

United States District Court,  
D. Delaware.

**PIRELLI CABLE CORPORATION,**  
Plaintiff.

v.

**CIENA CORPORATION,**  
Defendant.

**CIENA CORPORATION,**  
Counterclaim Plaintiff.

v.

**PIRELLI CABLE CORPORATION, Pirelli S.p.A., and Pirella Cavi S.p.A,**  
Counterclaim Defendants.

CIV. A. No. 96-625 MMS

**Nov. 17, 1997.**

Opinion Granting Reargument in Part Feb. 18, 1998.

Patentee brought action against competitor, alleging infringement of its fiber optic cable patents. Following *Markman* hearing, the District Court, Murray M. Schwartz, Senior District Judge, held that: (1) requirement that optical service signal be of "different" wavelength from optical communication signal required difference in wavelength that allowed for signal separation by optical couplers that existed at time of invention; (2) "input/output" port of optical coupler claimed in patent could be either bidirectional connection or connection that supported only input or output connection; (3) "second optical signal laser transmitter" was equivalent to a laser; (4) "laser piloting means" functioned by variably controlling input of laser in adapter through use of direct modulation in order to produce directly corresponding output; (5) "detection means" was peak detector that detected optical telecommunication signals and comparator which recognized absence of signal; and (6) "interrupting means" interrupted flow of optical telecommunication signals.

Ordered accordingly.

5,113,459, 5,267,073, 5,278,686. Cited.

Robert W. Whetzel, Francis DiGiovanni, Richards, Layton & Finger, Wilmington, DE (Michael A. Epstein, Alan J. Weinschel, Steven D. Glazer, Daniel A. DeVito, Weil, Gotshal & Manges LLP, New York, NY, of counsel), for plaintiff and counterclaim defendants.

Jack B. Blumenfeld, Morris, Nichols, Arsht & Tunnell (Albert E. Fey, W. Edward Bailey, A. Peter Adler, Fish & Neave, New York, NY, of counsel), for defendant and counterclaim plaintiff.

***OPINION***

## I. INTRODUCTION

Pirelli Cable Corporation ("Pirelli") filed a complaint against Ciena Corporation ("Ciena") alleging infringement of five of its United States Patents concerning fiber optic technology. *See* Docket Item ("D.I.") 1, at para. 1. Ciena answered Pirelli's complaint and brought a counterclaim for a declaratory judgment that the patents in suit are invalid and not infringed by Ciena, and joined Counter Defendants Pirelli S.p.A., Pirelli Cavi S.p.A. and Pirelli General plc. D.I. 9, at para. 19. FN1 Subsequently, two of the patents in suit, U.S. Patent No. 5,282,079 and U.S. Patent No. 5,355,250, have been dismissed. The remaining patents are U.S. Patent No. 5,113,459 ("the '459 Patent"), U.S. Patent No. 5,267,073 ("the '073 Patent"), and U.S. Patent No. 5,278,686 ("the '686 Patent").

FN1. Pirelli General plc has been dismissed as a party from the case by joint stipulation of the remaining parties.

Pursuant to *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996), the Court scheduled briefing and oral argument for purposes of construing the disputed claim language of these three remaining patents in suit. The Court's construction of the disputed claim language follows.

## II. FACTUAL BACKGROUND

Telecommunications is an important part of the global infrastructure of the Information Age. Communication by wire remains an important part of that infrastructure. The three patents remaining in suit relate to a specific type of telecommunications technology, "fiber optic telecommunications". Initially, telephone companies used copper wires to transmit electrical signals. However, the need for a more efficient method of transmitting telecommunication signals arose with the rise of the personal computer and associated modem, fax and Internet technologies. Because copper wire is limited in its ability and capacity to carry high speed communications, telecommunications companies turned to ultra-thin strands of ultra-pure glass, or "optical fibers," which have a higher capacity and are a faster transport medium than copper.

In an optical fiber telecommunication system, information is carried by an optical, light signal rather than an electrical signal. Because much of the world's telecommunications systems run on the old copper wires that carry electrical signals, the electrical signals must be converted to optical signals by an optical transmitter, which is usually a laser. The laser works by converting these electrical signals into light pulses of a certain wavelength that carry the encoded information down the optical fiber. At the other end of an optical fiber, the optical signals are then reconverted back into electrical signals by a photo detector, where they then can travel to individual telephones, computers, etc.

However, as optical signals travel down an optical fiber, the signal fades. As a result, optical amplifiers must be added to the line every so often so that the signal strength is maintained. Different optical signals can travel different distances down an optical fiber before fading depending on the optical signal's wavelength. This characteristic of the optical fiber is referred to as "attenuation". The lower the attenuation, the farther the optical signal can travel; the higher the attenuation, the shorter the distance.

Silica gel fiber, of which fiber optic lines are made, have a particular attenuation curve which allow certain optical wavelengths to travel further before fading. Those portions of the curve where the attenuation is relatively low, compared to proximate regions of the attenuation curve, are referred to as "silica gel attenuation windows". These windows represent those wavelengths at which the attenuation characteristics are most favorable in allowing the optical signals to travel the furthest. There are three such windows on the silica gel attenuation curve.

One way that optical amplifiers can operate is by seasoning or doping the fiber inside an amplifier with the rare-earth element, erbium. An erbium-doped fiber amplifier ("EDFA") works by producing an exact but amplified replica of the incoming light signals, which include the information encoded on them. However, these EDFAs are not compatible with the existing line terminal equipment (LTE), which collects transmitted electrical information signals and converts them to optical signals that can then be sent over the long-distance fiber optic system. The heart of the problem is that LTEs and EDFAs operate on different wavelengths. When a LTE sends out a light signal of a certain wavelength it cannot be properly amplified by the EDFA operating at a different wavelength. As a result, the signal would fade before it arrived at its terminal point.

In addition to the EDFA compatibility problem, increased demand since the time of the development of fiber optic cables has forced telecommunication companies to find a method to squeeze more capacity from their existing optical strands. The way that they eventually increased capacity was through a process called wavelength-division multiplexing ("WDM"). Instead of sending one information-encoded light signal over an optical fiber, WDM operates by combining several encoded light signals into one composite signal and then sending the resulting composite signal over the optical fiber. This process vastly increases the amount of optical signals that can travel down the line at any one time thereby increasing the capacity of the telecommunication system. In addition, telecommunication companies have used WDM to send both optical communication signals and optical service signals, which help monitor the proper functioning of the system, down the fiber optic line simultaneously.

However, the WDM process did not solve the incompatibility between the LTEs and the EDFA amplifiers. The three patents in suit involve technology that both makes LTEs compatible with EDFA amplifiers and advancements related to this new fiber optic technology. These advances allow telecommunication companies to send optical signals further distances, while monitoring the system and protecting maintenance personnel from injury.

### *The '459 Patent*

Whereas normal communication signals for telephones, personal computers, faxes, etc., use optical light signals at a given wavelength, optical signals of another wavelength are used to carry service signals. In fiber optical communications systems that use EDFA optical amplifiers, there is no break in the optical fiber whereby optical service signals can be taken out of the cable and transformed into electrical signals. Optical service signals must be extracted and converted into electrical signals because the monitoring system can only read electric signals. In addition, these electrical signals need to be separately amplified so that when they are reinjected into the fiber optic line downstream from the EDFA amplifier, they are at the same amplitude as the optical communication signals. Further, the utilization of electrical signals must be done without disturbing the on-going optical communication signals that are associated with the optical service signals.

The problem that the '459 Patent solves is devising a process which is able to separate the optical service signal from the optical communications signal without disturbing the transmission of the communications signal. The '459 invention developed a process which utilizes a device, an optical coupler, which is able to separate the optical service signals from the optical communication signals along different points on the line so that the optical service signal may be converted to an electrical signal. The optical coupler *per se* is not the invention claimed under the '459 Patent. Optical couplers were known devices before this patent issued. What is patented under this invention is the process by which optical service signals are separated from optical communication signals so that they can be converted into electrical signals and, thereafter, be amplified and monitored without disturbing the corresponding optical communication signal.

The parties' claim construction dispute is two-fold. First, whether the optical communication signal and the optical service signal wavelengths must be substantially different or just sufficiently different so that the optical coupler can separate the two signals. Second, whether the optical coupler must have three ports with the following characteristics: one input, one output, and one bidirectional input/output.

### ***The '073 Patent***

Because EDFA optical amplifiers are incompatible with LTEs, the '073 Patent describes a system in which adapters are inserted between the LTE and the amplifier in order to bridge this incompatibility. The invention operates by having an adapter at the sending terminal convert the signal produced by the transmitter to a signal having the parameters appropriate for the EDFA optical amplifier. A second adapter at the receiving terminal then reconverts the signal into a signal with the parameters appropriate for the receiver.

There are currently two claim construction disputes between the parties concerning the '073 Patent. First, whether a "second optical signal laser transmitter" is a laser alone or a laser plus a modulated signal. Second, whether the "laser piloting means" described in the claim language may operate by direct modulation only or whether it may also operate through external modulation.

### ***The '686 Patent***

Because the laser light used in fiber optic telecommunications systems can potentially cause damage to eyesight of maintenance personnel if the fiber breaks, it is common to provide a mechanism to detect fiber breaks and, thereafter, interrupt the signal on the damaged fiber optic line. The '686 Patent claims an invention which detects the loss of a signal if the optical fiber line upstream has a break. The detection device then alerts an interruption device which interrupts the signal from continuing down the line.

