IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

SKYHOOK WIRELESS, INC., Plaintiff and Counterclaim-Defendant, v. GOOGLE INC., Defendant and Counterclaimant.	Case No. 1:10-cv-11571-RWZ **DECLARATION OF DAVID KOTZ, PH.D. IN SUPPORT OF PLAINTIFF SKYHOOK WIRELESS, INC.'S OPPOSITION TO SUMMARY JUDGMENT**

I, David Kotz, declare as follows:

1. I am an expert in the field of wireless networks. My declaration is based upon my education and professional experience shown in my curriculum vitae attached as Exhibit 1 and summarized below.

Education And Experience

2. I received a Bachelor of Arts degree in Computer Science and Physics from Dartmouth College in 1986.

3. I received a Master of Science degree in 1989 and I received a Ph.D. in 1991, both in Computer Science, from Duke University.

4. I returned to Dartmouth College to join the faculty in 1991.

5. My research interests include wireless networks, wireless security, sensor-network security, and security and privacy issues in pervasive computing.

6. While at Dartmouth, I have served as the Executive Director of the Institute for Security Technology Studies. I currently serve as the Champion International Professor in the

Department of Computer Science and Associate Dean of the Faculty for the Sciences at Dartmouth.

7. During the 2008-09 academic year, I was a Visiting Professor at the Indian Institute of Science in Bangalore, India and a Fulbright Research Scholar to India. My research there was focused on wireless networks.

8. I am an IEEE Fellow (for contributions to parallel and distributed systems and wireless networks) and a member of the IEEE Computer Society, a Senior Member of the Association for Computing Machinery (ACM), as well as a member of the Advanced Computing Systems Association (USENIX).

9. I am Associate Editor for Pervasive and Mobile Computing, and I was Associate Editor for IEEE Transactions on Mobile Computing from 2005-2011.

10. I have published over 100 refereed journal and conference papers. An article that I co-authored, Kim, M., et al., "Risks of Using AP Locations Discovered Through War Driving," Lecture Notes in Computer Science, vol. 1968 (2006), was cited as prior art to each of the patents-in-suit.

Compensation And Prior Testimony

11. I am being paid $350 per hour for my consulting services in this case. I have previously served as an expert witness in a case that went to trial, and served as a consultant on several other cases. I have neither testified at a trial or by deposition, nor served as a consultant in any litigation, since the Fall of 2002.

Materials Studied

12. In connection with this declaration I have read U.S. Patent Nos. 7,305,245 (the "'245 patent"), 7,433,694 (the "'694 patent"), 7,414,988 (the "'988 patent"), and 7,474,897 (the

"'897 patent") (collectively, the "patents-in-suit"). I have also read portions of the patent prosecution history of the '988 patent.

13. Additionally, I have read Google Inc.'s Memorandum of Law in Support of its Motion for Summary Judgment of Indefiniteness and, in the Alternative, Opening Claim Construction Brief; the Declaration of Anthony S. Acampora, Ph.D.; and Skyhook Wireless, Inc.'s Opening Claim Construction Brief.

Technology Background

14. As the use of mobile computing devices such as smartphones has become more common, there has been an increased demand for applications that utilize the location of these devices to provide services to the user.

15. Two common approaches for determining location in mobile devices are Global Positioning System ("GPS") and cell-tower triangulation. There are drawbacks to each approach.

16. In GPS positioning, GPS receivers pick up broadcast radio signals from orbiting satellites. These receivers measure the time it took for the signals to reach the receiver. After receiving signals from three or more GPS satellites, the receiver can triangulate its position on the globe. For the system to work effectively, the receivers require a clear line-of-sight to three or more satellites. Weather, buildings, or trees can interfere with GPS signals. Interference can also be caused by a phenomenon known as multi-path. Multi-path is when the radio signals from the satellites bounce off physical structures, causing multiple signals from the same satellite to reach a receiver at different times. Because the receiver's calculation is based on the time the signal took to reach the receiver, multi-path signals confuse the receiver and cause substantial errors.

17. Cell-tower signal information can also be used to calculate the location of a user device. Cell-tower signals, in contrast to GPS, do not require a direct line-of-sight and can penetrate buildings better. But this method of determining location is prone to error due to the heterogeneous nature of cellular tower hardware, the lack of uniformity in the positioning of cellular towers, and multi-path effects.

