Trials@uspto.gov
571-272-7822

Paper 51
Entered: September 29, 2016

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LUMENTUM HOLDINGS, INC., LUMENTUM, INC., LUMENTUM OPERATIONS, LLC, CORIANT OPERATIONS, INC., CORIANT (USA) INC., CIENA CORPORATION, CISCO SYSTEMS, INC., and FUJITSU NETWORK COMMUNICATIONS, INC.,
Petitioner,

v.

CAPELLA PHOTONICS, INC.,
Patent Owner.

Case IPR2015-00731[1]
Patent RE42,368

Before JOSIAH C. COCKS, KALYAN K. DESHPANDE, and JAMES A. TARTAL, *Administrative Patent Judges*.

TARTAL, *Administrative Patent Judge*.

FINAL WRITTEN DECISION

35 U.S.C. § 318(a) and *37 C.F.R. § 42.73*

[1] IPR2015-01969 was joined with IPR2015-00731 on March 10, 2016, by Order in IPR2015-01969, Paper 11 (IPR2015-00731, Paper 42).

I. INTRODUCTION

Petitioner, Lumentum Holdings, Inc., Lumentum Inc., Lumentum Operations, LLC, Coriant Operations, Inc., Coriant (USA) Inc., Ciena Corporation, Cisco Systems, Inc., and Fujitsu Network Communications, Inc., filed petitions requesting an *inter partes* review of claims 1–6, 9–13, and 15–22 of U.S. Patent No. RE42,368 ("the '368 patent"). Paper 1 ("Petition" or "Pet."); *see also* IPR2015-01969, Paper 6.

Claims 1–6, 9–13, and 15–22 of the '368 patent were previously held to be unpatentable in *Cisco Systems, Inc., Ciena Corporation, Coriant Operations, Inc., Coriant (USA) Inc., and Fujitsu Network Communications, Inc., v. Capella Photonics, Inc*., IPR2014-01166, (PTAB Jan. 28, 2016) (Paper 44) (the '1166 case). Claims 1–6, 9–12, and 15–22 of the '368 patent also were previously held to be unpatentable in *Fujitsu Network Communications, Inc., Coriant Operations, Inc., Coriant (USA) Inc., and Ciena Corporation v. Capella Photonics, Inc*., IPR2015-00726, (PTAB Sep. 28, 2016) (Paper 38) (the '726 case). The grounds of unpatentability asserted by Petitioner in this case rely on combinations of prior art, evidence, and arguments not asserted in either the '1166 case or the '726 case. Likewise, Patent Owner, Capella Photonics, Inc., advances arguments and evidence in response in this case that were not asserted by Patent Owner in either the '1166 case or the '726 case.

Based on the information provided in the Petition, and in consideration of the Preliminary Response (Paper 7) of Patent Owner, we instituted a trial pursuant to 35 U.S.C. § 314(a) of: (1) claims 1–6, 9–11, 13,

and 15–22 as obvious over Bouevitch,[2] Sparks[3], and Lin[4] under 35 U.S.C. § 103(a); and, (2) claim 12 as obvious over Bouevitch, Sparks, Lin, and Dueck[5] under 35 U.S.C. § 103(a). Paper 8 ("Institution Decision"); *see also* IPR2015-01969, Paper 11.

After institution of trial, Patent Owner filed a Response (Paper 17, "Response" or "PO Resp.") and Petitioner filed a Reply (Paper 37, "Pet. Reply"). The Petition is supported by the Declaration of Sheldon McLaughlin (Ex. 1028). The Response is supported by the Declaration of Dr. Alexander V. Sergienko (Ex. 2022).

A transcript of the Oral Hearing conducted on May 24, 2016, is entered as Paper 50 ("Tr.").

We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, Petitioner has shown by a preponderance of the evidence that claims 1–6, 9–13, and 15–22 of the '368 patent are unpatentable.

II. BACKGROUND

A. The '368 patent (Ex. 1001)

The '368 patent, titled "Reconfigurable Optical Add-Drop Multiplexers with Servo Control and Dynamic Spectral Power Management Capabilities," reissued May 17, 2011, from U.S. Patent No. 6,879,750

[2] U.S. Patent No. 6,498,872 B2, issued December 24, 2002 (Ex. 1003, "Bouevitch")
[3] U.S. Patent No. 6,625,340 B1, issued September 23, 2003 (Ex. 1004, "Sparks").
[4] U.S. Patent No. 5,661,591, issued August 26, 1997 (Ex. 1010, "Lin")
[5] U.S. Patent No. 6,011,884, issued January 4, 2000 (Ex. 1021, "Dueck")

("the '750 patent"). Ex. 1001. The '750 patent issued April 12, 2005, from application number 10/745,364, filed December 22, 2003.

According to the '368 patent, "fiber-optic communications networks commonly employ wavelength division multiplexing (WDM), for it allows multiple information (or data) channels to be simultaneously transmitted on a single optical fiber by using different wavelengths and thereby significantly enhances the information bandwidth of the fiber." *Id.* at 1:37–42. An optical add-drop multiplexer (OADM) is used both to remove wavelengths selectively from a multiplicity of wavelengths on an optical fiber (taking away one or more data channels from the traffic stream on the fiber), and to add wavelengths back onto the fiber (inserting new data channels in the same stream of traffic). *Id.* at 1:45–51.

The '368 patent describes a "wavelength-separating-routing (WSR) apparatus that uses a diffraction grating to separate a multi-wavelength optical signal by wavelength into multiple spectral channels, which are then focused onto an array of corresponding channel micromirrors." *Id.* at Abstract. "The channel micromirrors are individually controllable and continuously pivotable to reflect the spectral channels into selected output ports." *Id.* According to Petitioner, the small, tilting mirrors are sometimes called Micro ElectroMechanical Systems or "MEMS." Pet. 8.

The WSR described in the '368 patent may be used to construct dynamically reconfigurable OADMs for WDM optical networking applications. Ex. 1001, Abstract.

Figure 1A of the ’368 patent is reproduced below.

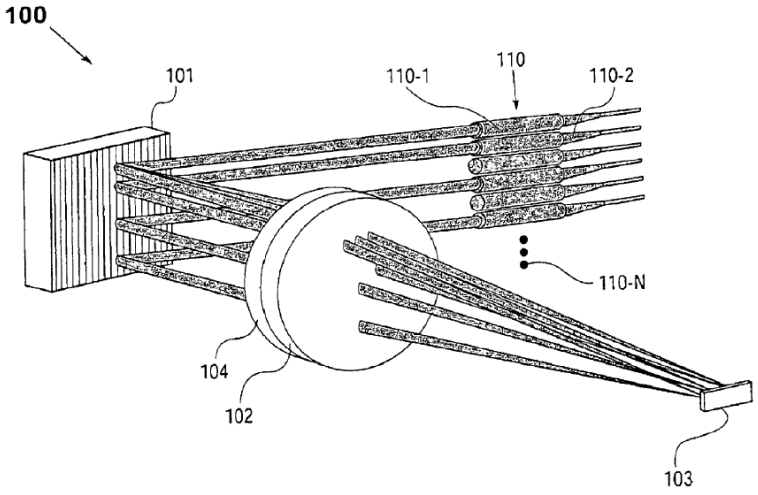

Fig. 1A

Figure 1A depicts wavelength-separating-routing (WSR) apparatus 100, in accordance with the ’368 patent. WSR apparatus 100 is comprised of an array of fiber collimators 110 (multiple input/output ports, including input port 110-1 and output ports 110-2 through 110-N), diffraction grating 101 (a wavelength separator), quarter wave plate 104, focusing lens 102 (a beam-focuser), and array of channel micromirrors 103. Ex. 1001, 6:57–63, 7:55–56.

