

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., and
SAMSUNG ELECTRONICS, AMERICA, INC.

Petitioners

v.

FOUR BATONS WIRELESS, LLC,

Patent Owner

Case IPR2025-00496
Patent 8,798,006

**PATENT OWNER'S PRELIMINARY RESPONSE
TO PETITION FOR INTER PARTES REVIEW
OF U.S. PATENT NO. 8,798,006**

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EXHIBIT LIST

Exhibit	Description
EX2001	Declaration of William B. Collier, Jr. in Support of Patent Owner’s Notice of Intent to Designate Provisionally Recognized Attorney William B. Collier, Jr. as Back-Up Counsel Under 37 C.F.R. § 42.10(c)
EX2002	<i>Four Batons Wireless, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Complaint for Patent Infringement, Case No. 2:24-cv-284, Dkt. No. 1 (E.D. Tex. Filed April 26, 2024)
EX2003	<i>Four Batons Wireless, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Defendants Samsung Electronics Co., Ltd.’s and Samsung Electronics America, Inc.’s Motion To Stay Proceedings Pending <i>Inter Partes</i> Review, Case No. 2:24-cv-284, Dkt. No. 62 (E.D. Tex. Filed Feb. 7, 2025)
EX2004	<i>Four Batons Wireless, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Plaintiff’s Opposition to Samsung’s Motion To Stay Proceedings Pending <i>Inter Partes</i> Review, Case No. 2:24-cv-284, Dkt. No. 63 (E.D. Tex. Filed Feb. 21, 2025)
EX2005	<i>Four Batons Wireless, LLC v. Samsung Electronics Co., Ltd. et al.</i> , First Amended Docket Control Order, Case No. 2:24-cv-284, Dkt. No. 69 (E.D. Tex. Filed April 30, 2025)
EX2006	United States District Courts — National Judicial Caseload Profile, available from https://www.uscourts.gov/sites/default/files/2025-02/fcms_na_distprofile1231.2024.pdf (accessed May 12, 2025)
EX2007	<i>Four Batons Wireless, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Plaintiff’s Infringement Contentions, Case No. 2:24-cv-284 (E.D. Tex. served July 25, 2024)
EX2008	<i>Four Batons Wireless, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Defendants’ Invalidity Contentions, Case No. 2:24-cv-284 (E.D. Tex. served Nov. 18, 2024)

Exhibit	Description
EX2009	<i>Four Batons Wireless, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Samsung's Preliminary Claim Constructions And Extrinsic Evidence Pursuant To Patent Local Rule 4-2, Case No. 2:24-cv-284 (E.D. Tex. served May 5, 2025)
EX2010	<i>Four Batons Wireless, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Plaintiff Four Batons Wireless, LLC's Initial Proposed Constructions, Case No. 2:24-cv-284 (E.D. Tex. served May 5, 2025)
EX2011	Correspondence between Samsung and Four Batons
EX2012	<i>Four Batons Wireless, LLC v. Samsung Electronics Co., Ltd. et al.</i> , The Parties' P.R. 4-3 Joint Claim Construction and Pre-hearing Statement, Case No. 2:24-cv-00284-JRG (E.D. Tex May 30, 2025)
EX2013	Declaration of Dr. Konstantinos Psounis in Support of Patent Owner's Preliminary Response
EX2014	Curriculum Vitae of Dr. Konstantinos Psounis

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I. Introduction

Petitioners Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc. (“Samsung” or “Petitioners”) filed a Petition challenging Claims 1-13 and 16 of U.S. Patent No. 8,798,006 (“the ’006 Patent”) on one ground. Paper 3 (“Pet.”) at 2. Patent Owner Four Batons Wireless, LLC (“Four Batons” or “Patent Owner”) respectfully requests the Board deny institution of that Petition because Petitioner has not shown a reasonable likelihood of prevailing on any of its grounds as to any challenged claim of the ’006 Patent.

Petitioner’s one ground argues that the ’006 Patent is rendered obvious by Guo in view of Neave. But, Petitioner’s arguments require misconstruing Guo. Guo describes techniques used at a mobile device to select between a wireless wide area network (“WWAN”) and a wireless local area network (“WLAN”). These techniques use quality of service (“QoS”) samples tied directly to the performance of the radio link between the mobile device and a transmitter for the wireless network. Guo describes preferencing WLAN networks when the QoS is greater. When deciding to switch from WLAN to WWAN, Guo teaches using QoS samples with a Fourier-based decreasing signal test combined with a regularly updated vertical handoff decision threshold to decide when to switch from a WLAN to a WWAN.

This system is fundamentally different from the inventions of the '006 Patent. Because Guo's QoS metrics are limited to the radio network, they are not path quality metrics that are independent of how the QoI is measured. Moreover, because Guo defines a specific method for selecting between the WWAN and WLAN interfaces, it cannot be combined with Neave—Guo's entire method would need to be modified to implement those tests. Petitioner has not provided any reasoning for making such radical changes to Guo.

