

United States District Court,
D. Delaware.

CIENA CORPORATION and Ciena Properties, Inc,
Plaintiffs.

v.

CORVIS CORPORATION,
Defendant.

Civil Action No. 00-662-JJF

Sept. 12, 2002.

William J. Marsden, Jr., Fish & Richardson, P.C., Wilmington, DE, for Plaintiffs.

Neal C. Belgam, Blank Rome LLP, Wilmington, DE, for Defendant.

MEMORANDUM ORDER

JOSEPH J. FARNAN, JR., District Judge.

Plaintiffs, Ciena Corporation and Ciena Properties, Inc. (collectively "Ciena") filed this action against Defendant, Corvis Corporation ("Corvis") alleging infringement of United States Patent Nos. 5,784,184 (the "'184 Patent"), 5,715,076 (the "'076 Patent"), and 5,038,309 (the "'309 Patent"). Corvis answered the Complaint asserting various defenses and two counterclaims. (D.I.17). Subsequently, Ciena filed a First Amended Complaint further alleging infringement of U.S. Patent No. 5,504,609 ("the '609 patent") and U.S. Patent No. 5,557,439 ("the '439 patent"). FN1 (D.I.60). Corvis filed its Answer and Counterclaims to the First Amended Complaint. (D.I.81). By letter dated May 24, 2002, the parties withdrew the ' 076 Patent from the litigation.

The parties briefed their respective positions on claim construction; however, due to the volume of briefing and disputed terms, the Court required the parties to limit the disputed terms. By letter dated April 19, 2002, the parties outlined the essential terms requiring the Court's construction. Thereafter, the Court held a *Markman* hearing on April 30, 2002. This Memorandum Order provides the Court's interpretation of the disputed claim terms.

BACKGROUND

The patents-in-suit are system patents that relate to equipment for use in a wavelength division multiplexing ("WDM") optical communication system. The technology of the patents allows for dense WDM systems ("DWDM"), dense in that the technology increases the wavelength capacity over a single fiber by permitting the transmission of closely-spaced wavelengths. The technology teaches how the entire WDM signal is transmitted and amplified so that it will reach the proper destination. Following transmission of wavelengths,

the technology of the patents teaches how the combined wavelengths will separate out at the destination, so that the proper signal is processed and sent to the appropriate customer. Further, the patents-in-suit disclose a DWDM system that is expandable and compatible with all vendor equipment.

LEGAL STANDARD

Claim construction is a question of law. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 977-78 (Fed.Cir.1995), *aff'd*, 517 U.S. 370, 388-90, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996). When construing the claims of a patent, a court considers the literal language of the claim, the patent specification and the prosecution history. *Markman*, 52 F.3d at 979. A court may consider extrinsic evidence, including expert and inventor testimony, dictionaries, and learned treatises, in order to assist it in construing the true meaning of the language used in the patent. *Id.* at 979-80 (citations omitted). A court should interpret the language in a claim by applying the ordinary and accustomed meaning of the words in the claim. *Envirotech Corp. v. Al George, Inc.*, 730 F.2d 753, 759 (Fed.Cir.1984). However, if the patent inventor clearly supplies a different meaning, the claim should be interpreted accordingly. *Markman*, 52 F.3d at 980 (noting that patentee is free to be his own lexicographer, but emphasizing that any special definitions given to words must be clearly set forth in patent). If possible, claims should be construed to uphold validity. *In re Yamamoto*, 740 F.2d 1569, 1571 & n. * (Fed.Cir.1984) (citations omitted).

THE COURT'S CLAIM CONSTRUCTION

1) "N"

In the papers submitted, Ciena argued that "N" means "two or more multiplexed optical wavelengths over an optical waveguide; the number of optical wavelengths N does not have to represent the total number of optical wavelengths present in the optical communication system." (D.I. 218 at 37). However, at the *Markman* hearing Ciena argued that "N" means "two or more." (D.I. 330, Ex. A at 21). Corvis contends once a value is selected for "N" in a claim, "N" has the same fixed value throughout the claim. (D.I.329, Ex. B-1).

