

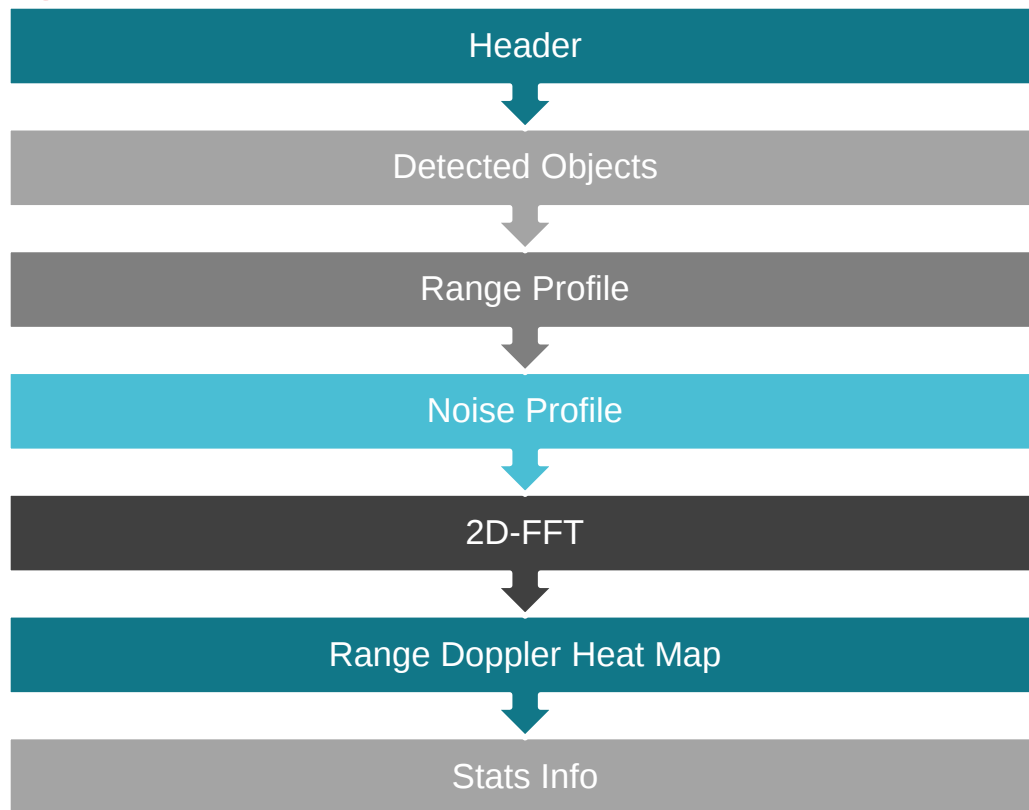
mmw Demo Data Structure v0.1

xWR14xx/xWR16xx

SDK v1.0.x.x

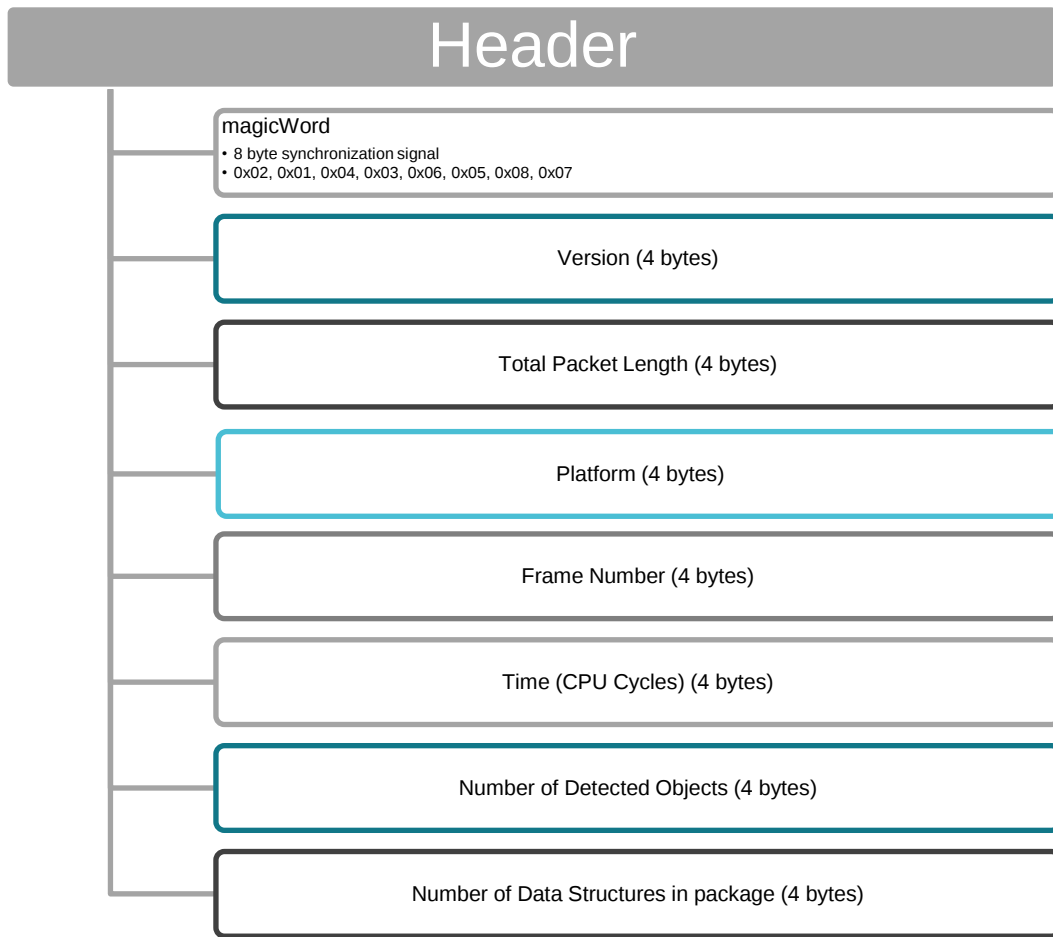
mmW Demo Package Structure

- Data is output through the Data UART Port
 - Baud Rate = 921600
- Data is Little Endian
- Packet consists of a header and all of the enabled data fields
- Can be configured via CLI interface
- One packet is sent per frame
- Length is multiple of 32 bytes



