UNITED STATES DISTRICT COURT DISTRICT OF MASSACHUSETTS

SKYHOOK WIRELESS, INC.,

v.

CIVIL ACTION NO. 10-cv-11571-RWZ

GOOGLE INC.,

Defendant.

Plaintiff,

GOOGLE INC.'S MEMORANDUM OF LAW IN SUPPORT OF ITS MOTION FOR SUMMARY JUDGMENT OF INDEFINITENESS AND, IN THE ALTERNATIVE, OPENING CLAIM CONSTRUCTION BRIEF

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I. INTRODUCTION AND SUMMARY OF ARGUMENT

This case is about a particular type of technology that can be used to provide information about the location of mobile phones, laptop computers, and other mobile devices. "Location aware" technology is increasingly common and used everyday in applications that provide maps, information about local businesses, and social networking applications like Facebook and Twitter. The technology has been available and used for many years.

There are several ways the location of a mobile device can be determined, including GPS satellites and triangulation based on cellular tower signals. Plaintiff Skyhook Wireless, Inc. ("Skyhook") asserts four patents in the same patent family: U.S. Patent Nos. 7,414,988 ("the '988 patent"), 7,433,694 ("the '694 patent"), 7,305,245 ("the '245 patent"), and 7,474,897 ("the '897 patent") (collectively, "the patents-in-suit"). Exs. C-F.¹ Skyhook—like Google, Apple, Microsoft, Intel, and others—offers a function that allows the physical location of a mobile device to be determined using signals from Wi-Fi access points, which provide wireless network connectivity for devices such as a cell phones or laptop computers. The patents-in-suit acknowledge that the basic technology of using Wi-Fi access points for location pre-dates the patents by many years. *See, e.g.*, Ex. C at 2:58-3:3 & 3:27-4:3.

The patents-in-suit, at most, attempt to describe an incremental improvement over the prior art.² The patents disclose a way of systematically driving a pre-identified target area along a specific type of pre-planned route, as opposed to an unplanned or random driving pattern to collect Wi-Fi access point signals. The signals from the access points are then used to calculate the locations of the Wi-Fi access points. Once the locations of Wi-Fi access points are known, they are stored in a database, and can be used in turn to determine the location of a mobile device with a Wi-Fi radio.

¹ Unless stated otherwise, all cited exhibits are attached to the accompanying declaration of Susan Baker Manning.

² Google believes the evidence will show that the patents-in-suit are both anticipated by, and obvious in light of, the prior art—particularly if construed as broadly as Skyhook proposes.

Skyhook's patents both are narrow, and fundamentally flawed. Many claim terms can only be defined by guess-work. A patent claim that is insufficiently clear to put the world on notice of its scope is invalid for failure to satisfy the definiteness requirement of 35 U.S.C. § 112, ¶ 2. Google demonstrates below that the patents-in-suit are invalid because every asserted independent claim includes terms that cannot be construed reliably and are therefore invalid as indefinite. Because indefiniteness, like claim construction, is an issue of law, Google respectfully submits that this issue can and should be resolved now.

The patents-in-suit are invalid for several other reasons. First, the '988 and '694 patents violate the basic rule that one cannot claim both an apparatus and a method in the same claim. The '988 and '694 patent claims require both (1) a database and (2) "recording multiple readings of the Wi-Fi access point at different locations around the Wi-Fi access point" using a particular methodology for determining the scanning route. The combination of method and apparatus limitations renders both the '988 and '694 patents invalid.

Second, the '988 and '694 patents require "reference symmetry," but the limitations are unintelligible. Persons of skill in the art cannot discern whether there is "reference symmetry" because there is no discernable reference point from which it can be measured, and because there is no objective standard for judging the presence or absence of "reference symmetry."

Third, the inventors' decision to express numerous limitations in the '988 patent as "logic" to perform various recited functions leads to indefiniteness. Such broad functional claiming is governed by 35 U.S.C. § 112, \P 6, which overcomes the inherent vagueness of such a claim by requiring the patentee to disclose a *specific structure* for performing the claimed function, and then limiting the claims to that structure. In the '988 patent, Skyhook sought the advantages of functional claiming, but failed to disclose any "logic" structure capable of performing the recited functions. This is a separate, sufficient reason why the '988 patent is invalid as a matter of law.

In addition, three other terms are so vague that they fail to delineate the metes and bounds of the claims:

- "avoid[s] arterial bias" ('988 patent, claim 1 and '694 patent, claim 1);
- "said chosen algorithm being suited for the number of identified Wi-Fi access points" ('245 patent, claim 1); and
- "predefined rules" and "rules" ('897 patent, claims 1 and 3).

Both "avoid[s] arterial bias" and the requirement that an algorithm be "suited" for the number of identified access points require a level of subjectivity and guess-work that makes it impossible to discern the scope of the claims. Neither the claims nor the specification gives the terms "predefined rules" and "rules" any context or content, leaving a person of ordinary skill to simply guess at Skyhook did or did not patent. Because the patents-in-suit fundamentally fail to put the world on notice of the scope of Skyhook's patent rights, they are invalid as a matter of law.

Should the Court consider the construction of other terms, Google's proposed constructions are drawn directly from the intrinsic evidence, and make plain that Skyhook's claims cover what it actually disclosed and described to the PTO. The '988 and '694 patents each claim a database of Wi-Fi access points. As the patents recognize, there was nothing novel about a database of Wi-Fi access points. The ostensible advantages of the claimed invention flow from how the data in the database was collected. The specification of the patents is clear on this point, as are the claims themselves. The inventors emphasized the importance of their data collection methodology to the PTO. The '245 and '897 patents each claim methodologies for determining the location of a mobile device using the same database disclosed in the '988 and '694 patents.

The most important of the disputed claim terms are "calculated position information" and its synonyms "calculated positions," "calculated locations," and "recorded location information." These appear in every asserted claim. The claimed "calculated position information" is and must be based on data gathered using the disclosed specific methodology for planning the scanning route. The claims, teachings of the patents, and prosecution history are clear on this point. Leaving aside that the inventors impermissibly tried to include a method step in their claims to a database, their way of collecting the underlying data is the key to what the calculated position information actually is—and also the key to their claims. Skyhook's *method* of collecting Wi-Fi access point data was their purported solution for achieving better location information, and was also the alleged point of novelty that allowed the applicants to overcome the prior art and obtain issuance of the patents.

The parties disagree on other key concepts. The disputed terms include "arterial bias," "reference symmetry," "substantially all Wi-Fi access points in the target area," and "providing a reference database of calculated locations of Wi-Fi access points in a target area." As Google shows below, to press its infringement claims, Skyhook would unmoor these terms from the claim language and the intrinsic evidence. This is impermissible, and Google respectfully requests that if the Court is inclined to reach claim construction, that it adopt Google's proposed constructions.

II. STATEMENT OF FACTS

A. The Background of the Technology and the Teachings of the Patents-in-Suit

The patents-in-suit describe a specific—and, the inventors claim, superior—approach to collecting data about the location of Wi-Fi access points. Every Wi-Fi access point broadcasts an identifier. Ex. C at 5:55-63, Fig. 9.³ Because Wi-Fi access points are installed by individuals, schools, and businesses, there is no central repository of information about where Wi-Fi access points are located. To use Wi-Fi access points as the basis of a location system, the locations of the Wi-Fi access points themselves first have to be determined. *Id.* at 2:58-3:6, 3:18-22, 3:50-4:3.

³ The patents-in-suit are related to one another, and the specifications of the '988, '694 and '245 patents are nearly identical. Ex. C at 1:12-22; Ex. D at 1:11-32; Ex. E at 1:14-19; Ex. K (redline comparing the '988 and '694 patents); Ex. L (same comparing the '988 and '245 patents). The '897 patent is a continuation-in-part of the '245 patent, and incorporates its specification by reference. Ex. F at 1:18-20. Thus the patents-in-suit all have the same basic disclosure, with certain new matter added to the '897 patent. For simplicity of reference, when referencing a portion of the disclosure common to all patents-in-suit, Google cites the '988 patent.

The first step in that process is generally to scan an area for Wi-Fi access points. *Id.* at 7:37-52. If the location of the scanning device is known, *e.g.*, it has a GPS device on board, at the time it scanned a certain access point at a certain signal strength, the scan data can be used to calculate the locations of the Wi-Fi access points. *Id.* at 7:44-52. Those calculated locations are in turn used in a system to determine the location of a mobile device that can "see" Wi-Fi access points whose locations have been previously calculated. *Id.* at 5:48-6:9; *see also generally* Declaration of Anthony S. Acampora ("Acampora Decl.") ¶ 20-35.

