LTE-5G Qualcomm SnapdragonX55 5G modem

通訊所

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Outline

- Introduction
- 5G Mode
- Technology Analysis
- Comparison
- Conclusion
- Reference

What is modem?

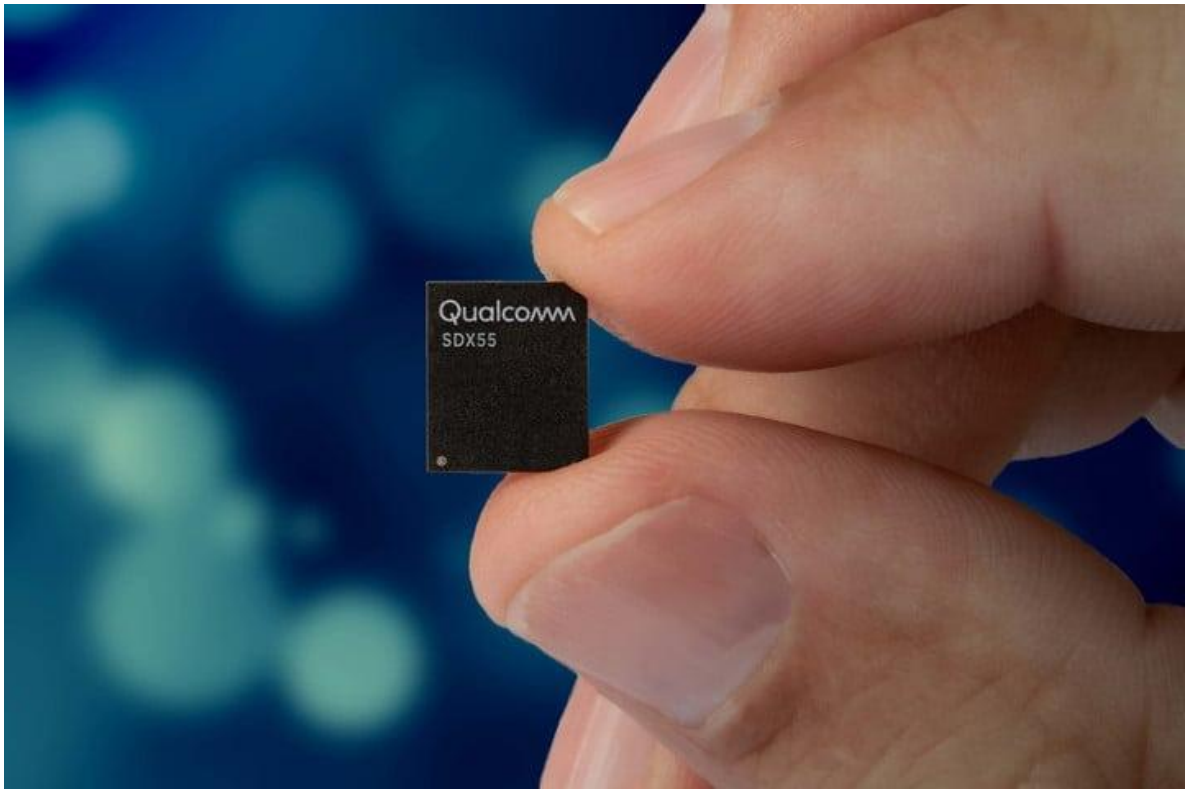
- ‘’Modulator’’ + ‘’Demodulator’’ = modem

Modulator converts a digital signal into analog signal

Demodulator converts a analog signal into digital signal

SnapdragonX55 modem

Snapdragon X55 is part of a comprehensive modem-to-antenna solution which includes the baseband, RF IC, and complete RF front-end for mmWave and sub-6 GHz.