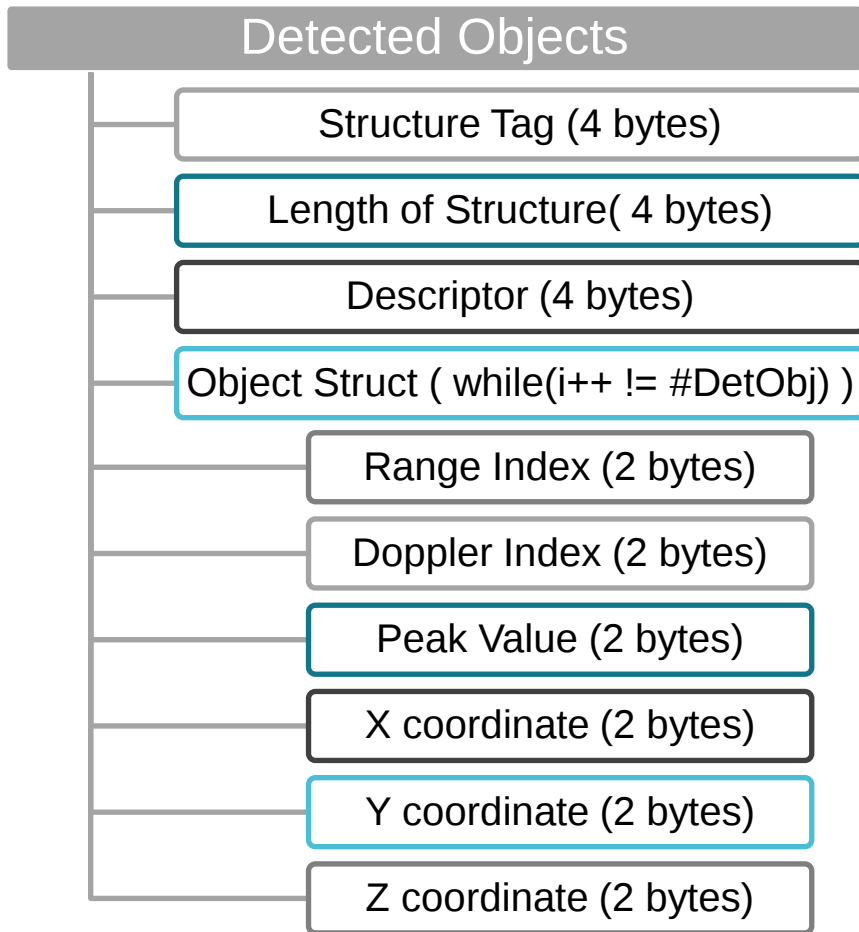
Header

- Sent at the beginning of every transmission
- Always 36 bytes
- Contains information regarding the whole data packet
- Contains the magicWord used to signal the start of a packet



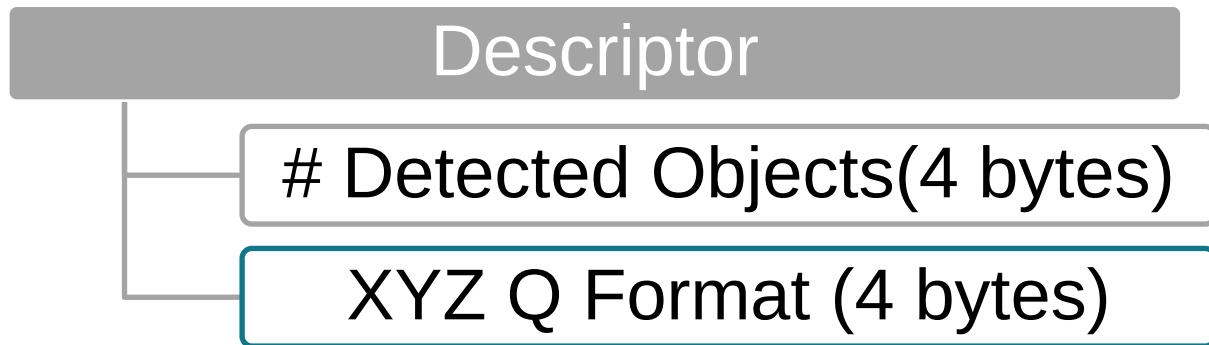
Detected Objects

- Contains range, angle, and velocity information of objects seen by the mmWave device
- Size depends on number of objects detected
- X, Y, and Z coordinates are in the Q format specified in the Descriptor field