Patent Owner has also filed its bifurcated discretionary denial briefing under pursuant to the Director's March 26, 2025, Memorandum. Paper 10. The PTAB should exercise its discretion to deny institution for the reasons presented in that brief, as well as the ones below.

II. Background

With the development of computer networks, and in particular, the widespread usage of internet protocol ("IP") based networks, groups such as the Institute of Electrical and Electronics Engineers ("IEEE") and the Internet Engineering Task Force ("IETF") developed various network access technologies for data networks. *See* EX1001, 2:60-3:33. These technologies include both wired network access and wireless network access hardware and software. *Id.* In the context of wireless networks, several standards developed, including Wi-Fi (based on the IEEE 802.11 standard) and cellular networks (such as the Global System for

Mobile Communications (“GSM”)). *Id.* at 2:62-10. Eventually, devices developed that included multiple network access interfaces, such as both a wired and wireless interface, or even different types of wired or wireless network access interfaces. *Id.* at 2:55-61. These devices are known as Multiple Interface Devices (“MIDs”). *Id.*

As MIDs came on the market, it became necessary to develop approaches to maintain an IP connection while switching between multiple wireless connections. *See id.* 3:54-57. This created a related need to determine which of two or more connections provides the best performance along the path of its IP connection. *Id.* One technique used to make this determination is “Quality of Interfaces” (“QoI”). *Id.* at 3:54-57, 5:1-5. QoI compares the qualities of the interfaces on a device based on a specific set of criteria, such as radio signal strength or signal to noise ratio. *Id.* at 3:54-59. But, as the inventors of the ’006 Patent recognized, these approaches limit the comparison to the radio network. *Id.*; EX2013 ¶33. On the other hand, end-to-end path quality comparison can be used to select optimal paths to connect traffic sources and destinations. EX1001, 3:59-66; EX2013 ¶33. These comparisons are used within a single autonomous domain by an operator that has access to extensive network statistics. *Id.* But, the statistics needed for this type of analysis are difficult to estimate for individual devices. EX1001, 3:67-4:3.

A. The '006 Invention

The inventions of '006 Patent solve these problems. Using the inventions of the '006 Patent, a mobile device can compare the connection between two or more interfaces by comparing path quality metrics between the available networks that are independent of how the quality of interfaces is measured. EX1001, 6:3-17; EX2013 ¶34. By using path quality metrics, a mobile device implementing the inventions of the '006 Patent can select a path with the best performance and can compare the quality of interfaces over heterogeneous networks. EX1001, 6:3-17; EX2013 ¶34.

The '006 Patent describes several techniques for making this comparison, including using quickest change detection problem, sequential two sample tests, one-sample change point detection methods, non-parametric and online two-sample methods. EX1001, 11:49-13:32; EX2013 ¶34. These tests are conducted in real time and allow a mobile device to select an interface for its wireless communications. *Id.* at 6:3-17.

The '006 Patent effectively has three independent claims, claims 1, 2, and 3. Each independent claim recites a “method for substantially real-time comparison of quality of interfaces (QoIs) by mobile devices having multiple heterogeneous interfaces....” Claims 1, 2, and 3 are presented below, using the same annotations as Petitioner for denoting claim limitations:

1[pre]. A method for substantially real-time comparison of quality of interfaces (QoIs) by mobile devices having multiple heterogeneous

interfaces that communicate over heterogeneous wireless networks, comprising:

1[a] a mobile device comparing in substantially real-time the qualities of multiple interfaces, including at least one cellular radio interface and at least one wireless local area network interface, of said mobile device that connect to heterogeneous networks using path quality metrics that are independent of how the QoI is measured, whether measured by a path through a wireless network alone or a path through both a wireless network and through a wired network,

1[b] said method including said mobile device comparing path quality as a quickest change detection problem for observations from a new interface or comparing path quality based on sequential two sample tests,

1[c] said mobile device performing said comparing of said multiple interfaces concurrently in real time during use of a current interface, and

1[d] said mobile device selecting one of said interfaces based on said comparing.

2[pre]. A method for substantially real-time comparison of quality of interfaces (QoIs) by mobile devices having multiple heterogeneous interfaces that communicate over heterogeneous wireless networks, comprising:

2[a] a mobile device comparing in substantially real-time the qualities of multiple interfaces, including at least one cellular radio interface and at least one wireless local area network interface, of said mobile device that connect to heterogeneous networks using path quality metrics that are independent of how the QoI is measured, whether measured by a path through a wireless network alone or a path through both a wireless network and through a wired network,

2[b] said method including said mobile device performing a one-sample change point detection method or performing a non-parametric and on-line two-sample method,

2[c] said mobile device performing said comparing of said multiple interfaces concurrently in real time during use of a current interface, and

2[d] said mobile device selecting one of said interfaces based on said comparing.

