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Datasheet for the decision of 10 December 2024

Case Number: T 0848/22 - 3.4.02

Application Number: 16200293.5

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Title of invention:
Hybrid Cable and Associated Communication System

Patent Proprietor:
Hexatronic Group AB

Opponent:
Emtelle UK Limited

Headword:
Direct Current and Optical Hybrid Cable System/HEXATRONIC

Relevant legal provisions:
EPC Art. 100(c), 123(2), 56

Keyword:

Patent as granted - extension beyond content of application as filed (yes) - main request
Amendments - extension beyond the content of the application as filed (yes) - auxiliary requests I to IV
Inventive step - obvious solution (yes) - several obvious steps - auxiliary request V

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Case Number: T 0848/22 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 10 December 2024

Appellant: (Patent Proprietor)	Hexatronic Group AB Sofierogatan 3A 412 51 Göteborg (SE)
Representative:	Lind Edlund Kenamets Intellectual Property AB Kungsportsavenyn 25 411 36 Göteborg (SE)
Respondent: (Opponent)	Emtelle UK Limited Haughhead Hawick Roxburghshire TD9 8LF (GB)
Representative:	Cameron Intellectual Property Ltd Moncrieff House 69 West Nile Street Glasgow G1 2QB (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 31 January 2022 revoking European patent No. 3327732 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	R. Bekkering
Members:	F. Giesen
	C. Almberg

Summary of Facts and Submissions

I. The present appeal by the patent proprietor is directed against the decision of the opposition division revoking European patent no EP 3 327 732. The basis for the decision were that the ground for opposition under Article 100(c) EPC prejudiced the maintenance of the patent as granted, that auxiliary requests I to IV were amended in contravention of Article 123(2) EPC, and that auxiliary request V did not meet the requirement of Article 56 EPC.

The following documents are referred to in the present decision:

D4 *WO 2015/168686 A1*

D8 Wikipedia: Direct Current, version of 14 October 2016, 11:01, https://en.wikipedia.org/w/index.php?title=Direct_current&oldid=744299401

D9 International Standard ISO 6722-1 2011 (E), "*Dimensions, test methods and requirements for copper conductor cables*" (A4 in the decision under appeal)

D10 Data sheet for cable type 5500FE, published 2015 by Belden AS Inc (A5 in the decision under appeal)

D18 Nortel Global Product and Solution Reference Guide, Version 5 - July 2005

D19 Cisco Unified IP Phone 7900 Series, Cisco Unified IP Phone Power Injector

D20 IEC 62368-1 International Standard, Audio/video, information and communication technology equipment - Part 1: Safety requirements, ISBN 978-2-8322-1405-3

D21 IEC 61140 International, Standard, Protection against electric shock - Common aspects for installations and equipment, ISBN 978-2-8322-3103-6

D22 Wikipedia: "*Extra-low voltage*", https://en.wikipedia.org./wiki/Extra-low_voltage

D23 FTTH Handbook. Edition 7, D&O Committee Revision date: 16/02/2016

II. Oral proceedings before the board took place on the 10 December 2024. The final requests of the parties were as follows:

The proprietor's main request was that

the appealed decision be set aside, and that the opposition be rejected, i.e. that the patent be maintained as granted.

In the alternative, it requested that the appealed decision be set aside, and that the patent be maintained as amended based on the claims of one of
- auxiliary requests I to IV, filed with letter dated 7 August 2020, and
- auxiliary request V, filed with letter dated 28 July 2021.

The opponent (respondent) requested that

the appeal be dismissed.

III. Claim 1 of the main request (i.e. as granted) is worded as follows

F1.1 *"A communication system (200) comprising:*

F1.2 *a duct (190);*

F1.3 *a hybrid cable (300, 400) for conveying electric power at least 100 meters through the duct,*

F1.4 *wherein at least a portion of the hybrid cable is located in the duct;*

F1.5 *a first converter having an optical interface and an electrical interface, wherein the first converter is configured to provide conversion between optical signals at the optical interface and electrical signals at the electrical interface; and*

F1.6 *a fourth converter (213) having an optical interface and an electrical interface, wherein the fourth converter is configured to provide conversion between optical signals at its optical interface and electrical signals at its electrical interface,*