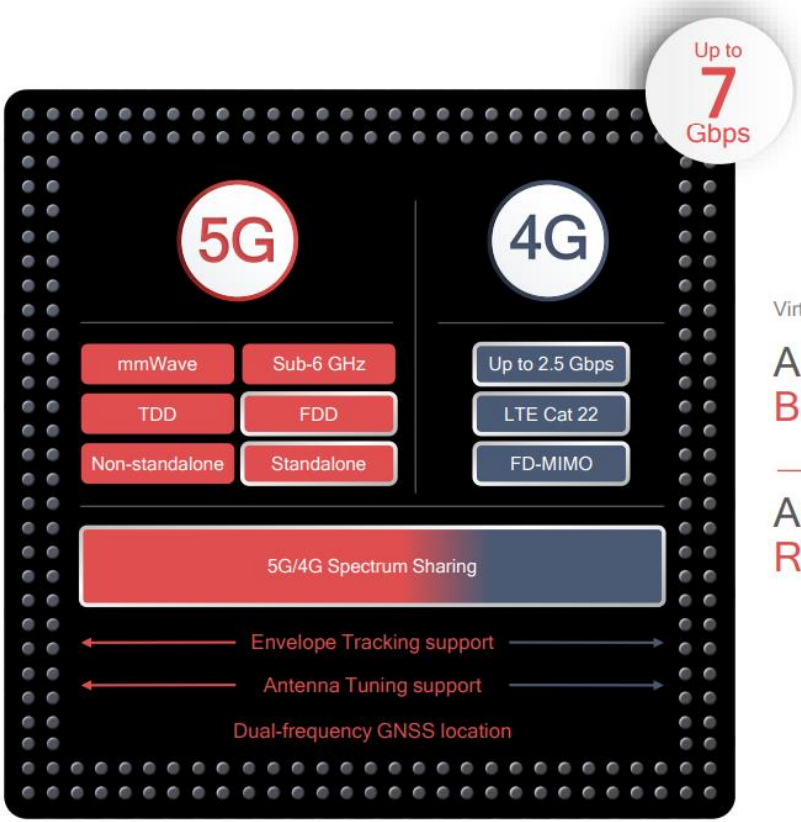


Single-chip 5G to 2G

Qualcomm snapdragon X55 5G modem

7nm single-chip

5G to 2G modem



5G for many device categories

- **Designed to bring 5G to all connected devices:**

Ex.