Wi-Fi based location detection is old technology, and Skyhook does not claim to have invented it. The patents-in-suit recognize that a number of well-known Wi-Fi location systems predate the claimed invention. *See, e.g., id.* at 2:58-3:26 (discussing Wi-Fi location systems from Microsoft Corporation, Intel Corporation's PlaceLab, WiGLE.net, Wi-FiMaps.com and others), 3:27-28 ("There have been a number of commercial offerings of Wi-Fi location systems targeted at indoor positioning."), 3:59-4:3 (discussing commonly available Wi-Fi location scanning clients).

The inventors regarded these prior art Wi-Fi based location systems as flawed—a flaw that was a direct consequence of prior art data collection methodologies. According to the inventors, the earlier location databases were built based on crowd-sourced Wi-Fi access point location data collected by "amateur scanners (known as 'wardrivers') who submit their Wi-Fi scan data to public community websites." *Id.* at 2:61-62. Because the data was collected while individuals went about their daily business, rather than while "following designated scanning routes," most of the readings were taken from main, heavily trafficked roads. This oversampling from main roads caused the Wi-Fi access points to appear to be closer to the main roads than they actually are—a problem the inventors dubbed "arterial bias." *Id.* at 3:12-18. The patents call this the "Random Model" of data gathering, and explain that it results in "arterial bias." *Id.* at 7:52-8:27, Figs. 3 & 5.

The inventors' proffered solution to the "arterial bias" problem was to "develop routing algorithms that include every single street in the target area." *Id.* at 8:28-29. By following the

well-known "Chinese Postman" routing algorithm—an "optimal route" of "the shortest tour of a graph which visits each edge at least once"—one "avoid[s] arterial bias in the resulting collection of data" and "ensur[es] that all observable access points are detected and mapped by the system." *Id.* at 28-47; *see also id.* at 4:28-46, 5:24-37, 5:48-63, 8:28-59, 9:2-6, 9:12-19, 9:64-10:4, Figs. 2, 4, & 6-8 (all discussing routing and data gathering methodology); Ex. G at GSHFED185-90 (applicants' comments distinguishing prior art based on the patents' data collection routing methodology). "[T]he Chinese Postman Scanning model not only gathers more access points uniformly across a target area but the resulting data produces more accurate calculations of access points." Ex. C at 8:56-59.

The claims of the '988 and '694 patent are directed to a database of calculated Wi-Fi access point locations built using data from the pre-planned driving methodology described in the specification and prosecution history. The '245 and '897 patents claim particular uses of that same database of calculated location information to determine the location of a mobile device. The '245 patent requires that a particular location determination algorithm be selected from the available options because it is "suited" for the number of identified Wi-Fi access points. The '897 requires, among other things, that access points be used or not used to calculate the location of a device based on unstated "predefined rules."

B. The Prosecution Histories of the Patents-In-Suit

On October 28, 2005, the applicants filed the three applications that issued as the '988, '694 and '245 patents. Exs. C-E. Each claims priority to the same provisional application, each states that it is related to the others, and their specifications are nearly identical. *See supra* at 4 n.3. Six months later, on February 22, 2006, the inventors filed the application that issued as the '897 patent. The '897 patent is a continuation-in-part of the '245 patent, incorporates by reference the disclosure of the '245 patent, and also states that it is related to each of the other patents-in-suit. Ex. F at 1:13-41. All four patents-in-suit name the same four inventors. Exs. C-F.

On November 30, 2007, the Examiner rejected all pending claims in the application for the '988 patent as obvious in light of the prior art. Ex. G at GSHFED200-12. In response, the applicants amended claim 1:

wherein said calculated position information is obtained from recording multiple readings of the Wi-Fi access point <u>at different</u> <u>locations around the Wi-Fi access point so that the multiple</u> <u>readings have to provide</u> reference symmetry <u>relative to other Wi-Fi access points in the target area when calculating and so that the</u> <u>calculation of the position of the Wi-Fi access point and to avoids</u> arterial bias in the calculated position information; <u>and</u>

computer-implemented logic to add records to the database for newly-discovered Wi-Fi access points said computer logic including logic to recalculate position information for Wi-Fi access points previously stored in the database to utilize position information for the newly-discovered <u>readings of previously stored</u> Wi-Fi access points.

Id. at GSHFED183. In accompanying remarks, the applicants argued the amended claims were patentable over the prior art. *Id.* at GSHFED185-91. What made them patentable, the applicants argued, was the particular methodology of systematically collecting Wi-Fi access point data. Ex. G at GSHFED186 (the prior art of record was "silent regarding any particular route or scheme taken or used by the mobile station to gather location information about wireless access points"). The applicants contrasted random, or, non-systematic, data collection with their purported invention:

[N]one of the cited reference teach or suggest conducting an audit of an area to build a reference database of the locations of Wi-Fi access points in a target area so as to provide reference symmetry and avoid arterial bias. ... Namely, as described in the application, the location data collected by the wardrivers is often inaccurate, incomplete, and grows organically *rather than being collected in a systematic fashion to purposefully avoid arterial bias.* See Application at ¶¶ 15-17.

Ex. G at GSHFED187-88 (emphasis added).

The applicants tied their allegedly novel data collection methodology directly to the calculated location information:

Collecting multiple readings of Wi-Fi access points in a systematic

fashion, as described in the application, provides reference symmetry within the target area. Thus, the distribution of reference points (i.e., Wi-Fi access point locations) is symmetric. By using a collection of location data that is symmetric, a mobile device attempting to calculate its location typically encounters physical locations in which there are numerous access point locations on all sides of the device within range of the device's Wi-Fi radio. Therefore, a position calculation performed by the mobile device will have reduced location bias and will be more accurate as a result.

Id. at GSHFED188 (emphasis added). In other words, "performing a planned audit" is what allows the inventors to calculate more accurate Wi-Fi access point locations, and provide a superior location service. *Id.* at GSHFED189 ("by performing a planned audit, and avoiding arterial bias, applicants at least achieve more complete information about access points in the target area, higher quality estimates of access point locations, and reference symmetry"). It is the lynchpin of applicant's claims.

The Examiner allowed the amended claims on May 21, 2008, and the '988 patent issued on August 19, 2008. *Id.* at GSHFED168-72.

The applicants were also forced to amend the claims of the '694 patent to overcome prior art and obtain issuance of that patent. After the Examiner rejected the claims as obvious, the Applicants amended claim 1 to "more particularly recite characteristics of the calculated position information," and submitted that the amendments overcome the rejection. Ex. H at GSHFED310-13 (rejection), GSHFED295-99 (amendment). As they had in the '988, the Applicants' amendments were directed to the method of collecting the data, and to the results flowing from that methodology:

> wherein said calculated position information is obtained from recording multiple readings of the Wi-Fi access point <u>at different</u> <u>locations around the Wi-Fi access point so that the multiple</u> <u>readings</u> to provide reference symmetry when calculating the position of the Wi-Fi access point and to avoid arterial bias in the calculated position information <u>of the Wi-Fi access point</u>, and

> wherein the database records for substantially all Wi-Fi access points in the target area provide reference symmetry within the target area.

Id. at GSHFED297. The Examiner allowed the claims as amended, and the '694 patent issued on October 7, 2008. The same Examiner who had reviewed the '694 patent also examined the '245 and '897 patents, which issued without amendments to the claims on December 4, 2007 and January 6, 2009, respectively.

III. THE PATENTS-IN-SUIT ARE INDEFINITE, AND THEREFORE INVALID.

The claims of a patent must "particularly point[] out and distinctly claim[] the subject matter which the applicant regards as his invention." 35 U.S.C. § 112, ¶ 2. This definiteness requirement "assures that claims in a patent are sufficiently precise to permit a potential competitor to determine whether or not he is infringing." *Amgen Inc. v. Hoechst Marion Roussel*, 314 F.3d 1313, 1342 (Fed. Cir. 2003) (internal quotations, citation omitted). If a claim is "insolubly ambiguous," such that "reasonable efforts at claim construction prove futile," it is indefinite. *Exxon Res. & Eng. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001).

"Indefiniteness is a matter of claim construction, and the same principles that generally govern claim construction are applicable to determining whether allegedly indefinite claim language is subject to construction." *Praxair, Inc. v. ATMI, Inc.*, 543 F.3d 1306, 1319 (Fed. Cir. 2008); *see also Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (en banc) ("The best source for understanding a technical term is the specification from which it arose, informed, as needed, by the prosecution history.") (internal quotations, citation omitted).

