

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC., QUANTUM CORPORATION,
and ORACLE CORPORATION,
Petitioners,

v.

CROSSROADS SYSTEMS, INC.,
Patent Owner.

Case IPR2014-01544¹
Patent 7,051,147 B2

Before NEIL T. POWELL, KRISTINA M. KALAN, J. JOHN LEE, and
KEVIN W. CHERRY, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

¹ Case IPR2015-00852 has been joined with this proceeding.

INTRODUCTION

On September 25, 2014, Cisco Systems, Inc. and Quantum Corporation filed a Petition (Paper 3, “Pet.”) requesting *inter partes* review of claims 1–39 of U.S. Patent No. 7,051,147 B2 (Ex. 1001, “the ’147 patent”). Crossroads Systems, Inc. timely filed a Preliminary Response (Paper 7). An *inter partes* review of all challenged claims was instituted on April 3, 2015. Paper 9 (“Inst. Dec.”). Crossroads then filed a Patent Owner Response (Paper 20, “PO Resp.”), and Cisco and Quantum filed a Petitioner Reply (Paper 33, “Pet. Reply”).

Oracle Corporation filed a separate petition challenging the same claims of the ’147 patent on March 6, 2015, in *Oracle Corporation v. Crossroads Systems, Inc.*, Case IPR2015-00852 (“852 IPR”). 852 IPR, Paper 1. The 852 IPR petition asserted the identical ground of unpatentability, and relied on the same evidence and arguments, as presented in this proceeding. *See id.* Concurrently with that petition, Oracle filed a Motion for Joinder requesting that the 852 IPR be joined with this proceeding. 852 IPR, Paper 3. Crossroads timely filed a preliminary response to Oracle’s petition (852 IPR, Paper 12), but it did not oppose joinder. An *inter partes* review of all challenged claims was instituted on August 14, 2015, and Oracle’s Motion for Joinder was granted. Paper 34 (“Joinder Inst. Dec.”). Because Oracle requested in its Motion for Joinder, the schedule in this proceeding was unchanged by the joinder of the 852 IPR, and Oracle indicated it would not require briefing separate from that filed by Cisco and Quantum in this proceeding. *Id.* at 8–9.

An oral hearing was held on October 30, 2015. Paper 49 (“Tr.”).²

We have jurisdiction under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. As discussed below, Petitioners have shown by a preponderance of the evidence that claims 1–39 of the ’147 patent are unpatentable.

A. Related Proceedings

The parties identify several of district court cases related to this proceeding, including the following in which Petitioners are named parties: (1) *Crossroads Systems, Inc. v. Oracle Corporation*, Case No. 1-13-cv-00895-SS (W.D. Tex.); (2) *Crossroads Systems, Inc. v. Cisco Systems, Inc.*, Case No. 1-14-cv-00148-SS (W.D. Tex.); and (3) *Crossroads Systems, Inc. v. Quantum Corporation*, Case No. 1-14-cv-00150-SS (W.D. Tex.). Pet. 1; Paper 15, 3–4.

In addition, the ’147 patent is the subject of two other pending *inter partes* reviews: (1) *Oracle Corporation v. Crossroads Systems, Inc.*, Case IPR2014-01207 (PTAB); and (2) *Oracle Corporation v. Crossroads Systems, Inc.*, Case IPR2014-01209 (PTAB). Pet. 1; Paper 15, 4.

B. The ’147 Patent

The ’147 patent relates to a storage router and network where devices (e.g., workstations) connected to a Fibre Channel (“FC”) transport medium are provided access to storage devices on a second FC transport medium. Ex. 1001, Abstract. The storage router interfaces with both FC media, mapping workstations on the first FC transport medium, for example, to the storage devices on the second FC transport medium. *Id.* The storage router

² A combined oral hearing was held for this case as well as related *inter partes* reviews IPR2014-01226 (to which IPR2015-00825 was joined) and IPR2014-01463 (to which IPR2015-00854 was joined).

of the '147 patent allows access from the workstations to the storage devices using “native low level, block protocol.” *Id.* One advantage of using such native low level block protocols is greater access speed when compared to network protocols that must first be translated to low level requests, and vice versa, which reduces access speed. *Id.* at 1:58–67.

C. *Challenged Claims*

Petitioners challenge the patentability of claims 1–39 of the '147 patent, of which claims 1, 6, 10, 14, 21, 28, and 34 are independent. Claim 1 is illustrative of the challenged claims, and recites:

1. A storage router for providing virtual local storage on remote storage devices to a device, comprising:

a buffer providing memory work space for the storage router;

a first Fibre Channel controller operable to connect to and interface with a first Fibre Channel transport medium;

a second Fibre Channel controller operable to connect to and interface with a second Fibre Channel transport medium; and

a supervisor unit coupled to the first and second Fibre Channel controllers and the buffer, the supervisor unit operable:

to maintain a configuration for remote storage devices connected to the second Fibre Channel transport medium that maps between the device and the remote storage devices and that implements access controls for storage space on the remote storage devices; and

to process data in the buffer to interface between the first Fibre Channel controller and the second Fibre Channel controller to allow access from Fibre Channel initiator devices to the remote storage devices using native low level, block protocol in accordance with the configuration.

D. Instituted Ground of Unpatentability

This *inter partes* review was instituted on the alleged ground of unpatentability of all challenged claims in view of the combination of the CRD Manual³ and the HP Journal⁴ under 35 U.S.C. § 103. Inst. Dec. 16; Joinder Inst. Dec. 9.

ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are construed according to their broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b); *see In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278–79 (Fed. Cir. 2015). Only those terms in controversy need to be construed, and 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).

