the video signal produced by the fixed unit, the invention characterized by:
communication circuitry (130, 126, 136) for communicating with the remote terminal using the frequency hopped RF communication link such that when the remote terminal is in an active state the video signal produced by the fixed unit is transmitted to the remote terminal utilizing the RF communication link, the video signal comprising a red color signal, a green color signal and a blue color signal, the communication circuitry adapted to transmit the red color signal on a first frequency, the green color signal on a second frequency and the blue color signal on a third frequency, said communication circuitry transmitting to the remote terminal video synchronization signals on a fourth frequency different from the first frequency, the second frequency and the third frequency."

VIII. Claim 1 of the first auxiliary request differs from claim 1 of the main request in the following additional feature that has been appended to the claim:

"...; and
a microcontroller for evaluating a received known bit stream used for a channel assessment to determine transmission quality of the channel at particular frequencies and for controlling intelligent frequency hopping to avoid non-favorable channel conditions."

IX. Claim 1 of the second auxiliary request reads as follows (amendments with respect to claim 1 of the main request indicated by underlining, deletions by strikethrough):

~~"A system (100) comprising a~~ A base station (20) for providing a frequency hopped radio frequency (RF) communication link between a fixed unit (30) located near and connected with the base station (20), the fixed unit (30) producing a video signal, and a remote terminal (10), the base station (20) comprising:

apparatus for connecting to the fixed unit (30) and receiving the video signal produced by the fixed unit (30), and the invention characterized by:

communication circuitry (130, 126, 136) for communicating with the remote terminal (10) using the frequency hopped RF communication link such that when the remote terminal (10) is in an active state the video signal produced by the fixed unit (30) is transmitted to the remote terminal (10) utilizing the RF communication link, the video signal comprising a red color signal, a green color signal and a blue color signal, the communication circuitry adapted to transmit the red color signal on a first frequency, the green color signal on a second frequency and the blue color signal on a third frequency, said communication circuitry transmitting to the remote terminal video synchronization signals on a fourth frequency different from the first frequency, the second frequency and the third frequency."

- X. Claim 1 of the third auxiliary request corresponds to claim 1 of the second auxiliary request, with the additional feature of claim 1 of the first auxiliary request being appended to the claim.

- XI. Claim 1 of the fourth auxiliary request differs from claim 1 of the third auxiliary request in its first feature, which reads:

"A system (100) comprising a base station (20), a fixed unit (30) located near and connected with the base station (20) and a remote terminal (10), the system (100) providing a frequency hopped radio frequency (RF) communication link between the fixed unit (30) producing a video signal, and the remote terminal (10), the base station (20) comprising: ..."

XII. Claim 1 of the fifth auxiliary request reads as follows:

"A base station (20) for providing a frequency hopped radio frequency (RF) communication link between a fixed unit (30) located near and connected with the base station (20), the fixed unit (30) producing a video signal, and a remote terminal (10), the base station (20) comprising:

apparatus for connecting to the fixed unit (30) and receiving the video signal produced by the fixed unit (30), and characterized by:

communication circuitry (130,126,136) for communicating with the remote terminal (10) using the frequency hopped RF communication link such that when the remote terminal (10) is in an active state the video signal produced by the fixed unit (30) is transmitted to the remote terminal (10) utilizing the RF communication link, the video signal comprising a red color signal, a green color signal and a blue color signal, the communication circuitry adapted to transmit the red color signal on a first frequency, the green color signal on a second frequency and the blue color signal on a third frequency, said communication circuitry transmitting to the remote terminal horizontal and

vertical video synchronization signals as video synchronization pulses, which are not digitized data, on a fourth frequency different from the first frequency, the second frequency and the third frequency in real time, establishing a super-frame, the interval between two consecutive vertical synchronization pulses, having a duration of about 16 millisecond, with sub-frames established by the horizontal synchronization pulses, wherein the video synchronization signal is sent by a data modem (128), controlled by a microcontroller (138) to hop with a hop frequency at an integer fraction of the horizontal video synchronization frequency."