A multi-wavelength optical signal emerges from input port 110-1 and is separated into multiple spectral channels by diffraction grating 101, which are then focused by focusing lens 102 into a spatial array of distinct spectral spots (not shown). *Id*. at 6:64–7:2. Channel micromirrors 103 are positioned such that each channel micromirror receives one of the spectral channels.

Figure 1B of the ’368 patent is reproduced below.

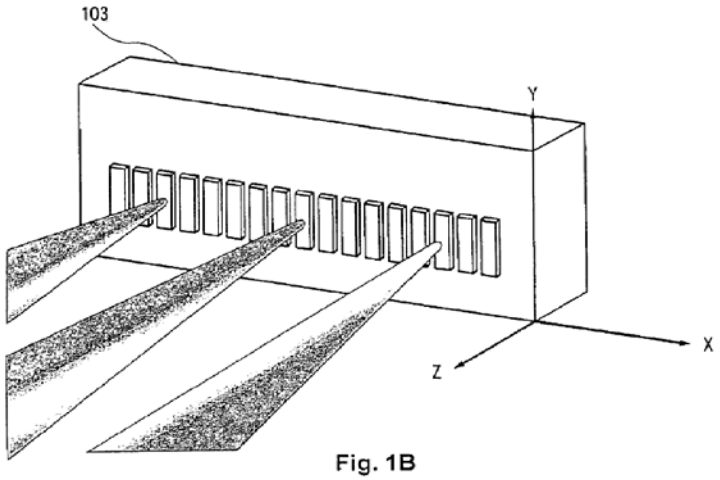

Fig. 1B

Figure 1B depicts a close-up view of the array of channel micromirrors 103 shown above in Figure 1A. *Id.* at 8:6–7. The channel micromirrors “are individually controllable and movable, e.g. pivotable (or rotatable) under analog (or continuous) control, such that, upon reflection, the spectral channels are directed” into selected output ports by way of focusing lens 102 and diffraction grating 101. *Id.* at 7:6–11.

According to the ’368 patent:

> each micromirror may be pivoted about one or two axes. What is important is that the pivoting (or rotational) motion of each channel micromirror be individually controllable in an analog manner, whereby the pivoting angle can be continuously adjusted so as to enable the channel micromirror to scan a spectral channel across all possible output ports.

Id. at 9:8–14.

Figure 3 of the ’368 patent is reproduced below.

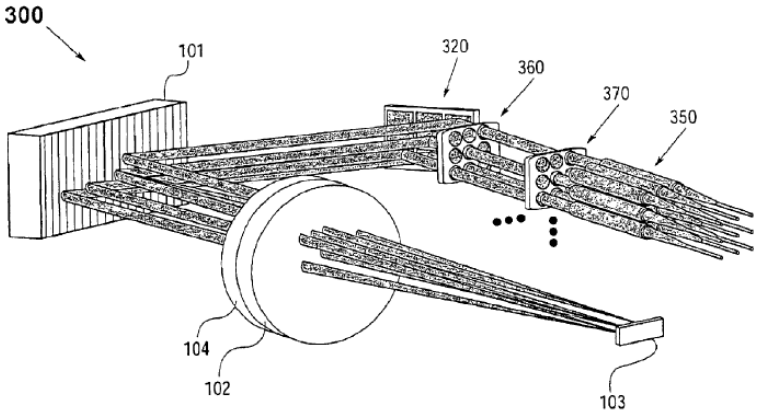

Fig. 3

Similar to Figure 1A, above, Figure 3 also shows a WSR apparatus as described by the ’368 patent. Ex. 1001, 10:25–26. In this embodiment, two-dimensional array of fiber collimators 350 provides an input port and plurality of output ports. *Id.* at 10:31–32. First and second two-dimensional arrays of imaging lenses 360, 370 are placed in a telecentric arrangement between two-dimensional collimator-alignment mirror array 320 and two-dimensional fiber collimator array 350. *Id.* at 10:37–43. “The channel micromirrors 103 must be pivotable biaxially in this case (in order to direct its corresponding spectral channel to anyone of the output ports).” *Id.* at 10:43–46.

The WSR also may incorporate a servo-control assembly (together termed a “WSR-S apparatus”). *Id*. at 4:65–67. According to the ’368 patent:

> The servo-control assembly serves to monitor the power levels of the spectral channels coupled into the output ports and further provide control of the channel micromirrors on an individual basis, so as to maintain a predetermined coupling efficiency of

> each spectral channel in one of the output ports. As such, the servo-control assembly provides dynamic control of the coupling of the spectral channels into the respective output ports and actively manages the power levels of the spectral channels coupled into the output ports.

Id. at 4:47–56.

Figure 5 of the ’368 patent is reproduced below.

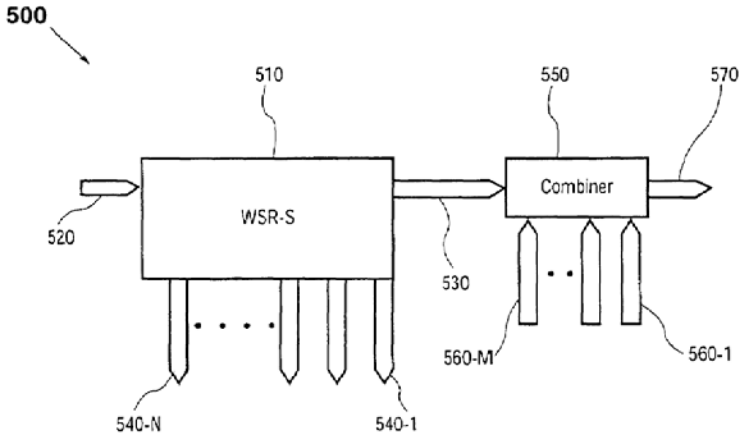

Fig. 5

Figure 5 depicts OADM 500 in accordance with the ’368 patent composed of WSR-S (or WSR) apparatus 510 and optical combiner 550. *Id.* at 12:40–44. Input port 520 transmits a multi-wavelength optical signal, which is separated and routed into a plurality of output ports, including pass-through port 530 and one or more drop ports 540-1 through 540-N. *Id.* at 12:44–48. Pass-through port 530 is optically coupled to optical combiner 550, which combines the pass-through spectral channels with one or more add spectral channels provided by one or more add ports 560-1 through 560-M. *Id.* at 12:52–56. The combined optical signal is then routed into an existing port 570, providing an output multi-wavelength optical signal. *Id*. at 12:56–58.

B. Illustrative Claims

Challenged claims 1, 15, 16, and 17 of the ’368 patent are independent. Claims 2–6 and 9–13 ultimately depend from claim 1 and claims 18–22 ultimately depend from claim 17. Claims 1 and 17 of the ’368 patent are illustrative of the claims at issue:

> 1. An optical add-drop apparatus comprising
> an input port for an input multi-wavelength optical signal having first spectral channels;
> one or more other ports for second spectral channels; an output port for an output multi-wavelength optical signal;
> a wavelength-selective device for spatially separating said spectral channels; [and]
> a spatial array of beam-deflecting elements positioned such that each element receives a corresponding one of said spectral channels, each of said elements being individually and continuously controllable *in two dimensions* to reflect its corresponding spectral channel to a selected one of said ports *and to control the power of the spectral channel reflected to said selected port*.

Ex. 1001, 14:6–20.

> 17. A method of performing dynamic add and drop in a WDM optical network, comprising
> separating an input multi-wavelength optical signal into spectral channels;
> imaging each of said spectral channels onto a corresponding beam-deflecting element; and
> controlling dynamically and continuously said beam-deflecting elements *in two dimensions* so as to combine selected ones of said spectral channels into an output multi-wavelength optical signal *and to control the power of the spectral channels combined into said output multi-wavelength optical signal*.

