

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
IPR2023-01211

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

“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); **Seluck
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.

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Primary Examiner—Duo L. Phao
(74) Attorney, Agent, or Firm—Diane 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

1001

Providing a Database of Calibration

1003

Collecting Network Measurement Data

1005

Comparing Network Measured Data with the Calibration Data to
Determine a Plurality of Location Estimates

1007

Determining a Confidence Measure

1009

Determining a Location Based on the Plurality of Location
Estimates and the Respective Confidence Measures

GOOGLE EXHIBIT 1001
Google v. Geoscope

US0008400358B2

(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); Selsak,
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 dis-
claimer.

(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.

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(Continued)

Primary Examiner—Diao 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 accu-
racy. Modifying pre-existing calibration data obtained out-
doors may provide a way to simulate indoor calibration data
characteristics.

52 Claims, 10 Drawing Sheets

701

Providing a Database of Calibration Data

703

Collecting Observed Network Measurement Data

705

Modifying the Observed Network Measurement Data

707

Comparing the Modified Network Measurement Data to the Database
of Calibration Data to Locate the Mobile

GOOGLE EXHIBIT 1001
Google v. Geoscape

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); Seleuk 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

701

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703

Collecting Observed Network Measurement Data

705

Modifying the Observed Network Measurement Data

707

Comparing the Modified Network Measurement Data to the Database of Calibration Data to Locate the Mobile

GOOGLE EXHIBIT 1001
Google v. Geoscope

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-DISCLAIMR
Document Description: Statutory Disclaimers per Manual of Patent Examining Procedure (MPEP) 1400
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
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PTO/PRR/43 (11-23)

DISCLAIMER IN A PATENT UNDER 37 CFR 1.322(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:

☒ the following complete claim(s) in the above-identified patent: 1,3 and 11

☐ the terminal part of the terms 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:

☒ 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:

☒ 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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If you need assistance in completing the form, call 1-800-PTO-8199 and select option 2.

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

Geoscope Exhibit 2024
Google v. Geoscope
IPR2023-01210, Page 1 of 2

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

GROUND – 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

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)

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.

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”

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

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:

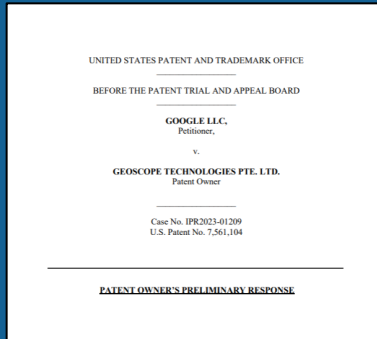
The location of a wireless mobile device may be estimated using, at least in part, one or more pre-existing Network Measurement Reports (“NMRs”) which include calibration data for a number of locations within a geographic region. *The calibration data for these locations is gathered and **analyzed** 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”

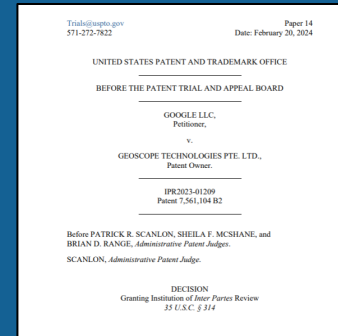
INSTITUTION DECISION

POPR:



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

ID:



“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

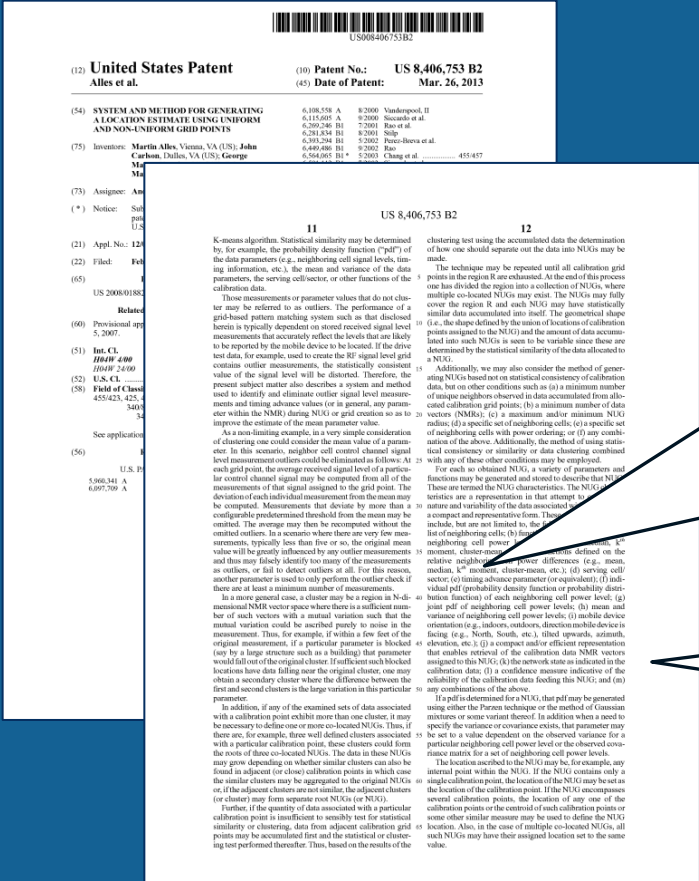
“EVALUATION” IS NOT REQUIRED

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”~~

- Gridpoints can be determined from collected calibration data without evaluation

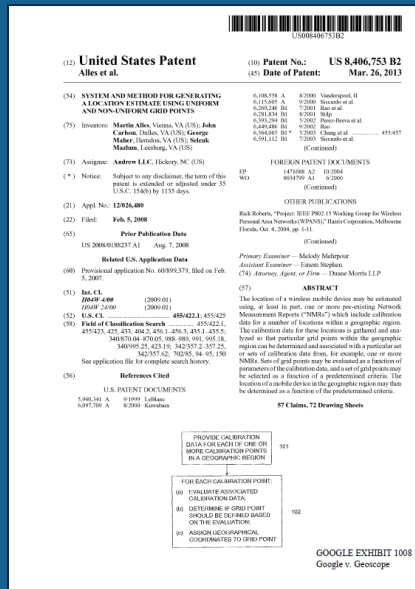


“EVALUATION” IS NOT REQUIRED

- **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.



POR: “STATISTICAL SIMILARITY”

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.**”

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

“STATISTICAL SIMILARITY”: MERELY ONE EMBODIMENT

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

U.S. PTO
60/899379
02/05/2007 #1058/16 (10-03)
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
PROVISIONAL APPLICATION FOR PATENT COVER SHEET – Page 1 of 2
This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(d).

Express Mail Label No. 1772 US PTO

Given Name (first and middle (if any))	Family Name or Surname
MARTIN	ALLES
JOHN	CARLSON
GEORGE	MAHER
SELCUK	MAZLUM

Additional inventors are being named on the

TITLE OF THE INVENTION
MOBILE LOCATION USING NETWORK MEASUREMENTS

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
one other conditions.

variety of parameters and functions are generated and

“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):

United States Patent
Alles et al.

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

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

(75) Inventors: Martin Alles, Vienna, VA (US); Carlsson, Dallas, 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 patent is extended or adjusted U.S.C. 154(b) by 1135 days.

(21) Appl. No.: 12/924,489
(22) Filed: Feb. 5, 2008
(65) US 2008/0040673 A1

6,108,578 A 8/2008 Vanderpool, II

US 8,406,753 B2

11 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 location data.