During trial, the parties disputed the claim construction of the term “maps between the device and the remote storage devices,” which we address below. No other claim terms require express construction to resolve the issues raised in this *inter partes* review.

Claim 1 recites “a configuration for remote storage devices . . . that *maps between the device and the remote storage devices*” (emphasis added). Each independent claim recites a similar limitation. This term was not construed expressly in the Decision on Institution. Petitioners argue this

³ CMD TECHNOLOGY, INC., CRD-5500 SCSI RAID CONTROLLER USER’S MANUAL (Rev. 1.3, 1996) (Ex. 1004, “CRD Manual”).

⁴ HEWLETT-PACKARD JOURNAL, Oct. 1996 (Ex. 1006, “HP Journal”).

term should be construed as “allocate[s] storage on the storage devices to devices to facilitate routing and access controls.” Pet. 11.⁵

Patent Owner argues that the term “requires that the map specifically identify the host and storage so that the storage router can allocate storage to particular hosts.” PO Resp. 10. Further, Patent Owner makes clear its position that the recited mapping requires the storage devices to be mapped directly to a particular device, such as a host computer. *Id.* at 6–10. According to Patent Owner, it is not enough to map between a storage device and an intermediate identifier associated with a particular device because the identifier is not directly and immutably associated with the device itself—in other words, mapping to an identifier is insufficient unless the identifier is associated with a particular device and *cannot* be associated with any other device. *See id.* at 19–22 (arguing that mapping to a channel identifier does not suffice, even if the channel is connected to only one host device, because the channel identifier *could* be associated with another device if another device were connected to that channel).

We are not persuaded Petitioners’ proposed construction is the broadest reasonable interpretation of the “maps between” term. Petitioners do not explain sufficiently what it means to “facilitate” routing and access controls. Moreover, other claim terms expressly address access controls and allocating storage. For example, dependent claim 7 recites “access controls” including “an allocation of subsets of storage space.” Petitioners do not provide a persuasive justification for including these concepts in the construction of the “maps between” term.

⁵ The 852 IPR petition presented the same challenges “verbatim” as the Petition in this proceeding. 852 IPR, Paper 1, 1. Thus, in general, we cite only to the Petition filed in this proceeding for brevity.

The construction proposed by Patent Owner, however, is overly narrow. Although Patent Owner emphasizes that the map must identify specific host devices, it does not explain persuasively why the claim language should be construed to exclude doing so via intermediate identifiers. *See* PO Resp. 5–10. Patent Owner does not identify any disclosure in the '147 patent's specification that clearly disavows mapping to a device indirectly, or mapping to a device via an intermediate identifier that could identify a different host if the system were configured differently. *See Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1374 (Fed. Cir. 2005) (holding that “words of manifest exclusion or explicit disclaimers in the specification are necessary to disavow claim scope” (internal quotations omitted)). Patent Owner's discussion of Figure 3, for example, is insufficient to compel a narrow construction of the term because it analyzes only a preferred embodiment of the invention. *See* PO Resp. 8–9; *see also In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1369 (Fed. Cir. 2004) (holding that limitations should not be imported from embodiments into the claims absent a clear disclaimer of claim scope in the specification).

Moreover, the '147 patent specifically discusses mapping with identifiers that are not immutable. For example, the specification discusses addressing devices on an FC loop using an AL_PA (arbitrated loop physical address) identifier, and the possibility of “FC devices changing their AL-PA due to device insertion or other loop initialization.” Ex. 1001, 8:40–46; *see* Tr. 54:5–55:15 (counsel for Patent Owner acknowledging an AL_PA is a “temporarily assigned ID” that can point to different devices); Pet. Reply 4–7 (discussing evidence supporting the use of intermediate identifiers, including testimony by Patent Owner's proffered expert).

Further, the claims of the '147 patent indicate the mapping may use mere representations of a device rather than requiring direct mapping to the device itself. Claim 15, for example, recites mapping including “virtual LUNs that provide a representation of the storage device,” and claim 17 recites “mapping from a host device ID to a virtual LUN representation of the remote storage device.” Although these claims refer to “virtual” representations of storage devices rather than host devices, the “maps between” term of the independent claims uses the same language when referring to both the devices and storage devices—for example, claim 14 merely recites a “map between the device and the remote storage device.” The claim language does not indicate that the mapping may address storage devices one way, but that devices must be addressed in a different, more specific or direct way.

For the reasons above, we are not persuaded that the broadest reasonable interpretation of “maps between the device and the remote storage devices” mandates mapping directly or immutably to a host device itself, or excludes mapping to devices using intermediate identifiers.

The parties note that a district court in a related case construed the term as follows:

To create a path from a device on one side of the storage router to a device on the other side of the router. A “map” contains a representation of devices on each side of the storage router, so that when a device on one side of the storage router wants to communicate with a device on the other side of the storage router, the storage router can connect the devices.

Ex. 1009, 12. Although we are not bound by the construction or reasoning of the district court, we do not disregard the analysis and conclusions of a court construing the same claim term in a concurrent proceeding concerning

the same patent. *See Power Integrations, Inc. v. Lee*, 797 F.3d 1318, 1326–27 (Fed. Cir. 2015). After considering the construction of the district court, we determine this construction corresponds to the broadest reasonable interpretation and adopt it for purposes of this Decision.

B. Asserted Grounds of Unpatentability

Petitioners assert that claims 1–39 are unpatentable under § 103 in view of the combination of the CRD Manual and the HP Journal. Pet. 14–60. As discussed below, Petitioners have demonstrated by a preponderance of the evidence that all challenged claims are unpatentable on this ground.

1. CRD Manual

The CRD Manual describes the CRD-5500 RAID controller, a device that enables access to an array of disk drives on SCSI buses. Ex. 1004, 9.⁶ This controller has a modular design that permits customization of its I/O channels using different I/O hardware modules, which allow support of multiple hosts and multiple drives. *Id.* at 9–11.

