

U.S. Patent No. 8,170,583 (“’583 Patent”)

Accused Instrumentalities

Samsung products, including without limitation Galaxy SmartTag devices, including, but not limited to the SmartTag, SmartTag+, and all variations or iterations thereof; Galaxy Tab tablet devices, including, but not limited to the S9, S9+, S9 Ultra, S8, S8+, S8 Ultra, S6 Lite 2022, S7 FE, S6 Lite, S6 5G, S7+ 5G, S7+, S7 5G, S7, S5e, S6, S4, S3, and all variations or iterations thereof; Galaxy mobile phone devices, including, but not limited to the S8, S8+, S8 Active, S9, S9+, S10, S10+, S10 5G, S10 Lite, S10e, S20, S20+, S20+ BTS Edition, S20 Ultra, S20 FE, S20, S21, S21+, S21 Ultra, S21 FE, S22, S22+, S22 Ultra, S23, S23+, S23 Ultra, Z Fold 5, Z Fold 4, Z Fold 3, Z Fold 2, Fold, Z Flip 5, Z Flip 4, Z Flip 3, Z Flip, A3, A5, A6, A6+, A7, A8, A8+, A8 Star, A9, A2 Core, A10e, A10, A10s, A20, A20s, A30, A30s, A40, A40s, A50, A50s, A60, A70, A70s, A80, A90, A01 Core, A01, A11, A21, A21s, A31, A41, A51, A71, A51 5G, A71 5G, A52s 5G, A73 5G, A23 5G, A02, A02s, A12, A22, A22 5G, A32, A32 5G, A42 5G, A52, A52 5G, A52s 5G, A72, A03 Core, A03, A03s, A13, A13 5G, A23, A23 5G, A33 5G, A53 5G, A73 5G, A04e, A04, A04s, A14, A14 5G, A24, A34 5G, A54 5G, Note 8, Note 9, Note 10, Note 10+, Note 10 Lite, Note 20, Note 20 Ultra, and all variations or iterations thereof (“Accused Products”), infringe at least Claims 1-10, 17-19, 20, and 24-26 of the ’583 Patent.

Each Accused Product infringes the claims in substantially the same way, and the evidence shown in this chart is similarly applicable to each Accused Product. Each claim limitation is literally infringed by each Accused Product. However, to the extent any claim limitation is not met literally, it is nonetheless met under the doctrine of equivalents because the differences between the claim limitation and each Accused Product would be insubstantial, and each Accused Product performs substantially the same function, in substantially the same way, to achieve the same result as the claimed invention. Notably, Samsung has not yet articulated which, if any, particular claim limitations it believes are not met by the Accused Products.

Claim 1

Claim 1	Accused Products
[1pre]. A signal-comparison based location-determining method, operable by a first portable RF communications device in conjunction with a plurality of fixed-location service-area antenna stations capable of RF communication with the first portable RF communications device	To the extent the preamble is limiting, each Accused Product performs a signal-comparison based location-determining method, operable by a first portable RF communications device in conjunction with a plurality of fixed-location service-area antenna stations capable of RF communication with the first portable RF communications device wherein the antenna stations are substantially continuously operating. For example, the Galaxy S22 contains both cellular and Wi-Fi radios, and associated antennas, which are used to determine the geographic location of the phone as described below.

Claim 1	Accused Products
wherein the antenna stations are substantially continuously operating, the method comprising:	See, e.g.: Samsung Galaxy S22 5G  <

Claim 1	Accused Products			
	NETWORK	Technology	GSM / CDMA / HSPA / EVDO / LTE / 5G COLLAPSE ▲	
		2G bands	GSM 850 / 900 / 1800 / 1900 - SIM 1 & SIM 2 (Dual SIM model only) CDMA 800 / 1900 & TD-SCDMA	
		3G bands	HSDPA 850 / 900 / 1700(AWS) / 1900 / 2100 CDMA2000 1xEV-DO	
		4G bands	1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28, 32, 38, 39, 40, 41, 66 - International 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 18, 19, 20, 25, 26, 28, 29, 30, 38, 39, 40, 41, 46, 48, 66, 71 - USA	
		5G bands	1, 2, 3, 5, 7, 8, 12, 20, 25, 28, 38, 40, 41, 66, 75, 77, 78 SA/NSA/Sub6 - International 1, 3, 5, 7, 8, 20, 28, 38, 41, 66, 71, 260, 261 SA/NSA/Sub6/mmWave - USA	
		Speed	HSPA 42.2/5.76 Mbps, LTE-A (7CA) Cat20 2000/200 Mbps, 5G (5+ Gbps DL)	
		PLATFORM	OS	Android 12, One UI 4.1.1
			Chipset	Exynos 2200 (4 nm) - Europe Qualcomm SM8450 Snapdragon 8 Gen 1 (4 nm) - ROW
	CPU		Octa-core (1x2.8 GHz Cortex-X2 & 3x2.50 GHz Cortex-A710 & 4x1.8 GHz Cortex-A510) - Europe Octa-core (1x3.00 GHz Cortex-X2 & 3x2.50 GHz Cortex-A710 & 4x1.80 GHz Cortex-A510) - ROW	
	GPU		Xclipse 920 - Europe Adreno 730 - ROW	
	COMMS		WLAN	Wi-Fi 802.11 a/b/g/n/ac/6, dual-band, Wi-Fi Direct, hotspot
		Bluetooth	5.2, A2DP, LE	
		GPS	Yes, with A-GPS, GLONASS, BDS, GALILEO	
		NFC	Yes	
		Radio	No	
		USB	USB Type-C 3.2, USB On-The-Go	
	https://www.gsmarena.com/samsung_galaxy_s22_5g-11253.php			

