PETITIONER'S DEMONSTRATIVES FOR ORAL ARGUMENT

Google LLC v. Geoscope Technologies Pte. Ltd.
Case No. IPR2023-01209 (U.S. Patent No. 7,561,104)
Case No. IPR2023-01210 (U.S. Patent No. 8,400,358)
Case No. IPR2023-01211 (U.S. Patent No. 8,786,494)

GOOGLE EXHIBIT 1033
Google v. Geoscope
IPR2023-01210

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

THE 104/358/494 PATENTS

"Method to modify calibration data used to locate a mobile unit"

US007561104B2

(12) **United States Patent**
Alles et al.

(10) **Patent No.: US 7,561,104 B2**
(45) **Date of Patent: Jul. 14, 2009**

(54) **METHOD TO MODIFY CALIBRATION DATA USED TO LOCATE A MOBILE UNIT**

(75) Inventors: **Martin Alles**, Vienna, VA (US); **John Carlson**, Dulles, VA (US); **George Maher**, Herndon, VA (US); **Selcuk Mazlum**, Leesburg, VA (US)

(73) Assignee: **Andrew LLC**, Hickory, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **12/026,333**

(22) Filed: **Feb. 5, 2008**

(65) **Prior Publication Data**

US 2008/0186234 A1 Aug. 7, 2008

Related U.S. Application Data

(60) Provisional application No. 60/899,379, filed on Feb. 5, 2007.

(51) **Int. Cl.**
G01S 3/02 (2006.01)

(52) **U.S. Cl.** **342/451**; 342/457

(58) **Field of Classification Search** 342/357.01, 342/357.06, 451, 457, 463–465; 455/456.6, 455/457

See application file for complete search history.

(56) **References Cited**

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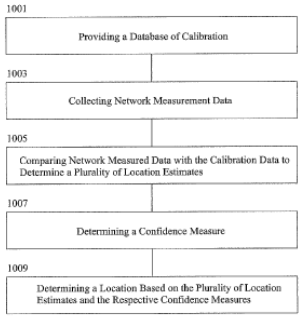
Primary Examiner—Dao L Phan
(74) *Attorney, Agent, or Firm*—Duane Morris LLP

(57) **ABSTRACT**

A method of modifying calibration data used to geo-locate a mobile station located in an indoor environment is disclosed. When a mobile station is located indoors, the signal strength of signals received and/or transmitted by the mobile station have the tendency to be lower than the strength of the signals received by a mobile station located outdoors. As a result of these lower signal strengths, geo-location efforts which rely on signal strengths may result in unsatisfactory location accuracy. Modifying pre-existing calibration data obtained outdoors may provide a way to simulate indoor calibration data characteristics.

21 Claims, 10 Drawing Sheets



GOOGLE EXHIBIT 1001
Google v. Geoscope

US008400358B2

(12) **United States Patent**
Alles et al.

(10) **Patent No.: US 8,400,358 B2**
(45) **Date of Patent: *Mar. 19, 2013**

(54) **METHOD TO MODIFY CALIBRATION DATA USED TO LOCATE A MOBILE UNIT**

(75) Inventors: **Martin Alles**, Vienna, VA (US); **John Carlson**, Dulles, VA (US); **George Maher**, Herndon, VA (US); **Selcuk Mazlum**, Leesburg, VA (US)

(73) Assignee: **Andrew LLC**, Hickory, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 686 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **12/424,320**

(22) Filed: **Apr. 15, 2009**

(65) **Prior Publication Data**

US 2009/0201207 A1 Aug. 13, 2009

Related U.S. Application Data

(63) Continuation of application No. 12/026,333, filed on Feb. 5, 2008, now Pat. No. 7,561,104.

(60) Provisional application No. 60/899,379, filed on Feb. 5, 2007.

(51) **Int. Cl.**
G01S 3/02 (2006.01)

(52) **U.S. Cl.** **342/451**; 342/457

(58) **Field of Classification Search** 342/451, 342/457, 463–465; 455/456.1, 456.6, 457

See application file for complete search history.

(56) **References Cited**

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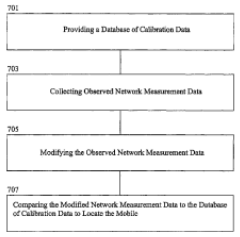
(Continued)

Primary Examiner — Dao Phan
(74) *Attorney, Agent, or Firm* — Duane Morris LLP

(57) **ABSTRACT**

A method of modifying calibration data used to geo-locate a mobile station located in an indoor environment is disclosed. When a mobile station is located indoors, the signal strength of signals received and/or transmitted by the mobile station have the tendency to be lower than the strength of the signals received by a mobile station located outdoors. As a result of these lower signal strengths, geo-location efforts which rely on signal strengths may result in unsatisfactory location accuracy. Modifying pre-existing calibration data obtained outdoors may provide a way to simulate indoor calibration data characteristics.

52 Claims, 10 Drawing Sheets



GOOGLE EXHIBIT 1001
Google v. Geoscope

US008786494B2

(12) **United States Patent**
Alles et al.

(10) **Patent No.: US 8,786,494 B2**
(45) **Date of Patent: *Jul. 22, 2014**

(54) **METHOD TO MODIFY CALIBRATION DATA USED TO LOCATE A MOBILE UNIT**

(71) Applicant: **Andrew LLC**, Hickory, NC (US)

(72) Inventors: **Martin Alles**, Vienna, VA (US); **John Carlson**, Dulles, VA (US); **George Maher**, Herndon, VA (US); **Selcuk Mazlum**, Leesburg, VA (US)

(73) Assignee: **Andrew LLC**, Hickory, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by **0** days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/771,542**

(22) Filed: **Feb. 20, 2013**

(65) **Prior Publication Data**

US 2013/0165145 A1 Jun. 27, 2013

Related U.S. Application Data

(63) Continuation of application No. 12/424,320, filed on Apr. 15, 2009, now Pat. No. 8,400,358, and a continuation of application No. 12/026,333, filed on Feb. 5, 2008, now Pat. No. 7,561,104.

(60) Provisional application No. 60/899,379, filed on Feb. 5, 2007.

(51) **Int. Cl.**
G01S 3/02 (2006.01)
G01S 5/02 (2010.01)
H04W 4/02 (2009.01)

(52) **U.S. Cl.**
CPC ***G01S 5/0252*** (2013.01); ***G01S 5/021*** (2013.01); ***G01S 5/0257*** (2013.01); ***H04W 4/02*** (2013.01)
USPC **342/451**; 342/457

(58) **Field of Classification Search**
CPC G01S 5/06; G01S 5/0242; G01S 5/0252; H04W 64/00
USPC 342/451, 457, 463–465; 455/456.1, 455/456.6, 457

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,561,104	B2 *	7/2009	Alles et al.	342/451
8,400,358	B2 *	3/2013	Alles et al.	342/451

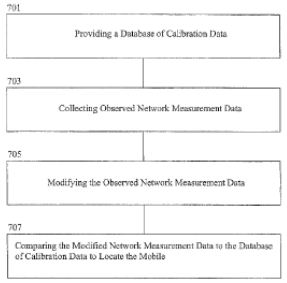
* cited by examiner

Primary Examiner — Dao Phan
(74) *Attorney, Agent, or Firm* — Duane Morris LLP

(57) **ABSTRACT**

A method of modifying calibration data used to geo-locate a mobile station located in an indoor environment is disclosed. When a mobile station is located indoors, the signal strength of signals received and/or transmitted by the mobile station have the tendency to be lower than the strength of the signals received by a mobile station located outdoors. As a result of these lower signal strengths, geo-location efforts which rely on signal strengths may result in unsatisfactory location accuracy. Modifying pre-existing calibration data obtained outdoors may provide a way to simulate indoor calibration data characteristics.