Ex. 1001, 16:3–14.

III. ANALYSIS

A. Claim Construction

The Board interprets claims using the "broadest reasonable construction in light of the specification of the patent in which [they] appear[]." 37 C.F.R. § 42.100(b). We presume a claim term carries its "ordinary and customary meaning," which is "the meaning that the term would have to a person of ordinary skill in the art in question" at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). A patentee may, however, act as their own lexicographer and give a term a particular meaning in the Specification, but must do so with "reasonable clarity, deliberateness, and precision." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Only terms which are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

1. *"to control"*

Independent claims 1, 15, and 16 each recite outside of the preamble:

> a spatial array of beam-deflecting elements positioned such that each element receives a corresponding one of said spectral channels, each of said elements being individually and continuously controllable in two dimensions to reflect its corresponding spectral channel to a selected one of said ports and <u>to control the power of the spectral channel reflected</u> to said selected port.

Ex. 1001, 14:14– 20, 15:14–20, 15:31–37 (emphases added). Independent claim 17 contains a similar limitation.[6] Petitioner contends that the "to

[6] Claim 17 recites: "controlling dynamically and continuously said beam-

control" clause "refers merely to intended use" and is limited "only to structure that may be capable of redirecting a spectral channel to a particular port." Pet. 13. Petitioner further asserts that the "to control" clause means "to change the power in the spectral channel that is received by a particular port." *Id.* Petitioner identifies no sufficient evidence in support of construing "to control" as meaning "to change." Patent Owner does not address the meaning of the term. Although "apparatus claims cover what a device is, not what a device does," the language at issue here describes the function that the apparatus must be capable of performing. *Hewlett-Packard Co. v. Bausch & Lomb, Inc*., 909 F.2d 1464, 1468 (Fed.Cir.1990); *see also K-2 Corp. v. Salomon S.A*., 191 F.3d 1356, 1363 (Fed. Cir. 1999) (explaining that functional language is an additional limitation in the claim). In that regard, the "to control" clause is, thus, functional rather than non-functional. Accordingly, the claimed "spatial array of beam-deflecting elements" is further limited to a spatial array that satisfies the "to control" functional limitations. We determine no further express construction of the "to control" clause is necessary for purposes of this decision.

2. "*continuously controllable*"

Claim 1 requires "a spatial array of beam-deflecting elements . . . each of said elements being individually and continuously controllable." Similarly, claim 17 requires "controlling dynamically and continuously said beam-deflecting elements." Petitioner asserts that "continuously

---

deflecting elements in two dimensions so as to combine selected ones of said spectral channels into an output multi-wavelength optical signal and to control the power of the spectral channels combined into said output multi-wavelength optical signal." Ex. 1001, 16:9–14.

controllable" should be construed to mean "able to effect changes with fine precision." Pet. at 11. Petitioner also notes, however, that the '368 patent identifies "under analog control" as an example of continuous control, and contends that "the example of analog control does not alone define the [broadest reasonable interpretation] of continuously controllable." *Id.* at 12; *see also* Ex. 1028 (stating "a mirror that is disclosed to be under analog control would fit within the scope of "continuously controllable"). Petitioner identifies the following disclosures of the '368 patent as supporting its proposed construction:

> The '368 Patent explains that "[a] distinct feature of the channel micromirrors in the present invention, in contrast to those used in the prior art, is that the motion…of each channel micromirror is under ***analog control*** such that its pivoting angle can be ***continuously adjusted***." ([Ex. 1001], 4:7–11; emphasis added). Another passage in the specification states that "[w]hat is important is that the pivoting (or rotational) motion of each channel micromirror be individually ***controllable in an analog manner***, whereby the pivoting angle can be continuously adjusted so as to enable the channel micromirror to scan a spectral channel across all possible output ports." (*Id*., 9:9–14; emphasis added). Yet another passage states that "channel micromirrors 103 are individually controllable and movable, e.g., pivotable (or rotatable) under analog (or continuous) control." (*Id*., 7:6–8).

Pet. 12. Patent Owner disputes Petitioner's proposed construction, but offers no express alternative. PO Response 46–47. We find that Petitioner: (1) offers no sufficient explanation for how its proposed definition accounts for the term "continuously" in "continuously controllable"; (2) directs us to no portion of the specification of the '368 patent that uses "fine precision"; and (3) fails to explain what "fine precision" is intended to encompass or

exclude. *See id.* at 11–12. Additionally, based on all of the evidence presented, we are not persuaded that "continuously controllable" is limited to "analog control," or that "analog control" necessarily corresponds to "continuous" control under all circumstances. We determine that "continuously controllable," in light of the specification of the '368 patent, encompasses "under analog control such that it can be continuously adjusted."

3. "port"

Claim 1 requires "an input port . . . one or more other ports. . . [and] an output port." Patent Owner contends that in the '368 patent "the structure or elements making up the ports are collimators." PO Resp. 33. Patent Owner offers no definition of "port," and does not suggest that the '368 patent provides an express definition of the term, but instead argues that a "port," as claimed, is not a "circulator port" because the '368 patent "disavows circulator-based optical systems." *Id*. at 34. We disagree.

There is no dispute that the ordinary and customary meaning of "port" encompasses circulator ports, and, indeed, any "point of entry or exit of light." *See* Dr. Sergienko Deposition Transcript (Ex. 1040), 43:16–23, 45:12–13 ("The circulator ports are ports with constraints."). Nor does the '368 patent equate the term "port" to "collimator," as both "port" and "collimator" appear separately in the claims of the '368 patent. Ex. 1001, 14:7, 14:48–51. We have considered the testimony of Dr. Sergienko as well (Ex. 2022 ¶¶ 168–172), and find that even if certain fiber collimators serve as ports in the '368 patent, that does not redefine the term "port" to mean

"collimator." *See id*. at ¶ 171. Thus, the primary issue is whether the '368 patent disavows circulator ports from the scope of the term "port."

Although the broad scope of a claim term may be intentionally disavowed, "this intention must be clear," *see Teleflex, Inc. v. Ficosa N. Am. Corp*., 299 F.3d 1313, 1325 (Fed. Cir. 2002) ("The patentee may demonstrate an intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope."), and cannot draw limitations into the claim from a preferred embodiment." *Conoco, Inc. v. Energy & Envtl. Int'l*., 460 F.3d 1349, 1357 (Fed. Cir. 2006).

Patent Owner fails to show any expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope with respect to the use of "port" in the '368 patent. Patent Owner argues: (1) that the '368 patent provides a scalable system without circulator ports, that a provisional application to the '368 patent "describes existing add/drop architectures that had a number of problems" (PO Resp. 35); (2) that U.S. Patent No. 6,984,917 shows how experts use the term "input port" and "output port" because it uses elements "similar to how the '368 patent describes fiber collimators serving as ports" (PO Resp. 42–43); and (3) that because the inventors of the '368 patent "consistently emphasized the limitations of circulator-based switches and provided an alternative configuration," a person of ordinary skill in the art would have understood that the inventors were disavowing the use of optical circulators (PO Resp. 35). S*ee also* PO Resp. 34–39 (citing Ex 2022 ¶ 182).

