

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DISH NETWORK LLC, DISH NETWORK SERVICE LLC, DISH NETWORK
CORPORATION, and DISH NETWORK CALIFORNIA SERVICE
CORPORATION,
Petitioners,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

CASE: IPR2024-00562
U.S. PATENT NO. 8,363,681

PATENT OWNER'S PRELIMINARY RESPONSE

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I. INTRODUCTION

Patent Owner, Entropic Communications, LLC (“Entropic” or “PO”), submits this Patent Owner Preliminary Response pursuant to 37 C.F.R. § 42.107(a) to the *Inter Partes* Review petition (“Petition”) filed by Dish Network LLC, Dish Network Service LLC, Dish Network Corporation, and Dish Network California Service Corporation (collectively “Petitioner”) for Claims 1-40 (the “Challenged Claims”) of U.S. Patent 8,363,681 (the “’681 Patent”).

The ’681 Patent presents an innovative solution to the problem of improving network efficiency by synchronizing local clock times of various connected nodes in a communication network. Simultaneously-utilized network nodes need an efficient protocol to ensure proper communication to allow “for substantially simultaneous arrival of OFDMA packets at the receiver, thereby reducing the cyclic prefix length needed.” Ex. 1001, 4:7-10.

The ’681 Patent’s novel solution is to designate a client node as the network coordinator (“NC”) to coordinate the timing needs of the various interconnected nodes on the network to avoid packet collisions. To facilitate such scheduling, the NC (1) sends a packet with the NC local time to a client node, (2) the client node resets its clock to a received clock time, (3) the NC then *performs a ranging method* to allocate time measurements to each node, where the ranging method includes

receiving a packet from the client and sending a third packet back to each node with the ranging times and clock time allocations that are then used to adjust the clock of the client nodes. *See* Ex. 1001, cl. 1.

The Petition proposes four theories of unpatentability, each of which relies on the same teachings of IEEE802.3ah (Ex. 1005). As discussed in more detail below, all four theories fail to identify any instance of a “third packet compris[ing] the estimated propagation delay” being transmitted, and all four fail to identify any instance of “adjusting the local clock time of either the first or second node based on the estimated propagation delay.” These missing disclosures are not surprising because, as discussed herein, Petitioner’s relied-upon disclosure of IEEE802.3ah not only does not send the alleged “propagation delay” but there is simply no reason to transmit the alleged “propagation delay” to any other node or to adjust any node’s clock based on the propagation delay.

IEEE802.3ah (Ex. 1005) is a published and adopted Ethernet standard describing the protocols and elements to provide subscriber access in a passive optical network (known as EPON). In this standard, when new nodes are added, a discovery process is initiated where a new node (referred to as an ONU) can connect over a common broadcast channel to the rest of the network, but more importantly to the main coordination node, the OLT (akin to a base station). During this

discovery process, there could be a problem with packet collision on the broadcast channel used for the discovery process.

To address this collision concern, IEEE802.3ah describes how the OLT calculates a round trip time (RTT), which the OLT will use to “block” its protocols from initiating uses of the broadcast channel during the discovery process. This prevents collisions between messages from a new client node attempting to register and the OLT’s own outbound use of the broadcast channel. The Petition relies upon this “RTT” value as the claimed “propagation delay,” but that value is not sent to any other node and is never used to adjust any clocks at either the OLT or ONU. And why should it be?—RTT is the OLT’s personal timer used to block normal OLT transmissions from taking place in the discovery window, use limited to *within* the OLT. Because RTT is not needed anywhere else in the IEEE802.3ah architecture, it is not surprising that no *transmission* of this RTT value to another node is taught or suggested by IEEE802.3ah.

Nor does the Petition identify any reason to change the established, adopted and perfectly functional IEEE802.3ah standard discovery process (except in hindsight to arrive at the Challenged Claims). In **Ground 1**, the Petition relies on IEEE802.3ah plus *Shvodian* (Ex. 1006), but *Shvodian*’s delay parameter is a different measurement for a different purpose in a different system than the RTT

calculated by the OLT of IEEE802.3ah. As discussed herein, IEEE802.3ah computes RTT specifically to include only travel time of the signal; any delays that may be the result of events at the remote node are purposefully excluded as is the intentionally introduced “wait” period T_{WAIT} . Ex. 1005, Fig. 64-4, 445, *see also id.*, 479, 490 (describing the waiting period as “shorter than the length of discovery time window”). In contrast, *Shvodian* is a network routing architecture based in IEEE 1394 where two nodes are bridged using, for example, IEEE 802.15.3 (Ex. 1006, [0003]-[0004]), with a focus on finding *preferred paths* for data to travel. *Id.*, [0004], [0020] (describing the 2ms or 7ms predetermined round-trip travel time that must be met or a second, follow-up attempt occurs).

Shvodian seeks to optimize delay by exploring different network paths (hops) within the system to find optimum paths providing a delay time that is shorter than some specified, acceptable delay decided by the control node. *Id.* Therefore, *Shvodian* cares about *all* delay, regardless of reason, including path length, hop count, bandwidth, processing time, etc. *Id.* For that purpose, *Shvodian* computes a delay parameter that, while incidentally also called “RTT,” measures not merely the travel time, but *all sources of latency* that contribute to delay including any processing time, bandwidth constraints, or other delays a message experiences at a distant node. However, in no instance is *Shvodian*’s RTT ever transmitted from the

source node to the destination node (as is confirmed by the Petition not alleging *Shvodian* discloses this element (Petition, 55)). The Petition provides no reason that a POSITA would or could modify the established, fully operational IEEE802.3ah standard with timing parameters from a different system, with different concerns.

In **Ground 2**, the Petition adds *Frei*. *Frei* adds a third cook to the kitchen, based on a wireless IEEE802.11 mesh network where different paths may be taken for different packets heading to the same destination. Ex. 1007, [0031].¹ *Frei* likewise introduces a third, different time calculation. *Frei* calculates an “average” propagation delay over a unit time to “increase the resolution of the [clock].” Ex. 1007, [0034]. However, *Frei* too fails to ever suggest any modification of a clock based on this propagation, as *Frei*’s system acknowledges that its clock times are misaligned, and the system addresses this problem without ever adjusting any clock time. *Id.*, [0025], Fig. 5. The Petition once again fails to explain why or how a POSITA would selectively combine teachings from different systems with different goals, other than with the goal of hindsight reconstruction of the challenged claims.

¹ In Grounds 3 and 4, the Petition relies on Ovadia, which describes MoCA, yet another protocol (Ex. 1008, 1) and Smith (Ex. 1009) respectively. Petition, 3. Grounds 3 and 4, however, are solely directed to dependent claims.

The Grounds of the Petition fail to render obvious independent Claims 1, 11, 21, and 31. And because Claims 3-10, 12-20, 22-30, and 32-40 depend from these independent claims, the entire Petition should be denied.

II. SUMMARY OF THE '681 PATENT

The '681 Patent, titled “Method and Apparatus for Using Ranging Measurements in a Multimedia Home Network,” describes a protocol for establishing synchronization of nodes within an on-premises local network. Ex. 1001, Abstract. The synchronization occurs by exchanging a channel time clock (“CTC”) between a first and second node, then a ranging method determining the timing of the data transmission, and the ranging results are shared with the second node for storage and action upon. *Id.*, Abstract. The '681 Patent states that “[b]ased on MoCA, inaccuracies to the CTC [] can be introduced by several factors . . . [such as] delay[s] in transmission [], propagation delay [], receive delay[s], clock drifts between nodes [], implementation delays [], and vendor implementation differences in estimating packet transmission time [.]” *Id.*, 3:1-14. The '681 Patent explains that “it is desirable for all OFDMA packets [from each transmitter node] to arrive at the OFDMA receiver at roughly the same time” or else there will be network performance issues due to lack of synchronization. *Id.*, 4:2-5.

Figure 2 illustrates a diagram for synchronizing a client node with the

Network Coordinator (“NC”) based on the then-existing MoCA 1.x standard. *Id.*, 2:60-62. The clock time counters (CTCs) of the NC and Node 1 may have up to a 2.2 μ sec delay that can be caused by: delay transmissions, propagation delays, receiver delays, clock drifts, implementation delays, and vendor implementation differences in estimating packet transmissions. *Id.*, 2:62-3:14.

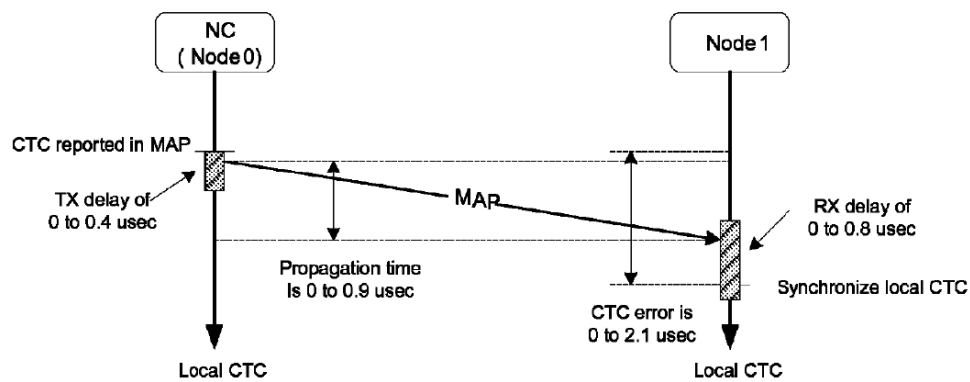


FIG. 2
(Prior Art)

Ex. 1001, Fig. 2.

The '681 Patent solves the problems faced by networks through its introduction of an innovative ranging method that results in clock synchronization. This synchronization allows for simultaneous arrival of transmission packets at the receiver to reduce cyclic length. *Id.*, 4:5-10. To achieve this, the '681 Patent discloses a method of exchanging local clock times between two nodes, performing a ranging method between the two, and adjusting the clock times of one or both

nodes based on the ranging. *Id.*, 4:20-31. This results in a synchronized local clock time at the first and second nodes which can be used in future packet transmissions. Ex. 1001, 4:30-34.

A. ORIGINAL PROSECUTION OF THE '681 PATENT

On October 15, 2009, the '681 Patent was filed as U.S. Patent Application No. 12/580,127. Ex. 1002. The United States Patent and Trademark Office ("Patent Office") issued a non-final office action against the originally filed claims noting dependent claims 3-5, 13-15, and 22-35 had allowable subject matter. *Id.*, 74-84. The subject matter deemed allowable by the Examiner included the claimed "transmitting a third packet from the first node to the second node, wherein the third packet comprises the estimated propagation delay," which is subject matter the Petition fails to render obvious. *Id.*, 50-51, 62-64. Following the amendment, the Examiner allowed the amended claims. *Id.*, 30.

