

Teldat Router

PPP Interface

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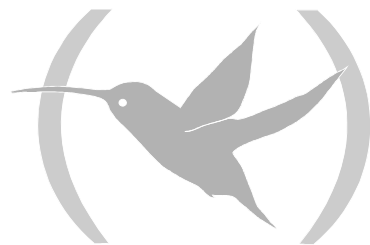
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Chapter 1

PPP Interface



1. Description

The PPP (Point-to-Point) protocol provides a mechanism to transmit datagrams of various protocols over a point-to-point link. This protocol is specified in the RFC-1661. PPP supports data transmission both in synchronous and asynchronous forms and provides the following services:

- LCP (Link Control Protocol) link establishment control, to establish, configure and test the link.
- Encapsulation to transmit datagrams over the link.
- Authentication protocols in order to demand the PPP remote end link authenticates before being able to transmit the data over the link. In the current implementation, PAP (Password Authentication Protocol) protocol (described in the RFC-1172) and CHAP (Challenge Handshake Authentication Protocol) protocol (described in the RFC-1994) are supported.
- PPP Multilink Protocol complying with the RFC-1990. The PPP Multilink protocol supports dividing, recombining and sequencing of datagrams through multiple data links.
- NCP protocols (Network Control Protocols) in order to establish and configure the various network protocols which run over PPP.

NB. In the current implementation, the network protocols supported over PPP are IPCP (Internet Protocol control Protocol, described in RFC 1332) and CCP (Compression Control Protocol, described in RFC 1962).

To carry out the connection establishment over a point-to-point link, the source PPP sends LCP packets in order to configure and test the link. Once this has been established at link level (data-link layer), the PPP sends NCP packets corresponding to the supported protocols (in this case IPCP and CCP) in order to configure and establish the network layer in the link (Network layer). Once these protocols have been configured, the PPP transmits the datagrams of each protocol over the link.

In order to implement the PPP in an asynchronous form, adaptation is carried out in compliance with the RFC-1662.

There exist various possibilities in the current implementation:

1. Define a PPP interface over a serial line in a synchronous format which through a cable or an external device or a terminal adapter, permits you to establish the link with the other end.
2. Define a PPP interface over a serial line in an asynchronous format which through a cable or an external device or a terminal adapter, permits you to establish the link with the other end.
3. Define a PPP interface over an AT command interface in order to connect to the other end through a modem. In this case, the data format in transmission is asynchronous.
4. Define a PPP interface over a basic access in order to connect to the other end through ISDN. In this case the data format in transmission is synchronous.
5. Define a PPP interface over an ATM subinterface.

2. PPP Frame structure

The PPP transmits frames which have the same structure as the HDLC frames. The PPP uses a synchronous transmission method, bit orientated with the following frame structure:

FLAG	ADDRESS	CONTROL	PROTOCOL	INFORMATION	FCS	FLAG
------	---------	---------	----------	-------------	-----	------

FLAG

Indicates the beginning and end of each frame with a unique pattern: 01111110. Supports frame synchronism. Among the rest of the frame data, transparency is implemented, bit-stuffing, so this character does not appear. The transparency consists of the transmission of a 0 once five consecutive 1's have been transmitted. This 0 is excluded from the data on reception.

ADDRESS

HDLC frame address field. 11111111 is always used in the PPP protocol. Individual addresses are not assigned.

CONTROL

Control field. All the PPP frames are HDLC unnumbered information (UI) frames with a field value of 00000011.

PROTOCOL

This is a 2-byte field which distinguishes the various protocols transported over the point-to-point link. All those which contain a value of Cxxx in this field correspond to the link configuration protocols (LCP, PAP, CHAP). Those which contain a value of 8xxx correspond to the network control protocols (NCP's: IPCP, CCP) and the value 0xxx corresponds to specific datagram transmissions over the link.

INFORMATION

Zero or more bytes contained in the datagram for the transported protocol. If the protocol is LCP or NCP this field will contain parameters to configure the link.

FCS

Field used to include the error detection mechanism which in this case is the cyclic redundancy checking (CRC) for 2-byte error detection.

2.1. Asynchronous PPP adaptation

When the data transmission format is asynchronous, the same framing is carried out as in the synchronous, according to the RFC-1662. The transported bytes are encapsulated within the previously described frame, but a transparency character is used, 0x7D in order to implement the bit-stuffing.

Subsequent to the FCS check and in the same direction as the transmission, all the characters going to be sent are examined. Each flag, control character (below 0x20), escape character

(0x7D) or anything else defined in the ACCM, is substituted for the transparency character and an additional character which is the result of an OR-exclusive with 0x20.

At reception, before the FCS check, all the frame bytes are examined. When the transparency character appears, it is eliminated and the following character is substituted by its OR-exclusive with 0x20.

The check and the subsequent CRC check (FCS) of the frame is carried out through a polynomial defined in the RFC-1662 and its subsequent transmission is also affected by the transparency.

For example, the 0x11 character (XON) is encoded within the frame in transmission as 0x7D + 0x31. At reception, the 0x7D is eliminated and the following bytes are substituted by its OR exclusive with 0x20, resulting in 0x11.

3. Link Control Protocol

The PPP LCP supports the establishment, configuration, maintenance and finalizing of a link. This process consists of 4 stages:

1. Before exchanging IP datagrams over the link, the LCP opens communications between the ends through the exchange of CONFIGURE-REQUEST LCP packets. Once the configuration has been accepted between the two ends with the CONFIGURE-ACK packets, the link is in an "OPEN" state.
2. Once the LCP has determined that the link is OPEN, it determines if it is of a high enough quality to start the network protocols. It is during this process that link authentication is carried out if required.
3. Once the LCP has checked that the link quality is high enough, the NCP control protocols at the network layer are started.
4. Finally, once these have been established, the LCP, through the ECHO-REQUEST and ECHO-REPLY transmission packets, takes over the link maintenance. If you wish to terminate the connection (e.g. due to inactivity), the LCP terminates the link through the TERMINATE-REQUEST and TERMINATE-ACK transmission packets.

4. LCP packet format

The LCP packets present the same format as previously described. The protocol field takes the value specified for LCP (0xC021) and in the Information field the type of packet and the associated data are encoded:

CODE	IDENTIFIER	SIZE	DATA
------	------------	------	------

CODE

One byte field which identifies the LCP packet type according to the following table:

CODE	LCP PACKET TYPE
1	CONFIGURE-REQUEST (Establishment)
2	CONFIGURE-ACK (Establishment)
3	CONFIGURE-NAK (Establishment)
4	CONFIGURE-REJECT (Establishment)
5	TERMINATE-REQUEST (Terminate)
6	TERMINATE-ACK (Terminate)
7	CODE-REJECT (Maintenance)
8	PROTOCOL-REJECT (Maintenance)
9	ECHO-REQUEST (Maintenance)
10	ECHO-REPLY (Maintenance)
11	DISCARD-REQUEST (Maintenance)

IDENTIFIER

One byte field which supports link requests and answers identification.

SIZE

Two bytes which indicate the total length of the LCP frame. Where an asynchronous mode is used, this does not include the possible transparent characters which exist within the frame.

DATA (Optional)

With zero or more bytes whose format depends on the type of LCP packet.

As seen in the previous table, the LCP packets can be grouped into three types:

- Packets in order to establish the link
 - **CONFIGURE-REQUEST**
Packet to be transmitted when you wish to open a link. All the configuration options are found within this. At reception, it should send an appropriate answer with one of the following packets.
 - **CONFIGURE-ACK**
The received configuration options are accepted. The frame identifier field should coincide with the accepted CONFIGURE-REQUEST. Once the two ends have received the ACK from the remote end, the link enters an OPEN state.
 - **CONFIGURE-NAK**
Some of the configuration options received in the frame with the identifier used are not accepted but the recommended value is sent or accepted by the remote end.

When a NAK is received, the receptor should generate a new CONFIGURE-REQUEST which contains the accepted values indicated.

- **CONFIGURE-REJECT**

Some of the configuration options received in the frame with the identifier used are not accepted or acknowledged. When a REJECT is received, the receptor should generate a new CONFIGURE-REQUEST which does not contain the rejected values.

- Packets to terminate the link

- **TERMINATE-REQUEST**

Packet which is transmitted when you wish to terminate, close, the link.

- **TERMINATE-ACK**

Packet which is transmitted after a TERMINATE-REQUEST is received. The reception of an unexpected TERMINATE-ACK indicates that the link has been closed.

- Packets for link maintenance

- **CODE-REJECT**

Indicates that an incomplete LCP packet has been received or one with an unknown code. If the packet persists in being transmitted, the link will close.

- **PROTOCOL-REJECT**

Indicates that a PPP frame with a non-implemented protocol field has been received. The end frame receptor should cease sending this protocol.

- **ECHO-REQUEST, ECHO-REPLY**

Provides link maintenance mechanism. This regularly generates a code request ECHO -REQUEST which should be returned with an ECHO-REPLY.

- **DISCARD-REQUEST**

Provides a frame discard and elimination, mechanism. This is used for testing.

5. Authentication Protocols

PPP has a series of protocols available which allow you to authenticate and verify the link. This is only established in cases where checks are made to ensure that the remote end is among the authorized users. This method is usually used in links where routers connect to a network via switched circuits (ISDN or PSTN) although it can be used in point to point circuits.

This check is carried out before establishing the network control protocols (NCP). If authentication is demanded and it not completed correctly, the link establishment is terminated.

There are two authentication methods defined in the RFC-1334. These are:

5.1. Password Authentication Protocol (PAP)

Provides a simple method to authenticate a link using 2-ways:

1. Once you have achieved an OPEN state in the LCP negotiation, the remote end that must authenticate sends a user (login) and password to the authenticator.
2. The remote end checks that this is valid and sends a response, accepting or rejecting the connection.

This authentication method is not very safe due to the fact that the user and password are sent over the network in clear. This means that there is no type of protection against errors or other attacks. This problem is resolved by another authentication method, CHAP.

a) PAP packet format

The PAP packets travel with the same format as described for the PPP frames. The protocol field differentiates them (0xC023). The type of packet and the associated data are encoded in the Information field.

CODE	IDENTIFIER	SIZE	DATA
------	------------	------	------

CODE

One byte field which identifies the type of PAP packet complying with the following table:

CODE	PAP PACKET TYPE
1	AUTHENTICATE-REQUEST
2	AUTHENTICATE-ACK
3	AUTHENTICATE-NAK

IDENTIFIER

One byte field which permits you to identify requests and responses over the link.

SIZE

Two bytes which indicate the total length of the PAP frame.

DATA (Optional)

With zero or more bytes whose format is related to the type of PAP packet. As seen in the previous table, the PAP packets can be grouped into three types:

- **AUTHENTICATE-REQUEST**
Packet to be transmitted when you wish to authenticate a link. The login and password used are sent within this. At reception, it should send an appropriate answer with one of the following packets.
- **AUTHENTICATE-ACK**
The received values are accepted. The frame identifier field should coincide with the accepted AUTHENTICATE-REQUEST. Once the ACK from the end authenticator has been received, you can continue to establish the network control protocols (NCP).
- **AUTHENTICATE-NAK**
The received values are not accepted. The end which must authenticate needs to send a new AUTHENTICATE-REQUEST with the adequate values or terminate the link.

5.2. Challenge Authentication Protocol (CHAP)

Provides a “safe” method to authenticate a link using a 3-way handshake.

1. Once an OPEN state has been achieved in the LCP negotiation, the end authenticator sends a password, known as Challenge, to the end it wishes to connect to. This password is variable in all the connections generally being a random value whose number of bytes depend on the algorithm used for the subsequent encoding. In this case the method implemented is the MD5 algorithm defined in the RFC - 1321 recommendation. This defines a length of 16 bytes for the challenge.
2. The end that receives the encryption with the password receives the password that it has programmed and sends the response to the authenticator end. The encryption function is defined by the MD5 algorithm and is the same at both ends.
3. On receiving the response, the authenticator verifies that the response is what he expected and permits (success) the establishment of the network protocols to continue or not (failed).

The security of this method depends on the secrecy of the password at both ends. With this method, the password never passes through the network in “clear”.

This method also permits link authentication even once the network protocols have been established (e.g. IP) to check their security.

a) CHAP packets format

The CHAP packets travel with the same format as described for the PPP frames. The protocol field differentiates them (0xC023). The type of packet and the associated data are encoded in the Information field.

CODE	IDENTIFIER	SIZE	DATA
------	------------	------	------

CODE

One byte field which identifies the type of CHAP packet complying with the following table:

CODE	CHAP PACKET TYPE
1	CHALLENGE
2	RESPONSE
3	SUCCESS
4	FAILED

IDENTIFIER

One byte field which permits you to identify requests and responses over the link.

SIZE

Two bytes which indicate the total length of the CHAP frame.

DATA (Optional)

With zero or more bytes whose format is related to the type of CHAP packet.

As seen in the table, the CHAP packets can be grouped into four types:

- **CHALLENGE**
Packets which are transmitted by the end authenticator when you wish to authenticate a link. The password that must be used to encrypt is transmitted in the said packets. This can also carry the name of the network you wish to access in clear. This value can be used in cases where the responding end sends the correct value should it be ready to connect to various networks. I.e. you can program distinct passwords depending on the network you wish to access.
- **RESPONSE**
Packet sent to the other end in which the encrypted password with the received password travels.
- **SUCCESS**
The transmitted value is accepted by the authenticator. Once the SUCCESS is received from the end authenticator, you can proceed to establish the network protocols (NCP).
- **FAILED**
The received value is not accepted by the end authenticator. The end that must authenticate in the link must send a new response with the adequate values or terminate the link.

6. Network Control Protocol (NCP)

The PPP has a series of network control protocols (NCP) in order to establish and configure the various network protocols which are encapsulated over PPP. The NCP to corresponding each protocol configures, enables and disables the network protocols between the two link ends.

Currently, the network protocols implemented in the **Teldat Router** are IPCP (*Internet Protocol Control Protocol*) described in the RFC-1332 recommendation, and CCP (*Compression Control Protocol*) described in the RFC 1962.

The IPCP allows you to indicate if you are using the Van Jacobson compression (or not) and in that way permits a mechanism in order to exchange IP addresses between both ends or the dynamic assignation of the IP number necessary for Internet connections.

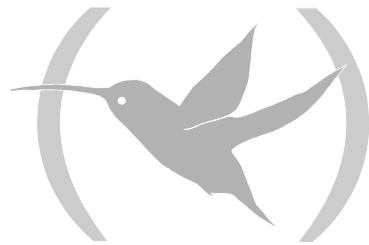
The CCP permits you to establish the use of various algorithms for the compression of data transmitted by the link.

7. References

- RFC 1661:** The Point-to-Point protocol, W. Simpson, July-1994
RFC 1662: PPP in HDLC-Like Framing, W. Simpson, July -1994
RFC 1618: PPP in ISDN, W.Simpson, May-1994
RFC 1570: PPP LCP extensions, W. Simpson, January-1994
RFC 1332: PPP Internet control protocol, G. McGregor, May -1992
RFC 1334: PPP Authentication protocols, B. Lloyd, October-1992
RFC 1172: Point-to-Point Protocol (PPP) initial configuration options. D. Perkins, R. Hobby. July -1990
RFC 1994: PPP Challenge Handshake Authentication Protocol (CHAP). W. Simpson. August-1996
RFC 1321: The MD5 message-digest Algorithm. R. Rivest, April-1992
RFC 1700: Assigned numbers, IETF, October -1994
RFC 1471: The Definitions of Managed Objects for the Link Control Protocol of the Point-to-Point Protocol, F. Kastenholtz, August -1993
RFC 1990: The PPP Multilink Protocol (MP), Network Working Group, August -1996
RFC 1962: The PPP Compression Control Protocol, Network Working Group, June-1996

Chapter 2

PPP Interface Configuration



1. Creating a PPP interface

To create PPP interfaces, enter the

add device ppp <PPP interface identifier>

command from the general configuration menu. Once added, the PPP interface you have created is displayed.

```
Config>add device ppp 1
Added PPP interface ppp1
Config>
```

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

```
Config>LIST DEVICES

Interface      Con   Type of interface      CSR   CSR2  int
ethernet0/0    LAN1  Quicc Ethernet         fa200a00 fa203c00 5e
serial0/0      WAN1  Synchronous Serial Line fa200a20 fa203d00 5d
atm0/0         ADSL1 Async Transfer Mode   fa200a60 fa203f00 55
bri0/0         ISDN1 ISDN Basic Rate Int   fa200a40 fa203e00 5c
x25-node       ---   Router->Node           0        0
subatml        ---   ATM subinterface       0        0
ppp1           ---   Generic PPP             0        0
Config>
```

```
Config>LIST DEVICES

Interface      Con   Type of interface      CSR   CSR2  int
ethernet0/0    LAN1  Fast Ethernet interface fa200e00 27
serial0/0      WAN1  Synchronous Serial Line fa200a00 fa203c00 5e
serial0/1      WAN2  X25                    fa200a20 fa203d00 5d
serial0/2      WAN3  X25                    fa200a60 fa203f00 5b
bri0/0         ISDN1 ISDN Basic Rate Int   fa200a40 fa203e00 5c
x25-node       ---   Router->Node           0        0
ppp1           ---   Generic PPP             0        0
Config>
```

The network protocol supported for the PPP interfaces is IP. In order to activate IP over each of the PPP interfaces, you need to assign an IP address to this **PPP interface** from the IP protocol configuration menu. This operation should always be carried out independently whether the interface obtains a dynamic IP address or not. Please note that only one IP address is supported for each PPP interface as the IPCP protocol only allows you to configure one for each PPP interface.