Optical fibers usually exists in pairs, with one fiber connecting a transmitter to a receiver in one direction, say west to east, while the other fiber connects a transmitter to a receiver in the other direction, east to west. At the end of each fiber pair is a line terminal which contains one receiver and one transmitter which are connected to one another. Therefore, one can think of a properly operating optical fiber pair as a loop.

The '686 Patent prevents emission of laser light from a broken fiber by using EDFA optical amplifiers, rather than the electrical regenerators that had been previously utilized. At the output of each optical amplifier, a device checks for the absence of communication signals. If there is such an absence, an optical switch is opened thereby interrupting the optical signal emitted by the amplifier. There are usually a number of optical amplifiers along a given line. Downstream amplifiers also have detection devices that pick up the absence of communication signals and this effect cascades down the optical fiber pair until the optical

amplifier upstream from the fiber break is affected and the emission of laser light is prevented from the fiber break.

The dispute between the parties centers on two "means" described in the patent. First, whether the "detection means" must discriminate between communication signals and other optical signals. Second, whether the "interruption means" must operate by completely terminating the optical signal or whether the signal need only be reduced so that it is no longer harmful to human eyesight.

### III. APPLICABLE LAW FOR MARKMAN HEARINGS

Determining whether a patent has been infringed is a two-step process. First, the claim language must be construed to determine the meaning and scope of the claim. Second, a comparison must be made between the claims as construed and the accused device or process. *See Serrano v. Telular Corp.*, 111 F.3d 1578, 1582 (Fed.Cir.1997). The first step is known as claim construction or claim interpretation and is left exclusively to the Court during the *Markman v. Westview Instr., Inc.*, 52 F.3d 967 (Fed.Cir.1995) phase of the patent infringement suit. *See Eastman Kodak Co. v. Goodyear Tire & Rubber Co.*, 114 F.3d 1547, 1552 (Fed.Cir.1997).

[1] When performing claim construction, the Court "look[s] first to the intrinsic evidence of the record, i.e., the patent itself, including the claims, the specification, and if in evidence, the prosecution history." *CVI/Beta Ventures, Inc. v. Tura LP*, 112 F.3d 1146, 1152 (Fed.Cir.1997) (quoting *Vitronics Corp. v. Conceptronic Inc.*, 90 F.3d 1576, 1582 (Fed.Cir.1996)). FN2 Without doubt, the claim itself is the first and most important source of the meaning and scope of the patent. *See Eastman Kodak*, 114 F.3d at 1552. The words of the claim are to be interpreted according to their ordinary and customary meaning unless a special definition is stated in the specification or prosecution history. *See Vitronics*, 90 F.3d at 1582.

FN2. Patent claims "particularly point out and distinctly claim the subject matter which the applicant regards as his invention." *Markman*, 517 U.S. at ---- - ----, 116 S.Ct. at 1387-88 (quoting 35 U.S.C. s. 112). The patent specification "describes the invention 'in such full, clear, concise, and exact terms as to enable any person skilled in the art ... to make and use the same.'" *Id.* at ----, 116 S.Ct. at 1388. Lastly, the prosecution history "contains the record of all the proceedings before the Patent and Trademark Office, including any express representations made by the applicant regarding the scope of the claims." *Vitronics*, 90 F.3d at 1582.

[2] [3] Although the specification and prosecution history are not given the same weight as the claim language, these sources are consulted to give the necessary context to the claim language. *Id.* In particular, the patent specification has been described as "often the single best guide to the meaning of a disputed term" and can be used "to determine whether the inventor has used any terms in a manner inconsistent with their ordinary meaning." *Vitronics*, 90 F.3d at 1582. The prosecution history, on the other hand, may limit the interpretation of the disputed language to meanings not disclaimed by the inventor during the prosecution of the patent. *See CVI/Beta Ventures*, 112 F.3d at 1155 (quoting *Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1579 (Fed.Cir.1995), *cert. denied*, 516 U.S. 987, 116 S.Ct. 515, 133 L.Ed.2d 424 (1995)).

[4] [5] [6] If after the intrinsic evidence of the patent has been considered the meaning of the claim language is still not clear, the court may consider extrinsic evidence, "if necessary to aid the court's understanding of the patent." *See Wright Medical Technology, Inc. v. Osteonics Corp.*, 122 F.3d 1440, 1443

(Fed.Cir.1997). Extrinsic evidence, in the claim construction context, refers to expert testimony, the testimony of the inventor, technical treatises, or dictionaries. *See* CVI/Beta Ventures, 112 F.3d at 1152-53. FN3 Thus, if the intrinsic evidence contained within the patent unequivocally describes the meaning and scope of the disputed language, reliance on extrinsic evidence is improper. *See* Vitronics, 90 F.3d at 1583. FN4

FN3. Technical treatises and dictionaries are favored over other forms of extrinsic evidence and may be consulted in conjunction with the public record in order to understand the underlying technology of the claim. *See* Vitronics, 90 F.3d at 1584 n. 6. However, these sources may not contradict anything in the patent documents. *See id.*

FN4. The reason extrinsic evidence is given such light regard in the claim construction context is because it is thought that the public is entitled to rely on the public record of the patentee's claim. If extrinsic evidence was relied on to a greater extent, competitors would not be able to properly develop non-infringing designs and processes. *See* Vitronics, 90 F.3d at 1583.

All of the above principles will be applied in construing the pertinent language of the three patents.

#### IV. CLAIM CONSTRUCTION ANALYSIS OF THE '459, '073, AND '686 PATENTS

##### A. THE '459 PATENT

Pirelli has put two phrases, contained in both claims 1 and 7 of the '459 Patent, at issue.

##### **1. "A first predetermined wavelength" and "a second predetermined wavelength different from said first predetermined wavelength"**

[7] There is no dispute between the parties that "a first predetermined wavelength" refers to an optical communication signal and that "a second predetermined wavelength" refers to an optical service signal. The crux of the matter is how different is "different". Ciena argues that the two wavelengths must be "substantially different". Pirelli refutes this contention by saying "different" means "sufficiently different" so that an optical coupler can properly separate the two wavelengths. There is also no dispute that neither prosecution history nor extrinsic evidence shed any light on how this specific language should be construed.

##### **(a) *The Claim Language***

As dictated by the foregoing claim construction principles, the Court starts with the language of the claim itself. In both claim 1 and claim 7 of the '459 Patent, the claim, in relevant part, reads: "[A]n optical communication signal transmitter for transmitting optical communication signals of a first predetermined wavelength; ... a second predetermined wavelength *different* from said first predetermined wavelength...." Col.7, lines 57-59 and Col.8, lines 19-21 (claim 1); Col.9, lines 1-3 and 29-31 (claim 7) (emphasis added).

Pirelli's position is that the term "different" is clear and unambiguous from the claim. Pirelli construes "different" as "any two optical wavelengths sufficiently different so that they can be separated from one another." *See* D.I. 79, at 10. In particular, Pirelli points out that the word "different" is not further characterized anywhere else in the claim and there is no basis in the claim language itself for the limitation

supplied by the word "substantially".

### **(b) *The Specification***

Ciena relies on the language of the specification for the argument that the two wavelengths must be "substantially different". Specifically, Ciena cites the following language:

[I]n order for such couplers to operate correctly, with a complete separation between the extracted signals and the unaltered signal and with a reduced attenuation of the signals themselves, they must operate between wavelengths that are *substantially different* whereas optical communications are accomplished in a fairly narrow range of wavelengths where the transmission characteristics of the fiber are better.

Col. 1, line 68 through Col.2, line 8 (emphasis added). This "substantially different" language is found again in the specification, *see* Col.2, lines 25-30, and in another section where the two wavelengths are selected to be "appreciably different" from one another. *See* Col.4, lines 57-60. Ciena concludes that this limitation found in the specification language precludes the use of closely spaced wavelengths for the service and communication signals.

In rebuttal, Pirelli points to another section of the specification which states that, "a different wavelength ... may be adopted for the service signals ... as long as it is sufficiently far from the range of transmission signal wavelengths as to allow the making of the corresponding optical couplers." Col.7, lines 30-38. Further, Pirelli advances two other arguments. First, it is impermissible to read limitations from the specifications into the clear language of the claims, especially where a claim term does not say it must have a particular definition. Second, Pirelli asserts that under the rule of claim differentiation, independent claims 1 and 7 should not include the limitations sought to be read into them because those limitations already appear in dependent claims 4 and 5. FN5

FN5. Claim 4 of the '459 Patent reads:

An optical fiber transmission system as set forth in claim 1 wherein said second wavelength is selected to be substantially equal to a wavelength at which the attenuation in the sections of optical fiber line is less than the attenuation at adjacent wavelengths.

Col. 8, lines 51-55.

Claim 5 of the '459 Patent reads:

An optical fiber transmission system as set forth in claim 1 wherein said first determined wavelength is in the range from about 1500 nm to about 1600 nm, said second predetermined wavelength is in the range from about 1200 nm to about 1400 nm and said service signals have a rate substantially less than 300 kilobits per second.

Col. 8, lines 56-62.