III. THE PETITION FAILS TO SHOW THAT THERE IS A REASONABLE LIKELIHOOD THAT THE PETITIONER WILL PREVAIL ON A SINGLE CLAIM

The Petition attempts to combine references with fundamentally different and often inconsistent architectures and disclosures in each of its Grounds 1, 2, 3, and 4 (collectively, "Grounds"). The primary reference, IEEE802.3ah, fails to teach or suggest the limitations "transmitting a third packet from the first node to the second

node, wherein the third packet comprises the estimated propagation delay” and “adjusting the local clock time of either the first or second node based on the estimated propagation delay, thereby resulting in a synchronized local clock time between the first and second node,” as required by the Challenged Claims. The alleged “propagation delay” of IEEE802.3ah, the RTT value, is never transmitted from the first node, such that there is no third packet that includes the propagation delay. Moreover, this RTT value is used solely by the alleged first node in a software primitive to ensure the node does not broadcast data while in a discovery mode. There is no basis to provide this RTT value to any other node in the network, let alone adjust any clock based on the RTT value. IEEE802.3ah fails to teach or render obvious the Challenged Claims

To modify IEEE802.3ah to closer fit the claims, the Petition purports to modify IEEE802.3ah in view of references that themselves lack any transmission of a third packet or an adjustment to any clock based on the estimated propagation delay. These references are not only themselves deficient, but the Petition fails to establish that anyone would have modified the RTT from the discovery process of IEEE802.3ah to instead transmit this value or adjust any clock of any node based on this value. Instead, at best, the Petition relies on references that rely on similar language (e.g., use “RTT” despite doing so in a completely different context) and

baselessly concludes, without regard for the teaching of any reference, that not only would the combination have been obvious, but that it would somehow result in the Challenged Claims.

In Ground 1, the Petition proposes the combination of IEEE802.3ah and *Shvodian*. Neither reference, alone or in combination, teaches or suggests the claimed third packet or the claimed adjusting step. In Ground 2, the Petition proposes the combination of IEEE802.3ah, *Frei*, and *Shvodian*. Yet again, none of the references teach the claimed adjusting step.

Moreover, each reference relates to a different type of network, relies on different established and adopted standards, addresses different concerns over different transmission mediums, and uses different protocols. These differences confirm that a POSITA would not have made the proposed combinations and ultimately underscore a fatal flaw of the Petition: that Dr. Acton's analysis (and therefore the Petition itself) is infected by hindsight bias. Dr. Acton's analysis overlooks the complexity of combining communication techniques used in drastically different architectures over different communication mediums (*i.e.*, twisted pair, Ethernet, and coaxial cables), and instead uses the teachings and claims of the '681 Patent as a roadmap to identify and modify disclosures of the prior art, contrary to the actual teachings of the prior art.

Dr. Acton and the Petition fail to establish that a POSITA would be motivated to combine the proposed combinations to arrive at the claims. The Petition should be denied.

A. Overview of the Alleged Prior Art References

1. Institute of Electrical and Electronics Engineers Std. 802.3ah (“IEEE802.3ah”)

Unlike the ’681 Patent’s network, where a network communicator (“NC”) communicates directly with client nodes and transmits packets to the client nodes, and clocks are adjusted based on calculated results that are communicated between nodes, IEEE802.3ah outlines the adopted standard that the IEEE developed and voted on for an *Ethernet passive optical network* (“EPON”) where calculated results are not communicated from one node to another and no clock adjustment is ever made based on a calculated result. Ex. 1005, 6, 438.

IEEE802.3ah utilizes downstream and upstream communication to ensure stable communication from the control node to downstream nodes. *Id.* at 438. These downstream and upstream channels are configured to use different channels (i.e., different carrier frequencies) and do so to ensure packets do not interfere or collide with one another. *Id.* at 407, Fig. 62-3 (discussing frequency allocation), *see also* table 62-5. The standard provides for both broadcast communications and unicast communications. *Id.* at Fig. 64-14 (reproduced below). These two channel

allocations are depicted as “Broadcast Channel” and “Unicast Channel” during the discovery process. *Id.*; *id.* at Table 62-5, Fig. 62-3.

To admit new nodes into IEEE802.3ah’s system, the NC of the system (the OLT) will complete a “handshake” with each connected downstream node (the ONUs). Ex. 1005, 438. These “handshakes” involve transmissions between the NC and the downstream nodes to allow admittance to the network. *Id.*, 438-39. This creates a point-to-multi-point system allowing the NC to control several downstream nodes which can communicate in a bi-directional manner. *Id.* The system created by the hierarchy is a “Multi-point MAC Control” system. *Id.*, 438.

The MAC instance layers in the NC and downstream nodes offer point-to-point connections between the Optical Line Terminal (“OLT”) and the Optical Network Units (“ONU(s)”) of the system. *Id.*, 439. The OLT, the NC of IEEE802.3ah’s system, can communicate with all ONUs at once using a broadcast channel and is known as a “Single Channel Broadcast.” *Id.* After the initialization, each ONU is given a single unicast channel specific for its MAC layer address known as a Unicast Logical Link ID (“LLID”). *Id.*, 443, 458, Fig. 64-14 (reproduced below). These unicast channels are the working channels for upstream transmissions between the ONU and OLT and are allotted during the initialization phase. *Id.*, 407.

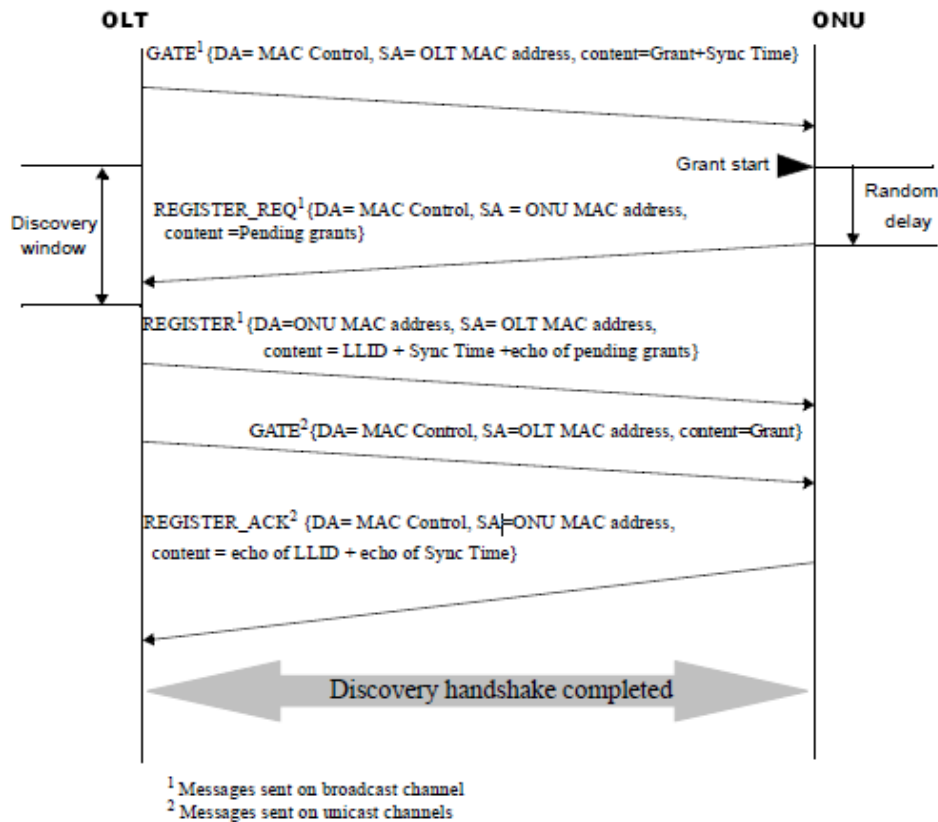


Figure 64-14—Discovery Handshake Message Exchange

Ex. 1005, Fig. 64-14 (showing the discovery exchange in IEEE802.3ah occurring on two separate channels).

Figure 64-1 illustrates the network topology of the PON including: an OLT, connected to a splitter via a feeder, with three downstream ONUs. *Id.*, 438, Fig. 64-1 (reproduced below). The OLT transmits a signal through splitters to the downstream ONUs, while the ONUs will transmit messages back upstream to the OLT. *Id.* To avoid collisions amongst transmissions, the ONU's transmissions are *arbitrated*. *Id.* The “arbitration is achieved by allocating a transmission window

(grant) to each ONU.” *Id.* The ONU will wait to transmit any information until it receives its grant. *Id.* (“An ONU defers transmission until its grant arrives”).

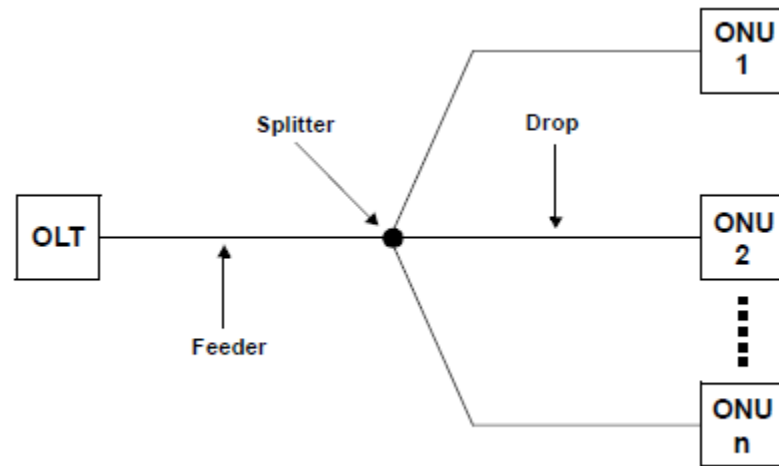


Figure 64-1—PON topology example

Ex. 1005, Fig. 64-1.

To calculate the ranging and timing process devised for use in Ethernet networks, both the OLT and ONU have counters. *Id.*, 444, Fig. 64-4 (reproduced below and depicting the schematic overview of the discovery admittance process). As part of the discovery process, the OLT transmits a timestamp field to the ONU when sending the “first octet of the MPCPDU.” *Id.* at 444. The ONU sets its counter to the value received in the multi-point control protocol data unit (“MPCPDU”) from the OLT: T_0 . *Id.* The ONU then waits to transmit a message back to the OLT based on a specified time value which was sent by the OLT. *Id.* The ONU then sends back a “REGISTER_REQ” message to the OLT after a period chosen randomly to reduce the chance any other ONU transmits at the same moment. *Id.*, 457-58. This wait

time shall not exceed the discovery window period. *Id.* After receiving the “REGISTER_REQ” message, the OLT registers the ONU and assigns a MAC address to the ONU. *Id.*, Fig. 64-14.

