3GPP TSG RAN WG1 Meeting #123 **R1-2508618**
Dallas, US, November 17th – 12th, 2025

Agenda Item: 10.5.1

Source: EURECOM

Title: Evaluation assumptions and performance evaluation for ISAC

Document for: Discussion and decision

1. Introduction

According to the SI for Release 20 ISAC [1], the objective of this SI is as follows:

Evaluate the performance of gNB-based mono-static sensing (i.e., single TRP with co-located sensing transmitter and receiver) for UAV use case [RAN1]
- Identify and study metrics, measurements, and relevant measurement quantization for UAV use case
- As baseline, existing DL NR waveform and DL NR reference signals are to be used for evaluations.
  o For other waveform and reference signals, companies are to share relevant information
  o No UE impacts
- Deployment scenario and assumptions for channel model calibration for UAV sensing targets in the Rel-19 ISAC channel model SI [*FS_Sensing_NR*] are used as starting point for evaluation assumptions.
  o FR1 frequency range is prioritized.
 	
Study the procedures, signaling between RAN and CN to support ISAC [RAN3]
 	
Study network architecture for gNB-based mono-static sensing for UAV sensing target use cases [RAN3]
- Applicability to gNB bistatic sensing may be considered as part of this network architecture without additional architecture impacts.
- No inter-gNB coordination will be studied.
- Coordination with SA2 as necessary.

The following agreements were made in Release 19 for UAV sensing scenarios:

Evaluation parameters for UAV sensing scenarios

Parameters		Value
Applicable communication scenarios		UMi, UMa, RMa, SMa UMi-AV, UMa-AV, RMa-AV
Sensing transmitters and receivers properties	Rx/Tx Locations	Rx/Tx locations are selected among the TRPs and UEs locations in the corresponding communication scenarios. Note1: This may include aerial UEs for UMi-AV, UMa-AV, RMa-AV communication scenarios. In this case, other Rx/Tx properties (e.g. mobility) are also taken from the corresponding communication scenario.
Sensing target	LOS/NLOS	LOS and NLOS
	Outdoor/indoor	Outdoor
	3D mobility	Horizontal velocity: uniform distribution between 0 and 180km/h, if horizontal velocity is not fixed to 0. Vertical velocity: 0km/h, optional {20, 40} km/h NOTE2: 3D mobility can be horizontal only or vertical only or a combination for each sensing target NOTE 3: time-varying velocity may be considered for future evaluations.
	3D distribution	Horizontal plane: Option A: *N* targets uniformly distributed within one cell. Option B: *N* targets uniformly distributed per cell. Option C: *N* targets uniformly distributed within an area not necessarily determined by cell boundaries. *N* = {1, 2, 3, 4, 5} NOTE4: *N*=0 may be considered for the evaluation of false alarm Vertical plane: Option A: Uniform between 1.5m and 300m. Option B: Fixed height value chosen from {25, 50, 100, 200, 300} m assuming vertical velocity is equal to 0.
	Orientation	Random in horizontal domain
	Physical characteristics (e.g., size)	Size: • Option 1: 1.6m x 1.5m x 0.7m • Option 2: 0.3m x 0.4m x 0.2m

Minimum 3D distances between pairs of Tx/Rx and sensing target	Min distances based on min. TRP/UE distances defined in TR36.777 as a starting point. NOTE5: the sensing target is assumed in the far field of sensing Tx/Rx
Minimum 3D distance between sensing targets	Option 1: At least larger than the physical size of a target Option 2: 10 meters
[Unintended/Environment objects, e.g., types, characteristics, mobility, distribution, etc.]	Can be considered in future evaluations

NOTE: A percentage of TRPs/UEs that have sensing capabilities may be considered for future evaluations.