### **(c) *Claim Construction***

As discussed above, when the meaning of words in a claim are in dispute, the specification can provide relevant information about the scope and meaning of the claim. *See* *Electro Medical Systems v. Cooper Life*

Sciences, Inc., 34 F.3d 1048, 1054 (Fed.Cir.1994). For the most part, however, "claims are not to be interpreted by adding limitations appearing only in the specification." *Id.* This is so because "no matter how great the temptations of fairness or policy making, courts do not rework claims. They only interpret them." *See Intervet America, Inc. v. Kee-Vet Lab.*, 887 F.2d 1050, 1053 (Fed.Cir.1989). Ciena suggests the language in the specification that, "[the two wavelengths] *must* operate between wavelengths that are *substantially different* ...," Col.2, lines 2-5 (emphasis added), should be read into the meaning of the claim. *See Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 987 (Fed.Cir.1988) ("Where specification does not require limitation, that limitation should not be read from specification into claims of patent.")

The Court is unpersuaded. Even if, *arguendo*, the "substantially different" language could be read into the claim, there is no guidance in the claim itself how "substantially" should be defined. Ciena suggests that the Court might define the communication signal as being in the third window of the silica gel attenuation curve and the service signal as being in the second window of the curve. The Court declines this invitation for three reasons. First, "although the specifications may well indicate that certain embodiments are preferred, particular embodiments appearing in a specification will not be read into the claims when the claim language is broader than such embodiments." *Electro Medical*, 34 F.3d at 1054. While Ciena's attenuation curve suggestion is found in the preferred embodiment, *see* Col. 4, line 61 through Col. 5, line 10, it does not mean the preferred embodiment should be used to limit the broad language of the claim. *See CVI/Beta Ventures*, 112 F.3d at 1158 ("[A]s a general matter, the claims of a patent are not limited by preferred embodiments").

In addition, the Court is counseled by the rule of claim differentiation. Under this "fixed, long and well established" rule, a limitation cannot be read into a claim that already appears in another claim. *See D.M.I., Inc. v. Deere & Co.*, 755 F.2d 1570, 1574 (Fed.Cir.1985). Ciena's suggestion to define "substantially different" by reference to the various windows of the silica gel fiber attenuation curve is found almost verbatim in dependent claim 5. "Where some claims are broad and others narrow, claim limitations cannot be read into the broad...." *Deere & Co. v. Int'l Harvester Co.*, 658 F.2d 1137, 1141 (7th Cir.), *cert. denied*, 454 U.S. 969, 102 S.Ct. 514, 70 L.Ed.2d 386 (1981). Therefore, the word "different" in independent claim 1 and 7 of the '459 Patent cannot be limited by reference to language found in dependent claim 5.

Third, Ciena's last ditch argument that "different" should mean "substantially different" is based on the proposition that optical couplers were available when the patent issued that allowed separation of signals not substantially apart and yet, Pirelli's specification language only refers to optical couplers that work with signals "substantially different". Therefore, by negative inference, Ciena asserts Pirelli cannot now claim that its invention was intended to work with optical couplers that can differentiate wavelengths not "substantially different". Pirelli contends that a patent should be read based on the current technology, not on what was in existence at the time of the invention of the patent.

The Federal Circuit recently declared in *Eastman Kodak*: "As a general rule, the construing court interprets words in a claim as one of skill in the art *at the time of the invention* would understand them." *Eastman Kodak*, 114 F.3d at 1555 (emphasis added); *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 986 (Fed.Cir.1995) (en banc), *aff'd* 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996) ("[T]he focus in construing disputed terms in claim language is not the subjective intent of the parties ... [r]ather the focus is on the objective test of what one of ordinary skill in the art at the time of the invention would have understood the term to mean."); *see also SRI International v. Matsushita Electric Corp. of America*, 775 F.2d 1107, 1122 (Fed.Cir.1985) ("[I]t is not necessary to embrace in the claims ... all possible forms in which the claimed principle may be reduced to practice.").

At the time of the '459 Patent invention, it is Ciena's assertion, and it is unrefuted by Pirelli, that optical couplers existed that could separate wavelengths of almost any difference. Therefore, "one of skill in the art at the time of the invention" would understand these claims in the '459 Patent to include optical couplers that could separate wavelengths that did not have to be "substantially different". Thus, by Ciena's own admission, Pirelli is entitled to claim as part of its invention optical couplers that are able to differentiate wavelengths that are not "substantially different".

[8] [9] The Court therefore construes the word "different" in the claim language "the second predetermined wavelength *different* from said first predetermined wavelength" (emphasis added), to mean any difference in wavelength that allows for signal separation by optical couplers that existed at the time of the invention. FN6 This definition in effect adopts the "sufficiently far" specification language that Pirelli has espoused, but does so in terms intelligible to a jury.

FN6. It is appropriate to define a claim in terms of some other element or structure. *See, e.g.*, In re Benson, 57 C.C.P.A. 797, 418 F.2d 1251, 1254 (1969); Autogiro Co. of America v. United States, 181 Ct.Cl. 55, 384 F.2d 391, 403-04 (1967). Both decisions of the former U.S. Court of Customs and Patent Appeals and the U.S. Court of Claims are binding precedent in matters of patent law. *See* UMC Electronics Co. v. United States, 816 F.2d 647, 652 n. 6 (Fed.Cir.1987).

## **2. "An optical coupling means having an input, an input/output and an output" and "a first optical coupler having an input, an input/output and an output"**

### **(a) *Means Plus Function***

[10] As an initial matter, Pirelli contends that the language "optical coupling means" should not be construed using the "means-plus-function" formulation under 35 U.S.C. s. 112, para. 6. FN7 Pirelli maintains that since optical couplers were known devices at the time of the filing of the patent application, the "optical coupling means" claim language recites predominantly structure. Therefore, Pirelli avers that "optical coupling means" is a structural element corresponding to an optical coupler and should not be limited to specific examples given in the specification. To further support for its position, Pirelli points to the prosecution history of claim 1 of the '459 Patent. There, Pirelli explains that the language use to be "optical coupler", but was amended for a reason unconnected to any means-plus-function determination. *See* Prosecution History, 71. Ciena disagrees.

FN7. 35 U.S.C. s. 112 para. 6 (1984) reads:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claims shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

[11] Under section 112, paragraph 6, "an applicant can describe an element of his invention by the result accomplished or the function served, rather than describing the item or element to be used...." Warner-Jenkinson v. Hilton Davis Chemical Co., --- U.S. ----, ----, 117 S.Ct. 1040, 1048, 137 L.Ed.2d 146 (1997). "In determining whether to apply the statutory procedures of Section 112, para. 6, the use of the word

'means' triggers a presumption that the inventor used the term advisedly to invoke the statutory mandates for means-plus-function clauses." *York v. Central Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1574 (Fed.Cir.1996). However, this presumption is not conclusive. *See Sage Products, Inc. v. Devon Indust., Inc.*, 126 F.3d 1420, 1427-28 (Fed.Cir.1997). "[M]erely because a named element of a patent claim is followed by the word 'means' ... does not automatically make that element a 'means-plus-function' element under 35 U.S.C. s. 112, para. 6." *Cole v. Kimberly-Clark Corp.*, 102 F.3d 524, 531 (Fed.Cir.1996); *see also York*, 99 F.3d at 1574 ("[M]ere incantation of the word 'means' in a clause reciting predominantly structure cannot evoke section 112, para. 6.").

[12] The Court must decide on an element-by-element basis, based upon the patent, whether s. 112, para. 6 applies. *See Cole*, 102 F.3d at 531. "Where a claim used the word 'means', but specifies no corresponding function for the 'means', it does not implicate section 112." *Sage*, 126 F.3d 1420, 1427 (citing *York*, 99 F.3d at 1574). Similarly, if a claim has sufficient structure within the claim itself which can perform the recited function, the language of the claim is not in means-plus-function format. *See id.* (citing *Cole*, 102 F.3d at 531).

In the case bar, the "optical coupling means" of Claim 1 employs the language "means" and thereby, presumptively implicate section 112, para. 6. That being said, there is no corresponding function for the "means". Although it is evident from other parts of the patent that the function of the optical coupling means is to separate different wavelengths, nowhere does the claim language state that function. *See York*, 99 F.3d at 1574. Moreover, the Court is counseled by the fact the "optical coupling means" recites a definite structure, i.e., the optical coupler. *See Cole*, 102 F.3d at 531 (clause reciting predominately structure does not implicate s. 112, para. 6). Finally, the Court need look no further than the nearly identical language of Claim 7 which refers to the same optical coupling device as a "first optical coupler", with the conspicuous absence of the word "means". *See Col. 9*, line 14. Therefore, it is apparent that "optical coupling means" and "first optical coupler" are synonymous.

Thus, because there is a detailed recitation of structure and there is an absence of any mention of function in the claim, the Court finds the mean-plus-function limitations of section 112, para. 6, are not implicated in construing "optical coupling means". *See Cole*, 102 F.3d at 531.

### **(b) *Construction of Disputed Claim Language***

[13] The dispute between the parties on this matter centers on the structure of the aforementioned optical coupler referred to in both claims 1 and 7 of the '459 Patent. Specifically, at issue is whether the "input/output" connection or port of the optical coupler has to be bidirectional, i.e., has an input going in one direction and has an output going in the opposite direction within the same connection. *Pirelli* contends that the "input/output" language should not be limited to this specific structure. Instead, *Pirelli* asserts that the "input/output" connection can serve as either an input or an output, or both. Whereas *Ciena* maintains that the "input/output" of the optical coupler can only be bidirectional.

