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D E C I S I O N
of 8 April 1997

Case Number: T 0694/93 - 3.5.1

Application Number: 88903608.3

Publication Number: 0308485

IPC: G06F 15/16

Language of the proceedings: EN

Title of invention:
Terminal device session management protocol

Applicant:
DIGITAL EQUIPMENT CORPORATION

Opponent:
-

Headword:
-

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

Keyword:
"Inventive step (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0694/93 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 8 April 1997

Appellant: DIGITAL EQUIPMENT CORPORATION
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 11 January 1993 refusing European patent application No. 88 903 608.3 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: P. K. J. van den Berg
Members: A. S. Clelland
G. Davies

Summary of Facts and Submissions

I. This is an appeal against the decision of the Examining Division dated 11 January 1993, rejecting European patent application No. 88 903 608.3 on the ground that the claims were not clear; it was also held that appropriately clarified claims would not meet the requirements of the EPC as regards inventive step.

II. In its decision the Examining Division referred *inter alia* to the following documents:

D1: IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, vol. IE-34, no. 1, pages 24 to 28, February 1987, New York, US; S. R. DILLON: "Upper layer protocols and their use in MAP"

D2: ALTA FREQUENZA, vol. 54, no. 6, pages 386 to 393, November/December 1985, Milano, IT; S. ALFONZETTI et al.: "SDL description of the ISO transport protocol".

III. On 12 March 1993 the appellant (applicant) lodged an appeal against this decision and paid the prescribed fee. A statement of grounds of appeal was received on 21 May 1993, together with revised independent claims. The appellant argued that the subject-matter of the revised claims was both clear and patentably distinguished from the disclosure of documents D1 and D2, so that the claims were allowable.

IV. Following an exchange of correspondence between the appellant and the rapporteur, acting on behalf of the Board, oral proceedings were appointed and took place

on the 8 April 1997. At the oral proceedings the appellant's main request was that the Examining Division's decision be set aside and a patent be granted on the basis of the following documents:

Claims: 1 and 2 as received on 8 April 1997 (at the oral proceedings)

Description: pages 1 to 3 and 5 to 37 as originally filed;
pages 4 and 4a filed on 28 June 1991; and
page 4b filed on 8 April 1997

Drawings: sheets 1 to 6 as originally filed.

In accordance with an **auxiliary request** the above claims were replaced by claims 1 and 2 as filed at the oral proceedings on 8 April 1997.

V. Claim 1 of the main request reads as follows:

"1. A method of providing information transfer between an application process running on a host computer (12) and a virtual terminal of a terminal system (14) which includes one or more virtual terminals via a communication link, comprising the steps of:

receiving a stream of characters from said communications link (16);

monitoring the stream of received characters to detect groups of characters (44) being predefined on said communications link as session management commands, those received characters not constituting a session management command being defined as data characters, each data character being destined for one of virtual terminals (26, 28, 30) existing in said terminal system (14);

in response to receiving those of a first type of session management command denoted a SELECT command identifying one of said virtual terminals, directing all subsequently-received data characters to the identified virtual terminal until another SELECT command identifying a different one of said virtual terminals is received; and

transmitting to said host computer system over said communications link a second type of session management command denoted an ADD_CREDIT command (94) identifying one of said virtual terminals and indicating to said host computer system that said terminal system is capable of receiving a predetermined number of data characters on behalf of the identified virtual terminal,

wherein

a stream of data characters being directed to a first virtual terminal by a first SELECT command is of arbitrary length, said length being defined only by the position of a second SELECT command in said stream of data characters following said first SELECT command which identifies a virtual terminal different from said first virtual terminal."