35 Claims, 10 Drawing Sheets



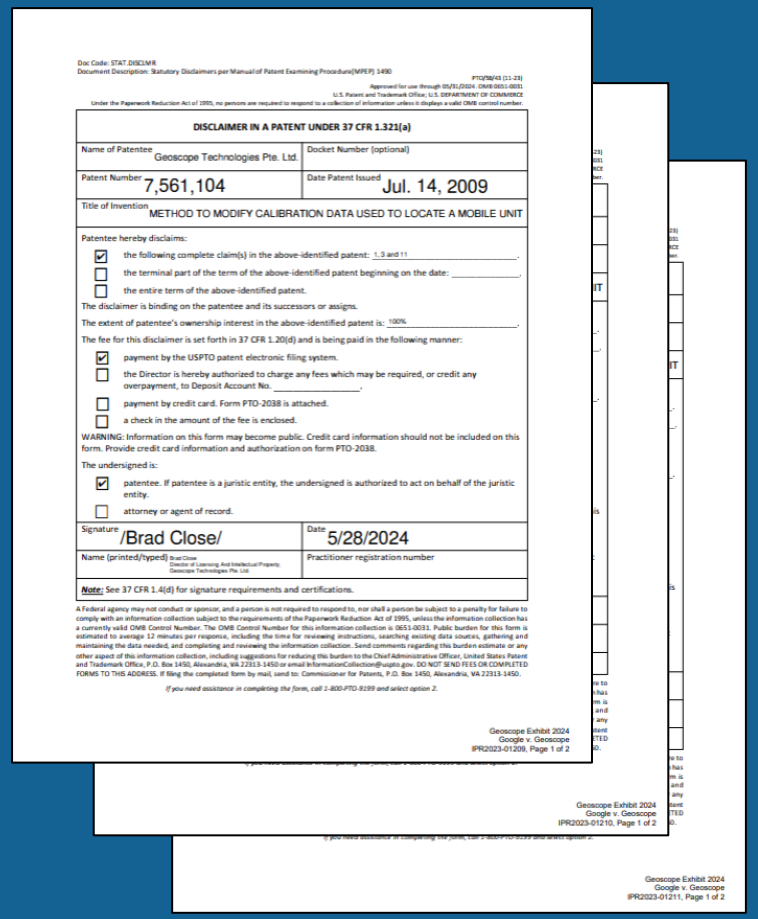
GOOGLE EXHIBIT 1001
Google v. Geoscope

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

EX1001 (01209-01211 IPRS).

PATENT OWNER'S DISCLAIMERS

Proceeding	Claims Challenged in Petition	Claims Disclaimed by Patent Owner	Remaining Claims
IPR2023-01209 ('104 Patent)	1, 2, 3, 11	1, 3, 11	2
IPR2023-01210 ('358 Patent)	1, 15, 18, 41, 52	1, 15, 41, 52	18
IPR2023-01211 ('494 Patent)	1, 4, 25, 26, 35	1, 25, 35	4, 26



Doc Code: STAT.DISCLMR
Document Description: Statutory Disclaimers per Manual of Patent Examining Procedure(MPEP) 1490

PTO/SB/43 (11-23)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DISCLAIMER IN A PATENT UNDER 37 CFR 1.321(a)

Name of Patentee: Geoscope Technologies Pte. Ltd.	Docket Number (optional)
Patent Number: 7,561,104	Date Patent Issued: Jul. 14, 2009
Title of Invention: METHOD TO MODIFY CALIBRATION DATA USED TO LOCATE A MOBILE UNIT	

Patentee hereby disclaims:

- [x] the following complete claim(s) in the above-identified patent: 1, 3 and 11.
- [ ] the terminal part of the term of the above-identified patent beginning on the date: _____.
- [ ] the entire term of the above-identified patent.

The disclaimer is binding on the patentee and its successors or assigns.

The extent of patentee's ownership interest in the above-identified patent is: 100%.

The fee for this disclaimer is set forth in 37 CFR 1.20(d) and is being paid in the following manner:

- [x] payment by the USPTO patent electronic filing system.
- [ ] the Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account No. _____.
- [ ] payment by credit card. Form PTO-2038 is attached.
- [ ] a check in the amount of the fee is enclosed.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on form PTO-2038.

The undersigned is:

- [x] patentee. If patentee is a juristic entity, the undersigned is authorized to act on behalf of the juristic entity.
- [ ] attorney or agent of record.

Signature: /Brad Close/	Date: 5/28/2024
Name (printed/typed): Brad Close, Director of Licensing And Intellectual Property, Geoscope Technologies Pte. Ltd.	Practitioner registration number

Note: See 37 CFR 1.4(d) for signature requirements and certifications.

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Geoscope Exhibit 2024
Google v. Geoscope
IPR2023-01209, Page 1 of 2

Geoscope Exhibit 2024
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IPR2023-01210, Page 1 of 2

Geoscope Exhibit 2024
Google v. Geoscope
IPR2023-01211, Page 1 of 2

104/358/494 Pet., p.6; 104/358/494 Reply, p.1; EX2024 (01209-01211 IPRS).

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

GROUNDS – REMAINING CLAIMS

Proceeding	Remaining Claims	Grounds
IPR2023-01209 (’104 Patent)	2	Ground 1 (§102): Shkedi (EX1006) Ground 2 (§103): Shkedi; Spain (EX1009) Ground 3 (§102): Zhu (EX1010) Ground 4 (§103): Zhu; Laitinen (EX1011) Ground 5 (§103): Zhu; Spain
IPR2023-01210 (’358 Patent)	18	Ground 1 (§102): Shkedi Ground 2 (§103): Shkedi; Spain Ground 3 (§102): Zhu Ground 4 (§103): Zhu; Spain
IPR2023-01211 (’494 Patent)	4, 26	Ground 1 [claim 4] (§102): Shkedi Ground 2 [claim 4] (§103): Shkedi; Spain Ground 3 [claims 4, 26] (§102): Zhu Ground 4 [claims 4, 26] (§103): Zhu; Spain Ground 6 [claim 26] (§103): Shkedi; Zhu; Spain

104/358/494 Pet., p.6; 104/358/494 Reply, p.1; EX2024 (01209-01211 IPRS).

THE 104/358/494 PATENTS

1. A method for determining a location of a mobile station, comprising:… (104 Patent)

15. A system for determining a location of a mobile station, comprising:… (358 Patent)

1. A method for determining a location of a mobile station, comprising:… (494 Patent)

25. A method for determining a location of a mobile station, comprising:… (494 Patent)

EX1001 (01209-01211 IPRS).

REMAINING CLAIMS

Claim 2 of the ’104 Patent	The method of claim 1 wherein said database comprises previously-gathered calibration data **for one or more non-uniform grid points within said region**.
Claim 18 of the ’358 Patent	The system of claim 15 wherein said database comprises previously-gathered calibration data **for one or more non-uniform grid points within said region**.
Claim 4 of the ’494 Patent	The method of claim 1 wherein said database comprises previously-gathered calibration data **for one or more non-uniform grid points within said region**.
Claim 26 of the ’494 Patent	The method of claim 25 wherein said database comprises previously-gathered calibration data **for one or more non-uniform grid points within said region**.

EX1001 (01209-01211 IPRS) (emphasis added).

CONSTRUCTION OF "GRID POINT"

DISTRICT COURT'S CONSTRUCTION OF "GRID POINT"

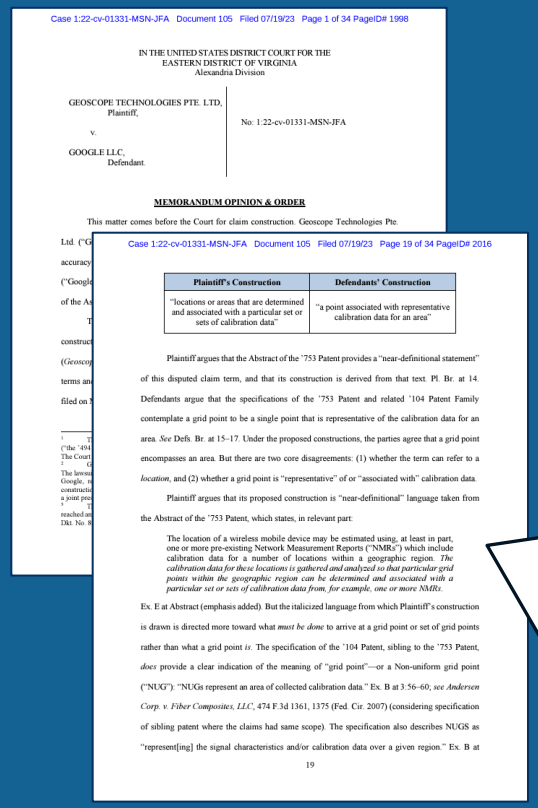
Final Construction
"a point associated with representative calibration data for an area"

PATENT OWNER'S NEW CONSTRUCTION OF "GRID POINT"

PO's New Construction
"Grid Point" Requires **Evaluation** of Calibration Data **to Determine the Boundaries of the Area** Represented by a "Grid Point"

104/358/494 Reply, pp.1-2; EX1028, p.20 (01209-01211 IPRS); 104/358/494 POR, p.18 (emphasis added).

