

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner,

v.

LIONRA TECHNOLOGIES LTD.,
Patent Owner.

IPR2023-00537
Patent 7,916,630 B2

Before PATRICK R. SCANLON, JO-ANNE M. KOKOSKI, and
STEVEN M. AMUNDSON, *Administrative Patent Judges*.

AMUNDSON, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Cisco Systems, Inc. (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–12, 14, and 15 in U.S. Patent No. 7,916,630 B2 (Exhibit 1001, “the ’630 patent”) under 35 U.S.C. §§ 311–319. Paper 2 (“Pet.”). Lionra Technologies Ltd. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). No further briefing was requested or authorized.

Under 37 C.F.R. § 42.4(a), we have authority to determine whether to institute an *inter partes* review. We may institute an *inter partes* review only if “the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018). The “reasonable likelihood” standard is “a higher standard than mere notice pleading” but “lower than the ‘preponderance’ standard to prevail in a final written decision.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential).

Based on the current record and for the reasons explained below, Petitioner has shown that there is a reasonable likelihood that it would prevail with respect to at least one of the challenged claims. Thus, we institute an *inter partes* review of claims 1–12, 14, and 15 in the ’630 patent on all challenges included in the Petition.

II. BACKGROUND

A. Real Parties in Interest

Petitioner identifies itself as the real party in interest. Pet. 50. Patent Owner identifies itself as the real party in interest. Paper 3, 2. The parties do not raise any issue about real parties in interest.

B. Related Matters

Petitioner and Patent Owner identify the following civil actions as related matters involving the '630 patent:

- *Lionra Technologies Ltd. v. Cisco Systems, Inc.*, No. 2:22-cv-00305 (E.D. Tex. filed Aug. 8, 2022); and
- *Lionra Technologies Ltd. v. Hewlett Packard Enterprise Co. et al.*, No. 2:22-cv-000319 (E.D. Tex. filed Aug. 19, 2022).

Pet. 50; Paper 3, 2; Prelim. Resp. 3–4.

Patent Owner explains that the above-identified civil actions were consolidated with the following civil actions in the Eastern District of Texas:

- *Lionra Technologies Ltd. v. Fortinet, Inc.*, No. 2:22-cv-00322 (E.D. Tex. filed Aug. 19, 2022) (the “lead Texas case”); and
- *Lionra Technologies Ltd. v. Palo Alto Networks, Inc.*, No. 2:22-cv-000334 (E.D. Tex. filed Aug. 29, 2022).

Prelim. Resp. 3; *see* Ex. 2001 (Order Consolidating Cases).

C. The '630 Patent (Exhibit 1001)

The '630 patent, titled “Monitoring Condition of Network with Distributed Components,” issued on March 29, 2011, from an application filed on June 17, 2005. Ex. 1001, codes (22), (45), (54). The patent claims priority to a German patent application filed on September 16, 2004. *Id.* at 1:7–8, code (30). The patent states that the disclosure “relates to the

monitoring and/or checking” of “a system condition of a system with distributed components” known as a distributed system. *Id.* at 1:14–18; *see id.* at code (57). As examples of distributed systems, the patent identifies “mobile or stationary radio and/or communication networks.” *Id.* at 1:18–20; *see id.* at 2:38–40, 4:33–40.

The ’630 patent explains that “there is as a rule a requirement for all the components of the distributed system to have a knowledge of the status or condition of every other component in the system.” Ex. 1001, 1:20–23. For example, if “a component in a distributed system fails” or “becomes inoperative and/or offline, then it is advantageous for every other component in the system to receive this information.” *Id.* at 1:24–27.

The ’630 patent describes a prior-art approach “for monitoring a system condition of a distributed system” where “the monitoring is implemented by a so-called Ping-Pong mechanism using so-called Ping-Pong messages.” Ex. 1001, 1:28–30. In that prior-art approach, “each component of the distributed system sends every other component of the system a Ping message” and “receives (back) corresponding Pong responses when the other components in question are in an operative or online condition.” *Id.* at 1:53–57. If “there is no Pong response from a component being monitored, then this component will be classified, by the component sending the Ping message” as inoperative or offline. *Id.* at 1:38–41.

The '630 patent's Figure 3 (reproduced below) depicts a distributed system implementing a Ping-Pong mechanism:

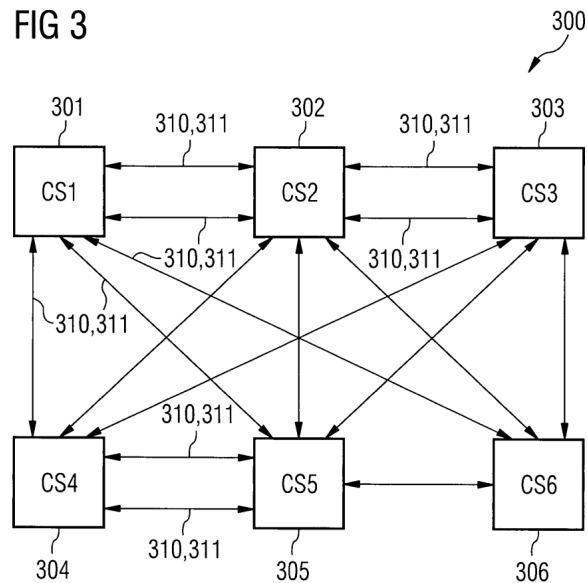


Figure 3 illustrates distributed system 300 with “a plurality of communication servers 301 to 306” associated in a communication network where “each component monitors every other component of the system.” Ex. 1001, 1:58–62, 4:57–59, Fig. 3. Specifically, each communication server “sends a Ping message 310 to each of the other communication servers 301 to 306” and “receives corresponding Pong responses 311 when the other communication servers 301 to 306 in question are in an operative or online condition.” *Id.* at 1:64–2:3.

The '630 patent identifies disadvantages of a Ping-Pong mechanism. Ex. 1001, 2:4–28. For example, “a high message volume is generated,” and the high message volume may “restrict the power or capacity and/or the error detection capability/speed of the system.” *Id.* at 2:4–9.

The '630 patent endeavors to overcome the disadvantages of a Ping-Pong mechanism by providing a method that “simplifies monitoring of a system condition of a distributed system and/or implements or enables this

with a reduced resource requirement.” Ex. 1001, 2:32–35. Specifically, “the distributed components of the system” are “organized in a logical ring structure.” *Id.* at 2:36–39; *see id.* at 2:62–64, 3:4–6. The logical ring structure constitutes a “conceptual model” or “virtual ring structure” that does not restrict the “physical concrete structuring of the system components.” *Id.* at 2:40–45.