Like claim construction, definiteness is an issue of law that can be resolved by the Court. *Praxair*, 543 F.3d at 1319; *Personalized Media Commc'ns*, *LLC v. Int'l Trade Comm'n*, 161 F.3d 696, 705 (Fed. Cir. 1998) ("A determination of claim indefiniteness is a legal conclusion that is drawn from the court's performance of its duty as the construer of patent claims."); *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1338 (Fed. Cir. 2008) (noting that any factual issues underlying the indefiniteness determination must by shown by clear and convincing evidence).

Datamize LLC v. Plumtree Software Inc., 417 F.3d 1342 (Fed. Cir. 2005), is the leading Federal Circuit case applying the definiteness standard to invalidate vague patent claims.⁴ The *Datamize* court held that the phrase "aesthetically pleasing" was indefinite because it was "completely dependent on a person's subjective opinion" and "[s]ome objective standard must be provided in order to allow the public to determine the scope of the claimed invention." 417 F.3d at 1350. The Federal Circuit also has invalidated claims that recite means-plus-function elements without disclosing any corresponding structure in the specification, *Biomedino, LLC v. Waters Techs. Corp.*, 490 F.3d 946, 950 (Fed. Cir. 2007), or claim both an apparatus and a related method, *IPXL Holdings, LLC v. Amazon.com, Inc.*, 430 F.3d 1377, 1384 (Fed. Cir. 2005).

"Summary judgment is appropriate in a patent case, as in other cases, when there is no genuine issue as to any material fact and the moving party is entitled to judgment as a matter of law." *Nike, Inc. v. Wolverine World Wide, Inc.,* 43 F.3d 644, 646 (Fed. Cir. 1994); *see also* Fed. R. Civ. P. 56(c); *Anderson v. Liberty Lobby, Inc.,* 477 U.S. 242, 248 (1986)

A. The '988 and '694 Patents are Indefinite and Invalid Because They Claim Both a Database and a Method of Updating It.

If a single patent claim covers both an apparatus and a method, it is indefinite and therefore invalid under § 112, ¶ 2. *IPXL*, 430 F.3d at 1384; *Rembrandt Data Techs., LP v. AOL, LLC*, 641 F.3d 1331, 1339 (Fed. Cir. 2011). This is because the "combination of two separate statutory classes of invention" makes it impossible to determine from the claim when it is infringed. *IPXL*, 430 F.3d at 1384.; *see also Manual of Patent Examination Procedure* §

⁴ Halliburton Energy Services, Inc. v. M-I, LLC, 514 F.3d 1244 (Fed. Cir. 2008), in which the court invalidated claims as indefinite based on vague, functional claim language, provided further impetus for the Patent and Trademark Office to tighten its standards. See also David A. Kelly, Indefiniteness Invalidations Continue to Rise Sharply in 2008, 77 PTCJ 576 (Mar. 27, 2009) (attached as Exhibit X); Memorandum from John Love on Indefiniteness Rejections Under 35 U.S.C. 112 to Technology Center Directors, Patent Examining Corps (Sept. 2, 2008) (attached as Exhibit Y). Federal Regulators have blamed vague patents for harming competition. See, e.g., Federal Trade Comm'n, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE REMEDIES COMPETITION (Mar. 2011). AND WITH at 81-85 available at http://www.ftc.gov/os/2011/03/110307patentreport.pdf.

2173.05(p)(II) ("A single claim which claims both an apparatus and the method steps of using the apparatus is indefinite under 35 U.S.C. 112, second paragraph.").

In *IPXL*, the Federal Circuit invalidated a claim that recited the elements of a financial transaction system (an apparatus), and also required that "the user uses the input means" (a method step). Accordingly, it was unclear as a matter of timing whether infringement occurred when a system that could accept user input was constructed or when a user actually used it. *IPXL*, 430 F.3d at 1384. Similarly, in *Rembrandt* the indefinite claim covered the elements of a transmitting device as well as the step of actually transmitting. *Rembrandt*, 641 F.3d at 1339.

The independent claims of the '988 and '694 patents have the same mixed statutory problem as those found indefinite in *IPXL* and *Rembrandt*. Claim 1 in each patent is directed to a database (an apparatus), which includes "substantially all Wi-Fi access points in the target area." In both patents, the calculated position information must be "obtained from recording multiple readings of the Wi-Fi access point." Both patents thus claim a database of Wi-Fi access points and a method of keeping that database up-to-date to include *substantially all* access points in the target area.

As in *IPXL*, it is impossible to know when the claim is infringed. Is it infringed when a database is created that can add properly scanned access points to it; or only when new data is obtained and the database updated to include substantially all access points in the target area? *See IPXL*, 430 F.3d at 1384. Given the correlation between the target area and the database, it is easy to imagine a situation in which the database is current in November of a given year, but in January, after people receive devices as holiday gifts, there are more access points deployed in the target area. At what point in time is infringement judged? What if such an out-of-date database is sold and later updated by the buyer following the claimed scanning method? Who is responsible for the infringement, and when does contributory infringement occur? *See id.* at 1384 (discussing inability of manufacturer or seller of apparatus to determine whether it would be liable for contributory infringement in light of mixing of apparatus and method limitations) (citing *Ex parte Lyell*, 17 U.S.P.Q.2d 1548 (1990)). Because claim 1 in each of the '988 and '694

patents requires both an apparatus, and a scanning method to scan substantially all access points in a target area, each is a mixed statutory claim and invalid under *IPXL* and *Rembrandt*.

B. The "Reference Symmetry" Limitations are Unintelligible. ('988/1 and '694/1)

Both the '988 and '694 patents recite limitations that require "reference symmetry." Although the patents' common specification disclosure discusses "reference symmetry," that discussion cannot be reconciled with what the claims say—and what they say is hopelessly confused.

The patent specification and figures suggest that "reference symmetry" has some relationship to a "balanced" or symmetrical distribution of numerous Wi-Fi access points on all sides of the user device and within range of the user device's Wi-Fi radio. *See* Ex. C at 2:53-57 (describing "[t]he classic example" of a situation lacking reference symmetry as "along the shoreline" where there are no access points in the water), Fig. 5 (entitled "Lack of Reference Symmetry" and showing access points on only one side of a user), 9:55-10:4 (describing Chinese Postman routing resulting in a situation "in which there are numerous access point locations [602] on all sides of the user [601] within the range [604] of the device's 802.11 radio"); Fig. 6 (showing access points distributed around the user); *see also* Acampora Decl. ¶ 73; Ex. G at GSHFED188.

The common specification does not, however, overcome the flaws of the claims. First, the claims have no comprehensible frame of reference for the "reference symmetry." The '988 patent requires "recording multiple readings of the Wi-Fi access point at different locations around the Wi-Fi access point so that *the multiple readings have reference symmetry* relative to other Wi-Fi access points in the target area." In the '694 patent, "*the database records* for substantially all Wi-Fi access points in the target area *provide reference symmetry* within the target area." Thus, in the '988 patent the raw scanning data must "have reference symmetry"—a proposition that makes no sense because there need not be any user or user device present during scanning, and for which there is no support whatsoever in the specification, which speaks of

reference symmetry around a user device. Acampora Decl. ¶¶ 74-76. In the '694 patent, some unidentified thing "within the target area" is "provide[d] reference symmetry" by the database records themselves. In both patents, there is no reference point by which "reference symmetry" is judged in the context in which its claimed.

Second, nothing in the patents gives any objective standard for when "reference symmetry" exists and when it does not. Even if, contrary to the claims, one arbitrarily chose a reference point for determining symmetry, there is no information that indicates what distribution of multiple scan readings (in the '988) or of database records (in the '694) constitutes symmetry. What does it look like? What is the dividing line between a balanced or symmetrical distribution and a non-infringing one? The patents do not say, and the law requires more than leaving those of skill in the art to guess.⁵ *Halliburton*, 514 F.3d at 1249; *see also* Acampora Decl. ¶¶ 71-77.

