NavIC In Mobile Phones

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Presentation Outline

- Importance of NavIC in Mobile
- Brief History
- Some results of MI8 Testing
- Current status
- Path Ahead

Importance of NavIC in Mobile

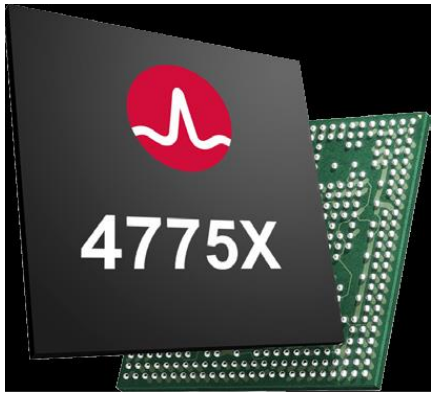
- Location Based Services (LBS) forms a major constituent in GNSS applications
- Use of Smart-Phones or Mobile is the real driver force behind LBS.
- India is witnessing a phenomenal growth in Mobile phone penetration in general and Smart phone adoption in particular.
- In order to have widespread usage and adoption of NavIC technology, it is imperative that NavIC has to come in Mobile

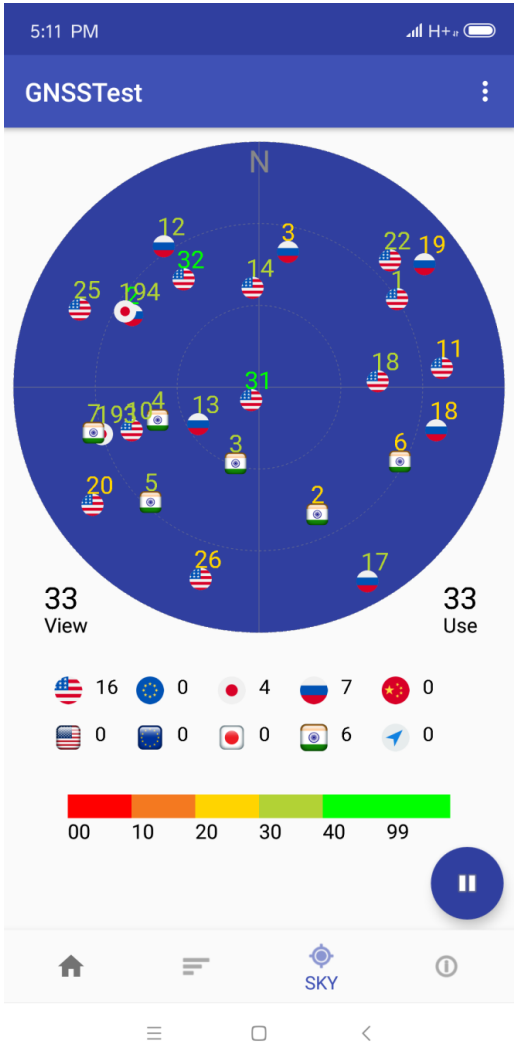
Brief History

- Broadcom Announced first dual freq. (L1+L5) GNSS chip BCM 47755 for Mobile phones in Sep. 2017.
- Xiomi Mi8 smartphone was launched on 31st may, 2018 which was having this dual freq. Broadcom chip. It was capable of processing L5 band signals of GPS, QZSS, Galileo, Beidou constellation Satellites for positioning.
- SAC interacted with Broadcomm for inclusion of NavIC in their processing

