PPPoE Interface

bintec Dm708-I

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Chapter 1 Introduction

1.1 Introducing the PPPoE protocol

The PPP protocol (Point-to-Point Protocol) provides a mechanism to transmit multi-protocol datagrams over a point-to-point link. The PPPoE protocol (PPP over Ethernet) allows you to establish PPP sessions and encapsulate PPP packets over Ethernet. This means you can achieve a multipoint connection such as that of Ethernet with the authentication characteristics, link control etc., and point-to-point connection characteristics. The PPPoE is basically used in broadband remote access technologies, which provide a bridged Ethernet topology when the access providers wish to maintain the session abstraction associated to PPP. This protocol is specified in RFC 2561. Said RFC mandates a maximum negotiated MRU of 1492 when using PPPoE. Consequently a new technique has been defined in RFC 4638 that allows a greater negotiated MRU.

1.2 Description of the PPPoE protocol

The PPPoE protocol is made up of two distinct stages: the Discovery stage and a PPP Session stage.

1.2.1 Discovery Stage

When a device wishes to initiate a PPPoE session, it must first perform Discovery to identify the peer Ethernet Mac address and establish a PPPoE session identifier. In the Discovery process, a client device discovers a PPPoE server (known as an Access Concentrator). Depending on the network topology, there may be more than one Access Concentrator. The Discovery stage allows the client to identify all Access Concentrators and then select one.

The discovery stage is divided into four parts:

(1) The client sends an initiation packet (PADI: PPPoE Active Discovery Initiation) to the whole network (broadcast packet), indicating the services they expect to receive.

(2) The Access Concentrator, if this can fulfill the required services, sends the client an offer packet (PADO: PPPoE Active Discovery Offer), indicating the services offered.

(3) The client then selects the Access Concentrator that has sent the offer that best suits their necessities. Subsequently the client sends said concentrator a Session Request packet (PADR: PPPoE Active Discovery Request).

(4) The Access Concentrator receives the Session Request and sends a Confirmation packet (PADS: PPPoE Active Discovery Session-confirmation), indicating the identifier for the established session. From this point onwards the session stage begins.

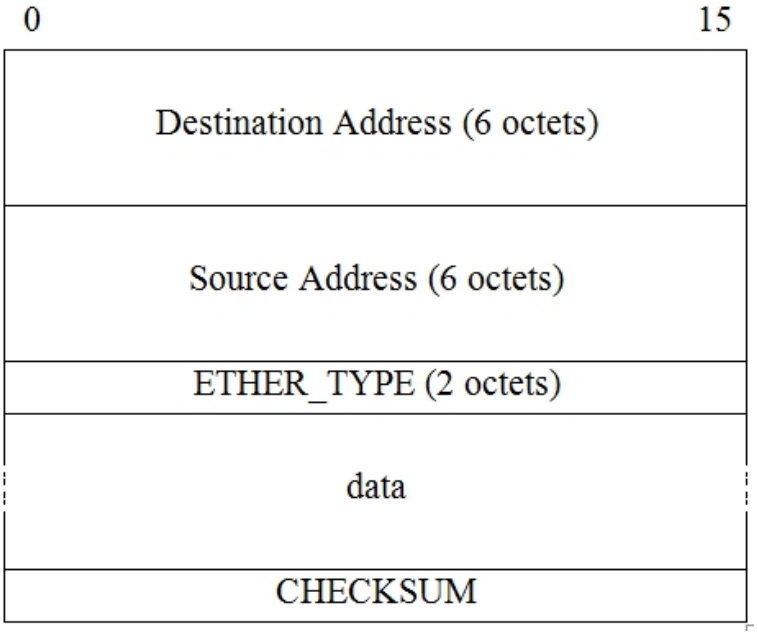
1.2.2 Session Stage

Once the discovery stage has been successfully completed, both the client and the Access Concentrator have the necessary information to construct their point-to-point connection over Ethernet. In the session stage, the frames exchanged between both ends correspond to those from a PPP session, with the peculiarity that the frames are encapsulated over Ethernet frames.

1.3 PPPoE frame structure

The PPPoE frame is basically an Ethernet frame with additional data encapsulation.

1.3.1 Ethernet frame format



DESTINATION ADDRESS

Packet destination MAC address. In the discovery stage, this may contain a 0xFFFFFFFFFFFF broadcast address.