The term "N" appears in claim 1 of the '609 Patent and claims 1, 4, and 7 of the '439 Patent. In construing this term the Court has considered the claim language where "N" is found. (D.I.218, Ex. 2, col.8, ln.7, Ex. 5, col.8, ln.67, col.9, ln.43, col.10, ln.23). In each independent claim, "N" is specifically defined as being "a whole number greater than or equal to two." (D.I.218, Ex. 2, col.8, ln.7, Ex. 5, col.8, ln.67, col.9, ln.43, col.10, ln.23). Because the claim language provides a clear and unambiguous definition, the Court concludes that "N" means two or more.

2) "Information-Bearing Optical Signal" "Non-Information-Bearing Optical Signal"

Ciena contends that "an information-bearing optical signal" is "an optical signal which has been coded with any type of information; any optical signal that has been modulated constitutes an information-bearing optical signal." (D.I. 330 at 18). Ciena also contends that a "non-information-bearing optical signal" is "an optical signal which has not been modulated." (D.I. 330 at 18). Corvis contends that an "information bearing optical signal" is "an optical signal which has been coded with information including but not limited to, audio signals, video signals, and computer data, generally through modulation; an information bearing optical signal does not result from the mere modulation in the absence of coding that signal with information." (D.I.329, Ex. 2).

The term "information-bearing optical signal" and "non-information-bearing optical signal" appear in claim 1 of the '609 Patent and claim 1[b] of the '184 Patent. In construing the disputed terms the Court has considered the patent specification of the '609 Patent. The patent specification states

[t]he expression "information-bearing optical signal," as used herein, refers to an optical signal which has been coded with information including, but not limited to, audio signals, video signals, and computer data generally through modulation. Similarly, the expression "non-information-bearing optical signal," as used herein, relates to CW optical signal which has not been coded with information, e.g. an optical carrier which has not been modulated.

(D.I.218, Ex. 2, col.3, ln.63-col.4, ln.4). Based on the Court's reading of the language quoted above, the Court concludes that the distinction between "information-bearing optical signals" and "non-information-bearing optical signals" is modulation. Accordingly, the Court concludes that "an information-bearing optical signal" is an optical signal which has been coded with any type of information; any optical signal that has been modulated constitutes an information-bearing optical signal and a "non-information-bearing optical signal" is an optical signal which has not been modulated.

3) "Plurality of Optical Communication Channels"

Ciena contends that "plurality of communication channels" should be construed, consistent with its plain and ordinary meaning, to mean "two or more optical communication channels; each optical communication channel providing an optical signal path separated in frequency from other optical signal paths." (D.I. 218 at 47). Similarly, Corvis contends that "plurality of optical communication channels" should be construed according to its plain and ordinary meaning to be "a plurality of optical communication channels, each of which has a distinct channel wavelength upon which information is placed." (D.I. 277 at 40). Corvis contends that "channel(s)" means "an optical communication channel, each having a distinct channel wavelength upon which information is placed." (D.I.329, Ex. 3).

The disputed term appears in claim 6[a] of the '609 Patent and claim 1[a] of the '184 Patent. (D.I.218, Ex. 2, col.9, ln.1-5, Ex. 3, col.9, ln.46-51). The Court understands the parties to primarily dispute the placement of information onto the wavelength. In construing this term the Court has considered the claim language, patent specification, and patent prosecution. (D.I. 218, Ex. 2 at col. 2, ln. 28-31, col. 5, ln. 51-54, Ex. 9 at 3). Based on this review, the Court concludes that it would be improper to impart information placement limitations into the preamble of the claim. Accordingly, the Court concludes that "plurality of communication channels" means two or more optical communication channels; each optical communication channel providing an optical signal path separated in frequency from other optical signal paths.

4) "Reception Wavelength (λ_j)"

Ciena contends that "reception wavelength (λ_j)" is "a wavelength that is included within the reflection band of a Bragg grating contained in a receiving system, and that is one of a number of non-information-bearing carrier optical signals that ranges from 1 to M." (D.I. 218 at 44). Corvis contends that "reception wavelength (λ_j)" is "the wavelength (λ_j) created by the light source of the carrier emitting element, the wavelength (λ_j) output by the remodulator, and the reception (λ_j) of the information bearing optical signal received by the optical systems." (D.I.329, Ex. 4).

