Appendix B

1 Export of SimpleSAT SRDB data into MIB data exchange format

In [**?**], authors have built and have shown how M&C data of SimpleSAT SRDB are defined. In this appendix, we aim to illustrate how this data could be represented in a set of MIB-compliant files. Additionally, in this illustrative scenario, we assume that the content of the MIB files is fully compliant with the PUS services implementation in the OBSW. More details concerning the compliance between MIB data and OBSW PUS services can be found in [**?**, **?**].

1.1 MIB definition of service 2 TC to switch on the RW

In this section, we show how the definition of PUS service 2 TC can be defined in MIB files to switch on the RW of SimpleSAT. Figure 1 shows what MIB files are used to encode the service 2 TC mentioned before before sending it to the onboard systems of SimpleSAT. Table 1 details the different steps of the encoding process.

ccf.dat

```
PK1021  SwitchOnRW          N   HEADER_TC   2   1   208 1   N   Y   N   C       N
```

Figure 2: Illustration of the content of the MIB **CCF** file

cdf.dat

```
PK1021  E       16  0   0   P00004  E   PKT_1553_SWITCH_ON_RW
```

Figure 3: Illustration of the content of the MIB **CDF** file

cpc.dat

```
P00004  1553_Telecommand    2   16  A   D       T           C00003  R
```

Figure 4: Illustration of the content of the MIB **CPC** file

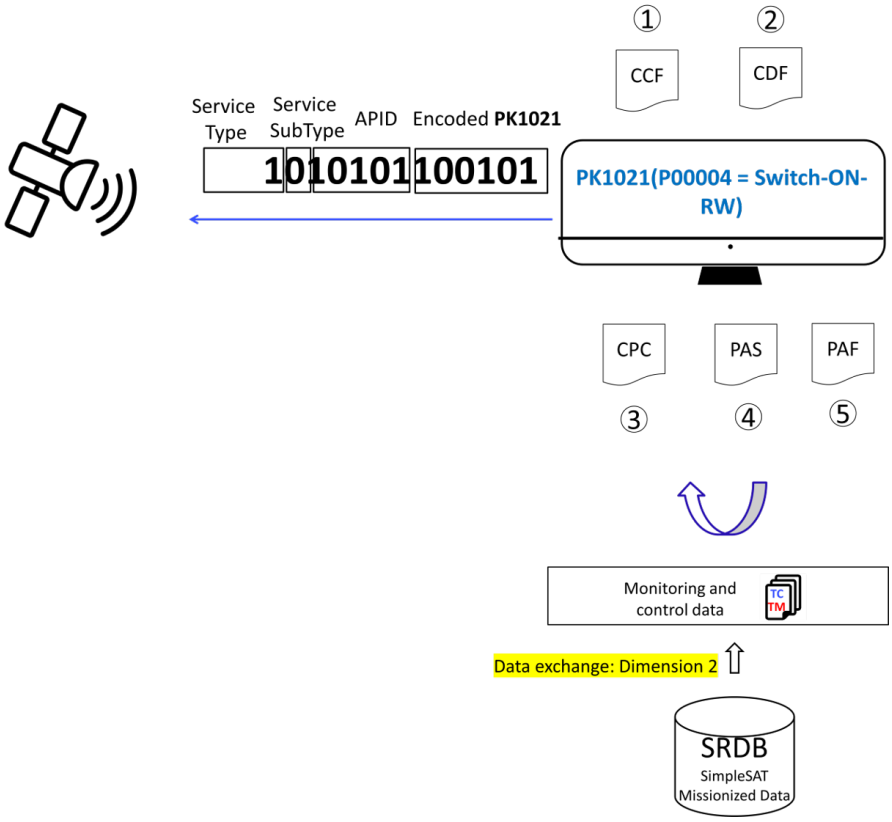

Figure 1: Example of encoding service 2 TC of SimpleSAT to switch on the RW

paf.dat

```
1   C00003   1553-CMD-RW U    2
```

Figure 5: Illustration of the content of the MIB **PAF** file

pas.dat

```
1   C00003   Switch-ON-RW     A0897
2   C00003   Switch-OFF-RW    352
```