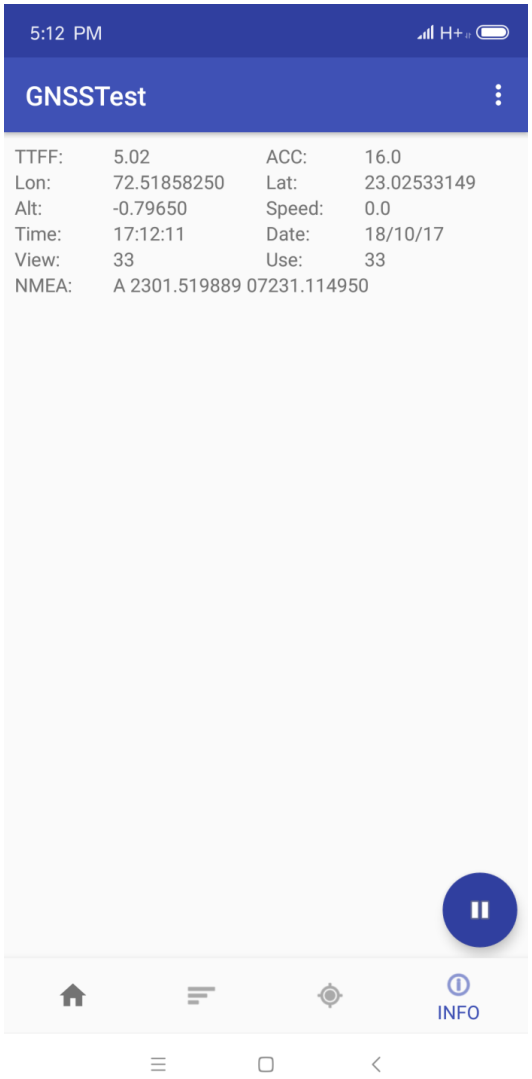
  After exchange of IRNSS ICD, multiple exchange of technical information, Broadcomm took up for NavIC adoption in July, 2018.
- During Sep. 2018, Broadcomm participated in BSX-2018 and committed their support for NavIC. By 20th Sep. 2018, Broadcomm declared successful NavIC Tracking.
- ISRO procured Mi8 phone. With active help from Broadcomm team, Same was unlocked and firmware was upgraded to support NavIC.
- Successful Demonstration of NavIC in Mobile: Xiomi MI8 in Oct. 2018