Claim 1	Accused Products
	 Find My Mobile Lost your phone? Don't panic. Find My Mobile will help you locate your phone or tablet and protect your data. You can even use it to unlock if you forget your pattern, PIN, or password. <i>*To use this service, you must be signed in to your Samsung account on your device.</i> https://findmymobile.samsung.com/ Find My Mobile Because many of us live a significant part of our lives through our Galaxy phones, Find My Mobile has become a necessary precaution. Use the Locate My Device function when you can't find your phone. When it's lost for sure, you have the option to remotely lock your device, block access to Samsung Pay, and even delete Samsung Pay or simply wipe data from the entire device. Requirements * To use the 'Find My Mobile' service, 1) You must have set up your Samsung account on your device. 2) You allow Google to collect your location information and agree to the 'Use wireless networks' term and conditions. https://www.samsung.com/us/support/owners/app/find-my-mobile

Claim 1	Accused Products
	How does Google know my location? Depending on the products you're using and settings you choose, you may provide Google with different types of location information that are critical to making some services work and making others more useful for you. Location can come from real-time signals, like your IP address or device location, and also your past activity on Google sites and services, to tailor experiences for your context. Below are the primary ways we may get information about your location. https://policies.google.com/technologies/location-data?hl=en-US

Claim 1	Accused Products
	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 https://policies.google.com/technologies/location-data?hl=en-US

Claim 1	Accused Products
	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 https://policies.google.com/technologies/location-data?hl=en-US
[1a] (a) the first portable RF communications device monitoring its location by (i)	In each Accused Product, the first portable RF communications device monitors its location by (i) receiving communications signals from a first plurality of the antenna stations, (ii) identifying at least one ID within at least one of the received communications signals, and (iii) measuring the

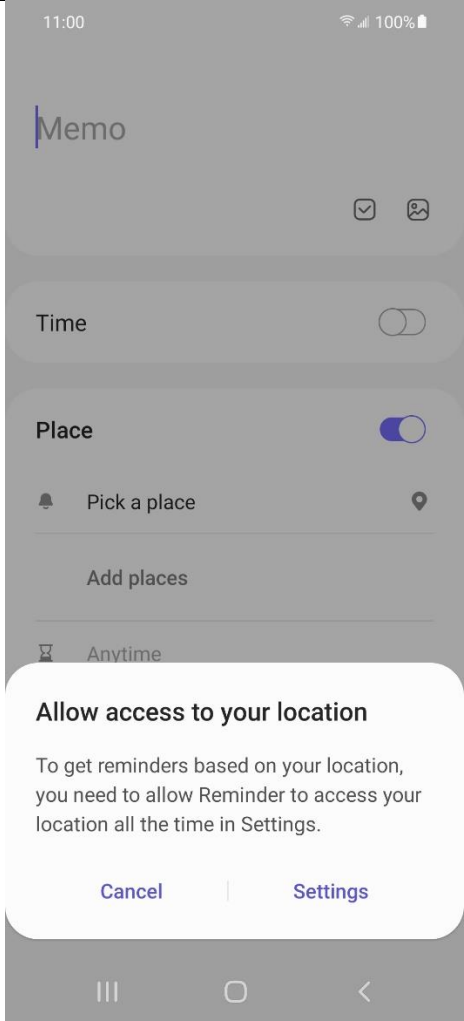
Claim 1	Accused Products
receiving communications signals from a first plurality of the antenna stations, (ii) identifying at least one ID within at least one of the received communications signals, and (iii) measuring the signal strengths associated with a received communications signal from the first plurality of antenna stations; and	signal strengths associated with a received communications signal from the first plurality of antenna stations. For example, the Galaxy S22 receives communication signals from a plurality of Wi-Fi network stations and/or a plurality of mobile network stations, each of which is generally in a fixed location and operating continuously (Wi-Fi access point, cell phone tower, etc.). By determining signal strengths and other factors, the device can determine its location. <i>See, e.g.:</i> Lost your phone? Don't panic. Find My Mobile will help you locate your phone or tablet and protect your data. You can even use it to unlock if you forget your pattern, PIN, or password. *To use this service, you must be signed in to your Samsung account on your device. https://findmymobile.samsung.com/ Find My Mobile Because many of us live a significant part of our lives through our Galaxy phones, Find My Mobile has become a necessary precaution. Use the Locate My Device function when you can't find your phone. When it's lost for sure, you have the option to remotely lock your device, block access to Samsung Pay, and even delete Samsung Pay or simply wipe data from the entire device. Requirements * To use the 'Find My Mobile' service, 1) You must have set up your Samsung account on your device. 2) You allow Google to collect your location information and agree to the 'Use wireless networks' term and conditions. https://www.samsung.com/us/support/owners/app/find-my-mobile

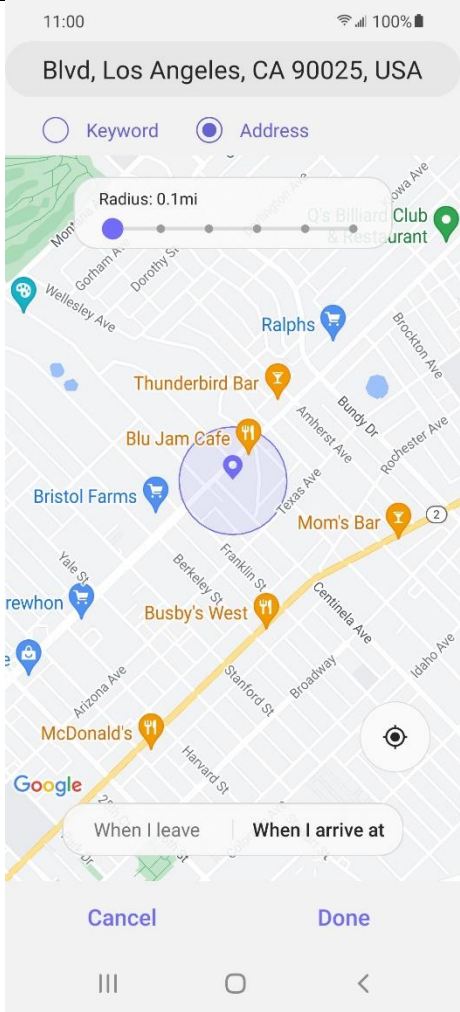
Claim 1	Accused Products
	How does Google know my location? Depending on the products you're using and settings you choose, you may provide Google with different types of location information that are critical to making some services work and making others more useful for you. Location can come from real-time signals, like your IP address or device location, and also your past activity on Google sites and services, to tailor experiences for your context. Below are the primary ways we may get information about your location. https://policies.google.com/technologies/location-data?hl=en-US