NOTE: As the IPCP protocol only permits you to configure a single IP address, no additional addresses should be aggregated to the PPP interfaces.

IMPORTANT: Whenever a PPP interface intervenes, the IP address must be assigned to the said PPP interface and NEVER to the base interfaces over which the protocol is negotiated.

It is also possible to assign an **UNNUMBERED** address to a PPP interface. This type is **0.0.0.n** where **n** represents the interface number.

An example is given below on how to carry out this process:

```
*PROCESS 4
Config>PROTOCOL IP

-- Internet protocol user configuration --
IP config>ADDRESS
Which net is this address for [ethernet0/0]? pppl
New address [0.0.0.0]? 192.168.5.1
Address mask [255.255.255.0]? 255.255.255.0
apu IP config>LIST ADDRESSES
IP addresses for each interface:
ethernet0/0      172.24.78.5      255.255.0.0      NETWORK broadcast, fill 0
serial0/0
serial0/1
serial0/2
bri0/0
x25-node
subatm1
pppl            192.168.5.1      255.255.255.0    NETWORK broadcast, fill 0
IP config>EXIT
Config>
```

2. Configuring a PPP interface

In order to access a PPP interface configuration menu, enter **NETWORK <PPP interface>** from the general configuration menu. E.g. if you wish to access interface **ppp2**, enter:

```
Config>NETWORK ppp2
-- Generic PPP User Configuration --
ppp2 config>
```

The commands available in the PPP interface configuration menu are as follows:

```
ppp2 config>?
BASE-INTERFACE
PPPOE
PPP
EXIT
ppp2 config>
```

Command	Function
? (HELP)	Displays the available commands or their options.
BASE-INTERFACE	Accesses the configuration menu for the base interfaces associated to the PPP interface.
PPPOE	Accesses the PPPoE parameters configuration menu.
PPP	Accesses the menu that permits you to associate a PPP parameters global profile to the PPP interface you are configuring.
EXIT	Exits the PPP interface configuration.

The configuration of a PPP interface mainly consists of the following:

- Base Interfaces over which PPP is negotiated.
- **Global** profiles with the PPP's *own* parameters.
- Association of the PPP interface with a PPP parameters global profile.
- If it is necessary, special PPPoE configuration.

2.1. Configuring the PPP interface Base Interfaces

In order to access the base interfaces configuration, enter the **BASE-INTERFACE** command within the PPP interface configuration menu.

```
Config>NETWORK ppp1
-- Generic PPP User Configuration --
ppp1 config>BASE-INTERFACE
-- Base Interface Configuration --
ppp1 Base IFC config>
```

The options for this configuration menu are as follows:

```
ppp1 Base IFC config>?
BASE-INTERFACE
LIST
```

```
NO
EXIT
ppp1 Base IFC config>
```

BASE-INTERFACE

The command permits you to associate a determined base interface to the PPP interface you are configuring and where necessary some DIAL profile parameters (calling).

In cases where the added base interface is a serial interface (synchronous or asynchronous) or an ATM subinterface, no further parameters are needed.

```
pppX Base IFC config>BASE-INTERFACE <permanent interface> [opciones]
link      add this interface to the dial group
pppX Base IFC config>
```

In order to eliminate a permanent base interface:

```
pppX Base IFC config>NO BASE-INTERFACE <permanent interface>
```

If the chosen base interface is switched (an ISDN basic or primary access or an AT commands interface) you need to specify the name of the DIAL profile that contains the call parameters (for further information on the configuration of Dial Profiles, please see manual Dm 732-I). Additionally, if the chosen base interface corresponds to an ISDN basic or primary access, in addition to the DIAL profile, you will be prompted for the base circuit identifier (an ISDN basic access can take values 1 or 2, referring to channels B1 and B2 respectively or value 255 if you do not wish to select a specific base circuit in this way indicating whichever B channel is available will be used). In cases where you indicate any free B channel (255), you will be asked for the number of the base circuits you wish to use as more than one can be employed for Multilink PPP (for an ISDN basic access up to 2 B channels).

```
pppX Base IFC config>BASE-INTERFACE <switched interface> <circuit id> [opciones]
link      add this interface to the dial group
number-of-circuits  number of circuits to request
profile      dial profile to use with this interface
```

link adds the base interface to PPP.
number-of-circuit number of base circuits you wish to use (valid in switched interfaces when the circuit identifier is 255)
profile dial profile that will use the base interface.

To eliminate a switched base interface:

```
pppX Base IFC config>NO BASE-INTERFACE <switched interface> <circuit id>
```

```
pppX Base IFC config>BASE-INTERFACE serial0/0 link
pppX Base IFC config>BASE-INTERFACE bri0/0 255 link
pppX Base IFC config>BASE-INTERFACE bri0/0 255 number-of-circuits 2
pppX Base IFC config>BASE-INTERFACE bri0/0 255 profile testprofile
pppX Base IFC config>LIST
```

Base Interface	Profile Name	Base Circuit Id	Number of circuits
serial0/0	sync/0	1	1
bri0/0	bri/0 testprofile	255	2

```
pppX Base IFC config>SHOW CONFIG
; Showing Menu and Submenus Configuration ...
```

```

base-interface serial0/0 link
;
base-interface bri0/0 255 link
base-interface bri0/0 255 profile testprofile
base-interface bri0/0 255 number-of-circuits 2
;
pppX Base IFC config>

```

Base interface is the base interface number you wish to associate to the PPP interface being configured.

Base circuit id is the circuit identifier.

Number of circuits the number of circuits you wish to use in the base interface.

Profile name this is the **name** (identifier) of the DIAL profile (calling) to use through the base interface.

NOTE: It is unnecessary to add more than one base interface to a PPP interface if you are not going to enable Multilink PPP.

2.2. Configuring PPP Global profiles

Use the **GLOBAL-PROFILES PPP** command to access the PPP global profiles configuration menu. An in-depth explanation on the configuration of the PPP global profiles is found in chapter 3.

NOTE: The PPP Global profiles are common to all PPP interfaces available in the device. Therefore, any modification of these may affect other PPP interfaces.

2.3. Configuring the PPP interface PPPoE protocol

This protocol is fully explained in the associated manual, Dm 708-I.

2.4. Configuring the PPP interface PPP parameters

To set the specific PPP parameters, enter the **PPP** command within the PPP interface configuration menu.

```

Config>NETWORK ppp1
-- Generic PPP User Configuration --
ppp1 config>PPP
-- PPP Configuration --
ppp1 PPP config>

```

The options presented in this menu are as follows:

PROFILE

This command associates a PPP parameters global profile to the PPP interface (for PPP global parameters configuration, please see chapter 3). The default global profile ‘0’ can be used if you wish to use the default parameters.

```
pppX PPP config>PROFILE <n° PPP profile>
pppX PPP config>PROFILE 1
pppX PPP config>
```

LIST

This command displays the PPP parameters global profile number assigned to this PPP interface. This permits you to view all the parameters configured in the assigned profile.

```
pppX PPP config>LIST

PPP Profile: 1
Show all parameters (Yes/No)(Y)? y

BACKUP Profile Number.....: 0 (default)
Number of call retries...: 5
IPCP timeout.....: 30 sec.
Time between call retries: 0 min.
Maximum backup time.....: 0 min.

CCP Profile Number.....: 0 (default)
CCP Options          Encode          Decode
-----
Type                : NO-COMP          LZS-DCP
Length              : 0                      6
History Count       : PackbyPack        1
Check Mode          : None                SeqNum.
Process Mode        : None                ProcUncomp
Protocol            : PPP                    PPP

FACILITIES Profile Number...: 1
Authentication enabled: CHAP
Validation by Keys
Multilink PPP disabled
CCP disabled
CRTP Compression disabled
RIP no-dial disabled
No member of any Dial Routing Pool

IPCP Profile Number.....: 1
IP Van Jacobson Compression : NO
Local IP address  : Assigned
Remote IP address : None

LCP PARAMETERS Profile Number: 0 (default)
Tries Configure-Request      : 10
Tries Configure-Nak          : 10
Tries Terminate-Request     : 10
Timeout between tries (sec)  : 3
Number of Echo-Request       : 6
Delay before starting LCP negotiation: 2

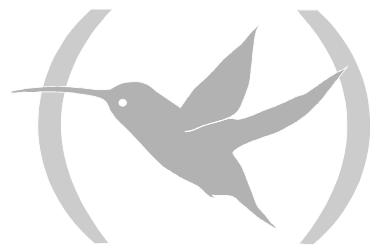
MULTILINK PPP Profile Number.: 0 (default)
MRRU...: 1524
Use SSN: NO
Endpoint Discriminator Class: 0
ED value (Null Class): None
Activation Interval...: 120
Deactivation Interval.: 300
Activation Threshold..: 90
Deactivation Threshold: 50
Traffic Load.....: Inbound & Outbound traffic
Max Links per Bundle.....: 2
Forced Fragmentation Size: 0 (disabled)
Permission to add/remove links: Any connection
NCP Profile Number.....: 0 (default)
Tries Configure-Request      : 10
Tries Configure-Nak          : 10
Tries Terminate-Request     : 10
Timeout between tries (sec)  : 3

AUTHENTICATION Profile Number: 1
Login: localuser
```

```
Password: ****  
Secret: ****  
  
USERS-LIST Profile Number....: 1  
Login: remoteuser  
pppX PPP config>
```

Chapter 3

PPP Global Profiles Configuration



1. Configuring PPP Global Profiles

Configuration of global profiles is common to all PPP interfaces. In order to access the PPP Global Profiles configuration menu, enter the **GLOBAL-PROFILES PPP** command from the general configuration menu:

```
Config>GLOBAL-PROFILES PPP
-- PPP Profiles Configuration --
PPP Profiles config>
```

The PPP profiles configuration menu options are as follows:

```
PPP Profiles config>?
BACKUP          backup profile
CCP             ccp profile
FACILITIES      miscellaneous facilities profile
IPCP           ipcp profile
LCP-OPTIONS     lcp per-interface options profile
LCP-PARAMETERS  lcp parameters profile
LIST            display ppp profiles configuration
MULTILINK       multilink ppp profile
NCP             ncp parameters profile
NO              NO
PPP             ppp main profile
USER            user definition profile
USERS-LIST      authorized users list profile
EXIT
PPP Profiles config>
```

Command	Function
? (HELP)	Displays the available commands or their options.
BACKUP	Configures a Backup profile.
CCP	Configures a CCP profile.
FACILITIES	Configures a profile of various Facilities.
IPCP	Configures an IPCP profile.
LCP-OPTIONS	Configures an LCP options profile (per interface).
LCP-PARAMETERS	Configures an LCP parameters profile.
LIST	Displays the configured profiles.
MULTILINK	Configures a Multilink PPP parameters profile.
NCP	Configures an NCP parameters profile.
NO	Configures an IPCP profile.
PPP	Configures a PPP global profile.
USER	Configures a user (user authentication parameters).
USERS-LIST	Configures a list of permitted users.
EXIT	Exits the PPP profile configuration.

1.1. Configuring Backup profiles

In order to configure a backup profile, use the **BACKUP** command.

Syntax:

```
PPP Profiles config>BACKUP <profile n°> [opciones]
```

The profile number can be between 1 and 255. The value 0 is reserved for the default parameters.

To eliminate a backup profile, the **NO BACKUP <profile n°>** is used.

The backup profile parameters are only significant when the said profile is associated to a PPP interface configured as the main interface within the WAN Reroute facilities and additionally if the base interface associated to this is a switch interface. For further information on the configuration of the WAN Reroute backup features, please see manual Dm 727-I.

The available options are as follows:

```

PPP Profiles config>BACKUP <profile n°> [opciones]
default                set backup profile default configuration
dial-test-time         time between dial recovery tests (min)
maximum-backup-time    maximum backup time (min)
ncp-timeout            ncp timeout before backup (sec)
retries                call retries before backup
  
```

- default* Creates a backup profile with the default parameters or reestablishes the default parameters for an existing profile.
- dial-test-time* Time between test calls (in minutes). Periodically, when the backup interface is activated, a call is carried out to try and reestablish the connection through the main interface (switched). If this value is set to 0, then test calls are not executed through the main interface. The default value for this parameter is 0 minutes (test calls are disabled).
- maximum-backup-time* Maximum backup time (in minutes). Once this time has timed out after switching to backup, the main interface will pass to UP and an attempt is made to reestablish the connection through the said interface. If this value is set to 0, then return from backup is not forced while the secondary link is still up. The default value for this parameter is 0 minutes.
- ncp-timeout* Maximum amount of time permitted during the NCP negotiation (in seconds). Once this has timed out and the NCP has not been negotiated, the PPP interface will pass to a DOWN state. If the WAN Reroute facility is enabled, the secondary or backup interface will activate. The default value for this parameter is 30 seconds.
- retries* Number of failed call retries that must be executed by the main interface before switching to backup. The default value for this parameter is 5 retries.

Example:

```

PPP Profiles config>BACKUP 1 default
PPP Profiles config>BACKUP 1 ncp-timeout 90
PPP Profiles config>BACKUP 1 maximum-backup-time 3600
PPP Profiles config>BACKUP 1 retries 3
PPP Profiles config>BACKUP 1 dial-test-time 2
PPP Profiles config>BACKUP 2 default
PPP Profiles config>LIST BACKUP
+-----+
+  BACKUP Profiles                                     +
+-----+
*** Profile number: 1 ***
Number of call retries...:      3
NCP timeout.....:          90 sec.
Time between test calls..:     2 min.
Maximum backup time.....:    3600 min.
  
```

```

*** Profile number: 2 ***
Number of call retries...:      5
NCP timeout.....:             30 sec.
Time between test calls..:     0 min.
Maximum backup time.....:     0 min.

PPP Profiles config>SHOW MENU
; Showing Menu Configuration ...

    backup 1 default
    backup 1 retries 3
    backup 1 ncp-timeout 90
    backup 1 dial-test-time 2
    backup 1 maximum-backup-time 3600
;
    backup 2 default
;
PPP Profiles config>

```

Profile number displayed backup profile identifier.
Number of call retries number of call retries before switching to backup.
NCP timeout NCP timer (in seconds) before switching to backup.
Time between test calls time between call retries (in minutes).
Maximum backup time maximum backup time (in minutes).

1.2. Configuring CCP profiles

In order to configure a CCP parameters profile (Compression Control Protocol) use the **CCP** command.

Syntax:

```
PPP Profiles config>CCP <profile n°> [options]
```

The profile number can be between 1 and 255. The value 0 is reserved for the default parameters.

To eliminate a CCP parameters profile, the **NO CCP <profile n°>** is used.

NOTE: So that the PPP tries to negotiate the CCP protocol, the CCP negotiate option must be enabled in the associated FACILITIES profile.

The available options are as follows:

```

PPP Profiles config>CCP <profile n°> [options]
default      set ccp profile default configuration
no
uncompress   uncompress ccp options

```

default creates a CCP profile with the default parameters or reestablishes the default parameters for an existing profile.

uncompress configures the decompression CCP options.

```

PPP Profiles config>CCP <profile n°> uncompress [options]
check-mode   check mode options
history      history
lzs-dcp      lzs compression algorithm
none         no compression
stac         stac compression algorithm
uncomp-process-mode  uncompressed packets process mode

```

<i>check mode</i>	indicates the check mode for the integrity of the data used. The values that can be taken depend on the compression algorithm used. If you select LZS-DCP compression, then the values can be: NONE, LCB, SEQ or BOTH (SEQ+LCB). In this case the default value for this parameter is BOTH (SEQ+LCB). If you select STAC compression, then the values can be: NONE, LCB, SEQ or EXTENDED. In this case the default value for this parameter is SEQ.
<i>history</i>	indicates if you can maintain histories to decompress. I.e. the decompression of each packet is carried out bearing in mind the data previously processed and sent in prior packets. The default value for this parameter is enabled (the history is maintained).
<i>lzs-dcp</i>	indicates that the LZS-DCP (RFC 1967) compression algorithm is used. This algorithm is configured by default.
<i>none</i>	indicates that you do not want to receive compressed information from the remote end.
<i>stac</i>	indicates that the STAC Electronics LZS (RFC 1974) compression algorithm will be used.
<i>uncomp-process-mode</i>	indicates that uncompressed packets received are processed by the CCP to update the status (uncompressed frame process mode). If this option is disabled, the uncompressed packets are not taken into account when updating the CCP status. This parameter is enabled by default.

We need to stress here that not all the value combinations of *CCP Algorithm*, *check-mode*, *uncomp-process-mode* and *history* are correct and can be admitted in the CCP negotiation. There are invalid combinations according to that specified in the RFCs.

- When you indicate that you do not want to receive compressed information (compression algorithm *none*), you cannot configure the *check-mode*, *history* and *uncomp-process-mode* options.
- When you select the STAC compression algorithm, you cannot configure the *uncomp-process-mode* parameter.
- Using either the LZS-DCP compression algorithm or the STAC compression algorithm, when you configure the *check-mode* parameter set to value *none* the *history* parameter is mandatorily disabled indicating that packet to packet compression is carried out.
- If you use the STAC compression algorithm, when you select the *check-mode* parameter with value *extended*, the *history* parameter is mandatorily enabled indicating that compression is carried out depending on the previously processed information

In addition to the restrictions given above, there is also a series of combinations that although they are valid, are not supported by the device.

- If you use the LZS-DCP compression algorithm, when you configure the *check-mode* parameter with value *seq* or *both*, the *uncomp-process-mode* parameter enables.

Bearing in mind the default values for each of the CCP parameters and the previously described restrictions, the default CCP profile contains the following values: *lzs-dcp*, *history*, *check-mode both* and *uncomp-process-mode*.

