

**IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF TEXAS  
MARSHALL DIVISION**

**OYSTER OPTICS, LLC,**  
**Plaintiffs,**

**v.**

**CORIAN AMERICA INC. and  
TELLABS, INC.**  
**Defendants.**

**Civil Action No. 2:16-cv-1302**

**LEAD CASE**

**JURY TRIAL DEMANDED**

**OYSTER OPTICS, LLC,**  
**Plaintiffs,**

**v.**

**CIENA CORPORATION AND  
ERICSSON INC.**  
**Defendants.**

**Civil Action No. 2:16-cv-01300**

**JURY TRIAL DEMANDED**

**AMENDED COMPLAINT FOR PATENT INFRINGEMENT**

This is an action for patent infringement arising under the Patent Laws of the United States of America, 35 U.S.C. § 1 *et seq.* in which Plaintiff Oyster Optics, LLC (“Oyster” or “Plaintiff”) makes the following allegations against Defendants Ciena Corporation (“Ciena”) and Ericsson Inc (“Ericsson”) (collectively, “Defendants”).

**PARTIES**

1. Oyster Optics, LLC is a Texas company, and has a place of business at 11921 Freedom Drive, Suite 550, Reston, VA 20190.

2. On information and belief, Ciena Corporation is a Delaware corporation with its principal place of business at 7035 Ridge Road, Hanover, Maryland 21076. Ciena Corporation can be served through its registered agent, Corporation Service Company, 2711 Centerville Road, Suite 400, Wilmington, DE 19808.

3. On information and belief, Ericsson Inc. is a Delaware corporation with its principal place of business at 6300 Legacy Drive, Plano, Texas 75024. Ericsson Inc. can be served through its registered agent, Capitol Corporate Services, Inc., 206 E. 9th Street, Suite 1300, Austin, TX 78701.

4. On information and belief, Ericsson and Ciena have a business relationship involving optical transport technology. For example, Ericsson and Ciena entered into an agreement to offer for sale a portfolio of Ciena products and/or services. More, Ericsson and Ciena entered into “a strategic global agreement to develop joint transport for IP-optical convergence and service provider software-defined networking (SDN).”<sup>1</sup>

#### **JURISDICTION AND VENUE**

5. This action arises under the patent laws of the United States, Title 35 of the United States Code. Accordingly, this Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendants in this action because, among other reasons, Defendants have committed acts within the Eastern District of Texas giving rise to this action and has established minimum contacts with the forum state of Texas.

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<sup>1</sup> See, e.g., *Ericsson telebriefing: Ericsson announces strategic global agreement with Ciena*, (Feb. 14, 2014), <https://www.ericsson.com/ericsson/investors/events/2014/ericsson-telebriefing-ciena.shtml>; Ian Scales, *Is the Ciena/Ericsson deal evidence of climate change?* <http://www.telecomtv.com/articles/vendors-and-oems/is-the-ciena-ericsson-deal-evidence-of-climate-change-10974/> (last visited Nov. 12, 2016).

Ciena maintains a place of business within the State at 1300 E Lookout Drive Suite 240 Richardson, TX 75080. Ericsson maintains a place of business at 6300 Legacy Drive, Plano, Texas 75024. Ciena directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others), has committed and continues to commit acts of infringement in this District by, among other things, making, using, importing, offering for sale, and/or selling products and/or services that infringe the patents-in-suit. Thus, Ciena purposefully availed itself of the benefits of doing business in the State of Texas and the exercise of jurisdiction over Ciena would not offend traditional notions of fair play and substantial justice. Ciena is registered to do business in the State of Texas, and has appointed Corporate Service Company, 2711 Centerville Road, Suite 400, Wilmington, DE 19808 as its agent for service of process. Ericsson is registered to do business in the State of Texas, and has appointed Capitol Corporate Services, Inc., 206 E. 9th Street, Suite 1300, Austin, TX 78701 as its agent for service of process.

7. Venue is proper in this District under 28 U.S.C. §§ 1391 (b)-(c) and 1400(b) because Defendants are subject to personal jurisdiction in this District, have transacted business in this District and have committed acts of patent infringement in this District.

### **BACKGROUND**

8. In the early 2000s, Oyster Optics, Inc., a research, development, and engineering company, was focused upon innovation in government, commercial, security, and broad-band applications of leading edge fiber optics technology. Mr. Peter (“Rocky”) Snawerdt was at Oyster Optics, Inc. when he invented the subject matter of U.S. Patent Nos. 6,469,816; 6,476,952; 6,594,055; 7,099,592; 7,620,327; 8,374,511; and 8,913,898 (collectively, “asserted patents” or “patents-in-suit”).

9. Oyster is the owner by assignment of United States Patent No. 6,469,816 (“the ’816 Patent”) entitled “Phase-Modulated Fiber Optic Telecommunications System.” The ’816 Patent was duly and legally issued by the United States Patent and Trademark Office on October 22, 2002. A true and correct copy of the ’816 Patent is included as Exhibit A.

10. Oyster is the owner by assignment of United States Patent No. 6,476,952 (“the ’952 Patent”) entitled “Phase-Modulated Fiber Optic Telecommunications System.” The ’952 Patent was duly and legally issued by the United States Patent and Trademark Office on November 5, 2002. A true and correct copy of the ’952 Patent is included as Exhibit B.

11. Oyster is the owner by assignment of United States Patent No. 6,594,055 (“the ’055 Patent”) entitled “Secure Fiber Optic Telecommunications System and Method.” The ’055 Patent was duly and legally issued by the United States Patent and Trademark Office on July 15, 2003. A true and correct copy of the ’055 Patent is included as Exhibit C.

12. Oyster is the owner by assignment of United States Patent No. 7,099,592 (“the ’592 Patent”) entitled “Telecommunications Card for Secure Optical Data Transmission and Installation Method.” The ’592 Patent was duly and legally issued by the United States Patent and Trademark Office on August 29, 2006. A true and correct copy of the ’592 Patent is included as Exhibit D.

13. Oyster is the owner by assignment of United States Patent No. 7,620,327 (“the ’327 Patent”) entitled “Fiber Optic Telecommunications Card with Energy Level Monitoring.” The ’327 Patent was duly and legally issued by the United States Patent and Trademark Office on November 17, 2009. A true and correct copy of the ’327 Patent is included as Exhibit E.

14. Oyster is the owner by assignment of United States Patent No. 8,374,511 (“the ’511 Patent”) entitled “Fiber Optic Telecommunications Card with Energy Level Monitoring.”

The '511 Patent was duly and legally issued by the United States Patent and Trademark Office on February 12, 2013. A true and correct copy of the '511 Patent is included as Exhibit F.

15. Oyster is the owner by assignment of United States Patent No. 8,913,898 (“the '898 Patent”) entitled “Fiber Optic Telecommunications Card with Energy Level Monitoring.” The '898 Patent was duly and legally issued by the United States Patent and Trademark Office on December 16, 2014. A true and correct copy of the '898 Patent is included as Exhibit G.

## **COUNT I**

### **INFRINGEMENT OF THE '816 PATENT**

16. Oyster references and incorporates by reference paragraphs 1 through 15 of this Complaint.

17. On information and belief, Defendants make, use, offer for sale and/or sell in the United States products and/or services that infringe various claims of the '816 Patent, and continues to do so. By way of illustrative example, Ciena’s infringing products include without limitation, all versions and variations of its FlexSelect 40G Shelf products, CoreSteam Agility, CN 4200 platforms, and its 6500 Series products.<sup>2</sup> Ericsson’s infringing products include without limitation the MHL 3000. Defendants’ infringing products are collectively referred to hereinafter as “Accused Instrumentalities.”

18. On information and belief, the Accused Instrumentalities are a fiber optic data transmission system. For example, Ciena Corporation’s FlexSelect 40G Shelf “is the first solution to offer 40G metro, regional, long-haul, and ultra long-haul DWDM transmission in one

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<sup>2</sup> See, e.g., <http://www.ciena.com/about/newsroom/press-releases/Ciena-Delivers-Seamless-40G-Transport-Upgrade-to-FlexSelect-Architecture-as-Universal-Solution-for-Metro-Regional-Long-Haul-and-Ultra-Long-Haul-Networks.html> (last visited September 22, 2016).

platform.”<sup>3</sup> It was designed to provide 40G service “over legacy fiber networks.”<sup>4</sup> In further example, Ericsson’s MHL3000 is an “Optical DWDM Solution” that provides for “40G transmission based on ODB, DPSK, RZ-DPQSK and 4G inverse multiplexer.”<sup>5</sup>

19. On information and belief, the Accused Instrumentalities comprise a transmitter having a laser emitting a continuous wave light. For example, the FlexSelect 40G Shelf was designed to add “40G transport capabilities to the CoreStream Agility and CN 4200 platforms.”<sup>6</sup> Ciena’s CoreStream Agility product literature describes the use of, for example, a “laser of a transceiver module” with “automatic laser power-up.”<sup>7</sup> Ciena’s FlexSelect 40G Shelf product literature also discusses how the exemplary product “[t]ransports 40G waves,” touting it as a product benefit.<sup>8</sup> In a 2007 article announcing the availability of the FlexSelect 40G Shelf (and explaining that it is compatible with the CN 4200 and CoreStream Agility systems), Ciena’s director of marketing, Vinay Rathore, explained that Ciena uses DPSK for these FlexSelect 40G Shelf, CN 4200, and CoreStream Agility products.<sup>9</sup>

20. On information and belief, the Accused Instrumentalities comprise a phase modulator phase modulating the continuous wave light as a function of an electronic input data stream and of an electronic feedback loop with a feedback time delay, the electronic feedback loop being fed back to the electronic input data stream, so as to create an optical signal bearing information in phase- modulated form. For example, Ciena product literature on an exemplary 40G DPSK shows the use of a phase modulator modulating continuous wave light as a function

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<sup>3</sup> [http://ciena.com/files/40G\\_Shelf\\_Opt\\_trans\\_.pdf](http://ciena.com/files/40G_Shelf_Opt_trans_.pdf) at p. 7.

<sup>4</sup> [http://www.ciena.com/products/products\\_FlexSelect\\_40G\\_Shelf.htm](http://www.ciena.com/products/products_FlexSelect_40G_Shelf.htm).

<sup>5</sup> Marconi MHL 3000 Product white paper, p. 1.

<sup>6</sup> *Id.* at p. 3.

<sup>7</sup> [http://www.ciena.com/files/Optical\\_Transport\\_System\\_PB.pdf](http://www.ciena.com/files/Optical_Transport_System_PB.pdf) at pp. 4-5.

<sup>8</sup> [http://www.ciena.com/products/products\\_FlexSelect\\_40G\\_Shelf.htm](http://www.ciena.com/products/products_FlexSelect_40G_Shelf.htm). at p. 3.

