LMS Hardware Engineer Assignment

Message Extractor

All exchanges have a custom protocol in which they disseminate data and accept data from their customers. The objective of the assignment is to design and implement a message extractor/parser.
The format of the incoming data stream is given below.

Address 0 (LSB)

MSG COUNT	MSG_1 LENGTH	PAYLOAD_1	…	MSG_n LENGTH	PAYLOAD_n
2 Bytes	2 Bytes	Variable Bytes	…	2 Bytes	Variable Bytes

Field name	**Length**	**Description**
Message Count	2 Bytes	Number of messages in the packet
Message length	2 Bytes	Length of the following message excluding this field
Payload	Variable	Payload data

The expected output of the block is the payload of these messages.

Assumptions:

1. The input of the module is a 64bit AXI-ST interface.
2. The minimum message length for any message is **8 Bytes** and the maximum is **32 Bytes**. The total size of the entire stream can be a maximum of 1,500 bytes.
3. It outputs each message one after the other

Questions

1. Draw a diagram of your chosen design (feel free to use https://asciiflow.com)
2. Write an elegant, synthesizable solution for the message extractor in RTL/Verilog/SystemVerilog using the skeleton provided. And verify it against the given sample inputs.

NOTE: If Verilog/SystemVerilog is too big of a step, please feel free to use VHDL, in that case the diagram and the explanation/comments of your code will have a bigger impact. The reference is the bare minimum that the design must be able to handle. The candidate is encouraged to add more test cases that cover as many scenarios they can think of to showcase their design skills.

3. What is the bottleneck of your design/code? (what can limit the maximum frequency?)
4. Please explain how would your design change if the range of message lengths change from min=8B max=32B to:
    a. min=1B ; max=32B
    b. min=8B ; max=256B
5. What are the trade-offs for the chosen approach?

Please write down all other assumptions that you make as comments in your code.

Please reach us if you have any questions.