International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.999.1

Amendment 1

(04/2014)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

Digital sections and digital line system – Metallic access networks

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Interface between the link layer and the physical layer for digital subscriber line (DSL) transceivers

Amendment 1: Extension for flow control on the PHY-to-LINK data stream over gamma reference point

Recommendation ITU-T G.999.1 (2009) – Amendment 1

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Recommendation ITU-T G.999.1

Interface between the link layer and the physical layer for digital subscriber line (DSL) transceivers

Amendment 1

Extension for flow control on the PHY-to-LINK data stream over gamma reference point

Summary

Amendment 1 to Recommendation ITU-T G.999.1 (2009) provides the following update:

- Revision to clause 6.3 with extension for flow control on the PHY-to-LINK data stream over gamma reference point.
- Update of clause 7, Table 7-1 Configuration parameters for the encapsulation.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T G.999.1	2009-10-09	15	11.1002/1000/9677
1.1	ITU-T G.999.1 (2009) Cor. 1	2010-04-22	15	11.1002/1000/10703
1.2	ITU-T G.999.1 (2009) Amd.1	2014-04-04	15	11.1002/1000/12091

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Recommendation ITU-T G.999.1

Interface between the link layer and the physical layer for digital subscriber line (DSL) transceivers

Amendment 1

Extension for flow control on the PHY-to-LINK data stream over gamma reference point

1) Clause 6.3

Update clause 6.3 "Data flow control" as follows:

6.3 Data flow control

Data flow control (DFC) is a mechanism that prevents congestion by ensuring that transmitting devices do not overwhelm receiving devices with data. This is achieved by the receiving device informing in advance the transmitting device when no further data can be received (e.g., when the RX-Buffer-Filling becomes critical), after which the transmitter stops transmission (= Transmission-Off = XOFF = Active-Backpressure) until the receiver indicates in the same manner that it has regained ability to receive data (e.g., enough free RX-Buffer-Resources) and transmission may continue (= Transmission-On = XON = Inactive-Backpressure).

For the LINK/PHY interface, data flow control is defined ~~only~~ independently for ~~the~~ both the transmission of data from the (transmitting) LINK device to the (receiving) PHY device and for the transmission of data from the (transmitting) PHY device to the (receiving) LINK device. Data flow control is defined per data stream to prevent loss of data units.

To control the data flow from the ~~LINK~~transmitting device to the ~~PHY~~receiving device, the ~~PHY~~receiving device may transmit pause units to the ~~LINK~~transmitting device. The format of the pause unit is shown in Figure 6-4.

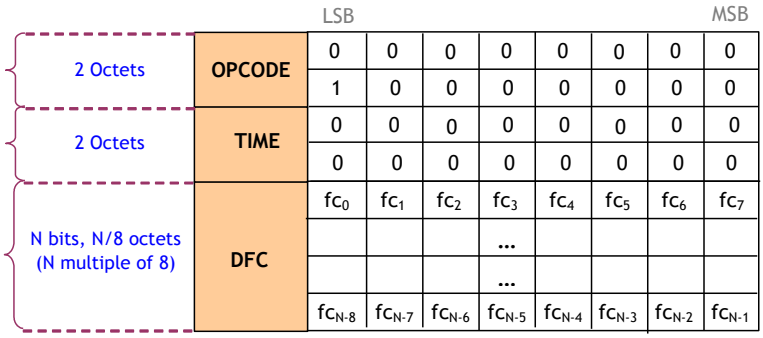

Figure 6-4 – Pause unit format

The OPCODE field shall be set to 0x0001 (i.e., the Ethernet MAC control opcode for pause frame). The OPCODE value allows to uniquely distinguish pause units from tagged data fragments.

The TIME field shall be set to 0x0000 (i.e., the Ethernet pause frame value for immediate resume of transmission).

The DFC field shall contain N/8 octets, where N represents the highest used SID, incremented to the next multiple of 8. The N data flow control bits [fc_0..fc_{N-1}] represent the data flow control states for the stream with SID = 0 up to the stream with SID = N–1. A data flow control bit shall be set to 0 to indicate the XON-State and shall be set to 1 to indicate XOFF-State for the respective data stream. A data flow control bit corresponding to an unused SID shall be set to 0.

Upon reception of a pause unit from a ~~PHY~~receiving device ~~-side~~, the ~~LINK~~transmitting device shall stop transmission within the XOFF-latency of 10 microseconds for the data streams with their flow control bit set to XOFF in this PAUSE unit.

Upon reception of a pause unit from a ~~PHY~~ receiving device, the ~~LINK~~transmitting device shall resume transmission within the XON-latency of 240 microseconds for all the data streams with their flow control bit set to XON in this PAUSE unit and was set to XOFF in the last transmitted PAUSE unit and for which the last transmitted fragment was not the last fragment of a data unit.

The XOFF-latency and XON-latency are referred to the LINK/PHY-reference point (see Figure 5-1). The XOFF-latency shall be measured from the last FCS bit of the PAUSE unit transmitted by the PHY device to the last FCS bit of the last fragment transmitted by the LINK-side for the concerned data stream. The XON-latency shall be measured from the last FCS bit of the PAUSE unit transmitted by the PHY device to the last FCS bit of the first fragment transmitted by the LINK-side for the concerned data stream.

If a data stream is in the XON-state, then the transmitter shall manage the time in-between the transmission of consecutive data fragments belonging to the same data unit, so as to avoid data underflow in the reassembly of the data units at the receiving side.

Operation with flow control on the PHY-to-LINK data stream (i.e., where the LINK device is the receiving device) is enabled only if the corresponding capability is indicated by both the LINK and PHY devices per the configuration parameter FCTL-us (see Table 7-1).

2) Clause 7

Update clause 7 "Configuration parameters" as follows:

7 Configuration parameters

Table 7-1 summarizes the encapsulation configuration parameters defined in clause 6 and defines a detailed format.

Table 7-1 – Configuration parameters for the encapsulation

NAME	SIZE	LINK	PHY	Definition
FRAGMENTATION (clause 6.1)				
TXC_MFS	[10:0]	R	R	Maximum fragment data size supported by near-end transmitter.
RXC_MFS	[10:0]	R	R	Maximum fragment data size supported by near-end receiver.
TX_MFS	[10:0]	R/W	R/W	Maximum fragment data size to be used by near-end transmitter.
LENGTH MODE	[0]	R/W	R/W	0: LENGTH field shall not be appended. 1: LENGTH field shall be appended.

Table 7-1 – Configuration parameters for the encapsulation

NAME	SIZE	LINK	PHY	Definition
FLOW CONTROL on the PHY-to-LINK data stream (clause 6.3)				
FCTL-us	[0]	R/W	R/W	0: Flow Control on the PHY-to-LINK data stream Not Supported. 1: Flow Control on the PHY-to-LINK data stream Supported.
ETHERNET ADAPTATION (clause 6.4)				
ETH	[0]	R/W	R/W	0: Ethernet Adaptation shall not be used. 1: Ethernet Adaptation shall be used.
NE_MAC_ADDRESS	[47:0]	R/W	R/W	Near-end MAC Address
FE_MAC_ADDRESS	[47:0]	R/W	R/W	Far-end MAC Address
PAUSE_MULTICAST	[0]	R/W	R/W	0: Pause frame shall have far-end MAC address as destination MAC address. 1: Pause frame shall have multicast MAC address as destination MAC address.

If the ETH bit is set to ONE, then the LENGTH MODE bit shall also be set to ONE.

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