UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner

IPR2026-00186
U.S. Patent No. 10,051,556

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

TABLE OF CONTENTS

PETITIONER'S EXHIBIT LIST

Ex.1001	U.S. Patent No. 10,051,556.
Ex.1002	Prosecution History of U.S. Patent No. 10,051,556.
Ex.1003	Declaration of Dr. Christopher Hansen under 37 C.F.R. § 1.68.
Ex.1004	*Curriculum Vitae* of Dr. Hansen.
Ex.1005	U.S. Patent No. 9,161,293 to Choudhary ("Choudhary").
Ex.1006	U.S. Patent No. 7,058,018 to Hasty ("Hasty").
Ex.1007	U.S. Patent No. 8,503,390 to Chen ("Chen").
Ex.1008	802.11h-2003.
Ex.1009	802.11k-2008.
Ex.1010	U.S. Patent No. 8,363,617 to Meyer ("Meyer").

I. INTRODUCTION

U.S. Patent No. 10,051,556 ("the '556 patent") was granted in error and is an ideal candidate for *inter partes* review. The '556 patent was allowed after the Applicant amended the claims to recite concepts that were not only acknowledged as prior art in the '556 patent background but explicitly disparaged. Ex.1002, 78.

The '556 patent relates to "an access point scan method using an active scan scheme in a wireless LAN system." Ex.1001, 1:15-21. As part of the scanning procedure, the access point "*receiv[es], from a station, a probe request frame*." Ex.1001, claim 9. The probe request includes "*information on a signal strength*" *Id*. After the original claims directed to this concept were rejected, the Applicant amended the claims to further recite "*wherein an access of the station to the access point is based on … a maximum probe response time*." *Id.;* Ex.1002, 78. The Applicant argued that the prior art "fails to teach or suggest a maximum probe response time **<u>during which the station waits for a response</u>**." Ex.1002, 45. But the applicants had affirmatively disparaged waiting as a problem with prior art approaches: "[E]ven after a probe response frame is received from an access point …, the station **<u>waits for the maximum probe response time to pass</u>**, and then requests an access at the access point, **<u>thereby causing waste of time</u>**." Ex.1001, 2:2-6. Because the '556 patent was allowed for reciting concepts that were acknowledged and disparaged as prior art, it was granted in error.

The prior art presented in this Petition teaches both the original limitations and the admitted prior art limitations that were added to gain allowance. For the original limitations, Choudhary (Ex.1005) and Hasty (Ex.1006) teach an access point that receives a probe request that includes the transmission power level of the probe request. For the admitted prior art limitations that were added to gain allowance, Chen (Ex.1007) teaches that "[a]fter the timer has reached the maxReplyWait, the scanning is stopped, and … the AP corresponding to the probe response message having the biggest SNR is selected as the new AP." Ex.1007, 2:24-28.

Because the prior art presented in this Petition renders each of the challenged claims obvious, and because the claims of the '556 patent were allowed for reciting what was acknowledged as prior art in the specification, the '556 patent is an ideal candidate for *inter partes* review.

Accordingly, 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 1-4 and 9-11 (the "Challenged Claims") of the '556 patent.

II. GROUNDS FOR STANDING

Petitioner certifies that the ’556 patent is eligible for IPR and that Petitioner is not barred or estopped from requesting IPR challenging the patent claims. 37 C.F.R. § 42.104(a).

III. NOTE

Petitioner cites to non-patent exhibits’ PDF page numbers. Emphasis in quoted material has been added.

IV. TECHNOLOGY BACKGROUND

A. Wireless Networks

In an IEEE 802.11 environment, client devices (mobile stations) connect to access points that provide connectivity to a fixed network. “An Access Point (AP) in 802.11 … operates at a fixed Radio Frequency (RF) frequency selected from one of the set of frequencies permitted in the country of operation.” Ex.1005, 1:8-11. These frequencies are often referred to as channels. Each wireless network is uniquely identified by a default alpha-numeric name called an SSID. Ex.1003, ¶25.

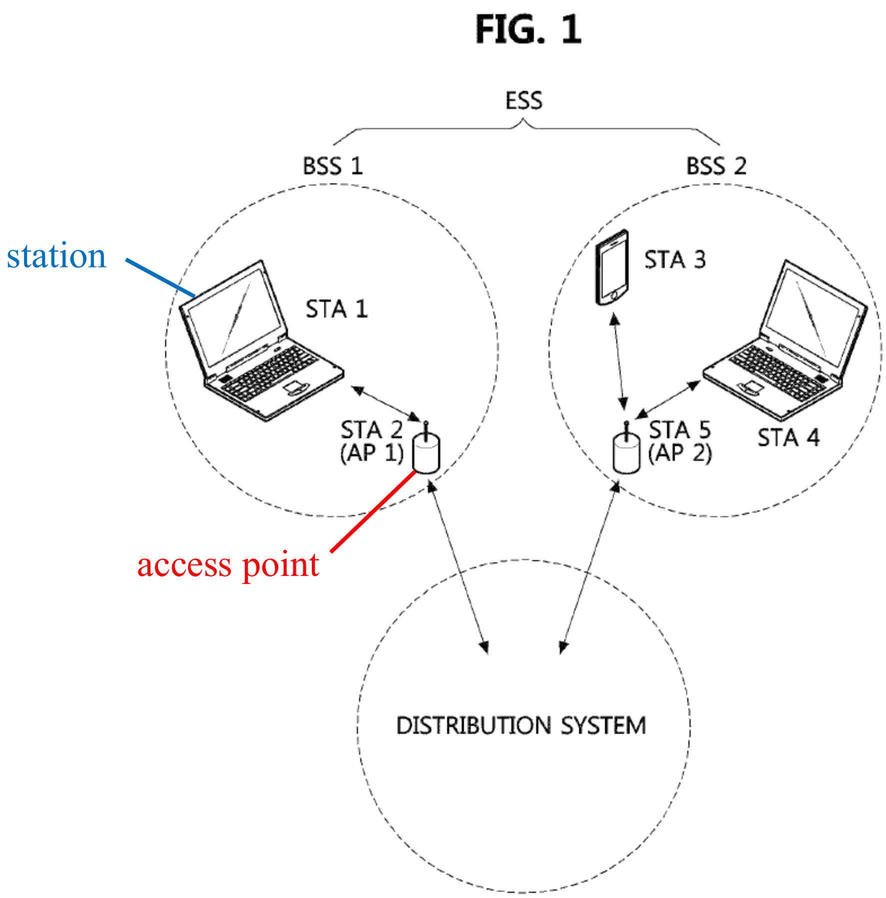
B. Active Scanning

“When a wireless computing device (also referred to as a ‘station’ or ‘node’) wants to access a WLAN, for example after power-up, sleep mode, or moving to a new area, the wireless computing device searches for access points (APs) by scanning.” Ex.1010, 1:16-20. The client devices (mobile stations), such as a phone or laptop, discover nearby APs using passive or active scanning. Client devices are commonly referred to by several names, including mobile unit (MU), mobile station (MS), and non-AP station (STA). "In active probing, an MU [client device] sends an 802.11 broadcast probe request at a lowest supported data rate on a specific frequency and listens for a response from AP(s) on that frequency." Ex.1005, 1:21-24. Those probe responses carry radio metrics so the client device can choose the best AP. Then, "the MS [i.e., client device] selects an AP corresponding to a channel with the best signal quality as a new AP based on the signal quality information in the probe response message," where the "signal quality information includes signal strength or a signal to noise ratio." Ex.1007, 3:50-55; Ex.1003, ¶26.

V. OVERVIEW OF THE '556 PATENT

A. Summary of the '556 Patent

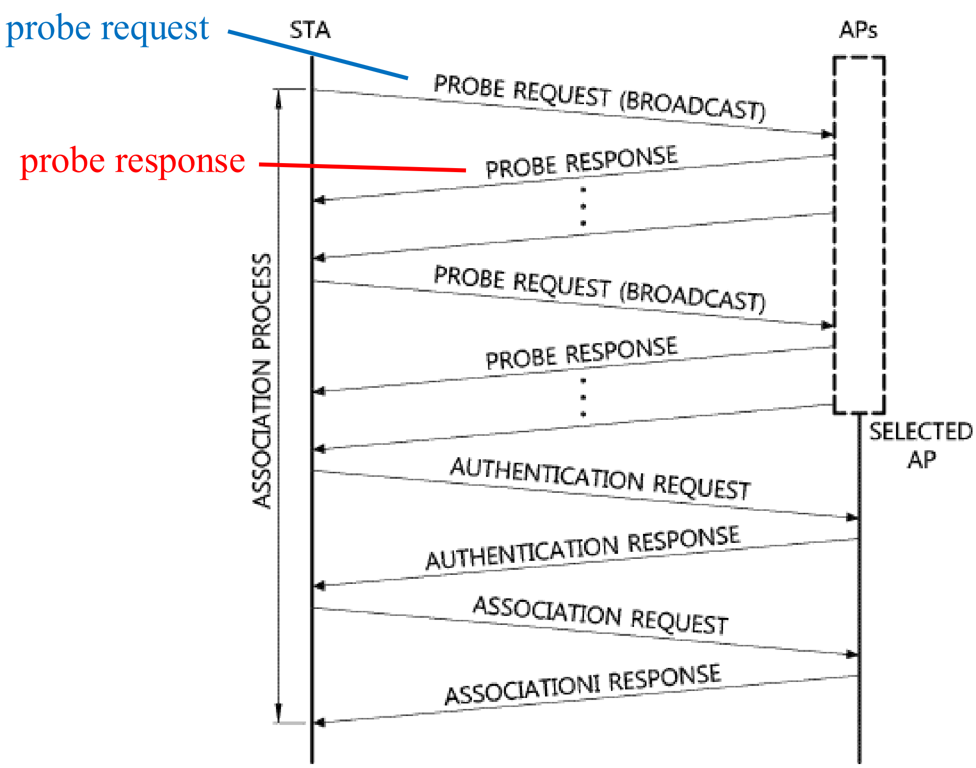
The '556 patent "relate[s] in general to the field of an access point scan method, and more particularly, to an access point scan method using an active scan scheme in a wireless LAN system." Ex.1001, 1:15-20. An exemplary access point and station (e.g., a mobile device) is shown in Fig. 1 below.



Ex.1001, Fig. 1 (annotated); Ex.1003, ¶27.

The ’556 patent describes and claims a technique whereby an access point only responds to a station’s probe request that meets a quality threshold. In particular, the access point (AP) receives from a mobile station a probe request that includes “signal strength information of the station.” Ex.1001, 2:31. Using the signal strength information, the access point evaluates whether the “uplink quality” meets a “predetermined standard.” Ex.1001, 2:37-41. The access point then “transmit[s] a probe response frame to the station if the uplink quality satisfies a predetermined standard.” Ex.1001, 10:48-50. A probe request and response are illustrated in Fig. 2 below.

FIG. 2



Ex.1001, Fig. 2 (annotated); Ex.1003, ¶28.

The "signal strength information" may include the station's transmit power. The STA "generat[es] a probe request frame including signal strength information of the station." Ex.1001, 8:7-8. "The signal strength information may include information about transmission power of the station," and thus "the signal strength may represent transmission power." Ex.1001, 7:66-8:2.

The AP uses the signal strength information from the probe request—specifically the STA's transmit power combined with the received signal strength at the AP—to compute uplink path loss and thereby evaluate uplink quality. The patent explains that the AP "acquir[es] information about uplink quality based on signal strength information of the station included in the probe request frame." Ex.1001, 10:45-47. The "uplink quality information" includes "uplink path loss information." Ex.1001, 10:60-67. The AP "may acquire an uplink path loss through a difference between the transmission power of the station included in the probe request frame and received signal strength of the probe request frame." Ex.1001, 10:60-65.

