

IRIG 106 Chapter 7

Purpose

- Chapter 7 of IRIG 106 is a form of packetized telemetry that is designed to work with existing telemetry hardware.
- Chapter 7 builds on traditional PCM, so standard encryptors, decryptors, transmitters, tracking antennas, receivers, and bit synchronizers are all compatible with Chapter 7.
- There is no need to reinvest in receiving and processing hardware in order to take advantage of Chapter 7.

Content

- Chapter 7 of IRIG 106 multiplexes data packets into a PCM stream for transmission through the standard transmission/reception path.
- There are several defined packet types, such as Chapter 10 packets, Ethernet packets, and TMnS packets.
- There are also accommodations for user-defined packets.

Golay Code Protection

- Purpose is to protect from multi-bit errors
- It can correct up to 3-bit transmission errors in a 24-bit sequence.
- 12-bit words are encoded into 24 bits.
- Only critical elements are protected using the Golay code such as the Encapsulation Packet Header and 48-bits of the Chapter 11 SP header.

Glossary

- EP = Encapsulation Packet
- SP = Source Packet
- TP = Transport Packet
- HDR = Header
- LLEP = Low-Latency Encapsulation Packet

Graphical Overview

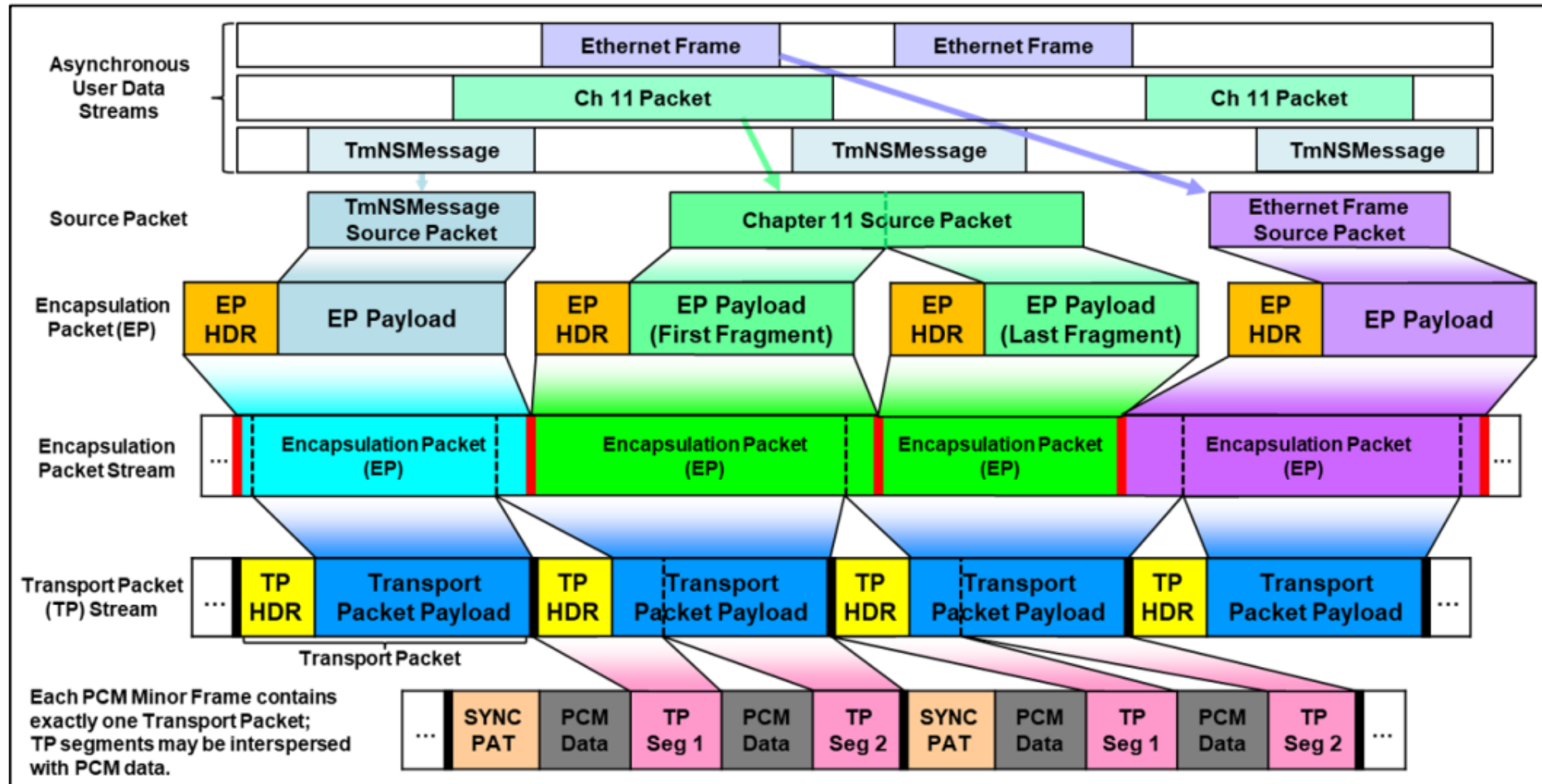


Figure 7-1. Packet Telemetry Overview

Encapsulation Packet Structure

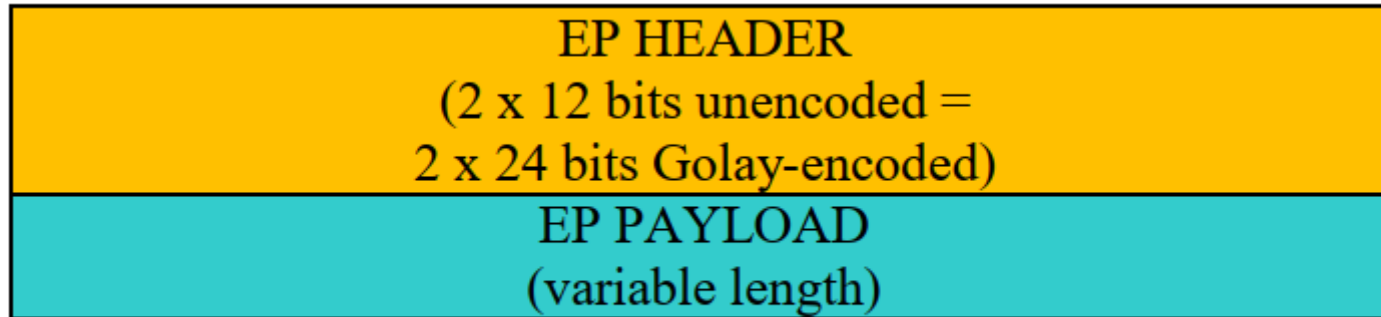


Figure 7-2. Encapsulation Packet Structure

	11	10	9	8	7	6	5	4	3	2	1	0
Word 0	Reserved		Content				Fragment		Length (15 – 12)			
Word 1	Length (11 – 0)											

Figure 7-3. EP Header Protected Fields (Unencoded)

Packet Content

- 0 = Fill SP (Fill with 0xAA)
