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Datasheet for the decision of 10 July 2025

Case Number: T 0828/23 - 3.5.04

Application Number: 14186759.8

Publication Number: 2822199

IPC: H04H40/90

Language of the proceedings: EN

Title of invention:
Low noise block (LNB) with optical output

Applicant:
Global Invacom Ltd.

Relevant legal provisions:
EPC Art. 76(1), 56
RPBA 2020 Art. 12(4)

Keyword:
Main request and auxiliary request 1 - subject-matter extends beyond the content of the earlier application (yes)
Auxiliary request 3 - amendment admitted (yes)
Auxiliary request 3 - inventive step (no)

Decisions cited:
T 0800/91

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Beschwerdekammern

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Case Number: T 0828/23 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 10 July 2025

Appellant: (Applicant)	Global Invacom Ltd. Unit 3 Caxton Place Caxton Way Potters Lane Stevenage, Hertfordshire SG1 2UG (GB)
Representative:	Wood, Graham Bailey Walsh & Co LLP 1 York Place Leeds, LS1 2DR (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 20 December 2022 refusing European patent application No. 14186759.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair	B. Willems
Members:	F. Sanahuja
	G. Decker

Summary of Facts and Submissions

I. The appeal is against the examining division's decision to refuse European patent application No. 14 186 759.8.

The application was filed as a divisional application of European patent application No. 07 705 240.5 ("the parent application"). The parent application is a Euro-PCT application within the meaning of Article 153(2) EPC. The underlying international application was published as WO 2007/096617 A2.

II. The documents cited in the decision under appeal included the following:

D1 US 6,424,817 B1
D3 US 2006/0030259 A1

III. The application was refused on the following grounds.

- Neither the main request nor auxiliary request 1 met the requirements of Article 76(1) EPC.

- Auxiliary request 2 was not admitted into the examination proceedings under Rule 137(3) EPC.

- The subject-matter of the claims of auxiliary request 3 did not involve an inventive step (Article 56 EPC).

- Claim 1 of auxiliary request 3 was not clear (Article 84 EPC).

IV. The applicant (appellant) filed notice of appeal. With its statement of grounds of appeal, the appellant maintained the main request and auxiliary request 1 that had formed the basis of the decision under appeal, withdrew auxiliary request 2 and filed a new auxiliary request 3. The appellant also provided arguments as to why the examining division's findings were incorrect.

V. The appellant was summoned to oral proceedings. In a communication under Article 15(1) RPBA, the board set out the following preliminary opinion.

- Neither claim 1 of the main request nor that of auxiliary request 1 met the requirements of Article 76(1) EPC.

- The board was minded to exercise its discretion under Article 12(4) RPBA by admitting auxiliary request 3 into the appeal proceedings.

- Claim 1 of auxiliary request 3 did not involve an inventive step over the combined disclosures of documents D1 and D3 (Article 56 EPC).

VI. In its reply dated 27 May 2025, the appellant provided arguments to counter the analysis of inventive step set out in the board's preliminary opinion.

VII. The appellant's final requests were that the decision under appeal be set aside and that a patent be granted on the basis of the claims according to the main request or auxiliary request 1 that had formed the basis of the decision under appeal, or on the basis of the claims according to auxiliary request 3 filed with the statement of grounds of appeal.

VIII. At the end of the oral proceedings, the chair announced the board's decision.

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

"*A low noise block (LNB) for receiving data which is transmitted thereto via one or more satellite transmission systems and an antenna with respect to which the LNB is located and said data is converted to an optical signal for transfer in an optical format to one or more premises, the LNB includes an integrated IF optical converter and also includes waveguide probes (249) which split the received data into vertical and horizontal polarization paths which lead to a~~n~~ [sic] IF diplexer (213; 243', 243'') in the range of 45MHz - 5.45GHz which provides the data from the said vertical and horizontal data paths to an IF frequency data stacker within the LNB to create a combined stacked data signal which is passed to a laser modulator (26; 215) which changes the format of the said stacked data signal into a single optical signal output (28) from the LNB and characterised in that the said laser modulator is provided integrally within the LNB such that the said frequency stacking and change of format of the received data is performed within the LNB such that all of the received data is carried in an optical format by the said single optical signal and output via a single fibre optic cable (16; 219) from the LNB.*"