Claim 1	Accused Products
	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 https://policies.google.com/technologies/location-data?hl=en-US

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[1b] (b) the first portable RF communication device determining if a monitored	Each Accused Product determines if a monitored location is within proximity of a location chosen by a user of the first portable RF communication device, as a result of (i) electronically comparing the at least one ID and at least one figure based on the signal strengths of the first plurality of

Claim 1	Accused Products
location is within proximity of a location chosen by a user of the first portable RF communication device, as a result of (i) electronically comparing the at least one ID and at least one figure based on the signal strengths of the first plurality of antenna stations at the monitored location with the at least one ID and the at least one figure based on signal strengths of the first plurality of antenna stations at the location chosen by the user, and (ii) determining if the difference between the signal strengths measured at the monitored location and the signal strengths at the location chosen by the user is less than a predetermined threshold.	antenna stations at the monitored location with the at least one ID and the at least one figure based on signal strengths of the first plurality of antenna stations at the location chosen by the user, and (ii) determining if the difference between the signal strengths measured at the monitored location and the signal strengths at the location chosen by the user is less than a predetermined threshold. For example, using the Samsung Reminder app included with the Galaxy S22, a user can specify a location by creating a location-based reminder. This functionality uses the Google Location Services functionality, as shown by the necessity of providing Location permissions to the Reminder app. The phone then uses signal strength and other network information from nearby Wi-Fi and/or mobile communications signals, based on antennas identified as being within range of the specified location, to determine whether or not the phone is in the same location as the location chosen by the user. Similar reminders can also be created through Samsung's Bixby service. For another example, Samsung's SmartThings Find, Search Nearby, and/or Find My systems, when used on a Galaxy S22 or other Samsung Accused Product, enable locating, and navigating to the location of, a user's SmartTag, SmartThings, and/or Android devices. On information and belief, these processes use the same or similar techniques as described in other Samsung and Google documentation, including comparing varying signal characteristics in order to determine if the Accused Product is within proximity of the chosen location. <i>See, e.g.:</i>

Claim 1	Accused Products
	 The screenshot shows the Samsung Reminder app interface. At the top, the status bar displays 11:00, signal strength, and 100% battery. The app has a 'Memo' field with a blue cursor. Below it are icons for a checklist and a location pin. The 'Time' setting is turned off. The 'Place' setting is turned on, with a 'Pick a place' button and a location pin icon. Below that is an 'Add places' button. At the bottom, there is an 'Anytime' option with a clock icon. A white dialog box is overlaid on the screen with the title 'Allow access to your location'. The text inside says: 'To get reminders based on your location, you need to allow Reminder to access your location all the time in Settings.' At the bottom of the dialog are two buttons: 'Cancel' and 'Settings'. Screenshot from Samsung Reminder app showing that the app uses Google Services based location determination.

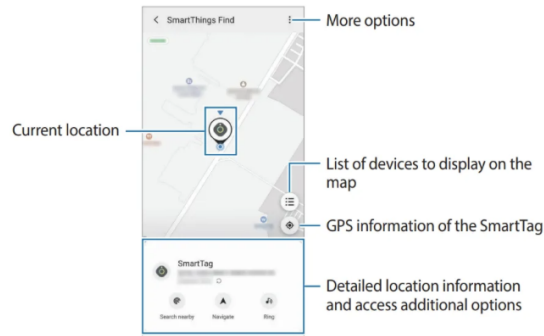
Claim 1	Accused Products
	 Screenshot from Samsung Reminder app showing selection of location for notification.

Claim 1	Accused Products
	The image is a screenshot of an Android phone's home screen. At the top, there is a notification bar with a blue bell icon, the word 'Demonstration', and the text 'Arriving: 12424 Wilshire Blv...'. Below the notification, the status bar shows the time '11:00', signal strength, and '100%' battery. The background is a dark blue and green abstract pattern. In the center, there is a weather widget showing a sun and cloud icon with the text 'Tap for weather info'. Below the widget is a Google search bar with the Google logo, a microphone icon, and a camera icon. Under the search bar are four app icons: 'Galaxy Store' (pink shopping bag), 'Play Store' (white triangle on a blue background), 'Google' (a grid of colorful icons), and 'Microsoft' (a grey rounded square). At the bottom are four more app icons: 'Phone' (green), 'Messages' (blue), 'Chrome' (multi-colored circle), and 'Camera' (pink). The very bottom shows the Android navigation bar with three icons: a square, a circle, and a triangle. Screenshot showing, at top, notification from Samsung Reminder app that the phone is in the same location as specified by the user.

Claim 1	Accused Products
	Get reminded. When you create a new reminder with Bixby, you can set a specific time and location for delivery, so you'll get it when you need it.  https://www.samsung.com/global/galaxy/apps/bixby/reminder/

Claim 1	Accused Products
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Claim 1	Accused Products
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Claim 1	Accused Products
	tablet that is registered to use SmartThings Find and can relay the location of a Galaxy SmartTag to the tag's owner. https://9to5google.com/2022/07/13/samsung-smarththings-find-users/ Using the SmartTag Viewing a SmartTag's location You can remotely view your SmartTag's location from the SmartThings app on your mobile device and find its location by triggering a notification sound on the SmartTag. 1. Launch the SmartThings app on your mobile device. 2. Tap on your SmartTag card and tap View map. Alternatively, tap SmartThings Find. The current location of the device will be displayed on the map.  • The location of the SmartTag is based on GPS and Wi-Fi positioning results of the mobile device connected to the SmartTag or the nearby Android mobile device, which may have some errors due to things like the surrounding environment or GPS failure • If the current location of the SmartTag does not appear, the SmartTag's battery has been discharged or has not been discovered by an Android mobile device that can check the SmartTag's location information. Activate the related feature to get notifications of the SmartTag's location information. • The SmartTag's usage time may vary depending on the user's environment and the usage pattern. • The Ultra-Wideband (UWB) feature may not be available depending on the region. 