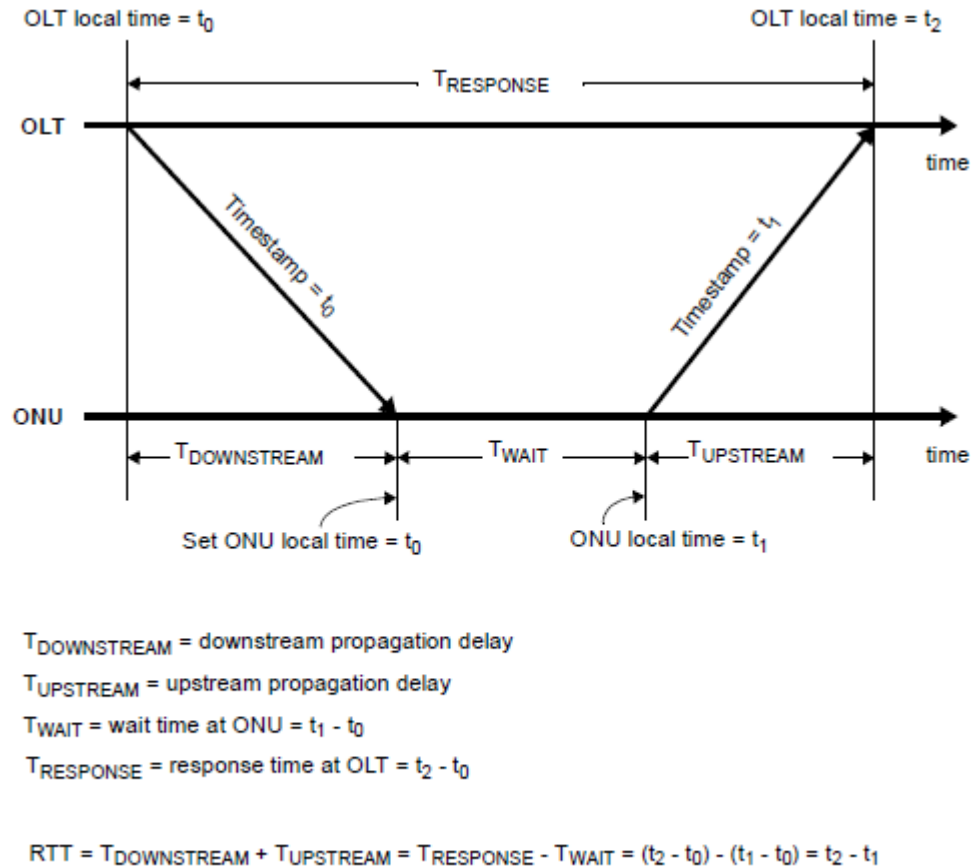


Figure 64-4—Round trip time calculation

Ex. 1005, Fig. 64-4.

IEEE802.3ah’s process of ranging includes specific delay requirements when transmitting a multi-point control protocol (“MPCP”). This adherence relies on timing based on timestamps. As described in IEEE802.3ah, “[t]he OLT shall not grant less than 1024 time_quanta into the future, in order to allow the ONU

processing time when it receives a gate message. The ONU shall process all messages in less than this period. The OLT shall not issue more than one message every 1024 time_quanta to a single ONU.” Ex. 1005, 457. This process is, however, only for the discovery process by the OLT of new ONUs in the network. This process has nothing to do with the subsequent communications between the ONU and the OLT, which are governed by the aforementioned grants.

Absent from the well-established IEEE802.3ah standard is any disclosure regarding transmission of a packet containing the estimated propagation delay or any adjustment of a clock at either the OLT or the ONU based on the estimated propagation delay. Indeed, these two aspects are not relevant to IEEE802.3ah, because instead of relying on such an estimation or adjustment of a clock based on a propagation delay, the OLT admits the ONU on a separate working channel to transmit messages and grants time access in the form of grants to allow for transmissions from the ONU. IEEE802.3ah’s RTT is instead used to block transmissions *within* the OLT, to ensure other information is not transmitted on the broadcast channel while the OLT is processing the discovery process. Ex. 1005, 457 (noting “The SCB MAC handles all downstream broadcast traffic but is never used in the upstream direction for client traffic.”).

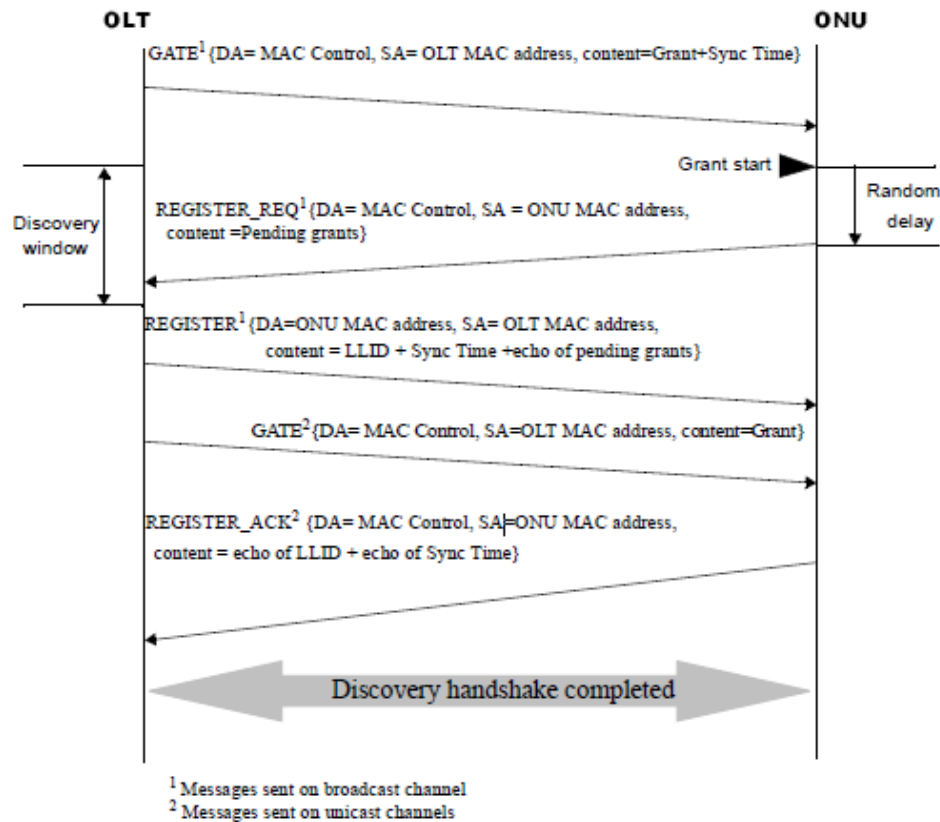


Figure 64-14—Discovery Handshake Message Exchange

Ex. 1005, Fig. 64-14 (failing to show any propagation delay or RTT parameter transmitted from the OLT (left) to ONU (right) and the utilization of different channels for the initial discovery process and finalization of discovery).

2. U.S. Patent Pub. No. 2008/0101253 (“Shvodian”)

Shvodian discloses a different method to measure a **different** round trip time (“RTT”) between two nodes in a network. Ex. 1006, [0015]. According to *Shvodian*, a need existed for allocating timeslots for exchanging data transmissions between a source node and destination node since there will be latency between

packet arrival and transmission *at the destination node*. *Id.*, [0005]. The method in *Shvodian* discloses optimization of RTT through different network paths within the system to allow for an RTT between the source node and destination node to be shorter than the specified timeframe by the control node.

Shvodian's design for a network includes several sub-networks connected to a splitter. *Id.*, [0016]. These sub-networks include network elements, a router, and/or an access point for wireless communication. *Id.*, [0017]. To ensure transmission between nodes, the controller in *Shvodian's* system sends a packet to measure RTT, then waits to receive the response packet back from the destination node. If *Shvodian's* RTT is greater than a predetermined value—around 2 milliseconds to 7 milliseconds—then the controller will continually send RTT transmissions. *Id.*, [0020]. *Shvodian's* RTT is measured from the time of transmission from the source node to the time of reception of a response from the destination node. *Id.*, cl. 1. *Shvodian's* RTT necessarily includes any time that passes between while the destination node receives the packet, processes the packet, and the time before the destination node sends its response. *Id.*, [0020].

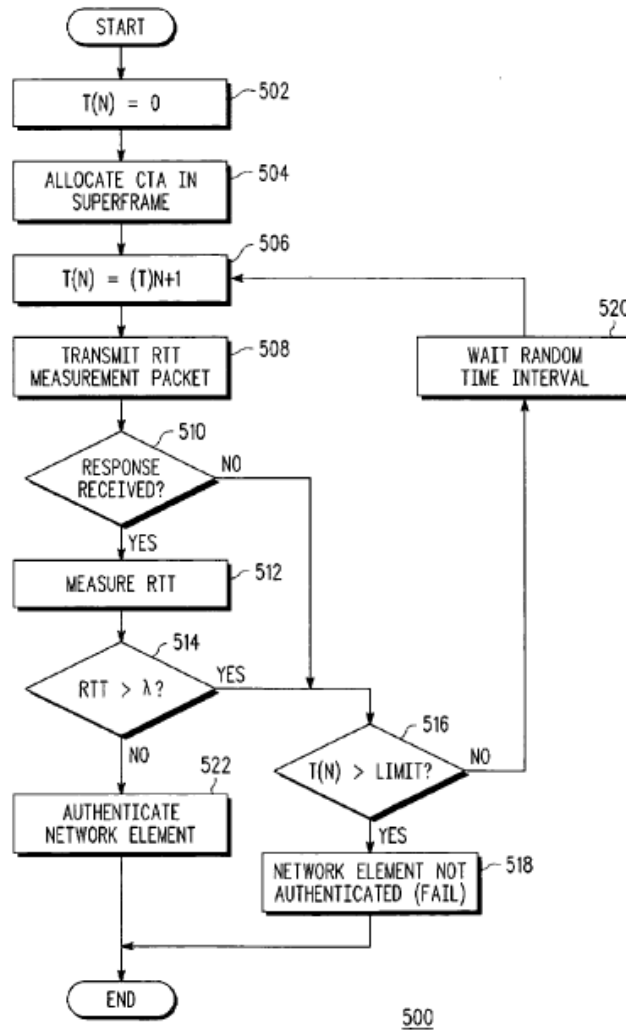


FIG. 5

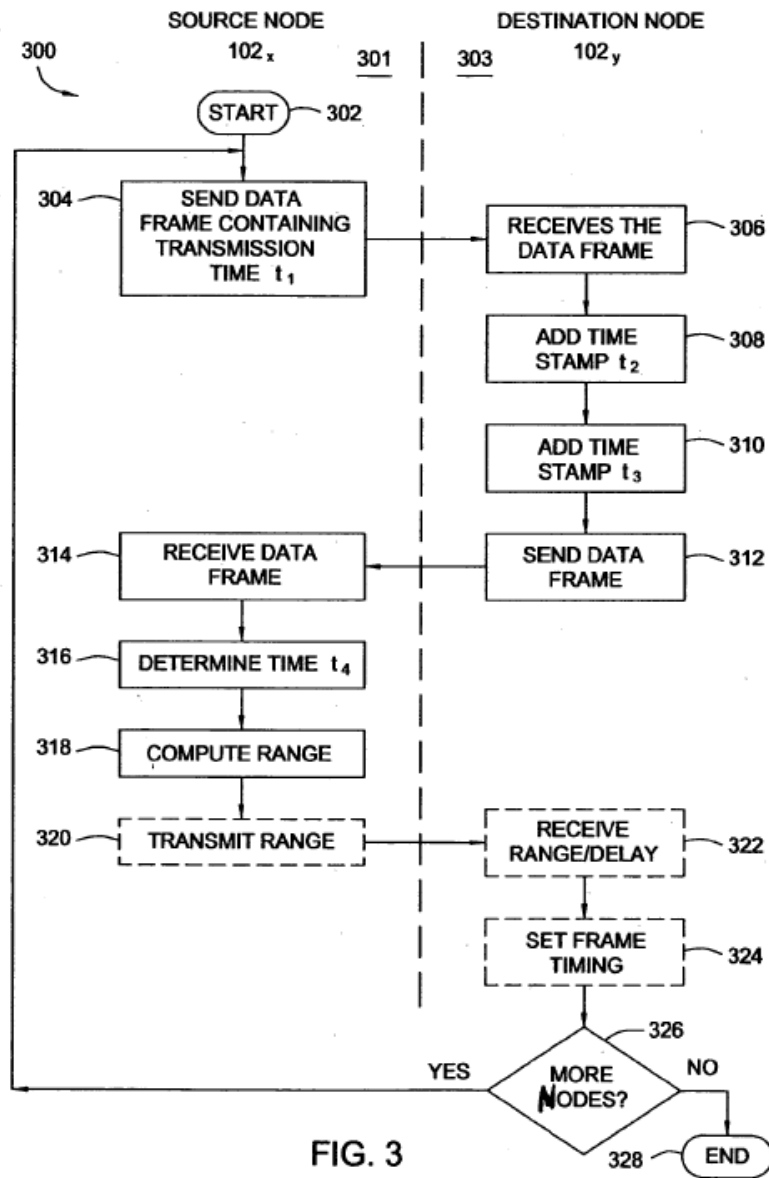
Ex. 1006, Fig. 5.

