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# D E C I S I O N
## of 30 November 1999

**Case Number:** T 0695/98 - 3.5.1

**Application Number:** 85106702.5

**Publication Number:** 0179979

**IPC:** H04L 12/58

**Language of the proceedings:** EN

**Title of invention:**
Synchronous packet voice/data communications system

**Patentee:**
Cisco Technolgy, Inc.

**Opponent:**
Siemens AG

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 52(1), 56

**Keyword:**
"Inventive step (no)"

**Decisions cited:**
-

**Catchword:**
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

**Case Number:** T 0695/98 - 3.5.1

**D E C I S I O N**
**of the Technical Board of Appeal 3.5.1**
**of 30 November 1999**

**Appellant:** (Proprietor of the patent)
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**Representative:**
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**Respondent:** (Opponent)
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**Representative:**
-

**Decision under appeal:**
**Decision of the Opposition Division of the European Patent Office posted 23 April 1998 revoking European patent No. 0 179 979 pursuant to Article 102(1) EPC.**

**Composition of the Board:**

**Chairman:** P. K. J. van den Berg
**Members:** A. S. Clelland
V. Di Cerbo

## Summary of Facts and Submissions

I. This is an appeal against the decision of the Opposition Division to revoke patent No. 179 979 on the ground that the subject-matter of claim 1 lacked an inventive step having regard to the disclosure, *inter alia*, of the following document:

D7: "Multiplexor performance for integrated line and packet-switched traffic" K. Kummerle, ICCC, Stockholm 1974, pages 507 to 515.

II. The appellant (patentee) launched an appeal against this decision and paid the prescribed fee. In a statement of grounds of appeal it was argued that D7 was in fact a hybrid transmission scheme permitting both line-switched and packet-switched services on the same trunk line, the destination of traffic being determined by the particular slot used in the framing structure rather than by destination information contained within a packet. There was no disclosure in D7 of transmitting voice data in asynchronous traffic; the data moreover did not conform to boundaries of a standardised digital time frame as claimed in claim 1. In D7, on the contrary, a framing structure was proposed in which the slots were assumed to be a single packet wide.

III. The appellant requested that the decision under appeal be set aside and the patent maintained as granted; an auxiliary request was made for oral proceedings.

IV. In a communication pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal the parties were invited to oral proceedings; in the communication the rapporteur, on behalf of the Board, expressed the preliminary opinion that the question of inventive step in the light of the disclosure of D7 was the main issue to be discussed in the oral proceedings, and that it was not apparent where an inventive step might lie.

V. Oral proceedings were held on 30 November 1999. The respondent did not attend the oral proceedings and indeed took no part in the appeal proceedings other than a note immediately prior to the hearing supporting the preliminary view expressed by the rapporteur in the communication.

VI. In the course of the oral proceedings the appellant amplified the above arguments: before the invention the skilled person had been fixated on a frame/slot scheme. D7 was an example of such a scheme and focussed exclusively on the slots; in the 10 years between D7 and the priority date there had been no development which led the skilled person in the direction of viewing the frame as a whole rather than considering the individual slots. Because in D7 the slots were allocated to respective data sources the bandwidth for any given data source was limited and data bursts would cause problems. The invention on the other hand permitted an entire frame to be allocated to a single data source and hence a very substantial increase in the bandwidth.

VII. Claim 1 of the granted patent reads as follows:

"A communications network (10) for communicating digitized voice and data in separate and distinct packets, said network employing a digital communications medium (82, 84, 86) having at least a first node (14, 16) and a second node (18), said network comprising:

[a] coupling means (100) for coupling digital signals bit synchronously to said digital communications medium (82, 84, 86) at a respective first node, said coupling means (100) including

[a1] packetizing means (136, 140) for packetizing signals into digitized information packets (Fig. 3A), each of said digitized information packets having a packet format which is self contained as to destination (ADDR) and content,

[b] wherein said digital communications medium (82, 84, 86) is operative to communicate standardized bit synchronous digital time frames of information according to a standardized bit synchronous communications format having a predetermined bit synchronous framing structure (Fig. 3B);

[c] and wherein each packet conforms bit synchronously to said bit synchronous communications format and to boundaries of said standardized bit synchronous digital time frames such that packets are communicated from a respective first node (14, 16) to a respective second node (18) bit synchronously with reference to said communications medium (82, 84, 86) within said standardized bit synchronous communications format such that an additional framing structure

is not needed."

## Reasons for the Decision

1. The appeal is admissible.

2. *Technical background*

2.1 For several decades it has been known in the telephone art to provide a multiplicity of telephone links on a twisted pair by using time division multiplexing (TDM). One such system is the T1 system, referred to at columns 1 and 2 of the patent in suit, which by means of so-called channel banks (as shown in Figure 1 of the patent) multiplexes 24 subscriber lines into 24 digital channels or time slots to form a "frame". Each time slot holds a 8-bit word and the frame starts with an additional framing bit, giving a total of 193 bits in a frame. With a frame interval of 125 microseconds the basic T1 line rate is 1.544 Mbps which constitutes the DS-1 signal and is the standard used in North America; the corresponding European equivalent established by CCITT has a data rate of 2.048 Mbps, each frame having 32 channels or time slots. Such a system can be described as a "virtual circuit" system and is highly suitable for voice communication.