Additionally, each system component “monitors only its respective neighboring component in the logical ring structure, whereby a condition of the neighboring component is determined.” Ex. 1001, 2:46–48; *see id.* at 2:65–67, 3:6–11. The monitored neighboring component “can be a predecessor or also a successor in the logical ring structure.” *Id.* at 4:30–32. If “a component determines a condition of its neighboring component” that corresponds to a determined, predefined condition, “then it informs the other components of the system about the determined, predefined condition of its neighboring component.” *Id.* at 2:49–53; *see id.* at 2:67–3:3, 3:12–16.

The ’630 patent’s Figure 1 (reproduced below) depicts a distributed system organized in a logical ring structure:

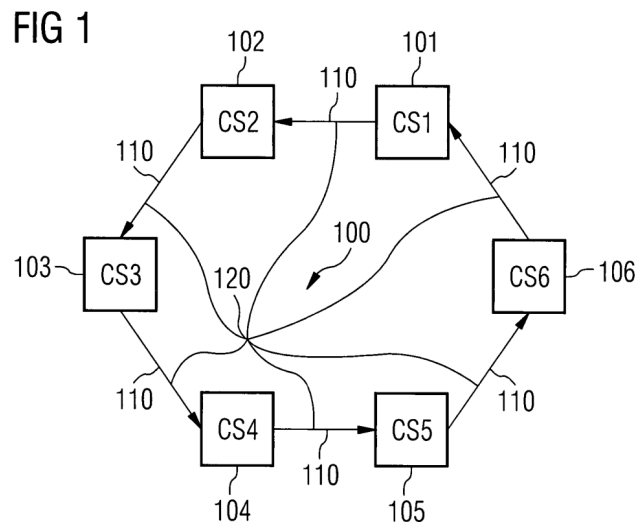


Figure 1 illustrates distributed system 100 with “a plurality of communication servers 101 to 106” associated in a communication network and organized in a logical ring structure where “each component only monitors its respective neighbor in the ring.” Ex. 1001, 4:48–50, 5:1–4, Fig. 1.

As Figure 1 shows, communication servers 101 to 106 are “organized in a logical ring structure 120” such that “102 follows 103, 101 follows 102, 106 follows 101, 105 follows 106, 104 follows 105, [and] 103 follows 104.” Ex. 1001, 5:12–17, Fig. 1. Each “communication server 101 to 106 then monitors only its respective successor in the ring structure 120 (102 monitors successor 101; 103 monitors successor 102; . . .).” *Id.* at 5:18–21 (ellipsis in original). In “the event of failure,” a monitoring communication server “informs all the other communication servers about” the failure. *Id.* at 5:22–25.

The ’630 patent’s Figure 2 (reproduced below) depicts a distributed system organized in a logical ring structure where one component has failed:

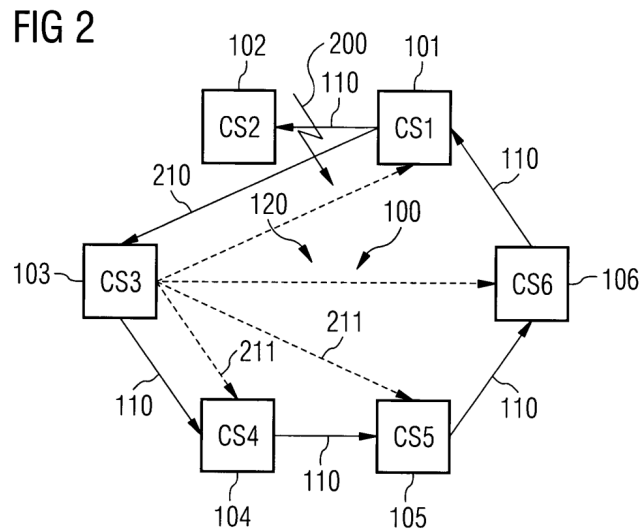


Figure 2 illustrates distributed system 100 with “a plurality of communication servers 101 to 106” where communication server 102 has

failed (as indicated by reference numeral 200). Ex. 1001, 4:52–55, 5:1–4, 5:22–23, Fig. 2. Communication server 103 “informs all the other communication servers about” the failure of communication server 102 by sending information messages 211 concurrently to the other communication servers. *Id.* at 5:22–25, 5:38–42.

The ’630 patent explains that the term “alive” has become widely accepted to denote “a functional capacity, in particular an online condition,” compared to “a functional incapacity, in particular an offline condition.” Ex. 1001, 3:38–42. The patent also explains that monitoring a neighboring component preferably occurs based on a “leasing” method. *Id.* at 3:43–46; *see id.* at 5:26–29. In a preferable “leasing” method, a neighboring component periodically sends an “Alive” message to a monitoring component. *Id.* at 3:46–53; *see id.* at 5:58–60.

If the monitoring component receives an “Alive” message from the neighboring component before the “lease” expires, the monitoring component categorizes the neighboring component as having a current condition of “online.” Ex. 1001, 3:58–61, 5:30–33. But if the monitoring component does not receive an “Alive” message from the neighboring component before the “lease” expires, the monitoring component categorizes the neighboring component as having a current condition of “offline.” *Id.* at 3:54–58, 5:34–37.

Preferably, a monitoring component informs all other components about a predefined condition of a neighboring component using an “Inform All” method to communicate concurrently with all other components. Ex. 1001, 3:62–65. For instance, Figure 2 shows communication server 103 sending information messages 211 concurrently to communication

servers 101, 104, 105, and 106 to inform communication servers 101, 104, 105, and 106 that communication server 102 has failed. *Id.* at 5:38–42, Fig. 2.

Preferably, an “acknowledgment process is performed for each other component” when it receives information from a monitoring component about the predefined condition of a neighboring component. Ex. 1001, 3:66–4:4. Specifically, in response to an “Inform All” communication from a monitoring component, a receiving component sends an “Acknowledgment” message. *Id.* at 3:66–4:6, 4:9–13, 5:43–45.

Further, if the monitoring component does not receive an “Acknowledgment” message from another component in response to an “Inform All” communication, the monitoring component may categorize the nonresponding component as “offline.” Ex. 1001, 4:14–18, 5:46–48. Additionally, the monitoring component may send another “Inform All” communication to inform the other components about the nonresponding component. *Id.* at 4:19–21, 5:49–50, 5:53.