The background section of the '556 patent explains the timing of an active scan procedure according to IEEE 802.11. Conventionally, a station "receives a probe response frame from the access points during a maximum probe response time Max_Probe_Response_Time, and requests access" afterward. Ex.1001, 1:63-67. The '556 patent disparages the concept of waiting until the timer expires as a "waste of time." Ex.1001, 2:5-9. The purported novelty—as described in the specification—is that "[t]he station may perform an access to the certain access point ***<u>before</u>*** a preset maximum probe response time elapses." Ex.1001, 10:32-37; Fig. 12.

Despite disparaging the concept of waiting until a probe timer (e.g., a maximum probe response time) expires before accessing the access point, the examiner allowed the claims after the applicant added the waiting-period concept to the claims. The claims were allowed after the Applicant added the following limitation: "*wherein the station access the access point based on the probe response frame and a maximum probe response time*."

As will be explained below, however, neither the reasons for allowance (waiting until the timer expires before access) nor other claimed concepts (placing signal strength information in a probe request) were new as of the '556 patent's earliest possible priority date. Ex.1003, ¶¶27-33.

B. Prosecution History of the '556 Patent

The '556 patent was filed on June 9, 2017 and claims priority to two Korean applications—one filed on June 28, 2012, and the other filed on June 4, 2013. Ex.1001, (30) Foreign Application Priority Data.

In a first Office Action, the claims were rejected as being obvious over U.S. Patent Publication No. 2016/0007386 to Park ("Park") in view of U.S. Patent No. 2009/004663 to Thomson ("Thomson"). Ex.1002, 64. In response, the Applicant amended the claims to recite "*wherein the station accesses the access point based on the probe response frame and a maximum probe response time*." Ex.1002, 78. Applicant then argued that "Applicant respectfully submits that Thomson fails to teach or suggest a maximum probe response time **during which the station waits for a response**." Ex.1002, 45. The Office then allowed the claims finding that the arguments related to this amendment were persuasive. Ex.1002, 23.

However, the concept of waiting for a "*maximum probe response time*" for response frames from access points was well known. Indeed, the background section of the '556 patent states that this was part of the 802.11 standards. Ex.1001, 1:16-2:14. The background section further disparages this concept as a "waste of time." *Id.* In other words, the Examiner erroneously allowed the claims for reciting what the '556 patent itself acknowledges was already known. Ex.1003, ¶¶34-36.

VI. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art ("POSITA") in the field of the '556 patent, as of its earliest possible priority date of June 28, 2012, would have been someone knowledgeable and familiar with wireless communications including wireless networks and local area networks (WLAN) based on IEEE 802.11 standards. That person would have a bachelor's degree in electrical engineering, computer science, or equivalent training, and approximately two years of experience implementing IEEE 802.11. Lack of work experience can be remedied by additional education, and vice versa. Ex.1003, ¶¶22-24.

VII. 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). *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). Petitioner submits that, for the purposes of this proceeding and the grounds presented herein, no claim term requires express construction. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Ex.1003, ¶37.

VIII. RELIEF REQUESTED AND THE REASONS FOR THE REQUESTED RELIEF

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

IX. DISCRETIONARY DENIAL WOULD BE INAPPROPRIATE

This patent is involved in the following district court proceeding: *Golden Eye Technologies LLC v. Cisco Systems, Inc.,* 2-25-cv-00898 (EDTX). As will be addressed in further detail in any discretionary briefing—the relevant considerations favor institution.

To that end, Petitioner stipulates, consistent with the stipulation made by the Petitioner in *Sotera* that, if the PTAB institutes this IPR, Petitioner will not pursue in the co-pending litigation (No. 2-25-cv-00898 identified above) against the claims challenged in this IPR, (i) the specific grounds raised, or (ii) any other grounds that could have reasonably been raised before the PTAB in that instituted proceeding (*i.e.*, any ground that could have reasonably been raised under §§ 102 or 103 on the basis of prior art patents or printed publications). *Sotera Wireless, Inc. v. Masimo Corporation (§ II.A)*, IPR2020-01019, Paper 12 (December 1, 2020) (precedential).

X. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE

A. Challenged Claims and Statutory Grounds for Challenge

Grounds	Claims	Basis
#1	1-4 and 9-11	35 U.S.C. § 103 (pre-AIA)[1] over Choudhary, Hasty, and Chen

U.S. Patent No. 9,161,293 to Choudhary et al. ("Choudhary," Ex.1005) was filed September 28, 2011 and issued October 13, 2015. Choudhary is thus prior art to the '556 patent under (pre-AIA) 35 U.S.C. 102(e).

U.S. Patent No. 7,058,018 to Hasty, Jr. et al. ("Hasty," Ex.1006) was filed on Mar. 6, 2002 and issued on June 6, 2006. Hasty is thus prior art to the '556 patent under (pre-AIA) 35 U.S.C. 102(b).

U.S. Patent No. 8,503,390 to Chen ("Chen," Ex.1007) was filed September 19, 2007 and issued August 6, 2013. Chen is thus prior art to the '556 patent under (pre-AIA) 35 U.S.C. 102(e).

Petitioner also cites below to additional prior art as evidence of the background knowledge of a POSITA and to provide contemporaneous context to

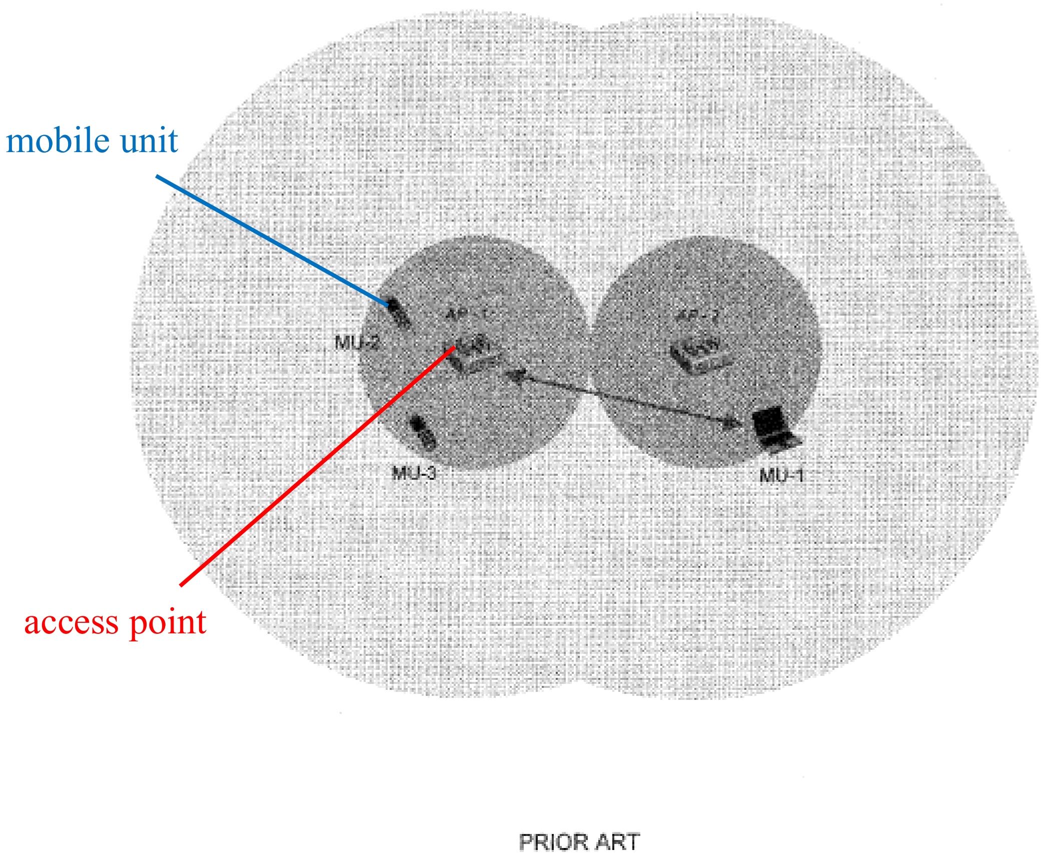
[1] To the extent that the '556 patent is not entitled to the earliest Korean Application date and is an AIA patent, the prior art references presented in this Petition are still prior art under AIA 35 U.S.C. 102(a).

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)).

B. Ground 1: Claims 1-4 and 9-11 are rendered obvious by Choudhary, Hasty, and Chen

1. Summary of Choudhary

Choudhary, like the '556 patent, relates to "active probing," in which "an MU [mobile unit] sends an 802.11 broadcast probe request at a lowest supported data rate on a specific frequency and listens for a response from AP(s) on that frequency." Ex.1005, 1:22-25. An example environment that includes mobile units and access points is illustrated in Choudhary's Fig. 1 below.



Ex.1005, Fig. 4 (annotated); Ex.1003, ¶41.

Also like the ’556 patent, Choudhary describes an access point that only responds to probe requests that meet certain criteria: “The presently disclosed invention utilizes RSSI [Received Signal Strength Indicator] filtering for selectively accepting or responding to an 802.11 frame **based on RSSI or some metric derived from RSSI**.” Ex.1005, 7:4-6. Choudhary explains that an “AP [Access Point] radio is configured with an RSSI threshold for sending probe response. Probe responses are not sent if the received probe requests do not meet the required RSSI threshold.” Ex.1005, 7:16-18. The purpose of this is for “testing if the client is close enough to the AP to benefit from associating with the AP. If the client is not close enough then there is no point indicating anything to the client since it won't associate with the AP anyway." Ex.1005, 7:18-23.

Accordingly, Choudhary shows that it was known for access points to only respond to probe requests that meet certain quality thresholds based on the RSSI or a metric derived from the RSSI. Ex.1003, ¶¶41-43.

2. Summary of Hasty

Hasty provides an example of using a metric that is derived from the RSSI to calculate path loss as a measure of link quality. Ex.1006, 2:48-53. "An object of the present invention is to provide a system and method for computing the path loss along a link … using transmitted power level information contained in a received data packet and the receive signal strength indication (RSSI) at which the data packet is received." Ex.1006, 2:48-53. "Specifically, an embodiment of the present invention uses the available per-packet receive signal strength indication (RSSI) from an 802.11 physical layer combined with the per-packet transmitted power level to evaluate the path loss along a link for a packet sent within the network 100." Ex.1006, 4:39-45.

Accordingly, Hasty shows that it was known to use the transmission power of a station along with the RSSI to calculate path loss (i.e., a quality metric that is derived from the RSSI). Ex.1003, ¶¶44-45.

3. Reasons to Combine Choudhary and Hasty

A POSITA would have found it obvious for Choudhary's probe request to include a power transmit level to allow the access point to use path loss as a quality metric derived from RSSI for determining whether to respond to a probe request. Ex.1005, 7:4-6; Ex.1006, 2:48-53; Ex.1003, ¶46. By comparing the transmit power level with the RSSI, the path loss provides a beneficial measure of the link quality, thereby aiding Choudhary's goal of not responding to low quality probe requests which are not likely to connect to the access point anyway. Ex.1005, 7:18-23.