THE DISTRICT COURT REJECTED PO'S ASSERTION THAT "GRID POINT" REQUIRES THAT CALIBRATION DATA BE "ANALYZED"



Case 1:22-cv-01331-MSN-JFA Document 105 Filed 07/19/23 Page 1 of 34 PageID# 1998

IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF VIRGINIA
Alexandria Division

GEOSCOPE TECHNOLOGIES PTE. LTD,
Plaintiff,
v.
GOOGLE LLC,
Defendant.

No: 1:22-cv-01331-MSN-JFA

MEMORANDUM OPINION & ORDER

This matter comes before the Court for claim construction. Geoscope Technologies Pte.

Case 1:22-cv-01331-MSN-JFA Document 105 Filed 07/19/23 Page 19 of 34 PageID# 2016

Plaintiff's Construction	Defendants' Construction
"locations or areas that are determined and associated with a particular set or sets of calibration data"	"a point associated with representative calibration data for an area"

Plaintiff argues that the Abstract of the '753 Patent provides a "near-definitional statement" of this disputed claim term, and that its construction is derived from that text. Pl. Br. at 14. Defendants argue that the specifications of the '753 Patent and related '104 Patent Family contemplate a grid point to be a single point that is representative of the calibration data for an area. *See* Defs. Br. at 15–17. Under the proposed constructions, the parties agree that a grid point encompasses an area. But there are two core disagreements: (1) whether the term can refer to a *location*, and (2) whether a grid point is "representative" of or "associated with" calibration data.

Plaintiff argues that its proposed construction is "near-definitional" language taken from the Abstract of the '753 Patent, which states, in relevant part:

> The location of a wireless mobile device may be estimated using, at least in part, one or more pre-existing Network Measurement Reports ("NMRs") which include calibration data for a number of locations within a geographic region. *The calibration data for these locations is gathered and analyzed so that particular grid points within the geographic region can be determined and associated with a particular set or sets of calibration data from, for example, one or more NMRs.*

Ex. E at Abstract (emphasis added). But the italicized language from which Plaintiff's construction is drawn is directed more toward what *must be done* to arrive at a grid point or set of grid points rather than what a grid point *is*. The specification of the '104 Patent, sibling to the '753 Patent, *does* provide a clear indication of the meaning of "grid point"—or a Non-uniform grid point ("NUG"): "NUGs represent an area of collected calibration data." Ex. B at 3:56–60; *see Andersen Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1375 (Fed. Cir. 2007) (considering specification of sibling patent where the claims had same scope). The specification also describes NUGS as "represent[ing] the signal characteristics and/or calibration data over a given region." Ex. B at

19

District Court:

Plaintiff argues that its proposed construction is "near-definitional" language taken from the Abstract of the '753 Patent, which states, in relevant part:

> The location of a wireless mobile device may be estimated using, at least in part, one or more pre-existing Network Measurement Reports ("NMRs") which include calibration data for a number of locations within a geographic region. *The calibration data for these locations is gathered and* ***analyzed*** *so that particular grid points within the geographic region can be determined and associated with a particular set or sets of calibration data from, for example, one or more NMRs….*

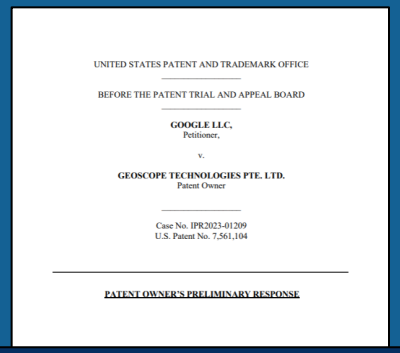
But the italicized language from which Plaintiff's construction is drawn is directed more toward what must be done to arrive at a grid point or set of grid points rather than what a grid point is. The specification of the '104 Patent, sibling to the '753 Patent, does provide a clear indication of the meaning of "grid point"—or a Non-uniform grid point ("NUG"): "NUGs represent an area of collected calibration data."

104 Sur-Reply, p.6: "there is no relevant difference in 'evaluation' and 'analysis' for purposes of this IPR"

104/358/494 Reply, pp.3-4; EX1028, p.19 (01209-01211 IPRS) (emphasis added);
104 Sur-Reply, p.6; 358 Sur-Reply, p.5; 494 Sur-Reply, p.5.

INSTITUTION DECISION

POPR:



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

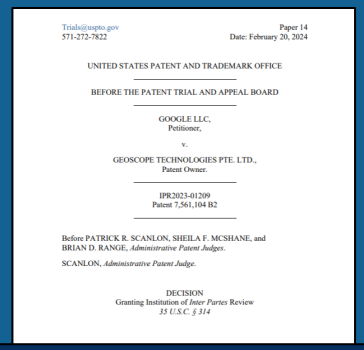
GEOSCOPE TECHNOLOGIES PTE. LTD.
Patent Owner

Case No. IPR2023-01209
U.S. Patent No. 7,561,104

PATENT OWNER'S PRELIMINARY RESPONSE

Petitioner: The POPR again asserted that grid points "are generated based on the **analysis** of calibration data".

ID:



Trials@uspto.gov
571-272-7822

Paper 14
Date: February 20, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

GEOSCOPE TECHNOLOGIES PTE. LTD.,
Patent Owner.

IPR2023-01209
Patent 7,561,104 B2

Before PATRICK R. SCANLON, SHEILA F. MCSHANE, and BRIAN D. RANGE, *Administrative Patent Judges*.

SCANLON, *Administrative Patent Judge*.

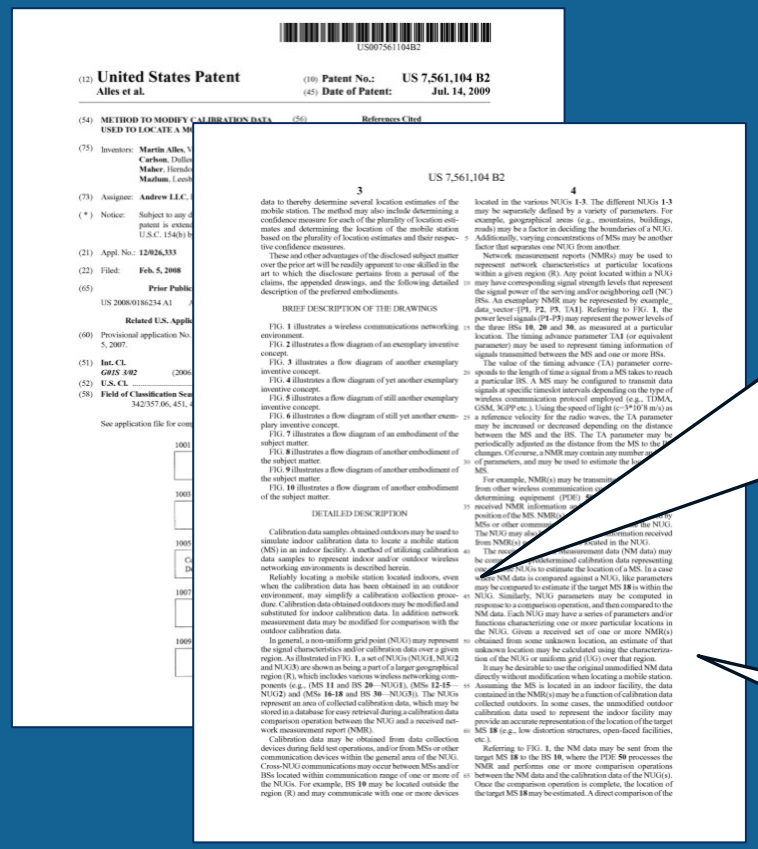
DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

"Patent Owner mischaracterizes the district court's claim construction order. Instead of concluding that a 'grid point' must be generated based on **analysis** of calibration data, the district court was explaining why it declined to adopt Patent Owner's[] proposed construction…. **Patent Owner's argument attempts to introduce additional requirements that are not part of the claim construction.** For these reasons, we do not find Patent Owner's argument on this point persuasive."

104 Sur-Reply, p.6: "there is no relevant difference in 'evaluation' and 'analysis' for purposes of this IPR"

104/358/494 Reply, pp.3-4; 104/358/494 POPR, p.2 (emphasis added); 104 ID, p.27 (emphasis added); 358 ID, pp.27-28 (emphasis added); 494 ID, pp.32-33 (emphasis added); 104 Sur-Reply, p.6; 358 Sur-Reply, p.5; 494 Sur-Reply, p.5.