18. The positions of Wi-Fi access points can also be used to locate mobile computing devices. Scanning devices can pick up signals from Wi-Fi access points within range. The signals from the Wi-Fi access points contain information about the Wi-Fi access point, including an identifier such as a MAC address. If the device is also able to receive GPS signals and compute its location using these GPS signals, the location of the Wi-Fi access point can be estimated. Once the locations of numerous Wi-Fi access points have been recorded in this manner, signals from these Wi-Fi access points can be used with the previously recorded locations of these Wi-Fi access points to estimate the present location of a mobile computing device.

Indefiniteness

19. I understand that a claim term is not indefinite merely because parties disagree concerning its construction.

20. To prove that a claim is indefinite, I understand that an accused infringer must demonstrate by clear and convincing evidence that one of ordinary skill in the relevant art could not discern the boundaries of the claim based on the claim language, the specification, the prosecution history, and the knowledge in the relevant art.

21. I understand that only claims not amenable to construction or insolubly ambiguous are indefinite.

22. I understand that when claims are amenable to more than one construction, they should, when reasonably possible, be interpreted to preserve their validity.

23. I understand that claim terms need only be as precise as the subject matter permits.

24. I understand that the test for indefiniteness does not depend on a potential infringer's ability to ascertain the nature of its own accused product to determine infringement, but instead on whether the claim delineates to a skilled artisan the bounds of the invention.

25. I understand that when a word of degree is used in a claim term, *e.g.*, near, the district court must determine whether the patent's specification provides some objective standard for measuring that degree.

26. I understand that a claim term that is purely subjective, *e.g.*, aesthetically pleasing, is indefinite.

Means-Plus-Function

27. I understand that there is a special claim format called "means-plus-function" that allows the patentee to claim a means for performing a specified function without reciting the structure that performs that function.

28. I understand that any claim term including the word "means" is presumed to be a means-plus-function claim term. I understand the presumption can be rebutted if the claim term recites a structure.

29. I understand that any claim term not including the word "means" is presumed not to be a means-plus-function claim term. I understand the presumption can be rebutted if the claim term fails to recite sufficiently definite structure or else recites a function without reciting sufficient structure for performing that function. If a claim term connotes some structure in the

understanding of one of ordinary skill in the art, the presumption against means-plus-function applies. As a result, the presumption can only be overcome if a claim uses a term that suggests no structure and is effectively a synonym for "means for," such as the word "element."

30. I understand that when a claim term is construed as a means-plus-function element, the patent owner is put to the additional burden of demonstrating that the structures of the accused product are identical or equivalent to the structures disclosed in the patent specification.

Level Of Ordinary Skill In The Art

31. I understand that the question of indefiniteness is determined from the perspective of a person of ordinary skill in the art.

32. In my opinion, a person of ordinary skill in the art would have a bachelor's degree in electrical engineering or computer science, 3-5 years of experience working in wireless communications software design, and would be able to read and write computer source code.

33. My opinion is based on the inventions claimed in the patents-in-suit, my education, and my experience in the field of wireless communications.

Relevant Claim Construction Principles

34. I understand that the parties have provided definitions of various terms in the claims of the patents-in-suit, and that this Court has been asked to rule on the appropriate definitions of those terms.

35. In connection with Skyhook's Opposition to Defendant's Motion for Summary Judgment of Indefiniteness, I have been asked to provide my understanding of whether particular claim terms are indefinite and what such claim terms would have meant to individuals working in the Wi-Fi positioning field in 2005.

36. I am not a lawyer.

37. The principles that are used by courts in construing claims have been explained to me by counsel for Skyhook.

38. I understand that the claims of a patent define the invention to which the patentee is entitled the right to exclude.

39. I understand that claim terms have the ordinary meaning that would be attributed to those words by persons of ordinary skill in the relevant art at the time of the invention, *i.e.*, as of the effective filing date of the patent application, unless the patentee demonstrated an intent to deviate from the ordinary and accustomed meaning of a claim term by redefining the term or by characterizing the invention in the patent specification or prosecution history using words or expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.

40. I understand that the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.

41. I understand that the specification is always highly relevant to the claim construction analysis.

42. I understand that claims should not be limited to preferred embodiments or specific examples in the specification unless there is a clear and unmistakable disavowal of claim scope.

43. I understand that the prosecution history of a patent provides evidence of how the PTO and the inventors understood the patent. But, because the prosecution history represents an ongoing negotiation between the PTO and the applicant, it often lacks the clarity of the patent specification and is therefore less useful for claim construction purposes.