As explained above, Choudhary describes a method in which an access point selectively responds to probe requests: "An AP radio is configured with an RSSI threshold for sending probe response. Probe responses are not sent if the received probe requests do not meet the required RSSI threshold." Ex.1005, 7:15-16. Choudhary describes this selective process as "filtering": "The presently disclosed invention utilizes RSSI filtering for selectively accepting or responding to an 802.11 frame based on RSSI or **some metric derived from RSSI**." Ex.1005, 7:4-6. Because Choudhary states that other metrics derived from RSSI would be suitable for filtering, a POSITA would have looked to known metrics derived from the RSSI. Ex.1003, ¶47.

Hasty provides an example of a known metric derived from the RSSI. As described above, Hasty describes "an embodiment [that] uses the available per-packet **receive signal strength indication (RSSI)** from an 802.11 physical layer **combined with the per-packet transmitted power level** to evaluate the path loss along a link for a packet sent within the network 100." Ex.1006, 2:48-53; Ex.1003, ¶48.

Hasty describes various metrics that are derived from the RSSI. In one example, Hasty describes using path loss as a metric. Path loss is determined by the difference between the transmission power and the power measured by the receiver (i.e., RSSI). Ex.1003, ¶49. As explained by Hasty, "[a]n object of the present invention is to provide a system and method for **computing the path loss** along a link between nodes in a wireless ad-hoc communications network using transmitted power level information contained in a received data packet and the receive signal strength indication (RSSI) at which the data packet is received." Ex.1006, 2:48-53; Ex.1003, ¶49.

In another example, Hasty describes using a link quality ratio (LQR) metric. Hasty provides an equation for calculating a link quality ratio (LQR) that uses both the transmit power level (TPL), measured RSSI, and the receiver sensitivity (which is the minimum power needed to successfully receive a transmitted packet). All of these values are represented in decibels (dBm). Hasty's LQR "equation represents an example of the manner in which the value of the link quality ratio (LQR) of the link … that yields a ratio which can be used to measure the per packet link quality between wireless nodes in the network 100." Ex.1006, 4:65-5:20; Ex.1003, ¶50.

Hasty's use of path loss as a quality metric provides various benefits. Ex.1003, ¶51. Hasty explains that "[t]he per-packet path loss is used as a metric that determines the integrity of a link between two 802.11-compliant nodes 102, 106 or 107, as well as the probability that future packets will be successfully transmitted on the link between the two nodes." Ex.1006, 4:46-48. This is consistent with Choudhary's goal of only responding to probe requests for mobile stations that are close enough for a quality connection. *See* Ex.1005, 7:15-23.

A POSITA would have been motivated to use path loss rather than RSSI alone for various reasons. For example, an AP receiving a probe request with a low RSSI power level cannot distinguish between (1) a nearby client with a low transmission power, or (2) a distant client with a significant amount of signal attenuation. Using path loss as taught by Hasty facilitates providing service to a station that is nearby (where there is relatively little path loss) but simply has a low-power transmitter. Ex.1003, ¶52. This is consistent with Choudhary's goal of "testing if the client is close enough to the AP to benefit from associating with the AP." Ex.1005, 7:17-20. The AP may also ignore requests from distant clients that may be better served by a different access point. Again, this is consistent with Choudhary's explanation that "[i]f the client is not close enough then there is no point indicating anything to the client since it won't associate with the AP anyway." Ex.1005, 7:19-22; Ex.1003, ¶52. In other words, employing Hasty's path loss as a threshold metric in Choudhary's system would better align the system's operation to Choudhary's stated goal of prioritizing service to nearby client devices.

A POSITA would have understood that if a client device and an access point cannot successfully transmit packets to one another, then the client would not benefit from associating with that access point. This is because an important purpose in establishing an association with an access point is for the client device to communicate with other network devices by sending and receiving packets to and from the access point. Ex.1003, ¶53.

Additionally, a POSITA would have been motivated to use Hasty's RSSI-derived metrics at least as known, suitable options. *See Intel Corp. v. Pact XPP Schweiz AG,* 61 F.4th 1373, 1380 (Fed. Cir. 2023) (It is "not necessary to show that a combination is the best option, only that it be a suitable option"). Indeed, Choudhary explicitly identifies that there are other RSSI-derived metrics that are suitable options. Ex.1005, 7:4-6; Ex.1003, ¶54.

A POSITA would have had a reasonable expectation of success because both Choudhary and Hasty seek to be compliant with IEEE 802.11. Ex.1005, 7:4-6 ("The presently disclosed invention utilizes RSSI filtering for selectively accepting or responding to an 802.11 frame based on RSSI or some metric derived from

RSSI.”); Ex.1006, 4:39-45 (an embodiment of the present invention uses the available per-packet receive signal strength indication (RSSI) from an 802.11 physical layer combined with the per-packet transmitted power level to evaluate the path loss along a link for a packet sent within the network 100.”). And Choudhary explicitly contemplates success with other RSSI-derived metrics (which a POSITA would have understood to include path loss or LQR). Ex.1005, 7:5-6; Ex.1003, ¶55.

Indeed, prior art standards within the IEEE 802.11 family already provided a frame structure including a field for sending within a frame, the transmit power level used to transmit that frame. Ex.1009, 95 (“The Link Measurement Request frame uses the Action frame body format and is transmitted by a STA to request another STA to respond with a Link Measurement Report frame to enable measurement of link path loss and estimation of link margin. The format of the frame is shown in Figure 7-101c…. The Transmit Power Used field is set to the transmit power used to transmit the frame containing the Link Measurement Request”), Fig. 7-101c (below); *see also* Ex.1008, 28 (“The TPC Report element contains transmit power and link margin information…”), 29 (“The Transmit Power field shall be set to the transmit power used to transmit the frame containing the TPC Report element.”), Fig. 46d; Ex.1003, ¶56.

	Category	Action	Dialog Token	Transmit Power Used	Max Trans-mit Power	Optional sub-elements
Octets:	1	1	1	1	1	variable

Figure 7-101c—Link Measurement Request frame body format

Ex.1009, 95.

Accordingly, implementing Choudhary's link quality measurement technique according to Hasty's known RSSI-derived metric is nothing more than "the predictable use of prior art elements according to their established functions." *See KSR Int'l v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). The result of the proposed combination is further predictable because Hasty' technique of using RSSI-derived metrics functions in Choudhary in the same way—placing the transmit power in a packet so that the receiving entity can calculate path loss. Ex.1003, ¶57.

In summary, the combination of Choudhary and Hasty represents the use of known techniques (Hasty's calculation of path loss or LQR for a quality metric) to improve similar methods (Choudhary's use of quality metrics for probe response filtering) in the same way (by placing the transmit power level in the probe request). Ex.1003, ¶58.

4. Summary of Chen

Chen's background section describes what was known in IEEE 802.11 with regard to probe response timing. Chen discusses the "802.11 specifications which suggests that when switching an AP, an MS should transmit a probe message on all channels one by one, and stop communicating with the original AP to wait for a probe response message. Only when all probe response messages are received, can the MS select a new AP among all the APs probed." Ex.1007, 1:40-46. "[T]he **Max Channel Time** for waiting for each of the probe response message is 10-100 ms, and the typical value of the **Max Channel Time** is 50 ms." Ex.1007, 1:46-49.

Chen explains an example that uses two timers, a minReplyWait timer and a maxReplyWait timer. Ex.1007, 2:4-23; Ex.1003, ¶60. Chen then explains that "After the timer has reached the maxReplyWait, the scanning is stopped, and the … AP corresponding to the probe response message having the biggest SNR is selected as the new AP." Ex.1007, 2:24-29. Accordingly, Chen provides an example of the timing used in scanning procedures for IEEE 802.11. Ex.1003, ¶¶59-60.

5. Reasons to Combine Chen with Choudhary and Hasty.

A POSITA would have found it obvious to implement Choudhary's active scanning procedures according to the known 802.11 standards as evidenced by Chen. Ex.1003, ¶61.

Choudhary explains that its technique utilizes the 802.11 specifications: "The presently disclosed invention utilizes RSSI filtering for selectively accepting or responding to an 802.11 frame based on RSSI or some metric derived from

RSSI." Ex.1005, 7:4-6. Choudhary describes probe requests and probe responses of the active scanning procedure generally. *See generally* Ex.1005. Choudhary also briefly mentions the timing associated with probe requests and probe responses: "probe responses consume more air-time than probe request, selectively pruning out probe responses reduces airtime consumed by aggressive clients for probes." Ex.1005, 7:28-31. Accordingly, Choudhary assumes that a POSITA would be familiar with the overall timing structure of 802.11 scanning procedures. Since Choudhary does not describe modifying the timing aspect of sending probe requests and waiting for probe responses, a POSITA would have implemented Choudhary's techniques using known techniques such as those provided for in the IEEE 802.11 standard as described in Chen. Ex.1003, ¶62.

Chen explains probe response timing according to the 802.11 specifications: "IEEE 802.11 specifications [suggest] that when switching an AP, an MS should transmit a probe message on all channels one by one, and stop communicating with the original AP to wait for a probe response message. Only when all probe response messages are received, can the MS select a new AP among all the APs probed." Ex.1007, 1:40-46. Chen further explains that "Since the Max Channel Time for waiting for each of the probe response message is 10~100 ms, and the typical value of the Max Channel Time is 50 ms, then the time for waiting for all probe response messages is n*Max Channel Time, where n is the number of the channels probed." Ex.1007, 1:46-52; Ex.1003, ¶63.

A POSITA would have thus found it beneficial for Choudhary's access points to grant access based on the known 802.11 timing procedures for active scanning. Using standardized techniques would have ensured compatibility with a wide variety of products and increased the marketability of Choudhary's product. Ex.1003, ¶64. Using these standardized techniques, a POSITA would have implemented Choudhary's client devices to wait until all probe responses had been received on the channels being probed before accessing the selected AP. Ex.1003, ¶64.

Even the background section of the '556 patent itself confirms that this timing procedure was known. "Upon requesting responses from a plurality of undesignated access points by setting a service set identifier (SSID) of a probe request frame in a state of null, the station receives a probe response frame from the access points during a maximum probe response time." Ex.1001, 1:61-66. "Even after a probe response frame is received from an access point having a superior wireless environment, the station waits for the maximum probe response time to pass, and then requests an access at the access point." Ex.1001, 2:2-5. It would have therefore been obvious to use a known, standard procedure. *See, e.g., Samsung Elecs. Co. v. Netlist Inc.*, IPR2023-00455 Paper 30, 33 (PTAB July 30, 2024) (finding obviousness of implementing according to known standards:

"Given JEDEC as the standard, an ordinarily skilled artisan would have reason to pursue such a known option"). Ex.1003, ¶65.

The combination of Choudhary and Chen thus predictably results in the mobile station waiting for probe responses until the Max Channel Time timer expires. *See* Ex.1007, 1:40-52. Given that the IEEE 802.11 standards were well established and widely adopted, a POSITA would have had a reasonable expectation of success in implementing Choudhary's scanning procedure in accordance with the 802.11 timing. Ex.1003, ¶66.