Simulation assumptions for large scale calibration for UAV sensing targets

Parameters	Values
Scenario	UMa-AV
Sensing mode	TRP monostatic, TRP-TRP bistatic, TRP-UE bistatic, UE-UE bistatic
Target type	UAV of small size (0.3m x 0.4m x 0.2m)
Sectorization	Single 360-degree sector can be assumed
Carrier Frequency	FR1: 6 GHz FR2: 30 GHz
BS antenna configurations	Single dual-pol isotropic antenna
BS Tx power	FR1: 56dBm FR2: 41dBm
Bandwidth	FR1: 100MHz FR2: 400MHz
BS noise figure	FR1: 5dB

	FR2: 7dB
UT antenna configurations	Single dual-pol isotropic antenna; (M,N,P,Mg,Ng;Mp,Np) = (1,1,2,1,1;1,1)
UT noise figure	FR1: 9dB FR2: 10dB
UT height	1.5m for terrestrial UTs,
UT Tx power	23dBm
UT Distribution	• The overall number of UTs is 30 uniformly distributed in the center cell. • All of the UTs are either terrestrial UTs or aerial UTs, all outdoors. • Vertical distribution of aerial UE: Fixed height value of 200 m. • FR1 is assumed for aerial UE.
Sensing target distribution	1 target uniformly distributed (across multiple drops) within the center cell. Vertical distribution: Fixed height value of 200 m.
Component A of the RCS for each scattering point	-12.81 dBsm
Minimum 3D distances between pairs of Tx/Rx and sensing target	10 m
Wrapping Method	No wrapping method is used if interference is not modelled, otherwise geographical distance based wrapping
Coupling loss for target channel	power scaling factor (pathloss, shadow fading, and RCS component A included): $L_{TX-SPST-RX} = PL_{dB}(d_1) + PL_{dB}(d_2) + 10lg\left(\frac{c^2}{4\pi f^2}\right) - 10lg(\sigma_{RCS,A}) + SF_{dB,1} + SF_{dB,2}$

Sensing Tx/Rx selection	Best N = 4 Tx-Rx pairs to be selected for the target. NOTE1: Based on the Tx-Rx pairs with the smallest power scaling factor of the target channel.
Metrics	Coupling loss for target channel Coupling loss for background channel (in case of monostatic sensing, this is the coupling loss between Tx and one reference point) Note: CDFs can be separately generated for target channel, background channel

Simulation assumptions for full calibration for UAV sensing targets

Parameters	Values
Scenario	UMa-AV
Sensing mode	TRP monostatic, TRP-TRP bistatic, TRP-UE bistatic, UE-UE bistatic
Target type	UAV of small size (0.3m x 0.4m x 0.2m)
Sectorization	Single 360-degree sector can be assumed
Carrier Frequency	FR1: 6 GHz FR2: 30 GHz
BS antenna configurations	Single dual-pol isotropic antenna
BS Tx power	FR1: 56dBm FR2: 41dBm
Bandwidth	FR1: 100MHz FR2: 400MHz
BS noise figure	FR1: 5dB

	FR2: 7dB
UT antenna configurations	Single dual-pol isotropic antenna; (M,N,P,Mg,Ng;Mp,Np) = (1,1,2,1,1;1,1)
UT noise figure	FR1: 9dB FR2: 10dB
UT height	1.5m for terrestrial UTs
UT Tx power	23dBm
UT Distribution	• The overall number of UTs is 30 uniformly distributed in the center cell. • All of the UTs are either terrestrial UTs or aerial UTs, all outdoors. • Vertical distribution of aerial UE: Fixed height value of 200 m. • FR1 is assumed for aerial UE.
Sensing target distribution	1 target uniformly distributed (across multiple drops) within the center cell. Vertical distribution: Fixed height value of 200 m.
RCS for each scattering point	Component A: -12.81 dBsm Component B1: 0 dB Component B2: 3.74 dB for standard deviation The same values are used for monostatic RCS and bistatic RCS
Minimum 3D distances between pairs of Tx/Rx and sensing target	10 m
Wrapping Method	No wrapping method is used if interference is not modelled, otherwise geographical distance based wrapping
Fast fading model	TR 36.777 Annex B.1.3
(u, std) for XPR of target	Mean 13.75 dB, deviation 7.07 dB

