**Suggested Revisions**

**Towards the IEEE Std 802.22.3-Draft1.0**

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Suggestions

Following are the modification suggestions to the standard version 1.0.

1. Replace fig 7 in section 5.3.2.1 at pag 23 with



and modify the figure caption in this way “SSD Simplified Hardware Model Block Diagram”

1. Modify the caption of the Figure 7 in section 5.3.2.1 at page 24 caption  in “Figure 7: SSD Functional Elements”
2. Replace Figure 7 in section 5.3.2.1 at page 25 with this new fig.



This is the proposed new figure caption “Figure 9: SSD model: Hardware layer components and Software layer processes with relative metadata”

1. Move metadata in section 7.1 deleting di old chapter 7 and the metadata info in the following sections 5.4.3, 5.4.4, 5.4.5, 5.4.6 and 5.4.7

In the following the new section 7.1

7.1      SSD hardware metadata specification

7.1.1       Top level hardware metadata

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Values** | **Description** |
| Antenna | 0 | Number of antennas |
| Calibration source |  | Present/absent |
| RF switch |  | Present/absent[M2]  |
| RFFilter |  | Present/absent |
| LNA |  |  |
| Sensor |  | COTS/SDR |

7.1.2       Antenna Metadata

Antenna metadata is reported in the table below. In the second column of the table the class of the metadata is specified.

|  |  |
| --- | --- |
| **Metadata Name** | **Metadata class** |
| Antenna Model | Class A |
| Freq. Range Min | Class A |
| Freq. Range Max | Class A |
| Type | Class A |
| Gain | Class A |
| Polarization | Class A |
| Height | Class A |
| Horz. Beam Width | Class A |
| Vert. Beam Width | Class A |
| Min Azi. Beam Dir. | Class A |
| Max Azi. Beam Dir. | Class A |
| Min Elev. Beam Dir. | Class A |
| Max Elev. Beam Dir. | Class A |
| Curr. Azi. Beam Dir. | Class B |
| Curr. Elev. Beam Dir. | Class B |
| Cable loss | Class A |

A detailed description of the field of each metadata is reported in the table below

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Editable** | **Content** |
| Antenna Model | string | “0” | It contains a string with the model of the antenna that is installed. |
| Freq. Range Min | float | “0” | Min frequency value expressed in Hz |
| Freq. Range Max | float | “0” | Max frequency value expressed in Hz |
| Type | string | “0” | Antenna type |
| Gain | float | “0” | Antenna gain expressed in dBi |
| Polarization | string | “0” | Antenna polarization [“VL”|“HL”|“LHC”|“RHC”|“Slant”] |
| Height | float | “0” | Antenna heigh in m. |
| Horz. Beam Width | float | “0” | Horizontal 3-dB beamwidth expressed in degrees |
| Vert. Beam Width | float | “0” | Vertical 3-dB beamwidth expressed in degrees |
| Min Azi. Beam Dir. | float | “0” | minimum direction of main beam in azimuthal plane expressed in degrees from N |
| Max Azi. Beam Dir. | float | “0” | maximum direction of main beam in azimuthal plane expressed in degrees from N |
| Min Elev. Beam Dir. | float | “0” | minimum direction of main beam in elevation plane expressed in degrees from horizontal plane |
| Max Elev. Beam Dir. | float | “0” | maximum direction of main beam in elevation plane expressed in degrees from horizontal plane |
| Curr. Azi. Beam Dir. | float | “0” if fixed antenna is used“1” if an antenna with beam steering capability is used. | Current direction of main beam in azimuthal plane expressed in degrees from N |
| Curr. Elev. Beam Dir. | float | “0” if fixed antenna is used“1” if an antenna with beam steering capability is used. | Current direction of main beam in elevation plane expressed in degrees from horizontal plane |
| Cable loss | float | “0” | Cable loss expressed in dB of the cable connecting the antenna with the RF front-end |

7.1.3       RF Front-end metadata

RF Front-end metadata is reported in the table below. In the second column of the table the class of the metadata is specified.

