

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner,

IPR2025-01569
Patent No. 7,894,385

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104**

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PETITIONER’S EXHIBIT LIST

Ex.1001	U.S. 7,894,385
Ex.1002	Prosecution History of U.S. 7,894,385
Ex.1003	Declaration of Christopher Hansen, Ph.D. under 37 C.F.R. § 1.68
Ex.1004	<i>Curriculum Vitae</i> of Christopher Hansen, Ph.D.
Ex.1005	U.S. Patent Publication No. 2006/0215583 to Castagnoli
Ex.1006	U.S. Patent No. 5,982,780 to Bohm et al.
Ex.1007	U.S. Patent Publication No. 2006/0198346 to Liu
Ex.1008	U.S. Patent Publication No. 2002/0136170 to Struhsaker
Ex.1009	U.S. Patent Publication No. 2003/0224750 to Sampath
Ex.1010	U.S. Patent Publication No. 2009/0049199 to Kuik et al.
Ex.1011	IEEE Standard 802.11-1999
Ex.1012	Complaint, <i>Dynamic Mesh Networks, Inc. d/b/a MeshDynamics v. Cisco Systems, Inc.</i> , No. 2:25-cv-00472, Dkt. no. 1 (E.D. Tex. May 5, 2025).
Ex.1013	U.S. Patent No. 5,535,338 to Krause et al.
Ex.1014	A. S. Tanenbaum, <i>Computer Networks</i> , 4 th ed. (Prentice Hall PTR) (selected pages)
Ex.1015	J. Henry, 802.11s Mesh Networking (White paper) (The Certified Wireless Network Professional (CWNP) Program)
Ex.1016	A. S. Tanenbaum, <i>Modern Operating Systems</i> , 2 nd ed. (Prentice Hall PTR) (selected pages)
Ex.1017	Intentionally Omitted
Ex.1018	H. Newton, <i>Newton’s Telecom Dictionary</i> , 17 th ed. (CMP Books)
Ex.1019	U.S. Patent No. 5,027,431 to Tanaka et al.
Ex.1020	U.S. Patent No. 6,912,215 to Lin et al.
Ex.1021	U.S. Patent No. 7,333,800 to Gopinath

Ex.1022	U.S. Patent No. 7,630,332 to Elliott
Ex.1023	U.S. Patent Publication No. 2004/0100929 to Garcia-Luna-Aceves
Ex.1024	U.S. Patent Publication No. 2006/0003764 to Saglam et al.
Ex.1025	U.S. Patent Publication No. 2006/0117174 to Lee
Ex.1026	U.S. Patent Publication No. 2007/0100396 to Freeberg
Ex.1027	U.S. Patent No. 6,807,163 to Shi
Ex.1028	U.S. Patent Publication No. 2006/0114851 to Gupta et al.
Ex.1029	U.S. Patent Publication No. 2005/0058149 to Howe
Ex.1030	U.S. Patent No. 7,058,027 to Alessi
Ex.1031	U.S. Patent Publication No. 2006/0009244 to Schacht
Ex.1032	U.S. Patent Publication No. 2004/0218562 to Orava et al.
Ex.1033	U.S. Patent No. 5,081,623 to Ainscow
Ex.1034	U.S. Patent No. 4,747,100 to Roach et al.
Ex.1035	U.S. Patent No. 4,803,485 to Rypinski
Ex.1036	Infringement Contentions for U.S. Patent No. 7,894,385, <i>Dynamic Mesh Networks, Inc. d/b/a MeshDynamics v. Cisco Systems, Inc.</i> , No. 2:25-cv-00472 (E.D. Tex.).

I. Introduction

Pursuant to 35 U.S.C. §§ 311, 314(a), and 37 C.F.R. § 42.100, Cisco Systems, Inc. (“Petitioner”) respectfully requests that the Board review and cancel as unpatentable under (pre-AIA) 35 U.S.C. §103(a) claims 1-3 (hereinafter, the “Challenged Claims”) of U.S. 7,894,385 (the “’385 patent,” Ex.1001).

The ’385 patent is directed to technology for a wireless mesh network. Ex.1001, Abstract, Title. The claims describe a mesh network where at least one child node includes two relay radios plus a dedicated scanning radio for scanning a radio frequency environment for a potential parent node. The one node samples potential new parent nodes during sampling times coordinated by the current parent node. During the sampling times, the child node and its current parent node buffer packets to be sent to one another.

These ideas were not new as of the earliest effective filing date. Other prior art patent applicants had already described mesh nodes using multiple radios, including a dedicated scanning radio. It was also well-known in the art to coordinate actions among nodes using assigned time slots, and to buffer packets during time slots not assigned for packet transmission.

Because the Challenged Claims merely recite an obvious combination of known concepts, Petitioner asks the Board to institute trial and find the claims unpatentable.

II. Grounds for standing

Petitioner certifies that the '385 patent is eligible for IPR and that Petitioner is not barred or estopped from requesting IPR of the Challenged Claims.

III. Note

Petitioner cites to exhibits' original page numbers. **Emphasis** in quoted material has been added. Claim terms are presented in *italics*.

IV. Background

As personal computers became more common in the 1980s, businesses found increasing advantages in networking computers together. Ex.1014, 6-9. By the late 1990s, the global network known as the internet evolved from its early military and research uses into a commercial juggernaut. Ex.1014, 50-59. Personal computers also continued to shrink in size and grow in capability, with “laptop” computers becoming increasingly common. With computers becoming more mobile, and network access becoming more important, the desire and interest for wireless networking grew. Ex.1014, 100. While several proprietary and niche wireless networking technologies were introduced in the 1990s, standardization efforts by the Institute of Electrical and Electronics Engineers (IEEE) produced an industry standard in 1997 known as IEEE 802.11, and often referred to as Wi-Fi. Ex.1014, 59-71. The standard was quickly extended in 1999 to standardize higher speed wireless networking technologies that operated in two radio frequency

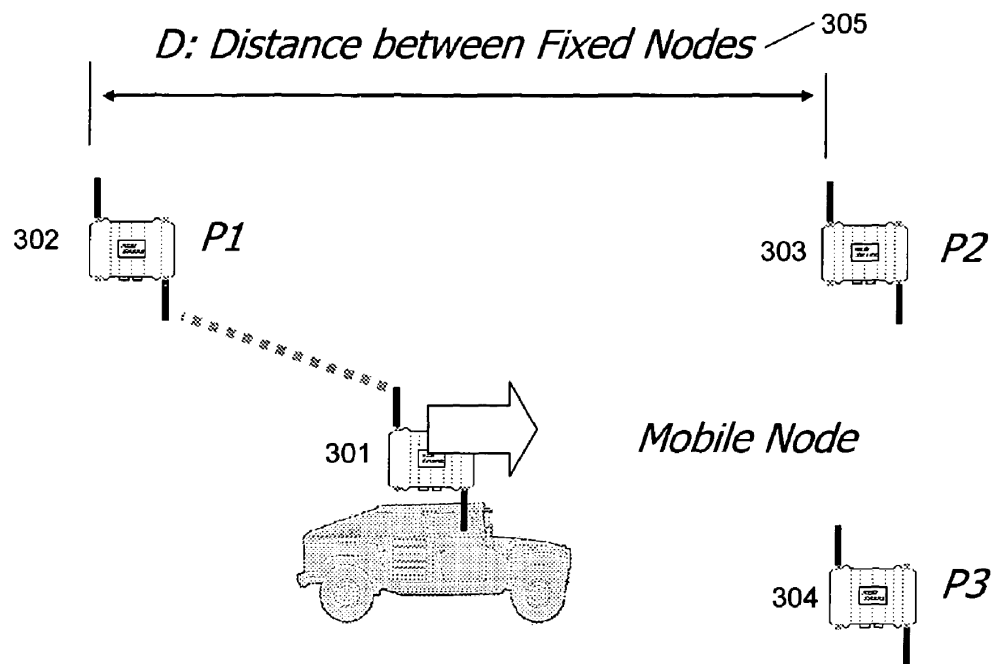
ranges: 802.11(a) operating around 5 GHz, and 802.11(b) operating around 2.4 GHz. Ex.1014, 292-295; *see generally* Ex.1011. Products implementing these standards quickly dominated the market for low-cost, high-speed wireless computer networking. Ex.1014, 301-302; Ex.1003, ¶27.

The IEEE 802.11 standards describe two operating modes or architectures. Ex.1014, 68-71. In infrastructure mode, a wireless access point has a wired network connection and provides wireless connectivity to client devices within its communication range. Ex.1014, 68-71. In ad hoc mode, a group of wireless peer nodes directly communicate among themselves (and there is no connectivity to a wired network). Ex.1014, 68-71; Ex.1003, ¶28.

Even before the IEEE standards published, there was interest in extending wireless networks to support communication between two nodes that are not close enough to one another to communicate via a single source-to-destination wireless transmission. Ex.1015, 3. To facilitate such communications, one or more intermediate wireless nodes retransmit packets between the source and destination. Ex.1015, 4. The use of packet retransmission was the subject of various projects, including an IEEE standardization effort that began in 2003 and resulted in the formally adopted IEEE 802.11s standard in 2011. Ex.1015, 3-5. Networks that support packet retransmission between wireless nodes are sometimes called “mesh” networks. Ex.1015, 3; Ex.1003, ¶29.

V. Summary of the '385 patent

The '385 patent purports to address the issue of maintaining data throughput and low latency in wireless mesh networks with mobile nodes. Ex.1001, 1:15-21. The patent acknowledges that “existing systems use multiple radio backhaul” and “sometimes use different non-interfering radio channels.” Ex.1001, 1:21-25. When a node is mobile, however, the '385 patent states that the node “must sample downlink channels” from potential parent nodes and “decide whether to switch from its current parent node.” Ex.1001, 1:33-36. This scenario is illustrated in Fig. 3 below, where mobile node 301 is moving away from current parent node 302 and toward potential parent nodes 303 and 304. Ex.1003, ¶31.



Ex.1001, Fig. 3.

The '385 patent describes a technique in which a mobile node uses a dedicated scanning radio to identify potential parent nodes when they come into range. Ex.1001, 3:62-67. The mobile node then uses its uplink radio to evaluate the identified potential new parent nodes. Ex.1001, 4:15-22. While the mobile node is scanning potential parent nodes, both the mobile node and its current parent node buffer packets to be transmitted between them. Ex.1001, 4:15-22. Although Fig. 3 is depicted with only one mobile node, the '385 patent describes how a parent node may have multiple mobile nodes associated with it, with all of them needing to evaluate potential parent nodes. Ex.1001, 4:23-25. To control the amount of buffering the parent node must perform at one time, the parent node coordinates the times that multiple child nodes sample their potential parent nodes. Ex.1001, 4:25-33. For example, time slots may be assigned to the child nodes in round robin fashion. Ex.1001, 4:34-36; Ex.1003, ¶32.

In summary, the '385 patent merely combines known elements—multi-radio mesh networking, a dedicated scanning radio, and network coordination via time slots—into one system. This agglomeration of known ideas did not advance human knowledge or understanding, and the '385 patent claims should not have been allowed to issue. Ex.1003, ¶33.

VI. Prosecution history of the '385 patent

The '385 patent application was filed on June 15, 2007 and claims priority to

a provisional application filed on June 19, 2006. Ex.1002, 132.

In prosecution, the presented claims were repeatedly rejected as anticipated or obvious over various prior art. Ex.1002, 103-113, 44-75. In a final rejection, certain dependent claims were only objected to, with the examiner identifying the use of tokens to coordinate sampling times as allowable subject matter. Ex.1002, 73. The claims were rewritten in independent form, and the examiner again cited the use of tokens in the reasons for allowance:

The entire prior-art combination disclosed fails to anticipate or render the claimed limitations of “sampling times are coordinated among multiple mesh nodes having a common current parent node, whereby the common current parent node sends tokens to each of its children in a round-robin manner” in combination with all the recited limitations of the disclosed independent claims obvious (viewed the entire claim as a whole), over any of the prior art of record, alone or in combination.

Ex.1002, 15.

VII. Effective priority date

The earliest possible priority date of the '385 patent is June 19, 2006. Ex.1001, 1 (field 60). It is unnecessary to determine whether the '385 patent is entitled to this date in this proceeding as all relied-upon prior art predates June 19, 2006. Petitioner does not waive any right or opportunity to dispute the '385

patent's priority date in this or another forum.

VIII. Level of ordinary skill in the art

A Person of Ordinary Skill in The Art (“POSITA”) in June 2006 would have had a working knowledge of the wireless networking art that is pertinent to the ’385 patent, including familiarity with standards such as IEEE 802.11. For example, the ’385 patent uses (without explanation) the acronyms AP and BSS (Ex.1001, 3:4-6), which a POSITA would have been familiar with from the IEEE 802.11 standard. Ex.1003, ¶20 (citing Ex.1011, 3 (defining “access point” and “basic service set”)).