Example:

```
PPP Profiles config>CCP 1 default
PPP Profiles config>CCP 1 uncompress check-mode none
PPP Profiles config>CCP 1 no uncompress uncomp-process-mode
PPP Profiles config>CCP 2 default
PPP Profiles config>CCP 2 uncompress stac
PPP Profiles config>LIST CCP
+-----+
+ CCP Profiles +
+-----+
*** Profile number: 1 ***
CCP Options      Encode      Decode
-----
Type             :      NO COMP      LZS-DCP
Length          :           0           6
History Count   :      PackbyPack   PackbyPack
Check Mode      :           None      None
Process Mode    :           None      None
Protocol        :           PPP       PPP

*** Profile number: 2 ***
CCP Options      Encode      Decode
-----
Type             :      NO COMP      STAC
Length          :           0           5
History Count   :      PackbyPack   1
Check Mode      :           None      SeqNum+LCB
Process Mode    :           None      None
Protocol        :           PPP       PPP

PPP Profiles config>SHOW MENU
; Showing Menu Configuration ...

    ccp 1 default
    ccp 1 uncompress check-mode none
    ccp 1 no uncompress history
    ccp 1 no uncompress uncomp-process-mode
;
    ccp 2 default
    ccp 2 uncompress stac
;
PPP Profiles config>
```

<i>Profile number</i>	identifier of the displayed CCP profile.
<i>Type</i>	compression algorithm used.
<i>Length</i>	length of the configuration format.
<i>History Count</i>	use of the history.
<i>Check Mode</i>	data integrity check mode.
<i>Process Mode</i>	process mode for uncompressed received packets.
<i>Protocol</i>	CCP encapsulation protocol type.

1.3. Configuring Facilities Profiles

In order to configure a various facilities profile, use the **FACILITIES** command.

Syntax:

```
PPP Profiles config>FACILITIES <profile n°> [options]
```

The profile number can be between 1 and 255. The value 0 is reserved for the default parameters.

To eliminate a facilities profile, the **NO FACILITIES <profile n° >** is used.

The available options are as follows:

```

PPP Profiles config>FACILITIES <profile n°> [options]
authentication      pap/chap authentication
ccp                 enable ccp
crtp                crtp compression for rtp packets
default            set facilities profile default configuration
dial-routing-pool  enables dial routing and sets pool name
multilink          enable multilink ppp
no
radius              enable radius
rip-no-dial        rip packets do not cause calls

```

- authentication* Permits you to select the authentication protocol to be used if you wish the router to prompt the remote end for authentication during the link negotiation. This can take the following values: *pap* (password authentication protocol) and *chap* (challenge authentication protocol). By default authentication is not enabled.
- ccp* Enables CCP protocol negotiation in the PPP interface. CCP negotiation is not enabled by default.
- crtp* Enables CRTP compression in the PPP interface. The possible values are: *with-checksum* and *without-checksum* indicating whether the UDP checksum is included or not. CRTP compression is disabled by default.

NOTE: The router DOES NOT NEGOTIATE CRTP compression, it is directly applied.

- default* Creates a facilities profile with the default parameters or reestablishes the default parameters for an existing profile.
- dial-routing-pool* Configures the PPP interface as pertaining to a Dial-Routing interface pool. For further information on configuring Dial-Routing interfaces, please see the associated manual DM 744-I.
- multilink* Enables the Multilink PPP negotiation in the PPP interface. By default, the Multilink PPP negotiation is disabled.
- radius* Enable the RADIUS facility. When this is enabled, the validity of the remote end authentication and the PPP connection configuration is carried out through the use of a RADIUS server which contains the said information instead of using the permitted users list configured in the router itself. In order to enable this facility, you need to have previously configured the RADIUS protocol and globally enabled it in the router through its associated configuration environment. For further information on the RADIUS protocol configuration, please see manual Dm 733-I. This facility is disabled by default.
- rip-no-dial* When you configure a *non-permanent* base interface to carry out outgoing calls the following problem arises if the RIP protocol over the PPP interface over the said interface is also enabled: the RIP protocol will begin to send IP packets over the PPP interface forcing a call due to traffic. Additionally and due to the fact that the RIP protocol sends periodic messages, the call is never released due to absence of traffic. To correct this problem in those cases where you wish to use dynamic routing, this option has been implemented so that if this is enabled the RIP packets will not generate calls nor be taken into account with

regard to maintaining a previously established call active. (I.e. if the only IP traffic in the link is due to RIP protocol, the call will be released once the timer for absence of traffic has timed out).

Example:

```

PPP Profiles config>FACILITIES 1 default
PPP Profiles config>FACILITIES 1 authentication chap
PPP Profiles config>FACILITIES 1 multilink
PPP Profiles config>FACILITIES 2 default
PPP Profiles config>FACILITIES 2 authentication pap
PPP Profiles config>FACILITIES 2 radius
PPP Profiles config>FACILITIES 2 crtp without-checksum
PPP Profiles config>FACILITIES 2 rip-no-dial
PPP Profiles config>LIST FACILITIES
+-----+
+ FACILITIES Profiles                                     +
+-----+
*** Profile number: 1 ***
  Authentication enabled: CHAP
  Validation by Keys
  Multilink PPP enabled
  CCP disabled
  CRTP Compression disabled
  RIP no-dial disabled
  No member of any Dial Routing Pool

*** Profile number: 2 ***
  Authentication enabled: PAP
  Validation by RADIUS
  Multilink PPP disabled
  CCP disabled
  CRTP Compression enabled
  UDP Checksum in CRTP disabled
  RIP no-dial enabled
  No member of any Dial Routing Pool

PPP Profiles config>SHOW MENU
; Showing Menu Configuration ...

  facilities 1 default
  facilities 1 authentication chap
  facilities 1 multilink
;
  facilities 2 default
  facilities 2 authentication pap
  facilities 2 radius
  facilities 2 rip-no-dial
  facilities 2 crtp without-checksum
;
PPP Profiles config>

```

<i>Profile number</i>	identifier of the displayed facilities profile.
<i>Authentication</i>	type of authentication protocol (if this is enabled).
<i>Validation</i>	authentication validation mode sent by the remote end (through the local list of permitted users or through a RADIUS Server).
<i>Multilink PPP</i>	Multilink PPP negotiation.
<i>CCP</i>	CCP protocol negotiation.
<i>CRTP Compression</i>	CRTP compression.
<i>UDP Checksum in CRTP</i>	sending of the UDP checksum in the compressed header (only when the CRTP compression is enabled).
<i>RIP no- dial</i>	displays if the RIP-NO-DIAL facility is enabled or not.
<i>Dial Routing Pool</i>	indicates if this pertains to a dial-routing pool.

1.4. Configuring IPCP profiles

To configure an IPCP (Internet Protocol Control Protocol) profile, use the **IPCP** command.

Syntax:

```
PPP Profiles config>IPCP <profile n°> [options]
```

The profile number can be between 1 and 255. The value 0 is reserved for the default parameters.

To eliminate an IPCP profile, the **NO IPCP <profile n° >** is used.

The available options are as follows:

```
PPP Profiles config>IPCP <profile n°> [options]
default          set ipcp profile default configuration
local-ip         set local ip for this interface
no
remote-ip        set remote ip for this interface
van-jacobson     van-jacobson compression
```

- default* Creates an IPCP profile with the default parameters or reestablishes the default parameters for an existing profile.
- local-ip* Configures the IP address to be used by the local end. This can take the values *fixed*, if the IP address to be used by the local end has to be configured by the user for the PPP interface. *Negotiable*, if the remote end is permitted to decide which IP address should be used by the local end and *assigned* if you wish the remote end to assign the IP address for the local end. The default value is *fixed*.
- remote-ip* Configures the IP address to be assigned to the remote end. This can take the values: *fixed* if you wish to assign a fixed IP address to the remote end and *same-subnet* if you wish to assign a local subnet IP address to the remote end. By default no IP address is assigned to the remote end (unless this is requested in which case any address is assigned from the device addresses pool).
- van-jacobson* Enables the Van Jacobson compression negotiation at the local end. This parameter is disabled by default.

Example:

```
PPP Profiles config>IPCP 1 default
PPP Profiles config>IPCP 1 local-ip assigned
PPP Profiles config>IPCP 2 default
PPP Profiles config>IPCP 2 local-ip fixed
PPP Profiles config>IPCP 2 remote-ip fixed 10.0.0.1
PPP Profiles config>IPCP 2 van-jacobson
PPP Profiles config>LIST IPCP
+-----+
+ IPCP Profiles +
+-----+
*** Profile number: 1 ***
  IP Van Jacobson Compression : NO
  Local IP address  : Assigned
  Remote IP address : None

*** Profile number: 2 ***
  IP Van Jacobson Compression : YES
  Local IP address  : Fixed
  Remote IP address : Fixed
  IP remote address : 10.0.0.1

PPP Profiles config>SHOW MENU
```



```

; Showing Menu Configuration ...

ipcp 1 default
ipcp 1 local-ip assigned
;
ipcp 2 default
ipcp 2 remote-ip fixed 10.0.0.1
ipcp 2 van-jacobson
;
PPP Profiles config>

```

Profile number displayed IPCP profile identifier.
IP Van Jacobson Compression negotiates the Van Jacobson compression.
Local IP address IP address to be used by the local end.
Remote IP address IP address to be used by the remote end.

1.5. Configuring the LCP Options profiles

To configure an LCP options (Link Control Protocol options) profile dependent on the base interface, use the **LCP-OPTIONS** command.

Syntax:

```

PPP Profiles config>LCP-OPTIONS <base interface> [options]

```

The LCP options profile is associated to the base interfaces.

To eliminate an LCP options profile, use the ***NO LCP-OPTIONS <base interface>***.

```

PPP Profiles config>LCP-OPTIONS <base interface> [options]
accm      asynchronous control character map
acfc      address control field compression
default   set lcp-options profile default configuration
magic-number magic number
mru       maximum receive unit
no
pfc       protocol field compression

```

accm Configures the mask to be applied if the transparency in transmission is to be used over the control characters in cases of asynchronous PPP. When these characters are included in the frame this prevents the flow control processes from being activated in the modem or adapters used for the connection. The default value is 0xFFFFFFFF (hexadecimal). Typically negotiated values are 0x00000000 for links that can manage any data and 0x000A0000 for links with XON/XOFF software flow control.

acfc Enables negotiation for this option (Address Control Field Compression). Permits reception of PPP HDLC frames without the *Address* and *Control* fields once the link has been established. By default this option is disabled. We recommend *acfc* is enabled in asynchronous interfaces.

default Creates an LCP options profile with the default parameters or reestablishes the default parameters for an existing profile.

magic-number Enables the “magic number” option when establishing the link. By default this is enabled. This is used to find out if the link is in loop or not through the transmission of a random number between the two ends based on the system clock and the number of times this has re-started.

mru This is the maximum size of the PPP frame that will be accepted at reception. This range is between values 576 and 4089 bytes. The default value is 1500 bytes.

pf Enables negotiation of this option (Protocol Field Compression). Permits the reception of the compressed protocol field in cases of PPP frames which are not control protocols (LCP, IPCP etc). By default this option is disabled. We recommend enabling *pf* in asynchronous interfaces.

Example:

```

PPP Profiles config>LCP-OPTIONS subatml default
PPP Profiles config>LCP-OPTIONS subatml mru 1524
PPP Profiles config>LCP-OPTIONS bri0/0 default
PPP Profiles config>LCP-OPTIONS bri0/0 mru 1524
PPP Profiles config>LCP-OPTIONS bri0/0 pfc
PPP Profiles config>LCP-OPTIONS serial0/0 default
PPP Profiles config>LCP-OPTIONS serial0/0 acm 00000000
PPP Profiles config>LCP-OPTIONS serial0/0 acfc
PPP Profiles config>LCP-OPTIONS serial0/0 pfc
PPP Profiles config>LIST LCP-OPTIONS
-----+
+ LCP OPTIONS Profiles                                     +
-----+
*** Base Interface: subatml ***
Interface MRU (bytes)           : 1524
Magic Number                    : YES
Asynchronous Control Character Map : FFFFFFFF
Protocol Field Compression      : NO
Address Control Field Compression : NO

*** Base Interface: bri0/0 ***
Interface MRU (bytes)           : 1524
Magic Number                    : YES
Asynchronous Control Character Map : FFFFFFFF
Protocol Field Compression      : YES
Address Control Field Compression : NO

*** Base Interface: serial0/0 ***
Interface MRU (bytes)           : 1500
Magic Number                    : YES
Asynchronous Control Character Map : 00000000
Protocol Field Compression      : YES
Address Control Field Compression : YES

apu PPP Profiles config>SHOW MENU
; Showing Menu Configuration ...
  lcp-options subatml default
;
  lcp-options subatml mru 1524
;
  lcp-options bri0/0 default
  lcp-options bri0/0 mru 1524
  lcp-options bri0/0 pfc
;
  lcp-options serial0/0 default
  lcp-options serial0/0 acfc
  lcp-options serial0/0 pfc
  lcp-options serial0/0 acm 0
;
PPP Profiles config>

```

- Base interface* base interface.
- Interface MRU* maximum size of the PPP frame that will be accepted at reception.
- Magic Number* “magic number” option.
- Asynchronous Control Character Map* mask to apply if transparency in transmission is used over the control characters.
- Protocol Field Compression* PFC negotiation.
- Address Control Field Compression* ACCM negotiation.

1.6. Configuring LCP Parameter profiles

In order to configure an LCP parameters profile (Link Control Protocol parameters), use the **LCP-PARAMETERS** command.

Syntax:

```
PPP Profiles config>LCP-PARAMETERS <profile n°> [options]
```

The profile number can be between 1 and 255. The value 0 is reserved for the default parameters.

To eliminate an LCP parameters profile, the **NO LCP-PARAMETERS <profile n°>** is used.

```
PPP Profiles config>LCP-PARAMETERS <n° perfil> [options]
conf-req          configure-request tries
conf-nak          configure-nak tries
default           set lcp-parameters profile default configuration
term-req          terminate-request tries
timeout-retry     time between tries
echo-req          number of echo-request
negotiation-delay delay before starting LCP negotiation
```

- conf-req* Indicates the number of times that an LCP CONFIGURE-REQUEST will be transmitted to establish the PPP link. The permitted values are between 1 and 100. The default value is 10.
- conf-nak* Maximum number of CONFIGURE-NAK rejects that will be transmitted during link establishment before timing out due to non-compatible configuration between both ends. The permitted values are between 1 and 100. The default value is 10.
- default* Creates an LCP parameters profile with the default parameters or reestablishes the default parameters for an existing profile.
- term-req* Number of times that the TERMINATE-REQUEST frame will be send without detecting a TERMINATE-ACK response before closing the link in the usual way. The permitted values are between 1 and 20. The default value is 10.
- timeout-retry* This is the time in seconds between consecutive LCP negotiation frame transmissions when an adequate response has not been received. The permitted values are between 1 and 30 seconds. The default value is 3 seconds.
- echo-req* Number of times that the ECHO-REQUEST frame has been transmitted without receiving a response from the remote end (ECHO-REPLY) in order to assume the link is down. The ECHO-REQUEST frames are sent every 10 seconds. The numerical values permitted are between 2 and 20; additionally you can introduce the “off” option to disable ECHO-REQUEST frame sending. The default value is 6.

NOTE: If you disable the transmission of LCP Echo-Request frames, the PPP interface will remain active provided the base interface does not go down. (CAREFUL: there are base interfaces which are always active).

negotiation-delay Time interval (in seconds) waited from the moment the link is considered active before initiating the LCP negotiation stage. Permitted values are between 0 (negotiation begins immediately) and 65535. Default is 0.

Example:

```
PPP Profiles config>LCP-PARAMETERS 1 default
PPP Profiles config>LCP-PARAMETERS 1 conf-req 4
PPP Profiles config>LCP-PARAMETERS 1 conf-nak 4
PPP Profiles config>LCP-PARAMETERS 1 term-req 2
PPP Profiles config>LCP-PARAMETERS 1 timeout-retry 5
PPP Profiles config>LCP-PARAMETERS 2 default
PPP Profiles config>LCP-PARAMETERS 2 echo-req 3
PPP Profiles config>LCP-PARAMETERS 2 negotiation-delay 2
PPP Profiles config>LIST LCP-PARAMETERS
+-----+
+ LCP PARAMETERS Profiles                                     +
+-----+
*** Profile number: 1 ***
  Tries Configure-Request           : 4
  Tries Configure-Nak               : 4
  Tries Terminate-Request           : 2
  Timeout between tries (sec)       : 5
  Number of Echo-Request            : 6
  Delay before starting LCP negotiation: 0

*** Profile number: 2 ***
  Tries Configure-Request           : 10
  Tries Configure-Nak               : 10
  Tries Terminate-Request           : 10
  Timeout between tries (sec)       : 3
  Number of Echo-Request            : 3
  Delay before starting LCP negotiation: 2

apu PPP Profiles config>SHOW MENU
; Showing Menu Configuration ...

  lcp-parameters 1 default
  lcp-parameters 1 conf-req 4
  lcp-parameters 1 conf-nak 4
  lcp-parameters 1 term-req 2
  lcp-parameters 1 timeout-retry 5
;
  lcp-parameters 2 default
  lcp-parameters 2 echo-req 3
  lcp-parameters 1 negotiation-delay 2
;
PPP Profiles config>
```

<i>Profile number</i>	displayed LCP parameters profile identifier.
<i>Tries Configure-Request</i>	number of CONFIGURE-REQUEST petitions.
<i>Tries Configure-Nak</i>	number of CONFIGURE NAK frame rejects.
<i>Tries Terminate-Request</i>	number of TERMINATE-REQUEST without detecting a response from the remote end (TERMINATE-ACK).
<i>Timeout between tries</i>	time (in seconds) between consecutive LCP negotiation frame transmissions when an adequate response has not been received.
<i>Number of Echo-Request</i>	number of ECHO-REQUEST without response before assuming the link is down.