The disputed term appears in claim 1 of the '609 Patent. (D.I. 218, Ex. 2, col. 8, ln. 13-21, 30-41, and 47-50). Specifically, claim 1 states in pertinent part:

at least M optical receiving systems, each receiving system configured to receive an information-bearing optical signal at a particular reception wavelength $(\lambda)_j$, where M is a whole number greater than or equal to N and *j* ranges from 1 to M, each receiving system including a demultiplexer having an optical filtering member comprising at least one Bragg grating member for selecting the particular reception wavelength $(\lambda)_j$, the Bragg grating member having a reflection band which includes the particular reception wavelength;

(D.I.218, Ex. 2, col.8, ln.13-21) (emphasis added). The Court finds Ciena's proposed construction to be wholly supported by the claim language. The claim language specifically defines "j" to range from 1 to M. Further, the claim language describes the particular reception wavelength as included within the Bragg grating, such Bragg grating contained in a receiving system intended to receive non-information bearing signals. Therefore, the Court concludes that "reception wavelength $(\lambda)_j$ " is a wavelength that is included within the reflection band of a Bragg grating contained in a receiving system, and that is one of a number of non-information-bearing carrier optical signals that ranges from 1 to M.

5) "Remodulator(s)"

Ciena contends that an "optical remodulator" or "remodulator" should be defined as "an optical interface between space-division transmission and wavelength-division transmission." (D.I. 218 at 41, 51). Corvis contends that a "remodulator" is "an element or combination of elements that perform a remodulation function of receiving an information bearing optical signal at an input wavelength and outputting an information bearing optical signal at an output wavelength." (D.I. 277 at 29).

The disputed term appears in claim 1 and 6 of the '609 Patent. (D.I.218, Ex. 2, col.8, 31-42, col.9, ln.10-16). In construing this term, the Court has considered the claim language and patent specification of the '609 Patent. (D.I.218, Ex. 2, col.3, ln.1-5, col.8, 31-42, col.9, ln.10-16). The Court concludes that "optical remodulator" or "remodulator" is an optical interface between space-division transmission and wavelength-division transmission.

Claim 1 of the '184 Patent states:

a plurality of remodulators optically communicating with the plurality of optical transmitters for converting the transmitted information-bearing optical signal to an electrical signal and placing the information from each of the information-bearing optical signals onto separate optical channels in the wavelength division multiplexed optical communication system

(D.I.218, Ex. 3, col.9, ln.55-col.10, ln.3).

Ciena contends that, in the '184 Patent, "plurality of remodulators" means "two or more optical remodulators; an optical interface between space-division transmission and wavelength-division transmission." (D.I. 218 at 51).

Corvis contends that, in this context, "plurality of remodulators ... for converting ... and placing" means "two or more optical remodulators; a remodulator is a device that includes an electro-optical converter, a transimpedance amplifier, a filter, a limiting amplifier, an external modulator and an optical source; the components of the remodulator work together to perform the function of taking an incoming information-

bearing optical signal from one of the optical transmitters, converting it to an electrical signal and placing that same information on a newly transmitted optical channel." (D.I. 277 at 51). Further, in the '184 Patent, Corvis contends that "remodulator(s)" should be construed under 28 U.S.C. s. 112(6) because the term is claimed using functional language, without reciting the structure in support thereof. (D.I.329, Ex. B-6-2).

In reply, Ciena contends that the term "remodulator" is a structural term not subject to the construction requirements of s. 112(6). (D.I. 260 at 30).

Because neither claim language employs the word 'means,' it is presumed that s. 112(6) does not apply. *See Personalized Media Communications, LLC v. International Trade Comm'n*, 161 F.3d 696, 703-04 (Fed.Cir.1998). To determine if this presumption has been rebutted, "the focus remains on whether the claim as properly construed recites sufficiently definite structure to avoid the ambit" of s. 112(6). *Id.* at 704.

Although, a structure is claimed followed by function, the Court concludes that "remodulator" is a sufficiently definite structural term to preclude the application of s. 112(6). *See Personalized Media*, 161 F.3d at 705. Therefore, the Court concludes that "remodulator" as found in claim 1 of the '184 Patent must be construed as it is construed for the other patents-in-suit. Accordingly, "remodulator" means an optical interface between space-division transmission and wavelength-division transmission.