D. The Challenged Claims

Petitioner challenges the following claims:

- independent claim 1 for a method for monitoring a system condition of a network;
- claims 2–12 that depend directly or indirectly from claim 1;
- independent claim 14 for a non-transitory computer-readable medium; and
- independent claim 15 for a network.

Pet. 6, 17–43.

Claims 1 and 15 exemplify the challenged claims and read as follows (with formatting added for clarity and with bracketed numbers added for reference purposes):¹

1. [1.0] A method for monitoring a system condition of a network with distributed components organized in a logical ring structure, comprising:

[1.1] each component in the system monitoring only a single respective neighboring component among said distributed components that is a predecessor or successor of said each component in the logical ring structure to determine a current condition of the respective neighboring component; and

[1.2] each component in the system informing all other components of the system about the current condition of the respective neighboring component when the current condition corresponds to at least one predefined condition.

15. [15.0] A network with distributed components, comprising:

[15.1] components organized in a logical ring structure,

[15.2] each component monitoring only a single respective neighboring component among components that is a predecessor or successor of said each component in the logical ring structure to determine a current condition of the respective neighboring component and

[15.3] informing all other components of said network when the current condition of the respective neighboring component corresponds to a predefined condition.

Ex. 1001, 6:25–38, 8:11–20.

¹ We use the same numbers that Petitioner uses to identify the claim language. *See* Pet. 20–28, 43.

E. The Asserted Reference

For its challenge, Petitioner relies on the following reference: Luís Moura Silva and João Gabriel Silva, *DIP: Distributed Diagnosis Protocol*, Microprocessing and Microprogramming, volume 38, pages 171 to 178 (1993) (Exhibit 1005) (“Silva”). Pet. 16–43; *see* Ex. 1007 ¶¶ 19–49.

Petitioner asserts that Silva qualifies as prior art under pre-AIA § 102(a) and § 102(b). Pet. 16; *see* 35 U.S.C. § 102(a)–(b) (2006).²

At this stage of the proceeding, Patent Owner does not dispute that Silva qualifies as prior art. *See* Prelim. Resp. 1–10.

F. The Asserted Challenge to Patentability

Petitioner asserts the following challenge to patentability:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–12, 14, 15	103(a)	Silva

Pet. 6, 17–43.

G. Testimonial Evidence

To support its challenge, Petitioner relies on the declaration of Nader F. Mir, Ph.D. (Exhibit 1003). Dr. Mir states, “I received a Ph.D. in electrical engineering from Washington University, St. Louis,” and “am a tenured professor in the Electrical Engineering Department of San Jose State University, California, where I also held the position of Associate Chair from 2006 through 2008.” Ex. 1003 ¶¶ 8–9. Dr. Mir also states, “I have been asked to provide my opinions regarding whether the subject matter of

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 102 and § 103 effective March 16, 2013. Because the filing date of the challenged claims predates the AIA’s amendments to § 102 and § 103, this Decision refers to the pre-AIA versions of § 102 and § 103.

claims 1–12, 14, and 15” in the ’630 patent “would have been obvious to a person having ordinary skill in the art” at “the time of the alleged invention, in light of the prior art.” *Id.* ¶ 3.

Petitioner also relies on the declaration of Ingrid Hsieh-Yee, Ph.D. (Exhibit 1007). Dr. Hsieh-Yee states, “I hold a Ph.D. in Library and Information Studies from the University of Wisconsin-Madison” and “am an expert on library cataloging and classification.” Ex. 1007 ¶¶ 4–5. Dr. Hsieh-Yee also states, “I have been retained as an independent expert witness on behalf of” Petitioner regarding “the authenticity and public availability date” of Silva (Exhibit 1005). *Id.* ¶¶ 1, 17.

III. DISCRETIONARY DENIAL IN VIEW OF PARALLEL LITIGATION

A. Background

Under § 314(a), the Director possesses “broad discretion” in deciding whether to institute an *inter partes* review. *See* 35 U.S.C. § 314(a); *Saint Regis Mohawk Tribe v. Mylan Pharm. Inc.*, 896 F.3d 1322, 1327 (Fed. Cir. 2018). The Director is “permitted, but never compelled,” to institute an *inter partes* review. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016). The Board decides whether to institute an *inter partes* review on the Director’s behalf. 37 C.F.R. § 42.4(a) (2023).

Patent Owner argues that we should exercise our discretion under § 314(a) to deny institution in view of the lead Texas case. *See* Prelim. Resp. 1–10; *supra* § II.B. Petitioner argues that we should decline to exercise our discretion under § 314(a) to deny institution. *See* Pet. 44–48. For the reasons explained below, we decline to exercise our discretion under § 314(a) to deny institution in view of the lead Texas case.

B. Nonexclusive Factors to Consider

When deciding whether to exercise discretion under § 314(a) to deny institution, the Board has considered the status of litigation involving the parties in light of the AIA’s objective “to provide an effective and efficient alternative to district court litigation.” *NHK Spring Co. v. Intrix-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 12, 19–20 (PTAB Sept. 12, 2018) (precedential). The Board has set forth the following nonexclusive factors to consider when determining whether to exercise discretion under § 314(a) to deny institution due to the advanced state of parallel litigation:

- (1) whether the court granted a stay or evidence exists that one may be granted if the Board institutes a trial;
- (2) the proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision;
- (3) the investment in the parallel litigation by the court and the parties;
- (4) the overlap in the issues raised by the petition and the issues in the parallel litigation;
- (5) whether the petitioner and the defendant in the parallel litigation are the same party; and
- (6) other circumstances that impact the Board’s exercise of discretion, including the merits.

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”).

These factors “relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding.” *Fintiv*, IPR2020-00019, Paper 11 at 6. Further, *Fintiv* instructs that the Board should take “a holistic view of whether efficiency and integrity of the system are best served by denying

or instituting review.” *Id.*; *see* PTAB Consolidated Trial Practice Guide at 55–56, 58 (Nov. 2019).³

We also follow the Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022) (“Interim Procedure”).⁴

C. Analysis

The Interim Procedure explains that “the PTAB will not discretionarily deny institution in view of parallel district court litigation where a petitioner presents a stipulation not to pursue in a parallel proceeding the same grounds or any grounds that could have reasonably been raised before the PTAB.” Interim Procedure at 3 (citing *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) (precedential as to § II.A)); *see id.* at 7, 9. The Interim Procedure also explains that such a stipulation (a *Sotera* stipulation) “mitigates concerns of potentially conflicting decisions and duplicative efforts between the district court and the PTAB.” *Id.* at 7.