3[pre]. A method for substantially real-time comparison of quality of interfaces (QoIs) by mobile devices having multiple heterogeneous interfaces that communicate over heterogeneous wireless networks, comprising:

3[a] a mobile device comparing in substantially real-time the qualities of multiple interfaces, including at least one cellular radio interface and at least one wireless local area network interface, of said mobile device that connect to heterogeneous networks using path quality metrics that are independent of how a QoI is measured,

3[b] said method including said mobile device comparing path qualities based on sequential two sample tests,

3[c] said mobile device performing said comparing of said multiple interfaces concurrently in real time during use of a current interface, and

3[d] said mobile device selecting one of said interfaces based on said comparing.

EX1001, 21:15-16 (claims). *See also* Pet., 1-2.

B. Effective Filing Date of the '006 Patent

The '006 Patent issued from U.S. Patent Application No. 12/973,300 and claims priority as a division of U.S. Patent Application No.11/209,331 filed on August 23, 2005. EX1001, cover. The '006 Patent also claims priority to U.S. Provisional Application No. 60/662,749, filed on March 17, 2005. *Id.* It issued on

August 5, 2014. *Id.* Petitioner does not dispute that the priority date of the '006 Patent is March 17, 2005. *See* Pet., 8 n.2.

C. Level of Ordinary Skill in the Art

For purposes of this Preliminary Response, Patent Owner does not contest Petitioner's recitation of the level of skill in the art, because even under Petitioner's proposed level of skill (Pet., 16-17), Petitioner failed to demonstrate a reasonable likelihood of success. Patent Owner reserves the right to later propose its own definition of a person of ordinary skill in the art, if necessary.

III. Petitioner's References

Petitioner asserts one ground of invalidity based on obviousness in light of Guo in view of Neave. Pet 5-6.¹

¹ For the purposes of this preliminary response, Patent Owner has addressed independent Claims 1, 2, and 3 because Petitioner has failed to demonstrate a reasonable likelihood of success of showing unpatentability of those claims (and therefore dependent Claims 4-13 and 16 as well). If the Petition is instituted, then Patent Owner reserves the right to further address the deficiencies in Petitioner's theories, including deficiencies regarding the dependent claims.

A. Guo [EX1005]

Guo is U.S. Patent Publication No. 2004/0170191 to Zihua Guo, Qian Zhang, Richard Yao, Wenwu Zhu, titled “Vertical Roaming in Wireless Networks Through Improved Quality of Service Measures.” EX1005, Cover.

Guo purports to “provide[] a system and method for improved vertical handoff between different types of wireless network[s],” in part by “enabling the measurement of wireless network quality of service parameters at a mobile computing device [which] enables the mobile computing device to make vertical handoff decisions....” EX1005 ¶[0010]. This vertical handoff decision is “based on the measured quality of service being provided by multiple candidate wireless networks.” *Id.*

Guo explains that there are two types of automatic vertical handoff decisions, “automatically deciding when to enter a potentially higher quality of service wireless network (e.g., WLAN) from a lower quality of service wireless network (e.g., WWAN), and automatically deciding when to exit a potentially higher quality of service network to a lower quality of service network.” *Id.* ¶[0055]; EX2013 ¶36. In the first instance, the goal is to achieve a higher quality of service. EX1005 ¶[0055]; EX2013 ¶37. In the second case there are two competing goals: “to handoff before the higher quality of Service wireless network is no longer able to provide Service, but also to remain in the potentially higher quality of Service wireless network while

that wireless network is actually able to provide a higher quality of Service.”

EX1005 ¶[0056]; EX2013 ¶38. In this second instance, a mobile device implementing Guo’s teachings must “detect an approaching wireless network cell boundary from the dynamic history of the signal strength received from the wireless network access point currently providing service to the mobile computing device 102, that is, without the benefit of simultaneous reference to the received signal strength of a candidate wireless network cell for direct comparison.” EX1005 ¶[0056]; *see also* EX2013 ¶38.

Guo notes that WWANs and WLANs use different channel allocation schemes. EX1005 ¶[0059]. In WWANs, a communication channel is dedicated to each mobile device. *Id.* One advantage of this scheme is that “its quality of service characteristics, such as bandwidth and transmission delay, are generally predictable in advance and relatively constant during use.” *Id.*; EX2013 ¶41. WLAN networks, such as networks implementing the IEEE 802.11b standard, use shared bandwidth communication channels. *Id.* ¶[0060]. In those networks, “quality of service characteristics, such as available band width and transmission delay, are not generally predictable in advance and typically vary during a communications session....” *Id.* So, Guo describes alternative techniques to determine quality of service in such networks.