Reference symmetry is much like the term "fragile gel" found indefinite in *Halliburton*, 514 F.3d at 1256. There, the court found the teachings in the specification of the patent including descriptions like "easily transitions," "easily disrupted or thinned," "less gel-like," "more liquid-like," "quickly returns to a gel," "break instantaneously," and "minimum pressure, force, and time"—to be too subjective to meet the definiteness requirement. *Id.* at 1247, 1256. The Federal Circuit held that even though a definition might be articulated, the claim was still indefinite because the words could not be translated into a meaningfully precise claim scope. *Id.*

⁵ The teachings of the patent are so divorced from the claims that no narrowing construction can properly be adopted in order to preserve the validity of the claims. *See Halliburton*, 514 F.3d at 1253 (where a claim is ambiguous, it is sometimes permissible to "adopt[] a narrowing construction when doing so would still serve the notice function of the claims"). Even following the Chinese Postman routing algorithm will not necessarily result in "reference symmetry." The patent indicates that "[w]ith Chinese Postman model of scanning for access points, the user *typically* encounters a physical location [Fig. 6] in which there are numerous access point locations on all sides of the user." Ex. C at 9:64-67 (emphasis added). There is no objective teaching of how "typical" such distributions are, what they look like when they occur, whether they are symmetrical, and how "typical" distributions are determined when measurements provide reference symmetry relative to other access points, as opposed to access points around a user, or access points within a target area without regard to where a user is.

at 1251. Likewise, here, even setting to one side the lack of a reference point, there is no objective standard by which the "reference symmetry" relative to such a point could be judged.

C. "Avoid[s] arterial bias" is Necessarily Relative, and Hence Indefinite ('988 patent, claim 1 and '694 patent, claim 1)

Claim 1 of the '988 patent requires that "calculated position information is obtained from recording multiple readings of the Wi-Fi access point at different locations around the Wi-Fi access point ... so that the calculation of the position of the Wi-Fi access point *avoids arterial bias* in the calculated position information" (emphasis added). Claim 1 of the '694 patent requires that "said calculated position information is obtained from recording multiple readings of the Wi-Fi access point at different locations around the Wi-Fi access point so that the multiple readings *avoid arterial bias* in the calculated position information information of the Wi-Fi access point so that the multiple readings *avoid arterial bias* in the calculated position information of the Wi-Fi access point (emphasis added).

The phrase "avoid(s) arterial bias" renders the bounds of these claims indefinite. *Halliburton*, 514 F.3d at 1251 ("Even if a claim term's definition can be reduced to words, the claim is still indefinite if a person of ordinary skill in the art cannot translate the definition into meaningfully precise claim scope."). This follows because, given any reading other than "eliminate," the term "avoid" is necessarily relative. Accordingly, it fails to properly define the patent's scope. *Datamize*, 417 F.3d at 1347 (relative terms indefinite if "insolubly ambiguous").

The specification confirms this ambiguity. It describes arterial bias variously as "data aggregation in heavily trafficked areas" from "not following designated scan routes," Ex. C at 3:14-15, and describes avoiding arterial bias as the result of following an "*optimal* route ... not showing bias to any street," *id.* at 8:44-45 (emphasis added), and using Chinese Postman to calculate the "*most efficient* driving route for covering every single street in a target area," *id.* at 8:31-34 (emphasis added). Each of these descriptions, however, is purely subjective. How much

data aggregation is too much? How "optimal" must a designated scan route be?⁶ There is thus an internal tension between the absolute standard of "*avoiding* arterial bias" on the one hand, and the looser standards of avoiding data aggregation on main routes, or following optimal scan routes like Chinese Postman, which still include multiple passes on and therefore a bias to many streets.

The '988 patent specifies that the calculation of the position of the Wi-Fi access point avoids "arterial bias," but nowhere in the specification does it describe the amount of avoidance necessary to meet this claim limitation. *Datamize*, 417 F.3d at 1350 ("Some objective standard must be provided to allow the public to determine the scope of the claimed invention."); *Halliburton*, 514 F.3d at 1253 (finding "fragile gel" indefinite as patentee failed to identify degree of fragility in invention).

If the Court is not inclined to hold that the term is indefinite, Google submits that the most appropriate alternative would be to construe the term as "eliminate arterial bias," the only result consistent with the proffered novelty of the claims. Google's construction is supported by the '988 patent, which provides a scanning vehicle "follows the optimal route according to the algorithm showing *no bias* to any street[.]" Ex. C at 8:44-47; *see also id.* at 9:14-19, 9:64-10:4, Figs. 1 & 2. Moreover, the preferred embodiments of the invention include using the Chinese Postman routing algorithm for planning the vehicle route, which covers "every single street in a target area." *Id.* at 8:28-59; Ex. Q (to "avoid" is "to prevent the occurrence of"); Ex. P (to "avoid" is "to make, become, or be empty").

In contrast, Skyhook's proposed construction only makes the term less clear. *See* Ex. Z (proposing: "From the perspective of a user whose location is being calculated, the calculated positions of observed Wi-Fi access points in range of the user tend to be distributed around the

⁶ Further confusing things, Figure 4 shows a Chinese Postman driving route in which the driving route shows a bias to the perimeter streets of the target area, each of which are each driven twice in the example. Ex. C at Fig. 4.

user with reduced arterial bias."). Skyhook's definition begs the question, reduced arterial bias relative to what? Nor does Skyhook's definition shed any light on the question, reduced by how much? The language "*tend to be* distributed" is also vague. Contrary to Skyhook's implication, "reference symmetry" is not merely a reduction in arterial bias. Reference symmetry may, in certain circumstances, help overcome arterial bias, but that is what it *does*, not what it actually *is*. Google therefore respectfully urges that its proposed definition be adopted.

D. The "Logic" Terms are Indefinite for Failure to Disclose Structure Corresponding to the Claimed Logic ('988 patent, claims 1-3).

1. The "logic" terms are means-plus-function limitations.

The inventors specified six different limitations in the '988 patent as "logic" to perform a recited function:

- "computer-implemented logic to add records to the database for newly-discovered Wi-Fi access points" (claim 1);
- "logic to recalculate position information for Wi-Fi access points previously stored in the database to utilize position information for the newly-discovered readings of previously stored Wi-Fi access points" (claim 1);
- "computer-implemented clustering logic to identify position information based on error prone GPS information" (claim 2);
- "logic to determine a weighted centroid position for all position information reported for an access point" (claim 3);
- "logic to identify position information that exceeds a statistically-based deviation threshold amount away from the centroid position" (claim 3); and
- "the clustering logic ... excludes such deviating position information from the database and from influencing the calculated positions of the Wi-Fi access points" (claim 3).

Each of these limitations only recites generic "logic" to perform a specified function, without claiming any particular structure to perform the claimed function.

This type of structureless claim limitation is permissible only if it meets the requirements of 35 U.S.C. § 112, ¶ 6. As the *quid pro quo* for being permitted to recite a claim element by its function, section 112, ¶ 6 requires that the claim be limited "to cover the corresponding structure, material, or acts described in the specification and equivalents thereof" that perform the recited function. *B. Braun Medical, Inc. v. Abbott Labs.*, 124 F.3d 1419, 1424-25 (Fed. Cir. 1997) ("structure disclosed in the specification is 'corresponding' structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim").

The statute thus "operates to restrict claim limitations drafted in such functional language to those structures, materials, or acts disclosed in the specification (and their equivalents) that perform the claimed function." *Personalized Media Commc'ns.*, 161 F.3d at 703; *see also Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc.*, 145 F.3d 1303, 1307-08 (Fed. Cir. 1998) (means-plus-function elements "must be construed 'to cover the corresponding structure, material, or acts described in the specification and equivalents thereof"). In short, functional language tells what the claimed component *does*; structural language tells what the claimed component *is, Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1536 (Fed. Cir. 1991), and if the patentee chooses to claim an element by what it does rather than what it is, the corresponding structure must be disclosed in the specification to fill that gap.

Because they omit the word "means," the "logic" claim terms are presumed not to be subject to means-plus-function limitations. *CSS Fitness Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1369 (Fed. Cir. 2002). That presumption is rebutted, however, by the "showing that the claim element recited a function without reciting sufficient structure for performing that function." *Watts v. XL Sys.*, 232 F.3d 877, 880 (Fed. Cir. 2000). Here, there is no structure associated with any of the "logic" limitations. The claims do not recite what the relevant "logic" actually is; instead, the patents merely recite what the "logic" does. *ABB Automation, Inc. v. Schlumberger Res. Mgmt. Servs.*, 2003 WL 1700013, at *1 (D. Del. Mar. 27, 2003) (holding that "logic" does

not recite sufficient structure to avoid means-plus-function analysis"); see also Acampora Decl. ¶ 87.