#### **(i) *The Claim***

Again, the Court starts with the language of the claim itself. Claim 1 of the '459 Patent, in relevant part, reads: "an optical coupling means having an input, an input/output and an output and having its output coupled to the input of said optical amplifier..." *Col.8*, lines 1-3. Claim 7 reads in relevant part: "a first optical coupler having an input, an input/output and an output and having its output coupled to the input of each active fiber..." *Col.9*, lines 14-16. As already determined, the "optical coupling means" and the "first

optical coupler" will be treated identically for purposes of claim construction.

Pirelli contends the claim language mandates that one of the "ports" must be bidirectional. To lend support to this conclusion, Pirelli argues that the diagonal (/) is defined as a "mark ... used typically to denote 'or' (as in and/or)...." *See Webster's New Collegiate Dictionary* (1979). Ciena, on the other hand, argues that this claim element requires that one of the ports performs the function of both an input and an output and that the other ports must be input only and output only.

### **(ii) *The Specification***

Pirelli asserts that the specification also does not preclude the optical coupler from having a non-bidirectional set up. Pirelli points to the following specification language to support its argument:

[O]ptical coupler [is] inserted in the line and [is] suitable for coupling within the line fiber and/or for extracting from it the optical service signals. With the optical amplifier, or with each optical amplifier, there is at least one means associated therewith for *injecting or for extracting* optical service signals.

Col.2, lines 34-37 (emphasis added). Moreover, Pirelli comments that the three-wavelength optical coupler described at Col. 6, lines 30-66 and illustrated in Figure 4 has four "ports" or connections. Lastly, Pirelli argues that this four port embodiment of the optical coupler is a preferred embodiment that should not be read out of the scope of the claim. *See Vitronics*, 90 F.3d at 1583.

Ciena points to patent drawing Fig. 2 for support that the coupler is only connected by three ports and therefore, one of the ports by necessity must be a dual purpose port so that both the function of putting signals into the coupler and taking signals out of the coupler can be accomplished. If this were not the case, the "connecting unit", which is shown with both an input and output on the side opposite from the optical coupler, could not operate properly. Moreover, Ciena contends the coupler's function is defined by the function of each of its three ports. Thus, the specification refers to one port connected to a fiber line from the transmitter, another port is connected to an optical amplifier and the third port is connected to a service channel device for injecting and/or extracting service signals from the optical fiber line. *See* Col.2, lines 16-42. Further, Ciena asserts that the necessarily bidirectionality of the input/output of the coupler is supported by a description of the preferred embodiments. *See* Col.6, lines 47-53.

### **(iii) *Claim Construction***

[14] A subtle distinction exists between the use of the specification to clarify otherwise ambiguous language in the claim and the extraction of limitations from the specification to impose those limitations on the claims. *See CCPI Inc. v. American Premier, Inc.*, 966 F.Supp. 276, 282 (D.Del.1997) (citing *CVI/Beta Ventures*, 112 F.3d at 1158; *Electro Medical*, 34 F.3d at 1054; *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed.Cir.1993); *Intervet America*, 887 F.2d at 1053; *Fonar Corp. v. Johnson & Johnson*, 821 F.2d 627, 632 (Fed.Cir.1987)). While the former is proper practice, the latter is impermissible. *See id.* Although the patent drawings in the specifications referred to by both parties are highly relevant in construing the "input/output" language of the claim, *see CVI/Beta Ventures*, 112 F.3d at 1153, "claims are not to be interpreted by adding limitations appearing only in the specification." *Electro Medical*, 34 F.3d at 1054.

In the case at bar, the term "input/output" is ambiguous. In addition, the language and drawings found in the specification are inconclusive and could support either a bidirectional connection or other types of connections. The Court is counseled by the well-known patent law principle that "claims are not to be

interpreted by adding limitations appearing only in the specification." *See id.* Further, "the claims are not limited to devices operated precisely as the specification describe[s][the] devices operat [ing], unless the specification requires a certain limitation." *See Specialty Composites*, 845 F.2d at 987 (citing *Lemelson v. United States*, 752 F.2d 1538, 1552 (Fed.Cir.1985)). In the case *sub judice*, there is no such required limitation in the specification.

The Court is led inexorably back to the plain language of the claim. The "input/output" port or connection of the optical coupler should be read as broadly as possible within the parameters that the claim language permits. *See Electro Medical Systems*, 34 F.3d at 1054 ("Particular embodiments appearing in a specification will not be read into the claims *when the claim language is broader than such embodiments.*") (emphasis added). The Court is convinced that the claim language "input/output" is broader than any of the specification language or patent drawings referred to by either party. This reading of the language is supported by the fact that a diagonal (/) is defined as typically meaning "or". *See Webster's Third New International Dictionary* 622 (1971). FN8 It follows the "input/output" port of the optical coupler can be either a bidirectional connection or a connection that supports only an input or output connection.

FN8. Dictionaries are a favored form of extrinsic evidence and may be consulted as long as they do not contradict anything in the patent documents. *See supra* note 2. Here, the interpretation of the diagonal (/) causes no such contradiction.

The Court holds that the optical coupler of claim 1 and claim 7 of the '459 Patent means is a device having at least three "ports" or "connections", one of which may, but need not, be bidirectional.

## **B. THE '073 PATENT**

The parties are disputing two phrases which appear in claims 1, 3, 8, 13, and 17 of the '073 Patent.

### **1. "second optical signal laser transmitter"**

[15] To reiterate, the purpose of the '073 Patent was to create a universal adapter that receives optical signals emitted by a transmitter and adjusts their parameters to match those required by an EDFA optical line amplifier connected to the adapter output. The adapter operates by converting the optical signals received into electrical signals representative of the information carried by such input optical signals, and by reconverting those electrical signals back into output optical signals having the appropriate optical wavelength to be compatible with the EDFA optical line amplifier. The electrical signals are reconverted into outgoing optical signals by means of a "second optical signal laser transmitter".

The dispute between the parties boils down to whether the "second optical signal laser transmitter" is equivalent to a laser, or whether it should be construed as referring to a laser plus a modulated signal. Pirelli asserts that an optical communication transmitter is not just constituted of an optical source like a laser, but is instead made up of both an optical source and an information-bearing modulated signal. Ciena, on the other hand, contends that the "second optical signal laser transmitter" is just a laser. Extrinsic evidence will not be consulted in construing this language. FN9

FN9. Pirelli during oral argument attempted to use extrinsic evidence in order to support its construction of the disputed language. Ciena objected saying that they thought there was an agreement not to use any extrinsic evidence. The Court declines to consider such extrinsic evidence. The Court is counseled by the

fact, as will be discussed below, that the claim and the specification unequivocally describe the meaning and scope of the disputed language. As such, utilization of extrinsic evidence is improper. *See Vitronics*, 90 F.3d at 1583.

### **(a) *The Claim Language***

Because the claim language is of paramount importance in the construction of this disputed language, the Court starts with the language of the claim. In Claim 8 of the '073 Patent FN10, the claim, in relevant part, reads: "a second optical signal laser transmitter connected to said first optical amplifier for supplying optical signals to said first optical amplifier...." Col. 8, lines 40-42. It is Pirelli's position that the second optical transmitter does not just refer to the laser itself, but also refers to the modulating signal coming from the laser. Pirelli reaches this conclusion by arguing that the first and second optical signal laser transmitter must be construed identically because the same language has been used. Because a first optical signal laser transmitter supplies a modulated optical signal through the use of a laser, the second optical signal laser transmitter must also be interpreted as including both the laser and the modulated signal. Pirelli also advances the contention that it is black letter law that every word of a claim must be given meaning. Thus, the word "transmitter" must be interpreted as requiring a modulated optical signal. Ciena argues that the second optical transmitter is a laser and that the "first optical signal laser transmitter" is a completely different claim element.

FN10. Because the language "second optical signal laser transmitter" and all the other relevant language appear in Claim 8 of the '073 Patent, only this claim language will be referenced, although similar language appears in Claim 1, 3, 13, 14, 15 and 17.

### **(b) *The Specification***

Pirelli asserts that the "first optical signal laser transmitter" is described in the specification as supplying an optical signal that has been modulated with information. *See* Col. 1, lines 9-12 ("an optical line transmitting apparatus provided with a laser"); Col.2, lines 31, 36 ("transmitting ... apparatus"), 49 ("optical line transmitting apparatus"); Col.5, lines 62-63 ("transmitting ... apparatus"); Col.6, lines 6-7 (same), 33, 46, 48, 54, 60, 61, 64 ("transmitter"). Further, Pirelli contends there is no indication that the second optical transmitter was to be construed differently from the first optical transmitter in the claim language. Therefore, a laser by itself cannot constitute an optical signal laser transmitter, but rather there must also be some modulated signal that emanates from the laser.

Ciena asserts that the second optical signal laser transmitter should not be confused with the first optical signal laser transmitter. Whereas the first optical transmitter is part of the terminal station equipment, the second optical transmitter is the laser in the claimed adapter that reconverts electrical signals into optical signals so that these optical signals are compatible with the optical amplifier. To support its conclusion, Ciena cites specification language that states that the claimed adapter is comprised of three components: (1) an optical-to-electric converter module, (2) a second adjustment module and (3) a laser. *See* Col.2, lines 54-62. Ciena argues that these three components correspond exactly to the three components of the adapter recited in Claim 8, with the laser corresponding to the "second optical laser transmitter". Further, Ciena cites specification language that supports its conclusion that the second optical transmitter is just a laser: "laser piloting circuit ... actuates a laser in the adapter converting said electrical signal to an optical signal...." Col.3, lines 57-59. Lastly, Ciena explains that in a "direct modulation" system, a laser piloting circuit

directly acts upon a laser that then emits the proper optical signals that are compatible with the optical amplifier.