VI. Claim 1 of the auxiliary request reads as follows:

"1. A method of providing information transfer between an application process of one or more application processes running on a host computer (12) and one or more virtual terminals of a terminal system (14) via a communications link (16) by one of one or more first sessions established along a first direction of said communications link, each of said first sessions being an association between an application process and one or more virtual terminals of said terminal system and

of providing an information transfer between a virtual terminal and one or more of said application processes running on said host computer (12) by one of one or more second sessions established along a second direction of said communications link, each of said second sessions being an association between a virtual terminal of said terminal system and one or more of said application processes, comprising the steps of:

receiving a stream of characters from said communications link (16);

monitoring the stream of received characters to detect groups of characters (44) being predefined on said communications link as session management commands, those received characters not constituting a session management command being defined as data characters, each data character being destined for said one or more virtual terminals (26, 28, 30) or said one or more application processes identified by said first or second session, respectively;

in response to receiving those of a first type of session management command denoted an OPEN_SESSION command (84) opening one or more of said first sessions and second sessions;

maintaining a mapping of the sessions opened;

in response to receiving those of a second type of session management command denoted a SELECT_SESSION command (88) identifying one of said opened first and second sessions, directing all subsequently-received data characters to the thereby identified one or more virtual terminals or the thereby identified one or more application processes, respectively, until another SELECT_SESSION command (88) identifying a different one of said sessions is received; and

transmitting to said host computer system or to said terminal system over said communications link a third type of session management command denoted an ADD_CREDIT command (94) identifying one of said sessions and indicating to said host computer system that said terminal system is capable of receiving an additional predetermined number of data characters on behalf of the session or indicating to said terminal system that said host computer system is capable of receiving an additional predetermined number of data characters on behalf of the session to thereby increase the number of credits for transmission, the number of credits being decreased for each character being transmitted in said session, said ADD_CREDIT command being sent so early that the number of available credits for transmission during a transmission never decreases to zero;

wherein

a stream of data characters being directed to said one or more virtual terminals or said one or more application processes by a first SELECT_SESSION command (88) is of arbitrary length, said length being defined only by the position of a second SELECT_SESSION command (88) in said stream of data characters following said first SELECT_SESSION command (88) which identifies a session different from the one selected by said first SELECT_SESSION command (88), and wherein

the first and second sessions opened and selected along different directions of said communications link (16) may identify different application processes (20,22, 24) and virtual terminals (26, 28, 30), respectively."

VII. Claim 2 of each request is directed to a system for providing information transfer having the features of the respective claim 1.

VIII. The appellant's arguments in support of patentability can be summarised as follows:

Although much of the discussion in the proceedings had revolved around the open systems model developed by ISO, it was important to appreciate that the invention was concerned with the control of **sessions**, i.e. the association between a terminal device and an application process, and not merely with a **session layer**. Known systems based on the ISO model invariably made use of packet switching, so much so that the skilled person was, at the claimed priority date, technically prejudiced against the use of non-packet systems. The inventors had appreciated that the data rate could be increased by avoiding the use of packets, as these required the provision of headers and, in the case of incomplete packets, bit-stuffing. By providing only a single header in order to start a session a higher data throughput was achievable since all subsequent signals constituted usable data. A new protocol was thereby provided. An additional advantage of the claimed system arose from the use of credits in order to avoid data overloads. These features were not derivable from the prior art. D1 was an explanation of the ISO model which did not disclose any actual protocols but implied that packets were used throughout. D2 clearly disclosed a packet system; although it referred to the use of credits, this was at the transport level and was moreover done in hardware rather than software. There was no suggestion in either of these documents of dispensing with the universally-used packet switching. As regards the auxiliary request, further advantageous features were added: the

provision of bidirectionality, the provision of an OPEN_SESSION command and the provision of an ADD_CREDIT command which was sent before the number of available credits for transmission reached zero. None of these features was derivable from the cited art.