Petitioner provides a *Sotera* stipulation. Paper 7, Attach. A. Specifically, Petitioner stipulates as follows:

if the PTAB institutes IPR on the ground presented in the petition, Petitioners [sic] will not pursue in the co-pending district court litigation the specific ground asserted in the petition, or any other ground that was raised or could have been reasonably raised in an IPR (i.e., grounds that could have been

³ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

⁴ Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

raised under §§ 102 or 103 on the basis of prior art patent [sic] or printed publications).

Id. (citing *Sotera*, IPR2020-01019, Paper 12 at 18–19).

Because Petitioner provides a *Sotera* stipulation, we decline to exercise our discretion under § 314(a) to deny institution in view of the lead Texas case. *See* Interim Procedure at 3, 7, 9.

IV. PATENTABILITY ANALYSIS

A. Legal Principles: Obviousness

A patent may not be obtained “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103(a) (2006). An obviousness analysis involves underlying factual inquiries including (1) the scope and content of the prior art; (2) differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) where in evidence, objective indicia of nonobviousness, such as commercial success, long-felt but unsolved needs, and failure of others.⁵ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18, 35–36 (1966); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1047–48 (Fed. Cir. 2016) (en banc).

We analyze the obviousness issues according to these principles.

B. Level of Ordinary Skill in the Art

Factors pertinent to determining the level of ordinary skill in the art include (1) the educational level of the inventor; (2) the type of problems

⁵ The record does not include evidence or argument regarding objective indicia of nonobviousness.

encountered in the art; (3) prior-art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983). Not all factors may exist in every case, and one or more of these or other factors may predominate in a particular case. *Id.* These factors are not exhaustive, but merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). Moreover, the prior art itself may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Petitioner asserts that a person of ordinary skill in the art at the time of the alleged invention would have had the following qualifications:

- (1) “a bachelor’s degree in computer science, computer engineering, electrical engineering, or equivalent training”;
- (2) “approximately two years of experience working in the field of communication networks”; and
- (3) “a working knowledge of the network monitoring art that is pertinent to the ’630 Patent, including monitoring system conditions of a network with distributed components.”

Pet. 13. Petitioner also asserts that “[a]dditional work experience can substitute for specific educational background, and vice versa.” *Id.*

Dr. Mir’s testimony supports Petitioner’s assertions. *See* Ex. 1003 ¶¶ 19–21.

At this stage of the proceeding, Patent Owner does not address the level of ordinary skill in the art. *See* Prelim. Resp. 1–10.

Based on the current record and for purposes of this Decision, we accept Petitioner’s description of an ordinarily skilled artisan because it

comports with the technology and claims of the '630 patent as well as the asserted prior art.

C. Claim Construction

We construe claim terms “using the same claim construction standard” that district courts use to construe claim terms in civil actions under 35 U.S.C. § 282(b). *See* 37 C.F.R. § 42.100(b). Under that standard, claim terms “are given their ordinary and customary meaning, which is the meaning the term would have to a person of ordinary skill in the art at the time of the invention.” *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 904 F.3d 965, 971 (Fed. Cir. 2018) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc)). The meaning of claim terms may be determined by “look[ing] principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner contends that “for the purposes of this proceeding and the grounds presented” in the Petition, “no claim terms require express construction.” Pet. 13.

At this stage of the proceeding, Patent Owner does not address claim construction. *See* Prelim. Resp. 1–10.

Based on the current record, we determine that no claim term requires an explicit construction to decide whether Petitioner satisfies the “reasonable likelihood” standard for instituting trial. “[O]nly those terms need be construed that are in controversy, 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); *see Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

D. Alleged Obviousness over Silva: Claims 1–12, 14, and 15

Petitioner contends that claims 1–12, 14, and 15 are unpatentable under § 103(a) as obvious over Silva. *See* Pet. 15–43. Below, we provide overview of Silva, and then we consider the obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that Silva teaches the subject matter in claims 1–12, 14, and 15.

1. OVERVIEW OF SILVA (EXHIBIT 1005)

Silva, a paper titled “DIP: Distributed Diagnosis Protocol,” identifies drawbacks in existing algorithms or methods for diagnosing faults or failures in systems with distributed components, e.g., networks. Ex. 1005, 171.⁶ For example, most “algorithms require a high number of diagnostic messages and, as a result, the execution time may exceed reasonable values.” *Id.*

Silva endeavors to address those drawbacks by disclosing a diagnosis protocol for checking the availability of nodes or processors in systems with distributed components, e.g., networks. Ex. 1005, 171–76. Silva explains that the diagnosis protocol accomplishes several functions, including the following:

- detect node failures or crashes;
- “notify all the network nodes” when a node fails or crashes, i.e., when a Node Down event occurs; and
- “notify all the nodes of the restart of a crashed node,” i.e., when a Node Up event occurs.

⁶ For Exhibit 1005 (Silva), we follow Petitioner’s practice and cite to the page numbers that appear in the publication rather than the page numbers that Petitioner applied to the exhibit.

Id. at 172.

Silva explains that in a network with N nodes, the “nodes are organized on a virtual ring and all the sites are numbered from 0 up to N-1, along the path of the virtual ring.” Ex. 1005, 172. The “order of the nodes in the ring follows the order of” a table unique to the network. *Id.* The “ring does not reflect the physical organization of the network.” *Id.*

Each node “has access to stable storage” for storing “information that must survive” a failure. Ex. 1005, 171 (emphasis omitted). Each node “maintains a table with the status of the other nodes,” i.e., a Network Status Table (NST). *Id.* at 172. In the Network Status Table, each available node is marked as UP, and each unavailable node is marked as DOWN. *Id.*; see *id.* at 173.

Each node may communicate with each other node in the network. Ex. 1005, 171. For communications between nodes, the diagnosis protocol employs various messages, including the following messages:

- I_AM_ALIVE;
- NODE_DOWN;
- ND_Ack (Node Down Acknowledge);
- NODE_UP; and
- NU_Ack (Node Up Acknowledge).

Id. at 172–76, 175 nn.2–3.

