IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

TRAXCELL TECHNOLOGIES, LLC,
Plaintiff,

v.

GOOGLE LLC,
Defendant.

CASE NO. 6:21-cv-00023

JURY DEMAND

PLAINTIFF'S ORIGINAL COMPLAINT FOR PATENT INFRINGEMENT

Traxcell Technologies, LLC. ("Traxcell") files this Original Complaint, and demand for jury trial seeking relief from patent infringement by Google LLC ("Defendant" or "Google"), alleging infringement of the claims of U.S. Pat. No. 9,918,196, U.S. Pat. No. 9,549,388, and U.S. Pat. No. 10,820,147 (collectively referred to as "Patents-in-Suit"), as follows:

I. THE PARTIES

1. Plaintiff Traxcell is a Texas Limited Liability Company, with its principal place of business located at 103 Country Club Drive. #508, Marshall, Texas 75672.

2. Defendant Google LLC is a Delaware corporation with a principal place of business located at 1600 Amphitheater Parkway, Mountain View, California 94043. Google designs, manufactures, uses, imports into the United States, sells, and/or offers for sale in the United States smartphones, tablets, iPods, desktop computers, and notebook computers that use Google Maps. Google markets, sells, and offers to sell its products and/or services, including those accused herein of infringement, to actual and potential customers and end-users located in Texas and in the judicial Western District of Texas such as at the Google maintains a permanent physical presence within the Western District of Texas, conducting business from at least its locations at: 9606 North Mo-Pac Expressway, Suite 700, Austin, Texas 78759; 500 West 2nd Street, Suite 2000, Austin, Texas

78701; 4100 Smith School Road, Austin, Texas 78744; as well as other locations in and around the Austin area.

3. Google is registered to do business in Texas and can be served via its registered agent, Corporation Service Company dba CSC – Lawyers Incorporating Service Company at 211 East 7th Street, Suite 620, Austin, Texas 78701-3218.

4. Google has placed or contributed to placing infringing products like the Google Maps for use on a computing device connected to a wireless network into the stream of commerce via an established distribution channel knowing or understanding that such products would be sold and used in the United States, including in the Western District of Texas. On information and belief, Google also has derived substantial revenues from infringing acts, including but not limited to advertising, business APIs, private usage, OEM usage, and/or the like.

II. JURISDICTION AND VENUE

5. This is an action for patent infringement arising under the patent laws of the U.S., 35 U.S.C. §§ 1 et. seq. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331, 1332(a) and 1338(a).

6. This Court has personal jurisdiction over Defendants because: Defendants are present within or has minimum contacts within the State of Texas and this judicial district; Defendants have purposefully availed itself of the privileges of conducting business in the State of Texas and in this judicial district; Defendants regularly conducts business within the State of Texas and within this judicial district; and Plaintiff's cause of action arises directly from Defendants' business contacts and other activities in the State of Texas and in this judicial district. The amount in controversy is more than $75,000.00.

7. Venue is proper in this judicial district per 28 U.S.C. §§ 1391 and 1400(b). Google has committed acts of infringement in this judicial district and maintains regular and established places of business in this district, as set forth above. Google has continuous and systematic business contacts with the State of Texas. Google, directly or through subsidiaries or intermediaries (including distributors, retailers, contract manufacturers, and others), conducts its business extensively throughout Texas, by shipping, manufacturing, distributing, offering for sale, selling, and advertising (including the provision of interactive web pages) its products and services in the State of Texas and the Western District of Texas. Google, directly or through subsidiaries or intermediaries (including distributors, retailers, contract manufacturers, and others), has purposefully and voluntarily placed its infringing products and services into this District and into the stream of commerce with the intention and expectation that they will be purchased and used by consumers in this District.

III. INFRINGEMENT ('196 Patent (attached as Exhibit A))

8. On March 13, 2018, U.S. Patent No. 9,918,196 ("the '196 patent"), attached as Exhibit A, entitled "Internet queried directional navigation system with mobile and fixed originating location determination" was duly and legally issued by the U.S. Patent and Trademark Office. Traxcell owns the '196 patent by assignment.

9. The '196 Patent's Abstract states, "A mobile wireless network and a method of operation provide directional assistance in response to an Internet query. The directional assistance is provided from a location of the querying device to a destination that may be selectively prompted based on whether the destination is a nearby business, a type of business, a street address, or another mobile device or fixed telephone location. The location of the querying

device is also selectively determined depending on whether the querying device is a wireless device such as a mobile telephone, or whether the device has a presumed fixed location, such as an ordinary telephone connected to a public-switched telephone network (PSTN).

10. The following preliminary exemplary chart provides notice of Traxcell's allegations of infringement.

Exemplary Claim	**Corresponding Structure in Accused Systems**
A method of providing navigation assistance to a user of a communications device, the method comprising:	The Google Maps online navigation service and the Google Maps server-side or cloud infrastructure needed to provide the service, constitute the "Accused System". The term "Google Maps" encompasses and includes all the versions and variants of the Google Maps web (for PC) and the Google Maps app (Google Maps app for Android and iOS devices) and the applications supported by the Google Maps Platform. The "method of providing navigation assistance to a user of a communications device" refers to the method by which Google Maps provides online navigation assistance (directions) to a user of a communications device or UE (example: mobile phone, smartphone, laptop, tablet, iPhone, iPad etc.) including the Google Maps app or including a browser plugin enabling access to the Google Maps website or having other means to access the Google Maps website, for querying and receiving navigation instructions for travelling from a starting location (current location of the communications device or a location specified by its user as the 'origin') to a destination location (a location specified by the said user as the 'destination'). The "communications device" refers to a UE (example: mobile phone, smartphone, laptop, tablet, iPhone, iPad etc.) including the Google Maps app or including a browser plugin enabling access to the Google Maps website or having other means to access the Google Maps website for querying and receiving navigation instructions for travelling from a starting location (current location of the communications device or a location specified by its user as the 'origin') to a destination location (a location specified by the said user as the 'destination').

Exemplary Claim	Corresponding Structure in Accused Systems
	The said "communications device" (the user of the said "communications device") is device of including but not limited to Verizon, T-Mobile, Sprint, SPRINT, Nokia, and the other United States communications device provider. Verizon, T-Mobile, Sprint, supports the Google Maps online navigation service on devices that are subscribed to wireless telecommunications network services of the Verizon, T-Mobile, Sprint, SPRINT, Nokia or any other united states carrier. Verizon, T-Mobile, SPRINT, etc. provides the mobile data service required to use the Google Maps online navigation service. Google Maps provides navigation assistance (directions) to a "user of a communications device" for travelling from a starting location (Ex: Starbucks, 13-25 Astor Pl, New York, NY 10003, USA) to a destination location (Ex: Central Park South, New York, NY, USA).
receiving, by a directional assistance service, an Internet query initiated at the communications device and directed via the Internet to initiate a request for navigational assistance to a destination;	Navigation using Google Maps online navigation service is a well-known example of off board navigation. To elaborate, an off board navigation system is a client/server system wherein only the user interface (UI) resides on the client's (user's) communications device and all the databases (GIS and/or mapping) and infrastructure required for computation (of route, distance, travel time, traffic etc.) reside remotely on a server or a network of servers (the server-side) located on the world wide web (www). The server-side could also comprise virtual (instead of physical) or cloud server infrastructure. The client side (user interface or UI at a user's communications device) can only communicate with the server-side via the Internet. This claim element refers to the method and process involved in initiating a navigation query, using Google Maps online navigation service, to obtain directions (navigation assistance) for travelling from a starting location to a destination location. The process involved in initiating the said navigation query includes inputting a destination location at the Google Maps' user interface (UI) at the user's communications device, and sending the said query via Internet to the remote Google Maps server (cloud server). The said remote Google Maps server (cloud server) receives the said query via Internet. The term "directional assistance service" herein refers to Google Maps online navigation service supported and facilitated by wireless telecommunications network of the Verizon, T-Mobile, Sprint, SPRINT, Nokia or any other united states carrier.

Exemplary Claim	Corresponding Structure in Accused Systems
	The "communications device" refers to a UE (example: mobile phone, smartphone, laptop, tablet, iPhone, iPad etc.) including the Google Maps app or including a browser plugin enabling access to the Google Maps website or having other means to access the Google Maps website, for querying and receiving navigation instructions for travelling from a starting location (current location of the communications device or a location specified by its user as the 'origin') to a destination location (a location specified by the said user as the 'destination'). The method of using the Google Maps for navigation includes initiating a query at the communications device to initiate a request for navigational assistance for travelling from a starting point (which could be the current location of the user's communications device) to a destination, by specifying (inputting) the destination and the starting point (if different from the current location of the user's communications device). The said query is directed via the Internet to the remote Google Maps server (cloud server). In other words, the Google Maps server (cloud server) receives the said query through the Internet. Google Maps online navigation is an example of off board navigation. In other words, Google Maps online navigation system is a client/server system wherein only the user interface (UI) resides on the client's (user's) communications device and all the databases (GIS and/or mapping) and infrastructure required for computation (of route, distance, travel time, traffic etc.) reside remotely on a Google Maps server or a network of servers (the server-side) located on the world wide web (www). The server-side could also comprise virtual (instead of physical) or cloud server infrastructure. The client side (user interface or UI at a user's communications device) can only communicate with the server-side via the Internet. In other words, destination is input and a query is initiation at the Google Maps user interface (UI) at the client device and the query (including the input destination) is communicated from the client-side (client or user's communications device) to the remote server-side (Google Maps server) via the Internet. The Google Maps server, upon receiving the query (including the input destination) communicated from the client-side (client or user's communications device) via the Internet, identifies the required map tiles (or grid squares), computes or calculates the route(s), and downloads the required map tiles (or grid squares) and the computed or calculated route(s) to the client-side (client or user's communications device) via the Internet. The aforementioned fact that Google Maps online navigation is an example of off-board navigation is established from the following details available in the public domain – a) In Attachment 8, which is a copy of information on off-board navigation available on the Wikipedia, Google Maps (online navigation) is cited as an example of off-board navigation system. The following is mentioned therein –

Exemplary Claim	Corresponding Structure in Accused Systems
	"In addition to navigation software, there are also route planner as offboard solution. The difference to the conventional route planning in the Internet is the possibility of the location transmission of the user. Google Maps offers such a mobile route planner with the Google Maps Mobile software." Attachment 8 also elaborates on and describes off-board navigation. The following is mentioned therein – "The **offboard navigation** allows the use of a mobile phone as a navigation system, with the route data and maps not stored on the device. Using special navigation software, the user contacts an external server via UMTS or GPRS and downloads the desired route information and maps from there. In everyday language, off-board navigation is also called "mobile phone navigation". "The difference between offboard navigation and onboard navigation: In the case of onboard navigation, the route data and maps are stored together with navigation software in the mobile device. This requires a lot of storage space, so onboard navigation is only suitable for devices with a larger processor and more storage space, such as PDAs and smartphones. For offboard navigation, however, are now many popular mobile phones with Java operating system (J2ME). A prerequisite for offboard navigation is that the mobile phone can connect to the Internet via UMTS or GPRS. Both variants require GPS reception. It must therefore have an integrated or an externally connected GPS receiver (GPS mouse). If an external GPS receiver is used, the two devices are now usually coupled together via Bluetooth." b) In Attachment 9, which is a copy of information on Google Maps navigation available on the Wikipedia, Google Maps (online navigation) is described as an off-board navigation system, which subsequent to receiving a destination input at the client-side user interface (UI) obtains map and route information (from its server) via the Internet. The following is mentioned therein – "**Google Maps Navigation** is a mobile application developed by Google for the Android and iOS operating systems that was later integrated into the Google Maps mobile app. The application uses an Internet connection to a GPS navigation system to provide turn-by-turn voice-guided instructions on how to arrive at a given destination. The application requires connection to Internet data (e.g. 3G, 4G, WiFi, etc.) and normally uses a GPS satellite connection to determine its location. A user can enter a destination into the application, which will plot a path to it. The app displays the user's progress along the route and issues instructions for each turn."

Exemplary Claim	Corresponding Structure in Accused Systems
	"Once the user has searched for a destination, the map will cache along the intended route. Note that the application requires an Internet connection to search for the route, but once a route has been found, the user no longer requires an Internet connection as the route is temporarily saved onto the device." c) In Attachment 10, which is a copy of information on Google Maps available on the Wikipedia, Google Maps (online navigation) is described as an off-board navigation system, wherein subsequent to inputting a destination input at the client-side user interface (UI) map tiles (or grid squares) are downloaded to the client-side (user's communications device) from the remote Google Maps server via the Internet. The following is mentioned therein – "As the user drags the map, the grid squares are downloaded from the server and inserted into the page. When a user searches for a business, the results are downloaded in the background for insertion into the side panel and map; the page is not reloaded." d) Attachment 11 describes Google Maps (online navigation) as an online and off board navigation system, which upon destination input and query initiation at the UI at the client device, downloads maps to the client device from its remote server via Internet. Attachment 11 also elaborates on and describes a typical "online/off board navigation system". The following is mentioned therein – "**Navigation online / offboard** This refers to a navigation **solution** that does not store your maps in the internal memory of the smartphone or on its SD card, but during use continuously from a server on the Internet. Thus, a continuous, wideband broadband Internet connection (UMTS, HSDPA, in the future also LTE) during the navigation is mandatory requirement. **Benefits of this online solution:** You do not have to worry about map updates, but always automatically use the most up-to-date maps available. In addition, the two most popular online navigation solutions for Android are free: Skobbler from a Berlin company and the well-known Google Maps Navigation." Attachment 11 also mentions the amount of data Google Maps (online navigation) requires. The following is mentioned therein –

Exemplary Claim	Corresponding Structure in Accused Systems
	"However, these free online solutions certainly have disadvantages: they cause considerable data traffic between the server of the navigation solution provider and your smartphone. If you only select the map view on Google Maps, you can significantly reduce the traffic: A 55-kilometer route caused only 1 MB of traffic in Google Maps Navigation in the map view. In the satellite view, it was on the same route 11 MB of traffic!" "And of course, an online solution requires a good internet connection. So, if you're often away from metropolitan areas in areas with poor data connectivity and therefore usually surf at edge speeds, then you should opt for an onboard solution. However, the use of Google Maps Navigation worked well with Edge, if you do not unnecessarily increase the resulting traffic. **Therefore, our tip:** With an online navigation solution like Google Maps Navigation, you should do without the satellite view and only choose the map view if the internet connection is poor and / or the monthly traffic limit is low." e) Attachment 12 describes Google Maps (online navigation) as an off board navigation system, which upon destination input and query initiation at the UI at the client device, downloads maps to the client device from its remote server via Internet. The following is mentioned therein – "Using GPS and mobile network, Google Maps locates you with astonishing precision. If you are looking for restaurants, petrol stations or ATMs, you will not only get the corresponding contact details and the position on the map, but you can also be directed there directly. With Google Map you always check your current position and find the best route to your desired destination. Who wants to use the free navigation frequently, should get an internet flat rate, as Google Maps pulls the map data from the Internet (Offboard- Navigation)." f) Attachment 4 indicates that Google Maps (online navigation) is an off board navigation system, which upon destination input and query initiation at the UI at the client device, downloads maps to the client device from its remote server via Internet. It also confirms that wireless telecommunications network (T-Mobile, Verizon, SPRINT, etc.) provides the mobile data service required to use the Google Maps online navigation service. The following is mentioned therein – "Google maps has offline maps feature save mobile data. Global Positioning Service - GPS is provided free of cost by satellite everywhere. Data will be used to get maps on the go with T Mobile, Verizon, Sprint, Airtel, Vodafone." "**Google maps app** is FREE to use but they do need **area maps** to be downloaded. Google maps allows offline or without internet access of their maps, if you have downloaded them earlier on your mobile."

Exemplary Claim	Corresponding Structure in Accused Systems
	"If not downloaded, and you use Google maps to find directions using your own FREE GPS receiver (installed in your smartphone) using your mobile internet connection to get maps on the go and show you directions." "Remember, Google maps (if maps not already available) would need the internet connection and would incur internet data charges in roaming." So, based on the foregoing information it is established that navigation using Google Maps online navigation service is an example of off board navigation. As we have learnt, an off board navigation system is a client/server system wherein only the user interface (UI) resides on the client's (user's) communications device and all the databases (GIS and/or mapping) and infrastructure required for computation (of route, distance, travel time, traffic etc.) reside remotely on a server or a network of servers (the server-side) located on the world wide web (www). The server-side could also comprise virtual (instead of physical) or cloud server infrastructure. The client side (user interface or UI at a user's communications device) can only communicate with the server-side via the Internet. In other words, destination is input and a query is initiation at the Google Maps user interface (UI) at the client device and the query (including the input destination) is communicated from the client-side (client or user's communications device) to the remote server-side (Google Maps server) via the Internet. The Google Maps server, upon receiving the query (including the input destination) communicated from the client-side (client or user's communications device) via the Internet, identifies the required map tiles (or grid squares), computes or calculates the route(s), and downloads the required map tiles (or grid squares) and the computed or calculated route(s) to the client-side (client or user's communications device) via the Internet. The said query is communicated from the Google Maps' client-side to the Google Maps server in the form of a URL The method of using the Google Maps for navigation includes initiating a query at the communications device to initiate a request for navigational assistance for travelling from a starting point (which could be the current location of the user's communications device) to a destination, by specifying (inputting) the destination and the starting point (if different from the current location of the user's communications device). The said query is directed via the Internet to the remote Google Maps server (cloud server). In other words, the Google Maps server (cloud server) receives the said query through the Internet.

Exemplary Claim	Corresponding Structure in Accused Systems
responsive to receiving the Internet query, determining whether or not the communications device is a mobile wireless communications device;	Google Maps is programmed to identify the "phone type" (or device type) and the "unique identifier" of the communications device (UEat which the said navigation query is initiated. In other words, Google Maps determines whether or not the said communications device (UE) is a mobile wireless communications device (UE). "a mobile wireless communications device" refers to a mobile wireless communications device or UE (example: mobile phone, smartphone, laptop, tablet, iPhone, iPad etc.), which includes the Google Maps app or includes a browser plugin enabling access to the Google Maps website or has other means to access the Google Maps website for querying and receiving navigation instructions for travelling from a starting point (current location of the communication's device or a location specified by its user as the 'origin') to a destination location (a location specified by the said user as the 'destination'). In Attachment 20, Google Privacy Policy document, it is clearly mentioned that Google (Google Maps) collects information such as device type, phone number and unique identifiers pertaining to the communications device (UE) at which a navigation query is initiated and communicated to the Google Maps server. In other words, Google Maps has means to determine whether a querying communications device (UE) is a mobile wireless communications device (UE) or not. The following is mentioned therein – "Information we collect as you use our services From the aforementioned, it is also confirmed that whenever a communications device uses Google Maps, information such as mobile network information including name of the carrier serving the said communications device are collected by Google (Google Maps). In other words, Google Maps can also ascertain whether the communications device (UE) at which the said navigation query is initiated, is connected to the Google Maps server through a wireless telecommunications network service (i.e. through RF signal-based communication) or through a Wi-Fi network supported by a fixed-line or wired broadband Internet service. A copy of the Google Play webpage displaying information on Google Maps app updated on November 8, 2018, it is clearly mentioned that the Google Maps app has access to Phone, Device ID and Call information pertaining to the device on which it is installed, and it can read "phone status and identity". In other words, Google Maps has means to determine whether a querying communications device (UE) is a mobile wireless communications device (UE) or not. Google Maps app installed on a communications device can "view Wi-Fi connections" and can "view network connections" pertaining to the said communications device.

Exemplary Claim	Corresponding Structure in Accused Systems
	In other words, Google Maps can also ascertain whether the communications device (UE) at which the said navigation query is initiated, is connected to the Google Maps server through a wireless telecommunications network service (i.e. through RF signal-based communication) or through a Wi-Fi network supported by a fixed-line or wired broadband Internet service. In summary, Google Maps has means to determine whether a querying communications device (UE) is a mobile wireless communications device (UE) or not, and also whether the said communications device (UE) is connected to the Google Maps server through a wireless telecommunications network service (i.e. through RF signal-based communication) or through a Wi-Fi network supported by a fixed-line or wired broadband Internet service.
responsive to determining that the communications device is the mobile wireless communications device, the directional assistance service determining and using a present location of the mobile wireless communications device as a location of the communications device;	If the Google Maps online navigation service determines that the said navigation query has been initiated at a mobile wireless communications device (UE), and that the said query was communicated through a wireless telecommunications network service (i.e. through RF signal-based communication), Google Maps determines current location of the mobile wireless communications device (UE) and uses it as the starting point for providing navigation information (instructions or directions) to travel to the destination input by the user of the said communications device (UE). The "the mobile wireless communications device" or the "communications device" refers to the mobile wireless communications device or UE (example: mobile phone, smartphone, laptop, tablet, iPhone, iPad etc.) at which the navigation query was initiated. A user can simply input a "destination" entry and initiate a navigation query on the Google Maps' client-side user interface (UI) at the user's mobile wireless communications device (Google Maps app on an Android smartphone). The Google Maps server, upon receiving the navigation query (including input "destination") from the client-side via Internet, determines the "current location" of the user's mobile wireless communications device, uses it as the default starting point, ascertains the location of the input "destination", computes or calculates the route(s) and directions, and downloads the computed or calculated route(s) and directions to the user's mobile wireless communications device. A user can simply input a "destination" entry and initiate a navigation query on the Google Maps' client-side user interface (UI) at the user's mobile wireless communications device (Google Maps app on an Android smartphone). The Google Maps server, upon receiving the navigation query (including input "destination") from the client-side via Internet, determines the "current location" of the user's mobile wireless communications device, uses it as the default starting point, ascertains the location of the input "destination", computes or calculates the

Exemplary Claim	Corresponding Structure in Accused Systems
	route(s) and directions, and downloads the computed or calculated route(s) and directions to the user's mobile wireless communications device. As has been mentioned with reference to the previous claim element, Google Maps, upon receiving a navigation query from a user's communications device, determines whether or not the said communications device is a mobile wireless communications device. Aa user can simply input a "destination" entry and initiate a navigation query on the Google Maps' client-side user interface (UI) at the user's mobile wireless communications device (Google Maps app on a smartphone). Implying that the Google Maps server, upon receiving the navigation query (including input "destination") from the client-side via Internet, determines the "current location" of the user's mobile wireless communications device, uses it as the default starting point, ascertains the location of the input "destination", computes or calculates the route(s) and directions, and downloads the computed or calculated route(s) and directions to the user's mobile wireless communications device. A user can simply input a "destination" entry and initiate a navigation query on the Google Maps' client-side user interface (UI) at the user's mobile wireless communications device (Google Maps app on an Android phone or tablet). The Google Maps server, upon receiving the navigation query (including input "destination") from the client-side via Internet, determines the "current location" of the user's mobile wireless communications device, uses it as the default starting point, ascertains the location of the input "destination", computes or calculates the route(s) and directions, and downloads the computed or calculated route(s) and directions to the user's mobile wireless communications device.
responsive to determining that the communications device is not the mobile wireless communications device, obtaining a fixed location associated with the communications device to determine the location of the	As mentioned previously, Google Maps is programmed to identify the "phone type" (or device type) of the communications device (UE) at which the said navigation query is initiated, and also to ascertain whether the communications device (UE) at which the said navigation query is initiated, is connected to the Google Maps server through a wireless telecommunications network service (i.e. through RF signal-based communication) or through a Wi-Fi network supported by a fixed-line or wired broadband Internet service. In other words, Google Maps has means to determine whether a querying communications device (UE) is a mobile wireless communications device (UE) or not, and also whether the said communications device (UE) is connected to the Google Maps server through a wireless telecommunications network service (i.e. through RF signal-based communication) or through a Wi-Fi network supported by a fixed-line or wired broadband Internet service.

Exemplary Claim	Corresponding Structure in Accused Systems
communications device; and	In the Google Privacy Policy document, it is clearly mentioned that Google (Google Maps) collects information such as device type, phone number and unique identifiers pertaining to the communications device (UE) at which a navigation query is initiated and communicated to the Google Maps server. In other words, Google Maps has means to determine whether a querying communications device (UE) is a mobile wireless communications device (UE) or not. The following is mentioned therein:
the directional assistance service providing navigation information to the communications device in response to the Internet query, wherein the navigation provides directions for proceeding from the location of the communications device to a location of the destination.	In response to receiving the navigation query (which includes the "destination" entry input by the user at the Google Maps client-side user interface or UI residing at the user's communications device) initiated at the communications device (UE) and directed via the Internet, Google Maps server determines the current location of the querying (the user's) communications device, considers it the default starting point, ascertains the location of the input "destination", computes and provides the navigation information (directions) to the said communications device (UE) to travel from the current location of said communications device (UE) to the input destination. A user can simply input a "destination" entry and initiate a navigation query on the Google Maps' client-side user interface (UI) at the user's mobile wireless communications device (Google Maps app on an Android smartphone). The Google Maps server, upon receiving the navigation query (including input "destination") from the client-side via Internet, determines the "current location" of the user's mobile wireless communications device, uses it as the default starting point, ascertains the location of the input "destination", computes or calculates the route(s), and downloads the computed or calculated route(s) to the user's mobile wireless communications device. In this manner, Google Maps provides the navigation information (directions) to the said communications device (UE) to travel from the current location of said communications device (UE) to the input destination. A user can simply input a "destination" entry and initiate a navigation query on the Google Maps' client-side user interface (UI) at the user's mobile wireless communications device (Google Maps app on an Android smartphone). The Google Maps server, upon receiving the navigation query (including input "destination") from the client-side via Internet, determines the "current location" of the user's mobile wireless communications device, uses it as the default starting point, ascertains the location of the input "destination", computes or calculates the route(s), and downloads the computed or calculated route(s) to the user's mobile wireless communications device. In this manner, Google Maps provides the navigation information (directions) to the said communications device (UE) to travel from the current location of said communications device (UE) to the input destination.

11. Defendant makes, uses, offers to sell, and/or sells within or imports into the wireless-network components, related applications and programs, and related services that use identified locations of wireless devices to provide directional assistance such that

Defendant infringes claims 1–30 of the '196 patent, literally or under the doctrine of equivalents.

12. Defendant put the inventions claimed by the '196 Patent into service (i.e., used them); but for Defendant's actions, the claimed-inventions embodiments involving Defendant's products and services would never have been put into service. Defendant's acts complained of herein caused those claimed-invention embodiments as a whole to perform, and Defendant obtaining monetary and commercial benefit from it.

13. Defendant has and continues to induce infringement. Defendants have actively encouraged or instructed others (e.g., its customers, such as Verizon, T-Mobile and Sprint), and continues to do so, on how to use its products and services (e.g., wireless-network components and related applications and programs that use identified locations of wireless devices to provide directional assistance) such to cause infringement claims 1–30 of the '196 patent, literally or under the doctrine of equivalents. Moreover, Defendant has known and should have known of the '196 patent, by at least by the date of the patent's issuance, or from the issuance of the '284 patent, which followed the date that the patent's underlying application was cited to Defendants by the U.S. Patent and Trademark Office during prosecution of one of Defendant's patent applications, such that Defendant knew and should have known that it was and would be inducing infringement.

14. Defendant has and continues to contributorily infringe. Defendant has actively encouraged or instructed others (e.g., its customers and/or the customers of its related companies, such as Verizon, T-Mobile and Sprint), and continues to do so, on how to use its products and services e.g., wireless-network components and related applications and programs that use identified locations of wireless devices to provide directional assistance) such as to cause

infringement of one or more of claims 1–30 of the ’196 patent, literally or under the doctrine of equivalents. Moreover, Defendant has known of the ’196 patent and the technology underlying it from at least the date of issuance of the patent or from the issuance of the ‘284 patent, which followed the date that the patent’s underlying application was cited to Defendants by the U.S. Patent and Trademark Office during prosecution of one of Defendant’s patent applications, such that Defendant knew and should have known that it was and would be contributorily infringing.

15. Defendants have caused and will continue to cause Traxcell damage by infringing the ’196 patent.

IV. INFRINGEMENT (’388 Patent (Attached as exhibit B))

16. On January 17, 2017, U.S. Patent No. 9,549,388 (“the ’388 patent”) entitled “Mobile wireless device providing off-line and on-line geographic navigation information” (attached as Exhibit D) was duly and legally issued by the U.S. Patent and Trademark Office. Traxcell owns the ’388 patent by assignment.

17. The ’388 Patent’s Abstract states, “A mobile device, wireless network and their method of operation provide both on-line (connected) navigation operation, as well as off-line navigation from a local database within the mobile device. Routing according to the navigation system can be controlled by traffic congestion measurements made by the wireless network that allow the navigation system to select the optimum route based on expected trip duration.”

18. The following preliminary exemplary chat provides Traxcell’s allegations of infringement.

Exemplary Claim	Corresponding Structure in Accused Systems
A wireless communications system including:	The Google Maps online navigation service and the Google Maps server-side or cloud infrastructure needed to provide the service, constitute the "Accused System".
a first radio-frequency transceiver within a wireless mobile communications device and an associated first antenna to which the first radio-frequency transceiver is coupled, wherein the first radio-frequency transceiver is configured for radio-frequency communication with a wireless communications network;	When a wireless communication device transceivers and antennas are in communication, they are coupled. Further, in addition to being so coupled, the transceiver of each Exhibit-B item is also configured for RF-communication wireless communication networks, such as AT&T, Verizon, T-Mobile, and other US networks (Cellular or WLAN) via Google Maps which comes preloaded on Exhibit-B items. Wireless mobile communication device — including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc.— include radio-frequency transceivers and an associated antenna. When wireless communication device transceivers and antennas are in communication, they are coupled. Further, in addition to being so coupled, the transceiver of each is also configured for RF-communication with the wireless communication network.
a first processor within the wireless mobile communications device coupled to the at least one first radio-frequency transceiver	Wireless mobile communication device- including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc. (refer Exhibit B for complete list) has a processor, for example, Quad-Core/ Octa-core processor. Each Exhibit-B-listed mobile wireless communications device's motherboard processor is programmed to process location-service information; i.e., to receive a location of the device from the wireless communications network (which is communicated to the device from the first RF transceiver) and generate an indication of the device's location with respect to geographic features according to mapping information stored within the device.

Exemplary Claim	Corresponding Structure in Accused Systems
	For example, the motherboard processor may use Google Maps to view and find places around the globe. The processor and base station transceivers communicate by RF communication and, thus, when doing so are communicatively coupled.
programmed to receive a location of the wireless mobile communications device from the wireless communications network and generate an indication of a location of the wireless mobile communications device with respect to geographic features	Plaintiff contends the Exhibit-B-listed mobile-wireless-communications device's motherboard processor is programmed to process location-service information; i.e., to receive a location of the device from the wireless communications network and generate an indication of the device's location. For example, the motherboard processor may use Google Maps to obtain the device's location and provide direction from that location to a destination. Wireless mobile communication device- including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc. has a processor for example, Quad-Core processor. When wireless communication device transceivers and processor are in communication, they are coupled. Further, the Location-based Service (LBS) provider, such as Google Map, on the Exhibit-B utilizes the processor coupled to the transceiver to estimates/receive the location on mobile wireless communications devices by utilizing wireless communication network or first computer. For example, the motherboard processor may use Google Maps to view and find places around the globe. Google map can also show your current location and provide direction (including with respect to geographic features such as nearby restaurants) from your location/source to any destination. In using Google Maps App, the mobile wireless communication device's motherboard processor generates signals for displaying on the device's screen a blue dot that shows the current location of the wireless mobile communication device. The Google map app estimates the location of the device from 3 sources: GPS (GPS uses satellites and knows your location within a few meters), Wi-Fi (the location of nearby Wi-Fi networks helps Maps know where you are), and cell towers (cell tower can be accurate up to a few thousand meters). When Google Maps isn't sure about your location, a light blue circle around the blue dot is shown. You might be anywhere within the light blue circle. The smaller the circle, the more certain the app is about your location. Furthermore, Google Maps App provides flexibility to download maps on SD card/internal memory of communication device examples of compatible devices is

Exemplary Claim	Corresponding Structure in Accused Systems
	Samsung Galaxy S20, Pixel 4a, Pixel 4a 5G, Pixel 5, etc., and navigate offline. When internet is slow or mobile data is expensive, or communication device cannot connect to internet, an area can be saved to phone or tablet (Exhibit B) from Google maps app and use it when offline. Communication device can use Offline maps for Navigation through the downloaded area without internet.
according to mapping information stored within the wireless mobile communications device, and	Plaintiff contends Google's and others mobile-wireless-communications device's motherboard processor is programmed to process location-service information; i.e., to receive a location of the device from the wireless communications network and generate an indication of the device's location. For example, the motherboard processor may use Google Maps to obtain the device's location and provide direction from that location to a destination. Wireless mobile communication device- including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc. (refer Exhibit B for complete list) has a processor for example, Quad-Core processor. When wireless communication device transceivers and processor are in communication, they are coupled. Further, the Location-based Service (LBS) provider, such as Google Map, on the Exhibit-B utilizes the processor coupled to the transceiver to estimates/receive the location on mobile wireless communications devices by utilizing wireless communication network or first computer. For example, the motherboard processor may use Google Maps to view and find places around the globe. Google map can also show your current location and provide direction (including with respect to geographic features such as nearby restaurants) from your location/source to any destination. In using Google Maps App, the mobile wireless communication device's motherboard processor generates signals for displaying on the device's screen a blue dot that shows the current location of the wireless mobile communication device. The Google map app estimates the location of the device from 3 sources: GPS (GPS uses satellites and knows your location within a few meters), Wi-Fi (the location of nearby Wi-Fi networks helps Maps know where you are), and cell towers

Exemplary Claim	Corresponding Structure in Accused Systems
	(cell tower can be accurate up to a few thousand meters). When Google Maps isn't sure about your location, a light blue circle around the blue dot is shown. You might be anywhere within the light blue circle. The smaller the circle, the more certain the app is about your location. Furthermore, Plaintiff contends Google Maps App provides flexibility to download maps on SD card/internal memory of communication device examples of compatible devices is Samsung Galaxy S20, Pixel 4a, Pixel 4a 5G, Pixel 5, etc., and navigate offline. When internet is slow or mobile data is expensive, or communication device cannot connect to internet, an area can be saved to phone or tablet from Google maps app and use it when offline. Communication device can use Offline maps for Navigation through the downloaded area without internet.
wherein the processor displays to the user navigation information according to the location of the wireless mobile communications device with respect to the geographic features and a destination specified by the user at the wireless mobile communications device;	Plaintiff contends the motherboard processor (i.e., processor on the motherboard) of each wireless communication device item meets this limitation. The processor processes location-service information, including displaying user navigation information according to the device's location with regards to geographic features and a user-specified destination. For example, using Google map app for more examples of location services processed by each Exhibit-B device's motherboard processor) the device user locates the device's current location on the google map app and then provide details for a destination on the options, provided in the Google map app. The user can then navigate (i.e., the processor processes display information) in real time from current location to destination. The processor displays navigation in the Google Maps app to display turn-by-turn directions. Using the Google map app, the processor will show the directions and use real-time traffic information to find the best route to the specified destination.

Exemplary Claim	Corresponding Structure in Accused Systems
at least one second radio-frequency transceiver and an associated at least one second antenna of the wireless communications network to which the second radio-frequency transceiver is coupled; and	Plaintiff contends each Accused System includes a base station and each of which is coupled to at least one antenna. Base station includes radio-frequency transceivers designed and used for radio-frequency communication with at least one antenna. When base-station transceivers and antennas are in communication, they are coupled. Further, in addition to being so coupled, the transceivers and antenna of each Exhibit-A item are also, by placement within a base station, physically coupled. The cell of the wireless communications network include base stations for transmission and reception of wireless signals to and from the mobile wireless communication devices or UEs or user devices (mobile phones, laptops, tablets, PDAs etc.). These base stations are, therefore, RF transceivers. Also, these base stations are coupled with at least one antenna for the function of transmission and reception.
a second processor coupled to the at least one second radio-frequency transceiver programmed to determine the location of the wireless mobile communications device,	Plaintiff contends that Google Maps has one or more processors that determine(s) the location of wireless mobile communications devices. These processors communicatively coupled to the second RF transceiver(s) and are programmed to determine a wireless mobile communication device's location. W reless mobile communications devices can, through the second RF transceiver(s), communicatively connect to and use Google Maps. Google Maps' processors can determine the device's current location and direction from that location/source to any destination. The processors are programmed to estimate the location of the device from 3 sources: GPS (GPS uses satellites and knows your location within a few meters), Wi-Fi (the location of nearby Wi-Fi networks helps Maps know where you are), and cell towers (cell tower can be accurate up to a few thousand meters).
wherein the second processor selectively determines the location of the wireless mobile communications	Plaintiff contends each wireless mobile can set preference flags that enable or disable accessibility to data relevant to the device's location by Location-Based Services (LBS) providers. Such programmability by a wireless device is at times known as a privacy setting. Further, such programmability is available by location-permission granting (wireless mobile communications device must grant permission). The LBS providers' processors select to determine a wireless mobile communications device's location if the preference flags applicable to that device have been set for enablement. The processors select to not determine a wireless mobile communications

Exemplary Claim	Corresponding Structure in Accused Systems
device dependent on the setting of preference flags,	device's location if the preference flags applicable to that device have not been set for enablement.
wherein the second processor determines the location of the wireless mobile communications device if the preference flags are set to a state that permits tracking of the user of the wireless mobile communications device and communicates the location of the wireless mobile communications device to the first processor via the second radio-frequency transmitter, and	Plaintiff contends each wireless mobile can set preference flags that enable or disable accessibility to data relevant to the device's location by Location-Based Services (LBS) providers. The LBS providers' processors select to determine a wireless mobile communications device's location if the preference flags applicable to that device have been set for enablement. The processors select to not determine a wireless mobile communications device's location if the preference flags applicable to that device have not been set for enablement. The Navigation hardware/software will only be able to determine and track the location of the Wireless communication device such as but not limited to including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc., Plaintiff contends each wireless mobile can set preference flags that enable or disable accessibility to data relevant to the device's location by Location-Based Services (LBS) providers. Such programmability by a wireless device is at times known as a privacy setting. Further, such programmability is available by location-permission granting (wireless mobile communications device must grant permission). Plaintiff contends that if the preference flags are enabled (i.e., the wireless-mobile-communication device's user has granted permission), LBS-providers' processor(s) proceed with determining the device's location and, when determined, communicates that location to the first processor through the second RF transceiver (which, as discussed above, is a transceiver to which the LBS-providers' processors communicatively couple). The LBS-providers' processors are programmed to estimate the location of the device from 3 sources: GPS (GPS uses satellites and knows your location within a few meters), Wi-Fi (the location of nearby Wi-Fi networks helps Maps know where you are), and cell towers (cell tower can be accurate up to a few thousand meters).

Exemplary Claim	Corresponding Structure in Accused Systems
wherein the second processor does not determine and communicate the location of the wireless mobile communications device if the preference flags are set to a state that prohibits tracking of the wireless mobile communications device.	Plaintiff contends that if the preference flags are not enabled (i.e., the wireless-mobile-communication device's user has not granted permission), LBS provider application hardware/software, will not be able to determine and track the location of the Wireless communication device (Exhibit B) such as but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc.

19. Defendant makes, uses, offers to sell, and/or sells within or imports into the U.S., wireless-network components and related applications and programs, and related services that use identified locations of wireless devices to provide tracking such that Defendant infringes claims 1–30 of the '388 patent, literally or under the doctrine of equivalents.

20. Defendant put the inventions claimed by the '388 Patent into service (i.e., used them); but for Defendant's actions, the claimed-inventions embodiments involving Defendant's products and services would never have been put into service. Defendant's acts

complained of herein caused those claimed-invention embodiments as a whole to perform, and Defendant obtaining monetary and commercial benefit from it.

21. Defendant has and continues to induce infringement. Defendants have actively encouraged or instructed others (e.g., its customers, such as Verizon, T-Mobile and Sprint), and continues to do so, on how to use its products and services (e.g., wireless-network components and related applications and programs that use identified locations of wireless devices to provide tracking of mobile devices) such to cause infringement claims 1–30 of the '388 patent, literally or under the doctrine of equivalents. Moreover, Defendant has known and should have known of the '388 patent, by at least by the date of the patent's issuance, or from the issuance of the '284 patent, which followed the date that the patent's underlying application was cited to Defendants by the U.S. Patent and Trademark Office during prosecution of one of Defendant's patent applications, such that Defendant knew and should have known that it was and would be inducing infringement.

22. Defendant has and continues to contributorily infringe. Defendant has actively encouraged or instructed others (e.g., its customers and/or the customers of its related companies, such as Verizon, T-Mobile and Sprint), and continues to do so, on how to use its products and services e.g., wireless-network components and related applications and programs that use identified locations of wireless devices to provide tracking of mobile devices) such as to cause infringement of one or more of claims 1–30 of the '388 patent, literally or under the doctrine of equivalents. Moreover, Defendant has known of the '388 patent and the technology underlying it from at least the date of issuance of the patent or from the issuance of the '284 patent, which followed the date that the patent's underlying application was cited to Defendants by the U.S. Patent and Trademark Office during prosecution of one of

Defendant's patent applications, such that Defendant knew and should have known that it was and would be contributorily infringing.

23. Defendants have caused and will continue to cause Traxcell damage by infringing the '388 patent.

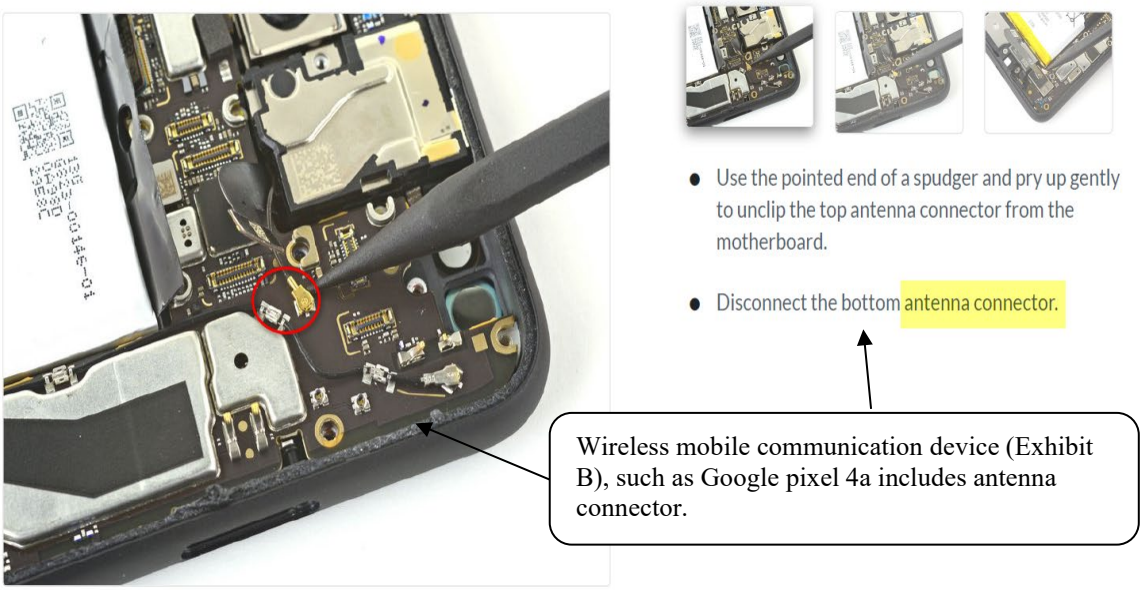
V. INFRINGEMENT ('147 Patent (Attached as exhibit C))

24. On October 27, 2020, U.S. Patent No. 10,820,147 ("the '147 patent") entitled "Mobile wireless device providing off-line and on-line geographic navigation information" (attached as Exhibit C) was duly and legally issued by the U.S. Patent and Trademark Office. Traxcell owns the '147 patent by assignment.