### (c) *Prosecution History*

Ciena also avers that Pirelli had to define the "laser piloting means" and in response, told the PTO that it was merely a "laser modulating circuit". *Prosecution History*, p. 167. Ciena asserts that a laser modulating circuit is a circuit that directly controls a laser. That laser is represented in the claim by the "second optical signal laser transmitter". Therefore, in a "direct modulation" set-up, the laser modulating circuit must act on a laser.

### (d) *Claim Construction*

The claim language refers to a "second optical signal laser transmitter" which supplies optical signals to an optical amplifier. However, the claim is ambiguous as far as whether the second optical transmitter has to be a laser or whether it can also include the modulated signal emitted by the laser. The specification is not helpful in that the "second optical signal laser transmitter" appears nowhere in the specification. Although as Ciena has pointed out, the preferred embodiment seems to contemplate using a laser, "references in the specifications to a preferred embodiment ... do not limit the scope of the patent claim." *See Specialty Composites*, 845 F.2d at 987. Moreover, the specification does not require that a laser be used as a second optical signal laser transmitter. *See id.* ("Where the specification does not require limitation, that limitation should not be read from specification into claims of patent.").

That being said, the Court finds unconvincing that Pirelli's contentions that the "second optical signal laser transmitter" is a laser plus a modulated signal and that the second optical signal laser transmitter should be construed identically to the "first optical signal laser transmitter." First, common sense dictates that having the definition of a "second optical signal laser transmitter" be a laser plus a modulated signal is incoherent. That's like saying a radio and the music that is emitted from it are what constitute a radio. But when the radio is turned off, the radio does not stop being a radio. Similarly, when the second optical signal laser transmitter is turned off, that does not mean that it stops being a second optical transmitter. The modulated signal is simply not a part of the laser transmitter; the modulated signal is what comes out of the laser transmitter.FN11

FN11. This finding is not inconsistent with giving meaning to every word in the claim. As discussed above, the word "transmitter" cannot refer to a modulated signal emanating from the laser. The "second optical signal laser transmitter" remains a laser transmitter irrespective of whether a signal is being modulated.

Second, the Court is not persuaded by Pirelli's argument that identical language must be interpreted in the same manner in the claims and specifications of a patent. *See Tandon Corp. v. U.S. Int'l Trade Comm.*, 831 F.2d 1017, 1023-24 (Fed.Cir.1987). The first laser transmitter performs a very different function than the second laser transmitter. The first laser transmitter is part of the line terminal equipment and is responsible for sending down the fiber optic line the initially incompatible optical signal. On the other hand, the second laser transmitter is responsible for changing altered electrical signals into altered optical signals which are now compatible with the EDFA optical amplifier. The simple response to this argument is that identical phraseology has not been employed; hence a *first* optical signal laser transmitter and *second* optical signal laser transmitter.

Lastly, the Court is further counseled by the prosecution history cited by Ciena which clearly shows that Pirelli believed the laser piloting means to be a "laser modulating circuit". Because the laser piloting means actuates the second optical signal laser transmitter, *a fortiori* the second laser transmitter must itself be a laser.

Therefore, the Court finds that the "second optical signal laser transmitter" in the '073 Patent is a laser, and nothing more.

## **2. "laser piloting means"**

[16] The dispute between the parties as to this term is whether the "laser piloting means" must operate through direct modulation or whether the claim language also covers "laser piloting means" that operate through external modulation. Direct modulation operates by having a driver device that varies the amount of light that emanates from a laser. Because the device operates by directly acting on the laser to modulate its signal, this set up is termed "direct modulation". On the other hand, external modulation works quite differently. In a set up of that type, the laser is operating at a constant output. Thereafter, the constant output of the laser is run through an external modulator, which operates as a shutter. Depending on how the shutter of the external modulator is varied, the laser signal is subsequently modulated. Pirelli claims that the language of the claim is broad enough to have "laser piloting means" encompass both direct and external modulation. Not surprisingly, Ciena disagrees and contends that Pirelli's "laser piloting means" must operate by direct modulation.

### **(a) *The Claim Language***

The "laser piloting means" phraseology is found in claims 1, 8, 13, 14, 15, and 17 of the '073 Patent. Because this language is used in a similar manner in all of the claims, for purposes of convenience, the language of claim 1 will be construed. In relevant part, claim 1 states: "an adjustment module comprising laser piloting means connected to said converting means and to said second transmitter for controlling said second transmitter by said electrical signals within said operating parameters of said optical amplifier." Col. 1, lines 37-41.

Pirelli asserts that the claim language is broad enough to encompass both direct and external modulation techniques. Specifically, Pirelli points to the language of the claim that states that the "laser piloting means" controls the second laser transmitter. Pirelli contends that this control can be by direct or external modulation. Ciena asserts there must be a direct modulation of the laser by the laser piloting means. This is so because the claim language itself recites that the laser piloting means is "connected" to the second optical signal laser transmitter for the purpose of controlling said second laser transmitter.

### **(b) *The Specification (and Means-Plus-Function Analysis)***

Neither party disputes that the "laser piloting means" falls under the means-plus-function rubric of 35 U.S.C. s. 112, para. 6. Under the means-plus-function analysis, the first step is to determine the function of the "means" and the second step is to locate the corresponding structure, or its equivalent, in the specifications of the patent. *See* 35 U.S.C. s. 112, para. 6. Although the parties agree as to the corresponding structure in the specification, they disagree over the function of the "means".

Pirelli argues that the function of the "laser piloting means" is to control the second laser transmitter. According to Pirelli, the corresponding structure in the specification which performs such a function is a

"laser piloting circuit". Col.3, lines 57-62. However, Pirelli asserts that under the equivalents language of section 112, para. 6, it is a question for the jury whether external modulation is an equivalent method to the direct modulation performed by the laser piloting circuit.

Ciena asserts that the function of the "laser piloting means" is to guide, direct, or pilot the laser of the second optical transmitter. The corresponding structure found in the specification is "laser piloting circuit 20, [ ] a known circuit of the digital type in which direct current modulation is also carried out in order to allow signals coming from service channels connected to the input to be inserted." Col.3, lines 63-67. In addition, Ciena cites the following relevant specification language: "The electrical signal activates the piloting circuit 20 for the adapter laser 22 ... Circuit 20 is entirely digital and has a circuit portion carrying out direct current modulation...." Col.5, lines 1-6. Ciena points out that external modulation is nowhere mentioned in the specification or claim of the '073 Patent. Therefore, Ciena urges the Court to find that the "laser piloting circuit" is the corresponding structure and that it functions only through direct modulation.

### **(c) *The Prosecution History***

During the prosecution of this patent, Pirelli was forced to more clearly define "laser piloting circuit 20". Prosecution History, at 166. Pirelli responded that a laser piloting circuit is "merely a laser modulating circuit well-known in the art and are so described in the specification of the subject application." Prosecution History, at 167. Pirelli went on to provide five examples to the patent examiner in order to more fully define what was meant by a laser piloting circuit. Ciena argues that all of the examples given by Pirelli are laser driver circuits that directly control a laser. Further, Ciena contends that at no time during the patent prosecution did Pirelli suggest that laser piloting circuit is anything different from a direct modulation circuit.

### **(d) *Claim Construction***

[17] It is improper claim construction to limit the interpretation of the means-plus-function language to particular means set forth in the specification. *See D.M.I.*, 755 F.2d at 1573. To do so, would "nullify the provision of s. 112[, para. 6] requiring that the limitation shall be construed to cover the structure described in the specifications and *equivalents thereof*." *Id.* (emphasis added). Moreover, "there is and can be no requirement that applicants describe or predict every possible means of accomplishing that function." *Id.* That being said:

[T]he scope of a means-plus-function claim is not limitless, but is confined to structures expressly disclosed in the specification and corresponding equivalents. Thus, [s. 112, para. 6] prevents an overly broad claim construction by requiring reference to the specification, and at the same time precludes an overly narrow construction that would restrict coverage solely to those means *expressly* disclosed in the specifications.

*Symbol Technologies, Inc. v. Opticon, Inc.*, 935 F.2d 1569, 1575 (Fed.Cir.1991) (emphasis in original).

[18] "The function performed by the means-plus-function element is a claim construction issue which should be resolved as a matter of law, because it requires the Court to only look at the patent itself...." *Motorola, Inc. v. Interdigital Technology Corp.*, 930 F.Supp. 952, 963 (D.Del.1996). Similarly, the corresponding structure, or specific means, that carries out the function described in the claim should also be decided as a matter of law as a claim construction issue. *See id.* The Court in *Motorola* put forward this helpful analogy as a way to think of how this analysis should be conducted:

For instance, if a patent contains a means-plus-function limitation claiming a "means for fastening" and the specification discloses a "button" as a possible fastening means, under *Markman* a court must resolve any dispute regarding both the 1) function of the fastening means, and 2) the meaning of the word "button," as a matter of law.

