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D E C I S I O N
of 6 March 2001

Case Number: T 0214/99 - 3.5.1

Application Number: 86902237.6

Publication Number: 0261112

IPC: H04B 1/56

Language of the proceedings: EN

Title of invention:

Method and apparatus for controlling a TDM communication device

Patentee:

MOTOROLA, INC.

Opponent:

Alcatel N.V.
ERICSSON BUSINESS MOBILE NETWORKS B.V.

Headword:

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Relevant legal provisions:

EPC Art. 56, 100(a), 100(c), 123(2)

Keyword:

"Added subject-matter (main request, yes)"
"Inventive step (auxiliary request, no)"

Decisions cited:

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Catchword:

-



Case Number: T 0214/99 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 6 March 2001

Appellant: MOTOROLA, INC.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 21 December 1998
revoking European patent No. 0 261 112 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: A. S. Clelland
Members: R. R. K. Zimmermann
P. H. Mühlens

Summary of Facts and Submissions

- I. European patent No. 261 112 was the subject of two admissible oppositions. Both opponents requested revocation of the patent on the grounds of lack of inventive step, Article 100(a) EPC, and added subject-matter, Article 100(c) EPC. Opponent 2 additionally raised an objection of insufficiency, Article 100(b) EPC.
- II. The opponents cited *inter alia* the following documents (using the opposition division's notation):
- (b) NEC Res. & Develop., No. 76, Jan 1985, pages 24 to 35, Tokyo, Hiyama et al.: "Digital Radio Concentrator System (DRCS)".
 - (c) CCITT Recommendation R. 101, pages 95 to 109, Geneva 1985, "Code and Speed Dependent TDM System for Anisochronous Telegraph and Data Transmission Using Bit Interleaving".
 - (d) EP-A-169 713.
- III. In the course of the opposition the patentee withdrew the granted claims and filed claims of a new main request and also claims of an auxiliary request. In the course of the oral proceedings before the opposition division this new main request was itself withdrawn and replaced by a further main request including amendments to the dependent claims and a new first auxiliary request. The previous auxiliary request was maintained as a second auxiliary request.
- IV. The opposition division held that the main request and

the first auxiliary request were inadmissible pursuant to Rule 71a(1) EPC. The opposition division went on to find that the second auxiliary request was not allowable because the subject-matter of the independent claims was obvious in view of the prior art, in particular the combination of prior art documents (b) and (c) as well as the combination of prior art documents (b) and (d). The patent was accordingly revoked.

- V. The patentee lodged an appeal against this decision and paid the prescribed fee. A statement of grounds of appeal was filed in due time. The Patentee's main request was for the patent as granted, the requests considered by the opposition division in the oral proceedings also being maintained as first to third auxiliary requests. A conditional request was made for oral proceedings.
- VI. The opponents (respondents) each requested that the appeal be dismissed and each made a conditional request for oral proceedings. In essence they argued that certain appendant claims of both requests gave rise to added subject-matter, Articles 100(c) and 123(2) EPC, whilst the subject-matter of the independent claims of both requests lacked an inventive step.
- VII. Oral proceedings were held on 6 March 2001 in the absence of both respondents, who had indicated in advance that they would not attend. In the course of the oral proceedings the appellant withdrew the second and third auxiliary requests. Claim 1 of the main request reads as follows:

"A method for controlling a remote communication

device to transmit voice or data signals preambled by a data signal in a time division multiplex communication system (100) having at least one primary station (106) and a plurality of remote devices (104, 108), comprising the steps of:

(a) synchronising to a signal (306, 308) received from the primary station;

(b) enabling a vo-coding analyzer (406) to vo-code a voice signal at a first rate to provide an information signal;

(c) buffering (408) said information signal to provide a buffered signal;

(d) transmitting (414) said buffered signal from a first device through a first subset of time slots in a given set of time slots, preambled by a data signal, characterised by:

(e) vo-coding voice signals at a second higher rate in a second remote device;

(f) transmitting from said second device through a second subset of time slots in the set of time slots, wherein the second subset comprises more time slots than the first subset."

Claim 2 of this request is appended to claim 1 and includes the following additional step:

"The step of transmitting the buffered signals includes the step of transmitting an identification signal identifying the vo-coding rate for that device".

Claim 3 is an independent method claim for controlling a remote communication device to receive (as opposed to transmit) voice or data signals; claims 5 and 7 are independent claims to devices for respectively transmitting and receiving voice or data signals having

the features of claims 1 and 3. Claims 4, 6 and 8 are respectively appended to claims 3, 5 and 7, and relate to subject-matter analogous of that of claim 2.