"EVALUATION" IS NOT REQUIRED



THE 104/358/494 PATENTS:

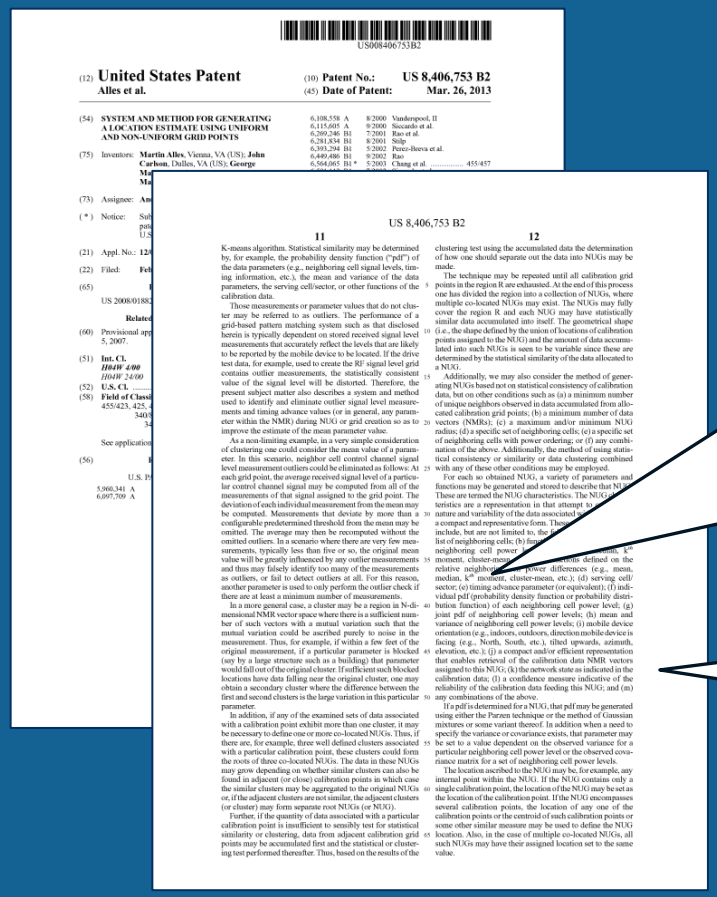
The NUGs represent an area of collected calibration data, which may be stored in a database for easy retrieval during a calibration data comparison operation between the NUG and a received network measurement report (NMR).

~~"Evaluation"~~

- The 104/358/494 and 753 Patents do not elaborate on this concept
- Grid points can be determined from collected calibration data without evaluation

104/358/494 Reply, pp.7, 13-14; EX1001 (01209 IPR), 3:52-60 (emphasis added); EX1001 (01210 IPR), 3:63-67 (emphasis added); EX1001 (01211 IPR), 3:65-4:2 (emphasis added).

"EVALUATION" IS NOT REQUIRED



US008406753B2

(12) **United States Patent**
Alles et al.

(10) **Patent No.: US 8,406,753 B2**
(45) **Date of Patent: Mar. 26, 2013**

(54) **SYSTEM AND METHOD FOR GENERATING A LOCATION ESTIMATE USING UNIFORM AND NON-UNIFORM GRID POINTS**

(75) Inventors: **Martin Alles**, Vienna, VA (US); **John Carlson**, Dulles, VA (US); **George**

(73) Assignee:

(*) Notice:

(21) Appl. No.:

(22) Filed:

(65)

US 2008/0188

(60) Provisional app 5, 2007.

(51) **Int. Cl.** *H04W 4/00* *H04W 24/00*

(52) **U.S. Cl.**

(58) **Field of Classi** 455/423, 425,

See application

(56)

U.S. P

6,108,558	A	8/2000	Vandenpool, II	
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6,303,294	B1	5/2002	Perez-Bueva et al.	
6,449,486	B1	9/2002	Rao	
6,564,065	B1 *	5/2003	Chang et al.	455/457

US 8,406,753 B2

11 12

K-means algorithm. Statistical similarity may be determined by, for example, the probability density function ("pdf") of the data parameters (e.g., neighboring cell signal levels, timing information, etc.), the mean and variance of the data parameters, the serving cell/sector, or other functions of the calibration data.

Those measurements or parameter values that do not cluster may be referred to as outliers. The performance of a grid-based pattern matching system such as that disclosed herein is typically dependent on stored received signal level measurements that accurately reflect the levels that are likely to be reported by the mobile device to be located. If the drive test data, for example, used to create the RF signal level grid contains outlier measurements, the statistically consistent value of the signal level will be distorted. Therefore, the present subject matter also describes a system and method used to identify and eliminate outlier signal level measurements and timing advance values (or in general, any parameter within the NMR) during NUG or grid creation so as to improve the estimate of the mean parameter value.

As a non-limiting example, in a very simple consideration of clustering one could consider the mean value of a parameter. In this scenario, neighbor cell control channel signal level measurement outliers could be eliminated as follows: At each grid point, the average received signal level of a particular control channel signal may be computed from all of the measurements of that signal assigned to the grid point. The deviation of each individual measurement from the mean may be computed. Measurements that deviate by more than a configurable predetermined threshold from the mean may be omitted. The average may then be recomputed without the omitted outliers. In a scenario where there are very few measurements, typically less than five or so, the original mean value will be greatly influenced by any outlier measurements and thus may falsely identify too many of the measurements as outliers, or fail to detect outliers at all. For this reason, another parameter is used to only perform the outlier check if there are at least a minimum number of measurements.

In a more general case, a cluster may be a region in N-dimensional NMR vector space where there is a sufficient number of such vectors with a mutual variation such that the mutual variation could be ascribed purely to noise in the measurement. Thus, for example, if within a few feet of the original measurement, if a particular parameter is blocked (say by a large structure such as a building) that parameter would fall out of the original cluster. If sufficient such blocked locations have data falling near the original cluster, one may obtain a secondary cluster where the difference between the first and second clusters is the large variation in this particular parameter.

In addition, if any of the examined sets of data associated with a calibration point exhibit more than one cluster, it may be necessary to define one or more co-located NUGs. Thus, if there are, for example, three well defined clusters associated with a particular calibration point, these clusters could form the roots of three co-located NUGs. The data in these NUGs may grow depending on whether similar clusters can also be found in adjacent (or close) calibration points in which case the similar clusters may be aggregated to the original NUGs or, if the adjacent clusters are not similar, the adjacent clusters (or cluster) may form separate root NUGs (or NUG).

Further, if the quantity of data associated with a particular calibration point is insufficient to sensibly test for statistical similarity or clustering, data from adjacent calibration grid points may be accumulated first and the statistical or clustering test performed thereafter. Thus, based on the results of the clustering test using the accumulated data the determination of how one should separate out the data into NUGs may be made.

The technique may be repeated until all calibration grid points in the region R are exhausted. At the end of this process one has divided the region into a collection of NUGs, where multiple co-located NUGs may exist. The NUGs may fully cover the region R and each NUG may have statistically similar data accumulated into itself. The geometrical shape (i.e., the shape defined by the union of locations of calibration points assigned to the NUG) and the amount of data accumulated into such NUGs is seen to be variable since these are determined by the statistical similarity of the data allocated to a NUG.

Additionally, we may also consider the method of generating NUGs based not on statistical consistency of calibration data, but on other conditions such as (a) a minimum number of unique neighbors observed in data accumulated from allocated calibration grid points; (b) a minimum number of data vectors (NMRs); (c) a maximum and/or minimum NUG radius; (d) a specific set of neighboring cells; (e) a specific set of neighboring cells with power ordering; or (f) any combination of the above. Additionally, the method of using statistical consistency or similarity or data clustering combined with any of these other conditions may be employed.

For each so obtained NUG, a variety of parameters and functions may be generated and stored to describe that NU These are termed the NUG characteristics. The NUG teristics are a representation in that attempt to nature and variability of the data associated a compact and representative form. Th include, but are not limited to, the list of neighboring cells; (b) fi neighboring cell power moment, cluster-me relative neighbor power differences (e.g., mean, median, k^{th} moment, cluster-mean, etc.); (d) serving cell/sector; (e) timing advance parameter (or equivalent); (f) individual pdf (probability density function or probability distribution function) of each neighboring cell power level; (g) joint pdf of neighboring cell power levels; (h) mean and variance of neighboring cell power levels; (i) mobile device orientation (e.g., indoors, outdoors, direction mobile device is facing (e.g., North, South, etc.), tilted upwards, azimuth, elevation, etc.); (j) a compact and/or efficient representation that enables retrieval of the calibration data NMR vectors assigned to this NUG; (k) the network state as indicated in the calibration data; (l) a confidence measure indicative of the reliability of the calibration data feeding this NUG; and (m) any combinations of the above.