We do not discern any "clear disavowal of claim scope" from the arguments advanced by Patent Owner. Dr. Sergienko merely states that based on market differentiation, construing "ports" to include circulator ports "goes beyond the intent of the '368 patent." Ex. 2022, ¶ 182. Even if the '368 patent were viewed as Dr. Sergienko suggests, a speculative purported intent of market differentiation is not disavowal. Moreover, Petitioner further demonstrates that a provisional application to the '368 patent in fact uses circulator ports as "ports." Pet. Reply 12–13 (citing Ex. 1008, 3, Fig. 9). Such usage undermines Patent Owner's disavowal contention. Patent Owner's argument that the provisional application is "entirely consistent with the '368 patent's use of collimators" fails to negate the fact that the provisional application uses circulator ports as "ports." *See* PO Resp. 39–42. Similarly, we find insufficient support for Patent Owner's argument based on the preamble that "circulators can only be coupled to, but not part of, the [optical add drop] apparatus. *See id.* at 39. We are not persuaded that the preamble's recitation of a "[a]n optical add-drop apparatus comprising" of claim 1 is limiting because "the body of the claim fully and intrinsically sets forth the complete invention, including all of its limitations." *See Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999). Because "the preamble offers no distinct definition of any of the claimed invention's limitations, but rather merely states . . . the purpose or intended use of the invention, . . . the preamble is of no significance to claim construction." *Id.* (citing *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997); *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989); *Kropa v. Robie*, 187 F.2d 150, 152

(CCPA 1951)). We also are persuaded that Bouevitch's "Configurable Optical Add/Drop Multiplexer" is recognized as an optical add-drop apparatus and includes circulators. *See* Pet. Reply 13. We have considered all of the arguments advanced by Patent Owner in its effort to redefine "port" as excluding "circulator ports" (PO Resp. 31–43), and find insufficient support for Patent Owner's contention that the '368 patent disavows or otherwise excludes circulator ports from the scope of the term "port." We determine that "port," in light of the specification of the '368 patent, encompasses "circulator port."

4. "*beam focuser*"

Claim 11 requires a "beam-focuser for focusing said separated spectral channels onto said beam deflecting elements." The '368 patent states that "[t]he beam-focuser may be a single lens, an assembly of lenses, or other beam focusing means known in the art." Ex. 1001, 4:20–22.

Petitioner contends that "beam focuser" is "a device that directs a beam of light to a spot." Pet. 16. According to Petitioner:

> The Summary of the '368 patent states that the "beam-focuser focuses the spectral channels into corresponding spectral spots." ([Ex. 1001], 3:63-64.) The specification also explains that the beams of light are "focused by the focusing lens 102 into a spatial array of distinct spectral spots (not shown in FIG. lA) in a one-to-one correspondence." (*Id*., 6:65-7:5.) The MEMS mirrors are in turn "positioned in accordance with the spatial array formed by the spectral spots, such that each channel micromirror receives one of the spectral channels." (*Id*.)

Id. Patent Owner does not dispute expressly Petitioner's proposed construction, and provides no alternative construction of "beam focuser." Consistent with Petitioner's proposed construction, Dr. Sergienko testified

that "focusing means bringing of the energy in the original image limited to the focal spot." Ex. 1040, 245:17–19. We agree that, based on the specification of the '368 patent, "beam focuser" means "a device that directs a beam of light to a spot."

5. "*dynamically*"

Claim 17 recites "[a] method of performing dynamic add and drop in a WDM optical network, comprising: . . . controlling dynamically and continuously said beam-deflecting elements in two dimensions." Ex. 1001, 16:3–10. Petitioner contends that "'dynamically' imports an aspect of control during operation," and equates the term to "able to effect changes . . . during operation." Pet. 17. It is unclear how Petitioner equates "dynamically" to "during operation" and no supporting citation is provided.

The '368 patent uses "dynamic" and "dynamically" throughout the specification, stating, for example, that "[t]he power levels of the spectral channels in the output ports may be dynamically managed according to demand." Ex. 1001, 11:30–32. We determine from the specification that the '368 patent uses "dynamically" in contrast to "static," in accordance with its ordinary and customary meaning.

6. Additional Claim Terms

Petitioner addresses several additional claim terms, including "in two dimensions," "spectral monitor," and "servo-control assembly." Pet. 12–16. For purposes of this decision, no express construction of any additional claim terms is necessary.

B. References Asserted as Prior Art

Petitioner relies on Bouevitch, Sparks, Lin, and Dueck with respect to its assertion that the challenged claims would have been obvious.

1. Bouevitch

Bouevitch describes an optical device for rerouting and modifying an optical signal, including modifying means such as a MEMS array and a liquid crystal array which function as an attenuator when the device operates as a dynamic gain equalizer (DGE), and as a switching array when the device operates as a configurable optical add/drop multiplexer (COADM). Ex. 1003, Abstract. According to Petitioner, the COADM described in Bouevitch "uses MEMS mirrors with 1 axis of rotation." Pet. 20. Petitioner also contends that the Bouevitch COADM controls the power of its output channels by tilting beam-deflecting mirrors at varying angles. *Id.* at 19.

2. Sparks

Sparks describes an optical switch arranged to misalign the optical beam path to provide a predetermined optical output power. Ex. 1004, Abstract. According to Sparks, "[t]he system operates by controlling the movable micromirrors (16, 26), which are fabricated using MEMS technology and are capable of two axis movement, to carefully align the beams so as to ensure that the maximum possible input optical signal is received at the output of the switch." *Id.* at 4:43–46.

3. Lin

Lin describes a "spatial light modulator… operable in the analog mode for light beam steering or scanning applications." Ex. 1010, Abstract. Lin explains that the angular deflection of a mirror about the torsional axis is

a function of the voltage potential applied to an address electrode. *Id*. at 6:29–32. Petitioner contends that Figure 3B of Lin depicts a continuous and linear relationship between the deflection angle of the MEMS mirrors and the applied voltage. Pet. 31.

4. Dueck

Dueck describes a wavelength division multiplexer that integrates an axial gradient refractive index element with a diffraction grating to provide efficient coupling from a plurality of input sources. Ex. 1021, Abstract. Petitioner contends that Dueck describes various diffraction gratings for use in WDM devices. Pet. 19.

C. Asserted Obviousness Over Bouevitch, Sparks, and Lin

Petitioner asserts that claims 1–6, 9–11, 13, and 15–22 would have been obvious over Bouevitch, Sparks, and Lin.[7] Pet. 5.

1. Claim 1

Claim 1, directed to an optical add-drop apparatus, requires "an input port . . . one or more other ports . . . [and] an output port." Petitioner asserts that Bouevitch discloses an optical add-drop apparatus, including an input

[7] Petitioner initially argues that Patent Owner admitted in a Replacement Reissue Application Declaration by Assignee that all elements of claim 1, except for two-axis mirrors, were disclosed by Bouevitch. Pet. 9–11 (quoting Ex. 1002, 81–82). Petitioner identifies no persuasive authority for the proposition that such a statement should be treated as an admission in this proceeding. Moreover, rather than admit that all original elements of claim 1 are disclosed by Bouevitch, the statement makes clear that three additional references not relied upon by Petitioner in this proceeding were considered in combination with Bouevitch. As a result, we are not persuaded that Patent Owner has admitted all elements of claim 1, except for two-axis mirrors, were disclosed by Bouevitch.

port (labeled "IN"), one or more other ports (labeled 80b "IN ADD" and "OUT DROP"), and an output port (labeled "OUT EXPRESS"), as recited by claim 1 of the '368 patent. Pet. 25–26 (citing Ex. 1003, Fig. 11). Petitioner's contentions are supported by Sheldon McLaughlin, an employee of Petitioner. Ex. 1028 (Declaration of Sheldon McLaughlin) ¶¶ 2, 38–41.

Patent Owner argues that, under its proposed claim construction of "port," Bouevitch discloses at most two ports because the '368 patent equates "port" to "collimator" and disavows circulator ports. PO Resp. 31–44. For the reasons explained above in our claim construction analysis for "port," we reject Patent Owner's claim construction for "port." Accordingly, we do not agree with Patent Owner's contention that the only ports disclosed by Bouevitch are collimator lenses 12a and 12b. *See* PO Resp. 44. Petitioner has shown, as discussed above and as supported by Mr. McLaughlin, that Bouevitch discloses the recited input, output, and one or more other ports, as recited by claim 1.