VIII. The independent claims of the first auxiliary request are in substance identical to those of the main request. This request differs from the main request in that the dependent claims, claims 3 and 6, relate respectively to a step of receiving vocoded signals and means for receiving vocoded signals; claim 3 is appended to claim 2 and adds the following feature:

"the step of receiving the vocoded signals includes the step of receiving an identification signal which contains information to operate on at least one TDM slot".

Claim 6 is appended to claim 5 and includes analogous subject-matter.

IX. In the written procedure both respondents argued that the main request was not allowable because the appendant claims disclosed subject-matter not derivable from the originally filed application and therefore open to objection under Article 123(2) EPC. Both also argued that the independent claims of the first auxiliary request were open to objection of lack of inventive step on the basis of a combination of documents (b) and (c) or (b) and (d).

X. The appellant argued that the skilled person would not make the combination of documents put forward by the opposition division and the respondents. Document (b) related to a wireless local loop for a rural telephone system and made use of comparatively high power with

large cells. It provided a TDM system with 16 time slots, one for control purposes and 15 speech channels. The document was correctly acknowledged in the patent and formed the basis of the delimitation of the independent claims.

The invention was concerned with two related problems; on the one hand, future-proofing the existing system and on the other hand, enabling the use of different speech qualities, i.e. with different billing rates, within a single system. Document (b) used speech channels of fixed bandwidth and gave no hint that the above-mentioned problems existed. Although as acknowledged in the originally filed application at page 8, lines 1 to 3 it was known at the priority date to use differing vocoder rates, there was no suggestion that different rates could be combined in a single system.

Document (c) was an international standard concerned with teletype, which had a much lower data rate than was used in the patent. The examples given in document (c) included data rates such as 50 or 75 baud, much lower than the lowest data rate mentioned in the patent, 2,4 kb/s. The skilled person would not turn to this document to solve a problem in the field of mobile phones. Indeed, document (c) was, albeit an international standard, relatively unknown and would not have been considered by the mobile phone engineer. It merely proved that in low data rate systems it was known to send at different data rates simultaneously. There was no evidence that the arrangement described in document (c) had ever been put into practice and only with the wisdom of hindsight could it be applied to a mobile phone system. The skilled person, facing the

problems referred to above in the context of the document (b) system, would not have found the claimed solution in document (c). There was no reason why the skilled person would, as opposed to could, combine the teaching of these documents.

Document (d) was concerned with the problem of duplex communication and had as its object the reduction of bandwidth in a point-to-point link. This was achieved by a quasi-duplex connection in which a single link was time-divided between the stations rather than providing two separate links. Since in general only one station would be transmitting i.e. speaking, at any given time the duplex effect was achieved by allocating most of the bandwidth to the speaking station and a much smaller portion to the listening station. Such a system was referred to in the art as time-division duplex (TDD) as opposed to time-division multiplex (TDM). It merely gave the effect of a full duplex system and only related to a single channel. The implication of the document, read as a whole, was that the channels were in a FDM system as opposed to a TDM system. The obvious combination with document (b) would be to provide TDD on each channel. The principle of TDD could not be used in a cellular TDM system since the two stations would be allocated the same time slots and would inevitably collide. Although document (d) implied some framing structure the discussion in the document was speculative and appeared to relate to a system which had never been put into practice; it did not constitute an enabling disclosure.

Reasons for the Decision

1. *Background*

1.1 The patent is concerned with the efficient use of the frequency spectrum in a TDM (time division multiplexed) mobile radio system. Each slot or channel is said normally to have a digital data rate of 12-16 kb/s and a bandwidth of 25 kHz, but it has been discovered that by the use of an improved vocoder to compress the speech the necessary bandwidth per user can be reduced. The channels could be halved in width to 12.5 kHz; a disadvantage however is that a once-and-for-all change in the system and its mobile units to migrate to narrower channels must take place. If at a future date vocoders were to improve to the point that a fourfold compression at unchanged speech quality were possible, another system-wide change would have to take place. The object of the invention is therefore to make the known system more versatile so as on the one hand to make it future-proof and on the other hand permit differing vocoders requiring different bandwidths to be used, thereby enabling subscriber billing to be related to speech quality.

1.2 This object is met by defining a plurality of sub-channels, or sub-slots, for each channel, i.e. by providing time-division multiplexing within individual TDM slots. In the preferred embodiment eight sub-slots are defined, which can be grouped in dependence on the desired quality of speech coding: grouping two sub-slots gives speech of lesser quality, four sub-slots provides better quality, and so forth. As the performance of speech coding systems improves, the number of sub-slots needed can be reduced.