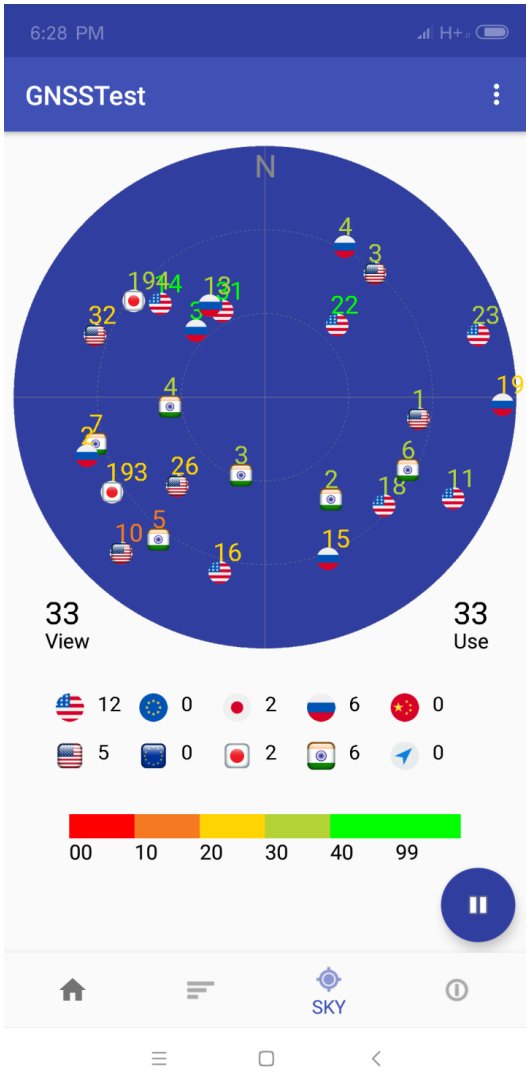
Some NavIC results with MI8 phone



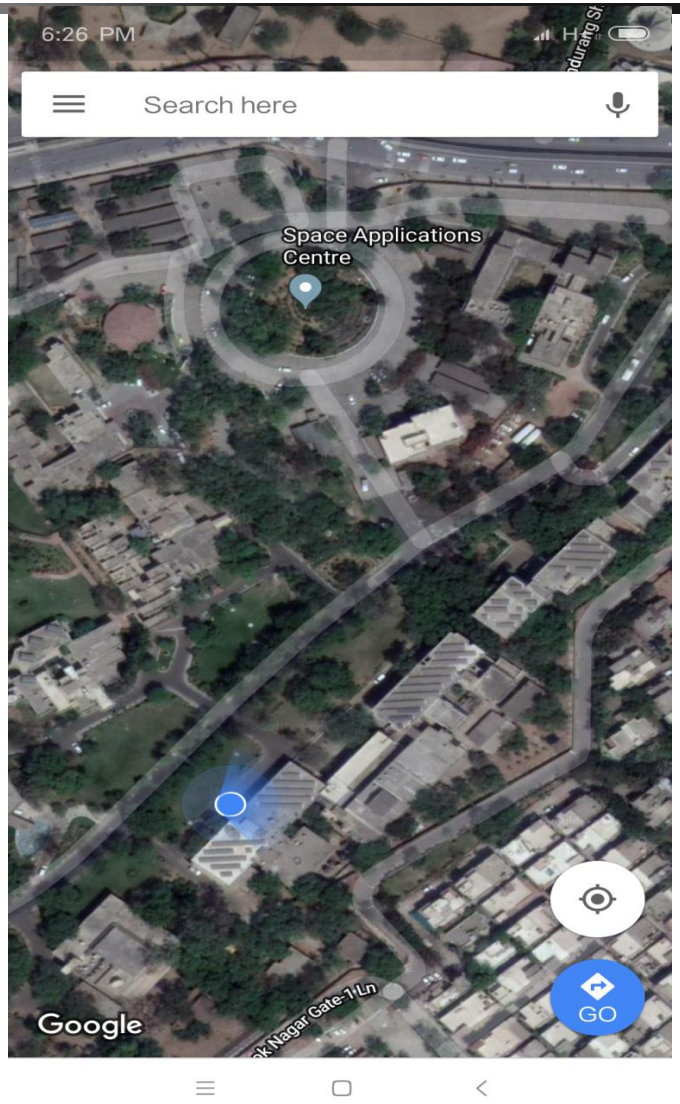


Some more results





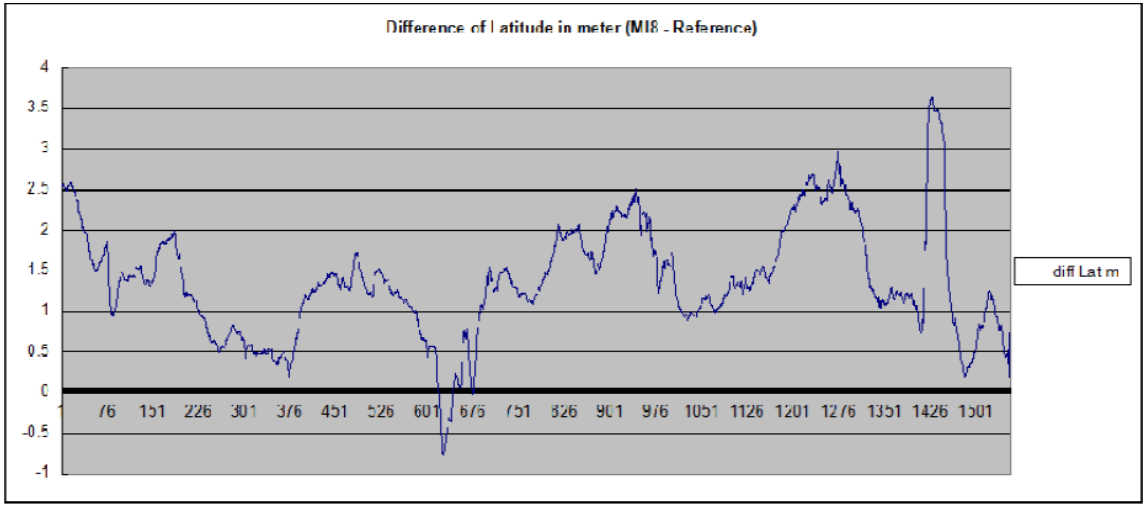
Positioning on the map



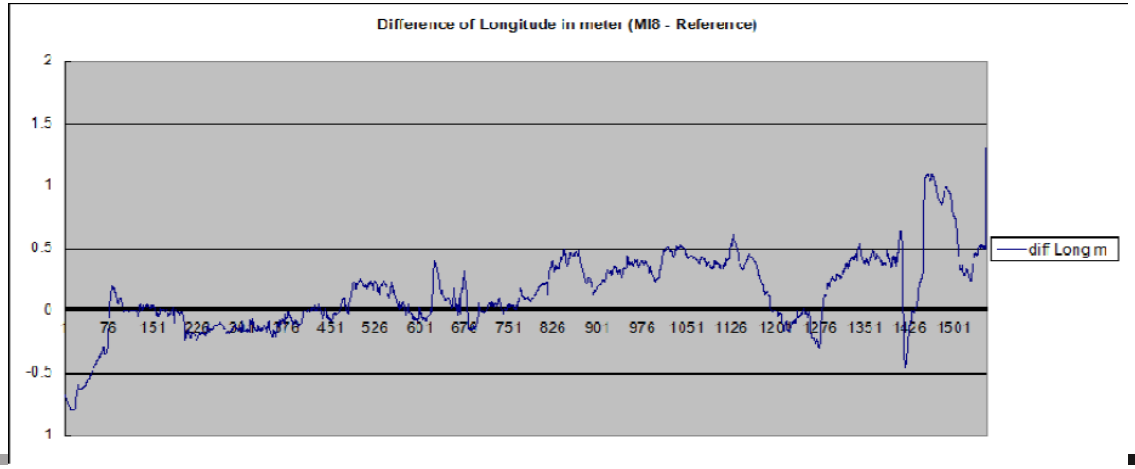
First NavIC Demonstration in Xiomi MI8 Phone