XIII. In the decision under appeal the examining division held that D6 represented the closest prior art with respect to the claimed subject-matter. It identified three features distinguishing the subject-matter of claim 1 of the then sole request (now the main request) from D6:

(a) the signal involved in the transmission was a component video signal (R, G, B, and synchronisation signals), wherein the red component, the green component, the blue component and the sync signals were respectively transmitted on different frequencies,

(b) an apparatus was connected to the fixed unit for receiving the video signal produced by said fixed unit and

(c) the video signal was transmitted by the fixed unit when the remote terminal was in an active state.

The examining division argued that the distinguishing features were not linked to each other and solved

different partial technical problems. Features (a) to (c) were respectively described in D3, D4 and D7 as providing the same advantages as in the present application. The skilled person would therefore regard it as a normal option to include these features in D6 in order to solve the respective problems posed (see point 2.2 of the decision under appeal).

XIV. The appellant's arguments with respect to inventive step starting from D6 as the closest prior art may be summarised as follows.

D6 had little direct connection with the claimed invention because it related to a terminal with highly reliable data transmission for use in a combat zone. D6 only disclosed a TV sensor in the section entitled "background of the invention". D6 was silent on any specifics of TV signal processing. D6 did not disclose at least the following features of claim 1 of the main request:

(1) "the communication circuitry [is] adapted to transmit the red color signal on a first frequency, the green color signal on an second frequency and the blue color signal on a third frequency, said communication circuitry transmitting to the remote terminal video synchronization signals on a fourth frequency different from the first frequency, the second frequency and the third frequency" and

(2) "the communication circuitry [is] for communicating with the remote terminal using the frequency hopped RF communication link".

The invention resulted in an increase in bandwidth and therefore a reduction of the power needed. A simple

robust and low power transmission system resulted from this partitioning of the video signals.

The objective technical problem starting from D6 was therefore to provide a low-cost solution for reliably transmitting a video signal. The technical problem in the decision under appeal contained part of the solution by referring to "a frequency hopped radio frequency communication from the base station to the remote station" (see decision under appeal, page 4).

If the data processor 22 of D6 received a TV signal it would have simply divided it into a number of lower-rate data streams. The skilled person would not have connected individual outputs of a TV camera directly to the one input of the data processor. Instead, it would have been necessary to provide a combined video signal first.

The additional feature of claim 1 of the first auxiliary request resulted in an intelligent frequency hopping to avoid unfavourable channel conditions. This feature was not disclosed in the prior art. Channel quality was determined differently in the present application compared with D8 or D9 (see page 15, lines 5 to 10 of the present application as originally filed).

With respect to the second to fourth auxiliary requests the appellant relied on the arguments regarding inventive step presented for the main and first auxiliary requests.

XV. Regarding the admissibility of the fifth auxiliary request the appellant provided the following arguments:

In the communication of the examining division dated 18 November 2010 the objective technical problem regarding distinguishing feature (a) was specified as "transmitting a specific type of video signal" (see page 3 of that communication). In the oral proceedings before the examining division this formulation was changed to "transmitting a specific type of video signal according to a frequency hopped radio frequency communication from the base station to the remote station" (see decision under appeal, page 4). The appellant was surprised by this change and would have submitted amendments before the oral proceedings if it had known about this new formulation.

The amendments to claim 1 were also clearly disclosed in the application (see paragraphs [0044], [0046] and [0047] of the application as published). It was therefore possible to check without effort that they complied with Article 123(2) EPC. It was also apparent that these amendments rendered the claimed subject-matter inventive.

Reasons for the Decision

1. The appeal is admissible.

The application

1. The application concerns a wireless interface for a handheld or portable unit such as a laptop. The handheld unit, which is also referred to as a "remote terminal" in the application, communicates via a radio link with a base station that is located near to and connected with a desktop PC. The desktop PC is also referred to as a "fixed unit".

The video signal of the desktop PC is transmitted to the handheld unit along with audio and other miscellaneous data signals if the handheld unit is in use. In order to provide a low-cost and effective transmission, the base station avails itself of three direct FM frequency-hopped modulators for transmission of the red, green and blue video signal components and an additional data modem that transmits the video synchronisation signals using frequency hopping. Due to the use of several frequency-hopped channels the signal energy is spread over a wide bandwidth which results in a decrease in the power required (see application as originally filed, page 1, line 7 to page 3, line 5; page 5, line 19 to page 6, line 2; page 12, line 7 to page 13, line 16; page 14, lines 18 to 24 and figure 1).