These methods use the collision avoidance scheme of WLAN networks, namely IEEE 802.11b's network allocation vector ("NAV") to calculate a network allocation vector occupation ("NAVO"). *Id.* ¶¶[0061]-[0062]; EX2013 ¶39. NAVO represents a "ratio of cumulative advertised transmission time during an observation period to the total observation time." EX1005 ¶[0062]; EX2013 ¶39. Guo then describes several ways NAVO in an IEEE 802.11 network can be mapped to network quality of service measures, such as residual bandwidth. EX1005 ¶¶[0063]-[0067]; EX2013 ¶39.

Guo also explains that NAVO cannot be calculated in some networks. EX1005 ¶[0068]; EX2013 ¶40. In those networks, other methods can be used to determine data packet collision probability ("PCP"), which "may serve as a wireless network quality of service measure even in wireless networks that do provide for senders to advertise transmission time." EX1005 ¶¶[0069]-[0072]; EX2013 ¶40.

One objective of Guo is to avoid unnecessary vertical handoffs. EX1005 ¶[0057]. Guo describes several methods to avoid this problem. *See id.* ¶¶[0075]-[0081], [0090]; EX2013 ¶38. Once multiple networks are connected, any of a number of parameters can be selected to initiate vertical handoff. *Id.* ¶[0090]. Guo describes steps to manage various handoff decisions, including the specific tests used to make those decisions. EX1005 ¶¶[0099]-[0118]; EX2013 ¶¶37-38.

Guo does not rely on path quality metrics. EX2013 ¶¶41-42. Instead, Guo relies on either NAVO or PCP of a WLAN, and the known quality of service characteristics of a WWAN network, to measure the quality of service only of the radio interface. *Id.* ¶42. These measurements are limited to the quality of the radio interface and cannot be used to measure the quality of a path. *Id.*

B. Neave [EX1006]

Neave is a textbook titled “Distribution-Free Tests” by H.R. Neave and P.L. Worthington. EX1006, 8. Petitioner contends that Neave was publicly available in 1989. Neave is cited as Reference [9] by the ’006 Patent.

Neave is an extensive volume, and discusses various aspects of statistical testing, from a background discussion of statistics to detailed discussions of various statistical tests. Neave does not purport to relate to wireless transmission. Petitioner’s discussion of Neave focuses on particular tests that Petitioner contends render elements of the claims of the ’006 Patent obvious.

IV. Legal Standards

An IPR should not be instituted unless Petitioner has shown a likelihood of success on the invalidity grounds *presented in the petition*. See *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (“[T]he Board must base its decision on arguments that were advanced by a party, and to which the opposing party was given a chance to respond.”).

“In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (petitions must identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”); 35 U.S.C. § 312(a)(3). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

“To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. The petitioner must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int’l*, 829 F.3d at 1380. The obviousness inquiry requires considering whether one of skill in the art “would have been motivated to combine the prior art to achieve the claimed invention.” *In re NuVasive, Inc.*, 842 F.3d 1376, 1381 (Fed. Cir. 2016) (quoting *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016)). “[T]he factual inquiry whether to combine references must be thorough and searching...” *Id.*

V. Claim Construction

Claims are construed according to *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). “Any prior claim construction

determination concerning a term of the claim in a civil action...will be considered.”

Id.

Despite having the burden to propose how each “challenged claim is to be construed” in the Petition itself, Petitioner did not explicitly propose any express constructions. *See* 37 C.F.R. § 42.104 (b)(3); Pet. at 17. However, in the District Court litigation Petitioner is asserting that multiple claims are indefinite or require construction, as shown in Exhibit 2012. EX2012 at 12-14. Notably, Petitioner did not explain “why [its] inconsistent positions are warranted”—a fact that further supports denial of the Petition here. *See Cambridge Mobile Telematics, Inc., Petitioner, v. Sfara, Inc.*, IPR2024-00952, Paper 12 at 7-9 (P.T.A.B. Dec. 13, 2024) (informative).

Moreover, Petitioner defines several claim terms in the body of its argument, without acknowledging it does so. For example, Petitioner misconstrues the phrase “using path quality metrics that are independent of how the QoI is measured” as explained below in Section VI.A. Patent Owner does not believe it is necessary to construe any additional claims to dispose of Petitioner’s challenge to the ’006 Patent.

VI. Arguments

- A. Petitioner has not shown that Guo renders obvious “using path quality metrics that are independent of how the QoI is measured, [whether measured by a path through a wireless network alone or a path through both a wireless network and through a wired network.]” [Claims 1, 2, 3]**

The independent claims of the '006 Patent each require “using path quality metrics that are independent of how the QoI is measured.” EX1001 21:15-22:16. Claims 1 and 2 add that the metrics are independent of how the QoI is measured “whether measured by a path through a wireless network alone or a path through both a wireless network and through a wired network.” *Id.* In either case, the claims require metrics related to path quality, and those metrics must be independent of how the QoI is measured.