Reasons for the Decision

1. *Admissibility*

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

2. The claims are clear (Article 84 EPC). The only issue to be decided is that of inventive step.

3. *The state of the art*

3.1 The application is based on the ISO open systems functional reference model, designed to facilitate the interconnection of autonomous computer systems; the model defines seven layers each of which has a specific set of functions, starting with a physical connection layer through increasing levels of abstraction to an application layer at which a process runs on a computer. From Figure 1 of the application it can be seen that layers 1 to 4 are subsumed in a "communications facility", whilst the session layer is provided in the form of a "session management facility", the presentation layer in the form of a "presentation data syntax facility" and the application layer in the form of an "application process" or "virtual terminal". The application is primarily concerned with the fifth or session layer, which

controls dialogue management, i.e. data passing between a server and a client (or, using the terminology of the application, a host system and a terminal system) given that the third, transport, layer has established a pathway between them.

3.2 Communication between corresponding layers in the client and server passes through each of the lower layers in turn and is modified to the format appropriate to that layer; corresponding layers of different systems appear to communicate directly, even though this is not the case. At any given layer information intended for a higher layer is by definition data, any header - in the case of a packet-switched system - being only relevant to that layer.

3.3 The ISO model is most frequently presented as packet switched, i.e. data transfer is by means of individual datagrams each of which comprises a header and data. The header may comprise, for example, a destination address, packet length and CRC information. In the most simplistic model a packet is transmitted by the lowest, physical layer along copper wire, received by a data link which adds its own header and passed on the network layer which adds a further header, and so on up to the application layer. However, it is important to bear in mind that the ISO model is concerned with **functions** and not with **protocols**. In the Board's understanding of the model there may be differing protocols for differing client-server systems at any given layer, although clearly it is desirable for interoperability that these protocols be standardised.

3.4 From D1, dated February 1987, it can be seen that shortly before the claimed priority date (March 1987) ISO layer protocols were still under development. D1 relates to the Manufacturing Automation Protocol (MAP) which is said to be based on the ISO model. It is stated at page 25, left hand column, lines 12 to 16 that in respect of the network layer "MAP has chosen the ISO connectionless network service...the need for connection-oriented network service...is being investigated". At lines 23 to 29 of this column, three different transport layer protocols are said to be popular, one of which - XNS - is stated at lines 31 and 32 to provide "simple connection-oriented and connectionless message services". The subsequent passage in the right hand column at lines 16 to 20 refers to the protocol preferred for MAP as being a "connection-oriented service placed over the connectionless network". At lines 36 to 41 of the right hand column reference is made to "The session layer protocol now in development in ISO"; With respect to the presentation layer, the layer above the session layer, D1 states at page 27, left hand column, lines 28 to 30 that "Due to the developing state of presentation layer protocols, none is yet specified in the MAP document...".

3.5 D2 on the other hand is concerned with a specific, transport layer, protocol. It is clear that this protocol, as argued by the appellant, involves the use of packet switching at all levels.

3.6 In conclusion, the Board understands from D1 and D2, together with the prior art acknowledgement in the application, that the functions defined by the ISO model on which the application is based had, at the claimed priority date, corresponding ISO protocols based on packet switching, but that these were not the only possible protocols known to the skilled person.

The Board also notes that in addition to the connectionless, i.e. packet switched, system supported by the ISO protocols the skilled person is made aware of the existence of so-called connection-oriented protocols such as provided by, for example, virtual circuits, used in many communications systems.

4. *Inventive step (main request)*

4.1 Although the appellant sought to make a distinction between a session per se and a session layer, claim 1 is concerned with a method of providing information transfer between an application process running on a host computer and a virtual terminal, and includes the step of detecting session management commands. The Board accordingly interprets the claim as being concerned with information at the session level. The claim is not in two-part form but it is clear that any session protocol will require certain features, in particular receiving a stream of characters from a communications link and monitoring the stream of received characters to detect those characters predefined as session management commands, all other characters being defined as data characters. To these *desiderata* of a session level protocol claim 1 adds the following features:

(a) In response to a SELECT command identifying a virtual terminal, directing all subsequently-received data to the virtual terminal until another SELECT command identifying a different virtual terminal is received.

(b) Use of an ADD_CREDIT command identifying a virtual terminal and indicating to the host that it can receive a predetermined number of data characters.

(c) The stream of data characters directed to a virtual terminal by the SELECT command is of arbitrary length, defined only by the position of a second SELECT command identifying a different virtual terminal.