For mobile

1. Smartphones
2. Mobile hotspots

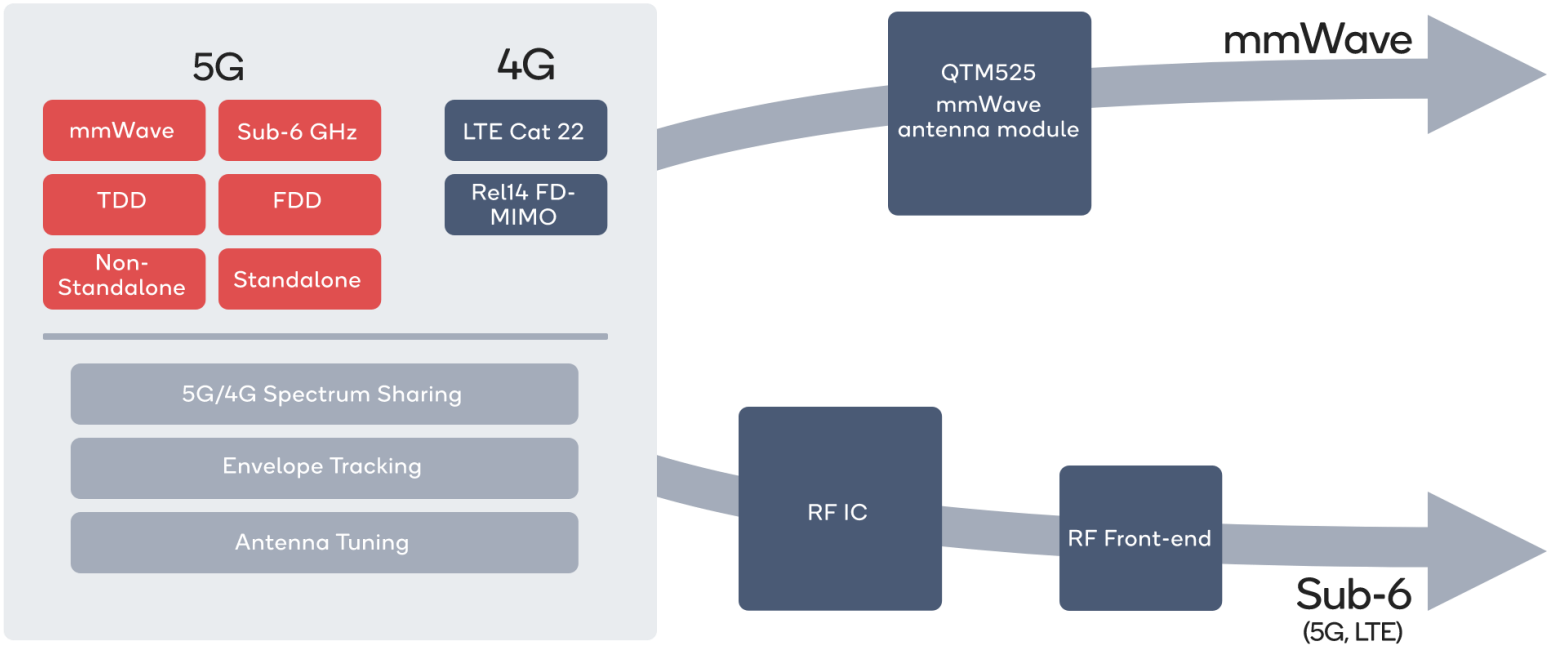
For fixed wireless device

1. Routers
2. CPEs

Specifications

Cellular Modem-RF	**Modem Name:** Snapdragon™ X55 5G Modem-RF system
	Peak Download Speed: Up to 7.5 Gbps, Up to 2.5 Gbps
	Peak Upload Speed: Up to 3 Gbps, Up to 316 Mbps
	Cellular Modem-RF Specs: 7x20 MHz carrier aggregation (DL), 200 MHz bandwidth (sub-6 GHz), 8 carriers (mmWave), 3x20 MHz carrier aggregation (UL), 800 MHz bandwidth (mmWave)
	Performance Enhancement Technologies: 100 MHz envelope tracking, Adaptive antenna tuning, Uplink Data Compression (UDC), 5G envelope tracking
	Cellular Technology: LTE Broadcast, TD-SCDMA, GSM/EDGE, LAA, 5G NR, 5G/4G spectrum sharing, LTE FDD, SA (standalone), NSA (non-standalone), CDMA 1x, 5G NR TDD, NSA, WCDMA (DC-HSUPA), EV-DO, 5G NR FDD, sub-6 GHz, WCDMA (DB-DC-HSDPA), TDD, LTE TDD support for CBRS, FDD, mmWave, LTE TDD
	Multi SIM: 5G Dual SIM
RF	**RF Front-End (RFFE) Features:** 5G Adaptive Antenna Tuning

Comprehensive 5G Solution



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5G spectrum (Sub-6 GHz & mmWave)

Designed for diverse spectrum bands/types

Global snapshot of 5G spectrum bands allocated or targeted

New 5G band
Licensed
Unlicensed/shared
Existing band

	<1 GHz	3 GHz	4 GHz	5 GHz	24-28 GHz	37-40 GHz	64-71 GHz
	600 MHz (2x35 MHz)	2.5/2.6 GHz (B41/n41)	3.45-3.55 GHz, 3.55-3.7 GHz, 3.7-4.2 GHz	5.9-7.1 GHz	24.25-24.45 GHz, 24.75-25.25 GHz, 27.5-28.35 GHz	37-37.6 GHz, 37.6-40 GHz, 47.2-48.2 GHz	64-71 GHz
	600 MHz (2x35 MHz)		3.55-3.7 GHz		26.5-27.5 GHz, 27.5-28.35 GHz	37-37.6 GHz, 37.6-40 GHz	64-71 GHz
	700 MHz (2x30 MHz)		3.4-3.8 GHz	5.9-6.4 GHz	24.5-27.5 GHz		
	700 MHz (2x30 MHz)		3.4-3.8 GHz		26 GHz		
	700 MHz (2x30 MHz)		3.4-3.8 GHz		26 GHz		
	700 MHz (2x30 MHz)		3.46-3.8 GHz		26 GHz		
	700 MHz (2x30 MHz)		3.6-3.8 GHz		26.5-27.5 GHz		
		2.5/2.6 GHz (B41/n41)	3.3-3.6 GHz	4.8-5 GHz	24.25-27.5 GHz	37-42.5GHz	
			3.42-3.7 GHz		26.5-28.9 GHz		
			3.6-4.1 GHz	4.5-4.9 GHz, 4.9 GHz	26.6-27 GHz, 27-29.5 GHz	39-43.5 GHz	
			3.4-3.7 GHz		24.25-27.5 GHz	39 GHz	