2. HP Journal

The HP Journal is a collection of articles dated October 1996. Ex. 1006, 1–3. For example, the HP Journal includes an article titled “An Introduction to Fibre Channel” by Meryem Primmer (“Primmer Article”). *Id.* at 94. The Primmer Article discusses FC technology, describing it as “a flexible, scalable, high-speed data transfer interface” where “[n]etworking and I/O protocols, such as SCSI commands, are mapped to [FC] constructs and encapsulated and transported within [FC] frames.” *Id.*

Additionally, an article titled “Tachyon: A Gigabit Fibre Channel Protocol Chip,” by Judith A. Smith and Meryem Primmer (“Smith Article”),

⁶ For clarity, we refer to the pagination of Exhibit 1004 provided by Petitioners and not its native pagination.

is also included in the HP Journal. *Id.* at 99. The Smith article discusses the Tachyon chip, an FC interface controller (*id.* at 111) that “enables a seamless interface to the physical FC-0 layer and low-cost [FC] attachments for hosts, systems, and peripherals on both industry-standard and proprietary buses.” *Id.* at 99.

These portions of the HP Journal relied on by Petitioners share a common author (Meryem Primmer), and similar subject matter (FC technology and its implementation), as well as the same apparent publication date in the same issue of the journal. Patent Owner did not dispute that one of ordinary skill⁷ would have combined the teachings of the different articles in the HP Journal. Based on the full record after trial, we agree and consider them collectively, as the parties have done throughout the proceeding, for simplicity and to avoid confusion.

3. *Reason to Combine the CRD Manual and the HP Journal*

Applicable to all of the challenged claims, the Petition provides a detailed analysis of why a person of ordinary skill in the art would have been motivated to combine the CRD Manual and the HP Journal in the manner asserted by Petitioners. Pet. 18–22 (citing Ex. 1003 ¶¶ 53–62). Specifically, Petitioners contend: (1) the CRD Manual explains that the disclosed CRD-5500 controller has a modular design capable of accepting various I/O modules; (2) the HP Journal describes the benefits of FC technology over SCSI technology; (3) the HP Journal discloses the replacement of SCSI with FC, including the use of SCSI commands with FC frames. *Id.* For example, the HP Journal discusses various advantages of FC over SCSI as a transport medium technology, including advantages in bandwidth and addressability,

⁷ The level of ordinary skill in the art is reflected by the prior art of record. See *Okajima v. Boudreau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

and explains how some FC controllers are compatible with SCSI devices. *Id.*; *see, e.g.*, Ex. 1006, 94–95, 99–101. Patent Owner does not dispute in its Patent Owner Response⁸ that a person of ordinary skill would have had reason to combine the teachings of these references. Based on the full record after trial, Petitioners have articulated a sufficient reason to combine the CRD Manual and the HP Journal with rational underpinnings supported by the evidence. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

4. *Claim 1*

Petitioners contend the CRD Manual teaches a storage router, the CRD-5500 controller, which routes data between host computers (“a device”) and SCSI disk drives (“remote storage devices”). Pet. 23; Ex. 1004, 9–11. According to Petitioners, the CRD Manual teaches the buffer limitation of claim 1 through its disclosure of an “onboard cache” that temporarily stores data from the hosts before eventually writing that data to the storage devices. Pet. 24; Ex. 1004, 12.

With respect to the first and second FC controllers, Petitioners rely on teachings from the combination of the CRD Manual and the HP Journal, as follows. Pet. 24–26. First, the CRD Manual discloses multiple “I/O modules,” which interface with SCSI buses that connect to the hosts and the disk drives. Ex. 1004, 9, 21, 24, 32. Second, the HP Journal discusses the Tachyon FC controller chip, which enables interfacing with a high-speed FC connection. Ex. 1006, 101, 111. The HP Journal further discloses that the Tachyon controller is designed to be compatible with SCSI commands as

⁸ Although Crossroads disputed whether Petitioners articulated a sufficient reason to combine the references in its Preliminary Response, it waived this argument by not including it in its Patent Owner Response.

well. *Id.* at 101. Based on these disclosures and the testimony of their proffered expert, Dr. Andrew Hospodor (Ex. 1003), Petitioners argue a person of ordinary skill would have been taught to replace the SCSI technology of the CRD Manual I/O modules with the FC controller chip and FC interconnects of the HP Journal to arrive at the recited FC controllers and FC transport media of claim 1. Pet. 24–26 (citing Ex. 1003 ¶¶ 53–62).⁹

Next, the Petition identifies the central processor, system circuitry, and firmware disclosed in the CRD Manual as teaching the recited “supervisor unit.” Pet. 26 (citing Ex. 1004, 9, 11, 40, 53, Fig. 2-1). Further, according to Petitioners, the combination of the CRD Manual and the HP Journal teaches “process[ing] data in the buffer to interface between the first Fibre Channel controller and the second Fibre Channel controller to allow access from Fibre Channel initiator devices to the remote storage devices using native low level, block protocol in accordance with the configuration,” as recited in claim 1. Pet. 28–29 (citing Ex. 1003, 56–59). Specifically, Petitioners note that the CRD Manual discloses host computers (initiator devices) writing data to disk drives (remote storage devices) via an onboard cache (buffer) using a SCSI interface. *Id.*; Ex. 1004, 9, 12, 24–25. As the ’147 patent discloses, SCSI is an example of a “native low level, block protocol” within the meaning of the claims. *See* Ex. 1001, 5:13–17, 5:46–50. In addition, Petitioners rely on the HP Journal’s discussion of using

⁹ Crossroads argues that Dr. Hospodor’s testimony should be accorded “diminished” weight due to his alleged bias and certain deposition testimony that Crossroads believes undermines his credibility. PO Resp. 55–58. All of these considerations were taken into account, and Dr. Hospodor’s testimony was accorded the weight appropriate in light of the full record. Further, we determine that Dr. Hospodor was a credible witness overall, despite the issues identified by Crossroads, because his testimony generally was supported by the record as explained in this Decision.

encapsulated SCSI commands over an FC link through the Tachyon FC controller (Ex. 1006, 101), arguing these disclosures would have taught a person of ordinary skill to process data from host computers via an onboard cache to access (e.g., write data to) storage drives using encapsulated SCSI commands over an FC network. Pet. 28–29.