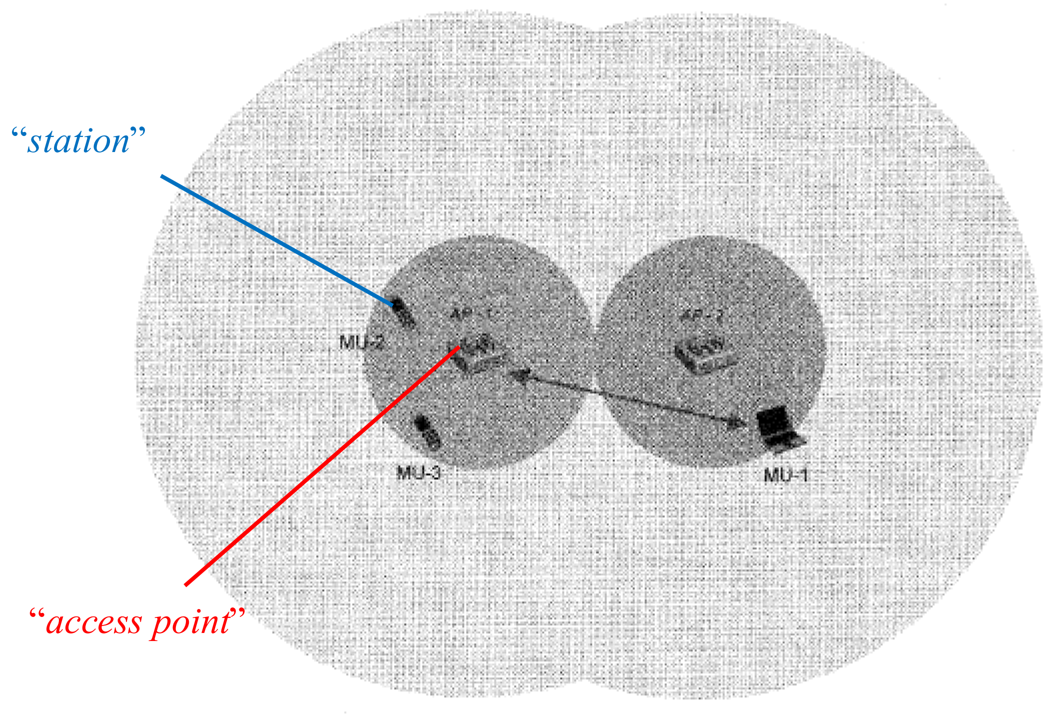
Accordingly, the combination of Chen with Choudhary represents applying a known technique (Chen's 802.11 scanning procedure timing) to a known method (Choudhary's 802.11 scanning procedure) ready for improvement to yield predictable results (the mobile station waits for probe responses until a timer expires). Additionally, the proposed combination of Chen with Choudhary merely represents the combination of prior art elements (probe request messages taught by Choudhary as modified by Hasty; waiting for probe response messages as taught by Chen) according to known methods (IEEE 802.11) to yield predictable results (an active scanning process where an access point filters probe requests based on a metric derived from RSSI, and where a client device waits until a timer expires before choosing whether to associate with the access point). Ex.1003, ¶67.

6. Claim 1

[1.0] ***A method for active scanning performed by a station, the method comprising:***

First, Choudhary describes "*active scanning*." Consistent with IEEE 802.11, this scanning process is referred to in Choudhary as active probing. "A wireless client (also referred to as a mobile device or mobile unit (MU)) **scans** the presence of desired SSID on a wireless medium on a given RF **using active probing**." Ex.1005, 1:16-36. "In **active probing**, an MU sends an 802.11 broadcast probe request at a lowest supported data rate on a specific frequency and listens for a response from AP(s) on that frequency." Ex.1005, 1:16-36. "All the APs that hear the broadcast probe may send a unicast response to the wireless client that sent the probe request." Ex.1005, 1:16-36; *see also* Ex.1005, 7:50-56 ("FIG. 6 shows where an MU **scans all channels using active broadcast probing**."). This is similar to how active scanning is described in the background section of the '556 patent: "According to the active access point scan method, a station transmits a probe request frame, and an access point having received the probe request frame transmits a probe response frame in response to the received probe request frame." Ex.1001, 1:58-62.

An example environment in which active scans are performed is illustrated in Fig. 4 of Choudhary, shown below.



Ex.1005, Fig. 4 (annotated); Ex.1003, ¶69.

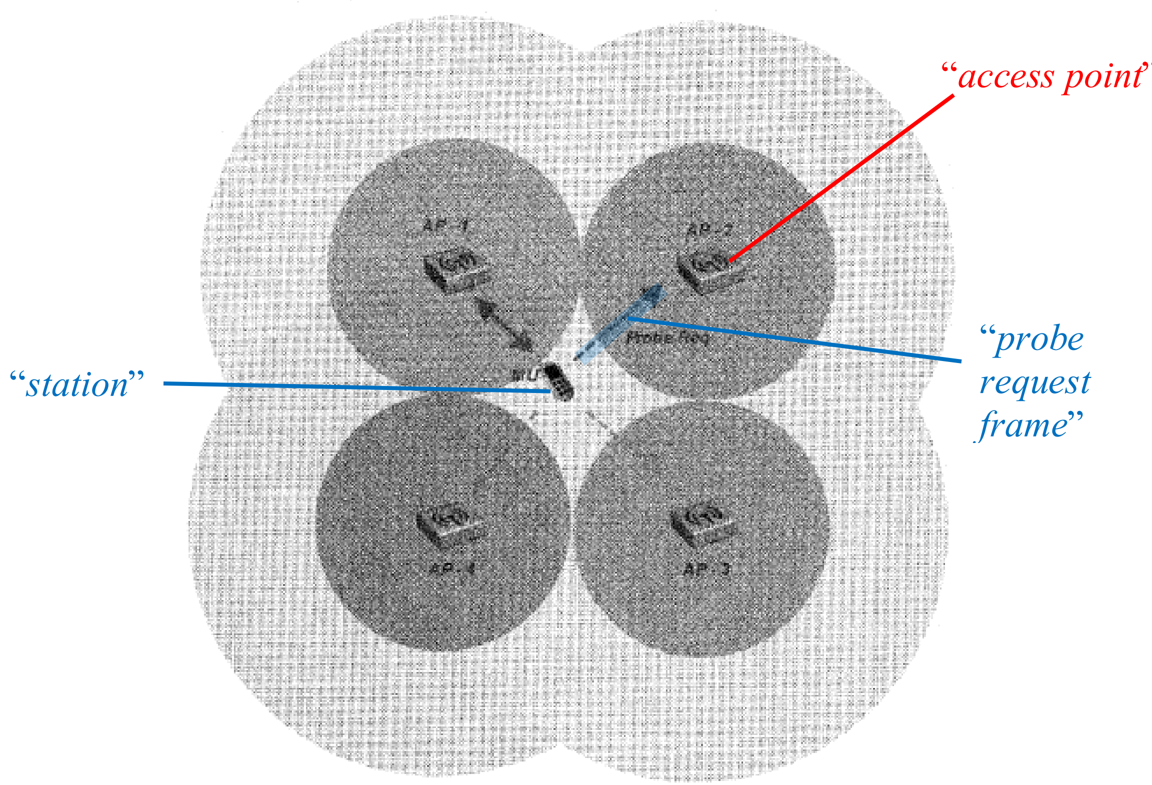
Second, Choudhary explains that the active scan method is performed in part by a mobile unit (MU) ("*station*") that receives probe responses from nearby access points in response to sending out probe requests. "In a particular embodiment the method includes receiving at the AP at least one message from a mobile unit (MU)." Ex.1005, 2:63-3:7. "The method additionally includes responding to the at least one message from a MU when the RSSI value associated with the at least one message from a MU is greater than to the predetermined threshold." Ex.1005, 2:63-3:7. Choudhary explains that "the message comprises **a**

probe request message and wherein the **response comprises a probe response message**." Ex.1005, 9:60-10:3.

In summary, because Choudhary describes an active scanning procedure in which a station sends probe requests to initiate a connection with an AP, Choudhary renders obvious "*[a] method for active scanning performed by a station*." Ex.1003, ¶¶68-71.

[1.1] ***transmitting, to an access point, a probe request frame including information on a signal strength; and***

First, Choudhary describes that the station (MU) transmits a probe request message ("*probe request frame*") to the access point (AP). "Method 100 begins with processing block 102 which discloses receiving at the AP at least one message from an unassociated mobile unit (MU)." Ex.1005, 9:60-10:3. That message "comprises a probe request message." Ex.1005, 9:60-10:3. "**The MU keeps sending broadcast/unicast probes to all APs (AP-2, AP-3, and AP-4) in the neighboring cells**." Ex.1005, 7:23-50. Such "probe request message[s]" are "receiv[ed]" at the AP. Ex.1005, 9:60-10:3. In another example, Choudhary illustrates the probe request frame in Fig. 5 as shown below.



Ex.1005, Fig. 5 (annotated); Ex.1003, ¶73.

Choudhary explains that the probe request message is an 802.11 "*frame*." "The presently disclosed invention utilizes RSSI filtering for selectively accepting or responding to an **802.11 frame** based on RSSI or some metric derived from RSSI." Ex.1005, 7:4-6; Ex.1003, ¶74.

Second, a POSITA would have found it obvious for Choudhary's probe request from the station to include the station's transmit power level ("*information on a signal strength*") as taught by Hasty. Ex.1003, ¶75. As explained above at X.B.3, Choudhary evaluates link quality using the measured RSSI, and Hasty describes an improved technique in which link quality is evaluated by both the

RSSI and a transmit power level. Hasty describes "a system and method for using **a receive signal strength indication and a transmit power level to determine the integrity of a link** for use in Layer II routing in a network, **such as an 802.11 network**." Ex.1006, 1:11-21. "More particularly, the present invention relates to a system and method for using **indications of per-packet receive signal strengths and per-packet transmit power levels to compute path** losses for links between nodes in a communication network, such as an 802.11 network, in order to select the most suitable link over which to send data packets between the nodes." Ex.1006, 1:11-21; Ex.1003, ¶75.

Hasty describes various metrics that can be derived from the RSSI. In one example, Hasty describes using path loss as a quality metric. Path loss is the difference between the transmission power and the power measured by the receiver (i.e., RSSI). "An object of the present invention is to provide a system and method for computing the path loss along a link between nodes in a wireless ad-hoc communications network using transmitted power level information contained in a received data packet and the receive signal strength indication (RSSI) at which the data packet is received." Ex.1006, 2:48-53.

Additionally, Hasty gives an example of using a link quality ratio (LQR) metric, which is also derived from the RSSI. Hasty provides an equation for calculating a link quality ratio (LQR) that uses both the transmit power level

(TPL), measured RSSI, and the receiver sensitivity. All of these values are represented in decibels (dBm).

$$LQR=1-(TPL(Dbm)-RSSI(Dbm))/(TPL(Dbm)-RS(Dbm))$$

Ex.1006, 5:20. This equation "yields a ratio which can be used to measure the per packet link quality between wireless nodes in the network 100." Ex.1006, 4:65-5:20.