Silva explains that an “important goal is to reduce the diagnosis latency to a minimal value, i.e., the protocol must provide timely failure detection.” Ex. 1005, 172. Hence, when a node fails, “all the other nodes must be acquainted with that as quickly as possible.” *Id.*

To provide timely failure detection, each node P_i periodically sends an I_AM_ALIVE message to the next neighbor node $P_{((i+1)\bmod N)}$ in the virtual ring. Ex. 1005, 172. A Heartbeat process in each node P_i “is periodically awakened” by a timer T_H to send an I_AM_ALIVE message to the next neighbor node $P_{((i+1)\bmod N)}$. *Id.*

Silva’s Figure 1 (reproduced below) depicts a network with multiple nodes during normal operation:

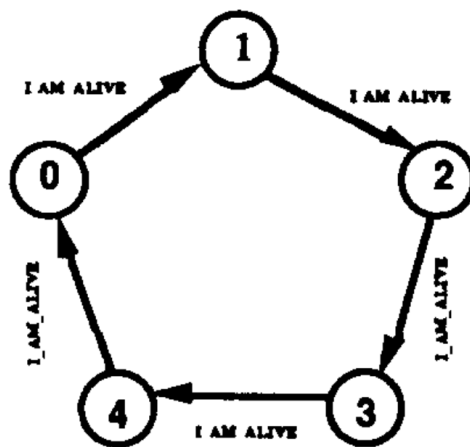


Figure 1 : Virtual Ring

Figure 1 depicts a network with five nodes numbered 0 through 4 “organized on a virtual ring” according to the order in a table. Ex. 1005, 172–73. In Figure 1’s five-node network, I_AM_ALIVE messages propagate as follows:

- node 0 sends an I_AM_ALIVE message to node 1;
- node 1 sends an I_AM_ALIVE message to node 2;
- node 2 sends an I_AM_ALIVE message to node 3;
- node 3 sends an I_AM_ALIVE message to node 4; and
- node 4 sends an I_AM_ALIVE message to node 0.

Id. at 173.

Additionally, each node P_i checks for the messages sent by the previous neighbor node $P_{((i-1)\bmod N)}$ in the virtual ring. Ex. 1005, 172. A Watchdog process in each node P_i “is listening to the messages sent by” the previous neighbor node $P_{((i-1)\bmod N)}$. *Id.* at 173.

A timer T_W in each node P_i starts when the node P_i receives an I_AM_ALIVE message from the previous neighbor node $P_{((i-1)\bmod N)}$. Ex. 1005, 173. If the node P_i receives another I_AM_ALIVE message from the previous neighbor node $P_{((i-1)\bmod N)}$ before the timer T_W expires, the node P_i triggers (resets) the timer T_W . *Id.* But if the node P_i does not receive another I_AM_ALIVE message from the previous neighbor node $P_{((i-1)\bmod N)}$ before the timer T_W expires, “this means that the previous node has crashed,” i.e., a Node Down event has occurred. *Id.* at 172–73.

When a node detects a Node Down event at its previous neighbor node, the detecting node initiates a Node Down Protocol. Ex. 1005, 173. As part of the Node Down Protocol, the detecting node immediately broadcasts a NODE_DOWN message to “all the others” to announce the Node Down event at its previous neighbor node. *Id.* The detecting node also starts a timer T_{ack} to determine whether the detecting node receives an ND_Ack message from every available node acknowledging the NODE_DOWN message before the timer T_{ack} expires. *Id.*

Silva's Figure 2 (reproduced below) depicts a network with multiple nodes where one node has failed:

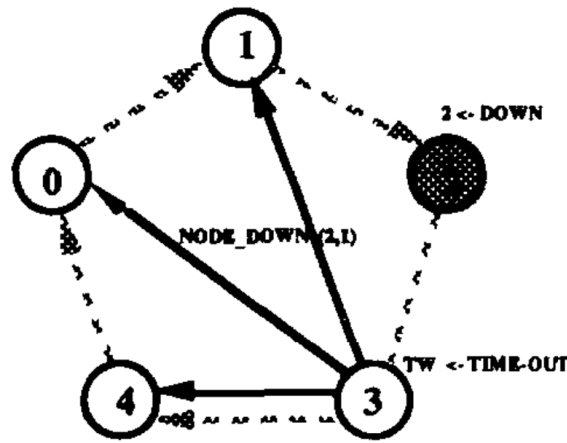


Figure 2 : Detection of a Failure

Figure 2 depicts a network with five nodes numbered 0 through 4 where node 2 has failed and does not send an I_AM_ALIVE message to node 3 before a timer T_w in node 3 expires. Ex. 1005, 173. After detecting a Node Down event at node 2, node 3 broadcasts a NODE_DOWN message to nodes 0, 1, and 4. *Id.* In the particular example depicted in Figure 2, node 3 sends NODE_DOWN (2,1) messages concurrently to nodes 0, 1, and 4, where the first number in parentheses “2” identifies the failed node and the second number in parentheses “1” corresponds to an incarnation number (counter) for the identified node. *Id.* at 172–73.

When a node receives a NODE_DOWN message, the receiving node responds by broadcasting an ND_Ack message. Ex. 1005, 173. If the detecting node, i.e., the node that broadcast a NODE_DOWN message, receives an ND_Ack message from every available node acknowledging the NODE_DOWN message before the timer T_{ack} expires, “this phase is finished and the protocol returns to the steady state.” *Id.* But if the detecting node

does not receive an ND_Ack message from every available node acknowledging the NODE_DOWN message before the timer T_{ack} expires, the detecting node retransmits the NODE_DOWN message “until a maximum number of retries is reached.” *Id.* If a node does not respond to the retransmitted message, the detecting node classifies the nonresponding node as DOWN in the Network Status Table. *Id.*

When “a node rejoins the network it must tell the others that it is back in operation and must also determine which nodes are UP and reachable.” Ex. 1005, 173. Among other things, a rejoining node “broadcasts a NODE_UP message to notify all the active nodes in the network.” *Id.* at 173–74. The rejoining node also starts a timer T_{up} to determine whether the rejoining node receives an NU_Ack message from every available node acknowledging the NODE_UP message before the timer T_{up} expires. *Id.* at 174.