As to the requirement that the supervisor unit be operable to “maintain a configuration . . . that maps between the device and the remote storage devices,” Petitioners rely on the CRD Manual’s discussion of a host LUN (Logical Unit Number) mapping feature. *Id.* at 26–27. Specifically, the CRD Manual describes a feature of its Monitor Utility used to “map LUNs on each host channel to a particular redundancy group.” Ex. 1004, 44. A host channel corresponds to an I/O module, which is assigned to a host. *Id.* Each host channel has multiple LUNs, each of which can be mapped to a specific redundancy group. *Id.* Redundancy groups may be one or more disk drives, or partitions thereof. *Id.* at 19. Thus, Petitioners assert the CRD Manual teaches that the Monitor Utility maintains host LUN mapping settings that map a host on a host channel (the recited “device”) and redundancy groups (the recited “remote storage devices”). Pet. 26–27 (citing Ex. 1003 ¶¶ 51–55).

Finally, Petitioners contend the CRD Manual teaches the “access controls” limitation as well. *Id.* at 27–28. Specifically, Petitioners identify the CRD Manual’s discussion of using host LUN mapping settings to make certain redundancy groups available to certain host channels while blocking access to other host channels. *Id.* (citing Ex. 1004, 44).

Based on the full record after trial, we find that the record supports the conclusion that the combination of the CRD Manual and the HP Journal teaches or suggests each limitation of claim 1 of the ’147 patent, as set forth

in Petitioners’ analysis explained above. Patent Owner’s counterarguments are unpersuasive.

First, Patent Owner argues the asserted combination does not teach the “maps between” limitation of claim 1. PO Resp. 24–33; *see also id.* at 14–23 (arguing the CRD Manual fails to teach mapping). According to Patent Owner, the CRD Manual fails to teach the recited mapping because the host LUN mapping feature only maps storage devices to host *channels*, not the specific hosts themselves. *Id.* at 14–16, 25–28 (citing Ex. 2027 ¶¶ 51–54, 61– 66, 73, 81, 82). This argument, however, relies on the overly narrow claim construction rejected above, and is unpersuasive as a result. For example, Patent Owner addresses Figure 1-2 of the CRD Manual, which is reproduced below:

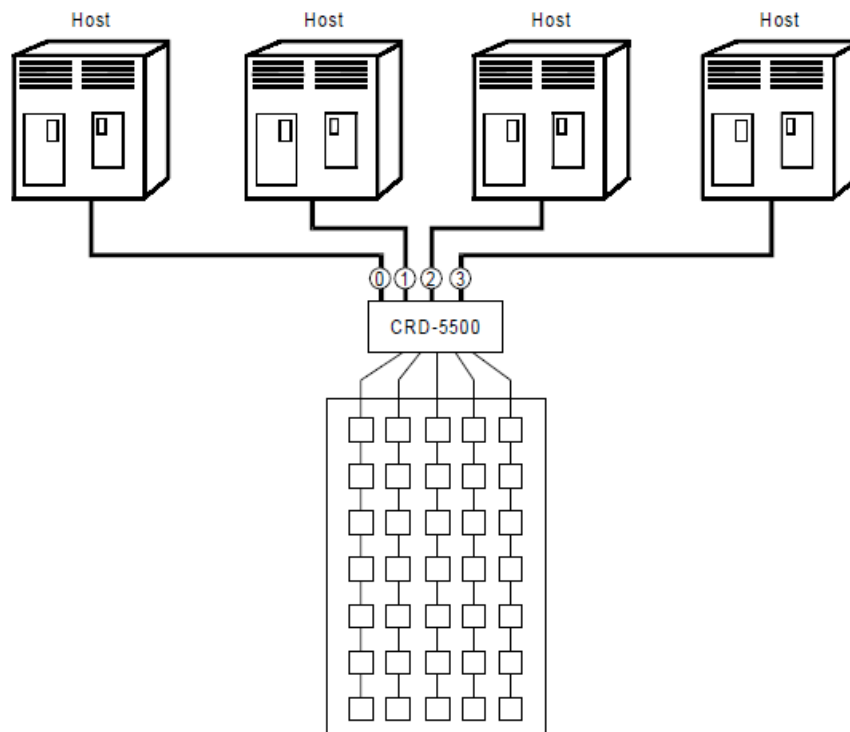


Figure 1-2 of the CRD Manual depicts a configuration of the CRD-5500 controller where each of four different hosts is assigned to a different

channel, i.e., channel 0 through channel 3. Ex. 1004, 10. These hosts may then access redundancy groups via the CRD-5500 controller. *Id.*