F1.7 *wherein the hybrid cable comprises: an optical cable member (310) comprising a signal transmitting member (311) adapted to transmit optical signals along the hybrid cable and a tubular enclosure (312) enclosing the signal transmitting member, wherein the optical cable member is connected to the optical interface of the first converter and the optical interface of the fourth converter; two electric cable members (320), wherein each of the electric cable members comprises an electrically conductive interior (321) for conveying electric power along the hybrid cable and an electrically insulating layer (322) enclosing the electrically conductive interior, and a cable sheathing (330) enclosing the optical cable member and the electric cable members,*

F1.8 *characterized in that a thickness (D1, D2) of the electrically insulating layer of at least one of the electrical cable members is less than or equal to 0.35 mm,*

F1.9 *and in that the communication system further comprises: a second converter (222) arranged to supply power to the first converter, wherein the second converter comprises an interface connected to the electric cable members of the hybrid cable, wherein the second converter is a power converter configured to convert electric power from a first power format received via the electric cable members into a second power format for powering the first converter,*

F1.10 *and wherein the first power format includes direct current at a voltage level of at least 75 Volt and at most 110 Volt; and*

F1.11 *a third converter (211) connected to the electric cable members of the hybrid cable for providing direct current at a first voltage level to the electric cable members of the hybrid cable, wherein the third converter is a power converter configured to convert a second voltage level into the first voltage level and or configured to convert alternate current into direct current."*

Here and in the following, the board adopts the feature labelling from the impugned decision, points 14, 28, 30, 32, 34 and 36. Claim 9 is a corresponding method claim.

IV. Claim 1 of auxiliary request I differs from claim 1 of the main request in the feature

F1.9^{I} *in that the communication system further comprises: a second converter (222) arranged to supply power to the first converter, wherein the second converter comprises an interface connected to the electric cable members of the hybrid cable, wherein the second converter is a direct current to direct current power converter configured to convert electric power from a first power format received via the electric cable members into a second power format for powering the first converter*

Here and in the following, underlining was added by the board to identify added features compared to claim 1 of the main request.

V. Claim 1 of auxiliary request II differs from claim 1 of the main request in the feature

F1.9^{II} *in that the communication system further comprises: a second converter (222) arranged to supply power to the first converter, wherein the second converter comprises an interface connected to the electric cable members of the hybrid cable, wherein the second converter is a power converter configured to convert electric power of from a first power format including a direct current at a voltage level of at least 75 Volt and at most 110 Volt as received via the electric cable members into a second power format including a direct current at a voltage level suitable for powering the first converter*

and in the deletion of feature F1.10.

VI. Claim 1 of auxiliary request III differs from claim 1 of the main request in the feature

F1.11^{III} *a third converter (211) connected to the electric cable members of the hybrid cable for providing direct current at a first voltage level of at most 120 V to the electric cable members of the hybrid cable, wherein the third converter is a power converter configured to convert a second voltage level into the first voltage level and/or configured to convert alternate current into direct current.*

VII. Claim 1 of auxiliary request IV has the features of claim 1 of the main request and instead of feature F1.10 following amendment feature

F1.10^{IV} *wherein the first power format includes direct current at a voltage level of at least 75 Volt and at most 110 Volt and the second power format includes direct current at a voltage level of 48 Volt.*

VIII. Claim 1 of auxiliary request V differs from claim 1 of the main request in the features

F1.5^{V} *a first converter having an optical interface and an electrical interface, wherein the first converter is configured to provide conversion between optical signals at the optical interface and electrical signals at the electrical interface, and wherein the first converter is a Power over Ethernet, PoE, switch*

F1.10^{V} *and wherein the first power format includes direct current at a voltage level of at least*

75 Volt and at most 110 Volt and the second power format includes direct current at a voltage level of 48 Volt.

Reasons for the Decision

1. *Admissibility of the appeal*

The appeal meets the requirements of Articles 106 to 108 EPC and of Rule 99 EPC. It is therefore admissible.

2. *Main request - Article 100(c) EPC*

2.1 The subject-matter of claim 1 as granted extends beyond the content of the application as filed. Therefore, the ground for opposition under Article 100(c) EPC prejudices the maintenance of the patent as granted.