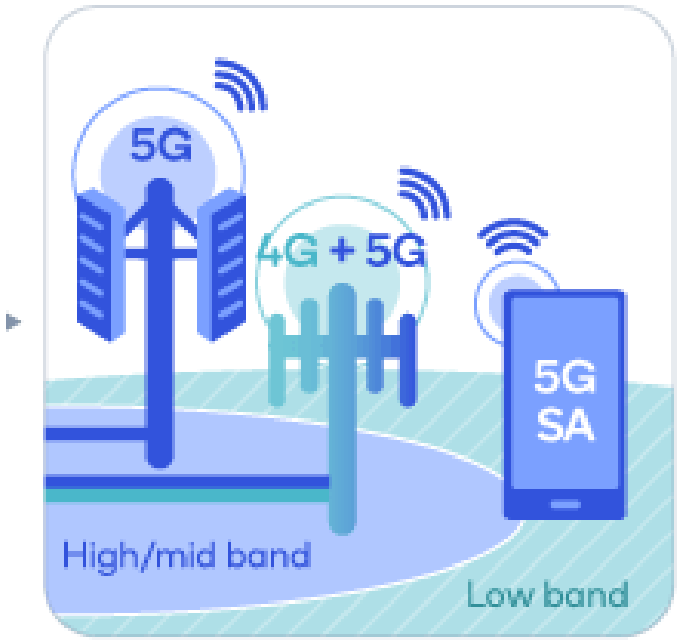
5G (NSA & SA)

- **“Non-Stand Alone” (NSA) :**
  the 5G Radio Access Network (AN) and its New Radio (NR) interface is used in conjunction with the existing LTE and EPC infrastructure Core Network (respectively 4G Radio and 4G Core).

- **“Stand-Alone” (SA) :**
  NR is connected to the 5G CN. Only in this configuration, the full set of 5G Phase 1 services are supported.

5G/4G spectrum sharing

Dynamic spectrum sharing refers to an antenna technology that allows 4G LTE and 5G cellular wireless technologies to be used in the same frequency band, while dynamically allocating bandwidth based on user demand.



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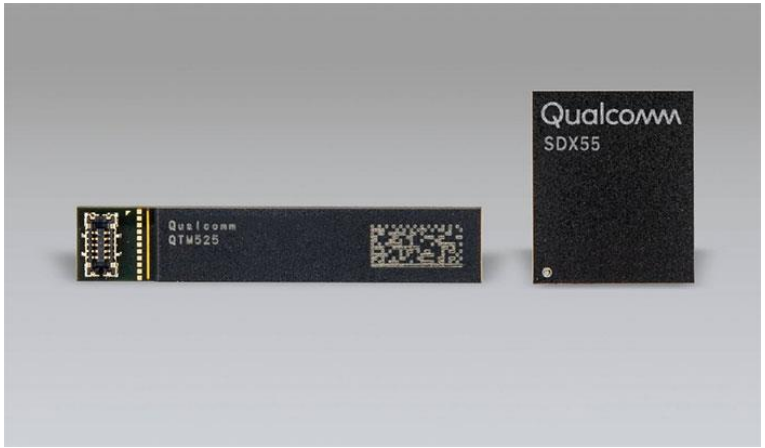
QTM-525 (5G mmWave antenna module)