1.3 It was common ground between the parties that the

single most relevant document is document (b), which is acknowledged in the patent and forms the basis for the delimitation of the independent claims. It discloses a wireless local loop for a rural telephone system, see Figure 1, in which each cell can contain a repeater or primary station and a plurality of subscribers or remote devices. The wireless connection within a cell uses TDMA with a 32 kb/s data rate, see paragraph 3.2.1 at page 25 and Figure 5 at page 27. The passage at page 25 also discloses the use both of an ADPCM vocoder with the vocoded speech buffered for the duration of a frame and of time slot synchronization. There are 16 time slots per rf channel, 15 being used for speech and one as a control channel, with the voice data in each slot being preambled by a data signal, see Figure 5.

1.4 The Board accordingly agrees that document (b) discloses a method of controlling a remote communication device to transmit and receive voice or data signals in accordance with the preamble of claims 1 and 3 respectively of the main request, corresponding to claims 1 and 2 of the auxiliary request, and a remote communication device to transmit and receive voice or data signals in accordance with the preamble of claims 5 and 7 respectively of the main request, corresponding to claims 4 and 5 of the auxiliary request.

1.5 The issues to be decided are firstly whether the appendant claims of both requests add subject-matter, Article 123(2) EPC, and, if they do not, whether the subject-matter of the independent claims involves an inventive step.

2. *Added subject-matter (Article 123(2) EPC)*

- 2.1 Claim 2 of the main request includes, for the step of transmitting the buffered signal from a remote device, the additional step of "transmitting an identification signal identifying the vocoding rate for that device". In other words the remote sends the primary station a signal identifying the vocoding rate it will use. Appendant claims 4, 6 and 8 relate to analogous subject-matter.
- 2.2 The appellant argued that the feature could be found in the originally filed application at page 8, lines 1 to 17, in which the provision of different combinations of sub-slots for different vocoder rates is discussed, and at page 10, lines 1 to 9, which states that the receiving remote device receives a "subframe ID code" containing "information which is used by a remote unit to control and direct the receiving circuitry to operate on at least one TDM slot".
- 2.3 The cited passages do not state that a signal is sent from a remote to identify the vocoding rate. The only relevant passages in the originally filed description are at page 16, lines 14 to 18, which states that the controller in a remote device checks to see whether a present time slot is that device's assigned time slot, and at page 17, lines 6 to 15, according to which a remote device receiving a vocoded signal also receives information updating a memory location which stores the slot assignments. These passages indicate that at the date of filing it was understood that the slot assignments are made by the primary station and then passed to the remote devices.
- 2.4 It is thus apparent that the primary station determines the slot allocation. The appellant was unable to point

to any passage in the originally filed application which teaches that a remote device chooses its own vocoding rate and transmits an identification signal identifying the vocoding rate. The Board accordingly concludes that claims 2, 4, 6 and 8 of the main request contain added subject-matter, with the result that the request as a whole is not allowable. The main request is accordingly refused.

2.5 Turning now to the auxiliary request, in accordance with claim 3 the step of receiving a vo-coded voice signal at a remote device, see claim 2, includes the additional step of "receiving an identification signal which contains information to operate on at least one TDM slot". Claim 6 relates to analogous subject-matter.

2.6 This wording is not wholly identical to the passage at page 10, lines 1 to 9 of the originally filed application, which states that the receiving remote device receives a "subframe ID code" which contains "information which is used by a remote unit to control and direct the receiving circuitry to operate on at least one TDM slot". The respondents argued that the wording used was an intermediate generalization which could not be derived from the originally filed description.

2.7 In the context of a remote unit the Board can see no divergence between the claimed subject-matter and the original disclosure. Although the description states that the received information causes the receiving circuitry to operate on a TDM slot, whereas the claim does not mention the receiving circuitry, this is implicit in any practical receiver and no technical distinction can be seen. Similarly, although receiving

an identification signal may be broader in scope than receiving a subframe ID (or identification) code, no new technical teaching arises from this distinction. The Board accordingly concludes that claim 3 of the auxiliary request does not give rise to objection under Article 123(2) EPC. The same applies, *mutatis mutandis*, to claim 6.

3. *Inventive step Articles 52(1) and 56 EPC*

3.1 As discussed at points 1.3 and 1.4 above the single most relevant document is document (b). Although document (b) devotes considerable discussion to the reduction of power consumption, the Board takes the view that the skilled person, seeking to put the teaching of document (b) into effect, would also have in mind the pressure on the frequency spectrum and the need to conserve bandwidth. The skilled person, implementing document (b), would accordingly take account of any teaching which would enable him to increase the number of stations which could operate within a cell.