1.7. Configuring Multilink PPP profiles

In order to configure a Multilink PPP parameters profile, use the **MULTILINK** command.

Syntax:

```
PPP Profiles config>MULTILINK <profile n°> [options]
```

The profile number can be between 1 and 255. The value 0 is reserved for the default parameters.

To eliminate a Multilink PPP parameters profile, the **NO MULTILINK <profile n°>** is used.

NOTE: So that the PPP tries to negotiate the Multilink PPP protocol, the MULTILINK negotiate option must be enabled in the associated FACILITIES profile.

The available options are as follows:

```

PPP Profiles config>MULTILINK <profile n°> [options]
activation          options to activate new links
call-out           add new links just for outgoing calls
deactivation        options to deactivate links
default            set multilink-ppp profile default configuration
endpoint           endpoint discriminator
fragmentation      forced mp fragmentation size
links-per-bundle   maximum number of links per bundle
mrru               mrru size in bytes
no
ssn-header-format  short sequence number header format
traffic-load       traffic load calculation

```

- activation* Configures the activation options for the new links: *interval* and *threshold*.
“*activation interval*” this is the activation interval (in seconds). This value can be between 4 and 1800 seconds. The default value is 120 seconds.
“*activation threshold*” this is the activation threshold (%). The default value for this parameter is 90%.
If, during the activation interval, the average occupation of the Multilink PPP surpasses the activation threshold, activation of a new PPP link is requested to add this to the multilink bundle.
- call-out* When this option is enabled, you can only add new PPP links if the first link (switched) was originated with an outgoing call. By default this parameter is disabled.
- deactivation* Configures the deactivation options for the links: *interval* and *threshold*.
“*deactivation interval*” this is the deactivation interval (in seconds). This value can be between 4 and 1800 seconds. The default value is 300 seconds.
“*deactivation threshold*” this is the deactivation threshold (%). The default value for this parameter is 50%.
If, during the deactivation interval, the average occupation of the Multilink PPP (the aggregated capacity) does not reach the deactivation threshold, deactivation of a PPP link is requested from those pertaining to the multilink bundle.

NOTE: Only switched links can be dynamically activated and deactivated in a Multilink PPP bundle.

- default* Creates a multilink PPP profile with the default parameters or reestablishes the default parameters for an existing profile.
- endpoint* Specifies the Endpoint Discriminator used. The possible classes are:
- *ethernet*: Ethernet MAC address.
 - *ip*: IP address.
 - *locally-assigned*: locally assigned address, up to 20 characters.
 - *magic-number*: magic-number from 4 up to 20 bytes.

	<ul style="list-style-type: none"> • <i>null</i>: null class, this does not have any associated value. • <i>psndn</i> (<i>public switched network directory number</i>): E.164 address The default value is <i>null</i>. You cannot configure the values <i>locally-assigned</i> and <i>magic-number</i> as their use is not recommended.
<i>fragmentation</i>	Configures the forced fragmentation size for the Multilink PPP frames. If you wish to disable this option, you can configure the default option 0 (disabled). This parameter is usually used when you want to force a smaller frame size than that negotiated with the MRRU.
<i>links-per-bundle</i>	Maximum number of PPP links that you can associate to a Multilink PPP bundle. This value can be between 1 and 31, the default being 2.
<i>mrru</i>	Maximum size of the Multilink PPP frames accepted at reception (Max-Receive-Reconstructed-Unit). This value must be between 1 and 4096 bytes. The default value is 1524 bytes.
<i>ssn-header-format</i>	Indicates that the MP header format is negotiated with the short sequence number. The default value is NO.
<i>traffic-load</i>	Indicates the direction of the traffic considered in order to calculate the average load of the channels. The possible values are <i>inbound</i> (inbound from the external network towards the device), <i>outbound</i> (outbound from the device towards the external network) and <i>either</i> (both types of traffic). Under normal access conditions towards an external network e.g. Internet where the majority of the traffic is inbound, we recommend configuring the <i>inbound</i> value. The default value for this parameter is <i>either</i> .

Example:

```

PPP Profiles config>MULTILINK 1 default
PPP Profiles config>MULTILINK 1 mrru 1540
PPP Profiles config>MULTILINK 1 activation interval 60
PPP Profiles config>MULTILINK 1 traffic-load inbound
PPP Profiles config>MULTILINK 2 default
PPP Profiles config>MULTILINK 2 activation threshold 85
PPP Profiles config>MULTILINK 2 deactivation threshold 40
PPP Profiles config>MULTILINK 2 fragmentation 400
PPP Profiles config>MULTILINK 2 links-per-bundle 4
PPP Profiles config>LIST MULTILINK
+-----+
+ MULTILINK Profiles                                     +
+-----+
*** Profile number: 1 ***
MRRU...: 1540
Use SSN: NO
Endpoint Discriminator Class: 0
ED value (Null Class): None
Activation Interval...: 60
Deactivation Interval.: 300
Activation Threshold..: 90
Deactivation Threshold: 50
Traffic Load.....: Inbound traffic
Max Links per Bundle....: 2
Forced Fragmentation Size: 0 (disabled)
Permission to add/remove links: Any connection

*** Profile number: 2 ***
MRRU...: 1524
Use SSN: NO
Endpoint Discriminator Class: 0

```

```

ED value (Null Class): None
Activation Interval...: 120
Deactivation Interval.: 300
Activation Threshold..: 85
Deactivation Threshold: 40
Traffic Load.....: Inbound & Outbound traffic
Max Links per Bundle....: 4
Forced Fragmentation Size: 400
Permission to add/remove links: Any connection

PPP Profiles config>SHOW MENU
; Showing Menu Configuration ...

    multilink 1 default
    multilink 1 mrru 1540
    multilink 1 activation interval 60
    multilink 1 traffic-load inbound
;
    multilink 2 default
    multilink 2 activation threshold 85
    multilink 2 deactivation threshold 40
    multilink 2 links-per-bundle 4
    multilink 2 fragmentation 400
;
PPP Profiles config>

```

<i>Profile number</i>	Multilink PPP profile identifier.
<i>MRRU</i>	maximum size of the Multilink PPP frames accepted at reception.
<i>Use SSN</i>	MP header format negotiation with short sequence number.
<i>Endpoint Discriminator Class</i>	Specifies the <i>Endpoint Discriminator</i> class.
<i>ED value</i>	contains the value of the <i>Endpoint Discriminator</i> . This value depends on the class configured.
<i>Activation Interval</i>	activation interval in seconds.
<i>Deactivation Interval</i>	deactivation interval in seconds.
<i>Activation Threshold</i>	activation threshold (%).
<i>Deactivation Threshold</i>	deactivation threshold (%).
<i>Traffic Load</i>	traffic considered to calculate the average load of the links.
<i>Max Links per Bundle</i>	maximum number of PPP links associated to the Multilink PPP bundle.
<i>Forced Fragmentation Size</i>	Forced fragmentation size for the Multilink PPP frames.
<i>Permission to add/remove links</i>	restrictions on the type of connection when adding/removing links.

1.8. Configuring NCP profiles

In order to configure an NCP parameters profile (Network Control Protocol parameters), use the **NCP** command.

Syntax:

```
PPP Profiles config>NCP <profile n°> [options]
```

The profile number can be between 1 and 255. The value 0 is reserved for the default parameters.

To eliminate an NCP parameters profile, the **NO NCP <profile n°>** is used.

The available options are as follows:

```

PPP Profiles config>NCP <profile n°> [options]
conf-req          configure-request tries
conf-nak          configure-nak tries
default           set ncp profile default configuration
term-req          terminate-request tries
timeout-retry     time between tries

```

- conf-req* Indicates the number of times that an NCP CONFIGURE-REQUEST will be transmitted to establish the network protocol. The permitted values are between 1 and 100. The default value is 10.
- conf-nak* Maximum number of CONFIGURE-NAK rejects that will be transmitted during link establishment before timing out due to non-compatible configuration between both ends. The permitted values are between 1 and 100. The default value is 10.
- default* Creates an NCP profile with the default parameters or reestablishes the default parameters for an existing profile.
- term-req* Number of times that the TERMINATE-REQUEST frame will be sent without detecting a TERMINATE-ACK response before finalizing network protocol in an orderly way. The permitted values are between 1 and 20. The default value is 10.
- timeout-retry* This is the time in seconds between consecutive NCP negotiation frame transmissions when an adequate response has not been received. The permitted values are between 1 and 30 seconds. The default value is 3 seconds.

Example:

```

PPP Profiles config>NCP 1 default
PPP Profiles config>NCP 1 conf-req 3
PPP Profiles config>NCP 1 timeout-retry 7
PPP Profiles config>NCP 2 default
PPP Profiles config>NCP 2 term-req 2
PPP Profiles config>NCP 2 conf-nak 3
PPP Profiles config>LIST NCP
+-----+
+ NCP Profiles                                     +
+-----+
*** Profile number: 1 ***
  Tries Configure-Request           : 3
  Tries Configure-Nak               : 10
  Tries Terminate-Request           : 10
  Timeout between tries (sec)       : 7

*** Profile number: 2 ***
  Tries Configure-Request           : 10
  Tries Configure-Nak               : 3
  Tries Terminate-Request           : 2
  Timeout between tries (sec)       : 3

PPP Profiles config>SHOW MENU
; Showing Menu Configuration ...

  ncp 1 default
  ncp 1 conf-req 3
  ncp 1 timeout-retry 7
;
  ncp 2 default
  ncp 2 conf-nak 3
  ncp 2 term-req 2
;
PPP Profiles config>

```

- Profile number* displayed NCP parameters profile identifier.
- Tries Configure-Request* number of CONFIGURE-REQUEST petitions.
- Tries Configure-Nak* number of CONFIGURE NAK rejects.
- Tries Terminate-Request* number of TERMINATE-REQUEST without detecting a response from the remote end (TERMINATE-ACK).

Timeout between tries time (in seconds) between consecutive NCP negotiation frame transmissions when an adequate response has not been received.

1.9. Configuring User profiles

In order to configure a profile that defines a user, apply the **USER** command.

Syntax:

```
PPP Profiles config>USER <profile n°> [options]
```

The profile number can be between 1 and 255. The value 0 is reserved for the default parameters.

To eliminate a user profile, the **NO USER <profile n°>** is used.

The available options are as follows:

```
PPP Profiles config>USER <profile n°> [options]
default      set user profile default configuration
login        login of this user
password     password of this user
secret       secret of this user
```

- default* Creates a user profile with the default parameters or reestablishes the default parameters for an existing profile.
- login* This is the user name or identifier used in the authentication process. The maximum length of the login is 32 characters.
- password* This is the password used when the authentication is carried out through either PAP or CHAP. Maximum length of the password is 32 characters.
- secret* When you wish to configure a different password depending on the type of authentication, execute the following: *password* configures the password you wish to use for PAP and *secret* for CHAP. This option is **only** used if the CHAP password is going to be different from PAP. Contrariwise, use *password* **only**. Maximum length for *secret* is 32 characters (the same as *password*).

Example:

```
PPP Profiles config>USER 1 login user1
PPP Profiles config>USER 1 password password1
PPP Profiles config>USER 2 login anotheruser
PPP Profiles config>USER 2 password anotherpassword
PPP Profiles config>LIST USER
-----+
+ USER Profiles                                     +
+-----+
*** Profile number: 1 ***
  Login:   user1
  Password: *****
  Secret:  *****

*** Profile number: 2 ***
  Login:   anotheruser
  Password: *****
  Secret:  *****

PPP Profiles config>SHOW MENU
; Showing Menu Configuration ...

  user 1 default
  user 1 login user1
```

```

user 1 password password1
;
user 2 default
user 2 login anotheruser
user 2 password anotherpassword
;
PPP Profiles config>

```

<i>Profile number</i>	identifier of the displayed user profile.
<i>Login</i>	user name used in the authentication process.
<i>Password</i>	password used when the authentication is carried out through the PAP protocol.
<i>Secret</i>	password used when authentication is carried out through the CHAP protocol.

1.10. Configuring the User List profiles

The user list profiles are used to locally validate authentication information sent by the remote end of the connection and used when it has not been specified that the validation must be carried out through a RADIUS server. In this way, only those connections proceeding from permitted users who have been previously configured in a determined user list profile will be accepted.

To configure a profile that defines a list of authorized users, apply the **USERS-LIST** command.

Syntax:

```
PPP Profiles config> USERS-LIST <profile n°> [options]
```

The profile number can be between 1 and 255. The value 0 is reserved for the default parameters.

To eliminate an authorized user list profile, the **NO USERS-LIST <profile n°>** is used.

The available options are as follows:

```

PPP Profiles config> USERS-LIST <profile n°> [options]
default      set users-list profile default configuration
no
user         user name

```

default Creates a user list profile with the default parameters or reestablishes the default parameters for an existing profile.

user User (login) name or identifier **previously defined** (in a user profile) that is included in the list of authorized users. If the introduced user name does not correspond to any user profile, an error is produced. You can define up to 254 users in a user list profile. To eliminate a determined user from the user list, the **USERS-LIST <profile n°> NO USER <login>** is used.

Example:

```

PPP Profiles config>USER 1 login aaaaa
PPP Profiles config>USER 2 login bbbbb
PPP Profiles config>USER 3 login ccccc
PPP Profiles config>USER 4 login ddddd
PPP Profiles config>USER 5 login eeeee
PPP Profiles config>USERS-LIST 1 default
PPP Profiles config>USERS-LIST 1 user aaaaa

```

```

PPP Profiles config>USERS-LIST 1 user bbbbb
PPP Profiles config>USERS-LIST 2 default
PPP Profiles config>USERS-LIST 2 user bbbbb
PPP Profiles config>USERS-LIST 2 user ccccc
PPP Profiles config>USERS-LIST 2 user ddddd
PPP Profiles config>USERS-LIST 2 user eeeee
PPP Profiles config>LIST USERS-LIST
+-----+
+ USERS-LIST Profiles                                     +
+-----+
*** Profile number: 1 ***
  Login:   aaaaa
  Login:   bbbbb

*** Profile number: 2 ***
  Login:   bbbbb
  Login:   ccccc
  Login:   ddddd
  Login:   eeeee

PPP Profiles config>SHOW MENU
; Showing Menu Configuration ...

  user 1 default
  user 1 login aaaaa
;
  user 2 default
  user 2 login bbbbb
;
  user 3 default
  user 3 login ccccc
;
  user 4 default
  user 4 login ddddd
;
  users-list 1 default
  users-list 1 user aaaaa
  users-list 1 user bbbbb
;
  users-list 2 default
  users-list 2 user bbbbb
  users-list 2 user ccccc
  users-list 2 user ddddd
  users-list 2 user eeeee
;
PPP Profiles config>

```

Profile number identifier of the displayed users list profile.

Login identifier of the authorized user.

1.11. Configuring PPP Global profiles

The PPP interfaces obtain information from the PPP own parameters of a PPP global profile which groups the said parameters.

To configure a PPP global profile, use the **PPP** command.

Syntax:

```

PPP Profiles config>PPP <profile n°> [opciones]

```

The profile number can be between 1 and 255. The value 0 is reserved for the default parameters.

To eliminate a PPP global profile, the **NO PPP <profile n°>** is used.

The available options are as follows:

```

PPP Profiles config>PPP <n° perfil> [opciones]
authentication-profile authentication profile id
backup-profile backup profile id
ccp-profile ccp profile id
default set ppp profile default configuration
facilities-profile facilities profile id
ipcp-profile ipcp profile id
lcp-parameters-profile lcp parameters profile id
multilink-profile multilink ppp profile id
ncp-profile ncp profile id
users-list-profile users list profile id

```

authentication-profile This is the number of the user profile to be associated to this global profile to carry out authentication if the remote end requests this. The values contained in this profile (login and password in cases of PAP authentication and login and secret in cases of CHAP) are used to send these to the remote end during the authentication process.

backup-profile Backup profile to be used.

ccp-profile CCP profile to be used.

default Creates a PPP global profile with the default parameters (use the default profiles) or reestablishes the default parameters for an existing profile.

facilities-profile Facilities profile to be used.

ipcp-profile IPCP profile to be used.

lcp-parameters-profile LCP parameters profile to be used.

multilink-profile Multilink PPP parameters profile to be used.

ncp-profile NCP parameters profile to be used.

users-list-profile Authorized users list profile to be used.

In all cases, the default parameters are found associated to the ‘0’ profile. By default, the PPP global profile is composed of the default profiles of each type of parameter.