<sup>9</sup> <http://www.xchangemag.com/hotnews/76h1111149.html>. □

of an input data stream.<sup>10</sup> Ericsson's MHL3000 provides for "40G transmission based on ODB, DPSK, RZ- DPQSK and 4G inverse multiplexer."<sup>11</sup> A DPSK transmitter used for communications and that is present, on information and belief, in the Accused Instrumentalities, includes a feedback loop in the Precoder with a time delay "T" feeding into an exclusive-or gate ("driver") along with the input data stream and producing an output that controls the phase modulator. This driver is an example of a control circuit that controls the modulator to adjust the properties of the optical signal itself as a function of the incoming data. On information and belief, the Accused Instrumentalities are consistent with this type of design.

21. On information and belief, the Accused Instrumentalities comprise a telecommunications optical fiber connected to at least one receiver, the phase-modulator being connected to the telecommunications fiber so that the phase-modulated information optical signal is transmitted over the telecommunications fiber without recombining with the continuous wave light. For example, the exemplary 40G Shelf "is the first solution to offer 40G metro, regional, long-haul, and ultra long-haul DWDM transmission in one platform."<sup>12</sup> It was designed to provide 40G service "over legacy fiber networks."<sup>13</sup> Ciena's product literature refers to this exemplary product as a "card," as depicted below.<sup>14</sup>

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<sup>10</sup> [http://www.ciena.com/files/The\\_Road\\_to\\_100G\\_Networking\\_A4\\_WP\\_new.pdf](http://www.ciena.com/files/The_Road_to_100G_Networking_A4_WP_new.pdf) at p. 3.

<sup>11</sup> Marconi MHL 3000 Product white paper, p. 1.

<sup>12</sup> [http://ciena.com/files/40G\\_Shelf\\_Opt\\_trans\\_.pdf](http://ciena.com/files/40G_Shelf_Opt_trans_.pdf) at p. 7. □

<sup>13</sup> [http://www.ciena.com/products/products\\_FlexSelect\\_40G\\_Shelf.htm](http://www.ciena.com/products/products_FlexSelect_40G_Shelf.htm).

<sup>14</sup> [http://ciena.com/files/40G\\_Shelf\\_Opt\\_trans\\_.pdf](http://ciena.com/files/40G_Shelf_Opt_trans_.pdf) at p. 3.

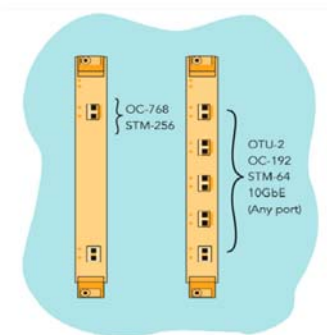


Figure 2. FlexSelect 40G Shelf line cards

The Ericsson product white paper on the “Marconi MHL 3000 Optical DWDM solution” lists various tributary cards, including those for 40G transmission.<sup>15</sup>

22. On information and belief, the receiver in the Accused Instrumentalities include an interferometer having a first fiber arm and a second fiber arm and having an interferometric delay being a function of the feedback time delay. A 2009 Ciena presentation distinguishes between the receivers used in 40G differential modulation techniques such as DPSK and DQPSK and the “coherent detection” receivers that Ciena intended to use in future 100G products.<sup>16</sup> As Ciena has explained, the major difference between a differential modulation system and a coherent modulation system “lies with the receiver. Instead of a differential detection circuit, a coherent receiver is employed where the incoming signal is coupled with a local oscillator and detected.”<sup>17</sup> On information and belief, the receivers in Ciena’s 40G DPSK and/or DQPSK products do not couple the incoming signal with a local oscillator, but rather rely upon interference between the incoming signal passing through a first fiber arm and a delayed version of the incoming signal passing through a second fiber arm. Indeed, a Ciena patent explains that this is the standard way to demodulate a differential signal at a receiver: “DQPSK modulates

<sup>15</sup> Marconi MHL 3000 Product white paper, p. 1.

<sup>16</sup> <https://www.internet2.edu/presentations/jt2009feb/20090203-janson.pdf> at 8.

<sup>17</sup> [http://www.ciena.com/files/The\\_Road\\_to\\_100G\\_Networking\\_A4\\_WP\\_new.pdf](http://www.ciena.com/files/The_Road_to_100G_Networking_A4_WP_new.pdf) at p. 4.



data onto the phase of a laser in a differential way. At the demodulator, a delay line interferometer is utilized to identify the signal.”<sup>18</sup>

23. On information and belief, Defendants have directly infringed and continues to directly infringe the ‘816 Patent by, among other things, making, using, offering for sale, and/or selling the Accused Instrumentalities. On information and belief, such products and/or services are covered by one or more claims of the ‘816 Patent’s including at least claim 1 because they contain each element of that claim.

24. By making, using, offering for sale, and/or selling the ‘816 Accused Instrumentalities infringing the ‘816 Patent, Defendants have injured Oyster and are liable to Oyster for infringement of the ‘816 Patent pursuant to 35 U.S.C. § 271(a) directly and/or under the doctrine of equivalents.

25. In addition, Defendants are actively inducing others, such as its customers and end users of Accused Instrumentalities, services based thereupon, and related products and/or processes, to directly infringe each and every claim limitation, including without limitation claim 1 of the ‘816 Patent, in violation of 35 U.S.C. § 271(b). Upon information and belief, Defendants’ customers and/or end users have directly infringed and are directly infringing each and every claim limitation, including without limitation claim 1 of the ‘816 Patent. Defendants have had actual knowledge of the ‘816 Patent at least as of service of the original complaint in this action. Defendants are knowingly inducing its customers and/or end users to directly infringe the ‘816 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement. Defendants’ inducement includes, for example, providing technical guides, product data sheets, demonstrations, software and hardware

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<sup>18</sup> U.S. Patent No. 7,697,803 at 1:40-42.

specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe the '816 Patent. The Accused Instrumentalities are designed in such a way that when they are used for their intended purpose, the user infringes the '816 Patent. Defendants know and intend that customers that purchase the Accused Instrumentalities will use those products for their intended purpose.

26. Further, Defendants are contributing to the infringing acts of others, such as its customers, end users, and/or service providers in selling, offering to sell or importing in the into the United States the Accused Instrumentalities which have been especially made or especially adapted for use in a manner that infringes the '816, and which have no substantial non-infringing uses. For example, Ciena stated that “Packet Optical sales principally reflect a \$106.8 million increase in sales of our 6500 Packet-Optical Platform on increased sales to AT&T, cable and multiservice operators and Web-scale providers[.]”<sup>19</sup> Further, “Converged Packet Optical revenue increased significantly, reflecting a \$258.2 million increase in sales of our 6500 Packet-Optical Platform, largely driven by service provider and Web-scale provider demand for high-capacity, optical transport for coherent 40G and 100G network infrastructures.”<sup>20</sup> Upon information and belief, Defendants’ customers, end users, and/or service providers have directly infringed and are directly infringing each and every claim limitation of claim 1 of the '816 Patent. Defendants have had actual knowledge of the '816 Patent at least as of service of the original complaint in this action. Defendants are therefore a contributory infringer under 35 U.S.C. § 271(c).

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<sup>19</sup> 2015 Annual Report at 47, *available at* <http://investor.ciena.com/phoenix.zhtml?c=99134&p=irol-reportsAnnual>.

<sup>20</sup> 2015 Annual Report at 52, *available at* <http://investor.ciena.com/phoenix.zhtml?c=99134&p=irol-reportsAnnual>.

27. Defendants have been aware of the '816 Patent and of their infringement as of a date no later than the date they were served with the original complaint in this action. To the extent facts learned in discovery show that Defendants' infringement of the '816 Patent is or has been willful, or to the extent that Defendants' actions subsequent to the filing of this Amended Complaint—such as their behavior as litigants or their failure to take remedial actions—render their infringement egregious, Oyster reserves the right to request such a finding at time of trial.

28. As a result of Defendants' infringement of the '816 Patent, Oyster has suffered monetary damages in an amount adequate to compensate for Defendants' infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendants, together with interest and costs as fixed by the Court, and Oyster will continue to suffer damages in the future unless Defendants' infringing activities are enjoined by this Court.

29. Unless a permanent injunction is issued enjoining Defendants and its agents, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '816 Patent, Oyster will be greatly and irreparably harmed.

## **COUNT II**

### **INFRINGEMENT OF THE '952 PATENT**

30. Oyster references and incorporates by reference paragraphs 1 through 28 of this Complaint.

31. On information and belief, Defendants make, use, offer for sale and/or sell in the United States products and/or services that infringe various claims of the '952 Patent, and continues to do so.

32. On information and belief, the Accused Instrumentalities are a fiber optic data transmission system. For example, Ciena Corporation's FlexSelect 40G Shelf "is the first

solution to offer 40G metro, regional, long-haul, and ultra long-haul DWDM transmission in one platform.”<sup>21</sup> It was designed to provide 40G service “over legacy fiber networks.”<sup>22</sup> In further example, Ericsson’s MHL3000 is an “Optical DWDM Solution” that provides for “40G transmission based on ODB, DPSK, RZ- DPQSK and 4G inverse multiplexer.”<sup>23</sup>

33. On information and belief, the Accused Instrumentalities comprise an optical data transmitter comprising a laser for producing light, a phase modulator phase modulating the light, and an electronic control circuit for receiving an electronic input data stream and controlling the phase-modulator, the electronic control circuit including an input data circuit having an electronic delay. For example, the FlexSelect 40G Shelf was designed to add “40G transport capabilities to the CoreStream Agility and CN 4200 platforms.”<sup>24</sup> Ciena’s CoreStream Agility product literature describes the use of, for example, a “laser of a transceiver module” with “automatic laser power-up.”<sup>25</sup> Ciena’s FlexSelect 40G Shelf product literature also discusses how the exemplary product “[t]ransports 40G waves,” touting it as a product benefit.<sup>26</sup> In a 2007 article announcing the availability of the FlexSelect 40G Shelf (and explaining that it is compatible with the CN 4200 and CoreStream Agility systems), Ciena’s director of marketing, Vinay Rathore, explained that Ciena uses DPSK for these FlexSelect 40G Shelf, CN 4200, and CoreStream Agility products.<sup>27</sup> Ciena product literature on an exemplary 40G DPSK shows the use of a phase modulator modulating continuous wave light as a function of an input data

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<sup>21</sup> [http://ciena.com/files/40G\\_Shelf\\_Opt\\_trans\\_.pdf](http://ciena.com/files/40G_Shelf_Opt_trans_.pdf) at p. 7.