2.2 In essence, the board agrees with the reasoning in point 25 of the impugned decision and most arguments of the opponent, see point 7 of the reply to the appeal.

The particular input voltage range for the second converter of 110 to 75 V is originally disclosed only in combination with a particular output voltage of 48 V direct current and in combination with the first converter being a PoE switch. Since the amended claim is not limited in that respect, it represents an unallowable intermediate generalisation.

2.3 The board is not persuaded by the proprietor's line of argument essentially for the reasons on which the decision under appeal is based.

The board wishes to emphasise that it is established case law that also in the case of an intermediate generalisation, amended subject-matter has to be directly and unambiguously derivable, for the skilled person using common general knowledge, from the application documents as filed (Case Law of the Boards of Appeal of the European Patent Office, July 2022, 10th edition ("CLBA"), II.E.1.9.1, seventh paragraph, last sentence, and II.E.1.3.1, first paragraph). In order to comply with the requirement of a direct and unambiguous disclosure, it is not sufficient that the amended subject-matter solves the subjective technical problem formulated in the application as filed, as the proprietor's main argument in this respect appears to be. It is also not sufficient, in order to comply with the requirement of a direct and unambiguous disclosure, to identify a "main teaching" in the application as a justification and to strip away all those features from the disclosure of a specific embodiment which are allegedly not necessary to put into practice that "main teaching".

It is therefore immaterial, that the proprietor considers that a skilled person would recognise that the essential realisation by the inventors was to use direct current of at most 110 Vdc to reduce the cable diameter sufficiently to be able to blow the cable down an existing duct. If anything, this argument implies that a limitation of the output voltage of the third converter to 110 V is a (further) essential feature, to which claim 1 of the main request is not limited.

A DC-DC converter, converting an input range of 110 V to 75 V to an output voltage of 48 V is constructionally different from other converters converting to output voltages at different output levels or from or to alternating current. There is therefore a technical link between the input and output voltages of a power converter in general, but also specifically in the present embodiment. According to the original disclosure the received input voltage range at the second converter of 110 Vdc to 75 Vdc is chosen in order to provide sufficient power to a specific PoE converter requiring an input voltage of 48 Vdc.

2.4 The passages on page 9, lines 22 and 23, page 14, lines 20 to 24, page 15, lines 9 to 13 and lines 20 to 26 of the application as filed, to which the proprietor refers in order to argue that a PoE converter was optional, are not a direct and unambiguous disclosure of the subject-matter of claim 1 of the main request.

The passage on page 9, lines 22 and 23 merely states in general terms that the third converter (not the second converter) may convert line power optionally to 120 V. This is not a direct and unambiguous disclosure of either the input voltage range of the second converter, since no cable length is disclosed in this passage, or of the output voltage of the second converter being arbitrary.

The passages on page 14, lines 20 to 24, on page 15, lines 9 to 13 and lines 22 to 26 are clearly part of a disclosure of an embodiment including a PoE switch as the first converter, see page 14, lines 5 to 7. In addition, the passage on page 15, lines 5 to 7 concerns

specifically a voltage drop across a cable that is 1 kilometre long, not 100 m as in the claim.

Within the disclosure of the embodiment concerning a PoE switch as the first converter, is a short passage on page 14, lines 10 to 14 concerning embodiments in which the transmitter is powered in some other way, according to which, for example, power from the hybrid cable may be provided to the transmitter in a separate conductor instead of being provided by a PoE switch in a cable together with data signals. This is a separate embodiment without a PoE converter in its own right. However, this separate embodiment does not directly and unambiguously disclose an input voltage to the second converter of 110 to 75 V, which is a range disclosed only in the specific context of a PoE converter, see page 15, lines 18 to 27.