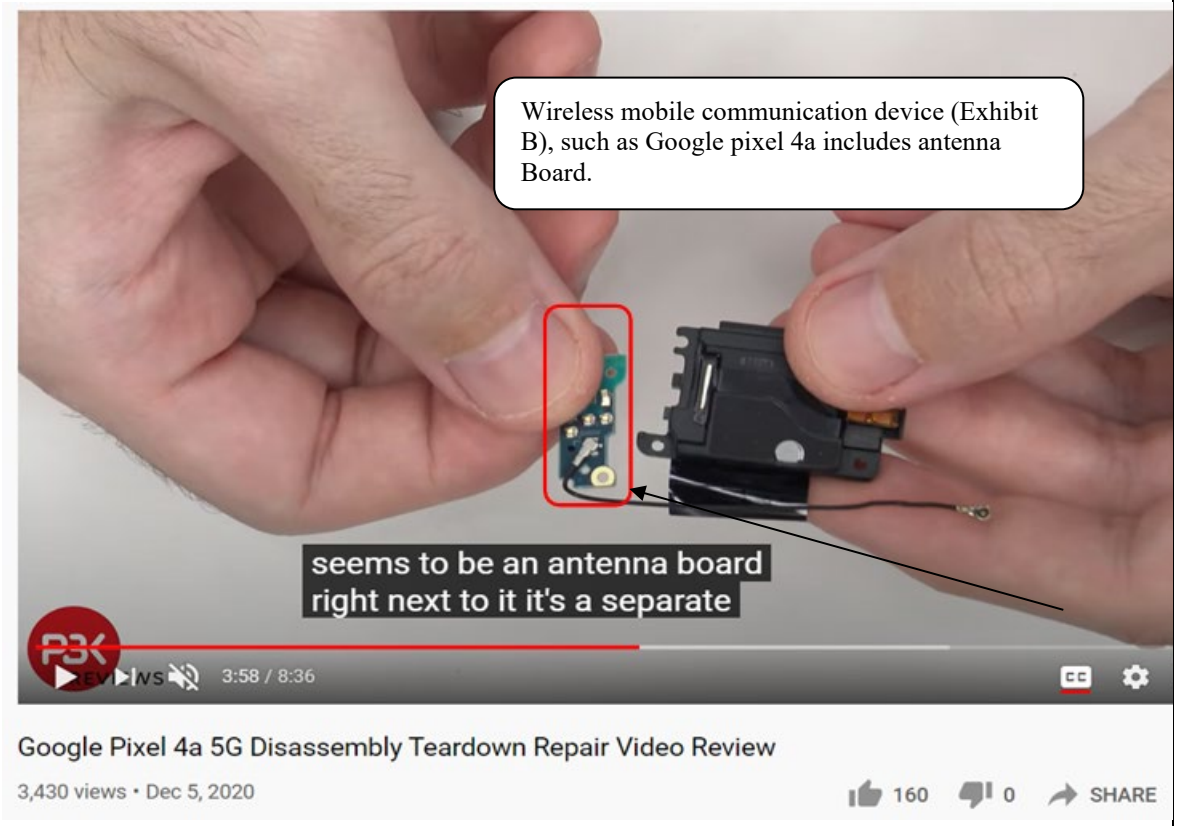
25. The '147 Patent's Abstract states, "A mobile device, wireless network and their method of operation provide both on-line (connected) navigation operation, as well as off-line navigation from a local database within the mobile device. Routing according to the navigation system can be controlled by traffic congestion measurements made by the wireless network that allow the navigation system to select the optimum route based on expected trip duration."

26. The following preliminary exemplary chat provides Traxcell's allegations of infringement.

Claim 1	Corresponding Structure in Accused Systems
1. A wireless communications system including:	The Google Maps online navigation service and the Google Maps server-side or cloud infrastructure needed to provide the service, constitute the "Accused System". Each combination having at least one item listed on Exhibit A, at least one item listed on Exhibit B, and at least one item listed on Exhibit C is a wireless communications system. Because infringement liability is not dependent on ownership, e.g., use of a system can infringe (35 U.S.C. § 271), infringement is not dependent on ownership of all limitations of a claim.
a first radio-frequency transceiver within a wireless mobile communications device and an associated first antenna to which the first radio-	Plaintiff contends each item listed on Exhibit B corresponds to this claim limitation because each Exhibit-B item is a device that provides communicative access to a wireless network by transceivers designed and used for radio-frequency communication and at least one antenna. When a wireless communication device transceivers and antennas are in communication, they are coupled. Further, in addition to being so coupled, the transceiver of each Exhibit-B item is also configured for RF-communication wireless communication networks, such as AT&T, Verizon, T-Mobile, and other US networks (Cellular or WLAN) via Google Maps which comes preloaded on Exhibit-B items. Plaintiff contends each item listed on Exhibit B corresponds to this claim limitation because each

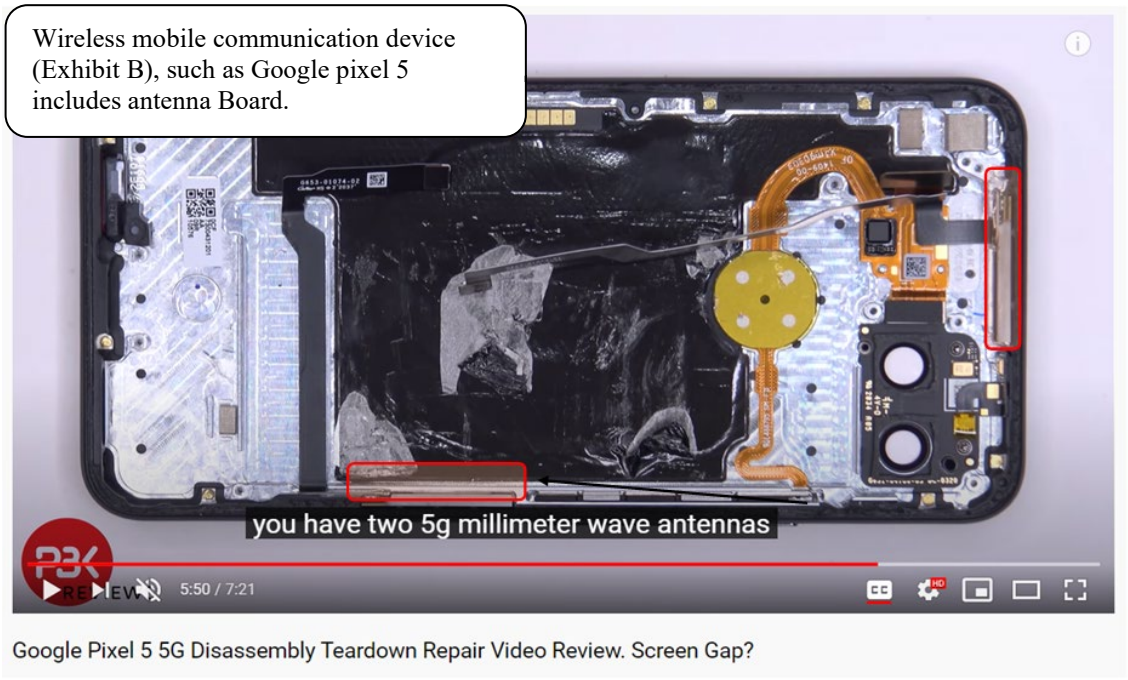
Claim 1	Corresponding Structure in Accused Systems
frequency transceiver is coupled, wherein the first radio-frequency transceiver is configured for radio-frequency communication with a wireless communications network;	Exhibit-B item includes a radio frequency transceiver. Wireless mobile communication device — including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc. (refer Exhibit B for complete list) — include radio-frequency transceivers and an associated antenna. When wireless communication device transceivers and antennas are in communication, they are coupled. Further, in addition to being so coupled, the transceiver of each Exhibit-B item is also configured for RF-communication with the wireless communication network. The following exemplifies this limitation's existence in Accused Systems: **Step 37** Disconnect the antennas  **Attachment 1 (Google Pixel 4XL showing antenna connector) at 21.**

Claim 1	Corresponding Structure in Accused Systems



Source: Antenna of Google pixel 4a Teardown by PBKreviews (Time 3:58/8:36)

Link: https://www.youtube.com/watch?v=pTPup76PxNo

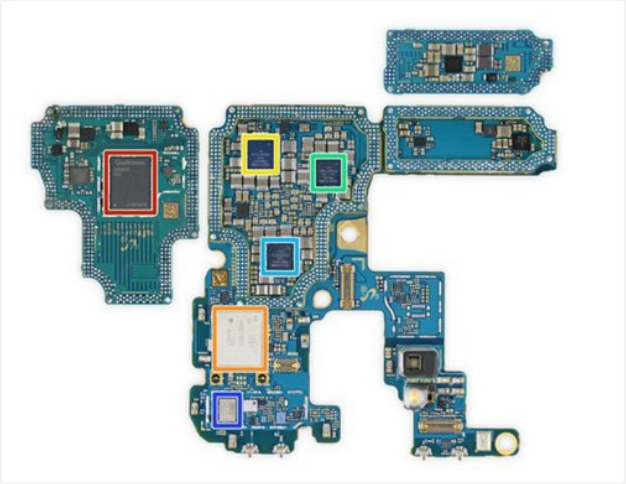


Source: Antenna of Google pixel 5 Teardown by PBKreviews (Time-5:50/7:21)

Claim 1	Corresponding Structure in Accused Systems

Link: https://www.youtube.com/watch?v=PPvlSHyok68

Step 9



- But wait! Flippin' the boards over reveals even more flippin' chips:
  - Qualcomm SDR865 RF Tranceiver
  - Murata KM9D19075 Wi-Fi & Bluetooth Module
  - Qualcomm PM8250 power management IC
  - Qualcomm PMX55 power management IC
  - Qualcomm PM8150C power management IC
  - Qualcomm QDM4870 front-end module

Wireless mobile communication device (Exhibit B) such as Samsung Galaxy S20 includes RF transceiver.

Attachment 2 (Teardown of Samsung Galaxy S20 showing RF Transceiver component) at 8.

Step 5

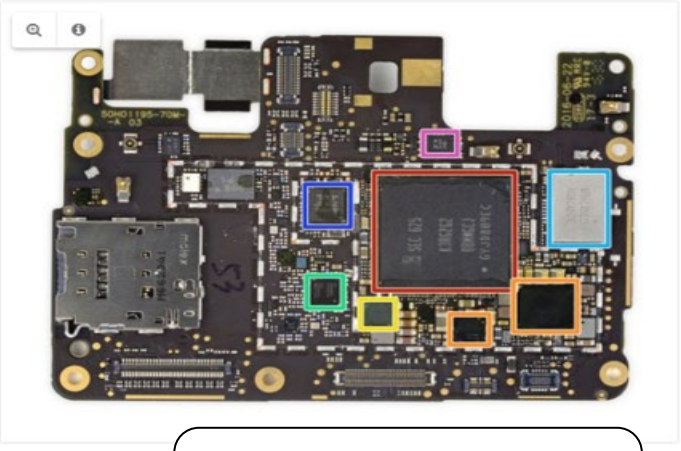
TOOL USED ON THIS STEP:
Manta Driver Kit - 112 Bit Driver Kit $64.99

- We continue to raid the toolbag for bigger and beefier tools—like this Manta kit driver, which works equally well for swatting away screws and smashing walnuts. Just don't mix them up.
  - These screws are all named Phillip. We like Phillip; it's a solid name for a screw.
- With the top layer of antennas, speaker, and charge coils flipped aside, we get a clear look at the internals. It does look a *lot* like a Note10+ 5G in there, if you eliminated the stylus and used that space for more battery.
- Stay tuned for our teardown wallpaper post! We'll have your Ultra wallpapers, as well as your Plus and your standard S20.
- We waste no time extracting the main board, which comes so laden with cameras, millimeter-wave hardware, and extra board layers that it feels like only half a victory. Time to start chucking things over-board.

Wireless mobile communication device (Exhibit B), such as Samsung Galaxy S20 includes antenna cables.

Claim 1	Corresponding Structure in Accused Systems
	Attachment 2 (ifixit Teardown of Samsung Galaxy S20 showing antenna) at 05.

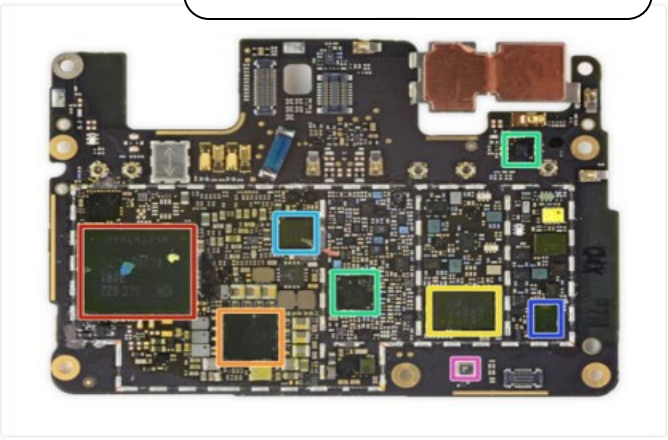
Step 10



- Chips on the front of the motherboard:
  - Samsung K3RG2G20BM-MGCJ 4 GB LPDDR4 mobile DRAM with a quad-core Qualcomm Snapdragon 821 processor layered underneath (two cores clocked at 2.15 GHz and two cores clocked at 1.6 Ghz)
  - Qualcomm PMI8996 power management IC, and Qualcomm SMB1350 Quick Charge 3.0 IC
  - NXP TFA9891 smart audio amplifier
  - Qualcomm WTR4905 LTE RF transceiver
  - 3207RA G707A (looks like Wi-Fi)
  - NXP 55102 1807 S0622 (likely NFC controller)
  - Bosch Sensortec BMI160 low power IMU

Wireless mobile communication device (Exhibit B) such as Google Pixel includes RF transceiver.

Step 11



- And on the back:
  - Samsung KLUBG4G1CE-B0B1 32 GB Universal Flash Storage (UFS) 2.0
  - Qualcomm PM8996 Power Management IC
  - Avago ACPM-7800 power amplifier
  - Qualcomm WTR3925 LTE RF transceiver, and Qualcomm RF360 Dynamic Antenna Matching Tuner (QFE2550)
  - Qualcomm WCD9335 audio codec
  - Skyworks SKY77807 Quad-Band Power Amplifier Module (PAM)
  - Bosch Sensortec BMP280-series barometric pressure sensor

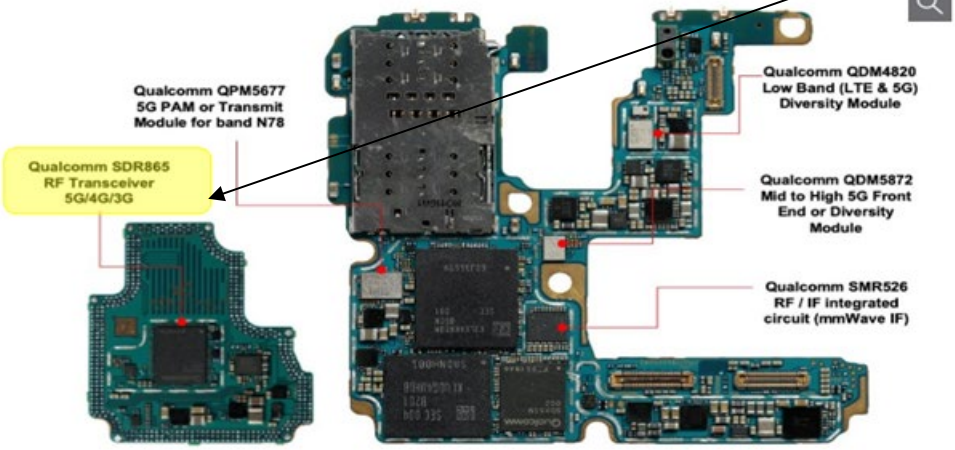
Attachment 13 (Google Pixel showing RF Transceiver component) at 9&10.

Claim 1	Corresponding Structure in Accused Systems

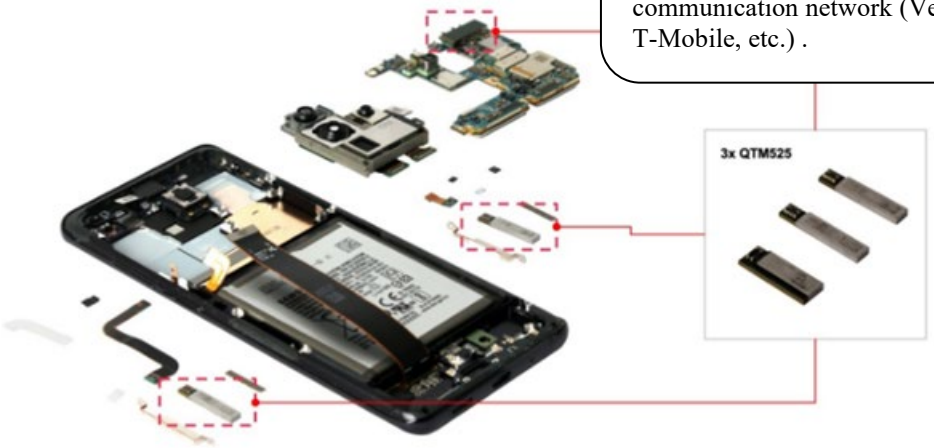
While the 1st Gen 5G smartphone supported only single or dual band 5G, the 2nd Gen designs like the Samsung Galaxy S20 now support much more. The Galaxy S20 Ultra under review here is model number SM-G988U1 for the North American market which supports low band FDD 5G like n5 (850MHz) and n71 (600MHz) as well as mid-to-high bands like n2, n41 and n66. For 5G global roaming, the Galaxy S20 Ultra also included the common Ultra-High Frequency (UHF) 5G band n78. Further, the Galaxy S20 Ultra has millimeter wave (mmWave) antenna modules in addition to the Sub-6GHz RFFE. The new Qualcomm QTM0525 antenna modules in the Galaxy S20 Ultra support an additional four ultra-wide 5G bands (n258, n257, n260 and n261). So how do all these RF capabilities come together inside the Galaxy S20? Let's dive in for a closer

5g-modem-to-rf-integration-rf

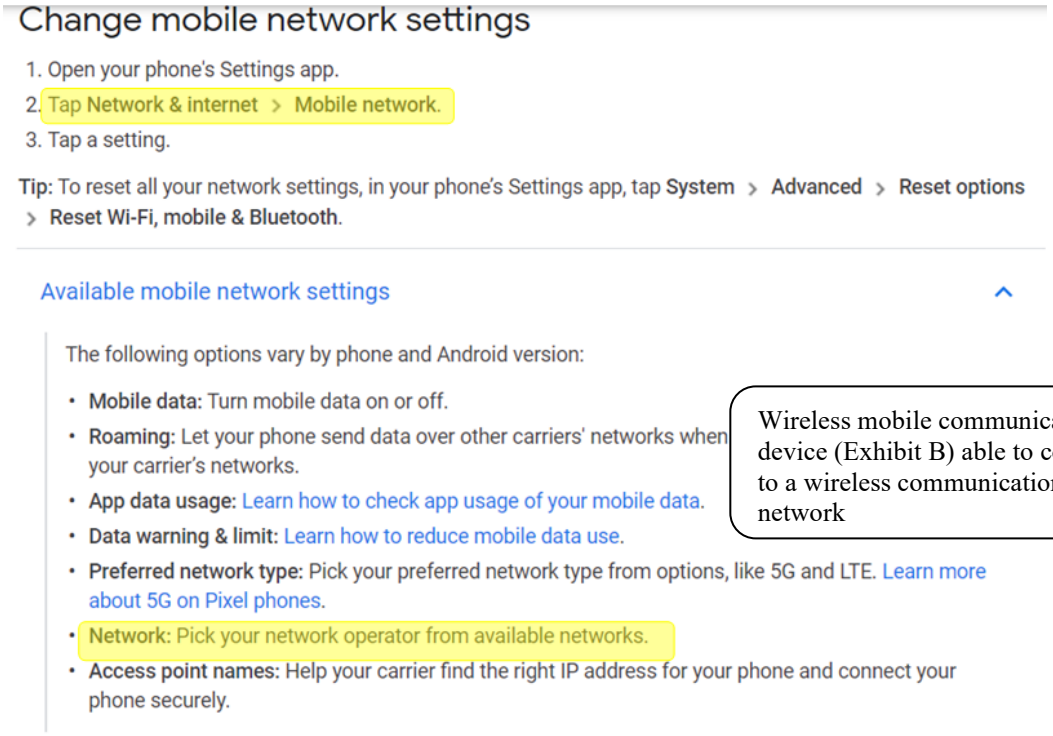
Wireless mobile communication device (Exhibit B) such as Samsung Galaxy S20 Ultra includes RF transceiver.



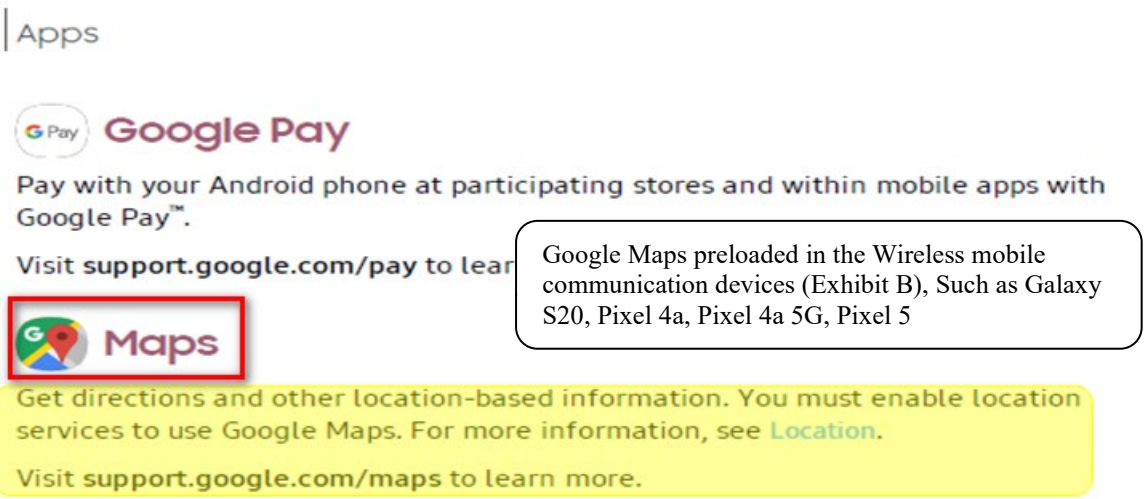
Attachment 3 (RF-Transceiver and antenna of Galaxy S20 device coupled with communication network) at 7.

Claim 1	Corresponding Structure in Accused Systems
	The first 5G devices in the US were based on mmWave technology. The 1st generation 5G devices were either using Qualcomm's mmWave antenna module design for mmWave networks (Verizon, AT&T, T-Mobile) or a more conventional RFFE design for sub-6 GHz 5G networks (Sprint). However, that represented a design compromise since each variant would be shut out from other 5G network. With the 2nd Gen 5G designs like the Galaxy S20 Ultra, OEMs are adding mmWave capabilities along with Sub-6 GHz 5G RFFE on the same device. This dual RFFE design allows flagship devices to be network agnostic, opening up many more 5G network and also benefits Samsung by reducing 5G SKUs. 5g-modem-to-rf-integration-mmwave Wireless mobile communication device (Exhibit B) such as Samsung Galaxy S20 Ultra includes RF transceiver antenna (mmwave) designed to connect wireless communication network (Verizon, AT&T, T-Mobile, etc.) .  **Attachment 3 (RF-Transceiver and antenna of Galaxy S20 device coupled with communication network) at 10.**

Claim 1	Corresponding Structure in Accused Systems



Attachment 14 (Method to connect a wireless communication network via Google pixel 4a device) at 1.



Attachment 15 (Google Maps application preloaded on Samsung Galaxy S20) at 113.

Claim 1	Corresponding Structure in Accused Systems

Attachment 4 (Google Maps application preloaded on Pixel 4a, Pixel 4a 5G, and Pixel 5) at 1.

Wireless mobile communication device (Exhibit B) able to connect to a wireless communication network

Network[8]

- LTE: Up to 4CC (12 layers) DL & 2CC UL[9]

5G Sub-6[10]

- TDD: Up to 1CC x 100 MHz 4x4 MIMO DL & 1CC x 100 MHz UL
- FDD: Up to 1CC x 20 MHz 4x4 MIMO DL & 1CC x 20 MHz UL[9]

5G mmWave [US only][10, 11]

- TDD: Up to 4CC x 100 MHz 2x2 MIMO DL & 1CC x 100 MHz 2x2 M

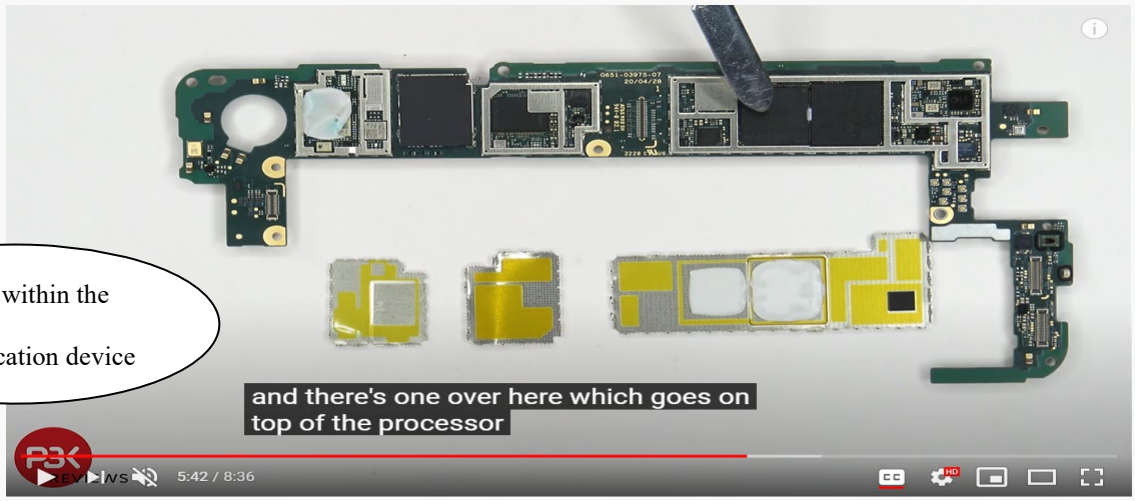
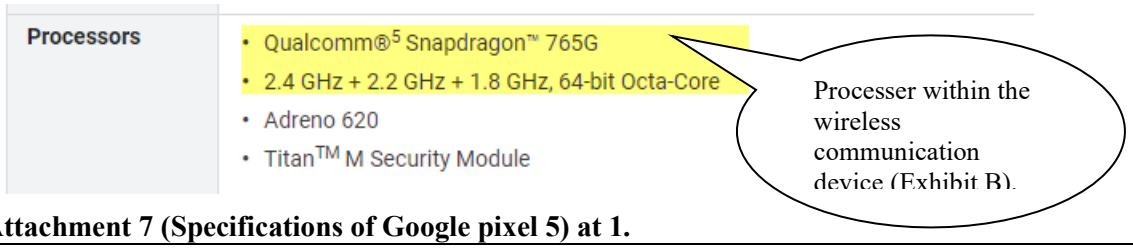
[US / FI / CA / TW] Model G025E

- GSM/EDGE: Quad-band (850, 900, 1800, 1900 MHz)
- UMTS/HSPA+/HSDPA: Bands 1/2/4/5/8
- CDMA EVDO Rev A: BC0/BC1/BC10
- LTE: Bands B1/2/3/4/5/7/8/12/13/14/17/18/19/20/25/26/28/29/30/32/38/39/40/41/42/46/48/66/71
- 5G Sub-6: Bands n1/2/5/12/25/28/41/66/71/78
- eSIM

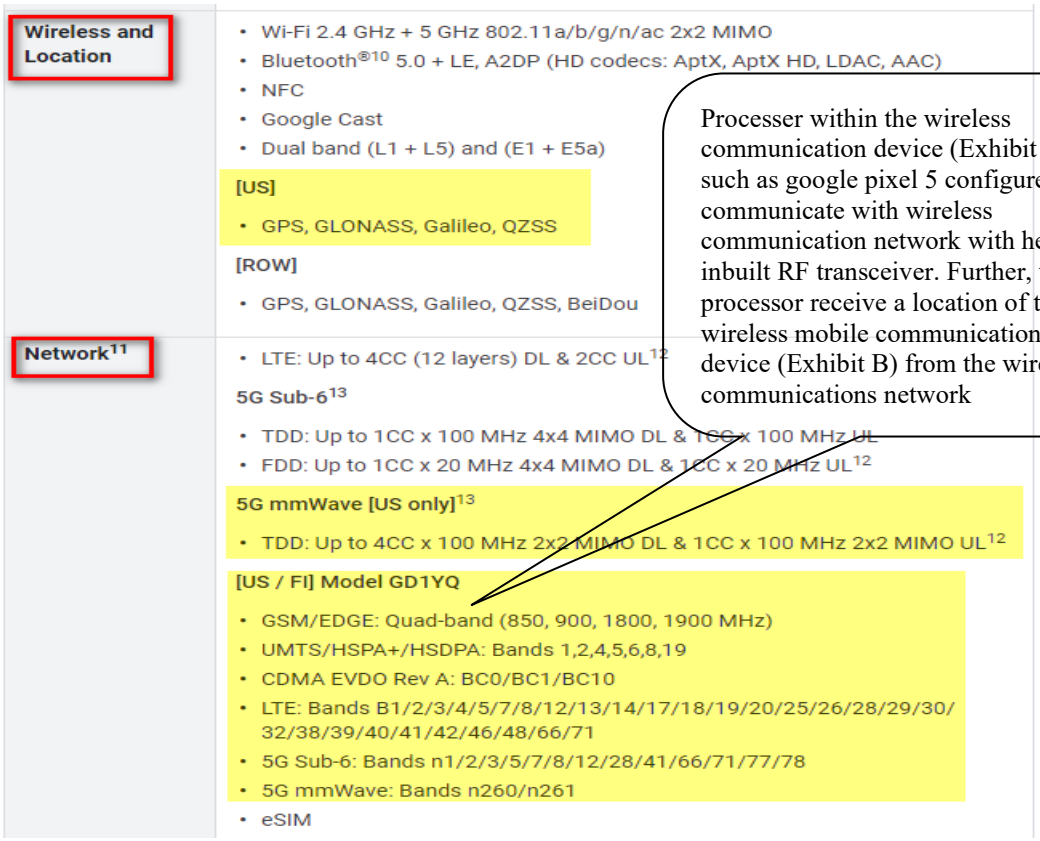
[Verizon] Model G6QU3

- GSM/EDGE: Quad-band (850, 900, 1800, 1900 MHz)
- UMTS/HSPA+/HSDPA: Bands 1/2/4/5/8
- CDMA EVDO Rev A: BC0/BC1/BC10
- LTE: Bands B1/2/3/4/5/7/8/12/13/14/17/18/19/20/25/26/28/29/30/32/38/39/40/41/42/46/48/66/71
- 5G Sub-6: Bands n2/5/12/25/66/71
- 5G mmWave: Bands n260/261
- eSIM

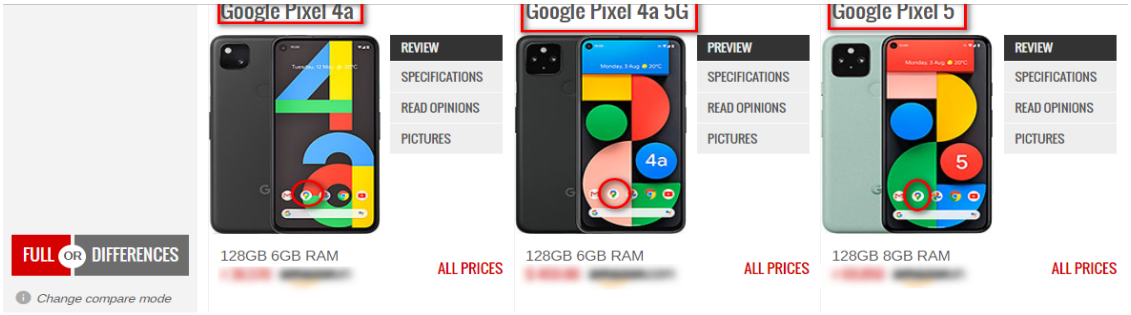
Attachment 7 (Pixel phone hardware tech specs) at 6.

Claim 1	Corresponding Structure in Accused Systems
a first processor within the wireless mobile communications device coupled to the at least one first radio-frequency transceiver	Plaintiff contends each item listed on Exhibit B corresponds to this claim limitation because each Exhibit-B item includes a processor. Wireless mobile communication device- including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc. (refer Exhibit B for complete list) has a processor, for example, Quad-Core/ Octa-core processor. Each Exhibit-B-listed mobile wireless communications device's motherboard processor is programmed to process location-service information; i.e., to receive a location of the device from the wireless communications network (which is communicated to the device from the first RF transceiver) and generate an indication of the device's location with respect to geographic features according to mapping information stored within the device. For example, the motherboard processor may use Google Maps to view and find places around the globe. The processor and base station transceivers communicate by RF communication and, thus, when doing so are communicatively coupled. The following exemplifies the existence of this limitation in Accused Systems:  Google Pixel 4a 5G Disassembly Teardown Repair Video Review **Source**: Processor of Google pixel 4a Teardown by PBKreviews (Time-5:42/8:36) **Link**: https://www.youtube.com/watch?v=pTPup76PxNo&ab_channel=PBKreviews  **Attachment 7 (Specifications of Google pixel 5) at 1.**

Claim 1	Corresponding Structure in Accused Systems



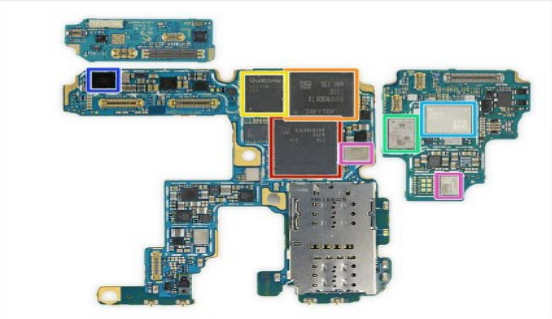
Attachment 7 (Specifications of Google pixel 5) at 2.

Claim 1	Corresponding Structure in Accused Systems
Processer within the wireless communication device (Exhibit B), such as Google Pixel 4a, Pixel 4a 5G and Pixel 5	 **Attachment 4 (Processor of Google Pixel 4a, Pixel 4a 5G and Pixel 5) at 1.**

NETWORK	Technology	GSM / HSPA / LTE	GSM / HSPA / LTE / 5G	GSM / CDMA / HSPA / EVDO / LTE / 5G
LAUNCH	Announced	2020, August 03	2020, September 30	2020, September 30
	Status	Available. Released 2020, August 20	Available. Released 2020, November 05	Available. Released 2020, October 15
BODY	Dimensions	144 x 69.4 x 8.2 mm (5.67 x 2.73 x 0.32 in)	153.9 x 74 x 8.2 mm (Sub-6) or 8.5 mm (Sub-6 and mmWave)	144.7 x 70.4 x 8 mm (5.70 x 2.77 x 0.31 in)
	Weight	143 g (5.04 oz)	168 g (5G Sub-6); 171 g (5G Sub-6 and mmWave) (5.93 oz)	151 g (5.33 oz)
	Build	Glass front (Gorilla Glass 3), plastic back, plastic frame	Glass front (Gorilla Glass 3), plastic back, plastic frame	Glass front (Gorilla Glass 6), aluminum back, aluminum frame
	SIM	Nano-SIM and/or eSIM	Nano-SIM and/or eSIM	Nano-SIM and/or eSIM
				IP68 dust/water resistant (up to 1.5m for 30 mins)
DISPLAY	Type	OLED, HDR	OLED, HDR	OLED, 90Hz, HDR10+
	Size	5.81 inches, 83.2 cm^2 (~83.3% screen-to-body ratio)	6.2 inches, 95.7 cm^2 (~84.1% screen-to-body ratio)	6.0 inches, 87.6 cm^2 (~85.9% screen-to-body ratio)
	Resolution	1080 x 2340 pixels, 19.5:9 ratio (~443 ppi density)	1080 x 2340 pixels, 19.5:9 ratio (~413 ppi density)	1080 x 2340 pixels, 19.5:9 ratio (~432 ppi density)
	Protection	Corning Gorilla Glass 3	Corning Gorilla Glass 3	Corning Gorilla Glass 6
		Always-on display	Always-on display	Always-on display
PLATFORM	OS	Android 10, upgradable to Android 11	Android 11	Android 11
	Chipset	Qualcomm SDM730 Snapdragon 730G (8 nm)	Qualcomm SM7250 Snapdragon 765G (7 nm)	Qualcomm SM7250 Snapdragon 765G (7 nm)
	CPU	Octa-core (2x2.2 GHz Kryo 470 Gold & 6x1.8 GHz Kryo 470 Silver)	Octa-core (1x2.4 GHz Kryo 475 Prime & 1x2.2 GHz Kryo 475 Gold & 6x1.8 GHz Kryo 475 Silver)	Octa-core (1x2.4 GHz Kryo 475 Prime & 1x2.2 GHz Kryo 475 Gold & 6x1.8 GHz Kryo 475 Silver)
	GPU	Adreno 618	Adreno 620	Adreno 620

Claim 1	Corresponding Structure in Accused Systems

Step 8

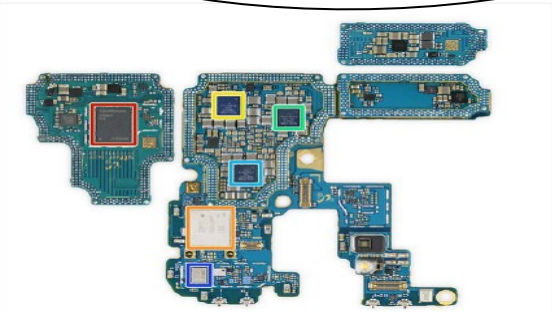


- With all shields down, we can get a better look at the silicon hiding beneath:
  - Samsung K3LK4K40BM-BGCN 12 GB LPDDR5 RAM layered over Qualcomm 865 SoC
  - Samsung KLUDG4UHDB-B2D1 128 GB UFS 3.0 flash storage
  - Qualcomm SDX55M 2nd-gen 5G modem
  - Skyworks SKY58210-11 RF Front-End Module
  - Qorvo QM78092 Front-End Module
  - Maxim MAX77705C power management IC
  - Qualcomm QPM5677 and QPM6585 5G power amplification modules

Add a comment

Processer within the wireless communication device (Exhibit B), such as Samsung Galxy S20 coupled with RF transceiver and Wi-Fi Module

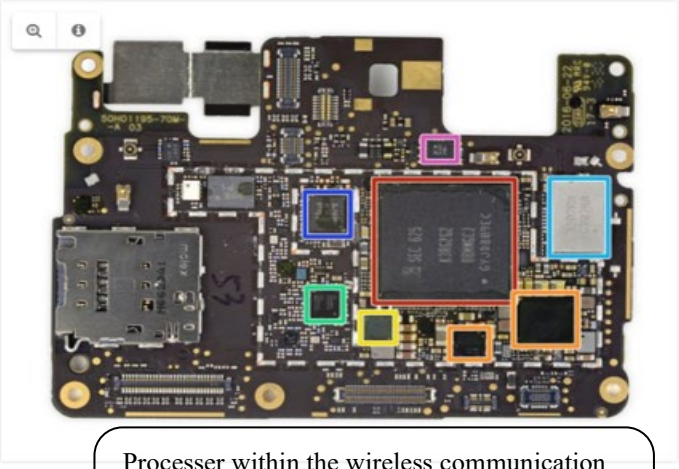
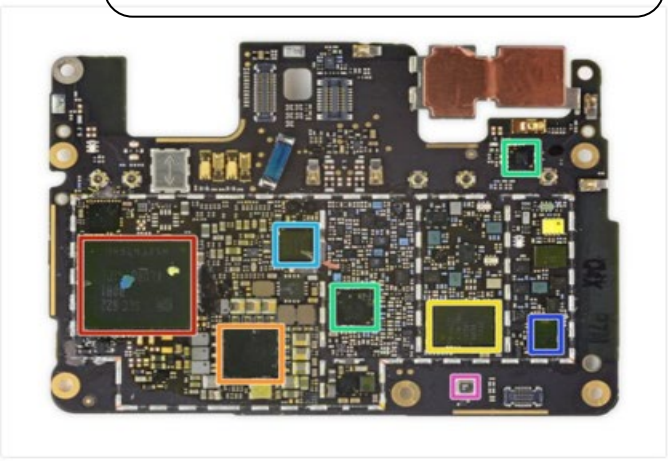
Step 9



- But wait! Flippin' the boards over reveals even more flippin' chips:
  - Qualcomm SDR865 RF Tranceiver
  - Murata KM9D19075 Wi-Fi & Bluetooth Module
  - Qualcomm PM8250 power management IC
  - Qualcomm PMX55 power management IC
  - Qualcomm PM8150C power management IC
  - Qualcomm QDM4870 front-end module

Attachment 2 (Teardown of Samsung Galaxy S20 showing RF Transceiver component) at 8.

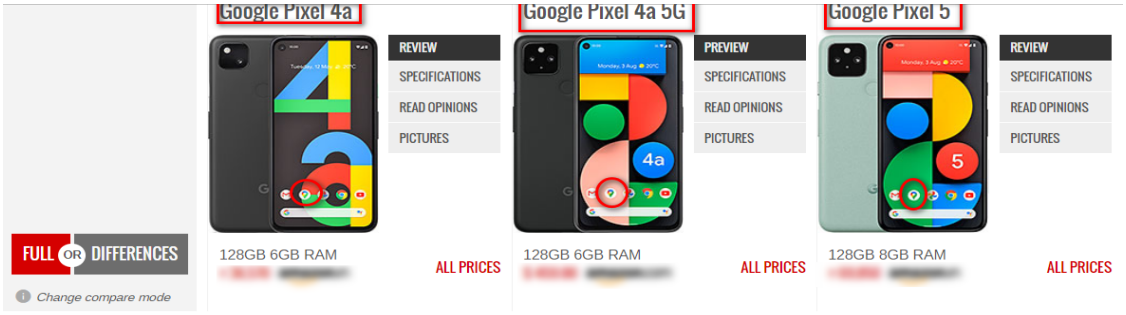
Claim 1	Corresponding Structure in Accused Systems

	Step 10
	 
	Processer within the wireless communication device (Exhibit B), such as Google pixel coupled with RF transceiver and Wi-Fi Module
	Step 11
	 
	• Chips on the front of the motherboard:
	  • Samsung K3RG2G20BM-MGCJ 4 GB LPDDR4 mobile DRAM with a quad-core Qualcomm Snapdragon 821 processor layered underneath (two cores clocked at 2.15 GHz and two cores clocked at 1.6 Ghz)
	  • Qualcomm PMI8996 power management IC, and Qualcomm SMB1350 Quick Charge 3.0 IC
	  • NXP TFA9891 smart audio amplifier
	  • Qualcomm WTR4905 LTE RF transceiver
	  • 3207RA G707A (looks like Wi-Fi)
	  • NXP 55102 1807 S0622 (likely NFC controller)
	  • Bosch Sensortec BMI160 low power IMU
	• And on the back:
	  • Samsung KLUBG4G1CE-B0B1 32 GB Universal Flash Storage (UFS) 2.0
	  • Qualcomm PM8996 Power Management IC
	  • Avago ACPM-7800 power amplifier
	  • Qualcomm WTR3925 LTE RF transceiver, and Qualcomm RF360 Dynamic Antenna Matching Tuner (QFE2550)
	  • Qualcomm WCD9335 audio codec
	  • Skyworks SKY77807 Quad-Band Power Amplifier Module (PAM)
	  • Bosch Sensortec BMP280-series barometric pressure sensor
	Attachment 13 (Google Pixel showing RF Transceiver component) at 9&10.

programmed to receive information indicative of a location of the wireless mobile communications device and generate an indication of a location of the wireless mobile communications device with respect to geographic	Plaintiff contends the Exhibit-B-listed mobile-wireless-communications device's motherboard processor is programmed to process location-service information; i.e., to receive a location of the device from the wireless communications network and generate an indication of the device's location. For example, the motherboard processor may use Google Maps to obtain the device's location and provide direction from that location to a destination. Wireless mobile communication device-including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc. (refer Exhibit B for complete list) has a processor for example, Quad-Core processor. When wireless communication device transceivers and processor are in communication, they are coupled. Further, the Location-based Service (LBS) provider, such as Google Map, on the Exhibit-B utilizes the processor coupled to the transceiver to estimates/receive the location on mobile wireless communications devices (specifically one or more of the mobile wireless communications devices identified on

Claim 1	Corresponding Structure in Accused Systems
features	Exhibit B) by utilizing wireless communication network or first computer. For example, the motherboard processor may use Google Maps to view and find places around the globe. Google map can also show your current location and provide direction (including with respect to geographic features such as nearby restaurants) from your location/source to any destination. In using Google Maps App, the mobile wireless communication device's motherboard processor generates signals for displaying on the device's screen a blue dot that shows the current location of the wireless mobile communication device. The Google map app estimates the location of the device from 3 sources: GPS (GPS uses satellites and knows your location within a few meters), Wi-Fi (the location of nearby Wi-Fi networks helps Maps know where you are), and cell towers (cell tower can be accurate up to a few thousand meters). When Google Maps isn't sure about your location, a light blue circle around the blue dot is shown. You might be anywhere within the light blue circle. The smaller the circle, the more certain the app is about your location. Furthermore, Google Maps App provides flexibility to download maps on SD card/internal memory of communication device (Exhibit B) examples of compatible devices is Samsung Galaxy S20, Pixel 4a, Pixel 4a 5G, Pixel 5, etc., and navigate offline. When internet is slow or mobile data is expensive, or communication device cannot connect to internet, an area can be saved to phone or tablet (Exhibit B) from Google maps app and use it when offline. Communication device can use Offline maps for Navigation through the downloaded area without internet. The following exemplifies the existence of this limitation in Accused Systems:

Claim 1	Corresponding Structure in Accused Systems



NETWORK	Technology	GSM / HSPA / LTE	GSM / HSPA / LTE / 5G	GSM / CDMA / HSPA / EVDO / LTE / 5G
LAUNCH	Announced	2020, August 03	2020, September 30	2020, September 30
	Status	Available. Released 2020, August 20	Available. Released 2020, November 05	Available. Released 2020, October 15
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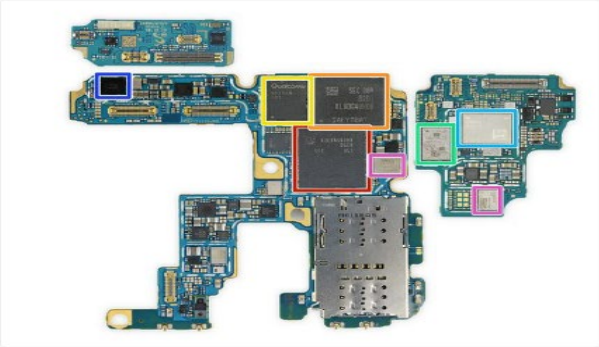
	Weight	143 g (5.04 oz)	168 g (5G Sub-6); 171 g (5G Sub-6 and mmWave) (5.93 oz)	151 g (5.33 oz)
	Build	Glass front (Gorilla Glass 3), plastic back, plastic frame	Glass front (Gorilla Glass 3), plastic back, plastic frame	Glass front (Gorilla Glass 6), aluminum back, aluminum frame
	SIM	Nano-SIM and/or eSIM	Nano-SIM and/or eSIM	Nano-SIM and/or eSIM
				IP68 dust/water resistant (up to 1.5m for 30 mins)
DISPLAY	Type	OLED, HDR	OLED, HDR	OLED, 90Hz, HDR10+
	Size	5.81 inches, 83.2 cm^2 (~83.3% screen-to-body ratio)	6.2 inches, 95.7 cm^2 (~84.1% screen-to-body ratio)	6.0 inches, 87.6 cm^2 (~85.9% screen-to-body ratio)
	Resolution	1080 x 2340 pixels, 19.5:9 ratio (~443 ppi density)	1080 x 2340 pixels, 19.5:9 ratio (~413 ppi density)	1080 x 2340 pixels, 19.5:9 ratio (~432 ppi density)
	Protection	Corning Gorilla Glass 3	Corning Gorilla Glass 3	Corning Gorilla Glass 6
		Always-on display	Always-on display	Always-on display
PLATFORM	OS	Android 10, upgradable to Android 11	Android 11	Android 11
	Chipset	Qualcomm SDM730 Snapdragon 730G (8 nm)	Qualcomm SM7250 Snapdragon 765G (7 nm)	Qualcomm SM7250 Snapdragon 765G (7 nm)
	CPU	Octa-core (2x2.2 GHz Kryo 470 Gold & 6x1.8 GHz Kryo 470 Silver)	Octa-core (1x2.4 GHz Kryo 475 Prime & 1x2.2 GHz Kryo 475 Gold & 6x1.8 GHz Kryo 475 Silver)	Octa-core (1x2.4 GHz Kryo 475 Prime & 1x2.2 GHz Kryo 475 Gold & 6x1.8 GHz Kryo 475 Silver)
	GPU	Adreno 618	Adreno 620	Adreno 620

Attachment 4 (Processor of Google Pixel 4a, Pixel 4a 5G and Pixel 5) at 1.