A POSITA would have had a bachelor’s degree in computer science, computer engineering, electrical engineering, or equivalent training, and approximately two years of experience working in the field of network communications. Additional work experience could have been substituted for educational experience, and vice versa. Ex.1003, ¶21.

IX. Claim Construction

Claim terms in IPR are construed according to their “ordinary and customary meaning” to those of skill in the art. 37 C.F.R. § 42.100(b). The Board needs to construe terms “only to the extent necessary” to decide a disputed issue. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

For the purposes of this proceeding and the grounds presented herein, Petitioner proposes that no claim terms require formal construction. Petitioner clarifies one issue of claim interpretation below.

A. “*at a first point in time*” (Claim 3)

Claim 3 recites “*at a first point in time*” three times. No claim term expressly refers back any of these recitations; that is, neither claim 3 nor any other claim recites “**the** first point in time.” Ex.1003, ¶37.

The triple recitation of “*at a first point in time*” was initially introduced during prosecution via a claim amendment presenting new prosecution claim 18. Ex.1002, 85. The language was subsequently incorporated into prosecution claim 20, which was then allowed and issued as claim 3. Ex.1002, 30-31, 22. Neither the examiner nor the applicant appear to have remarked on the intended meaning of this language. Ex.1003, ¶38.

Petitioner respectfully submits that the three recitations of “at a first point in time” in claim 3 should be construed to give them meaning and avoid rendering them superfluous. *Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005) (“A claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so.”). As literally recited, claim 3’s recitations of “*at a first point in time*” are each superfluous because it is inherent that any action occurs at a point in time, and none of them recite any relative or

objective temporal limitation about any of the “*first point[s] in time.*” Ex.1003,

¶¶37, 39.

Petitioner submits that the second and third recitations of “*at a first point in time*” should be understood to refer to the first recitation, i.e., “*at [the] first point in time.*” This interpretation thus requires that each of the actions recited as occurring “*at a first point in time*” must all occur at the **same** point in time. Ex.1003, ¶¶37, 39.

X. Relief requested and reasons therefore

Petitioner asks that the Board institute a trial for *inter partes* review and cancel the Challenged Claims in view of the analysis below.

XI. Identification of how the claims are unpatentable

A. Challenged Claims

Petitioner challenges claims 1-3. In a complaint for infringement (now dismissed) Patent Owner alleged that Petitioner infringes “one or more claims of the ’385 patent... including claim 2.” Ex.1012, ¶92. Patent Owner’s infringement contentions in that now-dismissed case alleged that claims 1-3 were infringed. Ex.1036, 1. Here, Petitioner challenges all claims (1-3) of the ’385 patent. A finding that the Challenged Claims (1-3) are unpatentable in this proceeding will resolve the parties’ dispute in ongoing litigation and obviate any need for a trial regarding the ’385 patent, substantially reducing the time and expense of that

litigation for all parties.

B. Statutory grounds

Grounds	Claims	Basis
#1	2, 3	35 U.S.C. § 103 (Pre-AIA) over Castagnoli and Bohm
#2	1	35 U.S.C. § 103 (Pre-AIA) over Castagnoli, Bohm, and Liu

U.S. Pub. 2006/0215583 to Castagnoli (Ex.1005) was filed August 26, 2005 and published September 28, 2006.

U.S. Patent No. 5,982,780 to Bohm et al. (Ex.1006) was filed on Dec. 26, 1996, and issued on Nov. 9, 1999.

U.S. Pub. 2006/0198346 to Liu (Ex.1007) was filed March 4, 2005 and published September 7, 2006.

Castagnoli and Liu are prior art under 35 U.S.C. § 102(e).

Bohm is prior art under 35 U.S.C. §§ 102(a), 102(b), and 102(e).

Petitioner's § 103 obviousness grounds rely on the combined teachings of the references and not on a physical incorporation of elements. *See In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012).

Petitioner also cites below to additional prior art as evidence of the background knowledge of a POSITA and to provide contemporaneous context to support Petitioner's assertions regarding what a POSITA would have understood

from the prior art in the grounds. *See Yeda Research v. Mylan Pharm. Inc.*, 906 F.3d 1031, 1041-1042 (Fed. Cir. 2018) (affirming the use of “supporting evidence relied upon to support the challenge”); 37 C.F.R. § 42.104(b); *see also K/S HIMPP v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1365-66 (Fed. Cir. 2014); *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363 (Fed. Cir. 2016).

C. Statement of material facts

1. The round robin scheduling algorithm was well-known in the prior art. Ex.1029, [0893] (“Otherwise a simpler algorithm such as **round-robin** may be used or any other sharing algorithms **well-known to those skilled in the art.**”); Ex.1030, 17:15-18 (“...a scheduling algorithm (**well-known examples include** Weighted Fair Queuing, Priority, FIFO and **Round Robin**)...”); Ex.1031, [0007] (“For example, these scheduling algorithms may include a **round robin scheduling algorithm**, a proportional fair scheduling algorithms, as well as other **well-known scheduling algorithms.**”); Ex.1016, 142 (“One of the oldest, simplest, fairest and **most widely used** algorithms is **round robin**”).

2. A radio typically scans multiple channels by tuning to each channel, one at a time. Ex.1019, 4:43-50 (“[T]he **channels are scanned sequentially....** [E]ach channel change is performed in response to the increment of the channel number....”); Ex.1027, 4:4-7 (“During each scan, the mobile station **tunes the receiver to the appropriate carrier**, detects the RF energy on that carrier during

an appropriate time slot, demodulates and decodes the RF energy and determines activity on the channel.”); Ex.1021, 10:49-52 (“For example, a sensor device that **scans 20 radio channels in the round robin fashion and dwells on each channel for 200 ms** can tune to a given channel again only once every 4 seconds.”); Ex.1024, [0041], (“**For each channel of the scan list**, the net server needs to tell the lower logical layers to what channel to tune to search for a signal broadcast thereon. The commands are routed through the logical layers and **the DSP programs the RF portion of the mobile node to the specified channel** to search for the signal broadcast thereon and reports the results back to the net server layer.”); Ex.1028, [0035] (“The main reason for this is that each IEEE 802.11 host is equipped with one half-duplex transceiver, so it can only transmit or listen on one channel at a time. So **when a host is listening on a particular channel, it cannot hear the communication taking place on a different channel.**”); Ex.1023, [0065] (“We assume that the radios used in the network are half-duplex and **can tune to only one channel at a time**”).

3. During a channel scan, a typical radio’s receiver would listen on a channel while the radio’s transmitter would remain silent (and thus be unavailable to engage in data communication). Ex.1021, 10:49-52 (“For example, a sensor device that scans 20 radio channels in the round robin fashion and **dwells on each channel for 200 ms** can tune to a given channel again only once every 4

seconds.”); Ex.1022, 1:55-59 (“Typically, each node in a network has a single transceiver. Usually the single transceiver may transmit or receive, but **may not simultaneously transmit and receive** because the power used to transmit information may interfere with reception.”); Ex.1020, 2:41-55 (“In the multihop mobile wireless networks.... **Half-duplex mode of operation is assumed.**”); Ex.1032, [0023] (“In all systems according to the IEEE 802.11 standards, **transmission and reception occur alternately** in the same frequency band, i.e. a half-duplex technique is concerned.”); Ex.1025, [0003] (“Current wireless systems, most notably 802.11 wireless local area network (‘WLAN’) systems, operate in half-duplex mode on a single frequency. That is, the mobile station in a wireless system **either transmits or receives at any given time, not both simultaneously.**”); Ex.1026, [0015] (“**Most wireless transceivers** operate in a half-duplex mode, however, and **cannot simultaneously transmit and listen for ongoing network activity.**”).

4. A MAC address is generally assigned to an interface, not to a node as a whole. Ex.1013, 2:29, 34-35 (“Each NIC [Network **Interface** Controller] is configured with a **unique, single address MAC address**”), Abstract (“DLL [data link layer] **devices** are built with **multiple MAC address instead of a single MAC address.**”); Ex.1010, [0004] (“When **network interface cards** were first developed, each card was **assigned a unique MAC (Media Access Control)**

address that was ‘burned’ into the memory of the interface card. Modern **network interface cards** support the ability to **dynamically assign MAC addresses.**”), [0034] (“The virtual **MAC address is assigned to a network interface** and will typically be associated with an application”).

5. Upstream and downstream radios that operate on different channels may be operated simultaneously without interfering with one another. Ex.1008, [0064] (“Duplexing techniques include frequency division duplexing (FDD) and time division duplexing (TDD). In FDD, **a first channel (frequency) is used for transmission and a second channel (frequency) is used for reception.** To avoid **physical interference** between the transmit and receive channels, the frequencies must have a separation know as the duplex spacing.”); Ex.1009, [0039] (“Alternatively, the transmission can be frequency division duplex (FDD). That is, the **downlink transmission can be at a different frequency than the uplink transmission.** FDD allows **downlink transmission and uplink transmission to occur simultaneously.**”).

6. The use of tokens to provide transmission permission to nodes, where only a holder of a token in a network has permission to perform data transmission, was a well-known network communication technique for avoiding interference between nodes of a network. Ex.1033, 1:17-20 (“In a token-passing network each node in the network may **only transmit information** to other nodes **when it is in**

possession of a ‘token’”); Ex.1034, 4:54-62 (“**Token** passing logical rings **are well known in the art as a means for implementing an orderly discipline for control of a shared broadcast communications media**. In a token passing logical ring, **only one station has control over the media at any one time**. Control over the media can **include transmitting messages** and commanding other stations to transmit a response. **That station** having control over the media is said to **possess the ‘token’ at that time**”); Ex.1035, 1:63-2:1 (“**presently recognized standard**]] of the Institute of Electrical and Electronics Engineers (IEEE) ... **IEEE 802.4: Bus Token passing**”), 11:37-40 (“To assure accurate communication, several bus control protocols may be used ... including **token passing** (e.g. **IEEE 802.4**) which **avoids simultaneous transmission**”).

D. Ground 1

1. Castagnoli

Castagnoli describes “facilitat[ing] data transfer between routing nodes in a wireless mesh network.” Ex.1005, Abstract. Castagnoli is analogous art to the ’385 patent for two reasons. First, it is directed to the same field of endeavor as the ’385 patent. The ’385 patent is directed to “Wireless Multiple Radio Mesh” networks. Ex.1001, Title, Abstract. Likewise, Castagnoli is directed to “wireless mesh communication networks,” where “wireless mesh routing nodes can be ... multiple radio systems.” Ex.1005, [0006]-[0007]; Ex.1003, ¶44.

Second, Castagnoli is analogous art to the '385 patent because it is reasonably pertinent to a problem the inventors of the '385 patent attempted to solve. In the '385 patent, “the main task at hand” is “the transfer of packets” in the wireless mesh, where a parent node “coordinate[s] all the[] sampling times” of its child nodes using a “timing chart”. Ex.1001, 7:28-30, 2:3-5, 4:25-28. Likewise, Castagnoli describes techniques for coordinating mobile mesh network communications. For example, Castagnoli describes “synchronizing transmissions among parent and child routing nodes in a hierarchical wireless mesh network” via “a time slot scheduling algorithm.” Ex.1005, Abstract. Castagnoli and the '385 patent therefore both recognize a need to synchronize communications to avoid collisions and interference. Thus, Castagnoli is analogous art to the '385 patent. Ex.1003, ¶45.

Castagnoli depicts, in Figure 1, a wireless mesh network that includes parent routing nodes 30, 32, child routing nodes 32, 34, and channels 1, 2, 3, 4, and 5 for enabling wireless transmissions between the parent and the child routing nodes. Ex.1005, [0032], Fig. 1. The wireless mesh network allows a wireless client 40 to communicate with the network 50 and/or another wireless client 40. Ex.1005, [0032]; Ex.1003, ¶46.