The power threshold for path dropping after concatenation for target channel	FFS
The power threshold for removing clusters in step 6 in section 7.5, TR 38.901 for background channel	FFS
Coupling loss for target channel	By definition, need to consider all direct and indirect paths. The following parameters are included in the calculation: • power scaling factor (pathloss, shadow fading, and RCS component A included) • for small scale RCS B1/B2 and power of rays in Tx-target/target-Rx links ($P^{k,p}_{n',m',n,m}$), Tx/Rx antenna pattern, 3 polarization matrixes, i.e., $$\sqrt{P^{k,p}_{n',m',n,m}}\begin{bmatrix} F_{rx,u,\theta}\left(\theta^{k,p}_{rx,n',m',ZOA},\phi^{k,p}_{rx,n',m',AOA}\right) \\ F_{rx,u,\phi}\left(\theta^{k,p}_{rx,n',m',ZOA},\phi^{k,p}_{rx,n',m',AOA}\right) \end{bmatrix}^T CPM^{k,p}_{rx,n',m'} CPM^{k,p}_{n',m',n,m} CPM^{k,p}_{tx,n,m}$$ $$\cdot \begin{bmatrix} F_{tx,s,\theta}\left(\theta^{k,p}_{tx,n,m,ZOD},\phi^{k,p}_{tx,n,m,AOD}\right) \\ F_{tx,s,\phi}\left(\theta^{k,p}_{tx,n,m,ZOD},\phi^{k,p}_{tx,n,m,AOD}\right) \end{bmatrix}$$
Sensing Tx/Rx selection	Best N = 4 Tx-Rx pairs to be selected for the target. NOTE1: Based on the Tx-Rx pairs with the smallest power scaling factor of the target channel.
Absolute delay	The model of UMa scenario defined in TR 38.901 7-24GHz channel modeling [ref] is reused for UMa-AV for all sensing modes.

Metrics	Coupling loss for target channel Coupling loss for background channel (in case of monostatic sensing, this is the linear sum of coupling losses between Tx/Rx and all reference points) Note: CDFs can be separately generated for target channel, background channel CDF of Delay Spread and Angle Spread (ASD, ZSD, ASA, ZSA) For monostatic sensing mode: delay spread and angle spread of the background channel is calculated separately for each reference point Definition of Delay Spread is similar to the definition of angle spread in Annex A of TR 25.996, Definition of Angle Spread can ref to Annex A of TR 25.996.

The following agreements were made in RAN1 #122 meeting for Release 20 for UAV evaluation:

Agreement

Horizontal/vertical positioning accuracy are agreed as performance metrics for NR ISAC.

- It is defined as the absolute value of the difference between the estimated horizontal/vertical position and the corresponding true position of a sensing target.
  - Note: in RAN1 evaluations, there should be only one estimated horizontal/vertical position corresponding to the true position of a sensing target.

Agreement

The following evaluation parameters are agreed for the evaluation on NR ISAC.

Parameters	Assumptions
Scenario	UMa-AV, Optional RMa-AV
Carrier frequency	Mandatory: one value either 4 GHz or 4.9GHz. optional for FR1: 6 GHz

	[optional for FR2: 28 GHz]
System bandwidth	100 MHz
Numerology	SCS = 30kHz
BS Layout	Hexagonal grid, 7 macro sites, 3 sectors per site. See Note1 3 sectors with 30, 150, 270 degrees
Inter-BS (2D) distance	Uma-AV: 500m, optional 1000m, RMa-AV: 1732m
BS antenna height	25m for UMa-AV, 35m for RMa-AV
Wrap-round	No wrap-round

Note1: target(s) are dropped only in the center site, and inter-BS interference is not modelled.

Agreement

The following evaluation parameters are agreed for the evaluation on NR ISAC.