Claim 1	Corresponding Structure in Accused Systems

Step 8

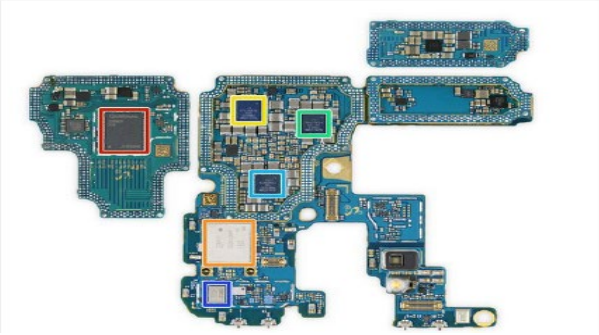


- With all shields down, we can get a better look at the silicon hiding beneath:
  - Samsung K3LK4K40BM-BGCN 12 GB LPDDR5 RAM layered over Qualcomm 865 SoC
  - Samsung KLUDG4UHDB-B2D1 128 GB UFS 3.0 flash storage
  - Qualcomm SDX55M 2nd-gen 5G modem
  - Skyworks SKY58210-11 RF Front-End Module
  - Qorvo QM78092 Front-End Module
  - Maxim MAX77705C power management IC
  - Qualcomm QPM5677 and QPM6585 5G power amplification modules

Add a comment

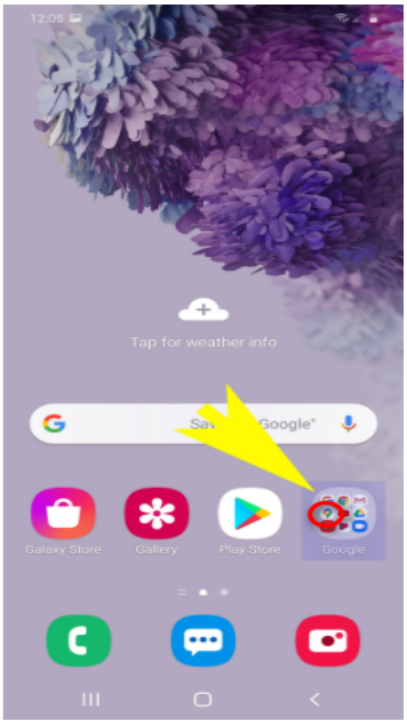
Processer within the wireless communication device (Exhibit B), such as Samsung Galxy S20 coupled with RF transceiver and Wi-Fi Module

Step 9

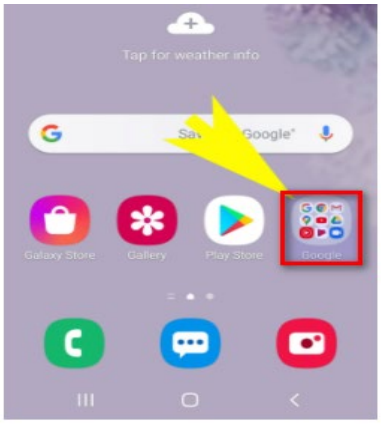


- But wait! Flippin' the boards over reveals even more flippin' chips:
  - Qualcomm SDR865 RF Tranceiver
  - Murata KM9D19075 Wi-Fi & Bluetooth Module
  - Qualcomm PM8250 power management IC
  - Qualcomm PMX55 power management IC
  - Qualcomm PM8150C power management IC
  - Qualcomm QDM4870 front-end module

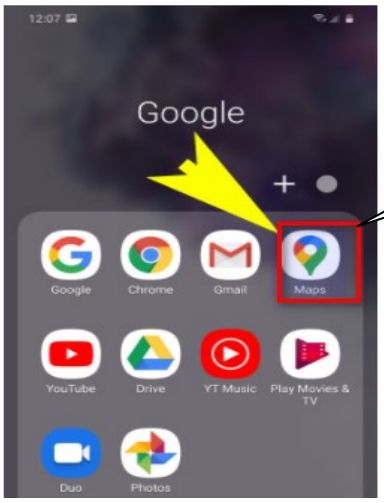
Attachment 2 (RF Transceiver and Processor of Samsung Galaxy S20) at 8.

Claim 1	Corresponding Structure in Accused Systems
	Using Turn-by-Turn Navigation with the Galaxy S20 Google Maps **Time Needed :** 8 minutes The following steps demonstrate the actual process of setting up and utilizing turn-by-turn navigation system with the Google Maps app on the new Samsung Galaxy S20 handset. Before you begin, verify and ensure that location is enabled on your phone. It has to be enabled so that your device can determine your current location. 1. **Tap to open the Google folder fr m the Home screen.** A new screen consisting of Google-re d apps and services will be displayed.  Google Maps preloaded in the Wireless mobile communication devices (Exhibit B), such as Galaxy S20. Current location of the device is determined if location is enabled **Attachment 5 (how to use turn by turn Google map) at 1.**

Claim 1	Corresponding Structure in Accused Systems



2. **Tap Maps to open Google Maps app.**
If this is the first time you use Google Maps on your Galaxy S20, you'll be prompted with a Welcome screen. If you see this screen, read and review the information then tap **GOT IT** to proceed.



Google Maps preloaded in the Wireless mobile communication devices (Exhibit B), such as Galaxy S20.

Attachment 5 (how to use turn by turn google map) at 2&3.

verizon

Personal Business

Shop Why Verizon Support

Home > Support > Sony > Sony Xperia Z2 > **Google Maps - Find Current Location**

Google Maps™ - Find Current Location

Notes:

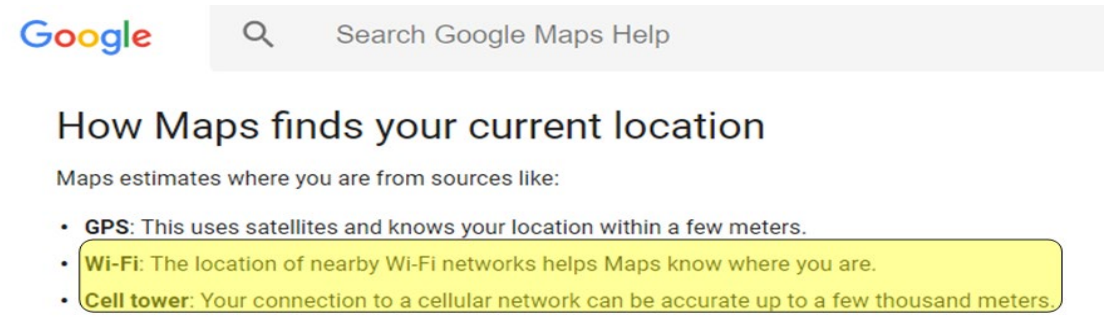
- If the Google Maps app isn't already installed on your device, it can be downloaded from the Google Play Store™.
- For further assistance, refer to the Google Maps Help Center.

1. From a Home screen, tap **Apps**.
2. Tap **Maps**.
3. Tap the **My Location icon** (located in the lower-right).

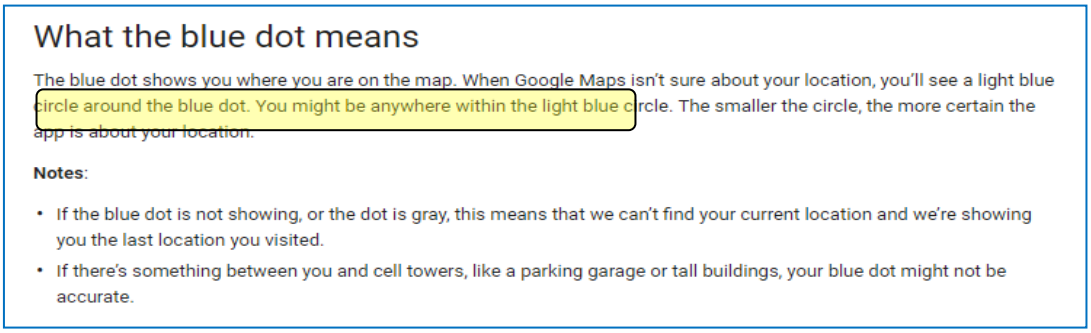
Wireless communication network (e.g. Verizon, AT&T, T-Mobile, etc.) used to estimate the location of the Wireless communication device (Exhibit B) on Google Maps.

Claim 1	Corresponding Structure in Accused Systems

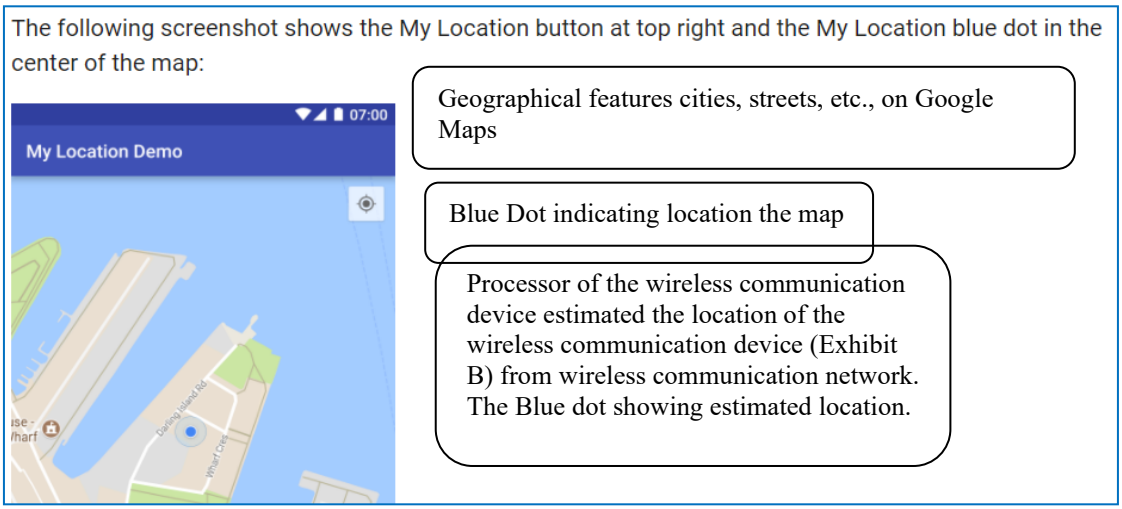
Attachment 6 (Find Current Location on Google map) at 1.



Attachment 8 (How map finds your current location) at 2.



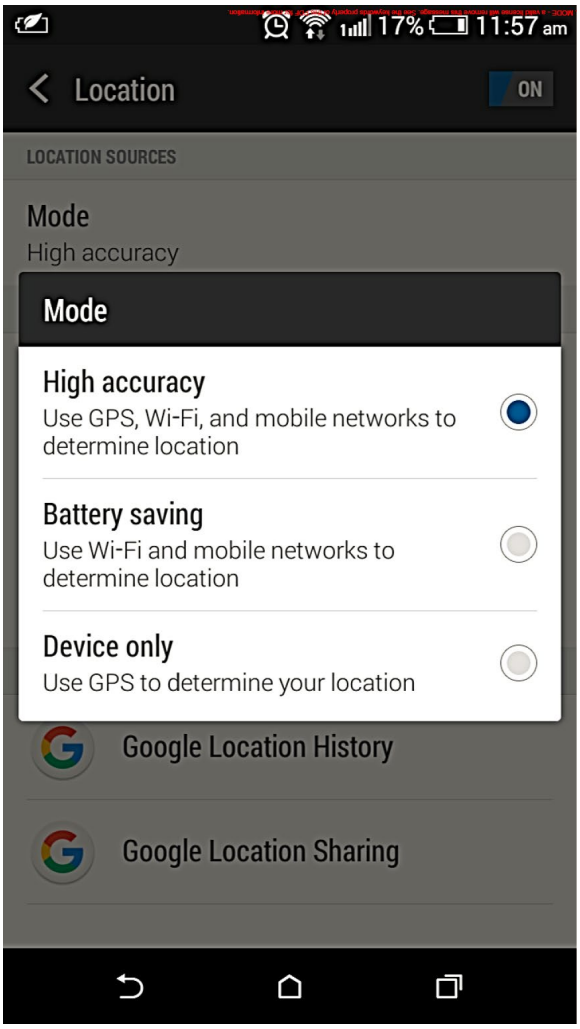
Attachment 8 (Current location shown on google map) at 3.



Source: Location estimation on the Wireless communication device

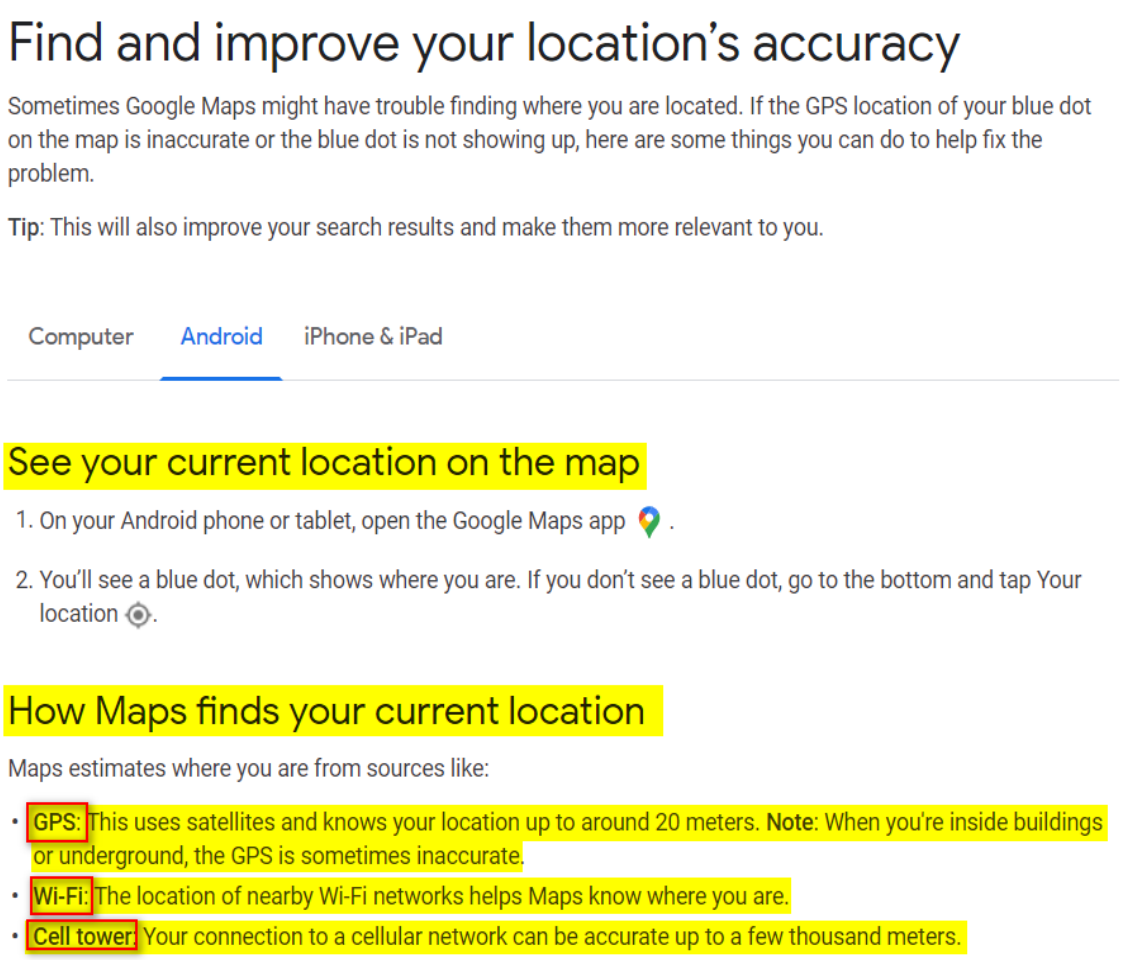
Attachment 22 (Location estimation on the Wireless communication device) at 10.

Claim 1	Corresponding Structure in Accused Systems



By default the "Location setting" is set at "High accuracy" mode, wherein, for example, accuracy of location of a communications device determined based on locations of nearby Wi-Fi network infrastructure (access points or hotspots) is further enhanced or fine-tuned by Google Maps Server additionally using the said communications device's GPS location and the location data obtained from the mobile network (Cell tower information and/or Location of the communications device determined through the Assisted-GPS method by the said mobile network) serving the said communications device.

Attachment 45 (Google Maps_Android app_Location settings) at 1.

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 46 (Find and improve your location's accuracy - Android - Google Maps Help) at 1.**

Claim 1	Corresponding Structure in Accused Systems

From your devices

Many devices, like phones or computers, can work out their precise location. You can allow Google and other apps to provide you with useful features based on where your device is located. For example, if you're running late to meet your friends, you'll probably want to use a navigation app to know the quickest way to get to your destination. To get turn-by-turn directions, you may need to turn on your device's location and give the app the permission to access it. Or for some searches like "coffee shop", "bus stop" or "atm", results will usually be more helpful when precise location is available.

On your Android device, if you choose to turn on your device location, you can use features like navigation, giving an app access to your current location, or find your phone. You can also choose which apps have permission to use your device's location with simple controls that let you turn the permission on or off for individual apps. On Android, you can see when an app is requesting to use your phone's GPS-based location when the top of your screen shows Location . Learn more

Google Location Services

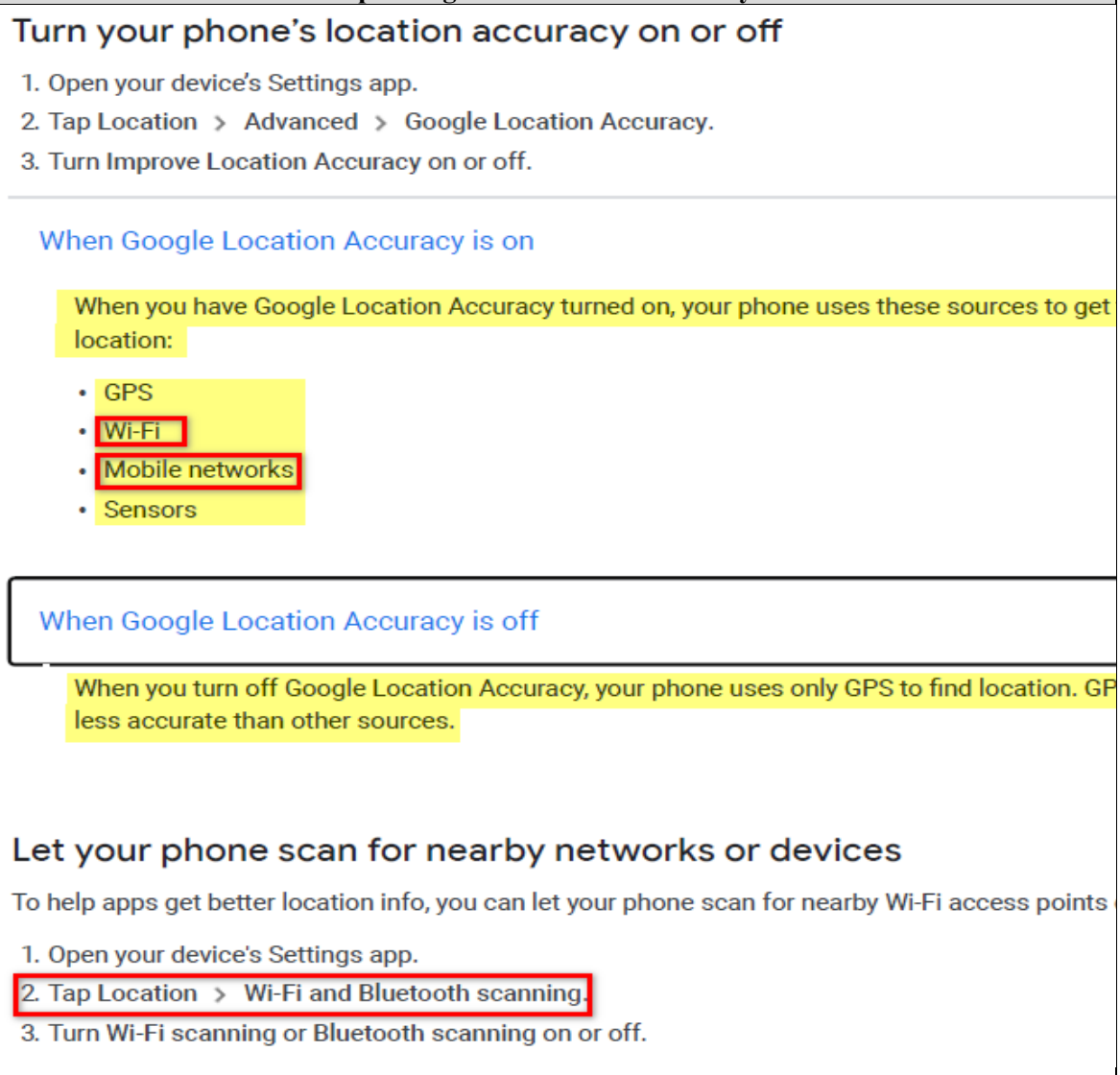
On most Android devices, Google, as the network location provider, provides a location service called Google Location Services (GLS), known in Android 9 and above as Google Location Accuracy. This service aims to provide a more accurate device location and generally improve location accuracy. Most mobile phones are equipped with GPS, which uses signals from satellites to determine a device's location – however, with Google Location Services, additional information from nearby Wi-Fi, mobile networks, and device sensors can be collected to determine your device's location. It does this by periodically collecting location data from your device and using it in an anonymous way to improve location accuracy.

You can disable Google Location Services at any time in your device's location settings. Your device's location will continue to work even if GLS is turned off, but the device will rely only on GPS to estimate device location for apps with the necessary permission. Google Location Services is distinct from your device's location setting. Learn more

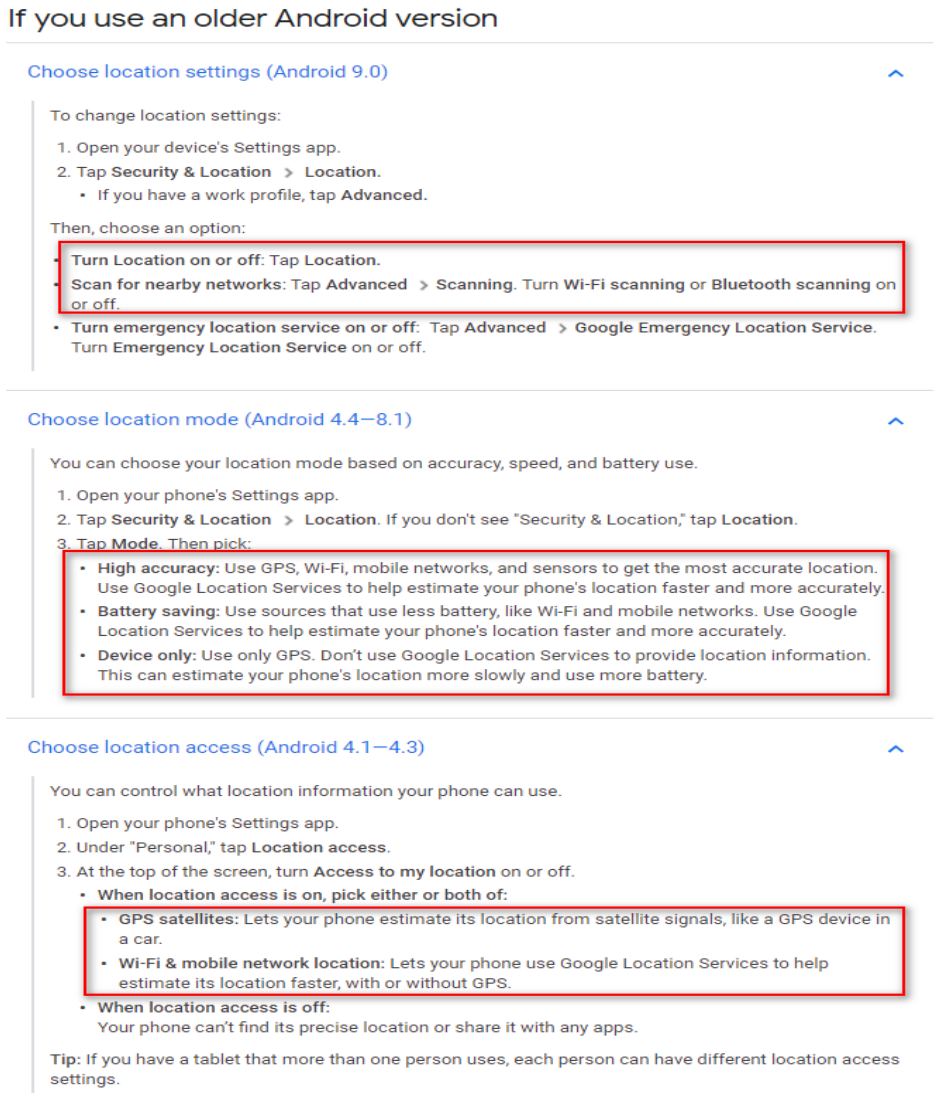
The settings and permissions on Android control whether your device sensors (like GPS) or network-based location (like GLS) are used to determine your location and which apps have access to that location. They do not impact how websites and apps might estimate your location in other ways, such as from your IP Address.

Attachment 44 (How Google uses location information – Privacy & Terms – Google) at 2 &3.

Wireless communication device receive the location of the Wireless communication device (Exhibit B) on Google Map from Wireless communication networks (e.g. Verizon, AT&T, T-Mobile, etc.)

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 21 (Manage your Pixel phone's location settings) at 2.**

Claim 1	Corresponding Structure in Accused Systems



If you use an older Android version

Choose location settings (Android 9.0)

To change location settings:

1. Open your device's Settings app.
2. Tap **Security & Location** > **Location**.
   - If you have a work profile, tap **Advanced**.

Then, choose an option:

- **Turn Location on or off**: Tap **Location**.
- **Scan for nearby networks**: Tap **Advanced** > **Scanning**. Turn **Wi-Fi scanning** or **Bluetooth scanning** on or off.
- **Turn emergency location service on or off**: Tap **Advanced** > **Google Emergency Location Service**. Turn **Emergency Location Service** on or off.

Choose location mode (Android 4.4—8.1)

You can choose your location mode based on accuracy, speed, and battery use.

1. Open your phone's Settings app.
2. Tap **Security & Location** > **Location**. If you don't see "Security & Location," tap **Location**.
3. Tap **Mode**. Then pick:
   - **High accuracy:** Use GPS, Wi-Fi, mobile networks, and sensors to get the most accurate location. Use Google Location Services to help estimate your phone's location faster and more accurately.
   - **Battery saving:** Use sources that use less battery, like Wi-Fi and mobile networks. Use Google Location Services to help estimate your phone's location faster and more accurately.
   - **Device only:** Use only GPS. Don't use Google Location Services to provide location information. This can estimate your phone's location more slowly and use more battery.

Choose location access (Android 4.1—4.3)

You can control what location information your phone can use.

1. Open your phone's Settings app.
2. Under "Personal," tap **Location access**.
3. At the top of the screen, turn **Access to my location** on or off.
   - **When location access is on, pick either or both of:**
     - **GPS satellites:** Lets your phone estimate its location from satellite signals, like a GPS device in a car.
     - **Wi-Fi & mobile network location:** Lets your phone use Google Location Services to help estimate its location faster, with or without GPS.
   - **When location access is off:**
     Your phone can't find its precise location or share it with any apps.

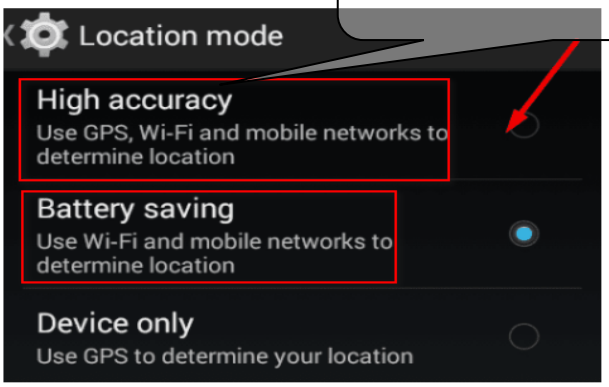
Tip: If you have a tablet that more than one person uses, each person can have different location access settings.

Attachment 40 (Manage your Pixel phone's location settings) at 3 & 4.

Claim 1	Corresponding Structure in Accused Systems

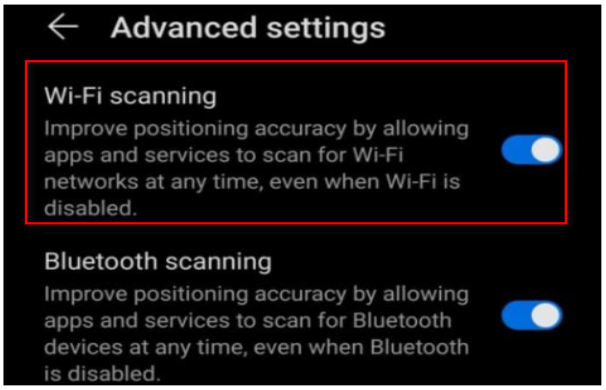
1. On your Android device, go to **Settings**
2. Tap **Location** and re-enable your location services
3. Select **Mode High accuracy**

The user of the wireless device can select the method of the location estimation



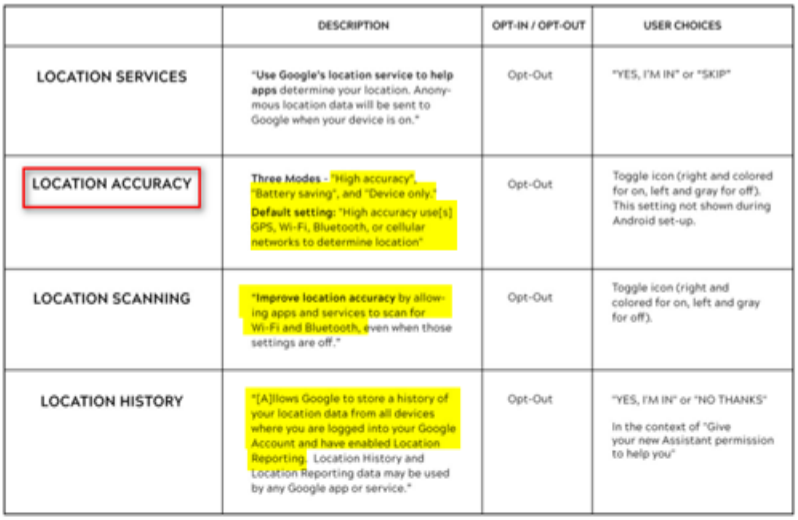
On some phone models, this option can be found under the Advanced Settings option.

Select **Advanced Settings** and enable your device to improve positioning accuracy by allowing apps to scan for Wi-Fi networks and Bluetooth devices at any time, even if Wi-Fi or Bluetooth is disabled.



Attachment 33 (Google Maps Not Updating Location) at 4.

Claim 1	Corresponding Structure in Accused Systems



	DESCRIPTION	OPT-IN / OPT-OUT	USER CHOICES
LOCATION SERVICES	"Use Google's location service to help apps determine your location. Anonymous location data will be sent to Google when your device is on."	Opt-Out	"YES, I'M IN" or "SKIP"
LOCATION ACCURACY	Three Modes - "High accuracy", "Battery saving", and "Device only." Default setting: "High accuracy use[s] GPS, Wi-Fi, Bluetooth, or cellular networks to determine location"	Opt-Out	Toggle icon (right and colored for on, left and gray for off). This setting not shown during Android set-up.
LOCATION SCANNING	"Improve location accuracy by allowing apps and services to scan for Wi-Fi and Bluetooth, even when those settings are off."	Opt-Out	Toggle icon (right and colored for on, left and gray for off).
LOCATION HISTORY	"[A]llows Google to store a history of your location data from all devices where you are logged into your Google Account and have enabled Location Reporting. Location History and Location Reporting data may be used by any Google app or service."	Opt-Out	"YES, I'M IN" or "NO THANKS" In the context of "Give your new Assistant permission to help you"

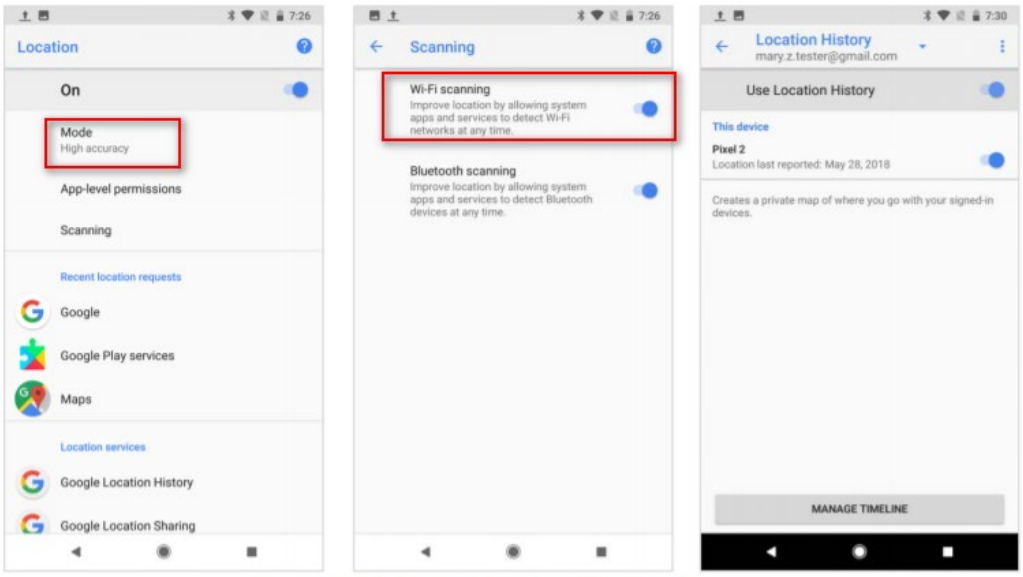
Figure 1: Four Android settings and services that relate to location information collection. [1]

Google Location Services

Google Location Services (GLS) operate at a device level and rely on sensors such as GPS, Wi-Fi, the cellular radio, and other technologies included in mobile devices to position a user in the world. If a user keeps the default settings prompted by Google, Location Services is enabled, Location Accuracy will be set to "High Accuracy" [2] and Location Scanning will be enabled for both Wi-Fi base stations and Bluetooth Beacons, regardless of a user's choice to turn Wi-Fi or Bluetooth on. The implications of user choices among the various Location Services settings are significant, but not intuitive, including:

- With Location Services turned on, Location Accuracy set to "Device only" and Location Scanning turned off, an Android device will only use GPS to provide the location of an Android device.
- When Location Accuracy is set to "High accuracy" and Location Scanning is enabled (the default setting for new device setup), an Android device will use sources including Wi-Fi, Bluetooth, and cellular radio to improve the accuracy of the device's position.

Attachment 38 (Google, Android and Location Tracking) at 2.

Claim 1	Corresponding Structure in Accused Systems
	After completing the setup process users can validate and control settings for device location via the Settings app and navigating to Google settings, then Location (Figure 4).  Figure 4: Location settings after Android device setup process As demonstrated in Figure 4, if users accept Google's defaults during the setup process, the Android device is configured with Location Services enabled, Wi-Fi and Bluetooth scanning engaged, and Location History active. **Attachment 38 (Google, Android and Location Tracking) at 5.**

Claim 1	Corresponding Structure in Accused Systems

Users can choose to disable GLS during the set-up process. However, if a user attempts to disable GLS, a warning dialogue box prompts an extreme scenario: "device location for all apps is turned off and you may not be able to locate your device if it is lost." (Figure 5) Note as well, the action prompt is to "Turn on Location" – reversing the user choice triggering the warning. Further, as described immediately below, many Google and third party apps will not function unless GLS is turned on. Therefore, Google forces user into an impossible ultimatum, have their every move constantly monitored, tracked, and stored or lose the functionality of their expensive smartphone.

If a user disables Location Services but then attempts to use a location aware app or service on their device, she will see the dialogue box shown in Figure 6. If the user clicks "OK" the service is enabled for the entire device and permanently, rather than enabling Location Services only for that particular app or service requesting the functionality.

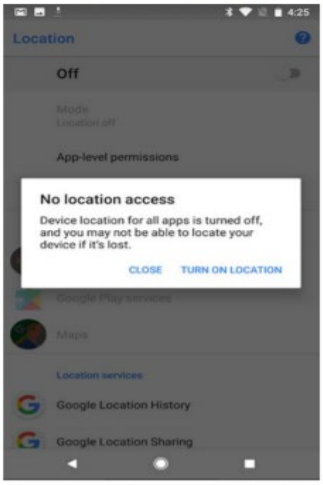


Figure 5: Location Services Warning

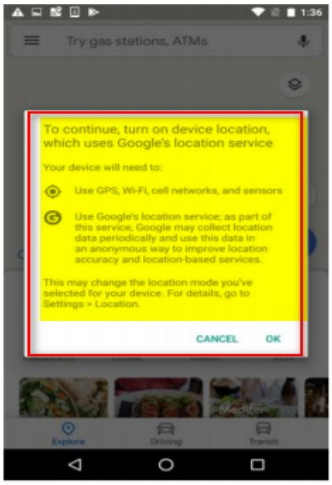


Figure 6: Re-Enable Location Services

Attachment 38 (Google, Android and Location Tracking) at 6.

We collect information about your location when you use our services, which helps us offer features like driving directions for your weekend getaway or showtimes for movies playing near you.

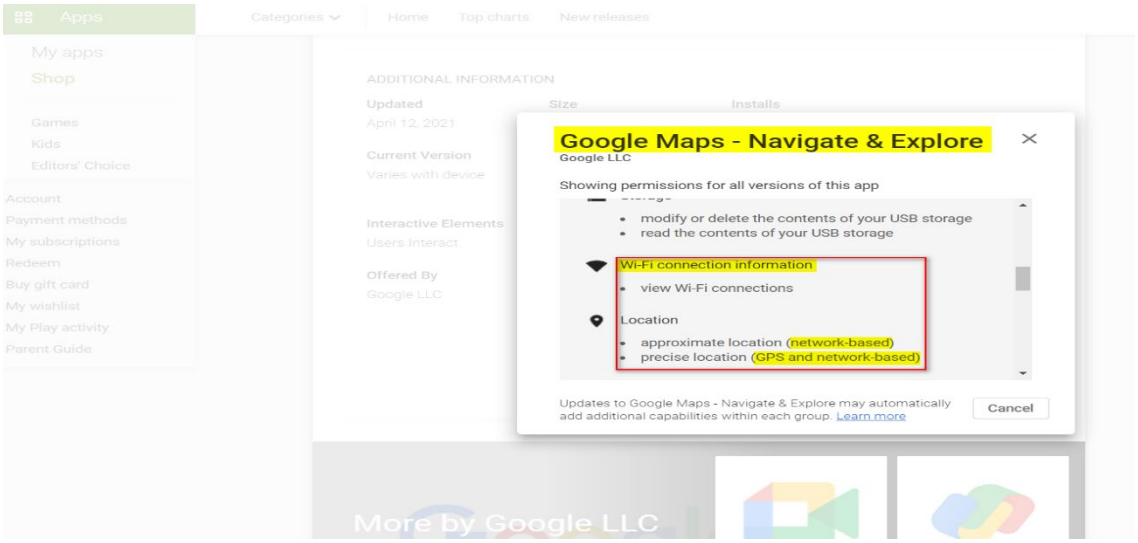
Your location can be determined with varying degrees of accuracy by:

- GPS
- IP address
- Sensor data from your device
- Information about things near your device, such as Wi-Fi access points, cell towers, and Bluetooth-enabled devices

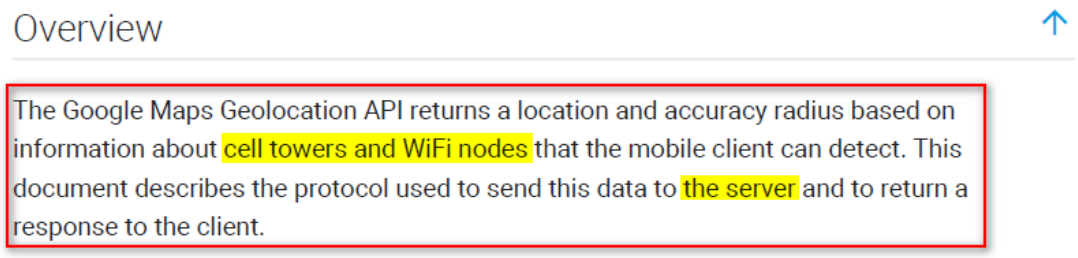
The types of location data we collect depend in part on your device and account settings. For example, you can turn your Android device's location on or off using the device's settings app. You can also turn on Location History if you want to create a private map of where you go with your signed-in devices.