Shvodian is fundamentally different from IEEE802.3ah, as it is not at all interested in the RTT described in IEEE802.3ah which expressly excludes the time between receipt and transmission at the destination node. Ex. 1005, Fig. 64-4. Instead, *Shvodian* explains that its RTT is compared to a pre-determined value (either 7 or 2

ms) and is used to analyze the latency in different nodes in the network. Ex. 1006, [0004]. And based on whether *Shvodian's* RTT is greater or less than this predetermined value, additional transmissions and alternative routes between nodes may be attempted to achieve an RTT less than the predetermined value. *Id.* The RTT of *Shvodian* is not the propagation delay, but instead an amalgam of events between transmission and reception at different nodes. That is, *Shvodian* is measuring total ***latency at the node*** plus any travel delays between nodes. *Id.*, [0005], *see also* [0020] (explaining that RTT may be sent during off-peak times to reduce the RTT value due to faster processing at the node).

3. U.S. Patent Pub. No. 2007/0140127 (“*Frei*”)

Frei discloses a method for a network system to improve efficiency by providing a means to calibrate clock timing and prevent timestamp drift. Ex. 1007, Abstract. *Frei* is intended to improve efficiency of a network by allowing a source node to determine the propagation delay between two nodes. *Id.*, [0009]. The destination node then uses this information to see if there are further connections to other nodes and determines propagation delays to other nodes. *Id.* This network topology is intended to be used in ad-hoc network environments such as a mesh network. *Id.*, [0006]. This type of network is different from a traditional network since there are no central switching points or routers to distribute data. *Id.*, [0005].



Ex. 1007, Fig. 3.

Frei's method begins at the source node where the source node transmits a synchronization message with a time of t_1 . Ex. 1007, [0029]. The destination node receives the message with its own time stamp t_2 which represents the destination node's own time. *Id.*, [0030]. At time t_3 , the destination node transmits the three

time stamps (t_1 , t_2 , and t_3 ,) to the source node. *Id.*, [0032]-[0033]. The source node then uses its own local receipt time, t_4 , to calculate the propagation delay using the formula $\text{propagation delay} = (t_4 - t_1 - (t_3 - t_2)) / 2$. *Id.*, [0034]. These propagation delays are then compiled over time and averaged to “increase the resolution of the [clock].” *Id.*, [0035]. The destination node is never told to change a clock based on any propagation delay calculated by the source node and instead changes its clock based on the calibration step 514 which is nothing more than a change to the clock time of the source node. *Id.*, [0041].

B. Ground 1 Fails to Render Obvious the Challenged Claims

IEEE802.3ah alone, or in combination with *Shvodian*, fails to render obvious the Challenged Claims. “An obviousness determination generally requires [1] a finding that all claimed limitations are disclosed in the prior art, and [2] that a person of ordinary skill in the art would have been motivated to combine or modify the teachings in the prior art.” *Univ. of Strathclyde v. Clear-Vu Lighting LLC*, 17 F.4th 155, 160 (Fed. Cir. 2021) (citations omitted). Ground 1 fails to satisfy these two requirements because 1) there is simply no teaching in the prior art of a third packet or of any adjusting of the local clock times of either the first and second nodes based on the estimated propagation delay, as is required by the Challenged Claims, and 2) a POSITA would not have been motivated to modify the RTT process of

IEEE802.3ah in view of *Shvodian* to arrive at a process that did include these missing elements.

1. The Petition Fails to Establish that Claim 1 Would Have Been Obvious Over IEEE802.3ah

IEEE802.3ah fails to teach each and every element of Claim 1. The Petition fails to demonstrate that IEEE802.3ah teaches the claimed “transmitting a third packet from the first node to the second node, wherein the third packet comprises the estimated propagation delay” or the claimed “adjusting the local clock time of either the first or second node based on the estimated propagation delay, thereby resulting in a synchronized local clock time between the first and second node.”

a. IEEE802.3ah Does Not Disclose or Render Obvious “transmitting a third packet...”

Claim 1 of the '681 Patent requires “transmitting a third packet from the first node to the second node, wherein the third packet comprises the estimated propagation delay.” Ex. 1001, cl. 1.

In IEEE802.3ah’s process, there is no need for the ONU to ever know the RTT between the two nodes on the “Broadcast channel” used in the discovery process since the OLT then transmits the LLID to the ONU on the Unicast channels which are used for upstream communication to the OLT. Ex. 1005, Fig. 64-14, *see also* 457-58 (describing the discovery process and the changing of the channels for

upstream communication). Since IEEE802.3ah does not intend for communication to continue on the Broadcast channel, then there is no rationale for the RTT to be communicated to the ONU. *See id.*, Fig. 64-14 (denoting the change of broadcast transmissions to unicast transmission on the working channel). Instead, subsequent ONU transmissions occur via the ONU's unicast channel. The Petition fails to identify any packet transmitted from the OLT to the ONU that contains the calculated RTT, as there is none.

As described in Section III.A.1, the IEEE802.3ah standard deals with potential collisions caused by an ONU transmission on the broadcast channel in a different way—while the OLT blocks itself from sending using the RTT time, the ONU's block themselves for the random delay time. Ex. 1005, 457 (“The OLT signifies that a discovery period is occurring by broadcasting a discovery gate message, which includes the starting time and length of the discovery window. Off-line ONUs, upon receiving this message, wait for the period to begin and then transmit a REGISTER_REQ message to the OLT”), 476 (“rndDlyTmr”), 479 (RANDOM WAIT); 459 (Fig. 64-14). There is simply no rationale articulated in the Petition as to why an ONU needs to even know the RTT. Accordingly, there is not only no teaching of a third packet comprising the RTT, but the existence of such a packet is not rendered obvious by IEEE802.3ah.

The Petition's assertion that the OLT must transmit the RTT value cannot be reconciled with the actual teachings of IEEE802.3ah. Indeed, there is no evidence identified in the Petition of any third packet transmitted from the alleged first node to the alleged second node that contains RTT. Petition, 35-39. This is entirely consistent with the entirety of IEEE802.3ah because there is simply no need for an ONU to ever know the RTT because there is no evidence that an ONU ever uses the RTT value.

At best, the Petition alleges that the claimed third packet is found in the reference as a software primitive called MA_CONTROL.indication. Petition, 35, 38. However, contrary to the Petition's allegations, software primitives are messages in software code between protocol layers within a given node. The Petition fails to identify any evidence that this primitive is a packet, or that it is ever transmitted from the alleged first node (OLT) to the second node (ONU).

The Petition appears to recognize the problem and attempts to cover up the issue by erroneously characterizing the MA_CONTROL.indication as a message. (Petition, 35-36). While software primitives may very well be messages passed among software components in a given computing device, that has nothing to do with a packet transmitted from one node to another. Indeed, IEEE802.3ah confirms MA_CONTROL.indication is only sent *within* a client node. Ex. 1005, 446. This

primitive is not a packet and does not travel from the first node to the second node. Instead, this MA_CONTROL.indication is used *within* the OLT to block or stop transmissions by OLT, to ensure other information is not transmitted on the broadcast channel while the OLT is processing the discovery process. Ex. 1005, 457.

The Petition is unable to provide any evidence that MA_CONTROL.indication is anything but a software call within a node. Likewise, the Petition does not and cannot find any disclosure of a communication of MA_CONTROL.indication from one node to another. The Petition alleges that the ONU “can notify that value [the RTT] via the MA_Control.indication.” Petition, 37. But again, this is not evidence of the claimed packet and there is no evidence that this primitive travels from the first node (OLT) to the second node (ONU). The primitives identified by the Petition that include an RTT value are only ever used within the OLT, and the Petition fails to identify any instance of a packet transmitted from the OLT to the ONU that contains the RTT value. While the Petition cites to a MA_CONTROL.indication that exists at the ONU (Petition, 38 *citing* Fig. 64-17), the Petition ignores the fact that MA_CONTROL.indication clearly explains that the RTT field “holds a valid value *only* when the primitive is *generated by the Discovery*

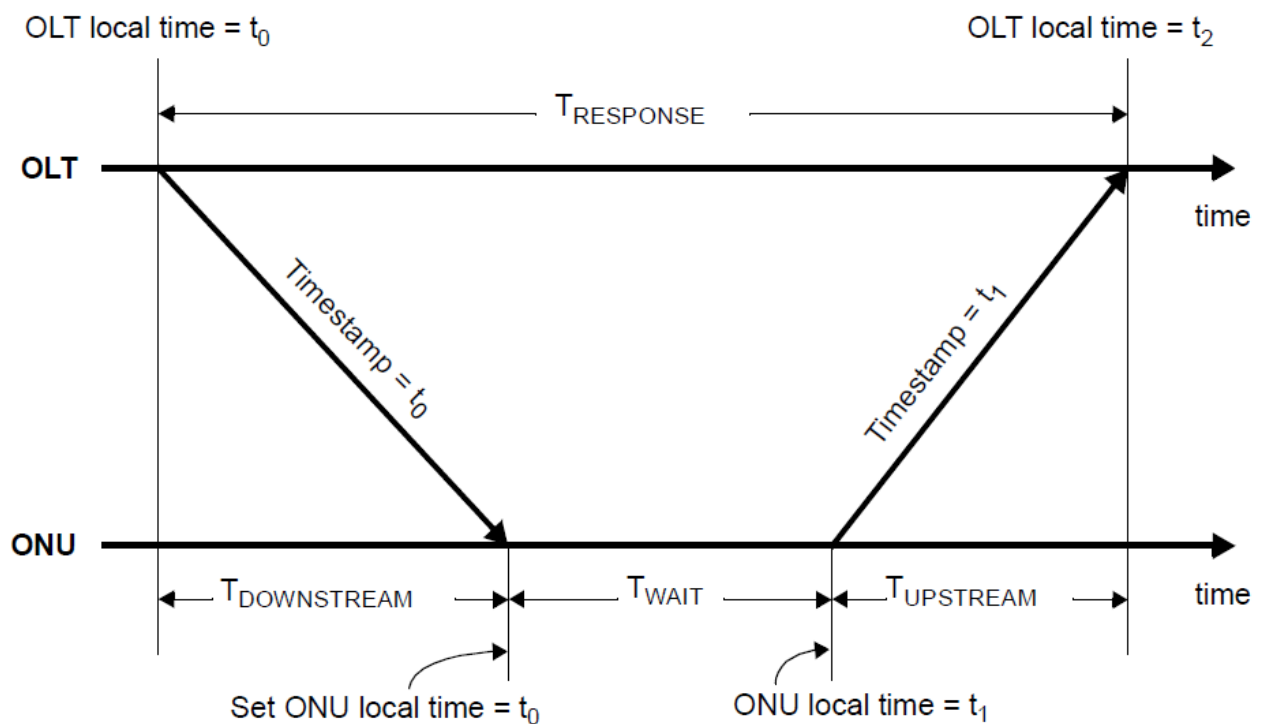
Process in the OLT.” Ex. 1005, 463. That is, when the primitive is generated elsewhere (such as the ONU), there is no valid value for RTT.