Figure 6: Illustration of the content of the MIB **PAS** file

Step	MIB files role
Step 1	The operator selects the service 2 TC PK1021 whose definition is in the file CCF as shown in Figure 2
Step 2	The TC is associated with the parameter P00004 in the file CDF as shown in Figure 3. The role of this parameter is to capture the action to be done by the RW
Step 3	P00004 parameter details are defined in the file CPC as shown in Figure 4. This parameter refers to the calibration C00003
Step 4	The calibration C00003 associates a raw value with the textual value S̈witch ON RW:̈ The value is the encoding of the Mil-Std-1553 packet that will actually switch on the RW onboard. The definition of the properties C00003 is in the file PAF as shown in Figure 5
Step 5	The mapping between raw values and their textual labels in C00003 are captured in the file PAS as shown in Figure 6

Table 1: MIB data encoding example for SimpleSAT

1.2 MIB definition of a housekeeping packet to report RW temperature

The second scenario consists in showing how MIB files, exported from SimpleSAT's SRDB, can be used to decode incoming housekeeping packet (PUS service 3). We show the decoding process as depicted in Figure 7 and what MIB files are involved in this process as summarized in Table 2.

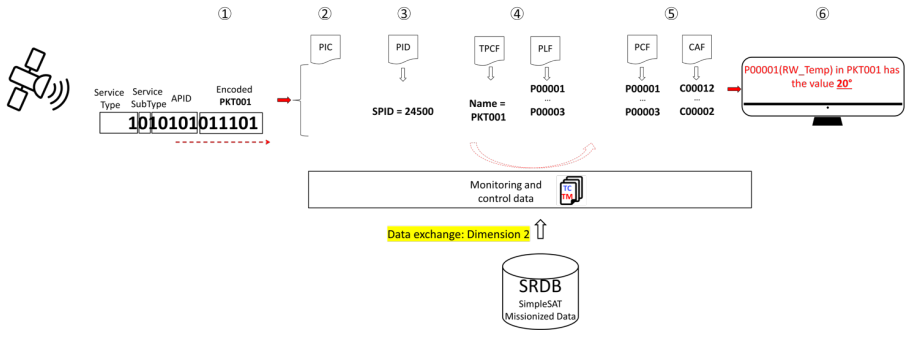

Figure 7: SimpleSAT example of decoding TM raw data using MIB files

For each important object we provide a snapshot of its representation in the MIB files. For the detail of each column, it is possible to refer to the SCOS-2000

Step	MIB files role
1	A raw TM packet flow arrives. As it is a representation of a PUS-compliant packet, the packet's service, subservice and application process identifier (APID) are extracted from its header. The structure of PUS-compliant packets is detailed in [**?**]
2	By relying on information in the PIC file, which is part of the MIB exchange format, it is possible to determine whether this flow also contains the values of one or two discriminants. Discriminants aim to identify each TM packet separately from the others
3	Once the values of the tuple <Service,Subservice,APID,Disciminants> are determined, then using information in the file PID, it is possible to identify the packet identifier named SPID [**?**]. The SPID represents a unique identifier of every TM packet
4	Using this SPID: (1) The name of the packet is determined by relying on information in the file TPCF as shown in Figure 8. This name is **PKT001**. This is what operators will see on their screen.(2) The parameters contained in the packet are determined by relying on the information in the file PLF. This list includes the parameter **P00001**
5	Once the list of parameters is identified, their properties are determined by relying on the content of the file PCF as shown in Figure 9. Among these properties, we can find the identifier of the parameter's calibration whose content is determined from the file CAF as shown in Figure 10. This calibration is then used to calculate the engineering value corresponding to the raw value of the parameter
6	These are the values along with their units which are displayed to the end user

Table 2: MIB data decoding example for SimpleSAT

Interface Control Document (ICD)[1].

Definition of telemetry packets is depicted in Figure 8.

tpcf.dat

```
24500    PKT001   26
24501    PKT003   22
24502    PKT004   22
```

Figure 8: Illustration of the content of the MIB **TPCF** file

Definition of telemetry parameters along with their calibrations are depicted in Figure 9.

pcf.dat

```
P00000  Filler          3   11              N   R       F   N
P00001  RW_Temperature      degC    3   12          N   R   C00012  F   N   2
P00002  RW_Status           1   0               S   R   C00002  F   N
P00003  RW_Global_Status             3   14          N   R       F   N
P00005  TC_PACKET_ID             3   12              N   R       F   N
P00006  TC_PACKET_SEQ_CTRL           3   12              N   R       F   N
```

Figure 9: Illustration of the content of the MIB **PCF** file

caf.dat

```
1   C00010   Ohm_to_temperature   R   U   D   2
2   C00011   Raw_to_Ohm   R   I           2
3   C00012   Raw_to_temperature   R   U   D   1
```

Figure 10: Illustration of the content of the MIB **CAF** file

[1] https://bit.ly/3h8jkgf