Intel® Ethernet Controller X710/ XXV710/XL710

Dynamic Device Personalization GTPv1-C and GTPv1-U Protocols

Ethernet Products Group (EPG)

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Revision 1.3

Revision History

Revision	Date	Comments
1.3	October 2021	Replaced .pkgo with .pkg. Refreshed template.
1.2	March 2018	Updated Table 2 (Version History). Updated note after Table 4 (GTP Packet Field Vector).
1.1	January 2018	Updated Table 2 (Version History). Updated note at the bottom of Table 5. Changed the offset for split header to IPv6 in IPv6 GTP frames.
1.0	December 2017	Initial release (Intel Confidential).

1.0   Introduction

This documents describes the Dynamic Device Personalization (DDP) functionality supported by the Intel® Ethernet Controller X710/XXV710/XL710 starting with firmware version 6.01.

The DDP profile (0x80000008) contains the X710/XXV710/XL710 parser graph for GTPv1-C and GTPv1-U protocols.

Table 1.   Terms and Definitions

Term	Definition
DDP	Dynamic device personalization.
GPRS	General packet radio service.
GTPv1	GPRS tunneling protocol, version 1.
GTP-C	GTP control protocol.
GTP-U	GTP user data tunneling.
PDU	Protocol data unit.
G-PDU	GTP-U non-signaling PDU
TEID	Tunnel endpoint identifier.

Table 2.   Version History

Version	Description
1.0.0.0	Initial release of GTPv1 parser graph for the X710/XXV710/XL710.
1.0.1.0	Fixed checksum calculation for PTYPEs 113, 120, and 191.
1.0.2.0	Changed the offset for split header to IPv6 in IPv6 GTP frames.
1.0.3.0	Default fields swap for symmetrical IPv4/IPv6 hash.

Table 3.   Firmware/NVM Support Matrix

FW Version	NVM Map Version	Description
6.01	6.36	Operating system and device independent.
6.02	6.48	

Table 4.   GTP Packet Field Vector

Word Num	Protocol Layers			
	L2 Protocol Layers			
0:2	Destination MAC address (in outer or single L2 header).			
3:5	Source MAC address (in outer or single L2 header).			
6	Default S-tag (DPDK: word 37).			
7	0x00.			
8	Inner or single VLAN tag (in outer or single L2 header).			
	L3 Protocol Layers			
	G-PDU Inner IPv4	**G-PDU Inner IPv6**	**GTP-U Signaling**	**GTP-C**
9	First 8 words of the IPv4 header (up to including the source IP address).	First 4 words of the IPv6 header (up to including the hop limit).	0x00	0x00
10			0x00	0x00
11:12			0x00	0x00
13:16		IPv6 source address.	0x00	0x00
17:20	0x00		0x00	0x00
21:22	0x00	IPv6 destination address.	0x00	0x00
23:26	0x00		0x00	0x00
27:28	Destination IP address.		0x00	0x00
	L4 Protocol Layers			
	TCP	**UDP**	**SCTP**	**ICMP**
29:30	First 16 bytes of the TCP header.	First 8 bytes of the UDP header.	First 8 bytes of the SCTP header.	Words 0, 1 of the header.
31:32				0x00
33:36		0x00	0x00	
	DPDK Outer VLAN for QinQ			
37	S-tag (DPDK)	S-tag (DPDK)	S-tag (DPDK)	S-tag (DPDK)
	GTP Tunnel Layer and Flexible Payload			
38:41	0x00			
42:43	GTP header.			
44:45	GTP tunnel endpoint ID.			

Table 4. **GTP Packet Field Vector**

	GTP Tunnel Layer and Flexible Payload
46:49	0x00
50:57	Outer destination IP address or flexible payload.

Note: DPDK (up to release 17.11) forces flexible payload to the first 16 bytes of the payload and overrides the outer destination IP address. Starting from DPDK 18.02, the flexible payload is extracted only if enabled by the flow director configuration.

Table 5. **Packet Classifier Types and Its Input Set**

PCTYPE	PCTYPE Description	Hash Input Set	FD Input Set
22	GTP-U, IPv4 PDU	IP4-S, IP4-D, GTP TEID	GTP TEID
23	GTP-U, IPv6 PDU	IP6-S, IP6-D, GTP TEID	GTP TEID
24	GTP-U, non PDU	GTP TEID	GTP TEID
25	GTP-C	GTP TEID	GTP TEID

Note: Only GTPv1 without extension headers is supported. For GTPv1 packets with extension headers or for GTPv2-C packets without TEID behavior of hash and flow director filters is undefined.

Table 6. **Packet Types**

PTYPE	Description	PTYPE	Description
	GTP-C Types		**GTP-U non-PDU Types**
167	IPv4, GTP-C, PAY4	181	IPv4, GTP-U, PAY4
168	IPv6, GTP-C, PAY4	182	IPv6, GTP-U, PAY4
	IPv4 --> GTP-U --> IPv4		**IPv4 --> GTP-U --> IPv6**
169	IPv4, GTP-U, IPv4, PAY3	183	IPv4, GTP-U, IPv6FRAG, PAY3
170	IPv4, GTP-U, IPv4FRAG, PAY3	184	IPv4, GTP-U, IPv6, PAY3
171	IPv4, GTP-U, IPv4, UDP, PAY4	185	IPv4, GTP-U, IPv6, UDP, PAY4
172	IPv4, GTP-U, IPv4, TCP, PAY4	186	IPv4, GTP-U, IPv6, TCP, PAY4
173	IPv4, GTP-U, IPv4, SCTP, PAY4	187	IPv4, GTP-U, IPv6, SCTP, PAY4
174	IPv4, GTP-U, IPv4, ICMP, PAY4	188	IPv4, GTP-U, IPv6, ICMP6, PAY4
	IPv6 --> GTP-U --> IPv4		**IPv6 --> GTP-U --> IPv6**
175	IPv6, GTP-U, IPv4, PAY3	189	IPv6, GTP-U, IPv6, PAY3
176	IPv6 GTP-U, IPv4FRAG, PAY3	190	IPv6, GTP-U, IPv6FRAG, PAY3
177	IPv6, GTP-U, IPv4, UDP, PAY4	191	IPv6, GTP-U, IPv6, UDP, PAY4
178	IPv6, GTP-U, IPv4, TCP, PAY4	113	IPv6, GTP-U, IPv6, TCP, PAY4

Table 6.   Packet Types

179	IPv6, GTP-U, IPv4, SCTP, PAY4	120	IPv6, GTP-U, IPv6, SCTP, PAY4
180	IPv6, GTP-U, IPv4, ICMP, PAY4	128	IPv6, GTP-U, IPv6, ICMP6, PAY4

Note: Due to limited number of packet types available, for IPv6 --> GTP-U --> IPv6 packets types numeration is not sequential and some spare types with lower numbers are used.

Double tunnelling is not supported. For example, packet types for GTP over VXLAN or GTP over GRE are not supported.

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