

RP-192796

3GPP TSG RAN Meeting #86
Sitges, Spain, December 9th – 12th, 2019

Key points on NR positioning enhancements

Huawei, HiSilicon



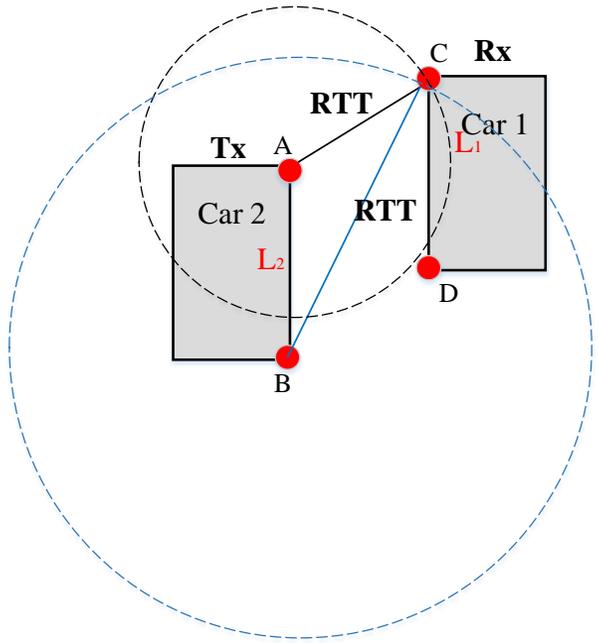
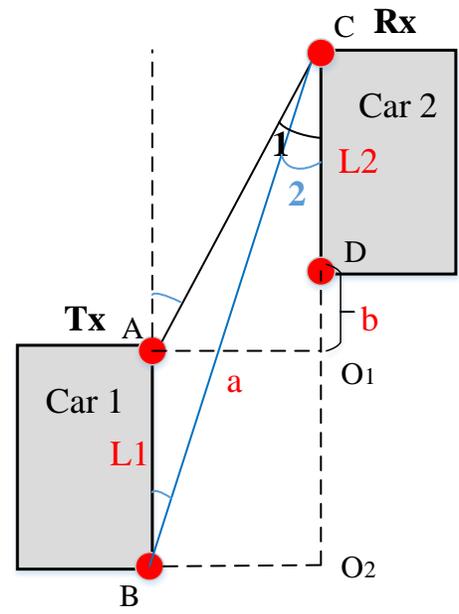
Justification on Sidelink positioning

General requirements [TS 22.186]

- [R.5.1-007] The 3GPP system shall support relative **lateral** position accuracy of **0.1 m** between UEs supporting V2X application.

Platooning requirements [TS 22.186]

- [R.5.2-003] The 3GPP system shall support relative **longitudinal** position accuracy of less than **0.5 m** for UEs supporting V2X application for platooning in proximity



Requirements set by email discussion for other cases than V2X

- (a) For general commercial use cases (e.g., TS 22.261):
 - **sub-meter level position accuracy (< 1 m)**
- (b) For IIoT Use Cases (e.g., 22.804):
 - **position accuracy < 0.2 m**

Observation 1: To meet the relative positioning requirements with existing Uu-based positioning technique is very challenging between two UEs.

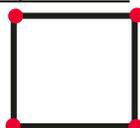
		50%	67%	80%	90%	99%
SL-Multi-AoA	Lateral	0.033	0.061	0.102	0.172	0.668
	Longitudinal	0.042	0.105	0.214	0.424	1.560
SL-Multi-RTT	Lateral	0.067	0.103	0.139	0.194	0.536
	Longitudinal	0.031	0.045	0.059	0.078	0.288