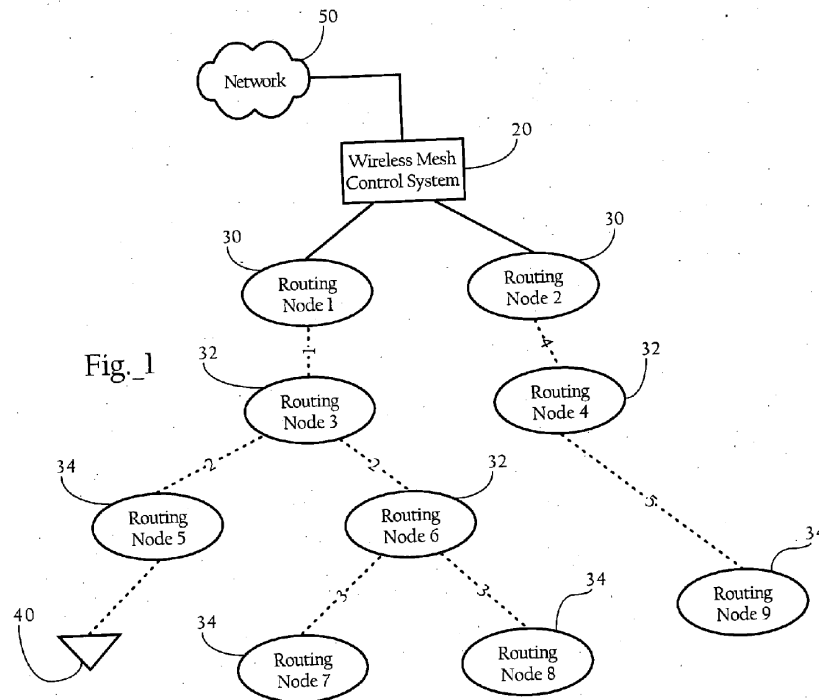
**Ex.1005, Fig. 1.**

Figure 2 of Castagnoli depicts a schematic illustration of a routing node including a wireless backbone interface unit 60, a routing node control processor 70, a WLAN interface unit 80, and antennas 85-87. Ex.1005, [0040]. The routing node control processor maintains “upstream transmit and receive queues 77” for transmission to a parent routing node and “downstream transmit and receive queues 78” for transmission to a child routing node. Ex.1005, [0040]. Castagnoli discloses that:

wireless frames received from a parent routing node during the parent slot are buffered in the downstream transmit/receive queues 78 for transmission to a child routing node for transmission in the appropriate child slot.

Oppositely, wireless frames received from a child routing node during the downstream phase are buffered in the parent slot queue 77 for transmission to the parent routing node during the upstream phase.

Ex.1005, [0040]; Ex.1003, ¶47.

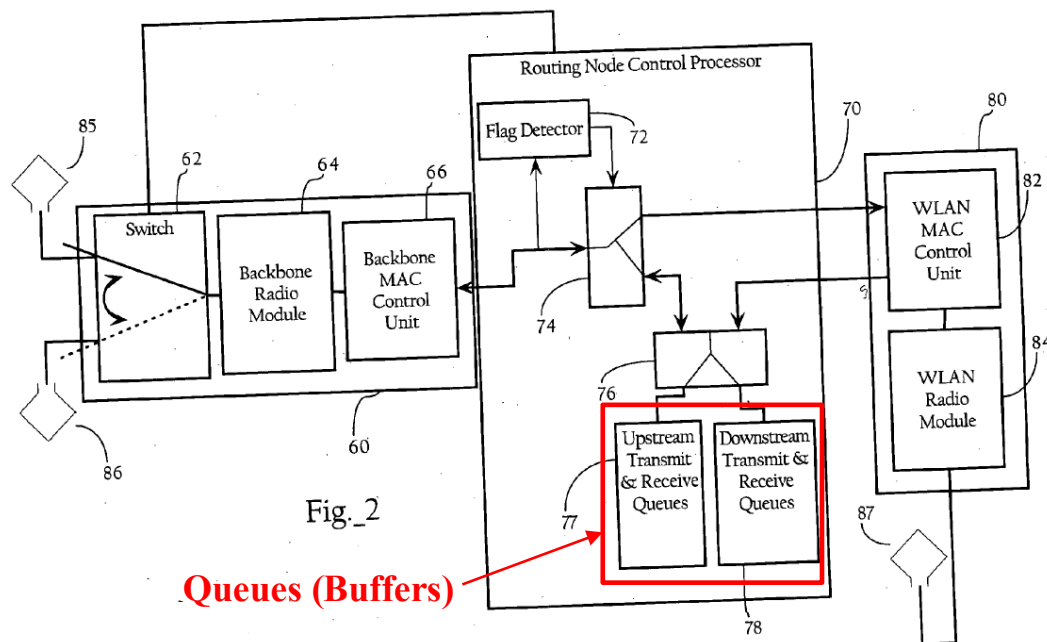


Fig. 2

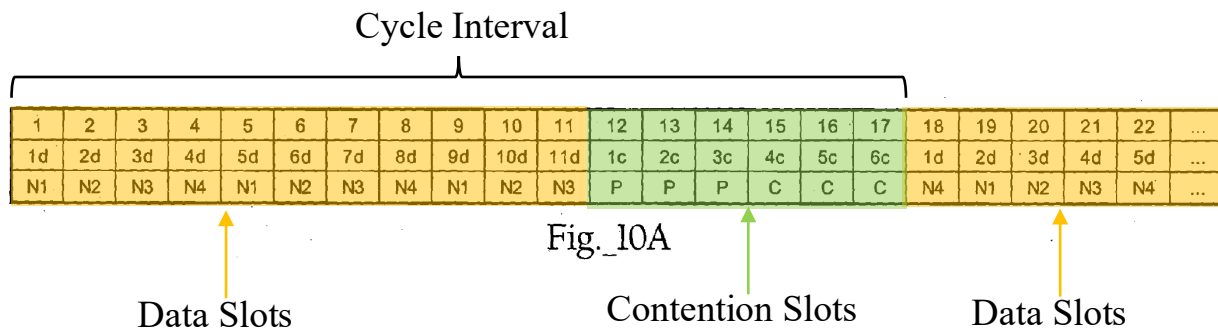
Queues (Buffers)

Ex.1005, Fig. 2 (annotated); Ex.1003, ¶47.

Castagnoli also discloses a “slot-based synchronization mechanism” for synchronizing transmissions among parent and child routing nodes in the wireless mesh network. Ex.1005, [0006], Abstract. The slot-based synchronization mechanism utilizes “a time slot scheduling algorithm” where “slot scheduling information propagates throughout the mesh[, so that] individual nodes [] compute their respective time slot schedules based on this information and the current state of the network.” Ex.1005, [0031]. A parent routing node sends a child routing node

slot scheduling information to indicate “when the parent has scheduled communications with it.” Ex.1005, [0107]. That is, the slot scheduling information includes the parent’s slot schedule. Ex.1005, [0111]; Ex.1003, ¶48.

The slot schedules of the parent and child routing nodes are based on cycle intervals comprising fixed, uniform numbers of data slots and contention slots, shown below in Figure 10 of Castagnoli. Ex.1005, [0107]. A parent node “cycl[es] through its child nodes” when allocating available data slots (e.g., 1-11) among its child routing nodes (e.g., N1-N4). Ex.1005, [0111]. “[C]ontention slots are optional,” so an “implementation need not include contention slots.” Ex.1005, [0108]; Ex.1003, ¶49.



Ex.1005, Fig. 10A (annotated); Ex.1003, ¶49.

Each routing node has a “neighbor state machine” for discovering neighboring routing nodes to “identify a potential parent routing node with which to synchronize.” Ex.1005, [0045], [0049]. This neighbor state machine includes a SEEK state in which a routing node “scans all available operating channels,

broadcasting neighbor request packets and listening for neighbor response packets.” Ex.1005, [0049]. Castagnoli discloses that “typically,” a routing node has a dedicated radio that performs the scanning step by “monitoring the RF environment and other conditions on multiple radio frequencies.” Ex.1005, [0007]. Routing nodes also have a separate radio dedicated “for access,” and “one or more” separate radios dedicated “to service the backhaul.” Ex.1005, [0007]; Ex.1003, ¶50.

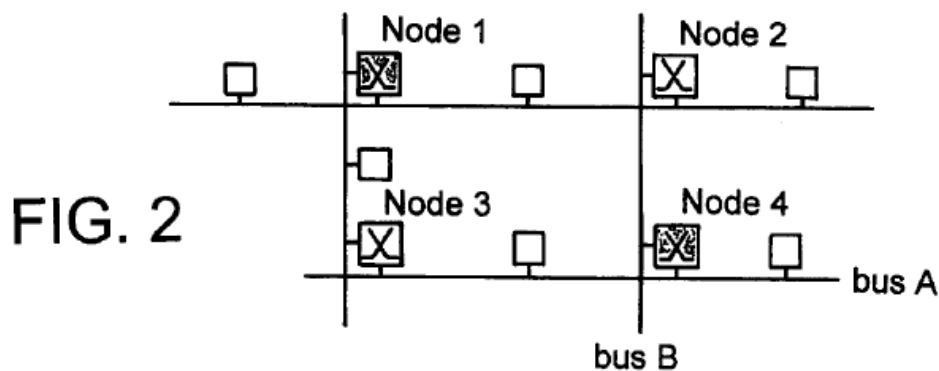
2. Bohm

Bohm is analogous art to the ’385 patent for two reasons. First, it is directed to the same field of endeavor as the ’385 patent. The ’385 patent is directed to “Wireless Multiple Radio Mesh” networks. Ex.1001, Title, Abstract. Likewise, Bohm is directed to a network of “nodes interconnected in a mesh structure.” Ex.1006, 5:4-5, 7:20-21; Ex.1003, ¶52.

Second, Bohm is analogous art to the ’385 patent because it is reasonably pertinent to a problem the inventors of the ’385 patent attempted to solve. The ’385 patent attempts to address the problem of “coordinat[ing] all these sampling times,” i.e., the times child nodes “sample other candidate parents,” “by having the parent node (P1 FIG. 3) send a token ... to each of its children.” Ex.1001, 4:23-28. Likewise, Bohm describes transferring tokens associated with data time slots to nodes so that only the nodes with the token can transmit during that data time slot,

thereby coordinating data transmission among the nodes. Ex.1006, 12:9-13, 4:56-63, 13:12-13, 36-40. Thus, Bohm is analogous art to the '385 patent. Ex.1003, ¶53.

Bohm describes “a method and arrangement for centralized and distributed management of capacity (communication resources) in a circuit switched network with shared medium topology such as bus or ring topology.” Ex.1006, 4:49-52. Multiple buses can be interconnected to form a network of nodes in a mesh structure, as shown in FIG. 2 of Bohm below. Ex.1006, 5:4-5, 7:20-21. The capacity is “divided into cycles which in turn are divided into control time slots for signaling and data time slots for data transmission. Each data time slot is associated with a token.” Ex.1006, 4:54-57. A controller of a node “may write data into a slot only if it owns the corresponding token.” Ex.1006, 12:9-11; Ex.1003, ¶54.



Ex.1006, Fig. 2.

Bohm discloses a “centralized server [token management] mechanism” or scheme where “a single node controller manage[s] all free tokens.” Ex.1006,

13:11-13. In this mechanism, “a first node, called server node, [] is assigned tokens corresponding to the unidirectionally flowing data time slots on the communication link.” Ex.1006, 4:57-60. The server node “reserves and transfers tokens” to nodes that “lock[] them throughout the channel life-time” while “transmitting data using the reserved slots,” i.e., slots that are associated with the reserved tokens. Ex.1006, 4:62-63, 13:20-21, 36-40. Once the reservation expires, “the tokens are immediately returned to the manager” node. Ex.1006, 13:21-23; *see also* Ex.1006, 22:40-43; Ex.1003, ¶55.

3. Reasons to combine

It would have been obvious to a POSITA to combine Castagnoli and Bohm because the combination is nothing more than a simple substitution of one known, equivalent element for another to obtain predictable results. Specifically, the combination is a simple substitution of the use of tokens to coordinate data transmission by nodes so as to avoid interference therebetween, as taught by Bohm, for packet collision avoidance mechanism to avoid radio interference between routing nodes, as taught by Castagnoli, to obtain the predictable result of avoiding node interference. Ex.1003, ¶56.

As discussed at [2.5], it would have been obvious to a POSITA that, when there are no contention slots, the assignment of time slots to child nodes for performing neighbor discovery would correspond to Castagnoli’s assignment of

time slots to child nodes for performing data transmission. A parent node assigns time slots to child nodes for performing data transmission according to Castagnoli's "slot-based transmission scheduling mechanism," i.e., "a time slot scheduling algorithm [that] coordinate[s] communications between wireless nodes of a hierarchical tree." Ex.1005, [0107], [0031]. The algorithm includes a parent node performing "clock synchronization across routing nodes," such as across its child nodes, and "each routing node ... generally employ[ing] a packet collision avoidance mechanism as part of the wireless communications protocol." Ex.1005, [0118], [0008]. A POSITA would have understood that a parent node performs the clock synchronization process and each child node employs the "packet collision avoidance mechanism" so that each child node can perform data transmission (corresponding to performing neighbor discovery, as discussed above) without interference from another child node performing its own neighbor discovery. Ex.1003, ¶57.

