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**D E C I S I O N**  
of 27 November 1995

**Case Number:** T 0163/94 - 3.5.1

**Application Number:** 89308846.8

**Publication Number:** 0361697

**IPC:** H04M 3/18

**Language of the proceedings:** EN

**Title of invention:**

Protection devices and arrangements for telephone lines

**Applicant:**

NORTHERN TELECOM LIMITED

**Opponent:**

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**Headword:**

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**Relevant legal provisions:**

EPC Art. 56, 113(1)

EPC R. 67

**Keyword:**

"Inventive step (no)"

"Substantial procedural violation (no)"

**Decisions cited:**

T 0019/87, T 0084/82, T 0300/89

**Catchword:**

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Case Number: T 0163/94 - 3.5.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.5.1  
of 27 November 1995

**Appellant:** NORTHERN TELECOM LIMITED  
600 de la Gauchetiere Street West  
Montreal Quebec H3B 4N7 (CA)

**Representative:** Laurence, Simon French  
Nortel Limited  
Patents and Licensing  
West Road  
Harlow  
Essex CM20 2SH (GB)

**Decision under appeal:** Decision of the Examining Division of the European  
Patent Office dated 20 October 1993 refusing  
European patent application No. 89 308 846.8  
pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** P. K. J. van den Berg  
**Members:** A. S. Clelland  
C. Holtz

**Summary of Facts and Submissions**

I. This is an appeal against the decision of the Examining Division dated 20 October 1993 to refuse European patent application No. 8 930 846.8 on the ground that the subject-matter of each of Claims 1 to 10 lacked an inventive step having regard to the disclosure of the following document:

D1: FR-A-2 533 369.

II. On 20 December 1993 the Appellant filed a notice of appeal and subsequently paid the prescribed fee. The decision was appealed in its entirety. A statement setting out the grounds of appeal was subsequently received on 29 January 1994; in this statement the Appellant requested that the application either be granted in its existing form or that examination be continued, and additionally requested refund of the appeal fee.

III. In a communication dated 13 March 1995 the rapporteur, on behalf of the Board, cited the following additional documents said to represent the common general knowledge in the art:

D2: "Pulse, Digital and Switching Waveforms",  
Millman and Taub, McGraw-Hill, New York 1965,  
pages 465 and 466

D3: "Physics of Semiconductor Devices", Sze,  
John Wiley and Sons, New York 1981, pages 190-193

D4: "Semiconductor Devices and Circuits", Zanger,  
John Wiley and Sons, New York 1984, pages 500-502,  
517, 518.

IV. The rapporteur took the preliminary view that the subject-matter of at least Claims 1, 5, 6 and 8 lacked an inventive step having regard to the disclosure of D1 read in the light of the common general knowledge represented by D2 to D4. In response to this communication the Appellant on 30 June 1995 filed a submission arguing that the subject-matter of these claims involved an inventive step. Oral proceedings were requested. In a further communication on behalf of the Board dated 7 September 1995 the rapporteur commented on the Appellant's further submission; oral proceedings were appointed for 27 November 1995. Prior to these proceedings, on 4 September 1995, the Appellant filed as an auxiliary request new Claims 1 to 5 and argued in support both of his main and auxiliary requests.

V. In a further submission received 25 October 1995 the Appellant announced that he would not attend the oral proceedings but maintained his requests and raised further arguments in support of the claims.

The oral proceedings were held in the absence of the Appellant, on 27 November 1995.

VI. The application consists of the following documents:

**Main request**

**Claims:** 1 to 10 as received on 15 May 1993

**description:** pages 1, 6 to 20 as originally filed  
2 to 5 as received on 15 May 1993

**drawings:** sheets 1/4 to 4/4 as originally filed.

**Auxiliary request**

**Claims:** 1 to 5 as received on 4 September 1995

**Description and drawings:** as for main request.

VII. Claim 1 of the main request, the broadest independent claim directed to a device, reads as follows:

"1. A protection device comprising:

first and second terminals, for connection to a wire of a telephone subscriber line and to ground respectively, and a third terminal;

a first SCR (semiconductor controlled rectifier) (42) having a cathode and an anode connected to the first and second terminals respectively, and a gate coupled directly to the third terminal;

a second SCR (44) having an anode and a cathode connected to the first and second terminals respectively, and a gate coupled directly to the third terminal; and

resistive means (46) connected between the first and third terminals, whereby a predetermined current flowing via the resistive means triggers one of the SCRs to conduct current between the first and second terminals;

characterized in that:

the gate of the first SCR is adjacent to the cathode of the first SCR; and

the second SCR is complementary to the first SCR and its gate is adjacent to the anode of the second SCR."