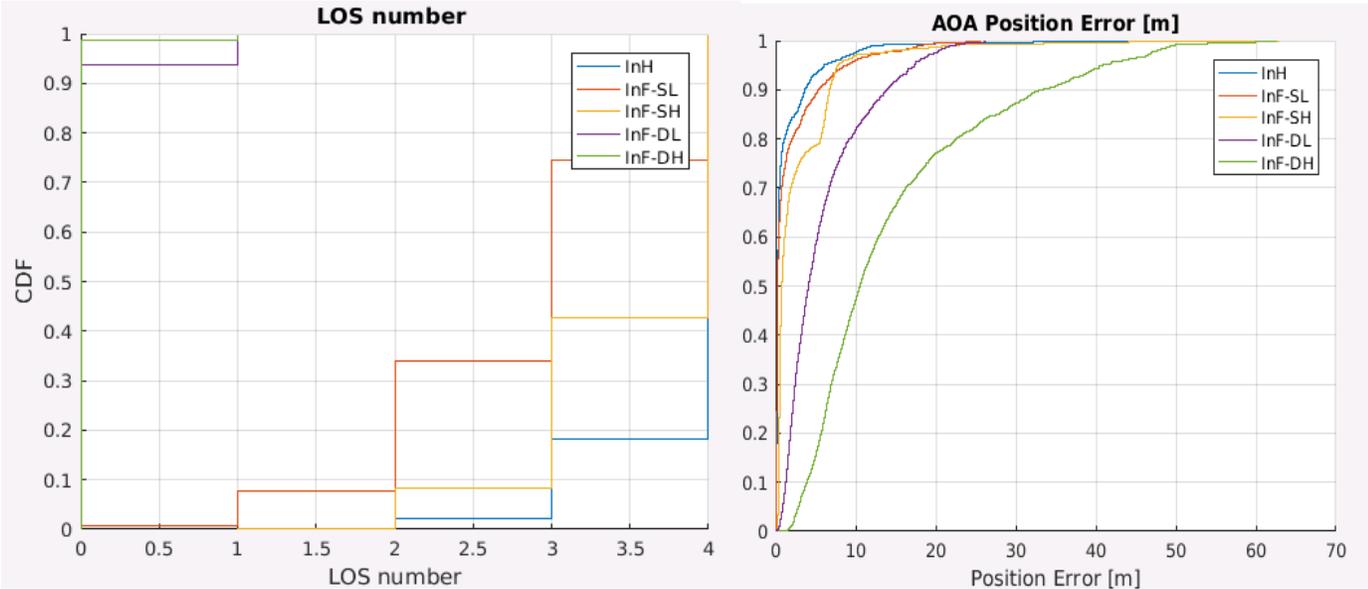
Observation 2: Using SL-based multi-AoA/RTT can meet the relative positioning requirements set by SA1.

Justification on IIOT positioning

IIOT positioning requirements [TS 22.804, Section 8.1.7]

- Horizontal accuracy <0.2m with availability 99%

Parameter	Values
Scenario	InF-SL, InF-DL, InF-SH, InF-DH
Hall size	InF-SL: 20x20 m; InF-DL: 20x20 m InF-SH: 50x50 m; InF-DH: 50x50 m
Room height	10 m
Sectorization	None
BS antenna configurations	M=4, N=4, P=2
UT antenna configurations	M=1, N=2, P=2
Handover margin (for calibration)	0dB
BS deployment	<p>4BSs on a square lattice with spacing D, located 0 from the walls.</p> <ul style="list-style-type: none"> for InF-SL and InF-DL: $D=20m$ for InF-SH and InF-DH: $D=50m$ <p>BS height = 1.5 m for InF-SL and InF-DL BS-height = 8 m for for InF-SH and InF-DH</p> 
UT distribution	<p>uniform dropping for indoor with minimum 2D distance of 1 m</p> <p>UT height = 1.5 m</p>
UT attachment	Based on pathloss
UT noise figure	9 dB
Carrier frequency	3.5 GHz
Bandwidth	100 MHz
algorithm	AOA
Channel Model	IIOT channel model in 38.901 (indoor Factory)



Loc_Error (m)	InH	InF_SL	InF_SH	InF_DL	InF_DH
80%	1.1	2.05	5.65	9.2	22.56
90%	3.65	5.3	6.75	14	33.35

Observation 1: Indoor factory has larger probability of NLOS path than indoor hotspot, see figure on the left.

Observation 2: UL-AoA positioning has worse performance in indoor factory than in indoor hotspot. See figure on the right.

Observation 3: The best performance with Rel-16 positioning in indoor hotspot is 1.0m@90% with multi-RTT and 3.5m@90% with UL-AOA [TR 38.855]

Conclusion: It is almost impossible to meet the 0.2m@99% accuracy with existing Rel-16 positioning techniques.



Thank you.

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