At one point the Petition appears to walk back from its allegation that the primitive is the third packet, suggesting that the RTT value itself simply *must* be transmitted. Petition, 38-39. However, there is no evidence that it was transmitted as opposed to calculated independently at the ONU (second node). There is nothing in the IEEE802.3ah standard to suggest that a packet, as opposed to any other independent creation of RTT, is used, or that any calculated RTT value is used at the ONU. *See* Ex. 1005; *see also Id.*, 463 (confirming the RTT field in any primitive at the ONU holds no valid value). It is Petitioner’s burden to set forth a clear case of obviousness including identification of each claimed element. Vague allusions to possibilities are insufficient to meet that burden.

The Petition then concludes that “a POSITA would have understood it to be *required* to ‘transmit ... the estimated propagation delay’ to ONU for ONU to know what that propagation delay was.” Petition, 39. But the Petition cannot locate any such requirement in IEEE802.3ah. The Petition’s incorrect assertion is not only unsupported by IEEE802.3ah but is evidence of using the ’681 Patent (the only actual evidence of a third packet with any alleged propagation delay being transmitted) as a roadmap to interpret the prior art and construct a hindsight-driven

obviousness case. As argued above, this conclusion is based on the incorrect assumption that the RTT value is ever at the ONU—it is not.

IEEE802.3ah has no requirement or suggestion of a transmission as the standard is completely silent about any mechanism by which the ONU could even gain an awareness of RTT. As is shown in Fig. 64-4, there is no communication back to the ONU after the OLT receives the transmission from the ONU as part of this discovery process. Ex. 1005, Fig. 64-4 (reproduced below).



There is no disclosure in any subsequent transmission from the OLT to the ONU depicting this RTT value. Fig. 64-14 provides the full discovery process for

IEEE802.3ah and depicts several additional transmissions back to the ONU, none of which include an RTT value. *Id.*, Fig. 64-14 (reproduced below).

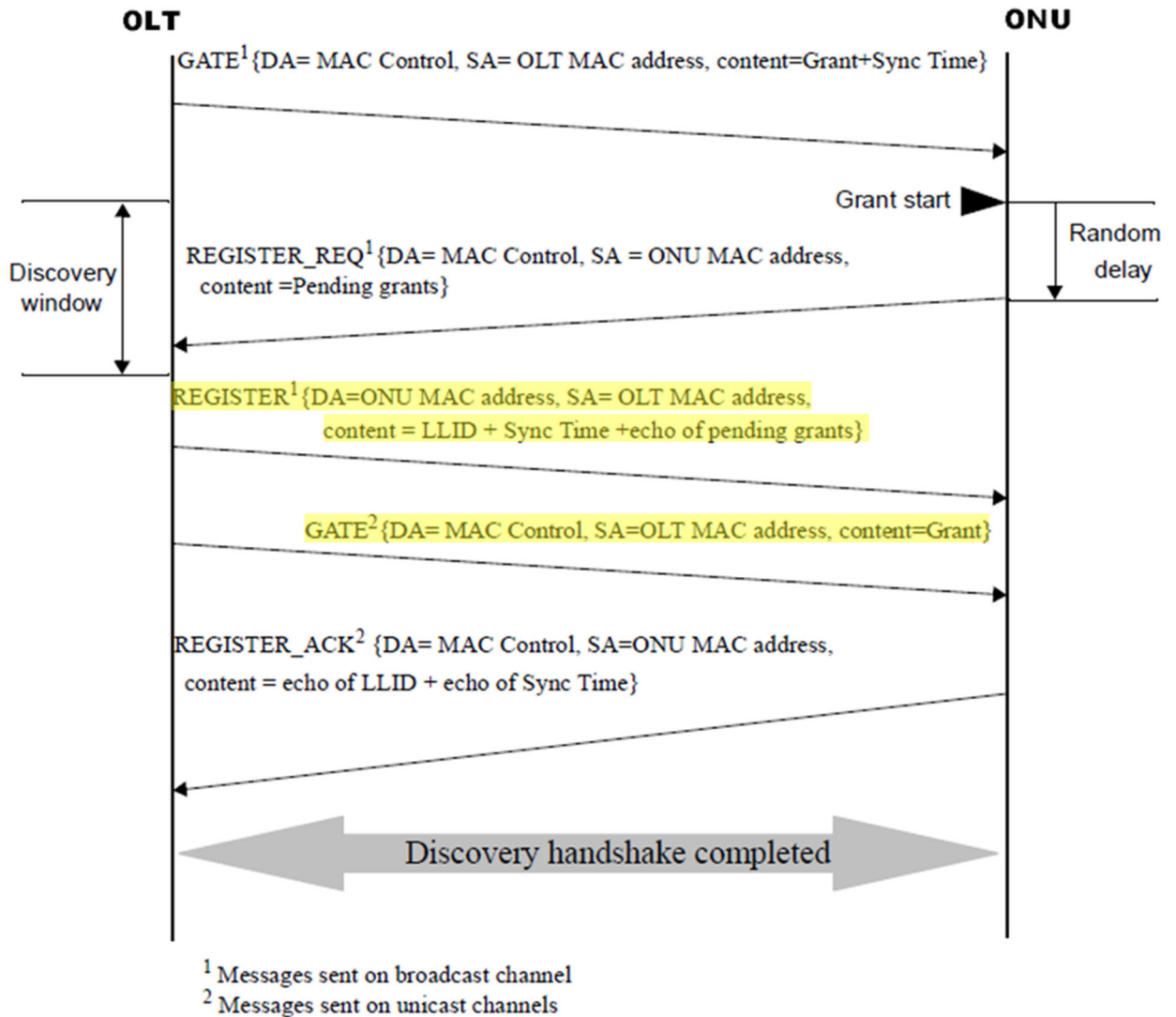


Figure 64-14—Discovery Handshake Message Exchange

As is annotated above, there are two messages sent from the OLT to the ONU after the ONU receives the local clock time transmission from the ONU. *Id.* (see Register¹ and Gate² annotated above). Neither of these messages contain the alleged estimated

propagation delay (RTT); they instead contain registration acknowledgements and grants to the working frequency channel. *Id.*

As a result, the Petition fails to identify or render obvious any message that is the claimed third packet.

- b. IEEE802.3ah Does Not Disclose or Render Obvious “adjusting the local clock...based on the estimated propagation delay...”

Claim 1 of the '681 Patent also requires “adjusting the local clock time of either the first or second node based on the estimated propagation delay, thereby resulting in a synchronized local clock time between the first and second node.” Ex. 1001, cl. 1.

IEEE802.3ah explains that the change from transmitting over a Broadcast channel to a transmission over a Unicast channel happens at the *end* of the Discovery process, confirming IEEE802.3ah does not intend for the RTT to be used outside of the discovery process. Ex. 1005, Fig. 64-14. As discussed, the RTT value is only used by the OLT to ensure that, during the discovery period, there are no competing transmissions on the Broadcast channel. Indeed, there is no need for the OLT to transmit any RTT to the ONU as the Broadcast channel will not be used anymore after the conclusion of the discovery process, by either node, except in future re-

discovery correspondences. *Id.*, 457-58. There is no adjustment of any clock based on RTT.

The Petition fails to identify any instance of the local clock of either the OLT (first node) or ONU (second node) being adjusted *based on the estimated propagation delay*. IEEE802.3ah is completely silent with regard to any usage of RTT by the ONU. If indeed the ONU were ever intended to receive RTT, the standards-setting document would identify the reason why and what the ONU should do with RTT. It does not. This lack of disclosure confirms that not only is RTT not transmitted to the ONU, but it is never used to adjust any clock.

The Petition alleges that the setting of the ONU to time T_0 is the claimed adjustment of a local clock time based on the propagation delay. Petition, 40. This is simply not true. Instead, T_0 is the timestamp value the OLT sends at the *beginning* of the RTT calculation process. Ex. 1005, Fig. 64-4. When the ONU receives MPCPDUs, it sets its counter according to the value in the timestamp field received in the MPCPDU, but this is not an adjustment “based on the estimated propagation delay” as “the estimated propagation delay” is the result of the ranging method, which has not been completed at this point in time. *Id.*, 444, Fig. 64-4; Ex. 1001, cl. 1.

Instead, this value is simply the time sent by the OLT at an originating time that the OLT is able to identify. Ex. 1005, 444, Fig. 64-4. This initial clock change effectively acts as a “reset” to the ONU, such that the timestamp (T_0) received by the OLT is used for accurate RTT calculations by the OLT. *Id.* As such, the setting of the ONU time to T_0 happens before the RTT (what the Petition alleges as the estimated propagation delay) is even calculated and therefore cannot be the claimed final adjustment.

The Petition does not identify any other instance of adjusting any value of a clock in IEEE802.3ah. *See* Petition, 41-42.

The Petition then alleges that a paragraph of IEEE802.3ah that does not mention clock synchronization, or adjusting or changing any clock value, somehow suggests that a clock is adjusted ***based on the estimated propagation delay*** that is calculated in the claimed ranging method. *Id.* However, there is no actual teaching or suggestion of any adjusting of a clock based on a propagation delay, and the Petition improperly relies on expert testimony to bridge the gap of the lacking disclosure of IEEE802.3ah. Consolidated Trial Practice Guide (November 2019) at 36 (“Expert testimony, however, cannot take the place of a disclosure in a prior art reference, when that disclosure is required as part of the unpatentability analysis” and “in an obviousness analysis, conclusory assertions from a third party about

general knowledge in the art cannot, *without supporting evidence of record*, supply a limitation that is not evidently and indisputably within the common knowledge of those skilled in the art.”).