SOURCE ADDRESS

Packet source MAC Address.

ETHER_TYPE

Indicates that the frame must be interpreted as PPPoE. This has a value equal to 0x8863 in the discovery stage and 0x8864 in the session stage.

DATOS

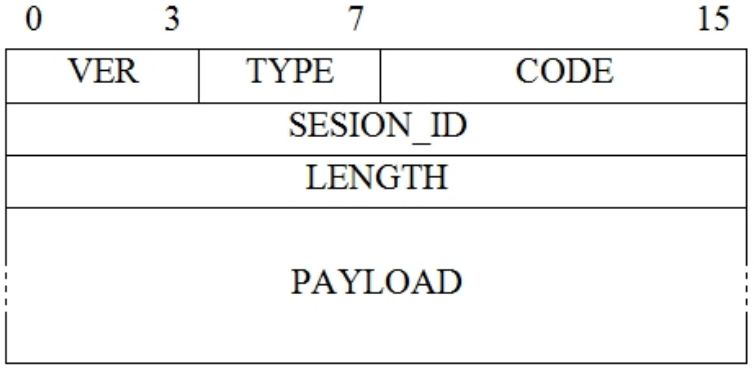
Ethernet frame data. The structure of this data for PPPoE is explained in the next section.

CHECKSUM

Ethernet frame data checksum.

1.3.2 Data format: PPPoE frame

The Ethernet frame data for PPPoE takes the following format:



VER

This is a four bit field indicating the PPPoE version. This must be 0x1.

TYPE

This is an eight bit field indicating the type of PPPoE. This must be 0x1.

CODE

This is an eight bit field indicating the type of PPPoE packet according to the following table:

CODE	TYPE OF PPPoE PACKET
0x09	PADI: PPPoE Active Discovery Initiation.
0x07	PADO: PPPoE Active Discovery Offer.
0x19	PADR: PPPoE Active Discovery Request.
0x65	PADS: PPPoE Active Discovery Session-Confirmation.
0xA7	PADT: PPPoE Active Discovery Terminate.
0x0	Packet in the session stage.

SESSION_ID

This is a two byte field identifying the established PPPoE session. In the discovery stage, this takes a value equal to 0 until the Access Concentrator assigns an identifier to the session in progress. The source and destination addresses together uniquely identify a PPPoE session.

LENGTH

This is a two byte field indicating the size, in bytes, of the PPPoE data part (payload). This does not include the Ethernet or the PPPoE header.

PAYLOAD

PPPoE data. In the session stage, this really is PPP protocol data. In the discovery stage, the payload contains zero or more tags. Each tag is made up of two bytes indicating the type of tag, two bytes indicating the tag length in bytes and the tag value. The distinct tags are used to negotiate the establishment conditions of the PPPoE session.

1.4 References

RFC 2516

A Method for Transmitting PPP Over Ethernet (PPPoE), February 1999.

RFC 2684

Multiprotocol Encapsulation over ATM Adaptation Layer 5, September 1999.

RFC 4638

Accommodating a Maximum Transit Unit/Maximum Receive Unit (MTU/MRU) greater than 1492 in the Point-to-Point Protocol over Ethernet (PPPoE), September 2006.

Chapter 2 Configuration

2.1 Creating the PPP Interface

To create PPP interfaces, run **add device ppp** from the general configuration menu. Once added, indicate the number of the interface assigned to the created PPP interface.

```
Config>add device ppp 1
Config>
```

You can check the created interface has been correctly added by listing the interfaces that exist in the device:

```
Config>list devices

Interface            Connector     Type of interface
ethernet0/0          GE0/FE0/LAN1  Fast Ethernet interface
ethernet0/1          GE1/FE1/LAN2  Fast Ethernet interface
atm0/0               DSL1          Generic ATM
x25-node             ---           Router->Node
atm0/0.1             ---           ATM subinterface
ppp1                 ---           Generic PPP
Config>
```

2.2 Configuring the PPPoE Interface

To configure the PPPoE parameters associated with the interfaces, enter the **PPPoE** command at the PPP interface configuration menu.

```
Config>network ppp1

-- Generic PPP User Configuration --
ppp1 config>pppoe

-- PPPoE User Configuration --
ppp1 PPPoE config>
```

Note

Manual bintec Dm710-I describes how to create and configure a PPP interface. To access the PPPoE configuration menu, the PPP base interface must be one of the following: Ethernet interface/subinterface, BVI interface/ subinterface or ATM interface.