X. Claim 1 of auxiliary request 1 reads as follows:

"*A low noise block (LNB) for receiving data which is transmitted thereto via one or more satellite transmission systems and an antenna with respect to which the LNB is located and said data is converted to*

an optical signal for transfer in an optical format to one or more premises, the LNB includes an integrated IF optical converter and also includes waveguide probes (249) which split the received data into vertical and horizontal polarization paths which lead to ~~a~~an [sic] IF diplexer (213; 243', 243'') in the range of 45MHz - 5.45GHz which provides the data from the said vertical and horizontal data paths to an IF frequency data stacker within the LNB to create a combined stacked data signal which is passed to an optical converter and a laser modulator (26; 215) and optical amplifier (217) which changes the format of the said stacked data signal into a single optical signal output (28) from the LNB and characterised in that the said optical converter and laser modulator and optical amplifier are provided integrally within the LNB such that the said frequency stacking and change of format of the received data is performed within the LNB such that all of the received data is carried in an optical format by the said single optical signal and output via a single fibre optic cable (16; 219) from the LNB."

XI. Claim 1 of auxiliary request 3 reads as follows:

"*A low noise block (LNB) for receiving data which is transmitted thereto via one or more satellite transmission systems and an antenna with respect to which the LNB is located and said data is converted to an optical signal for transfer in an optical format to one or more premises, the LNB incorporates an integrated IF optical converter, which includes:*

- *waveguide probes (249) to split the received data signal into vertical and horizontal polarization paths which lead to;*
- *an IF diplexer (213; 243', 243'') to provide the data from the said vertical and horizontal data*

paths to
- a laser modulator (26; 215) to change the format of the said data signal into a single optical signal output (28) from the LNB and
characterised in that the said waveguide probes (249), IF diplexer (213; 243', 243'') and laser modulator are provided integrally within the LNB such that the said change of format of the received data is performed within the LNB such that all of the received data is carried in an optical format by the said single optical signal and output via a single fibre optic cable (16) from the LNB."

Reasons for the Decision

1. *The invention*

The invention relates to a low noise block (LNB) for receiving data from satellite transmission systems. The LNB includes an intermediate frequency (IF) diplexer and a laser modulator which changes the format of the received data to a single optical signal. This signal is then output via a single fibre optic cable.

2. *Main request and auxiliary request 1 - content of the divisional application (Article 76(1) EPC)*

2.1 A European divisional application may be filed only in respect of subject-matter which does not extend beyond the content of the earlier application as filed (Article 76(1) EPC).

2.2 The examining division found that the subject-matter of claim 1 both of the main request and auxiliary request 1 extended beyond the content of the earlier

application (see points II.1 and II.2 of the decision under appeal).

Figures 2 and 8b of the parent application disclosed an LNB with an optical converter, as specified in claim 1 of both requests. However, neither these figures nor the related description disclosed an IF diplexer in the claimed frequency range or an "IF frequency data stacker".

2.3 The board agrees with the examining division that the subject-matter of claim 1 of both the main request and auxiliary request 1 extends beyond the content of the parent application for the following reasons.

2.3.1 When referring to the parent application, the board refers to the publication of the international application.

2.3.2 Neither Figure 2 nor the corresponding disclosure in the paragraph bridging pages 19 and 20 of the description of the parent application discloses a diplexer in the claimed frequency range.

The claimed frequency range of 45 MHz to 5.45 GHz is disclosed for the embodiment of Figure 7a which comprises a diplexer, external to the LNB, receiving satellite, Digital Audio Broadcast (DAB) and Digital Terrestrial Television (DTT, DTV) signals (see also the first and second full paragraphs on page 23 of the parent application). Figures 8a and 8b show some elements of Figure 7a integrated into the LNB. It could potentially be derived from Figures 8a and 8b that the input to "DTV IF DIPLEXER" 243'' is the DTV, DAB signal output by diplexer 247 shown in Figure 8a rather than the optional DTV signal shown in Figure 8b.

Diplexer 243'' would then be operating in the frequency range of 45 MHz to 5.45 GHz and outputting a signal to "LASER MODULATOR" 215.

2.3.3 However, claim 1 of both requests specifies that the "*IF diplexer (213; 243', 243'') in the range of 45 MHz-5.45 GHz*" receives data from waveguide probes and provides the data to an "IF frequency data stacker". Diplexer 213 in Figure 7a cannot correspond to the claimed diplexer because the former is not integrated into the LNB. Moreover, the claimed diplexer cannot correspond to "SAT IF DIPLEXER" 243' in Figure 8b, because this diplexer operates in a different frequency range. Further, the claimed IF diplexer cannot correspond to "DTV IF DIPLEXER" 243'' as the latter does not output a signal to an "IF frequency data stacker".