44. I understand that all evidence external to the patent and prosecution history is considered "extrinsic" evidence. I understand that the patent and prosecution history are considered "intrinsic" evidence.

45. I understand that extrinsic evidence is less significant than the patent and prosecution history in determining the meaning of claim language.

46. I understand that in those cases where the public record unambiguously describes the scope of the patented invention, reliance on any extrinsic evidence is improper.

47. I understand that, while Courts may rely on dictionary definitions in construing claim terms, they must ensure that any reliance on dictionaries accords with the intrinsic evidence: the claims themselves, the specification, and the prosecution history.

48. I understand that expert testimony can be useful to provide background on the technology at issue, to ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of ordinary skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field.

49. I understand that expert testimony is viewed as less reliable than the patent and its prosecution history in determining how to read claim terms because it is generated at the time of and for the purpose of litigation and thus can suffer from bias that is not present in the intrinsic evidence.

Patents-In-Suit

A. The "Logic" Terms Of The '988 Patent

50. I understand that a number of terms containing the word "logic" are disputed in this litigation. I am informed that it is Defendant's position that these terms are "means-plus-

function" limitations, while Skyhook believes that these terms are not in "means-plus-function" form.

51. I am informed that the test for whether a term that does not use the word "means" is in "means-plus-function" form is whether a person of ordinary skill in the art would understand the term to designate structure, or even a broad class of structures. I am also informed that if a term is not recognized as the name of a structure and is simply a substitute for the generic "means-for," then the term should be interpreted as a "means-plus-function" limitation.

52. As discussed below, it is my opinion that the "logic" terms convey structure and are not purely functional. Nevertheless, I am informed that if the Court were to construe the "logic" terms as functional "means-plus-function" limitations, it would be necessary to determine whether the specification discloses sufficient corresponding structure for each limitation.

53. In this case, because the functions are performed by a computer, I understand that the corresponding structure would not be the computer, but would instead be the computer after it has been specially-programmed to carry out the claimed function. However, for generic functions such as "processing," "receiving," and "storing" that can be achieved by any general-purpose computer without special programming, the general-purpose computer itself can constitute the corresponding structure. It is my understanding that in such cases, the specification does not need to disclose an algorithm for performing the recited function.

54. I am informed that if software were clearly linked to the function, and if one skilled in the art would know what kind of program to use, there would be sufficient structure corresponding to the "means-plus-function" limitation.

55. I am informed that an algorithm in the specification need only disclose adequate defining structure to render the bounds of the claim understandable to one of ordinary skill in the art.

56. I am informed that, in instances where the corresponding algorithm is known in the art, simply referring to the algorithm provides sufficient structural disclosure.

57. I am further informed that if no algorithm is disclosed in the specification, or if the specification provides no more than a restatement of the function that was recited in the claim, sufficient structure would not have been disclosed.

1. The "Logic" Terms Are Structural

58. It is my opinion that in the context of computers, the word "logic" conveys a class of structures to a person of ordinary skill. For example, "logic" encompasses a circuit programmed to carry out an operation. "Logic" also includes the computer instructions that make up a computer program.

59. Each instance of "logic" must be "computer-implemented," and a person of ordinary skill in the art would understand a "computer" to be a machine that utilizes a processor to perform operations. As such, the class of structures covered by the "logic" in the '988 patent is limited to those structures that are implemented by or as a computer. For example, although the word "logic" could normally be understood to mean a circuit that performs a logical operation, if the circuit were not implemented in conjunction with a computer processor, the circuit would not be properly referred to as "computer-implemented logic."

60. Based on the context of the claims and the specification, it is my opinion that the terms involving "logic" are not in "means-plus-function" form because a person of ordinary skill would understand these terms to provide structure. It is my opinion that, in the context of the

claims and the written description, a person of ordinary skill would not understand "logic" to be a "nonce word" or a substitute for the term "means-for." Rather, an ordinary artisan would understand the "logic" limitations to convey the structures of hardware and/or software, implemented with a computer processor, programmed to perform the specified operations.

2. If The "Logic" Terms Were Not Structural, The Patent Would Provide Sufficient Corresponding Structure

61. After reviewing the "logic" limitations in the claims '988 patent, it is my opinion that the specification and claims disclose sufficient algorithmic structure for a person of ordinary skill in the art to understand each algorithm and to be able to implement it.