3.2 Document (d) discloses a duplex communications system which enables the skilled person to achieve this goal. It describes a system suitable for use *inter alia* in a cellular radio telephone network, see page 1 line 8 and page 6 line 17, in which two stations, which may be linked via a mobile switching center, communicate on two channels which may be two distinct links at different frequencies. The preferred arrangement however, see page 7, lines 2 to 7, makes use of a single TDM channel "where each station transmits alternately for a brief period giving the effect of full duplex communications". In other words, the TDM

channel is itself sub-divided. In the embodiment described in the paragraph bridging pages 8 and 9 a variable-rate vocoder is disclosed which, as discussed at pages 10 and 11, provides a bit rate of 250 bits/s, 16 kb/s or 31.75 kb/s. In an alternative embodiment discussed at page 16 the voice encoders may have continuously variable bit rates. It is also envisaged, see page 14, lines 8 to 21, that dynamic allocation of channel capacity is provided so that the system acts as a form of concentrator.

3.3 The Board accordingly understands document (d) to disclose a duplex communications system in which voice signals are vocoded at a plurality of differing rates and using TDM with individual time slots sub-divided so that one remote device may be allocated the greater part of a slot and a second remote device the lesser, remaining part. The Board accordingly concludes that the skilled person, making use of the teaching of document (d) in the document (b) system, would arrive at the arrangement claimed in claims 1, 2, 4 and 5. Each of the independent claims of the auxiliary request accordingly lacks an inventive step.

3.4 The appellant argued that document (d) was concerned with a quite different system to that proposed in the patent. It related to time division duplex rather than time division multiplex and merely gave the effect of full duplex communication. Although it was true that each channel could be multiplexed this was never true for more than a single pair of speakers. The skilled person would appreciate that the teaching of document (d) could not be applied to that of document (b) because it would be impossible to avoid collision between the speakers. The passages on

pages 14 to 16 of document (d) referred to above were speculative and did not constitute an enabling disclosure.

- 3.5 The Board observes that claim 1 is merely characterised by the provision of two vocoder rates and the use of subsets of time slots of different sizes. Both these features are disclosed in document (d). As previously noted the pressure to reduce bandwidth would lead a skilled person to examine any method which claims to facilitate this, so that the skilled person would, as opposed to could, seek to apply the teaching of document (d) to that of document (b). The Board accepts that in the document (b) system in which separate frequencies are used for the up and down links, it would not be feasible to allocate the subsets of a time slot to both stations; on the other hand, page 14, lines 8 to 21 of document (d) refers to the dynamic allocation of channel capacity and thus leads the skilled person in the direction of allocating a single slot to, for example, two subscribers, one of whom is speaking and the other listening. The majority of the slot would be allocated to the subscriber speaking and the remaining portion to the subscriber listening. The Board is unable to accept the appellant's argument that such an arrangement does not constitute an enabling disclosure. Given that TDM was well known at the publication dates of documents (b) and (d), the subdivision of a TDM slot into smaller TDM slots, once the basic principle is grasped, would not appear to involve any great difficulty for the skilled person. The appellant's arguments as to whether the primary embodiment of document (d) constitutes time division duplex rather than time division multiplex appears irrelevant since the independent claims do not require

more than two subscribers.

3.6 The Board accepts that document (d) is primarily concerned with providing three discrete vocoding rates, a continuously variable vocoding rate being given as an alternative. In particular, the document does not suggest that a single TDM slot maybe sub-divided into sub-slots of equal size. On the other hand, although this feature is true of the described embodiment in the patent in suit, the independent claims merely refer to first and second subsets of time slots wherein the second subset comprises more time slots than the first subset (claim 1) and transmitting or receiving over a subset of time slots where the number of time slots in the subset is dependent on the vocoding rate for that device (claims 2, 4 and 5). This can be taken to mean that the subsets of time slots are arranged in discrete multiples of a basic time slot. The Board observes that even if such an interpretation of the independent claims is adopted the embodiment described at page 10 of document (b) suggests a lowest bit rate of 250 bits/s; the higher bit rates of 16 kb/s and 31.75 kb/s are multiples of this rate.

3.7 The first auxiliary request is accordingly not allowable because the subject-matter of the independent claims does not involve an inventive step. Since the main request is not allowable because of added subject-matter, it follows the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

M. Kiehl

A. S. Clelland