Claim 1 requires "a wavelength-selective device" for spatially separating spectral channels. Petitioner identifies diffraction grating 20 of Bouevitch as corresponding to the recited "wavelength-selective device." Pet. 27. Claim 1 also requires "a spatial array of beam-deflecting elements." Petitioner identifies MEMS mirror array 50 of Bouevitch as corresponding to the recited "spatial array of beam-deflecting elements positioned such that each element receives a corresponding one of said spectral channels." Pet. 27–28. Patent Owner does not dispute Petitioner's contentions, with which we agree. Patent Owner does, however, argue that "Petitioner does not meet its burden of showing in the Petition how 'deflecting' to a

circulator and then 'propagating' to the output or the drop meets the claim element "reflecting" to an output port," and that "propagating" is not "reflecting." PO Resp. 44–45. Patent Owner's argument is not persuasive because it is beyond the scope of the claims, which do not require reflection directly to an output port. To the contrary, we agree with Petitioner that "Fig. 1A of the '368 patent, for example, discloses a light beam that reflects off micromirror 103, and then propagates back though both focusing lens 102 and quarter-wave plate 104 before being directed to an output port." Pet. Reply 14.

For each of the beam-deflecting elements, claim 1 further requires that they be "individually and continuously controllable *in two dimensions* to reflect its corresponding spectral channel to a selected one of said ports *and to control the power of the spectral channel reflected to said selected port*."

The '368 patent provides analog control as an example of "continuously controllable," and Petitioner shows that Bouevitch discloses continuously controllable power attenuation as an analog function of the angle of the deflector, which is also described as "variable." *Id.* at 28–30. As Mr. McLaughlin explains, a person of ordinary skill would understand from Bouevitch that "the level of control, required to balance the optical power differentials among the wavelength channels, is achieved via analog voltage control." Ex. 1028 ¶ 48. *See also* Declaration of Dr. Dan Marom, Ex. 1029 ¶ 58 (explaining that Bouevitch discloses the use of variable attenuation for power control, and a person of ordinary skill in the art would understand that the necessary level of control required to balance the optical power differentials among the wavelength channels is achieved in Bouevitch

with continuous control over the mirror tilt via analog voltage control); Ex. 1003, 7:35–37 (stating that "[t]he degree of attenuation is based on the degree of deflection provided by the reflector (i.e., the angle of reflection)"). Patent Owner does not otherwise dispute Petitioner's contention that Bouevitch discloses continuous control of beam-deflecting elements via analog voltage control with respect to a single axis. *See* PO Resp. 47.

Petitioner also contends that Lin discloses "continuous control." Pet. 31–32, Ex. 1028 ¶ 51. Lin describes a spatial light modulator (SLM) operable in the analog mode for light beam steering or scanning applications. Ex. 1010, Abstract. Figures 3A and 3B of Lin are reproduced below.

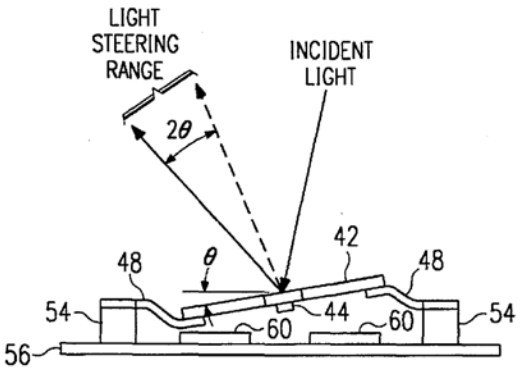

FIG. 3A

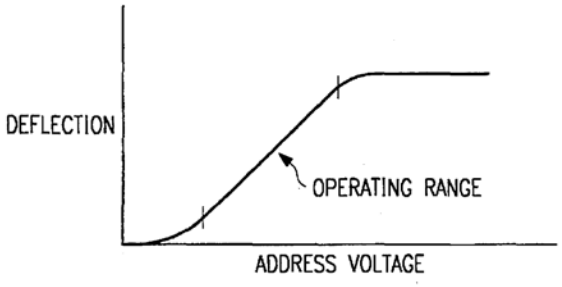

FIG. 3B

Figure 3A is a spatial light modulator, "illustrating the pixel being deflected about the torsion hinge to steer incident light in a selected direction, the deflection of the pixel being a function of the voltage applied to the underlying address electrode." Ex. 1010, 5:20–25. As Petitioner explains, Figure 3B shows a graph disclosing the continuous deflection angle of MEMS mirrors as a function of the voltage applied to affect that deflection. Pet. 31; *see also* Ex. 1028 ¶ 61 (testimony of Dr. Marom stating that Lin "confirms that continuous and analog control of MEMS mirrors was known prior to the '368 patent's priority date"). Lin explains that "the angular deflection of mirror 42 about the torsional axis defined by hinges 44 is seen to be a function of the voltage potential applied to one of the address electrodes 60." Ex. 1010, 6:29–32. Lin further explains that:

> With an address voltage being applied to one address electrode 60 being from 0 to 20 volts, mirror 42 is deflected proportional to the address voltage. When SLM 40 is operated as an optical switch or light steerer, incident light can be precisely steered to a receiver such as an optical sensor or scanner. The mirror tilt angle can be achieved with a excellent accuracy for pixel steering.

Id. at 7:13–19.

Patent Owner argues that Petitioner has not shown that Lin discloses continuous control because such control cannot be shown by the input signal alone, and Petitioner did not "look at the structure of the mirror, how the voltage affects movement of the mirror, and what control loop algorithm has been utilized." PO Resp. 51 (citing Ex. 2022 ¶ 204–05 (stating that Lin Figure 3B "may represent a mirror that is controlled in a step-wise manner"). We find the speculative testimony of Dr. Sergienko not persuasive over the express disclosure of Lin of analog control whereby "mirror 42 is deflected

proportional to the address voltage," thereby demonstrating "continuous control," as claimed.

With regard to beam-deflecting elements controllable in two dimensions, as required by claim 1, Petitioner also shows that "Sparks describes 'movable micromirrors (16,26), which are fabricated using MEMS technology and are capable of two axis movement, to carefully align the beams so as to ensure that the maximum possible input optical signal is received at the output of the switch.'" Pet. 33–34 (quoting Ex. 1004, 4:43–47); *see also* Ex. 1028 ¶ 56). Patent Owner does not dispute that Sparks discloses MEMS controllable in two dimensions. *See* PO Resp. 48.

In summary, for the reasons discussed above, Petitioner has established that Bouevitch discloses all of the recited limitations of claim l for an array of mirrors individually and continuously controllable on a single axis, but not on a two axis (i.e., two dimension) array "to reflect its corresponding spectral channel to a selected one of said ports and to control the power of the spectral channel reflected to said selected port." Patent Owner did not dispute that Bouevitch discloses continuous control of beam-deflecting elements via analog voltage control with respect to a single axis, and Petitioner has demonstrated that Lin also discloses such "continuous control." Finally, Petitioner has established that Sparks discloses an array of mirrors controllable in two dimensions "to reflect" and "to control," as recited by claim 1. Thus, the remaining issue is whether Petitioner has provided "some articulated reasoning with some rational underpinning to

support the legal conclusion of obviousness." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007).[8]

With respect to a rationale for combining Bouevitch and Sparks, Petitioner contends the use of the two-axis mirror of Sparks in Bouevitch: (1) is a simple substitution of one known element for another yielding predictable results, (2) is the use of a known technique to improve similar devices, (3) would be obvious to try as there are only two options for tilting MEMS mirrors: one-axis and two-axis mirrors, and (4) would be motivated to help ensure that all channels have nearly equivalent power and to overcome manufacturing deviations by being actuatable to adjust for any unintentional misalignment in two axes. Pet. 22–24. Petitioner also contends that several reasons support the addition of Lin's continuous, analog control to the asserted combination:

> (1) continuously controlled mirrors were known to be interchangeable with discrete step mirrors; (2) continuously controlled mirrors allow arbitrary positioning of mirrors and can more precisely match the optimal coupling value; and (3) Lin specifically teaches that its analog, continuous MEMS mirrors would be useful in optical switching applications like Bouevitch's and Sparks' optical switch devices. (Lin, Ex. 1010 at 2:6–9; McLaughlin Decl., Ex. 1028 at ¶ 52.)