Skyhook submits that "logic" means "software and/or hardware." Ex. Z at 5-10. That does not provide the requisite concreteness. *Laitram*, 939 F.2d at 1536. Some kind of software and/or hardware is obviously necessary, but had Skyhook claimed "software and/or hardware" to perform the various functions, it would be no different than reciting a "means" to perform the functions; neither provides guidance on what software or hardware is claimed. Because each "logic" limitation is claimed in purely functional form, each is governed by section 112, ¶ 6.

2. The specification of the '988 patent does not disclose any structure capable of performing the function of the "logic" claims.

"The first step in construing a means-plus-function limitation is to identify the function explicitly recited in the claim. The next step is to identify the corresponding structure set forth in the written description that performs the particular function set forth in the claim." *Asyst Techs., Inc. v. Empak, Inc.,* 268 F.3d 1364, 1369 (Fed. Cir. 2001) (citation omitted); *Creo Prod., Inc. v. Presstek, Inc.,* 305 F.3d 1337, 1347 (Fed. Cir. 2002) (whether a patent discloses a structure for performing a function depends on "whether one skilled in the art would have understood that the specification of each patent disclosed structure capable of performing the function cited in the claim limitation").

If the specification does not disclose a corresponding structure, then the limitation is indefinite. *Tech. Licensing*, 545 F.3d at 1338. A means-plus function claim satisfies the definiteness requirement only if the written description clearly links or associates structure to the claimed function. *Biomedino*, 490 F.3d at 950. "The question is not whether one of skill in the art would be capable of implementing a structure to perform the function, but whether that person would understand the written description itself to disclose such a structure." *Tech. Licensing*, 545 F.3d at 1338. The corresponding structure "must include all structure that actually performs the recited function." *Telcordia Techs., Inc. v. Cisco Sys.*, 612 F.3d 1365, 1376 (Fed. Cir. 2010) (internal citation omitted).

Under Federal Circuit precedent, the "logic" limitations must be limited to any algorithm disclosed in the specification for performing the recited function. *WMS Gaming, Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1348 (Fed. Cir. 1999) ("[T]he [district] court erred by failing to limit the claim to the algorithm disclosed in the specification. The structure of a microprocessor programmed to carry out an algorithm is limited by the disclosed algorithm."); *ABB Automation Inc. v. Schlumberger Resource Mgmt. Svcs, Inc.*, 2003 WL 21034979, at *1 (D. Del. May 6, 2003) ("[A] court must identify the algorithm disclosed in the specification (often in the form of figures or flowcharts) when construing means-plus-function claim limitations involving a microprocessor programmed to carry out an algorithm.") (*WMS Gaming*).

The specification of the '988 patent does not, however, disclose any specific formula, algorithm, code, or other structure actually capable of performing the functions recited in the "logic" limitations. Each of the "logic" limitations is therefore invalid as a matter of law. *Tech. Licensing*, 545 F.3d at 1338 (if the patent does not disclose a structure corresponding to a meansplus-function limitation, it is indefinite under § 112, ¶ 2 and therefore invalid); *Creo Prods.*, 305 F.3d at 1347 (the test for whether the patent discloses a structure for performing the recited function depends on "whether one skilled in the art would have understood that the specification of each patent disclosed structure capable of performing the function cited in the claim limitation."); *see also* Acampora Decl. ¶¶ 87-118.

a. "logic to recalculate position information for Wi-Fi access points previously stored in the database to utilize position information for the newly-discovered readings of previously stored Wi-Fi access points"

The '988 patent does not disclose any "logic" capable of recalculating the positions of a previously stored Wi-Fi access point based on a new reading of that same Wi-Fi access point. The specification refers to this functionality only generally: "During [the Reverse Triangulation] process . . . existing access points are repositioned based on any new data recorded by the scanners," and that "[t]he reverse triangulation algorithm factors in the number of records and their associated signal strengths to weight stronger signal readings more than weaker signals with

a quasi weighted average model." Ex. C at 12:31-38. Although there is a set of equations in columns 12 and 13 of the '988 patent that appear to describe one aspect of "reverse triangulation," apart from these equations the specification does not provide logic for applying a "reverse triangulation algorithm." Neither the disclosed equations nor anything else in the patents is capable of actually performing the recited function of "recalculat[ing] position information for Wi-Fi access points previously stored in the database". Acampora Decl. ¶¶ 89-96. The limitation is therefore indefinite.

b. "computer-implemented logic to add records to the database for newly-discovered Wi-Fi access points"

The specification of the '988 patent discloses that "[d]uring [the Reverse Triangulation] process 1) new access points are added to the database and their physical location is calculated." Ex. C at 12:31-33. It does not, however, disclose how new access points are added, or any algorithm or structure for doing so. Acampora Decl. ¶¶ 97-101.

c. "computer-implemented clustering logic to identify position information based on error prone GPS information"

The '988 specification notes that "[t]he filtering process users [sic] clustering techniques to weed out error prone GPS readings," but does not disclose key elements of the referenced clustering technique nor how the technique may be reconciled with other claimed techniques. Ex. C at 12:1-28. This vague reference to the concept of a clustering technique, without any description of the algorithm, is insufficient disclosure of structure corresponding to the claimed clustering logic. Acampora Decl. ¶ 102-107.

d. "logic to determine a weighted centroid position for all position information reported for an access point"

The specification of the '988 patent states that "the system first calculates the weighted centroid for the access point using all reported data" without providing any disclosure whatsoever about how the weighted centroid position is calculated. Ex. C at 12:11-13. In effect, instead of disclosing structure corresponding to the claimed logic, the specification simply

repeats the function performed by the logic without providing any additional clarity. Acampora Decl. ¶¶ 110-114.

e. "logic to identify position information that exceeds a statistically-based deviation threshold amount away from the centroid position"

The '988 patent's specification states that the system "determines the standard deviation based on the distribution of the reported locations. The system uses a definable threshold based on the sigma of this distribution to filter out access points that are in error." Ex. C at 12:13-17. It fails to disclose how the access points are filtered out, or how the deviation threshold and centroid are calculated. Acampora Decl. ¶ 115-118.

f. "the clustering logic . . . excludes such deviating position information from the database and from influencing the calculated positions of the Wi-Fi access points"

The specification notes the concept of excluding outliers from the database so that they do not impact the calculated locations of the Wi-Fi access points, and gives a single example of criteria that might be used to do so. Ex. C at 12:16-17 ("For example, if 90% of the readings are within 200 meters of each other but the remaining 10% of the readings are 5 kilometers away then those outliers are removed by the filter The system uses a definable threshold based on the sigma of this distribution to filter out access points that are in error. Once these error records are marked, the centroid is recalculated with the remaining location records to determine the final centroid."). The key points of the concept are not disclosed, such as how the threshold, sigma, and centroid are calculated. Acampora Decl. ¶¶ 106-109.

* * *

In return for the convenience of functional claiming, the Patent Act requires Skyhook to disclose a corresponding structure that actually performs the recited functions. Skyhook failed to do this. This renders each of the "logic" terms indefinite under § 112, ¶ 2, and every claim of the '988 patent is therefore invalid.

E. "Rules" and "Predefined Rules" in the '897 Patent are Indefinite.

In claim 1 of the '897 patent, the inventors recite the step of "using the recorded location information for each of the observed WiFi access points in conjunction with *predefined rules* to determine whether an observed WiFi access point should be included or excluded from a set of WiFi access points" (emphasis added). Dependent claim 3 further requires "*rules* to determine a reference point and to compare the recorded location information for each of the observed WiFi access points to the reference point."

The terms "rules" and "predefined rules" do not apprise persons of skill of the scope of the claims, thus rendering the '897 patent invalid. A "rule," even a predefined one, could be literally any criteria: whether the dog wagged her tail, whether it is Tuesday, whether the sun rose this morning. It would be a "rule" to always include every observed Wi-Fi access point in a set. Or a "rule" could be a particular clustering or filtering algorithm. Ex. F at 9:11-15 (referencing clustering and filtering algorithms). But the patent sheds no light on what constitutes a "rule" within the meaning of the patent, and a person of skill in the art is left to guess at the metes and bounds of the '897 patent. The patent is therefore indefinite and invalid.⁷ *Halliburton*, 514 F.3d at 1251; *Datamize*, 417 F.3d at 1350; *S3 Inc. v. nVidia Corp.*, 259 F.3d 1364, 1372 (Fed. Cir. 2001).