*Id.* Once the court has construed the function and the specific means, it is a question for a jury what the equivalents are of the specific means or structure identified in the specification. *See In re Hayes Microcomputer Prods., Inc., Patent Litigation*, 982 F.2d 1527, 1541 (Fed.Cir.1992); *D.M.I.*, 755 F.2d at 1575; *LRC Electronics Inc. v. Mezzalingua Assoc., Inc.*, 974 F.Supp. 171, 180-81 (N.D.N.Y.1997); *Raleigh v. Tandy Corp.*, 1997 WL 26299, at (N.D.Cal. January 10, 1997); *Motorola*, 930 F.Supp. at 963.

The Court is persuaded that, as a matter of law, the function of the "laser piloting means" cannot include external modulating devices, but only includes direct modulation devices. This conclusion is the result of a close reading of the claim language as to the function of a "laser piloting means". Claim 1 states, in relevant part: "an adjustment module comprising *laser piloting means connected ... to said second transmitter for controlling said second transmitter ...*" Col. 7, lines 37-40. According to the plain language of the claim, and recognizing that "second transmitter" has already been construed to be equivalent to a laser, the "laser piloting means" functions by being connected to the laser for the purpose of controlling the laser. Only direct modulation works in this fashion; i.e., by having the modulator directly attached to a laser. On the other hand, external modulation operates by having a constant laser beam being acted upon by an external modulator, not connected to the laser.

This reading of the claim is supported by both the language of the specification and the prosecution history. Both parties agree that the corresponding structure found in the specification that performs the function of the laser piloting means is the "laser piloting circuit 20". "Laser piloting circuit 20" is described in the specification as "a known circuit of the digital type in which *direct current modulation* is [ ] carried out ...," Col.4, lines 63-65 (emphasis added), and as "entirely digital and ha[ving] a circuit portion carrying out *direct current modulation.*" Col. 5, lines 1-6 (emphasis added). Although this language from the specification may not be properly imported into the claim, it does properly assist in giving a context to the disputed claim language. *See Wright Medical*, 122 F.3d at 1443. Moreover, the prosecution history illustrates that when Pirelli was forced to more clearly define the "laser piloting circuit," Pirelli replied that the circuit was, "merely a laser modulating circuit well known in the art...." Prosecution History, at 167. All five examples that Pirelli provided to the patent examiner were laser driver circuits that directly modulate the laser.

Because "the evidence is such that no reasonable jury could determine [these] two elements to be equivalent," the Court need not reach the question of whether the determination of equivalents under s. 112, para. 6 is a question of law or fact. *See Warner-Jenkinson*, --- U.S. at ----, n. 8, 117 S.Ct. at 1053, n. 8. As a matter of law, the direct modulation function performed by the "laser piloting means" is neither identical to, nor the equivalent of, external modulation since an external modulator is not directly connected to the laser for purposes of controlling the laser.

For all the foregoing reasons then, the Court holds, pursuant to the means-plus-function analysis of 35 U.S.C. s. 112, para. 6, that the "laser piloting means," found in claims 1, 3, 8, 13, 14, 15, and 17 of the '073 Patent, functions by variably controlling the input of the laser in the adapter through the use of direct modulation in order to produce a directly corresponding output. The corresponding structure, as a matter of law, is found to be "laser piloting circuit," which is a laser driver circuit that directly modulates the input of

the laser in the adapter in order to produce a directly corresponding output.

## C. THE '686 PATENT

There is only one phrase that is being contested by the parties in the '686 Patent. This language appears in both claim 1 and claim 7 of the '686 Patent in different forms.

### 1. "interruption and detection means," "interruption means," "detection means"

The purpose of the '686 patent is to provide protection for maintenance personnel who repair the system when there has been a break or interruption in the optical communications line. A break resulting in the release of high powered optical light could cause considerable damage to the eyes of maintenance personnel. The '686 Patent operates by ensuring that in the event of a fiber break, an optical switch detects the absence of such signals and causes another component to interrupt the optical signal from being propagated further down the optical fiber line.

The dispute between the parties centers on two issues. First, whether the "detection means" must be able to discriminate between optical communication signals and other optical signals, such as spontaneous optical emissions. FN12 Second, whether the optical signal must be completely terminated by the "interruption means", or whether the signal must just be reduced so that it does not pose a danger to maintenance personnel. Pirelli contends that the "detection means" need not discriminate between different types of optical signals and that the "interruption means" only substantially limits the emission of light energy when the optical signal is not present at the amplifier output. Ciena, on the other hand, asserts that the "detection means" must be able to discriminate between various types of optical signals and the emission of light energy must be completely halted by the "interruption means" in order to be consistent with the terms of the claim and specification language.

FN12. A spontaneous optical emission results when there is a break in the fiber optic line and because of the way the optical fiber amplifier operates, there still continues to be emitted other optical signals (so called "spontaneous emissions"), even in the absence of incoming optical communication signals. *See* D.I. 78, at 38.

#### (a) *The Claim*

The relevant language in claim 1, which refers to the safety device in an optical telecommunications system, recites:

detection and interrupting means coupled to said output of said amplifier and responsive to optical telecommunication signals transmitted at said output and for interrupting the transmission of optical signals to a receiver by said amplifier in the absence of telecommunication signals at the output of said amplifier; whereby at least one of said protection means prevents transmission of optical signals by at least one of said first and second transmitters.

Col.7, lines 36-45. The corresponding language in claim 7, which talks of the same safety device within an optical amplifier, states:

interrupting means at said output of said amplifier for interrupting the provision of optical signals by said

amplifier to said optical fiber; and detection means coupled to said output of said amplifier intermediate said output and said interrupting means for operating said interrupting means in the absence of said telecommunications signals and for preventing delivery of optical signals to said optical fibers.

Col.8, lines 22-30. Pirelli contends that the function of the "detection means" is to determine whether optical communication signals are present at the output of the amplifier. Pirelli asserts that the function of the "interruptionmeans" is to interrupt the transmission of optical signals to a receiver by the amplifier. Pirelli interprets the word "interrupt" to mean "substantially reducing". Moreover, Pirelli contends that the "detection and interruption means" of claim 1 and the "detection means" of claim 7 are not required to be able to discriminate between optical communications and other optical signals. To so require would violate the rule of claim differentiation because dependent claim 2 would be read improperly into independent claim 1, and dependent claim 8 would be read into independent claim 7.FN13

FN13. Claim 2 of the '686 Patent, in pertinent part, reads:

An optical telecommunications system as set forth in claim 1 wherein said detection and interrupting means comprises discrimination means for discriminating between optical telecommunication signals and other optical signals at the output of said amplifier....

Col.7, lines 46-50.

Claim 8 of the '686 Patent, in pertinent part, reads:

Active fiber optical amplifier apparatus as set forth in claim 7 wherein said detection means comprises filtering means for separating optical signals having an alternating component from other signals....

Col.8, lines 31-34.

Ciena maintains that the "detection and interruption means" has the function of detecting the absence of optical telecommunications signals in the presence of other optical signals such as optical noise and thereafter, preventing the delivery of optical signals to the optical fiber. Preventing, Ciena avers, should be given its ordinary meaning: "to stop from happening or existing". *Webster's Third New Int'l Dictionary* 1798 (1971). Ciena further asserts that the function of the "detection and interruption means" is to interrupt the transmissions of optical signals. Ciena observes that the term "interrupting" is a nontechnical term that is defined as "to stop by breaking in". *Webster's Third New Int'l Dictionary* 1182 (1971).

### **(b) *The Specification***

Pirelli maintains the specific means identified in the specification for the "detection means" is a circuit that converts the optical signal from the amplifier output to an electrical signal, and then compares the level of the electrical signal with a predetermined threshold to determine whether the optical telecommunications

signals are present. Col.4, lines 6-21. The corresponding structure for the "interruption means," Pirelli avers, is a device that interrupts substantially any emission of light energy on the part of the optical amplifier. Col.2, lines 14-21, 45-48. Pirelli further maintains that if this language is read in conjunction with specification language that speaks of "placing [the optical line] in a safe condition (absence of optical emissions)," Col.5, 45-48; *see also* Col. 5, lines 49-53, it is not necessary for the interrupting means to completely shut down the optical fiber line.

Ciena advances the structure of the "interruption and detection means" as being found within Fig. 2 of the patent. The most relevant parts of Fig. 2 is peak detector 14, comparator 18, and optical switch 19, which physically opens the optical fiber when the detected optical signal is lower than a reference voltage,  $V_s$ . Ciena advances the proposition that optical switch 19 is either off or on; there is no intermediate condition.

### **(c) *The Prosecution History***

Pirelli asserts the prosecution history does not limit in any way the construction of the claimed means-plus-function limitations. Pirelli points out that during the prosecution of the '686 Patent, they were forced to overcome rejections based on two prior art references to Kanenou and Neumann. In overcoming Kanenou, Pirelli commented that Kanenou is not responsive to the mere absence of the telecommunication signal, while Pirelli's invention could discriminate between telecommunication signals and other optical signals, such as spontaneous emission from an active fiber amplifier. Prosecution History, 77. As to Neumann, Pirelli argued that the Neumann invention had transmitters that were disabled both when the line was interrupted and when the line was not interrupted, and therefore, spontaneous emission signals can still get through. Whereas with the Pirelli invention, the detection and interrupting means is responsive only in the complete absence of telecommunication signals. Prosecution History, 78. Pirelli argues that this prosecution history is consistent with its interpretation of the detection and interruption means.