6) "Channel Selecting Element Optically Communicating With The Optical Input Port For Selecting A Particular Optical Channel"

Ciena contends that "channel selecting element optically communicating with the optical input port for selecting a particular optical channel" means "an optically selective component optically communicating with the optical input port of the remodulating channel selector and that optically selects at least one optical channel to be processed by the remodulating channel selector." (D.I. 218 at 57).

Corvis contends that the disputed term means "a channel selecting element is a Bragg grating, a multilayer interference filter, a tunable Fabry-Perot selector, a wavelength router or the equivalent of the above; the channel selecting element communicates with the input port and selects, from all of the optical channels in the wavelength division multiplexed optical communication system, a single optical channel to be remodulated by the remodulating channel selector." (D.I. 277 at 56-57).

Claim 1 of the '184 Patent states:

a plurality of remodulating channel selectors optically communicating with the optical waveguide, each remodulating channel selector comprising:

...

a channel selecting element optically selecting element optically communication with the optical input port for selecting a *particular* optical channel from the wavelength division multiplexed optical communication system

(D.I.218, Ex. 5, col.10, ln.21-24). The Court understands the parties to dispute the proper construction of "particular optical channel;" Ciena contends that particular means at least one optical channel wavelength, Corvis contends that particular means a single optical channel wavelength. In construing this term the Court

considered the claim language and the similar claim language in the related '076 Patent. Specifically, the claim language of the '076 Patent states in relevant part "for optically selecting a single optical channel." (D.I. 218, Ex. 4 at col. 10, ln. 4-5). Thus it is clear the patentee knew the difference between "single" and "particular." Further, the term "a," when used in connection with the transitional phrase "comprising" should be construed to mean one or more. *See Elkay Mfg. Co. v. Ebco Mfg. Co. ,* 192 F.3d 973, 977-78 (Fed.Cir.1999). Because, it is clear that the patentee knew how to claim a single optical channel, and the use of "a" in conjunction with "comprising," the Court cannot conclude that particular is equivalent to single. Accordingly, the Court concludes that "channel selecting element optically communicating with the optical input port for selecting a particular optical channel" means an optically selective component optically communicating with the optical input port of the remodulating channel selector and that optically selects at least one optical channel to be processed by the remodulating channel selector.

7) "Each Bragg Grating Configured To Select A Particular Optical Channel"

Ciena contends that "each Bragg grating configured to select a unique optical channel wavelength" means "each Bragg grating optically selects at least one optical channel wavelength." (D.I. 218 at 71). Corvis contends that the disputed term means "each Bragg grating is configured to select a single respective one of the N optical channels in the wavelength division multiplexed optical communication system." (D.I. 277 at 73).

The disputed term appears in claims 1, 4, and 7 of the '439 Patent. (D.I.218, Ex. 5, col.9, ln.21-22, 58-59, col.10., ln.48-49). As with the previous term, the parties dispute centers on the optical channel wavelength selected; Ciena proposes at least one optical channel wavelength, Corvis proposes a single optical channel wavelength. In construing this term, the Court has considered the claim language and the patent specification. (D.I.218, Ex. 5, col.3, ln.28-33, col.9, ln.21-22, 58-59, col.10., ln.48-49). The Court has not considered the preferred embodiment, as suggested by Corvis. (D.I. 277 at 73 citing col. 6., ln. 51-col. 8, ln. 16). Based on this review and its conclusion above, the Court cannot conclude that the optical channel wavelength selected is limited to a single optical channel wavelength. Therefore, the Court concludes that "each Bragg grating configured to select a unique optical channel wavelength" means each Bragg grating optically selects at least one optical channel wavelength.

8) "Remodulating Channel Selector"

Ciena contends that "remodulating channel selectors" is "an integrated optical interface between wavelength-division transmission and further optical transmission." (D.I. 218 at 54). Corvis contends that "remodulating channel selector" is "an element or combination of elements that performs the function of receiving all of the optical channels from the remodulators, selecting one optical channel from the plurality of such channels, and outputting a modulated signal containing the information from the one optical channel that was selected." (D.I.329, Ex. 7).