If a pdf is determined for a NUG, that pdf may be generated using either the Parzen technique or the method of Gaussian mixtures or some variant thereof. In addition when a need to specify the variance or covariance exists, that parameter may be set to a value dependent on the observed variance for a particular neighboring cell power level or the observed covariance matrix for a set of neighboring cell power levels.

The location ascribed to the NUG may be, for example, any internal point within the NUG. If the NUG contains only a single calibration point, the location of the NUG may be set as the location of the calibration point. If the NUG encompasses several calibration points, the location of any one of the calibration points or the centroid of such calibration points or some other similar measure may be used to define the NUG location. Also, in the case of multiple co-located NUGs, all such NUGs may have their assigned location set to the same value.

THE 753 PATENT:

The location ascribed to the NUG may be, for example, **any** internal point within the NUG. If the NUG contains only a single calibration point, **the location of the NUG may be set as the location of the calibration point.**

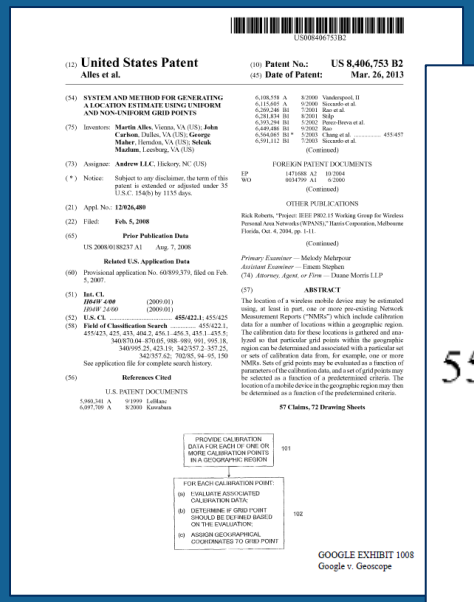
~~"Evaluation"~~

- Grid points can be determined from collected calibration data without evaluation

104/358/494 Reply, pp.4-7; EX1008 (01209-01211 IPRS), 12:59-61 (emphasis added).

"EVALUATION" IS NOT REQUIRED

- **104 Sur-Reply, p.8**: EX1008 ['753 Patent], 2:56-59.



The '753 Patent (EX1008):

Accordingly, an embodiment of the present subject matter provides a method for assigning geographical coordinates to a grid point located in a geographic region for the location of a mobile device where the method provides calibration data for each of one or more calibration points in the geographic region and where for each of the calibration points the associated calibration data is evaluated and based on that evaluation a determination is made as to whether at least one grid point should be defined, and if so, geographical coordinates are assigned to the grid point.

EX1008 (01209-01211 IPRS), 2:56-59.

POR: "STATISTICAL SIMILARITY"

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

GEOSCOPE TECHNOLOGIES PTE. LTD.
Patent Owner

Case No. IPR2023-01209
U.S. Patent No. 7,561,104

PATENT OWNER'S RESPONSE

104 POR, p.10:

This evaluation of calibration data involves determining which data are "statistically very similar"…

104 POR, p.1:

Notably, the parent provisional application … **explicitly states** that "[t]he geometrical shape and the amount of data accumulated into such NUGs is seen to be variable **since these are determined by the statistical similarity of the data**…"

104 POR, p.9:

This is **stated explicitly** in the '379 Provisional incorporated by reference in the '104 Patent … "The NUGs fully cover the region R and each NUG **has statistically similar data** accumulated into itself. The geometrical shape and the amount of data accumulated into such NUGs is seen to be variable **since these are determined by the statistical similarity of the data allocated to a NUG**."

104 POR, pp.1, 9, 10 (emphasis added).

"STATISTICAL SIMILARITY": MERELY ONE EMBODIMENT

379 PROVISIONAL (EX1005, p.8) (emphasis added):

U.S. PTO
60/899379
02/05/2007

PROVISIONAL APPLICATION FOR PATENT COVER SHEET – Page 1 of 2

AND01 073

Additionally, we also consider the method of generating NUGs based not on statistical consistency but on other conditions such as
(a) minimum number of unique neighbors observed in data accumulated from allocated calibration grid points
(b) minimum number of data vectors (NMRs)
(c) maximum and minimum NUG radius
specific set of NCs
specific set of NCs with power ordering
of using statistical consistency or similarity or data clustering
other conditions.

variety of parameters and functions are generated and

Page 8 of 40

"Additionally, we also consider the method of generating NUGs **based not on statistical consistency but on other conditions**"

753 PATENT (EX1008, 12:15-17) (emphasis added):

(12) United States Patent
Alles et al.

(10) Patent No.: US 8,406,753 B2
(45) Date of Patent: Mar. 26, 2013

(54) SYSTEM AND METHOD FOR GENERATING A LOCATION ESTIMATE USING UNIF AND NON-UNIFORM GRID POINTS

(75) Inventors: Martin Alles, Vienna, VA (US); Carlson, Dulles, VA (US); Maher, Herndon, VA (US); Mazlum, Leesburg, VA (US)

(73) Assignee: Andrew LLC, Hickory, NC (US

(*) Notice: Subject to any disclaimer, the ter patent is extended or adjusted U.S.C. 154(b) by 1135 days.

(21) Appl. No.: 12/026,480

(22) Filed: Feb. 5, 2008

US 8,406,753 B2

11 12

K-means algorithm. Statistical similarity may be determined by, for example, the probability density function ("pdf") of the data parameters (e.g., neighboring cell signal levels, timing information, etc.), the mean and variance of the data parameters, the serving cell/sector, or other functions of the calibration data.

clustering test using the accumulated data the determination of how one should separate out the data into NUGs may be made.

The technique may be repeated until all calibration grid points in the region R are exhausted. At the end of this process one has divided the region into a collection of NUGs, where multiple co-located NUGs may exist. The NUGs may fully cover the region R and each NUG may have statistically similar data accumulated into itself. The geometrical shape (i.e., the shape defined by the union of locations of calibration points assigned to the NUG) and the amount of data accumulated into such NUGs is seen to be variable since these are determined by the statistical similarity of the data allocated to

"One may also consider the method of generating NUGs **based not on statistical consistency of calibration data, but on other conditions**"

104 Sur-Reply, p.10: "PO's construction does not mention or require statistical similarity"

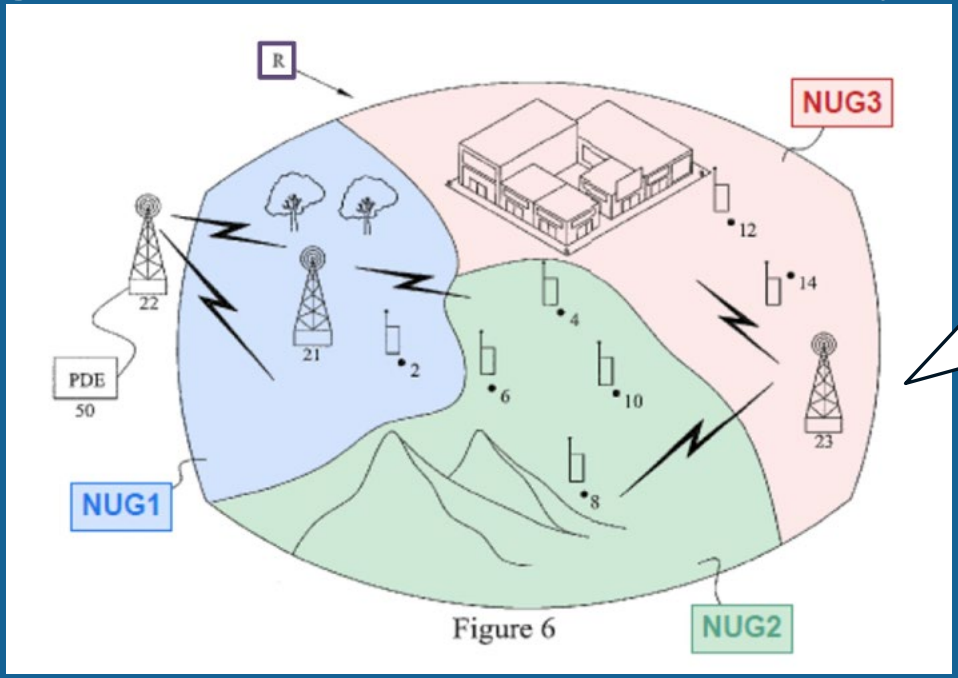
104/358/494 Reply, pp.7-8.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

FIGURE 6 IS EXEMPLARY

- The ’784 Patent states that Figure 6 illustrates “an ***exemplary*** non-uniform grid (NUG) region”. EX2013, 3:12-13. Patent Owner’s expert agrees. EX1031, 115:13-20.