The options for this configuration menu are as follows:

```
ppp1 PPPoE config>?
  ac-name           Access Concentrator name
  bridge-type       Bridge configuration over non Ethernet interface
  disable           Disables PPPoE mode
  enable            Enables PPPoE mode
  list              Lists PPPoE configuration
  mac-address       Source MAC address
  n-padi            PADI attempts
  n-padr            PADR attempts
  no                Negate a command or set its defaults
  ppp-max-payload   Send PPP Max-Payload tag in PPPoE control packets
  server            AC mode
  service-name      Required service name for the client
  t-pado            PADO timeout
  t-pads            PADS timeout
  wait-algorithm    Wait time calculation algorithm in the Discovery stage
  exit
```

2.2.1 AC-NAME

Configures the Access Concentrator name with which you wish to establish a PPPoE session. If none is configured, offers are accepted from all the concentrators available in the network.

Syntax:

```
ppp1 PPPoE config>ac-name <AC-Name>
ppp1 PPPoE config>
```

Example:

```
ppp1 PPPoE config>ac-name Concentrator1
ppp1 PPPoE config>
```

2.2.2 BRIDGE-TYPE

Configures whether to send the Ethernet checksum in the packet when you need to bridge (as the PPPoE frames are sent over an interface other than Ethernet).

Syntax:

```
ppp1 PPPoE config>bridge-type ?
  fcs       Send Ethernet frame checksum
  no-fcs    Not send Ethernet frame checksum
ppp1 PPPoE config>
```

2.2.2.1 BRIDGE-TYPE FCS

Configures bridge frames to include the Ethernet checksum.

2.2.2.2 BRIDGE-TYPE NO-FCS

Configures bridge frames to exclude the Ethernet checksum.

2.2.3 DISABLE

Syntax:

```
ppp1 PPPoE config>disable ?
  pppoe    Disables PPPoE mode
ppp1 PPPoE config>
```

2.2.3.1 DISABLE PPPoE

Configures the interface as PPP (disabling PPPoE mode).

2.2.4 ENABLE

Syntax:

```
ppp1 PPPoE config>enable ?
  pppoe    Enables PPPoE mode
ppp1 PPPoE config>
```

2.2.4.1 ENABLE PPPoE

Configures the interface as PPPoE (enabling PPPoE mode).

2.2.5 LIST

Displays the PPPoE interface configuration.

```
ppp1 PPPoE config >list
Status ..................... Enabled
Service-Name ................ PPPoE Service
AC-Name ..................... Access1
```

```
PADI attempts ................. 3
PADR attempts ................. 3
PADO timeout .................. 5 seconds
PADS timeout .................. 5 seconds
Timeout ....................... Exponential
Bridge (for bridged frames) ... Do not send FCS
PPP-Max-Payload ............... Do not send Tag
Source MAC address ............ 00-a0-26-33-0a-f9
ppp1 PPPoE config>
```

"Status"	PPPoE status, enabled or disabled.
"Service-Name"	Configures service name.
"AC-Name"	Configures Access Concentrator name.
"PADI Attempts"	Maximum number of PADI transmissions.
"PADR Attempts"	Maximum number of PADR transmissions.
"PADO timeout"	PADO wait time (time between PADI retransmissions).
"PADS timeout"	PADS wait time (time between PADR retransmissions).
"Timeout"	Indicates the type of algorithm used to calculate the wait time between retransmissions. This can be constant or exponential. In this latter case, the wait time is multiplied by two in each new retransmission.
"Bridge (for bridged frames)"	Indicates whether to send the Ethernet checksum when packets are sent over an interface other than Ethernet (ATM for example).
"PPP-Max-Payload"	Indicates whether to send the PPP-Max-Payload tag in the PPPoE control packets and the tag value if sent.
"Source MAC address"	MAC address used in the PPPoE frames as source address. If this has not been configured through the **max-address** command, it's not shown.

Command history:

Release	Modification
10.09.25	This command was modified as of version 10.09.25 to show PPP-Max-Payload configuration information.
11.00.04	This command was modified as of version 11.00.04 to show PPP-Max-Payload configuration information.
11.01.00	This command was modified as of version11.01.00 to show PPP-Max-Payload configuration information.

