DATA TRANSFER FROM RADAR TO PC

The radar board sends data to the PC via UART. The transmission baud rate is 921600.

The composition of the data packets is shown in Figure 1: each packet is composed of a header, including a control string (magic string), and a data array. The data array is composed of N sections called TLVs which can be enabled or disabled through the user interface. Details on the different fields of the header are given in Table 1, while Figure 2 shows the generic structure of a TLV.

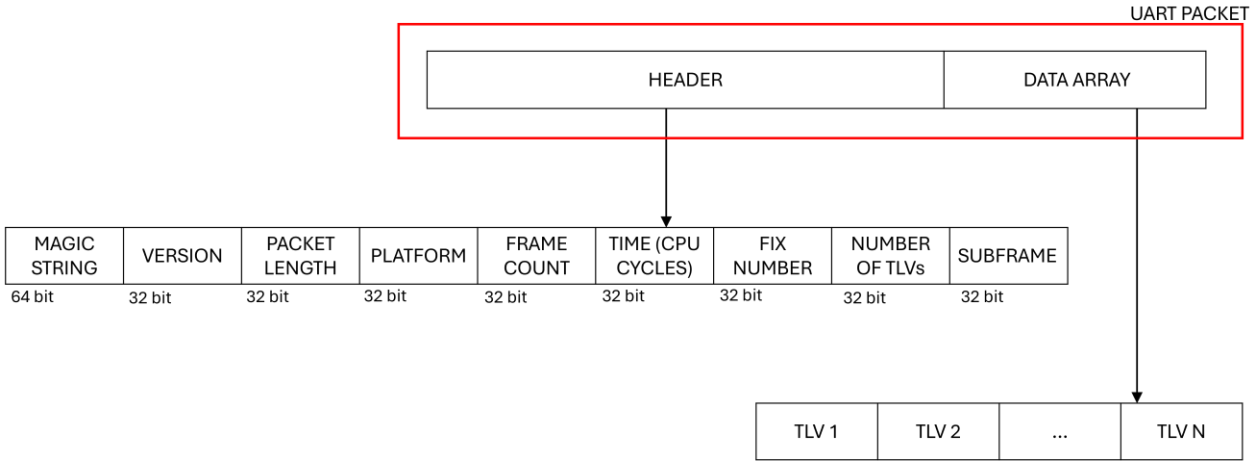

Figure 1. Structure of data packets.

Table 1. Description of the different fields of the message header.

MAGIC STRING	4 x UINT16	[0x0102 0x0304 0x0506 0x0708]
VERSION	UINT32	Firmware version (0x3050004)
PACKET LENGTH	UINT32	Total length of the packet, including control string, header and data array, in bytes
PLATFORM	UINT32	Platform type (0xA1642)
FRAME COUNT		Frame number
TIME (CPU CYCLES)	UINT32	Time, in CPU cycles of the DSS, when the message was created
FIX NUMBER	UINT32	99
NUMBER OF TLVs	UINT32	Depends on the user selection
SUBFRAME	UINT32	Number of the subframe (always = 0)

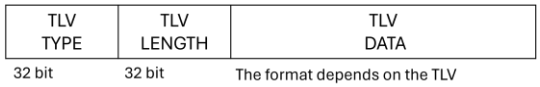

Figure 2. Composition of a generic TLV.

The TLVs that can be optionally enabled are listed in Table 3 to Table 6. Each TLVs is explained in detail in tables from Table 3 to Table 6.

Table 2. List of the TLVs.

Name	Identification code	Description
MMWDEMO_OUTPUT_MSG_STATS	1	Vital signs data
MMWDEMO_OUTPUT_MSG_RANGE_PROFILE	2	Range Profile
MMWDEMO_OUTPUT_MSG_ADC_DATA	3	ADC raw data
MMWDEMO_OUTPUT_MSG_SYSINFO	4	System information

Table 3. Description of the vital signs' TLV.

	TLV1 – Vital signs data	
Type	1	
Length (bytes)	24	
Content	Range bin of the maximum of the range profile	2 bytes, uint16
	Analyzed range bin	2 bytes, uint16
	Max value of the range profile	4 bytes, float
	Phase value	4 bytes, float
	Breath signal	4 bytes, float
	Heart signal	4 bytes, float
	Frame counter	4 bytes, uint32

Table 4. Description of the range profile TLV.

	TLV2 – Range profile	
Type	2	
Length (bytes)	4 x Number of processed range bins	
Content	Range profile (complex data). For each range bin, real and imaginary parts of the range profile are transmitted. The range profile is transmitted only for the range bins included in the limits set by the user. Data are transmitted in the order [Re0 Im0 Re1 Im1…]	2 bytes, int16, each value

Table 5. Description of the ADC raw data TLV.

	TLV2 – ADC data	
Type	3	
Length (bytes)	4 x 4 x Number of ADC samples	
Content	I/Q ADC data of all the four RX antennas. Data are transmitted in the order: [Rx0_I0 RX0_Q0 RX0_I1 RX0_Q1 …. RX1_I0 RX1_Q0 RX1_I1 RX1_Q1 …]	2 bytes, int16, each value

Table 6. Description of the system's information TLV.

	TLV4 – System information	
Type	4	
Length (bytes)	20	
Content	Range accuracy	4 bytes, float
	Frame periodicity	4 bytes, float
	Number of transmitted chirps per frame	2 bytes, uint16
	First analyzed range bin	2 bytes, uint16
	Last analyzed range bin	2 bytes, uint16
	Rx antenna processed	2 bytes, uint16
	Frame counter	4 bytes, uint32