12 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

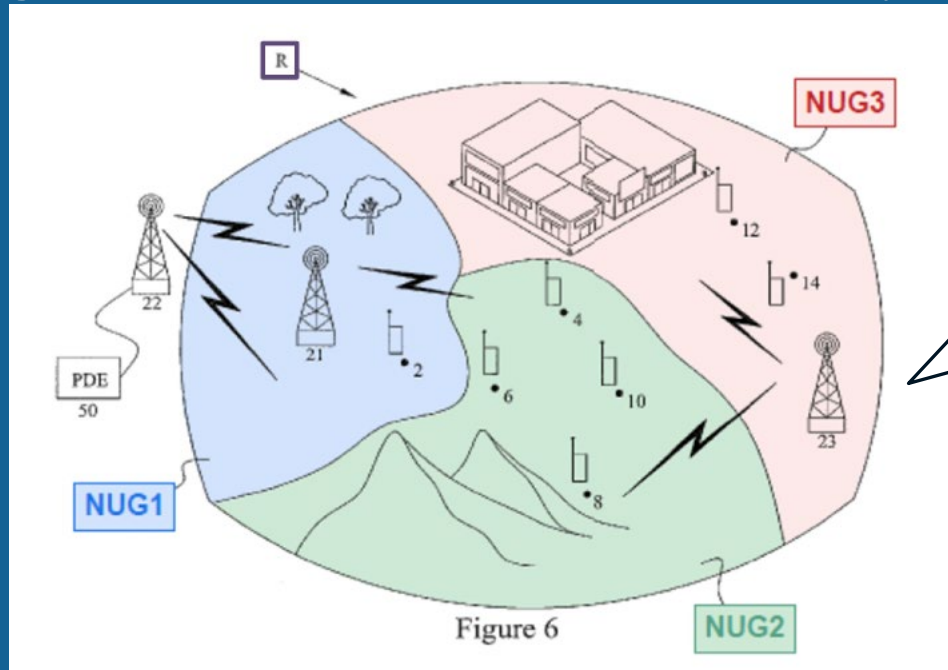
“One may also consider the method of generating NUGs based not on statistical consistency of calibration data, but on other conditions”

104 Sur-Reply, p.10: “PO’s construction does not mention or require statistical similarity”

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.”**...

PETITIONER'S EXPERT

Mr. Williams:

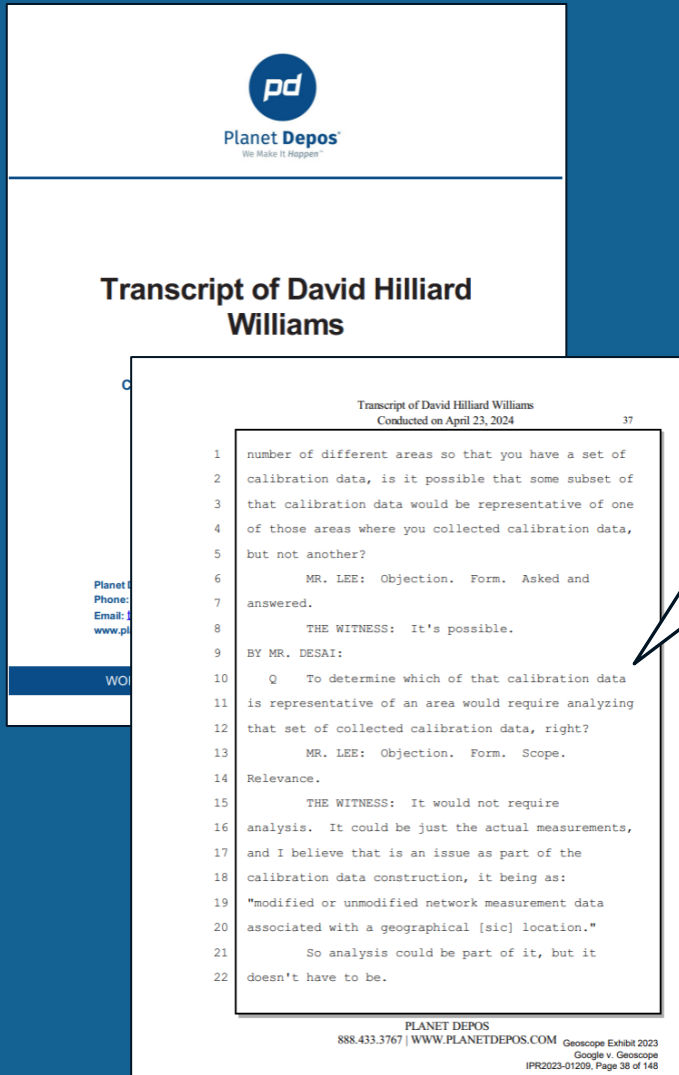
Q To determine which of that calibration data is representative of an area would require analyzing that set of collected calibration data, right?