Although the host LUN mapping feature disclosed in the CRD Manual maps redundancy groups to host channels, the specific configuration depicted in Figure 1-2 meets the mapping limitation because each host channel is dedicated to a single host—thus, in effect, mapping to a host channel is tantamount to mapping to a particular host. *See* Pet. Reply 12–13. In recognition of this fact, the CRD Manual explicitly refers to mapping to hosts and host channels interchangeably, which Patent Owner acknowledges at least with respect to Figure 1-2. *See* Ex. 1004, 9; PO Resp. 30–31; Pet. Reply 11. The analysis presented by Patent Owner regarding other configurations *different* from that in Figure 1-2—i.e., configurations where two hosts are connected to the same host channel (PO Resp. 21–22, 31)—does not cancel or negate the configuration disclosed by Figure 1-2. Similarly, whether the Figure 1-2 configuration would teach the mapping limitation *if it were hypothetically altered* is irrelevant. *See* PO Resp. 20–21. As discussed above, the broadest reasonable interpretation of the mapping limitation is not limited only to mapping directly and immutably to a specific host device, and does not exclude categorically the use of intermediate identifiers. Consequently, Patent Owner has not shown persuasively why the configuration disclosed in the CRD Manual falls outside the scope of the claim language.

Patent Owner additionally contends that the CRD Manual fails to teach the access controls limitation of claim 1. *Id.* at 33–38. Similar to its arguments relating to the mapping limitation, Patent Owner purports to show how the redundancy group access controls of the CRD Manual can be defeated by changing the disclosed configuration in Figure 1-2, i.e., by

rewiring the hosts such that multiple hosts are connected to the same host channel. *Id.* at 36–38. Patent Owner has not persuasively demonstrated, however, that the purported inadequacy of the access control method disclosed for the Figure 1-2 configuration, when directly applied to a *different* configuration, shows that the CRD Manual fails to teach implementing access controls at least for the configuration of Figure 1-2.

Although Patent Owner argues that Petitioners rely on such a configuration because they propose combining the CRD Manual with the HP Journal, Patent Owner inaccurately characterizes Petitioners' contentions as bodily incorporating only one aspect of the HP Journal's teachings—placing all hosts on a single FC arbitrated loop—while ignoring the HP Journal's other teachings regarding implementing such FC loops. *See* PO Resp. 34–36; *see also In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.”). As noted in the Petition (Pet. 20), the HP Journal provides detailed disclosures on the implementation of FC arbitrated loops, including configurations with multiple host devices. *See* Ex. 1006, 100–111. The record as a whole supports Petitioners' contention that a person of ordinary skill would have been able to combine the teachings of the CRD Manual and the HP Journal to arrive at a system utilizing FC loops, which maps redundancy groups to particular hosts and implements access controls as taught by the CRD Manual, but applying FC addressing capabilities taught by the HP Journal in

lieu of the host channel-based implementation of the CRD Manual. *See* Ex. 1003 ¶¶ 55–61.

Lastly, Patent Owner argues the asserted prior art fails to teach that the data in the CRD Manual’s onboard cache is processed “to allow access from Fibre Channel initiator devices to the remote storage devices,” as recited in claim 1, because the host already has access when that data is processed. PO Resp. 39. Thus, Patent Owner appears to argue that the data in the cache must be processed as part of determining whether access can be granted in the first place. Patent Owner does not, however, explain why the claim should be construed in that manner. The data in the CRD Manual’s onboard cache is written to the target storage device once it is processed, which Patent Owner does not dispute. *See* Ex. 1004, 12. As discussed above, Petitioners’ contention that writing to a storage device teaches allowing access to those devices is persuasive based on the record, and we are not persuaded that Patent Owner’s position is commensurate with the full scope of the claim language.

In sum, based on the full record after trial, we find that a preponderance of the evidence supports Petitioners’ contention that the combination of the CRD Manual and the HP Journal teaches or suggests each limitation of claim 1 of the ’147 patent.

5. *Claims 2–5*

Claims 2–5 depend, directly or indirectly, from claim 1. Petitioners presented evidence and argument to support their contention that the combination of the CRD Manual and the HP Journal teaches each limitation of these dependent claims. Pet. 30–34. We agree that the cited evidence teaches or suggests the limitations of these claims. For example, Petitioners rely on the redundancy groups of the CRD Manual as teaching the “subsets

of storage space” recited in claim 2, and identify the host LUN mapping and access control features in the CRD Manual as teaching allocating those subsets to associated devices such that each subset is only accessible by the associated device. *Id.* at 30–31. The Petition identifies portions of both the CRD Manual and the HP Journal that describe workstations, including workstations in an FC loop, as teaching FC devices comprising workstations, as recited in claim 3. *Id.* at 31. With respect to claim 4, Petitioners rely on the CRD Manual as disclosing disk drives as storage devices. *Id.* at 32. Further, Petitioners rely on the HP Journal’s discussion of an FC frame manager, FIFO queues, and inbound/outbound block movers, as teaching the FC protocol unit, first-in-first-out queue, and DMA interface limitations of claim 5. *Id.* at 32–34. We find Petitioners’ contentions persuasive and supported by the record.

In response, Patent Owner argues that the asserted prior art does not teach the limitations of claim 2 because it contends, as it did for claim 1, that the CRD Manual teaches associating storage devices (or subsets thereof) with host channels and not host devices directly. *See* PO Resp. 39–40. Patent Owner did not present other arguments specifically directed to claims 2–5. *See id.* For the same reasons as discussed above for claim 1, this argument is unpersuasive.

Based on the full record after trial, a preponderance of the evidence supports Petitioners’ contention that the combination of the CRD Manual and the HP Journal teaches or suggests each limitation of claims 2–5 of the ’147 patent.