(a) "computer-implemented logic to add records to the database for newly-discovered Wi-Fi access points"

62. If the Court were to construe this limitation as a "means-plus-function" term, it is my opinion that sufficient corresponding structure would be disclosed.

63. To "add records to a database" simply means to "store" those records. A database is simply a form of computer memory, so when information is stored in a database, the information is stored in computer memory.

64. Any general-purpose computer can add records without specialized programming. As a result, sufficient structure is disclosed because the specification discloses that the "Central Network Server," which is a type of computer, adds the records.

65. Additionally, a person of ordinary skill in the art would know of commercially available database management software to add records to a database. Because a person of ordinary skill in the art would know that the recited function can be implemented by a variety of commercially-available database programs, it is my opinion that sufficient corresponding structure has been disclosed.

(b) "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"

66. Unlike adding records to a database, recalculating position information cannot be performed by a computer without specialized programming. Accordingly, I understand that if this limitation is interpreted as a "means-plus-function" term, the Court must determine whether an algorithm to perform the recited function is disclosed. In this case, the recited function is "recalculat[ing] 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."

67. It is my opinion that sufficient algorithmic structure corresponding to the recited function is disclosed. For example, the algorithm "factors in the number of records and their associated signal strengths." (Def. Ex. C[1] ('988) 12:35-36.) This data is then used "to weight stronger signal readings more than weaker signals with a quasi weighted average model." (Def. Ex. C ('988) 12:36-38.) Additionally, "the algorithm would include a weighting value based on the age of the records such that new records represent a more significant indication of the present location for a given access point." (Def. Ex. C ('988) 12:25-28.) A person of ordinary skill would thus understand that the steps of the algorithm include using the specified variables, weighting stronger signals more than weaker signals, and weighting newer records more than older records.

[1] All citations in the form "Def. Ex. __" are to the exhibits attached to the declaration of Susan Baker Manning in support of Defendant's motion for summary judgment and, in the alternative, opening claim construction brief.

68. A person of ordinary skill would understand this disclosure to convey an algorithm for performing this function, and would be able to implement software to perform the recited function of recalculating position information.

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

69. Again, I am informed that if the Court were to construe this limitation in "means-plus-function" form, it would be necessary to determine whether sufficient corresponding structure is disclosed in the form of an algorithm. It is my opinion that the patent discloses sufficient algorithmic structure.

70. The specification discloses that the position information is identified using "clustering techniques." (Def. Ex. C ('988) 12:6-7.) A clustering technique is a well-known statistical method by which data points are divided into groups, or "clusters." Although there are many techniques for dividing data points into groups, the example in the specification makes clear that data points that are relatively close to each other are grouped together, and then the data points that do not fall into this group are identified and eventually excluded. (*Id.* at 12:6-11.)

71. Moreover, the specification provides a specific example of the results of the clustering technique. "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 and stored in a corrupted table of the database for further analysis." (Def. Ex. C ('988) 12:7-11.)

72. A person of ordinary skill would understand this disclosure to convey an algorithm for performing this function, and would be able to implement software to perform the recited clustering function.

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

73. If the Court were to construe this limitation as a "means-plus-function" term, it is my opinion that sufficient corresponding structure would be disclosed.

74. A person of ordinary skill in the art would recognize the steps implicit in the calculation of a weighted-centroid position. The algorithm involves weighting certain data points more than others, and then calculating an average position based on the weightings.

75. The specification provides even more detail regarding how the recited function should be performed. For example, the specification teaches that the weighted average calculation involves weighting "stronger signal readings more than weaker signals." (Def. Ex. C ('988) 12:36-37.)

76. A person of ordinary skill would understand this disclosure to convey an algorithm for performing this function, and would be able to implement software to perform the recited function of determining a weighted-centroid position.

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

77. If the Court were to construe this limitation as a "means-plus-function" term, it is my opinion that sufficient corresponding structure would be disclosed.

78. The algorithmic structure is clear simply by reading the claim language. The steps that the claim conveys involve determining how far away position information is from the centroid position, comparing that deviation to a threshold distance, and identifying the position information if it is farther away than the threshold allows.

79. The specification further narrows the type of algorithm to be used in performing the function because it describes how the threshold is calculated. Initially, the algorithm

calculates the standard deviation, or sigma, based on the distribution of reported locations. (Def. Ex. C ('988) 12:13-15.) Then the "threshold [is] based on the sigma" of the reported locations. (*Id.* at' 12:15-16.)