There is no teaching in the application as filed that allowed to isolate the particular input voltage level of 48 Vdc from either the specific type of the first converter being a PoE switch or from its input voltage level. In this regard, the board agrees with the argument of the opponent on page 22 of its reply to the appeal that the particular input range of 110 V to 75 V is chosen so as to be able to power the 48 Vdc PoE switch at a distance typical for the use situation envisaged, i.e. over about 1000 m, for example in a building such as a shopping mall, see page 1, lines 9 to 12, page 15, lines 5 to 7 and lines 22 to 27. Moreover, a skilled person knows that 48 Vdc is the standardised supply voltage that a PoE switch has to deliver. It is therefore immediately apparent that the input voltage is chosen such as to match the standardised output voltage directly without the need for further conversion.

2.5 The argument of the proprietor that a PoE switch and an input voltage of 48 Vdc are just examples is not persuasive. They may have been portrayed as examples in the application as filed simply by virtue of being part of a specific embodiment. As soon as the claim is amended by adding features of that specific embodiment, the question is no longer whether the specific features of the embodiment were initially portrayed as being optional, but rather whether they are inextricably linked to the features added to the claim, and whether the resulting subject-matter is directly and unambiguously derivable. Moreover, a skilled person recognises from the application as filed a clear technical link between the choice of a PoE switch and the output voltage of the second converter of 48 Vdc as explained in the previous paragraph.

2.6 For the sake of completeness the board remarks that the opponent raised a further objection of added subject-matter at the oral proceedings (when asserting that a range of voltages was missing in the claim). This objection and the board's decision not to take it into account under Article 13(2) RPBA are however not relevant to the outcome of the present decision and need not be discussed in further detail.

2.7 Therefore, the ground for opposition under Article 100(c) EPC prejudices the maintenance of the patent as granted.

3. *Auxiliary requests I to IV - Article 123(2) EPC*

3.1 In contravention of Article 123(2) EPC, the opposed patent was amended in such a way that the subject-

matter of claim 1 of each of the auxiliary requests I to IV extends beyond the content of the application as filed.

3.2 The opponent argues that the amendments of claim 1 according to auxiliary requests I to IV, respectively, did not fully address the problem of added subject-matter, see pages 45 and 46 of the reply.

3.3 The board agrees for the following reasons.

3.4 Claim 1 of auxiliary request I specifies that the second converter is a DC to DC converter. It is apparent that this does not fully address the problem of an unallowable intermediate generalisation explained above because the claim still does not specify that the first converter is a PoE switch and that the output level of the second converter is 48 V.

3.5 Claim 1 of auxiliary request II contains in essence the additional limitation that the second power level is suitable for the second converter. That does not fully address the problem of the unallowable intermediate generalisation as laid out in the preceding paragraph.

3.6 Claim 1 of auxiliary request III specifies the output voltage of the third converter to the electric cable members to be at most 120 V. This does not address the unallowable intermediate generalisation, which concerns the second and first converters.

3.7 Claim 1 of auxiliary request IV specifies that the output voltage level of the second converter is 48 V, but is still not limited to the first converter being a PoE switch. Therefore, it does not fully address the unallowable intermediate generalisation.

4. *Admittance of documents D18 to D23*

4.1 The proprietor filed documents D18 to D23 for the first time with the statement of grounds of appeal. The admittance of this new evidence is at the discretion of the board pursuant to all relevant parts of Article 12 RPBA.

4.2 The documents are relevant for clarifying questions in the context of assessing inventive step and thus suitable to address an issue leading to the appealed decision. The opponent and the board have had enough time to familiarise themselves with these documents. The opponent made extensive reference to them at the oral proceedings and indicated already in point 2.1, last sentence, of their reply to the statement setting out the grounds of appeal that they have no objection to the admission of D18 to D23.Their admittance is thus helpful to decide on inventive step, without disadvantaging the opponent and without having a negative impact on procedural economy (see Article 12(4), fifth sentence, RPBA).

4.3 The board therefore admits documents D18 to D23.

5. *Auxiliary request V - Inventive step (Article 56 EPC)*

5.1 The subject-matter of claim 1 of auxiliary request V does not involve an inventive step within the meaning of Article 56 EPC.

5.2 Starting point

The parties and the opposition division consider document D4 to represent the closest prior art. The board can accept the choice of D4 as a suitable starting point for the assessment of inventive step.

5.3 Distinguishing features

5.3.1 Features F1.3, F1.5^{V}, F1.8, F1.9, F1.10^{V}, and F1.11 are the features that distinguish the system according to claim 1 of auxiliary request V from the system according to document D4.