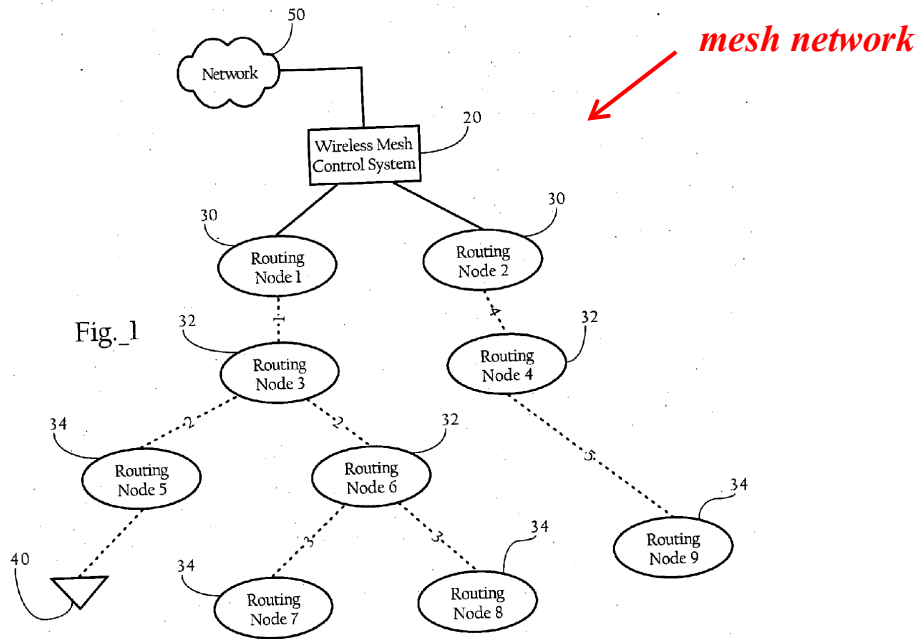
Before the '385 patent's priority date, a well-known network communication technique for avoiding interference between nodes of a network was the use of tokens to provide transmission permission to nodes, where only a holder of a token in a network has permission to perform data transmission. Material Fact #6; Ex.1003, ¶58.

As discussed below at [2.7] in Ground 1, Bohm discloses an example implementation of the use of tokens to coordinate data time slot access by nodes, thereby avoiding interferences therebetween during data transmission or neighbor discovery. Because “[e]ach data time slot is associated with a token” and a node can use a data time slot “only if it owns the corresponding token,” a POSITA would have understood that interference between child nodes performing data transmission (corresponding to performing neighbor discovery, as discussed above) can be avoided by using tokens to coordinate neighbor discovery by the child nodes, as taught by Bohm. Ex.1006, 4:56-57; 12:10-11. The results would have been predictable because Bohm teaches that its “token protocol guarantees the slot access to be conflict free, which means that at most one node writes data into the same slot.” Ex.1006, 12:11-13; Ex.1003, ¶59.

4. Claim 2

[2.0] A mesh network comprising:

Castagnoli illustrates a “wireless mesh network” in Figure 1, annotated below. Ex.1005, [0032]; Ex.1003, ¶61.

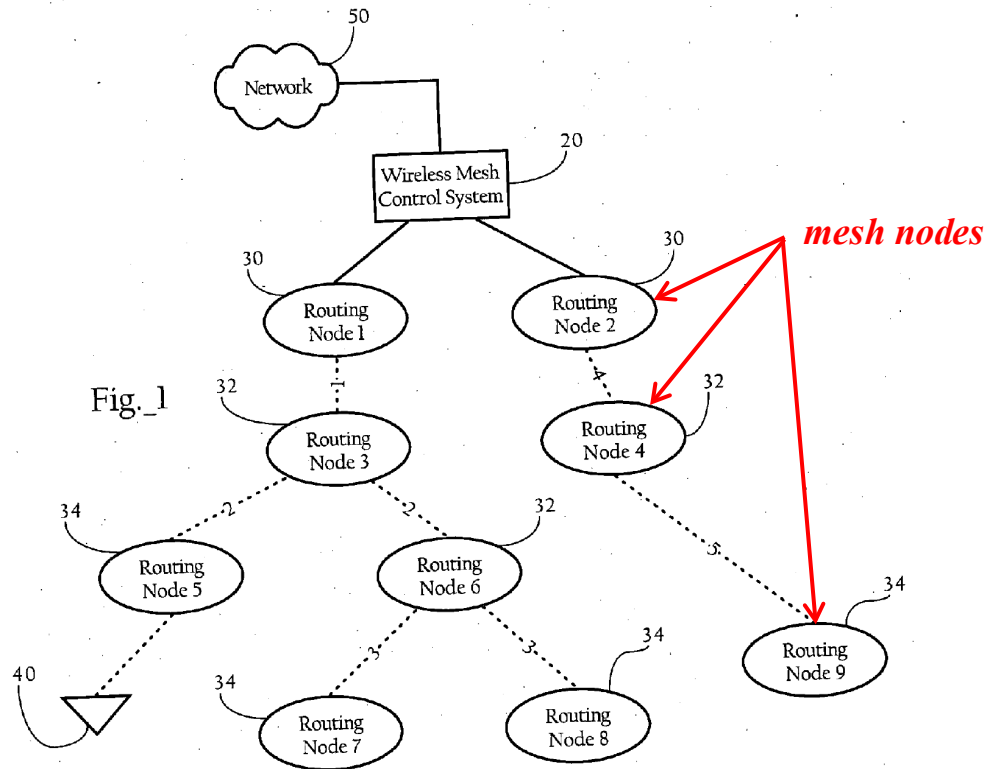


Ex.1005, Fig. 1 (annotated); Ex.1003, ¶61.

Castagnoli’s wireless mesh network renders obvious the claimed “*mesh network*.” Ex.1003, ¶¶60-61.

[2.1] a plurality of mesh nodes;

Castagnoli illustrates in Figure 1 that the wireless mesh network includes a “plurality of routing nodes,” also known as “mesh routing nodes.” Ex.1005, [0032], [0036]; Ex.1003, ¶62.



Ex.1005, Fig. 1 (annotated); Ex.1003, ¶62.

Castagnoli’s plurality of routing nodes renders obvious the claimed
“*plurality of mesh nodes.*” Ex.1003, ¶62.

[2.2] wherein at least one mesh node of the mesh network is configured to scan a Radio Frequency (RF) environment using a dedicated scanning radio to determine a new potential parent mesh node for connecting with said at least one mesh node;

Castagnoli explains in its background section that in typical mesh wireless networks, it was known for nodes to “dedicate a radio for the purposes of monitoring the RF [radio frequency] environment and other conditions on multiple radio frequencies.” Ex.1005, [0007]. Castagnoli’s description of a radio dedicated to monitoring multiple radio frequencies renders obvious a “*dedicated scanning*

radio” that is “*configured to scan a Radio Frequency (RF) environment*” as claimed. Ex.1003, ¶63.

Castagnoli also describes techniques for managing connections between routing nodes in its wireless mesh network, including identifying potential parent routing nodes:

In one implementation, the neighbor and route management functionality implemented on each node is responsible for one or more of the following tasks: 1) **discovering neighboring routing nodes**; 2) maintaining a list of attractive neighbor routing nodes **as tentative parent routing nodes**; 3)....

Ex.1005, [0046]; Ex.1003, ¶64.

Castagnoli explains that a routing node discovers neighbor routing nodes by “scan[ning] all available operating channels.” Ex.1005, [0049]. “A routing node can choose a potential parent from among the discovered neighbors....” Ex.1005, [0052]. Thus, Castagnoli’s neighbor routing node renders obvious the claimed “*new potential parent mesh node for connecting with said at least one mesh node.*” Ex.1003, ¶¶64-65.

Castagnoli does not expressly state that routing nodes in its Figure 1 network scan for neighbor routing nodes using the dedicated scanning radio described in Castagnoli’s background. It would have been obvious to a POSITA for the Figure 1

nodes to incorporate a dedicated scanning radio, however, for multiple reasons.

Ex.1003, ¶66. First, Castagnoli expressly states that employing a dedicated scanning radio is “typical[.]” Ex.1005, [0007]. Using a technique that is “prevalent” in a field of technology is per se obvious. *Randall Mfg. v. Rea*, 733 F.3d 1355, 1363 (Fed. Cir. 2013); Ex.1003, ¶66.

Second, the neighbor-scanning process “scans all available operating channels,” and a POSITA would have known that a radio can only scan one operating channel at a time. Material Fact #2; Ex.1003, ¶67. A POSITA also would have known that while a radio is being used to scan an operating channel, the radio is unavailable to engage in data communication. Material Fact #3; Ex.1003, ¶68. Thus, a POSITA would have been motivated to employ the described dedicated scanning radio for the purpose of scanning the RF environment for potential parent nodes. Ex.1003, ¶69. Using the dedicated scanning radio would allow the other radio or radios in the node to be used for active data communication on other channels. Material Fact ##3, 5. Consistent with that idea, Castagnoli describes how nodes “typically dedicate one radio for access” and “one or more to service the backhaul.” Ex.1005, [0007]. It would have been obvious to a POSITA that for a radio **dedicated** to access or backhaul activities, the radio would not be used for scanning for potential parents. Ex.1003, ¶70.

Third, dedicating one radio for scanning the RF environment for potential

parent nodes was merely the use of a known technique (a dedicated scanning radio) to improve similar devices (Castagnoli's routing nodes of Figure 1) in the same way (allowing RF scanning to occur without disrupting data communications occurring on other radios). Ex.1003, ¶71. Using a dedicated scanning radio "according to its established function" would have been obvious, regardless of whether doing so provides any "improvement in a categorical sense." *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380-1381 (Fed. Cir. 2023) (cleaned up). Ex.1003, ¶71.

In summary, Castagnoli describes (1) the use of a dedicated scanning radio and (2) scanning the RF environment for potential parent nodes, which in combination render obvious this limitation. Ex.1003, ¶72.

[2.3] wherein said at least one mesh node includes, in addition to the scanning radio, at least two relay radios in each mesh element¹ and

Castagnoli explains that "wireless mesh routing nodes can be one-, two-, or multiple radio systems," with the multiple radio systems dedicating "one or more [radios] to service the backhaul." Ex.1005, [0007]. A POSITA would have

¹ The recitation "mesh element" has no antecedent basis and the specification never uses the phrase. Whether the phrase is understood to mean the at least one mesh node, or a component thereof, Castagnoli's two or more backhaul traffic radios discussed in [2.3] render this limitation obvious.

understood that Castagnoli's reference to "backhaul" traffic referred to forwarding packets among the routing nodes. Ex.1003, ¶73. By explaining that more than one radio may be used for backhaul traffic, Castagnoli expressly contemplates using at least two backhaul traffic radios. Thus, under Patent Owner's litigation theories, Castagnoli's description of a routing node with "one or more [radios] to service the backhaul" render obvious a routing that has "*at least two relay radios in each mesh element.*" Ex.1036, 32-34; Ex.1003, ¶73. The obviousness of employing "at least two relay radios" is also demonstrated by Castagnoli's discussion of using separate channels for upstream and downstream communications among the routing nodes. *See infra*, [2.4]; Ex.1003, ¶73.

The radios used for backhaul traffic are separate from the radio dedicated "for the purposes of monitoring the RF environment," i.e., *the scanning radio*. Ex.1005, [0007]; *see supra*, [2.2]. Thus, the backhaul radios are provided "*in addition to the scanning radio*" as claimed. Ex.1003, ¶¶74-75.

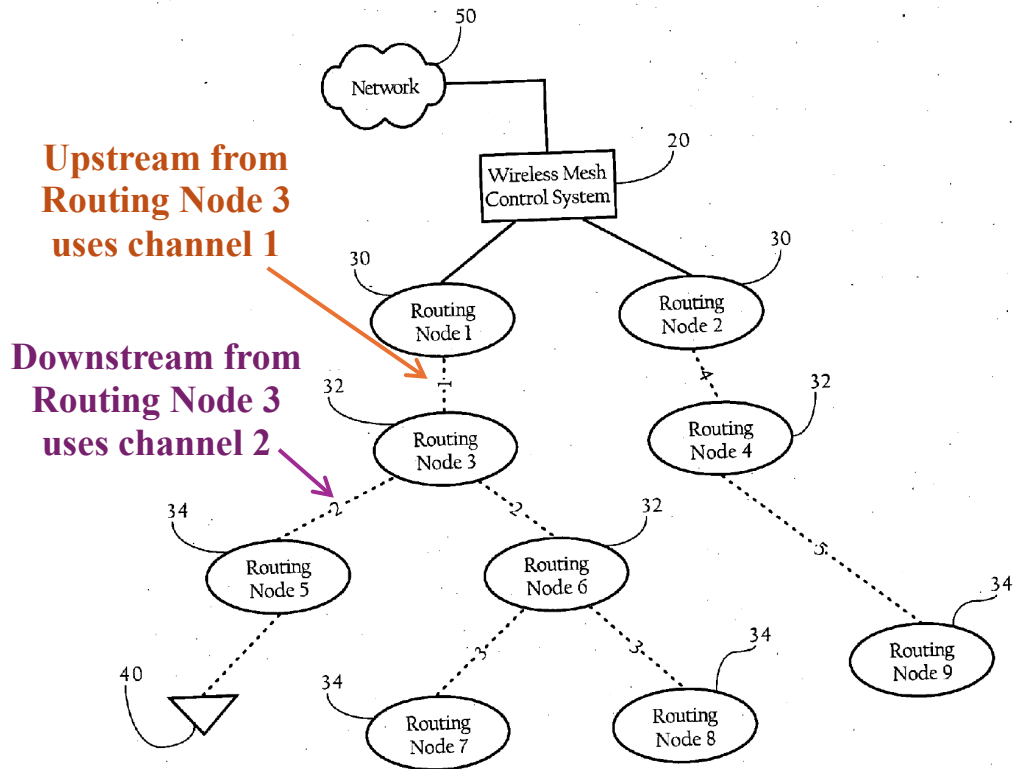
[2.4] wherein said scanning radio and said at least two relay radios operate on different non-interfering channels;

Castagnoli describes how routing nodes use different channels for upstream and downstream communications:

FIG. 1 also illustrates a channel assignment within a given frequency band between routing nodes according to one possible implementation of the present invention. In one

implementation, the routing nodes for a given tree and a given hop are set to the same channel. Additionally, for a given routing node, the **operating channel for upstream data transfer, in one implementation, is different than the operating channel used for downstream data transfer**. For example, wireless transmissions between routing node 1 and routing node 3 occur on channel 1, while routing node 3 communicates with routing node 5 and routing node 6 on channel 2. In one implementation, the upstream and downstream channels assigned to a given routing node are **non-overlapping channels**....