80. A person of ordinary skill would understand this disclosure to convey an algorithm for performing this function, and would be able to implement software to perform the recited function.

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

81. The "logic" in this limitation performs two functions. First, the deviating position information is excluded from the database. Second, the deviating position information is excluded from influencing the calculated position of the Wi-Fi access points. In my opinion, adequate structure would be disclosed for each of the two functions if the Court were to construe this limitation as a "means-plus-function" term.

82. To exclude information from a database, all a computer must do is either (1) not store that information, or (2) if the information is already stored, delete the information. Excluding information thus consists of either failing to store information, or deleting information. These operations can be accomplished by any computer without special programming.

83. Additionally, a person of ordinary skill in the art would know of commercially available database management software that can exclude records from a database. Because a person of ordinary skill in the art would know that the recited function can be implemented by a variety of commercially-available database programs, it is my opinion that sufficient corresponding structure has been disclosed.

84. Excluding the information "from influencing the calculated position of the Wi-Fi access points" requires only a very simple algorithm. Even without reading the specification, a person of ordinary skill would know exactly how to prevent the information from influencing the calculation; one would simply not use that information in the calculation. The specification confirms this by disclosing that the system "filter[s] out access points that are in error," then recalculates "with the remaining location records." (Def. Ex. C ('988) 12:16-19.) In other words, the deviating position information is not used in the recalculation.

85. A person of ordinary skill would understand this disclosure to convey an algorithm for performing this function, and would be able to implement software to perform the recited function.

B. The Requirement That An Algorithm Be "Suited" For A Particular Number Of Access Points Is Not Insolubly Ambiguous

86. Claim 1 of the '245 patent contains the following step: "based on the number of Wi-Fi access points identified via received messages, choosing a corresponding location-determination algorithm from a plurality of location-determination algorithms, said chosen algorithm being suited for the number of identified Wi-Fi access points."

87. In my opinion, the requirement that the "chosen algorithm be[] suited for the number of identified Wi-Fi access points" is not ambiguous and does not depend on the subjective opinion of a particular individual. Certain algorithms are, and are known to be, more appropriate to use in certain instances than other algorithms. For example, one algorithm may be designed to work only with an even number of access points. Another algorithm may be optimized for a calculation involving a small number of access points, but may operate inefficiently when applied to a large number of access points.

88. A person of ordinary skill in the art would know of different algorithms that may be used, would understand how to select an appropriate algorithm based on the number of access points, and would recognize certain algorithms as suited or not suited to a particular number of access points. It is my opinion that this term is clear and definite.

C. The Terms "Rules" And "Predefined Rules" Are Not Ambiguous

89. A "rule" is simply a determinate method for obtaining a certain result. (Pl. Ex. M[2] (*Merriam-Webster's Collegiate Dictionary* (10th ed. 2001)) at 1020.) It is my opinion that the term "rule" is not ambiguous, because one can easily determine what is or is not a rule.

90. I am informed that a term in a claim is not indefinite merely because it is broad. Nonetheless, it appears that Defendant may be arguing that because a "rule" could extend to any method for obtaining any result, the patent does not adequately inform a person of ordinary skill what is covered by the claims.

91. When interpreted in the context of the '897 patent, the term "rule" is considerably less broad than its ordinary meaning would imply. This is because the claimed step requires "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." Thus, the recorded location information must be used in conjunction with the predefined rules. A rule that operates independently of the recorded location information could not fall within the claims of the '897 patent.

92. Accordingly, many of the examples of rules that Defendant lists in its motion for summary judgment would not fall within the claims of the '897 patent because those rules would not take into account the recorded location information. For example, determining whether a

Wi-Fi access point should be included or excluded based simply on "whether it is Tuesday" would not "us[e] the recorded location information." Similarly, always including every access point would not depend, even in part, upon using the recorded location information.

93. I see no reason why a person of ordinary skill in the art would have difficulty distinguishing what is or is not a "rule" within the meaning of the patent. A method that takes into account the calculated position information in determining whether to include or exclude an access point is a "rule" that could be encompassed by the claim terms. Everything else is not a "rule" that could be encompassed by the claim terms. It is therefore my opinion that "rules," as claimed in the '897 patent is not indefinite.

94. I understand that Defendant does not argue that "predefined" is indefinite. However, I understand "predefined" to refer to something that is determined prior to a specified occurrence.