F. The Requirement of the '245 Patent that the Algorithm be "Suited" to the Number of Identified Wi-Fi access Points Calls for an Entirely Subjective Determination.

The Examiner allowed the '245 patent to issue because he believed that the prior art of record did not teach the claim 1 step of "based on the number of Wi-Fi access points identified via received messages, choosing a corresponding location-determination algorithm from a

⁷ A patent must both enable and provide a written description for the full scope of the claims. 35. U.S.C. § 112, ¶¶ 1, 2. If construed to cover any and every possible "rule," this would render the '897 patent invalid. *See Alza Corp. v. Andrx Pharms., LLC,* 603 F.3d 935, 940 (Fed. Cir. 2010) (finding patent given a broad construction invalid because the full scope of the claims was not enabled); *Ariad Pharm., Inc. v. Eli Lilly and Co.,* 598 F.3d 1336, 1358 (Fed. Cir. 2010) (en banc) (holding patent invalid for lack of written description where asserted claims were broader than what was described in the specification).

plurality of location-determination algorithms, said chosen algorithm being suited for the number of identified Wi-Fi access points." Ex. I at GSHFED89. The term "said chosen algorithm being suited for the number of identified Wi-Fi access points" is indefinite, however, because it does not apprise one skilled in the art of the bounds of the claim. There is no indication in the claims or the disclosure which algorithm(s) is (are) "suited" for a particular number of identified Wi-Fi access points. *Datamize*, 417 F.3d at 1350 ("The scope of claim language cannot depend solely on the unrestrained, subjective opinion of a particular individual purportedly practicing the invention."); *Halliburton*, 514 F.3d at 1251.

When faced with a purely subjective phrase such as "suited," "a court must determine whether the patent's specification supplies some standard for measuring the scope of the phrase." *Datamize*, 417 F.3d at 1351. The '245 patent provides no such guidance. While the specification notes that "[p]referred embodiments of the invention can use a number of positioning algorithms" and that "[t]he decision of which algorithm to use is driven by the number of access points observed and the user case application using it," Ex. E at 7:3-12, it never explains how the number of access points impacts what algorithm is appropriate, never identifies the possible algorithms, and never identifies any algorithm as suited or not suited to a given number of identified Wi-Fi access points. Simply put, the specification fails to teach what the dividing line is between "suited" and "not suited." *See Datamize*, 417 F.3d at 1350; *Union Pac. Res. Co. v. Chesapeake Energy Corp.*, 236 F.3d 684, 692 (Fed. Cir. 2001) (finding claim term "comparing" indefinite). Accordingly, a person of ordinary skill cannot discern the bounds of the claim, and it is therefore indefinite. *Halliburton*, 514 F.3d at 1251.

IV. THE PROPER CONSTRUCTION OF CERTAIN DISPUTED CLAIM TERMS

A. "Target area" ('988 patent, claim 1; '694 patent, claim 1; 245 patent, claim 1)

Claim 1 in each of the '988 and '694 patents requires "a database of Wi-Fi access points for at least one target area having a radius on the order of tens of miles" and the database must "includ[e] database records for substantially all Wi-Fi access points in the target area." Claim 1 of the '245 patent similarly requires "a reference database of calculated locations of Wi-Fi access points in a target area." "Target area" should be defined as "a pre-identified geographic region throughout which a shortest route is planned along all drivable roads."

The necessary first step in programmatically gathering information about Wi-Fi access points is to identify the "target area." "Preferred embodiments of the invention include *a methodology for identifying a target region* for coverage *and then* using the Chinese Postman routing algorithm for planning the vehicle route." Ex. C at 8:41-44 (emphasis added). The upfront identification of the "target area" prior to scanning is critical to the inventors' insight that an efficient and thorough pre-planned route can be used to address the perceived arterial bias problem. *Id.* at 8:28-59; Ex. G at GSHFED187-88. Without a pre-identified "target area," it would, of course, be impossible to "plan[] the vehicle route," Ex. C at 8:43-44, or "perform[] a planned audit . . . following designated scanning routes," Ex. G at GSHFED189 (also discussing a "systematic" traverse of the target area).

As discussed below regarding the Location Terms, the patent and prosecution history confirm that once the relevant geographic region is identified, the shortest possible route must be pre-planned for traversing all drivable roads. *See, e.g.,* Ex. C at 7:37-44 ("These vehicles 201 follow a programmatic route through target scan areas to gather data in the most optimal fashion producing the highest quality data. The target scan areas typically represent a large metropolitan area including *every single drivable street* in 15-20 mile radius") (emphasis added); Ex. G at GSHFED188 (criticizing failure in the prior art to "follow[] designated scanning routes"); *id.* ("Collecting multiple readings of Wi-Fi access points *in a systematic fashion, as described in the application,* provides reference symmetry within the target area."); Ex. G at GSHFED187-89; *see also supra* at 26-30.

Skyhook's proposed definition provides no guidance on what the term means. Skyhook would define "target area" as a "targeted geographic area." There is no dispute that a "target area" is a geography. The term "targeted" in Skyhook's construction implies what Google's construction makes plain: that the "target area" must be specifically identified in advance of data collection; it cannot be superimposed on the data post hoc. Skyhook's construction also is in

error because it disregards the teachings of the patents and prosecution history that the claimed "target area" is an area that is traversed efficiently.

B. "Arterial bias" ('988 patent, claim 1 & '694 patent, claim 1)

The patents-in-suit are directed to solving the problem of "arterial bias." The inventors' goal was to create a better location positioning system using Wi-Fi access points. Ex. C at Abstract, 4:4-9, 5:24-37; Ex. G at GSHFED00000187 ("In contrast to the cited references, applicants' claim 1 is directed to a Wi-Fi location server that includes position information for Wi-Fi access points without arterial bias."). The inventors detailed how, in their view, the prior art Random Model methodology for collecting Wi-Fi access point locations was flawed because it suffered from "arterial bias." Under the Random Model, Wi-Fi access point location information was crowd-sourced, or collected from individuals going about their daily business. Ex. C at 7:55-63. The inventors posit that the tendency of individuals to use main roads results in "a bias to the main roads, or arteries at the expense of the smaller and surrounding roads" because such roads are more heavily scanned. *Id.* at 8:6-13. The patents thus describe arterial bias as a direct consequence of the Random Model of data collection. *Id.* at 3:12-18 ("arterial bias" present when "the data is self-reported by individuals who are not following designed scanning routes"), 8:24-27, 9:57-61, Figs. 3 & 5.

The prosecution history succinctly summarizes what the patents-in-suit teach:

[S]ignificant errors in position calculation can result when the reference points used for the calculation lack symmetry around the physical location of the device performing the calculation. Unsymmetrical location data (or "arterial bias") occurs when individuals (e.g., wardrivers) collect location data for Wi-Fi access points without following designated scanning routes. Such data tends to aggregate around heavily traffic areas (or "arteries"). Attempting to use arterially biased data to estimate the location of a mobile device causes a "location pull" towards the main arteries regardless of where the user is currently located. This causes substantial accuracy errors in the location estimation.

Ex. G at GSHFED00000188.

"Arterial bias" should be construed as "the deviation of the calculated position information for a Wi-Fi access point toward heavily trafficked roads and away from the actual geographic location of the access point due to the tendency of random scanning to result in a greater number of scans from heavily trafficked roads." Skyhook agrees with most of this definition, but would omit the "due to" clause. Unlike Skyhook's construction, Google's proposal correctly identifies the source of the bias: excessive scanning data from heavily trafficked roads relative to more lightly traveled roads. Google's definition is grounded in the disclosure and prosecution history, and only Google's definition gives the full picture of what arterial bias actually is. *Phillips*, 415 F.3d at 1321 ("Properly viewed, the 'ordinary meaning' of a claim term is its meaning to the ordinary artisan after reading the entire patent.").

C. The Location Terms

Every claim of every asserted patent requires a database of calculated Wi-Fi access point locations. The viability of the inventors' positioning system depends on those calculated locations, and on the data that underlies them. Ex. C at 5:35-37, 5:63-6:10, 6:31-6:58. The calculated Wi-Fi access point locations are at the heart of what the patents claim.