Attachment 29 (Google Privacy Policy) at 4.

Claim 1	Corresponding Structure in Accused Systems



Attachment 39 (Google Map_Permissions) at 1.

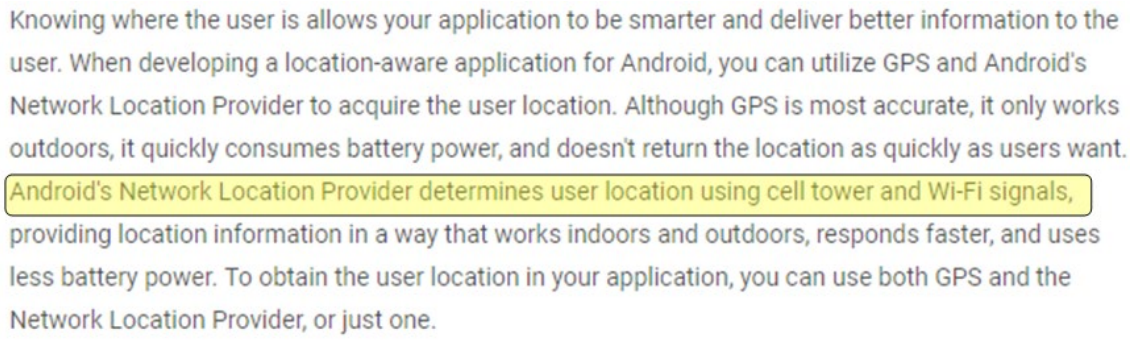


Overview

The Google Maps Geolocation API returns a location and accuracy radius based on information about cell towers and WiFi nodes that the mobile client can detect. This document describes the protocol used to send this data to the server and to return a response to the client.

Communication is done over HTTPS using POST. Both request and response are formatted as JSON, and the content type of both is `application/json`.

Attachment 17 (Cell Towers/Wi-Fi Nodes (RF transceivers) in a wireless communication network) at 1.



Knowing where the user is allows your application to be smarter and deliver better information to the user. When developing a location-aware application for Android, you can utilize GPS and Android's Network Location Provider to acquire the user location. Although GPS is most accurate, it only works outdoors, it quickly consumes battery power, and doesn't return the location as quickly as users want. Android's Network Location Provider determines user location using cell tower and Wi-Fi signals, providing location information in a way that works indoors and outdoors, responds faster, and uses less battery power. To obtain the user location in your application, you can use both GPS and the Network Location Provider, or just one.

Attachment 12 (Location of the device determined using cell tower) at 1&2.

Claim 1	Corresponding Structure in Accused Systems

The first parameter in `requestLocationUpdates()` is the type of location provider to use (in this case, the Network Location Provider for cell tower and Wi-Fi based location). You can control the frequency at which your listener receives updates with the second and third parameter—the second is the minimum time interval between notifications and the third is the minimum change in distance between notifications—setting both to zero requests location notifications as frequently as possible. The last parameter is your `LocationListener`, which receives callbacks for location updates.

To request location updates from the GPS provider, use `GPS_PROVIDER` instead of `NETWORK_PROVIDER`. You can also request location updates from both the GPS and the Network Location Provider by calling `requestLocationUpdates()` twice—once for `NETWORK_PROVIDER` and once for `GPS_PROVIDER`.

Requesting User Permissions

Google Maps application makes use of wireless communication network, having cell towers (Exhibit A) or Wi-Fi access points (Exhibit A), to estimate the location of the Wireless communication device (Exhibit B).

In order to receive location updates from `NETWORK_PRO`

`ACCESS_COARSE_LOCATION` or `ACCESS_FINE_LOCATION` permission, respectively, in your Android manifest file. Without these permissions, your application will fail at runtime when requesting location updates.

If you are using both `NETWORK_PROVIDER` and `GPS_PROVIDER`, then you need to request only the `ACCESS_FINE_LOCATION` permission, because it includes permission for both providers. Permission for `ACCESS_COARSE_LOCATION` allows access only to `NETWORK_PROVIDER`.

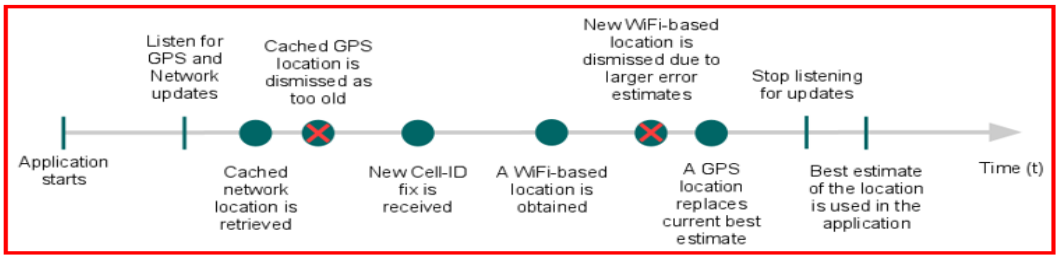
Attachment 12 (Location is estimated using cell tower/wi-fi network) at 3 & 4.

Flow for obtaining user location

Here's the typical flow of procedures for obtaining the user location:

1. Start application.
2. Sometime later, start listening for updates from desired location providers.
3. Maintain a "current best estimate" of location by filtering out new, but less accurate fixes.
4. Stop listening for location updates.
5. Take advantage of the last best location estimate.

Figure 1 demonstrates this model in a timeline that visualizes the period in which an application is listening for location updates and the events that occur during that time.



Attachment 12 (Location is estimated using cell tower/wi-fi network) at 5.

Claim 1	Corresponding Structure in Accused Systems

There are 3 location providers in Android.

They are:

gps –> (GPS, AGPS): Name of the GPS location provider. This provider determines location using satellites. Depending on conditions, this provider may take a while to return a location fix. Requires the permission android.permission.ACCESS_FINE_LOCATION.

network –> (AGPS, CellID, WiFi MACID): Name of the network location provider. This provider determines location based on availability of cell tower and WiFi access points. Results are retrieved by means of a network lookup. Requires either of the permissions android.permission.ACCESS_COARSE_LOCATION or android.permission.ACCESS_FINE_LOCATION.

passive –> (CellID, WiFi MACID): A special location provider for receiving locations without actually initiating a location fix. This provider can be used to passively receive location updates when other applications or services request them without actually requesting the locations yourself. This provider will return locations generated by other providers. Requires the permission android.permission.ACCESS_FINE_LOCATION, although if the GPS is not enabled this provider might only return coarse fixes. This is what Android calls these location providers, however, the underlying technologies to make this stuff work is mapped to the specific set of hardware and telco provided capabilities (network service).

The best way is to use the "network" or "passive" provider first, and then fallback on "gps", and depending on the task, switch between providers. This covers all cases, and provides a lowest common denominator service (in the worst case) and great service (in the best case).

Attachment 41 (Android Location Providers - GPS or Network Provider?) at 1 & 2.

Accuracy

You can specify location accuracy using the `setPriority()` method, passing one of the following values as the argument:

- `PRIORITY_HIGH_ACCURACY` provides the most accurate location possible, which is computed using as many inputs as necessary (it enables GPS, Wi-Fi, and cell, and uses a variety of Sensors), and may cause significant battery drain.
- `PRIORITY_BALANCED_POWER_ACCURACY` provides accurate location while optimizing for power. Very rarely uses GPS. Typically uses a combination of Wi-Fi and cell information to compute device location.
- `PRIORITY_LOW_POWER` largely relies on cell towers and avoids GPS and Wi-Fi inputs, providing coarse (city-level) accuracy with minimal battery drain.
- `PRIORITY_NO_POWER` receives locations passively from other apps for which location has already been computed.

The location needs of most apps can be satisfied using the balanced power or low power options. High accuracy should be reserved for apps that are running in the foreground and require *real time* location updates (for example, a mapping app).

Attachment 42 (Optimize location for battery) at 2.

Traffic conditions [edit]

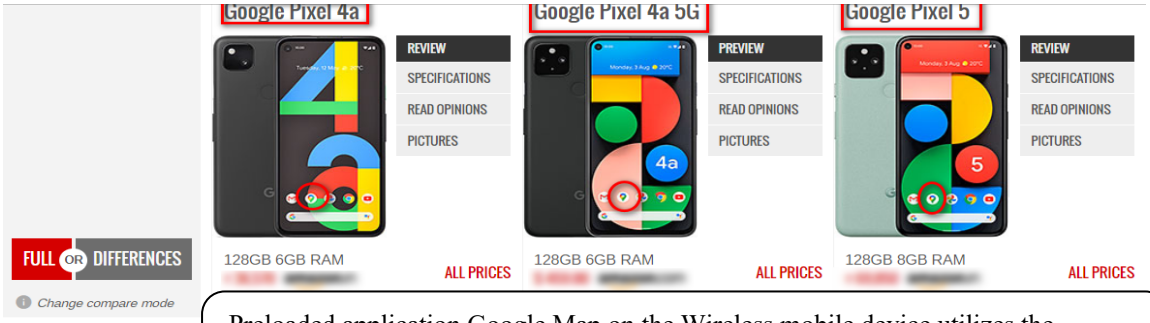
In 2007, Google began offering traffic data as a colored overlay on top of roads and motorways to represent the speed of vehicles on particular roads. Crowdsourcing is used to obtain the GPS-determined locations of a large number of cellphone users, from which live traffic maps are produced.[59][60][61]

Google has stated that the speed and location information it collects to calculate traffic conditions is anonymous.[62] Options available in each phone's settings allow users not to share information about their location with Google Maps.[63] Google stated, "Once you disable or opt out of My Location, Maps will not continue to send radio information back to Google servers to determine your handset's approximate location".[64][*failed verification*]

Attachment 43 (Google Maps Wikipedia) at 5 & 6.

Claim 1	Corresponding Structure in Accused Systems
according to mapping information stored within the wireless mobile communications device,	Plaintiff contends the Exhibit-B-listed mobile-wireless-communications device's motherboard processor is programmed to process location-service information; i.e., to receive a location of the device from the wireless communications network and generate an indication of the device's location. For example, the motherboard processor may use Google Maps to obtain the device's location and provide direction from that location to a destination. Wireless mobile communication device-including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc. (refer Exhibit B for complete list) has a processor for example, Quad-Core processor. When wireless communication device transceivers and processor are in communication, they are coupled. Further, the Location-based Service (LBS) provider, such as Google Map, on the Exhibit-B utilizes the processor coupled to the transceiver to estimates/receive the location on mobile wireless communications devices (specifically one or more of the mobile wireless communications devices identified on Exhibit B) by utilizing wireless communication network or first computer. For example, the motherboard processor may use Google Maps to view and find places around the globe. Google map can also show your current location and provide direction (including with respect to geographic features such as nearby restaurants) from your location/source to any destination. In using Google Maps App, the mobile wireless communication device's motherboard processor generates signals for displaying on the device's screen a blue dot that shows the current location of the wireless mobile communication device. The Google map app estimates the location of the device from 3 sources: GPS (GPS uses satellites and knows your location within a few meters), Wi-Fi (the location of nearby Wi-Fi networks helps Maps know where you are), and cell towers (cell tower can be accurate up to a few thousand meters). When Google Maps isn't sure about your location, a light blue circle around the blue dot is shown. You might be anywhere within the light blue circle. The smaller the circle, the more certain the app is about your location. Furthermore, Plaintiff contends Google Maps App provides flexibility to download maps on SD card/internal memory of communication device (Exhibit B) examples of compatible devices is Samsung Galaxy S20, Pixel 4a, Pixel 4a 5G, Pixel 5, etc., and navigate offline. When internet is slow or mobile data is expensive, or communication device cannot connect to internet, an area can be saved to phone or tablet (Exhibit B) from Google maps app and use it when offline. Communication device can use Offline maps for Navigation through the downloaded area without internet. The following exemplifies the existence of this limitation in Accused Systems:

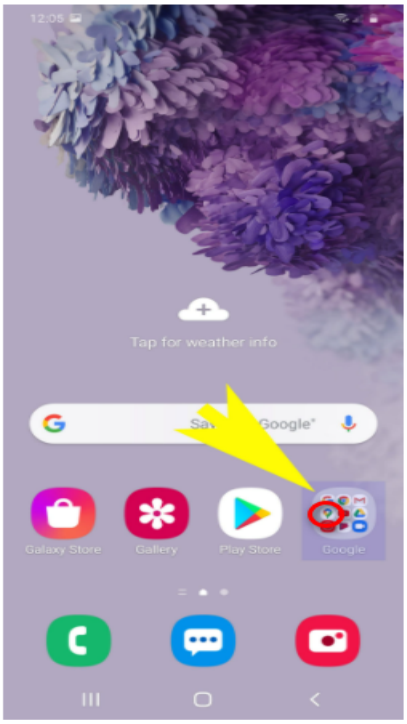
Claim 1	Corresponding Structure in Accused Systems



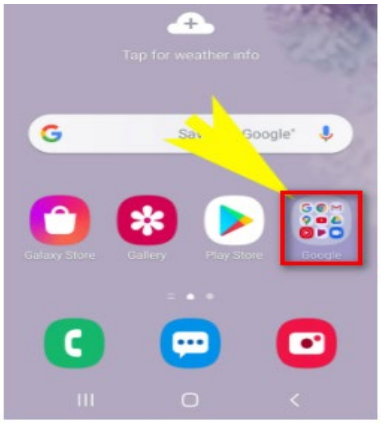
Preloaded application Google Map on the Wireless mobile device utilizes the processor coupled to the transceiver to estimates/receive the location on mobile wireless communications device by utilizing wireless communication network

NETWORK	Technology	GSM / HSPA / LTE	GSM / HSPA / LTE / 5G	GSM / CDMA / HSPA / EVDO / LTE / 5G
LAUNCH	Announced	2020, August 03	2020, September 30	2020, September 30
	Status	Available. Released 2020, August 20	Available. Released 2020, November 05	Available. Released 2020, October 15
BODY	Dimensions	144 x 69.4 x 8.2 mm (5.67 x 2.73 x 0.32 in)	153.9 x 74 x 8.2 mm (Sub-6) or 8.5 mm (Sub-6 and mmWave)	144.7 x 70.4 x 8 mm (5.70 x 2.77 x 0.31 in)
	Weight	143 g (5.04 oz)	168 g (5G Sub-6); 171 g (5G Sub-6 and mmWave) (5.93 oz)	151 g (5.33 oz)
	Build	Glass front (Gorilla Glass 3), plastic back, plastic frame	Glass front (Gorilla Glass 3), plastic back, plastic frame	Glass front (Gorilla Glass 6), aluminum back, aluminum frame
	SIM	Nano-SIM and/or eSIM	Nano-SIM and/or eSIM	Nano-SIM and/or eSIM
				IP68 dust/water resistant (up to 1.5m for 30 mins)
DISPLAY	Type	OLED, HDR	OLED, HDR	OLED, 90Hz, HDR10+
	Size	5.81 inches, 83.2 cm^2 (~83.3% screen-to-body ratio)	6.2 inches, 95.7 cm^2 (~84.1% screen-to-body ratio)	6.0 inches, 87.6 cm^2 (~85.9% screen-to-body ratio)
	Resolution	1080 x 2340 pixels, 19.5:9 ratio (~443 ppi density)	1080 x 2340 pixels, 19.5:9 ratio (~413 ppi density)	1080 x 2340 pixels, 19.5:9 ratio (~432 ppi density)
	Protection	Corning Gorilla Glass 3	Corning Gorilla Glass 3	Corning Gorilla Glass 6
		Always-on display	Always-on display	Always-on display
PLATFORM	OS	Android 10, upgradable to Android 11	Android 11	Android 11
	Chipset	Qualcomm SDM730 Snapdragon 730G (8 nm)	Qualcomm SM7250 Snapdragon 765G (7 nm)	Qualcomm SM7250 Snapdragon 765G (7 nm)
	CPU	Octa-core (2x2.2 GHz Kryo 470 Gold & 6x1.8 GHz Kryo 470 Silver)	Octa-core (1x2.4 GHz Kryo 475 Prime & 1x2.2 GHz Kryo 475 Gold & 6x1.8 GHz Kryo 475 Silver)	Octa-core (1x2.4 GHz Kryo 475 Prime & 1x2.2 GHz Kryo 475 Gold & 6x1.8 GHz Kryo 475 Silver)
	GPU	Adreno 618	Adreno 620	Adreno 620

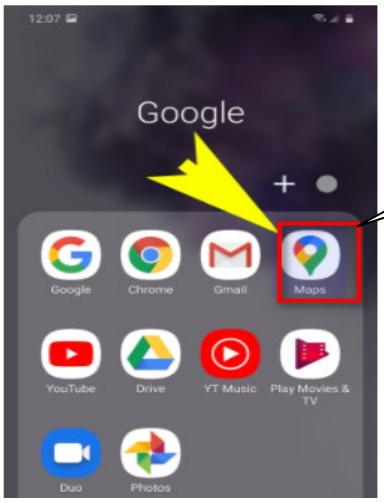
Attachment 4 (Processor of Google Pixel 4a, Pixel 4a 5G and Pixel 5) at 1.

Claim 1	Corresponding Structure in Accused Systems
	Using Turn-by-Turn Navigation with the Galaxy S20 Google Maps **Time Needed :** 8 minutes The following steps demonstrate the actual process of setting up and utilizing turn-by-turn navigation system with the Google Maps app on the new Samsung Galaxy S20 handset. Before you begin, verify and ensure that location is enabled on your phone. It has to be enabled so that your device can determine your current location. 1. **Tap to open the Google folder fr the Home screen.** A new screen consisting of Google-re apps and services will be displayed.  Google Maps preloaded in the Wireless mobile communication devices (Exhibit B), such as Galaxy S20. Current location of the device is determined if location is enabled. **Attachment 5 (how to use turn by turn Google map) at 1.**

Claim 1	Corresponding Structure in Accused Systems



2. **Tap Maps to open Google Maps app.**
If this is the first time you use Google Maps on your Galaxy S20, you'll be prompted with a Welcome screen. If you see this screen, read and review the information then tap **GOT IT** to proceed.



Google Maps preloaded in the Wireless mobile communication devices (Exhibit B), such as Galaxy S20.

Attachment 5 (how to use turn by turn google map) at 2&3.

verizon

Personal Business

Shop Why Verizon Support

Home > Support > Sony > Sony Xperia Z2 > **Google Maps - Find Current Location**

Google Maps™ - Find Current Location

Notes:

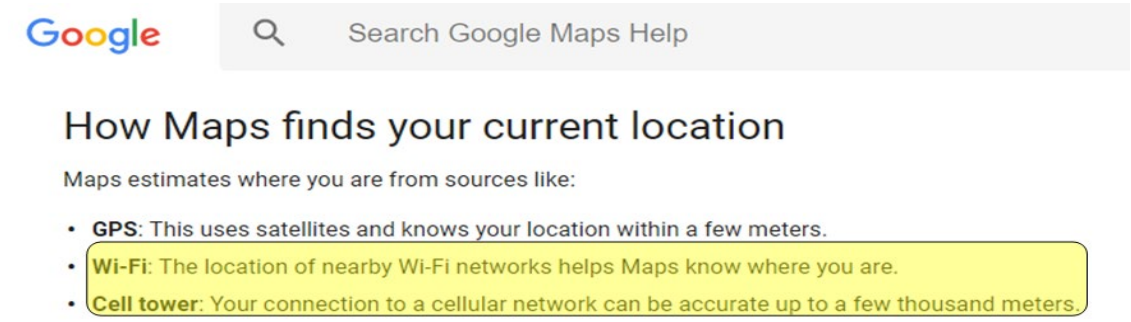
- If the Google Maps app isn't already installed on your device, it can be downloaded from the Google Play Store™.
- For further assistance, refer to the Google Maps Help Center.

1. From a Home screen, tap **Apps**.
2. Tap **Maps**.
3. Tap the **My Location icon** (located in the lower-right).

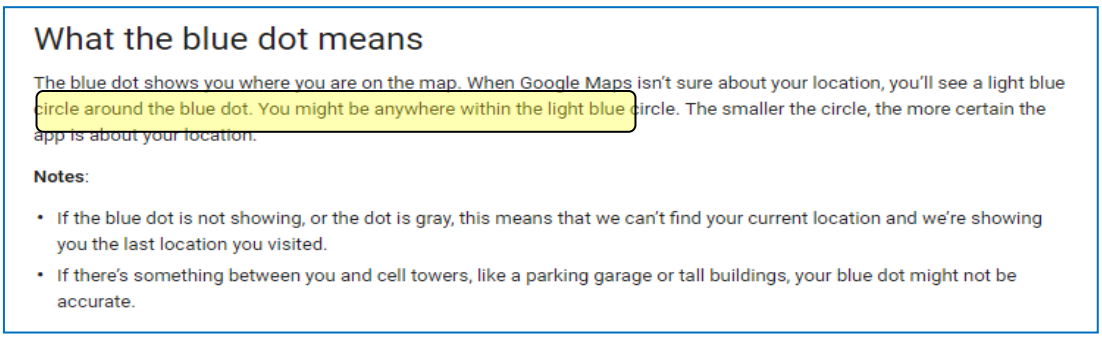
Wireless communication networks (e.g. Verizon, AT&T, T-Mobile, etc.) estimate/determine the location of the Wireless communication device (Exhibit B) on Google Maps.

Claim 1	Corresponding Structure in Accused Systems

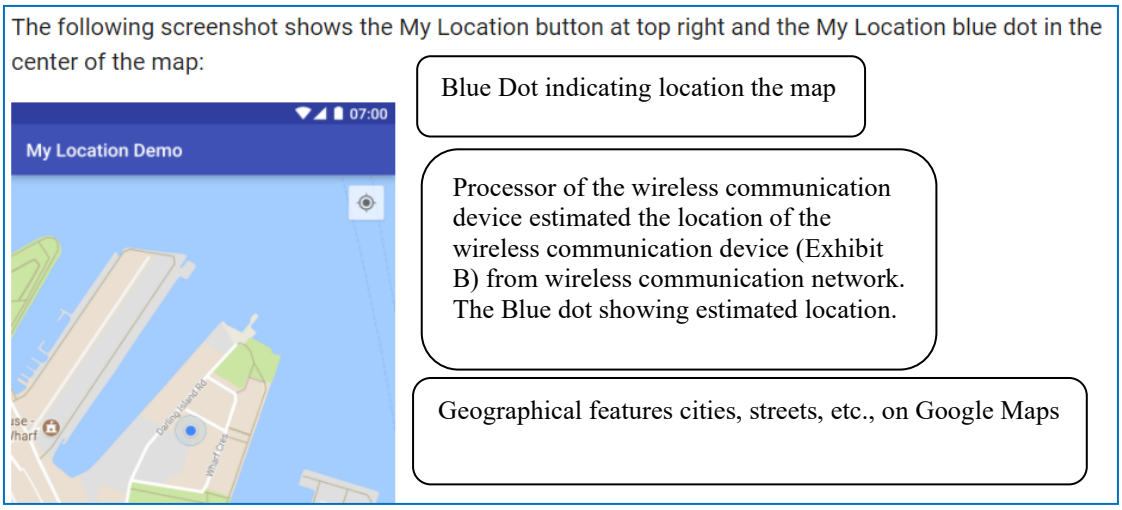
Attachment 6 (Find Current Location on Google map) at 1.



Attachment 8 (How map finds your current location) at 2.

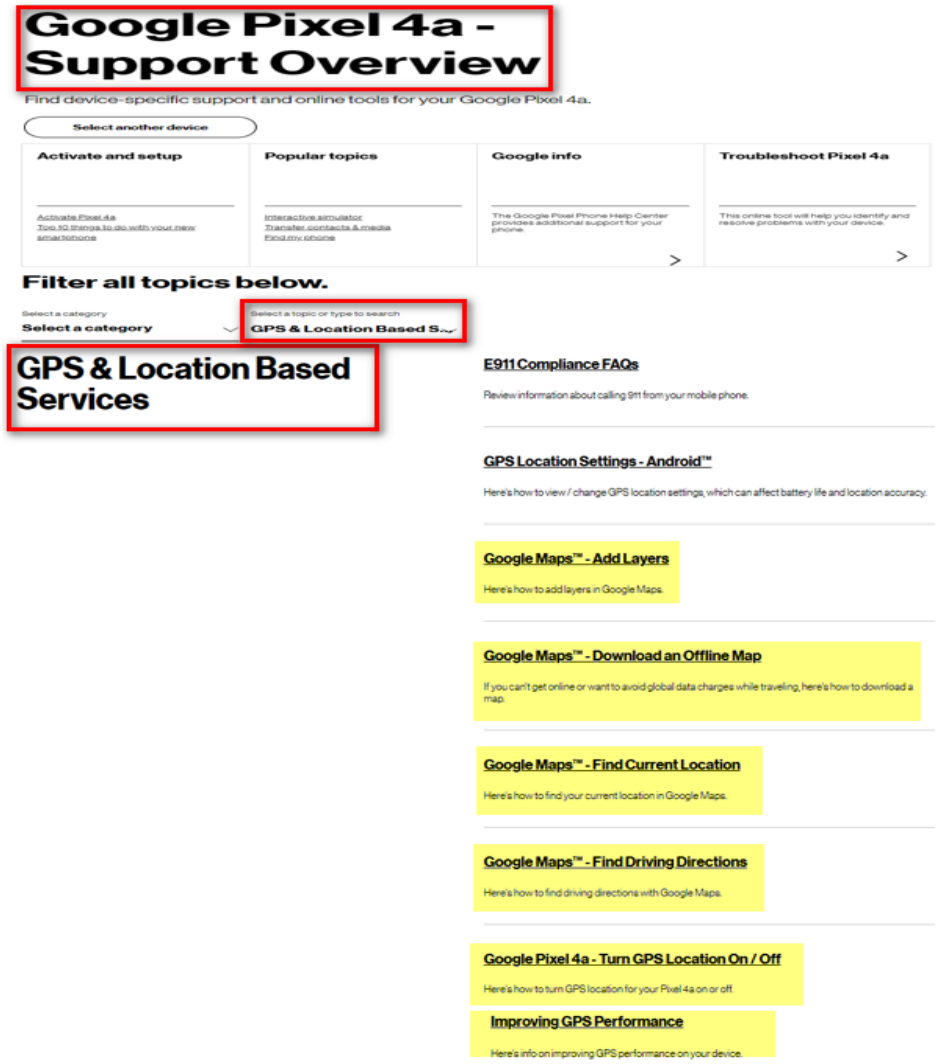


Attachment 8 (Current location shown on google map) at 3.

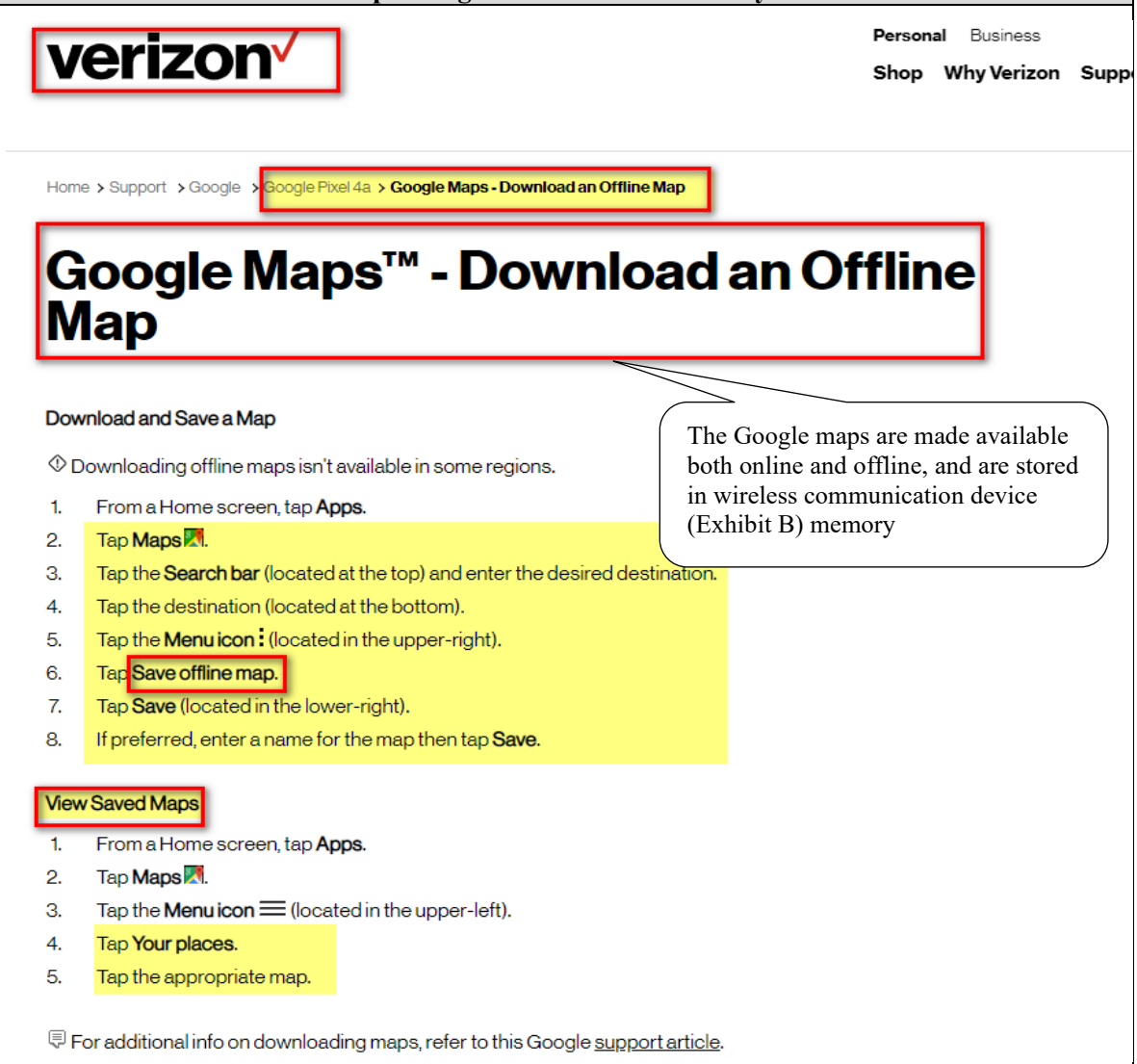


Source: Location estimation on the Wireless communication device

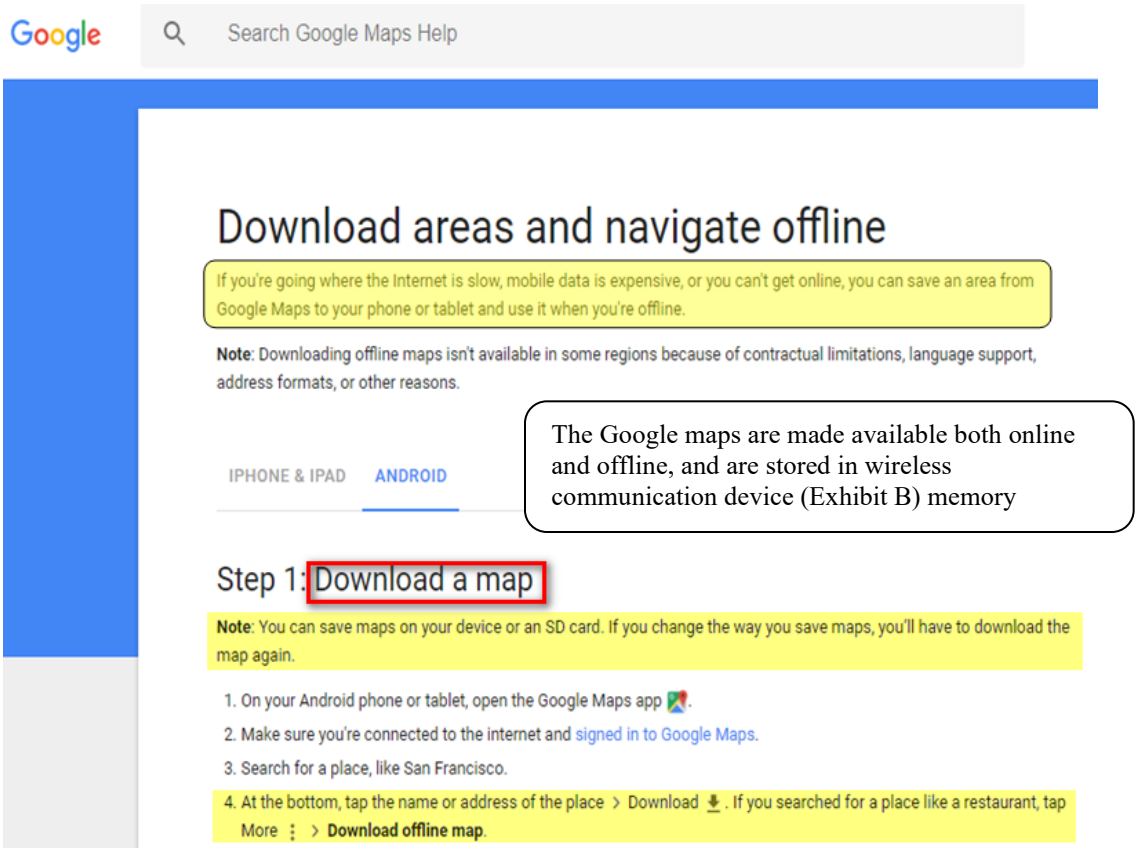
Attachment 22 (Location estimation on the Wireless communication device) at 10.

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 16 (How to use Pixel 4a GPS and location-based services) at 9.**

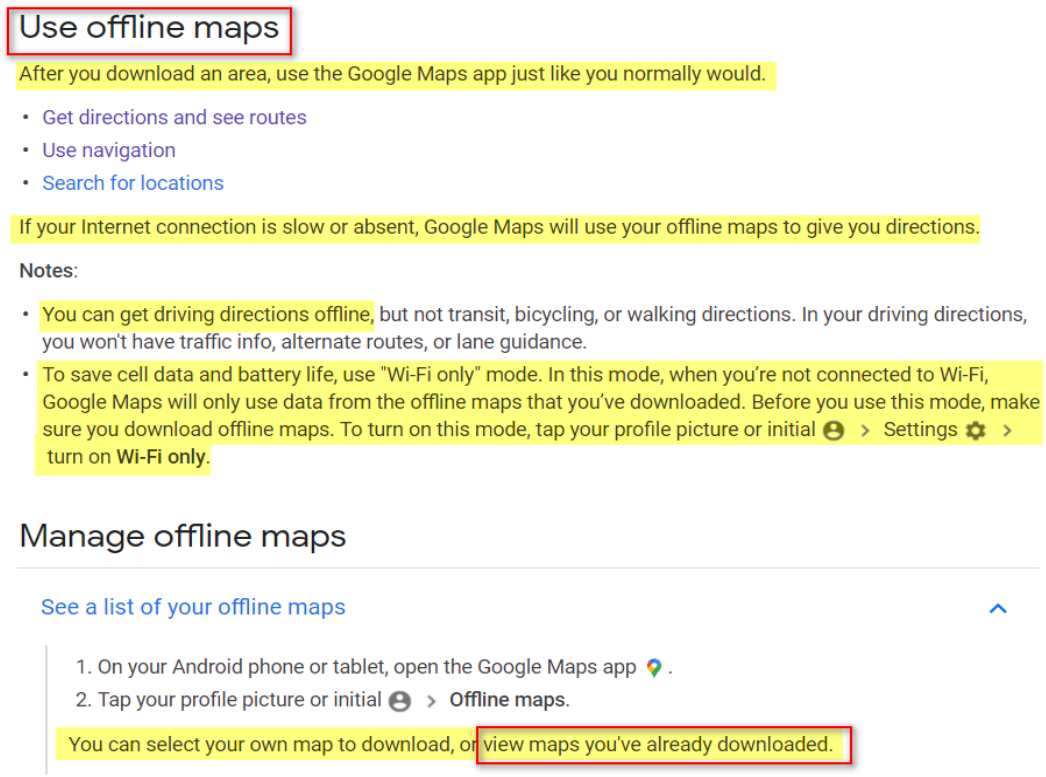
Claim 1	Corresponding Structure in Accused Systems



Attachment 10 (Google Map-Download an offline map on pixel 4a) at 1.

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 9 (Mapping information stored on wireless communication device) at 1.**

Claim 1	Corresponding Structure in Accused Systems
	Save a route 1. On your Android phone or tablet, open the Google Maps app . 2. Make sure you're connected to the Internet. 3. Search for your destination or tap it on the map. 4. In the bottom left, tap Directions . 5. From the top, choose your mode of transit. 6. Tap the white bar at the bottom. It's the one that shows the travel time and distance. 7. At the bottom, tap **Save offline**. Tip: • Your route is saved on your phone or tablet. Make sure to use the same phone or tablet when looking for a saved route. • Your saved route expires after 30 days. • Your route will show you the same mode of transit you chose when you saved the route. **Find a saved route** 1. On your Android phone or tablet, open the Google Maps app . 2. At the bottom, tap **Saved offline route**. Tip: • If you save a route from "Your location" and look up a saved route, the directions will start from the place where you saved the route. The directions won't start from your current location. • To get updated information like traffic, tap Refresh . • Turn-by-turn navigation isn't currently available for saved routes. To search for places and get turn-by-turn navigation, download an offline area. **Attachment 32 (Get directions & show routes) at 3.**

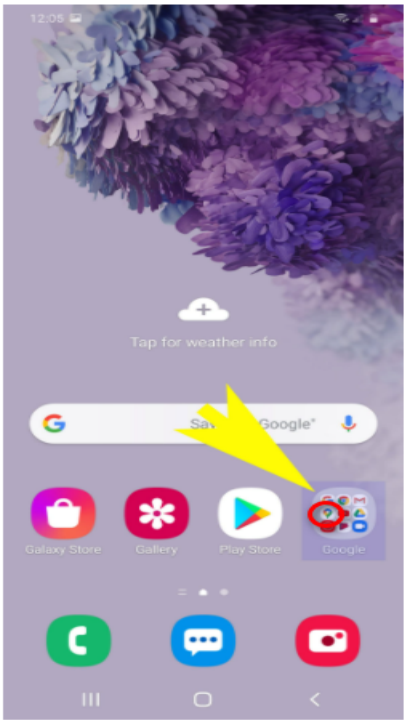
Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 31 (Download google map) at 2.**
and wherein the first processor determines user navigation information and displays the user navigation information according to the location of the wireless mobile communications device with respect to the geographic features and a destination specified at the wireless mobile communications device,	Plaintiff contends the motherboard processor (i.e., processor on the motherboard) of each Exhibit-B-listed item (i.e., mobile Wireless communications device) meets this limitation. The processor processes location-service information, including displaying user navigation information according to the device's location with regards to geographic features and a user-specified Destination. For example, using Google map app for more examples of location services processed by each Exhibit-B device's motherboard processor) the device user locates the device's current location on the google map app and then provide details for a destination on the options, provided in the Google map app. The user can then navigate (i.e., the processor processes display information) in real time from current location to destination. The processor displays navigation in the Google Maps app to display turn-by-turn directions. Using the Google map app, the processor will show the directions and use real-time traffic information to find the best route to the specified destination. The following exemplifies this limitation's existence in Accused Systems:

Claim 1	Corresponding Structure in Accused Systems

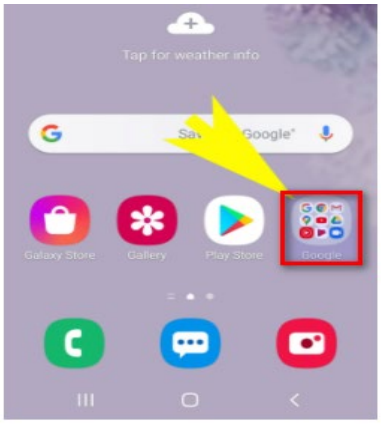
Preloaded application Google Map on the Wireless mobile device utilizes the processor coupled to the transceiver to estimates/receive the location on mobile wireless communications device by utilizing wireless communication network

NETWORK	Technology	GSM / HSPA / LTE	GSM / HSPA / LTE / 5G	GSM / CDMA / HSPA / EVDO / LTE / 5G
LAUNCH	Announced	2020, August 03	2020, September 30	2020, September 30
	Status	Available. Released 2020, August 20	Available. Released 2020, November 05	Available. Released 2020, October 15
BODY	Dimensions	144 x 69.4 x 8.2 mm (5.67 x 2.73 x 0.32 in)	153.9 x 74 x 8.2 mm (Sub-6) or 8.5 mm (Sub-6 and mmWave)	144.7 x 70.4 x 8 mm (5.70 x 2.77 x 0.31 in)
	Weight	143 g (5.04 oz)	168 g (5G Sub-6); 171 g (5G Sub-6 and mmWave) (5.93 oz)	151 g (5.33 oz)
	Build	Glass front (Gorilla Glass 3), plastic back, plastic frame	Glass front (Gorilla Glass 3), plastic back, plastic frame	Glass front (Gorilla Glass 6), aluminum back, aluminum frame
	SIM	Nano-SIM and/or eSIM	Nano-SIM and/or eSIM	Nano-SIM and/or eSIM
				IP68 dust/water resistant (up to 1.5m for 30 mins)
DISPLAY	Type	OLED, HDR	OLED, HDR	OLED, 90Hz, HDR10+
	Size	5.81 inches, 83.2 cm^2 (~83.3% screen-to-body ratio)	6.2 inches, 95.7 cm^2 (~84.1% screen-to-body ratio)	6.0 inches, 87.6 cm^2 (~85.9% screen-to-body ratio)
	Resolution	1080 x 2340 pixels, 19.5:9 ratio (~443 ppi density)	1080 x 2340 pixels, 19.5:9 ratio (~413 ppi density)	1080 x 2340 pixels, 19.5:9 ratio (~432 ppi density)
	Protection	Corning Gorilla Glass 3	Corning Gorilla Glass 3	Corning Gorilla Glass 6
		Always-on display	Always-on display	Always-on display
PLATFORM	OS	Android 10, upgradable to Android 11	Android 11	Android 11
	Chipset	Qualcomm SDM730 Snapdragon 730G (8 nm)	Qualcomm SM7250 Snapdragon 765G (7 nm)	Qualcomm SM7250 Snapdragon 765G (7 nm)
	CPU	Octa-core (2x2.2 GHz Kryo 470 Gold & 6x1.8 GHz Kryo 470 Silver)	Octa-core (1x2.4 GHz Kryo 475 Prime & 1x2.2 GHz Kryo 475 Gold & 6x1.8 GHz Kryo 475 Silver)	Octa-core (1x2.4 GHz Kryo 475 Prime & 1x2.2 GHz Kryo 475 Gold & 6x1.8 GHz Kryo 475 Silver)
	GPU	Adreno 618	Adreno 620	Adreno 620

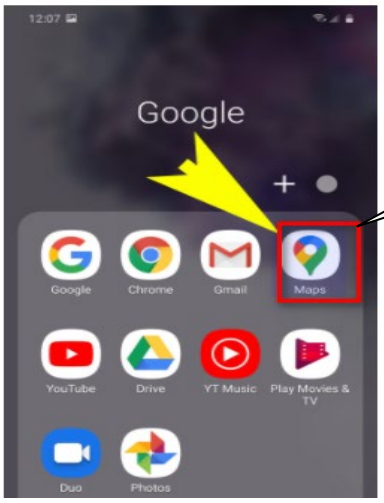
Attachment 4 (Processor of Google Pixel 4a, Pixel 4a 5G, and Pixel 5) at 1.

Claim 1	Corresponding Structure in Accused Systems
	Using Turn-by-Turn Navigation with the Galaxy S20 Google Maps **Time Needed :** 8 minutes The following steps demonstrate the actual process of setting up and utilizing turn-by-turn navigation system with the Google Maps app on the new Samsung Galaxy S20 handset. Before you begin, verify and ensure that location is enabled on your phone. It has to be enabled so that your device can determine your current location. 1. **Tap to open the Google folder fro he Home screen.** A new screen consisting of Google-rela ps and services will be displayed.  Google Maps preloaded in the Wireless mobile communication devices (Exhibit B), such as Galaxy S20. Current location of the device is determined if location is enabled **Attachment 5 (how to use turn by turn Google map) at 1.**

Claim 1	Corresponding Structure in Accused Systems



2. **Tap Maps to open Google Maps app.**
If this is the first time you use Google Maps on your Galaxy S20, you'll be prompted with a Welcome screen. If you see this screen, read and review the information then tap **GOT IT** to proceed.



Google Maps preloaded in the Wireless mobile communication devices (Exhibit B), such as Galaxy S20.