Parameters	Assumptions
Target type	UAV with small size (0.3m x 0.4m x 0.2m)
Target distribution when target(s) are dropped	N = 5 targets per sector in the center site. Optional: N is uniformly distributed from 1 to 10. Horizontal plane: uniformly distributed in a sector Vertical plane: Uniformly distributed between 25m and 300m, optionally distributed between 1.5m and 300m
Mobility	horizontal speed: uniformly distributed between 0 and 180km/h vertical speed: 0km/h

Note: N=0 will be discussed in a later proposal in relation to false alarm.

Agreement

The following evaluation parameters are agreed for the evaluation on NR ISAC.

Parameters	Assumptions
Minimum BS-target 3D distance	10 m
Minimum target-target (3D) distance	10 m
Target outdoor/indoor proportion	100% outdoor
LOS/NLOS	LOS and NLOS
Orientation	Random in horizontal domain
RCS model	RCS model 1 for UAV with small size

Agreement

For the purpose of performance metric calculation, association of the detected object(s) and the true target(s) should fulfil at least the following conditions:

- One true target is associated with at most one detected object.
- One detected object is associated with at most one true target.
- The same association applies to miss detection, false alarm probability Type 2 (if defined) and positioning/velocity accuracy.
- Companies to report the method used for association of the detected object(s) and the true target(s).

Agreement

Missed detection probability is agreed as performance metric for NR ISAC.

- It is defined as the conditional probability of not detecting the presence of a target when the target is actually present in the simulation area.

$$P_{md} = \sum_{n=0}^{N-1} \frac{D_n}{M_n} / N$$

Where,

- D_n is the number of missed targets in the drop n, i.e., the true target not associated with any detected object.
- M_n is the number of true targets in the drop n.

- N is total number of drops with at least one target per drop.

Agreement

False alarm probability is agreed as performance metric for NR ISAC.

- For cases without true target dropped in simulation area, False alarm probability Type 1 is computed and reported
- For cases with true targets dropped in simulation area, False alarm probability Type 2 is computed and reported
- Note: both False alarm probability Types are mandatory
- KPI values for False alarm probability Type 1 and 2 can be discussed separately.

Definitions:

- False alarm probability Type 1 (no target dropped in simulation area): An object is detected when there is no target present in simulation area is considered a false alarm.

$$P_{f1} = \frac{\sum_{n=0}^{N-1} Q_n}{N}$$

Where,

- Q_n equal to 1 if at least one object is detected when there is no target dropped in the simulation area in the drop n, otherwise Q_n equal to 0.
- N is the total number of drops without targets in the simulation area.

- False alarm probability Type 2 (targets dropped in simulation area): An object is detected but not associated with any true targets in the simulation area is considered as a false alarm.

$$P_{f2} = \sum_{\substack{0 \le n < N \\ M'_n \ne 0}} \frac{D'_n}{M'_n} / K$$

Where,

- D'_n is the number of detected objects but not associated with any true targets in the drop n.
- M'_n is the total number of detected objects in the drop n.
- FFS:
  - Option 1: K is number of drops (N)
  - Option 2: K is number of drops with at least one detected object

Note: the number of targets should be reported by companies when providing False alarm probability Type 2.

Agreement

Velocity accuracy is agreed as performance metric for NR ISAC.

- Velocity accuracy is defined as the absolute value of the difference between the estimated velocity and the corresponding true velocity of a sensing target.
- For single TRP monostatic sensing,
  - The radial velocity accuracy can be estimated
    - The true radial velocity is the projection of true velocity on the direction from TRP to target for TRP monostatic.
  - The true velocity accuracy can be estimated.

The following agreements were made in RAN1 #122b meeting for Release 20 for UAV evaluation:

Agreement

On False alarm probability Type 2 (targets dropped in simulation area), the parameter K is the number of drops with at least one detected object.

Conclusion:

Sensing resolution is not considered as a performance metric for evaluation of NR ISAC.

Agreement

The following evaluation parameters are agreed for the evaluation on NR ISAC.