Ex.1005, [0034]; Ex.1003, ¶¶76-77.



Ex.1005, Fig. 1 (annotated); Ex.1003, ¶77.

As discussed at [2.3], Castagnoli also suggests for routing nodes to employ two separate radios for “backhaul” traffic, such as the upstream and downstream data transfers discussed in the above quotation. *See, e.g.,* Ex.1005, [0007]. Since the upstream communications use a different channel than the downstream communications, it would have been obvious to a POSITA for a routing node with two backhaul radios to use a first radio for upstream communications on the upstream channel (i.e., an “uplink” radio), and to use the second radio for downstream communications on the downstream channel (i.e., a “downlink” radio). Ex.1003, ¶78.

Additionally, the use of “different non-interfering channels” by Castagnoli’s routing nodes would have been obvious because it is merely a design choice: “the **selection of frequency band** for wireless backbone traffic and wireless traffic between clients and routing nodes **is a matter of engineering choice.**” Ex.1005, [0039]. The claimed *scanning radio* and two relay radios can either operate on interfering channels, or they can operate on “*different non-interfering channels.*” Ex.1003, ¶79. The limited number of potential design choices renders them obvious. *ACCO Brands Corp. v. Fellowes, Inc.*, 813 F.3d 1361, 1367 (Fed. Cir. 2016) (“Each of these two design choices is an obvious combination of prior-art elements.”); *see also Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1340 (Fed. Cir. 2020).

[2.5] wherein while said at least one mesh node samples potential new parent nodes, packets to be sent to said at least one mesh node from its current parent node are buffered by the current parent node, and

Sampling of potential parent nodes: Castagnoli describes evaluating potential parent nodes by transmitting a “neighbor request packet” to a selected potential parent. Ex.1005, [0075], [0054]. The potential parent replies with a “neighbor response packet” containing various information, including the “detected SNR [signal-to-noise ratio] of the neighbor request packet,” “the detected receive error rate of the neighbor request packet,” and “the number of hops to the root routing node.” Ex.1005, [0047]. These values are then used in

choosing a parent node, including whether to switch from a current parent node.

Ex.1005, [0052], [0054]; Ex.1003, ¶80.

A POSITA would have found it obvious for a node to prefer for its parent node to provide a high signal-to-noise ratio, a low error rate, and few hops to the root routing node. Ex.1003, ¶81. Castagnoli discusses “selecting a parent routing node” based on “the ease/effectiveness of a link,” where, for example, “a link that exhibits a low SNR could provide a low data rate either by virtue of the poor SNR itself, or by the effective data rate resulting from a high error rate and consequent re-transmissions.” Ex.1005, [0071]. By measuring these values and evaluating neighbor nodes for their potential usefulness as a parent node, Castagnoli renders obvious that a node “*samples potential new parent nodes*” as claimed. Ex.1003, ¶¶80-82.

Buffering while sampling: Castagnoli suggests that a node may “attempt neighbor discovery” (i.e., evaluate neighbor nodes as discussed immediately above) during a “contention slot.” Ex.1005, [0136]. However, Castagnoli also explains that “contention slots are optional,” so an “implementation need not include contention slots.” Ex.1005, [0108]. In the instance that there are no contention slots for a node to use for neighbor discovery, it would have been obvious to a POSITA for the node’s current parent node to assign it one or more slot times for performing neighbor discovery. Ex.1006, [0011], [0018]; Ex.1003,

¶¶83-84.

Having the current parent assign a neighbor discovery slot would have been obvious because in Castagnoli's system, "a routing node receives slot scheduling information from its parent node indicating when the parent has scheduled communications with it, and then uses this information to schedule its own child routing nodes." Ex.1005, [0107]. While Castagnoli describes a scheduling algorithm that does not allocate a time slot for neighbor discovery, Castagnoli acknowledges that "if contention slots are not used[,] this scheduling algorithm should be modified accordingly." Ex.1005, [0127]; Ex.1003, ¶85.

It would have been obvious to a POSITA for a current parent node to buffer packets to be sent to a child node while that child node was performing neighbor discovery (including exchanging packets with a neighbor). Ex.1003, ¶86. Buffering packets during neighbor discovery would have been obvious, in part, because the child node's uplink radio performing neighbor discovery would tune to the channel of the neighbor's downlink radio, which Castagnoli shows as a different channel than the child node's current parent. Ex.1005, Fig. 1; *see also infra*, [3.5]. Because the child node's uplink radio would not be tuned to its current parent's downlink channel, the child node would not receive a parent node transmission sent while the child node was performing neighbor discovery. Material Fact #2-3, 5; *see also* Ex.1005, Fig. 1, [0111]; Ex.1003, ¶¶67, 68, 109. Buffering would prevent such

failed transmissions by storing them in queues until the child node is tuned once again to its current parent node's downlink channel, thereby avoiding a "low" "effective data rate [for the link between the routing nodes] resulting from a high error rate and consequent re-transmissions." Ex.1005, [0071]; Ex.1003, ¶86.

To facilitate the buffering of packets, each routing node "maintains separate transmit and receive queues for each of the parent and child routing nodes to which the current node is associated." Ex.1005, [0040]. Packets to be transmitted are placed in these queues. Ex.1005, [0153]. Thus, it would have been obvious for a parent node to enqueue a packet to be transmitted to a child when the parent node was not transmitting packets to the child node, including while the child node was busy performing neighbor discovery procedures. Ex.1003, ¶87. By storing packets in a transmission queue, Castagnoli renders obvious that "*packets to be sent to said at least one mesh node from its current parent node are buffered by the current parent node.*" Ex.1003, ¶87.

[2.6] packets to be sent from said at least one mesh node to its current parent are buffered by said at least one mesh node;

As discussed at [2.5], Castagnoli renders obvious for a parent node to enqueue ("*buffer[]*") a packet to be transmitted to a child node. Castagnoli similarly explains that each routing node has a "transmit... queue[]" for each of the parent... routing nodes to which the current node is associated." Ex.1005, [0040].

A child node transmits packets to its current parent during data slots that are

“dedicated for flow of traffic between [the current] parent [node] and [the] child node.” Ex.1005, [0124], [0107] (“during a given data slot, a routing node communicates with only one other routing node (such as its parent routing node...)”). Ex.1003, ¶88.

While a child node is performing neighbor discovery with potential parent nodes (including transmitting and receiving neighbor messages on potentially different channels), it would have been obvious to a POSITA for the child node not to transmit packets to its current parent and instead enqueue those packets. Ex.1003, ¶89. During neighbor discovery, the child node’s upstream radio would be tuned to a different channel to attempt communication with its neighbors (that is, the upstream radio would tune to a channel that the current parent node is not listening to). Ex.1005, [0034]. Thus, it would have been obvious for a child node to enqueue a packet to be transmitted to its parent when the child node was not transmitting packets to its current parent node, including while the child node was busy performing neighbor discovery procedures. Ex.1003, ¶89. By storing packets in a transmission queue, Castagnoli renders obvious that “*packets to be sent from said at least one mesh node to its current parent are buffered by said at least one mesh node.*” Ex.1003, ¶89.

[2.7] wherein sampling times are coordinated among multiple mesh nodes having a common current parent node whereby the common current parent node sends tokens to each of its children in a round-robin manner.

Sampling times of multiple mesh nodes having a common current parent

node: As discussed at [2.5], in the instance where there are no contention slots, a routing node's current parent node assigns the routing node one or more data slot times ("*sampling times*") for performing neighbor discovery. Castagnoli describes a parent node having more than one "child nodes" (*see, e.g., Ex.1005, [0031]*); thus, it would have been obvious to a POSITA that a parent node ("*a common current parent node*") of more than one child nodes ("*multiple mesh nodes having a common current parent node*") assigns each of the child nodes one or more data slot times ("*sampling times*") for performing neighbor discovery. Ex.1003, ¶91.

Sending tokens to child routing nodes to coordinate neighbor discovery: The '385 patent describes a "token" "as an application specific information element (ASIE) to be used by the children mesh nodes to determine which child node is allowed to sample other potential parent nodes," thereby "coordinat[ing] all these sampling times." Ex. 1001, 4:25-33. A "token," "[i]n networking," is understood to be information "used to confer transmit privileges to a computer on a local area network," and "coordinate[] use of [a] control packet network among the nodes connected to it." Ex.1018, 703; Ex.1003, ¶92.

Bohm discloses an example implementation of the use of tokens to coordinate data time slot access by nodes, which "guarantees the slot access to be conflict free, which means that at most one node writes data into the same slot."

Ex.1006, 12:11-13. Bohm explains that “[w]rite access to slots is controlled by slot tokens,” i.e., “each data time slot is associated with a token,” and “[a] node controller may write data into a slot only if it owns the corresponding token.”

Ex.1006, 4:56-57, 12:9-11. A “single node controller” is responsible for “manag[ing] all free tokens” in the network and “reserves and transfers tokens ... to the other node[s].” Ex.1006, 13:12-13, 4:62-63. The other nodes then utilize the tokens to “transmit[] data using the reserved slots” associated with the received tokens. Ex.1006, 13:39-40. In other words, Bohm teaches that a single node controller that is responsible for managing tokens in a network coordinates data transmission by nodes of the network by sending tokens, each of which is associated with a data slot time, to network nodes so that only a node that is in possession of a token can utilize the data slot time that is associated with that token to perform data transmission. Ex.1006, 12:9-13, 4:56-63, 13:12-13, 36-40; Ex.1003, ¶93.

As discussed at [2.5], it would have been obvious to a POSITA that Castagnoli’s assignment of time slots to child nodes for performing data transmission would correspond to the assignment of time slots to child nodes for performing neighbor discovery when there are no contention slots. The combination of Castagnoli and Bohm would have suggested to a POSITA that when a parent node assigns each of its child routing nodes one or more data slot

times (“*sampling times*”) for performing data transmission (i.e., for performing neighbor discovery), the parent node also transfers tokens associated with the one or more data slot times to the child routing nodes (“*whereby the common current parent node sends tokens to each of its children*”) to coordinate the timing of the nodes’ neighbor discovery and avoid interference between the nodes (“*sampling times are coordinated among multiple mesh nodes having a common current parent node*”). Ex.1003, ¶94.

Round-robin: Castagnoli illustrates in Figure 10A a parent node’s assignment of 11 data slots to 4 child nodes. The child nodes are labeled as N1 through N4. The parent node setting this schedule assigns data slots “evenly across its child nodes” by “cycling through its child nodes.” Ex.1005, [0111]. The figure shows that the time slots are repeatedly assigned from node N1 to node N4, which a POSITA would have recognized as assigning time slots in a “*round-robin manner*” as claimed. Ex.1003, ¶95.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	...
1d	2d	3d	4d	5d	6d	7d	8d	9d	10d	11d	1c	2c	3c	4c	5c	6c	1d	2d	3d	4d	5d	...
N1	N2	N3	N4	N1	N2	N3	N4	N1	N2	N3	P	P	P	C	C	C	N4	N1	N2	N3	N4	...

Fig. 10A

Parent node assigns time slots to its four child nodes N1 to N4 in a “*round-robin manner*”

Ex.1005, Fig. 10A (annotated); Ex.1003, ¶95.