Attachment 5 (how to use turn by turn google map) at 2&3.

verizon

Personal Business

Shop Why Verizon Support

Home > Support > Sony > Sony Xperia Z2 > **Google Maps - Find Current Location**

Google Maps™ - Find Current Location

Notes:

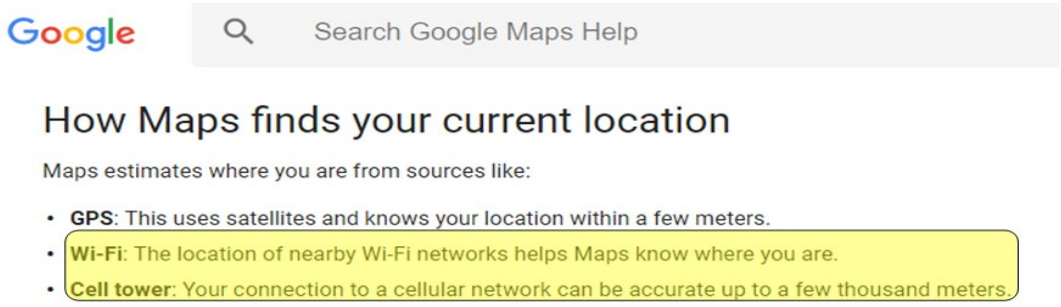
- If the Google Maps app isn't already installed on your device, it can be downloaded from the Google Play Store™.
- For further assistance, refer to the Google Maps Help Center.

1. From a Home screen, tap **Apps**.
2. Tap **Maps**.
3. Tap the **My Location icon** (located in the lower-right).

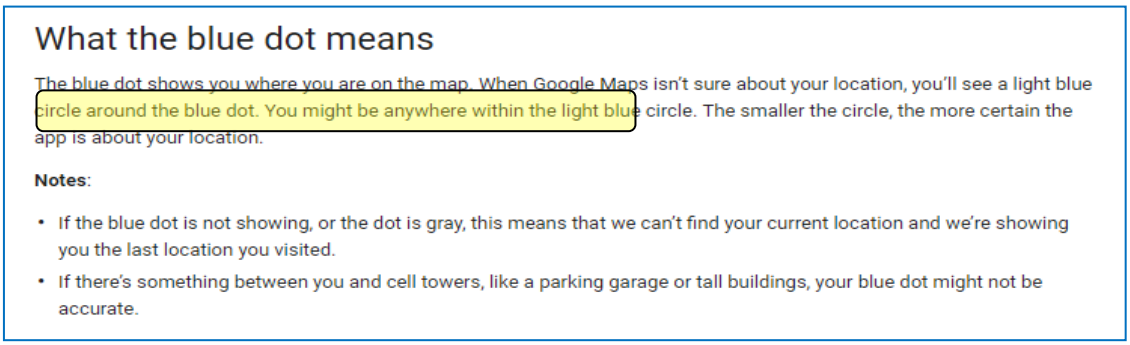
Wireless communication networks (e.g. Verizon, AT&T, T-Mobile, etc.) estimate/determine the location of the Wireless communication device (Exhibit B) on Google Maps.

Claim 1	Corresponding Structure in Accused Systems

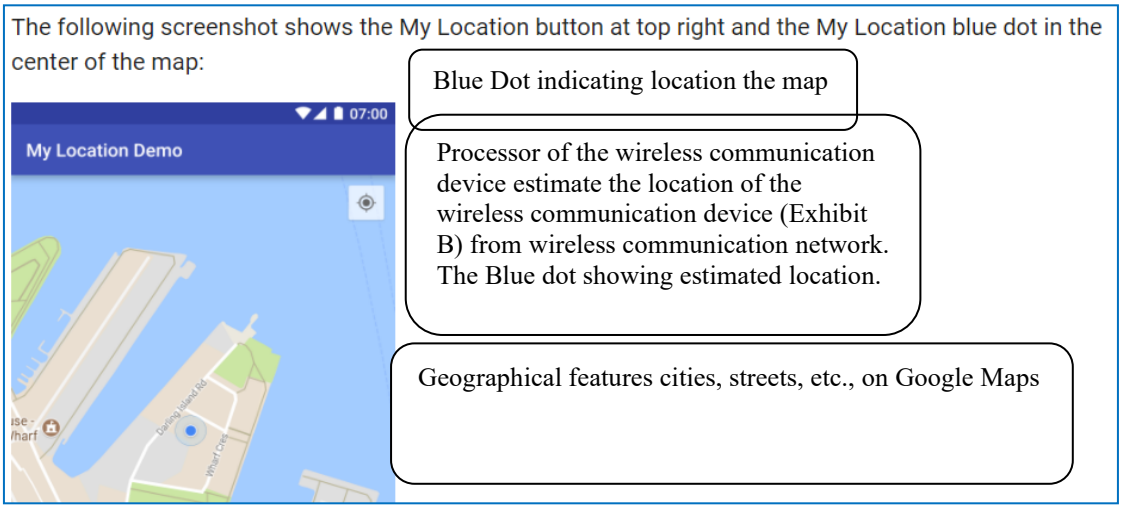
Attachment 6 (Find Current Location on Google map) at 1.



Attachment 8 (How map finds your current location) at 2.



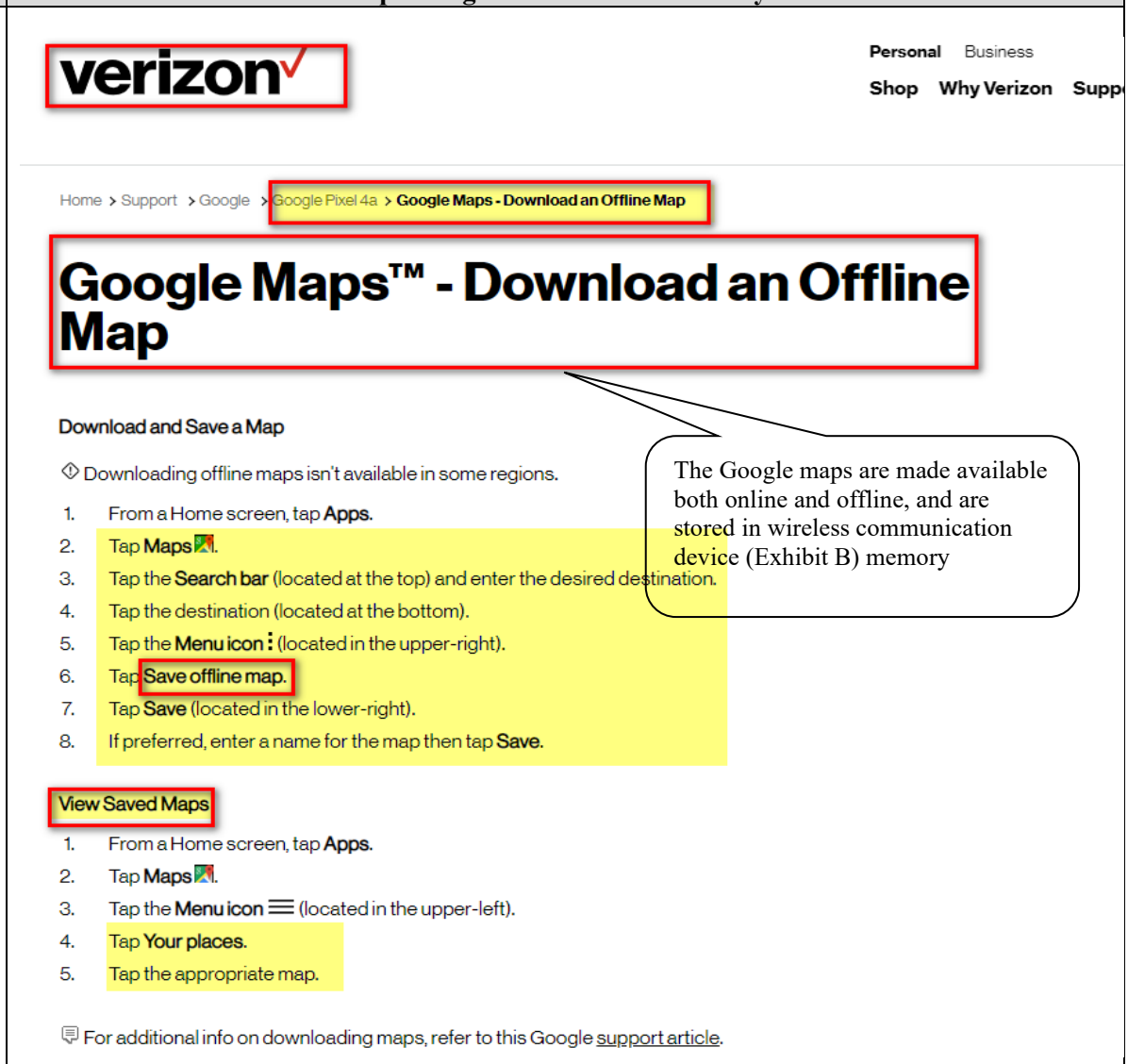
Attachment 8 (Current location shown on google map) at 3.



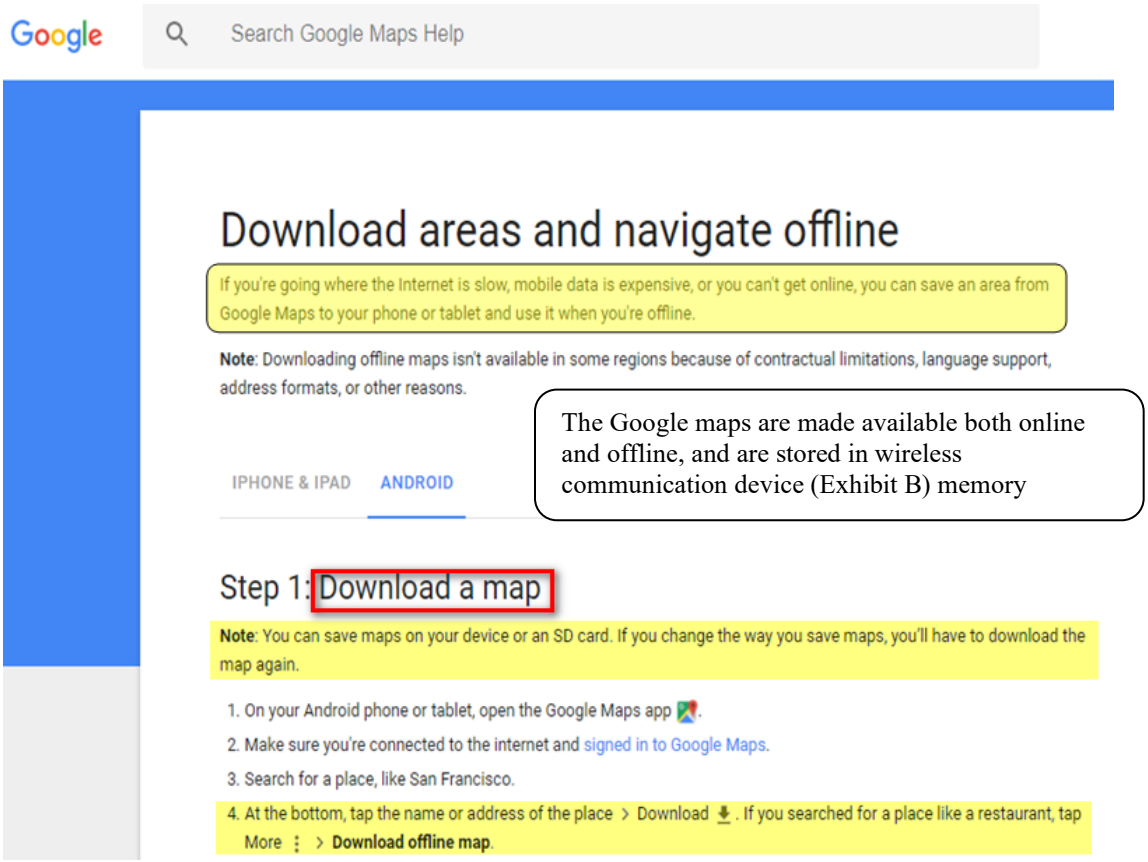
Source: Location estimation on the Wireless communication device

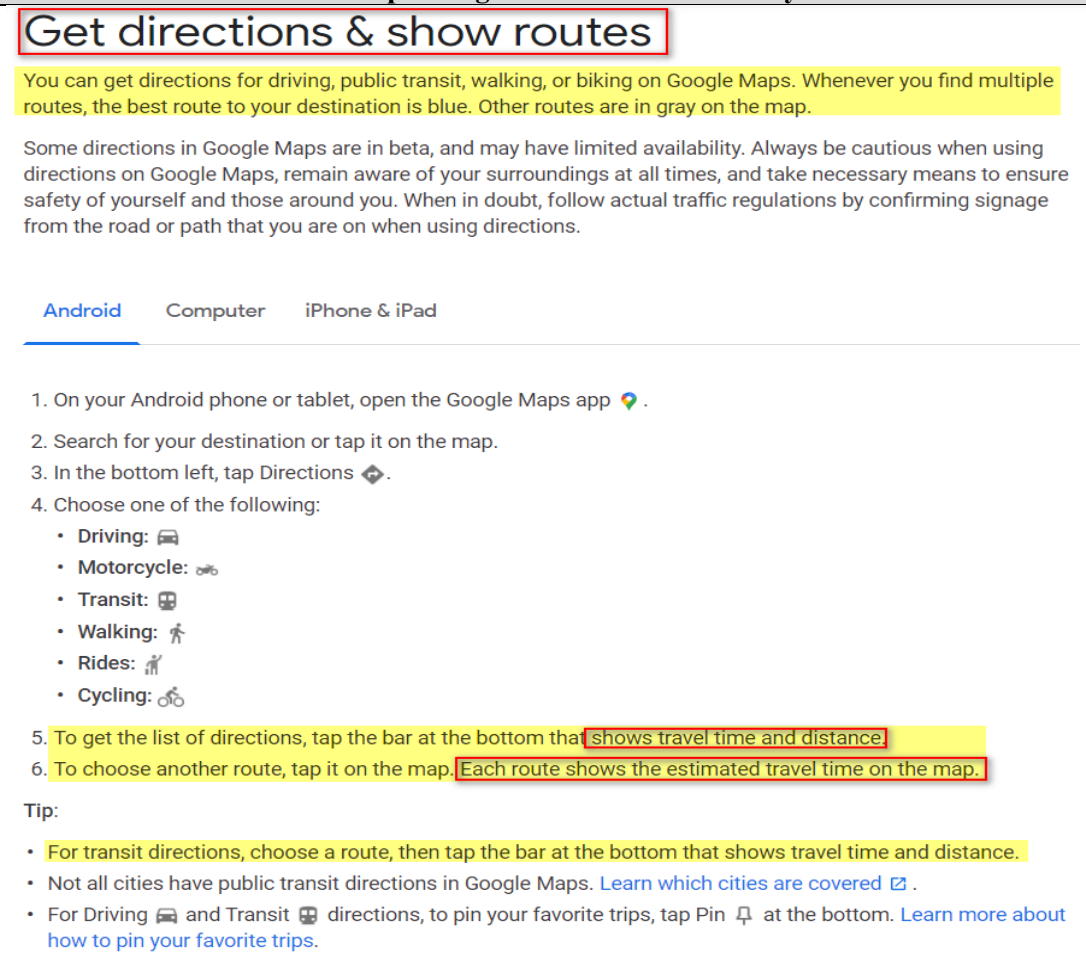
Attachment 22 (Location estimation on the Wireless communication device) at 10.

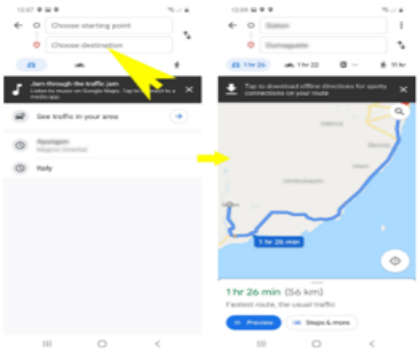
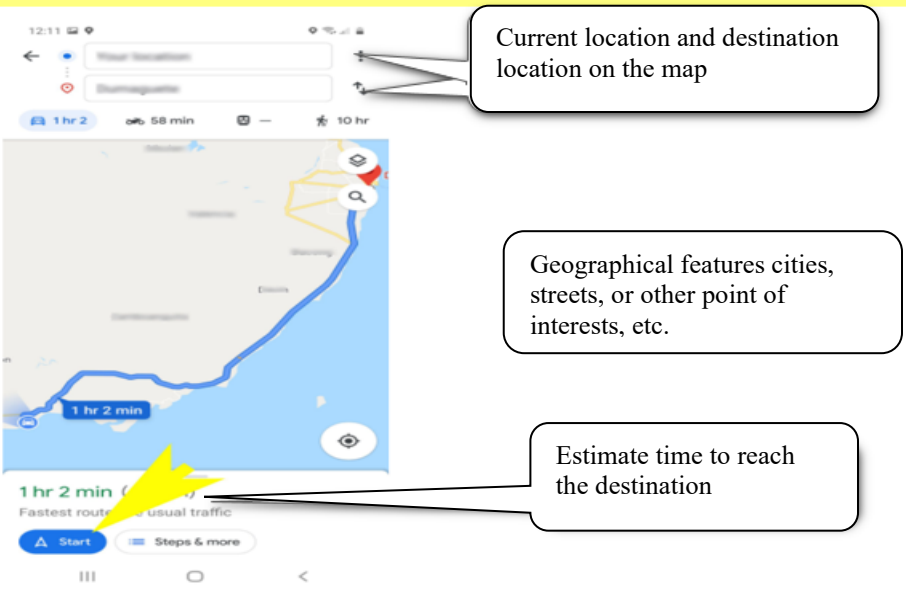
Claim 1	Corresponding Structure in Accused Systems



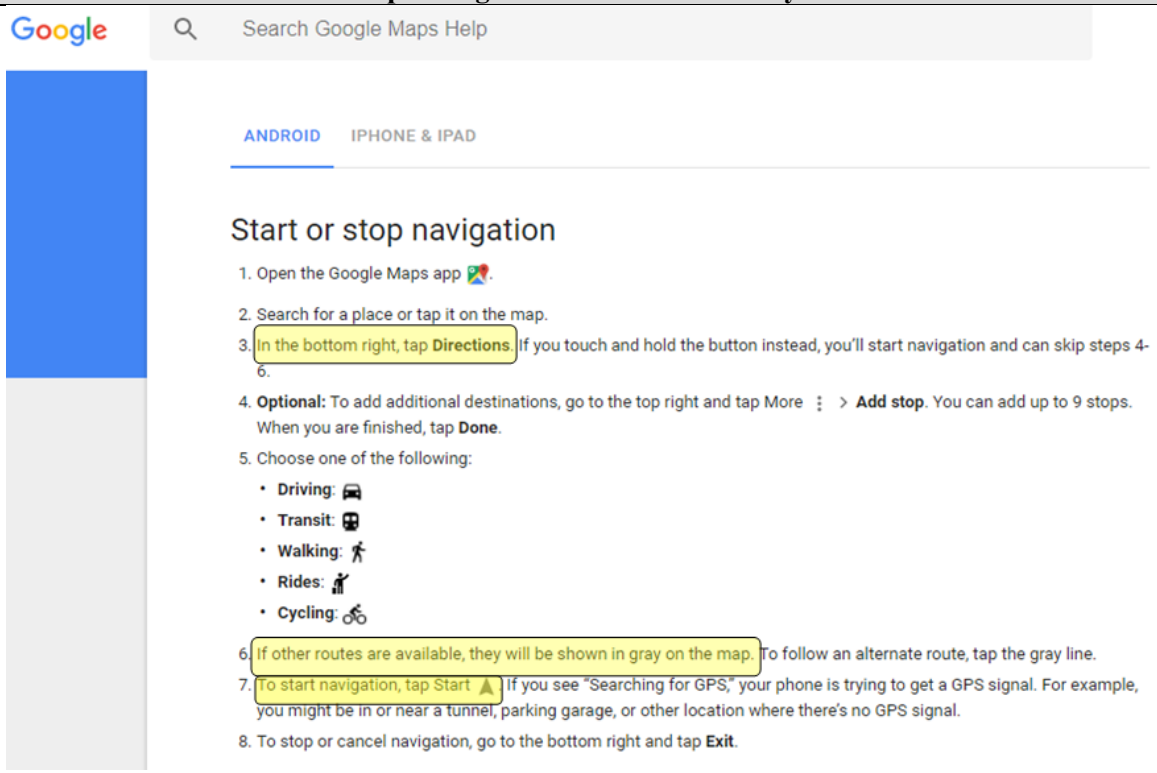
Attachment 10 (Google Map-Download an offline map on Pixel 4a) at 1.

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 9 (Mapping information stored on wireless communication device) at 1.**

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 32 (Get directions & show routes) at 3.**

Claim 1	Corresponding Structure in Accused Systems
	4. **Tap the Choose destination field to specify your target location as a travel destination.** On the next screen, simply type in the name of the place where you'd like to travel to. If prompted, select the correct location from the search result.  Navigation Information displayed to user based on destination entered on the Wireless communication device (Exhibit B). 5. **After entering your destination, tap the Start button at the bottom-left corner of the screen.** That should prompt the app to start giving turn by turn navigation instructions.  Current location and destination location on the map Geographical features cities, streets, or other point of interests, etc. Estimate time to reach the destination **Attachment 5 (Navigation based on destination entered on Google Maps) at 4 & 5.**

Claim 1	Corresponding Structure in Accused Systems



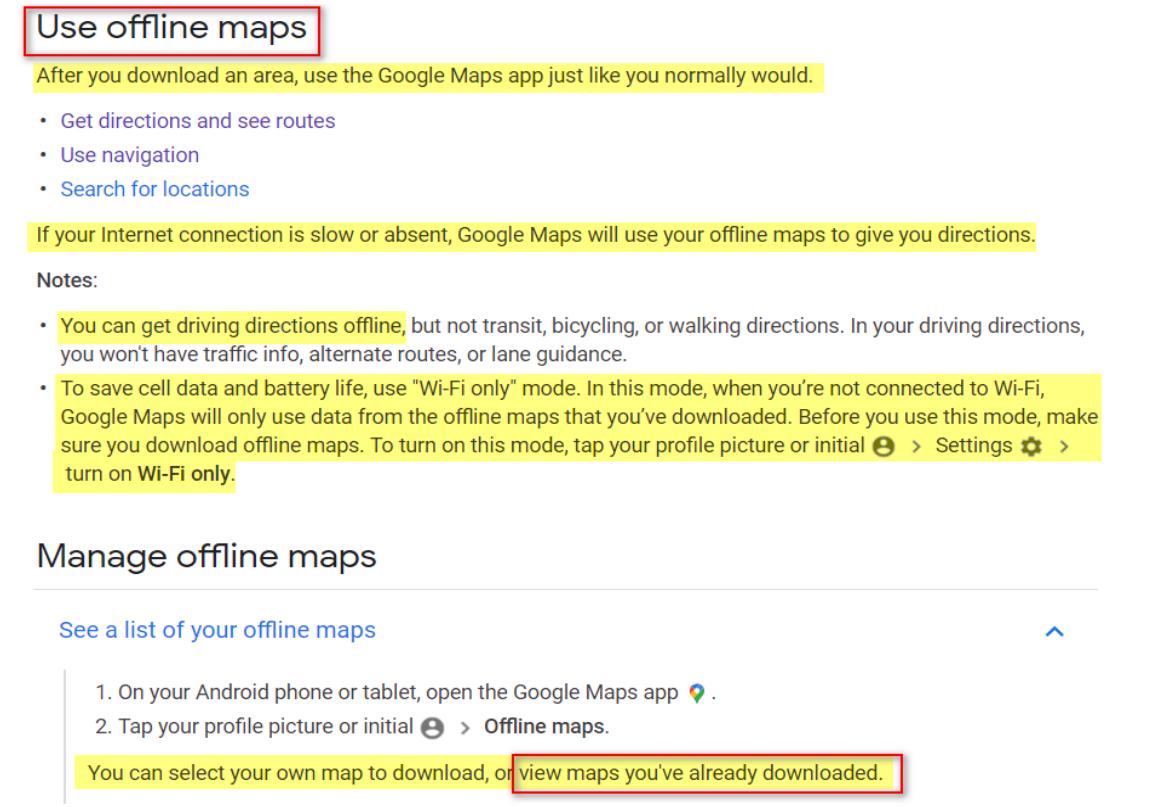
Google Search Google Maps Help

ANDROID IPHONE & IPAD

Start or stop navigation

1. Open the Google Maps app.
2. Search for a place or tap it on the map.
3. In the bottom right, tap **Directions**. If you touch and hold the button instead, you'll start navigation and can skip steps 4-6.
4. **Optional:** To add additional destinations, go to the top right and tap More > **Add stop**. You can add up to 9 stops. When you are finished, tap **Done**.
5. Choose one of the following:
   - **Driving**:
   - **Transit**:
   - **Walking**:
   - **Rides**:
   - **Cycling**:
6. If other routes are available, they will be shown in gray on the map. To follow an alternate route, tap the gray line.
7. To start navigation, tap Start. If you see "Searching for GPS," your phone is trying to get a GPS signal. For example, you might be in or near a tunnel, parking garage, or other location where there's no GPS signal.
8. To stop or cancel navigation, go to the bottom right and tap **Exit**.

Attachment 11 (Navigation based on destination entered on Google Maps) at 1 & 2.



Use offline maps

After you download an area, use the Google Maps app just like you normally would.

- Get directions and see routes
- Use navigation
- Search for locations

If your Internet connection is slow or absent, Google Maps will use your offline maps to give you directions.

Notes:

- You can get driving directions offline, but not transit, bicycling, or walking directions. In your driving directions, you won't have traffic info, alternate routes, or lane guidance.
- To save cell data and battery life, use "Wi-Fi only" mode. In this mode, when you're not connected to Wi-Fi, Google Maps will only use data from the offline maps that you've downloaded. Before you use this mode, make sure you download offline maps. To turn on this mode, tap your profile picture or initial > Settings > turn on **Wi-Fi only**.

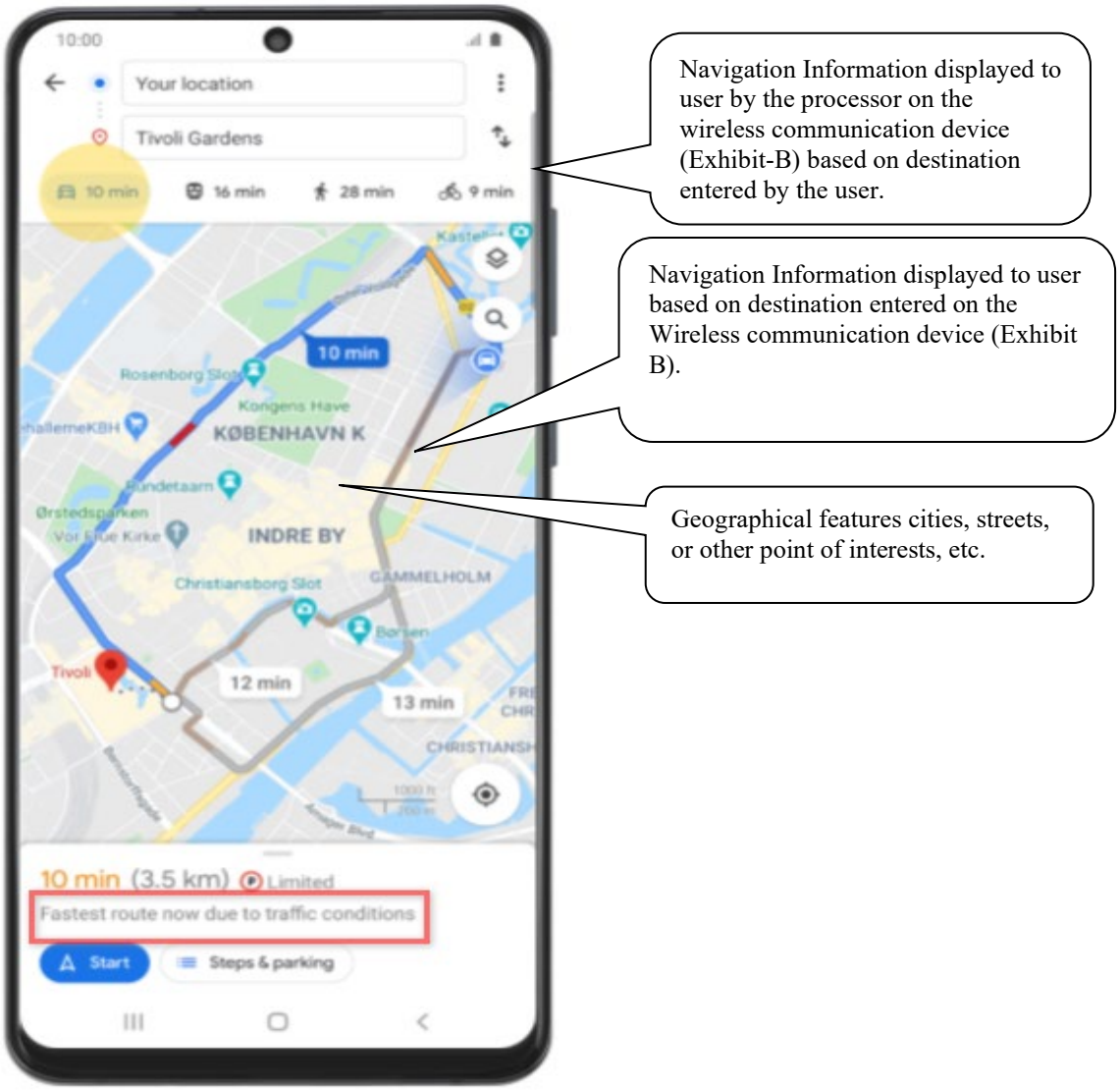
Manage offline maps

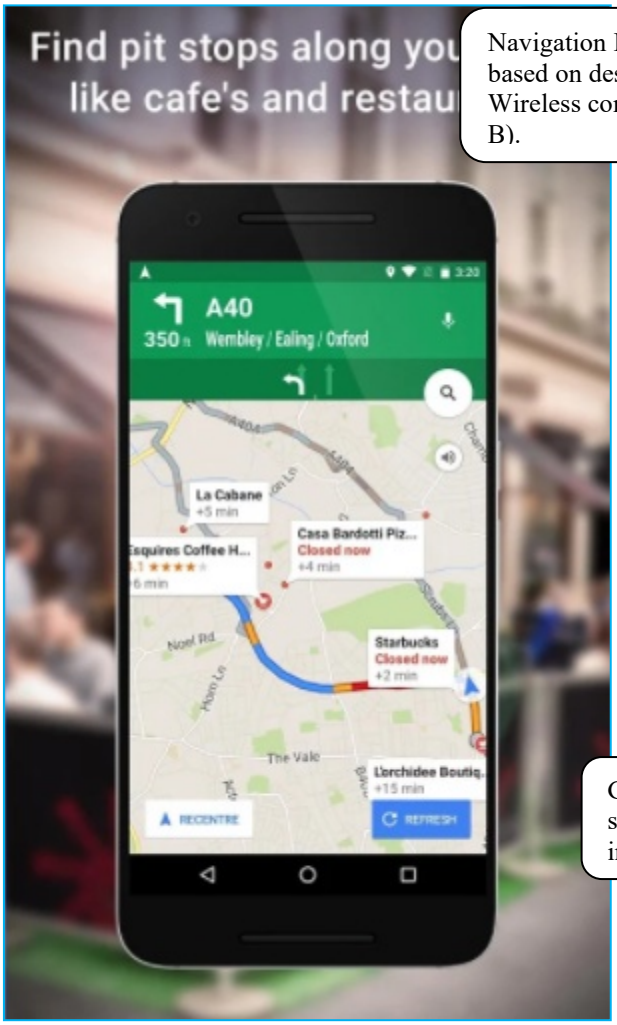
See a list of your offline maps

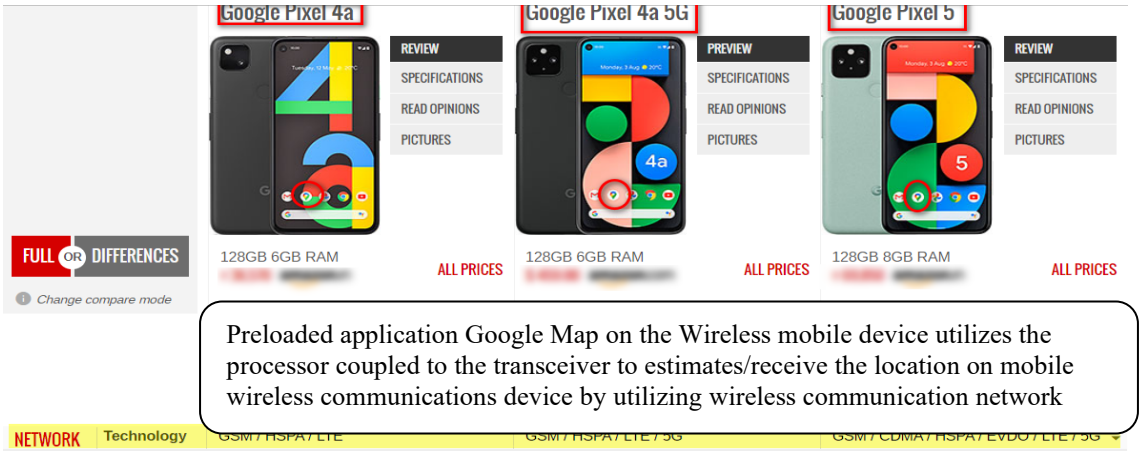
1. On your Android phone or tablet, open the Google Maps app.
2. Tap your profile picture or initial > **Offline maps**.

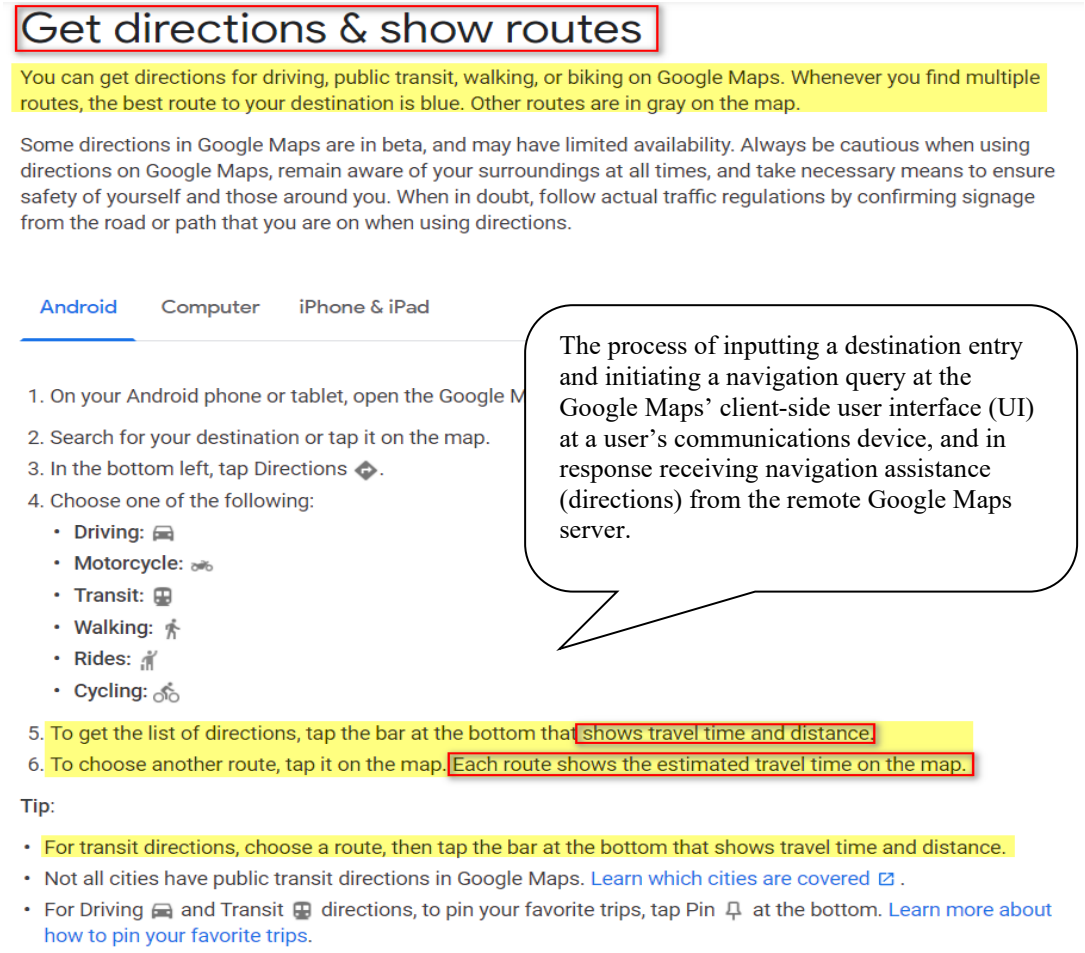
You can select your own map to download, or view maps you've already downloaded.

Attachment 31 (Download google map) at 2.

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 25 (Use Google Maps - Samsung Galaxy S20 Ultra 5G) at 6.**

Claim 1	Corresponding Structure in Accused Systems
	 **Source:** Navigation based on destination entered on Google Maps
wherein the first processor further sends the user navigation information to the network as a number of segments, wherein at least one other processor outside the network updates the user navigation information in conformity with traffic congestion	Plaintiff contends each item listed on Exhibit B corresponds to this claim limitation because each Exhibit-B item includes a processor. Wireless mobile communication device- including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc. (refer Exhibit B for complete list) has a processor, for example, Quad-Core/ Octa-core processor. Further, the Google Maps utilizing the processor can send the user navigation information to the network as a number of segments as to receive the traffic information for the segments, it is required to send the navigation information to the network as a number of segments. As can be seen from the citations, the wireless communications device (Exhibit-B), having a processor, while navigating keeps on communicating the navigation information to the wireless communication network. The Google Maps hardware/software in the wireless communication network computes the average speed (numerical value) or average delays for each segment based on traffic congestion information for each segment. The updated information in response to the user's current navigation information is then transmitted by Google Maps hardware/software to

Claim 1	Corresponding Structure in Accused Systems
information accessible to the at least one other processor outside the network by computing a numerical value for the segments corresponding to the expected time to travel through the segments, updates the user navigation information in conformity with the numerical values for the segments, and sends the updated user navigation information to the wireless mobile communications device;	the wireless communication device (Exhibit-B). The Google Map provides the user of the wireless communication device with the delays from traffic, summary of incidents and the average speed of each segment on the traffic page and also provides the user with the suggested navigation information with the received traffic information. The suggested route screen shows the proposed new route, outlining the original and suggested route, as well as listing the estimated time saved. The following exemplifies the existence of this limitation in Accused Systems:  Preloaded application Google Map on the Wireless mobile device utilizes the processor coupled to the transceiver to estimates/receive the location on mobile wireless communications device by utilizing wireless communication network NETWORK Technology — GSM / HSPA / LTE — GSM / HSPA / LTE / 5G — GSM / CDMA / HSPA / EVDO / LTE / 5G LAUNCH Announced — 2020, August 03 — 2020, September 30 — 2020, September 30 LAUNCH Status — Available. Released 2020, August 20 — Available. Released 2020, November 05 — Available. Released 2020, October 15 BODY Dimensions — 144 x 69.4 x 8.2 mm (5.67 x 2.73 x 0.32 in) — 153.9 x 74 x 8.2 mm (Sub-6) or 8.5 mm (Sub-6 and mmWave) — 144.7 x 70.4 x 8 mm (5.70 x 2.77 x 0.31 in) BODY Weight — 143 g (5.04 oz) — 168 g (5G Sub-6); 171 g (5G Sub-6 and mmWave) (5.93 oz) — 151 g (5.33 oz) BODY Build — Glass front (Gorilla Glass 3), plastic back, plastic frame — Glass front (Gorilla Glass 3), plastic back, plastic frame — Glass front (Gorilla Glass 6), aluminum back, aluminum frame BODY SIM — Nano-SIM and/or eSIM — Nano-SIM and/or eSIM — Nano-SIM and/or eSIM IP68 dust/water resistant (up to 1.5m for 30 mins) DISPLAY Type — OLED, HDR — OLED, HDR — OLED, 90Hz, HDR10+ DISPLAY Size — 5.81 inches, 83.2 cm^2 (~83.3% screen-to-body ratio) — 6.2 inches, 95.7 cm^2 (~84.1% screen-to-body ratio) — 6.0 inches, 87.6 cm^2 (~85.9% screen-to-body ratio) DISPLAY Resolution — 1080 x 2340 pixels, 19.5:9 ratio (~443 ppi density) — 1080 x 2340 pixels, 19.5:9 ratio (~413 ppi density) — 1080 x 2340 pixels, 19.5:9 ratio (~432 ppi density) DISPLAY Protection — Corning Gorilla Glass 3 — Corning Gorilla Glass 3 — Corning Gorilla Glass 6 Always-on display — Always-on display — Always-on display PLATFORM OS — Android 10, upgradable to Android 11 — Android 11 — Android 11 PLATFORM Chipset — Qualcomm SDM730 Snapdragon 730G (8 nm) — Qualcomm SM7250 Snapdragon 765G (7 nm) — Qualcomm SM7250 Snapdragon 765G (7 nm) PLATFORM CPU — Octa-core (2x2.2 GHz Kryo 470 Gold & 6x1.8 GHz Kryo 470 Silver) — Octa-core (1x2.4 GHz Kryo 475 Prime & 1x2.2 GHz Kryo 475 Gold & 6x1.8 GHz Kryo 475 Silver) — Octa-core (1x2.4 GHz Kryo 475 Prime & 1x2.2 GHz Kryo 475 Gold & 6x1.8 GHz Kryo 475 Silver) PLATFORM GPU — Adreno 618 — Adreno 620 — Adreno 620 **Attachment 4 (Processor of Google Pixel 4a, Pixel 4a 5G and Pixel 5) at 1.**

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 32 (Get directions and show routes - Android - Google Maps Help) at 1.**

Claim 1	Corresponding Structure in Accused Systems

Save a route

1. On your Android phone or tablet, open the Google Maps app .
2. Make sure you're connected to the Internet.
3. Search for your destination or tap it on the map.
4. In the bottom left, tap Directions .
5. From the top, choose your mode of transit.
6. Tap the white bar at the bottom. It's the one that shows the travel time and distance.
7. At the bottom, tap **Save offline**.

Tip:

- Your route is saved on your phone or tablet. Make sure to use the same phone or tablet when looking for a saved route.
- Your saved route expires after 30 days.
- Your route will show you the same mode of transit you chose when you saved the route.

Find a saved route

1. On your Android phone or tablet, open the Google Maps app .
2. At the bottom, tap **Saved offline route**.

Tip:

- If you save a route from "Your location" and look up a saved route, the directions will start from the place where you saved the route. The directions won't start from your current location.
- To get updated information like traffic, tap Refresh .
- Turn-by-turn navigation isn't currently available for saved routes. To search for places and get turn-by-turn navigation, download an offline area.

Attachment 32 (Get directions & show routes) at 3.

Update offline maps

Offline maps that you downloaded on your phone or tablet need to be updated before they expire. When your offline maps expire in 15 days or less, Google Maps will try to update the area automatically when you're connected to Wi-Fi.

If your offline maps aren't automatically updated, you can update them by following the steps below.