<table>
<tr><th>Parameters</th><th colspan="2">Assumptions</th></tr>
<tr><td rowspan="2">BS antenna configuration</td><td>For 4GHz, 4.9GHz:
• Option 1 as optional
- Tx: (12,16, 2,1,1;2,16)
- Rx: (12,16,2,1,1;2,16)
• Option 2
- Tx: (8,8,2,1,1;4,8)
- Rx: (8,8,2,1,1;4,8)</td><td>For 6GHz:
• Option 1 as optional
- Tx: (16,16, 2,1,1;4,16)
- Rx: (16,16,2,1,1;4,16)
• Option 2:
- Tx: (8,8,2,1,1;4,8)
- Rx: (8,8,2,1,1;4,8)</td></tr>
<tr><td colspan="2">Mandatory: (d_H, d_V) = (0.5, 0.8)λ, +45°/-45° polarization

Optional: (d_H, d_V) = (0.5, 0.5)λ, +45°/-45° polarization</td></tr>
</table>

Note: Tx antenna elements and Rx antenna elements are operating simultaneously

Agreement

The following evaluation parameters are agreed for the evaluation on NR ISAC.

Parameters	**Assumptions**
BS antenna radiation pattern	Table 9 in Report ITU-R M.2412
BS antenna mechanic tilt (downtilt angle without electrical tilt)	90° in GCS (pointing to horizontal direction)
BS antenna electrical tilt **(downtilt angle after mechanic and electrical tilt)**	Option 1: no electrical tilt Option 2: 102° in GCS
Polarized antenna model	Model-2 in clause 7.3.2 in TR 38.901

Agreement

The following evaluation parameters are agreed for the evaluation on NR ISAC.

Parameters	**Assumptions**
gNB-target link	gNB-aerial UE of UMa/RMa parameters in 36.777 with Alternative 3
Concatenation of TX-target and target-RX links	Up to company choice between two options for concatenation defined in Step 9 in section 7.9.4.1, TR 38.901
The power threshold for path dropping after	-25dB and -40dB are respectively used for the two options for concatenation

concatenation for target channel	

Agreement

The following evaluation parameters are agreed for the evaluation on NR ISAC.

Parameters	**Assumptions**
Co-site inter-sector interference	Not modelled
Adjacent channel interference	Not modelled
BS receiver noise figure	5dB

Agreement

When Tx/Rx operates simultaneously (baseline case), the following parameters are used for the evaluation on NR ISAC:

Antenna isolation	• Option 1: 65dB • Option 2: 80dB
Maximum BS Tx power	• Option 1: 37dBm • Option 2: 52dBm The above options are calculated with BS_maxpower = BS Rx saturation power + antenna isolation by assuming the BS Rx saturation power = -28dBm and the antenna isolation = 65dB and 80dB, respectively

- Optionally: companies should report the maximum BS Tx power when it is assumed that Tx and Rx don't operate simultaneously. Companies should report how the maximum BS Tx power is derived.

Agreement

The following evaluation parameters are agreed for the evaluation on NR ISAC.

Parameters	**Assumptions**

CPI (coherent processing interval)	Companies to report the CPI value assumed
Waveform	CP-OFDM as baseline, other waveform is up to companies report

Agreement

When Tx/Rx operates simultaneously, the following evaluation parameters are agreed for the evaluation on NR ISAC.

Self-interference	The residual leakage interference/noise is modelled e.g. by additional additive white Gaussian noise, -94+X dBm in 100 MHz, X is up to company report. Companies to provide details on their modelling. Note: X = -Infinity corresponds to not modelling self-interference

Agreement

For the evaluation on NR ISAC,

- 3 kinds of resources are defined
  - Type 1: resources that are used for sensing signal transmission
  - Type 2: part of Type 1 resources that are used for communication purpose
    - Note: it is possible the resource type 2 doesn't exist
  - Type 3: resources that are not used for sensing signal transmission, and cannot be used for communication purpose due to sensing operation
- Both options should be reported for sensing resource ratio
  - Option 1: (Type_1 + Type_3) resources over all radio DL and UL resources
  - Option 2: (Type_1 - Type_2 + Type_3) resources over all radio DL and UL resources
  - Note: if Type 2 resource doesn't exist, two options are the same

For the evaluation on NR ISAC,

- Company should report T/F RE mapping of sensing RS, assumed TDD UL/DL configuration if applicable.
  - Company should report which sensing RS resources are considered as Type 2 resource and related reason.