<sup>22</sup> [http://www.ciena.com/products/products\\_FlexSelect\\_40G\\_Shelf.htm](http://www.ciena.com/products/products_FlexSelect_40G_Shelf.htm).

<sup>23</sup> Marconi MHL 3000 Product white paper, p. 1.

<sup>24</sup> *Id.* at p. 3.

<sup>25</sup> [http://www.ciena.com/files/Optical\\_Transport\\_System\\_PB.pdf](http://www.ciena.com/files/Optical_Transport_System_PB.pdf) at pp. 4-5.

<sup>26</sup> [http://www.ciena.com/products/products\\_FlexSelect\\_40G\\_Shelf.htm](http://www.ciena.com/products/products_FlexSelect_40G_Shelf.htm). at p. 3.

<sup>27</sup> <http://www.xchangemag.com/hotnews/76h1111149.html>. □

stream.<sup>28</sup> Ericsson's MHL3000 provides for "40G transmission based on ODB, DPSK, RZ-DQPSK and 4G inverse multiplexer."<sup>29</sup> A DPSK transmitter used for communications and that is present, on information and belief, in the Accused Instrumentalities, includes a feedback loop in the Precoder with a time delay "T" feeding into an exclusive-or gate ("driver") along with the input data stream and producing an output that controls the phase modulator. This driver is an example of a control circuit that controls the modulator to adjust the properties of the optical signal itself as a function of the incoming data. On information and belief, the Accused Instrumentalities are consistent with this type of design.

34. On information and belief, the Accused Instrumentalities comprises a receiver that includes an interferometer having a first fiber arm and a second fiber arm, the second arm being longer than the first arm, and having an interferometric delay being a function of the feedback time delay. A 2009 Ciena presentation distinguishes between the receivers used in 40G differential modulation techniques such as DPSK and DQPSK and the "coherent detection" receivers that Ciena intended to use in future 100G products.<sup>30</sup> As Ciena has explained, the major difference between a differential modulation system and a coherent modulation system "lies with the receiver. Instead of a differential detection circuit, a coherent receiver is employed where the incoming signal is coupled with a local oscillator and detected."<sup>31</sup> On information and belief, the receivers in Ciena's 40G DPSK and/or DQPSK products do not couple the incoming signal with a local oscillator, but rather rely upon interference between the incoming signal passing through a first fiber arm and a delayed version of the incoming signal passing through a second fiber arm. Indeed, a Ciena patent explains that this is the standard way to demodulate a

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<sup>28</sup> [http://www.ciena.com/files/The\\_Road\\_to\\_100G\\_Networking\\_A4\\_WP\\_new.pdf](http://www.ciena.com/files/The_Road_to_100G_Networking_A4_WP_new.pdf) at p. 3.

<sup>29</sup> Marconi MHL 3000 Product white paper, p. 1.

<sup>30</sup> <https://www.internet2.edu/presentations/jt2009feb/20090203-janson.pdf> at 8.

<sup>31</sup> [http://www.ciena.com/files/The\\_Road\\_to\\_100G\\_Networking\\_A4\\_WP\\_new.pdf](http://www.ciena.com/files/The_Road_to_100G_Networking_A4_WP_new.pdf) at p. 4.

differential signal at a receiver: “DQPSK modulates data onto the phase of a laser in a differential way. At the demodulator, a delay line interferometer is utilized to identify the signal.”<sup>32</sup>

35. On information and belief, the Accused Instrumentalities comprise a phase compensation circuit for altering an output of the input data circuit, the phase compensation circuit including an N-bit register for storing a desired phase compensation amount, an ALU for summing without carry the desired phase compensation amount, and a delayed feedback exclusive-or gate having a gate output and receiving the input data stream as an input. For example, a DPSK transmitter, which on information and belief is consistent with the design of the Accused Instrumentalities, includes an exclusive-or gate receiving the input data stream as input and producing an output. On information and belief, a most significant bit of an ALU output of the ALU is fed together with the gate output through another exclusive-or gate.

36. On information and belief, Defendants have directly infringed and continues to directly infringe the '952 Patent by, among other things, making, using, offering for sale, and/or selling the '952 Accused Instrumentalities. On information and belief, such products and/or services are covered by one or more claims of the '952 Patent's including at least claim 13, because they contain each element of that claim.

37. By making, using, offering for sale, and/or selling the '952 Accused Instrumentalities infringing the '952 Patent, Defendants have injured Oyster and are liable to Oyster for infringement of the '952 Patent pursuant to 35 U.S.C. § 271(a) directly and/or under the doctrine of equivalents.

38. In addition, Defendants actively induce others, including without limitation

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<sup>32</sup> U.S. Patent No. 7,697,803 at 1:40-42.

customers and end users of Accused Instrumentalities, to directly infringe each and every claim limitation, including without limitation claim 13 of the '952 Patent, in violation of 35 U.S.C. § 271(b). Upon information and belief, Defendants' customers and/or end users have directly infringed and are directly infringing each and every claim limitation, including without limitation claim 13 of the '952 Patent. Defendants have had actual knowledge of the '952 Patent at least as of service of the original complaint in this action. Defendants are knowingly inducing its customers and/or end users to directly infringe the '952 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement. Defendants' inducement includes, for example, providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe the '952 Patent. The Accused Instrumentalities are designed in such a way that when they are used for their intended purpose, the user infringes the '952 Patent. Defendants know and intend that customers that purchase the Accused Instrumentalities will use those products for their intended purpose.

39. Defendants have been aware of the '952 Patent and of their infringement as of a date no later than the date they were served with the original complaint in this action. To the extent facts learned in discovery show that Defendants' infringement of the '952 Patent is or has been willful, or to the extent that Defendants' actions subsequent to the filing of this Amended Complaint—such as their behavior as litigants or their failure to take remedial actions—render their infringement egregious, Oyster reserves the right to request such a finding at time of trial.

40. As a result of Defendants' infringement of the '952 Patent, Oyster has suffered monetary damages in an amount adequate to compensate for Defendants' infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendants, together

with interest and costs as fixed by the Court, and Oyster will continue to suffer damages in the future unless Defendants' infringing activities are enjoined by this Court.

41. Unless a permanent injunction is issued enjoining Defendants and its agents, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '952 Patent, Oyster will be greatly and irreparably harmed.

### **COUNT III**

#### **INFRINGEMENT OF THE '055 PATENT**

42. Oyster references and incorporates by reference paragraphs 1 through 39 of this Complaint.

43. On information and belief, Defendants make, use, offer for sale and/or sell in the United States Accused Instrumentalities that infringe various claims of the '055 Patent, and continues to do so.

44. On information and belief, the Accused Instrumentalities comprise a fiber optic data transmission system. For example, the exemplary FlexSelect 40G Shelf "is the first solution to offer 40G metro, regional, long-haul, and ultra long-haul DWDM transmission in one platform."<sup>33</sup> It was designed to provide 40G service "over legacy fiber networks."<sup>34</sup>

45. On information and belief, the Accused Instrumentalities a transmitter having a light source producing light and a phase modulator for phase modulating the light source. For example, the exemplary FlexSelect 40G Shelf was designed to add "40G transport capabilities to the CoreStream Agility and CN 4200 platforms."<sup>35</sup> Ciena's CoreStream Agility product literature describes the use of, for example, a "laser of a transceiver module" with "automatic

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<sup>33</sup> [http://ciena.com/files/40G\\_Shelf\\_Opt\\_trans\\_.pdf](http://ciena.com/files/40G_Shelf_Opt_trans_.pdf) at p. 7.

<sup>34</sup> [http://www.ciena.com/products/products\\_FlexSelect\\_40G\\_Shelf.htm](http://www.ciena.com/products/products_FlexSelect_40G_Shelf.htm).

<sup>35</sup> *Id.* at p. 3.



laser power-up.”<sup>36</sup> These lasers are a light source. Furthermore, Ciena’s FlexSelect 40G Shelf product literature also discusses how the exemplary product “[t]ransports 40G waves,” touting it as a product benefit.<sup>37</sup> In a 2007 article announcing the availability of the FlexSelect 40G Shelf (and explaining that it is compatible with the CN 4200 and CoreStream Agility systems), Ciena’s director of marketing, Vinay Rathore, explained that Ciena uses DPSK for these FlexSelect 40G Shelf, CN 4200, and CoreStream Agility products.<sup>38</sup> Ciena product literature on the exemplary 40G DPSK shows the use of a phase modulator modulating continuous wave light as a function of an input data stream.<sup>39</sup> In further example, Ericsson’s MHL3000 provides for “40G transmission based on ODB, DPSK, RZ- DPQSK and 4G inverse multiplexer.”<sup>40</sup>

46. On information and belief, the Accused Instrumentalities comprise a controller for controlling the phase modulator, the controller including a delayed feedback exclusive or gate and having a controller output electronic data stream of a plurality of bits, each bit being either a binary zero or a binary one, and the phase modulator creating a phase-modulated optical signal, for each bit the phase modulator imparting on the light for each binary zero of the controller output electronic data stream either a first phase corresponding to the binary zero or a second phase offset 180 degrees from the first phase corresponding to the binary one so as to create the phase-modulated optical signal, and the transmitter having an optical output for the phase-modulated optical signal, the phase-modulated optical signal at the optical output being free of amplitude modulation as a function of the input electronic data stream. For example, a DPSK transmitter used for communications, and exemplary of the type of transmitter that on

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<sup>36</sup> [http://www.ciena.com/files/Optical\\_Transport\\_System\\_PB.pdf](http://www.ciena.com/files/Optical_Transport_System_PB.pdf) at pp. 4-5.

<sup>37</sup> [http://www.ciena.com/products/products\\_FlexSelect\\_40G\\_Shelf.htm](http://www.ciena.com/products/products_FlexSelect_40G_Shelf.htm). at p. 3.

<sup>38</sup> <http://www.xchangemag.com/hotnews/76h1111149.html>.

<sup>39</sup> [http://www.ciena.com/files/The\\_Road\\_to\\_100G\\_Networking\\_A4\\_WP\\_new.pdf](http://www.ciena.com/files/The_Road_to_100G_Networking_A4_WP_new.pdf) at p. 3.

<sup>40</sup> Marconi MHL 3000 Product white paper, p. 1.

information and belief is used in the Accused Instrumentalities, includes a feedback loop in the Precoder with a time delay “T” feeding into an exclusive-or gate along with the input data stream and producing an output that controls the phase modulator. On information and belief, the Accused Instrumentalities utilize a controller consistent with this type of design. In a DPSK system such as the one used in Accused Instrumentalities, the phase of a signal is, for example, confined to  $-\pi$  or  $\pi$ , where  $\pi = 90^\circ$ , the phase of a signal is confined to 0 or  $\pi$ , where  $\pi = 180^\circ$ , and the  $180^\circ$  offset corresponds to either a binary 0 or 1, or vice versa. Binary 0s and 1s are interpreted from these exemplary phase variances and are translated into a modulated signal. For example, a differential encoder/precoder controls the phase modulator based on a received input binary data stream. An input data stream enters an exclusive-or function which requires a binary/digital input.