From the notification

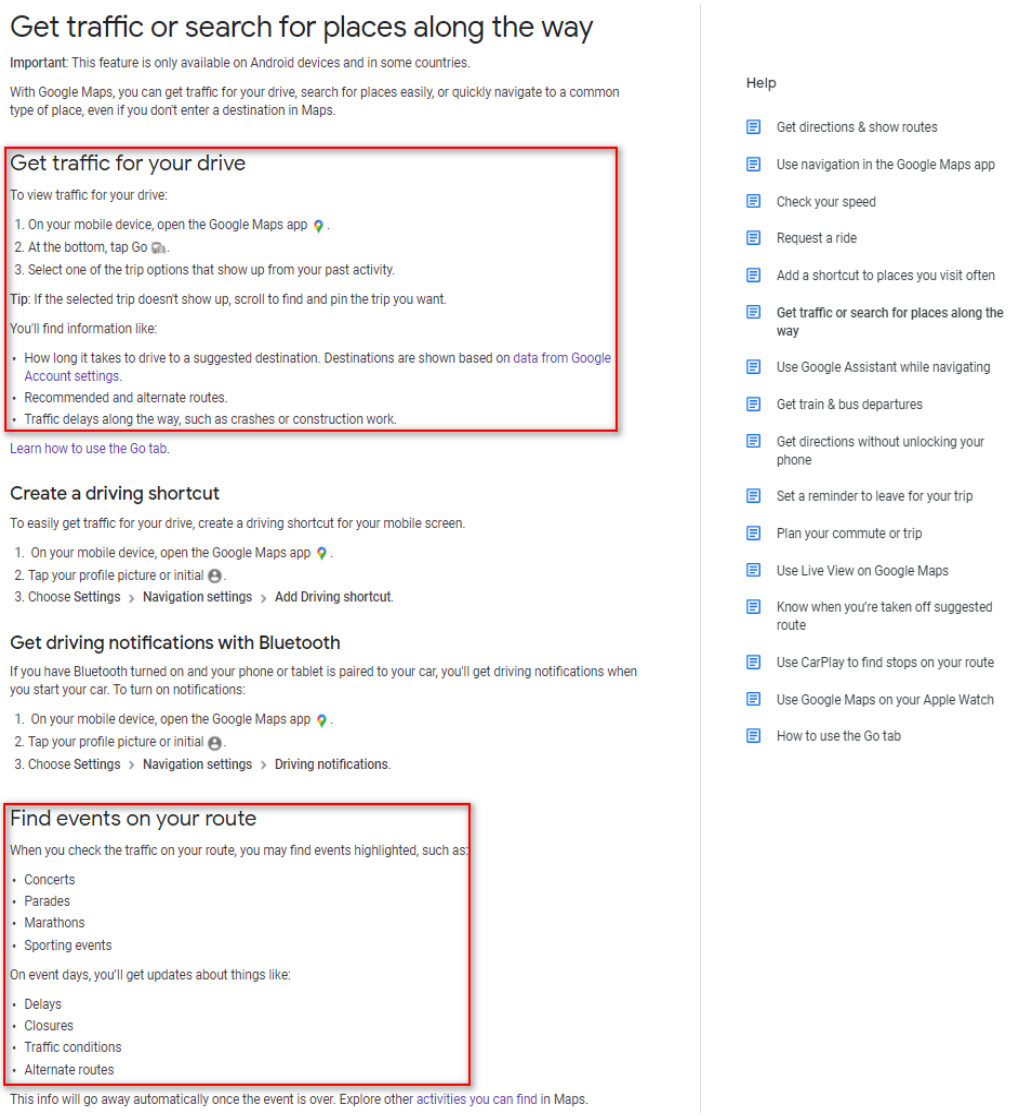
1. In the "Update offline maps" notification, tap **Update Now.**
2. Tap the expired or expiring area on the list.
3. Tap **Update**.
4. The offline area will update

From anywhere else

1. On your Android phone or tablet, open the Google Maps app .
2. Tap your profile picture or initial > **Offline maps**.
3. Tap the expired or expiring area on the list.
4. Tap Update.
5. The offline area will update

Attachment 31 (Download google map) at 3.

Claim 1	Corresponding Structure in Accused Systems



Get traffic or search for places along the way

Important: This feature is only available on Android devices and in some countries.

With Google Maps, you can get traffic for your drive, search for places easily, or quickly navigate to a common type of place, even if you don't enter a destination in Maps.

Get traffic for your drive

To view traffic for your drive:

1. On your mobile device, open the Google Maps app .
2. At the bottom, tap Go .
3. Select one of the trip options that show up from your past activity.

Tip: If the selected trip doesn't show up, scroll to find and pin the trip you want.

You'll find information like:

- How long it takes to drive to a suggested destination. Destinations are shown based on data from Google Account settings.
- Recommended and alternate routes.
- Traffic delays along the way, such as crashes or construction work.

Learn how to use the Go tab.

Create a driving shortcut

To easily get traffic for your drive, create a driving shortcut for your mobile screen.

1. On your mobile device, open the Google Maps app .
2. Tap your profile picture or initial .
3. Choose **Settings** > **Navigation settings** > **Add Driving shortcut**.

Get driving notifications with Bluetooth

If you have Bluetooth turned on and your phone or tablet is paired to your car, you'll get driving notifications when you start your car. To turn on notifications:

1. On your mobile device, open the Google Maps app .
2. Tap your profile picture or initial .
3. Choose **Settings** > **Navigation settings** > **Driving notifications**.

Find events on your route

When you check the traffic on your route, you may find events highlighted, such as:

- Concerts
- Parades
- Marathons
- Sporting events

On event days, you'll get updates about things like:

- Delays
- Closures
- Traffic conditions
- Alternate routes

This info will go away automatically once the event is over. Explore other activities you can find in Maps.

Help

- Get directions & show routes
- Use navigation in the Google Maps app
- Check your speed
- Request a ride
- Add a shortcut to places you visit often
- **Get traffic or search for places along the way**
- Use Google Assistant while navigating
- Get train & bus departures
- Get directions without unlocking your phone
- Set a reminder to leave for your trip
- Plan your commute or trip
- Use Live View on Google Maps
- Know when you're taken off suggested route
- Use CarPlay to find stops on your route
- Use Google Maps on your Apple Watch
- How to use the Go tab

Attachment 26 (Get traffic or search for places along the way - Google Maps Help) at 1.

Claim 1	Corresponding Structure in Accused Systems
	Putting it all together So how exactly does this all work in real life? Say you're heading to a doctor's appointment across town, driving down the road you typically take to get there. When you leave the house, traffic is flowing freely, with zero indication of any disruptions along the way. With Google Maps' traffic predictions combined with live traffic conditions, we let you know that if you continue down your current route, there's a good chance you'll get stuck in unexpected gridlock traffic about 30 minutes into your ride—which would mean missing your appointment. As a result, Google Maps automatically reroutes you using its knowledge about nearby road conditions and incidents—helping you avoid the jam altogether and get to your appointment on time. Predicting traffic and determining routes is incredibly complex—and we'll keep working on tools and technology to keep you out of gridlock, and on a route that's as safe and efficient as possible. **Attachment 35 (How AI helps predict traffic and determine routes - Google Maps) at 2.**

Claim 1	Corresponding Structure in Accused Systems

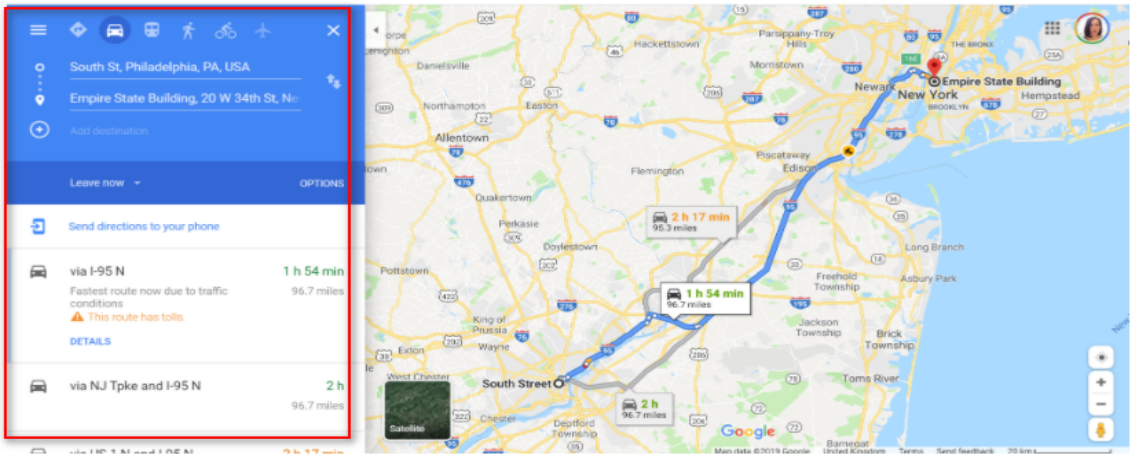
How to change your route on Google Maps on desktop

1. Open Google Maps and type in the address or name of the location you wish to travel to before pressing Enter.

2. Once the location comes up, click the Directions button beneath the info card. **3.** Enter the starting point for your journey. This could be your home address or wherever you'll be departing from.

4. Using the menu box above the journey information, choose which directions you would like to use - options for the purposes of this article include driving, public transit, cycling, and walking.

5. On the map, you'll notice outlines for several routes. The default one, or the one Google Maps believes is best, will be highlighted blue.



Jennifer Still/Business Insider

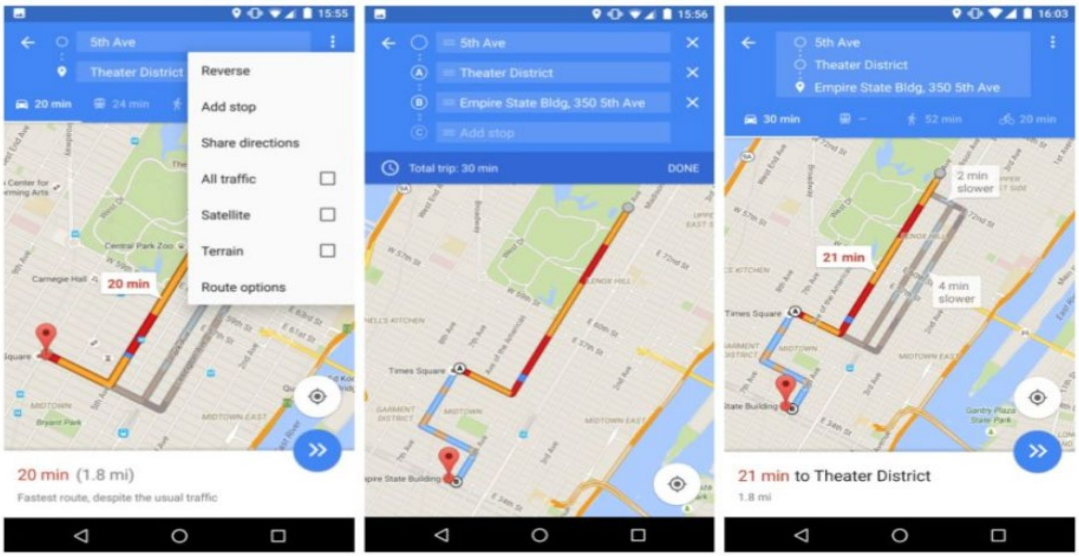
You can change your route by choosing one of the grey alternate ones, or dragging it to another route.

6. To choose an alternate route, either click on a greyed-out route on the map or click on one of the other routes listed on the left-hand side menu. Note that you can also change routes by clicking on one and dragging it so that the directions will take you via certain roads.

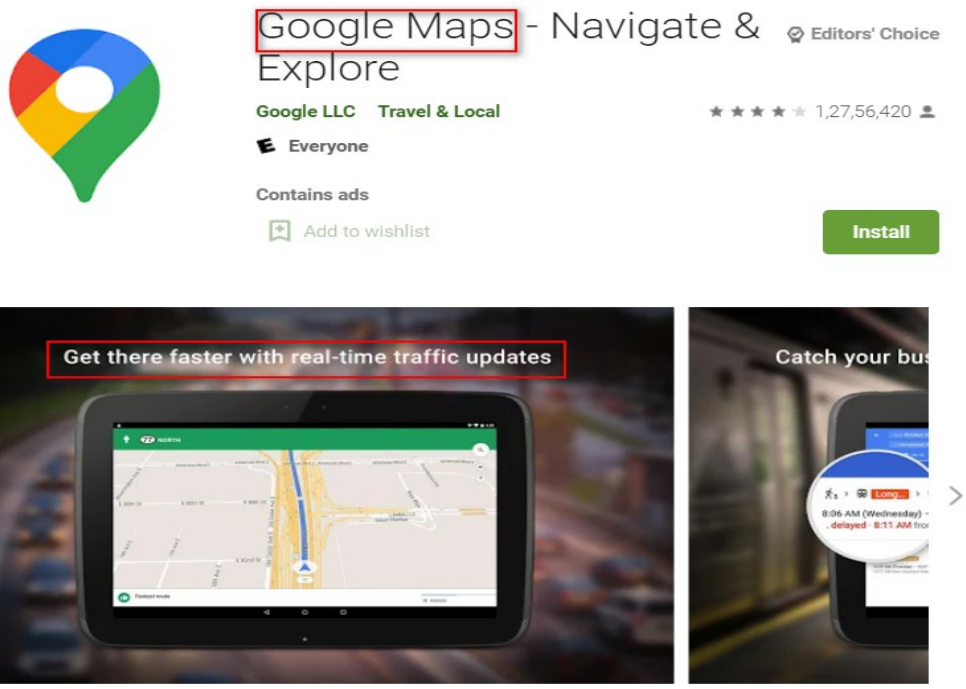
Attachment 37 (How to change the route on Google Map) at 3.

Google map Navigator hardware/software (Exhibit C) in the wireless network computes the estimated time delays (numerical value) for each segment corresponding to the time to travel through each segment. The updated information in response to user's current navigation information is then transmitted by the Google Map hardware/software (Exhibit C) to the wireless communication device (Exhibit-B)

Claim 1	Corresponding Structure in Accused Systems



Attachment 24 (Traffic information summary on Google Maps) at 9.



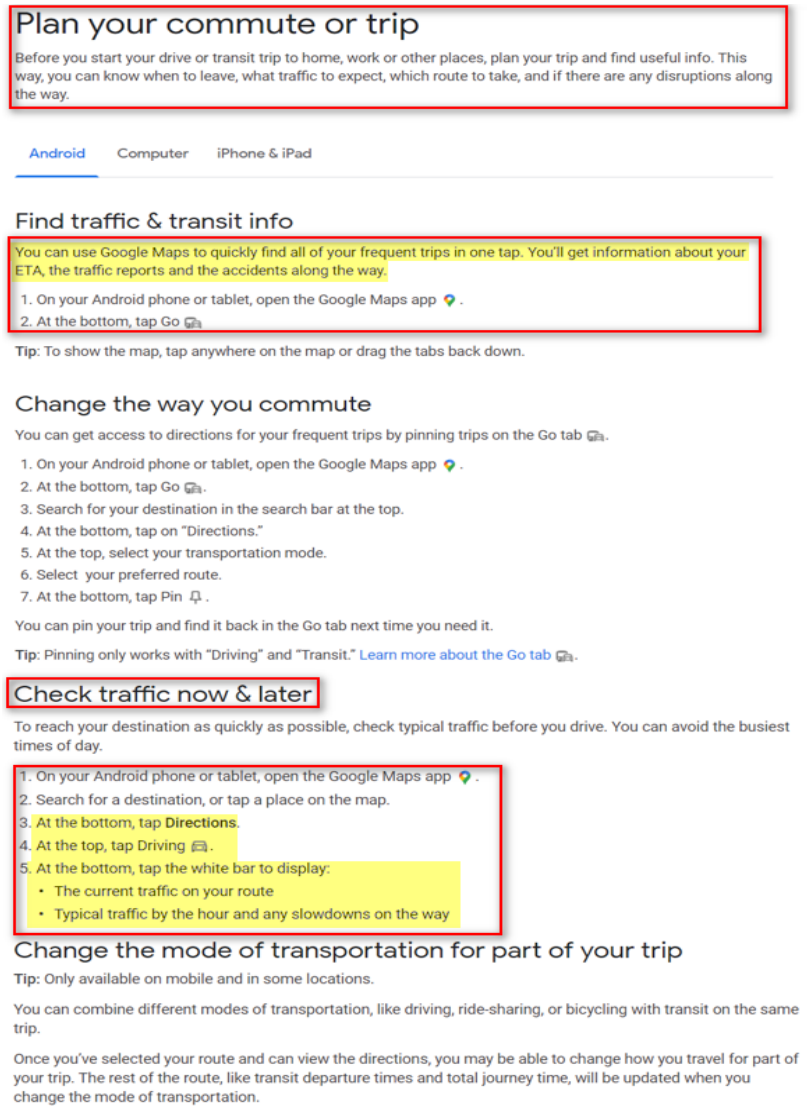
Navigate your world faster and easier with Google Maps. Over 220 countries and territories mapped and hundreds of millions of businesses and places on the map. Get real-time GPS navigation, traffic, and transit info, and explore local neighborhoods by knowing where to eat, drink and go - no matter what part of the world you're in.

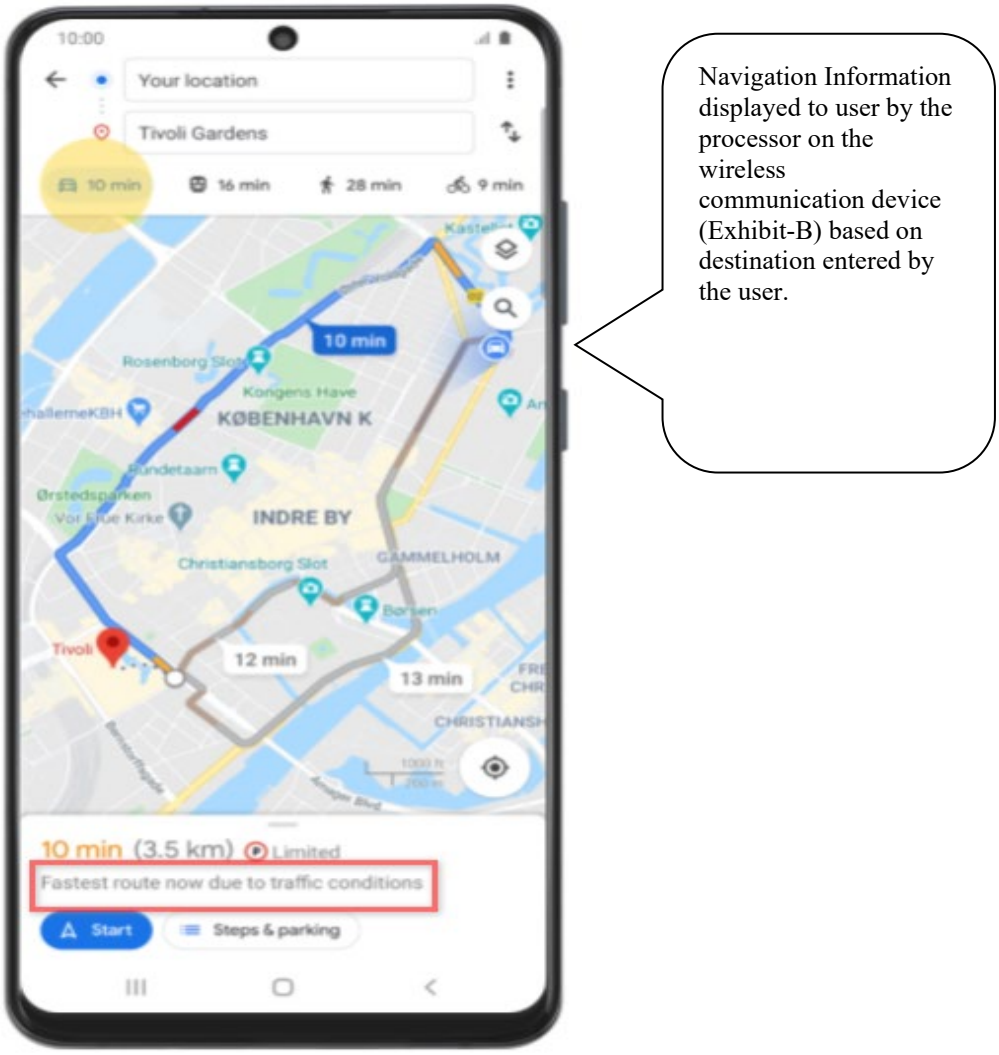
Get there faster with real-time updates

- Beat traffic with real-time ETAs and traffic conditions
- Catch your bus, train, or ride-share with real-time transit info
- Save time with automatic rerouting based on live traffic, incidents, and road closures

Attachment 23 (Google Maps – Navigation & Explore) at 1.

Claim 1	Corresponding Structure in Accused Systems
	Find live traffic for buses 1. On your Android phone or tablet, open the Google Maps app . 2. Search for your destination, then select transit directions. Read more about how to get directions. 3. If a bus route has Live Traffic for Buses information available, one of the following will be displayed: • Usual traffic • How many minutes are added for traffic **What the colors and symbols mean on the legend** Nearby places of interest Traffic **Traffic colors** The color code shows you the speed of traffic on the road. • **Green**: No traffic delays. • **Orange**: Medium amount of traffic. • **Red**: Traffic delays. The darker the red, the slower the speed of traffic on the road. **Note**: Gray or blue lines on the map show your routes. **Traffic incident symbols** Traffic incidents include these types of delays: • Crashes • Construction • Road closures • Other incidents To find details about what happened, click or tap the icon. **Note**: For road closures, you'll find a dotted red line where the road is closed. **Attachment 34 (View places, traffic, terrain, biking, and transit) at 2.**

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 36 (Plan your commute or trip) at 1&2.**

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 25 (Use Google Maps - Samsung Galaxy S20 Ultra 5G) at 6.**
at least one second radio-frequency transceiver and an associated at least one second antenna of the wireless communications network to which the second radio-frequency transceiver is coupled; and	Plaintiff contends each Accused System includes at least one item listed on Exhibit A, each of which is a base station and each of which is coupled to at least one antenna. Base station includes radio-frequency transceivers designed and used for radio-frequency communication with at least one antenna. When base-station transceivers and antennas are in communication, they are coupled. Further, in addition to being so coupled, the transceivers and antenna of each Exhibit-A item are also, by placement within a base station, physically coupled. The cell of the wireless communications network include base stations for transmission and reception of wireless signals to and from the mobile wireless communication devices or UEs or user devices (mobile phones, laptops, tablets, PDAs etc.). These base stations are, therefore, RF transceivers. Also, these base stations are coupled with at least one antenna for the function of transmission and reception. The following exemplifies this limitation's existence in Accused Systems:

Claim 1	Corresponding Structure in Accused Systems

Google Search Google Maps Help

How Maps finds your current location

Maps estimates where you are from sources like:

- **GPS**: This uses satellites and knows your location within a few meters.
- **Wi-Fi**: The location of nearby Wi-Fi networks helps Maps know where you are.
- **Cell tower**: Your connection to a cellular network can be accurate up to a few thousand meters.

Attachment 8 (How map find your current location) at 2.

Knowing where the user is allows your application to be smarter and deliver better information to the user. When developing a location-aware application for Android, you can utilize GPS and Android's Network Location Provider to acquire the user location. Although GPS is most accurate, it only works outdoors, it quickly consumes battery power, and doesn't return the location as quickly as users want. Android's Network Location Provider determines user location using cell tower and Wi-Fi signals, providing location information in a way that works indoors and outdoors, responds faster, and uses less battery power. To obtain the user location in your application, you can use both GPS and the Network Location Provider, or just one.

Attachment 12 (Location of the device determined using cell tower) at 1&2.

Google Maps provides location information based on cell towers/Wi-Fi nodes which form part of cellular communication network. These cell towers are radio frequency transceivers with antenna (Exhibit A).

Introduction

The Geolocation API returns a location and accuracy radius based on information about cell towers and WiFi nodes that the mobile client can detect. This document describes the protocol used to send this data to the server and to return a response to the client.

Communication is done over HTTPS using POST. Both request and response are formatted as JSON, and the content type of both is `application/json`.

Attachment 17 (Cell Towers/Wi-Fi Nodes (RF transceivers) in a wireless communication network) at 1

Claim 1	Corresponding Structure in Accused Systems

The first parameter in `requestLocationUpdates()` is the type of location provider to use (in this case, the Network Location Provider for cell tower and Wi-Fi based location). You can control the frequency at which your listener receives updates with the second and third parameter—the second is the minimum time interval between notifications and the third is the minimum change in distance between notifications—setting both to zero requests location notifications as frequently as possible. The last parameter is your `LocationListener`, which receives callbacks for location updates.

To request location updates from the GPS provider, use `GPS_PROVIDER` instead of `NETWORK_PROVIDER`. You can also request location updates from both the GPS and the Network Location Provider by calling `requestLocationUpdates()` twice—once for `NETWORK_PROVIDER` and once for `GPS_PROVIDER`.

Google Maps application makes use of wireless communication network, having cell towers (Exhibit A) or Wi-Fi access points (Exhibit A), to estimate the location of the Wireless communication device (Exhibit B).

Requesting User Permissi

In order to receive location updates from `NETWORK_PROVIDER` or `GPS_PROVIDER`, you must request the user's permission by declaring either the `ACCESS_COARSE_LOCATION` or `ACCESS_FINE_LOCATION` permission, respectively, in your Android manifest file. Without these permissions, your application will fail at runtime when requesting location updates.

If you are using both `NETWORK_PROVIDER` and `GPS_PROVIDER`, then you need to request only the `ACCESS_FINE_LOCATION` permission, because it includes permission for both providers. Permission for `ACCESS_COARSE_LOCATION` allows access only to `NETWORK_PROVIDER`.

Attachment 12 (Location is estimated using cell tower/wi-fi network) at 3 & 4.

Help your phone get a more accurate location (Google Location Services a.k.a. Google Location Accuracy)

Turn your phone's location accuracy on or off

1. Open your device's Settings app.
2. Tap **Location** > **Advanced** > **Google Location Accuracy**.
3. Turn **Improve Location Accuracy** on or off.

When Google Location Accuracy is on

When you have Google Location Accuracy turned on, your phone uses these sources to get the most accurate location:

- GPS
- Wi-Fi
- Mobile networks
- Sensors

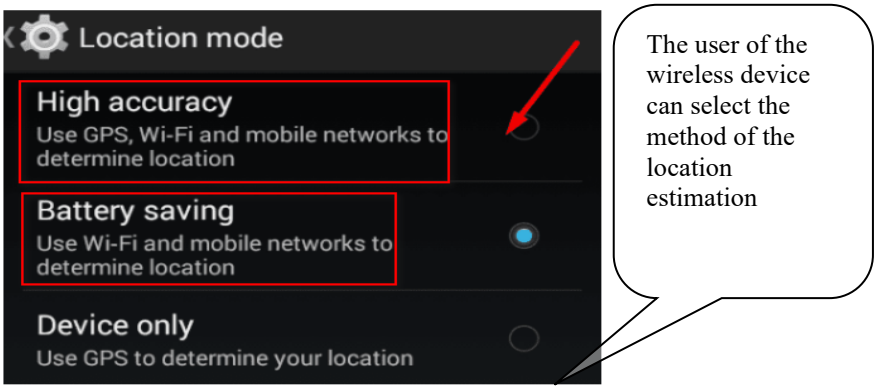
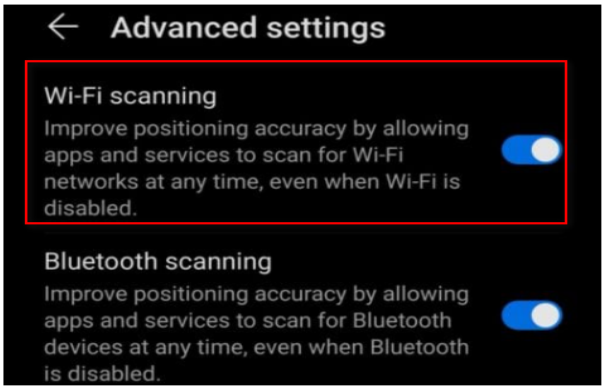
Wireless communication device receive the location of the Wireless communication device (Exhibit B) on Google Map from Wireless communication networks (e.g. Verizon, AT&T, T-Mobile, etc.)

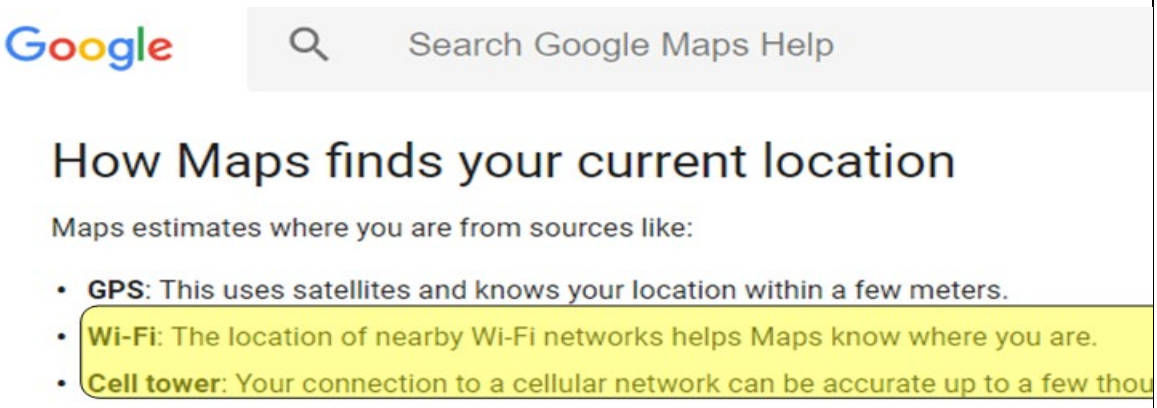
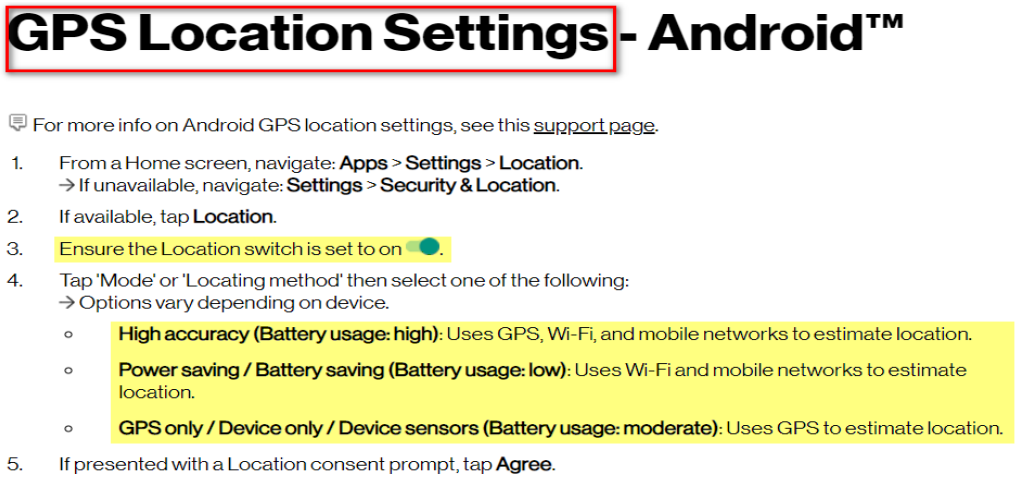
When Google Location Accuracy is off

Let your phone scan for nearby networks or devices

To help apps get better location info, you can let your phone scan for nearby Wi-Fi access points or Bluetooth devices.

1. Open your device's Settings app.
2. Tap **Location** > **Wi-Fi and Bluetooth scanning**.
3. Turn **Wi-Fi scanning** or **Bluetooth scanning** on or off.

Claim 1	Corresponding Structure in Accused Systems
	Attachment 21 (Manage your Pixel phone's location settings) at 2. 1. On your Android device, go to **Settings** 2. Tap **Location** and re-enable your location services 3. Select **Mode High accuracy**  On some phone models, this option can be found under the Advanced Settings option. Select **Advanced Settings** and enable your device to improve positioning accuracy by allowing apps to scan for Wi-Fi networks and Bluetooth devices at any time, even if Wi-Fi or Bluetooth is disabled.  **Attachment 33 (Google Maps Not Updating Location) at 4.**

Claim 1	Corresponding Structure in Accused Systems
a second processor coupled to the at least one second radio-frequency transceiver programmed to acquire the information indicative of a location of the wireless mobile communications device,	Plaintiff contends that Google Maps has one or more processors that determine(s) the location of wireless mobile communications devices. These processors communicatively coupled to the second RF transceiver(s) and are programmed to determine a wireless mobile communication device's location. Wireless mobile communications devices can, through the second RF transceiver(s), communicatively connect to and use Google Maps. Google Maps' processors can determine the device's current location and direction from that location/source to any destination. The processors are programmed to estimate the location of the device from 3 sources: GPS (GPS uses satellites and knows your location within a few meters), Wi-Fi (the location of nearby Wi-Fi networks helps Maps know where you are), and cell towers (cell tower can be accurate up to a few thousand meters). The following exemplifies this limitation's existence in Accused Systems:  **Attachment 8 (How map find your current location) at 2.**  **Attachment 18 (method of estimate the location of the device) at 1.**

Claim 1	Corresponding Structure in Accused Systems

Settings

Google map estimates the location of the device from 3 sources: GPS, Wi-Fi and cell towers

Location

Location services use a combination of GPS, mobile network and Wi-Fi to determine the location of your device.

1. From Settings, tap Location.
2. Tap to turn on Location services.

TIP Some apps require location services be turned on for full functionality.

Attachment 15 (Turn ON/OFF the location setting) at 161.

Knowing where the user is allows your application to be smarter and deliver better information to the user. When developing a location-aware application for Android, you can utilize GPS and Android's Network Location Provider to acquire the user location. Although GPS is most accurate, it only works outdoors, it quickly consumes battery power, and doesn't return the location as quickly as users want. Android's Network Location Provider determines user location using cell tower and Wi-Fi signals, providing location information in a way that works indoors and outdoors, responds faster, and uses less battery power. To obtain the user location in your application, you can use both GPS and the Network Location Provider, or just one.

Attachment 12 (Location of the device determine using cell tower) at 1&2.

Google Maps provides location information based on cell towers/Wi-Fi nodes which form part of cellular communication network. These cell towers are radio frequency transceivers with antenna (Exhibit A).

Introduction

The Geolocation API returns a location and accuracy radius based on information about cell towers and WiFi nodes that the mobile client can detect. This document describes the protocol used to send this data to the server and to return a response to the client.

Communication is done over HTTPS using POST. Both request and response are formatted as JSON, and the content type of both is `application/json`.

Attachment 17 (Cell Towers/Wi-Fi Nodes (RF transceivers) in a wireless communication network) at 1.

Claim 1	Corresponding Structure in Accused Systems

The first parameter in `requestLocationUpdates()` is the type of location provider to use (in this case, the Network Location Provider for cell tower and Wi-Fi based location). You can control the frequency at which your listener receives updates with the second and third parameter—the second is the minimum time interval between notifications and the third is the minimum change in distance between notifications—setting both to zero requests location notifications as frequently as possible. The last parameter is your `LocationListener`, which receives callbacks for location updates.

To request location updates from the GPS provider, use `GPS_PROVIDER` instead of `NETWORK_PROVIDER`. You can also request location updates from both the GPS and the Network Location Provider by calling `requestLocationUpdates()` twice—once for `NETWORK_PROVIDER` and once for `GPS_PROVIDER`.

Google Maps application makes use of wireless communication network, having cell towers (Exhibit A) or Wi-Fi access points (Exhibit A), to estimate the location of the Wireless communication device (Exhibit B).

Requesting User Permissions

In order to receive location updates from `NETWORK_PROVIDER` [illegible] `ACCESS_COARSE_LOCATION` or `ACCESS_FINE_LOCATION` permission, respectively, in your Android manifest file. Without these permissions, your application will fail at runtime when requesting location updates.

If you are using both `NETWORK_PROVIDER` and `GPS_PROVIDER`, then you need to request only the `ACCESS_FINE_LOCATION` permission, because it includes permission for both providers. Permission for `ACCESS_COARSE_LOCATION` allows access only to `NETWORK_PROVIDER`.

Attachment 12 (Location is estimated using cell tower/wi-fi network) at 3 & 4.

Help your phone get a more accurate location (Google Location Services a.k.a. Google Location Accuracy)

Turn your phone's location accuracy on or off

1. Open your device's Settings app.
2. Tap **Location** > **Advanced** > **Google Location Accuracy**.
3. Turn **Improve Location Accuracy** on or off.

When Google Location Accuracy is on

When you have Google Location Accuracy turned on, your phone uses these sources to get the most accurate location:

- GPS
- Wi-Fi
- Mobile networks
- Sensors

Wireless communication device receive the location of the Wireless communication device (Exhibit B) on Google Map from Wireless communication networks (e.g. Verizon, AT&T, T-Mobile, etc.)

When Google Location Accuracy is off

Let your phone scan for nearby networks or devices

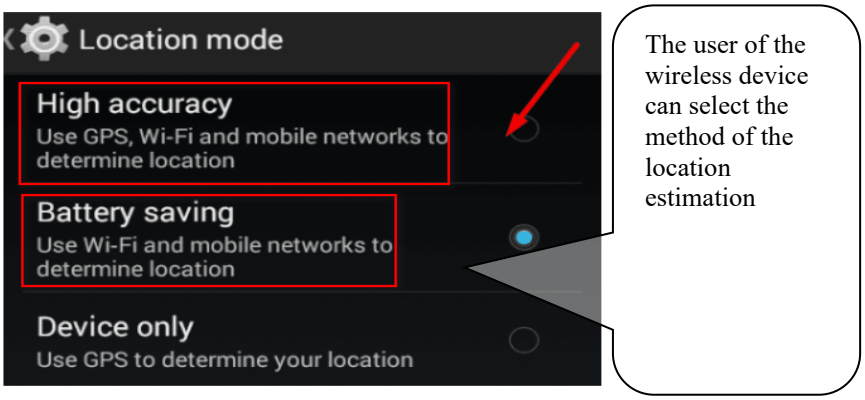
To help apps get better location info, you can let your phone scan for nearby Wi-Fi access points or Bluetooth devices.

1. Open your device's Settings app.
2. Tap **Location** > **Wi-Fi and Bluetooth scanning**.
3. Turn **Wi-Fi scanning** or **Bluetooth scanning** on or off.

Attachment 21 (Manage your Pixel phone's location settings) at 2.

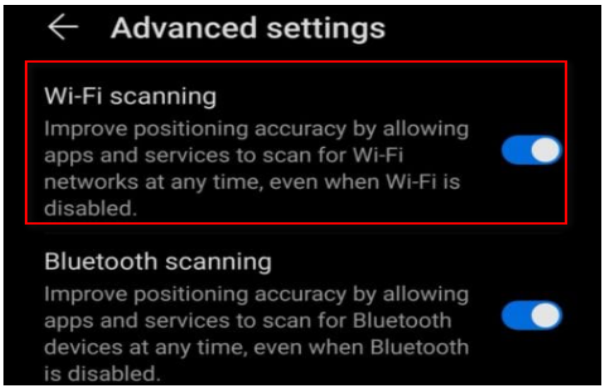
Claim 1	Corresponding Structure in Accused Systems

1. On your Android device, go to **Settings**
2. Tap **Location** and re-enable your location services
3. Select **Mode High accuracy**



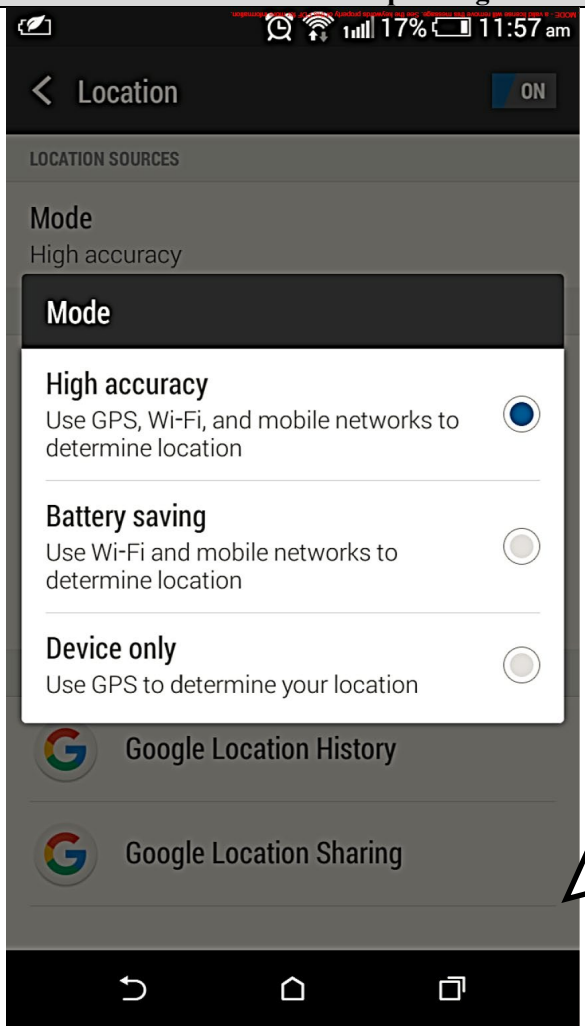
On some phone models, this option can be found under the Advanced Settings option.

Select **Advanced Settings** and enable your device to improve positioning accuracy by allowing apps to scan for Wi-Fi networks and Bluetooth devices at any time, even if Wi-Fi or Bluetooth is disabled.



Attachment 33 (Google Maps Not Updating Location) at 4.

Claim 1	Corresponding Structure in Accused Systems



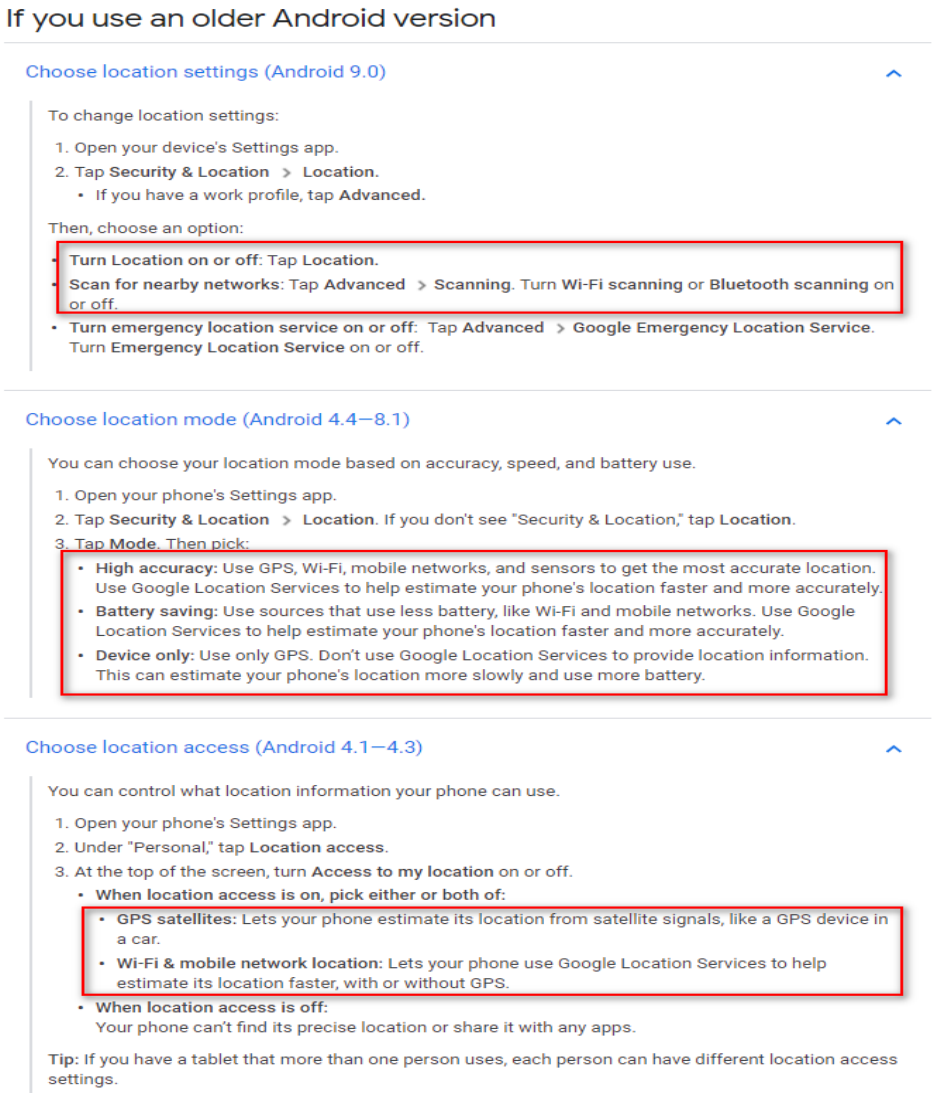
By default the "Location setting" is set at "High accuracy" mode, wherein, for example, accuracy of location of a communications device determined based on locations of nearby Wi-Fi network infrastructure (access points or hotspots) is further enhanced or fine-tuned by Google Maps Server additionally using the said communications device's GPS location and the location data obtained from the mobile network (Cell tower information and/or Location of the communications device determined through the Assisted-GPS method by the said mobile network) serving the said communications device.

Attachment 45 (Google Maps_Android app_Location settings) at 1.