The Petition’s attempted “adjustments” to or “clarifications” of the well-established IEEE802.3ah standard are unjustified and therefore untenable to support its conclusory assertions. IEEE802.3ah was voted on and *approved* by over 250 individual members of the standards committee and was approved by those same members and an oversight board. Ex. 1005, 8-10. In addition, IEEE802.3ah was at least the sixth revision of this standard to be approved by the committee for implementation. *Id.*, 5-6 (noting that each sequential abbreviation will have the following format “IEEE 802.3ae” as an exemplar). The Petition and supporting declaration fail to establish any reason why a POSITA would look to modify the established adopted IEEE802.3ah standard.

2. The Petition Fails to Establish that Claim 11 Would Have Been Obvious Over IEEE802.3ah in Combination with *Shvodian*

IEEE802.3ah in combination with *Shvodian* also fails to teach each and every element of the Challenged Claims. The Petition fails to demonstrate that IEEE802.3ah in combination with *Shvodian* teaches the claimed “transmitting a third packet from the first node to the second node, wherein the third packet comprises the estimated propagation delay” or the claimed “adjusting the local clock

time of either the first or second node based on the estimated propagation delay, thereby resulting in a synchronized local clock time between the first and second node.”

Additionally, the Petition fails to demonstrate that a POSITA would modify IEEE802.3ah in view of *Shvodian*. The Petition, to use its own words, intends to “clarify” IEEE802.3ah with *Shvodian* since both mention calculating “RTT.” Petition, 51. This misses the mark as IEEE802.3ah is a well-established standard and needs no “clarification.” Moreover, *Shvodian*’s RTT is fundamentally different, both in calculation and use, than IEEE802.3ah, such that a POSITA would not simply modify IEEE802.3ah in view of *Shvodian*.

- a. *Shvodian* Also Does Not Disclose or Render Obvious “transmitting a third packet...”

Claim 1 of the ’681 Patent requires “transmitting a third packet from the first node to the second node, wherein the third packet comprises the estimated propagation delay.” Ex. 1001, cl. 1. As discussed above in Section III.A.2., IEEE802.3ah does not teach the claimed third packet. Moreover, the Petition does not rely on any teaching of *Shvodian* for the claimed third packet. See Petition, 55. As a result, any addition of *Shvodian*, even if proper, fails to alter the deficiencies outlined above. Petition, 35-39, 52-55.

The Petition appears to allege that a ranging method is performed since “[t]he ranging method is based on these multiple clock times.” Petition, 55. But this is not a disclosure of transmitting the claimed third packet because no such packet exchange includes the estimated propagation delay. Instead, these exchanges are repeated instances of *Shvodian*’s alleged ranging method across several nodes in the transmission network utilizing bridge nodes as intermediaries. The total RTT of *Shvodian* is calculated using the combined values received by the bridge nodes at the source node. Ex. 1006, [0040]. Recall that, as discussed above in Section III.A.2, if the RTT value is found to be greater than a predetermined value, *Shvodian*’s system will perform a continuing series of the same packet transmissions to continue measuring updated RTT values. *Id.*, [0020].

The Petition incorrectly alleges that *Shvodian*’s framework is “used to reset the second node’s local clock and the second local clock time.” Petition, 55. Nothing in any transmission sent after any RTT value is determined contains the previously-measured RTT value. Instead, the subsequent transmissions are *new* ranging procedures to update the RTT value. Ex. 1006, [0020]. Indeed, these new transmissions are expected to result in a lower RTT value, as they are only transmitted when the calculated value is greater than the pre-determined threshold. *Id.* The latency at the node may ultimately change with conditions and require re-

authentication to assure proper connection within the network. Ex. 1006, [0020], [0039]. The framework of *Shvodian* is used to probe for optimum paths between nodes and to identify the path that allows for the fastest packet round trip. *Id.*, [0020] (“If the RTT is greater than the predetermined time period, the controller 210 repeatedly retransmits the RTT measurement packet at a different timing and remeasures the RTT until either the RTT measurement packet has been transmitted a predetermined number of times or the RTT is not greater than the predetermined time period.”).

As a result, the Petition fails to identify or render obvious any third packet that includes the estimated propagation delay.

- b. *Shvodian* Also Does Not Disclose or Render Obvious “adjusting the local clock...based on the estimated propagation delay...”

Claim 1 of the '681 Patent requires “adjusting the local clock time of either the first or second node based on the estimated propagation delay, thereby resulting in a synchronized local clock time between the first and second node.” Ex. 1001, cl. 1. The Petition does not rely on any teaching of *Shvodian* for the claimed adjusting element either. As a result, *Shvodian* fails to alter the deficiencies outlined above with regard to IEEE802.3ah and this element. This failure is also fatal to Ground 1.

**3. The Petitioner Fails to Show a Motivation to Combine
IEEE802.3ah and *Shvodian***

The Petition attempts to “clarify” the teachings of a well-established and accepted IEEE802.3ah standard approved by over 250 board members by supplementing its own broad assertions to “clarify” the RTT already envisioned in IEEE802.3ah. In doing so, the Petition attempts to construct the claimed invention through impermissible hindsight, conclusory motivation to combine, and a failure to address the actual teachings of IEEE802.3ah and *Shvodian* in favor of focusing on its “word-search” analysis. The Petition ignores the differences in calculation, purpose, and outcome of the two entirely different RTTs.

**a. The Petition Ignores the Differences Between the Time
Calculations of IEEE802.3ah and *Shvodian***

The Petition relies on the teachings of *Shvodian*’s RTT calculation to modify the propagation delay calculation in the already established standard of IEEE802.3ah. But the Petition offers no reason why a POSITA would be motivated to disturb the adopted, functional, and complete IEEE802.3ah standard at all, much less offering a reason to replace IEEE802.3ah’s timing control mechanism to instead transmit a value that, in IEEE802.3ah, never leaves the OLT.

It is undeniable that IEEE802.3ah and *Shvodian* deal with different measurements of different delays. The RTT of IEEE802.3ah is the time it takes a

message to be sent from a source node to a destination node and back to the source node, with the RTT calculated based on timestamp values; this expressly excludes any delays incurred while the packet is processed at the destination node. Ex. 1005, Fig. 64-4.

In contrast, *Shvodian* calculates an entirely different RTT measurement, defined as the overall amount of time it takes for the packet to travel from a first node to a second node, be processed at the second node, and the return travel time back to the first node. Ex. 1006, [0005]. *Shvodian*'s system intends to probe for the fastest route to achieve an RTT below a threshold value and does not utilize the RTT for anything more than this calculation. *Id.*, [0020].

The different measurements of RTT between IEEE802.3ah and *Shvodian* provide different information to the system: IEEE802.3ah will know nothing about processing delays; *Shvodian* will know total delay (but not how that is allocated among travel time and processing delays). A POSITA would have no reason to change the wholly adopted mechanism of the IEEE802.3ah standard with a different mechanism measuring a different property from *Shvodian* which is intended for an entirely different purpose.

The Petition makes two arguments to avoid this clear defect, both of which ignore the crucial incompatibility of the two references. **First**, the Petition alleges,

“*Shvodian* is analogous art to the ’681 Patent and IEEE802.3ah because they are from the same field and *Shvodian* is reasonably pertinent to the problem addressed by the patent and IEEE802.3ah.” Petition, 48. While the references in general may both be directed to network systems, they have entirely different measurements to account for different types of delays across their respective systems: propagation time vs. total delay. *Supra* Sections III.A.1 and III.A.2.

Second, the Petition relies on expert testimony that the implementation of *Shvodian*’s RTT is “address[ing] the same problem of determining RTT” and that “propagation delay could be calculated by first determining RTT.” Petition, 49; Ex. 1003, ¶¶ 152-159. But the issue is not what could be done, but **why** would it be done, as assertions that claim elements are known are insufficient to establish a motivation to combine. *Virtek Vision Int., ULC. V. Assembly Guidance Systems, Inc., DBA Aligned Vision*, No. 2022-1998 (Fed. Cir. Mar. 27, 2024) (citing *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007)). Each reference has a solution to the generic timing problem, but they are different approaches measuring different delays. That is no motivation to eliminate one in favor of the other. The Petition’s attempt to overlay *Shvodian*’s RTT calculation of node latency with IEEE802.3ah’s

already adopted standard of propagation delay *between nodes* is not a basis to modify IEEE802.3ah's to include messages and adjustments not found in either reference.

As such, a POSITA would not be motivated to combine IEEE802.3ah with *Shvodian* based on the differences in their time calculations.

- b. IEEE802.3ah Already Identifies and Solves the Alleged “Challenges” that the Petition Relies on for a Motivation to Combine IEEE802.3ah and *Shvodian*

The Petition fails to provide an adequate basis to combine IEEE802.3ah and *Shvodian*. Rather than indicating actual reasons why a POSITA would be motivated to combine the cited references, the Petition (1) appeals broadly to general desires and problems known in telecommunication systems, and incorrectly alleges that it would be obvious to combine IEEE802.3ah and *Shvodian* as analogous art that face similar problems; (2) incorrectly alleges that replacing part of IEEE802.3ah with *Shvodian*'s implementation simplifies functions already found in IEEE802.3ah; and (3) inconsistently describes the combination such that it is unclear what the combination actually includes.

First, the Petition alleges that “like the patent and IEEE802.3ah, *Shvodian*'s field is ‘transmissions between a source node and a destination node in a network,’ such as a ‘1394-overcoax bridged network,’ to determine RTT.” Petition, 48 (citing Ex. 1001, 1:15-19; Ex. 1005, v, 4; Ex. 1006, ¶¶ [0001]-[0002], [0035]; Ex. 1003, ¶¶

150-151). This would not motivate a POSITA to make any changes to IEEE802.3ah because IEEE802.3ah already addresses this issue.

According to the Petition, “[a] POSITA would have been motivated to combine IEEE802.3ah and *Shvodian* because they both address the same problem of determining RTT” because “IEEE802.3ah recognized that propagation delay could be calculated by first determining RTT.” Petition, 48-49 (citing Ex. 1003 ¶¶ 151-59; Ex. 1005, Fig. 64-4).

The Petition’s reliance on broad problems or objectives in the field to reconstruct the claimed invention is impermissible. In *Johns Manville Corp. v. Knauf Insulation, Inc.*, this Board stated when denying institution that “[d]emonstrating that a reference is analogous art or relevant to the field of endeavor of the challenged patent is not sufficient to establish that one of ordinary skill would have had reason to combine its teachings with other prior art in the manner set forth in the claim.” IPR2018-00827, Paper 9 at 17 (P.T.A.B. Oct. 16, 2018) (informative, designated Dec. 11, 2019) (citing *Securus Techs., Inc. v. Global Tel*Link Corp.*, 701 F. App’x 971, 977 (Fed. Cir. 2017)). In *Securus Techs.*, the Federal Circuit held that the Board correctly found that the proposed rationale to combine the asserted art was “simply too conclusory.” 701 F. App’x at 976. This holding was based on Securus “assert[ing], without more, that because [the references] were drawn from the same

general field of art, the skilled artisan would have turned to them to solve the problems identified” in the challenged patent. *Securus Techs.*, 701 F. App’x at 976-77 (citing *Microsoft Corp. v. Enfish, LLC*, 662 F. App’x 981, 990 (Fed. Cir. 2016)). The Federal Circuit criticized petitioner’s reliance solely on the same field of endeavor, stating “[s]uch short-cut logic would lead to the conclusion that any and all combinations of elements known in this broad field would automatically be obvious, without the need for any further analysis. The Board, therefore, properly rejected Securus’ assertion of obviousness.” *Securus Techs.*, 701 F. App’x at 977.