Claim 8, the broadest claim directed to a protection arrangement for a telephone line, reads as follows:

"8. A protection arrangement for a two-wire telephone subscriber line comprising tip and ring wires, the arrangement comprising:

a first bidirectional protection device (60) having a first terminal for connection to the ring wire, a second terminal for connection to ground, and a third terminal for connection to a central office termination for the ring wire; and

a second bidirectional protection device (62) having a first terminal for connection to the tip wire, a second terminal, and a third terminal for connection to a central office termination for the tip wire;

each protection device comprising means (42, 44, 46) for conducting current between its first and third terminals and responsive to such current exceeding a predetermined level for providing a conductive path in either direction between its first and second terminals;

characterized in that the second terminal of the second protection device is connected to the first terminal of the first protection device."

Claim 1 of the auxiliary request reads as follows:

"1. A protection arrangement for a two-wire telephone subscriber line comprising tip and ring wires, the arrangement comprising first and second protection devices each comprising:

first, second, and third terminals;

a first SCR (semiconductor controlled rectifier) (42) having a cathode and an anode connected to the first and second terminals respectively, and a gate coupled directly to the third terminal;

a second SCR (44) having an anode and a cathode connected to the first and second terminals respectively, and a gate coupled directly to the third terminal; and

resistive means (46) connected between the first and third terminals, whereby a predetermined current flowing via the resistive means triggers one of the SCRs to conduct current between the first and second terminals;

wherein the gate of the first SCR is adjacent to the cathode of the first SCR, and the second SCR is complementary to the first SCR and its gate is adjacent to the anode of the second SCR;

wherein the first, second, and third terminals of the first protection device (60) are connected respectively to the ring wire, ground, and a central office termination for the ring wire, and the first and third terminals of the second protection device (62) are connected respectively to the tip wire and a central office termination for the tip wire;

characterized in that the second terminal of the second protection device is connected to the first terminal of the first protection device."

VIII. The Appellant's arguments in support of patentability can be summarized as follows:

D1 disclosed a protection device in which two substantially identical but oppositely poled SCRs were connected in parallel and had their gates connected to a common point. In order to establish bias voltages for triggering the SCRs additional components were required and the SCRs were triggered differently for different directions of sensed overcurrent. The two SCRs were not complementary as required by Claim 1 and the first SCR did not have its gate adjacent to the cathode as also required by Claim 1. The claimed arrangement had the advantage that both devices were triggered in the same manner for different directions of sensed overcurrent and extra components were not required. Although a variety of p-n-p-n devices were known in the art there

was a clear distinction between 3- and 4-terminal devices and the skilled person, aware of the 4-terminal devices known from D2 to D4, would not be led to make use of only three of the terminals. No evidence had been produced that the skilled person, aware of the disclosure of D1, would find it obvious to modify it to provide complementary rather than identical SCRs with interconnected gates.

Independent Claims 5 and 8 of the main request, and Claim 1 of the auxiliary request, were concerned with a protection arrangement for a 2-wire telephone subscriber line. The claimed protection arrangement had the advantage of directional sensitivity and would operate at a current level lower than the ring trip current, an advantage not provided in the prior art. No prior art had been cited which suggested that the claimed protection arrangement had ever been considered prior to the invention.

### **Reasons for the Decision**

#### **1. *Admissibility***

The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

#### **2. *Amendments***

The claims of the main and of auxiliary requests are based on the disclosure of the original application documents; they are further adequately clear and supported by the description. Hence the requirements of Articles 84 and 123(2) EPC are considered to be met.



3. *The state of the art*

3.1 The present application is concerned with the protection of telephone lines against excessive currents, by means of devices which prevent the current from flowing around the subscriber loop or between the loop and earth; in its broadest aspect the application claims a protection device per se, the device consisting of first and second complementary semiconductor controlled rectifiers or SCRs. These devices are complementary in the sense that they are oppositely poled but not identical in that one device has a cathode gate and the other device an anode gate. The SCRs are arranged with their gates connected together and a resistor between the gates and an input terminal; excessive current flowing in the resistor generates a current which causes one or the other gate to trigger, depending on the direction of current flow, and thus shorts the current to earth to protect the telephone subscriber line.