Claim 1	Accused Products
	1. Launch the SmartThings app on your mobile device. 2. Tap SmartThings → Find Navigate. <u>Directions to the place where the SmartTag is located will begin.</u>  If a supported navigation app is not installed on your mobile device, install the desired app from the list of supported navigation apps first and get directions. Searching for the SmartTag location by signal strength You can find the SmartTag's location by detecting its signal strength. 1. Launch the SmartThings app on your mobile device. 2. Tap SmartThings Find Search nearby. The signal screen of the SmartTag you are looking for will appear. The closer you are to the location of the SmartTag you are looking for, the stronger the signal strength indicated on the screen will be. https://manuals.plus/samsung/galaxy-smarttagmarttag-manual#axzz7g8yWgeln

Claim 2

Claim 2	Accused Products
2. The method of claim 1 wherein the chosen location signal strengths were measured by the first portable RF communication device.	Each Accused Product performs the method of claim 1 wherein the chosen location signal strengths were measured by the first portable RF communication device. For example, the geolocation system in each Accused Product includes periodic collection of location information from the first portable RF communication device. <i>See, e.g.:</i> To provide this more accurate location, when turned on, GLA periodically collects location information from your Android device—including GPS and information about Wi-Fi access points, mobile networks and device sensors—using a temporary rotating device identifier that is

Claim 2	Accused Products
	not associated with any specific person. GLA uses this information to improve location accuracy and provide location-based services, including by building crowdsourced maps of Wi-Fi access points and mobile network towers. Source: https://policies.google.com/technologies/location-data?hl=en-US <pre> { "cellTowers": [{ "cellId": 170402199, "locationAreaCode": 35632, "mobileCountryCode": 310, "mobileNetworkCode": 410, "age": 0, "signalStrength": -60, "timingAdvance": 15 }] } { "macAddress": "9c:1c:12:b0:45:f1", "signalStrength": -43, "signalToNoiseRatio": 0, "channel": 11, "age": 0 } </pre> Source: https://developers.google.com/maps/documentation/geolocation/requests-geolocation#cell_tower_object

Claim 2	Accused Products			
	Field	JSON type	Description	Notes
	macAddress	string	The MAC address of the WiFi node. It's typically called a BSS, BSSID or MAC address.	Required.Colon-separated (:) hexadecimal string. Only universally-administered MAC addresses ☒ can be located via the API. Other MAC addresses are silently dropped and may lead to an API request becoming effectively empty. For details, see Dropping useless Wifi access points .
	signalStrength	number (double)	The current signal strength measured in dBm.	For WiFi access points, dBm values are typically -35 or lower and range from -128 to -10 dBm. Be sure to include the minus sign.
Source: https://developers.google.com/maps/documentation/geolocation/requests-geolocation#cell_tower_object				

Claim 3

Claim 3	Accused Products
3. The method of claim 1 wherein the chosen location signal strengths were measured by a second portable RF communication device, different from the first portable RF communication device.	Each Accused Product performs the method of claim 1 wherein the chosen location signal strengths were measured by a second portable RF communication device, different from the first portable RF communication device. For example, the geolocation system in each Accused Product includes periodic collection of location information from the other (“crowdsourced”) communication devices. <i>See, e.g.:</i> To provide this more accurate location, when turned on, GLA periodically collects location information from your Android device—including GPS and information about Wi-Fi access points, mobile networks and device sensors—using a temporary rotating device identifier that is not associated with any specific person. GLA uses this information to improve location accuracy and provide location-based services, including by building crowdsourced maps of Wi-Fi access points and mobile network towers. Source: https://policies.google.com/technologies/location-data?hl=en-US

Claim 3	Accused Products												
	<pre>{ "cellTowers": [{ "cellId": 170402199, "locationAreaCode": 35632, "mobileCountryCode": 310, "mobileNetworkCode": 410, "age": 0, "signalStrength": -60, "timingAdvance": 15 }] } { "macAddress": "9c:1c:12:b0:45:f1", "signalStrength": -43, "signalToNoiseRatio": 0, "channel": 11, "age": 0 }</pre> Source: https://developers.google.com/maps/documentation/geolocation/requests-geolocation#cell_tower_object <table><tr><th>Field</th><th>JSON type</th><th>Description</th><th>Notes</th></tr><tr><td>macAddress</td><td>string</td><td>The MAC address of the WiFi node. It's typically called a BSS, BSSID or MAC address.</td><td><i>Required.</i> Colon-separated (:) hexadecimal string. Only universally-administered MAC addresses ↗ can be located via the API. Other MAC addresses are silently dropped and may lead to an API request becoming effectively empty. For details, see Dropping useless Wifi access points.</td></tr><tr><td>signalStrength</td><td>number (double)</td><td>The current signal strength measured in dBm.</td><td>For WiFi access points, dBm values are typically -35 or lower and range from -128 to -10 dBm. Be sure to include the minus sign.</td></tr></table> Source: https://developers.google.com/maps/documentation/geolocation/requests-geolocation#cell_tower_object	Field	JSON type	Description	Notes	macAddress	string	The MAC address of the WiFi node. It's typically called a BSS, BSSID or MAC address.	<i>Required.</i> Colon-separated (:) hexadecimal string. Only universally-administered MAC addresses ↗ can be located via the API. Other MAC addresses are silently dropped and may lead to an API request becoming effectively empty. For details, see Dropping useless Wifi access points .	signalStrength	number (double)	The current signal strength measured in dBm.	For WiFi access points, dBm values are typically -35 or lower and range from -128 to -10 dBm. Be sure to include the minus sign.
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signalStrength	number (double)	The current signal strength measured in dBm.	For WiFi access points, dBm values are typically -35 or lower and range from -128 to -10 dBm. Be sure to include the minus sign.										