Ciena cites the same section of the prosecution history for the proposition that Pirelli's invention improved over the prior art by being able to discriminate between telecommunication signals and other optical noise. Prosecution History, 76. Ciena argues that Pirelli pointed to the Kanenou and Neumann inventions in order to show that these inventions could not discriminate between a telecommunication signal and other signals. Prosecution History, 78. From these sections of the prosecution history, Ciena argues that part of the required function of the detection and interruption means is to detect the absence of optical telecommunications signals at the output of the optical amplifier. Thus, Ciena believes that what truly distinguishes the '686 Patent from prior art is that it is able to detect the absence of optical telecommunication signals in the presence of other optical signals such as optical noise caused by spontaneous emissions.

### **(d) *Claim Construction***

There is no dispute between the parties that the phraseology in contention should be construed according to a means-plus-function analysis under 35 U.S.C. s. 112, para. 6. Therefore, it is necessary to first determine the function of the means and, then, to identify the specific means in the structure and equivalents thereof if necessary. For the sake of clarity, even though the "detection means" and "interruption means" are recited together in claim 1, they will be discussed separately in order to accommodate similar language in claim 7, where the two means are stated separately.

### **(i) *The "Detection Means"***

[19] Under the doctrine of claim differentiation, "[w]here ... the limitation sought to be 'read into' a claim already appears in another claim, the rule is far more than 'general'." *Modine Manuf. Co. v. United States Int'l Trade Comm.*, 75 F.3d 1545, 1551 (Fed.Cir.1996) (quoting *D.M.I.*, 755 F.2d at 1574). "Where some claims are broad and others narrow, the narrow claim limitations cannot be read into the broad...." *Deere*, 658 F.2d at 1141. That being said, " 'although the doctrine of claim differentiation may at times be controlling,' it is trumped if the 'definition [at issue] ... is otherwise clear from the claim language, [the specification], and [the] prosecution history' ". *Clintec Nutrition Co. v. Baxa Corp.*, 1997 WL 535043, at (N.D.Ill. August 22, 1997) (quoting in part *O.I v. Tekmar Co., Inc.*, 115 F.3d 1576, 1582 (Fed.Cir.1997)); *see also* *Autogiro*, 384 F.2d at 404 ("Claim differentiation is a guide, not a rigid rule. If a claim will bear only one interpretation, similarity will have to be tolerated.").

The claim language, in both claims 1 and 7, identifies the "detection means" as "interrupting the transmission of optical signals ... in the absence of optical telecommunication signals at the output of said amplifier". The claim language is not ambiguous as to how the "detection means" functions, i.e., in the absence of telecommunication signals, it sends a signal to the "interrupting means" to interrupt the transmission of optical signals. The corresponding specific means in the specification is found in patent drawing Fig. 2 and consists of peak detector 14, which "detects that an optical signal at output from the pre-amplifier has an alternating component with a peak value lower than the threshold  $V_s$ ," col. 4, lines 14-20, and a comparator 18 with reference threshold  $V_s$ , which "recognizes the absence of a signal...." Col.5, line 28. Therefore, under a mean-plus-function analysis, the "detection means" is a peak detector that detects optical telecommunication signals and a comparator which recognizes the absence of a signal.

This construction is consistent with the prosecution history cited by the parties. There, *Pirelli* distinguished its invention from two prior art references by explaining that the previous inventions could not distinguish between the absence of telecommunication signals and the absence of other optical signals such as spontaneous optical emissions. Therefore, although the rule of claim differentiation would usually disallow reading the language of dependent claims 2 and 8 into independent claims 1 and 7, respectively, the Court finds the definition of the "detection means" is otherwise clear from the claim language, the specification, and the prosecution history. *See Tekmar*, 115 F.3d at 1582.

The Court therefore holds that "detection means" as recited in both claims 1 and 7, refers to a device whose function is to discriminate between optical telecommunication signals and other optical signals. The corresponding structure in the specification is found by the Court to be made up of a peak detector and a comparator.

### (ii) *The "Interrupting Means"*

[20] As far as the "interrupting means", the claim language identifies this claim element as a device that, "interrupt[s] the transmission of optical signals to a receiver by said amplifier in the absence of optical telecommunication signals," Col.7, lines 39-41, and as a device that, "interrupt[s] the provision of optical signals by said amplifier to said optical fiber." Col.8, lines 22-24. Although *Pirelli* maintains that the word "interrupt" should be construed to mean substantially reduce, the clear language of the claim is unambiguous. Under the means-plus-function analysis of s. 112, para. 6, the function of the interrupting means is, not too surprisingly, to interrupt the flow of optical telecommunication signals. There is no language to the effect in the claim that the optical signal is "substantially interrupted" or that the interruption is just to a degree. Significantly, the claim language of claim 7 provides that the "said interrupting means ... prevent[s][the] delivery of optical signals to said optical fiber." Col.8, lines 29-30. As *Ciena* has argued,

both "interrupt" and "prevent" are non-technical terms that are defined as "to stop by breaking in" and "to *keep from happening* or existing," respectively. (emphasis added). Neither word implies a degree of reduction; both do imply a complete shut down or termination.

The Court is also guided by considering what the corresponding structure is in the specification. This corresponding structure is found in Figure 2 and consists of an "optical switch 19". Col. 4, lines 16-17. This optical switch operates, when in the absence of telecommunication signals, it is opened by the comparator element of the detection means. *See* Col.5, lines 28-31. Moreover, in reciting the function of the optical switch, the specification observes that, "the function of interrupting the optical signal at the output ... ensure [s] optical safety through the interruption of the optical emission downstream...." Col.5, lines 32-36. Although Ciena cites to specification language that refers to a signal "interrupt[ing] substantially any emission of light energy on the part of said optical amplifier," *see* Col.2, lines 20-21, the Court declines to read the language of the specification into the claim. *See* *Electro Medical*, 34 F.3d at 1054.

Lastly, Pirelli points to the following language to support its contention that "interrupt" in the claim means substantially reduce: "[T]he safety of the line as a whole requires that, in the absence of an input signal, [the optical fiber line or amplifier] do not emit an output, i.e., *downstream, spontaneous emissions or noise, at a dangerous level.*" Col.5, lines 50-53 (emphasis added). Pirelli points to the last part of this sentence to infer that the optical signal must be just be substantially reduced.

[21] The Court is unpersuaded. Although the Court can look to the specification to identify the specific means under the means-plus-function analysis, it is improper to willy-nilly import specification language into the claim. The means-plus-function construction principle that one must look to the specification in order to interpret that language in light of corresponding structure and its equivalents does not conflict with the general claim construction principle that limitations found only in the specification of a patent should not be imported or read into a claim. *See* *Raleigh*, 1997 WL 26299, at \*2 (quoting in part *In re Donaldson Co., Inc.*, 16 F.3d 1189, 1193-1195 (Fed.Cir.1994)). It is therefore improper to read any possible inference, whether reasonable or not, from the specification into the claim language of the patent.

For the foregoing reasons, the Court holds that the "interrupting means" found in both claims 1 and 7 of the '686 Patent functions by completely interrupting the transmission of optical signals in the absence of a detected optical telecommunications signal. Further, as a matter of law, the Court finds that the corresponding structure within the specification is an optical switch.

An appropriate order will issue.

### ***MEMORANDUM OPINION ON REARGUMENT***

**SCHWARTZ, Senior District Judge.**

#### **I. Introduction**

Pirelli Cable Corporation ("Pirelli") filed a complaint against Ciena Corporation ("Ciena") alleging infringement of five of its United States Patents concerning fiber optic technology. FN1 Ciena answered Pirelli's complaint and brought a counterclaim for a declaratory judgment that the patents in suit are invalid and not infringed by Ciena, and joined Pirelli S.p.A. and Pirelli Cavi S.p.A..

FN1. Subsequently, two of the patents were removed from the litigation.

On September 22, 1997, pursuant to *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996), the Court held a hearing for purposes of construing certain claim language in the three remaining patents in suit. The Court issued an Opinion and Order on November 17, 1997, setting forth the construction of the contested claim language of the patents in suit. *See Pirelli Cable Corp. v. Ciena Corp.*, 988 F.Supp. 424 (D.Del.1997).

Now pending before the Court is Pirelli's motion for reargument pursuant to Local Rules of Civil Practice and Procedure of the United States District Court for the District of Delaware, Rule 7.1.5. FN2 For the following reasons, Pirelli's motion for reargument will be granted in part and denied in part.

FN2. Local Rule 7.1.5. states:

A motion for reargument shall be served and filed within 10 days after the filing of the Court's opinion or decision. The motion shall briefly and distinctly state the grounds therefor. Within 10 days after service of such motion, the opposing party may serve and file a brief answer to each ground asserted in the motion. The Court will determine from the motion and the answer whether reargument will be granted.

D. Del. LR 7.1.5. (1995).

## II. Factual Background

There is no need to rehash the extensive factual background set forth in this Court's Opinion of November 17, 1997. *See Pirelli Cable*, 988 F.Supp. at 427-29. Pirelli moves for reargument on two issues, both contained within one of the patents in suit, U.S. Patent No. 5,267,073 ("the '073 Patent"). Specifically, Pirelli challenges both the Court's statements regarding equivalents with regard to the "laser piloting means" of the '073 Patent and the Court's refusal to accept and consider certain extrinsic evidence offered by Pirelli with respect to the "second optical signal laser transmitter" and "laser piloting means" language of the '073 Patent. As to the equivalence issue, Pirelli urges that a determination of whether external modulation is "equivalent" to the direct modulation function performed by the "laser piloting means" is premature. As to the extrinsic evidence issue, Pirelli seeks to reargue that the extrinsic evidence provided by Pirelli in support of its construction of the disputed terms of the '073 Patent should have been accepted and considered in construing the claim language.