Petitioner’s argument relies on a misreading of the claim that eliminates the claimed distinction between path quality metrics and QoI. Petitioner contends that “the term ‘path quality metric’ refers to a measure of a network path that is indicative of a network’s performance.” Pet., 23-24. This definition broadens the term to include metrics only reflecting radio network performance and ignores that the claim element refers to “path quality.” EX2013 ¶¶31-32. In contrast, the '006 Patent explains that one example of such a path quality metric is “the available bandwidth of a network path.” EX1001, 11:49-52; *Id.* ¶¶33-34. As explained below, this metric

is different from the residual bandwidth and other metrics used by Guo. EX2013 ¶¶35.

1. Petitioner has not shown that Guo renders obvious path quality metrics of both a cellular radio interface and a wireless local area network interface.

As an initial matter, Petitioner only focuses on quality of service metrics related to IEEE 802.11 wireless networks discussed by Guo. Pet. 23-26. Even in this context, Petitioner only relies on Guo’s discussion of the NAVO and PCP and their purported relation to residual bandwidth. *Id.* These metrics are only relevant to the WLAN network discussed in Guo. *See* EX1005 ¶¶[0060]-[0063], [0068]-[0072].

On the other hand, the ’006 Patent requires comparing the qualities of “at least one cellular radio interface and at least one wireless local area network interface,” but the Petition did not identify any metrics of a cellular radio network. Petitioner’s failure to distinguish between different elements in a claim fails to establish a reasonable likelihood of showing unpatentability. *See Chongqing Optoelectronics Tech. Co. v. 138 East LCD Advancements Ltd.*, IPR2023-00476, Paper 9 at 12-14 (P.T.A.B Aug. 28, 2023). In *Chongqing*, the claims were directed to “wiring lines for driving the circuit unit and the display electrodes” and “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.” *Id.* at 12. The Board determined that these elements are separate “wiring lines” and “lead wiring lines.” *Id.* 12-13. However,

the petition there failed to distinguish between the two. *Id.* at 14. The Board concluded there was “no argument of record that the wiring lines and lead wiring lines are not set forth as distinct elements in the claim” and “there [was] no explanation why [the prior art]’s wiring group 13a/13b would be understood to include distinct ‘segments’ and, if it was, there [was] no explanation why different ‘segments’ would be understood to be separate, distinct elements.” *Id.* On this record, the petitioner failed to show a reasonable likelihood of unpatentability. *Id.*

Here, Petitioner must identify path quality metrics of both the cellular radio interface and the wireless local interface that could be compared. By failing to identify a path quality metric corresponding to the cellular radio interface, the Petition cannot establish obviousness of the ’006 Patent.

2. Guo does not describe “path quality metrics”

Nothing in the Petition suggests that Guo’s metrics are path metrics that are independent of how the QoI is measured. EX2013 ¶42. Guo’s QoS metrics only relate to the quality of the interface connection and cannot provide information on the path quality. *Id.* Therefore, the Petition fails to show a likelihood that the claims are obvious. *Id.*

One benefit of the inventions described by the ’006 Patent is the ability to expand the quality of interface measurement beyond the narrow criteria of a single link to the entire end-to-end path:

As discussed above, a number of approaches are available that compare the qualities of the interfaces based on a very narrow set of criteria such as radio signal strength or signal to noise ratios, which approaches limit their comparison to the radio network. On the other hand, in the preferred embodiments of the present invention, approaches are designed to handle many more criteria of interface qualities, taking a full end-to-end network path into account—including, by way of example, round-trip available bandwidth, end-to-end delay and delay jitter, unidirectional available bandwidth, delay and delay jitter along an end-to-end network path through each interface.

EX1001 at 5:1-12, 11:43-54; EX20013 ¶33-34. The '006 Patent explains “[i]n general, the QoI should reflect the quality of the network path, which may involve a path through the radio network and a path through a wired backbone network..., between the mobile device interface and a corresponding node with which, for example, the mobile device is ultimately communicat[ing] with.” *Id.* 11:20-26.

The '006 Patent then describes several methods to measure available bandwidth across a path. *See* EX1001 11:55-13:32; EX20013 ¶34. Each of these methods permits the mobile device to measure available bandwidth across a path, rather than only at the wireless interface. EX1001 11:55-13:32; EX20013 ¶34.

The Petition fails to grapple with the difference between these path quality metrics and the quality of service metrics described by Guo. For example, Petitioner only points to the fact that Guo discusses WLAN and WWAN networks and asserts that such networks “contain multi-step paths.” Pet. 24. Petitioner then points to Guo’s measurement of “residual bandwidth” as rendering this element obvious. Pet. 25. But, Guo’s residual bandwidth is not a path quality metric. As explained below,

this residual bandwidth is a quality of service measurement of a wireless network single link connection between a mobile device and a WLAN or WWAN base station. EX2013 ¶39-42.