17/10/2018
17:12 Hrs

Static Receiver Accuracy (25 Minutes)



Difference in Latitude in Meters (MI8 – Reference)



Difference in Longitude in Meters (MI8 – Reference)

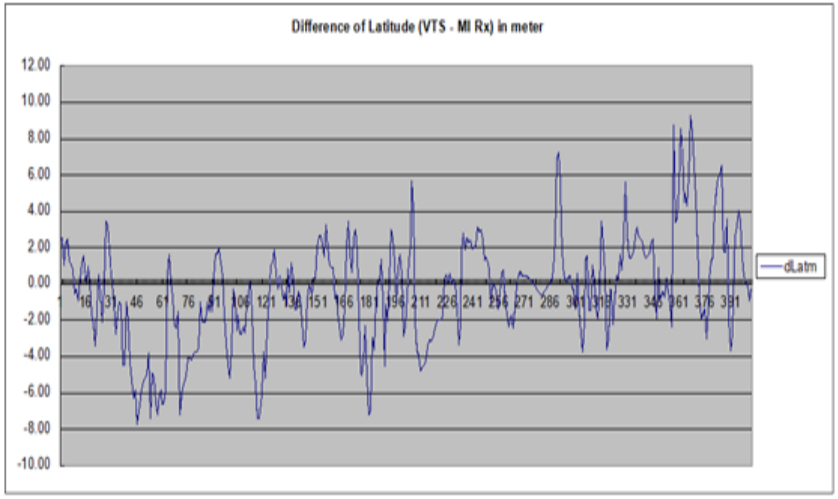
Static Positioning Accuracy

Parameters	Diff Lat (MI8 - Ref) in meters	Diff Long (MI8 - Ref) in meters	Diff Pos in meter
std dev	0.69	0.31	0.64
maximum	3.63	1.63	3.64
minimum	-0.76	-0.79	0.01
average	1.38	0.15	1.44

So, MI8 Experimental Data shows Accuracy ~ 1.5m

NavIC based MI8 mobile logged data vs. VTS logged data
Trip from Gandhinagar to SAC on 24-10-2018

Comparison of VTS and MI8 Rx Logged Latitude Difference in meter



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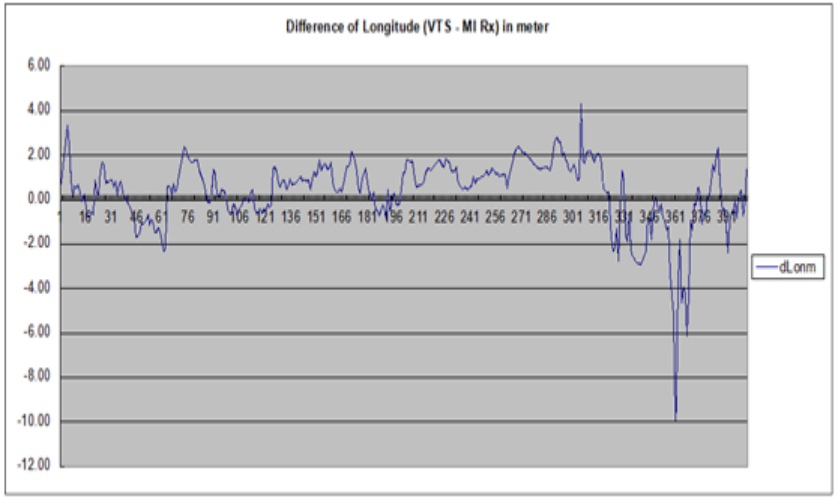


Parameter	Diff. Of Lat (VTS-MI) in m	Diff. Of Long (VTS-MI) in m	SQRT (diff Lat^2 + diff Lon^2) in m
Std Dev	3.01	1.56	1.96
Maximum	9.26	4.31	12.58
Minimum	-7.70	-9.91	0.16
Average	-0.44	0.36	2.82

The average value is 2.82 m. The physical distance between MI8 and VTU was about 2 to 3 m approx. So it matches very closely.