5.3.2 Concerning feature F1.3, the board can accept the argument in the decision under appeal that broadband networks having broadband service nodes typically have duct lengths of more than 100 m. On the basis of the opponent's argument in point 8.1 of the reply and their reference to document D23, point 8.2.1.5, the board also has no doubts that cable blowing into de-cored coaxial cables is suitable for hybrid cable lengths of more than 100 m, which the proprietor contests in the statement of grounds of appeal on page 10, third paragraph, without providing evidence for this assertion.

However, while a duct length of 100 m in D4 is highly likely, the standard for deciding on the disclosure content of D4 is a direct and unambiguous disclosure. Therefore, feature F1.3 is a distinguishing feature.

5.3.3 Concerning feature F1.5^{V}, the board can accept that a first and fourth converter converting optical to electrical signals and vice versa is implicitly disclosed in a broadband service node based on optical fibres according to D4, since the server side and the

user devices use electrical signals, whereas the optical fibre transmits optical signals.

However, document D4 does not disclose that the first converter is a PoE switch, which was not contentious.

Feature F1.5^{V} is therefore a distinguishing feature.

5.3.4 According to feature F1.8, a thickness of the electrically insulating layer of at least one of the electrical cable members is less than or equal to 0.35 mm. The proprietor argued at the oral proceedings before the board and in the submission of 17 October 2024, pages 14, penultimate paragraph, to page 16 that based on dimensions mentioned in the text the insulating layer of D4 had to be (at least) 0.6 mm. Irrespective of whether this calculation is correct, there is no direct and unambiguous disclosure of the insulation thickness of 0.35 mm, and the opponent did not argue to the contrary.

Feature F1.8 is therefore a distinguishing feature.

5.3.5 The proprietor argued that feature F1.9, F1.10^{V} and F1.11, requiring second and third converters, a first power format of 110 V to 75 V dc and a second power format of 48 V dc, were distinguishing features with respect to D4.

These features in combination imply that the third converter converts input power to direct current, and that the second converter converts an input voltage lying in the range between 110 Vdc to 75 Vdc to 48 Vdc.

Document D4 discloses in paragraph [49] a transmitted electrical power of 90 Vac between the input to the hybrid cable and the broadband service node.

It follows that D4 does not disclose a first power format of 110 Vdc to 75 Vdc, as required by feature $F1.10^{V}$.

According to the proprietor a third converter was not disclosed in D4 at all, but at least not one that provides direct current as output. The opponent (page 10 of the reply to the appeal, last dash) and the opposition division (see decision under appeal point 53) argued that, since 90 Vac is not a standard mains voltage anywhere in the world, this implied a third converter.

The board considers the reference to 90 Vac in D4 to be to the power at the input of the cable. A different reading would be speculative, even when taking into account a potential voltage drop over the cable length. The proprietor's argument would rest on the unlikely assumption that the cable resistance would cause a voltage drop of exactly 20 V when assuming a US mains voltage of 110 Vac without any of this being mentioned in D4. As a consequence, the board accepts on the basis of the argument of the opponent that a third converter is implicitly disclosed in D4, but not one according to F1.11, which converts to direct current.

Concerning feature F1.9, the proprietor argued that a second converter was not disclosed at all in D4, but at least not one that converts from between 110 Vdc and 75 Vdc, to 48 Vdc. Documents D18 and D19 showed network switches and a phone power injector, respectively, that could work with 90 Vac input voltage. The first and

second converters according to claim 1 were separate entities.

The opponent argued (see page 25, last paragraph to page 29, first paragraph of the reply to the appeal) that any broadband node necessarily contained electronic circuitry, and that 90 Vac was plainly unsuitable to drive such electronic circuitry. In particular the equipment referenced in D18 and D19 could accept 90 Vac input voltage only because it contained itself a second converter. Claim 1 referred to a system and did not exclude that the second converter was a distinct part of the first converter.