As noted in Section III.A, residual bandwidth of a WLAN is calculated using the NAVO or PCP techniques described in Guo. *Supra* III.A. NAVO relies on the collision avoidance scheme provided as part of the medium access control (“MAC”) layer of 802.11. EX1005 ¶[0061]; EX2013 ¶39. As Guo explains, this scheme takes the form of a network allocation vector (“NAV”) in the MAC layer of an 802.11 network. EX1005 ¶[0061]; EX2013 ¶39. Because it is part of 802.11 MAC, the NAV only concerns transmission between a base station and the user device. EX1005 ¶¶[0061]-[0063]; EX2013 ¶39; EX1001, 2:53-54 (the “MAC (Media Access Control) layer that controls packet flow between points in a network”).

Similarly, PCP relies on transmitting probing IP packets directly to an access point and determining the number of unacknowledged packets. EX1005 ¶[0070]; EX2013 ¶40. This technique cannot measure path quality beyond the access point. EX2013 ¶40.

In the WWAN network, Guo only describes using predictable, previously known characteristics of the network. EX1005 ¶[0059]; EX2013 ¶41. Again, nothing in Guo suggests that these characteristics can represent the quality of a path, and instead, these represent the quality of the interface. EX1005 ¶[0059]; EX2013 ¶41.

Guo's methods of measuring the quality of service of a wireless network stand in contrast to the methods to measure path metrics described by the '006 Patent. *See* EX2013 ¶¶34-35. One embodiment described by the '006 Patent explains that "[t]he available bandwidth of an H hop network path is [] the minimum available bandwidth among the H links." EX1001, 12:2-3; EX2013 ¶¶34. The '006 Patent then describes several techniques that can be used to measure path quality metrics, such as self-induced congestion approaches, packet pair train dispersion methods, combined self-induced congestion and packet pair approaches, and TCP bulk transfer rate approaches. EX1001, 12:9-13:32; EX2013 ¶¶34. Each of these metrics is independent of how the QoI is measured and can measure capacity along the transmission path. EX1001, 12:9-13:32; EX2013 ¶¶34.

Petitioner has not identified anything in Guo that can describe path metrics that are independent of how the QoI is measured. EX2013 ¶¶42. As with all its metrics, Guo's residual bandwidth is limited to the quality of the network at the interface and cannot measure the quality of a path. *Id.* Petitioner has not established a likelihood of showing obviousness.

B. Guo in view of Neave does not render obvious the claimed tests [Claims 1, 2, and 3]

Claims 1, 2, and 3 each claim tests or methods that used to compare the path quality of the two interfaces. Claim 1 requires that the use of either "a quickest change detection problem for observations from a new interface or... sequential two

sample tests.” EX1001, 21:28-31. Claim 2 requires “a one-sample change point detection method or [] a non-parametric and on-line two-sample method.” *Id.*, 21:50-52. And Claim 3 requires “comparing path qualities based on sequential two sample tests.” *Id.*, 22:9-10.

For each claim, Petitioner acknowledges that Guo alone does not render the claim obvious. *See* Pet at 28-29, 34-36, 38. Instead, Petitioner argues that a POSITA would look to the teachings of Neave. The basis of this argument is petitioner’s view that “Guo does not explicitly state how [Guo’s] policy manager 1010 compares the QoS data for the WWAN and WLAN to determine whether ‘the estimated residual bandwidth in the WLAN is higher than the communication bandwidth currently being experienced in the WWAN.’” Pet. 28. This is incorrect. EX2013 ¶¶37, 44, 45, 49.

Guo describes specific algorithms to select between a WLAN and WWAN. EX2013 ¶45. Indeed, Guo explains that its method to select between two networks is a key improvement over prior art methods. EX1005 ¶¶[0074]-[0075]. For example, Guo teaches using “a Fourier transform based method” and explains this method in detail:

The recent received signal strength history (e.g., the past 4 sec) undergoes a Discrete Fourier Transform, for example, a Fast Fourier Transform (FFT). The Fourier transform and its variants are well known in the art and need not be detailed here. The fundamental term of the transform is a complex number with real and imaginary parts (i.e., a number of the form $a + ib$; where a is the real part, b is the

imaginary part and i is the square root of -1). For clarity, the equation for the imaginary part of the fundamental term is given here:

$$\text{Im}\{X_1\} = \frac{1}{N} \sum_{n=0}^{N-1} x(n) \sin\left(-\frac{2\pi n}{N}\right)$$

where X denotes the fundamental term of the Discrete Fourier Transform, $\text{Im}\{X_1\}$ denotes the imaginary part of X_1 , $x(n)$ is the received signal strength history, and N is the number of discrete samples in the history. In an embodiment of the invention, if the imaginary part of the fundamental term is negative and less than a Fourier domain threshold (e.g., -0.6), then the received signal strength is determined to be decreasing.