Pet. 32.

---

[8] The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) secondary considerations, i.e. objective evidence of unobviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We have considered each of the Graham factors and incorporate our discussion of those considerations, to the extent there is a dispute, in our evaluation of the reasoning that supports the asserted combination.

Patent Owner disputes the sufficiency of the rationale provided in the Petition. PO Resp. 14–29. First, Patent Owner argues that Petitioner combines disparate embodiments of Bouevitch, noting that the Petition cites portions of Bouevitch describing not only figure 11, but also figures 1, 5, 6a, and 9 which correspond to other embodiments. *Id*. at 16–18. Noting that various portions of a reference are cited does not show that the asserted combination is dependent upon a disclosure appearing only with respect to one embodiment and not another. Petitioner persuasively explains that it relies "only on the Fig. 11 embodiment of Bouevitch." Pet. Reply 1–2. Although Petitioner includes a discussion of Bouevitch's disclosure of power control in the Petition, it is clear that the asserted combination does not stand or fall on that disclosure. The Petition states that a person of ordinary skill in the art "would be motivated to use the 2-axis system of Sparks within the system of Bouevitch for power control." Pet. 35. Petitioner's discussion of the power control embodiment of Bouevitch in support of the rationale for the asserted combination with Sparks (i.e., both Sparks and Bouevitch address power control) does not impose an obligation on Petitioner to articulate a rationale for including the power control embodiment of Bouevitch in the asserted combination.

Patent Owner also argues that a person of ordinary skill in the art would not have combined Bouevitch and Sparks for various reasons. PO Resp. 18–31. Patent Owner argues that if Bouevitch accomplishes both switching and power control using a one-axis mirror, absent hindsight a person of ordinary skill "would have had *no* reason" to use a two-axis mirror to control power, particularly because it would make it "vastly more

complex." *Id*. at 18. We find Patent Owner's argument conclusory and not persuasive because it fails to address the benefits of a two-axis mirror disclosed by Sparks which would be apparent to one of skill in the art without hindsight. *See* Pet. Reply 3 (stating "Sparks expressly states that an advantage of the optical switches with two-axis mirrors is that attenuation (i.e., power control) can be achieved without incorporating separate attenuators within the system. (*See, e.g.*, Sparks, Ex. 1004, col. 2, ll. 28-30, col. 4, ll. 55-58.)"). Petitioners' expert Mr. McLaughlin testified that a person of ordinary skill would have been capable of overcoming any problems presented by technical issues. Ex. 2032, 125:18–126:10, 134:11–19, 137:16–23.) Patent Owner concedes that two-axis mirrors were known and cited during prosecution. PO Resp. 19. Patent Owner argues that Petitioner "fails to address the technical challenges" that would prevent it from being a simple substitution. PO Resp. 20–23. Dr. Sergienko was asked whether similar technical considerations presented problems that could not be overcome by one of skill in the art, and indicated "no." Ex. 1040, 266:16–267:25. Moreover, "[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Here, the test for obviousness reflects what the combined teachings of Bouevitch, Sparks, and Lin would have suggested to one of ordinary skill in the art, and does not require that any one particular component of a reference must be bodily incorporated, or physically inserted, into another reference.

Next, Patent Owner argues that a person of ordinary skill in the art would not have been motivated to combine Spark's tiltable mirrors with Bouevitch because it would disrupt Bouevitch's explicit teaching of parallel alignment, and "Bouevitch teaches away from misalignment for power control." PO Resp. 23–27. "The prior art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed in the … application." *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). While Bouevitch discusses how angular displacement is disadvantageous in certain respects (*see* Ex. 1028, 2:1–7), we are not persuaded such discussion is sufficient to constitute a teaching away. To the contrary, Petitioner has shown persuasively that Bouevitch uses angular misalignment to control power in at least some embodiments of Bouevitch. Pet. Reply 4–6.

Similarly, Patent Owner's contention that Bouevitch and Sparks are "incompatible technologies" is not persuasive. *See* PO Resp. 27–29. According to Patent Owner, Bouevitch would be rendered unsatisfactory for its intended purpose "to provide *both* power optimization control *and* optimally efficient optical coupling of the beam to the output port" because Bouevitch and Sparks perform attenuation "at opposite ends of the optical system." *Id.* at 29. As Petitioner notes, Bouevitch discloses embodiments that perform power attenuation by angular misalignment of the beam using MEMS mirrors. Pet. Reply 6. Patent Owner's articulation of the intended purpose of Bouevitch focuses on only one objective, and fails to address what Bouevitch discloses as a whole to one of skill in the art. There is no

dispute that the use of a two-axis mirror includes benefits as well as costs over a one-axis mirror. "The fact that the motivating benefit comes at the expense of another benefit, … should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. Instead, the benefits, both lost and gained, should be weighed against one another." *Winner Int'l.*, 202 F.3d at 1349, n. 8. We are not persuaded that the costs identified by Patent Owner overcome the rationale of the asserted combination provided by Petitioner. Importantly, Patent Owner does not persuasively counter Petitioner's rationale that it would have been obvious to try, because, as Mr. McLaughlin testified: (1) there were only two solutions to the known need to deflect light beams with MEMS: 1-axis or 2-axis; (2) a person of ordinary skill would have had a high expectation of success to try two-axis mirror control in Bouevitch; and (3) the result of the combination would be predictable. *See* Pet. 22–23; Reply 4; Ex. 1028 ¶¶ 41–42; Ex. 1029 ¶ 45.

With respect to Lin, Patent Owner argues that "Petitioner provides no KSR rationale." PO Resp. 7. Patent Owner's argument neglects the rationale provided by Petitioner. See Pet. 32. Patent Owner also implicates "impermissible hindsight" in the combination with Lin (*id*. at 14) and argues that Petitioner fails to explain how to modify Lin's structural elements to incorporate a two-dimensional rotation (*id.* at 52–53). As explained above, however, the test for obviousness is not whether the features of one reference may be bodily incorporated into the structure of another reference. Moreover, the references of record reflect that there routinely are complex design considerations in the fiber optic communications field. Patent Owner

does not explain persuasively why combining the teachings of Sparks and Lin would be beyond the skill of a skilled artisan. We find more persuasive Petitioner's contention that Lin specifically teaches that its analog, continuous MEMS mirrors would be useful in optical switching applications like Bouevitch's and Sparks' optical switch devices. *See* Ex. 1010, 2:6–9; Ex. 1028 ¶ 52.

Petitioner has articulated sufficient reasoning with some rational underpinning to support the legal conclusion of obviousness based on the asserted combination of Bouevitch, Sparks, and Lin. With regard to incorporating the teaching of a two-axis mirror in Sparks with Bouevitch, we are persuaded that it is a simple substitution, notwithstanding the fact that it may require substantial engineering as a practical matter. The asserted combination of Sparks and Bouevitch and Lin yields a predictable result. *See KSR*, 550 U.S. at 416 ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.").