## III. Applicable Legal Standard

[22] [23] [24] Motions for reargument should only be granted sparingly, and not granted "where it would merely 'allow wasteful repetition of arguments already briefed, considered and decided.'" *Wilcher et. al. v. City of Wilmington et. al.*, 924 F.Supp. 613, 616 (D.Del.1996) (citing *Helman v. Murry's Steaks, Inc.*, 743 F.Supp. 289, 290 (D.Del.1990)). Reargument will be granted only where the matters for reargument would alter the previous result reached by the Court. *See id.* (quoting in part *Crane Co. v. Harsco Corp.*, 511 F.Supp. 294, 307 (D.Del.1981)). The Court has identified three circumstances when reargument may be allowed: 1) "where the Court has patently misunderstood a party," 2) "[where the Court] has made a decision outside the adversarial issues presented to the Court by the parties," or 3) "[where the Court] has made an error not of reasoning but of apprehension." *Brambles USA, Inc. v. Blocker et. al.*, 735 F.Supp. 1239, 1241 (D.Del.1990). This procedural mechanism should not be abused to allow a never ending polemic between litigants and the Court. *Oglesby v. Penn Mut. Life Ins. Co.*, 877 F.Supp. 872, 892 (D.Del.1995),

*aff'd*, 127 F.3d 1096 (3d Cir.1997). In deciding a motion for reargument, the Court should balance the interest in finality of judicial decisions with the recognition that courts sometimes err. *Oglesby*, 877 F.Supp. at 892.

## IV. Discussion

### A. The "Equivalence" Issue

[25] *Pirelli* contends the November 17, 1997 Opinion of the Court exceeded the scope of the September 22, 1997 *Markman* hearing by including a statement that "[a]s a matter of law, the direct modulation function performed by the 'laser piloting means' is neither identical to, nor the equivalent of, external modulation." *See Pirelli Cable*, 988 F.Supp. at 441. *Pirelli* asserts that by coming to such a conclusion, the Court impermissibly considered issues of infringement, under either a theory of literal infringement or the doctrine of equivalents, when *Markman* hearings should be solely confined to claim construction. In addition, *Pirelli* argues that under the means-plus-function analysis of 35 U.S.C. s. 112, para. 6, the scope of literally infringing equivalents is a factual determination. Lastly, *Pirelli* contends that, "[t]he discussion by the parties of external modulation at the September 22[nd] hearing was intended to put the concept of direct modulation in context." *See* D.I. 109, at 4 n. 2.

*Ciena*, arguing in opposition to *Pirelli's* motion for reargument, maintains that the Court properly concluded that the "laser piloting means" could not be construed so broadly as to include external modulation, since such a construction would be inconsistent with other explicit requirements of the claim. Specifically, *Ciena* asserts that by having external modulation as a possible equivalent, it would impermissibly read the required claim language out of the patent. In addition, *Ciena* correctly makes clear that at no time did the Court make any reference to the accused device or decide any issue of infringement, either literally or under the doctrine of equivalents. Finally, *Ciena* contends that the Court's decision concerning the construction of the "laser piloting means" was well within the adversarial issues squarely presented to the Court as both parties at length addressed at the hearing and in their pre-hearing briefs whether the laser piloting means must function solely through direct modulation.

The Court agrees with *Ciena* that the issue of whether the "laser piloting means" can function only through direct modulation was extensively briefed and discussed and well within the adversarial issues squarely presented to the Court for its determination. *See Ciena's Pre-Hearing Brief Concerning Claim Construction Issues*, D.I. 78, at 33-35; *Pirelli Cable Corp.'s Pre-Hearing Brief Memorandum*, D.I. 79, at 33-35; *Transcript of Markman Hearing*, D.I. 83, at 153, 155-156, 163-168.

The language in this Court's November 17, 1997, Opinion with which *Pirelli* takes issue reads as follows:

Because "the evidence is such that no reasonable jury could determine [these] two elements to be equivalent," the Court need not reach the question of whether the determination of equivalents under s. 112, para. 6 is a question of law or fact. *See Warner-Jenkinson*, --- U.S. at ----, n. 8, 117 S.Ct. at 1053, n. 8. As a matter of law, the direct modulation function performed by the "laser piloting means" is neither identical to, nor the equivalent of, external modulation since an external modulator is not directly connected to the laser for purposes of controlling the laser.

*See Pirelli*, 988 F.Supp. at 441. *Pirelli* complains that by employing the above language the Court has made a finding with respect to the doctrine of equivalents and equivalents under s. 112, para. 6.

The accused device has never been placed before the Court nor does the phrase "doctrine of equivalents" appear anywhere in the November 17, 1997, Opinion. Further, the "offending language" by its terms is limited to "equivalents under s. 112, para. 6." Accordingly, to the extent Pirelli is requesting reargument predicated upon the doctrine of equivalents, reargument will be denied.

[26] Reargument directed to a determination of equivalents under s. 112, para. 6, is another matter. The "equivalent" in s. 112 is vastly different than the "doctrine of equivalents." The doctrine of equivalents "equitably expands exclusive patent rights." *Valmont Industries, Inc. v. Reinke Manufacturing Co., Inc.*, 983 F.2d 1039, 1044 (Fed.Cir.1993). In contrast, s. 112, para. 6, "equivalents" "limits the broad language of means-plus-function limitations in combination claims to equivalents of the structures, materials or acts in the specification." *Id.*, at 1043-44.

The *Valmont* court has described s. 112 as permitting a "means-plus-function" language in a combination claim, but with a "string attached." The "'attached string' limits the applicant to the structure, material or acts in the specification and their equivalents. Indeed the section operates more like the reverse doctrine of equivalents than the doctrine of equivalents because it restricts the coverage of literal claim language." *Id.* at 1042. The *Valmont* court went on to describe its position as follows:

In sum, for a means-plus-function limitation to read on an accused device, the accused device must employ means identical to or the equivalent of the structures, material or acts described in this patent specification. The accused device must also perform the identical function as specified in the claims.

*Id.* at 1042.

Pirelli correctly argues that it is inappropriate in a *Markman* hearing for a court to make a s. 112, para. 6, equivalents determination without first alerting the parties so that they have the opportunity to provide a full record on the "equivalent" issue. Interestingly, Pirelli did not attack the Court's holding which immediately following the "offending language." That holding repeated below remains the law of the case:

For all the foregoing reasons then, the Court holds, pursuant to the means-plus-function analysis of 35 U.S.C. s. 112, para. 6, that the "laser piloting means," found in claims 1, 3, 8, 13, 14, 15, and 17 of the '073 Patent, functions by variably controlling the input of the laser in the adapter through the use of direct modulation in order to produce a directly corresponding output. The corresponding structure, as a matter of law, is found to be "laser piloting circuit," which is a laser driver circuit that directly modulates the input of the laser in the adapter in order to produce a directly corresponding output.

*See Pirelli Cable*, 988 F.Supp. at 441.

Without an accused device before the Court, it was and remains impossible for the Court to have made a s. 112, para. 6, "equivalent" determination. That determination must necessarily await further motion practice. Nonetheless, the language deemed objectionable by Pirelli will be deleted from the November 17, 1997, Opinion.

## **B. Extrinsic Evidence Issue**

[27] Motion for reargument on the extrinsic evidence issue need not detain the Court. Pirelli asserts the extrinsic evidence provided by Pirelli in support of its construction of the disputed terms of the '073 Patent

should have been accepted. Pirelli maintains that the Court's decision to exclude such extrinsic evidence was erroneous because it was based, at least in part, on the fact that there was an agreement between the parties that there would be no use of extrinsic evidence at the hearing. As a preliminary matter, the Court is not clear on what basis Pirelli moves for reargument on this issue. *See* D.I. 109, at 9 ("Pirelli ... asks the Court to consider the proffered extrinsic evidence"). The Court will assume, for the sake of argument, that Pirelli is contending that the Court made an error, not of reasoning, but of apprehension.

Quite to the contrary, the Court stated without reservation in the Opinion of November 17, 1997: "The Court declines to consider such extrinsic evidence. The Court is counseled by the fact ... that the claim and the specification unequivocally describe the meaning and scope of the disputed language. As such, utilization of extrinsic evidence is improper. *See Vitronics*, 90 F.3d at 1583." *See Pirelli Cable*, 988 F.Supp. at 436 n. 9; *see also Bell & Howell v. Altek Systems*, 132 F.3d 701, 705-06 (Fed.Cir.1997). The Court arrived at its decision based upon the claim and specification language, not based upon the representations made by counsel that an agreement had been made about extrinsic evidence. Consequently, reargument is inappropriate on this issue because "the matter[ ] advanced for reargument would not 'reasonably have altered the result [previously] reached by the Court...." *Brambles*, 735 F.Supp. at 1240. There being no error of apprehension, Pirelli's motion for reargument on the extrinsic evidence issue will be denied.

An appropriate order will issue.

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