Detected Objects Descriptor

- Describes how many objects have been detected and the Q format the data is in



Range Profile

- Contains 1D array of Log Magnitude Range FFTs
 - i.e. The first column of the Log Mag Range-Doppler Matrix
- Size = #RangeBins * 4 bytes
- #RangeBins = number of ADC samples rounded up to the nearest power of 2
- #ADCsamples is set in the profileCfg line of the cfg file

Range Profile

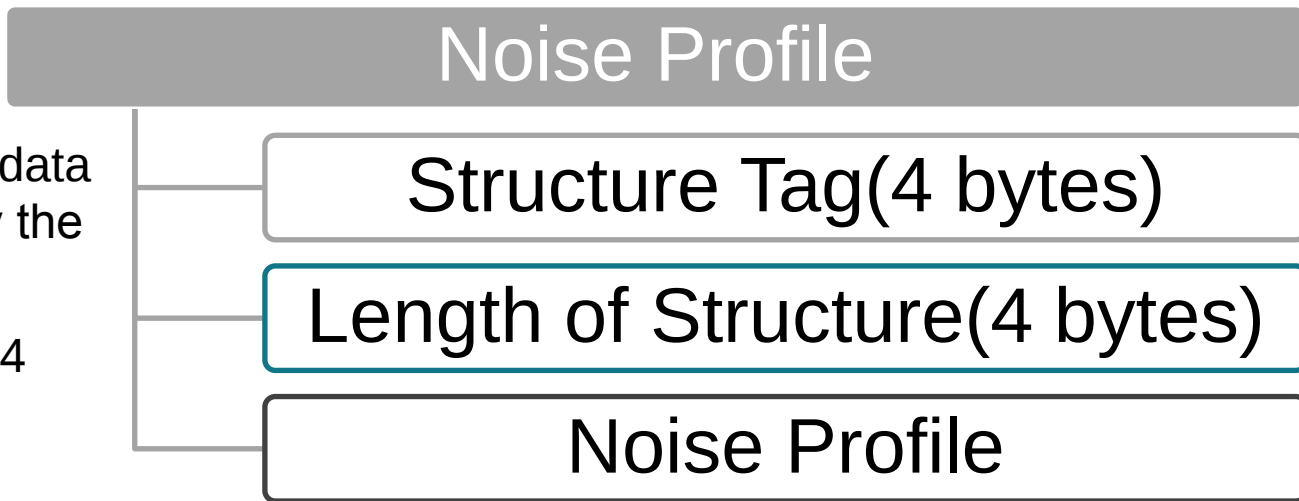
Structure Tag (4 bytes)