6. *Claims 6–39*

The limitations recited in independent claim 6 are very similar to those of claims 1 and 3, and both parties rely on essentially the same

arguments¹⁰ with respect to those limitations as for claims 1 and 3. *See* Pet. 34–38; PO Resp. 40–43. Claim 6 requires explicitly that the storage router map between a “plurality of workstations” and a “plurality of storage devices.” As discussed above for claims 1 and 3, Petitioners established sufficiently that the combination of the CRD Manual and the HP Journal teach multiple workstations and multiple storage devices (e.g., multiple disk drives), as well as mapping between them, and Petitioners advance the same arguments and evidence for claim 6 (Pet. 35–37). For reasons similar to those discussed above with respect to claims 1 and 3, we find the full record after trial supports Petitioners’ contention that the asserted prior art teaches each limitation of claim 6.

Claims 7–9 depend, directly or indirectly, from claim 6 and recite limitations similar to those recited in claim 1 and its dependent claims. For example, claims 7 and 8 recite the same limitations as claims 2 and 4, respectively. Both parties rely on essentially the same arguments as those discussed above for the previous claims. *See* Pet. 38–41; PO Resp. 43–44. For reasons similar to those discussed above for the previous claims, we find the full record after trial supports Petitioners’ contention that the asserted prior art teaches each limitation of claims 7–9.

¹⁰ Crossroads also argues in a footnote that it “strenuously disagrees that the [CRD Manual] discloses a storage network.” PO Resp. 40 n.8. This contention is not explained, nor is any evidentiary support cited except three paragraphs of Dr. Levy’s Declaration. *Id.* This conclusory statement is insufficient and, to the extent it seeks to incorporate by reference the explanations provided in the Levy Declaration, is contrary to 37 C.F.R. § 42.6(a)(3). Thus, the argument was not considered. Further, even were it considered, it is unpersuasive, and we find Dr. Hospodor’s testimony more credible on this issue. *See* Ex. 1003, 73–74.

Each of the remaining independent claims (claims 10, 14, 21, 28, and 34), as well as most of their dependent claims (claims 11–13, 18–20, 25–27, 32, 33, and 37–39) recite limitations similar to those recited in previous claims discussed above. For example, claims 11–13 recite limitations substantially the same as those of claims 2–4, and the limitations of claim 28 are substantially the same as limitations recited in claim 1. The parties advance similar arguments and evidence with respect to these claims as for those previous claims. *See* Pet. 41–46, 49–60; PO Resp. 44–47, 49–50. For similar reasons as discussed above, we find the full record after trial supports Petitioners’ contention that the asserted prior art teaches each limitation of claims 10–14, 18–21, 25–28, 32, 33, and 37–39.

Claims 15–17 recite additional limitations relating to “virtual LUNs that provide a representation of the storage device,” “mapping from a host device ID to a virtual LUN representation of the remote storage device to a physical LUN of the remote storage device,” and exposing the (host) device to only “LUNs that the device may access.” The remaining claims (claims 22–24, 29–31, 35, and 36) recite essentially the same limitations.

Petitioners contend the CRD Manual’s description of its host LUN mapping feature teaches these limitations. Pet. 46–49. Specifically, Petitioners focus on the table depicted on page 44 of the CRD Manual, which is reproduced below:

Monitor Utility
HOST LUN MAPPING
Channel 0

02-09-96
13:14:00

Host LUN	Redundancy Group	Host LUN	Redundancy Group
0	0	16	16
1	1	17	17
2	-	18	18
3	-	19	19
4	5	20	20
5	-	21	21
6	6	22	22
7	7	23	23
8	8	24	24
9	9	25	25
10	10	26	26
11	11	27	27
12	12	28	28
13	13	29	29
14	14	30	30
15	15	31	31

ARROW KEYS: MOVE CURSOR | N: NEXT CH | P: PREV CH | ENTER: SELECT | CTRL-Z: EXIT

This table shows the host LUN mapping settings for host channel 0.

Ex. 1004, 44. Host LUNs 0 through 31 for channel 0 are shown, some of which are assigned to particular redundancy groups (e.g., LUN 4 is assigned to redundancy group 5). *Id.*

According to Petitioners, the host channel number corresponds to the recited “host device ID,” the host LUNs correspond to the recited “virtual LUNs,” and each redundancy group number corresponds to the recited “physical LUN.” Pet. 47–49. Thus, Petitioners assert the above table from the CRD Manual teaches mapping from the host channel number (“host device ID”) to a LUN (“virtual LUN representation of the remote storage device”) to a particular redundancy group number (“physical LUN of the remote storage device”). *Id.* at 48–49. Further, Petitioners contend the CRD Manual teaches exposing a host device (via a specific host channel assigned to a particular host) to only the LUNs it may access by describing that particular redundancy groups can be hidden from particular host channels. *Id.* at 48 (citing Ex. 1004, 44). We find Petitioners’ arguments regarding these claims to be persuasive and supported by the record.

The counterarguments advanced by Patent Owner essentially are the same as its arguments for claim 1. Patent Owner maintains that the CRD Manual fails to disclose a host device ID because the host channel is the ID of a slot where a host may be connected, not an ID of the host itself. PO Resp. 48. Thus, according to Patent Owner, the CRD Manual fails to disclose mapping from a host device ID as well. *Id.* Similar to Patent Owner's position regarding the "maps between" limitation of claim 1, Patent Owner does not provide a persuasive justification for construing the claims narrowly to exclude mapping to host channel numbers that are dedicated to individual host devices, as shown in Figure 1-2 of the CRD Manual.

In sum, based on the full record after trial, we find that a preponderance of the evidence supports Petitioners' contention that the combination of the CRD Manual and the HP Journal teaches each limitation of claims 6–39 of the '147 patent.

7. *Secondary Considerations of Non-Obviousness*

Secondary considerations based on objective evidence of non-obviousness, if present, must be considered in an obvious determination. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Notwithstanding what the teachings of the prior art would have suggested to one of ordinary skill in the art at the time of the invention, the totality of the evidence submitted, including objective evidence of non-obviousness, may lead to a conclusion that the challenged claims would not have been obvious to one of ordinary skill. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984).