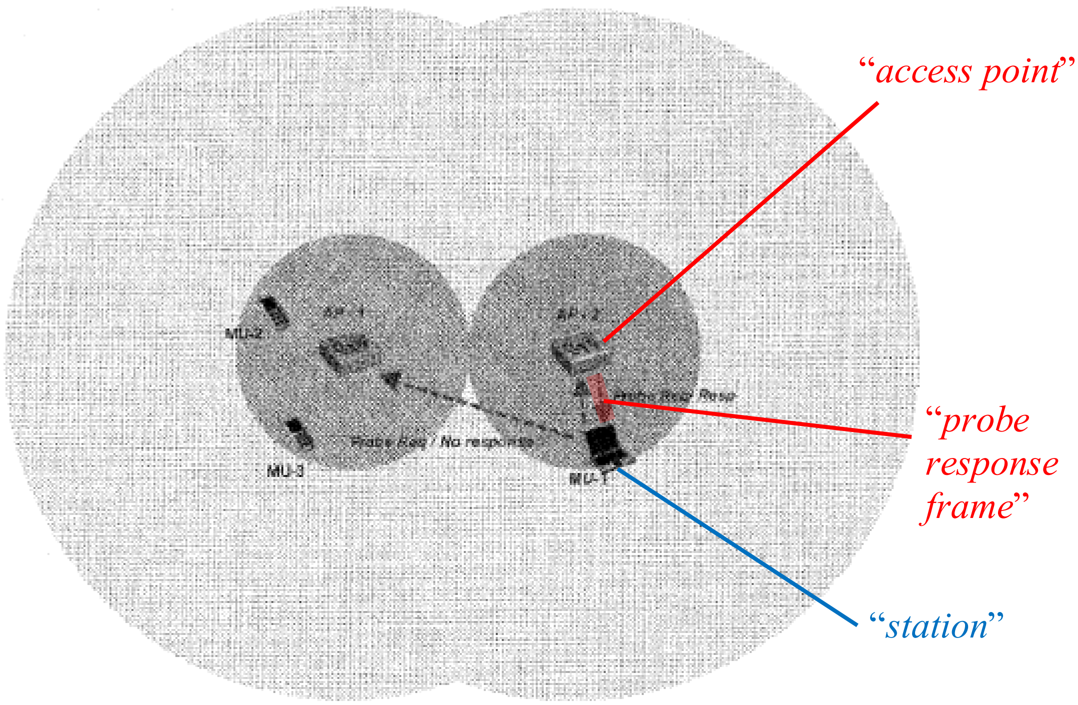
The link quality ratio LQR, as defined in the above equation, is a ratio of path loss (transmission power – RSSI) over the largest acceptable path loss (transmission power – receive sensitivity). The receive sensitivity is "the lowest level signal strength at which a received signal containing a data packet can be received in order for the node to be able to successfully recover data from the received data packet." Ex.1006, 4:65-5:20. By calculating the ratio of the actual path loss to the largest acceptable path loss in which a packet can be successfully received, the receiving node can gauge the relative quality of the connection. Ex.1003, ¶78.

For the reasons explained above at [1.1] and X.B.3, a POSITA would have found it obvious for Choudhary's probe request to include a transmit power level to allow the AP to consider path loss as part of the quality metric. Ex.1003, ¶79. In other words, by knowing the power level at which the probe request was transmitted, the AP can determine path loss in addition to just the measured RSSI.

In summary, because Choudhary describes an access point that receives a probe request, and it would have been obvious to include a transmit power level as taught by Hasty, Choudhary and Hasty render obvious "*transmitting, to an access point, a probe request frame including information on a signal strength.*" Ex.1003, ¶¶72-80.

[1.2] ***receiving, from the access point, a probe response frame in response to the probe request frame,***

Choudhary teaches that the mobile unit ("*station*") receives a "*probe response frame*" from an access point. "When a client sends active probes it will receive responses from closest AP(s) only as defined by configured RSSI threshold." Ex.1005, 7:35-38. Choudhary's access points send probe responses "when the probe requests from the MU(s) are received with RSSI above the RSSI_hi threshold." Ex.1005, 8:42-57; *see also* Ex.1005, 10:13-21 ("Processing block 112 recites responding to the at least one message from the unassociated MU when the RSSI value associated with the at least one message from the unassociated MU is greater than the predetermined threshold."). Choudhary illustrates a probe response frame in Fig. 6, shown below.



Ex.1005, Fig. 6 (annotated); Ex.1003, ¶81.

Accordingly, because the probe responses sent by the access points are responsive to a particular probe request, those probe responses are "*in response to*" to that particular probe request. And Choudhary explains that the probe response message is an 802.11 "*frame*:" "The presently disclosed invention utilizes RSSI filtering for selectively accepting or responding to an **802.11 frame** based on RSSI or some metric derived from RSSI." Ex.1005, 7:4-6. A POSITA would have understood that probe responses are frames. *See e.g.* Ex.1010, 1:45-47 ("APs that receive the probe request frame will respond by transmitting a probe response frame."); *see also* Ex.1009, 33 (describing the "probe response frame format.").

Ex.1003, ¶82.

In summary, because Choudhary describes that the access points will respond to a probe request with a corresponding probe response, Choudhary renders obvious "*receiving, from the access point, a probe response frame in response to the probe request frame*." Ex.1003, ¶¶81-83.

[1.3] ***wherein the probe response frame is transmitted by the access point based on the information on the signal strength,***

First, as described above at [1.2], Choudhary teaches that the access point transmits a probe response message ("*probe response frame*") to the mobile unit. Ex.1005, 8:42-57.

Second, Choudhary describes a filtering process in which an access point only responds to probe requests meeting a "predetermined threshold." In the proposed combination, that threshold is a path loss or LQR threshold that considers the station's transmission power ("*based on the information on the signal strength.*"). Ex.1005, 10:13-21. Several instances of the filtering process are described in Choudhary. Ex.1005, 7:4-14 ("An AP will respond to probes only when the probe request is received with **<u>sufficient RSSI</u>**."); Ex.1005, 8:42-57 ("Probe responses are sent to MU(s) only when the probe requests from the MU(s) are received with RSSI above the **<u>RSSI_hi threshold</u>**."); Ex.1005, 10:13-21 ("Processing block 112 recites responding to the at least one message from the unassociated MU when the RSSI value associated with the at least one message from the unassociated MU is **greater than the predetermined threshold**.”); Ex.1005, 10:32-47 (“Processing block 156 states determining whether a Received Signal Strength indicator (RSSI) associated with the at least one message from the associated MU is greater than a predetermined threshold.”); Ex.1005, 7:23-56 (“When a client sends active probes it will receive responses from closest AP(s) only as defined by configured RSSI threshold.”).

For the reasons explained above at X.B.3, a system implementing the combined teachings of Choudhary and Hasty would use a “metric derived from RSSI.” Ex.1005, 7:4-6; Ex.1003, ¶86. Again, Choudhary instructs a POSITA that metrics derived from RSSI can be used with Choudhary’s technique. Ex.1005, 7:4-6. Hasty provides an example of a known and beneficial metric that is derived from the RSSI. Ex.1006, 2:48-53. Specifically, the combined system uses Hasty’s path loss or LQR metric as an RSSI-derived metric. *See* [1.1]; X.B.3.

Because the proposed combination uses a path loss metric or LQR metric as a measure of link quality, the threshold for that link quality is likewise a path loss threshold or an LQR threshold. While Choudhary describes an example of using an “RSSI threshold” where RSSI is used, Choudhary also mentions compatibility with RSSI-derived metrics. In such cases (e.g., using Hasty’s path loss or LQR), a threshold for the RSSI-derived metric is used—a path loss threshold or LQR threshold. Ex.1005, 7:4-14; Ex.1003, ¶87.

Thus, in the Choudhary-Hasty combination, the access points respond only to probe requests that meet a certain quality metric derived from RSSI, specifically the path loss or LQR as taught by Hasty. The path loss or LQR considers the station transmission power level ("*information on the signal strength*") that was in a provided through the probe request. Ex.1003, ¶88. Accordingly, because the access point responds only to probe requests meeting a certain quality threshold based on signal strength information, the probe response is "*based on information on the signal strength*" as claimed.

In summary, because Choudhary describes that the access points will respond to a probe request meeting a quality threshold that is determined in part through the signal strength information in the probe request, Choudhary and Hasty render obvious "*wherein the probe response frame is transmitted by the access point based on the information on the signal strength*." Ex.1003, ¶¶84-89.

[1.4] ***wherein the station accesses the access point based on the probe response frame and a maximum probe response time.***

First, consistent with IEEE 802.11, Choudhary's mobile station accesses a selected access point. The "MU-1 **<u>authenticates and associates</u>** with AP-2 which is the desired AP for MU-1 in this case." Ex.1005, 7:54-56. Choudhary's authentication and association is consistent with how the '556 patent describes "*accesses*": "[T]he station may perform an access (that is, an **authentication process and an association process**) to the certain access point." Ex.1001, 9:34-36.

Indeed, the very purpose of Choudhary's scanning procedure is to associate the wireless device with the access point: "Effectively this is a way of testing if the client is close enough to the AP to benefit from associating with the AP. If the client is not close enough then there is no point indicating anything to the client since it won't associate with the AP anyway." Ex.1005, 7:18-22. Consistent with IEEE 802.11, it was known in the art that when a mobile station associates with an access point, the access point grants access to the mobile station. Ex.1003, ¶91 (citing Ex.1010, 1:59-2:65). Accordingly, Choudhary's authentication and association with the selected access point renders obvious that "*the station accesses the access point*" as claimed. Ex.1003, ¶91.

Second, the access is "*based on the probe response*" because the mobile station uses the probe response to select the desired AP. As described above at X.B.5, a POSITA would have found it obvious for Choudhary to implement the scanning procedure according to known, standardized 802.11 techniques as evidenced by Chen. Ex.1003, ¶93. Chen explains that "[o]nly when all probe response messages are received, can the MS select a new AP among all the APs probed." Ex.1007, 1:44-46. "[T]he MS selects an AP corresponding to a channel with the best signal quality as a new AP **<u>based on the signal quality information in the probe response message</u>**." Ex.1007, 3:50-53. "After the scanning is finished, the MS can compare the signal quality information in all of the probe response messages, and select the AP corresponding to the probe response message with the best signal quality as a new AP." Ex.1007, 2:34-37.

Chen describes an example in which a mobile station selects an AP based on the probe response message. "The MS1 will compare the signal quality information of each of the probe response message, assuming the signal quality of the probe response message from the channel 3 is the best, then the MS1 selects the AP1 corresponding to the probe response message from the channel 3 as a new AP." Ex.1007, 9:1-11. Accordingly, in the combined system, the mobile station performs an authentication and association process ("*access*") with the selected access point "*based on*" the received probe responses ("*the probe response*"). Ex.1003, ¶94.

Third, according to IEEE 802.11—evidenced by Chen—the AP grants access after the mobile station waits for a "Max Channel Time" or a MaxReplyWait time ("*maximum probe response time*"). *See* Ex.1007, 2:4-24. As such, access is "*based on … a maximum probe response time.*" Ex.1003, ¶95.

Chen gives example ranges for a Max Channel Time: "Since the **<u>Max Channel Time</u>** for waiting for each of the probe response message is 10~100 ms, and the typical value of the **<u>Max Channel Time</u>** is 50 ms, then the time for waiting for all probe response messages is n*Max Channel Time, where n is the number of the channels probed." Ex.1007, 1:44-51.

Chen also describes another example in which there are two timers used, a "minimum waiting time (minReplyWait) and the **<u>maximum waiting time (maxReplyWait)</u>**." Ex.1007, 2:4-24. When "timer reaches the minReplyWait" and "no available network has been found, the scanning is stopped." Ex.1007, 2:4-24. But if during that time the "MS has received a probe response message, then … the timing continues." Ex.1007, 2:4-24. When "the timer has reached the **<u>maxReplyWait</u>**, the scanning stops." Ex.1007, 2:4-24. Then, "[a]fter the timer has reached the maxReplyWait, … the probe response message having the biggest SNR is selected as the new AP." Ex.1007, 2:4-24. For the reasons explained above at X.B.5, it would have been obvious and beneficial for Choudhary's scanning procedure to use the standardized IEEE 802.11 timing as described by Chen (either the Max Channel Time or the maxReplyWait), either of which teach a "*maximum probe response time*."

In summary, because the mobile station waits until a timer expires before selecting and accessing an access point, the prior art renders obvious "*wherein the station accesses the access point based on the probe response frame and a maximum probe response time*." Ex.1003, ¶¶90-98.