2.2.6 MAC-ADDRESS

This command configures the MAC address used as source address in the PPPoE frames. The MAC address you want to set must belong to one of the device's Ethernet interfaces or be a locally administrated address.

Syntax:

```
ppp1 PPPoE config>mac-address <mac>
ppp1 PPPoE config>
```

Example:

```
ppp1 PPPoE config>mac-address 02-00-00-00-00-05
ppp1 PPPoE config>
```

If you haven't configured a MAC through this command, the device will assign different source addresses to the PPPoE interfaces whose base interfaces must be ATM subinterfaces. If you need more MAC addresses than the device has, the assigned addresses are repeated.

2.2.7 N-PADI

Configures the number of times that a PPPoE Active Discovery Initiation packet (PADI) is sent before the negotiation is considered as failed.

Syntax:

```
ppp1 PPPoE config>n-padi <número transmisiones PADI>
ppp1 PPPoE config>
```

Example:

```
ppp1 PPPoE config>n-padi 4
ppp1 PPPoE config>
```

2.2.8 N-PADR

Configures the number of times that a PPPoE Active Discovery Request packet (PADR) is sent before the negotiation is considered down.

Syntax:

```
ppp1 PPPoE config>n-padr <number of PADR transmissions>
ppp1 PPPoE config>
```

Example:

```
ppp1 PPPoE config>n-padr 5
ppp1 PPPoE config>
```

2.2.9 NO

Deletes different configuration parameters.

Syntax:

```
ppp1 PPPoE config>no ?
  ac-name           Access Concentrator name
  bridge-type       Bridge configuration over non Ethernet interface
  mac-address       Source MAC address
  n-padi            PADI attempts
  n-padr            PADR attempts
  ppp-max-payload   Send PPP Max-Payload tag in PPPoE control packets
  server            AC mode
  service-name      Required service name for the client
  t-pado            PADO timeout
  t-pads            PADS timeout
  wait-algorithm    Wait time calculation algorithm in the Discovery stage
ppp1 PPPoE config>
```

2.2.9.1 NO AC-NAME

Deletes the Access Concentrator name required in the PPPoE session. Thus, offers from all concentrators available in the network are accepted.

```
ppp1 PPPoE config>no ac-name
ppp1 PPPoE config>
```

2.2.9.2 NO BRIDGE-TYPE

Configures the default value for sending (or not) the Ethernet frame checksum in the packet when PPPoE frames are sent over an interface other than Ethernet (so needing bridge). By default, the checksum is not sent.

```
ppp1 PPPoE config>no bridge-type
ppp1 PPPoE config>
```

2.2.9.3 NO MAC-ADDRESS

Deletes the MAC address configured to be used as a source address in the PPPoE frames.

```
ppp1 PPPoE config>no mac-address
ppp1 PPPoE config>
```

2.2.9.4 NO N-PADI

Configures the number of times that a PPPoE Active Discovery Initiation packet (PADI) is sent before the negotiation is considered down. Default is 3 transmissions.

```
ppp1 PPPoE config>no n-padi
ppp1 PPPoE config>
```

2.2.9.5 NO N-PADR

Configures the number of times that a PPPoE Active Discovery Request packet (PADR) is sent before the negotiation is considered as down. Default is 3 transmissions.

```
ppp1 PPPoE config>no n-padr
ppp1 PPPoE config>
```

2.2.9.6 NO PPP-MAX-PAYLOAD

Disables the sending of PPP-Max-Payload tags in the PPPoE control packets (described in RFC 4638), thus restricting the maximum negotiated MRU to 1492.

```
ppp1 PPPoE config>no ppp-max-payload
ppp1 PPPoE config>
```

Command history:

Release	Modification
10.09.25	Command added as of version 10.09.25.
11.00.04	Command added as of version 11.00.04.
11.01.00	Command added as of version 11.01.00.