To be relevant, evidence of non-obviousness must be commensurate in scope with the claimed invention. *In re Huai-Hung Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011) (citing *In re Tiffin*, 448 F.2d 791, 792 (CCPA 1971)); *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998). In that regard,

there must be a nexus between the merits of the claimed invention and the evidence of secondary considerations for that evidence to be accorded substantial weight. *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). “Nexus” is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in determining non-obviousness. *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988). The burden of producing evidence showing a nexus lies with the patent owner. *Id.*; *Prometheus Labs, Inc. v. Roxane Labs, Inc.*, 805 F.3d 1092, 1101–02 (Fed. Cir. 2015).

Here, Patent Owner alleges that such secondary considerations include long-felt but unmet need, commercial success, and licensing. PO Resp. 51–55. As explained below, Patent Owner has not established sufficiently that the record supports its allegations.

a. Long-Felt Need

Patent Owner’s evidence of alleged long-felt need includes selected quotes from an article by an expert purportedly used by Petitioners in a co-pending lawsuit, and citations to testimony by the same expert to the effect that “before Crossroads’ invention, there was no such thing as a storage router and that the term ‘storage router’ did not exist.” PO Resp. 51–52 (citing Ex. 2038, 14; Ex. 2029, 103:18–24, 104:15–105:1, 136:6–14).

“Establishing long-felt need requires objective evidence that an art-recognized problem existed in the art for a long period of time without solution.” *Ex parte Jellá*, 90 USPQ2d 1009, 1019 (BPAI 2008) (precedential). The evidence presented is insufficient to establish such a long-felt need. The cited testimony is directed to whether the term “storage router” was used in the art in the late 1990s. *See, e.g.*, Ex. 2029, 104:24–

105:1. It does not address what the needs or problems of the art were at that time. The article cited by Patent Owner (Ex. 2038), which suggests that a problem might have existed in file system performance generally, nevertheless also does not establish that there was long-felt need for the claimed invention. As Petitioners note (Pet. Reply 25), Patent Owner has presented no evidence as to how long this problem had been recognized, the extent of the problem, whether it remained unresolved at the time of the invention, or whether the invention resolved this need. *See Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1332–33 (Fed. Cir. 2009). As a result, Patent Owner has not established adequately a long-felt but unmet need for its claimed invention.

b. Commercial Success

Patent Owner submits evidence of the number of products it has sold, revenue from those sales, and the relative sales of its various products, as allegedly demonstrating the commercial success of the claimed invention. PO Resp. 48–52 (citing Ex. 2043; Ex. 2044). In particular, it identifies the relative sales of certain products where two versions were sold, one with “access controls” and one without them, as allegedly establishing a nexus between their commercial success and the claimed invention of the ’147 patent. *Id.* (citing Ex. 2043 ¶¶ 2–6; Ex. 2044).

Evidence of commercial success “is only significant if there is a nexus between the claimed invention and the commercial success.” *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1311–12 (Fed. Cir. 2006). To establish a proper nexus between a claimed invention and the commercial success of a product, a patent owner must offer “proof that the sales [of the allegedly successful product] were a direct result of the unique characteristics of the claimed invention—as opposed to other economic and commercial factors

unrelated to the quality of the patented subject matter.” *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996).

As a threshold matter, Patent Owner has not established a sufficient nexus between its commercial product and the features of its claimed invention. Patent Owner has not shown that the items listed in Exhibit 2044 embody the claimed invention, or that sales of the listed products resulted from novel, non-obvious features of the claimed invention rather than other features. *See Ormco Corp.*, 463 F.3d at 1312–13 (evidence did not show that commercial success was due to claimed and novel features). The statements by Patent Owner’s declarant that certain products include “mapping” or “access controls” (Ex. 2043 ¶¶ 5–6) are insufficient to show commercial success of the claimed invention. Petitioners also identify evidence indicating that factors other than the claimed features contributed to the commercial performance of Patent Owner’s products. Pet. Reply 23–24 (citing, e.g., Ex. 1102, 4–6; Ex. 1105, 89:4–17, 91:7–12, 96:5–102:24, 127:9–20, 136:20–138:24).

Even if Patent Owner had established a nexus between its marketed technology and the invention claimed in the ’147 patent, its commercial success argument would not be persuasive. An important component of the commercial success inquiry is determining market share associated with the alleged success, relative to all competing products. *In re Applied Materials, Inc.*, 692 F.3d 1289, 1300 (Fed. Cir. 2012). Even sales volume, if provided without market share information, is only weak evidence, if any, of commercial success. *Id.* at 1299. As Petitioners assert (Pet. Reply 23), the fact that Patent Owner sold a certain number of these devices and that they made up a certain share of its own sales is insufficient to establish

commercial success without some context about the larger market. *See In re Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991).

c. Licensing

Patent Owner also presents evidence relating to licensing of its patents, including the '147 patent. PO Resp. 54–55. Specifically, Patent Owner argues that “a large number of licensees have taken licenses directed specifically to Crossroads’ ’972 patent family.” PO Resp. 54. Patent Owner submits that “[t]he total license payments through FY2014 are over \$60 million” and that “[p]rominent members of the industry have paid millions of dollars to Crossroads in exchange for a license.” *Id.* Patent Owner concludes that because these companies were willing to pay millions of dollars to license the invention claimed in the '972 patent family, the claims are not obvious. *Id.*