We are further persuaded that Petitioner has identified additional "rational underpinning" in support of the asserted combination. Mr. Laughlin explains that the references all address optical signal switches, that "the principles of operation of the MEMS-based actuating mirrors are essentially the same except that the mirrors of Sparks are actuatable in one more axis than those of Bouevitch," and that a two-axis mirror in place of a one-axis mirror "would yield a predictable result of the same functionality (e.g., movement of a reflective surface in a first axis) yet with more control (e.g., the reflective surface moving in a second axis in similar manner as the

movement in the first axis). Ex. 1028 ¶ 30. While Lin is not necessary in light of our determination that Bouevitch also discloses continuous control, Mr. Laughlin persuasively explains that continuously controlled analog mirrors were recognized as interchangeable with discrete step mirrors. *Id*. at 53–55; *see also* Ex. 1010, 2:7–9, 3:41–57 (discussing analog control as an alternative to binary (discrete) control of mirrors to increase the precision of the mirror placement).

Finally, Patent Owner argues that "[i]ndustry adoption is additional evidence of non-obviousness and the fact that Petitioner relies on impermissible hindsight when making the combination." PO Resp. 54–59. In particular, Patent Owner argues that "[t]he industry recognized the advantages presented in [Patent Owner's] optical configuration. *Id*. at 55. Patent Owner quotes, for example, a statement that describes Patent Owner as offering "a 10-fiber port solution." *Id*. Patent Owner offers no explanation as to how such a statement is within the scope of the claims at issue. Similarly, Patent Owner refers to a "WavePath product line" without demonstrating any of those products practice the challenged claims. *See id*. Patent Owner further argues that "experts" adopted its ROADM configuration. *Id*. at 56–59. According to Patent Owner, if certain other patents held by Mr. Laughlin and Dr. Marom "are not evidence of nonobviousness themselves, they at the least show that Mr. McLaughlin and Dr. Marom are susceptible to hindsight bias because both worked on [Patent Owner's] optical configuration, and both were aware of the [Patent Owner's] optical configuration after [Patent Owner] disclosed it to the public.

We agree with Petitioner that Patent Owner does not offer adequate support that such alleged "industry adoption" suggests non-obviousness, and that Patent Owner does not demonstrate any nexus to the merits of the claimed invention. *See* Pet. Reply 20. Pet. Reply 20. We likewise agree with Petitioner that, to the extent that Patent Owner is suggesting that it is providing evidence of copying, it is insufficient because Patent Owner does not present any evidence of actual copying or a nexus to any of Patent Owner's products. *See, e.g., Iron Grip Barbell Co. Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004) ("[C]opying requires the replication of a specific product."); *see also Tokai Corp. v. Easton Enters.*, 632 F.3d 1358, 1370 (Fed. Cir. 2011). We have considered all of the evidence of non-obviousness identified by Patent Owner. For the foregoing reasons, we conclude Petitioner has established by a preponderance of the evidence that claim 1 would have been obvious over Bouevitch, Sparks, and Lin.

2. Claims 2, 5, 6, 9, 10, 13, 15, and 16

Claims 2, 5, 6, 9, 10, 13, 15, and 16 ultimately depend from claim 1. In addition to addressing the elements of claim 1, we agree with Petitioner's identification of how claims 2, 5, 6, 9, 10, 13, 15, and 16 would have been obvious over Bouevitch, Sparks, and Lin, as supported by the declaration of Mr. Laughlin. Pet. 36–38, 43–46, 49–54. For example, claim 2 requires "a control unit for controlling each of said beam-deflecting elements," and Petitioner has shown that it would have been obvious to apply the control unit disclosed by Sparks to Bouevitch as it is the addition of a known element which yields the predictable result of electronic control. *See* Pet. 36–38. As another example, claim 13 requires that "beam-deflecting

elements comprise micromachined mirrors." Petitioner has shown that mirrors disclosed in Bouevitch and Sparks are "micromachined mirrors." Pet. 49–50. Patent Owner has not raised additional arguments with respect to claims 2, 5, 6, 9, 10, 13, 15, and 16 beyond those asserted with respect to claim 1, addressed above. We have assessed the information provided and determine that Petitioner has established by a preponderance of the evidence that claims 2, 5, 6, 9, 10, 13, 15, and 16 would have been obvious over Bouevitch, Sparks, and Lin.

3. Claims 3 and 4

Claim 3, which depends from claim 1, further requires that the control unit "comprises a servo-control assembly, including a spectral monitor for monitoring power levels of selected ones of said spectral channels, and a processing unit responsive to said power levels for controlling said beam deflecting elements." Claim 4, which depends from claim 3, further requires that the "servo-control assembly maintains said power levels at predetermined values." The '368 patent states that:

> The electronic circuitry and the associated signal processing algorithm/software for such processing unit in a servo-control system are known in the art. A skilled artisan will know how to implement a suitable spectral monitor along with an appropriate processing unit to provide a servo-control assembly in a WSP-S apparatus according to the present invention, for a given application.

Ex. 1001, 12:9–15. Accordingly, the '368 patent expressly recognizes that the additional features of claims 3 and 4 were "known in the art" to a skilled artisan and would have been obvious to implement.

We agree with Petitioner's contention that the disclosure in Sparks of a "closed-loop servo control system" and "power measuring means"

correspond to the claimed servo-control assembly and spectral monitor, and serve the same purpose. Pet. 38–42 (citing, *inter alia*, Ex. 1004, 2:59–65, 4:39–45, 4:61–67; Ex. 1028 ¶¶ 75–78). With regard to claim 4, Petitioner directs us to Sparks, which teaches that the closed-loop power control feature carries out "controlled misalignment of the optical beam path so as to achieve a predetermined optical output power" (Ex. 1004 at 2:24-25; *see also id.* at Abstract.) Petitioner also provides sufficient articulated reasoning with some rational underpinning to support the combination of the Sparks controller and optical power monitor with Bouevitch, including that "the feedback-driven control of Sparks would improve the precision of the mirror-based switching system of Bouevitch." Pet. 41–42 (citing Ex. 1028 ¶¶ 81–82). Petitioner also reasons that it would have been obvious to try the predetermined power settings of Sparks within Bouevitch, "because there are only a limited set of types of power settings to use: predetermined and not-predetermined." *Id.* at 42 (citing Ex. 1028 ¶ 86).

Patent Owner argues that Petitioner fails to explain how or why a person of ordinary skill would have been able to add Sparks's control features to Bouevitch. *Id*. Patent Owner does not address the disclosure of the '368 patent, which states that a "skilled artisan will know how to implement a suitable spectral monitor," or the reasoning provided by Petitioner. We have considered Patent Owner's arguments and find them to be insufficiently supported and conclusory. On the other hand, we conclude that Petitioner's reasoning is sound and supported adequately by the record. Petitioner has established by a preponderance of the evidence that claims 3 and 4 would have been obvious over Bouevitch, Sparks, and Lin.

4. Claim 11

Claim 11 depends from claim 1 and further requires "a beam-focuser for focusing said separated spectral channels onto said beam deflecting elements." Petitioner contends, and we agree, that Bouevitch discloses a "beam-focuser element at reflector 10 in Figure 11." Pet. 46–47; *see also* Ex. 1028 ¶ 96. Petitioner further explains that in Bouevitch "reflector 10 directs the separated beams of light λ_1 and λ_2 from the points on the reflector annotated as R onto the corresponding beam deflecting mirrors 51 and 52 in MEMS array 50." *Id*. at 47. Patent Owner does not dispute Petitioner's contentions with regard to claim 11 beyond the arguments asserted with respect to claim 1, addressed above. Petitioner has established by a preponderance of the evidence that Bouevitch discloses a "beam focuser," as recited in claim 11, and that claim 11 would have been obvious over Bouevitch, Sparks, and Lin.