Claim 1	Corresponding Structure in Accused Systems
	# Find and improve your location's accuracy Sometimes Google Maps might have trouble finding where you are located. If the GPS location of your blue dot on the map is inaccurate or the blue dot is not showing up, here are some things you can do to help fix the problem. **Tip**: This will also improve your search results and make them more relevant to you. Computer Android iPhone & iPad ## See your current location on the map 1. On your Android phone or tablet, open the Google Maps app . 2. You'll see a blue dot, which shows where you are. If you don't see a blue dot, go to the bottom and tap Your location . ## How Maps finds your current location Maps estimates where you are from sources like: • GPS: This uses satellites and knows your location up to around 20 meters. **Note**: When you're inside buildings or underground, the GPS is sometimes inaccurate. • Wi-Fi: The location of nearby Wi-Fi networks helps Maps know where you are. • Cell tower: Your connection to a cellular network can be accurate up to a few thousand meters. **Attachment 46 (Find and improve your location's accuracy - Android - Google Maps Help) at 1.**

Claim 1	Corresponding Structure in Accused Systems
	From your devices Many devices, like phones or computers, can work out their precise location. You can allow Google and other apps to provide you with useful features based on where your device is located. For example, if you're running late to meet your friends, you'll probably want to use a navigation app to know the quickest way to get to your destination. To get turn-by-turn directions, you may need to turn on your device's location and give the app the permission to access it. Or for some searches like "coffee shop", "bus stop" or "atm", results will usually be more helpful when precise location is available. On your Android device, if you choose to turn on your device location, you can use features like navigation, giving an app access to your current location, or find your phone. You can also choose which apps have permission to use your device's location with simple controls that let you turn the permission on or off for individual apps. On Android, you can see when an app is requesting to use your phone's GPS-based location when the top of your screen shows Location . Learn more Google Location Services On most Android devices, Google, as the network location provider, provides a location service called Google Location Services (GLS), known in Android 9 and above as Google Location Accuracy. This service aims to provide a more accurate device location and generally improve location accuracy. Most mobile phones are equipped with GPS, which uses signals from satellites to determine a device's location – however, with Google Location Services, additional information from nearby Wi-Fi, mobile networks, and device sensors can be collected to determine your device's location. It does this by periodically collecting location data from your device and using it in an anonymous way to improve location accuracy. You can disable Google Location Services at any time in your device's location settings. Your device's location will continue to work even if GLS is turned off, but the device will rely only on GPS to estimate device location for apps with the necessary permission. Google Location Services is distinct from your device's location setting. Learn more The settings and permissions on Android control whether your device sensors (like GPS) or network-based location (like GLS) are used to determine your location and which apps have access to that location. They do not impact how websites and apps might estimate your location in other ways, such as from your IP Address. **Attachment 44 (How Google uses location information – Privacy & Terms – Google) at 2 &3.**

Claim 1	Corresponding Structure in Accused Systems



If you use an older Android version

Choose location settings (Android 9.0)

To change location settings:

1. Open your device's Settings app.
2. Tap **Security & Location** > **Location**.
   - If you have a work profile, tap **Advanced**.

Then, choose an option:

- **Turn Location on or off**: Tap **Location**.
- **Scan for nearby networks**: Tap **Advanced** > **Scanning**. Turn **Wi-Fi scanning** or **Bluetooth scanning** on or off.
- **Turn emergency location service on or off**: Tap **Advanced** > **Google Emergency Location Service**. Turn **Emergency Location Service** on or off.

Choose location mode (Android 4.4—8.1)

You can choose your location mode based on accuracy, speed, and battery use.

1. Open your phone's Settings app.
2. Tap **Security & Location** > **Location**. If you don't see "Security & Location," tap **Location**.
3. Tap **Mode**. Then pick:
   - **High accuracy:** Use GPS, Wi-Fi, mobile networks, and sensors to get the most accurate location. Use Google Location Services to help estimate your phone's location faster and more accurately.
   - **Battery saving:** Use sources that use less battery, like Wi-Fi and mobile networks. Use Google Location Services to help estimate your phone's location faster and more accurately.
   - **Device only:** Use only GPS. Don't use Google Location Services to provide location information. This can estimate your phone's location more slowly and use more battery.

Choose location access (Android 4.1—4.3)

You can control what location information your phone can use.

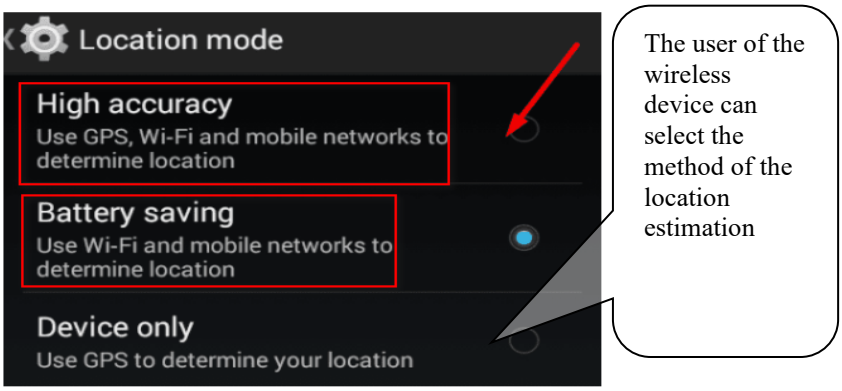
1. Open your phone's Settings app.
2. Under "Personal," tap **Location access**.
3. At the top of the screen, turn **Access to my location** on or off.
   - **When location access is on, pick either or both of:**
     - **GPS satellites:** Lets your phone estimate its location from satellite signals, like a GPS device in a car.
     - **Wi-Fi & mobile network location:** Lets your phone use Google Location Services to help estimate its location faster, with or without GPS.
   - **When location access is off:**
     Your phone can't find its precise location or share it with any apps.

Tip: If you have a tablet that more than one person uses, each person can have different location access settings.

Attachment 40 (Manage your Pixel phone's location settings) at 3 & 4.

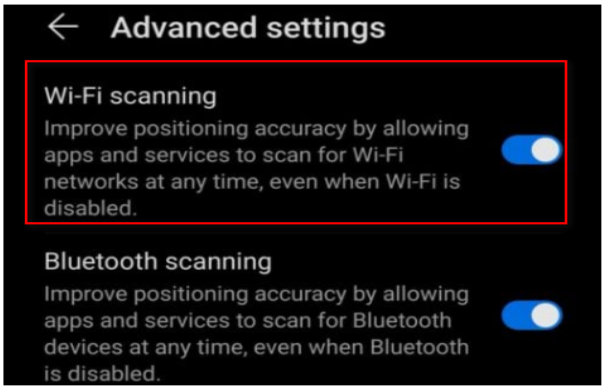
Claim 1	Corresponding Structure in Accused Systems

1. On your Android device, go to **Settings**
2. Tap **Location** and re-enable your location services
3. Select **Mode High accuracy**



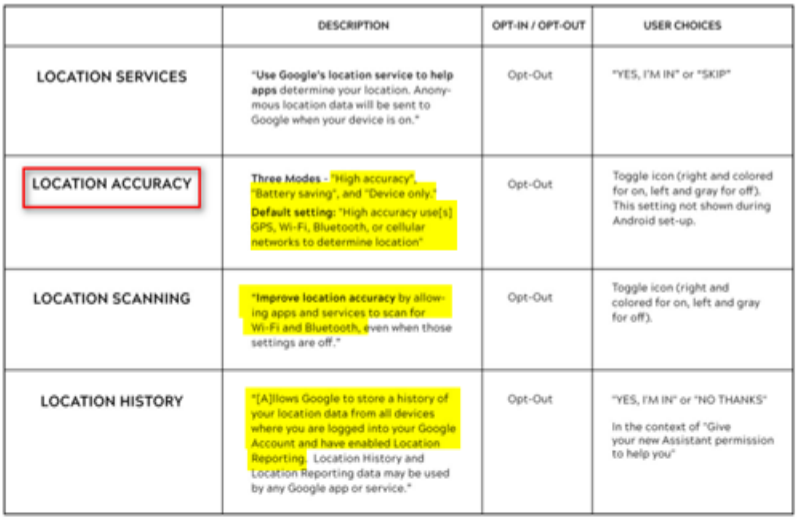
On some phone models, this option can be found under the Advanced Settings option.

Select **Advanced Settings** and enable your device to improve positioning accuracy by allowing apps to scan for Wi-Fi networks and Bluetooth devices at any time, even if Wi-Fi or Bluetooth is disabled.



Attachment 33 (Google Maps Not Updating Location) at 4.

Claim 1	Corresponding Structure in Accused Systems



	DESCRIPTION	OPT-IN / OPT-OUT	USER CHOICES
LOCATION SERVICES	"**Use Google's location service to help apps** determine your location. Anonymous location data will be sent to Google when your device is on."	Opt-Out	"YES, I'M IN" or "SKIP"
LOCATION ACCURACY	**Three Modes** - "High accuracy", "Battery saving", and "Device only." **Default setting:** "High accuracy use[s] GPS, Wi-Fi, Bluetooth, or cellular networks to determine location"	Opt-Out	Toggle icon (right and colored for on, left and gray for off). This setting not shown during Android set-up.
LOCATION SCANNING	"**Improve location accuracy** by allowing apps and services to scan for Wi-Fi and Bluetooth, even when those settings are off."	Opt-Out	Toggle icon (right and colored for on, left and gray for off).
LOCATION HISTORY	"[A]llows Google to store a history of your location data from all devices where you are logged into your Google Account and have enabled Location Reporting. Location History and Location Reporting data may be used by any Google app or service."	Opt-Out	"YES, I'M IN" or "NO THANKS" In the context of "Give your new Assistant permission to help you"

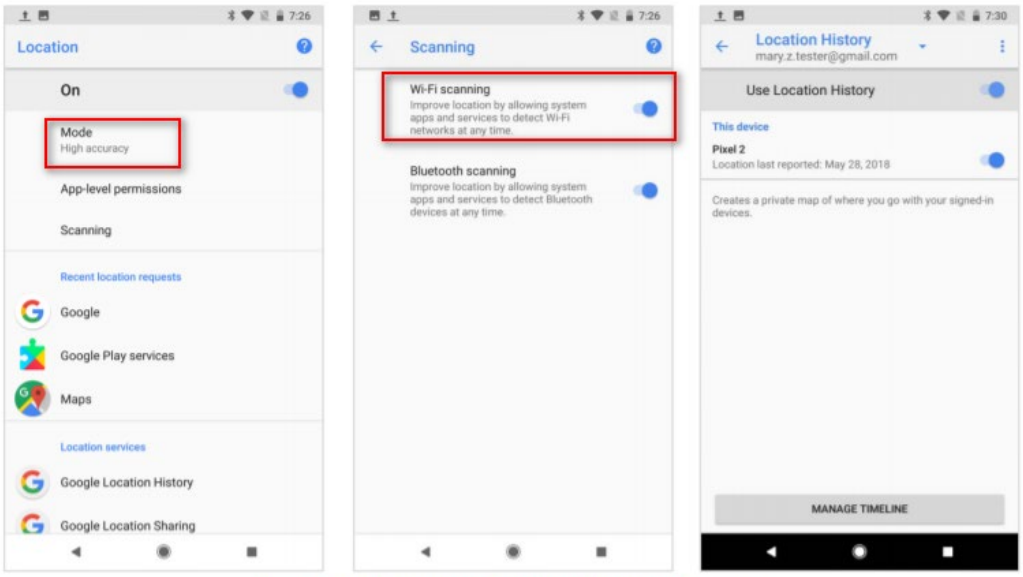
Figure 1: Four Android settings and services that relate to location information collection. [1]

Google Location Services

Google Location Services (GLS) operate at a device level and rely on sensors such as GPS, Wi-Fi, the cellular radio, and other technologies included in mobile devices to position a user in the world. If a user keeps the default settings prompted by Google, Location Services is enabled, Location Accuracy will be set to "High Accuracy" [2] and Location Scanning will be enabled for both Wi-Fi base stations and Bluetooth Beacons, regardless of a user's choice to turn Wi-Fi or Bluetooth on. The implications of user choices among the various Location Services settings are significant, but not intuitive, including:

- With Location Services turned on, Location Accuracy set to "Device only" and Location Scanning turned off, an Android device will only use GPS to provide the location of an Android device.
- When Location Accuracy is set to "High accuracy" and Location Scanning is enabled (the default setting for new device setup), an Android device will use sources including Wi-Fi, Bluetooth, and cellular radio to improve the accuracy of the device's position.

Attachment 38 (Google, Android and Location Tracking) at 2.

Claim 1	Corresponding Structure in Accused Systems
	After completing the setup process users can validate and control settings for device location via the Settings app and navigating to Google settings, then Location (Figure 4).  Figure 4: Location settings after Android device setup process As demonstrated in Figure 4, if users accept Google's defaults during the setup process, the Android device is configured with Location Services enabled, Wi-Fi and Bluetooth scanning engaged, and Location History active. **Attachment 38 (Google, Android and Location Tracking) at 5.**

Claim 1	Corresponding Structure in Accused Systems

Users can choose to disable GLS during the set-up process. However, if a user attempts to disable GLS, a warning dialogue box prompts an extreme scenario: "device location for all apps is turned off and you may not be able to locate your device if it is lost." (Figure 5) Note as well, the action prompt is to "Turn on Location" – reversing the user choice triggering the warning. Further, as described immediately below, many Google and third party apps will not function unless GLS is turned on. Therefore, Google forces user into an impossible ultimatum, have their every move constantly monitored, tracked, and stored or lose the functionality of their expensive smartphone.

If a user disables Location Services but then attempts to use a location aware app or service on their device, she will see the dialogue box shown in Figure 6. If the user clicks "OK" the service is enabled for the entire device and permanently, rather than enabling Location Services only for that particular app or service requesting the functionality.

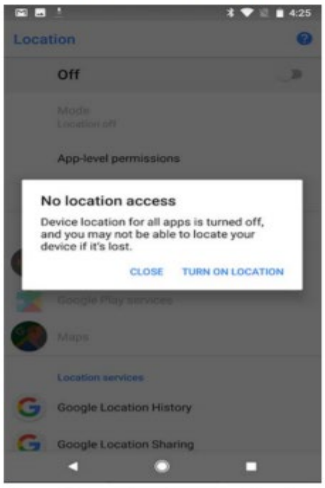


Figure 5: Location Services Warning

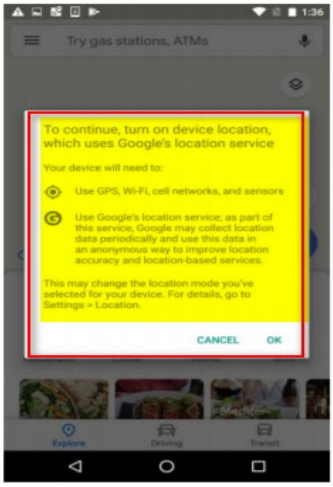


Figure 6: Re-Enable Location Services

Attachment 38 (Google, Android and Location Tracking) at 6.

We collect information about your location when you use our services, which helps us offer features like driving directions for your weekend getaway or showtimes for movies playing near you.

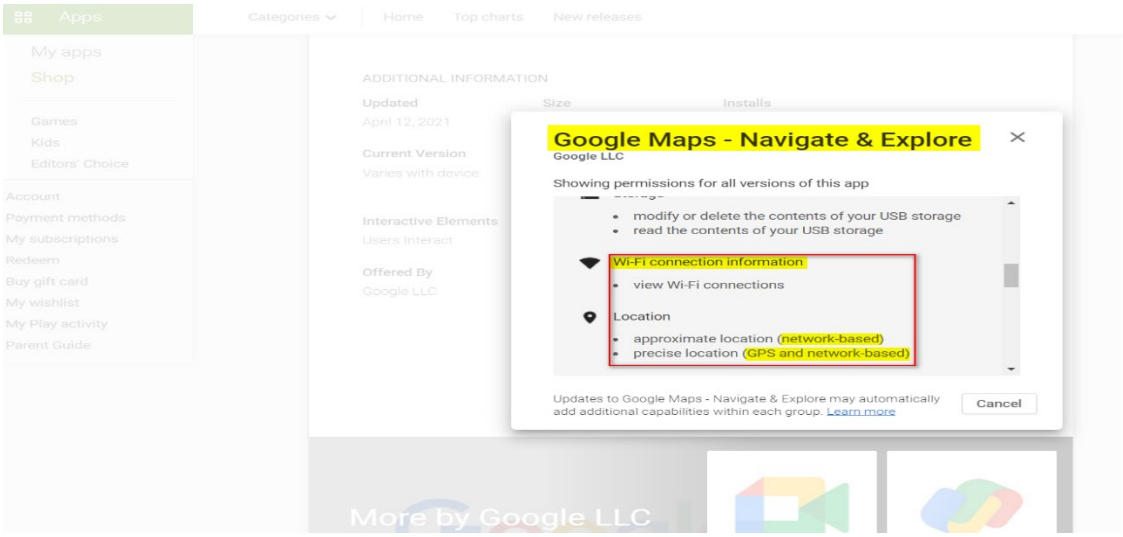
Your location can be determined with varying degrees of accuracy by:

- GPS
- IP address
- Sensor data from your device
- Information about things near your device, such as Wi-Fi access points, cell towers, and Bluetooth-enabled devices

The types of location data we collect depend in part on your device and account settings. For example, you can turn your Android device's location on or off using the device's settings app. You can also turn on Location History if you want to create a private map of where you go with your signed-in devices.

Attachment 29 (Google Privacy Policy) at 4.

Claim 1	Corresponding Structure in Accused Systems



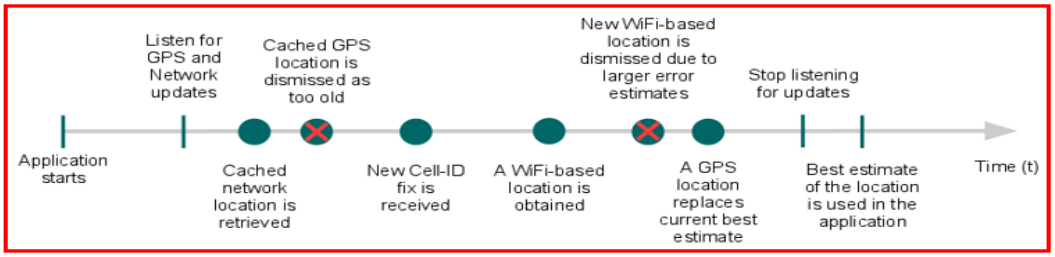
Attachment 39 (Google Map_Permissions) at 1.

Flow for obtaining user location

Here's the typical flow of procedures for obtaining the user location:

1. Start application.
2. Sometime later, start listening for updates from desired location providers.
3. Maintain a "current best estimate" of location by filtering out new, but less accurate fixes.
4. Stop listening for location updates.
5. Take advantage of the last best location estimate.

Figure 1 demonstrates this model in a timeline that visualizes the period in which an application is listening for location updates and the events that occur during that time.



Attachment 12 (Location is estimated using cell tower/wi-fi network) at 5.

Claim 1	Corresponding Structure in Accused Systems

There are 3 location providers in Android.

They are:

gps –> (GPS, AGPS): Name of the GPS location provider. This provider determines location using satellites. Depending on conditions, this provider may take a while to return a location fix. Requires the permission android.permission.ACCESS_FINE_LOCATION.

network –> (AGPS, CellID, WiFi MACID): Name of the network location provider. This provider determines location based on availability of cell tower and WiFi access points. Results are retrieved by means of a network lookup. Requires either of the permissions android.permission.ACCESS_COARSE_LOCATION or android.permission.ACCESS_FINE_LOCATION.

passive –> (CellID, WiFi MACID): A special location provider for receiving locations without actually initiating a location fix. This provider can be used to passively receive location updates when other applications or services request them without actually requesting the locations yourself. This provider will return locations generated by other providers. Requires the permission android.permission.ACCESS_FINE_LOCATION, although if the GPS is not enabled this provider might only return coarse fixes. This is what Android calls these location providers, however, the underlying technologies to make this stuff work is mapped to the specific set of hardware and telco provided capabilities (network service).

The best way is to use the "network" or "passive" provider first, and then fallback on "gps", and depending on the task, switch between providers. This covers all cases, and provides a lowest common denominator service (in the worst case) and great service (in the best case).

Attachment 41 (Android Location Providers - GPS or Network Provider?) at 1 & 2.

Accuracy

You can specify location accuracy using the `setPriority()` method, passing one of the following values as the argument:

- `PRIORITY_HIGH_ACCURACY` provides the most accurate location possible, which is computed using as many inputs as necessary (it enables GPS, Wi-Fi, and cell, and uses a variety of Sensors), and may cause significant battery drain.
- `PRIORITY_BALANCED_POWER_ACCURACY` provides accurate location while optimizing for power. Very rarely uses GPS. Typically uses a combination of Wi-Fi and cell information to compute device location.
- `PRIORITY_LOW_POWER` largely relies on cell towers and avoids GPS and Wi-Fi inputs, providing coarse (city-level) accuracy with minimal battery drain.
- `PRIORITY_NO_POWER` receives locations passively from other apps for which location has already been computed.

The location needs of most apps can be satisfied using the balanced power or low power options. High accuracy should be reserved for apps that are running in the foreground and require *real time* location updates (for example, a mapping app).

Attachment 42 (Optimize location for battery) at 2.

Traffic conditions [edit]

In 2007, Google began offering traffic data as a colored overlay on top of roads and motorways to represent the speed of vehicles on particular roads. Crowdsourcing is used to obtain the GPS-determined locations of a large number of cellphone users, from which live traffic maps are produced.[59][60][61]

Google has stated that the speed and location information it collects to calculate traffic conditions is anonymous.[62] Options available in each phone's settings allow users not to share information about their location with Google Maps.[63] Google stated, "Once you disable or opt out of My Location, Maps will not continue to send radio information back to Google servers to determine your handset's approximate location".[64][*failed verification*]

Attachment 43 (Google Maps Wikipedia) at 5 & 6.

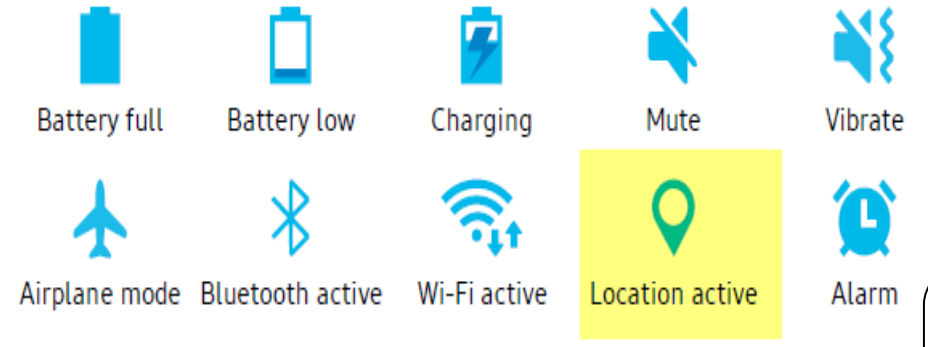
Claim 1	Corresponding Structure in Accused Systems
wherein the second processor selectively acquires the information indicative of a location of the wireless mobile communications device dependent on the setting of preference flags,	Plaintiff contends each Exhibit-B wireless mobile can set preference flags that enable or disable accessibility to data relevant to the device's location by Location-Based Services (LBS) providers. Such programmability by a wireless device is at times known as a privacy setting. Further, such programmability is available by location-permission granting (wireless mobile communications device must grant permission). The LBS providers' processors select to determine a wireless mobile communications device's location if the preference flags applicable to that device have been set for enablement. The processors select to not determine a wireless mobile communications device's location if the preference flags applicable to that device have not been set for enablement. The following exemplifies this limitation's existence in Accused Systems: Google map estimated the location of the device based upon GPS, mobile network or Wi-Fi method. Further, the Google Map hardware/software will be able/not able to locate the Wireless communication device (Exhibit B) if "Location" flag is turned ON/OFF respectively. Settings Location Location services use a combination of GPS, mobile network and Wi-Fi to determine the location of your device. 1. From Settings, tap Location. 2. Tap to turn on Location services. TIP Some apps require location services be turned on for full functionality. **Attachment 15 (Turn ON/OFF the location setting) at 161.**

Claim 1	Corresponding Structure in Accused Systems

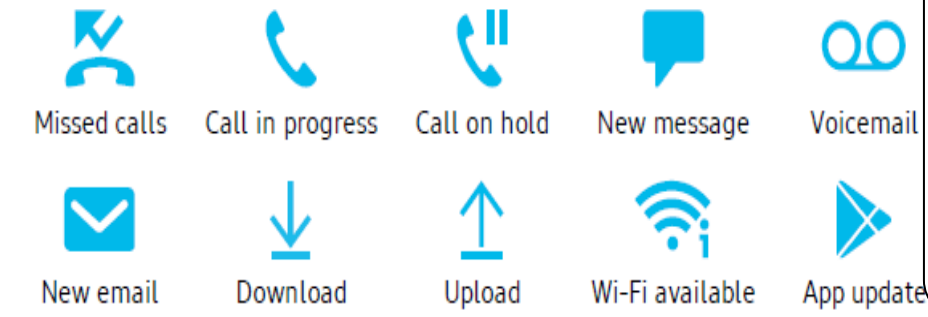
Status bar

The Status bar provides device information on the right side and notification alerts or the left.

Status icons



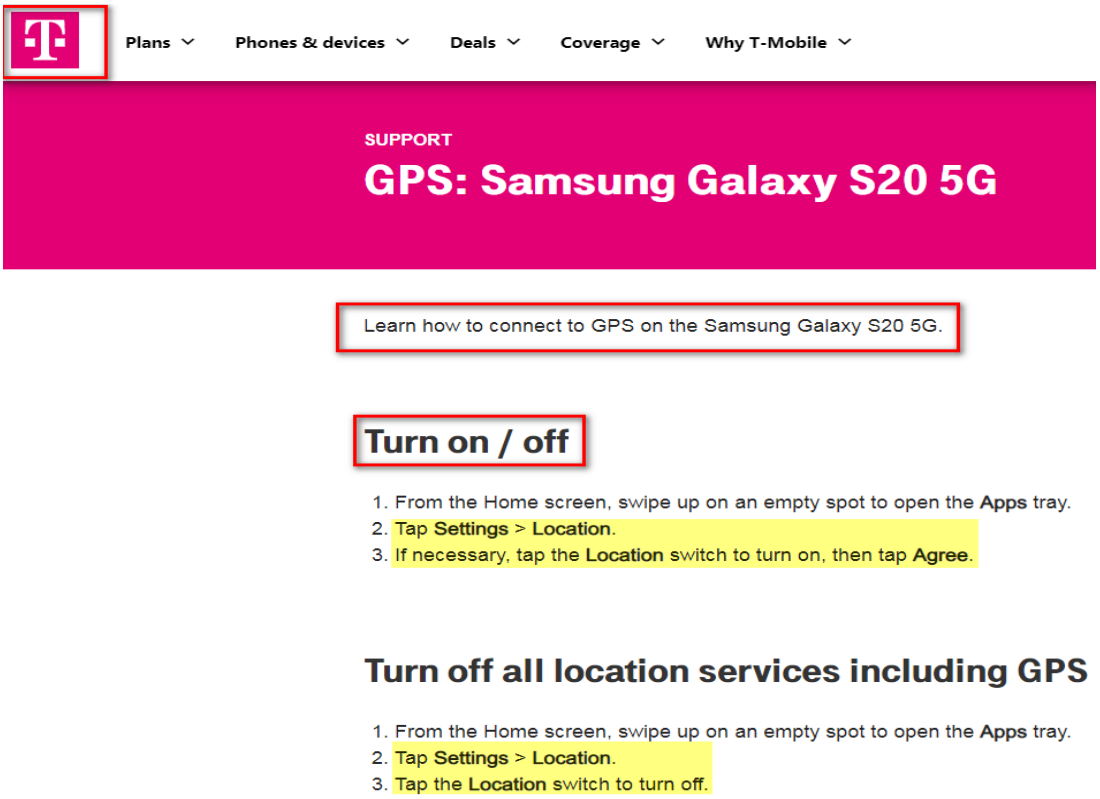
Notification icons



Google Map hardware/software will be able/not able to locate the Wireless communication device (Exhibit B) if "Location" flag is turned ON/OFF respectively

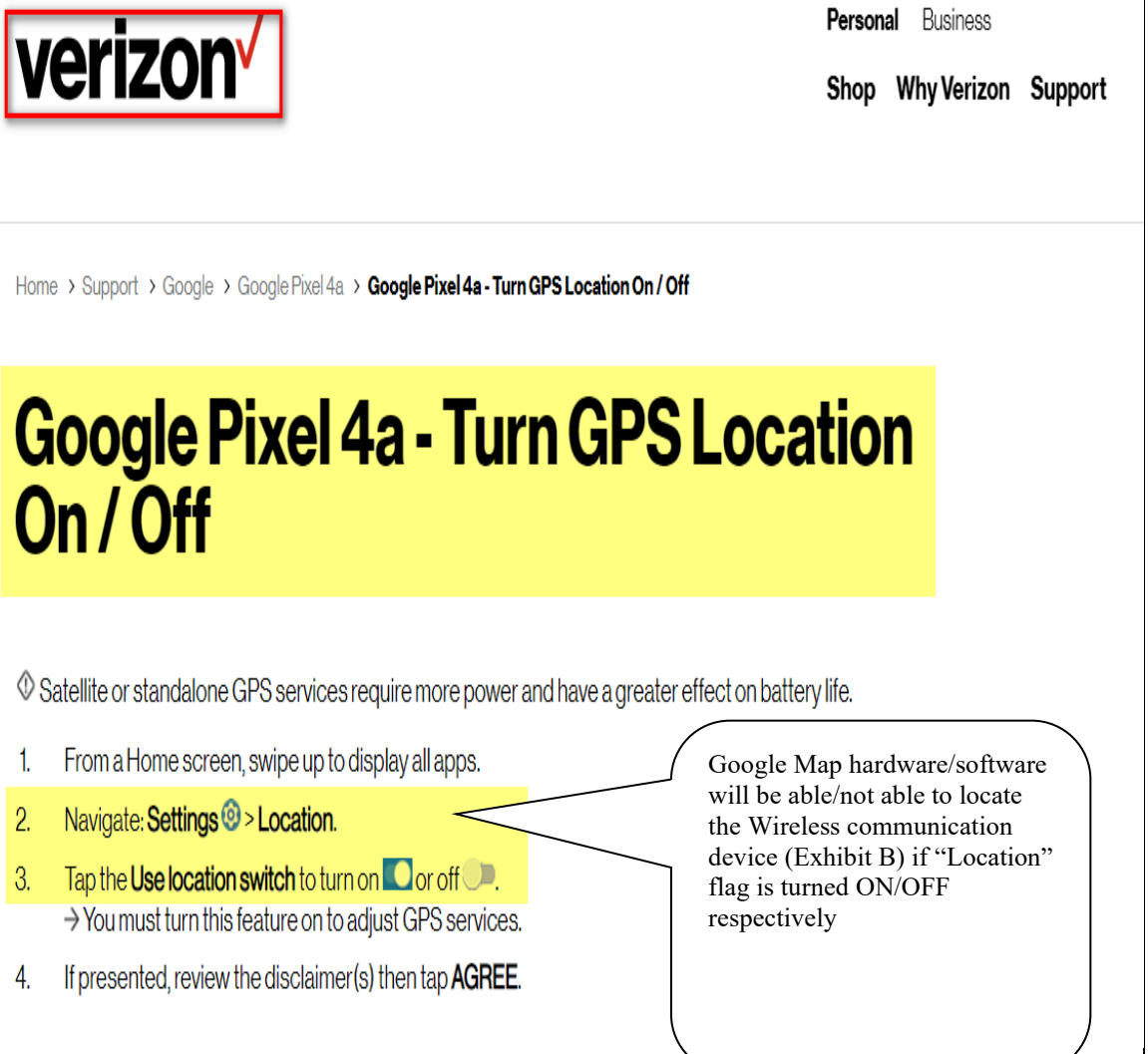
Attachment 15 (Icon for turn ON/OFF the location setting) at 161.

Claim 1	Corresponding Structure in Accused Systems



Attachment 19 (Turn ON/OFF the location) at 1.

Claim 1	Corresponding Structure in Accused Systems



Attachment 20 (Turn ON/OFF the location) at 1.

Claim 1	Corresponding Structure in Accused Systems

Help your phone get a more accurate location (Google Location Services a.k.a. Google Location Accuracy)

Turn your phone's location accuracy on or off

1. Open your device's Settings app.
2. Tap **Location** > **Advanced** > **Google Location Accuracy**.
3. Turn **Improve Location Accuracy** on or off.

When Google Location Accuracy is on

When you have Google Location Accuracy turned on, your phone uses these sources to get the most accurate location:

- GPS
- Wi-Fi
- Mobile networks
- Sensors

Wireless communication device receive the location of the Wireless communication device (Exhibit B) on Google Map from Wireless communication networks (e.g. Verizon, AT&T, T-Mobile, etc.)

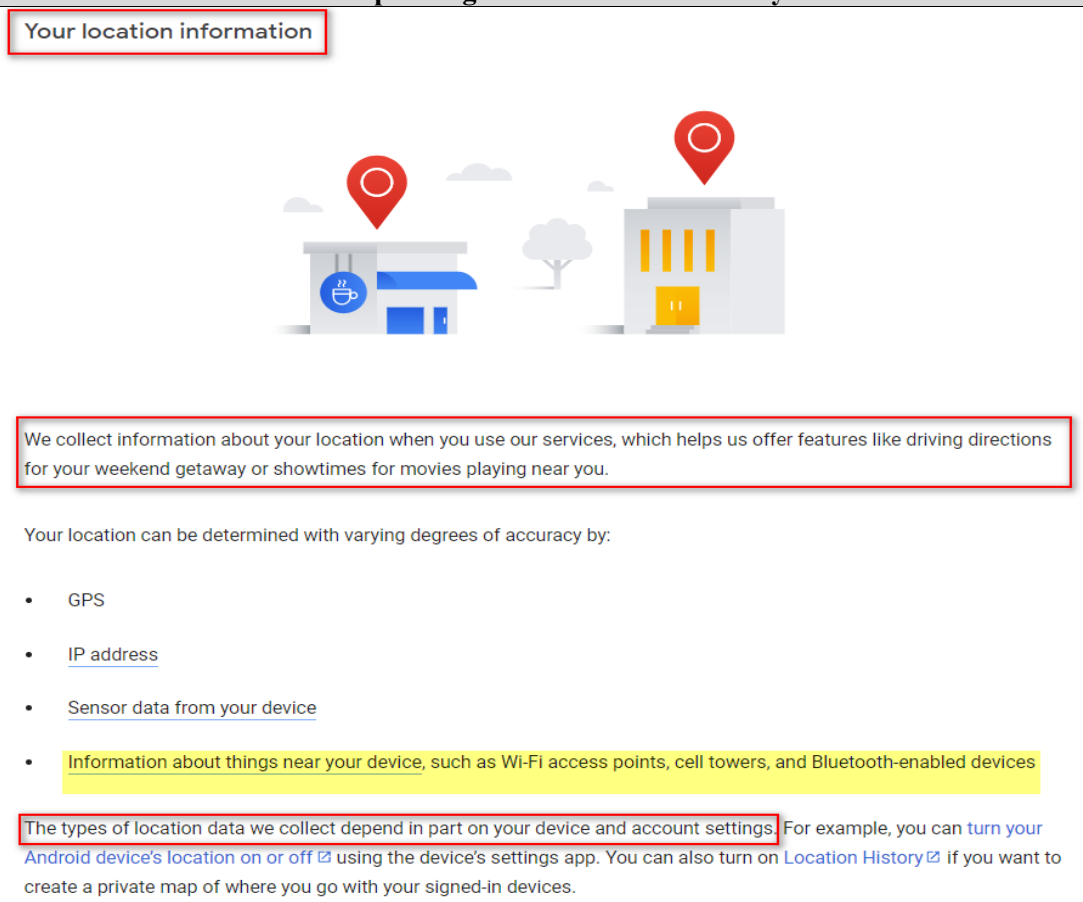
When Google Location Accuracy is off

Let your phone scan for nearby networks or devices

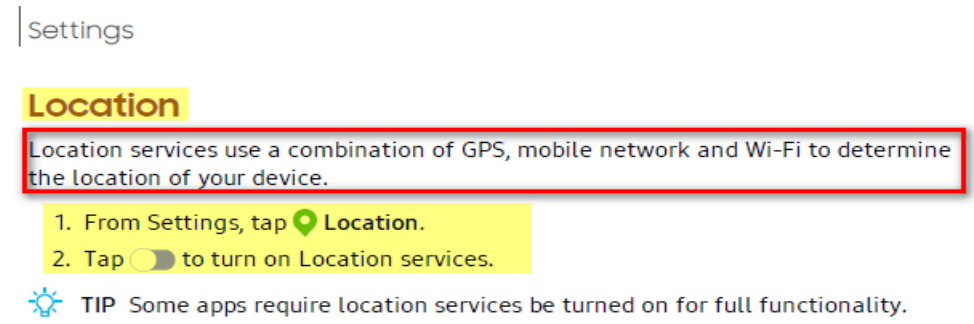
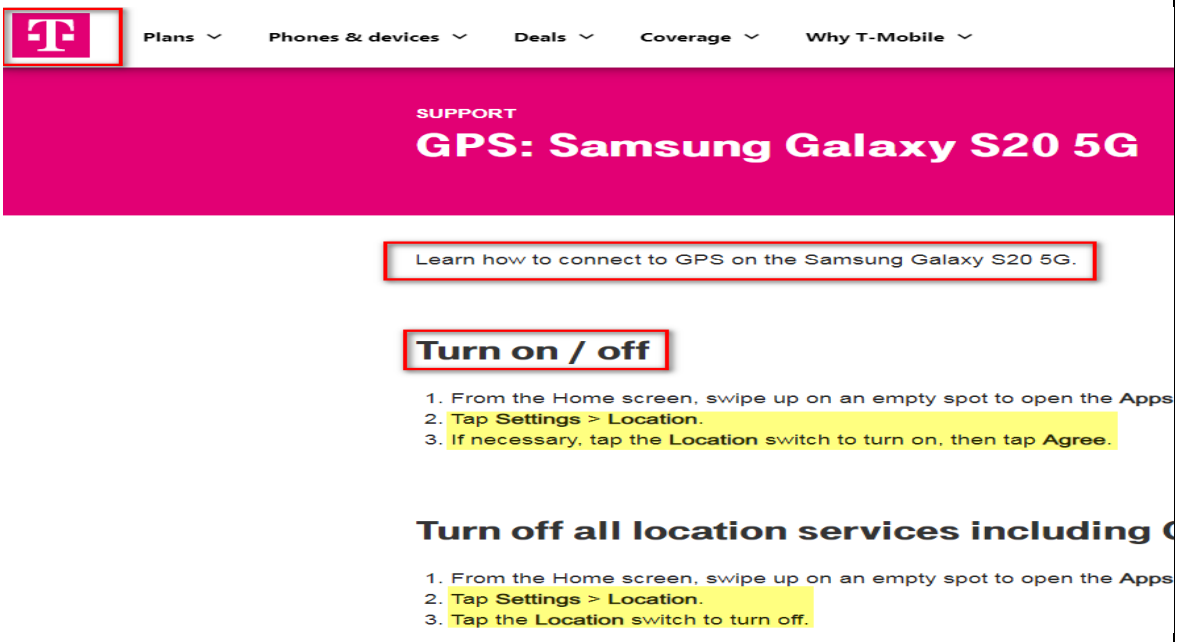
To help apps get better location info, you can let your phone scan for nearby Wi-Fi access points or Bluetooth devices.

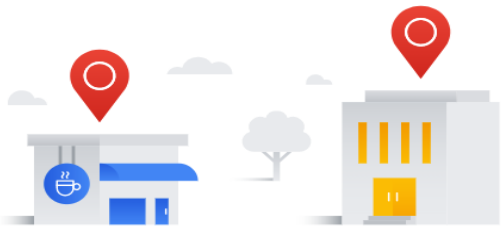
1. Open your device's Settings app.
2. Tap **Location** > **Wi-Fi and Bluetooth scanning**.
3. Turn **Wi-Fi scanning** or **Bluetooth scanning** on or off.

Attachment 21 (Manage your Pixel phone's location settings) at 2.

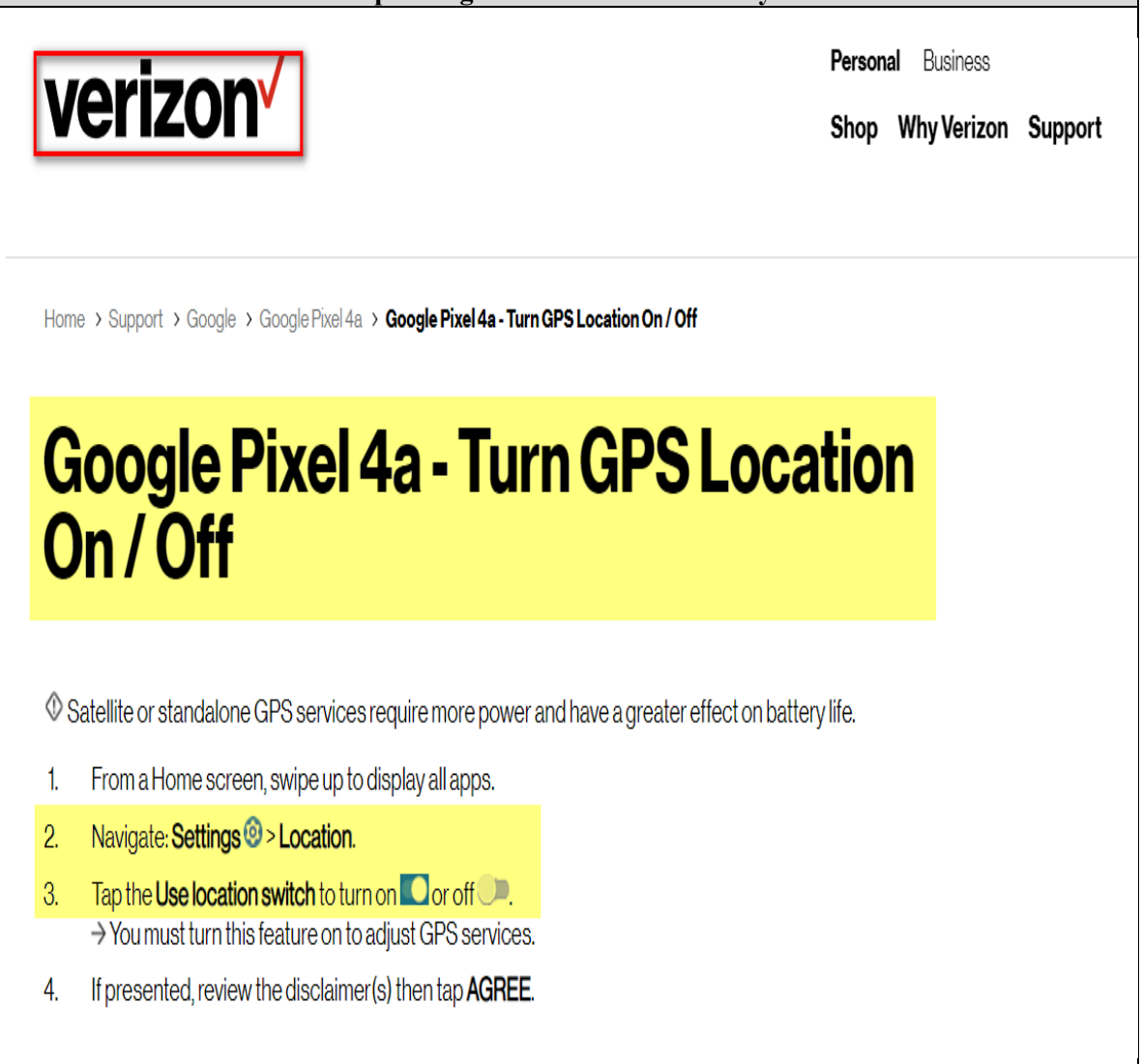
Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 29 (Google privacy policy) at 4.**
wherein the second processor acquires the information indicative of a location of the wireless mobile communications device if the preference flags are set to a state that permits tracking of the wireless mobile communications device,	Plaintiff contends each Exhibit-B wireless mobile can set preference flags that enable or disable accessibility to data relevant to the device's location by Location-Based Services (LBS) providers. The LBS providers' processors select to determine a wireless mobile communications device's location if the preference flags applicable to that device have been set for enablement. The processors select to not determine a wireless mobile communications device's location if the preference flags applicable to that device have not been set for enablement. The Navigation hardware/software will only be able to determine and track the location of the Wireless communication device (Exhibit B) such as but not limited to including but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc. (refer Exhibit B for complete list), Plaintiff contends each Exhibit-B wireless mobile can set preference flags that enable or disable accessibility to data relevant to the device's location by Location-Based Services (LBS) providers. Such programmability by a wireless device is at times known as a privacy setting. Further, such programmability is available by location-permission granting (wireless mobile communications device must grant permission). Plaintiff contends that if the preference flags are enabled (i.e., the wireless mobile communication device's user has granted permission), LBS providers' processor(s)

Screenshot of the "Location setting" associated with Google Maps app installed on an Android communications device.