47. On information and belief, the Accused Instrumentalities comprise a transmitter having an optical output for the phase-modulated optical signal, the phase-modulated optical signal at the optical output being free of amplitude modulation as a function of the input electronic data stream. For example, the modulated output signal of a DPSK receiver such as the exemplary type used in the Accused Instrumentalities is free of amplitude modulation. The following figure from a Ciena document shows that DPSK signals are phase-modulated but have

no amplitude modulation<sup>41</sup>:

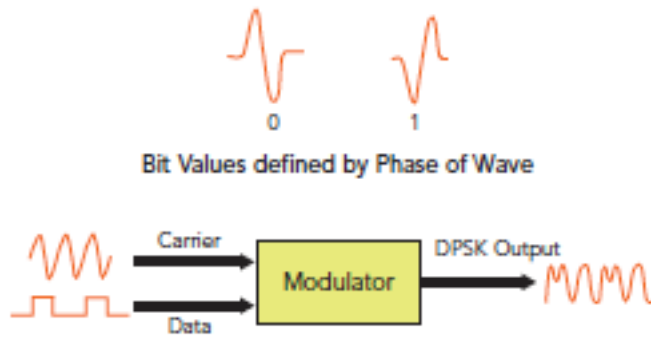


Figure 8. Transmitter for DPSK modulation

48. On information and belief, Defendants have directly infringed and continues to directly infringe the '055 Patent by, among other things, making, using, offering for sale, and/or selling the '055 Accused Instrumentalities. On information and belief, such products and/or services are covered by one or more claims of the '055 Patent's including at least claim 15, because they contain each element of that claim.

49. By making, using, offering for sale, and/or selling the Accused Instrumentalities infringing the '055 Patent, Defendants have injured Oyster and are liable to Oyster for infringement of the '055 Patent pursuant to 35 U.S.C. § 271(a) directly and/or under the doctrine of equivalents.

50. In addition, Defendants actively induce others, including without limitation customers and end users of Accused Instrumentalities, to directly infringe each and every claim limitation, including without limitation claim claim 15 of the '055 Patent, in violation of 35 U.S.C. § 271(b). Upon information and belief, Defendants' customers and/or end users have directly infringed and are directly infringing each and every claim limitation, including without limitation claim 1 of the '055 Patent. Defendants have had actual knowledge of the '055 Patent

<sup>41</sup> [http://www.ciena.com/files/The\\_Road\\_to\\_100G\\_Networking\\_A4\\_WP\\_new.pdf](http://www.ciena.com/files/The_Road_to_100G_Networking_A4_WP_new.pdf) at p. 3.

at least as of service of the original complaint in this action. Defendants are knowingly inducing its customers and/or end users to directly infringe the '055 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement. Defendants' inducement includes, for example, providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe the '055 Patent. The Accused Instrumentalities are designed in such a way that when they are used for their intended purpose, the user infringes the '055 Patent. Defendants know and intend that customers that purchase the Accused Instrumentalities will use those products for their intended purpose.

51. Defendants have been aware of the '055 Patent and of their infringement as of a date no later than the date they were served with the original complaint in this action. To the extent facts learned in discovery show that Defendants' infringement of the '055 Patent is or has been willful, or to the extent that Defendants' actions subsequent to the filing of this Amended Complaint—such as their behavior as litigants or their failure to take remedial actions—render their infringement egregious, Oyster reserves the right to request such a finding at time of trial.

52. As a result of Defendants' infringement of the '055 Patent, Oyster has suffered monetary damages in an amount adequate to compensate for Defendants' infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendants, together with interest and costs as fixed by the Court, and Oyster will continue to suffer damages in the future unless Defendants' infringing activities are enjoined by this Court.

53. Unless a permanent injunction is issued enjoining Defendants and its agents, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '055 Patent, Oyster will be greatly and irreparably harmed.

**COUNT IV**

**INFRINGEMENT OF THE '592 PATENT**

54. Oyster references and incorporates by reference paragraphs 1 through 51 of this Complaint.

55. On information and belief, Defendants make, use, offer for sale and/or sell in the United States Accused Instrumentalities that infringe various claims of the '592 Patent, and continues to do so.

On information and belief, the Accused Instrumentalities comprise a card for transmitting data over at least one optical fiber. The exemplary 40G Shelf “is the first solution to offer 40G metro, regional, long-haul, and ultra long-haul DWDM transmission in one platform.”<sup>42</sup> It was designed to provide 40G service “over legacy fiber networks.”<sup>43</sup> Ciena’s product literature refers to this exemplary product as a “card,” as depicted previously.<sup>44</sup> The Ericsson product white paper on the “Marconi MHL 3000 Optical DWDM solution” lists various tributary cards, including those for 40G transmission.<sup>45</sup>

56. On information and belief, the Accused Instrumentalities comprise a transmitter having at least one light source and a phase modulator for phase modulating light from the source so as to create phase-modulated optical signals in the light as a function of an input electronic data stream. For example, the FlexSelect 40G Shelf was designed to add “40G transport capabilities to the CoreStream Agility and CN 4200 platforms.”<sup>46</sup> Ciena’s CoreStream Agility product literature describes the use of a “laser of a transceiver module” with “automatic

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<sup>42</sup> [http://ciena.com/files/40G\\_Shelf\\_Opt\\_trans\\_.pdf](http://ciena.com/files/40G_Shelf_Opt_trans_.pdf) at p. 7.

<sup>43</sup> [http://www.ciena.com/products/products\\_FlexSelect\\_40G\\_Shelf.htm](http://www.ciena.com/products/products_FlexSelect_40G_Shelf.htm).

<sup>44</sup> [http://ciena.com/files/40G\\_Shelf\\_Opt\\_trans\\_.pdf](http://ciena.com/files/40G_Shelf_Opt_trans_.pdf) at p. 3.

<sup>45</sup> Marconi MHL 3000 Product white paper, p. 1.

<sup>46</sup> [http://ciena.com/files/40G\\_Shelf\\_Opt\\_trans\\_.pdf](http://ciena.com/files/40G_Shelf_Opt_trans_.pdf) at p. 3.

laser power-up.”<sup>47</sup> Ciena’s FlexSelect 40G Shelf product literature also discusses how the exemplary product “[t]ransports 40G waves,” touting it as a product benefit.<sup>48</sup> In a 2007 article announcing the availability of the FlexSelect 40G Shelf (and explaining that it is compatible with the CN 4200 and CoreStream Agility systems), Ciena’s director of marketing, Vinay Rathore, explained that Ciena uses DPSK for these FlexSelect 40G Shelf, CN 4200, and CoreStream Agility products.<sup>49</sup> Ciena product literature on 40G DPSK shows the use of a phase modulator modulating continuous wave light as a function of an input data stream.<sup>50</sup> A DPSK transmitter used for communications that is, on information and belief, exemplary of the type of transmitter used in the Accused Instrumentalities includes a feedback loop in the Precoder with a time delay “T” feeding into an exclusive-or gate along with the input data stream and producing an output that controls the phase modulator. On information and belief, the Accused Instrumentalities are consistent with this design.

57. On information and belief, the Accused Instrumentalities comprise a receiver having an interferometer for reading received optical signals, the interferometer having a delay loop fiber. For example, Ciena product literature describes both the exemplary CN 4200 and the exemplary CoreStream Agility as Wavelength Division Multiplexing (WDM) systems.<sup>51</sup> A “delay line” interferometer with two arms of different lengths is present in a DPSK receiver used for communications, such as the one that, on information and belief, is used in the Accused Instrumentalities. The length difference between the two arms of such an interferometer is chosen such that it delays the signal by exactly one bit slot. It is this one-bit delay that allows

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<sup>47</sup> [http://www.ciena.com/files/Optical\\_Transport\\_System\\_PB.pdf](http://www.ciena.com/files/Optical_Transport_System_PB.pdf) at pp. 4-5.

<sup>48</sup> [http://www.ciena.com/products/products\\_FlexSelect\\_40G\\_Shelf.htm](http://www.ciena.com/products/products_FlexSelect_40G_Shelf.htm). at p. 3.

<sup>49</sup> <http://www.xchangemag.com/hotnews/76h1111149.html>. □

<sup>50</sup> [http://www.ciena.com/files/The\\_Road\\_to\\_100G\\_Networking\\_A4\\_WP\\_new.pdf](http://www.ciena.com/files/The_Road_to_100G_Networking_A4_WP_new.pdf) at p. 3.

<sup>51</sup> [http://www.ciena.com/products/products\\_cn4200\\_overview.htm](http://www.ciena.com/products/products_cn4200_overview.htm) at p. 1.

one to reconstruct the original bit stream using a conventional direct-detection scheme. In other words, the one-bit delay matches the one-bit delay imposed in the transmitter on the original bit stream, which is what allows the reconstruction of that bit stream at the receiver.

58. On information and belief, the Accused Instrumentalities comprise a fastening device for securing the delay loop fiber. For example, the interferometer device for the Accused Instrumentalities is packaged, on information and belief, in an industry-standard module. Such a module must be fastened and soldered to a circuit board for operation. The subcomponents within the module, including the exemplary delay loop fiber, must be secured to the package or package substrate using a fastening device. For example, Ericsson's MHL 3000 Optical DWDM solution shows a platform with industry-standard card modules plugged into it.<sup>52</sup>



59. As another example, a Ciena document contains a photograph of a line card utilized in the Ciena CN 4200 and supporting differential DQPSK modulation.<sup>53</sup> On information and belief, this photograph show an interferometer delay loop fiber secured with clips or other

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<sup>52</sup> Marconi MHL 3000 Product white paper, p. 1.

<sup>53</sup> <https://www.internet2.edu/presentations/jt2009feb/20090203-janson.pdf> at 10-12.

fastening devices<sup>54</sup>:



60. On information and belief, Defendants have directly infringed and continue to directly infringe the '592 Patent by, among other things, making, using, offering for sale, and/or selling the '592 Accused Instrumentalities. On information and belief, such products and/or services are covered by one or more claims of the '592 Patent's including at least claim 1, because they contain each element of that claim.

61. By making, using, offering for sale, and/or selling the Accused Instrumentalities infringing the '592 Patent, Defendants have injured Oyster and are liable to Oyster for infringement of the '592 Patent pursuant to 35 U.S.C. § 271(a) directly and/or under the doctrine

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<sup>54</sup> *Id.* at 11.



of equivalents.