D. The "Reference Symmetry" Claim Terms Are Amenable To Construction

95. I understand that the claim terms in dispute are (1) "wherein the database records for substantially all Wi-Fi access points in the target area provide reference symmetry within the target area" in the '694 patent; and (2) "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 '988 patent.

96. In my opinion, a person having ordinary skill in the art would be able to understand the scope of both claim terms.

97. I understand that Skyhook has proposed that "wherein the database records for substantially all Wi-Fi access points in the target area provide reference symmetry within the

[2] All citations in the form "Pl. Ex. __" are to the exhibits attached to the declaration of

target area" in the '694 patent be construed as "wherein the database records for substantially all Wi-Fi access points in the target area are distributed such that when the database records are used to calculate a user's location, the calculated positions of the observed Wi-Fi access points in range of the user tend to be distributed around the user with reduced levels of arterial bias."

98. In my opinion, Skyhook's construction is consistent with how a person of ordinary skill in the art would understand this claim term.

99. Skyhook's interpretation is obvious from the patent specification, which describes an embodiment of the invention that "not only gathers more access points uniformly across a target area but the resulting data produces more accurate calculations of access point locations." (Def. Ex. D ('694) 8:9-11.) Other portions of the patent specification describe how "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," (*id.* at 9:18-20); and how "[t]he resulting position calculation [603] has reduced location bias and is more accurate as a result," (*id.* at 9:20-22).

100. I understand that Skyhook has proposed that "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 and so that the calculation of the position of the Wi-Fi access point avoids arterial bias in the calculated position information" should be construed as "multiple scans of a Wi-Fi access point are recorded. The scans are taken at different locations around the Wi-Fi access point. This results in the following: (a) the multiple readings produce a calculated position of the Wi-Fi access point having reference symmetry relative to other Wi-Fi access points in the target area and (b) the calculated position of the Wi-Fi access point reduces the effects of arterial bias."

Samuel K. Lu filed concurrently herewith.

101. In my opinion, Skyhook's construction is consistent with how a person of ordinary skill in the art would understand this claim term.

102. The specification refers to multiple readings "provid[ing] reference symmetry among the reference points." (Def. Ex. C ('988) 2:55-56.) The specification also explains that, in one aspect of the disclosed invention, "more access points [are gathered] uniformly across a target area," (*id.* at 8:56-59, 9:4-21), confirming that the multiple readings produce reference symmetry relative to other Wi-Fi access points. Thus, the multiple scans produce a calculated position of the Wi-Fi access point having reference symmetry relative to other Wi-Fi access points in the target area.

103. The patent specification also explains that "[a]nother approach is to 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." (Def. Ex. C ('988) 8:28-31.) This would suggest to a person having ordinary skill in the art that "so that the calculation of the position of the Wi-Fi access point avoids arterial bias in the calculated position information" means that the more accurately calculated position reduces the effects of arterial bias when the calculated position is later used to calculate the location of a user device.

104. I understand that Defendant is arguing that the "reference symmetry" claim terms are indefinite for two reasons: (1) "the claims have no comprehensible frame of reference for the 'reference symmetry;'" and (2) "nothing in the patents gives any objective standard for when 'reference symmetry' exists and when it does not." (Def. Mem. at 12-13.)

105. I disagree with Defendant's argument that the claims have no comprehensible frame of reference for the "reference symmetry."

106. It would have been obvious to a person of ordinary skill in the art that the purpose of the database in the '988 and '694 patents is to calculate the location of mobile devices. If the user is in the target area, the goal is to calculate her location as accurately as possible. To do this, the database should contain calculated Wi-Fi access point locations distributed throughout the target area, so that wherever the user is, there will tend to be Wi-Fi access points distributed around her.

107. Accordingly, it is clear that the claim terms are describing a distribution of calculated positions of Wi-Fi access points such that if a user whose location is being calculated is in the target area, the calculated positions of the observed Wi-Fi access points in range of the user tend to be distributed around the user with reduced arterial bias.

108. This interpretation is reinforced by the prosecution history of the '988 patent. In a response to an Office Action dated November 30, 2007, the applicants explained what they meant by reference symmetry in claim 1 of the '988 patent:

> [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 [sic] areas (or "arteries").
>
> (Def. Ex. G ('988 patent prosecution history) Reply to Non-Final Office Action of Nov. 30, 2007, p. 8.)