7. Claim 2

[2.1] ***The method of claim 1, wherein the maximum probe response time comprises a preset maximum time period during which the station is required to wait for the probe response frame from the access point.***

First, as described above at [1.4], Choudhary and Chen teach that the mobile station waits until a timer expires before selecting an AP. Ex.1007, 2:4-24 ("**<u>After</u>** the timer has reached the maxReplyWait, the scanning is stopped."). As such, Choudhary and Chen teach "*the station is required to wait for probe response frames from the access points*."

Second, the Max Channel Time or MaxReplyWait times are predetermined and are thus "preset." For example, Chen explains that "the Max Channel Time for waiting for each of the probe response message is 10~100 ms, and the typical value of the Max Channel Time is 50 ms." Ex.1007, 1:44-51. Additionally, Chen describes a defined timer of "maxReplyWait." Ex.1007, 2:4-24.

In summary, because the mobile stations wait to receive probe responses from APs until a timer expires before selecting an AP, the prior art renders obvious "*wherein the maximum probe response time comprises a preset maximum time period during which the station is required to wait for the probe response frame from the access point*." Ex.1003, ¶¶99-101.

8. Claim 3

[3.1] ***The method of claim 1, wherein the information on the signal strength***

includes information about transmission power of the station.

As explained above at [1.1], Choudhary and Hasty teach that the station transmits probe requests that include "transmit power levels" ("*transmission power of the station*"). Again, it would have been obvious for Choudhary's probe request to include a transmit power level ("*signal strength information*") as taught by Hasty. As explained above at X.B.3, Choudhary evaluates link quality using the measured RSSI (or metrics derived from RSSI), and Hasty describes an improved technique in which link quality is evaluated by both the RSSI and a transmit power level. Hasty describes "a system and method for using **a receive signal strength indication and a transmit power level to determine the integrity of a link** for use in Layer II routing in a network, **such as an 802.11 network**." Ex.1006, 1:11-21. "More particularly, the present invention relates to a system and method for using indications of per-packet receive signal strengths and per-packet **transmit power levels** to compute path losses for links between nodes in a communication network, such as an 802.11 network, in order to select the most suitable link over which to send data packets between the nodes." Ex.1006, 1:11-21.

Thus, because Choudhary's method, implemented with Hasty's RSSI-derived metric as described at [1.1], includes transmitting from the station a probe request with the transmit power level of the station, Choudhary and Hasty render obvious "*wherein the information on the signal strength includes information* *about transmission power of the station.*" Ex.1003, ¶¶102-103.

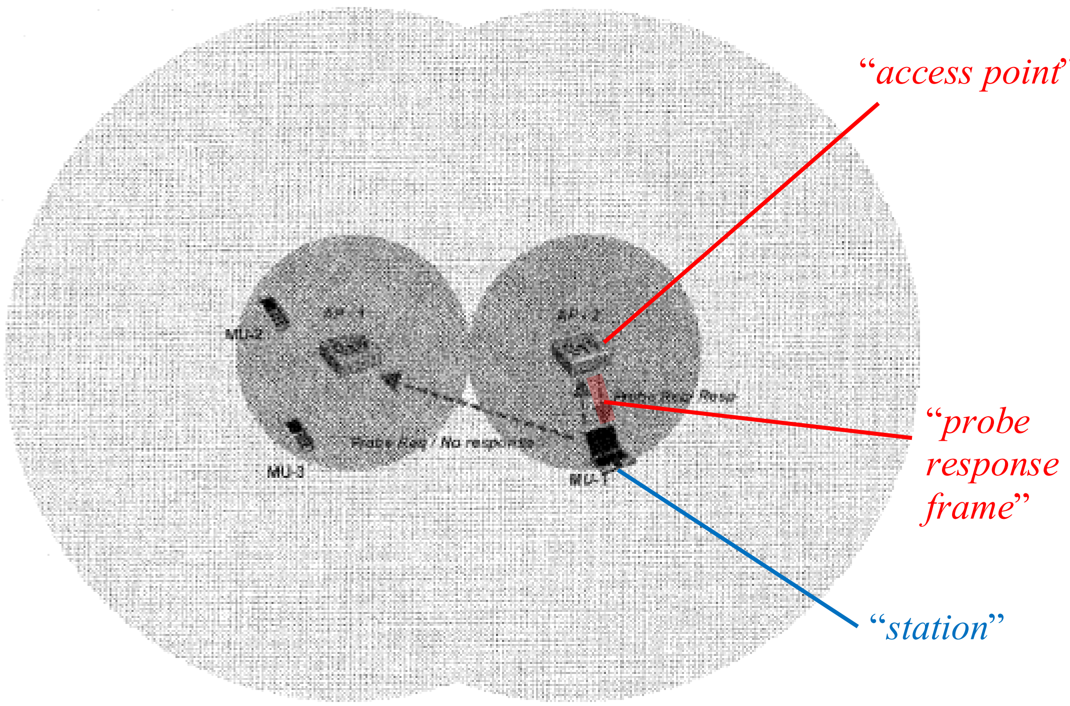
9. Claim 4

[4.1] ***The method of claim 1, wherein the access point is an access point satisfying a predetermined standard for an uplink quality with respect to the station.***

First, as described above at [1.4], Choudhary's station accesses a chosen "*access point*."

Choudhary describes a filtering process in which an access point (e.g., "*the access point*") only responds to probe requests meeting a "predetermined threshold" ("*satisfying a predetermined standard for an uplink quality with respect to the station.*"). Ex.1005, 10:13-21. Several instances of this concept are described in Choudhary. Ex.1005, 7:4-14 ("An AP will respond to probes only when the probe request is received with **sufficient RSSI**."); Ex.1005, 8:42-57 ("Probe responses are sent to MU(s) only when the probe requests from the MU(s) are received with RSSI above the **RSSI_hi threshold**."); Ex.1005, 10:13-21 ("Processing block 112 recites responding to the at least one message from the unassociated MU when the RSSI value associated with the at least one message from the unassociated MU is **greater than the predetermined threshold**."); Ex.1005, 10:32-47 ("Processing block 156 states determining whether a Received Signal Strength indicator (RSSI) associated with the at least one message from the associated MU is greater than a predetermined threshold."); Ex.1005, 7:23-56

("When a client sends active probes it will receive responses from closest AP(s) only as defined by configured RSSI threshold.").



Ex.1005, Fig. 6 (annotated); Ex.1003, ¶105.

For the reasons explained above at X.B.3, Choudhary uses a "metric derived from RSSI" rather than the RSSI alone. Ex.1005, 7:4-6. In particular, the Choudhary-Hasty combination renders obvious using path loss or LQR metric rather than the RSSI alone. *See* [1.1]; *supra,* § X.B.3.

Because the proposed combination uses a path loss metric or LQR metric as a measure of link quality, the threshold for that link quality is likewise a path loss threshold or an LQR threshold. In other words, instead of using an "RSSI threshold" as described in Choudhary's example, the Choudhary-Hasty combination uses a threshold for the RSSI-derived metric—a path loss threshold or LQR threshold. Ex.1005, 7:4-14.

Additionally, because the access point is measuring the quality of a frame transmitted from the mobile unit to the access point, it is measuring "*uplink*" quality. Choudhary refers to transmissions in this direction as "**uplink** frames from the client." Ex.1005, 7:23-56.

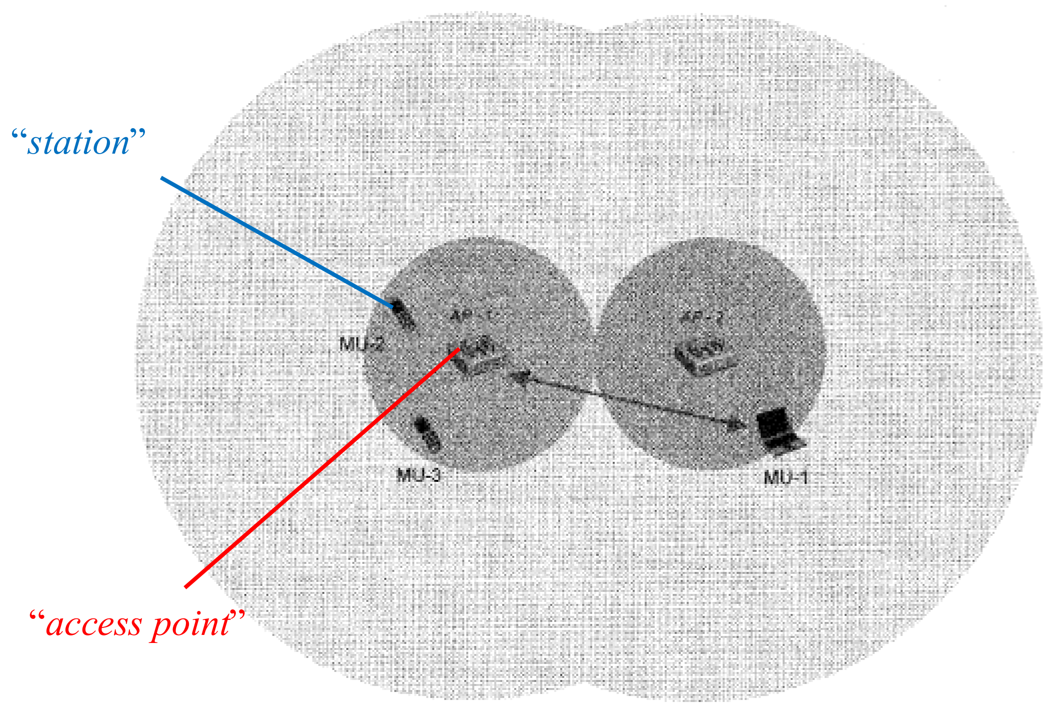
Thus, because the access points respond only to probe requests that meet a certain quality metric derived from RSSI, which may include the path loss quality information as taught by Hasty, Choudhary and Hasty render obvious "*wherein the access point is an access point satisfying a predetermined standard for an uplink quality with respect to the station.*" Ex.1003, ¶¶104-109.

10. Claim 9

Claim 9 recites substantially similar subject matter as claim 1. While claim 1 recites a method "performed by a station" seeking to associate itself with an access point, claim 9 recites a corresponding method "performed by an access point." Because the two claims recite steps in the same overall process from two related perspectives, claim 9 would have been obvious for the same reasons discussed above for claim 1. Ex.1003, ¶110. Although partly redundant of the discussion of claim 1, a detailed discussion of claim 9 follows.

[9.0] ***A method for active scanning performed by an access point, the method comprising:***

First, Choudhary describes "*active scanning*." This scanning process is referred to in Choudhary as active probing. "A wireless client (also referred to as a mobile device or mobile unit (MU)) **scans** the presence of desired SSID on a wireless medium on a given RF **using active probing**." Ex.1005, 1:16-36. "In **active probing**, an MU sends an 802.11 broadcast probe request at a lowest supported data rate on a specific frequency and listens for a response from AP(s) on that frequency." Ex.1005, 1:16-36. "All the APs that hear the broadcast probe may send a unicast response to the wireless client that sent the probe request. Probe responses have almost the same information that is present in the AP beacon." Ex.1005, 1:16-36; *see also* Ex.1005, 7:50-56 ("FIG. 6 shows where an MU **scans all channels using active broadcast probing**."). An example environment in which active scans are performed is illustrated in Fig. 4 of Choudhary, shown below.



PRIOR ART

Ex.1005, Fig. 4 (annotated); Ex.1003, ¶111.