Agreement

Companies are encouraged to report the high-level sensing signal/data processing method used in the evaluation, e.g., 2D FFT, MUSIC, and any other methods.

Agreement

Up to company to model low power cluster in the evaluation of NR ISAC

Agreement

Companies should report details of the Tx beam information (number of Tx beams, wide/narrow Tx beam) being used at TRP.

- The details of the Tx beam information (number of Tx beams, wide/narrow Tx beam) being used at TRP will be captured along with the corresponding evaluation results in the Rel-20 TR

Agreement

The following performance objectives are adopted for evaluation purpose of NR ISAC.

Metric	Value
Missed detection Probability	[5]%
False Alarm Probability Type 1	[5]%
False Alarm Probability Type 2	[5]%
Horizontal Positioning Accuracy	[10] m with confidence level 90%
Vertical Positioning Accuracy	[10] m with confidence level 90%
Velocity Accuracy	[5] m/s with confidence level 90%

2. Discussion

2.1 Evaluation steps

In order to set up and measure the metrics in the simulation to evaluate UAV detection performance, we follow the following steps:

1. Simulation parameter configuration
2. Sensing scenario generation

3. Drop N targets, N $\in$ {0, 5}
4. Channel generation
5. Sensing node selection
6. Sensing signal generation: sensing signal is generated based on the parameters configured in Step 1 such as sequence type, comb sizes, time and frequency resources.
7. Sensing signal transmission
8. Receive signal at the receiver
9. Channel estimation
10. Target detection: a threshold is chosen for target detection based on the requirement of false alarm rate and detection rate
11. Sensing metric calculation (if a target is detected)
12. Sensing results: range, angle, velocity

The BSs do not cooperate together in sensing one target. Each BS senses the target and derives the target's range and velocity independently. The performance metrics are calculated independently for each BS and sensing target pair.

Proposal 1: The evaluation simulation is set up following the below steps:

1. **Simulation parameter configuration**
2. **Sensing scenario generation**
3. **Drop N targets, N $\in$ {0, 5}**
4. **Channel generation**
5. **Sensing node selection**
6. **Sensing signal generation: sensing signal is generated based on the parameters configured in Step 1 such as sequence type, comb sizes, time and frequency resources.**
7. **Sensing signal transmission**
8. **Receive signal at the receiver**
9. **Channel estimation**
10. **Target detection: a threshold is chosen for target detection based on the requirement of false alarm rate and detection rate**

11. **Sensing metric calculation (if a target is detected)**

12. **Sensing results: range, angle, velocity**

Proposal 2: Multi-BS-cooperation sensing is not supported.

Proposal 3: The performance metrics are calculated independently for each BS and sensing target pair.

Proposal 4: Range, angle and velocity per detected point for a given time stamp are reported in the measurement report.

The quantization of the measurements of range, angle and velocity depends on the requirements of the ISAC use cases.

Proposal 5: The quantization of the measurements of range, angle and velocity depends on the requirements of the ISAC use cases.

Tracking a UAV is carried out based on multiple-shot process (multiple CPIs) in processing the reflected sensing signal. In this study, the focus is the sensing performance in one-shot process (in one CPI). The purpose is UAV detection where the TRP processes the reflected signal in a CPI to estimate UAV's range and velocity. For this reason, tracking is not supported in this study or has a low priority. It only should be considered after the evaluation of sensing performance in one-shot process is done.

Proposal 6: Tracking is not supported in this study or has a low priority compared to the goal of assessing sensing evaluation in one-shot process in this study.

When tracking is not support, the UAV's trajectory is also not a part of the sensing result transmitted in the measurement report.

Proposal 7: Trajectory is not a part of sensing result and not transmitted in the measurement report.