2.2.9.7 NO SERVER

Deactivates the Access Concentrator or server mode. The **n-padi**, **n-padr**, **t-pado** and **t-padi** ppp-max-payload commands can be activated again i.e. they are no longer redundant.

```
ppp1 PPPoE config>no server
ppp1 PPPoE config>
```

2.2.9.8 NO SERVICE-NAME

Deletes the service name required in the PPPoE session. In this way, any offered service is accepted.

```
ppp1 PPPoE config>no service-name
ppp1 PPPoE config>
```

2.2.9.9 NO T-PADO

Configures the time (in seconds) that must lapse without receiving an offer (PADO), before re-sending the PPPoE Active Discovery Initiation packet (PADI) to the default value. Default is 5 seconds.

```
ppp1 PPPoE config>no t-pado
ppp1 PPPoE config>
```

2.2.9.10 NO T-PADS

Configures the time (in seconds) that must lapse without receiving a PPPoE Active Discovery Session-confirmation packet (PADS), before resending the PPPoE Active Discovery Request packet (PADR) to the default value. Default is 5 seconds.

```
ppp1 PPPoE config>no t-pads
ppp1 PPPoE config>
```

2.2.9.11 NO WAIT-ALGORITHM

Configures the algorithm to be used to calculate the frame wait time in the PPPoE Discovery stage to the default value. The default value is the exponential wait algorithm (in each new wait session the wait time duplicates).

```
ppp1 PPPoE config>no wait-algorithm
ppp1 PPPoE config>
```

2.2.10 PPP-MAX-PAYLOAD

The RFC describing the PPPoE protocol (RFC 2615) mandates a maximum negotiated MRU of 1492. A new procedure has been defined in RFC 4638 to accommodate a greater MRU value.

With this new procedure, the PPPoE client sends the PPP-Max-Payload tag in a PPPoE Active Discovery Initiation (PADI) packet and in a PPPoE Active Discovery Request (PADR) packet with the MRU value to be negotiated. If the PPPoE server can support this value it responds with an echo of the client's tag in a PPPoE Active Discovery Offer (PADR) packet and in a PPPoE Active Discovery Session-Confirmation (PADS) packet.

This command is used to enable the sending of PPP-Max-Payload tags with the PPPoE client's desired MRU value.

Syntax:

```
ppp1 PPPoE config>ppp-max-payload <MRU>
ppp1 PPPoE config>
```

Example:

```
ppp1 PPPoE config>ppp-max-payload 1560
ppp1 PPPoE config>
```

Command history:

Release	Modification
10.09.25	Command added as of version 10.09.25.
11.00.04	Command added as of version 11.00.04.
11.01.00	Command added as of version 11.01.00.

2.2.11 SERVER

Configures the interface to behave as an Access Concentrator i.e. server. On configuring this command, the PPPoE interface will then wait to receive PADI session start petitions (PPPoE Active Discovery Initiation). When received, this interface responds with PADO (PPPoE Active Discovery Offer) offering the available service (provided it has been configured, **service-name** command). When this command is entered, the **ppp-max-payload**, **n-padi**, **n-padr**, **t-pado** and the **t-padi** commands are consequently redundant. If after sending a PADO packet, a PADR packet hasn't been received within 20 seconds, the server starts listening again and responding to new PADI petitions. The server only allows one connection per interface.

Syntax:

```
ppp1 PPPoE config>server
ppp1 PPPoE config>
```

Example:

```
ppp1 PPPoE config>server
ppp1 PPPoE config>
```

2.2.12 SERVICE-NAME

Configures the required service name for the client. If none is configured, the client indicates that any service is required.

Syntax:

```
ppp1 PPPoE config>service-name <Service-Name>
ppp1 PPPoE config>
```

Example:

```
ppp1 PPPoE config>service-name PPPoE Service
ppp1 PPPoE config>
```

2.2.13 T-PADO

Configures the time (in seconds) that must lapse without receiving an offer (PADO), before re-sending the PPPoE Active Discovery Initiation packet (PADI).

Syntax:

```
ppp1 PPPoE config>t-pado <time waited for PADO>
ppp1 PPPoE config>
```

Example:

```
ppp1 PPPoE config>t-pado 3
ppp1 PPPoE config>
```

2.2.14 T-PADS

Configures the time (in seconds) that must lapse without receiving a PPPoE Active Discovery Session-confirmation packet (PADS), before resending the PPPoE Active Discovery Request packet (PADR).

Syntax:

```
ppp1 PPPoE config>t-pado <time waited for PADS>
ppp1 PPPoE config>
```

Example:

```
ppp1 PPPoE config>t-pads 4
ppp1 PPPoE config>
```

2.2.15 WAIT-ALGORITHM

Configures the algorithm to be used to calculate the frame wait time in the PPPoE Discovery stage.