Example:

```

PPP Profiles config>PPP 1 default
PPP Profiles config>PPP 1 authentication-profile 1
PPP Profiles config>PPP 1 users-list-profile 1
PPP Profiles config>PPP 2 default
PPP Profiles config>PPP 2 facilities-profile 2
PPP Profiles config>PPP 2 ipcp-profile 2
PPP Profiles config>PPP 2 multilink-profile 2
PPP Profiles config>LIST PPP
+-----+
+ GLOBAL PPP Profiles +
+-----+
*** Profile number: 1 ***
BACKUP Profile Number.....: 0 (default)
CCP Profile Number.....: 0 (default)
FACILITIES Profile Number...: 0 (default)
IPCP Profile Number.....: 0 (default)
LCP PARAMETERS Profile Number: 0 (default)
MULTILINK PPP Profile Number.: 0 (default)
NCP Profile Number.....: 0 (default)
AUTHENTICATION Profile Number: 1
USERS-LIST Profile Number....: 1

*** Profile number: 2 ***
BACKUP Profile Number.....: 0 (default)
CCP Profile Number.....: 0 (default)
FACILITIES Profile Number...: 2
IPCP Profile Number.....: 2
LCP PARAMETERS Profile Number: 0 (default)
MULTILINK PPP Profile Number.: 2
NCP Profile Number.....: 0 (default)
AUTHENTICATION Profile Number: 0 (default)

```

```

USERS-LIST Profile Number...: 0 (default)

PPP Profiles config>SHOW CONFIG
; Showing Menu Configuration ...

  ppp 1 default
  ppp 1 authentication-profile 1
  ppp 1 users-list-profile 1
;
  ppp 2 default
  ppp 2 facilities-profile 2
  ppp 2 ipcp-profile 2
  ppp 2 multilink-profile 2
;
PPP Profiles config>

```

- Profile number* identifier of the displayed PPP global profile.
- BACKUP Profile Number* Backup profile number.
- CCP Profile Number* CCP profile number.
- FACILITIES Profile Number* Facilities profile number.
- IPCP Profile Number* IPCP profile number.
- LCP Parameters Profile* LCP Parameters profile number.
- MULTILINK PPP Profile Number* Multilink PPP profile number.
- NCP Profile Number* NCP profile number.
- AUTHENTICATION Profile Number* User profile number used in device authentication.
- USERS-LIST Profile Number* permitted Users List profile number.

1.12. Listing the configured profiles

The **LIST ALL** command from the PPP profiles configuration menu displays the distinct parameters associated to all the PPP profiles configured in the device.

```

PPP Profiles config>LIST ALL
+-----+
+  BACKUP Profiles                                     +
+-----+
*** Profile number: 1 ***
Number of call retries...:      3
NCP timeout.....:          90 sec.
Time between test calls..:     2 min.
Maximum backup time.....:    3600 min.

*** Profile number: 2 ***
Number of call retries...:      5
NCP timeout.....:          30 sec.
Time between test calls..:     0 min.
Maximum backup time.....:     0 min.

+-----+
+  CCP Profiles                                       +
+-----+
*** Profile number: 1 ***
CCP Options                    Encode                    Decode
-----
Type                    :    NO COMP                    LZS-DCP
Length                  :           0                    6
History Count           :    PackbyPack            PackbyPack
Check Mode               :       None                    None
Process Mode              :       None                    None

```

```

Protocol      :      PPP          PPP
*** Profile number: 2 ***
CCP Options          Encode          Decode
-----
Type                :      NO COMP      STAC
Length              :      0            5
History Count       :      PackbyPack   1
Check Mode          :      None         SeqNum+LCB
Process Mode        :      None         None
Protocol            :      PPP          PPP

+-----+
+ FACILITIES Profiles                                     +
+-----+
*** Profile number: 1 ***
Authentication enabled: CHAP
Validation by Keys
Multilink PPP enabled
CCP disabled
CRTP Compression disabled
RIP no-dial disabled
No member of any Dial Routing Pool

*** Profile number: 2 ***
Authentication enabled: PAP
Validation by RADIUS
Multilink PPP disabled
CCP disabled
CRTP Compression enabled
UDP Checksum in CRTP disabled
RIP no-dial enabled
No member of any Dial Routing Pool

+-----+
+ IPCP Profiles                                         +
+-----+
*** Profile number: 1 ***
IP Van Jacobson Compression : NO
Local IP address  : Assigned
Remote IP address : None

*** Profile number: 2 ***
IP Van Jacobson Compression : YES
Local IP address  : Fixed
Remote IP address : Fixed
IP remote address : 10.0.0.1

+-----+
+ LCP OPTIONS Profiles                                  +
+-----+
*** Base Interface: bri0/0 ***
Interface MRU (bytes)          : 1524
Magic Number                   : YES
Asynchronous Control Character Map : FFFFFFFF
Protocol Field Compression     : YES
Address Control Field Compression : NO

*** Base Interface: serial0/0 ***
Interface MRU (bytes)          : 1500
Magic Number                   : YES
Asynchronous Control Character Map : 00000000
Protocol Field Compression     : YES
Address Control Field Compression : YES

+-----+
+ LCP PARAMETERS Profiles                               +
+-----+
*** Profile number: 1 ***
Tries Configure-Request       : 4
Tries Configure-Nak           : 4
Tries Terminate-Request       : 2

```

```

Timeout between tries (sec)      : 5
Number of Echo-Request          : 6
Delay before starting LCP negotiation: 0

*** Profile number: 2 ***
Tries Configure-Request         : 10
Tries Configure-Nak             : 10
Tries Terminate-Request        : 10
Timeout between tries (sec)     : 3
Number of Echo-Request         : 3
Delay before starting LCP negotiation: 2

+-----+
+ MULTILINK Profiles +
+-----+
*** Profile number: 1 ***
MRRU...: 1540
Use SSN: NO
Endpoint Discriminator Class: 0
ED value (Null Class): None
Activation Interval...: 60
Deactivation Interval.: 300
Activation Threshold..: 90
Deactivation Threshold: 50
Traffic Load.....: Inbound traffic
Max Links per Bundle.....: 2
Forced Fragmentation Size: 0 (disabled)
Permission to add/remove links: Any connection

*** Profile number: 2 ***
MRRU...: 1524
Use SSN: NO
Endpoint Discriminator Class: 0
ED value (Null Class): None
Activation Interval...: 120
Deactivation Interval.: 300
Activation Threshold..: 85
Deactivation Threshold: 40
Traffic Load.....: Inbound & Outbound traffic
Max Links per Bundle.....: 4
Forced Fragmentation Size: 400
Permission to add/remove links: Any connection

+-----+
+ NCP Profiles +
+-----+
*** Profile number: 1 ***
Tries Configure-Request         : 3
Tries Configure-Nak             : 10
Tries Terminate-Request        : 10
Timeout between tries (sec)     : 7

*** Profile number: 2 ***
Tries Configure-Request         : 10
Tries Configure-Nak             : 3
Tries Terminate-Request        : 2
Timeout between tries (sec)     : 3

+-----+
+ USER Profiles +
+-----+
*** Profile number: 1 ***
Login:   user1
Password: *****
Secret:  *****

*** Profile number: 2 ***
Login:   anotheruser

Password: *****
Secret:  *****

```

```

+-----+
+ USERS-LIST Profiles                                     +
+-----+
*** Profile number: 1 ***
  Login:      user1

*** Profile number: 2 ***
  Login:      user1
  Login:      anotheruser

+-----+
+ GLOBAL PPP Profiles                                   +
+-----+
*** Profile number: 1 ***
  BACKUP Profile Number.....:  0 (default)
  CCP Profile Number.....:    0 (default)
  FACILITIES Profile Number...:  0 (default)
  IPCP Profile Number.....:    0 (default)
  LCP PARAMETERS Profile Number:  0 (default)
  MULTILINK PPP Profile Number.:  0 (default)
  NCP Profile Number.....:    0 (default)
  AUTHENTICATION Profile Number:  1
  USERS-LIST Profile Number....:  1

*** Profile number: 2 ***
  BACKUP Profile Number.....:  0 (default)
  CCP Profile Number.....:    0 (default)
  FACILITIES Profile Number...:  2
  IPCP Profile Number.....:    2
  LCP PARAMETERS Profile Number:  0 (default)
  MULTILINK PPP Profile Number.:  2
  NCP Profile Number.....:    0 (default)
  AUTHENTICATION Profile Number:  0 (default)
  USERS-LIST Profile Number....:  0 (default)

PPP Profiles config>

```


2. Configuring PPP Events

The PPP interfaces have a specific global menu available. From the events configuration menu enter the command **PPP**. This command permits you to access the menu in order to configure the PPP events:

```
Config>EVENT
-- ELS Config --
ELS config>ppp
-- PPP Events Configuration --
PPP Events config>
```

The options available in the PPP events configuration menu are as follows:

```
PPP Events config>?
DISABLE
ENABLE
LIST
MODE
EXIT
PPP Events config>
```

ENABLE/DISABLE ALL

This command permits you to enable/disable **all** the PPP events.

```
PPP Events config>ENABLE ALL
PPP Events config>
```

```
PPP Events config>DISABLE ALL
PPP Events config>
```

ENABLE/DISABLE AUTHENTICATION

This command permits you to enable/disable the group of PPP events related to **authentication**.

```
PPP Events config>ENABLE AUTHENTICATION
PPP Events config>
```

```
PPP Events config>DISABLE AUTHENTICATION
PPP Events config>
```

ENABLE/DISABLE ERROR

This command permits you to enable/disable the group of PPP events related to **errors**.

```
PPP Events config>ENABLE ERROR
PPP Events config>
```

```
PPP Events config>DISABLE ERROR
PPP Events config>
```

ENABLE/DISABLE INFORMATION

This command permits you to enable/disable the group of PPP events related to **general information**.

```
PPP Events config>ENABLE INFORMATION
PPP Events config>
```

```
PPP Events config>DISABLE INFORMATION
PPP Events config>
```

ENABLE/DISABLE NEGOTIATION

This command permits you to enable/disable the group of PPP events related to **negotiation** (including events associated to the LCP negotiation and the distinct NCPs).

```
PPP Events config>ENABLE NEGOTIATION
PPP Events config>
```

```
PPP Events config>DISABLE NEGOTIATION
PPP Events config>
```

ENABLE/DISABLE PACKET

This command permits you to enable/disable the group of PPP events related to the transmission and reception of PPP **packets**.

```
PPP Events config>ENABLE PACKET
PPP Events config>
```

```
PPP Events config>DISABLE PACKET
PPP Events config>
```

LIST

Displays the existing PPP events configuration in the device, indicating what type of events are enabled and disabled. Additionally this indicates the chosen view mode for the events: *user* or *expert*.

```
PPP Events config>LIST
+-----+
+ EVENT Configuration +
+-----+
PPP Authentication Events: Disabled
PPP Error Events.....: Disabled
PPP Information Events...: Disabled
PPP Negotiation Events...: Disabled
PPP Packet Events.....: Disabled

PPP Events Mode.....: User
PPP Events config>
```

MODE EXPERT

Selecting the *expert* mode for PPP events viewing. The *expert* mode displays information occurring in the PPP interface in maximum detail.

```
PPP Events config>MODE EXPERT
PPP Events config>
```

MODE USER

Selecting the *user* mode for PPP events viewing. The *user* mode displays the main information (without going into in-depth detail) occurring in the PPP interface.

```
PPP Events config>MODE USER
PPP Events config>
```

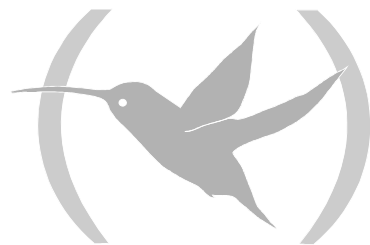
EXIT

Exits the PPP events configuration and returns to the PPP global parameters configuration menu.

```
PPP Events config>EXIT
PPP Global config>
```

Chapter 4

PPP Interface Monitoring



1. PPP Interface Monitoring

This section summarizes and explains the PPP interface monitoring commands. In order to access the PPP interface monitoring menu, enter the **NETWORK <PPP Interface>** command from the general monitoring menu:

```
+NETWORK ppp1
Generic PPP Console
ppp1>
```

Command	Function
? (HELP)	Lists the commands or their options.
BASE-INTERFACE	Accesses the base interfaces monitoring menu associated to the PPP interface.
PPPOE	Accesses the PPPoE parameters monitoring menu.
PPP	Accesses the PPP parameters monitoring menu.
EXIT	Exits the PPP interface monitoring.

2. Monitoring the Base Interfaces of the PPP Interface

To access the menu where you can carry out monitoring over the BASE interfaces of the PPP interface, enter the **BASE-INTERFACE** command from the PPP interface monitoring menu:

```
ppp1>BASE-INTERFACE
Base Interface Console
ppp1 Base IFC>
```

The available options in this menu are as follows:

```
ppp1 Base IFC>?
LIST
EXIT
ppp1 Base IFC>
```

LIST

Displays the base interfaces parameters associated to a determined PPP interface. In cases where more than one base interface has been associated to the PPP interface, the value for these parameters is displayed for each link.

```
ppp1 Base IFC>LIST
Profile name      :
Destination address :
Local address     :
Base interface    : 1
Circuit id request : 1
Dial circuit status : OPEN
Circuit id assigned : 1

ppp1 Base IFC>
```

<i>Profile name</i>	DIAL profile name being used for the link (only when base interfaces need to use a profile of this type).
<i>Destination address</i>	remote address used (destination n° in switched interfaces).
<i>Local address</i>	displays the local address used (local n° in switched interfaces).
<i>Base interface</i>	base interface identifier.
<i>Circuit id request</i>	identifier of the circuit requested in the configuration.
<i>Dial circuit status</i>	current status of the DIAL circuit (base interface status).
<i>Circuit id assigned</i>	assigned circuit identifier.

EXIT

This command allows you to exit the PPP base interface monitoring and return to the general PPP monitoring menu.

```
ppp1 Base IFC>EXIT
ppp1>
```

3. PPP Monitoring of the PPP Interface

To access the PPP parameters monitoring menu, enter the **PPP** command from the PPP interface monitoring menu.

```
pppX>PPP
-- PPP Console --
pppX PPP>
```

The following commands are presented in the PPP monitoring menu:

```
pppX PPP>?
CLEAR
LIST
RESET-LINK
EXIT
pppX PPP>
```

CLEAR

Permits you to clear (initialize) all the statistics associated to the PPP interface in question.

```
pppX PPP>CLEAR
pppX PPP>
```

LIST CONTROL CCP

Displays the CCP control parameters negotiated in encoding and decoding as well as the current status of the CCP protocol and if this is enabled or disabled. In cases where CCP has not been negotiated, the configuration values are displayed.

```
pppX PPP>LIST CONTROL CCP

CCP Enabled          CCP State          : OPENED

O(PPP): ENCODE LZS-DCP 1 SeqNum+LCB ProcUncomp
          Session:1    Sequence number:0
I(PPP): DECODE STAC 1 Extended
          Session:2    Sequence number:0
pppX PPP>
```

CCP State CCP state.
ENCODE negotiated encode options.
DECODE negotiated decode options.

LIST CONTROL IPCP

Displays the options negotiated when establishing the IPCP network layer protocol. In cases where you are using dynamic IP address assignment, you can check the assigned IP addresses. In the same way, you can display the remote end IP address if this has been received. If the IPCP negotiation has not completed, the configuration values are displayed.

```

pppX PPP>LIST CONTROL IPCP
IPCP State      : OPENED
IPCP Options
-----
Local           Remote
-----
IP Address      : 192.168.2.83 192.168.2.24
Van Jacobson Cmp: NO         NO
pppX PPP>

```

IPCP State IPCP state.
IP Address IP addresses at both ends of the PPP interface.
Van Jacobson Cmp indicates if the Van Jacobson compression has been negotiated.

LIST CONTROL LCP

Displays the options transmitted and received when establishing the link as well as the current state of the LCP protocol. In cases where more than one base interface has been associated to the PPP interface, the value of these parameters are displayed for each link. For those base interfaces that have not finished negotiating LCP, the configuration parameters are displayed.

```

pppX PPP>LIST CONTROL LCP
Version         : 3.0.0

Base Interface  : 1 SYNC/0
Base Circuit Id : 1
LCP State      : OPENED
LCP Options
-----
Local           Remote
-----
Max Receive Unit: 1500      1500
Async Char Mask : 0xffffffff 0xffffffff
Authentication  : PAP       PAP
Magic Number    : 0x22ad0a50 0x423be0cc
Prot Field Compr: NO        NO
Addr/Ctrl Compr: NO        NO
32-Bit Checksum : NO        NO

pppX PPP>

```

Version always 3.0.0.
Base Interface identifier and type of base interface.
Base Circuit Id base circuit identifier.
LCP State LCP state.
Max Receive Unit value of the negotiated MRU.
Async Char Mask negotiated Asynchronous Control Character Map (ACCM).
Magic Number negotiated Magic Number.
Prot Field Compr indicates if the Protocol Field Compression (PFC) option has been negotiated.
32-Bit Checksum always NO, due to the fact that a 16 bits checksum is used.

LIST CONTROL MULTILINK-PPP

When you negotiate multilink PPP in a PPP interface, this commands permits the negotiated MP options to be displayed as well as other parameters related to the PPP multilink bundle. When the Multilink PPP has not been negotiated, the locally configured options are displayed.


```

pppX PPP>LIST CONTROL MULTILINK-PPP

--- Multilink PPP: NEGOTIATED ---

MP Options:
  Local MRRU .....: 1524
  Local SSN .....: NO
  Local EndPoint Disc.: Class 0
  ED value (Null Class): None

  Remote MRRU .....: 1524
  Remote SSN .....: NO
  Remote EndPoint Disc.: Class 3
  ED value (MAC Address): 00-A0-26-40-0E-70

  Remote User: nucleox

  Active links in bundle: 1
  Current Fragment Queue Length: 0
pppX PPP>

```

MRRU negotiated MRRU.

SSN indicates if the SSN (Short Sequence Number) header format has been negotiated.

EndPoint Disc negotiated Endpoint Discriminator class.

ED value negotiated Endpoint Discriminator value.

Remote User authenticated remote user.

Active Links in Bundle number of active PPP links in the multilink PPP bundle.

Current Fragment Queue Length current length of the fragment queue.