Figure 6 of the ’784 Patent (Annotated by PO)

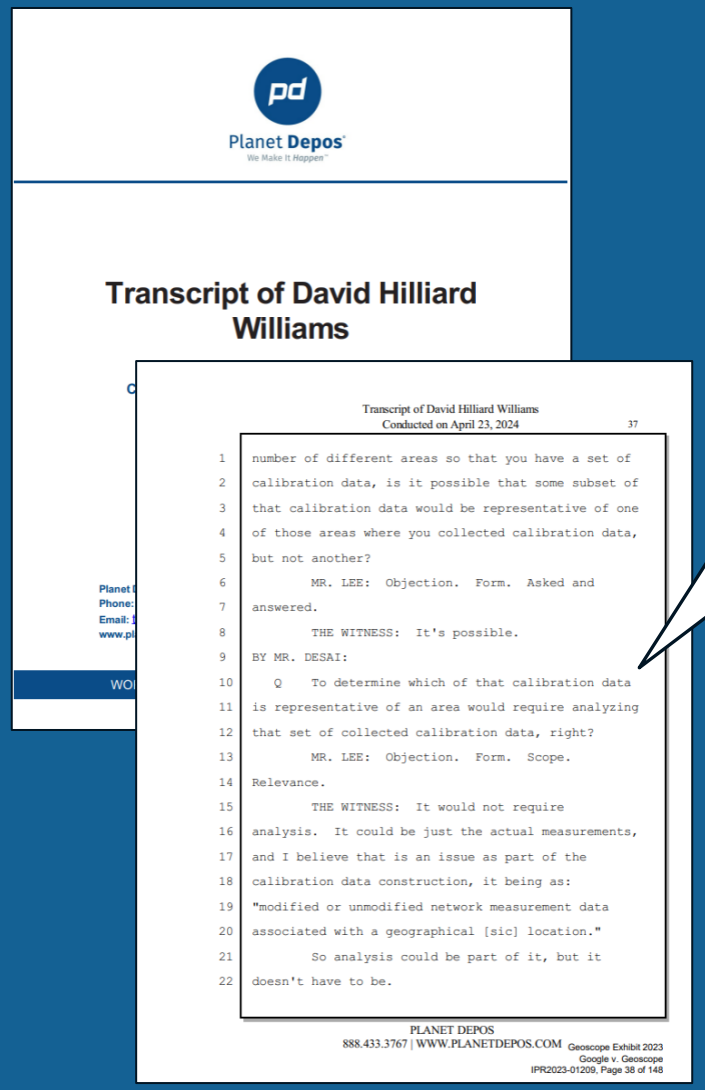


104 POR, p.8 (emphasis added):

[A]s seen in the figure, the boundaries for each NUG differ, resulting in **each NUG having a different shape and size**. Consequently, the grid points are not uniform and **look nothing like any conventional notion of a “grid.”**…

104/358/494 Reply, pp.8-9; EX2013 (01209 IPR), 3:12-13; EX1007 (01210-01211 IPRS), 3:12-13.

PETITIONER'S EXPERT


Planet Depos
We Make It Happen

Transcript of David Hilliard Williams

Transcript of David Hilliard Williams
Conducted on April 23, 2024 37

1 number of different areas so that you have a set of
2 calibration data, is it possible that some subset of
3 that calibration data would be representative of one
4 of those areas where you collected calibration data,
5 but not another?
6 MR. LEE: Objection. Form. Asked and
7 answered.
8 THE WITNESS: It's possible.
9 BY MR. DESAI:
10 Q To determine which of that calibration data
11 is representative of an area would require analyzing
12 that set of collected calibration data, right?
13 MR. LEE: Objection. Form. Scope.
14 Relevance.
15 THE WITNESS: It would not require
16 analysis. It could be just the actual measurements,
17 and I believe that is an issue as part of the
18 calibration data construction, it being as:
19 "modified or unmodified network measurement data
20 associated with a geographical [sic] location."
21 So analysis could be part of it, but it
22 doesn't have to be.

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888.433.3767 | WWW.PLANETDEPOS.COM Geoscope Exhibit 2023
Google v. Geoscope
IPR2023-01209, Page 38 of 148

Mr. Williams:

Q To determine which of that calibration data is representative of an area would require analyzing that set of collected calibration data, right?

…

THE WITNESS: **It would not require analysis. It could be just the actual measurements**….

104 Sur-Reply, p.6: "there is no relevant difference in 'evaluation' and 'analysis' for purposes of this IPR"

Mr. Sturza: "I don't recall if the district court construed 'evaluating' or 'evaluation' but I don't recall it being in that section." (EX1032, 68:15-25)

104/358/494 Reply, pp.5-7; EX2023, 37:10-22 (01209-01211 IPRS).

PO FAILS TO DEMONSTRATE DISCLAIMER/DISAVOWAL

104 Sur-Reply, pp.1-2:

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner
v.
GEOSCOPE TECHNOLOGIES PTE. LTD,
Patent Owner.

CASE: IPR2023-01209
U.S. Patent No. 7,561,104

PATENT OWNER'S SUR-REPLY

[T]he prior art employs interpolation or extrapolation to estimate signal strength measurements—calibration data—against a pre-laid grid, not generate NUGs that define the grid.

[U]nlike the prior art, where calibration data is assigned to predetermined areas or grids, the '104 Patent and its family members teach that NUGs are determined based on areas that have *representative* calibration data for an area.

Final Construction
"a point associated with representative calibration data for an area"

PO's New Construction
"Grid Point" Requires **Evaluation** of Calibration Data **to Determine the Boundaries of the Area** Represented by a "Grid Point"

104/358/494 Reply, pp.7-8, 1-2; EX1028, p.20 (01209-01211 IPRS); 104/358/494 POR, p.18 (emphasis added).

"GRID POINT" ENCOMPASSES A SINGLE POINT

- **104 Reply, p.7:** "[o]ne or more signal strengths measured at a point, without further evaluation, can thus serve as representative calibration data for a grid point."
- **104 Sur-Reply, p.7**: "**even NUGs consisting of a single calibration point** are formed based on evaluation of calibration data at neighboring points." (emphasis added)
- **The 753 Patent**: "If the NUG contains only a single calibration point, the location of the NUG may be set as the location of the calibration point." (EX1008, 12:59-61)

Final Construction
"a point associated with representative calibration data for an area"

~~"Evaluation"~~

104/358/494 Reply, pp.6-7, 9-11.

"NON-UNIFORM GRID POINT" DOES NOT REQUIRE A NEW CONSTRUCTION

- The Board (in the ID) construed "non-uniform grid points" as "grid points that are non-uniformly spaced throughout a geographic region." (104 ID, pp.24-25)
- Patent Owner asserts that, to the extent the Board finds that a "grid point" is not required to be generated "based on evaluation of calibration data", the Board should adopt a construction of "non-uniform grid point" that expressly recites this requirement. (104 POR, p.3)
- Patent Owner's construction of "non-uniform grid points" should fail for the same reasons discussed above with respect to "grid point".

104/358/494 Reply, pp.11-12; 104 ID, pp.24-25; 358 ID, p.25; 494 ID, p.30.

PATENT OWNER FAILS TO EXPLAIN THE METES AND BOUNDS OF "EVALUATION"

Mr. Sturza:

- "The terms 'non-uniform grid point' and 'NUG' are not to my knowledge terms of art with commonly understood meanings". (EX2020, ¶73)
- "I've provided, you know, no opinion on how the evaluation could be performed." (EX1031, 87:5-6; see also 83:19-21)
- "Q. So you do not have any opinion on how the evaluation in your construction might be performed. Is that correct? … A. That's correct." (EX1031, 87:9-15)
- "Well, you know, I haven't, you know, provided an opinion on statistically similar". (EX1031, 84:4-6)
- Statistical similarity "is not a defined value". (EX1031, 81:6-10)
- Statistical similarity: "Again, not something I specifically opined upon." (EX1031, 82:13-21)

104/358/494 Reply, pp.12-14.