Syntax:

```
ppp1 PPPoE config>wait-algorithm ?
  constant       Constant wait time
  exponential    Exponential wait time
ppp1 PPPoE config>
```

2.2.15.1 WAIT-ALGORITHM EXPONENTIAL

Configures the wait-time between the retransmissions of frames in the Discovery stage as exponential. The initial time is that configured in T-PADO or T-PADS. Each time the timer times out and a frame must be re-transmitted, the wait time is duplicated.

2.2.15.2 WAIT-ALGORITHM CONSTANT

Configures the wait-time between the retransmissions of frames in the Discovery stage as constant. The wait-time is that configured in T-PADO or T-PADS and does not vary for each transmission.

2.2.16 EXIT

Exits the PPPoE interface configuration menu.

```
ppp1 PPPoE config>exit
ppp1 config>
```

Chapter 3 Monitoring

3.1 PPPoE interface monitoring

Run **pppoe** (PPP interface monitoring menu) to access PPPoE monitoring.

```
+network ppp1
-- Generic PPP Console --
ppp1+pppoe
-- PPPoE Console --
ppp1 PPPoE+
```

The options for this monitoring menu are as follows:

```
ppp1 PPPoE+?
  clear-statistics    Initialize all the statistics
  list                Monitoring information relative to PPPoE parameters
  exit
ppp1 PPPoE+
```

3.1.1 CLEAR-STATISTICS

Deletes the PPPoE statistics.

Syntax:

```
pppX PPPoE+clear-statistics
```

Example:

```
ppp1 PPPoE+clear-statistics
ppp1 PPPoE+
```

3.1.2 LIST

Displays the status of a PPPoE session and the distinct generic statistics for the PPPoE interface.

```
ppp1 PPPoE+list ?
  all           All the corresponding monitoring information
  connection    Connection status
  statistics    Statistics of the established sessions
ppp1 PPPoE+
```

3.1.2.1 LIST ALL

Returns the monitoring information relative to the PPPoE parameters considering both the connections as well as the established sessions' statistics. This is explained below.

3.1.2.2 LIST CONNECTION

Displays the status of a PPPoE connection.

Syntax:

```
pppX PPPoE+list connection
```

Client example:

```
ppp1 PPPoE+list connection

CONNECTION

Connection status ..... Closed
ppp1 PPPoE+
ppp1 PPPoE+list connection

CONNECTION
```

```
Connection status ..... Opening
Discovery status ..... Waiting for PADS
PADI attempts ..... 2 / 3
PADO timeout ..... 5 seconds
PADR attempts ..... 1 / 3
PADS timeout ..... 2 seconds
Session id ..... 0 (0x0)
Remote MAC ..... 00C0DFAA184B
Host-Uniq ..... Router1
Service-Name ..... PPPoE Service
AC-Name ..... Access1
Cookie ..... No
Relay Session Id ..... 12345
PPP-Max-Payload ..... 1560

ppp1 PPPoE+
```

Server example:

```
ppp1 PPPoE+list connection

CONNECTION

Connection status ..... Opened
Discovery status ..... Session established
Session id ..... 2 (0x2)
Remote MAC ..... 00127F7E5F4D
Host-Uniq ..... Router1
Service-Name ..... PPPoE Service
AC-Name ..... Access1
Cookie ..... No
PPP-Max-Payload ..... 1560

ppp1 PPPoE+
```

The fields displayed depend on the status of the connection. The information shown can include the following fields:

- *“Connection status”*: The connection may be Closed, Opening (Discovery stage in progress) or Opened (PPPoE session established).
- *“Discovery status”*. This can be Initial state (the PADI frame has not been sent as yet), Waiting for PADO (the PADI frame has been sent and it is waiting to receive PADO frames), Waiting for PADS (the PADR frame has been sent and it is waiting to receive PADS frames), Session established or PADT received (a session termination frame has been received and the PPPoE connection will close).
- *“PADI attempts”* , number of PADI frames sent in the Discovery stage of this PPPoE session. This also indicates the maximum number of configured transmissions.
- *“PADO timeout”*, wait time for a PADO frame before re-transmitting the PADI frame. For an exponential wait algorithm, this reflects the last wait time used.
- *“PADR attempts”*, number of PADR frames sent in the Discovery stage of this PPPoE session. This also indicates the maximum number of configured transmissions.
- *“PADS timeout”*, wait time for a PADS frame before re-transmitting the PADR frame. For an exponential wait algorithm, this reflects the last wait time used.
- *“Session id”*, identifier of the established PPPoE session. In the Discovery stage, this indicates a value equal to zero.
- *“Remote MAC”*, remote MAC address. This is only displayed when a packet from the Access Concentrator has been received.
- *“Host-Uniq”*, identifier of the Host used in the PPPoE session.
- *“Service-Name”*, name of the service used in the PPPoE session. This is the one configured in the device, if a name has been configured, the one indicated by the remote end if none has been configured and the remote end indicates one, or none if there is no service name configured and the Access Concentrator does not provide one.
- *“AC-Name”* , name of the Access Concentrator with which the PPPoE session is established. This is the one configured in the device if a name has been configured, the one indicated by the remote end if none has been configured and the remote end indicates one, or none if there is no Access Concentrator name configured and the Access Concentrator does not provide one.
- *“Cookie”*, indicates if the Access Concentrator has used a cookie during the Discovery stage. The value of said cookie is not displayed: this is usually large and includes illegible characters.

- *“Relay Session Id”*, identifier of the Relay, if this exists, situated between the device and the Access Concentrator. This value is not shown if the Relay is not detected. The Relay identifier is truncated into 19 bytes to display this on the screen.
- *“PPP-Max-Payload”* , maximum negotiable MRU value. This value is not shown if the PPP-Max-Payload tag is not sent in the PPPoE control packets.

Command history:

Release	Modification
10.09.25	Command modified as of version 10.09.25 to show PPP-Max-Payload information.
11.00.04	Command modified as of version 11.00.04 to show PPP-Max-Payload information.
11.01.00	Command modified as of version 11.01.00 to show PPP-Max-Payload information.

3.1.2.3 LIST STATISTICS

Displays the statistics of the PPPoE sessions established in the interface. This includes information on each type of received frames and errors produced.

Syntax:

```
pppX PPPoE+list statistics
```

Client example:

```
ppp1 PPPoE+list statistics

STATISTICS

PADI transmitted ........................ 269
PADO received ........................... 9 (ok: 3)
PADR transmitted ........................ 3
PADS received ........................... 3 (ok: 3)
PADT transmitted ........................ 0
PADT received ........................... 1 (ok: 0)
Session packets transmitted ............. 62
Session packets received ................. 51 (ok: 48)
Tag-length errors ....................... 0
Service-Name errors ..................... 0
AC-Name errors .......................... 0
Host-Uniq errors ........................ 0
Tags Service-Name error ................. 0
Tags AC-System error .................... 0
Tags Generic error ...................... 0
Packets with destination MAC error ..... 0
Packets with eth-type error ............. 0
Packets with version error .............. 0
Packets with type error ................. 0
Packets with code error ................. 6
Packets with tags missing ............... 0
Packets with session error .............. 4
Packets discarded after PADT reception ... 0
Transmit packet errors .................. 0
Excessive length packet errors (xmt) ......0
Packets not transmitted ................. 0
Maximum PADI retries reached ............ 88
Maximum PADR retries reached ............ 0
PADO timeout ............................ 266
PADS timeout ............................ 0

ppp1 PPPoE+
```

Server Example:

```
ppp1 PPPoE+list statistics

STATISTICS

PADI received ........................... 2 (ok: 2)
```

```
PADO transmitted ....................... 2
PADR received .......................... 2 (ok: 2)
PADS transmitted ....................... 2
PADT transmitted ....................... 1
PADT received .......................... 0 (ok: 0)
Session packets transmitted ............. 12761
Session packets received ................ 12511 (ok: 12511)
Tag-length errors ...................... 0
Service-Name errors .................... 0
AC-Name errors ......................... 0
Host-Uniq errors ....................... 0
Tags Service-Name error ................ 0
Tags AC-System error ................... 0
Tags Generic error ..................... 0
Packets with eth-type error ............ 0
Packets with version error ............. 0
Packets with type error ................ 0
Packets with code error ................ 0
Packets with tags missing .............. 0
Packets with session error ............. 0
Packets discarded after PADT reception ... 0
Transmit packet errors ................. 0
Excessive length packet errors (xmt) ..... 0
Packets not transmitted ................ 0
PADR timeout ........................... 0

ppp1 PPPoE+
```