According to an embodiment of the invention, the quality of the available FM carriers is assessed by a microcontroller in the base station such that frequencies for data transmission can be controlled to avoid unfavourable channel conditions (see page 13, lines 5 to 11 and page 15, lines 3 to 14).

Main request

2. D6 may be considered as the closest prior art with respect to the subject-matter of claim 1 for the reasons set out below.
- 2.1 D6 relates to the transmission of data over a radio link for use in hostile conditions such as in a combat environment. According to D6 a common combat scenario in which data links are employed is one in which sensor data is transmitted between an airborne terminal and a

ground terminal in both directions. The sensors on board the airborne terminal may include, for example, "radar, infrared scanners radio receivers and TV". The data from the sensors is transmitted to the ground station (see column 1, lines 9 to 67). According to D6 either terminal of the transmission system may be located on an aircraft or the ground and it may be moving or stationary with respect to the other terminal (see column 1, lines 64 to 67).

Hence, D6 discloses a base station (figure 1A), which is connected to a fixed unit (TV sensor with its supporting structure), the fixed unit producing a video signal. The base station transmits data via a radio link to a remote terminal (figure 1B).

The data transmission of D6 employs a data processor which divides an incoming high-rate data stream into parallel low-rate data streams. Each low-rate data stream is encoded and used to modulate a frequency-hopping carrier signal. The low-rate data streams can be transmitted effectively with significantly less power than would be required to transmit the original high-rate data stream (see figure 1A, column 1, line 67 to column 2, line 49 and column 4, lines 64 to 67).

2.2 Thus the subject-matter of claim 1 is distinguished from D6 by the following features:

(a) the signal involved in the transmission is a component video signal (R, G, B, and synchronisation signals), wherein the red component, the green component, the blue component and the sync signals are transmitted on different frequencies,

(b) the apparatus connected to the fixed unit receives the video signal produced by said fixed unit and

(c) the video signal is transmitted from the fixed unit when the remote terminal is in an active state.

2.3 The appellant argued that D6 had little direct correspondence to the claimed invention because it related to a terminal with highly reliable data transmission for use in a combat zone. The board agrees that D6 concerns transmission of data over a radio link for use in demanding conditions such as a combat environment. However, there are no features in claim 1 which exclude such applications from the scope of the claim.

Moreover, the appellant argued that D6 did not disclose features (1) and (2) (see point XIV above). The board considers feature (a) to be equivalent to feature (1). With respect to feature (2) specifying that "the communication circuitry [is] for communicating with the remote terminal using the frequency hopped RF communication link", the board holds that this feature is disclosed in D6 (see figure 1A and column 1, line 57 to column 2, line 20). The data processor 22, together with the separate downlink transmit paths 24a to 24n, provides the functionality of the above communication circuitry, i.e. it is suitable to communicate with the remote terminal using the frequency-hopped RF communication link.

The appellant also argued that D6 only disclosed a TV sensor in the section entitled "background of the invention". However, the passage in column 1, lines 21 to 32 of D6 constitutes a description of the work environment of the invention in D6 and hence should be

regarded as being implicitly a part of that invention. D6 therefore addresses the transmission of TV sensor signals to a remote station via a frequency-hopped radio link. The appellant also argued that D6 refers to a TV sensor and not a TV camera. However, a TV sensor produces a video signal and is hence regarded as a "fixed unit ... producing a video signal" as specified in claim 1.

- 2.4 Features (a) and (b) together provide an implementation for the transmission of a colour video signal from a fixed unit to a remote terminal. The board regards the corresponding partial technical problem as "how to employ the frequency-hopped radio communication link from the fixed unit to the remote terminal for transmission of a colour TV signal".

Feature (c) is understood to relate to step 152 of figure 11 and the corresponding passages of the description, see page 16, lines 6 to 8 of the present application. No signal is transmitted from the base station to the handheld terminal while the base station waits for the handheld terminal to become active. As stated in the decision under appeal, the corresponding partial technical problem may be formulated as how to transmit data from the fixed unit to the remote terminal such that a compromise between limited power consumption and availability of the remote terminal is achieved.