- 1 = Application – Specific SP
- 2 = Test Counter SP
- 3 = Chapter 11 SP
- 4 = Raw Ethernet Media Access Control (MAC) Frame SP
- 5 = Internet Protocol (IP) SP
- 6 = Chapter 24 TmNSMessage SP

Chapter 11 SP Protected Fields

	11	10	9	8	7	6	5	4	3	2	1	0
Word 0	Reserved (0)								Channel ID (15 – 12)			
Word 1	Channel ID (11 – 0)											
Word 2	Packet Trailer Bytes ¹ (4 – 0)						Data Length ² (18 – 12)					
Word 3	Data Length ² (11 – 0)											

¹ The packet trailer bytes shall contain the sum of the Chapter 11 SP's secondary header length, fill bytes length, and packet checksum length. See Subsection [7.2.2.4.1](#).

² The Data Length field size limit of 19 bits is sufficient for all Chapter 11 packet sizes, except Computer-Generated Data Packet, Format 1 setup record. See Subsection [7.2.2.4.1](#).

Figure 7-8. PT Chapter 11 Header Protected Fields (Unencoded)

Chapter 11 SP Unprotected fields

31	24	23	16	15	8	7	0
Data Type		Packet Flags		Sequence Number		Data Type Version	
Relative Time Counter (low)							
Header Checksum				Relative Time Counter (high)			

Figure 7-9. Chapter 11 Source Packet Header Unprotected Fields

TmNSMessage SP Header Protected Fields

	11	10	9	8	7	6	5	4	3	2	1	0
Word 0	Message Version				OptionWordCount				MessageFlags (3 – 0)			
Word 1	MessageFlags (15 – 4)											
Word 2	Reserved				MessageDefinitionID (31 – 24)							
Word 3	MessageDefinitionID (23 – 12)											
Word 4	MessageDefinitionID (11 – 0)											
Word 5	MessageType				MessageLength (31 – 24)							
Word 6	MessageLength (23 – 12)											
Word 7	MessageLength (11 – 0)											

Figure 7-15. TmNSMessage SP Header Protected Fields (Unencoded)