Silva’s Figure 4 (reproduced below) depicts a network with multiple nodes where one node has rejoined the network:

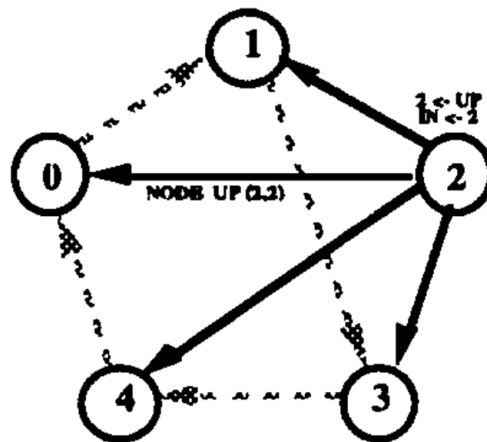


Figure 4 : Node #2 Rejoins the Network

Figure 4 depicts a network with five nodes numbered 0 through 4 where node 2 has rejoined the network and has broadcast a NODE_UP message to nodes 0, 1, 3, and 4. Ex. 1005, 174. In the particular example depicted in Figure 4, node 2 sends NODE_UP (2,2) messages concurrently to nodes 0, 1, 3, and 4, where the first number in parentheses “2” identifies the rejoining node and the second number in parentheses “2” corresponds to an incarnation number (counter) for the identified node. *Id.* at 172, 174.

2. INDEPENDENT CLAIM 1

(a) Preamble 1.0

Claim 1 recites “[a] method for monitoring a system condition of a network with distributed components organized in a logical ring structure.” Ex. 1001, 6:25–27.

Petitioner contends that Silva teaches or renders obvious claim 1’s preamble for three related reasons. *See* Pet. 21–23. First, Petitioner asserts that Silva teaches “[a] method for monitoring a system condition of a network” according to claim 1’s preamble because Silva discloses “a ‘DIP: Distributed Diagnosis Protocol’ for detecting ‘node crashes’ and ‘node failure[s]’ in a network.” *Id.* at 21 (alteration by Petitioner) (quoting Ex. 1005, 171–72).

Second, Petitioner asserts that Silva teaches “a network with distributed components” according to claim 1’s preamble because Silva discloses a network with nodes remote from each other and “‘interconnected by a LAN’ where ‘each [node] can communicate with any other [node] in the network.’” Pet. 21 (alterations by Petitioner) (quoting Ex. 1005, 171) (citing Ex. 1003 ¶ 47). According to Petitioner, the network nodes may

communicate across the network by sending I_AM_ALIVE messages. *Id.* (citing Ex. 1003 ¶ 48; Ex. 1005, 173).

Third, Petitioner asserts that Silva teaches network components “organized in a logical ring structure” according to claim 1’s preamble because Silva discloses that:

- (1) “[t]he network nodes are organized on a virtual ring and all sites are numbered from 0 up to N-1, along the path of the virtual ring”; and
- (2) “the ring does not reflect that physical organization of the network.”

Pet. 22 (alteration by Petitioner) (emphasis omitted) (quoting Ex. 1005, 172) (citing Ex. 1003 ¶ 49).

To support its positions, Petitioner provides an annotated version of Silva’s Figure 1 as reproduced below (Pet. 22):

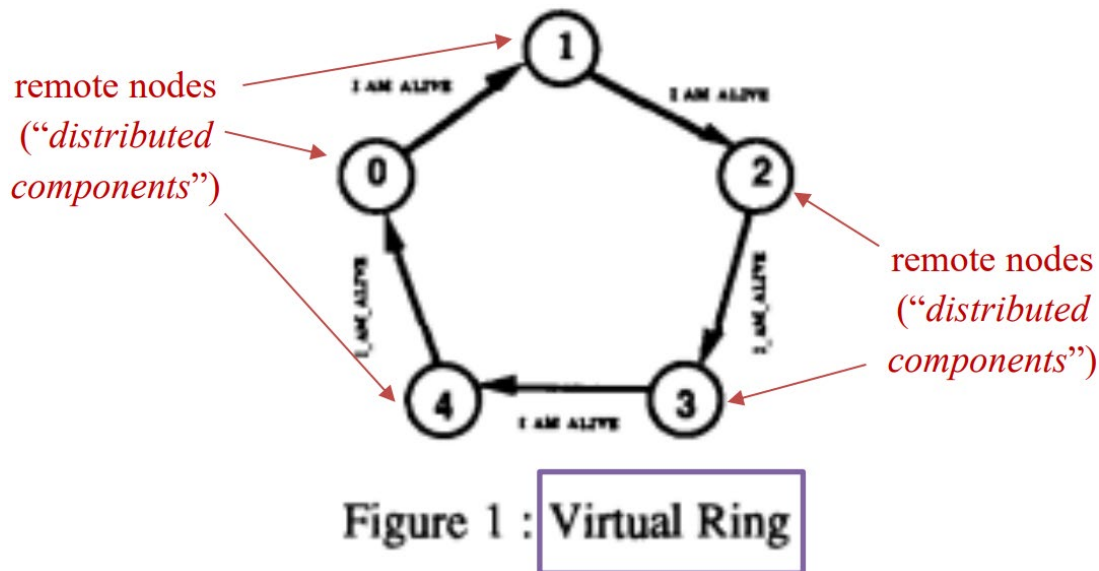


Figure 1 depicts a network with five nodes numbered 0 through 4 “organized on a virtual ring” according to the order in a table. Ex. 1005, 172–73; *see* Ex. 1003 ¶¶ 39–40. The above annotated version of Figure 1 includes the following annotations:

- (1) the red annotation “remote nodes (*‘distributed components’*)” on the left side of Figure 1;
- (2) three red arrows pointing from the red annotation on the left side of Figure 1 toward the right and identifying nodes 0, 1, and 4;
- (3) the red annotation “remote nodes (*‘distributed components’*)” on the right side of Figure 1;
- (4) two red arrows pointing from the red annotation on the right side of Figure 1 toward the left and identifying nodes 2 and 3; and
- (5) a purple box around the words “Virtual Ring” in the title for Figure 1.

See Pet. 22; Ex. 1003 ¶ 50.

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 1’s preamble. See Prelim. Resp. 1–10. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. See *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

Generally, a preamble does not limit a claim. *Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). We need not decide whether claim 1’s preamble limits the claim because, based on the current record and for the reasons advanced by Petitioner and supported by Dr. Mir’s testimony, Petitioner establishes sufficiently that Silva teaches claim 1’s preamble. See Pet. 21–23; Ex. 1003 ¶¶ 39, 45–53.

(b) Limitation 1.1

Claim 1 recites “each component in the system monitoring only a single respective neighboring component among said distributed components that is a predecessor or successor of said each component in

the logical ring structure to determine a current condition of the respective neighboring component.” Ex. 1001, 6:28–33 (limitation 1.1).