LIST CCP

Displays the statistics associated to the CCP protocol.

```

pppX PPP>LIST CCP
CCP Statistics      Received      Sent
-----
Config. Request:      1             1
Config. Ack....:      0             0
Config. Nak....:      0             0
Config. Reject.:      0             0
Termin. Request:      0             0
Termin. Ack....:      0             0
Processed Frms.:      6             6
Processed Bytes:     171           516
Dec/Enc Frames.:      6             6
Dec/Enc Bytes..:     516           159
Uncompress Frms.:      0             0
Error Frames...:      0             0
Reset Request..:      0             0
Reset Ack.....:      0             0
Out of Sequence:      0             0
LCB Error.....:      0             0
Header Error...:      0             0
pppX PPP>

```

Config. Request Number of Configure Request CCP frames.

Config. Ack Number of Configure Ack CCP frames.

Config. Nak Number of Configure Nak CCP frames.

Config. Reject Number of Configure Reject CCP frames.

Termin. Request Number of Terminate Request CCP frames.

Termin. Ack Number of Terminate Ack CCP frames.

Processed Frms Number of processed frames received for decompress/compress.

Processed Bytes Number of processed bytes received for decompress/compress.

<i>Dec/Enc Frames</i>	Number of decompressed/compressed frames.
<i>Dec/Enc Bytes</i>	Number of decompressed/compressed bytes.
<i>Uncompress Frms</i>	Number of non-processed frames received for decompress/compress.
<i>Error Frames</i>	Number of frames with errors in compression/decompression.
<i>Reset Request</i>	Number of Reset Request CCP frames.
<i>Reset Ack</i>	Number of Reset Ack CCP frames.
<i>Out of Sequence</i>	Number of sequence errors.
<i>LCB Error</i>	Number of LCB errors in reception/transmission.
<i>Header Error</i>	Number of header errors.

LIST IPCP

Displays the statistics associated to the IPCP protocol.

```

pppX PPP>LIST IPCP
IPCP Statistics      Received      Send
-----
Config. Request:    2              2
Config. Ack       : 2              2
Config. Nak        : 0              0
Config. Reject    : 0              0
Termin. Request:   0              0
Termin. Ack       : 0              0
pppX PPP>

```

<i>Config. Request</i>	Number of Configure Request IPCP frames.
<i>Config. Ack</i>	Number of Configure Ack IPCP frames.
<i>Config. Nak</i>	Number of Configure Nak IPCP frames.
<i>Config. Reject</i>	Number of Configure Reject IPCP frames.
<i>Termin. Request</i>	Number of Terminate Request IPCP frames.
<i>Termin. Ack</i>	Number of Terminate Ack IPCP frames.

LIST LCP

Displays the LCP statistics for each link. In cases where more than one base interface has been associated to the PPP interface, the statistics value for each link is displayed.

```

pppX PPP>LIST LCP
Base Interface      : 1  SYNC/0
Base Circuit Id     : 1
LCP Statistics      Received      Send
-----
Frames             : 89              95
Bytes              : 912             1186
Config. Request:   2              6
Config. Ack       : 2              2
Config. Nak        : 0              0
Config. Reject    : 1              0
Termin. Request:   0              1
Termin. Ack       : 0              0
Echo Request:     42             44
Echo Reply       : 42             42
pppX PPP>

```

<i>Base Interface</i>	base interface number and associated descriptor.
<i>Base Circuit Id</i>	Identifier of the base circuit to which these counters are associated.
<i>Frames</i>	Number of received/transmitted frames.

<i>Bytes</i>	Number of received/transmitted bytes.
<i>Config. Request</i>	Number of Configure Request LCP frames.
<i>Config. Ack</i>	Number of Configure Ack LCP frames.
<i>Config. Nak</i>	Number of Configure Nak LCP frames.
<i>Config. Reject</i>	Number of Configure Reject LCP frames.
<i>Termin. Request</i>	Number of Terminate Request LCP frames.
<i>Termin. Ack</i>	Number of Terminate Ack LCP frames.
<i>Echo Request</i>	Number of Echo Request LCP frames.
<i>Echo Reply</i>	Number of Echo Reply LCP frames.

LIST MULTILINK-PPP

Displays the statistics associated to the Multilink PPP.

```

pppX PPP>LIST MULTILINK-PPP
--- Multilink PPP: NEGOTIATED ---

MP Statistics:
-----
Tx. Frames .....: 6
Tx. Bytes .....: 177
Rx. Frames .....: 6
Rx. Bytes .....: 177
Enqueued Frames : 0
Error Frames ...: 0
Lost Frames ....: 0

pppX PPP>

```

<i>Tx. Frames</i>	Number of transmitted MP frames.
<i>Tx. Bytes</i>	Number of transmitted bytes.
<i>Rx. Frames</i>	Number of received MP frames.
<i>Rx. Bytes</i>	Number of received bytes.
<i>Enqueued Frames</i>	Number of enqueued frames.
<i>Error Frames</i>	Number of frames discarded due to errors.
<i>Lost Frames</i>	Number of frames discarded due to sequence number.

LIST VAN-JACOBSON-COMPRESSION

Permits you to view the statistics associated to the Van Jacobson compression.

```

pppX PPP>LIST VAN-JACOBSON-COMPRESSION
Van Jacobson Statistics
-----
outbound TCP/IP packets:                0
outbound TCP/IP compressed packets:     0
searches for connection state:          0
times couldn't find conn. state:        0
inbound TCP/IP uncompressed packets:    0
inbound TCP/IP compressed packets:      0
inbound TCP/IP unknown type packets:    0
inbound TCP/IP packets tossed error:    0

pppX PPP>

```

<i>outbound TCP/IP packets</i>	Number of outgoing TCP/IP packets.
<i>outbound TCP/IP compressed packets</i>	Number of outgoing TCP/IP compressed packets.
<i>searches for connection state</i>	Number of searches for the connection state.
<i>times couldn't find conn. State</i>	Number of times the connection state could not be found.

<i>inbound TCP/IP uncompressed packets</i>	Number of incoming TCP/IP uncompressed packets.
<i>inbound TCP/IP compressed packets</i>	Number of incoming TCP/IP compressed packets.
<i>inbound TCP/IP unknown type packets</i>	Number of incoming TCP/IP unknown type packets discarded.
<i>inbound TCP/IP packets tossed error</i>	Number of incoming TCP/IP erroneous packets discarded.

LIST CRTP-COMPRESSION

Displays the statistics associated to the CRTP compression.

```

pppX PPP>LIST CRTP-COMPRESSION
CRTP Compression Statistics
-----
Outbound RTP packets:                552
Outbound RTP compressed packets:     347
Searches for connection state:       0
Times couldn't find conn. state:     0
Inbound RTP uncompressed packets:    287
Inbound RTP compressed packets:      156
Inbound RTP unknown type packets:    0
Inbound RTP Context State packets:   0
pppX PPP>

```

<i>Outbound RTP packets</i>	Number of outgoing RTP packets.
<i>Outbound RTP compressed packets</i>	Number of outgoing RTP compressed packets.
<i>Searches for connection state</i>	Number of searches for the connection state.
<i>Times couldn't find conn. State</i>	Number of times the connection state could not be found.
<i>Inbound RTP uncompressed packets</i>	Number of incoming RTP uncompressed packets.
<i>Inbound RTP compressed packets</i>	Number of incoming RTP compressed packets.
<i>Inbound RTP unknown type packets</i>	Number of incoming RTP unknown type packets.
<i>Inbound RTP Context State packets</i>	Number of incoming RTP Context State packets.

RESET-LINK

Reset the PPP connection. If the PPP interface has negotiated Multilink PPP and has various PPP links grouped in a multilink bundle, all the links associated to the said PPP interface are closed.

```

pppX PPP>RESET-LINK
pppX PPP>

```

EXIT

This command permits you to exit the PPP parameters monitoring and return to the PPP general monitoring menu.

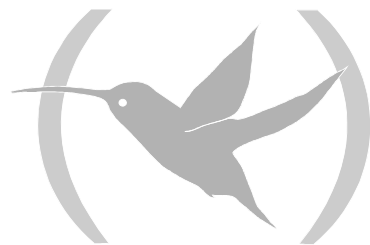
```

pppX PPP>EXIT
pppX>

```

Chapter 5

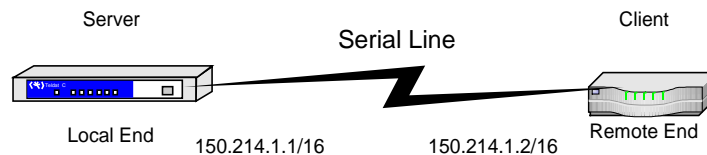
PPP Interface Configuration Examples



1. PPP Interface over serial line

1.1. Description

In this example, we are going to configure a PPP interface over a synchronous serial line. The PPP interface is configured in such a way that the local end behaves as server and the remote end as client. I.e. the local end will use a fixed IP address, previously configured, and assign one to the remote end during IPCP negotiation. Additionally, during the link establishment process authentication for the remote end through PAP protocol is carried out using the permitted users list configured at the local end. Finally the LCP options associated to the serial interface are configured to use a 2048 byte MRU and request during the LCP negotiation that the remote ends carries out compression (elimination) of the protocol field.



1.2. Configuration

The first step is to assign the interfaces. Specifically this means to assign a synchronous serial interface to the device WAN connector (if there is more than one WAN connector, you can select any of them) and create the PPP interface.

```
*PROCESS 4
Config>SET DATA-LINK sync serial0/0
Config>ADD device ppp 1
Added PPP interface ppp1
Config>
```

The next step is to assign an IP address to the recently created PPP interface. To do this, you need to access the IP configuration menu and execute the **ADDRESS** command indicating the created PPP interface, the required IP address and its mask.

```
*PROCESS 4
Config>PROTOCOL IP

-- Internet protocol user configuration --
IP config>ADDRESS ppp1 150.214.1.1 255.255.0.0
IP config>exit
Config>
```

The following step is to indicate that the created PPP interface is going to be mounted over the WAN1 synchronous serial line. For this you need to access the configuration menu for the base interfaces associated to the PPP1 interface and execute the **BASE-INTERFACE**

command indicating the synchronous serial interface and the option to associate the said interface to PPP.

```
Config>NETWORK ppp1
-- Generic PPP User Configuration --
ppp1 config>BASE-INTERFACE
-- Base Interface Configuration --
ppp1 Base IFC config>BASE-INTERFACE serial0/0 link
ppp1 Base IFC config>EXIT
ppp1 config>EXIT
Config>
```

Next, the configuration of the necessary PPP profiles to be subsequently assigned to the created PPP interface is carried out. For this you need to access the PPP profiles configuration menu in the following way:

```
Config>GLOBAL-PROFILES PPP
-- PPP Profiles Configuration --
PPP Profiles config>
```

Next, the configuration of the facilities profile is carried out. Here you indicate that the remote end must authenticate itself through the PAP protocol which instead of using a Radius server to carry out remote user authentication, uses the permitted users list configured which does not negotiate Multilink PPP, does not enable CRTP compression and does not enable the RIP-no-dial facility either.

```
PPP Profiles config>FACILITIES 1 default
PPP Profiles config>FACILITIES 1 authentication pap
PPP Profiles config>
```

Subsequently, the IPCP profile configuration is carried out. Here you indicate that the Van Jacobson compression is not enabled, that the local end uses the IP address configured for this specific PPP interface and that address 150.214.1.2 is assigned to the remote end.

```
PPP Profiles config>IPCP 1 default
PPP Profiles config>IPCP 1 local-ip fixed
PPP Profiles config>IPCP 1 remote-ip fixed 150.214.1.2
PPP Profiles config>
```

Next, the configuration of the LCP options profile is carried out. Here you indicate that a 2048 byte MRU (Maximum Received Unit) is used, the use of the magic number is enabled, the compression of the protocol field is enabled and that the compression of the HDLC frame control and address fields is not enabled.

```
PPP Profiles config>LCP-OPTIONS serial0/0 default
PPP Profiles config>LCP-OPTIONS serial0/0 mru 2048
PPP Profiles config>LCP-OPTIONS serial0/0 magic-number
PPP Profiles config>LCP-OPTIONS serial0/0 pfc
PPP Profiles config>
```

The next step is to carry out the configuration of the user profile. In this case you need to configure a user to whom reference will be made from the permitted users list profile.

```
PPP Profiles config>USER 1 login REMOTEUSER
PPP Profiles config>USER 1 password remotekeyword
PPP Profiles config>
```

Subsequently the configuration of the permitted users list profile is carried out. This profile is used to indicate the name of the user and password which must be provided by the remote end as a mandatory condition in order to establish the link.

```
PPP Profiles config>USERS-LIST 1 default
PPP Profiles config>USERS-LIST 1 user REMOTEUSER
PPP Profiles config>
```

Next carry out the configuration of the PPP global profile. As the name suggests, this profile encompasses a series of profiles that will subsequently be assigned to the PPP interface in question.

```
PPP Profiles config>PPP 1 default
PPP Profiles config>PPP 1 facilities-profile 1
PPP Profiles config>PPP 1 ipcp-profile 1
PPP Profiles config>PPP 1 users-list-profile 1
PPP Profiles config>EXIT
Config>
```

Finally, the created PPP global profile is assigned to the PPP interface in question.

```
Config>NET ppp1

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

-- PPP Configuration --
ppp1 PPP config>PROFILE 1
ppp1 PPP config>EXIT
ppp1 config>EXIT
Config>
```

Once all these configuration steps have been executed, you need to save the said configuration and restart the device.

```
Config>SAVE
Save configuration [n]? yes

Saving configuration...OK on Flash
Config>                                     Press <ctrl-p>
*RESTART
Are you sure to restart the system(Yes/No)? yes
```

The complete configuration for this example is as follows:

```
; Showing System Configuration ...

no configuration

add device ppp 1
global-profiles ppp
; -- PPP Profiles Configuration --
  facilities 1 default
  facilities 1 authentication pap
  facilities 1 ccp
;
  ipcp 1 default
  ipcp 1 remote-ip fixed 150.214.1.2
;
  lcp-options serial0/0 default
  lcp-options serial0/0 mru 2048
  lcp-options serial0/0 pfc
;
  user 1 default
  user 1 login REMOTEUSER
```



```

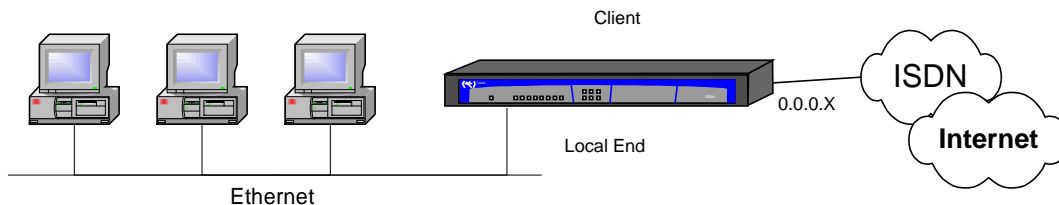
user 1 password remotekeyword
;
users-list 1 default
users-list 1 user REMOTEUSER
;
ppp 1 default
ppp 1 facilities-profile 1
ppp 1 ipcp-profile 1
ppp 1 users-list-profile 1
;
exit
;
network pppl
; -- Generic PPP User Configuration --
ppp
; -- PPP Configuration --
profile 1
exit
;
base-interface
; -- Base Interface Configuration --
base-interface serial0/0 link
;
exit
;
exit
;
;
protocol ip
; -- Internet protocol user configuration --
address pppl 150.214.1.1 255.255.0.0
;
exit
;
; --- end ---

```

2. Accessing Internet through ISDN

2.1. Description

In this example, we are going to configure a PPP interface to access Internet through an Integrated Service Digital Network (ISDN) basic access. The PPP interface is configured in such a way that the local end behaves as client and the remote end as server. I.e. the local end requests the remote end to assign it an IP address during the IPCP negotiation. Additionally, during the link establishment, the remote end executes local end authentication which sends the user name and password associated to the account it has open in the server. The Multilink in the PPP interface is going to be enabled so that an access speed of up to 128 Kbps is achieved by simultaneously using both the B channels making up the basic access.