Therefore, the claimed diplexer does not have a basis in any of the diplexers disclosed in the parent application.

2.3.4 In addition, Figures 2, 7a, 8a and 8b of the parent application do not disclose any element that can be readily identified as the "IF frequency data stacker" of claim 1.

2.3.5 The board does not share the appellant's view that all of the embodiments of the parent application included an LNB with a diplexer and means for creating a combined stacked data signal which was processed to create a single optical signal output (see point 1 of the statement of grounds of appeal). This is because the parent application discloses LNBs which do not output an optical signal (see Figures 5 and 7a).

2.3.6 The argument that there was nothing to suggest to the reader that a frequency range other than the only one specified could or should be used for different embodiments of the invention (see point 5 of the statement of grounds of appeal) is not convincing. Indeed, Figures 2 and 8b of the parent application explicitly disclose using frequency ranges other than the claimed one for the IF diplexers in the LNB.

2.3.7 Furthermore, the board does not share the appellant's view that the use of the same reference numerals in the different embodiments of the parent application suggested that the features of those embodiments could be used in combination and were not mutually exclusive (see point 4 of the statement of grounds of appeal).

It is not apparent which "same reference numerals" the appellant was referring to. Moreover, reference numerals are not used consistently throughout the embodiments. For example, the IF diplexer in Figure 5 does not have the same reference numeral as the IF diplexer in Figure 8b. The same applies to the laser modulator in Figures 2, 7a and 8b.

2.4 In view of the above, claim 1 of both the main request and auxiliary request 1 contravenes the requirements of Article 76(1) EPC.

3. *Auxiliary request 3 - admittance (Article 12(4) RPBA)*

3.1 Under Article 12(2) and (4) RPBA, a submission constitutes an amendment if it is not directed to the requests, facts, objections, arguments and evidence on which the decision under appeal was based. Any such amendment may be admitted only at the discretion of the board.

Under Article 12(4) RPBA, the board must exercise its discretion in view of, *inter alia*, the complexity of the amendment, the suitability of the amendment to address the issues which led to the decision under appeal, and the need for procedural economy.

3.2 In the present case, the amendments to auxiliary request 3 do not substantially change the subject-matter of the proceedings. Thus, the board decided to admit this request into the appeal proceedings in the exercise of its discretion under Article 12(4) RPBA.

4. *Auxiliary request 3 - inventive step (Article 56 EPC)*

4.1 An invention is considered to involve an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art (Article 56 EPC).

In the following, the board applies the established "problem-solution approach" to assess whether the subject-matter of claim 1 involves an inventive step (see Case Law of the Boards of Appeal of the European Patent Office, "Case Law", 10th edition, 2022, I.D.2).

The technical problem as originally presented in the application, which is to be regarded as the "subjective" technical problem, may require reformulation on the basis of objectively more relevant elements not originally taken into account by the applicant. When formulating the technical problem, the only factor of importance in determining the problem objectively is the result actually achieved in relation to the closest state of the art. Any effect provided by

the invention may be used as a basis for reformulating the technical problem, as long as that effect is derivable from the application as filed (see Case Law, I.D.4.4 and I.D.4.4.2).

4.2 The examining division identified document D1 as the closest prior art for the assessment of inventive step (see point II.4.1 of the decision under appeal). The appellant did not dispute this and the board agrees with the examining division's view.

4.3 Document D1 discloses, using the wording of claim 1, an LNB for receiving data which is transmitted thereto via one or more satellite transmission systems and an antenna with respect to which the LNB is located (see dual-polarity low-noise block downconverter 30 for receiving satellite signals via an antenna in col. 3, line 63, to col. 4, line 5) and for transferring said data to one or more premises (see col. 4, lines 32 to 36), the LNB incorporates an integrated IF converter which includes:

- waveguide probes to split the received data signal into vertical and horizontal polarisation paths which lead to (see col. 4, lines 1 to 5)

- an IF diplexer to provide the data from the said vertical and horizontal data paths to an output port (see col. 4, lines 29 to 31)

wherein the said waveguide probes and IF diplexer are provided integrally within the LNB such that all of the received data is carried in a single signal and output via a single cable from the LNB (see col. 4, lines 32 to 36).