EX1005 ¶¶[0076]-[0077]. Using this method, a mobile device can determine whether signal strength is decreasing or increasing over time. *Id.* ¶¶[0078]-[0079] (citing Figs. 8A-8D); EX2013 ¶¶38, 46; *supra* III.A. Using these techniques, Guo teaches that a mobile device implementing its teaching can “initiate a vertical handoff before [a] high quality of service wireless network is no longer able to provide service, but to stay in the high quality of service wireless network as long as possible otherwise.” EX1005 ¶¶[0081]; EX2013 ¶¶38, 46; *supra* III.A.

Another aspect of this invention is adaptively determining the minimum operating signal strength for a particular network interface. EX1005 ¶[0082]; EX2013 ¶¶38, 46; *see also* EX1005 ¶¶[0083]-[0084]. This minimum signal strength threshold can be used “[i]n combination with the Fourier transform based method for reliably detecting a decreasing received signal strength, an order of magnitude reduction in the unnecessary vertical handoff rate compared to the prior art simple

threshold method of triggering vertical handoffs is not uncommon.” EX1005 ¶[0085]; EX2013 ¶¶38, 46.

Guo then describes several circumstances where a decision to join a network or initiate a handoff may occur. *See* EX1005 ¶¶[0089]-[0123]; EX2013 ¶¶36-38, 46-47. These methods use the Fourier-based test and the threshold determination techniques described earlier. *See, e.g.*, EX1005 ¶¶[0116] (discussing “Fourier-based decreasing signal test 1408), [0119] (same), [0108] (describing threshold updates), [0111-0117] (same); EX2013 ¶¶38, 46-47.

Petitioner completely ignores this disclosure to argue that a POSITA would combine Guo with Neave. To support its argument, Petitioner points to paragraph [0104] of Guo to argue that some other, undisclosed technique is required to initiate a vertical handoff from a WWAN network to a WLAN network. Pet. 27-28. This section refers to the situation where a device is connected to a WWAN network, but a WLAN network becomes available. *See* EX1005 ¶[0104].

Contrary to Petitioner’s assertion, Guo explains exactly how this handoff is managed. EX2013 ¶¶37, 45. The “Multi-Network Manager component 1006 periodically (e.g., every 10 seconds) sends a Network Available notification....notifying [the Policy Manger component 1010] that the WLAN is available, as well as the [WLAN’s] current quality of service statistics.” EX1005 ¶[0104]. In this instance, no statistical tests are needed to determine whether to

switch networks. EX1005 ¶[0104]; EX2013 ¶¶37, 45. Instead, Guo teaches that the network will change if, for example, “the estimated residual bandwidth in the WLAN is higher than the communications bandwidth currently being experienced in the WWAN.” EX1005 ¶[0104]; EX2013 ¶¶37, 45. In other words, Guo defaults to WLAN if it is available and has a higher residual bandwidth than the WWAN system. EX2013 ¶¶37, 45. There is no need for the “statistical analysis” as proposed by Petitioner.

Going in the other direction, from WLAN to WWAN, Guo expressly teaches using its threshold and Fourier techniques. EX2013 ¶¶38, 46-47. This process is depicted in Figure 12, with more detail added in Figures 13 and 14. EX1005 ¶¶[0108]-[0118].

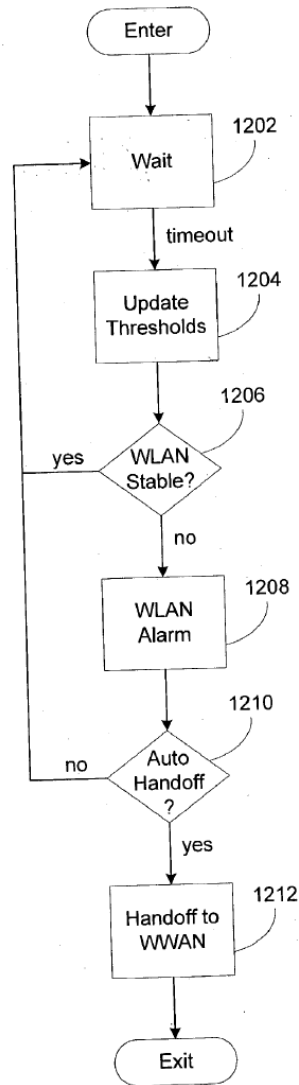


FIG. 12

EX1005 Fig. 12. As illustrated above, this process relies on Guo's signal strength threshold. EX1005 (including "Update Thresholds step 1204"); see EX2013 ¶¶38, 46-47. The threshold update step 1204 is depicted in Figure 13, and Figure 14 depicts the decision step 1206. EX1005 ¶¶[0111], [0114].