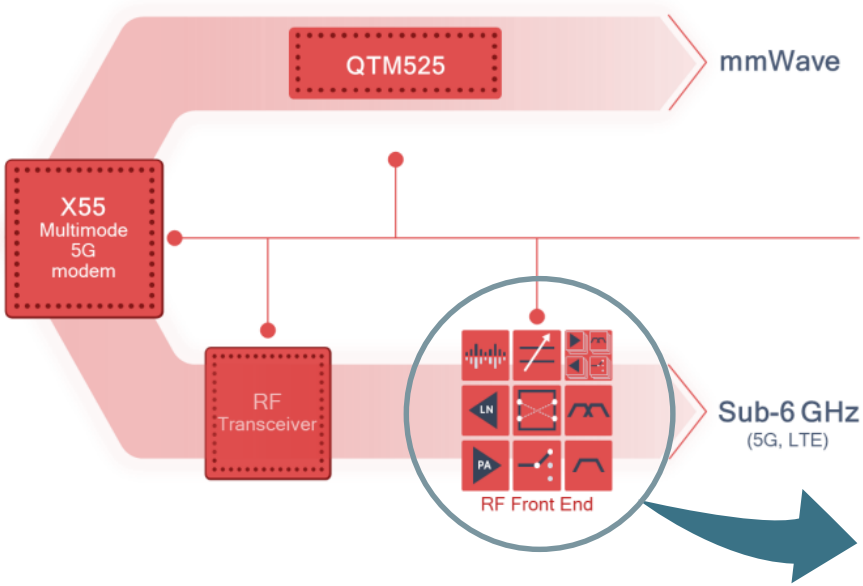
Announcing ...

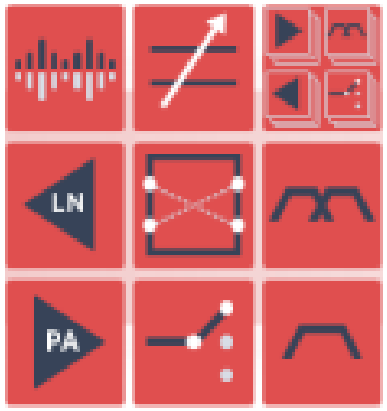
Qualcomm®
QTM525
mmWave
antenna module

Global mmWave band support
26 GHz, 28 GHz, 39 GHz
(NA, Korea, Japan, Europe, Australia)



RF Front-end





RF Front End

5G Power Amplifier modules
5G Envelope Tracking
5G Antenna Tuning

QET6100 (5G NR Envelope Tracker)

5G Envelope Tracking solution

Qualcomm® QET6100

Device performance

Up to 2X higher power efficiency for longer battery life*

Faster speeds*

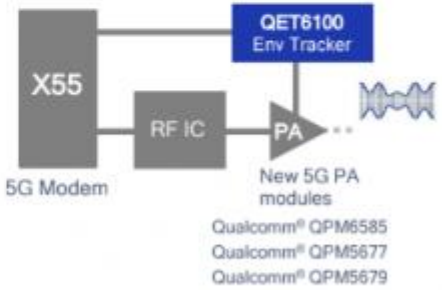
Network performance

Better indoor coverage*

Higher 256-QAM coverage, network utilization*

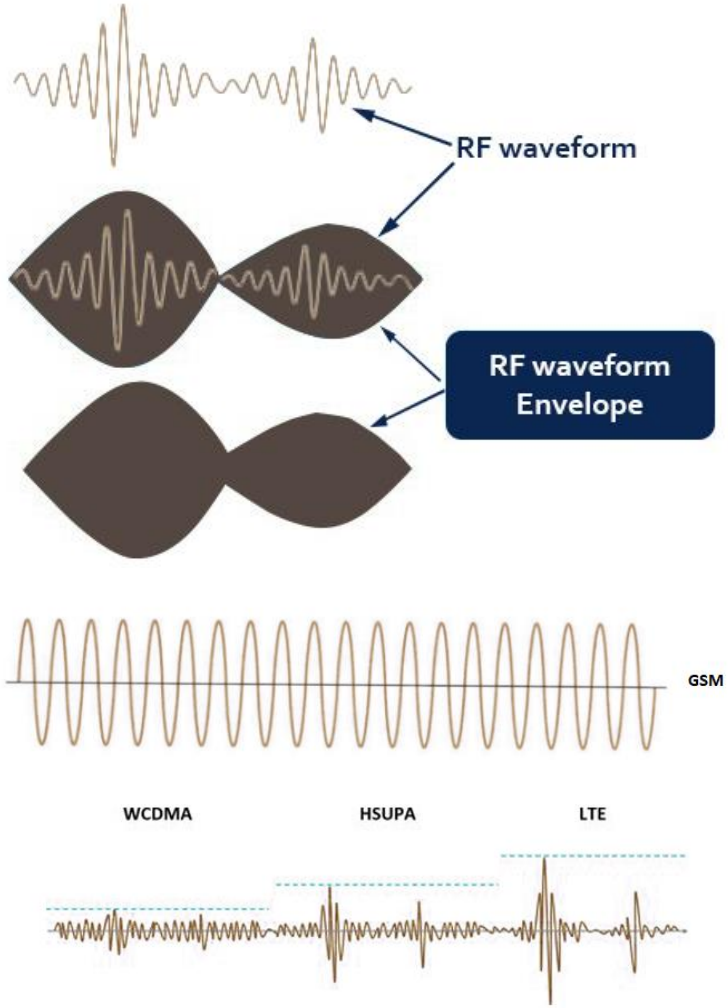
Qualcomm® QET6100
5G NR Envelope Tracker