|  |  |
| --- | --- |
| **Metadata Name** | **Metadata class** |
| Low Freq Passband | Class A |
| High Freq Passband | Class A |
| Low Freq Stopband | Class A |
| High Freq Stopband | Class A |
| LNA Gain | Class A |
| LNA Noise Figure | Class A |

A detailed description of the field of each metadata is reported in the table below

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Editable** | **Content** |
| Low Freq Passband | float | “0” | Low passband frequency evaluated at -1 dB and expressed in Hz |
| High Freq Passband | float | “0” | High passband frequency evaluated at -1 dB and expressed in Hz |
| Low Freq Stopband | float | “0” | Low stopband frequency evaluated at -60 dB and expressed in Hz |
| High Freq Stopband | string | “0” | High stopband frequency evaluated at -60 dB and expressed in Hz |
| LNA Gain | float | “0” | Low Noise Amplifier Gain expressed in dB |
| LNA Noise Figure | float | “0” | Noise Figure of LNA expressed in dB |

7.1.4       Calibration Metadata

Calibration metadata is reported in the table below. In the second column of the table the class of the metadata is specified.

|  |  |
| --- | --- |
| **Metadata Name** | **Metadata class** |
| Cal. Sig. Freq. | Class A |
| Cal. Sig. Ampl. | Class A |
| Self Calibration flag | Class A |
| Last Cal. Date | Class A |

A detailed description of the field of each metadata is reported in the table below

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Editable** | **Content** |
| Cal. Sig. Freq. | float | “0” | Frequency of the internal calibration source expressed in Hz |
| Cal. Sig. Ampl. | float | “0” | Amplitude of the internal calibration source expressed in dB |
| Self Calibration flag | boolean | “0” | This is set to “1” if the sensor performs a periodical self calibration procedure. Otherwise it is set to “0” if the self calibration is performed after a user request |
| Last Cal. Date | string | “0” | The time stamp of the last calibration expressed as HH:MM:SS YYYY/MM/DD |

7.1.5       SDR Metadata

SDR metadata is reported in the table below. In the second column of the table the class of the metadata is specified.

|  |  |
| --- | --- |
| **Metadata Name** | **Metadata class** |
| SDR Manufacturer | Class A |
| SDR Model | Class A |
| Firmware version | Class A |

A detailed description of the field of each metadata is reported in the table below

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Editable** | **Content** |
| SDR Manufacturer | string | “0” | Manufacturer of the sensor used |
| SDR Model | string | “0” | Model of the sensor used |
| Firmware version | string | “0” | Current firmware version |

7.1.6       SSD Host Metadata

Host metadata is reported in the table below. In the second column of the table the class of the metadata is specified.

|  |  |
| --- | --- |
| **Metadata Name** | **Metadata class** |
| Manufacturer | Class A |
| Model | Class A |
| Installation Date | Class A |
| OS | Class A |

A detailed description of the field of each metadata is reported in the table below

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Editable** | **Content** |
| Manufacturer | string | “0” | Manufacturer of the host |
| Model | string | “0” | Model of the host |
| Installation Date | string | “0” | The date when SSD has been installed expressed as YYYY/MM/DD |
| OS | string | “0” | Operating System installed on the host |

7.1.7       Environmental Metadata

Environment metadata is reported in the table below. In the second column of the table the class of the metadata is specified.

|  |  |
| --- | --- |
| **Metadata Name** | **Metadata class** |
| GPS | Class C |
| Temperature | Class C |
| Humidity | Class C |

A detailed description of the field of each metadata is reported in the table below

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Editable** | **Content** |
| GPS | Array of float | “0” | [Latitude expressed in decimal degrees (-90°-90°)Longitude expressed in decimal degrees (-180°-180°) |
| Temperature | float | “0” | Environment temperature expressed in K |
| Humidity | float | “0” | Environment relative humidity expressed in percentage |

7.1.8    SSD Software metadata

For Software metadata, they are the result of a processing of acquired data samples. No reason to have editable attribute, since they cannot be modified but they are just readable by the final user. Modifications are allowed by the SSM as specific task initial settings.