PO SUR-REPLY

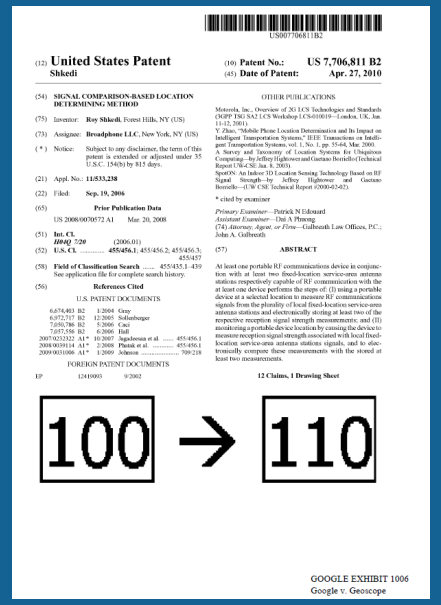
104 Sur-Reply, p.1: "None of the prior art teaches NUGs **under the appropriate construction** because the prior art only teaches generating calibration data. That is, the prior art employs interpolation or extrapolation to estimate signal strength measurements—calibration data—against a pre-laid grid, not generate NUGs that define the grid."

Final Construction
"a point associated with representative calibration data for an area"

PO's New Construction
"Grid Point" Requires **Evaluation** of Calibration Data **to Determine the Boundaries of the Area** Represented by a "Grid Point"

104/358/494 Reply, pp.1-2; 104/358/494 Sur-Reply, p.1 (emphasis added); 104/358/494 POR, p.18 (emphasis added).

SHKEDI GROUNDS

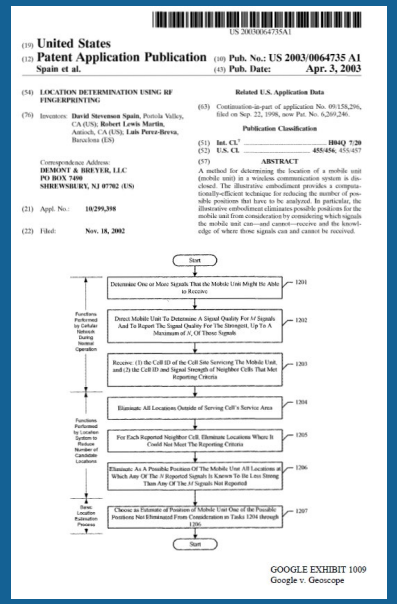


SHKEDI:

- "[A] mobile telephone (at a **user selected location**) measures a plurality of [signal strengths] and stores them in a database". EX1006, 8:41-48 (emphasis added) (104 Pet., pp.32-33)
- Locates a mobile telephone "within **a predetermined proximity** of the original user selected location." EX1006, 8:41-48 (emphasis added) (104 Pet., pp.32-33)
- User selected locations are **random** locations in which a user travels (i.e., not "predefined") (104 Reply, p.17); EX1006, 17:29-30, ("as a cell phone user moves around"); 104 ID, p.28 ("we are persuaded that one of ordinary skill in the art would have recognized these locations to be random locations")
- A "never registered location" is found by "**extrapolating**". 104 Pet., p.33 (EX1006, 13:15–23) (emphasis added)

104 Reply, pp.15-19; 358 Reply, pp.15-18; 494 Reply, pp.15-18; 104 Pet., pp.32-33; 358 Pet., p.33; 494 Pet., pp.28-29).

SHKEDI-SPAIN GROUNDS


US 2003/0064735A1

(19) United States
(12) Patent Application Publication
Spain et al.
(10) Pub. No.: US 2003/0064735 A1
(43) Pub. Date: Apr. 3, 2003

(54) LOCATION DETERMINATION USING RF FINGERPRINTING

(76) Inventors: David Stevenson Spain, Portola Valley, CA (US); Robert Lewis Martin, Antioch, CA (US); Luis Perez-Breva, Barcelona (ES)

Correspondence Address:
DEMONT & BREYER, LLC
PO BOX 7400
SHREWSBURY, NJ 07702 (US)

(21) Appl. No.: 10/299,398

(22) Filed: Nov. 18, 2002

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/158,296, filed on Sep. 22, 1998, now Pat. No. 6,269,246.

Publication Classification

(51) Int. Cl.[7] H04Q 7/20
(52) U.S. Cl. 455/456; 455/457

(57) ABSTRACT

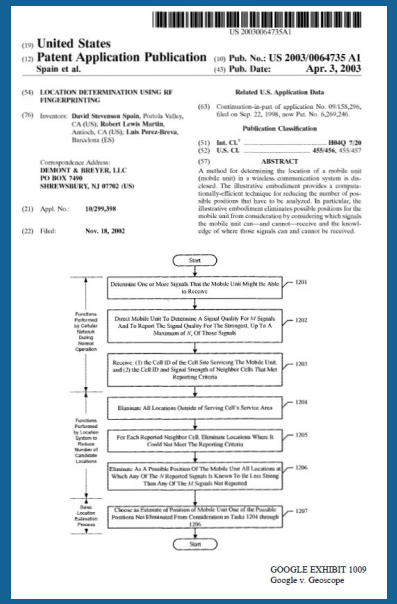
A method for determining the location of a mobile unit (mobile unit) in a wireless communication system is disclosed. The illustrative embodiment provides a computationally-efficient technique for reducing the number of possible positions that have to be analyzed. In particular, the illustrative embodiment eliminates possible positions for the mobile unit from consideration by considering which signals the mobile unit can—and cannot—receive and the knowledge of where those signals can and cannot be received.

GOOGLE EXHIBIT 1009
Google v. Geoscope

- Patent Owner: Petitioner "does not provide any substantive analysis"; Shkedi already discloses a method for extrapolating (104 POR, p.42; 104 Sur-Reply, p.27)
- Both Shkedi and Spain are directed to improving location accuracy in areas with degraded GPS capability. (104 Pet., 37)
- Spain: "interpolate the fingerprints at **all locations** in between the sampled locations." Pet., p.36 (quoting EX1009, [0101]) (emphasis added)
- "Spain's **addition** of interpolated "grids of location data" would have been a routine addition. (104 Pet., p.37) (emphasis added)
- Spain's "learning/training fingerprint techniques" are applicable to Shkedi's fingerprint database to generate **more** non-uniform grid points in Shkedi's database (104 Reply, p.20)

104 Reply, pp.19-22; 358 Reply, pp.18-22; 494 Reply, pp.18-22; 104 Pet., pp.36-37; 358 Pet., pp.35-36; 494 Pet., pp.31-32).

SHKEDI-SPAIN GROUNDS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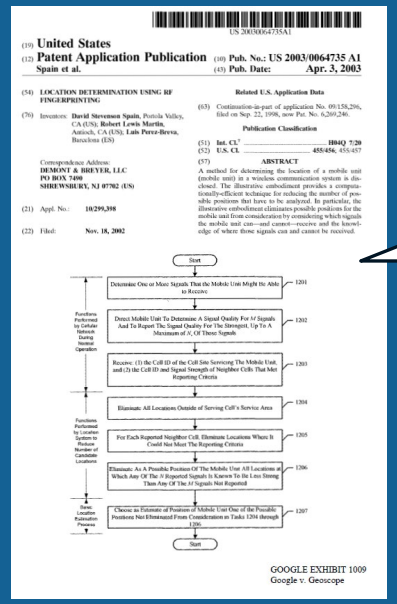
Start
Determine One or More Signals That the Mobile Unit Might Be Able to Receive — 1201
Direct Mobile Unit To Determine A Signal Quality For M Signals And To Report The Signal Quality For The Strongest, Up To A Maximum of N, Of Those Signals — 1202
Receive: (1) the Cell ID of the Cell Site Servicing The Mobile Unit, and (2) the Cell ID and Signal Strength of Neighbor Cells That Met Reporting Criteria — 1203
Eliminate All Locations Outside of Serving Cell's Service Area — 1204
For Each Reported Neighbor Cell, Eliminate Locations Where It Could Not Meet The Reporting Criteria — 1205
Eliminate: As A Possible Position Of The Mobile Unit All Locations at Which Any Of The N Reported Signals Is Known To Be Less Strong Than Any Of The M Signals Not Reported — 1206
Choose an Estimate of Position of Mobile Unit One of the Possible Positions Not Eliminated From Consideration in Tasks 1204 through 1206 — 1207
Stop

GOOGLE EXHIBIT 1009
Google v. Geoscope

- Patent Owner: Spain teaches a uniform grid of calibration points where some grid points are measurements, and some are interpolated estimates. (104 Sur-Reply, p.24)
- Spain discloses enhancing the accuracy of a fingerprint database by **adding interpolated non-uniform grid points** to a fingerprint matching database for location determination. (104 Pet., p.36) (emphasis added)
- "Spain expressly distinguishes **interpolated points** from the 'predetermined locations.'" (104 Reply, p.21) (emphasis added)
- PO's construction does not require the areas/boundaries to have varying shapes/sizes. Mr. Sturza: EX1031, 72:4-25 ("Q. Is it possible that the evaluation that you speak of would result in boundaries that are uniform? … A. Well, I think that's a -- unlikely but, you know, perhaps possible.").