3.2 It is common ground that the single most relevant document is D1. This document discloses at Figure 2 a protection circuit for integrated circuits rather than telephone line protection. The circuit comprises two SCRs with a triggering resistor as in the invention, but with both SCRs of similar type in that the gates connected to the resistor are both so-called anode gates; the D1 device includes two further components said by the Appellant to be unnecessary in the invention, namely a diode in parallel between the gates and earth, and an internal resistor in one SCR between the (internal) cathode gate and cathode.

3.3 In the course of the appeal procedure the Board sought to ascertain the state of common general knowledge in the SCR art. From D2, D3 and D4 it is clear that the basic mode of operation is identical for all p-n-p-n

devices, whether the device be a 2-terminal device such as a diac with no gate electrode or a 4-terminal device with two gate electrodes. In each case the device acts as a switch, remaining off until an internal current is established which is sufficiently high to switch the device on; this current arises either from the forward voltage or from a current introduced at one or other gate. As shown both in D1 and the application, an SCR can be represented as a 2-transistor pnp and npn pair with the base of each transistor connected to the collector of the complementary transistor; when a sufficiently high voltage exists between the anode and cathode, i.e. between the emitters of the pnp and npn transistors, any base current will be regenerative in that it will cause a collector current in the same transistor which in turn provides base current to the complementary transistor. An SCR can accordingly in principle have a gate at either the cathode or anode ends, or indeed both ends, although as a matter of everyday practice SCRs are normally provided with cathode gates.

4. *Inventive step (main request)*

4.1 Turning first to Claim 1, the Board notes that the claim is directed to a protection device for connection to a telephone subscriber line but includes no features arising from this particular use. The Board takes the view that the protection device of D1, although particularly intended for use with integrated circuits, would be understood by the skilled person to be applicable to telephone subscriber lines as in the present application.

4.2 The remaining features of the preamble of Claim 1 can be found in the Figure 2 circuit of D1, namely a first SCR Q<sub>3</sub>, Q<sub>4</sub> having a cathode and an anode connected to first

and second terminals 14, 16 respectively, and a gate coupled directly to a third terminal; a second SCR  $Q_1$ ,  $Q_2$  having an anode and a cathode connected to the first and second terminals respectively, and a gate coupled directly to the third terminal; and resistive means 20 connected between the first and third terminals, whereby a predetermined current flowing via the resistive means triggers one of the SCRs to conduct current between the first and second terminals.

- 4.3 The Board also notes that one of the features of the characterizing part of the claim is also known from D1 in that the gate of the second SCR is adjacent to its anode.

The remaining features of Claim 1 are that the gate of the first SCR is adjacent to its cathode and that the second SCR is complementary to the first SCR. However, the two features in effect specify a single feature in different language in that the only sense in which one SCR is complementary to the other is that one has a cathode gate and the other an anode gate. Accordingly, in the Board's view, the sole distinction contained in Claim 1 with respect to D1 is that the claimed device has a first SCR with a cathode gate rather than an anode gate.

- 4.4 As however noted in point 3.3 above it is common general knowledge in the art that either gate of an SCR can be used to achieve triggering of the device. D2 states at page 465 that "the usefulness of gate terminals rests on the fact that currents introduced into **one or both gate terminals** (Board's emphasis) may be used to control the anode-to-cathode breakover voltage". In other words, either gate of a pnpn device can be used for triggering. The skilled person, given the D1 circuit, would

therefore appreciate from common general knowledge that either gate of either SCR could be used for triggering and with a minimum of non-inventive experimentation would arrive at the claimed circuit.

The subject-matter of Claim 1 of the main request accordingly lacks an inventive step.

- 4.5 Against this conclusion the Appellant has raised several arguments. In particular, the Appellant argues that the D1 circuit needs additional components not present in the application in order to establish bias voltages for triggering. The Appellant also argues that the documents cited to show common general knowledge make a distinction between 3-terminal and 4-terminal devices and do not disclose the use of complementary 3-terminal devices as claimed.

