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Datasheet for the decision of 20 January 2021

Case Number: T 1735/17 - 3.5.05

Application Number: 10848313.2

Publication Number: 2552057

IPC: H04L12/44, H04B10/00, H04Q11/00, H04J14/02

Language of the proceedings: EN

Title of invention:
COMMUNICATION METHOD, OPTICAL COMMUNICATION SYSTEM, OPTICAL LINE TERMINAL, AND OPTICAL NETWORK UNIT

Applicant:
Mitsubishi Electric Corporation

Headword:
Optical Line Terminal sleep mode/MITSUBISHI

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (yes)

Decisions cited:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1735/17 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 20 January 2021

Appellant: (Applicant)	Mitsubishi Electric Corporation 7-3 Marunouchi 2-Chome Chiyoda-ku Tokyo 100-8310 (JP)
Representative:	Pfenning, Meinig & Partner mbB Patent- und Rechtsanwälte Theresienhöhe 11a 80339 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 2 January 2017 refusing European patent application No. 10848313.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair	A. Ritzka
Members:	P. Cretaine
	F. Blumer

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division posted on 2 January 2017 refusing European patent application No. 10848313.2. The application was refused for lack of novelty (Article 54 EPC) of a main request and an auxiliary request 1 over the disclosure of:

D1: EDITORS G.984.3: "White Paper: Means and impact of GPON power conservation; 97 (WP 1/15)", ITU-T DRAFT; STUDY PERIOD 2009-2012, INTERNATIONAL TELECOMMUNICATION UNION, GENEVA; CH, vol. 2/15, 30 November 2008, pages 1 to 53.

The document

D3: "EPON Powersaving via Sleep Mode; 3av_0809_mandin_4", IEEE DRAFT; 3AV_0809_MANDIN_4, IEEE-SA, PISCATAWAY, NJ USA, vol. 802.3, 9 September 2008, pages 1 to 8

was cited in the decision as an illustration of the common general knowledge.

II. Notice of appeal was received on 13 March 2017, and the appeal fee was paid on the same date. With the statement setting out the grounds of appeal, received on 8 May 2017, the appellant refiled the main request and auxiliary request 1 on which the decision was based and requested that the decision under appeal be set aside and that a patent be granted on the basis of one of those requests. In the alternative, oral proceedings were requested.

III. A summons to oral proceedings was issued on 24 February 2020. In a communication pursuant to Article 15(1) RPBA sent on 19 March 2020, the board gave its preliminary opinion that the main request and auxiliary request 1 did not meet the requirements of Article 56 EPC in the light of the disclosure of D1 and common general knowledge.

IV. In a letter of response dated 6 April 2020, the appellant provided arguments in respect of inventive step over the disclosures of D1 and D3.

V. Oral proceedings were held on 20 January 2021. The appellant withdrew auxiliary request 1 and requested that the decision under appeal be set aside and a patent be granted on the basis of the main request. The decision of the board was announced at the end of the oral proceedings.

VI. Claim 1 of the main request (sole request) reads as follows:

"A communication method of an optical communication system in which a plurality of user-side optical-line terminals (hereinafter, called ONUs) (10-1, 10-2, 10-3) is connected to a station-side optical-line terminal (hereinafter, called OLT) (1) by using a common optical fiber (30), characterized by comprising the following steps (a) to (d):
(a) allocating, by the OLT, a transmission bandwidth to the ONU (10-1, 10-2, 10-3) capable of an operation in a normal mode and a sleep mode, the sleep mode including a sleep time in which an optical transmitter (141) is in an off-state and a tentative wake-up time in which the optical transmitter (141) is in an on-state and an optical receiver (142) is in an on-state, the sleep

time being signaled by the OLT and being measured by a timer;
(b) transmitting, by the OLT, a transmission bandwidth notification to the ONU (10-1, 10-2, 10-3);
(c) transmitting, by the ONU (10-1, 10-2, 10-3), to which the transmission bandwidth is allocated, a response signal in the transmission bandwidth allocated in the tentative wake-up time, the transmission of the response signal being omitted during the sleep time; and
(d) suppressing, by the OLT, an alarm by not counting a communication failure for the transmission bandwidth in the sleep time, the alarm being caused by the communication failure with the ONU (10-1, 10-2, 10-3) on a basis of the response signal from the ONU (10-1, 10-2, 10-3)."

The main request comprises further independent claims directed to a corresponding optical communication system (claim 6), user-side optical line terminal apparatus (claim 9), station-side optical terminal apparatus (claim 14), control device of a user-side optical line terminal apparatus (claim 18) and control device of a station-side optical line terminal apparatus (claim 23).

Reasons for the Decision

1. The appeal is admissible (see point II).

2. Prior art

D1 was identified as the closest prior art in the impugned decision. D1 is a standardization document related to optical communication systems in which a plurality of user-side optical-line terminals, ONUs,

are connected to a station-side optical-line terminal, OLT, using a common optical fiber. In such a system, the OLT regularly allocates a transmission bandwidth to an ONU by transmitting a transmission bandwidth notification to the ONU, to which the ONU responds by transmitting upstream data in the allocated bandwidth. D1 relates to power-saving requirements for ONUs and in that respect discloses different sleep modes in sections 3.1, 3.2 and 3.3. ONU sleeping means that both ONU transmitter and ONU receiver are turned off for a period of time.