Because assigning time slots to child nodes for performing neighbor

discovery corresponds to Castagnoli's assignment of time slots to child nodes for performing data transmission, as shown above in this section, a POSITA would have found it obvious for a parent node to use the same cyclical time-slot assignment technique when allocating time slots to child nodes during which the child nodes would perform neighbor discovery. Further, because the parent node sends tokens associated with the time slots to the child nodes when assigning the time slots to the child nodes, a POSITA would have found it obvious for the parent node to send the tokens to the child nodes in the same manner as it assigns the time slots, i.e., in a cyclical "*round-robin manner*." The round-robin scheduling algorithm was a simple and well-known scheduling algorithm, and therefore would have been an obvious choice for allocating neighbor discovery time slots among child nodes as well as sending the tokens associated with the time slots to the child nodes. Material Fact #1; Ex.1003, ¶96.

In summary, Castagnoli describes assigning time slots to child nodes in a repeated sequential order, and Bohm discloses a single node controller sending other nodes tokens that are associated with data time slots so that only a node that is in possession of a token can use the data time slot associated with that token, rendering obvious this limitation. Ex.1003, ¶97.

5. Claim 3

[3.0] A mesh network comprising:

See analysis of [2.0], which is identical. Ex.1003, ¶98.

[3.1] a plurality of mesh nodes;

See analysis of [2.1], which is identical. Ex.1003, ¶99.

[3.2] wherein each node within said plurality of nodes comprises at least three radios further including:

As discussed at [2.2] and [2.3], Castagnoli describes wireless mesh routing nodes that each have at least three radios dedicated to various purposes:

The wireless mesh routing nodes can be one-, two-, or multiple radio systems.... Multiple radio designs typically dedicate one radio **for access**, one or more to service the **backhaul**, and may also dedicate a radio for the purposes of **monitoring the RF environment**....

Ex.1005, [0007]; Ex.1003, ¶100.

It would have been obvious to a POSITA for the nodes in Castagnoli's Figure 1 mesh network to each have three radios because the description of a three-radio node is part of Castagnoli's discussion of how wireless mesh communication networks "typically" work. Ex.1005, [0007]; Ex.1003, ¶101. Thus, Castagnoli renders obvious this limitation. Ex.1003, ¶101.

[3.3] a first relay radio operating on a first RF channel at a first point in time and dedicated to uplink connections to a single current parent node;

As discussed at [3.2], Castagnoli describes a typical mesh node dedicating "one **or more** [radios] to service the backhaul." Ex.1005, [0007]. As discussed at

[2.3], this disclosure of multiple backhaul radios renders obvious a mesh node having “*at least two relay radios.*” Ex.1003, ¶102.

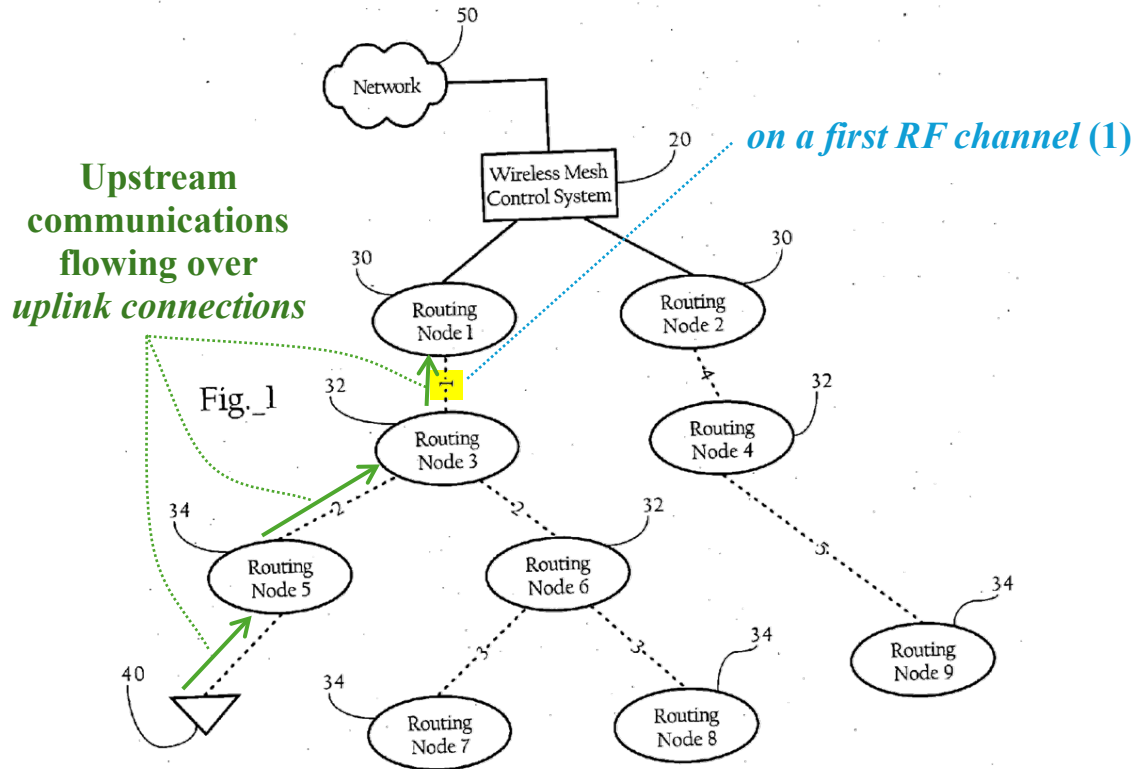
It would have been obvious to a POSITA for a mesh node in Castagnoli to have one backhaul radio “*dedicated to uplink connections to a single current parent node.*” Ex.1003, ¶103; *see also supra*, [1.6]. Castagnoli describes a “hierarchical” network topology, shown in Figure 1 (annotated below), in which each mesh node is in communication with one parent node. Ex.1005, [0032]. These node-to-node communications are what Castagnoli refers to as the “backhaul.” Ex.1003, ¶103 (citing Ex.1005, [0007], [0033]). It would have been obvious to a POSITA for the internode communications to include “*uplink connections,*” since Castagnoli describes “upstream” communications from wireless clients to a “wired network at the top of the hierarchy” (Ex.1005, [0007]):

FIG. 1 illustrates a wireless mesh network according to an implementation of the present invention. In one implementation, the wireless mesh network includes a wireless mesh control system 20, and a plurality of routing nodes. In one implementation, a hierarchical architectural overlay is imposed on the mesh network of routing nodes to create a downstream direction towards leaf routing nodes 34, and **an upstream direction toward the root routing nodes 30**. For example, in the hierarchical mesh network illustrated in FIG. 1, first hop routing node 130 is the parent of intermediary routing node 332. In addition,

intermediate routing node 332 is the parent to leaf routing node 534, and intermediate routing node 632. In one implementation, this hierarchical relationship is used in routing packets between wireless clients 40, or **between wireless clients 40 and network 50.**

Ex.1005, [0032]; Ex.1003, ¶103.

Figure 1 also shows, for connections between two nodes, “a channel assignment within a given frequency band,” which corresponds an “*RF channel*.” Ex.1005, [0034]. Dr. Hansen has annotated a portion of the upstream communications on Castagnoli’s Figure 1, below. As one example of the channel assignments, Figure 1 shows that Routing Node 3 receives upstream communications on channel 2 and transmits upstream communications to Routing Node 1 (“*uplink connections to a single current parent node*”) on channel 1 (“*a first RF channel*”). Ex.1003, ¶104.



Ex.1005, Fig. 1 (annotated); Ex.1003, ¶104.

Since Castagnoli's Routing Node 3 receives upstream (backhaul) communications on a different channel than it transmits upstream (backhaul) communications, and since Castagnoli suggests that a node may dedicate two radios to backhaul service, it would have been obvious to a POSITA for one of the backhaul-dedicated radios to be dedicated to communications with Routing Node 1 on channel 1. Ex.1003, ¶105. The second backhaul-dedicated radio would be dedicated to communications with Routing Nodes 5 and 6 on channel 2. Ex.1003, ¶105. This arrangement would have been obvious because it would allow each of the backhaul-dedicated radios to generally remain on the assigned frequency, minimizing the amount of time lost to switching between channels, reducing the

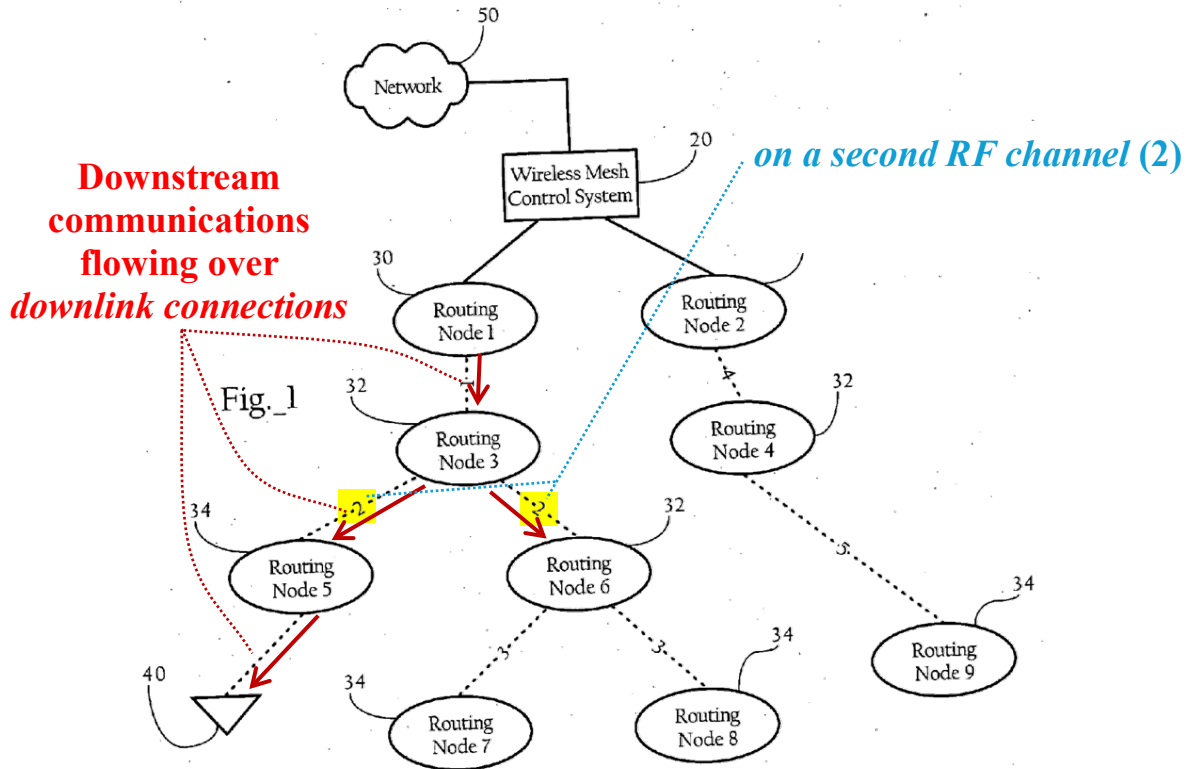
likelihood of failing to receive a communication because a radio was tuned to a different channel, and allowing for simultaneous upstream and downstream communications. Material Facts ##2-3, 5; Ex.1003, ¶105.

In summary, Castagnoli describes dedicating radios to backhaul service and shows a routing node communicating with a parent node on an assigned channel, which renders obvious this limitation. Ex.1003, ¶106.

[3.4] a second relay radio operating on a second RF channel at [the] first point in time and dedicated to downlink connections to zero or more child nodes; and

As discussed at [3.3], Castagnoli renders obvious dedicating one of two “backhaul” radios to handling upstream traffic to a parent node. For similar reasons, Castagnoli renders obvious this limitation relating to “*downlink connections to... child nodes.*” Ex.1003, ¶107.

Figure 1 also shows, for connections between two nodes, “a channel assignment within a given frequency band,” which corresponds to an “*RF channel.*” Ex.1005, [0034]. Dr. Hansen has annotated a portion of the downstream communications on Castagnoli’s Figure 1, below. As one example of the channel assignments, Figure 1 shows that Routing Node 3 receives downstream communications on channel 1 and transmits downstream communications to Rounding Nodes 5 and 6 on channel 2. Ex.1003, ¶108.



Ex.1005, Fig. 1 (annotated); Ex.1003, ¶108.

Since Castagnoli's Routing Node 3 transmits downstream (backhaul) communications on a different channel than it receives downstream (backhaul) communications, and since Castagnoli contemplates Routing Node 3 having two radios dedicated to backhaul service, it would have been obvious to a POSITA for one of the backhaul-dedicated radios to be dedicated to communications with Routing Node 1 on channel 1. Ex.1003, ¶109. The second backhaul-dedicated radio would be dedicated to downstream communications with Routing Nodes 5 and 6 on channel 2 ("*second relay radio operating on a second RF channel... dedicated to downlink connections to zero or more child nodes*"). Ex.1003, ¶109. This arrangement would have been obvious because it would allow each of the

backhaul-dedicated radios to generally remain on the assigned frequency, minimizing the amount of time lost to switching between channels, reducing the likelihood of a communication being missed or lost because a radio was tuned to a different channel, and allowing for simultaneous upstream and downstream communications. Material Facts ##2-3, 5; Ex.1003, ¶109.