62. In addition, Defendants actively induce others, including without limitation customers and end users of Accused Instrumentalities, to directly infringe each and every claim limitation, including without limitation claim 1 of the '592 Patent, in violation of 35 U.S.C. § 271(b). Upon information and belief, Defendants' customers and/or end users have directly infringed and are directly infringing each and every claim limitation, including without limitation claim 1 of the '592 Patent. Defendants have had actual knowledge of the '592 Patent at least as of service of the original complaint in this action. Defendants are knowingly inducing its customers and/or end users to directly infringe the '592 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement. Defendants' inducement includes, for example, providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe the '592 Patent. The Accused Instrumentalities are designed in such a way that when they are used for their intended purpose, the user infringes the '592 Patent. Defendants know and intend that customers that purchase the Accused Instrumentalities will use those products for their intended purpose.

63. Defendants have been aware of the '592 Patent and of their infringement as of a date no later than the date they were served with the original complaint in this action. To the extent facts learned in discovery show that Defendants' infringement of the '592 Patent is or has been willful, or to the extent that Defendants' actions subsequent to the filing of this Amended Complaint—such as their behavior as litigants or their failure to take remedial actions—render their infringement egregious, Oyster reserves the right to request such a finding at time of trial.

64. As a result of Defendants' infringement of the '592 Patent, Oyster has suffered

monetary damages in an amount adequate to compensate for Defendants' infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendants, together with interest and costs as fixed by the Court, and Oyster will continue to suffer damages in the future unless Defendants' infringing activities are enjoined by this Court.

65. Unless a permanent injunction is issued enjoining Defendants and its agents, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '592 Patent, Oyster will be greatly and irreparably harmed.

## **COUNT V**

### **INFRINGEMENT OF THE '327 PATENT**

66. Oyster references and incorporates by reference paragraphs 1 through 62 of this Complaint.

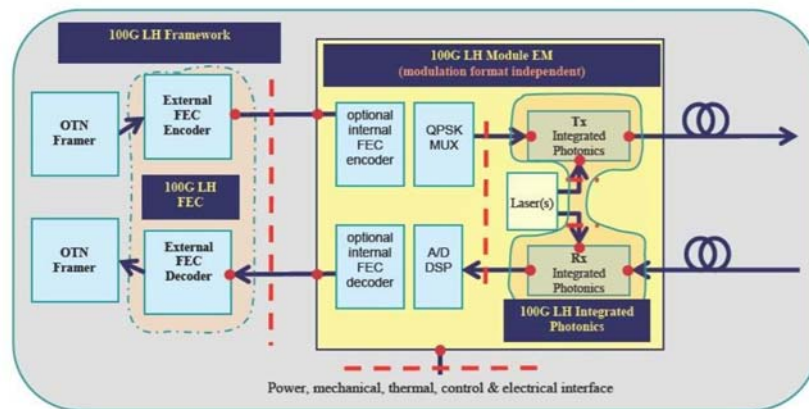
67. On information and belief, Defendants make, use, offer for sale and/or sell in the United States the Accused Instrumentalities that infringe various claims of the '327 Patent, and continues to do so. These products include, for example, Ciena's 6500 family of products, including without limitation the 6500 T-12, 6500-D2, 6500-7, and 6500-S32. On information and belief, Ericsson has entered an agreement with Ciena to "offer Ciena's Converged Packet Optical portfolio, including the 6500 Packet-Optical Platform and 5400 family, to deliver a broader set of infrastructure solutions as customers migrate to new converged network architectures."<sup>55</sup> The exemplary infringing products shall be referred to hereinafter as the "100G Accused Instrumentalities."

68. On information and belief, the 100G Accused Instrumentalities are transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving

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<sup>55</sup> [http://www.ciena.com/about/newsroom/press-releases/Ciena-Announces-Strategic-Global-Agreement-with-Ericsson\\_prx.html](http://www.ciena.com/about/newsroom/press-releases/Ciena-Announces-Strategic-Global-Agreement-with-Ericsson_prx.html).

data over a second optical fiber. The 100G Accused Instrumentalities, on information and belief, are designed in accordance with Optical Internetworking Forum (“OIF”) specifications. The technical editor of the OIF CFP2 ACO standard was Ciena employee Ian Betty.<sup>56</sup> According to a Ciena press release, Ciena developed Dual-Polarization Quadrature Phase Shift Keying (DP-QPSK) modulation, and “[i]n August 2008, the Optical Internetworking Forum (OIF) acknowledged the strong performance of this approach, selecting it as the recommended line modulation format for 100G data transmission.”<sup>57</sup> According to the OIF CFP2 ACO standard, the goal of the OIF is “promoting worldwide compatibility of optical internetworking products.”<sup>58</sup> On information and belief, Ciena’s 100G Accused Instrumentalities comply with the OIF CFP2 ACO interoperability standard that it helped to create and that incorporates technology that Ciena claims to have developed. The implementation of an exemplary OIF standardized DP-QPSK transceiver for sending and receiving data over optical fibers is depicted below. The blocks shown below are printed on a single circuit board or card.

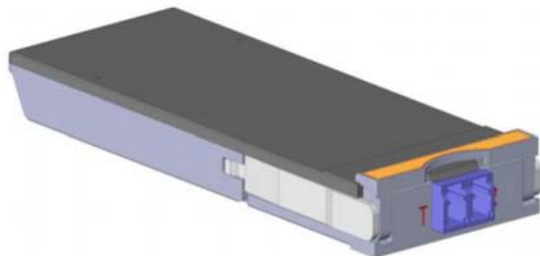


A product designed in accordance with the OIF CFP2 ACO standard is depicted below, and shows a module or card that is implemented in a telecommunications box or system.

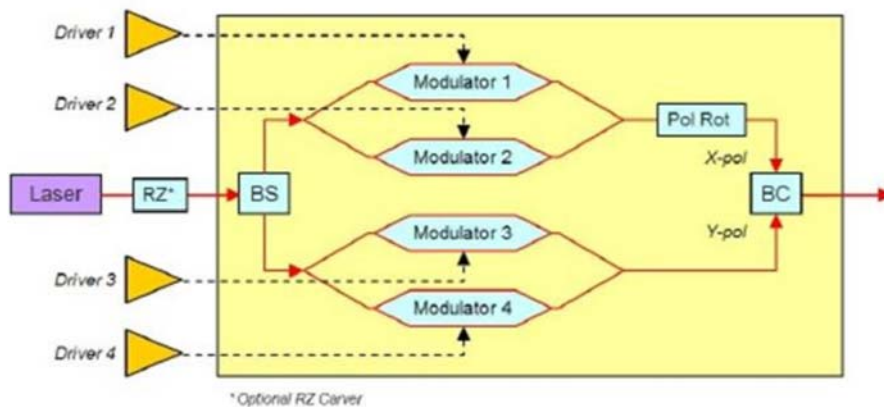
<sup>56</sup> <http://www.oiforum.com/wp-content/uploads/OIF-CFP2-ACO-01.0.pdf> at 3.

<sup>57</sup> <http://www1.ciena.com/about/newsroom/press-releases/Ciena-100G-Solution-Receives-RD-100-Award.html>

<sup>58</sup> *Id.* at 2.



69. On information and belief, the 100G Accused Instrumentalities comprise a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, a modulator, and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of the input data. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G standard comprise a laser and a modulator. As shown below, OIF 100G Standard devices employ lasers and modulators.



As shown in below, the Accused Instrumentalities designed in accordance with the OIF CFP2 ACO Standard contain a transmitter (Tx Coherent Optics) with a laser, a modulator, and a driver which is configured to receive input data and control the modulator to generate a first optical signal as a function of the input data.

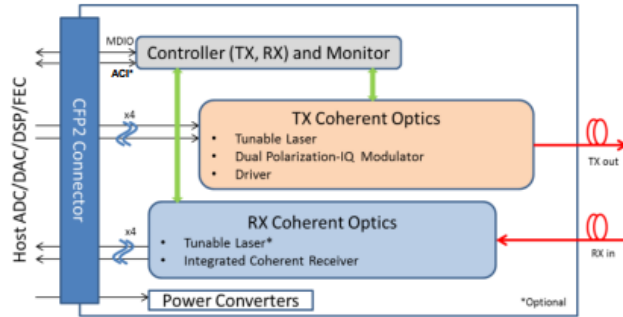


Figure 2 CFP2-ACO Module High Level Block Diagram

Depicted below is an exemplary controller consistent with the OIF CPA2 ACO Standard, and, on information and belief, utilized by the 100G Accused Instrumentalities that are configured to receive input data and control the modulator to generate a first optical signal as a function of the input data.

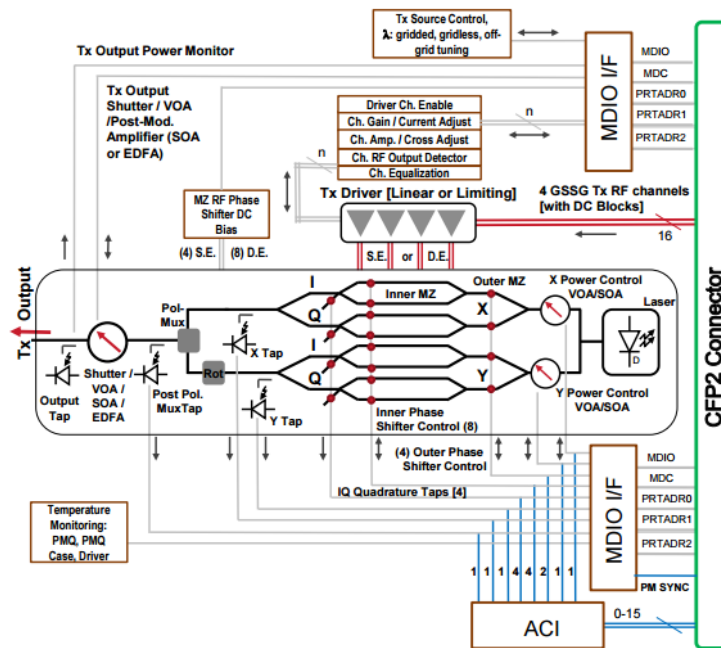


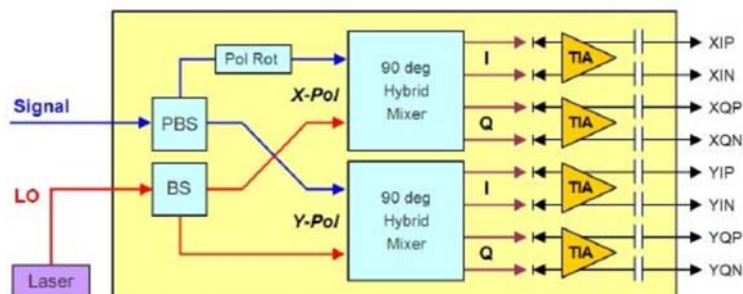
Figure 4: Superset Transmit Function Block Diagram with an MDIO plus Full Superset Analog Control Interface (ACI)

70. On information and belief, the 100G Accused Instrumentalities comprise a fiber output optically connected to the laser for connecting the first optical fiber to the card. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G

Standard utilize a laser's optical output as connected through "Tx Integrated Photonics" and an output to reach the optical transmission fiber, as shown above. A first optical fiber is also depicted above at the "Tx out" of the exemplary OIF CFP2 ACO Standardized module.