4.4 Document D1 does not disclose a laser modulator provided integrally within the LNB to change the format of the data signal into a single optical signal for the transfer thereof to the one or more premises via a single fibre optic cable. Thus, these features are to be regarded as the distinguishing features.

4.5 The examining division was of the opinion that these distinguishing features solved the problem of avoiding signal loss when distributing the data to multiple receivers (see point II.4.3 of the decision under appeal).

This appears to be due to the fact that fibre optic cables have a lower attenuation than conventional coaxial cables.

4.5.1 The appellant argued that the invention instead addressed the problem of how to distribute an increased volume of data in a commercially viable manner (see point 10 of the statement of grounds of appeal). The use of a laser modulator and a single fibre optic cable addressed the problem of capacity, both in terms of the number of dwelling units that could be served and the number of channels that could be provided to each dwelling unit.

The appellant referred to several passages of the application that recognised the capacity limitations of coaxial cables. The appellant further pointed to decision T 0800/91 to support its view that the objective technical problem should be derived from a problem stated in the application.

4.5.2 The board is not convinced that the technical problem formulated by the appellant specifically addresses the technical effect of the distinguishing features.

It is not apparent why the appellant is of the opinion that more dwelling units could be served solely as a result of using a fibre optic cable instead of a coaxial cable. This modification does not necessarily change the architecture of the distribution system. It only has an impact on the properties specifically associated with the transmission medium. Whether more dwelling units can be served will depend on the architecture of the system as a whole, which comprises additional elements to those claimed (such as splitters) to provide the satellite signal to each dwelling unit via a dedicated cable.

Even if the board were to accept the argument that fibre optic cables in general may allow a higher data volume to be transmitted than coaxial cables, the claimed LNB is not configured to distribute an increased volume of data; both document D1 and the claimed invention distribute the data volume received from the horizontally-polarised and vertically-polarised satellite signals. Nothing in claim 1 suggests that the received data signals carry a higher data volume than in document D1.

The objective technical problem must reflect the result actually achieved in relation to the closest state of the art. Although the starting point may be the problem identified in the patent application, this does not necessarily have to be the case if there is closer prior art of greater technical relevance to the claimed solution. This principle is actually reflected in decision T 0800/91 (see point 6 of the Reasons), which

was cited by the appellant itself. In the case at hand, document D1 discloses outputting all satellite data signals received over two polarisations using a single coaxial cable. Since the subject-matter of claim 1 does not necessarily achieve serving an increased number of dwelling units or the provision of an increased number of channels, the board considers the objective technical problem formulated by the examining division to be more appropriate in the present case.

4.5.3 Faced with the objective technical problem as identified above, the first and most logical step for the person skilled in the art would have been to consider replacing the limiting element - the coaxial cable - with a transmission medium with lower signal-loss characteristics. It was well known in the art at the time of priority that optical fibres exhibit significantly lower attenuation than coaxial cables. Thus, based on common general knowledge, a fibre optic cable would have been an obvious choice for this replacement.

Having identified a fibre optic cable for the replacement, the person skilled in the art would have needed to convert the electrical signal from the LNB into an optical signal. They would have selected a laser modulator - a well-known device for converting an electrical signal into an optical signal - for transmission of the signals over the fibre optic cable.

The person skilled in the art would then have been faced with integrating the laser modulator into the distribution system of document D1. Looking to the prior art for guidance on how to integrate a laser modulator into a satellite broadcast distribution system, they would have arrived at the disclosure of

document D3. This document discloses a single housing unit used in accordance with conventional LNBs and mounted on the antenna (see paragraph [0012]). The single housing unit comprises a bus interface for interfacing with a distribution network that may be based on light-wave guides, i.e. an optical distribution network (see paragraph [0014]). Thus, the person skilled in the art would have integrated the converter together with the LNB into a single housing unit and used it as a conventional LNB, as disclosed in document D3, without having to exercise any inventive skill.

4.5.4 The board acknowledges that the single housing unit disclosed in document D3 includes one or more receivers that selectively receive and demodulate a certain band from the data received by the antenna - as dictated by the subscriber - and transmits this demodulated signal to the subscriber through the bus system (see paragraphs [0010], [0011] and [0015] of document D3 and point 9 of the comments annexed to the appellant's letter dated 27 May 2025). Hence, the entire received signal in document D3 is not transmitted along the bus system.