The board accepts on the basis of the opponent's arguments that D4 implicitly discloses a second converter. In particular, the wording of claim 1 requires that the first converter converts optical signals to electrical signals. It does therefore not exclude that the second converter is part of the first converter, albeit a distinct one. However, there is no direct and unambiguous disclosure of the second converter converting input voltages in the range of 110 Vdc and 75 Vdc to output voltages of 48 Vdc.

Therefore, features F1.9, F1.10^{V} and F1.11 are also distinguishing features.

5.4 Technical effects and objective technical problems

5.4.1 The proprietor argues that there was a synergy between all distinguishing features. The use of dc voltage and the specified input voltage range to the second converter of 110 Vdc to 75 Vdc was low enough to fall in the ES2 class according to the industry standard of

document D20 or in the ELV (extra low voltage) range according to D21 or D22. This allowed to reduce the outside cable diameter because, the proprietor implied, the insulation thickness of the electrical cable members could be chosen to be smaller than in the prior art, namely 0.35 mm. At the same time, the input voltage level to the second converter was just high enough to power a PoE switch over useful distances of over 100 m, despite the voltage drop over that distance. Therefore, the proprietor concludes, the distinguishing features made the cables suitable to be blown over long distances of more than a 100 m, contrary to hybrid cables of the state of the art. This allowed cables to be installed in existing infrastructure.

The opponent contested that the choice of direct current lead to thinner insulation thickness or overall cable thickness. Document D9, which was an ISO industry standard, demonstrated in table 4 that the claimed insulation thickness was merely the result of the application of a recommendation by an industry standard for 0,75 mm^2 core diameters and a voltage range of between 60 Vdc and 600 Vdc. It also applied to individual cores in multi-core cables (see point 1 of D9). Document D10 showed cables suitable for 300 V rms, i.e. higher than the 110 Vdc claimed, yet a thinner insulation thickness of only 0.203 mm. Moreover, other factors determined the overall hybrid cable thickness, as for example the number of optical fibres.

In the board's view, the technical effects achieved by the distinguishing features are as follows.

A PoE switch is a standardised embodiment of a broadband network node, which can provide power to

peripheral devices, typically network cameras, wireless access points, or VOIP telephones. It allows to provide power and data over an Ethernet cable, thus reducing the number of cabling and power outlets at the output of the cable, thus serving the same purpose as that of a hybrid optical and electrical cable.

The technical effect of the third converter is to allow the conversion of a source power, such as mains power, to an appropriate "power format" (in the words of the opposed patent) for transmitting over the hybrid cable. The technical effect of the chosen power format of 110 Vdc to 75 Vdc, is to increase the safety of the system by staying in the extra low voltage regime, while at the same time being sufficiently high in order to power the PoE switch over useful distances of over 100 m taking into account the voltage drops that occur over these distances.

The technical effect of the second converter is to comply with the PoE standard without requiring further conversion. The PoE standard requires the PoE switch to provide a supply voltage to the peripheral devices of 48 Vdc. Therefore providing 48 Vdc at the input of the PoE switch meets the standardised supply (or output) voltage requirement without further conversion.

The board is not persuaded by the proprietor's assertion according to which the choice of dc voltages enabled cable blowing over sufficiently long distances for the following reasons.

First, the opponent convincingly demonstrated that insulation sleeves can be much thinner than the claimed 0.35 mm even for higher voltages as those claimed, for example for 300 Vrms. Moreover, the opponent argued

convincingly that the correct technical effect of the particular claimed insulation thickness was not more than being suitable as insulation for the chosen power format. Second, in order to be taken into account in the assessment of inventive step, a technical effect has to be achieved across the entire scope of the claim. However, the claim merely limits the insulation sheet thickness of one of the potentially several insulating sheets. It does not limit other parameters that have an influence on the ability of the cable to be blown or jetted into a duct, such as the ratio of the duct diameter and the total cable diameter, or the stiffness or the weight of the cable. The proprietor's conclusion according to which the distinguishing features showed synergy to enable the cable to be blown into existing ducts is therefore not justified without further limitations in the claim.

5.4.2 The board therefore comes to the conclusion that the technical problem to be solved is to provide a system that is able to power and provide data to peripheral devices over a given distance independent from grid power and to provide a suitable insulation thickness.