The displayed statistics include the following:

- *“PADI transmitted”* , number of PADI frames sent by the interface.
- *“PADI received”*, number of PADI frames received by the interface provided this is the server. This indicates, between brackets, how many of these frames were correct, i.e. received at the point of the negotiation where a PADI frame is expected and with the expected tags and the session identifier.
- *“PADO transmitted”* , number of *PADO* frames sent by the interface provided this is the server.
- *“PADO received”*, number of PADO frames received by the interface. This indicates, between brackets, how many of these frames were correct, i.e. received at the point of the negotiation where a PADO frame is expected and with the expected tags and the identifier of the session.
- *“PADR transmitted”* , number of PADR frames sent by the interface.
- *“PADR received”*, number of PADR frames received by the interface provided this is the server. This indicates, between brackets, how many of these frames were correct, i.e. received at the point of the negotiation where a PADR frame is expected and with the expected tags and the session identifier.
- *“PADS transmitted”* , number of *PADS* frames sent by the interface provided this is the server.
- *“PADS received”*, number of PADS frames received by the interface. This indicates, between brackets, how many of these frames were correct, i.e. received at the point of the negotiation where a PADS frame is expected and with the expected tags and the identifier of the session.
- *“PADT transmitted”* , number of PADT frames sent by the interface.
- *“PADT received”*, number of PADT frames received by the interface. This indicates, between brackets, how many of these frames were correct, i.e. with a correct session identifier.
- *“Session packets transmitted”*, number of frames sent by the interface with the session established.
- *“Session packets received”*, number of frames received by the interface with the session established.
- *“Tag-length errors”* , frames received with an error in a tag length.
- *“Service-Name errors”*, frames received with an erroneous ‘Service-Name’ (different from that configured in the device).
- *“AC-Name errors”* , frames received with an erroneous ‘AC-Name’ Name’ (different from that configured in the device).
- *“Host-Uniq errors”*, frames received with an erroneous ‘Host-Uniq’ Name’ (different from that configured in the device).
- *“Tags Service-Name error”* , frames received with an erroneous tag in the ‘Service-Name’. This frame indicates that the Access Concentrator for some reason or other cannot provide the requested service.
- *“Tags AC-System error”* , frames received with an erroneous tag in the ‘AC-Name’. This frame indicates that the Access Concentrator had an error in processing the petition.
- *“Tags Generic error”* , frames received with an erroneous generic tag.

- *“Packets with destination MAC error”* , frames received with incorrect destination MAC.
- *“Packets with eth-type error”*, frames received with an error in the Ethernet frame ‘ether_type field.
- *“Packets with version error”* , frames received with an error in the PPPoE frame ‘version’ field.
- *“Packets with type error”*, frames received with an error in the PPPoE frame ‘type’ field.
- *“Packets with code error”* , frames received with an error in the PPPoE frame ‘code’ field.
- *“Packets with tags missing”*, frames received with fewer tags than expected.
- *“Packets with session error”*, frames received with an error in the session identifier.
- *“Packets discarded after PADT reception”* , frames received after receiving a PADT frame indicated the end of the established session. These frames are discarded without being processed.
- *“Transmit packet errors”* , total number of frames not transmitted due to an internal error.
- *“Excessive length packet errors (xmt)”*, frames not transmitted as the data exceeds the maximum Ethernet frame size.
- *“Packets not transmitted”* , frames not transmitted as the PPPoE session is not established or because a PADT frame has been received indicating the end of the session.
- *“Maximum PADI retries reached”* , number of times that the maximum number of retransmissions configured for a PADI frame has been reached.
- *“Maximum PADR retries reached”* , number of times that the maximum number of retransmissions configured for a PADR frame has been reached.
- *“PADO timeout”*, number of times that a maximum wait time out for a PADO frame has been produced without receiving anything.
- *“PADR timeout”*, number of times that a maximum wait time out for a *PADR* frame has been produced without receiving anything providing that this is the server.
- *“PADS timeout”,* number of times that a maximum wait time out for a PADS frame has been produced without receiving anything.

3.1.3 EXIT

Exits the PPPoE interface monitoring menu.

Syntax:

```
pppX PPPoE+exit
```

Example:

```
ppp1 PPPoE+exit
ppp1+
```