2.2 An alternative to this known system is provided by packet switching. A packet or datagram contains its own addressing information and is supplied asynchronously to a network including a plurality of store-and-forward nodes. In such a node the packet is received, the address decoded, and the packet forwarded, with or

without modification of the header, to the next node for onward transmission. Because of the delays involved in storage and the likelihood that not all packets will follow the same path, the system is not well suited to real-time speech transmission. This problem can be solved if the packets are sent by way of a virtual circuit such as the TDM arrangement described above, but an additional problem then arises that the system has a fixed bandwidth and is not well equipped to deal with "bursty" traffic such as can occur both in speech and data communication, each source and destination node corresponding to a time slot which is allocated at the time of set-up and cannot easily be modified.

2.3 The form of multiplexing referred to at point 2.1 above is known in the art as synchronous TDM but other forms also exist to solve the problem discussed at point 2.2, in particular asynchronous TDM and statistical TDM. In an asynchronous TDM system the number of time slots is dependent on the required bandwidth while statistical TDM is specifically designed for packet systems and avoids queuing by intermingling packets so that short messages are not queued behind long messages.

3. *Inventive step*

3.1 The single most relevant document is D7, which is concerned with the problem of multiplexing both synchronous and asynchronous traffic on a trunk line having a frame structure which is subdivided into slots, cf. the T1 system described at point 2.1 above. The document discusses the use of line-switched (i.e. TDM) and packet-switched networks, and seeks to provide what is referred to as "time transparency", meaning

that time jitter and excessive delays are avoided in a packet-switched network by a combination of line and packet switching principles. In order to achieve this, packets belonging to the same message are generated at constant intervals with constant packet length, see D7 at page 508, right-hand column, last six lines. In the preferred arrangement a proportion of the slots are reserved for synchronous traffic, i.e. this portion of the network operates as a standard TDM network, whilst the remainder of the slots are reserved for asynchronous, i.e. packet, traffic. From page 509, see Figures 2 and 3 and the associated text, it can be seen that the proportion reserved for synchronous traffic is in one embodiment, the so-called "movable boundary solution", dynamically variable so that statistical traffic variations in the synchronous traffic can be used to increase or decrease the number of slots reserved for asynchronous traffic. Figure 3 shows that in the limit all slots can be allocated to asynchronous traffic. The discussion of the "movable boundary solution" at page 512 explicitly discusses in the right-hand column of the page the limiting case of an "asynchronous traffic only situation". At page 513, right-hand column the question of slot size is discussed; it is stated that for the purposes of the paper the slots of a frame "have been assumed to be one packet wide". Two situations are discussed: one is that the packets are transmitted in "pieces" according to the size and availability of slots and are reassembled in the next node before the packet can be further forwarded; a second situation is that the "pieces" of an original packet are themselves transformed into packets with respective headers. Although the discussion of packet size seems to prefer a smaller

packet, it is apparent from the reference to transmitting packet "pieces" that it is envisaged that a packet can be transmitted over a plurality of dynamically allocated slots, the limiting case being that all slots are allocated to asynchronous transmission and a single packet is transmitted in these slots, i.e. the packet fills a frame. It is apparent that in such a case all slots will have the same destination.

3.2 Turning now to claim 1 of the patent, it will be apparent from the discussion at point 3.1 above that D7 discloses a communications network for both digitised voice and data in separate and distinct packets, the D7 network employing a digital communications medium in the form of a TDM channel system for communication between first and second nodes. Such a system furthermore fulfils the requirement for coupling means in accordance with feature (a) of the claim and communication by standardized bit synchronous digital time frames according to a format having a predetermined bit synchronous framing structure in accordance with feature (b). Since the system is designed to accommodate asynchronous traffic in the form of packets, see page 507, right-hand column, third and fourth paragraphs, feature (a1) is also known from D7.

3.3 In the course of the oral proceedings the Board primarily addressed the question of what is meant by feature (c) of claim 1. This feature requires each packet to conform "bit synchronously to said bit synchronous communications format and to boundaries of said standardized bit synchronous digital time

frames...such that an additional framing structure is not needed". It was asserted by the appellant that the feature required each packet to be of the same length as the frame, i.e. 193 bits as shown in Figure 3a of the patent. The Board has considerable difficulty in relating this assertion to the wording of the claim. Feature (c) merely requires that each packet conforms "bit synchronously" to the communications format and "boundaries of said standardized bit synchronous digital time frames". This wording does not exclude the D7 arrangement in which packets are transmitted in "pieces" within a frame. Although the appellant argued that in such a case all slots must have the same destination, this would seem implicit in the allocation of slots to asynchronous traffic.

3.4 The skilled person, seeking to implement the D7 system, would from the passages cited above appreciate that the "movable boundary solution" of D7 gives the limiting case of "asynchronous traffic only" in which all the slots of a frame are devoted to packets. The subject-matter of claim 1 only adds to this the requirement that a frame consists of exactly one packet, i.e. all the slots are devoted to "pieces" of the same packet. Although D7 assumes that each packet is one slot in width it explains at page 513, right-hand column that no analytical investigation of optimum packet width had been carried out. The relative merits of short and long packets were however well understood in the art before the claimed priority date; short packets give the advantage of rapid error correction but are inefficient because of the overhead; longer packets contain a larger payload but run the risk of decreasing overall efficiency because of repetition necessitated by error

correction. In the Board's view the solution adopted by the appellant does not go beyond what the skilled person would have known at the claimed priority date. In other words, the packet length adopted is considered to be one of the possibilities available to the skilled person, no invention being involved in the particular size of packet claimed.

3.5 The subject-matter of claim 1 accordingly lacks an inventive step.

There being no other requests, it follows that the appeal must be dismissed.

## Order

## For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Kiehl P. K. J. van den Berg