...

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)



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”

“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”**~~

“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”.

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)

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.”

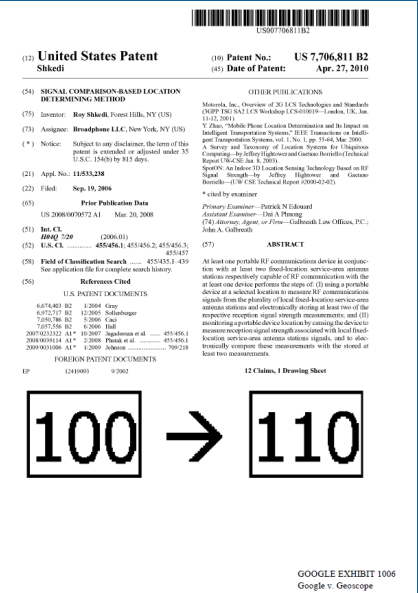
Final Construction

“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”

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)

(19) United States

(11) Patent Application Publication

(52) Pub. No.: US 2003/0064735 A1

(21) Appl. No.: 09/347,351

(54) LOCATION DETERMINATION USING RF FINGERPRINTING

(57) Invention: David Stevenson Smith, Perkin Valley, CA (US); Robert Lewis Martin, Anaheim, CA (US); Lee Peter Brown, Berkeley (US)

Continuation-in-part of application No. 09/126,296, filed Apr. 27, 1998, now Pat. No. C6,290,246.

Publication Classification

Int. Cl.⁷ H04W 52/08
 U.S. Cl. 455/456, 455/457

ABSTRACT

The method for determining the location of a mobile unit (mobi) and/or in a wireless communication system is disclosed. The position for the mobi to be analyzed is pre-determined prior to the mobi to be analyzed. In particular, the illustrative embodiment eliminates possible problems for the mobi and 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.

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 PO BOX 7596
 SHERBOURNE, MD 07802-0596

(21) Appl. No.: 09/239,398

(22) Filed: Nov. 28, 2002

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graph TD
    Start([Start]) --> D1{Determine One or More Signals That the Mobile Unit May Receive the Mobi to Receive}
    D1 -- No --> P1[Process Mobile Unit's Location, a Fixed Output of 0.0 Squares and 0.0 Cubes]
    D1 -- Yes --> P2[Dress Mobile Unit's Location, a Fixed Output of 0.0 Squares and 0.0 Cubes]
    P2 --> D2{Can the Mobile Unit Receive the Signal?}
    D2 -- No --> P3[Process the Signal Output of the Mobile Unit, Up To A Maximum of 0.0 Squares and 0.0 Cubes]
    D2 -- Yes --> P4[Receive: (1) the Cell ID of the Cell Site Serving the Mobile Unit and (2) the Cell ID of the Signal Strength of Neighbor Cells that are Receiving Cells]
    P4 --> D3{Estimate All Locations Outside of Serving Cell's Service Area}
    D3 -- No --> P5[Process Mobile Unit's Location, a Fixed Output of 0.0 Squares and 0.0 Cubes]
    D3 -- Yes --> P6[For Each Receiving Neighbor Cell, Estimate Locations Where it Could Not Receive the Repeating Cells]
    P6 --> D4{Can a Possible Position Of The Mobile Unit be Determined When One Of the Repeating Signals is Known To Not Be Received?}
    D4 -- No --> P7[Process Mobile Unit's Location, a Fixed Output of 0.0 Squares and 0.0 Cubes]
    D4 -- Yes --> P8[Determine Estimated Position of Mobile Unit One of the Possible Positions Not Eliminated From Consideration in Table Under 0.0 Squares and 0.0 Cubes]
    P8 --> End([End])
  