Claim 4

Claim 4	Accused Products
4. The method of claim 1 wherein the chosen location signal strengths and at least one ID originated from a database of geographic locations and corresponding signal strengths and IDs.	Each Accused Product performs the method of claim 1 wherein the chosen location signal strengths and at least one ID originated from a database of geographic locations and corresponding signal strengths and IDs. For example, the geolocation system in each Accused Product uses “crowdsourced maps of Wi-Fi access points and mobile network towers” to determine the chosen location signal strengths and IDs. This database contains, for example, MAC addresses and signal strengths. <i>See, e.g.:</i> To provide this more accurate location, when turned on, GLA periodically collects location information from your Android device—including GPS and information about Wi-Fi access points, mobile networks and device sensors—using a temporary rotating device identifier that is not associated with any specific person. GLA uses this information to improve location accuracy and provide location-based services, including by building crowdsourced maps of Wi-Fi access points and mobile network towers. Source: https://policies.google.com/technologies/location-data?hl=en-US <pre>{ "cellTowers": [{ "cellId": 170402199, "locationAreaCode": 35632, "mobileCountryCode": 310, "mobileNetworkCode": 410, "age": 0, "signalStrength": -60, "timingAdvance": 15 }] }</pre>

Claim 4	Accused Products												
	<pre>{ "macAddress": "9c:1c:12:b0:45:f1", "signalStrength": -43, "signalToNoiseRatio": 0, "channel": 11, "age": 0 }</pre> Source: https://developers.google.com/maps/documentation/geolocation/requests-geolocation#cell_tower_object <table><tr><th>Field</th><th>JSON type</th><th>Description</th><th>Notes</th></tr><tr><td>macAddress</td><td>string</td><td>The MAC address of the WiFi node. It's typically called a BSS, BSSID or MAC address.</td><td><i>Required.</i> Colon-separated (:) hexadecimal string. Only universally-administered MAC addresses ↗ can be located via the API. Other MAC addresses are silently dropped and may lead to an API request becoming effectively empty. For details, see Dropping useless Wifi access points.</td></tr><tr><td>signalStrength</td><td>number (double)</td><td>The current signal strength measured in dBm.</td><td>For WiFi access points, dBm values are typically -35 or lower and range from -128 to -10 dBm. Be sure to include the minus sign.</td></tr></table> Source: https://developers.google.com/maps/documentation/geolocation/requests-geolocation#cell_tower_object	Field	JSON type	Description	Notes	macAddress	string	The MAC address of the WiFi node. It's typically called a BSS, BSSID or MAC address.	<i>Required.</i> Colon-separated (:) hexadecimal string. Only universally-administered MAC addresses ↗ can be located via the API. Other MAC addresses are silently dropped and may lead to an API request becoming effectively empty. For details, see Dropping useless Wifi access points .	signalStrength	number (double)	The current signal strength measured in dBm.	For WiFi access points, dBm values are typically -35 or lower and range from -128 to -10 dBm. Be sure to include the minus sign.
Field	JSON type	Description	Notes										
macAddress	string	The MAC address of the WiFi node. It's typically called a BSS, BSSID or MAC address.	<i>Required.</i> Colon-separated (:) hexadecimal string. Only universally-administered MAC addresses ↗ can be located via the API. Other MAC addresses are silently dropped and may lead to an API request becoming effectively empty. For details, see Dropping useless Wifi access points .										
signalStrength	number (double)	The current signal strength measured in dBm.	For WiFi access points, dBm values are typically -35 or lower and range from -128 to -10 dBm. Be sure to include the minus sign.										

Claim 5

Claim 5	Accused Products
5. The method of claim 4 wherein the database is stored remotely, and not on the first portable RF communication device.	Each Accused Product performs the method of claim 4 wherein the database is stored remotely, and not on the first portable RF communication device. For example, each Accused Product uses an HTTPS connection with a remote server to access the database.

Claim 5	Accused Products
	<i>See, e.g.:</i> The Geolocation API is a service that accepts an HTTPS request with the cell tower and WiFi access points that a mobile client can detect. Source: https://developers.google.com/maps/documentation/geolocation/overview

Claim 6

Claim 6	Accused Products
6. The method of claim 5 wherein the database is built by a service provider.	Each Accused Product performs the method of claim 4 wherein the database is built by a service provider. For example, the claimed database is built by a service provider associated with Google. <i>See, e.g.:</i> The Geolocation API is a service that accepts an HTTPS request with the cell tower and Wi-Fi access points that a mobile client can detect. Source: https://developers.google.com/maps/documentation/geolocation/overview Google Maps Platform web services are an interface for requesting Maps API data from external services and using the data within your Maps applications. These services are designed to be used in conjunction with a map, as per the License Restrictions in the Google Maps Platform Terms of Service. Geolocation requests are sent using POST to the following URL: https://www.googleapis.com/geolocation/v1/geolocate?key=YOUR_API_KEY Source: https://developers.google.com/maps/documentation/geolocation/web-service-best-practices

Claim 7

Claim 7	Accused Products
7. The method of claim 4 wherein the database is built based on multiple locations, where for each location, GPS measurements and signal strength measurements are performed and the IDs of nearby antenna stations of the plurality of antenna stations are recognized.	Each Accused Product performs the method of claim 4 wherein the database is built based on multiple locations, where for each location, GPS measurements and signal strength measurements are performed and the IDs of nearby antenna stations of the plurality of antenna stations are recognized. For example, each Accused Product uses a database built using periodic location information including both GPS measurements and Wi-Fi/mobile access station signal strength measurements, including the IDs of nearby Wi-Fi/mobile access stations. <i>See, e.g.:</i> To provide this more accurate location, when turned on, GLA periodically collects location information from your Android device—including GPS and information about Wi-Fi access points, mobile networks and device sensors—using a temporary rotating device identifier that is not associated with any specific person. GLA uses this information to improve location accuracy and provide location-based services, including by building crowdsourced maps of Wi-Fi access points and mobile network towers. Source: https://policies.google.com/technologies/location-data?hl=en-US <pre>{ "cellTowers": [{ "cellId": 170402199, "locationAreaCode": 35632, "mobileCountryCode": 310, "mobileNetworkCode": 410, "age": 0, "signalStrength": -60, "timingAdvance": 15 }] }</pre> <pre>{ "macAddress": "9c:1c:12:b0:45:f1",</pre>