The Petition similarly fails to provide adequate motivation to combine the cited references, and instead appeals broadly to concerns in the field (such as interference and power efficiency) to enable reconstructing the claims of the ’681 Patent through impermissible hindsight.

Second, a POSITA would not be motivated to change the RTT calculation process of IEEE802.3ah with *Shvodian*’s RTT calculation because IEEE802.3ah already determines the RTT *between* nodes without the need to implement an additional clock synchronization sequence at the node.

The Petition alleges obviousness based on the potential to increase “network efficiency by determining propagation delay between nodes and then synchronizing their local clocks based on propagation delay.” Petition, 49 (citing Ex. 1005, Fig.

64-4). As an initial matter, this is the invention of the '681 Patent and cannot form the basis to modify the prior art as it is evidence of hindsight as there is no evidence that such a driver existed before the '681 Patent. Moreover, this would not motivate a POSITA to make any changes to IEEE802.3ah because IEEE802.3ah already addresses this alleged issue with propagation delay. Ex. 1005, 64-4. In IEEE802.3ah, the ranging procedure is meant to account for the propagation delay between the OLT and ONU, albeit for a different purpose during the discovery process. *Id.*, 21 (“1.4.xxx Ranging: A procedure by which the propagation delay between a master (e.g., OLT) and slave (e.g., ONU) is measured. The round-trip delay computation is performed by the OLT, using the timestamp in MPCP messages from the ONU.”); *supra* Section III.A.1.

The Petition’s argument thus fails because IEEE802.3ah already solves each “challenge” that allegedly exists, in that it already calculates an RTT value at the OLT. *See e.g., Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d. 1342, 1369 (Fed. Cir. 2012) (“[B]oth of these references independently accomplish similar functions Because each device independently operates effectively, a person having ordinary skill in the art, who was merely seeking to create a better device [], would have no reason to combine the features of both devices into a single device.”). As IEEE802.3ah already addresses the “problem” of determining its RTT, there is

no basis to suggest that a POSITA would need to look elsewhere to compensate for any alleged “problem” of knowing any propagation delay.

Moreover, *Shvodian*’s RTT is incompatible with the teachings of IEEE802.3ah because *Shvodian*’s RTT measurement determines the latency *at the node*. Ex. 1006, [0005], [0020]. IEEE802.3ah’s RTT, in contrast, expressly excludes this by requiring the ONU wait until a predetermined time to respond, thereby removing any latency from IEEE802.3ah’s RTT. *Shvodian* uses a fundamentally different calculation for its RTT. First, the controller sends a packet to measure the RTT and waits for the response from the destination node, which happens after the destination node processes the packet. *Id.*, [0020]. The response time includes the latency at the destination node, thereby allowing RTT to analyze the total time it takes to send, process, and respond to a packet. In *Shvodian*, if the RTT is greater than a set value, then the RTT packet is sent again because it is concerned with the most efficient route, whereas in IEEE802.3ah, the RTT value is used to ensure the OLT does not broadcast packets during the discovery process. *Id.*, [0020]; Section III.A.1.

The Petition’s alleged combination would not have suggested that a POSITA make any changes to the specific standards of IEEE802.3ah. The teachings in IEEE802.3ah would cause a POSITA to proceed in a different direction, and the

proposal advanced by the Petition would frustrate the intended purpose of the well-defined standard of IEEE802.3ah.

The Petition's conclusory and inconsistent arguments illustrate a high degree of reliance on hindsight to reconstruct the claimed invention. Based on these flawed arguments, a POSITA would not be motivated to combine the cited references to arrive at the challenged claims.

c. The Petitioner Fails to Show an Expectation of Success in Combining IEEE802.3ah and *Shvodian*

The Petition attempts to conjure an expectation of success by making broad assertions about the art instead of focusing on the actual teachings and disclosures of the proposed combination.

First, the Petition alleges that since the “apparatuses and methods were ‘applicable to any wired . . . communication network elements,’” a POSITA “would [] have understood *Shvodian*’s network to be compatible with IEEE802.3ah’s ranging protocol.” Petition, 50. This is a broad oversimplification of both references.

Shvodian directly discloses the types of IEEE standards that are intended for use with *Shvodian*’s RTT, namely IEEE802.15 or 802.16. Ex. 1006, [0015]. *Shvodian*’s disclosure was intended to fix the need for allocating timeslots between a source node and destination node to compensate for latency of packet arrival and

transmission at the destination node. *Id.*, [0004]-[0005], [0033]. The RTT in *Shvodian*'s system is intended to focus on the latency at the node, not any propagation delay or the RTT value disclosed in IEEE802.3ah. *Id.*, [0020]. In fact, IEEE802.3ah would have no need to send retransmissions of an RTT value between nodes since after the initial RTT value is calculated, the OLT no longer dispatches messages on the Broadcast channels that were used to calculate the RTT. Ex. 1005, 457-58, Fig. 64-14. Since IEEE802.3ah no longer uses the Broadcast channels until the next discovery period, then there is no reason to calculate a "faster" route between nodes as is described in *Shvodian*. The reoccurring calculations to identify the fastest route between nodes is not what IEEE802.3ah intends to use.

Next, the Petition alleges that since both *Shvodian* and IEEE802.3ah use "RTT as part of the ranging," *Shvodian* would "clarify the implementation of IEEE802.3ah's ranging technique." Petition, 51. IEEE standards are widely accepted standards that achieve approval through adoption of individuals working in the respective fields, and IEEE802.3ah has over 250 board members that approved this standard. Ex. 1005, 7-10. The standard does not need to be clarified as the document expressly sets forth what is necessary for interoperability and is not open

to different interpretations or subject to “clarifications” not actually required by the standard.

As such, a POSITA would not look to modify these standards and would instead look to these standards for guidance within their respective fields without any modification unless approved by the standards committee, as has already been done at least five times with IEEE802.3ah. Ex. 1005, 5-6. The Petition fails to acknowledge or address that although the same acronym may be used across references (“RTT”), the definition and use of RTT is quite different in the two references. The Petition’s reliance on “clarifying” an established standard is inapposite to these standard setting conventions.

Accordingly, a POSITA would have no reasonable expectation of success in combining *Shvodian* and IEEE802.3ah.

4. IEEE802.3ah alone or in combination fails to disclose the limitations of independent claims 11, 21, and 31

Independent Claims 11, 21, and 31 recite similar limitations as Claim 1 as noted in the Petition. Petition, 51-52, 56-57. The Petition incorporates the same arguments regarding the same limitations as discussed *supra* and the arguments fail for the same reasons. Petition, 51-58.

5. IEEE802.3ah alone or in combination with *Shvodian* fails to disclose the limitations of dependent claims 2-10, 12-20, 22-30, 32-40

For the claims from which dependent Claims 2-10, 12-20, 22-30, 32-40 depend, Ground 1 relies on the obviousness analysis of IEEE802.3ah alone or in combination with *Shvodian*. Petition, 42-46, 58. Since the Petition fails to show a reasonable likelihood that Claims 1, 11, 21, and 31 are unpatentable, Ground 1 challenging certain dependent claims also fails to show a reasonable likelihood of success. Ground 1 of the Petition therefore fails to warrant institution and should therefore be denied.

C. Ground 2 Fails to Render Obvious the Challenged Claims

The combination of IEEE802.3ah, *Shvodian*, and *Frei* fails to render obvious the Challenged Claims. IEEE802.3ah and *Shvodian* fail to teach or render obvious the Challenged Claims as set forth above.

There is simply no teaching in the prior art of Ground 2 of any adjusting of the local clock times of either the first and second nodes based on the estimated propagation delay, as required by the Challenged Claims. For this reason, the Petition can be denied.

Moreover, as a last-ditch effort, the Petition attempts to “throw the kitchen sink” at the claimed invention by adding yet another reference, that describes yet

another calculation for yet another purpose, in yet another standard environment. The Petition does so using impermissible hindsight and conclusory motivation to combine teachings along with the failure to consider practical complications in combining IEEE802.3ah, *Shvodian*, and *Frei*.

Yet again, the Petition attempts to “clarify” the teachings of a well-established and accepted standard approved by over 250 board members by supplementing their own broad assertions to “clarify” the RTT already envisioned in IEEE802.3ah. Petition, 64-65, 67. The Petition again relies on conclusory statements as its evaluation of the alleged additional combination of *Frei* with IEEE802.3ah and *Shvodian*.

1. *Frei* Does Not Disclose or Render Obvious “adjusting the local clock time of either the first or second node based on the estimated propagation delay”

Claim 1 of the ’681 Patent requires the “adjusting the local clock time of either the first or second node *based on the estimated propagation delay*.” Ex. 1001, cl. 1. This adjustment comes after the completion of the claimed “ranging method” which results in the estimated propagation delay. *Frei* does not describe or suggest any such adjustment of a local clock based on the estimated propagation delay.

While *Frei* describes adjusting frame timing, it fails to teach or suggest ***adjusting a local clock time*** based on an estimated propagation delay. Ex. 1007,

[0037]. The Petition broadly asserts that *Frei*'s waiting to send a delay signal meets this claim limitation. Petition, 72. However this is not any actual adjustment of the clock of either node.

The assertion by the Petition mischaracterizes what *Frei*'s delay actually is, which is nothing more than a calibration of clock timing. Ex. 1007, Fig. 5, [0040]. The control node in *Frei* transmits the new local clock time of the source node to the destination node (the new local clock time is *not* the propagation delay as it is the beginning of the process, before any ranging method has begun). Ex. 1007, [0032] ("Messages comprising timestamp information can also be used to calibrate the clock of the destination node 102 with the clock of the source node 102."). The timestamp messages of 102 are merely just updated times from the clock of the source node (a clock that remains unchanged throughout the process of *Frei*) that ensure proper calibration of timing between the two nodes and prevent timestamp drift. *Id.*, [0035]. Indeed, *Frei* expressly confirms that the clocks between the nodes are misaligned, in a step that occurs only at the source node. *Id.*, [0025]; Fig. 5. This acceptance of misalignment confirms that there not only is no adjustment of a clock, but that the system of *Frei* accepts clock misalignment. Indeed, *Frei* confirms that its clocks do not have a common time base. *Id.* ("In this manner, synchronization

between the two nodes is achieved without a common time base.”). *Frei* is clear that no adjustment occurs.