7.1.8.1      Algorithm specification

|  |  |  |
| --- | --- | --- |
| **Algorithm** | **Value** | **Notes** |
| Unspecified | 0 |  |
| Energy Detection | 1 | Default |
| Direction Finding | 2 |  |
| Cyclostationary | 3 |  |
| Wideband | 4 |  |

7.1.8.2 Acquisition metadata

Acquisition metadata is reported in the table below. In the second column of the table the class of the metadata is specified.

|  |  |
| --- | --- |
| ***Metadata Name*** | ***Metadata class*** |
| Frequency | Class B |
| Sample Rate | Class B |
| Bandwidth | Class B |
| Time Stamp | Class C |

A detailed description of the field of each metadata is reported in the table below

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Content** |
| Frequency | float | Actual center frequency of the acquisition process |
| Sample Rate | float | Sample rate used for A/D conversion |
| Bandwidth | float | Acquisition spectrum interval width. |
| Time Stamp | float | Time information expressed in seconds from January,1 1970. |

7.1.8.3 Signal Processing metadata

Signal Processing metadata is reported in the table below. In the second column of the table the class of the metadata is specified.

|  |  |
| --- | --- |
| **Metadata Name** | **Metadata class** |
| IQ capture | Class B |
| Frequency Domain Samples | Class B |
| Sensing algorithm | Class B |

A detailed description of the field of each metadata is reported in the table below

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Content** |
| IQ capture | Boolean | Tag to describe if data content is IQ samples format |
| Frequency Domainsamples | Boolean | True if frequency spectrum |
| Sensing algorithm | Enumerate | Numerical association to one of the implemented sensing algorithms (list 0—5 described in algorithm specification table) |

7.1.8.4 Scheduling metadata

Scheduling metadata is reported in the table below. In the second column of the table the class of the metadata is specified.

|  |  |
| --- | --- |
| **Metadata Name** | **Metadata class** |
| Priority | Class B |
| On-Demand | Class B |
| Timed | Class A |

A detailed description of the field of each metadata is reported in the table below

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Content** |
| Priority | enumerate | ssNumerical association to one of the listed scheduling techniques (0 – RR round robin; 1 – FCFS (first come first served), 2 – SJF (shortest job first). The techniques can allow pre-determined scanning operations or contemplate possibility of on-demand task. |
| On-Demand | boolean | If true, it allows to schedule on-demand sensing tasks in real time. Requests can also be asynchronous and be served according to the priority rules. |
| Timed | boolean | Tasks are planned to be executed at a certain time in a day. If multiple tasks have to be executed in the same time, priority rules to transfer data to SSM apply. |

7.1.8.5 Packaging and transmission metadata

Packaging and transmission metadata is reported in the table below. In the second column of the table the class of the metadata is specified.

|  |  |
| --- | --- |
| **Metadata Name** | **Metadata class** |
| Format | Class C |
| Compression | Class C |

A detailed description of the field of each metadata is reported in the table below

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Content** |
| Format | Enumerate | Numerical association with a listed sequence of data coding techniques |
| Compression | Enumerate | Lossless or lossy data compression technique used |

7.1.9       SSD Task Control metadata

7.1.9.1      Scheduler Specification

|  |  |  |
| --- | --- | --- |
| **Algorithm** | **Value** | **Notes** |
| Unspecified | 0 |  |
| Host Controller | 1 |  |
| Embedded Job Controller | 2 |  |
| Multilevel | 3 |  |
|  |  |  |

7.1.9.2      SSD Output Specification

|  |  |  |
| --- | --- | --- |
| **Algorithm** | **Value** | **Notes** |
| Unspecified | 0 | Invalid |
| Time domain IQ | 1 | Default |
| Freq domain IQ | 2 |  |
| Time domain Amp, Phase | 3 |  |
| Freq domain Amp, Phase | 4 |  |