A POSITA would have immediately recognized that with the upstream and downstream radios operating on different channels, both radios may be operated simultaneously without interfering with one another. Material Fact #5; Ex.1003, ¶110 (citing Ex.1008, [0064]; Ex.1009, [0039]). Thus, it would have been obvious for Castagnoli's downstream radio ("*second relay radio*") to operate while the upstream radio is also operating ("*at [the] first point in time*"). Ex.1003, ¶110.

In summary, Castagnoli describes a routing node with multiple radios conducting upstream and downstream communications on separate channels, which renders obvious this limitation. Ex.1003, ¶111.

[3.5] a dedicated scanning radio operating on a third RF channel at [the] first point in time and configured to scan a Radio Frequency (RF) environment to discover new potential parent mesh nodes for connecting with said first relay radio;

As analyzed at [2.2] and [1.5], Castagnoli renders obvious for a mesh node to include a "*dedicated scanning radio*" "*configured to scan a Radio Frequency (RF) environment... to determine a new potential parent mesh node.*" Ex.1003, ¶112; see Ex.1005, [0007], [0046], [0049].

Castagnoli explains that a mesh node dedicates “a radio for the purposes of monitoring... conditions on multiple radio frequencies.” Ex.1005, [0007].

Castagnoli also describes how a node will “discover its neighbor routing nodes” by “scan[ning] all available operating channels.” Ex.1005, [0049]. Thus, it would have been obvious to a POSITA for the scanning radio to operate on a “*third RF channel*” different from the uplink and downlink channels discussed at [3.3] and [3.4]. Figure 1 (annotated below) shows that Routing Node 3 has as potential neighbor nodes at least Routing Node 2 and Routing Node 4, whose respective downlink channels are channels 4 and 5. Ex.1005, Fig. 1. Thus, Routing Node 3 would discover these potential neighbors when Routing Node 3’s scanning radio of tunes to channels 4 and 5 (each a “*third RF channel*”). Because the scanning radio is “dedicate[d]” (Ex.1005, [0007]) to the task of monitoring the RF environment, it would have been obvious to a POSITA for the scanning radio to operate at the same time as the uplink and downlink radios discussed [3.3] and [3.4], i.e., “*at [the] first point in time.*” Ex.1003, ¶113. Alternatively, it would have been obvious for the scanning radio to operate substantially continuously, which also renders obvious for the scanning radio to operate “*at [the] first point in time.*” Ex.1003, ¶113.

nodes identified by the scanning radio would be nodes “*for connecting with said first relay radio,*” i.e., the “*uplink*” radio. Ex.1003, ¶115.

In summary, Castagnoli describes using a dedicated scanning radio and scanning the RF environment to identify potential parent nodes, which renders obvious this limitation. Ex.1003, ¶116.

[3.6] wherein said first, second, and third RF channels are different from each other

See analysis of [2.4], which recites substantially the same concept. Ex.1003, ¶117.

[3.7] wherein after said dedicated scanning radio discovers a potential new parent node, said first relay radio samples the RF link to said potential new parent node using its uplink radio and

As discussed at [2.5], Castagnoli describes how a mesh node exchanges “neighbor” packets with a potential parent node. Ex.1005, [0075], [0054]. This exchange provides various information used to choose whether to switch to a new parent node. Ex.1005, [0047], [0052], [0054]. Thus, the neighbor packet exchange is Castagnoli’s mechanism to “*sample[] the RF link to said potential new parent node.*” Ex.1003, ¶118.

Castagnoli does not expressly state which of a node’s multiple radios is used for exchanging neighbor packets, but it would have been obvious to a POSITA for Castagnoli’s mesh node to use the uplink radio (discussed at [3.3]) to exchange neighbor packets with a potential parent node. Ex.1003, ¶118.

For the reasons discussed at [1.6], a POSITA would have found it obvious for Castagnoli's mesh node to “*sample[] the RF link to said potential new parent node using its uplink radio.*” Ex.1003, ¶119.

Castagnoli also teaches that the overall neighbor-discovery process includes first “scan[ning] all available operating channels,” and then “broadcasting neighbor request packets and listening for neighbor response packets.” Ex.1005, [0049]. Thus, it would have been obvious for Castagnoli's node to exchange neighbor packets (“*sample[] the RF link...*”) only after first identifying a potential parent node using its scanning radio. Ex.1003, ¶120. Sequencing actions in this order would also have been obvious because Castagnoli describes how a neighbor request packet includes a MAC address of the potential parent. Ex.1005, [0075] (“request packets are directly transmitted to the neighbor (i.e., the MAC address of the neighbor is used).”). It would have been obvious for Castagnoli's node to obtain a MAC address of the potential parent by listening to transmissions from the potential parent using its scanning radio. Material Fact #4; Ex.1003, ¶120. Thus, Castagnoli renders obvious for the uplink radio to conduct neighbor packet exchange “*after said dedicated scanning radio discovers a potential new parent node.*” Ex.1003, ¶120.

[3.8] concurrent with said sampling, packets to be sent to the mesh node from its current parent node are buffered by the current parent node, and

As discussed at [2.6], it would have been obvious from Castagnoli for a

mesh node to buffer packets to be sent to its current parent node while its uplink radio is conducting a neighbor packet exchange (“*said sampling*”) with a potential new parent node. Ex.1003, ¶121.

[3.9] packets to be sent from the mesh node to its current parent node are buffered by the mesh node

As discussed at [2.5], it would have been obvious from Castagnoli for a parent node to buffer packets to be sent to its child node while the child node is conducting a neighbor packet exchange with a potential new parent node. Ex.1003, ¶122.

[3.10] wherein sampling times are coordinated among multiple mesh nodes having a common current parent node whereby the common current parent node sends tokens to each of its children in a round-robin manner.

See analysis of [2.7], which is identical. Ex.1003, ¶123.

E. Ground 2

1. Liu

Liu is analogous art to the ’385 patent for two reasons. First, it is directed to the same field of endeavor as the ’385 patent. The ’385 patent is directed to “Wireless Multiple Radio Mesh” networks. Ex.1001, Title, Abstract. Likewise, Liu is directed to “[a]n Ad-Hoc wireless network,” where a “[network] node 10 includes a transmitter 22 [and] a receiver 24” that transmits and receives “radio frequency (RF) signals,” respectively. Ex.1006, Abstract, [0037]; Ex.1003, ¶125.

Second, Liu is analogous art to the '385 patent because it is reasonably pertinent to a problem the inventors of the '385 patent attempted to solve. The '385 patent attempts to address problems that arise when a node is in motion and has to “sample throughput available from [] potential parents and collect sufficient samples to make an informed decision” about acquiring a new parent. Ex.1001, 3:49-61. Likewise, Liu addresses the problem of “nodes mov[ing] or travel[ing] constantly” such that they “acquire a new neighbor or lose an existing neighbor.” Ex.1007, [0008]; *see also* [0068]. Thus, Liu is analogous art to the '385 patent. Ex.1003, ¶126.

2. Reasons to combine

Castagnoli is directed to “wireless mesh communication networks” of nodes that can be arranged in “a variety of hierarchical configurations.” Ex.1005, [0006], [0032]. “[T]he hierarchical configuration may be dynamic in that the parent and child relationships between routing nodes may change depending on factors, such as congestion, node failures and the like.” Ex.1005, [0032]. Castagnoli provides other factors or reasons that cause “[a] given routing node [to] lose synchronization with its parent node,” such as “a hardware failure on the parent routing node, or [] the parent node being taken out of service,” or “environmental changes, such as a new source of RF interference”. Ex.1005, [0145]; Ex.1003, ¶127.

Liu, which is also directed to “multi-hop wireless Ad-Hoc networks,” provides movement of nodes as a reason for changes in a node’s neighbors, explaining that “[s]ince nodes are mobile in a wireless Ad-Hoc network, a node may acquire a new neighbor or lose a prior neighbor.” Ex.1007, [0008]. In particular, “in a mobile environment (e.g., military battlefield, etc.), nodes move or travel constantly. A node may acquire a new neighbor or lose an existing neighbor.” Ex.1007, [0008]. Liu describes “nodes that have moved from or within the network” as “lost nodes.” Ex.1007, [0008]; Ex.1003, ¶128.

A POSITA would have been motivated to modify Castagnoli with Liu because Castagnoli discloses that “factors, such as congestion, node failures and the like” cause changes in “the parent and child relationships between routing nodes,” and Liu teaches another factor that causes changes in a node’s relationship with its neighbors, *viz.*, the movement of the nodes. Ex.1005, [0032]. A POSITA would have understood that a parent-child relationship between nodes is an example of a neighbor relationship. Liu further teaches that nodes that move away from the network disconnect from the network and become “lost nodes.” Ex.1007, [0008]. The combination of Castagnoli and Liu would have been obvious to a POSITA because it is the combination of prior art elements (Castagnoli teaching example factors that change its nodes’ parent-child relationship, which is a form of neighbor relationship between nodes, and Liu teaching movement of its nodes being a factor

that changes nodes' neighbor relationship, including a node disconnecting and being lost when it moves from the network) according to known methods (a node's movement causing a change in a node's neighbor relationships, as taught by Liu) to yield a predictable result (Castagnoli's child node moving away from the network so that its connection to its parent node is lost). Ex.1003, ¶129.

3. Claim 1

[1.0] A method for operating a mesh network having a plurality of mesh nodes, comprising:

Castagnoli describes “[m]ethods... directed to synchronizing transmissions among parent and child routing nodes in a hierarchical wireless mesh network.” Ex.1005, Abstract. Castagnoli's mesh network comprising routing nodes constitute a “*mesh network having a plurality of mesh nodes.*” Ex.1003, ¶131. Thus, to the extent that the preamble is limiting, Castagnoli renders it obvious. Ex.1003, ¶¶130-131.

[1.1] for at least one mesh node of the mesh network, scanning a Radio Frequency (RF) environment using a dedicated scanning radio to determine a new potential parent mesh node for connecting with said at least one mesh node;

See analysis of [2.2], which recites a substantially similar limitation. Ex.1003, ¶132.

[1.2] wherein said at least one mesh node includes, in addition to said scanning radio, at least two relay radios in each mesh element and

See analysis of [2.3], which is identical. Ex.1003, ¶133.

[1.3] wherein said scanning radio and said at least two relay radios operate on different non-interfering channels;

See analysis of [2.4], which is identical. Ex.1003, ¶134.

[1.4] wherein said at least one mesh node is moving sufficiently rapidly² that it may lose connectivity with its current parent mesh node, and

Castagnoli and Liu render this limitation obvious. Ex.1003, ¶135.

Castagnoli describes nodes that move, for example, by discussing how to “maintain wireless connections with mobile stations.” Ex.1005, [0033]. Liu provides further details about moving nodes, including that movement causes a node’s neighbors to change and suggests that these changes increase when a node moves at a “fast rate”:

[I]n a mobile environment (e.g., military battlefield, etc.), nodes move or travel constantly. **A node may acquire a new neighbor or lose an existing neighbor.** If the nodes

² The ’385 patent provides no objective bound on what speed of movement is “sufficiently rapid[]” that a node *may lose connectivity with its parent mesh node*.

The Board cannot review the infirmities of this claim language under 35 U.S.C. § 112. However, under any interpretation of this limitation, Castagnoli’s and Liu’s disclosure of a mesh node having moved far enough in a period of time that it has actually lost its connection to its parent routing node renders this limitation obvious for reasons discussed here.

move at a fast rate, the frequency of HELLO packets must
be increased in order to track the changing neighbors.

Ex.1006, [0008].

Since nodes are mobile in a wireless Ad-Hoc network, a
node may acquire a new neighbor or lose a prior neighbor.

Ex.1006, [0068]; Ex.1003, ¶¶136-137.

It would have been obvious to a POSITA from Castagnoli and Liu that a mesh node may lose connectivity with its parent node, such as due to rapid movement away from the parent node. Ex.1003, ¶138. Liu expressly contemplates that a node may “move[] away beyond a radio propagation range” of another node, in which instance the node will not receive the other node’s transmissions.

Ex.1006, [0070]; *see also* Ex.1005, [0032] (“...the parent and child relationships between routing nodes may change...,” so nodes “adapt to changing conditions of the hierarchical mesh network”). It would have been obvious to a POSITA that a node that moves beyond the radio propagation range of its parent node must have been “*moving sufficiently rapidly that it may lose connectivity with its current parent mesh node.*” Ex.1003, ¶138.

[1.5] wherein said dedicated scanning radio is utilized for discovery of potential new parent nodes and

As analyzed at [2.2], Castagnoli renders obvious for a mesh node to include a “*dedicated scanning radio*” “*configured to scan a Radio Frequency (RF)*

environment... to determine a new potential parent mesh node.” Ex.1003, ¶139; see Ex.1005, [0007], [0046], [0049].