Length of Structure(4 bytes)

Log Mag Range Profile

Noise Profile

- Contains 1D array of data considered “noise” by the mmWave demo
- Size = #RangeBins * 4 bytes



Range Azimuth Heat Map

Range Azimuth Heat Map

- Contains 2D antenna symbols from the radar cube matrix
- 2D-FFT symbols are sent for each range bin at 0 Doppler
- On PC, Azimuth FFT is applied to symbols for each range bin and a static heat map is constructed
- $\text{Size} = \text{\#RangeBins} * \text{\#VirtualAntennas} * 4 \text{ bytes}$
- $\text{\#VirtualAntennas} = \text{\#RXantennas} * \text{\#TXantennas}$
- Number of Rx and Tx antennas are set in the configuration file

Structure Tag(4 bytes)

Length of Structure(4 bytes)

Range Azimuth Heat map

Range Doppler Heat Map

- Sends entire, 2D, Log Magnitude Range/Doppler array
- $\text{Size} = \text{\#RangeBins} * \text{\#DopplerBins} * 4 \text{ bytes}$
- $\text{\#DopplerBins} = \frac{\text{\#ChirpsPerFrame}}{\text{\#TXantennas}}$

Range Doppler Heat Map

Structure Tag(4 bytes)

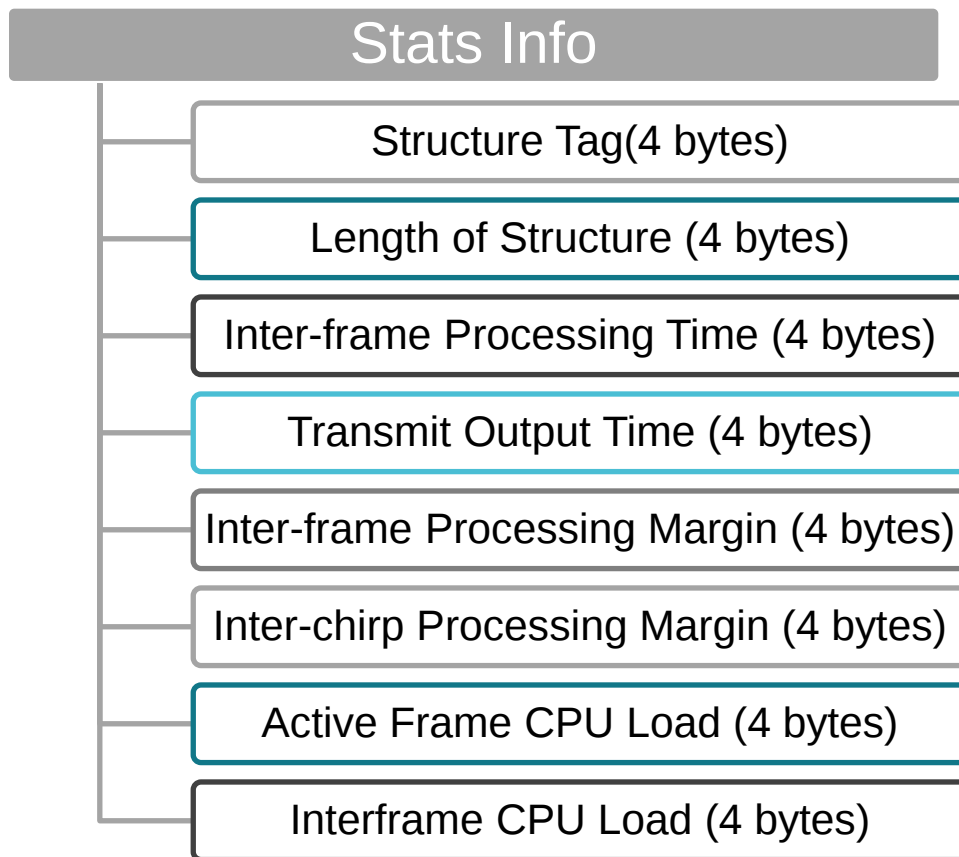
Length of Structure(4 bytes)