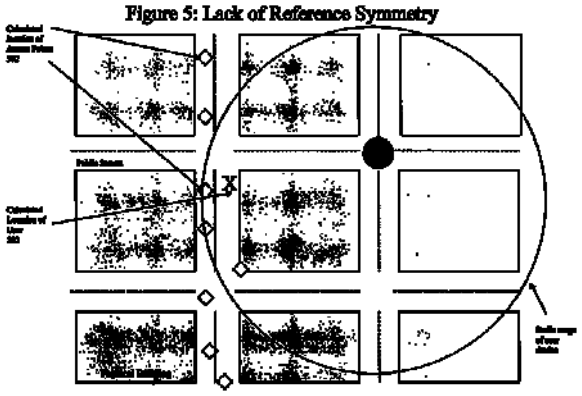
109. In my opinion, a person having ordinary skill in the art would understand that "symmetry" can relate to both to the distribution of Wi-Fi access points around the device performing the calculation and the distribution of Wi-Fi access points throughout a target area, as shown in Figure 3 of the patents.

110. I disagree with Defendant's argument that "nothing in the patents gives any objective standard for when "reference symmetry exists and when it does not."

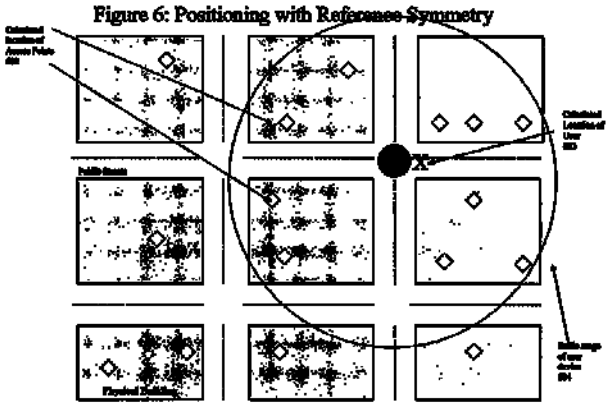
111. Wi-Fi access point distribution is unpredictable because Skyhook's system takes advantage of Wi-Fi access points that are installed by third parties. Some areas may have Wi-Fi access points more evenly distributed than others (though, given the density of Wi-Fi access points in most cities this may not be a wide variation). Because of the mobility of Wi-Fi access points, and the impossibility of taking inventory of all of the Wi-Fi access points in a target area, Skyhook's claim construction for "reference symmetry" is as precise as the subject matter of the '988 and '694 patents permits.

112. Moreover, in my opinion, the '988 and '694 patents provide sufficient guidance to enable persons of ordinary skill in the art to determine when a scanning method would result in reference symmetry and when it would not.

113. Figure 5 from the '988 patent, which is identical to Figure 5 of the '694 patent, is an example showing a lack of reference symmetry:



114. Figure 6 is an example showing reference symmetry:



115. It is clear from these figures that reference symmetry refers to the distribution of calculated locations of access points.

116. It is also clear that reference symmetry with respect to a user requires the calculated locations of access points to be distributed around a user whose location is being calculated.

117. It is clear from Figure 6 that this distribution does not have to be exactly symmetrical or balanced.

118. An accused infringer could map the locations of the Wi-Fi access points collected in its database and determine based on these examples whether reference symmetry exists.

E. The Scope Of "Avoid[s] Arterial Bias" Is Clear

119. I understand that the claim terms "avoids arterial bias" from the '988 patent and "avoid arterial bias" from the '694 patent are in dispute.

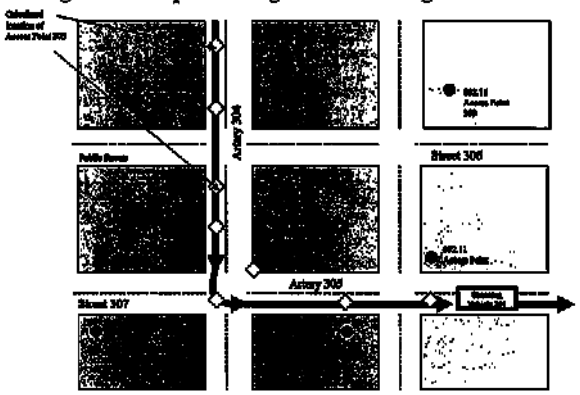
120. I understand that Skyhook has proposed that these claim terms be construed as "reduce(s) the effects of arterial bias."

