**3GPP TSG SA WG1 Meeting #104 *S1-23xxxx***

**Chicago, USA, 13-17 November 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **22.837** | **CR** |  | **rev** | **-** | **Current version:** | **19.1.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | Update sensing consolidated KPI table | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | ZTE | | | | | | | | | |
| ***Source to TSG:*** | SA1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_Sensing | | | | |  | ***Date:*** | | | 2023-11-03 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| Reason for change: | | In the latest TR22.837, the consolidated KPI values still need to further clean up based on the use cases which have been grouped into different KPI categoriaes. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | it is suggested to revise the consolidated KPI tables:   * Move the public safety related KPIs into cat.4 * Align the KPI values with the use cases in the TR. | | | | | | | | |
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| ***Consequences if not approved:*** | | The KPI tables are not correct and inconsistency | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.2, | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* First Change \* \* \* \*

## 7.2 Consolidated potential KPIs of sensing results

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| Scenario | Sensing service category | Sensing service area | Confidence level [%] | Accuracy of positioning estimate by sensing (for a target confidence level) | | Accuracy of velocity estimate by sensing (for a target confidence level) | | Sensing resolution | | Max sensing service latency  [ms] | Refreshing rate  [s] | Missed detection  [%] | False alarm  [%] | Example Services |
| Horizontal  [m] | Vertical  [m] | Horizontal  [m/s] | Vertical  [m/s] | Range resolution  [m] | Velocity resolution (horizontal/ vertical)  [m/s x m/s] |
| Object detection and tracking | 1 (use cases 5.1; 5.13 – level1) | Object to be detected indoor: Human, object to be detected outdoor: UAV | 95 | 10 | 10 | N/A | N/A | 10  NOTE 2 | 5  NOTE 3 | 1000 | 1 | 5 | 2 | intruder detection in smart home,  UAV intrusion detection |
| 2 (use cases 5.13 – level2, 5.6, 5.14) | Object to be detected outdoor:  Human, UAV | 95 | 2 | 5 | 1 | N/A | 1  NOTE 2 | 1  NOTE 3 | Tourist spot monitoring : 5000;  Others: 1000 | 0.2 | 0.1 | 5 | UAV flight route intrusion detection,  intruder detection in surroundings of smart home, tourist spot monitoring |
| 3 (use cases 5.2, 5.7, 5.10, 5.11, 5.12, 5.23) | Factory (100m2), crossroad, highway, railway [air]  NOTE 4  Object to be detected: Animal, Human, UAV, Vehicle | 95 | 1 | 1 | 1  NOTE 5 | 1 | 1  NOTE 5  NOTE 8 | 1 x 1 NOTE 9 | 100  NOTE 6  1000  NOTE 10  detection in highway: 5000 | 0.05  NOTE 11 | 2 | 2 | pedestrian/animal intrusion detection on a highway/railway,  sensing at crossroads with/without obstacle,  UAV flight trajectory tracing  UAV collision avoidance,  AMR collision avoidance in smart factories |
| 4 (use cases 5.20, 5.22, 5.25, 5.32,5.27) | Factory and public safety  Object to be detected: Animal, Human, UAV, AGV/AMR, Vehicle | 95, Public safety: 99 | 0.5 | 0.5 | 0.1;  Vehicle: 15; Pedestrian: 1.5 | N/A;  Pedestrian: 1.5 | 0.5m | factories: 0.5 x 0.5 | Detection for smart grid: 5000;  Public safety: 1000;  Factory:100 | 0.1 | 1 | 3 | Parking Space Determination,  UAVs/vehicles/pedestrians detection near Smart Grid equipment (NOTE 7),  immersive experience based on sensing,  integrated sensing and positioning in factory hall |
| 5 (use cases 5.28) | ADAS  Object to be detected: Vehicle Public area safety, | 95 | short-range radar:2.6  Long range radar: 1.3 | 0.5 | 0.12 | N/A; | 0.4 | 0.6 | Short range radar: 20;  Long range radar: 50 | Short range radar: 0.05;  Long range radar: 0.2 | 10 | 1 | public safety search and rescue or apprehend, ADAS |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Environment monitoring | 6 (use cases 5.3 and 5.5.) | Rainfall monitoring and flooding  NOTE 14  Object to be detected: Rain | 95 | 10 | 0.2  NOTE 15 | N/A | N/A | N/A | N/A | 60000 | 1<10min, application configurable | 0.1 | 3 | rainfall monitoring,  flooding monitoring |
| Motion monitoring | 7 (use cases 5.15, 5.24) | Indoor human motion -sleep monitoring NOTE 12, sports monitoring NOTE 13, | 95 | N/A | N/A | N/A | N/A | N/A | N/A | 60000 | 60 | 5 | 5 | sleep monitoring,  sports monitoring |
| 8 (use case 5.29) | Hand gesture recognition | 95 | 0.2 | 0.2 | 0.1 | 0.1 | 0.375 | 0.3 | 5 | 0.1 | 5 | 5 | Hand gesture recognition |
| NOTE 1: The terms in Table 7.2-1 are found in Section 3.1.  NOTE 2: To detect the UAV existance (e.g., for intrusion detection), the sensing resolution of distance is 10m [25].  NOTE 3: To detect the UAV existence, the sensing resolution of velocity is 10m/s [25].  NOTE 4: The typical size (Length x Width x Height) of UAV is 1.6m x 1.5m x 0.7m, the typical size of pedestrian is 0.5m x 0.5m x 1.75m, and the typical size of engineering vehicle is 7.5m x 2.5m x 3.5 m.  NOTE 5: The KPI values for UAVs are sourced from [25] and [40] and for factories are sourced from [47].  NOTE 6: The value 100 ms is sourced from [28] and is valid for sensing at crossroads.  NOTE 7: The safe distance between pedestrian/vehicle and transmission station/line is 0.7m/0.95m [46]. The size of the park of Smart Grid depends on the real environment.  NOTE 8: To track the UAV flying (e.g., for collision detection and warning), the sensing resolution of distance is 1m [25].  NOTE 9: To track the UAV flying, the sensing resolution of velocity is 1m/s [25].  NOTE 10: To realize 1m granularity tracking, when the velocity resolution is 1 m/s, the maximum corresponding sensing service latency is 1s.  NOTE 11: Echodyne MESA-DAATM has approximate 1Hz scan rate [40].  NOTE 12: Additional KPI on human motion rate accuracy of 2 times/min (0.033 Hz).  NOTE 13: Additional KPI on human motion rate accuracy of 3 times/min (0.05Hz) and 4 times/min (0.07 Hz)  NOTE 14: Rainfall estimation accuracy is1 mm/h[39] and describes the closeness of the measured rainfall estimation to its true rainfall value.  NOTE 15: This value is for the water level. Description related to NOTE in clause 5.5.1 suggests 0.01 m. [≤0.2] is derived from the water level where people feel difficulty in walking. | | | | | | | | | | | | | | |

Editor’s note: The values in brackets are FFS