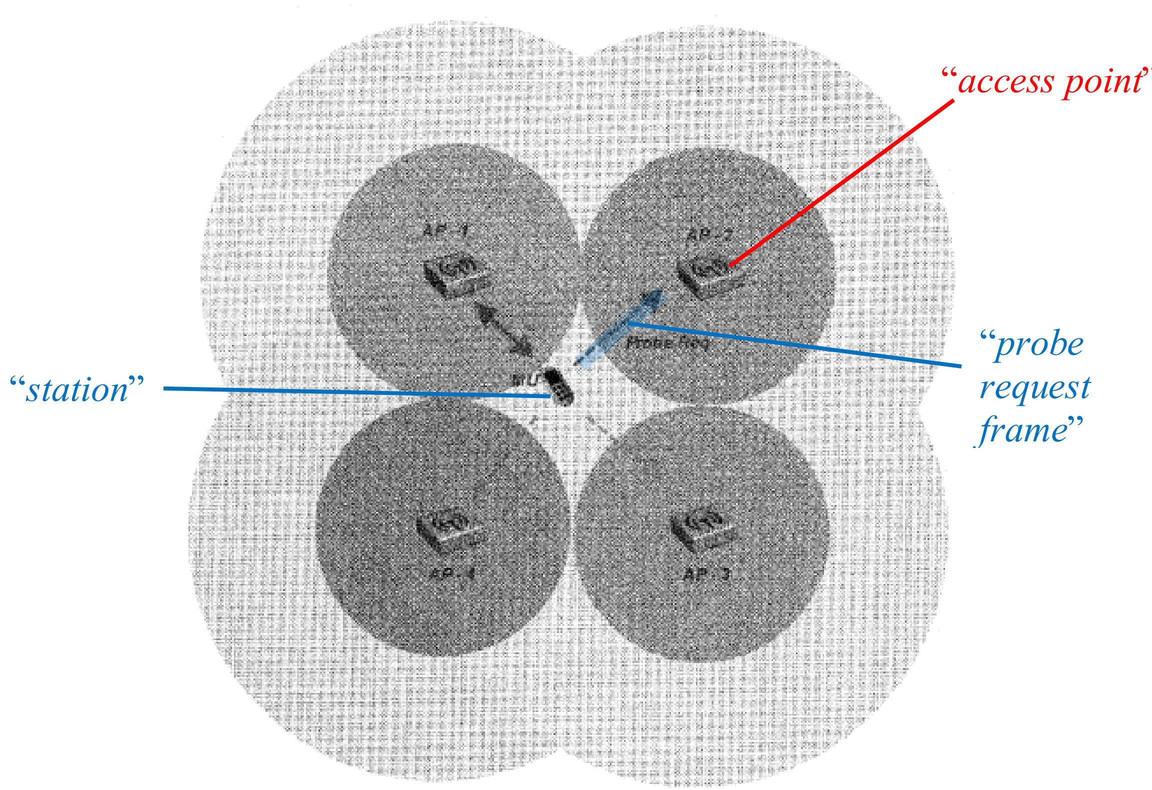
Second, the active probing process is performed in part by an access point, which receives and responds to probe requests from a mobile unit. "In a particular embodiment the method includes receiving at the AP at least one message from a mobile unit (MU)." Ex.1005, 2:63-3:7. "The method additionally includes responding to the at least one message from a MU when the RSSI value associated with the at least one message from a MU is greater than to the predetermined threshold." Ex.1005, 2:63-3:7. Choudhary explains that "the message comprises **a probe request message** and wherein the **response comprises a probe response**

message." Ex.1005, 9:60-10:3.

In summary, because Choudhary describes an access point that performs an active scanning procedure that includes receiving and responding to active probe requests, Choudhary teaches "*[a] method for active scanning performed by an access point*." Ex.1003, ¶¶111-113; *see also* [1.0].

[9.1] ***receiving, from a station, a probe request frame including information on a signal strength; and***

First, Choudhary describes that the access point receives a probe request message ("*probe request frame*") from a mobile unit ("*station*"). "Method 100 begins with processing block 102 which discloses **receiving at the AP at least one message** from an unassociated mobile unit (MU) from which RSSI can be determined. As shown in processing block 104, in this embodiment **the message comprises a probe request message** and wherein the response comprises a probe response message." Ex.1005, 9:60-10:3. In another example, "**The MU keeps sending broadcast/unicast probes to all APs (AP-2, AP-3, and AP-4) in the neighboring cells**." Ex.1005, 7:23-50. Choudhary illustrates the probe request frame in Fig. 5 as shown below.



Ex.1005, Fig. 5 (annotated); Ex.1003, ¶114.

Choudhary explains that the probe request message is an 802.11 "*frame*." "The presently disclosed invention utilizes RSSI filtering for selectively accepting or responding to an **802.11 frame** based on RSSI or some metric derived from RSSI." Ex.1005, 7:4-6.

Second, it would have been obvious for Choudhary's probe request to include a transmit power level ("*information on a signal strength*") as taught by Hasty. As explained above at X.B.3, Choudhary evaluates link quality using the measured RSSI or metric derived from the RSSI, and Hasty describes a technique in which link quality is evaluated by both the RSSI and a transmit power level.

Ex.1003, ¶117.

Choudhary evaluates link quality using the measured RSSI, and Hasty describes an improved technique in which link quality is evaluated by both the RSSI and a transmit power level. Hasty describes "a system and method for using **a receive signal strength indication and a transmit power level to determine the integrity of a link** for use in Layer II routing in a network, **such as an 802.11 network**." Ex.1006, 1:11-21. "More particularly, the present invention relates to a system and method for using **indications of per-packet receive signal strengths and per-packet transmit power levels** to compute path losses for links between nodes in a communication network, such as an 802.11 network, in order to select the most suitable link over which to send data packets between the nodes." Ex.1006, 1:11-21.

As explained above at [1.1], Hasty describes various metrics that can be derived from the RSSI. In one example, Hasty describes using path loss as a quality metric. Path loss is the difference between the transmission power and the power measured by the receiver (i.e., RSSI). "An object of the present invention is to provide a system and method for computing the path loss along a link between nodes in a wireless ad-hoc communications network using transmitted power level information contained in a received data packet and the receive signal strength indication (RSSI) at which the data packet is received." Ex.1006, 2:48-53.

Additionally, Hasty gives an example of using a link quality ratio (LQR) metric, which is also derived from the RSSI. Hasty provides an equation for calculating a link quality ratio (LQR) that uses both the transmit power level (TPL), measured RSSI, and the receiver sensitivity (which is the minimum power needed to successfully receive a transmitted packet). All of these values are represented in decibels (dBm).

Additionally, Hasty gives an example of using a link quality ratio (LQR) metric, which is also derived from the RSSI. Hasty provides an equation for calculating a link quality ratio (LQR) that uses both the transmit power level (TPL), measured RSSI, and the receiver sensitivity (which is the minimum power needed to successfully receive a transmitted packet). All of these values are represented in decibels (dBm).

$$LQR=1-(TPL(Dbm)-RSSI(Dbm))/(TPL(Dbm)-RS(Dbm))$$

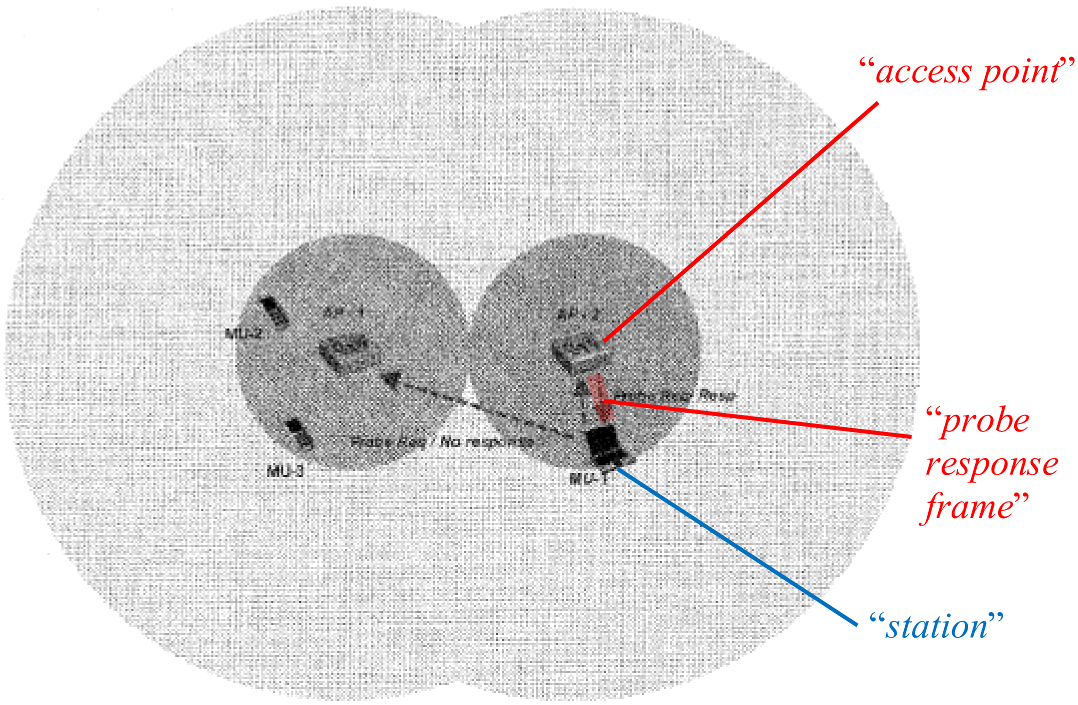
Ex.1006, 5:20. This equation "yields a ratio which can be used to measure the per packet link quality between wireless nodes in the network 100." Ex.1006, 4:65-5:20.

The link quality ratio LQR, as defined in the above equation, is a ratio of path loss (transmission power – RSSI) over the largest acceptable path loss (transmission power – receive sensitivity). The receive sensitivity is "the lowest level signal strength at which a received signal containing a data packet can be received in order for the node to be able to successfully recover data from the received data packet." Ex.1006, 4:65-5:20. By calculating the ratio of the actual path loss to the largest acceptable path loss in which a packet can be successfully received, the receiving node can gauge the relative quality of the connection. Ex.1003, ¶121.

In summary, because Choudhary describes an access point that receives a probe request, which would have been obvious to include a transmit power level as taught by Hasty, Choudhary and Hasty render obvious "*receiving, from a station, a probe request frame including information on a signal strength.*" Ex.1003, ¶¶114-122; *see also* [1.1].

[9.2] ***transmitting, to the station, a probe response frame in response to the probe request frame based on the information on the signal strength,***

First, as explained above at [1.2]-[1.3], Choudhary teaches that an access point responds to a probe request frame from a station by transmitting a "*probe response frame*" to the station.



Ex.1005, Fig. 6 (annotated); Ex.1003, ¶123.

Choudhary explains that the probe response message is an 802.11 "*frame*:" "The presently disclosed invention utilizes RSSI filtering for selectively accepting or responding to an **802.11 frame** based on RSSI or some metric derived from RSSI." Ex.1005, 7:4-6. A POSITA would have understood that probe responses are frames. *See e.g.,* Ex.1010, 1:45-47 ("APs that receive the probe request frame will respond by transmitting a probe response frame."); *see also* Ex.1009, 33 (describing the "probe response frame format."). Ex.1003, ¶124.