Claim 1	Corresponding Structure in Accused Systems
	proceed with determining the device's location and, when determined, communicates that location to the first processor through the second RF transceiver (which, as discussed above, is a transceiver to which the LBS-providers' processors communicatively couple). The LBS-providers' processors are programmed to estimate the location of the device from 3 sources: GPS (GPS uses satellites and knows your location within a few meters), Wi-Fi (the location of nearby Wi-Fi networks helps Maps know where you are), and cell towers (cell tower can be accurate up to a few thousand meters). The following exemplifies this limitation's existence in Accused Systems:  **Attachment 15 (Turn ON/OFF the location setting) at 161.**  **Attachment 19 (Turn ON/OFF the location) at 1.**

Claim 1	Corresponding Structure in Accused Systems
	Your location information  We collect information about your location when you use our services, which helps us offer features like driving directions for your weekend getaway or showtimes for movies playing near you. Your location can be determined with varying degrees of accuracy by: • GPS • IP address • Sensor data from your device • Information about things near your device, such as Wi-Fi access points, cell towers, and Bluetooth-enabled devices The types of location data we collect depend in part on your device and account settings. For example, you can turn your Android device's location on or off using the device's settings app. You can also turn on Location History if you want to create a private map of where you go with your signed-in devices. **Attachment 29 (Google privacy policy) at 4.**

Claim 1	Corresponding Structure in Accused Systems



Attachment 20 (Turn ON/OFF the location) at 1.

Claim 1	Corresponding Structure in Accused Systems

Turn location on or off for your phone

1. Open your phone's Settings app.
2. Tap **Location**. If you have a work profile, tap **Advanced**.
3. At the top, turn **Use location** on or off.

Tip: You can also turn your phone's location on or off with Quick Settings. Learn about Quick Settings.

When Location is on

- Apps can find your phone's location to give you location-based info or services. Learn how to change app location settings.
- If Google Location Accuracy is on, Google Location Services can collect data to improve location-based services. Learn about Google Location Services.
- You can get search results and ads in apps based on your phone's location.
- You can locate where your phone is if you lose it. Learn about Find My Device.
- You can share your phone's location with others. Learn about Location Sharing with Google Maps and sending location in emergencies.
- If you have Location History turned on, the places your phone goes will be saved. You can review and manage them later. Learn about Location History.

Attachment 21 (Manage your pixel phone settings) at 1.

Help your phone get a more accurate location (Google Location Services a.k.a. Google Location Accuracy)

Turn your phone's location accuracy on or off

1. Open your device's Settings app.
2. Tap **Location** > **Advanced** > **Google Location Accuracy**.
3. Turn **Improve Location Accuracy** on or off.

When Google Location Accuracy is on

When you have Google Location Accuracy turned on, your phone uses these sources to get the most accurate location:

- GPS
- Wi-Fi
- Mobile networks
- Sensors

Wireless communication device receive the location of the Wireless communication device (Exhibit B) on Google Map from Wireless communication networks (e.g. Verizon, AT&T, T-Mobile, etc.)

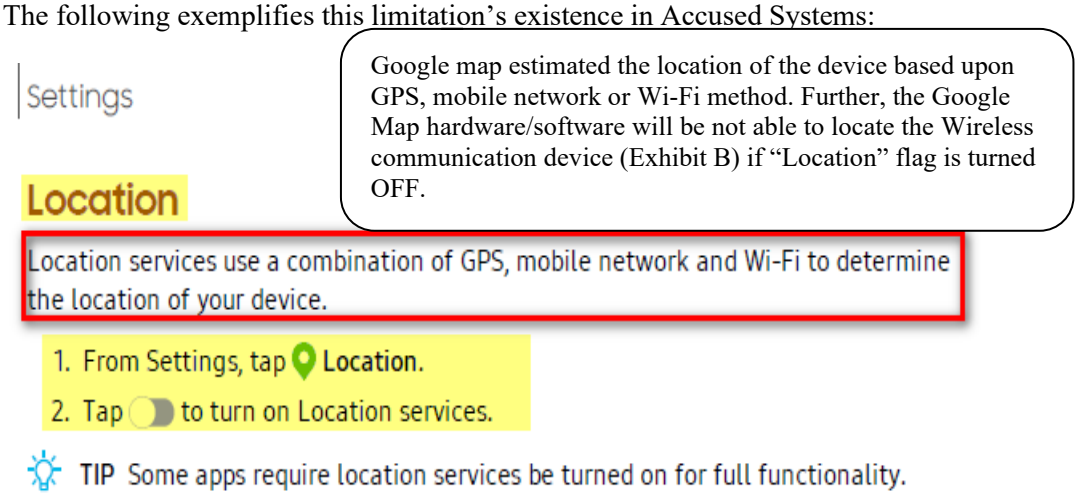
When Google Location Accuracy is off

Let your phone scan for nearby networks or devices

To help apps get better location info, you can let your phone scan for nearby Wi-Fi access points or Bluetooth devices.

1. Open your device's Settings app.
2. Tap **Location** > **Wi-Fi and Bluetooth scanning**.
3. Turn **Wi-Fi scanning** or **Bluetooth scanning** on or off.

Attachment 21 (Manage your Pixel phone's location settings) at 2.

Claim 1	Corresponding Structure in Accused Systems
and wherein the second processor does not acquire the information indicative of the location of the wireless mobile communications device if the preference flags are set to a state that prohibits tracking of the wireless mobile communications device.	Plaintiff contends that if the preference flags are not enabled (i.e., the wireless-mobile-communication device's user has not granted permission), LBS provider application hardware/software, will not be able to determine and track the location of the Wireless communication device (Exhibit B) such as but not limited to Google's branded devices such as Google Pixel 5, pixel 4a 5G, pixel 4a, pixel 4 XL, pixel 4, pixel 3a XL, pixel 3a, pixel 3 XL, pixel 3, pixel 2, pixel 2 XL, pixel XL, pixel, pixel C or other (third-parties) branded devices such as Samsung Galaxy S20 Ultra, Galaxy S20 plus, Galaxy S20, Galaxy Z fold, Galaxy S10, Galaxy A series, etc. (refer Exhibit B for complete list), if the location flag on the Wireless communication device (Exhibit B) is turned off (that is, locations privacy settings are set to "Deny"). The following exemplifies this limitation's existence in Accused Systems:  Google map estimated the location of the device based upon GPS, mobile network or Wi-Fi method. Further, the Google Map hardware/software will be not able to locate the Wireless communication device (Exhibit B) if "Location" flag is turned OFF. **Attachment 15 (Turn ON/OFF the location setting) at 161.**

Claim 1	Corresponding Structure in Accused Systems

Your location information

We collect information about your location when you use our services, which helps us offer features like driving directions for your weekend getaway or showtimes for movies playing near you.

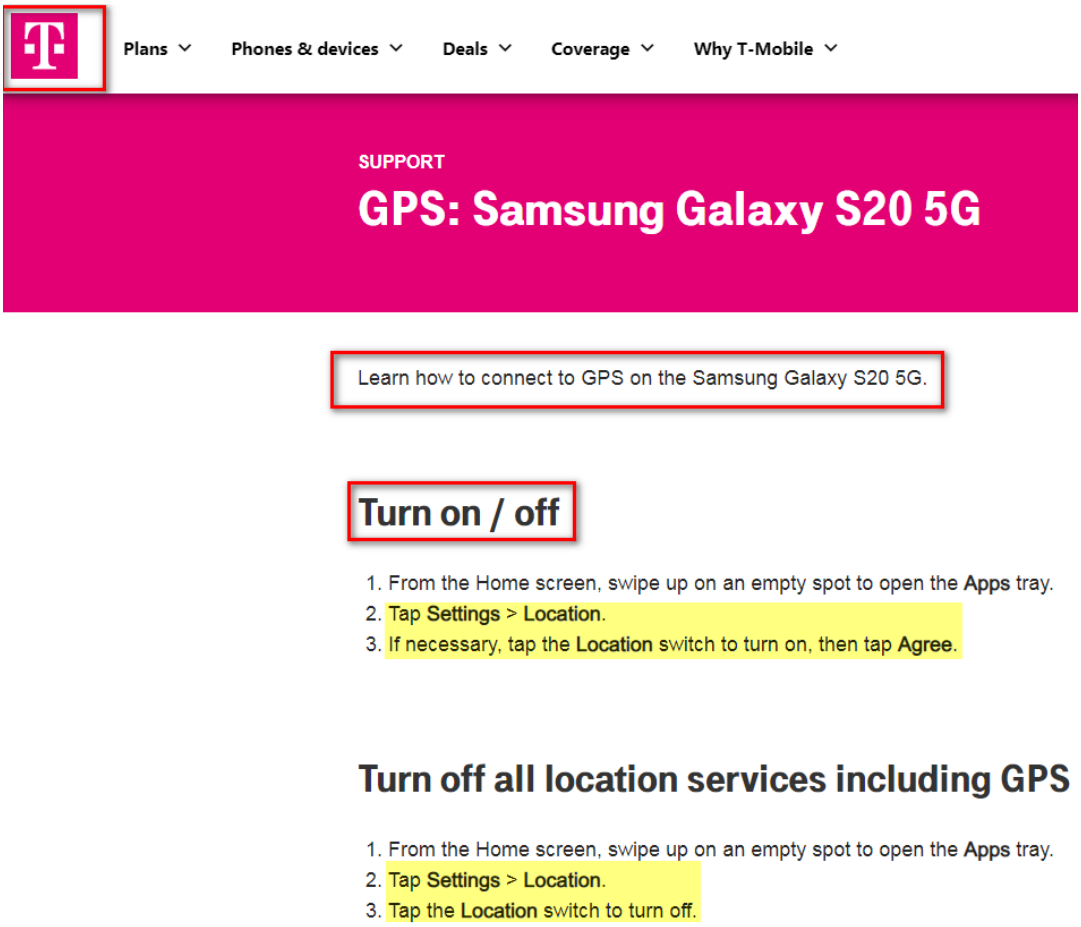
Your location can be determined with varying degrees of accuracy by:

- GPS
- IP address
- Sensor data from your device
- Information about things near your device, such as Wi-Fi access points, cell towers, and Bluetooth-enabled devices

The types of location data we collect depend in part on your device and account settings. For example, you can turn your Android device's location on or off using the device's settings app. You can also turn on Location History if you want to create a private map of where you go with your signed-in devices.

Attachment 29 (Google privacy policy) at 4.

Claim 1	Corresponding Structure in Accused Systems



Attachment 19 (Turn ON/OFF the location) at 1.

Claim 1	Corresponding Structure in Accused Systems

verizon

Personal Business

Shop Why Verizon Support

Home › Support › Google › Google Pixel 4a › **Google Pixel 4a - Turn GPS Location On / Off**

Google Pixel 4a - Turn GPS Location On / Off

Satellite or standalone GPS services require more power and have a greater effect on battery life.

1. From a Home screen, swipe up to display all apps.
2. Navigate: **Settings** > **Location**.
3. Tap the **Use location switch** to turn on or off.
   → You must turn this feature on to adjust GPS services.
4. If presented, review the disclaimer(s) then tap **AGREE**.

Google Map hardware/software will be not able to locate the Wireless communication device (Exhibit B) if "Location" flag is turned OFF

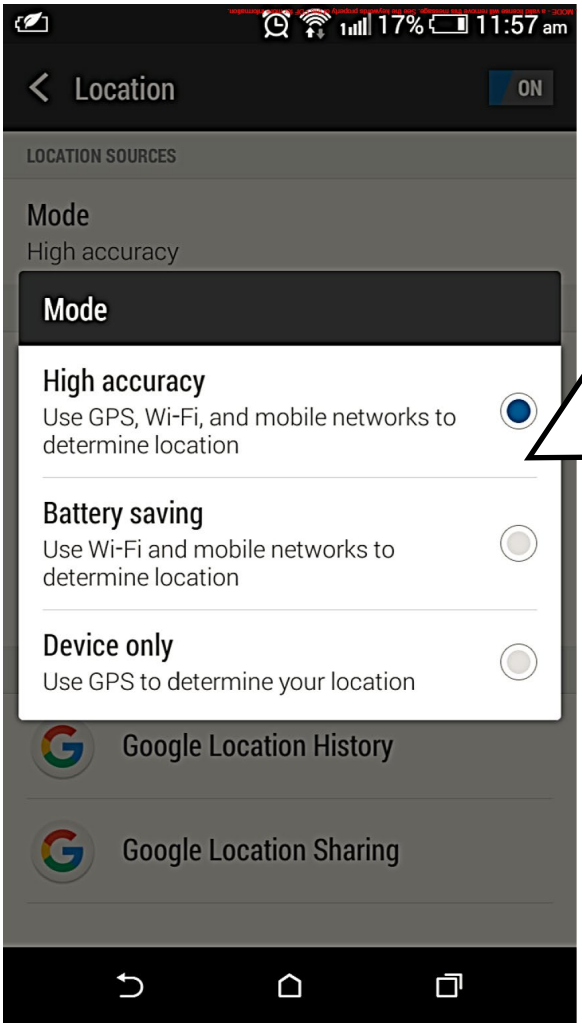
Attachment 20 (Turn ON/OFF the location) at 1.

Manage your Pixel phone's location settings - Pixel Phone Help

When Location is off

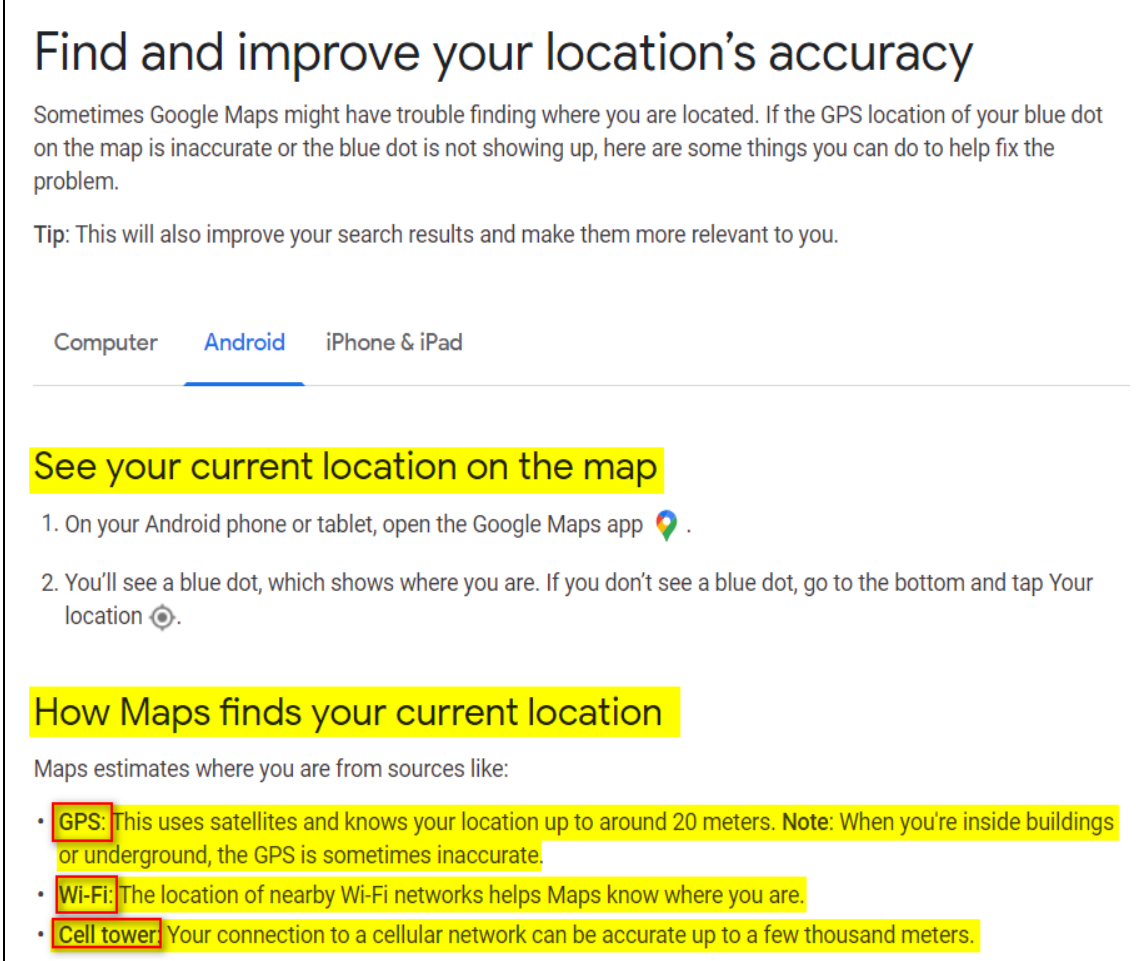
- Your phone's location isn't shared with any apps. Features that use location may not work properly.
- Google Location Services won't collect data to improve location-based services.
- You can get search results and ads based on your IP address.
- You can't see where your phone is if you lose it. Learn about Find My Device.
- You can't share your phone's location with anyone via Google Maps. Your device can still send it to first responders in an emergency. Learn about Location Sharing with Google Maps and sending location in emergencies.
- Even if you have Location History turned on, the places your phone goes won't be saved. Learn about Location History.

Claim 1	Corresponding Structure in Accused Systems
	Attachment 21 (Manage your pixel phone settings) at 1.



By default the "Location setting" is set at "High accuracy" mode, wherein, for example, accuracy of location of a communications device determined based on locations of nearby Wi-Fi network infrastructure (access points or hotspots) is further enhanced or fine-tuned by Google Maps Server additionally using the said communications device's GPS location and the location data obtained from the mobile network (Cell tower information and/or Location of the communications device determined through the Assisted-GPS method by the said mobile network) serving the said communications device.

Attachment 45 (Google Maps_Android app_Location settings) at 1.

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 46 (Find and improve your location's accuracy - Android - Google Maps Help) at 1.**

Claim 1	Corresponding Structure in Accused Systems

From your devices

Many devices, like phones or computers, can work out their precise location. You can allow Google and other apps to provide you with useful features based on where your device is located. For example, if you're running late to meet your friends, you'll probably want to use a navigation app to know the quickest way to get to your destination. To get turn-by-turn directions, you may need to turn on your device's location and give the app the permission to access it. Or for some searches like "coffee shop", "bus stop" or "atm", results will usually be more helpful when precise location is available.

On your Android device, if you choose to turn on your device location, you can use features like navigation, giving an app access to your current location, or find your phone. You can also choose which apps have permission to use your device's location with simple controls that let you turn the permission on or off for individual apps. On Android, you can see when an app is requesting to use your phone's GPS-based location when the top of your screen shows Location . Learn more

Google Location Services

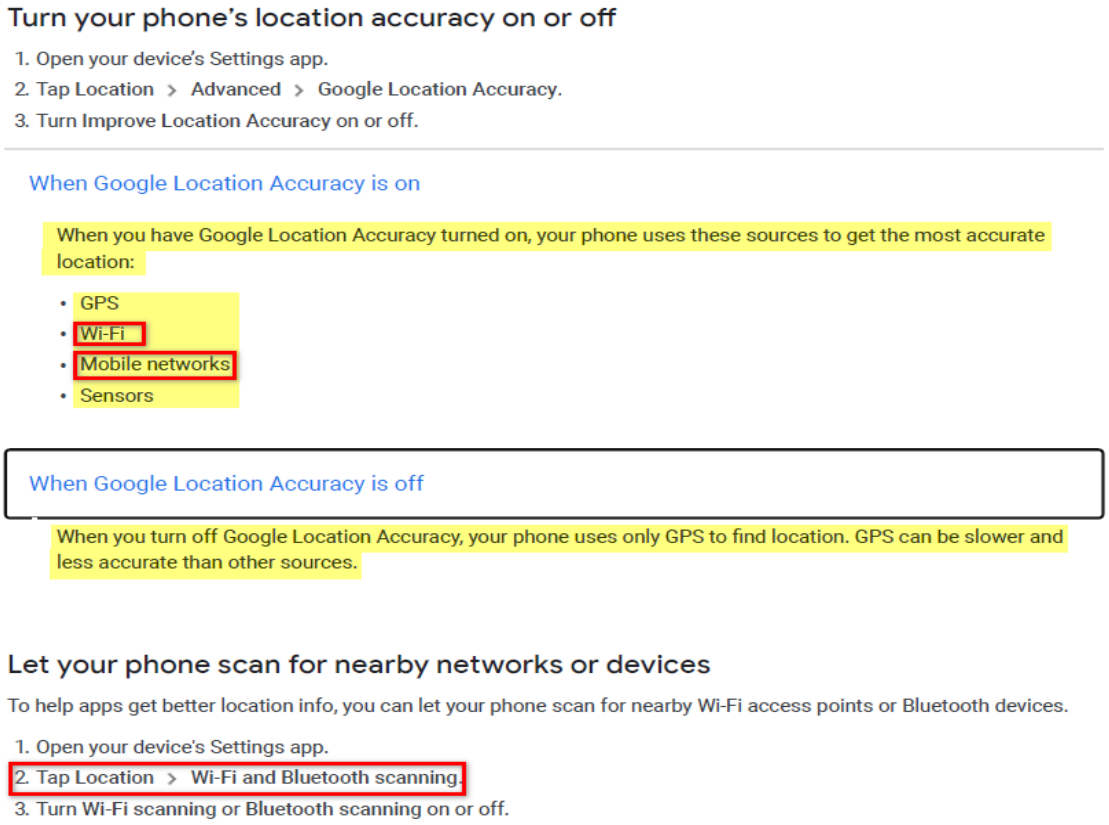
On most Android devices, Google, as the network location provider, provides a location service called Google Location Services (GLS), known in Android 9 and above as Google Location Accuracy. This service aims to provide a more accurate device location and generally improve location accuracy. Most mobile phones are equipped with GPS, which uses signals from satellites to determine a device's location – however, with Google Location Services, additional information from nearby Wi-Fi, mobile networks, and device sensors can be collected to determine your device's location. It does this by periodically collecting location data from your device and using it in an anonymous way to improve location accuracy.

You can disable Google Location Services at any time in your device's location settings. Your device's location will continue to work even if GLS is turned off, but the device will rely only on GPS to estimate device location for apps with the necessary permission. Google Location Services is distinct from your device's location setting. Learn more

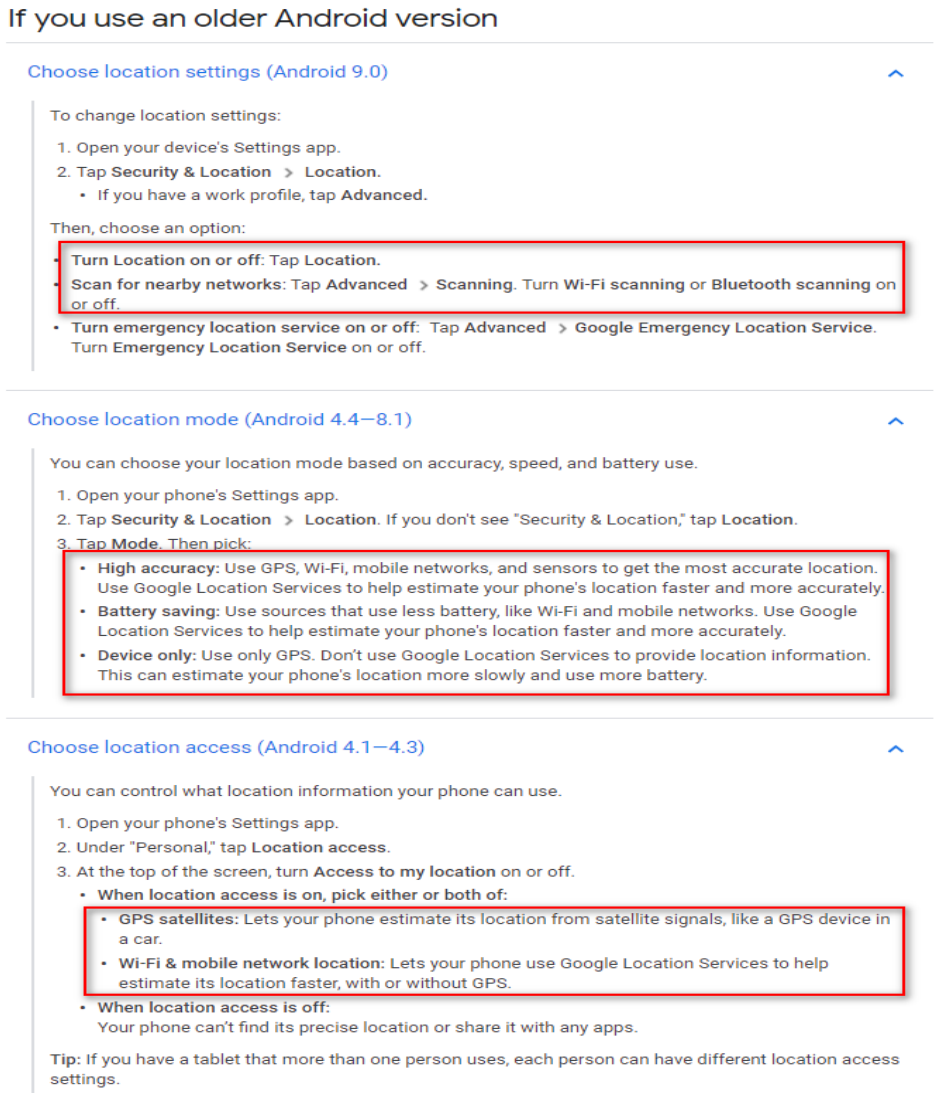
The settings and permissions on Android control whether your device sensors (like GPS) or network-based location (like GLS) are used to determine your location and which apps have access to that location. They do not impact how websites and apps might estimate your location in other ways, such as from your IP Address.

Attachment 44 (How Google uses location information – Privacy & Terms – Google) at 2 &3.

Wireless communication device receive the location of the Wireless communication device (Exhibit B) on Google Map from Wireless communication networks (e.g. Verizon, AT&T, T-Mobile, etc.)

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 21 (Manage your Pixel phone's location settings) at 2.**

Claim 1	Corresponding Structure in Accused Systems



If you use an older Android version

Choose location settings (Android 9.0)

To change location settings:

1. Open your device's Settings app.
2. Tap **Security & Location** > **Location**.
   - If you have a work profile, tap **Advanced**.

Then, choose an option:

- **Turn Location on or off**: Tap **Location**.
- **Scan for nearby networks**: Tap **Advanced** > **Scanning**. Turn **Wi-Fi scanning** or **Bluetooth scanning** on or off.
- **Turn emergency location service on or off**: Tap **Advanced** > **Google Emergency Location Service**. Turn **Emergency Location Service** on or off.

Choose location mode (Android 4.4—8.1)

You can choose your location mode based on accuracy, speed, and battery use.

1. Open your phone's Settings app.
2. Tap **Security & Location** > **Location**. If you don't see "Security & Location," tap **Location**.
3. Tap **Mode**. Then pick:
   - **High accuracy:** Use GPS, Wi-Fi, mobile networks, and sensors to get the most accurate location. Use Google Location Services to help estimate your phone's location faster and more accurately.
   - **Battery saving:** Use sources that use less battery, like Wi-Fi and mobile networks. Use Google Location Services to help estimate your phone's location faster and more accurately.
   - **Device only:** Use only GPS. Don't use Google Location Services to provide location information. This can estimate your phone's location more slowly and use more battery.

Choose location access (Android 4.1—4.3)

You can control what location information your phone can use.

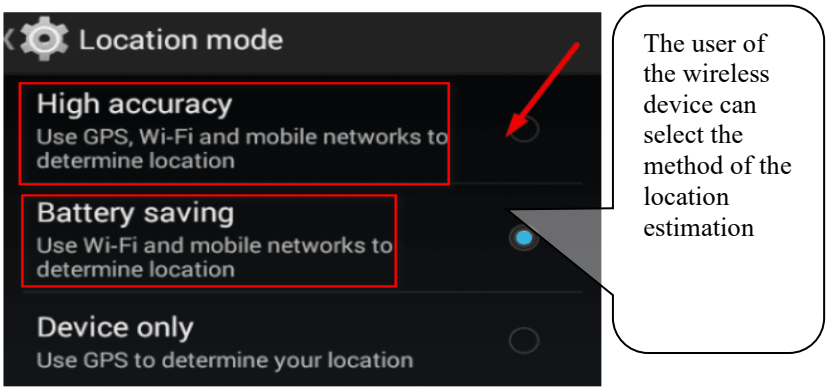
1. Open your phone's Settings app.
2. Under "Personal," tap **Location access**.
3. At the top of the screen, turn **Access to my location** on or off.
   - **When location access is on, pick either or both of:**
     - **GPS satellites:** Lets your phone estimate its location from satellite signals, like a GPS device in a car.
     - **Wi-Fi & mobile network location:** Lets your phone use Google Location Services to help estimate its location faster, with or without GPS.
   - **When location access is off:**
     Your phone can't find its precise location or share it with any apps.

Tip: If you have a tablet that more than one person uses, each person can have different location access settings.

Attachment 40 (Manage your Pixel phone's location settings) at 3 & 4.

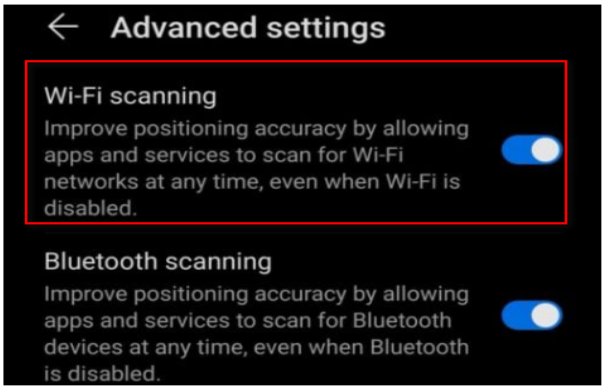
Claim 1	Corresponding Structure in Accused Systems

1. On your Android device, go to **Settings**
2. Tap **Location** and re-enable your location services
3. Select **Mode High accuracy**



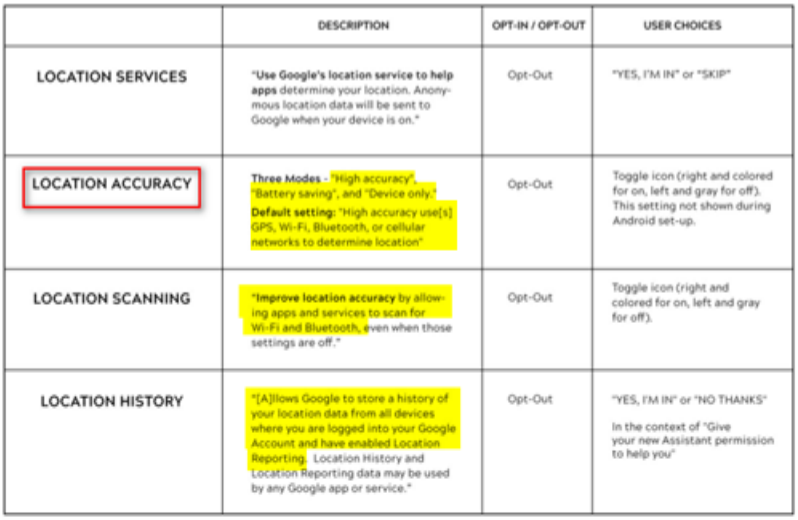
On some phone models, this option can be found under the Advanced Settings option.

Select **Advanced Settings** and enable your device to improve positioning accuracy by allowing apps to scan for Wi-Fi networks and Bluetooth devices at any time, even if Wi-Fi or Bluetooth is disabled.



Attachment 33 (Google Maps Not Updating Location) at 4.

Claim 1	Corresponding Structure in Accused Systems



	DESCRIPTION	OPT-IN / OPT-OUT	USER CHOICES
LOCATION SERVICES	"**Use Google's location service to help apps** determine your location. Anonymous location data will be sent to Google when your device is on."	Opt-Out	"YES, I'M IN" or "SKIP"
LOCATION ACCURACY	**Three Modes** - "High accuracy", "Battery saving", and "Device only." **Default setting:** "High accuracy use[s] GPS, Wi-Fi, Bluetooth, or cellular networks to determine location"	Opt-Out	Toggle icon (right and colored for on, left and gray for off). This setting not shown during Android set-up.
LOCATION SCANNING	"**Improve location accuracy** by allowing apps and services to scan for Wi-Fi and Bluetooth, even when those settings are off."	Opt-Out	Toggle icon (right and colored for on, left and gray for off).
LOCATION HISTORY	"[A]llows Google to store a history of your location data from all devices where you are logged into your Google Account and have enabled Location Reporting. Location History and Location Reporting data may be used by any Google app or service."	Opt-Out	"YES, I'M IN" or "NO THANKS" In the context of "Give your new Assistant permission to help you"

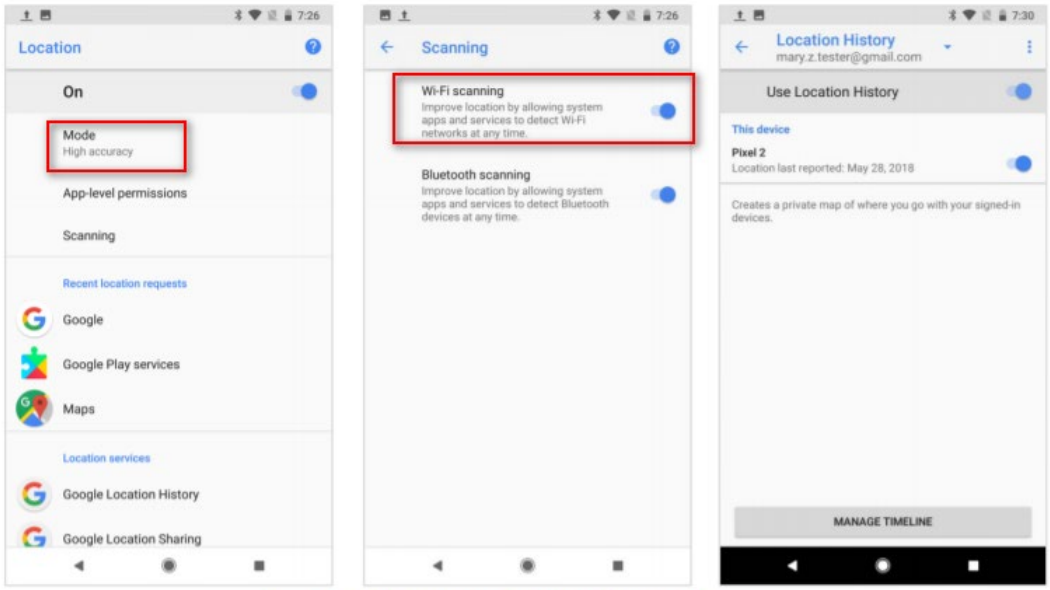
Figure 1: Four Android settings and services that relate to location information collection. [1]

Google Location Services

Google Location Services (GLS) operate at a device level and rely on sensors such as GPS, Wi-Fi, the cellular radio, and other technologies included in mobile devices to position a user in the world. If a user keeps the default settings prompted by Google, Location Services is enabled, Location Accuracy will be set to "High Accuracy" [2] and Location Scanning will be enabled for both Wi-Fi base stations and Bluetooth Beacons, regardless of a user's choice to turn Wi-Fi or Bluetooth on. The implications of user choices among the various Location Services settings are significant, but not intuitive, including:

- With Location Services turned on, Location Accuracy set to "Device only" and Location Scanning turned off, an Android device will only use GPS to provide the location of an Android device.
- When Location Accuracy is set to "High accuracy" and Location Scanning is enabled (the default setting for new device setup), an Android device will use sources including Wi-Fi, Bluetooth, and cellular radio to improve the accuracy of the device's position.

Attachment 38 (Google, Android and Location Tracking) at 2.

Claim 1	Corresponding Structure in Accused Systems
	After completing the setup process users can validate and control settings for device location via the Settings app and navigating to Google settings, then Location (Figure 4).  Figure 4: Location settings after Android device setup process As demonstrated in Figure 4, if users accept Google's defaults during the setup process, the Android device is configured with Location Services enabled, Wi-Fi and Bluetooth scanning engaged, and Location History active. **Attachment 38 (Google, Android and Location Tracking) at 5.**

Claim 1	Corresponding Structure in Accused Systems

Users can choose to disable GLS during the set-up process. However, if a user attempts to disable GLS, a warning dialogue box prompts an extreme scenario: "device location for all apps is turned off and you may not be able to locate your device if it is lost." (Figure 5) Note as well, the action prompt is to "Turn on Location" – reversing the user choice triggering the warning. Further, as described immediately below, many Google and third party apps will not function unless GLS is turned on. Therefore, Google forces user into an impossible ultimatum, have their every move constantly monitored, tracked, and stored or lose the functionality of their expensive smartphone.

If a user disables Location Services but then attempts to use a location aware app or service on their device, she will see the dialogue box shown in Figure 6. If the user clicks "OK" the service is enabled for the entire device and permanently, rather than enabling Location Services only for that particular app or service requesting the functionality.

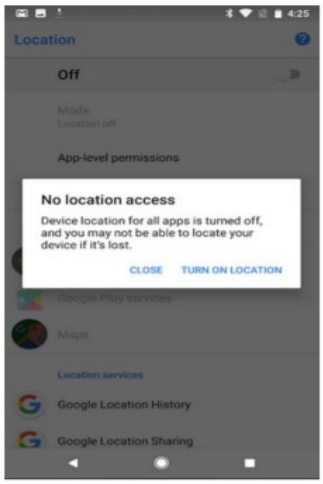


Figure 5: Location Services Warning

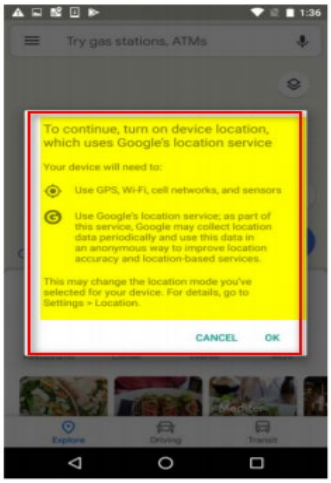


Figure 6: Re-Enable Location Services

Attachment 38 (Google, Android and Location Tracking) at 6.

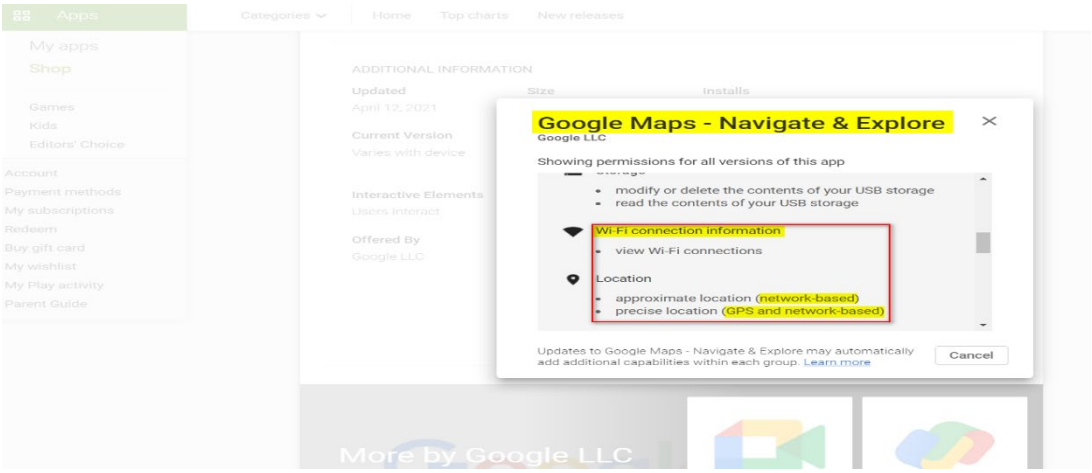
We collect information about your location when you use our services, which helps us offer features like driving directions for your weekend getaway or showtimes for movies playing near you.

Your location can be determined with varying degrees of accuracy by:

- GPS
- IP address
- Sensor data from your device
- Information about things near your device, such as Wi-Fi access points, cell towers, and Bluetooth-enabled devices

The types of location data we collect depend in part on your device and account settings. For example, you can turn your Android device's location on or off using the device's settings app. You can also turn on Location History if you want to create a private map of where you go with your signed-in devices.

Attachment 29 (Google Privacy Policy) at 4.

Claim 1	Corresponding Structure in Accused Systems
	 **Attachment 39 (Google Map_Permissions) at 1.**

27.

28. Defendant makes, uses, offers to sell, and/or sells within or imports into the U.S., wireless-network components and related applications and programs, and related services that use identified locations of wireless devices to provide tracking such that Defendant infringes claims 1–24 of the ’147 patent, literally or under the doctrine of equivalents.

29. Defendant put the inventions claimed by the ’147 Patent into service (i.e., used them); but for Defendant’s actions, the claimed-inventions embodiments involving Defendant’s products and services would never have been put into service. Defendant’s acts complained of herein caused those claimed-invention embodiments as a whole to perform, and Defendant obtaining monetary and commercial benefit from it.

30. Defendant has and continues to induce infringement. Defendants have actively encouraged or instructed others (e.g., its customers, such as Verizon, T-Mobile and Sprint), and continues to do so, on how to use its products and services (e.g., wireless-network components and related applications and programs that use identified locations of wireless devices to provide tracking of mobile devices) such to cause infringement claims 1–24 of the ’147 patent, literally or under the doctrine of equivalents. Moreover, Defendant has known and should have known of the ’147 patent, by at least by the date of the patent’s issuance, or from the issuance of the ‘284 patent, which followed the date that the patent’s underlying application was cited to Defendants by the U.S. Patent and Trademark Office during prosecution of one of Defendant’s patent applications, such that Defendant knew and should have known that it was and would be inducing infringement.

31. Defendant has and continues to contributorily infringe. Defendant has actively encouraged

or instructed others (e.g., its customers and/or the customers of its related companies, such as Verizon, T-Mobile and Sprint), and continues to do so, on how to use its products and services e.g., wireless-network components and related applications and programs that use identified locations of wireless devices to provide tracking of mobile devices) such as to cause infringement of one or more of claims 1–24 of the '147 patent, literally or under the doctrine of equivalents. Moreover, Defendant has known of the '147 patent and the technology underlying it from at least the date of issuance of the patent or from the issuance of the '284 patent, which followed the date that the patent's underlying application was cited to Defendants by the U.S. Patent and Trademark Office during prosecution of one of Defendant's patent applications, such that Defendant knew and should have known that it was and would be contributorily infringing.

32. Defendants have caused and will continue to cause Traxcell damage by infringing the '147 patent.

VI. PRAYER FOR RELIEF

WHEREFORE, Traxcell respectfully requests that this Court:

i. enter judgment that Defendants have infringed the Patents-in-Suit;

ii. award Traxcell damages in an amount sufficient to compensate it for Defendants' infringement of the Patents-in-Suit, in an amount no less than a reasonable royalty, together with prejudgment and post-judgment interest and costs under 35 U.S.C. § 284;

iii. award Traxcell an accounting for acts of infringement not presented at trial and an award by the Court of additional damage for any such acts of infringement;

iv. declare this case to be "exceptional" under 35 U.S.C. § 285 and award Traxcell its attorneys' fees, expenses, and costs incurred in this action;

v. declare Defendants infringement to be willful and treble the damages, including attorneys'

fees, expenses, and costs incurred in this action and an increase in the damage award pursuant to 35 U.S.C. §284;

vi. a decree addressing future infringement that either (i) awards a permanent injunction enjoining Defendants and their agents, servants, employees, affiliates, divisions, and subsidiaries, and those in association with Defendants, from infringing the claims of the Patents-in-Suit or (ii) award damages for future infringement in lieu of an injunction, in an amount consistent with the fact that for future infringement the Defendants will be adjudicated infringers of a valid patent, and trebles that amount in view of the fact that the future infringement will be willful as a matter of law; and,

vii. award Traxcell such other and further relief as this Court deems just and proper.

JURY DEMAND

Traxcell hereby requests a trial by jury on issues so triable by right.

Respectfully submitted,

Ramey & Schwaller, LLP

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