2.2. Configuration

The first step consists of creating the PPP interface which will provide the device with access to Internet.

```
*PROCESS 4
Config>ADD device ppp 2
Added PPP interface ppp2
Config>
```

The next step is to assign an IP address to the newly created PPP interface in order to enable IP protocol in the said interface. As initially the IP address to be assigned by the remote end is unknown, an unnumbered IP address is used. For this you need to access the IP configuration menu and execute the **ADDRESS** command indicating the created PPP interface and the unnumbered IP address. Additionally, you need to select the IP interface as the default route. If you wish to provide Internet access to the devices connected to a LAN, you need to configure an IP address from this network in the corresponding interface.

```
Config>PROTOCOL IP
-- Internet protocol user configuration --
IP config>ADDRESS ppp2 unnumbered
IP config>ROUTE 0.0.0.0 0.0.0.0 ppp2 1
IP config>EXIT
Config>
```

The next step is to configure the Dial Profile to define all the parameters related to the call which subsequently will be referred to in the base interface configuration. For further information on the configuration of Call Profiles, please see manual Dm 732-I.

```
Config>GLOBAL-PROFILES DIAL
-- DIAL PROFILE CONFIGURATION --
DIALPROF config>PROFILE ISDN default
DIALPROF config>PROFILE ISDN dialout
DIALPROF config>PROFILE ISDN remote-address 384020
DIALPROF config>PROFILE ISDN idle-time 60
DIALPROF config>EXIT
Config>
```

The following step is to indicate that the created PPP interface is going to be mounted over the ISDN basic access. Additionally you need to indicate that you want the two B channels to do Multilink PPP. You also need to associate the previously configured dial profile.

```
Config>NETWORK ppp2
-- Generic PPP User Configuration --
ppp1 config>BASE-INTERFACE
-- Base Interface Configuration --
ppp1 Base IFC config>BASE-INTERFACE bri0/0 255 link
ppp1 Base IFC config>BASE-INTERFACE bri0/0 255 number-of-circuits 2
ppp1 Base IFC config>BASE-INTERFACE bri0/0 255 profile ISDN
ppp1 Base IFC config>EXIT
ppp1 config>EXIT
Config>
```

Next, you need to configure the PPP profiles.

```
Config>GLOBAL-PROFILES PPP
-- PPP Profiles Configuration --
PPP Profiles config>
```

Firstly, the configuration of the facilities profile is carried out. Through this you indicate that the remote end does not need to authenticate itself, Multilink PPP is negotiated, CCP protocol is not negotiated, CRTP compression is not enabled and that the RIP-no-dial facility is not enabled.

```
PPP Profiles config>FACILITIES 2 default
PPP Profiles config>FACILITIES 2 multilink
PPP Profiles config>
```

Subsequently, the IPCP profile configuration is carried out. Here you indicate that the Van Jacobson compression is not enabled. The local end requests the remote end to assign an IP address and that no IP address is assigned to the remote end.

```
PPP Profiles config>IPCP 2 default
PPP Profiles config>IPCP 2 local-ip assigned
PPP Profiles config>
```

The next step is to carry out the configuration of the user profile. In this case you need to configure a user to whom reference will be made from the PPP global profile (authentication-profile). This is used to save the name and password sent to the remote end during link establishment to authenticate the remote end.

```
PPP Profiles config>USER 1 login MYUSER
PPP Profiles config>USER 1 password mykeyword
PPP Profiles config>
```

Next, the configuration of the necessary Multilink profile to be subsequently assigned to the PPP interface is carried out.

Here you indicate that the required MRRU value is 1750 bytes.

The activation interval will be 90 seconds, the deactivation interval will be 180 seconds, the activation threshold 80%, the deactivation threshold 40% and the outbound traffic is considered in order to calculate the average load for the channels.

```
PPP Profiles config>MULTILINK 2 default
PPP Profiles config>MULTILINK 2 mrru 1750
PPP Profiles config>MULTILINK 2 activation interval 90
PPP Profiles config>MULTILINK 2 activation threshold 80
PPP Profiles config>MULTILINK 2 deactivation interval 180
PPP Profiles config>MULTILINK 2 deactivation threshold 40
PPP Profiles config>MULTILINK 2 traffic-load outbound
PPP Profiles config>
```

Next, the configuration of the PPP global profile is carried out. As this name indicates, this profile encompasses a series of profiles which will be subsequently assigned to the PPP interface.

```
PPP Profiles config>PPP 2 default
PPP Profiles config>PPP 2 facilities-profile 2
PPP Profiles config>PPP 2 ipcp-profile 2
PPP Profiles config>PPP 2 multilink-profile 2
PPP Profiles config>PPP 2 authentication-profile 2
PPP Profiles config>EXIT
Config>
```

Finally the created PPP global profile is assigned to the PPP interface.

```
Config>NETWORK ppp2
-- Generic PPP User Configuration --
ppp2 config>PPP
-- PPP Configuration --
ppp2 PPP config>PROFILE 2
ppp2 PPP config>EXIT
ppp2 config>EXIT
Config>
```

Once all these steps have been carried out, save the configuration and restart the device.

```
Config>SAVE
Save configuration [n]? yes
Saving configuration...OK on Flash
Config>
*restart
Are you sure to restart the system(Yes/No)? yes press <ctrl-p>
```

The complete configuration for this example is as follows:

```

; Showing System Configuration ...

no configuration

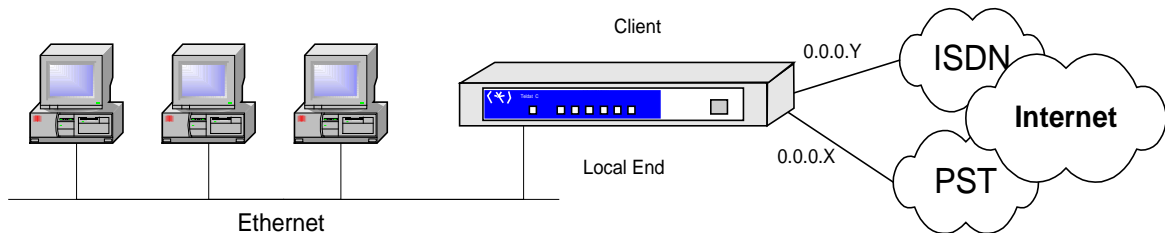
add device ppp 2
global-profiles dial
; -- Dial Profiles Configuration --
  profile ISDN default
  profile ISDN dialout
  profile ISDN remote-address 384020
  profile ISDN idle-time 60
;
exit
;
global-profiles ppp
; -- PPP Profiles Configuration --
  facilities 2 default
  facilities 2 multilink
;
  ipcp 2 default
  ipcp 2 local-ip assigned
;
  multilink 2 default
  multilink 2 mrru 1750
  multilink 2 activation interval 90
  multilink 2 deactivation interval 180
  multilink 2 activation threshold 80
  multilink 2 deactivation threshold 40
  multilink 2 traffic-load outbound
;
  user 1 default
  user 1 login MYUSER
  user 1 password mykeyword
;
  ppp 2 default
  ppp 2 facilities-profile 2
  ppp 2 ipcp-profile 2
  ppp 2 multilink-profile 2
  ppp 2 authentication-profile 2
;
exit
;
network ppp2
; -- Generic PPP User Configuration --
  ppp
; -- PPP Configuration --
  profile 2
  exit
;
  base-interface
; -- Base Interface Configuration --
  base-interface bri0/0 255 link
  base-interface bri0/0 255 profile ISDN
  base-interface bri0/0 255 number-of-circuits 2
;
  exit
;
exit
;
protocol ip
; -- Internet protocol user configuration --
  address ppp2          unnumbered      0.0.0.0
;
;
  route 0.0.0.0          0.0.0.0        ppp2          1
;
exit
;
; --- end ---

```

3. Access to Internet through ISDN with backup interface with PSTN connection

3.1. Description

In this example, the aim is to achieve access to Internet through an Integrated Service Digital Network (ISDN) and should this access fail to have a secondary access available through the Public Switched Telephone Network (PSTN). To do this, you configure a PPP interface over an ISDN basic access as the main interface and a PPP interface over an AT commands interface as the secondary. Under normal conditions, the PPP interface over ISDN will operate properly and all traffic will be routed through the said interface. When the main interface drops and/or cannot establish calls through ISDN, or the IPCP negotiation timer times out for this interface, then the secondary or backup interface activates. This secondary interface will then route all the traffic that previously was sent through the ISDN basic access. The configuration of both PPP interfaces is similar to that commented on in the previous example. The difference here consists in configuring a backup profile in the main interface. Additionally you need to configure the WAN Reroute backup facility.



3.2. Configuration

The first step consists in assigning the interfaces.

```
*PROCESS 4
Config>SET DATA-LINK at serial0/0
Config>ADD device ppp 3
Added PPP interface ppp3
Config>ADD device ppp 4
Added PPP interface ppp4
Config>
```

The next step is to assign an IP addresses to the PPP interfaces which have been created to enable IP protocol in the said interfaces. As initially the IP address to be assigned by the remote end is unknown, unnumbered IP addresses are used. You also need to configure two default routes. The lower cost route is assigned to the main link and the higher cost to the secondary or backup link. If you wish to provide Internet access to the devices connected to a LAN, you need to configure an IP address from this network in the corresponding interface.

```

Config>PROTOCOL IP

-- Internet protocol user configuration --
IP config>ADDRESS ppp3 unnumbered
IP config>ADDRESS ppp4 unnumbered
IP config>ROUTE 0.0.0.0 0.0.0.0 ppp3 1
IP config>ROUTE 0.0.0.0 0.0.0.0 ppp4 2
IP config>EXIT
Config>

```

The next step is to configure the Call profiles. For further information on the configuration of Dial Profiles, please see manual Dm 732-I.

```

Config>GLOBAL-PROFILES DIAL

-- DIAL PROFILE CONFIGURATION --
Dial Profiles config>PROFILE ISDN default
Dial Profiles config>PROFILE ISDN dialout
Dial Profiles config>PROFILE ISDN remote-address 384020
Dial Profiles config>PROFILE ISDN idle-time 60
Dial Profiles config>PROFILE AT default
Dial Profiles config>PROFILE AT remote-address 974000
Dial Profiles config>PROFILE AT idle-time 120
Dial Profiles config>EXIT
Config>

```

The following step is to indicate the base interface associated to each created PPP interface. As the default route is the lower cost one, previously configured, corresponding to the PPP3 interface, this must be mounted over the ISDN basic access making up the main interface. In this way, PPP4 interface will be mounted over the AT commands interface thus making up the secondary interface.

```

Config>NETWORK ppp3

-- Generic PPP User Configuration --
ppp3 config>BASE-INTERFACE

-- Base Interface Configuration --
ppp3 Base IFC config>BASE-INTERFACE bri0/0 255 link
ppp3 Base IFC config>BASE-INTERFACE bri0/0 255 profile ISDN
ppp3 Base IFC config>EXIT
ppp3 config>EXIT
Config>NETWORK ppp4

-- Generic PPP User Configuration --
ppp4 config>BASE-INTERFACE

-- Base Interface Configuration --
ppp4 Base IFC config>BASE-INTERFACE serial0/0 link
ppp4 Base IFC config>BASE-INTERFACE serial0/0 profile AT
ppp4 Base IFC config>EXIT
ppp4 config>EXIT
Config>

```

Next, the PPP profiles configuration is carried out. For this you need to access the PPP profiles configuration menu in the following way:

```

Config>GLOBAL-PROFILES PPP

-- PPP Profiles Configuration --
PPP Profiles config>

```

The following step consists of configuring the backup profile which will subsequently be associated to the main PPP interface. Here you need to indicate that switch to backup is executed when 3 unsuccessful calls have been made or the NCP negotiation takes longer than 30 seconds. Lastly the maximum configured backup time indicates that once 60 minutes have lapsed from the start of backup, the main link status changes to UP and another 3 calls are

carried out to see if the said link has recovered. If this is not the case then backup is re-initiated.

```
PPP Profiles config>BACKUP 3 default
PPP Profiles config>BACKUP 3 retries 3
PPP Profiles config>BACKUP 3 ncp-timeout 30
PPP Profiles config>BACKUP 3 maximum-backup-time 60
PPP Profiles config>
```

Subsequently, the configuration of the IPCP profile is carried out. This will be common to the two PPP interfaces.

```
PPP Profiles config>IPCP 34 default
PPP Profiles config>IPCP 34 local-ip assigned
PPP Profiles config>
```

The next step is to carry out the user profiles configuration. You configure a user profile with the data to be sent during the authentication phase for each PPP interface, assuming that you have two distinct access accounts available.

```
PPP Profiles config>USER 3 login ISDN_USER
PPP Profiles config>USER 3 password isdnkeyword
PPP Profiles config>USER 4 login AT_USER
PPP Profiles config>USER 4 password atkeyword
PPP Profiles config>
```

Subsequently the configuration of the PPP global profiles is carried out, one for each created PPP interface.

```
PPP Profiles config>PPP 3 default
PPP Profiles config>PPP 3 backup-profile 3
PPP Profiles config>PPP 3 facilities-profile 3
PPP Profiles config>PPP 3 ipcp-profile 34
PPP Profiles config>PPP 3 authentication-profile 3
PPP Profiles config>PPP 4 default
PPP Profiles config>PPP 4 ipcp-profile 34
PPP Profiles config>PPP 4 authentication-profile 4
PPP Profiles config>EXIT
Config>
```

Next, the created PPP global profiles are assigned to the PPP interfaces in question.

```
Config>NETWORK ppp3

-- Generic PPP User Configuration --
ppp3 config>PPP

-- PPP Configuration --
ppp3 PPP config>PROFILE 3
ppp3 PPP config>EXIT
ppp3 config>EXIT
Config>NETWORK ppp4

-- Generic PPP User Configuration --
ppp4 config>PPP

-- PPP Configuration --
ppp4 PPP config>PROFILE 4
ppp4 PPP config>EXIT
ppp4 config>EXIT
Config>
```

Finally, the WAN ReRoute backup facility is created. For further information on the configuration of this facility, please see manual Dm 727-I.


```

Config>FEATURE wrp-backup-wan

-- WAN Reroute Backup user configuration --
Backup WRR>ENABLE
Backup WRR>PAIR 1 primary interface ppp4
Backup WRR>PAIR 1 secondary interface ppp3
Backup WRR>EXIT
Config>

```

Once all these steps have been carried out, save the configuration and restart the device.

```

Config>SAVE
Save configuration [n]? yes

Saving configuration...OK on Flash
Config>
*RESTART
Are you sure to restart the system(Yes/No)? yes

```

press <ctrl-p>

The complete configuration for this example is as follows:

```

; Showing System Configuration ...

no configuration

add device ppp 3
add device ppp 4
set data-link at serial0/0
global-profiles dial
; -- Dial Profiles Configuration --
  profile ISDN default
  profile ISDN dialout
  profile ISDN remote-address 384020
  profile ISDN idle-time 60
;
  profile AT default
  profile AT dialout
  profile AT remote-address 974000
  profile AT idle-time 120
;
exit
;
global-profiles ppp
; -- PPP Profiles Configuration --
  backup 3 default
  backup 3 retries 3
  backup 3 maximum-backup-time 60
;
  ipcp 34 default
  ipcp 34 local-ip assigned
;
  user 3 default
  user 3 login ISDN_USER
  user 3 password isdnkeyword
;
  user 4 default
  user 4 login AT_USER
  user 4 password atkeyword
;
  ppp 3 default
  ppp 3 backup-profile 3
  ppp 3 facilities-profile 3
  ppp 3 ipcp-profile 34
  ppp 3 authentication-profile 3
;
  ppp 4 default
  ppp 4 ipcp-profile 34
  ppp 4 authentication-profile 4
;
exit

```

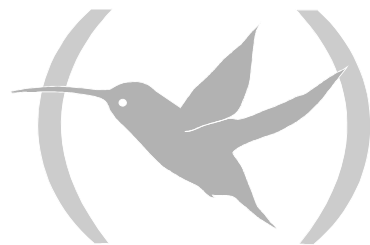
```

;
network ppp3
; -- Generic PPP User Configuration --
  ppp
; -- PPP Configuration --
  profile 3
  exit
;
  base-interface
; -- Base Interface Configuration --
  base-interface bri0/0 255 link
  base-interface bri0/0 255 profile ISDN
;
  exit
;
exit
;
network ppp4
; -- Generic PPP User Configuration --
  ppp
; -- PPP Configuration --
  profile 4
  exit
;
  base-interface
; -- Base Interface Configuration --
  base-interface serial0/0 link
  base-interface serial0/0 profile AT
;
  exit
;
exit
;
;
;
protocol ip
; -- Internet protocol user configuration --
  address ppp3          unnumbered    0.0.0.0
  address ppp4          unnumbered    0.0.0.0
;
;
  route 0.0.0.0        0.0.0.0        ppp3          1
  route 0.0.0.0        0.0.0.0        ppp4          2
;
exit
;
feature wrp-backup-wan
; -- WAN Reroute Backup user configuration --
  pair 1 primary interface ppp3 secondary interface ppp4
;
  enable
exit
;
; --- end ---

```

Chapter 6

PPP Interface Events



1. PPP interface events viewing

In the same way as other subsystems, this permits real time viewing of the events produced in the distinct PPP interface in the device when the events system is enabled for this protocol. The way to enable this from the general events configuration menu is as follows. In this case, the classification for the events is different from that commented on in chapter 3, section 2 of this manual.

```
*PROCESS 4
User Configuration
Config>EVENT

-- ELS Config --
ELS Config>ENABLE TRACE SUBSYSTEM PPP ALL
ELS Config>EXIT
Config>SAVE
Save configuration [n]? Y

Saving configuration...OK
Config>
```

These can also be enabled from the monitoring menu, in which case you do not need to restart the device in order to view them. The process is as follows:

```
*PROCESS 3
Console Operator
+EVENT

-- ELS Monitor --
ELS>ENABLE TRACE SUBSYSTEM PPP ALL
ELS>EXIT
+
```

The events list available for the PPP protocol is as follows:

PPP.001

Level: Common informational comment, C-INFO

Syntax:

PPP.001 Interface *network_ID* ready

Description:

Selftest successfully completed.

PPP.002

Level: Common informational comment, C-INFO

Syntax:

PPP.002 Interface *network_ID* down

Description:

The selftest indicates that the base nets are all down.

PPP.003

Level: Abnormal internal error, UI-ERROR

Syntax:

PPP.003 *linkPPP* In frame, MRU exceeded. Size *size*, MRU *MRU*

Description:

The MRU has been exceeded in an incoming packet in the indicated link.

PPP.011

Level: Per packet trace, P-TRACE

Syntax:

PPP.011 *linkPPP "received(In) or sent(Out)"* frame, type *0xprotocol*, size *size*

Description:

Received/sent frame from the protocol specified by a PPP interface.

PPP.012

Level: Normal operation trace, C-TRACE

Syntax:

PPP.012 *linkPPP "received(In) or sent(Out)"* PFC frame, *0xprotocol* [*result*]

Description:

Frame received with Protocol Field Compression.

PPP.013

Level: Normal operation trace, C-TRACE

Syntax:

PPP.013 *linkPPP "compressed(In) or uncompressed(Out)"* action VJ frame, *0xprotocol* [*result*]

Description:

A Van Jacobson frame has been compressed/decompressed (indicating the result of the operation).