2.2 Sensing signal

The evaluation focuses on monostatic sensing where the base station transmits the sensing signal to the UAV target and receives the reflected signal. In order to evaluate the sensing performance, OFDM is used as a baseline waveform for sensing signal the conventional DL signal is used as a baseline for sensing signal. The BS transmits CSI-RS, DL- PRS, SSB, TRS, PDCCH (DMRS) or PDSCH (DMRS) to the sensing UAV target. Different comb sizes and CPI are used for the sensing signal. The sensing performance is evaluated for each signal CSI-RS, DL-PRS, SSB, TRS, PDCCH and PDSCH. The BS processes the received signal to derive range, velocity of the target and angle of arrival of the signal. Due to time limit for this study, CSI-RS and DL-PRS have a higher priority for sensing performance evaluation because they are not limited in bandwidth with 240 subcarriers as SSB and are also not mixed with communication signal such as DMRS in PDCCH and PDSCH.

Proposal 8: The sensing performance of CSI-RS, DL-PRS, SSB, TRS, DMRS of PDCCH or PDSCH is evaluated based on the agreed metrics. CSI-RS and DL-PRS have a higher priority for sensing performance evaluation.

The period of SSB is 20 ms. The minimum period of CSI-RS and DL-PRS is 4 slots. The minimum period of TRS is 20ms. These periods make the system unable to achieve a maximum unambiguous velocity to estimate the velocity that can reach 160 km/h as agreed in the UAV scenarios. At f_c = 5 GHz, the period is equal to 340 us to achieve a maximum unambiguous velocity of 160 km/h. With SCS of 15 kHz and 30 kHz, this period is smaller than a slot so CSI-RS and SSB are required to repeat in mini-slot level to achieve the required maximum unambiguous velocity.

Proposal 9: The signal used for sensing purpose is required to have smaller period (e.g 340 us for fc = 5 GHz) than the current standard to satisfy the maximum unambiguous velocity of 160 km/h for UAV.

2.3 Full-duplex mode

In monostatic sensing, a full-duplex mode is considered for the sensing operation done by a TRP to a UAV. A half-duplex mode limits the ability of the TRP to sense the UAVs nearby.

Proposal 10: Full-duplex mode is used in the evaluation.

3. Conclusion

Proposal 1: The evaluation simulation is set up following the below steps:

1. **Simulation parameter configuration**
2. **Sensing scenario generation**
3. **Drop N targets, N $\in$ {0, 5}**
4. **Channel generation**
5. **Sensing node selection**
6. **Sensing signal generation: sensing signal is generated based on the parameters configured in Step 1 such as sequence type, comb sizes, time and frequency resources.**
7. **Sensing signal transmission**
8. **Receive signal at the receiver**
9. **Channel estimation**
10. **Target detection: a threshold is chosen for target detection based on the requirement of false alarm rate and detection rate**
11. **Sensing metric calculation (if a target is detected)**
12. **Sensing results: range, angle, velocity**

Proposal 2: Multi-BS-cooperation sensing is not supported.

Proposal 3: The performance metrics are calculated independently for each BS and sensing target pair.

Proposal 4: Range, angle and velocity per detected point for a given time stamp are reported in the measurement report.

Proposal 5: The quantization of the measurements of range, angle and velocity depends on the requirements of the ISAC use cases.

Proposal 6: Tracking is not supported in this study or has a low priority compared to the goal of assessing sensing evaluation in one-shot process in this study.

Proposal 7: Trajectory is not a part of sensing result and not transmitted in the measurement report.

Proposal 8: The sensing performance of CSI-RS, DL-PRS, SSB, TRS, DMRS of PDCCH or PDSCH is evaluated based on the agreed metrics. CSI-RS and DL-PRS have a higher priority for sensing performance evaluation.

Proposal 9: The signal used for sensing purpose is required to have smaller period (e.g 340 us for fc = 5 GHz) than the current standard to satisfy the maximum unambiguous velocity of 160 km/h for UAV.

Proposal 10: Full-duplex mode is used in the evaluation.