Claim 7	Accused Products
	<pre>"signalStrength": -43, "signalToNoiseRatio": 0, "channel": 11, "age": 0 }</pre> Source: https://developers.google.com/maps/documentation/geolocation/requests-geolocation#cell_tower_object

Claim 8

Claim 8	Accused Products
8. The method of claim 7 wherein at least for some of the locations, signal strength measurements are taken at different times.	Each Accused Product performs the method of claim 7 wherein at least for some of the locations, signal strength measurements are taken at different times. For example, the database is based on periodic collection of location information, which includes multiple measurements of the same location at different times. <i>See claim 7 above. See also, e.g.:</i> To provide this more accurate location, when turned on, GLA periodically collects location information from your Android device—including GPS and information about Wi-Fi access points, mobile networks and device sensors. https://policies.google.com/technologies/location-data?hl=en-US

Claim 9

Claim 9	Accused Products
9. The method of claim 7 wherein the signal strength measurements are taken using a portable RF communication device.	Each Accused Product performs the method of claim 7 wherein the signal strength measurements are taken using a portable RF communication device. For example, the database is based on periodic measurements from the user's own device. <i>See claim 7 above. See also, e.g.:</i> To provide this more accurate location, when turned on, GLA periodically collects location information from your Android device—including GPS and information about Wi-Fi access points, mobile networks and device sensors. https://policies.google.com/technologies/location-data?hl=en-US

Claim 10

Claim 10	Accused Products
10. The method of claim 9 wherein the signal strength measurements or calculation results made using the signal strength measurements, along with the antenna station IDs, are sent by the portable RF communication device to a server responsible for building the database of geographic locations and corresponding signal strengths and antenna stations IDs.	Each Accused Product performs the method of claim 9 wherein the signal strength measurements or calculation results made using the signal strength measurements, along with the antenna station IDs, are sent by the portable RF communication device to a server responsible for building the database of geographic locations and corresponding signal strengths and antenna stations IDs. For example, each Accused Product sends signal strength measurements and associated calculation results to a server using HTTPS for building the database. <i>See, e.g.:</i> The Geolocation API is a service that accepts an HTTPS request with the cell tower and WiFi access points that a mobile client can detect. <pre>{ "cellTowers": [{ "cellId": 170402199, "locationAreaCode": 35632,</pre>

Claim 10	Accused Products
	<pre> "mobileCountryCode": 310, "mobileNetworkCode": 410, "age": 0, "signalStrength": -60, "timingAdvance": 15 }] } { "macAddress": "9c:1c:12:b0:45:f1", "signalStrength": -43, "signalToNoiseRatio": 0, "channel": 11, "age": 0 } </pre> Source: https://developers.google.com/maps/documentation/geolocation/requests-geolocation#cell_tower_object Google Maps Platform web services are an interface for requesting Maps API data from external services and using the data within your Maps applications. These services are designed to be used in conjunction with a map, as per the License Restrictions in the Google Maps Platform Terms of Service. Geolocation requests are sent using POST to the following URL: https://www.googleapis.com/geolocation/v1/geolocate?key=YOUR_API_KEY Source: https://developers.google.com/maps/documentation/geolocation/web-service-best-practices

Claim 17

Claim 18	Accused Products
17. The method of claim 1 wherein the monitoring step comprises ‘low accuracy monitoring’ and ‘high accuracy monitoring’. 19. The method of claim 18 wherein ‘high accuracy monitoring’ takes place only if the current location IDs are determined to match the chosen location IDs in the ‘low accuracy monitoring’ step.	Each Accused Product performs the method of claim 1 wherein the monitoring step comprises ‘low accuracy monitoring’ and ‘high accuracy monitoring’. For example, the fused location provider can provide varying levels of accuracy by configuration. For a further example, the location service initially uses the monitored cell tower id and/or Wi-Fi AP to search against the database. Only when the monitored ID matches the database, will the signal strength be further utilized to estimate a more accurate location. This constitutes steps of ‘low accuracy monitoring’ and ‘high accuracy monitoring.’ <i>See, e.g.:</i> The fused location provider is a location API in Google Play services that intelligently combines different signals to provide the location information that your app needs. The fused location provider manages the underlying location technologies, such as GPS and Wi-Fi, and provides a simple API that you can use to specify the required quality of service. For example, you can request the most accurate data available, or the best accuracy possible with no additional power consumption. Source: https://developers.google.com/location-context/fused-location-provider setPriority() - This method sets the priority of the request, which gives the Google Play services location services a strong hint about which location sources to use. The following values are supported: PRIORITY_BALANCED_POWER_ACCURACY - Use this setting to request location precision to within a city block, which is an accuracy of approximately 100 meters. This is considered a coarse level of accuracy, and is likely to consume less power. With this setting, the location services are likely to use WiFi and cell tower positioning. Note, however, that the choice of location provider depends on many other factors, such as which sources are available.

Claim 18	Accused Products
	PRIORITY_HIGH_ACCURACY - Use this setting to request the most precise location possible. With this setting, the location services are more likely to use GPS to determine the location. PRIORITY_LOW_POWER - Use this setting to request city-level precision, which is an accuracy of approximately 10 kilometers. This is considered a coarse level of accuracy, and is likely to consume less power. PRIORITY_NO_POWER - Use this setting if you need negligible impact on power consumption, but want to receive location updates when available. With this setting, your app does not trigger any location updates, but receives locations triggered by other apps. Source: https://developer.android.com/training/location/change-location-settings

Claim 18

Claim 18	Accused Products
18. The method of claim 17 wherein ‘low accuracy monitoring’ includes comparing the chosen location IDs with the current location IDs.	Each Accused Product performs the method of claim 17 wherein ‘low accuracy monitoring’ includes comparing the chosen location IDs with the current location IDs. For example, the fused location provider can provide varying levels of accuracy by configuration. For a further example, the location service initially uses the monitored cell tower id and/or Wi-Fi AP to search against the database. Only when the monitored ID matches the database will the signal strength be further utilized to estimate a more accurate location. <i>See, e.g.:</i> The fused location provider is a location API in Google Play services that intelligently combines different signals to provide the location information that your app needs. The fused location provider manages the underlying location technologies, such as GPS and Wi-Fi, and provides a simple API that you can use to specify the required quality of service. For example, you can request the most accurate data available, or the best accuracy possible with no additional power consumption.