TmNSMessage SP Header Unprotected Fields

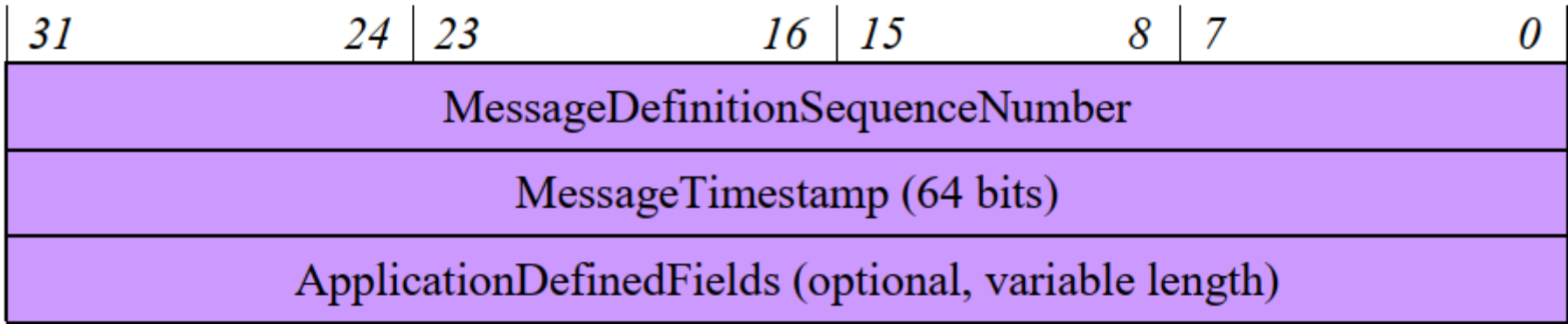


Figure 7-16. TmNSMessage SP Header Unprotected Fields

Low Latency Packets

- Provide a mechanism to transmit critical data with deterministic latency
- Occur at fixed points within the Class II PCM frame
- Must not span multiple Transport Packets.
- Encapsulation Packet is wrapped around the LLEP

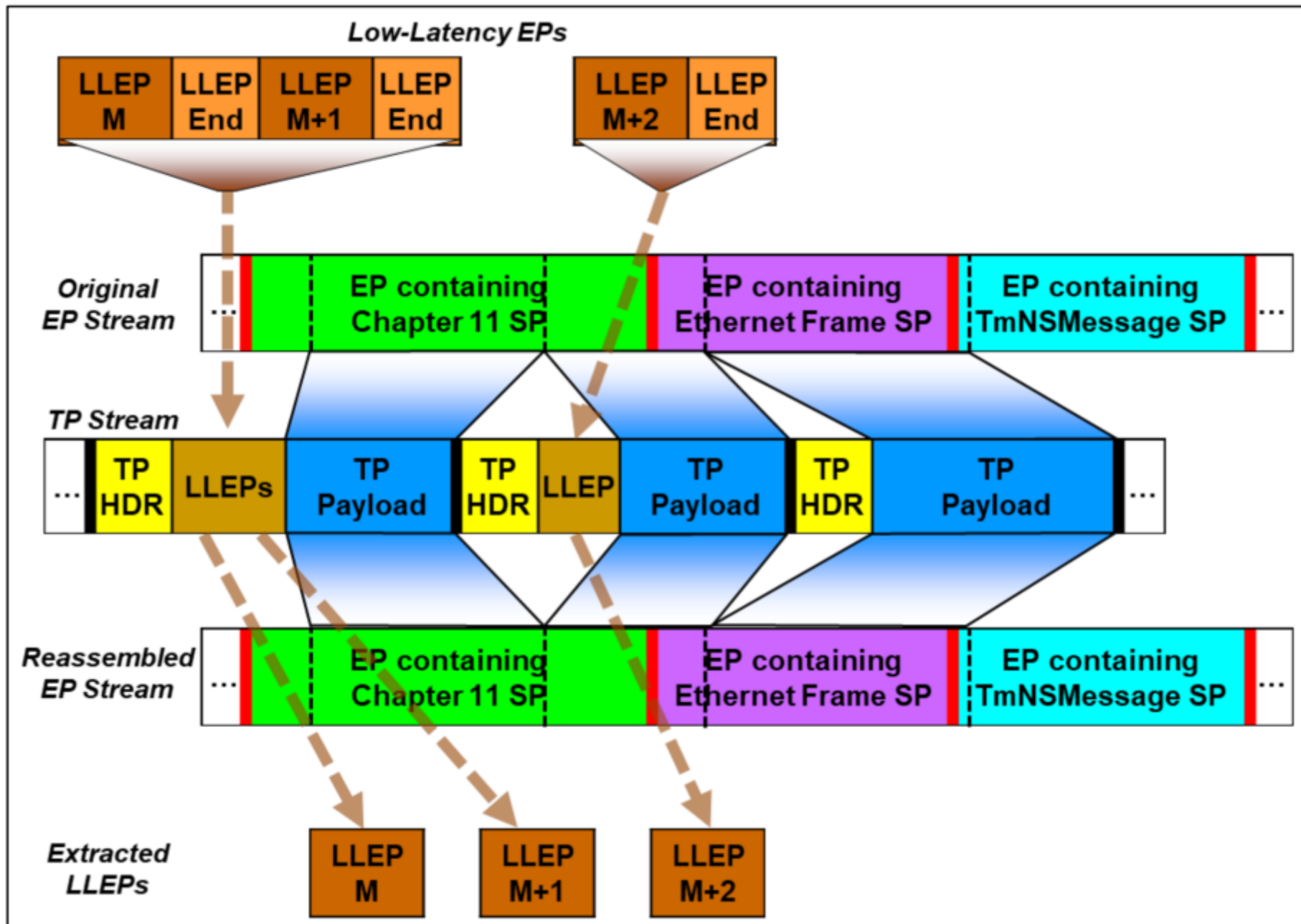


Figure 7-25. Transport Packet Segmentation with LLEPs Overview

Standard

- RCC Document Repository @ WSMR
- https://www.wsmr.army.mil/RCCsite/Documents/106-20_Telemetry_Standards/chapter7.pdf