This idea is further illustrated in Fig. 5 where the calibration of step 514 is an ongoing process that happens before any computation of propagation delay. *Id.*, Fig. 5, [0041] (“At step 512, the source node transmits a plurality of one-way messages to the destination node to calibrate the clock at the destination node.”). These “one-way” messages are sent *before* the source node computes the alleged estimated propagation delay as shown in Fig. 5. *Id.* Using these values, *Frei* explains that differences in clock speeds can be calculated at the destination node, not in response to any received estimated propagation delay. *Id.*, [0041] (“At step 514, the clock speed difference between the source node and the destination node is computed at the destination node.”). Regardless, calculation of clock speed differences is not an estimated propagation delay between two nodes.

Yet again, the Petition relies on unrelated disclosures that, upon actual reading of the references, confirm that a POSITA would not find the references pertinent to the Challenged Claims, nor would one be motivated to modify any other reference to arrive at the Challenged Claims.

As such, nothing in *Frei* describes adjusting a clock based on the estimated propagation delay that is returned from the ranging method. As a result, the Petition

fails to identify or render obvious any adjustments to the local clocks with the estimated propagation delay.

2. The Petitioner Fails to Show Motivation to Combine IEEE802.3ah and *Frei* either alone or in combination with *Shvodian*

A POSITA would not have been motivated to modify IEEE802.3ah's process in view of "Frei's calculation of propagation delay from round-trip time and transmission of propagation delay to the second node," as the Petition alleges. Petition, 64. As with Ground 1, the Petition ignores the fact that IEEE802.3ah already recognizes and addresses the alleged "challenges" or shortcomings that the Petition alleges are the basis for adding any teachings of *Frei*. See e.g., *Kinetic Concepts*, 688 F.3d. at 1369; *Stryker Corp. v. Karl Storz Endoscopy America, Inc.*, IPR2015-00764, Paper 13 at 13 (P.T.A.B. Sept. 2, 2015) ("[W]e fail to see, and Petitioner does not adequately explain, why it would be obvious to add a translator to redundantly perform the function that Petitioner maintains is performed by the interconnect devices and network computer located within the surgical network."). Each citation to *Frei* in the Petition is addressed below.

First, the Petition states that "[t]hose skilled in the art will realize from [Frei's] disclosure that other network topologies, both wired and wireless, may find benefit by using the present invention [of Frei]." Petition, 65. (citing Ex. 1007,

[0017]). This broad conjecture overlooks that *Frei* is directed to *wireless technology*. Ex. 1007, [0018]. The Petition acknowledges this shortcoming by stating that a POSITA would generally apply any communication medium to a wired network as it is “intended for implementation” in such networks. Petition, 65. This is improper as the relevant test should focus “on . . . what a skilled artisan *would* have been motivated to do,” not simply what one would be capable of doing. *Polaris Industries, Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1068-69 (citing *InTouch Techs., Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014)). Since IEEE802.3ah is already a well-established standard with contemplations of using RTT to evaluate timing between nodes of an EPON network, there is simply no motivation to implement *Frei*’s recurring calculation over wireless pathways, in the EPON network of IEEE802.3ah.

As described in Section III.A.3, *Frei*’s calculations are made on a repeating basis to account for node movement throughout the network. In the environment of *Frei*, this makes sense as a user’s wireless device can move throughout the environment. In IEEE802.3ah’s EPON network, the nodes are physically fixed (required so through the presence of optical cabling). The differing delays between nodes in *Frei* is impractical in a PON network as this network is a static network with nodes that do not rise to the distances envisioned in a wireless network. The

Petition's "motivation" oversteps these fundamental differences in an effort to combine teachings that would not actually suggest the claimed subject matter to a POSITA.

Second, the Petition alleges that "[t]o the extent that IEEE802.3ah and/or *Shvodian* does not render obvious the calculation and transmission of propagation delay, a POSITA would have been motivated to look to references like Frei for clarification." Petition, 67. For the same reasons as outlined above in Ground 1, a POSITA would not seek any "clarification" of the IEEE802.3ah standard, as the standard needs no clarification. The Petition's approach confirms the Petition's hindsight driven analysis that amounts to nothing more than continuing to allege additional references would be added to the alleged combination.

Frei's disclosure of a ranging method, like *Shvodian's* discussed above, would not motivate a POSITA to make any changes to IEEE802.3ah because IEEE802.3ah already provides a functioning ranging analysis for its intended purpose. *See Supra* Section III.B.3.

In view of IEEE802.3ah's disclosure regarding the ranging procedure, the Petition's reliance on a POSITA wanting a "network device [to] include the structure of a device module and memory coupled to a controller" as a motivation to combine IEEE802.3ah and *Shvodian* is unfounded. Again, a POSITA would not be motivated

to improve IEEE802.3ah based on the structure of IEEE802.3ah's ranging procedures and network configuration since IEEE802.3ah already includes specific functionality to address this "issue." The Petition's broad statements concerning "clock synchronization" and "point-to-multipoint topologies" do not rectify the Petition's insufficient motivation. At no point does the Petition even attempt to explain why a POSITA *would* make this combination *to arrive at the Challenged Claims* and instead focus their attention on broad statements of ranging procedures as the only means of combining the references coupled with unfounded assertions of "nonobviousness" as the guide for a POSITA to look to combine additional references.

3. The Petitioner Fails to Show an Expectation of Success in Combining IEEE802.3ah and Shvodian with Frei

The Petition attempts to conjure an expectation of success by making broad assertions about the art instead of focusing on the disclosures.

The Petition alleges that since the "the references teach similar, compatible ranging protocols including calculation of RTT; a POSITA would therefore have expected a combination to be successful." Petition, 68. The Petition alleges that the ranging of IEEE802.3ah may be used to calculate propagation delay which is supplemented by *Frei's* calculations. *Id.* This fails to identify any basis to incorporate any teaching of *Frei* or any explanation of why any change to

IEEE802.3ah or *Shvodian's* different RTT processes would be made with any expectation of success.

The Petition alleges that since both *Frei* and IEEE802.3ah use “propagation delay” then “[a] POSITA would have had no difficulty implementing the calculation performed by Frei (dividing by two) after RTT is calculated in IEEE802.3ah(-*Shvodian*).” Petition, 68. This misses the mark. The expectation of success is not tied to simply performing the mathematical operation of division, but rather the changes that would need to be made to IEEE802.3ah and *Shvodian*, one an adopted standard using one form of RTT during node discovery and the other using a different RTT to ensure optimized communication paths through a mesh network.

Indeed, the propagation delay of *Frei* uses different timestamp allocations than those described in IEEE802.3ah and fails to teach or suggest any adjustment of any clock time based on any alleged propagation delay. Ex. 1007, [0033]-[0034]. *Frei's* propagation delay calculation does not account for differing local times at each node and instead assumes all nodes are synchronized. *Frei* instead calibrates clocks with new times on an ongoing basis to account for moving nodes that change

relative distance due to that movement to ensure efficient transmission of data. Ex. 1007, [0042]-[0043], Fig. 6.

Frei utilizes intra-node communication to triangulate the distance of each node to the source node. It then implements a *new* ranging procedure to calculate the RTT all within the continuing working channels. *Id.*, [0018]. This system of calculation would not be operable in a PON (IEEE802.3ah) as each node in a PON is static and will not move the distances envisioned by *Frei* nor would the dynamic teachings of *Frei* suggest any suitability to a POSITA looking to make any change to the static optical network of IEEE802.3ah.

Again, in IEEE802.3ah, once the ranging calculation is made, IEEE802.3ah no longer uses the Broadcast channel where the OLT calculates the RTT. Ex. 1005, 457-58, Fig. 64-14. The OLT in IEEE802.3ah acts as the originating node for all communications to the various ONUs, without any need for ONU-to-ONU coordination to occur. *Id.*, 456 (“The operation of P2MP network is *asymmetrical*, with the OLT assuming the role of master, and the ONU assuming the role of slave.”). Since IEEE802.3ah does not need to continually triangulate a distance between itself and a node or between two nodes, use cross-talk between the ONUs, or maintain communication on the Broadcast channels, then there is no basis to conclude a POSITA would look to *Frei* in the first place, let alone have a reasonable

expectation of success to implement *Frei*'s disclosure on the PON network of IEEE802.3ah. This oversight is a fatal flaw for any reasonable expectation of success in combining *Frei* with IEEE802.3ah and *Shvodian*.

4. IEEE802.3ah alone or in combination fails to disclose the limitations of independent claims 11, 21, and 31

Independent Claims 11, 21, and 31 recite similar limitations as Claim 1 as noted in the Petition. Petition, 51-52, 56-57. The Petition incorporates the same arguments regarding the same limitations as discussed *supra* and therefore fail for the same reasons. Petition, 51-58.

5. IEEE802.3ah alone or in combination with *Shvodian* fails to disclose the limitations of dependent claims 2-3, 6-10 12-13, 15-20, 22-23, 26-30, 33, 36-40

For the claims from which dependent Claims 2-3, 6-10 12-13, 15-20, 22-23, 26-30, 33, 36-40 depend, Ground 1 relies on the obviousness analysis of IEEE802.3ah alone or in combination with *Shvodian*. Petition, 42-46, 58. Since the Petition fails to show a reasonable likelihood that Claims 1, 11, 21, and 31 are unpatentable, Ground 1 challenging certain dependent claims also fails to show a reasonable likelihood of success. Ground 2 of the Petition therefore fails to warrant institution and should therefore be denied.

D. Grounds 3 and 4 Fail to Render Obvious the Challenged Claims

Grounds 3 and 4 incorporate additional references in combination with IEEE802.3ah to render obvious the dependent claims without adding to the analysis of the independent claims. Since the Petition fails to show a reasonable likelihood that Claims 1, 11, 21, and 31 are unpatentable, Grounds 3 and 4 challenging certain dependent claims also fail to show a reasonable likelihood of success. Grounds 3 and 4 of the Petition therefore fail to warrant institution and should therefore be denied.

IV. CONCLUSION

For the reasons set forth above, the IPR should not be instituted.

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Respectfully submitted,

By: /Jason A. Engel/
Jason A. Engel
Reg. No. 51,654
K&L Gates LLP

Counsel for Patent Owner

Certification of Word Count Under 37 C.F.R. § 42.24(d)

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By: /Jason A. Engel/
Jason A. Engel
Reg. No. 51,654
K&L GATES LLP
70 W. Madison Street, Suite 3100
Chicago, IL 60602
Jason.Engel.PTAB@klgates.com
T: (312) 807-4236
F: (312) 827-8145

CERTIFICATE OF SERVICE

I hereby certify that on May 23, 2024, a true and correct copy of the foregoing was caused to be served on the following counsel of record for Petitioners by electronic mail at the following addresses:

Adam R. Shartzner
Ruffin B. Cordell
Richard A. Sterba
Scott M. Flanz
Vivian C. Keller
Timothy Riffe
Usman Khan
Fish & Richardson P.C.
60 South Sixth Street, Suite 3200
Minneapolis, MN 55402
Tel: 202-783-5070
Fax: 877-769-7945
Email: IPR45035-0035IP1@fr.com

By: /Jason A. Engel/
Jason A. Engel
Reg. No. 51,654