5. Claims 17–22

Claim 17 is directed to "a method of performing dynamic add and drop in a WDM optical network" which includes elements substantially similar to features of apparatus claim 1. Claims 18–22 ultimately depend from claim 17. We agree with Petitioner's identification of how claims 17–22 would have been obvious over Bouevitch, Sparks, and Lin, as supported by the declaration of Mr. Laughlin. Pet. 54–60. Petitioner asserts that other than for "dynamically," the method step for "controlling dynamically and continuously said beam-deflecting elements *in two dimensions* so as to combine selected ones of said spectral channels into an output multi-wavelength optical signal *and to control the power of the spectral channels*

combined into said output multi-wavelength optical signal" would have been obvious for the same reasons articulated with regard to claim 1. Pet. 56. Petitioner also contends that:

> Both Bouevitch and Sparks teach dynamic control during operation. Bouevitch's device can be used as a "dynamic gain equalizer and/or configurable add/drop multiplexer," which includes dynamic control of the mirrors that perform those actions. (Ex. 1003 at 2:24-25.) Sparks teaches closed-loop 2-axis control (Ex. 1004 at 4:39-47) which the PHOSITA would have understood to mean making adjustments to the deflection of the beam in response to real-time monitoring of the channel power level. (McLaughlin Decl., Ex. 1028 at ¶ 117.)

Id. at 56–57. We find Petitioner's contentions persuasive.

Patent Owner does not dispute Petitioner's contentions with regard to claims 17–22 beyond the arguments asserted with respect to claim 1 and 3 (with respect to claim 22), addressed above. We have assessed the information provided and determine that Petitioner has established by a preponderance of the evidence that claims 17–22 would have been obvious over Bouevitch, Sparks, and Lin.

D. Asserted Obviousness Over Bouevitch, Sparks, Lin, and Dueck

Petitioner contends claim 12 would have been obvious over Bouevitch, Sparks, Lin, and Dueck. Pet. 47–49. Claim 12 recites the apparatus of claim 1, wherein the wavelength-selective device comprises a device selected from the group consisting of ruled diffraction gratings, holographic diffraction gratings, echelle gratings, curved diffraction gratings, and dispersing prisms. Ex. 1001, 14:63–67. Petitioner contends that any of the types of wavelength-selective devices recited in claim 12 would have been obvious because "[e]ach type was known in the prior art,

each was interchangeable as a wavelength-selective device, and each was one of a small set of possible choices." Pet. 48 (citing Ex. 1028 ¶¶ 98–99). Petitioner contends that Bouevitch discloses the claimed wavelength selective device in the form of a prism. *Id.* Patent Owner does not dispute that Bouevitch discloses the additional elements of claim 12. Petitioner also asserts that Dueck discloses "ruled diffraction gratings," as claimed. *Id.*; Ex. 1021, 6:26–30. Petitioner further asserts that it would have been obvious to try Dueck's ruled diffraction gratings in the devices of Bouevitch and Sparks because it represents the "best mode" of separating wavelengths in WDM devices. *Id.* at 49.

Patent Owner argues that a person of ordinary skill would not have been motivated to use Dueck's diffraction grating. PO Resp. 29–31. According to Patent Owner, Dueck discloses a diffraction grating that reflects an input light beam to an output port at very nearly the same angle as the incident angle. *Id*. at 31. Patent Owner reasons that because no configuration shown in Bouevitch is designed to reflect a light beam at the same angle as Dueck, there is no motivation to use Dueck's diffraction grating in Bouevitch. *Id*. In reply, Petitioner asserts that Dueck was relied on "to show that ruled diffraction gratings were one of a small set of known and interchangeable choices." Pet. Reply 8. As noted above, the obviousness test has no bodily incorporation requirement, and is instead focused on "what the combined teachings of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d at 425. While the particular configuration of the ruled diffraction grating in Dueck may not be incorporated readily into Bouevitch, Dueck nonetheless discloses

the broader concept of a ruled diffraction grating. Indeed, Dr. Sergienko testified that a ruled diffraction grating could have been used in Bouevitch, as well as holographic diffraction grating, or an echelle grating, as they are all reasonable substitutes for one another and would be expected to work. *See* Ex. 1040, 256:13–259:7.

We have assessed the information provided and determine that Petitioner has established by a preponderance of the evidence that claim 12 would have been obvious over Bouevitch, Sparks, Lin, and Dueck.

E. Conclusion

Petitioner has shown by a preponderance of the evidence that claims 1–6, 9–11, 13, and 15–22 would have been obvious over Bouevitch, Sparks, and Lin, and that claim 12 would have been obvious over Bouevitch, Sparks, Lin, and Dueck.

IV. MOTIONS TO SEAL

Petitioner and Patent Owner filed a joint motion to seal Exhibit 2032, along with a proposed protective order. Paper 18. Patent Owner also filed a motion to seal Exhibit 2035. Paper 29. Redacted copies of Exhibits 2032 and 2035 were also filed. We hereby grant entry of the parties' Stipulated Protective Order.

There is an expectation that information will be made public where the information is identified in a final written decision, and that confidential information that is subject to a protective order ordinarily becomes public 45 days after final judgment in a trial, unless a motion to expunge is granted. 37 C.F.R. § 42.56; Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,761 (Aug. 14, 2012). In rendering this Final Written Decision, it was not

necessary to identify, nor discuss in detail, any confidential information. However, a party who is dissatisfied with this Final Written Decision may appeal the Decision pursuant to 35 U.S.C. § 141(c), and has 63 days after the date of this Decision to file a notice of appeal. 37 C.F.R. § 90.3(a). Thus, it remains necessary to maintain the record, as is, until resolution of an appeal, if any.

In view of the foregoing, the confidential documents filed in the instant proceeding will remain under seal, at least until the time period for filing a notice of appeal has expired or, if an appeal is taken, the appeal has concluded. The record for the instant proceeding will be preserved in its entirety, and the confidential documents will not be expunged or made public, pending appeal. Notwithstanding 37 C.F.R. § 42.56 and the Office Patent Trial Practice Guide, neither a motion to expunge confidential documents nor a motion to maintain these documents under seal is necessary or authorized at this time. *See* 37 C.F.R. § 42.5(b).

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, based on a preponderance of the evidence, claims 1–6, 9–13, and 15–22 of U.S. Patent No. RE42,368 are unpatentable;

FURTHER ORDERED that the Stipulated Protective Order of the parties is entered;

FURTHER ORDERED that the Joint Motion to Seal Exhibit 2032 is granted;

FURTHER ORDERED that Patent Owner's Motion to Seal Exhibit

2035 is granted; and

FURTHER ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

For PETITIONER:

Walter Linder
FAEGRE BAKER DANIELS LLP
patentdocketing@faegrebd.com

Pieter van Es
Thomas Pratt
Jordan Bodner
Michael Cuviello
BANNER & WITCOFF, LTD.
pvanes@bannerwitcoff.com
TPratt@bannerwitcoff.com
jbodner@bannerwitcoff.com
mcuviello@bannerwitcoff.com

Matthew Moore
Robert Steinberg
LATHAM & WATKINS LLP
matthew.moore@lw.com
Bob.Steinberg@lw.com

Wayne Stacy
COOLEY LLP
wstacy@cooley.com

Lawrence Kass
Christopher Chalsen
Nathaniel Browand
Suraj Balusu
MILBANK, TWEED, HADLEY & MCCLOY LLP
lkass@milbank.com
cchalsen@milbank.com
nbrowand@milbank.com
sbalusu@milbank.com

For PATENT OWNER:

Jason Eisenberg
Robert Sterne
Jon Wright
STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.
Jasone-ptab@skgf.com
rsterne-PTAB@skgf.com
jwright-PTAB@skgf.com