The patents-in-suit use several phrases for the same concept: "calculated position information" for the Wi-Fi access point ('988/1 and '694/1), "calculated positions of the Wi-Fi access points" ('988/3), "calculated locations" ('245/1 and 2), and "recorded location information" ('897/1 and 3) (collectively, the "Location Terms"). It is undisputed the Location Terms are synonymous. *See also, e.g., Omega Eng'g Inc. v. Raytek Corp.*, 334 F.3d 1314, 1334 (Fed. Cir. 2003) ("[W]e presume, unless otherwise compelled, that the same claim term in the same patent or related patents carries the same construed meaning."). Each should be defined as:

The physical location (*i.e.*, latitude and longitude) attributed to each Wi-Fi access point determined mathematically from readings recorded along a shortest planned route throughout all drivable roads in the target area (*i.e.*, by following the Chinese Postman routing algorithm). The "calculated position information" cannot be based on randomly, or non-systematically, collected readings of Wi-Fi access points.

Google's proposed construction flows directly from the claim language, the detailed teachings of the specification, and the applicants' own characterization of their purported invention made during prosecution.⁸

There is no dispute the calculated position of a Wi-Fi access point is its physical location as determined based on scanning data; Skyhook's own definition implicitly recognizes as much. *See also* Ex. C at 4:28-40. But the claimed "calculated position information" cannot be based on just any scanning data. It is a core teaching of every patent-in-suit that the claimed calculated position information must be based on data gathered while systematically and efficiently traversing all drivable roads in the target area using a Chinese Postman routing algorithm in order to avoid arterial bias; it cannot be based on Wi-Fi access point readings collected randomly, or non-systematically. The inventors criticized the Random Model, and the consequent problem of arterial bias, at length. Ex. C at 3:12-18, 7:52-8:27, 9:57-61, Figs. 3 & 5. The inventors contrasted this with their solution:

> Another approach is develop routing algorithms that include every single street in the target area so as to avoid arterial bias in the resulting collection of data thus producing a more reliable positioning system for the end users. FIG. 4 describes an optimized routing algorithm known as the Chinese Postman to calculate the most efficient driving route for covering every single street in a target area.

Ex. C at 8:28:34; *see also id.* at 7:37-44 ("These vehicles 201 follow a programmatic route through target scan areas to gather data in the most optimal fashion producing the highest quality data. The target scan areas typically represent a large metropolitan area including *every single drivable street* in 15-20 mile radius"), 9:12-19 (discussing advantages of Chinese Postman),

⁸ Because the patents-in-suit are closely related, statements made during prosecution of one patent are highly relevant to the interpretation of all patents. *Ormco Corp. v. Align Tech., Inc.*, 498 F.3d 1307, 1314 (Fed. Cir. 2007) (disclaimer in a related patent are relevant in construing the claims at issue); *see also Omega*, 334 F.3d at 1334; *Abtox, Inc. v. Exitron Corp.*, 131 F.3d 1009, 1010 (Fed. Cir. 1997) (claim terms are to be construed consistently across related patents).

9:64-10:4 (same). Having disparaged the "Random Model," and having offered the Chinese Postman routing algorithm as their solution to the problems of the "Random Model," calculated location information based on data collected using random, or non-systematic methods cannot fall within the scope of the claims. *Phillips*, 415 F.3d at 1316 ("[T]he specification may reveal an intentional disclaimer, or disavowal, of claim scope by the inventor. In that instance as well, the inventor has dictated the correct claim scope, and the inventor's intention, as expressed in the specification, is regarded as dispositive"); *SciMed Life Sys. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed. Cir. 2001) ("Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question."); *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996) (the specification "is the single best guide to the meaning of a disputed term"); *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1998) ("[c]laims must be read in view of the specification").

The patents' disclosure is so clear on this point that it would control the construction of the Location Terms had the applicants never discussed calculated locations or the method of collecting the underlying data during prosecution. But, in fact, the applicants obtained patents they now assert by distinguishing their systematic data collection method—and the resulting nature of their calculated locations—from the prior art.

Skyhook emphasized to the Examiner that the prior art of record was "completely silent regarding any method of determining the location of Wi-Fi access points" and "silent regarding any particular route or scheme taken or used by the mobile station to gather location information about wireless access points." Ex. G at GSHFED185-86. The applicants contrasted random, or, non-systematic, data collection with their purported invention:

[N]one of the cited reference teach or suggest conducting an audit of an area to build a reference database of the locations of Wi-Fi access points in a target area so as to provide reference symmetry and avoid arterial bias. ... Namely, as described in the application, the location data collected by the wardrivers is often inaccurate, incomplete, and grows organically *rather than being collected in a systematic fashion to purposefully avoid arterial bias.* See Application at ¶¶ 15-17.

Ex. G at GSHFED187-88. The cited paragraphs of the Application are unamended claims 1-3 as recited in the Summary of the '988 patent. Ex. C at 4:28-57. *See* Ex. G at GSHFED234. The applicants thus directly contrasted the invention with the prior art, and tied both non-random, systematic data collection, and purposeful avoidance of arterial bias to the claims.

The applicants repeatedly emphasized their allegedly novel data collection methodology of "[c]ollecting multiple readings of Wi-Fi access points *in a systematic fashion*, as described in the application," and the resulting improvement in the calculated location information. Ex. G at GSHFED188 (emphasis added). This was the applicants' "solution[]" to "the arterial bias problem": "by performing *a planned audit*, and avoiding arterial bias, applicants at least achieve more complete information about access points in the target area, higher quality estimates of access point locations, and reference symmetry." Ex. G at GSHFED189 (emphasis added). In other words, the "planned audit" is the lynchpin of the claimed invention. The inventors' characterizations of their invention are binding. *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002); *Phillips*, 415 F.3d at 1317; *Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1576 (Fed. Cir. 1995).

During prosecution of the '694 patent, the applicants stated they were "amending claim 1 to more particularly recite characteristics of the calculated position information." Ex. H at GSHFED297 (amending the limitations that specify the driving methodology, reference symmetry and the avoidance of arterial bias). This is a further admission that the inventors' comprehensive and systematic method of collecting the underlying data is fundamental to what the "calculated position information" actually is. Although these statements regarding the nature of the applicants' invention were made in the prosecution of the '988 and '694 patents, they are directly relevant to the construction of the claims of each of these closely-related patents-in-suit. *Ormco*, 498 F.3d at 1314; *Omega Eng'g*, 334 F.3d at 1333.

In light of the inventors' statements to the PTO, and consistent with the specification and the amendments, Skyhook disavowed calculated location information for Wi-Fi access points that is based on data collected in a random or non-systematic way. Indeed, it disavowed the use of any method of collecting information about Wi-Fi access points other than using the Chinese Postman approach to "conducting an audit of an area" to "collect[] [location data] in a systematic fashion to purposefully avoid arterial bias." Ex. G at GSHFED187-88; *see also Chimie v. PPG Indus., Inc.,* 402 F.3d 1371, 1384 (Fed. Cir. 2005) (claim construction must exclude and "any interpretation that was disclaimed during prosecution").

For these reasons, each of the Location Terms should therefore be construed as: "The physical location (*i.e.*, latitude and longitude) attributed to each Wi-Fi access point determined mathematically from readings recorded along a shortest planned route throughout all drivable roads in the target area, *i.e.* Chinese Postman, that avoids arterial bias and meets the stated reference symmetry criteria. The 'calculated position information' cannot be based on randomly, or non-systematically, collected readings of Wi-Fi access points."

D. "substantially all Wi-Fi access points in the target area" ('988 patent, claim 1; '694 patent, claim 1)

Both database patents require that the database "includ[e] database records for substantially all Wi-Fi access points in the target area." Ex. C at claim 1; Ex. D at claim 1. The Court should construe the phrase "substantially all Wi-Fi access points in the target area" as "all but an insignificant number of Wi-Fi access points in the target area."

Completeness is a key characteristic of the claimed database. Claim 1 of the '988 actually requires "computer implemented logic to add records to the database for newly discovered Wi-Fi access points," a function that allows the database to be updated over time so that it can continue to have data for "substantially all Wi-Fi access points." Both patents teach that the inventors sought to "ensur[e] that all observable access points are detected and mapped by the system" by having "[t]he scanning vehicle [401] follow[] the optimal route according to the algorithm." Ex. C at 8:44-47; Ex. G GSHFED188 ("[B]y performing a planned audit . . .

applicants at least achieve more complete information about access points in the target area[.]"). These teachings are consistent with the ordinary meaning of "substantially all," which Courts have recognized means "all but an insignificant amount." *David Nichols & Nichols Lures v. Strike King Lure Co.*, 2000 WL 1593616, at *11 (N.D. Tex. Oct. 25, 2000) (quoting *Atmel Corp. v. Info. Storage Devices, Inc.*, 997 F. Supp. 1210, 1229 (N.D. Cal. 1998)).