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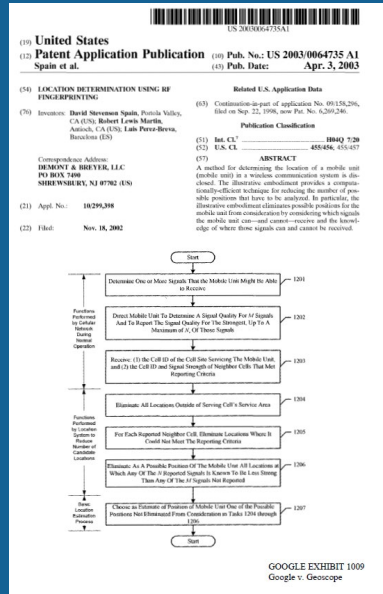
Flowchart illustrating the location determination process using RF fingerprinting:

- Start
- Decision: Determine One or More Signals That the Mobile Unit May Receive the Mobi to Receive.
 - If No: Process Mobile Unit's Location, a Fixed Output of 0.0 Squares and 0.0 Cubes.
 - If Yes: Dress Mobile Unit's Location, a Fixed Output of 0.0 Squares and 0.0 Cubes.
- Decision: Can the Mobile Unit Receive the Signal?
 - If No: Process the Signal Output of the Mobile Unit, Up To A Maximum of 0.0 Squares and 0.0 Cubes.
 - If Yes: Receive: (1) the Cell ID of the Cell Site Serving the Mobile Unit and (2) the Cell ID of the Signal Strength of Neighbor Cells that are Receiving Cells.
- Decision: Estimate All Locations Outside of Serving Cell's Service Area.
 - If No: Process Mobile Unit's Location, a Fixed Output of 0.0 Squares and 0.0 Cubes.
 - If Yes: For Each Receiving Neighbor Cell, Estimate Locations Where it Could Not Receive the Repeating Cells.
- Decision: Can a Possible Position Of The Mobile Unit be Determined When One Of the Repeating Signals is Known To Not Be Received?
 - If No: Process Mobile Unit's Location, a Fixed Output of 0.0 Squares and 0.0 Cubes.
 - If Yes: Determine Estimated Position of Mobile Unit One of the Possible Positions Not Eliminated From Consideration in Table Under 0.0 Squares and 0.0 Cubes.
- End

GOOGLE EXHIBIT 1009
 Google & Googleco

- DEMONSTRATIVE EXHIBIT – NOT EVIDENCE* 23

SHKEDI-SPAIN GROUND



- 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.”).

SHKEDI-SPAIN GROUNDS

United States

Patent Application Publication

Spain et al.

Pub. No.: US 2003/0064735 A1

Pub. Date: Apr. 3, 2003

US 2003/0064735 A1

Related U.S. Application Data

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

Publication Classification

Int. Cl.⁷ H04Q 7/28

U.S. Cl. 455-456, 455-457

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 computer-implemented technique for reducing the number of possible positions that have to be searched. 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.

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Appl. No.: 08/299,308

Filed: Nov. 18, 2002

FIG. 1

Flowchart illustrating a method for determining the location of a mobile unit (120) in a wireless communication system (100). The process starts at 1200, then proceeds to 1201 (Determine One or More Signals That the Mobile Unit Might Be Able to Receive), 1202 (Direct Mobile Unit to Determine a Signal Quality for N Signals and to Report the Signal Quality for the Strongest, Up To A Maximum of N, Of These Signals), 1203 (Receive (1) the Cell ID of the Cell Site Serving the Mobile Unit, and (2) the Cell ID and Signal Strength of Neighbor Cells That Are Reporting Criteria), 1204 (Eliminate All Locations Outside of Serving Cell's Service Area), 1205 (For Each Reported Neighbor Cell, Eliminate Locations Where It Could Not Hear the Reporting Criteria), 1206 (Eliminate As A Possible Position Of The Mobile Unit All Locations in Which Any Of The N Reported Signals Is Known To Be Lost During Their Area Of The N Signals Not Reported), and 1207 (Choose an Estimate of Position Of Mobile Unit One of the Possible Positions Not Eliminated From Consideration in Steps 1204 through 1206). The process ends at 1208.