However, the person skilled in the art faced with integrating the laser modulator into the satellite distribution system of document D1 would not be concerned with the specific demodulation scheme of document D3. Instead, they would recognise a general and transferable technical principle, also common in engineering, to integrate all necessary conversion and interface electronics into a single, compact housing (see paragraph [0025] of document D3).

4.6 The appellant argued that the most obvious solution to avoiding signal loss in the satellite distribution system of document D1 would have been to use additional amplifiers for the coaxial cables.

Even if this solution were to have been considered by the person skilled in the art for reducing signal loss, it would at best represent a further obvious solution to the technical problem, but it would not have prevented the skilled person from immediately recognising that fibre optic cables were suitable for that purpose.

4.7 The appellant also submitted that the aim of document D1 was to provide an inexpensive and economical distribution system that minimised losses in the digital distribution system using commonplace, inexpensive components. Hence, the person skilled in the art would not have been motivated to include an expensive laser modulator and replace the distribution network to make it suitable for transmitting optical signals (see points 6 and 7 of the comments annexed to the letter dated 27 May 2025).

The board is not convinced by these arguments. When faced with the problem at issue here, the person skilled in the art would not have been constrained by cost considerations; rather, they would have regarded the well-known low-attenuation properties of fibre optic cables as providing a technical solution to the problem posed, even if they were more expensive. Cost factors alone do not render a solution non-obvious if it delivers a clear technical advantage (such as reduced signal attenuation).

4.8 Additionally, the appellant argued that document D3 did not disclose how "light-waves guides" could be put into practice, as it did not teach how to convert the received and combined signal using laser modulation, a combination that would not have been obvious (see point 8 of the comments annexed to the letter dated 27 May 2025).

The board is not persuaded by these arguments. Laser modulation was a well-established method for converting electrical signals into optical signals on the date of filing of the present application. Therefore, the absence of explicit teaching in this regard in document D3 does not preclude the obvious application of standard conversion methods in the field of optical communications.

4.9 The appellant further reasoned that with the combined teachings of documents D1 and D3, the person skilled in the art would have only included a receiver to demodulate a required channel band and then send this selected channel band via light-wave guides to achieve reduced attenuation. Thus, the person skilled in the art was not taught to transmit the entire signal received by the antenna from the LNB along the distribution network in an optical format, and would not be motivated to solve that problem, as that was not the aim of the prior-art documents (see point 10 of the comments submitted with the letter dated 27 May 2025).

The board notes that document D1 already discloses distributing the entire received signal as a single electrical signal via the distribution network. As discussed in point 4.5 above, the person skilled in the art is faced with the technical problem of avoiding signal loss when distributing data to multiple

receivers. Given that the low attenuation properties of fibre optic cables were well known in the art, it is inconsequential to the case at hand whether the problem was discussed in the prior art. In view of this technical problem, it is not apparent why the person skilled in the art would have considered modifying the system of document D1 to have the LNB distribute only one channel band. This modification does not appear to be related to a reduction of signal loss and would have required upstream channel selection signalling and demodulation capabilities at the LNB.

4.10 According to the appellant (see point 11 of the comments submitted with the letter dated 27 May 2025), neither document D1 nor document D3 disclosed at what stage the conversion of the signals into optical signals should occur. If the conversion were to take place at the downconverters in the LNB, there would be two laser modulators outputting two laser-modulated signals - which would need to be combined using wavelength-division multiplexing (WDM) - rather than the single optical signal output as claimed.

The board finds that in view of the technical problem of avoiding signal loss when distributing data to multiple receivers, the person skilled in the art would have focused only on the distribution network and its interface. There is no apparent reason why the internal structure of the LNB should be modified prior to interfacing with the distribution network without a corresponding technical motivation. Therefore, the appellant's argument is unconvincing.

4.11 In view of the above, the subject-matter of claim 1 of auxiliary request 3 does not involve an inventive step over the combined disclosures of documents D1 and D3

and the common general knowledge of the person skilled in the art (Article 56 EPC).

5. *Conclusion*

Since claim 1 of both the main request and auxiliary request 1 contravenes the requirements of Article 76(1) EPC and claim 1 of auxiliary request 3 does not involve an inventive step (Article 56 EPC), the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

K. Boelicke B. Willems

Decision electronically authenticated