Petitioner contends that Silva teaches or renders obvious limitation 1.1 for two related reasons. *See* Pet. 23–26. First, Petitioner asserts that Silva teaches “each component in the system monitoring only a single respective neighboring component among said distributed components that is a predecessor or successor of said each component in the logical ring structure” according to limitation 1.1 because Silva discloses that “each node in the virtual ring monitors only its neighboring predecessor node” in “the virtual ring for an I_AM_ALIVE message.” *Id.* at 23.

As support, Petitioner quotes Silva’s disclosure that “[e]ach processor P_i sends periodically an I_AM_ALIVE message to the next neighbour $P_{((i+1)\bmod N)}$ while it is checking for the messages sent by the previous processor $P_{((i-1)\bmod N)}$.” Pet. 23 (emphasis omitted) (quoting Ex. 1005, 172) (citing Ex. 1003 ¶ 55). Petitioner then contends that a Watchdog process in a node accomplishes this checking such that the node “is listening to the messages sent by the previous neighbour.” *Id.* (emphasis omitted) (quoting Ex. 1005, 173) (citing Ex. 1003 ¶ 57).

Petitioner also contends that an ordinarily skilled artisan would have understood that “ $P_{((i-1)\bmod N)}$ ” refers to “the network node immediately preceding network node P_i ” because:

- (1) the variable “ i ” indicates the identity of a particular node;
- (2) the variable “ N ” indicates the total number of nodes in the virtual ring; and
- (3) “mod” is the mathematical operation (modulo) indicating the remainder after dividing $(i-1)$ by N .

Pet. 23–24 (citing Ex. 1005, 172). For instance, “in a virtual ring with a total of 5 nodes, network node P_2 monitors its neighboring predecessor P_1 because $P_{((2-1)\bmod 5)} = P_1$.” *Id.* at 24 (citing Ex. 1003 ¶ 56).

Second, Petitioner asserts that Silva teaches that each node “determine[s] a current condition of the respective neighboring component” according to limitation 1.1 because Silva discloses using “the Watchdog process to detect the absence or presence of an I_AM_ALIVE message.”

Pet. 25. As support, Petitioner quotes Silva’s disclosure as follows:

[T]he Watchdog process . . . listen[s] to the messages sent by the previous neighbor. Every time it receives an I_AM_ALIVE message it triggers a timer T_w If the timer expires, this means that the previous node has crashed and the Node Down Protocol is started for that node.

Id. (alterations by Petitioner) (emphasis omitted) (citation omitted) (quoting Ex. 1005, 173). Further, Petitioner asserts that if “an I_AM_ALIVE message is received from the neighboring predecessor node before the timer expires, the timer is reset and the Node Down Protocol is not started because the node is alive.” *Id.* (citing Ex. 1003 ¶ 58; Ex. 1005, 172–73).

To support its positions, Petitioner provides an annotated version of Silva's Figure 1 as reproduced below (Pet. 24):

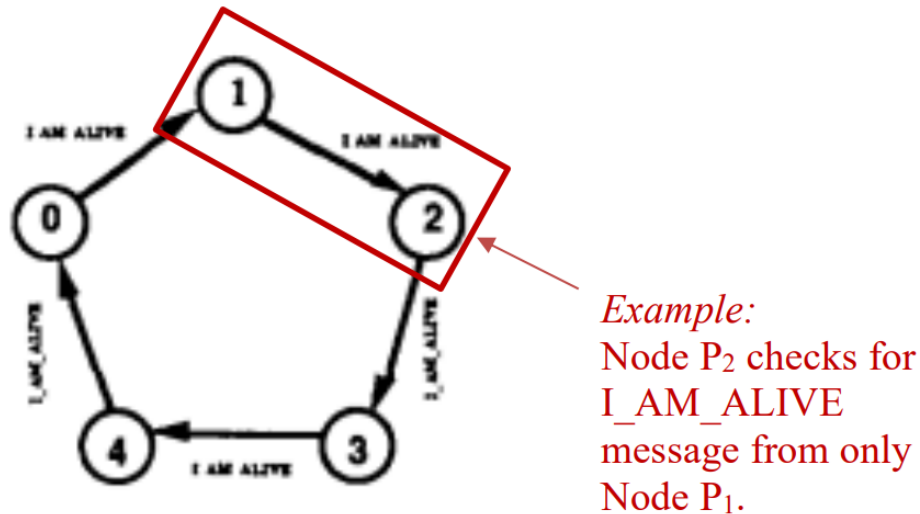


Figure 1 : Virtual Ring

Figure 1 depicts a network with five nodes numbered 0 through 4 “organized on a virtual ring” according to the order in a table. Ex. 1005, 172–73; see Ex. 1003 ¶¶ 39–40. The above annotated version of Figure 1 includes the following annotations:

- (1) a red box around nodes 1 and 2;
- (2) the red annotation “*Example: Node P₂ checks for I_AM_ALIVE message from only Node P₁*” on the right side of Figure 1; and
- (3) a red arrow pointing from the red annotation on the right side of Figure 1 toward the left and identifying the red box around nodes 1 and 2.

See Pet. 24; Ex. 1003 ¶ 57.

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1.1. See Prelim. Resp. 1–10. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. See *Dynamic Drinkware*, 800 F.3d at 1378.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Mir's testimony, Petitioner establishes sufficiently that Silva teaches limitation 1.1. *See* Pet. 23–26; Ex. 1003 ¶¶ 40–41, 54–59.

(c) Limitation 1.2

Claim 1 recites “each component in the system informing all other components of the system about the current condition of the respective neighboring component when the current condition corresponds to at least one predefined condition.” Ex. 1001, 6:34–38 (limitation 1.2).

Petitioner contends that Silva teaches or renders obvious limitation 1.2. *See* Pet. 26–28. Specifically, Petitioner asserts that Silva discloses that when a node detects a Node Down condition of “its neighboring predecessor node,” the detecting node initiates a Node Down Protocol to “notify all other nodes in the virtual ring of the Node Down condition” with a “broadcast message” to the network “announcing the Node_Down event of its neighbour.” *Id.* at 26 (emphasis omitted) (quoting Ex. 1005, 173) (citing Ex. 1003 ¶ 64). Petitioner also asserts that a Node Down condition corresponds to “at least one predefined condition” because “its requirements are known prior to detecting a node is actually down.” *Id.* (citing Ex. 1003 ¶ 62). Petitioner identifies the known requirements for the “at least one predefined condition” as the detecting node not receiving an I_AM_ALIVE message before the timer T_w expires. *Id.* (citing Ex. 1003 ¶¶ 62–63; Ex. 1005, 172–73).