Enhancement post Initial Trials

- Support for Standalone NavIC positioning Mode
- Tracking of All available NavIC satellites as per latest ICD
- Support for NavIC message extraction

NavIC in Mobile Path Ahead..

- More mobile phones are coming up with Dual freq. GNSS support
- Huwei's Mate 20 X pro has also announced inclusion of Broadcom dual freq. Chip. So eventually that also will support NavIC. Besides Xiomi mix 3 and honor magic 2 phones are also coming up with dual freq. GPS chip
- Other leading GNSS ASIC manufacturers like Qualcomm and MediaTek are coming up with some products that will support NavIC
- Qualcomm has demonstrated NavIC support in recently held India Mobile Congress

Qualcomm Support for NavIC

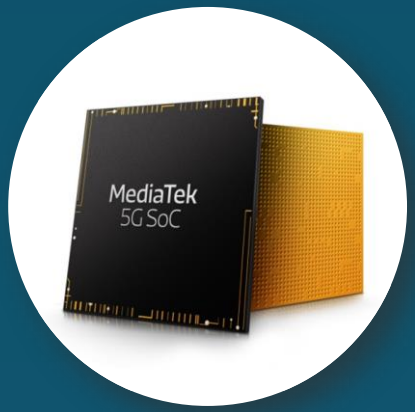
NavIC Demo at Indian Mobile Congress, 2019

- NavIC compatible Chipsets to OEM likely by late 2019
- NavIC supported Phones are likely to hit market by First half of 2020
- Snapdragon-600 & snapdragon-700 series chipsets are among the most prominent SoC in Indian Market. They will have NavIC support.
- First set of chipsets is likely to support L5 band.

MediaTek Support Announced for NavIC

Helio M70 - World's Fastest sub-6GHz SoC

Computex 2019: MediaTek 7nm SoC with integrated Helio M70 5G modem, ARM Cortex-A77 CPU, Mali-G77 GPU announced



- World's 1st Arm **Cortex-A77** CPU
- World's 1st Arm **Mali-G77** GPU
- Industry leading **APU 3.0**
- **7nm** FinFET, 5G SoC with ultra-low power
- Support for Indian Standard **NavIC!!**

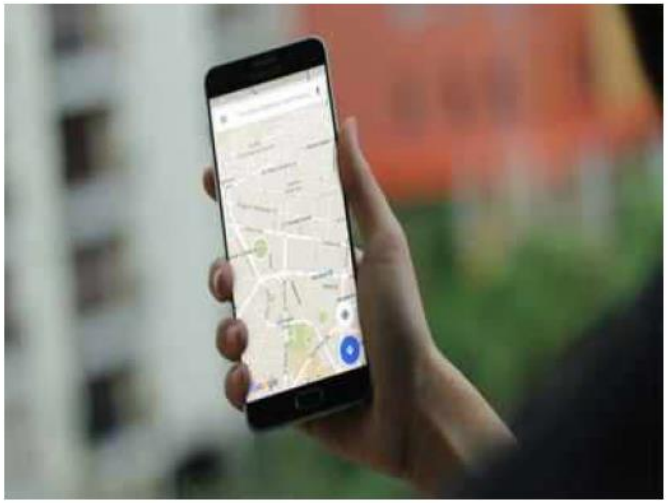
Chipset samples by **Q3.2019** ; First customer 5G device expected in **Q1.2020**

Courtesy : MediaTek

3GPP & NavIC

HIGHLIGHTS

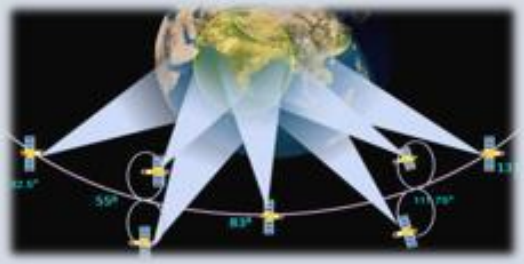
- Global standards body 3GPP has approved India's regional navigation system NaVIC, developed by ISRO
- The implications of NavIC acceptance by 3GPP would bring NavIC technology to the commercial market for its use in 4G, 5G and Internet of Things (IoT)



(Representative Image)

- Manufacturers can now mass-produce navigation devices compatible with NaVIC so that users of these devices can easily access desi GPS or NaVIC signals

THANKS



Thank You