As regards the first argument, the Board observes that Claim 1 does not include any features which exclude the provision of additional components as in D1; moreover, it is noted that the practical circuits used in the application show various additional components, the Figure 6 embodiment for example showing an extra diode 48. It is moreover not clear to the Board whether the Appellant's assertion that D1 requires additional components is sustainable, in that the two additional components shown in Figure 2 of D2 are a shunt diode 22 which merely parallels the pn diode formed by the anode and gate of SCR 10, apparently a normal practice in the art, whilst the resistor 18 appears equivalent to the diode 44e shown in Figures 4 and 6 of the application. No merit can accordingly be seen in this argument.

The argument that a 4-terminal device cannot be compared with a 3-terminal device has largely been dealt with at point 3.3 above. The Board takes the view that the

essential physical characteristics and operation of a pnpn device are the same whether the device has 1, 2 or no gates. The device operates as a switch at a predetermined breakover voltage, this voltage being determined by whether or not current is injected into one or more gates. Since this appears to be the sole function of the gate of an SCR it is in the Board's view a matter of non-inventive design choice which gate is in practice used.

4.6 The main request includes a second independent claim, Claim 8. This claim is explicitly directed to a protection arrangement for a two-wire telephone subscriber line comprising tip and ring wires, the normal designation in US practice for the two wires of a telephone line. The arrangement comprises first and second bi-directional protection devices which are known per se, see Figures 1 to 3 of the application, the devices being connected in series with respective telephone wires. One of the devices provides a current path to earth and the other a current path between the tip and ring wires. In the prior art as exemplified by Figure 1 of the application both protection devices provide a current path to earth.

4.7 The sole characterising feature merely states in other words that, rather than providing for detection of excessive current in each line, provision is made for detection of an excessive current in the loop and one of the lines. As noted by the Examining Division in the decision under appeal, this merely represents a standard design option where the skilled person finds it necessary or desirable to detect such a condition. It is self-evident that an excessive current could arise in a telephone loop and the arrangement of protection devices of unspecified type to protect against an excessive loop current by shorting the tip and ring wires is considered

to be a matter of ordinary workshop practice. The subject-matter of Claim 8 accordingly does not involve an inventive step.

5. *Inventive step (auxiliary request)*

5.1 Claim 1 of the auxiliary request in essence combines the subject-matter of Claims 1 and 5 of the main request, being directed to a protection arrangement for a two-wire telephone subscriber line comprising tip and ring wires using protection devices defined as in Claim 1 of the main request and connected to protect on the one hand against an excessive current in the ring wire and on the other hand against an excessive current in the telephone loop; the claim is thus characterised by the same feature as Claim 8 of the main request, i.e. that the second terminal of the second protection device is connected to the first terminal of the first protection device. In other words, operation of the second protection device shorts the tip and ring wires.

5.2 It will be noted from the above discussion that the Board considers that a protection device as in Claim 1 of the main request lacks an inventive step having regard to the disclosure of D1, whilst the arrangement of protection devices of unspecified type to protect against an excessive loop current by shorting the tip and ring wires, as in Claim 8 of the main request, also lacks an inventive step; no invention can be seen in the combination of an obvious protection device in an obvious protection arrangement. The Board accordingly concludes that the subject-matter of Claim 1 of the auxiliary request lacks an inventive step.

6. *Reimbursement of appeal fee*

6.1 In accordance with Rule 67 EPC "The reimbursement of appeal fees shall be ordered...where the Board of Appeal deems an appeal to be allowable, if such reimbursement is equitable by reason of a substantial procedural violation." Thus, a procedural violation as opposed to an error of judgement must have occurred (see for example T 19/87 OJ EPO 1988, 268).

6.2 The reason given by the Appellant for the requested reimbursement of the appeal fee was that the application was rejected immediately after the reply to the first communication. The Appellant feels that in such circumstances there is an implication that the reply was not considered bona fide and refers to the Guidelines at C IV 4.3 in which immediate refusal is envisaged if "the Applicant has not made any real effort to deal with (the) objections".

6.3 The Board is in no doubt that the response was bona fide. However, it is the established jurisprudence of the boards of appeal that an immediate refusal cannot be considered a substantial procedural violation if the decision under appeal was based on grounds on which the Appellant has had an opportunity to present comments, see T 84/82 (OJ EPO 1983, 41) and T 300/89 (OJ EPO 1991, 480). In the present case this opportunity existed after the communication. A substantial procedural violation in view of which reimbursement would be equitable does not therefore, in the Board's view, exist.

7. 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