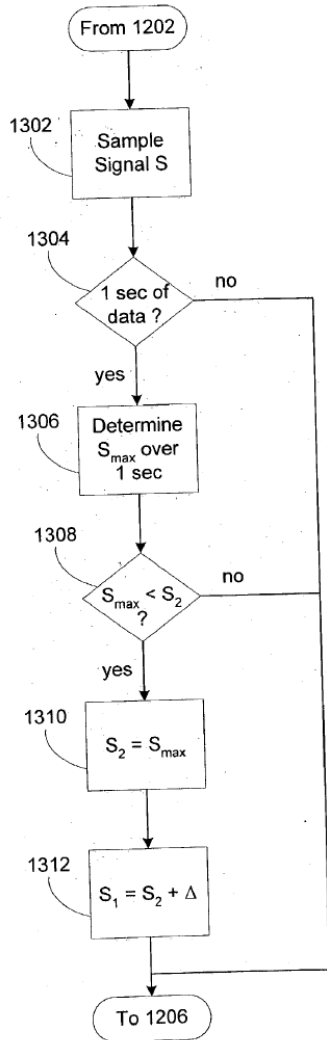


FIG. 13

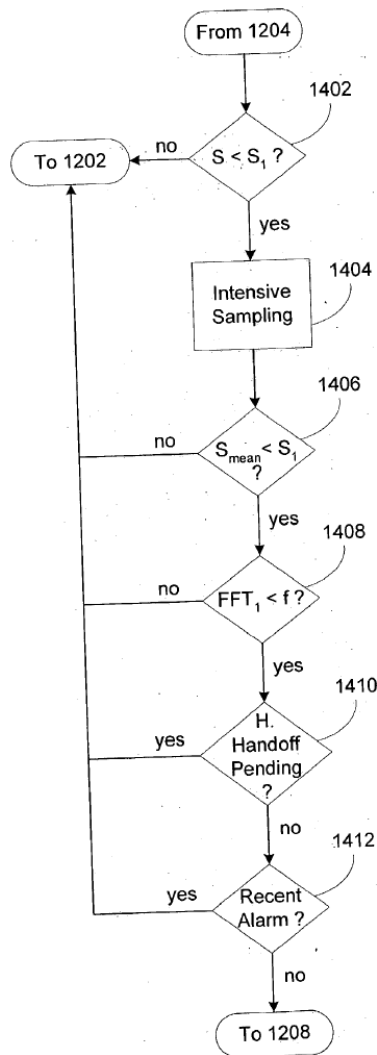


FIG. 14

In the later process, Guo relies on “the most recent...sample for each wireless network interface... [which] is compared to the wireless network alarm threshold....” *Id.* ¶[0114]. By storing the threshold, this method leaves are no “distributions underlying the QoS data” that would need to be tested using Neave’s test, as proposed by petition. EX2013 ¶47.

Petitioner also contends that “POSITAs would have been motivated to look to statistical tests that do not require any detailed assumptions about the distribution

underlying the data.” Pet. 29. But, as explained above, Guo’s teachings do not require any such assumptions. EX2013 ¶47. Instead, Guo’s teachings rely on specific measurements of the quality of service interface and use the Fourier and threshold techniques to generate “an order of magnitude reduction in the unnecessary vertical handoff rate.” EX1005 ¶[0085]; EX2013 ¶47.

Moreover, implementing the teachings of Neave would change the principle of operation of Guo. EX2013 ¶48. As explained above, Guo uses its Fourier transformation and minimum threshold methods to decide when to switch between wireless networks. These methods form the core of Guo’s system. *Id.*; see EX1005, Figs. 10-14. Combining Guo with Neave would require re-designing Guo’s system to use entirely different methods, a change that is not suggested in either Guo or Neave. EX2013 ¶48. For example, instead of maintaining a single threshold value, and periodically gathering signal samples, Guo would need to be modified to collect ranges of data for each network, such as described by Neave in reference to Rosenbaum’s test. *Id.*; see EX1006, 165. Nothing in Guo suggests modifying its teachings to use the techniques of Neave, much less specific ones that Petitioner relies on. EX2013 ¶48.

Petitioner’s argument is premised entirely on improper hindsight. EX2013 ¶49. Because it believes these path quality metrics and statistical tests existed conceptually in the prior art separately, Petitioner’s theory is an assertion that the

existence of those metrics and tests is sufficient to invalidate the claims. However, that is not sufficient under the law. *Polaris Industries, Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1068 (Fed. Cir. 2018) (“We have observed that the prejudice of hindsight bias often overlooks that the genius of invention is often a combination of known elements which in hindsight seems preordained.” (internal quotes omitted)); *TQ Delta, LLC v. Cisco Sys.*, 942 F.3d 1352, 1360 (Fed. Cir. 2019) (noting an invalidity challenge must “explain why a person of ordinary skill in the art would have combined elements from specific references in the way the claimed invention does” (emphasis in original)). The Petition fails to show a reasonable likelihood of showing that a POSITA would have combined Guo with Neave. EX2013 ¶48.

VII. Conclusion

Patent Owner respectfully requests that the Board refuse to institute *inter partes* review for the reasons stated herein.

Dated: June 23, 2025

Respectfully submitted,

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Dated: June 23, 2025

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CERTIFICATE OF SERVICE

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