Claim 18	Accused Products
	Source: https://developers.google.com/location-context/fused-location-provider setPriority() - This method sets the priority of the request, which gives the Google Play services location services a strong hint about which location sources to use. The following values are supported: PRIORITY_BALANCED_POWER_ACCURACY - Use this setting to request location precision to within a city block, which is an accuracy of approximately 100 meters. This is considered a coarse level of accuracy, and is likely to consume less power. With this setting, the location services are likely to use WiFi and cell tower positioning. Note, however, that the choice of location provider depends on many other factors, such as which sources are available. PRIORITY_HIGH_ACCURACY - Use this setting to request the most precise location possible. With this setting, the location services are more likely to use GPS to determine the location. PRIORITY_LOW_POWER - Use this setting to request city-level precision, which is an accuracy of approximately 10 kilometers. This is considered a coarse level of accuracy, and is likely to consume less power. PRIORITY_NO_POWER - Use this setting if you need negligible impact on power consumption, but want to receive location updates when available. With this setting, your app does not trigger any location updates, but receives locations triggered by other apps. Source: https://developer.android.com/training/location/change-location-settings

Claim 19

Claim 19	Accused Products
19. The method of claim 18 wherein 'high accuracy monitoring' takes place only if the current location IDs are	Each Accused Product performs the method of claim 18 wherein 'high accuracy monitoring' takes place only if the current location IDs are determined to match the chosen location IDs in the 'low accuracy monitoring' step.

Claim 19	Accused Products
determined to match the chosen location IDs in the ‘low accuracy monitoring’ step.	For example, the fused location provider can provide varying levels of accuracy by configuration. For a further example, the location service initially uses the monitored cell tower id and/or Wi-Fi AP to search against the database. Only when the monitored ID matches the database, will the signal strength be further utilized to estimate a more accurate location. <i>See, e.g.:</i> The fused location provider is a location API in Google Play services that intelligently combines different signals to provide the location information that your app needs. The fused location provider manages the underlying location technologies, such as GPS and Wi-Fi, and provides a simple API that you can use to specify the required quality of service. For example, you can request the most accurate data available, or the best accuracy possible with no additional power consumption. Source: https://developers.google.com/location-context/fused-location-provider setPriority() - This method sets the priority of the request, which gives the Google Play services location services a strong hint about which location sources to use. The following values are supported: PRIORITY_BALANCED_POWER_ACCURACY - Use this setting to request location precision to within a city block, which is an accuracy of approximately 100 meters. This is considered a coarse level of accuracy, and is likely to consume less power. With this setting, the location services are likely to use WiFi and cell tower positioning. Note, however, that the choice of location provider depends on many other factors, such as which sources are available. PRIORITY_HIGH_ACCURACY - Use this setting to request the most precise location possible. With this setting, the location services are more likely to use GPS to determine the location. PRIORITY_LOW_POWER - Use this setting to request city-level precision, which is an accuracy of approximately 10 kilometers. This is considered a coarse level of accuracy, and is likely to consume less power.

Claim 19	Accused Products
	PRIORITY_NO_POWER - Use this setting if you need negligible impact on power consumption, but want to receive location updates when available. With this setting, your app does not trigger any location updates, but receives locations triggered by other apps. Source: https://developer.android.com/training/location/change-location-settings

Claim 20

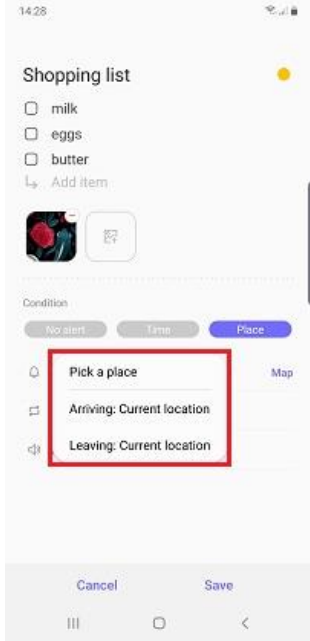
Claim 20	Accused Products
20. The method of claim 19 wherein ‘high accuracy monitoring’ includes measuring a signal strength at the current location.	Each Accused Product performs the method of claim 19 wherein ‘high accuracy monitoring’ includes measuring a signal strength at the current location. For example, the geolocation API request includes a signalStrength parameter representing a signal strength at the current location. <i>See, e.g.:</i> The fused location provider is a location API in Google Play services that intelligently combines different signals to provide the location information that your app needs. The fused location provider manages the underlying location technologies, such as GPS and Wi-Fi, and provides a simple API that you can use to specify the required quality of service. For example, you can request the most accurate data available, or the best accuracy possible with no additional power consumption. Source: https://developers.google.com/location-context/fused-location-provider setPriority() - This method sets the priority of the request, which gives the Google Play services location services a strong hint about which location sources to use. The following values are supported: PRIORITY_BALANCED_POWER_ACCURACY - Use this setting to request location precision to within a city block, which is an accuracy of approximately 100 meters. This is considered a

Claim 20	Accused Products
	coarse level of accuracy, and is likely to consume less power. With this setting, the location services are likely to use WiFi and cell tower positioning. Note, however, that the choice of location provider depends on many other factors, such as which sources are available. PRIORITY_HIGH_ACCURACY - Use this setting to request the most precise location possible. With this setting, the location services are more likely to use GPS to determine the location. PRIORITY_LOW_POWER - Use this setting to request city-level precision, which is an accuracy of approximately 10 kilometers. This is considered a coarse level of accuracy, and is likely to consume less power. Source: https://developer.android.com/training/location/change-location-settings The Geolocation API is a service that accepts an HTTPS request with the cell tower and WiFi access points that a mobile client can detect. <pre> { "cellTowers": [{ "cellId": 170402199, "locationAreaCode": 35632, "mobileCountryCode": 310, "mobileNetworkCode": 410, "age": 0, "signalStrength": -60, "timingAdvance": 15 }] } { "macAddress": "9c:1c:12:b0:45:f1", "signalStrength": -43, "signalToNoiseRatio": 0, "channel": 11, </pre>