5.5 Assessment of the solution

5.5.1 The proprietor argued that D4 did not suggest using existing infrastructure. Rather D4 followed what the proprietor termed a totally different approach of de-coring existing coaxial cables. D4 did not contain any suggestion to use a second and third converter, to enable transfer of direct current at a low voltage, in the range of 75-110 V, over the cable, and to use very thin insulating layers on the electric cable members within the hybrid cable. Concerning that last point, D4

taught to use cables with 0.6 mm insulation thickness and would thus have incentivised a skilled person to use this proven insulation thickness. According to the proprietor, since this insulation thickness worked, D4 in the words of the proprietor "taught away" from using thinner insulation. A skilled person would not have consulted documents D9 and D10 in an obvious manner, as they were in different technical fields, and did not address the technical problem. None of the documents suggested the use of direct current instead of alternating current. A skilled person starting from D4, would not have changed from alternating current as disclosed therein, to direct current. Insofar, the present case was similar to the case in T 570/91, in which the board found that the choice of the starting point was free but would bind a skilled person as far as obvious further developments were concerned.

The opponent argued that while there may be many differences between claim 1 and the system of D4, they were all obvious. A PoE switch was the most obvious example for the remote broadband apparatus according to D4, see background section of the opposed patent itself and D18 and D19. Using jetting for distances of 100 m was merely trivially obvious. The test routine described in document D11, which is an industry standard, was evidence that 100 m was the minimum test distance for blowing cables into microducts. Document D23 demonstrated that the hybrid cables can be blown into the de-cored coaxial cable according to D4 over distances of 50 to 400 m. Moreover, there was nothing inventive in making a choice of voltage of 110 V, rather than 48 or 90 or 120 V and there was nothing inventive in electing to supply direct current instead of alternating current. Indeed direct current was conventional in telecom applications, and according to

D8, in particular 48 Vdc was commonplace in telephony. There was nothing inventive in specifying readily-available thin insulation to achieve a small, lightweight product; and there was nothing inventive or surprising about these choices being made in combination. D9 and D10 demonstrated that an insulation thickness of 0.35 mm was merely commonplace, and was known to be more than capable of resisting any of the voltages contemplated in the opposed patent. Even if the proprietor's assertion that choosing an insulation thickness of less than 0.35 mm enabled the cable to be more suitable for installation in microducts by blowing, there was nothing inventive about that realisation.

5.5.2 The board agrees with the conclusion of the opponent and the opposition division according to which the solutions of claim 1 were obvious.

In more abstract terms, the skilled person, when implementing the system according to D4, would have arrived at the subject-matter of claim 1 by making obvious implementation choices which lead in an obvious manner to further obvious implementation choices, without at any step requiring more than the application of ordinary skill (CLBA, I.D.9.21.10).

If a skilled person started from the system of document D4, which uses a hybrid optical and electrical cable, they would have intended to provide data and power to the far end of the cable.

Document D4 discloses a broadband node at the end of the cable. The opponent argues correctly (see reply to appeal on page 47), that a PoE switch was an obvious specific choice of a broadband node. This is in

particular true, since D4 already anticipates the general idea that power can be transmitted together with data, and so the broadband node does not need a local power supply. The board adds that a PoE switch was commonly generally known for its ability to connect and power peripheral devices, such as WiFi access points, VOIP telephony, and network cameras. It was commercially available. Choosing such a device as a specific implementation of the broadband node according to D4 was obvious and within the knowledge and routine of a skilled person.

Starting from D4 a skilled person would also have found the particular choice of 100 m as duct length as it was obvious. A de-cored coaxial cable was merely existing infrastructure and it represented also a duct in the terms of claim 1, and the opponent has convincingly shown that a typical length for blowing hybrid cables through such ducts, in particular through de-cored coaxial cables, was 50 to 400 metres, see document D23 loc. cit. The proprietor's doubts whether, like D4, D23 dealt with de-cored coaxial cables is not persuasive. D23 talks explicitly about removing the core of already laid copper cables, leaving only the existing cable sheath. Whether the outer sheath is a conductive shield as in a coaxial cable or not has no influence on whether and how far a new hybrid cable can be blown through the core and the proprietor has not explained how it could.