First, section 3.1 and the corresponding Appendix III (see pages 40 ff.) describe a sleep mode according to the PMC-Sierra proposal. In that mode, the ONU requests the OLT to put it into a Sleep Ready mode, i.e. to enter a sleep period. The ONU in a sleep period must re-enter the active period, i.e. wake up, at the designated time (see Appendix III, page 40, fourth paragraph). It is the OLT which commands the transitions of the ONU from active periods to sleep periods and from sleep periods to active periods (wake-up) (see Appendix III.2, page 42, first paragraph). Appendix III.2.1 further specifies in its first paragraph that the OLT responds to a sleep request of the ONU by sending a message containing the sleep period end time. Section 3.1.2 discloses that this sleep period end time is indicated by the OLT as a 30-bit superframe counter indicating the first frame of the next active period. Section 3.1.2 and Appendix III. 3.1 further teach that an ONU powers its receiver a few frames in advance of the scheduled wake-up frame.

The Deep Sleep mode described in section 3.2 is a mode initiated by the ONU which fully shuts down its transceiver until a sleep timer expiration event

occurs. The ONU may wake up to a local stimulus only: switching the ONU on, off-hook condition, or expiration of the locally maintained timer.

The ONU Dozing mode described in section 3.4 is a mode that the ONU may enter at its discretion as long as it does not have traffic to send upstream. The OLT continuously sends bandwidth allocations to the ONU but expects the ONU to respond only if the ONU has something to say and thus leaves the dozing mode.

The disclosure of D1 in respect of the PMC-Sierra proposal is corroborated by the content of D3, which also relates to the PMC-Sierra proposal (see frontpage). In particular, the figure on page 5 of D3 shows that the OLT specifies a wake-up time to the ONU, that the ONU puts itself to sleep for an indicated period, and that the ONU wakes itself up prior to the end of the sleep period.

3. Inventive step

3.1 The three sleep modes described in D1 (Fast sleep mode/ PMC-Sierra, Deep Sleep mode, and Dozing mode) are distinct and are to be considered as separate embodiments of power-saving techniques (see Figure 1 of D1).

The mode which is the closest to the subject-matter of claim 1 is the Fast Sleep mode/PMC-Sierra since it is a mode wherein the OLT instructs the ONU to sleep.

The subject-matter of claim 1 differs from the disclosure of D1 in respect of this mode in that, *inter alia*:

a) the sleep time signalled by the OLT to the ONU is a time in which the transmitter of the ONU is in an off-state, i.e. it is a period of time during which the ONU is definitely in an off-state. By contrast, the wake-up time shown in the figure on page 5 of D3 corresponds to a frame number (see D1, section 3.1.2) and in the Fast Sleep mode/PMC-Sierra defines a point in time at which the ONU should be awake at the latest. The ONU may, but need not, be sleeping until this wake-up time.

b) the OLT suppresses an alarm by not counting a communication failure for the transmission bandwidth in the sleep time. By contrast, the Fast Sleep mode/ PMC-Sierra describes that an alarm may be masked during a sleep period, but does not indicate how such masking is done.

3.2 The board agrees with the appellant that features a) and b) are not merely juxtaposed in claim 1 since the alarm is defined in feature b) as being suppressed by the OLT during a period, the sleep time of the ONU, which is defined in feature a). Indeed, not counting a communication failure, i.e. suspending counting communication failures, as defined by feature b), makes sense only if the OLT definitely knows that the ONU is in a non-communicating state with its transmitter powered off. This is guaranteed by feature a).

The technical effect of the distinguishing features a) and b) is that the OLT knows with certainty when the OLT is sleeping, i.e. when it has its transmitter powered off, and that no false alarm can be generated during that period. By contrast, in the Fast Sleep mode/PMC-Sierra, each ONU decides when it wakes itself up, at least before the end of the wake-up time specified by the OLT (see the figure on page 5 of D3).

The appellant plausibly argued that not counting a communication failure when the ONUs are not sleeping during the period up to the wake-up time would result in not counting relevant failures.

The objective technical problem can thus be formulated as being how to provide a more reliable alarm scheme in the optical network.

The other modes described in D1 do not give any indication to the skilled person in that respect. Indeed, both the Deep Sleep mode and the ONU Dozing mode provide that the ONU could wake by itself, and do not describe that the OLT specifies the length of a sleep period to the ONU.

3.3 Therefore the board holds that the subject-matter of claim 1 involves an inventive step (Article 56 EPC), having regard to the prior art on file.
Independent claims 6, 9, 14, 18 and 23 contain substantially the same features as claim 1 (see point VI above). Thus these claims also meet the requirements of Article 56 EPC. The other claims are dependent claims and, as such, also meet the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the examining division with the order to grant a patent on the basis of the main request (claims 1 to 23) as filed with the statement setting out the grounds of appeal and a description and drawings yet to be adapted.

The Registrar: The Chair:

K. Götz-Wein A. Ritzka

Decision electronically authenticated