~~Range Azimuth Heat map~~

Doppler

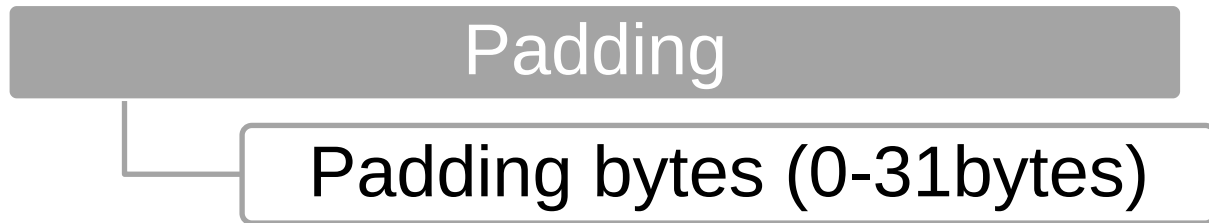
Stats Info

- Contains mmWave device performance statistical data
- Size = 32 bytes



Padding bytes

- Padding bytes are added to ensure that total packet length (including header) is a multiple of 32 bytes



	Size (Bytes)	When is it sent?**	Description
<u>Header</u> - Magic Word - Version - Total packet length - Platform - Frame number - Time (CPU Cycles) - Number detected objects - Number TLV's	36 (total) 8 4 4 4 4 4 4 4	ALWAYS	Contains information regarding the whole data packet
<u>Detected Objects</u> - Tag & length - Descriptor - Payload (object array)	<u>12+(# of objects*12)</u> 8 4 # of detected objects * 12	If “detected objects” parameter is set to 1	Contains range, angle, and velocity information of objects detected by the mmWave device
<u>Range Profile</u> - Tag & length - Payload	<u>8+(# of range bins*2)</u> 8 # of range bins*2	If “range profile” parameter is set to 1	Contains 1D array of Log <u>Magnitude Range FFTs</u>
<u>Noise Profile</u> - Tag & Length - Payload	<u>8+(# of range bins*2)</u> 8 # of range bins*2	If “noise profile” parameter is set to 1	Contains 1D array of data considered “noise” by the mmWave demo
<u>Azimuth Heat Map</u> - Tag & Length - Payload	<u>8+(# of range bins*# of virtual antennas *4)</u> 8 # of range bins*# of virtual azimuth antennas*4	If “range azimuth heat map” parameter is set to 1	Contains azimuth data from the radar cube matrix
<u>Range Doppler Heat Map</u> - Tag & Length - Payload	<u>8+(# of range bins*# of doppler bins*2)</u> 8 # of range bins*# of doppler bins*2	If “range doppler heat map” parameter is set to 1	Sends entire, 2D, <u>Log Magnitude Range/Doppler array</u>
<u>Statistics Profile</u> - Tag & Length - Payload	<u>32</u> 8 24	If “statistics” parameter is set to 1	Contains mmWave device performance statistical data
<u>Padding Bytes</u>	<u>0 – 31 bytes</u>	If total packet length is not a multiple of 32	Bytes are added to ensure that total packet length (including header) is a multiple of 32