The disputed term appears in claim 1 of the '184 Patent. (D.I.218, Ex. 3, col.10, ln.15-17). The Court understands the parties to dispute the "integration" of the remodulating channel selector. In construing this term, the Court has considered the claim language and the patent specification. (D.I. 218, Ex. 3, Figure 3, col. 2, ln. 43-54, col. 9, ln. 1-21). The Court concludes that because the claim language requires that the "remodulating channel selector" include an "optical input port" and "output port" the "remodulating channel selector must be configured as an integrated structure. Accordingly, consistent with the construction of "remodulator," the Court concludes that "remodulating channel selectors" means an integrated optical interface between wavelength-division transmission and further optical transmission.

9) "Separately-Packaged"

Ciena contends that "separately-packaged" means "each optical channel selecting module is physically enclosed in a housing separate from the optical splitter module." (D.I. 218 at 71). Corvis contends that "separately-packaged optical channel selecting modules" means "each of the N optical channel selecting modules is packaged separately from all other optical components, such as the optical splitters and receivers. (D.I.).

The disputed term appears in claim 1 and 4 of the '439 Patent. (D.I.218, Ex. 5, col.9, ln.19, col.9, ln.56). In construing this term the Court has considered the claim language and the patent specification. (D.I.218, Ex. 5, col.6, ln.38-42, col.9, ln.19, col.9, ln.56). Specifically, the patent specification states:

As used herein, the expression 'separately packaged' describes the manner in which the optical components are housed. The splitter is enclosed by a housing separate from the housing which enclose each wavelength selecting module.

(D.I.218, Ex. 5, col.6, ln.38-42). Based on its review, and particularly the language quoted above, the Court concludes that "separately-packaged" means each optical channel selecting module is physically enclosed in a housing separate from the optical splitter module.

10) "Each Amplifier Having At Least First And Second Amplifier Stages"

Ciena contends that "each amplifier having at least first and second amplifier stages" means "an optical amplifier having a first amplifier stage separate from a second amplifier stage." (D.I. 218 at 40). Corvis contends that "each amplifier having at least first and second amplifier stages" means "each amplifier positioned along the optical waveguide has at least first and second amplifier stages." (D.I. 277 at 26).

The disputed term appears in claim 1 of the '609 Patent. (D.I. 218, Ex. 2 col. 8, ln. 24-29). Specifically, the claim language provides in pertinent part: "a plurality of optical amplifiers positioned along the optical waveguide, each optical amplifier having at least first and second amplifier stages, interconnected by an optical connection element." (D.I. 218, Ex. 2 col. 8, ln. 24-29). The Court understands the parties to dispute whether the first and second amplifier stages must be separate. The Court concludes that the plain language of the claim itself requires a first amplifier stage and a second amplifier stage; such a delineation would not be present in the claim language if the amplifier had only a single, continuous stage. Accordingly, the Court concludes that first amplifier stage must be separate from the second amplifier stage. Thus, the Court concludes that "each amplifier having at least first and second amplifier stages" means an optical amplifier having a first amplifier stage separate from a second amplifier stage.

11) "Coupled"

Ciena contends that "coupled" means "the transfer of energy over a conductive or dielectric medium, such as an optical waveguide or wire." (D.I. 330 at 10). Corvis contends that "coupled" with regard to electrical devices means "the transfer of an electrical signal over an electrically conductive medium." Corvis also contends that "coupled" with regard to optical devices means "the transfer of an optical signal over a dielectric medium, such as an optical waveguide."

The term coupled appears in claims 7, 8, 11, and 12 of the '309 Patent. (D.I. 218, Ex. 6 at col 10. ln. 1-6, 31-

34, 44-51, and 55-62). In construing the disputed terms the Court has reviewed claim language and patent specification of the '309 Patent. (D.I. 218, Ex. 6 at col. 5 ln. 66-col. 6 ln. 1, col. 6 ln. 6-8 and 34-36, col 10. ln. 1-6, 31-34, 44-51, and 55-62). Based on this review, the Court finds Corvis' proposed definition unduly narrow. The term "coupled" is a broad term which is not limited by the claim language, patent specification, or prosecution history. Therefore, pursuant to its plain and ordinary meaning, the Court concludes that "coupled" means the transfer of energy over a conductive or dielectric medium, such as an optical waveguide or wire.

12) "External Modulator"

Ciena contends that "external modulator" is "a modulator that acts on the optical carrier signal output from a signal emitter, as opposed to acting on the signal emitter itself." (D.I. 218 at 45).