104 Reply, pp.19-22; 358 Reply, pp.18-22; 494 Reply, pp.18-22; 104 Pet., pp.36-37; 358 Pet., pp.35-36; 494 Pet., pp.31-32.

SHKEDI-SPAIN GROUNDS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GOOGLE EXHIBIT 1009
Google v. Geoscope

Spain (EX1009) [0099]:9-13 (emphasis added):

In one instance the fingerprint corresponds not to one exact spot on the surface of the earth, **but instead to a small area**. The Lat and Long fields in this embodiment indicate a position inside the area, preferably the center point.

Spain discloses generating geographically "small areas" (i.e., boundaries) as grid points. (104 Reply, p.22)

104 Reply, pp.19-22; 358 Reply, pp.18-22; 494 Reply, pp.18-22.

ZHU GROUNDS

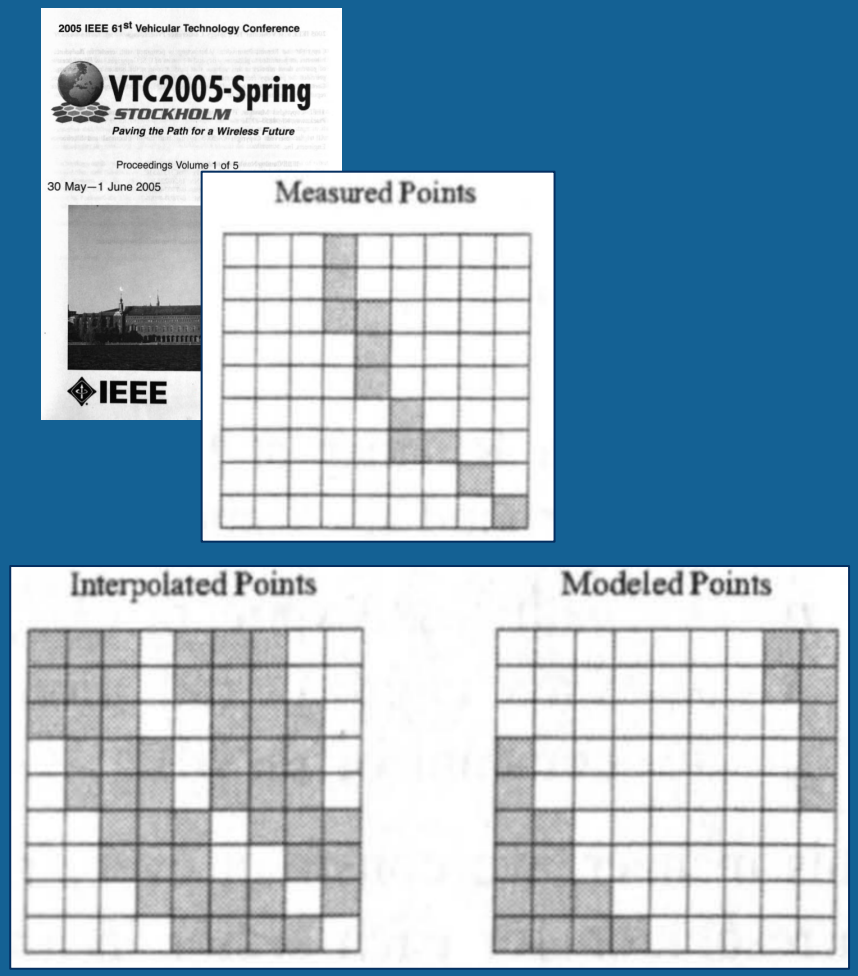

Figure 2 of Zhu (Excerpt)

- Zhu's "measured points" constitute the claimed one or more non-uniform grid points (104 Pet., p.48) (EX1010, pp.93-94)
  - EX1008, 12:59-61 ("If the NUG contains only a single calibration point, the location of the NUG may be set as the location of the calibration point.").
  - Sur-Reply, p.7: "even NUGs consisting of a single calibration point…"
- Zhu determines the "interpolated points" and "modeled points" by **analyzing/evaluating** collected calibration data (104 Reply, 23-24) (EX1010, pp.93-94)
  - Zhu determines non-uniform grid points to build out the RF map database using both "interpolated" and "modeled" points (104 Pet., p.48)

104 Reply, pp.22-25; 358 Reply, pp.22-25; 494 Reply, pp.22-26 ; 104 Pet., p.48-49; 358 Pet., pp.46-47; 494 Pet., pp.40-41.

ZHU GROUNDS

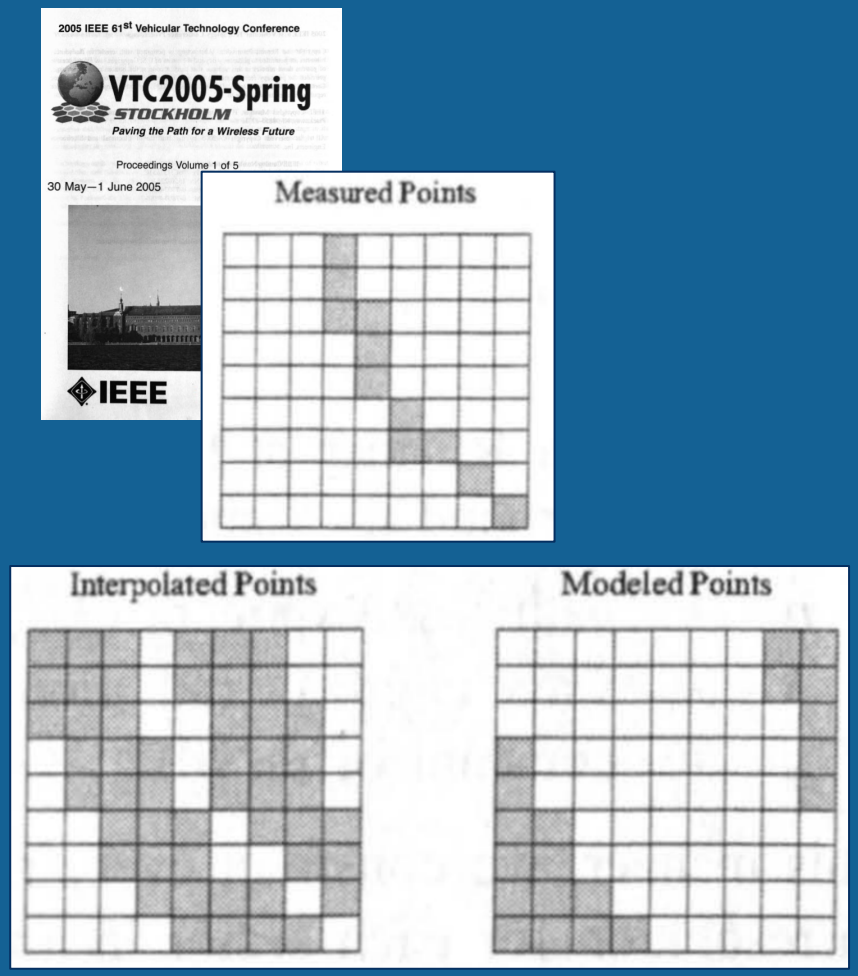

Figure 2 of Zhu (Excerpt)

- Each "grid spacing" of Zhu's RF map database is a 10-meter square **area** (104 Pet., p.49) (EX1010, p.93)
- PO's construction does not require the areas/boundaries to have varying shapes/sizes:

PO's New Construction
"Grid Point" Requires **Evaluation** of Calibration Data **to Determine the Boundaries of the Area** Represented by a "Grid Point"

- Mr. Sturza: EX1031, 72:4-25 ("Q. Is it possible that the evaluation that you speak of would result in boundaries that are uniform? … A. Well, I think that's a -- unlikely but, you know, perhaps possible.").

104 Reply, pp.22-25; 358 Reply, pp.22-25; 494 Reply, pp.22-26; 104/358/494 POR, p.18 (emphasis added); 104 Pet., pp.48-49; 358 Pet., pp.46-47; 494 Pet., pp.40-41.