Petitioner further asserts that Silva's Figure 2 illustrates “an example of the Node Down Protocol, where a node (i.e., node P_3) has detected the failure of its neighboring predecessor node (i.e., node P_2), and immediately

notifies all other nodes in the virtual ring (i.e., nodes P_0 , P_1 , and P_4) about the Node Down condition by broadcasting a ‘NODE_DOWN(2,1)’ message.”
Pet. 26–27.

To support its positions, Petitioner provides an annotated version of Silva’s Figure 2 as reproduced below (Pet. 27):

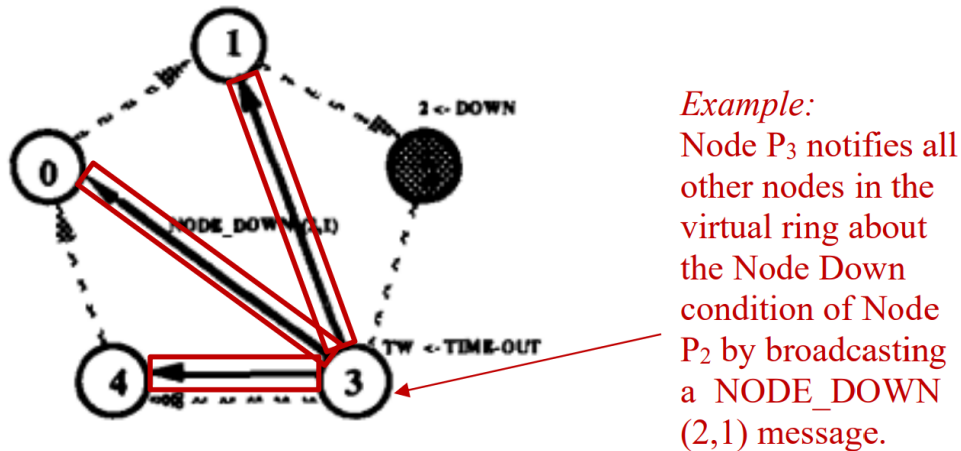


Figure 2 : Detection of a Failure

Figure 2 depicts a network with five nodes numbered 0 through 4 where node 2 has failed and does not send an I_AM_ALIVE message to node 3 before a timer T_w in node 3 expires. Ex. 1005, 173; *see* Ex. 1003 ¶ 43. The above annotated version of Figure 2 includes the following annotations:

- (1) a red box around each of the arrows denoting NODE_DOWN(2,1) messages from node 3 to nodes 0, 1, and 4;
- (2) the red annotation “*Example: Node P₃ notifies all other nodes in the virtual ring about the Node Down condition of Node P₂ by broadcasting a NODE_DOWN(2,1) message*” on the right side of Figure 2; and
- (3) a red arrow pointing from the red annotation on the right side of Figure 2 toward the left and identifying node 3.

See Pet. 27; Ex. 1003 ¶ 65.

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1.2. *See* Prelim. Resp. 1–10. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Mir’s testimony, Petitioner establishes sufficiently that Silva teaches limitation 1.2. *See* Pet. 26–28; Ex. 1003 ¶¶ 60–67.

(d) Preliminary Conclusion About Obviousness/Nonobviousness

As discussed above, Petitioner’s analysis addresses how Silva teaches claim 1’s subject matter. *See supra* §§ IV.D.2(a)–(c). Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 1 is unpatentable under § 103(a) as obvious over Silva.

3. DEPENDENT CLAIMS 2–12

Claims 2–12 depend directly or indirectly from claim 1. Ex. 1001, 6:39–7:15.

For claims 2–12, Petitioner provides an analysis supported by Dr. Mir’s testimony about how Silva teaches the claimed subject matter. *See* Pet. 28–41; Ex. 1003 ¶¶ 68–119.

At this stage of the proceeding, Patent Owner makes no arguments specific to claims 2–12. *See* Prelim. Resp. 1–10. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Mir’s testimony, Petitioner establishes sufficiently that Silva teaches the subject matter in claims 2–12. *See* Pet.

28–41; Ex. 1003 ¶¶ 68–119. Hence, Petitioner demonstrates a reasonable likelihood of proving that claims 2–12 are unpatentable under § 103(a) as obvious over Silva.

4. INDEPENDENT CLAIMS 14 AND 15

Claims 14 and 15 recite subject matter similar to claim 1. *Compare* Ex. 1001, 6:25–38, *with id.* at 7:20–8:20. Claim 14 also recites a “non-transitory computer-readable medium encoded with at least one computer program.” *Id.* at 7:20–21.

Petitioner’s analysis addresses how Silva teaches a “non-transitory computer-readable medium encoded with at least one computer program” as well as the other aspects of claims 14 and 15. *See* Pet. 41–43. Dr. Mir’s testimony supports Petitioner’s positions. *See* Ex. 1003 ¶¶ 120–130.

At this stage of the proceeding, Patent Owner makes no arguments specific to claims 14 and 15. *See* Prelim. Resp. 1–10. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the current record and for (1) the reasons advanced by Petitioner and supported by Dr. Mir’s testimony and (2) the reasons discussed above for claim 1, Petitioner establishes sufficiently that Silva teaches the subject matter in claims 14 and 15. *See* Pet. 41–43; Ex. 1003 ¶¶ 120–130; *supra* §§ IV.D.2(a)–(c). Hence, Petitioner demonstrates a reasonable likelihood of proving that claims 14 and 15 are unpatentable under § 103(a) as obvious over Silva.

V. CONCLUSION

Based on the arguments and evidence presented by the parties, we determine that there is a reasonable likelihood Petitioner would prevail with

respect to at least one claim challenged in the Petition. Hence, we institute an *inter partes* review of all challenged claims on all challenges included in the Petition. See *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018) (noting that the language of 35 U.S.C. § 314(b) “indicates a binary choice—either institute review or don’t”); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute as requiring “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”). Additionally, we decline to exercise our discretion under § 314(a) to deny institution.

At this preliminary stage, we have not made a final determination about the patentability of any challenged claim, the construction of any claim term, phrase, or limitation, or any other legal or factual issue.

VI. ORDER

Accordingly, it is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–12, 14, and 15 in the ’630 patent is instituted on all challenges included in the Petition; and

FURTHER ORDERED that, according to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial that commences on the entry date of this Decision.

IPR2023-00537
Patent 7,916,630 B2

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