Corvis contends that "external modulator" should be defined as "a device optically communicating with the light source output waveguide for imparting information from the electrical signal onto the non-information-bearing carrier optical signal situated in the light source output waveguide." (D.I.329, Ex. B-11). Further, Corvis contends that the recitation of an "external modulator" does not imply any specific structure, but is used with functional language to set forth the function of the element, which should be construed under 35 U.S.C. s. 112(6) as a means clause. (D.I. 277 at 35). Corvis contends that the absence of structure and presence of functional language dictates that the construction of the term should be made pursuant to 35 U.S.C. s. 112(6) by pointing to passages in the specification that describe the general function claimed. (D.I. 277 at 36). Alternatively, Corvis contends that if s. 112(6) is determined not to apply, the term should be limited to the specific structure delineated in the patent's specification. (D.I. 277 at 36).

In reply, Ciena contends that s. 112(6) is not applicable to the "external modulator," in that the disputed term corresponds to structure, not function. (D.I. 260 at 16).

The disputed term appears in claim 1 and 6 of the '609 Patent. (D.I.218, Ex. 2, col.8, ln.51-55, col.9, ln.27-col.10., ln.1-3). Claim 1 states in relevant part:

an external modulator optically communicating with the light source output waveguide for imparting information from the electrical signal onto the non-information-bearing carrier optical signal situated in the light source output waveguide

(D.I.218, Ex. 2, col.8, ln.51-55). Claim 6 states in relevant part:

an external modulator for modulating the optical carrier signal emitted by remodulator laser, the external modulator communicating with the electrical signal output from the opto-electronic conversion element for imparting the information from the electrical signal to the optical signal through the external modulator to create an information -bearing optical signal corresponding to an optical channel in the wavelength division optical communication system

(D.I.218, Ex. 2, col.9, ln.27-col.10., ln.1-3). Because neither claim language employs the word 'means,' it is presumed that s. 112(6) does not apply. *See Personalized Media Communications, LLC v. International Trade Comm'n*, 161 F.3d 696, 703-04 (Fed.Cir.1998). To determine if this presumption has been rebutted, "the focus remains on whether the claim as properly construed recites sufficiently definite structure to avoid the ambit" of s. 112(6). *Id.* at 704.

Although a structure is claimed followed by function, the Court concludes that "external modulator" is a sufficiently definite structural term to preclude the application of s. 112(6). Further, even though the term "external modulator" does not specifically evoke a particular structure, it does convey to one knowledgeable in the art a variety of structures, such as an "electro-optic external modulator," a "Mach-Zendher interferometer," and "an electro-absorption external modulator." (D.I.218, Ex. 2, col.8, ln.56-61, 65-67). *See Personalized Media*, 161 F.3d at 705. Therefore, the Court concludes that s. 112(6) is not applicable.

In construing the disputed term, the Court has considered the claim language and patent specification. (D.I.218, Ex. 2, col.4, ln.27-30, ln.48-50, col.8, ln.51-55, col.9, ln.27-col.10., ln.1-3). The patent specification states "[a]s used herein, the expression 'external modulator' includes any modulator which acts on an optical carrier emitted from a continuous wave (CW) optical source, such as a laser." (D.I.218, Ex. 2, col.4, ln.27-30). The patent specification further states "[e]xternal modulator 36 acts on the optical carrier signal output from laser 37, as opposed to acting on the laser itself or on a laser driver, as occurs in direct modulation systems." (D.I.218, Ex. 2, col.4, ln.48-50). Based on the language quoted above, the Court concludes that "external modulator" means a modulator that acts on the optical carrier signal output from a signal emitter, as opposed to acting on the signal emitter itself.

13) Other Terms

By Letter dated April 19, 2002, the parties agreed upon a definition for the "means for placing the information from the selected optical channel onto optical signal generated by the optical signal generator" described in Claim 1 of the '184 Patent. (D.I.). Because the term is not in dispute the Court will not construe the term, nor will the Court include this term in its claim construction order. The parties, of course, are free to enter a stipulation as to the definition of this term.

SO ORDERED.

FN1. The '184, '309, '609, and '439 patents will be collectively referred to as the "patents-in-suit."

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