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)

ZHU GROUNDS

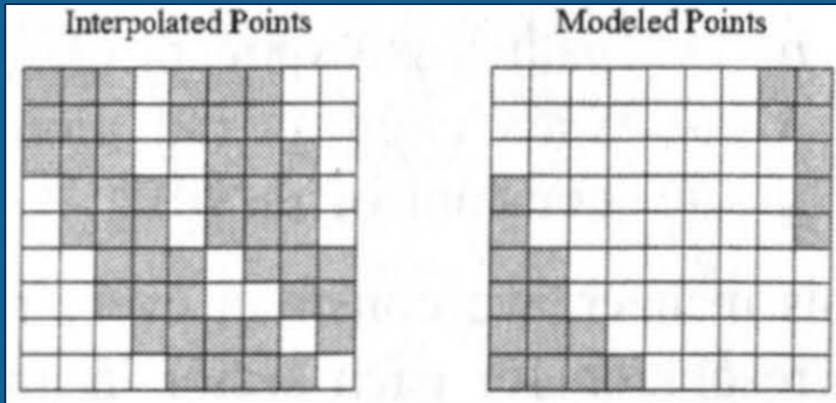
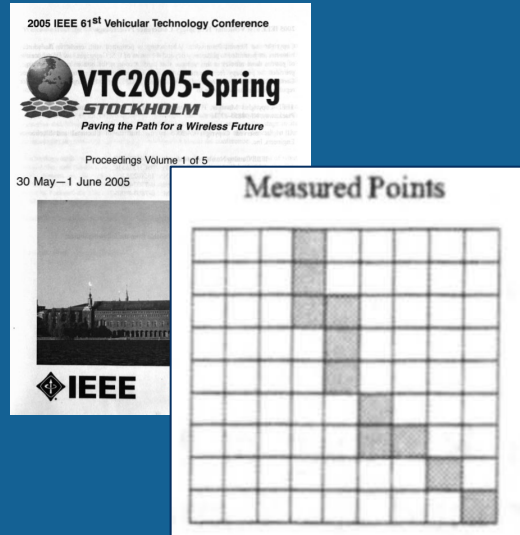
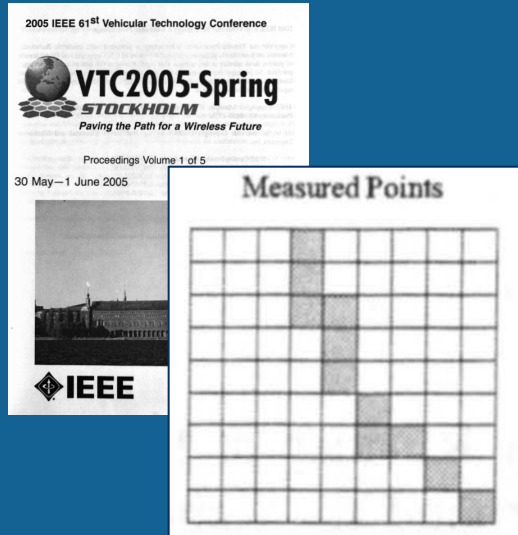


Figure 2 of Zhu (Excerpt)

- 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)

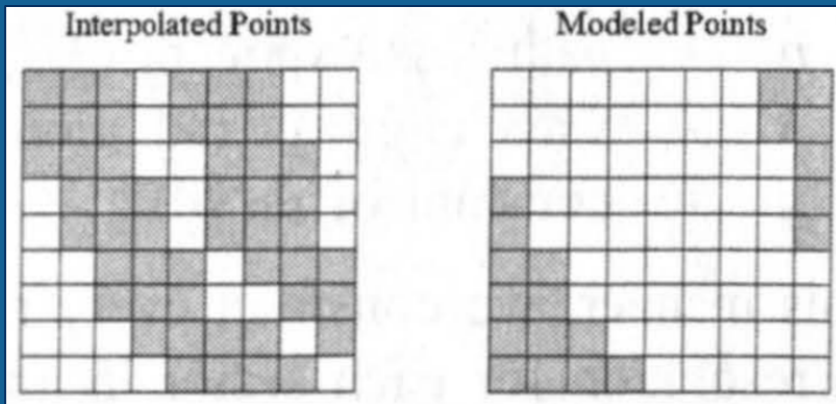
ZHU GROUNDS



- 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.”).

Figure 2 of Zhu (Excerpt)