Second, Choudhary describes a filtering process in which an access point only responds to probe requests meeting a "predetermined threshold." In the proposed combination, that threshold is a path loss or LQR threshold that considers the station's transmission power ("*based on the information on the signal strength.*"). Ex.1005, 10:13-21. Several instances of the thresholding concept are described in Choudhary. Ex.1005, 7:4-14 ("An AP will respond to probes only when the probe request is received with **sufficient RSSI**."); Ex.1005, 8:42-57 ("Probe responses are sent to MU(s) only when the probe requests from the MU(s) are received with RSSI above the **RSSI_hi threshold**."); Ex.1005, 10:13-21 ("Processing block 112 recites responding to the at least one message from the unassociated MU when the RSSI value associated with the at least one message from the unassociated MU is **greater than the predetermined threshold**."); Ex.1005, 10:32-47 ("Processing block 156 states determining whether a Received Signal Strength indicator (RSSI) associated with the at least one message from the associated MU is greater than a predetermined threshold."); Ex.1005, 7:23-56 ("When a client sends active probes it will receive responses from closest AP(s) only as defined by configured RSSI threshold.").

For the reasons explained above at X.B.3, a system implementing the combined teachings of Choudhary and Hasty would use a "metric derived from RSSI." Ex.1005, 7:4-6. Again, Choudhary instructs a POSITA that metrics derived from RSSI can be used with Choudhary's technique. Ex.1005, 7:4-6. Hasty provides an example of a known and beneficial metric that is derived from the

RSSI. Ex.1006, 2:48-53. Specifically, the combined system uses Hasty's path loss or LQR metric as an RSSI-derived. *See* [1.1]; X.B.3. Ex.1003, ¶126.

Because the proposed combination uses a path loss metric or LQR metric as a measure of link quality, the threshold for that link quality is likewise a path loss threshold or an LQR threshold. While Choudhary describes an example of using an "RSSI threshold" where RSSI is used, Choudhary also mentions compatibility with RSSI-derived metrics. In such cases (e.g., using Hasty's path loss or LQR), a threshold for the RSSI-derived metric is used—a path loss threshold or LQR threshold. Ex.1005, 7:4-14; Ex.1003, ¶127.

Thus, the access points respond only to probe requests that meet a certain quality metric derived from RSSI, which may include the path loss or LQR as taught by Hasty. The path loss or LQR considers the station transmission power level ("*information on the signal strength*") that was in a provided through the probe request. Accordingly, because the access point responds only to probe requests meeting a certain quality threshold based on signal strength information, the probe response is "*based on information on the signal strength*" as claimed.

In summary, because the access points will respond to a probe request meeting a quality threshold that is determined in part through the signal strength information in the probe request, Choudhary and Hasty render obvious "*transmitting, to the station, a probe response frame in response to the probe* *request frame based on the information on the signal strength*." *See also* [1.2]-[1.3]. Ex.1003, ¶¶123-129.

[9.3] ***wherein an access of the station to the access point is based on the probe response frame and a maximum probe response time.***

First, consistent with IEEE 802.11, Choudhary's mobile station accesses a selected access point. The "MU-1 **authenticates and associates** with AP-2 which is the desired AP for MU-1 in this case." Ex.1005, 7:54-56. Choudhary's authentication and association is consistent with how the '556 patent describes "*access*": "[T]he station may perform an access (that is, an **authentication process and an association process**) to the certain access point." Ex.1001, 9:34-36.

Indeed, the very purpose of Choudhary's scanning procedure is to associate the wireless device with the access point: "Effectively this is a way of testing if the client is close enough to the AP to benefit from associating with the AP. If the client is not close enough then there is no point indicating anything to the client since it won't associate with the AP anyway." Ex.1005, 7:18-22. Consistent with IEEE 802.11, it was known in the art that when a mobile station associates with an access point, the access point grants access to the mobile station. Ex.1003, ¶131 (citing Ex.1010, 1:59-2:65).

Second, the access is "*based on the probe response*" because the mobile station uses the probe response to select the desired AP. As described above at

X.B.5, a POSITA would have found it obvious for Choudhary to implement the scanning procedure according to known, standardized 802.11 techniques as evidenced by Chen. Ex.1003, ¶133. Chen explains that "[o]nly when all probe response messages are received, can the MS select a new AP among all the APs probed." Ex.1007, 1:44-46. "[T]he MS selects an AP corresponding to a channel with the best signal quality as a new AP **based on the signal quality information in the probe response message**." Ex.1007, 3:50-53. "After the scanning is finished, the MS can compare the signal quality information in all of the probe response messages, and select the AP corresponding to the probe response message with the best signal quality as a new AP." Ex.1007, 2:34-37.

Chen describes an example in which a mobile station selects AP based on the probe response message. "The MS1 will compare the signal quality information of each of the probe response message, assuming the signal quality of the probe response message from the channel 3 is the best, then the MS1 selects the AP1 corresponding to the probe response message from the channel 3 as a new AP." Ex.1007, 9:1-11. Accordingly, in the scanning procedure suggested by the prior art in combination, the authentication and association process ("*access*") with the selected access point is "*based on*" the received probe responses ("*the probe response*"). Ex.1003, ¶134.

Third, according to IEEE 802.11—evidenced by Chen—the AP grants access after the mobile station waits for a "Max Channel Time" or a MaxReplyWait time ("*maximum probe response time*"). *See* Ex.1007, 2:4-24. As such, access is "*based on … a maximum probe response time.*" Ex.1003, ¶135.

Chen gives example ranges for a Max Channel Time: "Since the **<u>Max Channel Time</u>** for waiting for each of the probe response message is 10~100 ms, and the typical value of the **<u>Max Channel Time</u>** is 50 ms, then the time for waiting for all probe response messages is n*Max Channel Time, where n is the number of the channels probed." Ex.1007, 1:44-51.

Chen also describes another example in which there are two timers used, a "minimum waiting time (minReplyWait) and the **<u>maximum waiting time (maxReplyWait)</u>**." Ex.1007, 2:4-24. When "timer reaches the minReplyWait" and "no available network has been found, the scanning is stopped." Ex.1007, 2:4-24. But if during that time the "MS has received a probe response message, then … the timing continues." Ex.1007, 2:4-24. When "the timer has reached the **<u>maxReplyWait</u>**, the scanning stops." Ex.1007, 2:4-24. Then, "[a]fter the timer has reached the maxReplyWait, … the probe response message having the biggest SNR is selected as the new AP." Ex.1007, 2:4-24. For the reasons explained above at X.A.5, it would have been obvious for Choudhary's scanning procedure to use either the Max Channel Time or the maxReplyWait timer, either of which teach a "*maximum probe response time*."

In summary, because the mobile station waits until a timer expires before selecting and accessing an access point, consistent with IEEE 802.11 as evidenced by Chen, Choudhary and Chen render obvious "*wherein an access of the station to the access point is based on the probe response frame and a maximum probe response time*." Ex.1003, ¶¶130-137; *see also* [1.4].

11. Claim 10

[10.0] ***A station configured to perform an active scanning, the station comprising: a transceiver; and a processor, wherein the processor is configured to:***

First, for the reasons explained above at [1.0], Choudhary teaches a "*station configured to perform an active scanning*."

Second, Choudhary's mobile unit includes an "antenna" along with the hardware, software, and circuitry used to perform the transmitting and receiving steps described above at [1.1] and [1.2]. *See* Ex.1005, 3:36-4:22; Ex.1005, 5:20-37. These components teach a "*transceiver*" as claimed. Ex.1003, ¶139.

Third, Choudhary explains that the methods it describes are performed using "a digital signal processor circuit or an application specific integrated circuit (ASIC)" ("*processor*"). Ex.1005, 9:42-60; *see also* Ex.1005, 10:59-11:22.

In summary, because Choudhary describes a mobile unit with an antenna and processor, and the mobile unit performs a scanning method, Choudhary renders obvious "*[a] station configured to perform an active scanning, the station* *comprising: a transceiver; and a processor, wherein the processor is configured to:"* Ex.1003, ¶¶138-141.

[10.1] ***cause the transceiver to transmit, to an access point, a probe request frame including information on a signal strength; and***

See [1.1]; *see also* [10.0] (transmitting the probe request utilizes an antenna ("*transceiver*")). Ex.1003, ¶142.

[10.2] ***cause the transceiver to receive, from the access point, a probe response frame in response to the probe request frame, and***

See [1.2]; *see also* [10.0] (receiving the probe response utilizes an antenna ("*transceiver*")). Ex.1003, ¶143.

[10.3] ***wherein the probe response frame is transmitted by the access point based on the information on the signal strength,***

See [1.3]. Ex.1003, ¶144.

[10.4] ***wherein the station accesses the access point based on the probe response frame and a maximum probe response time.***

See [1.4]. Ex.1003, ¶145.

12. Claim 11

[11.0] ***An access point configured to perform an active scanning, the access point comprising: a transceiver; and a processor, a [sic] wherein the processor is configured to:***

First, for the reasons explained above at [9.0], Choudhary teaches *"[a]n access point configured to perform an active scanning*."

Second, Choudhary's access point includes an "antenna" along with the hardware, software, and circuitry used to perform the transmitting and receiving steps described above at [1.1] and [1.2]. *See* Ex.1005, 3:36-4:22. These components teach a "*transceiver*" as claimed.. Ex.1005, 5:20-37.

Third, Choudhary explains that the methods it describes are performed using "a digital signal processor circuit or an application specific integrated circuit (ASIC)" ("*processor*"). Ex.1005, 9:42-60; *see also* Ex.1005, 10:59-11:22.

In summary, because Choudhary describes an access point with an antenna and processor, and the access point performs a scanning method, Choudhary renders obvious "*[a]n access point configured to perform an active scanning, the access point comprising: a transceiver; and a processor, a [sic] wherein the processor is configured to:*" Ex.1003, ¶¶146-149.

[11.1] ***cause the transceiver to receive, from a station, a probe request frame including information on a signal strength; and***

See [9.1]; *see also* [11.0] (receiving the probe request utilizes an antenna ("*transceiver*")). Ex.1003, ¶150.

[11.2] ***cause the transceiver to transmit, to the station, a probe response frame in response to the probe request frame based on the information on the signal strength,***

See [9.2]; *see also* [11.0] (transmitting the probe response utilizes an antenna ("*transceiver*")). Ex.1003, ¶151.

[11.3] ***wherein an access of the station to the access point is based on the probe response frame and a maximum probe response time.***

See [9.3]. Ex.1003, ¶152.

XI. CONCLUSION

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

Respectfully submitted,

Dated: January 7, 2026

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

HAYNES AND BOONE, LLP
2801 N. Harwood St., Suite 2300
Dallas, Texas 75201
Customer No. 27683

XII. 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 ’556 patent is involved in the following cases:

Case Heading	Number	Court	Date
Golden Eye Technologies LLC v. Cisco Systems, Inc.	2-25-cv-00898	EDTX	August 27, 2025

C. Lead and Back-up Counsel and Service Information

Lead Counsel
Theodore M. Foster
HAYNES AND BOONE, LLP
2801 N. 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 N. 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 N. 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

Gregory P. Huh HAYNES AND BOONE, LLP 2801 N. Harwood St., Suite 2300 Dallas, TX 75201	Phone: (972) 739-6939 Fax: (214) 200-0853 gregory.huh.ipr@haynesboone.com USPTO Reg. No. 70,480

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

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner hereby certifies, in accordance with and in 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 11,653. 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: January 7, 2026

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

CERTIFICATE OF SERVICE

The undersigned certifies that, in accordance with 37 C.F.R. § 42.6(e) and 37 C.F.R. § 42.105, service was made on Patent Owner as detailed below.

Date of service	January 7, 2026
Manner of service	Federal Express
Documents served	Petition for *Inter Partes* Review Under 35 U.S.C. § 312 and 37 C.F.R. § 42.104 of U.S. 10,051,556; Petitioner's Exhibit List; All Exhibits; Petitioner's Power of Attorney.
Persons served	Sughrue Mion, PLLC 2000 Pennsylvania Avenue, N.W., Suite 9000 Washington, DC 20006

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