- 2.5 Colour TV cameras having separate RGB and sync outputs were well known at the earliest priority date (2 August 1999) of the present application. Hence, depending on the circumstances, the skilled person would have employed such a TV camera and would have assigned the different outputs on a one-to-one basis to

corresponding transmission channels of the frequency-hopped transmission system of D6. For this purpose the skilled person would have connected the output of the TV camera to the input of the data processor of D6. The board also agrees with the decision under appeal (see first paragraph on page 5) that this view was supported by D3 showing such an assignment of camera signal components to different frequencies.

With respect to feature (c), the board concurs with the examining division that it was well known, and for example disclosed in D7 (see page 52, lines 3 to 20), that a good compromise between limited power consumption and availability of the remote terminal could be achieved by the implementation of an active and inactive state of the receiver and by communicating this state to the transmitter (see decision under appeal, page 5, penultimate paragraph).

- 2.6 According to the appellant, the objective technical problem starting from D6 was how to provide a low-cost solution for reliably transmitting a video signal. It is established jurisprudence that the objective technical problem should be based on the technical effect of exactly those features distinguishing the claim from the prior art (see Case Law of the Boards of Appeal of the European Patent Office, 7th edition, 2013, section I.D.4.3.1, in particular decision T 1019/99, point 3.3 of the Reasons). Since the closest prior-art document D6 concerns the transmission of signals using a frequency-hopping technique, technical effects resulting from the use of frequency hopping cannot be taken into account for the formulation of the technical problem. Hence, the board cannot agree with the appellant's formulation of the technical problem.

The appellant also argued that the technical problem contained part of the solution by referring to a frequency-hopped radio frequency communication from the base station to the remote terminal. As set out above, a frequency-hopped radio frequency communication from the base station to the remote terminal is disclosed in the closest prior-art document D6 and, hence, may be included in the formulation of the technical problem without anticipating elements of the solution.

The board is also not convinced by the argument that the skilled person would have provided a combined video signal before inputting it to the data processor and that the data processor 22 of D6 would then have divided the resulting TV signal into a number of lower-rate data streams. Colour TV cameras having separate RGB and synchronisation signal outputs were well known at the earliest priority date of the present application. In order to combine these signals, it would have been necessary to multiplex them into a high-rate input stream. The data processor would then have had to demultiplex this high-rate input stream into several low-rate streams (see D6, column 2, lines 1 to 3). It would therefore have been obvious to the skilled person that these multiplexing and demultiplexing stages could be avoided by using the already available RGB and synchronisation signals. This view is further supported by the disclosure of D3 (see abstract), which shows RGB and synchronisation signals being transmitted via different carrier signals.

Hence, the board is not convinced by the appellant's arguments regarding inventive step of the main request.

2.7 In conclusion, the subject-matter of claim 1 lacks inventive step in view of D6 (Article 56 EPC 1973).

First auxiliary request

3. Claim 1 according to the first auxiliary request contains the following additional feature:

(d) "... and a microcontroller for evaluating a received known bit stream used for a channel assessment to determine transmission quality of the channel at particular frequencies and for controlling intelligent frequency hopping to avoid non-favorable channel conditions."

3.1 This feature is not disclosed in D6. The effect of the additional feature (d) is to improve the reliability of the frequency-hopped transmission, which is not related to the effects of distinguishing features (a) to (c). Hence, the partial technical problem resulting from feature (d) may be formulated as how to improve the reliability of the frequency-hopped transmission.

3.2 Feature (d) relates to an adaptive frequency-hopping scheme, which is a technology that was well known in the art at the earliest priority date of the present application and which was, for example, described as being useful for the same purpose in D8 (see abstract and page 10, lines 7 to 33) and D9 (see abstract and "Introduction" section).

3.3 The appellant argued with reference to page 15, lines 5 to 10 of the present application as filed that quality was determined differently in D8 or D9, and in particular that D8 and D9 did not disclose a comparison of received data with a known bit stream. The board is not convinced by this argument. According to D8 the received data is compared to known data to enable a

quantitative assessment of channel quality (see D8, page 9, lines 18 to 29 and page 10, lines 32 to 33).

- 3.4 Hence, the subject-matter of claim 1 according to the first auxiliary request lacks inventive step (Article 56 EPC 1973).