Castagnoli explains that neighbor routing nodes are potential new parent nodes. Ex.1005, [0049] (“the routing node evaluates the neighbor routing nodes it discovered to identify a potential parent routing node”). Since a node may have multiple neighbors, it would have been obvious to a POSITA for a node’s scanning radio to discover multiple “*potential new parent nodes*” as claimed. Ex.1003, ¶140.

[1.6] sampling of discovered potential new parent nodes is performed by an uplink relay radio of said at least one mesh node;

As discussed at [2.5], Castagnoli describes how a mesh node exchanges “neighbor” packets with a potential parent node. Ex.1005, [0075], [0054]. This exchange provides various information used to choose whether to switch to a new parent node. Ex.1005, [0047], [0052], [0054]. Thus, the neighbor packet exchange is Castagnoli’s mechanism for “*sampling of discovered potential new parent nodes.*” Ex.1003, ¶141.

Castagnoli does not expressly state which of a node’s multiple radios is used for exchanging neighbor packets, but it would have been obvious to a POSITA for Castagnoli’s mesh node to use an “*uplink*” radio (e.g., an upstream radio as discussed at [2.4]) to exchange neighbor packets with a potential parent node. Ex.1003, ¶142. This is for several reasons.

First, a POSITA would have found it obvious to avoid using the scanning

radio (discussed at [2.2]) for neighbor packet exchanges because Castagnoli states that the scanning radio is “dedicate[d]” to “monitoring the RF environment and other conditions.” Ex.1005, [0007]. Using the scanning radio to conduct neighbor packet exchanges would mean that the scanning radio would no longer be “dedicate[d]” as Castagnoli teaches. At a minimum, the scanning radio would have to cease its “monitoring” activity while transmitting a neighbor request packet and receiving a neighbor response packet. Material Fact #3; Ex.1026, [0015] (“Most wireless transceivers operate in a half-duplex mode, however, and cannot simultaneously transmit and listen for ongoing network activity.”). Thus, a POSITA would have found it obvious not to use the scanning radio for neighbor packet exchanges because doing so would be contrary to Castagnoli’s teaching to dedicate the scanning radio to monitoring. Ex.1003, ¶143.

Second, a POSITA would have found it obvious to use an *uplink* radio because Castagnoli describes using “directional antennas whose peak gains are oriented depending on the location of the parent and child routing nodes.” Ex.1005, [0041]. A node’s uplink radio would therefore be coupled to an antenna oriented toward parent routing nodes. Ex.1003, ¶144. In contrast, the node’s downlink radio would be coupled to an antenna oriented toward child routing nodes, and thus the downlink radio would likely struggle to communicate effectively (if at all) with a potential parent node that is located in a different direction. Ex.1003, ¶144.

Third, a POSITA would have found it obvious to use an *uplink* radio because Castagnoli explains that neighbor request and response messages will include the MAC addresses of the sending and receiving interfaces. Ex.1005, [0047], [0057]. A POSITA would have been familiar with the use of MAC addresses and would have known that a MAC address is generally assigned to an interface, not to a node as a whole. Material Fact #4; Ex.1003, ¶145. Thus, a node having multiple radios would have multiple MAC addresses, with one MAC address assigned to each radio interface. Since Castagnoli's nodes use the MAC address as a key value for storing information related to neighbors (Ex.1005, [0057], [0062]), it would have been obvious for Castagnoli's node to use its uplink radio when conducting neighbor discovery exchanges with potential parent nodes. By doing so, the potential parent nodes would begin to store information about the potential child node using the MAC address of the potential child node's uplink radio, which is the radio (and MAC address) that will be used if a parent-child relationship is later formed. Ex.1003, ¶145; *see also infra*, [3.3].

For all these reasons, a POSITA would have found it obvious for “*sampling of discovered potential new parent nodes*” to be “*performed by an uplink relay radio of said at least one mesh node.*” Ex.1003, ¶146.

[1.7] wherein while said at least one mesh node samples potential new parent nodes, packets to be sent to said at least one mesh node from its current parent node are buffered by the current parent node, and

As discussed at [2.5], it would have been obvious from Castagnoli for a parent node to buffer packets to be sent to its child node while the child node is conducting a neighbor packet exchange with a potential new parent node. Ex.1003, ¶147.

[1.8] packets to be sent from said at least one mesh node to its current parent are buffered by said at least one mesh node; and

As discussed at [2.6], it would have been obvious from Castagnoli for a mesh node to buffer packets to be sent to its current parent node while its uplink radio is conducting a neighbor packet exchange (“*said sampling*”) with a potential new parent node. Ex.1003, ¶148.

[1.9] wherein sampling times are coordinated among multiple mesh nodes having a common current parent node whereby the common current parent node sends tokens to each of its children in a round-robin manner.

See analysis of [2.7], which is identical. Ex.1003, ¶149.

XII. Conclusion

Petitioner has established a reasonable likelihood that the Challenged Claims are unpatentable.

Respectfully submitted,

Dated: September 23, 2025
HAYNES AND BOONE, LLP
2801 N. Harwood St., Suite 2300
Dallas, Texas 75201
Customer No. 27683

/Theodore M. Foster/
Theodore M. Foster
Lead Counsel for Petitioner
Registration No. 57,456

XIII. Mandatory notices

A. Real party-in-interest

Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner certifies that the real party-in-interest is Cisco Systems, Inc.

B. Related matters

Pursuant to 37 C.F.R. § 42.8(b)(2), to the best knowledge of the Petitioner, the '385 patent is or was involved in the following cases:

Case Heading	Number	Court	Filed
<i>Dynamic Mesh Networks, Inc. d/b/a MeshDynamics v. Cisco Systems, Inc.</i>	2:25-cv-00472	E.D. Tex.	5/5/2025 (dismissed 8/4/2025)
<i>Cisco Systems, Inc. v. Dynamic Mesh Networks, Inc. d/b/a MeshDynamics</i>	5:25-cv-06441	N.D. Cal.	7/31/2025
<i>Dynamic Mesh Networks, Inc. d/b/a MeshDynamics v. Cisco Systems, Inc.</i>	2:25-cv-00781	E.D. Tex.	8/12/2025
<i>Dynamic Mesh Networks, Inc. d/b/a MeshDynamics v. Cisco Systems, Inc.</i>	2:25-cv-00783	E.D. Tex.	8/12/2025

C. Lead and back-up counsel and service information

Lead Counsel

Theodore M. Foster
HAYNES AND BOONE, LLP
2801 Harwood St. Suite 2300
Dallas, TX 75201

Phone: (303) 382-6205
Fax: (214) 200-0853
ipr.theo.foster@haynesboone.com
USPTO Reg. No. 57,456

Back-up Counsel

David L. McCombs
HAYNES AND BOONE, LLP
2801 Harwood St. Suite 2300
Dallas, TX 75201

Phone: (214) 651-5533
Fax: (214) 200-0853
david.mccombs.ipr@haynesboone.com
USPTO Reg. No. 32,271

Calmann J. Clements
HAYNES AND BOONE, LLP
2801 Harwood St. Suite 2300
Dallas, TX 75201

Phone: (972) 739-8638
Fax: (214) 200-0853
calmann.clements.ipr@haynesboone.com
USPTO Reg. No. 66,910

Brett Bostrom
HAYNES AND BOONE, LLP
2801 Harwood St. Suite 2300
Dallas, TX 75201

Phone: (720) 484-3715
Fax: (214) 200-0853
brett.bostrom.ipr@haynesboone.com
USPTO Reg. No. 73,009

Matthew Beck
HAYNES AND BOONE, LLP
2801 Harwood St. Suite 2300
Dallas, TX 75201

Phone: (202) 654-4573
Fax: (214) 200-0853
matthew.beck.ipr@haynesboone.com
USPTO Reg. No. 79,791

Dagim Tilahun
HAYNES AND BOONE, LLP
2801 Harwood St. Suite 2300
Dallas, TX 75201

Phone: (202) 654-4582
Fax: (214) 200-0853
dagim.tilahun.ipr@haynesboone.com
USPTO Reg. No. 75,722

Please address all correspondence in this proceeding to lead and back-up counsel. Petitioner consents to service in this proceeding by email at the addresses above.

CLAIMS APPENDIX

- [1.0] A method for operating a mesh network having a plurality of mesh nodes, comprising:
 - [1.1] for at least one mesh node of the mesh network, scanning a Radio Frequency (RF) environment using a dedicated scanning radio to determine a new potential parent mesh node for connecting with said at least one mesh node;
 - [1.2] wherein said at least one mesh node includes, in addition to said scanning radio, at least two relay radios in each mesh element and
 - [1.3] wherein said scanning radio and said at least two relay radios operate on different non-interfering channels;
 - [1.4] wherein said at least one mesh node is moving sufficiently rapidly that it may lose connectivity with its current parent mesh node, and
 - [1.5] wherein said dedicated scanning radio is utilized for discovery of potential new parent nodes and
 - [1.6] sampling of discovered potential new parent nodes is performed by an uplink relay radio of said at least one mesh node;
 - [1.7] wherein while said at least one mesh node samples potential new parent nodes, packets to be sent to said at least one mesh node from its current parent node are buffered by the current parent node, and

- [1.8] packets to be sent from said at least one mesh node to its current parent are buffered by said at least one mesh node; and
- [1.9] wherein sampling times are coordinated among multiple mesh nodes having a common current parent node whereby the common current parent node sends tokens to each of its children in a round-robin manner.
- [2.0] A mesh network comprising:
 - [2.1] a plurality of mesh nodes;
 - [2.2] wherein at least one mesh node of the mesh network is configured to scan a Radio Frequency (RF) environment using a dedicated scanning radio to determine a new potential parent mesh node for connecting with said at least one mesh node;
 - [2.3] wherein said at least one mesh node includes, in addition to the scanning radio, at least two relay radios in each mesh element and
 - [2.4] wherein said scanning radio and said at least two relay radios operate on different non-interfering channels;
 - [2.5] wherein while said at least one mesh node samples potential new parent nodes, packets to be sent to said at least one mesh node from its current parent node are buffered by the current parent node, and
 - [2.6] packets to be sent from said at least one mesh node to its current parent are buffered by said at least one mesh node;

- [2.7] wherein sampling times are coordinated among multiple mesh nodes
having a common current parent node whereby the common current parent
node sends tokens to each of its children in a round-robin manner.
- [3.0] A mesh network comprising:
 - [3.1] a plurality of mesh nodes;
 - [3.2] wherein each node within said plurality of nodes comprises at least three
radios further including:
 - [3.3] a first relay radio operating on a first RF channel at a first point in time
and dedicated to uplink connections to a single current parent node;
 - [3.4] a second relay radio operating on a second RF channel at a first point in
time and dedicated to downlink connections to zero or more child nodes;
and
 - [3.5] a dedicated scanning radio operating on a third RF channel at a first point
in time and configured to scan a Radio Frequency (RF) environment to
discover new potential parent mesh nodes for connecting with said first
relay radio;
 - [3.6] wherein said first, second, and third RF channels are different from each
other
 - [3.7] wherein after said dedicated scanning radio discovers a potential new
parent node, said first relay radio samples the RF link to said potential new

parent node using its uplink radio and

[3.8] concurrent with said sampling, packets to be sent to the mesh node from its current parent node are buffered by the current parent node, and

[3.9] packets to be sent from the mesh node to its current parent node are buffered by the mesh node

[3.10] wherein sampling times are coordinated among multiple mesh nodes having a common current parent node whereby the common current parent node sends tokens to each of its children in a round-robin manner.

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner hereby certifies, in accordance with and reliance on the word count provided by the word-processing system used to prepare this Petition, that the number of words in this paper is 12,373. Pursuant to 37 C.F.R. § 42.24(d), this word count excludes the table of contents, table of authorities, mandatory notices under § 42.8, certificate of service, certificate of word count, appendix of exhibits, and any claim listing.

Dated: September 23, 2025

/Theodore M. Foster/

Theodore M. Foster

Lead Counsel for Petitioner

Registration No. 57,456

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that a true and correct copy of the foregoing was served on the Patent Owner as detailed below:

<i>Date of service</i>	September 23, 2025
<i>Manner of service</i>	FedEx
<i>Documents served</i>	Petition for <i>Inter Partes</i> Review Under 35 U.S.C. § 312 and 37 C.F.R. § 42.104; Petitioner's Exhibit List; Petitioner's Power of Attorney; and Exhibits Ex.1001-1016 and Ex.1018-1036.
<i>Persons Served</i>	Michael J. Cherskov Szymon M. Gurda 903 Commerce Dr., Suite 310 Oak Brook, IL 60523

/Theodore M. Foster/
Theodore M. Foster
Lead Counsel for Petitioner
Registration No. 57,456