71. On information and belief, the 100G Accused Instrumentalities comprise a fiber input for connecting the second optical fiber to the card. A fiber receiving the data going into the transceiver card is shown above.

72. On information and belief, the 100G Accused Instrumentalities comprise a receiver optically connected to the fiber input for receiving data from the second optical fiber. For example, there is a receiver module that receives the optical signal from the receiver fiber at "Signal," as shown below. As an example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G Standard utilize a receiver module as shown below. This exemplary receiver module receives the optical signal from the receiver fiber at "Signal."



A receiver is also depicted above between the RX Coherent optics block at the CFP2 Connector, and below.

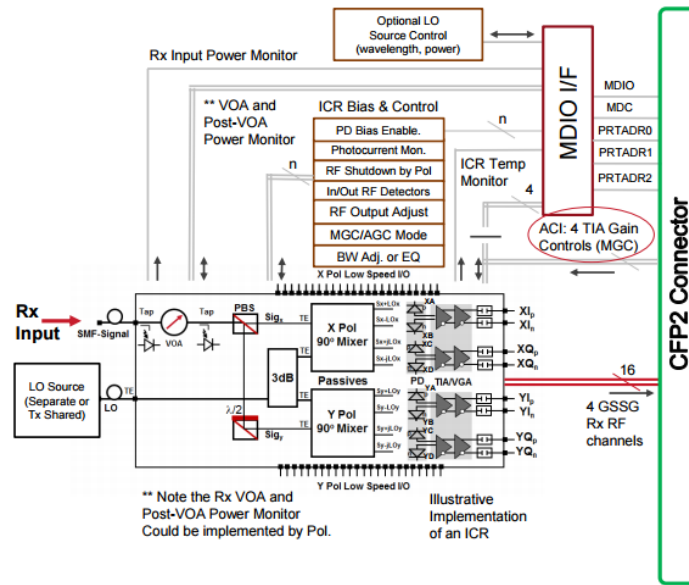


Figure 6: Superset Receive Function Block Diagram with an MDIO plus Full Superset Analog Control Interface (ACI)

73. The below two photographs depict an accused Ciena ActivFlex 100G line card.<sup>59</sup> Several of the claimed components are visible in the first photograph. For example, a laser is visible on the lower right portion of the circuit board. A fiber is optically connected to the laser and connects to the left terminal of the external connector in the lower left of the first photograph (labeled “TX” in the second photograph), where a first optical fiber is connected. Another fiber is connected to the receiver and connects to the right terminal of the external connector (labeled “RX” in the second photograph), where a second optical fiber is connected.

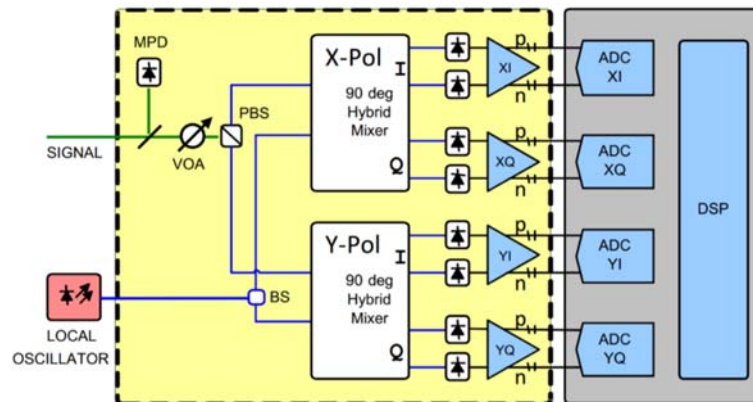
<sup>59</sup> <http://www.ebay.com/itm/CIENA-NTK539UH-ACTIVFLEX-6500-100G-LINE-CARD-/322415572251?hash=item4b1177351b:g:RQoAAOSwUKxYmN97>



74. On information and belief, the 100G Accused Instrumentalities comprise an



energy level detector optically connected between the receiver and the fiber input to measure an energy level of the optical signals, wherein the energy level detector includes a plurality of thresholds. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G Standard contain an energy level detector (power tap or monitor photodetector (“MPD”)), as the OIF 100G Standard specifies an integrated receiver module whose functional diagram is shown below.



One of the basic requirements for the coherent receiver is an optical power tap or monitor photodiode (“MPD”) in the signal input path. This MPD provides a representation of the optical signal strength in the form of an electrical signal. The electrical signal is measured, and provides an indication of the energy level of the optical signal. Table 1 specifies the opto-electrical properties of the receiver. The average optical power of the operating signal has minimum, typical and maximum threshold values.

**Table 1****Table 7: Opto-electrical properties**

Parameter	Units	Min	Typ	Max	Comments
Symbol Rate	GBaud			32	
Operating Signal Power	dBm	-18	-10	0	Average optical power
Local Oscillator Power	dBm				See Figure 5 for recommended operating conditions.
Linear output swing adjustment range					Peak to peak, differential, AC coupled
Standard	mVppd	300	500	700	
Extended	mVppd	400		900	

The defined parameters (e.g., current, average, minimum, and maximum) for the receiver input power are as depicted in Table 2 below.

**Table 2**

<b>Rx Total Optical Power Monitoring [13.3 Provides Existing MIS Rx Input Power Monitoring Registers]</b>						
B4E0 [2.0] [000]	1	RO	15~0	Current Input Power [Total Rx Optical]	A signed 16-bit integer with the LSB = 0.01dBm. [2.6 commentary: Preferred Register for CFP2-ACO Total Current Rx Input Power.]	
B4F0 [2.0] [000]	1	RO	15~0	Average Input Power over PM interval [Total Rx Optical]	A signed 16-bit integer with the LSB = 0.01dBm. [2.6 commentary: Preferred Register for CFP2-ACO Average Total Current Rx Input Power.]	
B500 [2.0] [000]	1	RO	15~0	Minimum Input Power over PM interval [Total Rx Optical]	A signed 16-bit integer with the LSB = 0.01dBm. [2.6 commentary: Preferred Register for CFP2-ACO Minimum Total Current Rx Input Power.]	
B510 [2.0] [000]	1	RO	15~0	Maximum Input Power over PM interval [Total Rx Optical]	A signed 16-bit integer with the LSB = 0.01dBm. [2.6 commentary: Preferred Register for CFP2-ACO Maximum Total Current Rx Input Power.]	

Tables 1 and 2 above specify the opto-electrical properties of the receiver. The average optical power of the operating signal has minimum, typical and maximum threshold values.

75. On information and belief, Defendants have directly infringed and continues to directly infringe the '327 Patent by, among other things, making, using, offering for sale, and/or selling the 100G Accused Instrumentalities. On information and belief, such products and/or services are covered by one or more claims of the '327 Patent's including at least claim 1,

because they contain each element of that claim.

76. By making, using, offering for sale, and/or selling the 100G Accused Instrumentalities infringing the '327 Patent, Defendants have injured Oyster and are liable to Oyster for infringement of the '327 Patent pursuant to 35 U.S.C. § 271(a) directly and/or under the doctrine of equivalents.

77. In addition, Defendants actively induce others, including without limitation customers and end users of Accused Instrumentalities, to directly infringe each and every claim limitation, including without limitation claim 1 of the '327 Patent, in violation of 35 U.S.C. § 271(b). Upon information and belief, Defendants' customers and/or end users have directly infringed and are directly infringing each and every claim limitation, including without limitation claim 1 of the '327 Patent. Defendants have had actual knowledge of the '327 Patent at least as of service of the original complaint in this action. Defendants are knowingly inducing its customers and/or end users to directly infringe the '327 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement. Defendants' inducement includes, for example, providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe the '327 Patent. The Accused Instrumentalities are designed in such a way that when they are used for their intended purpose, the user infringes the '327 Patent. Defendants know and intend that customers that purchase the Accused Instrumentalities will use those products for their intended purpose.

78. Defendants have been aware of the '327 Patent and of their infringement as of a date no later than the date they were served with the original complaint in this action. To the extent facts learned in discovery show that Defendants' infringement of the '327 Patent is or has

been willful, or to the extent that Defendants' actions subsequent to the filing of this Amended Complaint—such as their behavior as litigants or their failure to take remedial actions—render their infringement egregious, Oyster reserves the right to request such a finding at time of trial.

79. As a result of Defendants' infringement of the '327 Patent, Oyster has suffered monetary damages in an amount adequate to compensate for Defendants' infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendants, together with interest and costs as fixed by the Court, and Oyster will continue to suffer damages in the future unless Defendants' infringing activities are enjoined by this Court.

80. Unless a permanent injunction is issued enjoining Defendants and its agents, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '327 Patent, Oyster will be greatly and irreparably harmed.

## **COUNT VI**

### **INFRINGEMENT OF THE '511 PATENT**

81. Oyster references and incorporates by reference paragraphs 1 through 76 of this Complaint.

82. On information and belief, Defendants make, use, offer for sale and/or sell in the United States the 100G Accused Instrumentalities that infringe various claims of the '511 Patent, and continues to do so.

83. On information and belief, the 100G Accused Instrumentalities practice a method for operating an optical fiber multiplexor in a phase modulation mode. The 100G Accused Instrumentalities, on information and belief, are designed in accordance with the OIF 100G Standard specifying DP-QPSK as the modulation format for 100G. On information and belief, the 100G Accused Instrumentalities are also designed in accordance with the OIF CFP2

ACO Standard. The technical editor of the OIF CFP2 ACO standard was Ciena employee Ian Betty.<sup>60</sup> According to a Ciena press release, Ciena developed Dual-Polarization Quadrature Phase Shift Keying (DP-QPSK) modulation, and “[i]n August 2008, the Optical Internetworking Forum (OIF) acknowledged the strong performance of this approach, selecting it as the recommended line modulation format for 100G data transmission.”<sup>61</sup> According to the OIF CFP2 ACO standard, the goal of the OIF is “promoting worldwide compatibility of optical internetworking products.”<sup>62</sup> On information and belief, Ciena’s 100G Accused Instrumentalities comply with the OIF CFP2 ACO interoperability standard that it helped to create and that incorporates technology that Ciena claims to have developed. The implementation of an exemplary OIF standardized DP-QPSK transceiver for sending and receiving data over optical fibers is depicted above. The blocks discussed previously are typically printed on a single circuit board or card used in optical fiber multiplexor systems. A product designed in accordance with the OIF CFP2 ACO standard, which shows a module or card that is implemented in optical fiber multiplexor systems, is also shown above.