Continuing from these initial choices, a skilled person knew that PoE switches were required by industry standard to provide a supply voltage of 48 Vdc. It was therefore an immediately apparent and obvious choice that the PoE switch itself should be connected to a

source of 48 Vdc to avoid the need of further power conversion.

The board acknowledges that D4 already implied a third and a second converter. Having made the choice of supplying a PoE switch with 48 Vdc, a skilled person had to make the further choice concerning the power format for transport between the cable input and output. Contrary to the argument of the proprietor, such a choice was obvious. There would not have been an inventive realisation involved, according to which the conversion to direct current at the input of the cable allowed to make the cable diameter small enough to enable blowing. Rather, it was merely an obvious design choice that the transported power along the cable was high enough to provide 48 Vdc at the output, factoring in a voltage drop along the cable length, but not significantly higher than needed. It follows that a power format of 110 Vdc to 75 Vdc followed in an obvious manner from the choice of a PoE switch. The proprietor's argument that the choice of D4 as prior art would have confined any further development, which could have qualified as obvious, to using direct current, is not persuasive. While the general purpose and object of prior art items may have confined further "obvious" developments, the same is not true for every single detail of the prior art, such as the implementation detail in D4 of using 90 Vac.

5.5.3 In conclusion, starting from the system according to D4, the person skilled in the art would have arrived at the subject-matter according to claim 1 by merely making an initial obvious selection of a PoE switch for the implementation of a broadband node, and then making further obvious selections resulting therefrom merely using his ordinary skill.

5.5.4 The proprietor's main line of defence was the assertion that the choice of the first power format involved the surprising realisation that using dc voltages of a carefully chosen range was what enabled blowing the cable through ducts of over 100 m.

The board cannot accept this assertion. The proprietor fails to convincingly demonstrate that the choice of 110 Vdc maximum voltage was the prerequisite for an insulation thickness of less than 0.35 mm and therefore of making blowing of the cable possible in the first place. On the contrary, the opponent has convincingly demonstrated that cables with thinner insulation thicknesses than those claimed, such as 0.2 mm, which were designed for higher voltages than those claimed, for example 300 Vrms, were commercially available and commonplace. The fact that the evidence used to demonstrate these facts is from the field of automotive cables (D9) or domestic cables (D10) is immaterial for the conclusion.

Furthermore, the opponent has convincingly argued that it was quite obvious to a skilled person, based on D4, that the cable should not be too thick in order to facilitate blowing into a microduct of a given size. The ancillary counterargument of the opponent according to which there was no hint in the standard document D9 as to the criteria of choosing from the options of thick-wall, thin-wall and ultrathin-wall insulations, or that D9 did not contain any teaching concerning the relationship between the suitability of a cable for blowing and its thickness, is tantamount to denying a notional skilled person their ordinary skill.

The opponent also correctly argued that choosing between alternating and direct current did not involve an inventive step at the time of filing of the opposed patent. The board agrees with the opponent that the choice of direct current did not surprisingly enable thinner cable insulations. It was merely consequential to the choice of providing the PoE switch with a voltage which requires no further conversion to enable the standardised voltage output. Rather, there were exactly two options available from which to chose - alternating and direct current - both of which were well known to a skilled person and both of which might have had their distinctive advantages and disadvantages. However, making a choice on the basis of the knowledge of such advantages and disadvantages was precisely what fell in the realm of the routine tasks of a skilled person.

A further ancillary counterargument by the proprietor is that PoE switches could be powered by all sorts of voltages and that the chosen input voltage of 48 Vdc entailed surprising benefits, viz. the suitability of blowing of the cable over 100 m. In the board's view the opponent's arguments are persuasive and thus lead to the conclusion that no surprising benefit was achieved by 48 Vdc input voltage. It then follows that the mere presence of a host of possible input voltages to a PoE switch did not render a particular choice from that host of alternatives non-obvious.

5.6 In conclusion, the subject-matter of claim 1 according to auxiliary request V does not involve an inventive step within the meaning of Article 56 EPC.

6. It follows that the board considers that the decision under appeal to revoke the opposed patent according to Article 101(3)(b) EPC was justified.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

K. Boelicke R. Bekkering

Decision electronically authenticated