Second to fourth auxiliary requests

4. Claim 1 of the second auxiliary request and claim 1 of the third auxiliary request relate to a base station (20), whereas claim 1 of the main request and claim 1 of the first auxiliary request relate to a system comprising the base station. In addition, claim 1 of the second auxiliary request and claim 1 of the third auxiliary request contain the additional feature that the fixed unit is located near to and connected with the base station.

This additional feature is known from D6 (see column 1, lines 24 to 27), which discloses that the fixed unit (TV sensor) is located in the airborne terminal together with the base station (figure 1A).

The board holds that the restriction to a base station does not call into question the validity of the reasoning under sections 2 and 3 *supra* with respect to inventive step. The appellant did not dispute this finding.

5. Claim 1 of the fourth auxiliary request relates to a system comprising the base station, the fixed unit and the remote terminal. Otherwise, it corresponds essentially to claim 1 of the third auxiliary request. Therefore, the amendments to claim 1 of the fourth auxiliary request likewise do not call into question

the validity of the reasoning with respect to inventive step (see sections 2 and 3 *supra*).

6. As a result, the board finds that the subject-matter of each claim 1 according to the second to fourth auxiliary requests lacks inventive step (Article 56 EPC 1973).

Fifth auxiliary request

7. According to Article 13(1) RPBA (Rules of Procedure of the Boards of Appeal of the European Patent Office, OJ EPO 2007, 536) any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the board's discretion.

The board's discretion is to be exercised in view of *inter alia* the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.

- 7.1 In the present case the appellant submitted claims according to a fifth auxiliary request during the oral proceedings. These claims were substantially modified to overcome the objection of lack of inventive step against all higher-ranking requests. In particular, independent claim 1 was amended to contain the following additional features (amendments with respect to claim 1 of the main request are underlined):

"... said communication circuitry transmitting to the remote terminal horizontal and vertical video synchronization signals as video synchronization pulses, which are not digitized data, on a fourth frequency different from the first frequency, the second frequency and the third frequency in real time,

establishing a super-frame, the interval between two consecutive vertical synchronization pulses, having a duration of about 16 millisecond, with sub-frames established by the horizontal synchronization pulses, wherein the video synchronization signal is sent by a data modem (128), controlled by a microcontroller (138) to hop with a hop frequency at an integer fraction of the horizontal video synchronization frequency."

7.2 The amendments to claim 1 introduce new features which create a number of fresh problems.

For instance, it is doubtful whether the limitations resulting from the transmission of the video synchronisation signals being "in real time" are clear. In addition, the appellant argued that hopping "with a hop frequency at an integer fraction of the horizontal video synchronization frequency" had the technical effect that hopping did not occur during transmission of a horizontal synchronisation signal. However, it is doubtful whether this technical effect is achieved, since the feature only specifies the hop frequency and not its phase with respect to the synchronisation signals. Moreover, the additional features from the description may not have been searched by the department of first instance.

Hence, the amendments create fresh problems with respect to the clarity of claim 1 and, as a consequence, also for the assessment of inventive step. It follows that amended claim 1 of the fifth auxiliary request, and its dependent claims, introduce complex new issues at a very late stage of the proceedings, these claims having been presented only after the discussion of all the other requests during the oral proceedings.

- 7.3 The appellant's argument that the claims should be admitted because the examining division modified the formulation of the objective technical problem in the decision under appeal could not convince the board. The modification of the objective technical problem in the proceedings before the department of first instance cannot justify the filing of a request in the proceedings before the board at the latest possible moment. The modified formulation of the technical problem was known to the appellant when it filed its appeal and can therefore not be a reason for delaying the filing of a request until the oral proceedings. Moreover, the modification of the technical problem neither changed the examining division's assessment of inventive step for the claimed subject-matter, nor did it result in the anticipation of elements of the solution (see point 2.6, second paragraph, above).
- 7.4 For the above reasons, the board decided to exercise its discretion under Article 13(1) RPBA by not admitting the fifth auxiliary request into the appeal proceedings.

Conclusion

8. Since the appellant's main request and first to fourth auxiliary requests are not allowable and the appellant's fifth auxiliary request was not admitted into the proceedings, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



K. Boelicke

B. Müller

Decision electronically authenticated