84. On information and belief, the 100G Accused Instrumentalities perform the step of feeding input data to a controller of a transmitter of a telecommunications box, the telecommunications box having an electronic data input for the input data and an electronic data output. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G standard comprise a laser and a modulator. As shown above, OIF 100G Standard devices employ lasers and modulators. The signal passes to the transceiver module. Data is converted to drive signals to control the optical modulators. A transmit laser provides the light source for the

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<sup>60</sup> <http://www.oiforum.com/wp-content/uploads/OIF-CFP2-ACO-01.0.pdf> at 3.

<sup>61</sup> <http://www1.ciena.com/about/newsroom/press-releases/Ciena-100G-Solution-Receives-RD-100-Award.html>

<sup>62</sup> *Id.* at 2.

modulators. On the receive side the incoming signal is mixed with a local oscillator, demodulated into components, detected, amplified, digitized, then passed into the DSP module.

85. On information and belief, the 100G Accused Instrumentalities perform the step of using the controller, controlling a modulator to phase modulate light from a laser as a function of the input data. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G Standard utilized a transceiver where data is converted to drive signals to control the optical modulators, as shown above.

86. On information and belief, the 100G Accused Instrumentalities perform the step of sending the modulated light as an optical signal from the transmitter over an optical fiber. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G transmit phase modulated optical signal over an optical fiber, as shown above. An exemplary fiber input optically connected to the receiver and configured to optically connect the second optical fiber to the transceiver card is also depicted above at the “Rx in” of the exemplary OIF-CFP2-ACO Standardized module, and at the connection between the RX Coherent Optics block and the CFP2 Connector.

87. On information and belief, the 100G Accused Instrumentalities perform the step of receiving the optical signals from the optical fiber at a receiver of a further telecommunications box and converting the optical signals to electronic output data. For example, on information and belief the 100G Accused Instrumentalities designed in accordance with the OIF-DPC-RX Standard utilize an integrated receiver module as shown above.

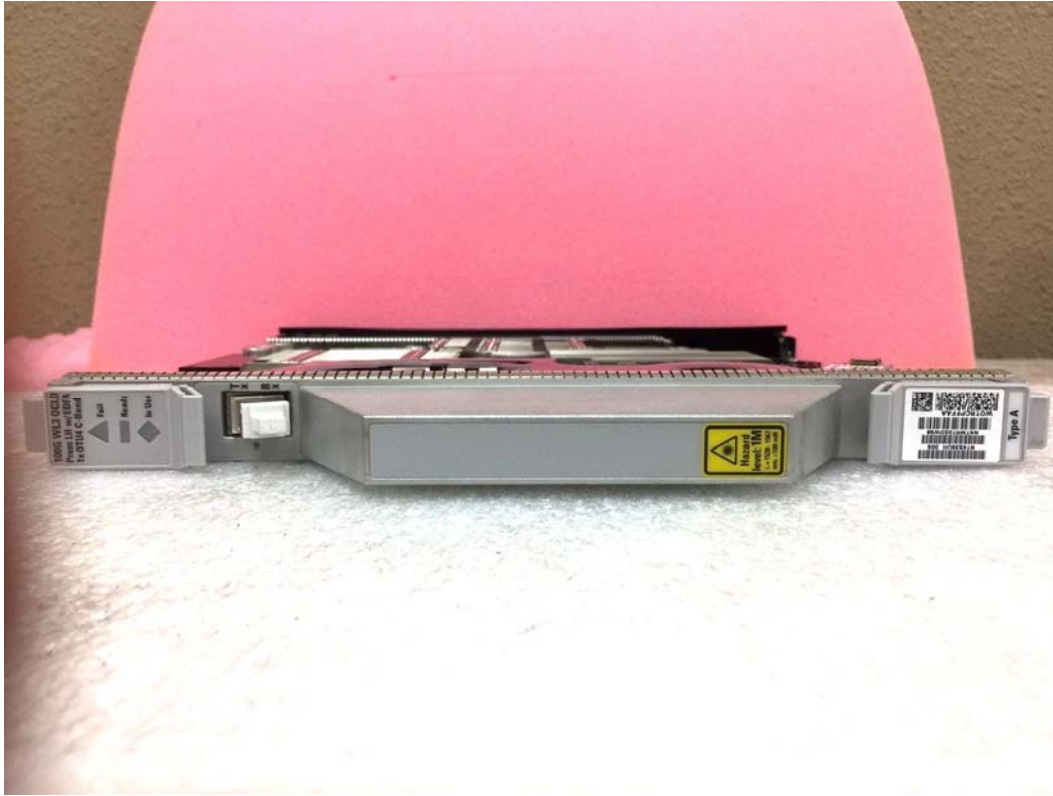
88. The below two photographs depict an accused Ciena ActivFlex 100G line card.<sup>63</sup> Several of the components used in the claimed methods are visible in the first photograph. For

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<sup>63</sup> <http://www.ebay.com/itm/CIENA-NTK539UH-ACTIVFLEX-6500-100G-LINE-CARD-/322415572251?hash=item4b1177351b:g:RQoAAOSwUKxYmN97>

example, a laser is visible on the lower right portion of the circuit board. A fiber is optically connected to the laser and connects to the left terminal of the external connector in the lower left of the first photograph (labeled “TX” in the second photograph), where a first optical fiber is connected. Another fiber is connected to the receiver and connects to the right terminal of the external connector (labeled “RX” in the second photograph), where a second optical fiber is connected.





89. On information and belief, the 100G Accused Instrumentalities perform the step of passing the phase-modulated optical signals to a photodetector to produce an electric signal. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G and OIF-DPC-RX Standards utilize a monitoring photodiode (MPD) that taps and receives the phase-modulated incoming optical signal and produces an electrical signal in response, as shown above.

90. On information and belief, the 100G Accused Instrumentalities perform the step of filtering the electrical signal to produce an average optical power. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G Standard contain an energy level detector (power tap or monitor photodiode (MPD)), as the OIF 100G Standard specifies an integrated receiver module whose functional diagram is presented above. One of the basic requirements for the coherent receiver is an optical power tap or MPD in the signal input path.



Table 1 specifies the opto-electrical properties of the receiver. The average optical power of the operating signal has minimum, typical and maximum threshold values.

91. On information and belief, Defendants have directly infringed and continues to directly infringe the '511 Patent by, among other things, making, using, offering for sale, and/or selling the 100G Accused Instrumentalities. On information and belief, such products and/or services are covered by one or more claims of the '511 Patent's including at least claim 9, because when used they necessarily perform each step of that method.

92. By making, using, offering for sale, and/or selling the Accused Instrumentalities infringing the '511 Patent, Defendants have injured Oyster and are liable to Oyster for infringement of the '511 Patent pursuant to 35 U.S.C. § 271(a) directly and/or under the doctrine of equivalents.

93. In addition, Defendants actively induce others, including without limitation customers and end users of Accused Instrumentalities, to directly infringe each and every claim limitation, including without limitation claim 9 of the '511 Patent, in violation of 35 U.S.C. § 271(b). Upon information and belief, Defendants' customers and/or end users have directly infringed and are directly infringing each and every claim limitation, including without limitation claim 9 of the '511 Patent. Defendants have had actual knowledge of the '511 Patent at least as of service of the original complaint in this action. Defendants are knowingly inducing its customers and/or end users to directly infringe the '511 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement. Defendants' inducement includes, for example, providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe the '511 Patent. The

Accused Instrumentalities are designed in such a way that when they are used for their intended purpose, the user infringes the '511 Patent. Defendants know and intend that customers that purchase the Accused Instrumentalities will use those products for their intended purpose.

94. Defendants have been aware of the '511 Patent and of their infringement as of a date no later than the date they were served with the original complaint in this action. To the extent facts learned in discovery show that Defendants' infringement of the '511 Patent is or has been willful, or to the extent that Defendants' actions subsequent to the filing of this Amended Complaint—such as their behavior as litigants or their failure to take remedial actions—render their infringement egregious, Oyster reserves the right to request such a finding at time of trial.

95. As a result of Defendants' infringement of the '511 Patent, Oyster has suffered monetary damages in an amount adequate to compensate for Defendants' infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendants, together with interest and costs as fixed by the Court, and Oyster will continue to suffer damages in the future unless Defendants' infringing activities are enjoined by this Court.

96. Unless a permanent injunction is issued enjoining Defendants and its agents, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '511 Patent, Oyster will be greatly and irreparably harmed.

## **COUNT VII**

### **INFRINGEMENT OF THE '898 PATENT**

97. Oyster references and incorporates by reference paragraphs 1 through 82 of this Complaint.

98. On information and belief, Defendants make, use, offer for sale and/or sell in the United States the 100G Accused Instrumentalities that infringe various claims of the '898 Patent,

and continues to do so.

99. On information and belief, the 100G Accused Instrumentalities are a transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving data over a second optical fiber. The 100G Accused Instrumentalities, on information and belief, are designed in accordance with OIF 100G Standard. OIF has focused on DP-QPSK as the modulation format for 100G. On information and belief, the 100G Accused Instrumentalities are also designed in accordance with the OIF CFP2 ACO Standard. The technical editor of the OIF CFP2 ACO standard was Ciena employee Ian Betty.<sup>64</sup> According to a Ciena press release, Ciena developed Dual-Polarization Quadrature Phase Shift Keying (DP-QPSK) modulation, and “[i]n August 2008, the Optical Internetworking Forum (OIF) acknowledged the strong performance of this approach, selecting it as the recommended line modulation format for 100G data transmission.”<sup>65</sup> According to the OIF CFP2 ACO standard, the goal of the OIF is “promoting worldwide compatibility of optical internetworking products.”<sup>66</sup> On information and belief, Ciena’s 100G Accused Instrumentalities comply with the OIF CFP2 ACO interoperability standard that it helped to create and that incorporates technology that Ciena claims to have developed. The implementation of an exemplary OIF standardized DP-QPSK transceiver for sending and receiving data over optical fibers is depicted above. The blocks depicted above are printed on a single circuit board or card, as discussed previously. A product designed in accordance with the OIF CFP2 ACO standard, which shows a module or card that is implemented in a telecommunications box or system, is shown above.

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<sup>64</sup> <http://www.oiforum.com/wp-content/uploads/OIF-CFP2-ACO-01.0.pdf> at 3.