“While licenses can sometimes tilt in favor of validity in close cases, they cannot by themselves overcome a convincing case of invalidity without showing a clear nexus to the claimed invention.” *ABT Sys., LLC v. Emerson Elec. Co.*, 797 F.3d 1350, 1361–62 (Fed. Cir. 2015); *see also Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1324 (Fed. Cir. 2004) (“Our cases specifically require affirmative evidence of nexus where the evidence of commercial success presented is a license, because it is often ‘cheaper to take licenses than to defend infringement suits.’”); *SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 225 F.3d 1349, 1358 (Fed. Cir. 2000) (“[T]he mere existence of these licenses is insufficient to overcome the conclusion of obviousness, as based on the express teachings in the prior art that would have motivated one of ordinary skill to modify [other prior art].”). In *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907–08 (Fed. Cir. 1985), the Federal Circuit stated that such licensing programs “are not infallible guides

to patentability,” noting that their success may be due to mutual benefits, “business judgments that it is cheaper to take licenses than to defend infringement suits,” or “for other reasons unrelated to the unobviousness of the licensed subject matter.”

Here, we lack sufficient information about the circumstances surrounding these licenses to be able to assess whether they truly weigh in favor of non-obviousness. Patent Owner directs us to no testimony from any licensee regarding why the licensee took a license from Patent Owner. It is unknown how much of the decision to take a license stems from a business cost-benefit analysis with regard to defending an infringement suit or from another business reason, rather than from acknowledged merits of the claimed invention. Patent Owner does not provide any information about how many entities refused to take a license, or why they refused.

In addition, as Patent Owner admits, these licenses are directed to an entire family of patents. PO Resp. 54; Pet. Reply 24. Without more evidence, we are unable to determine whether the claimed subject matter of the ’147 patent was the motivator for these licensees to take their licenses. *See* Pet. Reply 24. Given these circumstances, Patent Owner has failed to establish an adequate nexus between the claimed invention of the ’147 patent and the licenses. Thus, we find Patent Owner’s evidence of licensing does not weigh in favor of non-obviousness.

8. *Conclusion as to Asserted Ground of Unpatentability*

For the reasons discussed above and based on the full record after trial, we conclude Petitioners have established by a preponderance of the evidence that claims 1–39 are unpatentable under § 103 in view of the combination of the CRD Manual and the HP Journal. The relatively weak secondary evidence of non-obviousness, diminished further by Patent

Owner's failure to show an adequate nexus to the claimed invention, is insufficient to overcome the relatively strong evidence of obviousness presented by Petitioner. *See Ohio Willow Wood Co. v. Alps South, LLC*, 735 F.3d 1333, 1344 (Fed. Cir. 2013) (requisite nexus between secondary indicia and invention must be shown for evidence to be accorded substantial weight, and where a claimed invention represents no more than the predictable use of prior art elements according to established functions, evidence of secondary indicia is often inadequate to establish non-obviousness).

C. Patent Owner's Motion to Exclude

Patent Owner moves to exclude certain portions of Exhibit 1025, the deposition testimony of its expert, Dr. Levy, under Federal Rule of Evidence 403. Paper 38, 1–8. According to Patent Owner, the testimony in question “was obtained pursuant to objectionable questioning and/or mischaracterizes his testimony.” *Id.* at 1. In the alternative, Patent Owner requests that we consider additional portions of Dr. Levy's testimony pursuant to the Rule of Completeness (Fed. R. Evid. 106). *Id.* at 6, 8.

Petitioners respond that these objections were not preserved, that the Rule of Completeness is inapplicable to these proceedings because the entirety of the transcript of Dr. Levy's deposition is part of the record, that these objections go to the weight that should be given the evidence not its admissibility, and that Patent Owner's allegations of mischaracterizations are baseless. Paper 42, 1–12.

We agree with Petitioners that Patent Owner's objections go to the weight that should be given the evidence, not its admissibility. Moreover, as the entirety of Dr. Levy's deposition is in the record of this proceeding, we have considered the additional passages of Dr. Levy's testimony that Patent

Owner identifies, as well as the rest of his testimony. Accordingly, Patent Owner's Motion to Exclude is *denied*.

D. Patent Owner's Motion to Seal

Patent Owner filed several exhibits (Exhibits 2040, 2042, 2044, and 2045) under seal, along with a Motion to Seal (Paper 18) and a proposed protective order (Paper 19). We previously granted Patent Owner's motion for entry of the protective order. Paper 39. Petitioners oppose Patent Owner's Motion to Seal. Paper 23. Patent Owner filed a reply. Paper 27. For the reasons discussed below, Patent Owner's Motion to Seal is *granted*.

Petitioners argue that there is a strong public interest in unsealing these exhibits because they are a critical part of the substantive basis of Patent Owner's patentability arguments. Paper 23, 2–5. However, we did not see any need to rely on any of these exhibits in this Decision. We have reviewed the exhibits at issue and agree with Patent Owner that they contain confidential sales and licensing information. Given the sensitive nature of this information and the fact that we did not rely on it in rendering our Decision, we agree with Patent Owner that good cause has been shown to seal the information.

However, we note that confidential information 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 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 process 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).

CONCLUSION

For the foregoing reasons, Petitioners have shown by a preponderance of the evidence that claims 1–39 of the '147 patent are unpatentable under 35 U.S.C. § 103(a).

ORDER

It is

ORDERED that claims 1–39 of the '147 patent are held unpatentable under 35 U.S.C. § 103(a);

FURTHER ORDERED that Patent Owner's Motion to Exclude Evidence (Paper 38) is denied;

FURTHER ORDERED that Patent Owner's Motion to Seal (Paper 18) is granted;

FURTHER ORDERED that the information sealed during this *inter partes* review remain under seal, and the record preserved, until the time period for filing a notice of appeal of this Decision has expired or, if an appeal is taken, the appeal process has concluded; and

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

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