4.2 It is observed that features (a) and (c) in essence relate to the same feature: in response to the SELECT command switching to a particular virtual terminal until another such command is received for a different virtual terminal. Such an arrangement is in essence connection-oriented switching and is widely used in the communications art. Although ISO had at the claimed priority date defined a protocol which was connectionless, i.e. making use of packets, it will be clear from the discussion at point 3 above that this is only one possible protocol among many. Although in the interests of standardisation the skilled person could be expected to favour the ISO protocol, no evidence was forthcoming from the appellant that in fact a strong technical prejudice existed which would rule out all other protocols, in particular any making use of a connection-oriented service. It is noted that the MAP protocol described in D1 refers in connection with the session to a kernel functional unit which "permits connection establishment, normal data transfer, and data function release", see page 25, right hand column, lines 43 to 45. At page 26, left hand column, line 15 it is stated that "only one activity may be active at a time" but the user "may switch among several activities dynamically". This suggests a virtual circuit. It is moreover observed that as viewed from the session layer any connection is "connection-oriented", see D1 at page 25, right hand column, lines 36 and 37.

4.3 The remaining feature of claim 1, feature (b), is known per se from D2 at page 388, left hand column, lines 24 and 25. This passage describes the ISO transport

protocol and indicates that in the class 2 transport protocol, credits are used to define the initial amounts of data the transport entities are willing to receive. In the Board's view it is self-evident that data transfer between entities must involve some form of negotiation in order to avoid data overflow: D2 shows that a credit system was used at the transport level for flow control. Since the function of the transport level is to provide data to the higher levels, in particular the session level, it follows that flow control must be provided between the host and terminal at some point in the system. Whether this flow control is provided at the session level or at the transport level does not alter the fact that it must be provided. No invention can be seen in providing a session management command for a credit system known *per se* at the transport level.

4.4. The subject-matter of claim 1 is therefore considered to involve the application to the ISO model of protocols which are well known in themselves in the art, there being no technical prejudice against the use of these protocols and no unexpected advantage to be gained by their use. It follows that the subject-matter of claim 1 does not involve an inventive step.

5. Since claim 2 is a system claim directed, *mutatis mutandis*, to the same subject-matter as claim 1, it follows that the above finding of lack of inventive step applies also to claim 2.

6. *Inventive step (auxiliary request)*

6.1 Claim 1 of the auxiliary requests adds a number of features to claim 1 of the main request. These may be summarised as follows:

(d) Each session can associate an application process with one of more virtual terminals or one or more application processes with a virtual terminal.

(e) The communications link is bidirectional.

(f) An OPEN_SESSION command is provided as one of the session management commands.

(g) The ADD_CREDIT command is sent so early that the number of available credits for transmission during a transmission never decreases to zero.

6.2 These features do not appear to add anything of inventive significance to the subject-matter of the main request. D1 states at page 26, left hand column, lines 13 to 15 that "the activity management functional unit permits the two session users to communicate within a number of activities or contexts". The implication of this passage is that each user may run a plurality of application processes and/or have access to a plurality of virtual terminals, feature (d). It also appears from D1 that the session layer may provide a full duplex connection, page 25, righthand column, lines 50 to 52. Feature (e) is accordingly also known. The implication of the above-cited passage at page 26 is that the session user may choose an activity, requiring the existence of OPEN_SESSION and SELECT_SESSION commands, so that feature (f) is also implicit in D1. The remaining feature, feature (g), would appear self-evident since the skilled person would appreciate that allowing the number of credits to reduce to zero would have the undesirable effect of interrupting communication and effectively decreasing the bandwidth.

6.3 The Board accordingly concludes that the subject-matter of claim 1 of the auxiliary request also lacks an inventive step.

7. Since claim 2 is a system claim directed, *mutatis mutandis*, to the same subject-matter as claim 1, it follows that the above finding of lack of inventive step applies also to claim 2.

8. 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