ET for full 100 MHz UL BW, with 256-QAM
HPUE Power Class 2 support
Uplink MIMO support



* Compared to Average Power Tracking. Results based on lab measurements and projected performance of commercially available premium-tier handsets with APT solution. Qualcomm QET6100, Qualcomm QPM6585, Qualcomm QPM5677, Qualcomm QPM5679 are products of Qualcomm Technologies, Inc. and/or its subsidiaries.

Envelope Tracking



This way the power supply matches the voltage requirement of the RF amplifier and less heat is dissipated.

QAT3555 (5G adaptive antenna tuning)

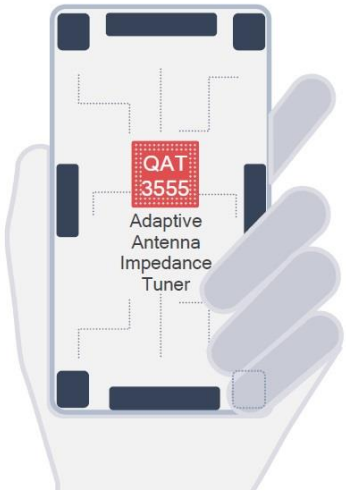
Extending adaptive antenna tuning technology to 5G bands up to 6 GHz, while featuring a 25% reduced package height, and lower loss compared to the previous generation.

World's First Announced

5G NR Adaptive Antenna Tuning solution

Qualcomm® QAT3555

- Better indoor coverage[1]
- Longer battery life[1]
- Faster, more consistent data speeds[1]
- Fast time-to-certification and launch for OEMs



Qualcomm® Signal Boost 5G adaptive antenna tuning solution

Support for growing antenna count in 5G

600 MHz - 6 GHz antenna frequency support

25% reduced package height for sleek devices*

[1] Compared to devices without Qualcomm Signal Boost technology. * Compared to previous generation QAT3550

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SnapdragonX55 v.s HiSilicon Balong 5000

SnapdragonX55 v.s SnapdragonX50

Product	5G Spectrum	5G Modes	5G mmWave specs	5G sub-6 GHz specs	LTE Peak Download Speed	LTE Peak Upload Speed
Snapdragon X55 5G Modem Modem	5G/4G spectrum sharing mmWave sub-6 GHz	FDD NSA (non-standalone) SA (standalone) TDD	800 MHz bandwidth 8 carriers 2x2 MIMO	100 MHz bandwidth 4x4 MIMO	2.5 Gbps	316 Mbps
Snapdragon X50 5G Modem Modem	mmWave sub-6 GHz	NSA (non-standalone) TDD	800 MHz bandwidth 8 carriers 2x2 MIMO	100 MHz bandwidth 4x4 MIMO		

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S.W.O.T

- **Strength**
  - Comprehensive 5G solution
  - Design to bring 5G to all connected device
  - Up to 7.5 Gbps peak downlink throughout
- **Weakness**
  - Expensive
  - The volume is larger than other
- **Opportunity**
  - Transitional market from 4G to 5G
- **Threat**
  - Other 5G modem (Balong 5000、Exynos 5100、helio M70)

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- https://www.androidcentral.com/qualcomm-x50-vs-x55-modem-why-x55-so-important-5gs-future#:~:text=The%20X55%20modem%20offers%20what's,phone%20calls%20or%20geolocation%20services.