<sup>65</sup> <http://www1.ciena.com/about/newsroom/press-releases/Ciena-100G-Solution-Receives-RD-100-Award.html>

<sup>66</sup> *Id.* at 2.

100. On information and belief, the 100G Accused Instrumentalities comprise a transmitter having a laser, a modulator, and a controller configured to receive input data and control the modulator to generate a first optical signal as a function of the input data. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G standard comprise a laser and a modulator. As shown above, the OIF 100G Standard devices employ lasers and modulators. As shown above, the Accused Instrumentalities designed in accordance with the OIF CFP2 ACO Standard contain a transmitter (Tx Coherent Optics) with a laser, a modulator, and a driver which is configured to receive input data and control the modulator to generate a first optical signal as a function of the input data. An exemplary controller consistent with the OIF CPA2 ACO Standard, and, on information and belief utilized by the 100G Accused Instrumentalities, that is configured to receive input data and control the modulator to generate a first optical signal as a function of the input data is also depicted above.

101. On information and belief, the 100G Accused Instrumentalities comprise a fiber output optically connected to the transmitter and configured to optically connect the first optical fiber to the transceiver card. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G Standard utilize a laser's optical output as connected through the "Tx Integrated Photonics" as shown above. Also depicted above is an output to reach the optical transmission fiber. A first optical fiber is also depicted above at the "Tx out" of the exemplary OIF CFP2 ACO Standardized module.

102. On information and belief, the 100G Accused Instrumentalities comprise a receiver configured to receive a second optical signal from the second optical fiber and to convert the second optical signal to output data. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G Standard utilize a receiver module

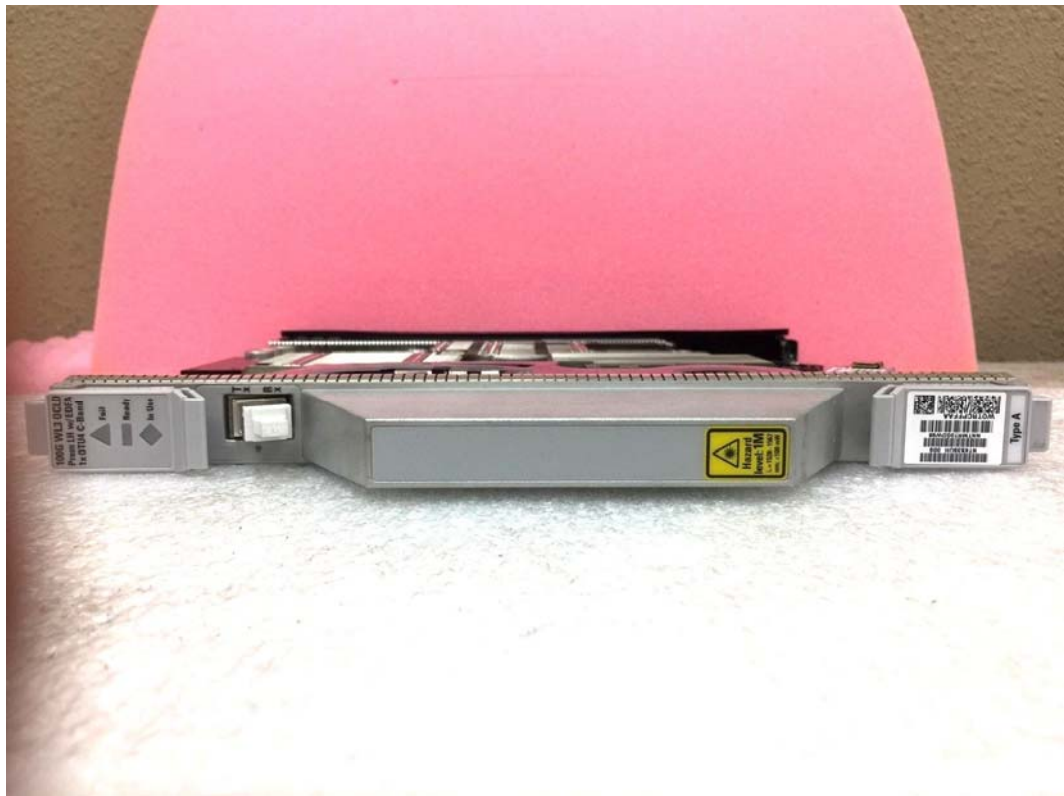
discussed previously that receives the optical signal from the receiver fiber at “Signal.” A receiver is also depicted between the RX Coherent optics block at the CFP2 Connector.

103. On information and belief, the 100G Accused Instrumentalities comprise a fiber input optically connected to the receiver and configured to optically connect the second optical fiber to the transceiver card. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G Standard connect the laser’s optical output through the “Rx Integrated Photonics”, and also specify an output to reach the optical transmission fiber, as depicted above. An exemplary fiber input optically connected to the receiver and configured to optically connect the second optical fiber to the transceiver card is also depicted above at the “Rx in” of the exemplary OIF CFP2 ACO Standardized module, and at the connection between the RX Coherent Optics block and the CFP2 Connector.

104. The below two photographs depict an accused Ciena ActivFlex 100G line card.<sup>67</sup> Several of the claimed components are visible in the first photograph. For example, a laser is visible on the lower right portion of the circuit board and forms part of the transmitter. A fiber is optically connected to the transmitter and connects to the left terminal of the external connector in the lower left of the first photograph (labeled “TX” in the second photograph), where a first optical fiber is connected. Another fiber is connected to the receiver and connects to the right terminal of the external connector (labeled “RX” in the second photograph), where a second optical fiber is connected.

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<sup>67</sup> <http://www.ebay.com/itm/CIENA-NTK539UH-ACTIVFLEX-6500-100G-LINE-CARD-/322415572251?hash=item4b1177351b:g:RQoAAOSwUKxYmN97>



105. On information and belief, the 100G Accused Instrumentalities comprise an energy level detector optically connected between the receiver and the fiber input to measure an energy level of the second optical signal, wherein the energy level detector includes a plurality of thresholds. For example, the 100G Accused Instrumentalities designed in accordance with the OIF 100G Standard and, for example, the OIF DPC RX Standard, contain an energy level detector depicted by the monitoring photodiode (“MPD”). The OIF 100G and OIF DPC RX Standards specify an integrated receiver module whose functional diagram is presented above. One of the basic requirements for the coherent receiver is an optical power tap (monitor photodiode or “MPD”) in the signal input path. This MPD provides a representation of the optical signal strength in the form of an electrical signal. The electrical signal is measured, and provides an indication of the energy level of the optical signal. Table 1 specifies the opto-electrical properties of the receiver. The average optical power of the operating signal has minimum, typical and maximum threshold values. The defined parameters (e.g., current, average, minimum, and maximum) for the receiver input power are as depicted in Table 2. On information and belief, the 100G Accused Instrumentalities must filter the electrical signal from the MPD to produce the receiver average optical power value specified in the OIF 100G Standard.

106. On information and belief, Defendants have directly infringed and continues to directly infringe the ’898 Patent by, among other things, making, using, offering for sale, and/or selling the 100G Accused Instrumentalities. On information and belief, such products and/or services are covered by one or more claims of the ’898 Patent’s including at least claim 1, because they contain each element of that claim.

107. By making, using, offering for sale, and/or selling the Accused Instrumentalities

infringing the '898 Patent, Defendants have injured Oyster and are liable to Oyster for infringement of the '898 Patent pursuant to 35 U.S.C. § 271(a) directly and/or under the doctrine of equivalents.

108. In addition, Defendants actively induce others, including without limitation customers and end users of Accused Instrumentalities, to directly infringe each and every claim limitation, including without limitation claim 1 of the '898 Patent, in violation of 35 U.S.C. § 271(b). Upon information and belief, Defendants' customers and/or end users have directly infringed and are directly infringing each and every claim limitation, including without limitation claim 1 of the '898 Patent. Defendants have had actual knowledge of the '898 Patent at least as of service of the original complaint in this action. Defendants are knowingly inducing its customers and/or end users to directly infringe the '898 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement. Defendants' inducement includes, for example, providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe the '898 Patent. The Accused Instrumentalities are designed in such a way that when they are used for their intended purpose, the user infringes the '898 Patent. Defendants know and intend that customers that purchase the Accused Instrumentalities will use those products for their intended purpose.

109. Defendants have been aware of the '898 Patent and of their infringement as of a date no later than the date they were served with the original complaint in this action. To the extent facts learned in discovery show that Defendants' infringement of the '898 Patent is or has been willful, or to the extent that Defendants' actions subsequent to the filing of this Amended Complaint—such as their behavior as litigants or their failure to take remedial actions—render



their infringement egregious, Oyster reserves the right to request such a finding at time of trial.

110. As a result of Defendants' infringement of the '898 Patent, Oyster has suffered monetary damages in an amount adequate to compensate for Defendants' infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendants, together with interest and costs as fixed by the Court, and Oyster will continue to suffer damages in the future unless Defendants' infringing activities are enjoined by this Court.

111. Unless a permanent injunction is issued enjoining Defendants and its agents, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '898 Patent, Oyster will be greatly and irreparably harmed.

**PRAYER FOR RELIEF**

Plaintiff respectfully requests the following relief from this Court:

A. A judgment that Ciena and/or Ericsson has infringed one or more claims of the '816, '952, '055, '592, '327, '511, and/or '898 Patents;

B. A permanent injunction enjoining Ciena and/or Ericsson along with each of their officers, directors, agents, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert or participation with Ciena and/or Ericsson, from infringing the '816, '952, '055, '592, '327, '511, and/or '898 Patents;

C. A judgment and order requiring Ciena and/or Ericsson to pay Oyster its damages, costs, expenses, and prejudgment and post-judgment interest for Ciena's and/or Ericsson's acts of infringement in accordance with 35 U.S.C. § 284;

D. A judgment and order requiring Ciena and/or Ericsson to provide accountings and to pay supplemental damages to Oyster, including, without limitation, prejudgment and post-judgment interest;

E. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Oyster its reasonable attorneys' fees against Ciena and/or Ericsson; and

F. Any and all other relief to which Oyster may show itself to be entitled.

**JURY TRIAL DEMANDED**

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, Oyster requests a trial by jury of any issues so triable by right.

Dated: March 7, 2017

Respectfully submitted,

/s/ Marc A. Fenster w/permission by Andrea  
L. Fair

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**CERTIFICATE OF SERVICE**

I hereby certify that a copy of the foregoing document was filed electronically in compliance with Local Rule CV-5(a). Therefore, this document was served on all counsel who are deemed to have consented to electronic service on this the 7<sup>th</sup> day of March, 2017.

*/s/ Andrea L. Fair*  
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Andrea L. Fair