Claim 20	Accused Products
	<pre>"age": 0 }</pre> Source: https://developers.google.com/maps/documentation/geolocation/requests-geolocation#cell_tower_object

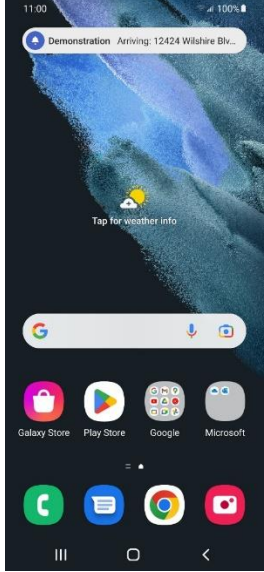
Claim 24

Claim 24	Accused Products
24. The method of claim 1 wherein determining if the monitored location is within proximity of a location chosen by the user of the first portable RF communication device further includes informing a location-based software program application running on the portable device that the device is at the location chosen by the user or is no longer at the location chosen by the user.	Each Accused Product performs the method of claim 1 wherein determining if the monitored location is within proximity of a location chosen by the user of the first portable RF communication device further includes informing a location-based software program application running on the portable device that the device is at the location chosen by the user or is no longer at the location chosen by the user. For example, the Samsung Reminder app allows a user to specify a location while creating a location-based reminder. The phone then uses signal strength and other network information from nearby Wi-Fi and/or mobile communications signals, based on antennas identified as being within range of the specified location, to determine whether the phone is arriving or leaving the location chosen by the user. For another example, any Android based mobile device can call a generic geofencing API to detect and notify applications when the device enters the vicinity of a defined location. <i>See, e.g.:</i>

Claim 24	Accused Products
	 The screenshot shows the Samsung Reminder app interface. At the top, there's a 'Shopping list' with items: milk, eggs, and butter, each with an unchecked checkbox. Below the list is an 'Add item' button. Further down, there's a 'Condition' section with three tabs: 'No alert', 'Time', and 'Place'. The 'Place' tab is selected. Under the 'Place' tab, there are three options: 'Pick a place', 'Arriving: Current location', and 'Leaving: Current location'. The 'Pick a place' option is highlighted with a red rectangular box. At the bottom of the screen, there are 'Cancel' and 'Save' buttons. Source: https://www.samsung.com/uk/support/mobile-devices/how-do-i-use-the-samsung-reminder-app/ Sometimes users want to use a particular app when they are in a specific type of location, such as an airport, or a supermarket. However, users have to navigate to that app and then take a specific action within it while they are near the area of interest. The geofencing API allows you to define perimeters, also referred to as geofences, which surround the areas of interest. Your app gets a notification when the device crosses a geofence, which allows you to provide a useful experience when users are in the vicinity. Source: https://developers.google.com/location-context/geofencing/

Claim 25

Claim 25	Accused Products
25. The method of claim 1 wherein determining if the monitored location is within proximity of a location chosen by the user of the first portable RF communication device further includes launching a location-based software program application on the portable device when the device is at the location chosen by the user.	Each Accused Product performs the method of claim 1 wherein determining if the monitored location is within proximity of a location chosen by the user of the first portable RF communication device further includes launching a location-based software program application on the portable device when the device is at the location chosen by the user. For example, the Samsung Reminder app allows a user to specify a location while creating a location-based reminder. The phone then uses signal strength and other network information from nearby Wi-Fi and/or mobile communications signals, based on antennas identified as being within range of the specified location, to determine whether the phone is arriving or leaving the location chosen by the user. Based on this determination, the phone launches the Samsung Reminder app. For another example, any Android based mobile device can call a generic geofencing API to detect and notify applications, including launching applications as appropriate, when the device enters the vicinity of a defined location. <i>See, e.g.:</i>

Claim 25	Accused Products
	 Screenshot showing, at top, notification from Samsung Reminder app that the phone arriving at the location as specified by the user.

Claim 26

Claim 26	Accused Products
26. The method of claim 1 wherein the determining of part (b) starts taking place or stops taking place at one or more of the following: (i) at specific time intervals, or (ii) at specific times, or (iii) depending on the rate the	Each Accused Product performs the method of claim 1 wherein the determining of part (b) starts taking place or stops taking place at one or more of the following: (i) at specific time intervals, or (ii) at specific times, or (iii) depending on the rate the user's location changes, or (iv) at the occurrence of an event, or (v) upon a request from the network, or (vi) upon a request from a software application on the device, or (vii) upon a request from the user. For example, each Accused Product's location settings can be configured, by the user or an application, to update location at either a specific update interval (<i>e.g.</i>, in milliseconds) or based

Claim 26	Accused Products
user's location changes, or (iv) at the occurrence of an event, or (v) upon a request from the network, or (vi) upon a request from a software application on the device, or (vii) upon a request from the user.	on the user's speed (rate of change of location), or based on the occurrence of an event such as beginning or ending a particular activity. <i>See, e.g.:</i> If your app needs to request location or receive permission updates, the device needs to enable the appropriate system settings, such as GPS or Wi-Fi scanning. Rather than directly enabling services such as the device's GPS, your app specifies the required level of accuracy/power consumption and desired update interval, and the device automatically makes the appropriate changes to system settings. These settings are defined by the LocationRequest data object. Update interval setInterval() - This method sets the rate in milliseconds at which your app prefers to receive location updates. Note that the location updates may be somewhat faster or slower than this rate to optimize for battery usage, or there may be no updates at all (if the device has no connectivity, for example). Source: https://developer.android.com/training/location/change-location-settings Starting updates based on the user's activity state. Example: Requesting updates only when the user is driving or riding a bike. Use the Activity Recognition API in conjunction with fused location provider updates. Request updates when the targeted activity is detected, and remove updates when the user stops performing that activity. Source: https://developer.android.com/guide/topics/location/battery