121. I further understand that Defendant is arguing that these terms are indefinite, but has proposed in the alternative that they be construed as "eliminate(s) arterial bias."

122. In my opinion, a person of ordinary skill in the art would understand "avoid(s) arterial bias" to mean "reduce(s) the effects of arterial bias." These patents disclose, for example, that location bias is "reduced." (Def. Ex. C ('988) 10:1-3 ("The resulting position calculation [603] has reduced location bias and is more accurate as a result."); Def. Ex. D ('694) 9:20-22 (same).)

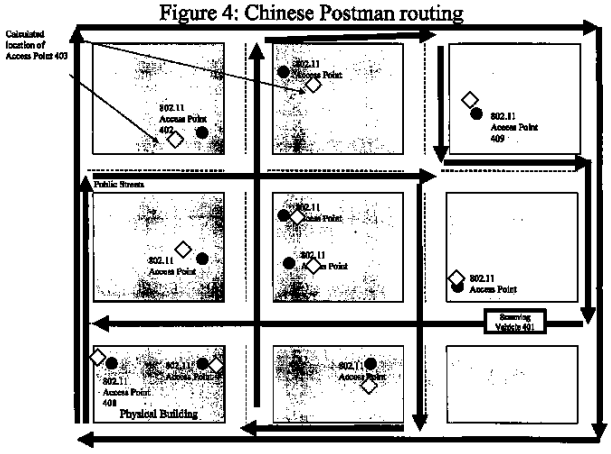
123. Figure 3 from the '988 and '694 patents shows that the calculated location of access points are pulled towards arteries when only the arteries are driven:

Figure 3: Example scanning scenario showing arterial bias



124. Figure 4 shows that the calculated locations of access points are closer to the actual locations of the access points when all streets are driven:

Figure 4: Chinese Postman routing



125. A person of ordinary skill in the art would understand that the degree by which arterial bias will be avoided will depend on numerous factors, including the number of roads in the target area, the location of each of the Wi-Fi access points in the target area, the capabilities of the scanning device used to collect Wi-Fi access point information, and the distribution of the roads.

126. For these and other reasons, Skyhook's claim construction for "avoid(s) arterial bias" is as precise as the subject matter of the '988 and '694 patents permits.

127. A person of ordinary skill in the art would understand that the claim simply requires that, when multiple readings of the Wi-Fi access point are recorded at different locations around the Wi-Fi access point, the arterial bias is less than the arterial bias when multiple readings of the Wi-Fi access point are not recorded at different locations around the Wi-Fi access point. In other words, when the claimed technique is practiced, arterial bias is reduced compared to when the claimed technique is not practiced.

128. A person having ordinary skill in the art can determine whether arterial bias has been reduced. For example, one can make an objective determination that Figure 4 shows a reduction in arterial bias from Figure 3 because the calculated locations of the access points are not pulled towards the arteries as much as in Figure 3.

129. An accused infringer could map the locations of the Wi-Fi access points collected in its database and determine whether there is arterial bias.

F. Chinese Postman Routing Model

130. I understand that Defendant contends that the claims of the patents-in-suit require "both non-random, systematic data collection, and purposeful avoidance of arterial bias," which in turn requires the Chinese Postman routing model because otherwise certain streets will be

driven more than others, thus leading to arterial bias. (Def. Mem. at 29; *see also* Pl. Ex. A (Acampora Dep. Tr.) 110:25-111:6 ("Because if I were to do that . . . I would have recorded the same access points more times along the streets that I drove multiple times. And that would not accomplish the objective of creating a more accurate database.").)

131. I do not agree with Defendant's position.

132. The Chinese Postman routing model may drive some streets more than once. (*See* Def. Ex. C ('988) Figure 4.) In such cases, driving an additional street or two would actually reduce arterial bias, not increase it.

133. In addition, there are any one of a number of techniques to reduce the effects of such arterial bias, including discarding data for streets driven more than once. Another technique would be to simply turn off the scanning when driving a street already driven.

Executed on September 28, 2011, in Lyme, New Hampshire.

I declare under penalty of perjury under the laws of the United States of America that the forgoing is true and correct.

David Kotz

Certificate of Service

I, Samuel K. Lu, hereby certify that this document filed through the ECF system will be sent electronically to the registered participants as identified on the Notice of Electronic Filing (NEF) on September 28, 2011.

/s/ Samuel K. Lu
Samuel K. Lu