Skyhook's proposal rewrites the claim language. The claims requires database records for "substantially all Wi-Fi access points," not for "substantially all *observed* Wi-Fi access points" as Skyhook would have it. This is contrary to the intrinsic evidence, and Skyhook cannot amend its claims through claim construction.⁹ *See Nichols*, 2000 WL 1593616, at *8 ("[T]he Court may not consider the fact that the patentee in retrospect would have inserted qualifying terms had he considered the implications of employing absolute language."); *see also Quantum Corp. v. Rodine, PLC*, 65 F.3d 1577, 1584 (Fed. Cir. 1995) ("[C]ourts do not redraft claims.").

Skyhook's rewriting would fundamentally transform the claim. For example, a "target area" might be scanned and 500 Wi-Fi access points included in the database of the claims. Six months later, there might now be 1,000 WiFi access points in that same target area. If the target area had not been rescanned during that time, the database would still have 500 access points, and would still have "substantially all *observed* Wi-Fi access points" simply because no observations had been made during a time in which the actual number of Wi-Fi access points present changed dramatically. Acampora Decl. ¶¶ 136-138. The inventors' purpose was to provide a useful location system, with as complete a set of information about Wi-Fi access point

⁹ The Court will note that although the specification speaks of "ensuring that all *observable* access points are detected and mapped by the system," Ex. C at 8:46-47 (emphasis added), Skyhook's proposed construction refers to "substantially all *observed* Wi-Fi access points." Those are very different concepts, and the phrase "substantially all Wi-Fi access points" already accounts for the possibility that some small number of access points could be excluded from the database, whether because they are unobservable of for some other reason. *See* Acampora Decl. ¶ 138.

locations as possible. Ex. C at 8:44-47, 5:24-27. Skyhook would dispense with the usefulness of the system in a bid to lower its burden of proof during litigation.

E. "providing a reference database of calculated locations of Wi-Fi access points in a target area" (25) (245/1)

In the '245 patent, the first step of Claim 1 is "providing a reference database of calculated locations of Wi-Fi access points in a target area." As detailed above, in all of the patents-in-suit the calculated location information in the database must be based on the data obtained through the inventors' allegedly novel Chinese Postman data collection methodology. In light of the teachings of the '245 specification, and given the applicants clear disclaimer during prosecution of related patents, the claimed database cannot include information about Wi-Fi access points gathered using random or end-user based collection methods. *See infra* 26-30.

The term "providing a reference database of calculated locations of Wi-Fi access points in a target area" should therefore be defined as: "A database that contains calculated locations for all the Wi-Fi access points collected in the pre-identified target area by scanning a shortest planned route along all drivable roads. The database does not include information about Wi-Fi access points gathered using random or end-user based collection methods."

F. "in response to a user application request to determine a location of a userdevice having a Wi-Fi radio" ('245 patent, claim 1)

The second step in claim 1 of the '245 patent is triggering a request to all Wi-Fi access points within range "in response to a user application request to determine a location of a user-device having a Wi-Fi radio." This term should be construed as "in response to a request made by an end-user facing application, *i.e.*, not by the operating system, to determine the location of an end user-device using a Wi-Fi radio."

The parties dispute what constitutes a "user application." In particular, Google understands that Skyhook contends an operating system is a "user application" within the meaning of the '245 patent. This is incorrect. The '245 patent repeatedly refers to "users," who are invariably consumers or end-users of mobile devices. *See* Ex. E at 1:36-40 (discussing parents, supervisors, and business travelers), 8:27 (referring to "end users"), 9:10 (same), 9:54-

55 (same). The inventors gave several examples of location aware "applications" that such "users" seek: "local weather, traffic updates, driving directions, child trackers, buddy finders and urban concierge services." *Id.* at 1:45-50; *see also id.* at 1:31-42. Every example is an end-user facing application running on an operating system, not the operating system itself.

Moreover, the inventors expressly recognized applications that use location data as distinct from the operating system. Ex. E at 6:12-19 (distinguishing "an application or service [901] that utilizes location readings" from "positioning software" that actually determines the location as requested); 6:52-56 (application program interface (or "API"), which is a typical component of an operating system, delivers location information to the "location application"); Figs. 1, 9. Like the inventors, persons of skill in the art readily distinguish between an operating system and applications running on an operating system. Acampora Decl. ¶¶ 144-147; Ex. R at 31, 33, 378, 544; Ex. S at 23-24, 264-265, 387.

G. "a user-device having a Wi-Fi radio" ('245 patent, claim 1)

As described above, the "users" referred to in the '245 patent are consumers or end-users of mobile devices. *See* Ex. E at 1:36-40, 8:27, 9:10, 9:54-55. Accordingly, the term "a user-device having a Wi-Fi radio" in claim 1 should be construed as "an end-user or consumer device having a Wi-Fi radio." *See also* Acampora Decl. ¶ 150.

H. "simple signal strength weighted average model" ('245 patent, claim 6)

A person of ordinary skill would understand "a simple signal strength weighted average model" in claim 6 of the '245 patent to be "a calculated average of signal strength measurements resulting from the multiplication of each measurement by a numeric or algebraic factor to weight stronger signal readings more than weaker signals, used to determine the location of a user device." The specification discloses determining a device's location by "compar[ing] the list of observed access points along with their calculated signal strengths to weight the location" of the user device. Ex. E at 7:1-12 (referencing "simple signal strength weighted average models"). It teaches taking the average location of access point readings and using their signal strengths "to weight stronger signal readings more than weaker signals." *Id.* at 12:29-32.

I. "triangulation technique" ('245 patent, claim 8)

Claim 8 of the '245 patent specifies that one of the available location determination techniques be a "triangulation technique." Triangulation is both described in the patent and well known to those of skill in the art. Ex. E at 6:67-7:12, 12:40-60, 13:1-17; Exs. P, T, U. A person of skill in the art would understand "triangulation technique" to mean "calculating the physical location of a user device by using the strength of signals received from two or more Wi-Fi access points whose locations have been calculated, by the formation of triangles having the user device and each such Wi-Fi access point as the vertices." Acampora Decl. ¶¶ 154-155.

J. "A weighted centroid position" ('988 patent, claim 3)

The '988 patent describes "a weighted centroid" as a calculation that weights and filters all reported Wi-Fi access point data, collected simultaneously with GPS data, in order to determine the position of an access point. Ex. C at 11:49-62, 12:1-28, 12:34-48, 13:21-27. The correct construction of "a weighted centroid position" should therefore be "a position determined by weighted averaging of recorded positions."

K. "a WiFi-enabled device communicating with WiFi access points within range of the WiFi-enabled device so that observed WiFi access points identify themselves" ('897 patent, claim 1)

The term "a WiFi-enabled device communicating with WiFi access points within range of the WiFi-enabled device so that observed WiFi access points identify themselves" in claim 1 of the '897 patent should be construed as "a user device having a Wi-Fi radio actively searching for Wi-Fi access points by transmitting a signal to all Wi-Fi access points within range and receiving a response that includes a unique identifier (*e.g.*, a MAC address) from each such Wi-Fi access point."

The parties disagree about whether the claim term requires active searching for access points, or whether passive monitoring for access points is also claimed. The claim language resolves the question. Active searching is required because the claim specifically says the Wi-Fi access points identify themselves in response to a communication from a Wi-Fi enabled device: "a WiFi-enabled device communicating with WiFi access points within range of the WiFienabled device *so that* observed WiFi access points identify themselves." Ex. F at claim 1 (emphasis added), which is the definition of active scanning; *see also id.* at 7:15-19 (describing active scanning); Fig. 2; Acampora Decl. ¶¶ 141-143 (discussing active versus passive scanning). Skyhook's proposed construction would erroneously read the language setting out that required action and reaction out of the claims. *See Merck & Co. v. Teva Pharms. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005) ("A claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so."); *Power Mosfet Techs., L.L.C. v. Siemens AG*, 378 F.3d 1396, 1410 (Fed. Cir. 2004) (interpretations of claims rendering claim terms superfluous are disfavored).

V. CONCLUSION

For all of these reasons, Google respectfully requests the Court find the patents-in-suit invalid for failure to comply with the definiteness requirement of 35 U.S.C. § 112, ¶ 2. To the extent the Court does not hold any asserted claim invalid, Google respectfully requests the Court adopt Google's proposed claim constructions for all disputed terms found in such claims.

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