PPP.014

Level: Abnormal operation trace, U-TRACE

Syntax:

PPP.014 *linkPPP "compressed(In) or uncompressed(Out)"* action CRTP frame, *0xprotocol* [*result*]

Description:

A CRTP frame has been compressed/decompressed (indicating the result of the operation).

PPP.015

Level: Normal operation trace, C-TRACE

Syntax:

PPP.015 *linkPPP "compressed(In) or uncompressed(Out)"* action CCP frame, *0xprotocol* [*result*]

Description:

A CCP frame has been compressed/decompressed (indicating the result of the operation).

PPP.016

Level: Abnormal informational comment, U-INFO

Syntax:

PPP.016 *linkPPP "received(In) or sent(Out)"* CCP Reset *request_ack*

Description:

A CCP Reset Request/Ack has been sent/received.

Cause:

An error has been produced when decompressing at one of the ends, the CCP session must be restarted.

PPP.017

Level: Common informational comment, C-INFO

Syntax:

PPP.017 *linkPPP* MP "*created or deleted*" bundle

Description:

An MP bundle has been created or eliminated.

PPP.018

Level: Normal operation trace, C-TRACE

Syntax:

PPP.018 *linkPPP* MP "*local or remote*" MRRU: *MRRU*

Description:

MRRU negotiated in the MP bundle.

PPP.019

Level: Normal operation trace, C-TRACE

Syntax:

PPP.019 *linkPPP* MP "*local or remote*" SSN header

Description:

SSN format (Short Sequence Number) negotiated in the MP bundle.

PPP.020

Level: Normal operation trace, C-TRACE

Syntax:

PPP.020 *linkPPP* MP "*local or remote*" EndPoint: class "*Endpoint class*", value "*Endpoint value*"

Description:

Endpoint Discriminator used in the MP bundle.

PPP.021

Level: Common informational comment, C-INFO

Syntax:

PPP.021 *linkPPP* MP link "*added or removed*" bundle

Description:

A PPP link has been added to or removed from an MP bundle.

PPP.022

Level: Normal operation trace, C-TRACE

Syntax:

PPP.022 *linkPPP* In MP frame, flags *0xflags*, seq: "*received sequence*" (exp: "*expected sequence*") [*action*], size *size*

Description:

A multilink PPP frame has been received with a determined sequence number (the expected sequence number is displayed and the corresponding action: accept, discard or queue). Includes the flags and the frame size.

PPP.023

Level: Normal operation trace, C-TRACE

Syntax:

PPP.023 *linkPPP* Out MP frame, seq: "*transmission sequence*", size *size*

Description:

A multilink PPP frame has been transmitted (the transmission sequence number and the frame size is displayed).

PPP.024

Level: Abnormal internal error, UI-ERROR

Syntax:

PPP.024 *linkPPP* MP Queue exceeds MAX Items

Description:

The maximum number of queued multilink PPP fragments has been exceeded.

PPP.025

Level: Abnormal external error UE-ERROR

Syntax:

PPP.025 *linkPPP* MP found END frag: *sequence*

Description:

A fragment with the MP frame end flag has been found (END) however the beginning part of the frame is not available.

Cause:

The first part of the MP frame has been lost. This can occur when fragments queue purging has been executed either because it is full or because the loss of a fragment has been detected.

PPP.026

Level: Abnormal internal error, UI-ERROR

Syntax:

PPP.026 *linkPPP* "*compressed(In) or uncompressed(Out)*" action VJ frame,
0x*protocol* [*result*]

Description:

An error has been produced compressing/decompressing a Van Jacobson frame.

PPP.027

Level: Abnormal internal error, UI-ERROR

Syntax:

PPP.027 *linkPPP* "*compressed(In) or uncompressed(Out)*" action CRTP frame,
0x*protocol* [*result*]

Description:

An error has been produced compressing/decompressing a CRTP frame.

PPP.028

Level: Abnormal internal error, UI-ERROR

Syntax:

PPP.028 *linkPPP* "*compressed(In) or uncompressed(Out)*" action CCP frame,
0x*protocol* [*result*]

Description:

An error has been produced compressing/decompressing a CCP frame.

PPP.049

Level: Normal operation trace, C-TRACE

Syntax:

PPP.049 "*link name*" LCP *option* (0x*dump*)

Description:

Description of non-supported LCP option.

PPP.050

Level: Normal operation trace, C-TRACE

Syntax:

PPP.050 "*link name*" LCP (0x*dump*)

Description:

Complete content of the LCP packet.

PPP.051

Level: Normal operation trace, C-TRACE

Syntax:

PPP.051 "link name" LCP direction code ["LCP state"] id identifier len length

Description:

LCP packet description.

PPP.052

Level: Normal operation trace, C-TRACE

Syntax:

PPP.052 "link name" LCP MRU mru (0xdump)

Description:

MRU option description.

PPP.053

Level: Normal operation trace, C-TRACE

Syntax:

PPP.053 "link name" LCP AsyncMap "async. map" (0xdump)

Description:

ACCM option description.

PPP.054

Level: Normal operation trace, C-TRACE

Syntax:

PPP.054 "link name" LCP AuthProt "auth. protocol" (0xdump)

Description:

Authentication option description.

PPP.055

Level: Normal operation trace, C-TRACE

Syntax:

PPP.055 "link name" LCP MagicNumber "magic number" (0xdump)

Description:

Magic number option description.

PPP.056

Level: Normal operation trace, C-TRACE

Syntax:

PPP.056 "link name" LCP ProtComp available (0xdump)

Description:

Description of the protocol field compression option.

PPP.057

Level: Normal operation trace, C-TRACE

Syntax:

PPP.057 "link name" LCP AddrCtrlComp available (0xdump)

Description:

Description of the address and control compression option.

PPP.058

Level: Normal operation trace, C-TRACE

Syntax:

PPP.058 "link name" LCP MRRU mrru (0xdump)

Description:

MRRU option description.

PPP.059

Level: Normal operation trace, C-TRACE

Syntax:

PPP.059 *"link name"* LCP ShortHeader available (0xdump)

Description:

Description of the short sequence number header format option.

PPP.060

Level: Normal operation trace, C-TRACE

Syntax:

PPP.060 *"link name"* LCP EndPoint class *class* (0xdump)

Description:

Description of the “end-point discriminator” option.

PPP.061

Level: Normal operation trace, C-TRACE

Syntax:

PPP.061 *"link name"* LCP Unknown option (0xdump)

Description:

Unknown option description.

PPP.062

Level: Normal operation trace, C-TRACE

Syntax:

PPP.062 *"link name"* LCP Bad option (0xdump)

Description:

Bad format option description.

PPP.063

Level: Normal operation trace, C-TRACE

Syntax:

PPP.063 *"link name"* PAP *direction code* [*"PAP state"*] *id identifier len length*

Description:

PAP packet description.

PPP.064

Level: Normal operation trace, C-TRACE

Syntax:

PPP.064 *"link name"* PAP Peer-Id *peer-id*

Description:

PAP request from “peer-id”.

PPP.065

Level: Normal operation trace, C-TRACE

Syntax:

PPP.065 *"link name"* PAP Password *password*

Description:

Password PAP request.

PPP.066

Level: Normal operation trace, C-TRACE

Syntax:

PPP.066 *"link name"* PAP Message: *message*

Description:

PAP response message.

PPP.067

Level: Normal operation trace, C-TRACE

Syntax:

PPP.067 *"link name"* CHAP *direction code* [*"CHAP state"*] *id identifier len length*

Description:

CHAP packet description.

PPP.068

Level: Normal operation trace, C-TRACE

Syntax:

PPP.068 *"link name"* CHAP Peer-Name *"peer name"*

Description:

Remote end CHAP name.

PPP.069

Level: Normal operation trace, C-TRACE

Syntax:

PPP.069 *"link name"* CHAP Message: *"peer name"*

Description:

Message sent by the Remote end.

PPP.070

Level: Normal operation trace, C-TRACE

Syntax:

PPP.070 *"link name"* CHAP Challenge *challenge*

Description:

CHAP challenge value.

PPP.071

Level: Normal operation trace, C-TRACE

Syntax:

PPP.071 *"link name"* CHAP MD5 *md5*

Description:

CHAP md5 value.

PPP.072

Level: Normal operation trace, C-TRACE

Syntax:

PPP.072 *"link name"* IPCP *direction code* [*"IPCP state"*] *id identifier len length*

Description:

IPCP packet description.

PPP.073

Level: Normal operation trace, C-TRACE

Syntax:

PPP.073 *"link name"* IPCP Address *address (0xdump)*

Description:

IPCP address option.

PPP.074

Level: Normal operation trace, C-TRACE

Syntax:

PPP.074 *"link name"* IPCP Van-Jacobson, *slots slots, comp. "compression flag"*
(*0xdump*)

Description:

Van-Jacobson compression IPCP protocol.

PPP.075

Level: Normal operation trace, C-TRACE

Syntax:

PPP.075 "*link name*" IPCP Unknown CompProtocol (0xdump)

Description:

Unknown compression IPCP protocol.

PPP.076

Level: Normal operation trace, C-TRACE

Syntax:

PPP.076 "*link name*" IPCP Unknown option (0xdump)

Description:

Unknown IPCP option.

PPP.077

Level: Normal operation trace, C-TRACE

Syntax:

PPP.077 "*link name*" CCP *direction code* ["*CCP state*"] *id identifier len length*

Description:

CCP packet description.

PPP.078

Level: Normal operation trace, C-TRACE

Syntax:

PPP.078 "*link name*" CCP LZS-DCP Compression (0xdump)

Description:

LZS-DCP compression option.

PPP.079

Level: Normal operation trace, C-TRACE

Syntax:

PPP.079 "*link name*" CCP Stac LZS Compression (0xdump)

Description:

Stac LZS compression option.

PPP.080

Level: Normal operation trace, C-TRACE

Syntax:

PPP.080 "*link name*" CCP History number: *histories*

Description:

"History number" Parameter.

PPP.081

Level: Normal operation trace, C-TRACE

Syntax:

PPP.081 "*link name*" CCP Check mode: "*check mode*"

Description:

"Check mode" Parameter.

PPP.082

Level: Normal operation trace, C-TRACE

Syntax:

PPP.082 *"link name" CCP* Process mode: *"process mode"*

Description:

“Process mode” Parameter.

PPP.083

Level: Normal operation trace, C-TRACE

Syntax:

PPP.083 *"link name" CCP* Unknown compression type *"compression type" (0xdump)*

Description:

Unknown compression type.

PPP.084

Level: Common informational comment, C-INFO

Syntax:

PPP.084 *"link name" PAP* required by *mode*

Description:

PAP mode description.

PPP.085

Level: Common informational comment, C-INFO

Syntax:

PPP.085 *"link name" CHAP* required by *mode*

Description:

CHAP mode description.

PPP.086

Level: Normal external error, CE-ERROR

Syntax:

PPP.086 *"link name" LCP* Invalid packet (*cause*)

Description:

Invalid LCP packet description.

PPP.087

Level: Common informational comment, C-INFO

Syntax:

PPP.087 *"link name" LCP* information

Description:

LCP information trace.

PPP.088

Level: Common informational comment, C-INFO

Syntax:

PPP.088 *"link name" IPCP* information

Description:

IPCP information trace.

PPP.089

Level: Common informational comment, C-INFO

Syntax:

PPP.089 *"link name" CCP* information

Description:

CCP information trace.

PPP.090

Level: Common informational comment, C-INFO

Syntax:

PPP.090 est *serial_number hostname nt network*, local addr: *local_address*, time
PPPoED *pppoe_disc_time ms*, lcp *lcp_time ms*, ipcp *ipcp_time ms*, auth
authentication_time ms, comp *compression_time ms*

Description:

PPP connection established with the specified negotiation times.

PPP.091

Level: Common informational comment, C-INFO

Syntax:

PPP.091 conn err *serial_number hostname nt network err-id error_identifier date err
error_code*

Description:

An error was produced when the PPP connection was being negotiated.

PPP.092

Level: Normal operation trace, C-TRACE

Syntax:

PPP.092 "*link name*" LCP Protocol 0x*protocol* (0x*dump*)

Description:

Description of the protocol rejected in the Protocol Reject LLCP frame.

2. PPP interface events example

Below you will find a typical events trace of a connection through a synchronous serial line:

```
*PROCESS 2
01/18/02 10:20:00 PPP.087 ppp1:serial0/0 LCP Negotiation started
01/18/02 10:20:03 PPP.051 ppp1:serial0/0 LCP Out CONF-REQ [req-sent] id 1 len 14
01/18/02 10:20:03 PPP.052 ppp1:serial0/0 LCP MRU 2048 (0x01040800)
01/18/02 10:20:03 PPP.055 ppp1:serial0/0 LCP MagicNumber 6CD05C80
(0x05066cd05c80)
01/18/02 10:20:03 PPP.011 ppp1:serial0/0 In frame, type 0xC021, size 16
01/18/02 10:20:03 PPP.051 ppp1:serial0/0 LCP In CONF-ACK [req-sent] id 1 len 14
01/18/02 10:20:03 PPP.052 ppp1:serial0/0 LCP MRU 2048 (0x01040800)
01/18/02 10:20:03 PPP.055 ppp1:serial0/0 LCP MagicNumber 6CD05C80
(0x05066cd05c80)
01/18/02 10:20:06 PPP.011 ppp1:serial0/0 In frame, type 0xC021, size 23
01/18/02 10:20:06 PPP.051 ppp1:serial0/0 LCP In CONF-REQ [ack-rcvd] id 2 len 21
01/18/02 10:20:06 PPP.052 ppp1:serial0/0 LCP MRU 2048 (0x01040800)
01/18/02 10:20:06 PPP.054 ppp1:serial0/0 LCP AuthProt CHAP (0x0305c22305)
01/18/02 10:20:06 PPP.055 ppp1:serial0/0 LCP MagicNumber D1384610
(0x0506d1384610)
01/18/02 10:20:06 PPP.056 ppp1:serial0/0 LCP ProtComp available (0x0702)
01/18/02 10:20:06 PPP.051 ppp1:serial0/0 LCP Out CONF-ACK [ack-rcvd] id 2 len 21
01/18/02 10:20:06 PPP.052 ppp1:serial0/0 LCP MRU 2048 (0x01040800)
01/18/02 10:20:06 PPP.054 ppp1:serial0/0 LCP AuthProt CHAP (0x0305c22305)
01/18/02 10:20:06 PPP.055 ppp1:serial0/0 LCP MagicNumber D1384610
(0x0506d1384610)
01/18/02 10:20:06 PPP.056 ppp1:serial0/0 LCP ProtComp available (0x0702)
01/18/02 10:20:06 PPP.087 ppp1:serial0/0 LCP Negotiation successful
01/18/02 10:20:06 PPP.051 ppp1:serial0/0 LCP Out ECHO-REQ [opened] id 0 len 8
01/18/02 10:20:06 PPP.085 ppp1:serial0/0 CHAP required by peer
01/18/02 10:20:06 PPP.011 ppp1:serial0/0 In frame, type 0xC021, size 10
01/18/02 10:20:06 PPP.051 ppp1:serial0/0 LCP In ECHO-REQ [opened] id 0 len 8
01/18/02 10:20:06 PPP.051 ppp1:serial0/0 LCP Out ECHO-REP [opened] id 0 len 12
01/18/02 10:20:06 PPP.011 ppp1:serial0/0 In frame, type 0xC021, size 14
01/18/02 10:20:06 PPP.051 ppp1:serial0/0 LCP In ECHO-REP [opened] id 0 len 12
01/18/02 10:20:06 PPP.011 ppp1:serial0/0 In frame, type 0xC223, size 23
01/18/02 10:20:06 PPP.067 ppp1:serial0/0 CHAP In CHALLENGE [ack-sent] id 2 len 21
01/18/02 10:20:06 PPP.070 ppp1:serial0/0 CHAP Challenge
7d88503b19f34f2ce98c210dd29c7f17
01/18/02 10:20:06 PPP.067 ppp1:serial0/0 CHAP Out RESPONSE [ack-sent] id 2 len 24
01/18/02 10:20:06 PPP.071 ppp1:serial0/0 CHAP MD5
41a4d313fce6cf8276a75609bd469dac
01/18/02 10:20:06 PPP.068 ppp1:serial0/0 CHAP Peer-Name c5i
01/18/02 10:20:06 PPP.011 ppp1:serial0/0 In frame, type 0xC223, size 6
01/18/02 10:20:06 PPP.067 ppp1:serial0/0 CHAP In SUCCESS [ack-sent] id 2 len 4
01/18/02 10:20:06 PPP.088 ppp1:serial0/0 IPCP Negotiation started
01/18/02 10:20:06 PPP.072 ppp1:serial0/0 IPCP Out CONF-REQ [starting] id 1 len 16
01/18/02 10:20:06 PPP.073 ppp1:serial0/0 IPCP Address 0.0.0.0 (0x030600000000)
01/18/02 10:20:06 PPP.074 ppp1:serial0/0 IPCP Van-Jacobson, 15 slots, comp.
enabled (0x0206002d0f01)
01/18/02 10:20:06 PPP.011 ppp1:serial0/0 In frame, type 0x8021, size 12
01/18/02 10:20:06 PPP.072 ppp1:serial0/0 IPCP In CONF-REQ [req-sent] id 1 len 10
01/18/02 10:20:06 PPP.073 ppp1:serial0/0 IPCP Address 150.214.1.2
(0x030696d60102)
01/18/02 10:20:06 PPP.072 ppp1:serial0/0 IPCP Out CONF-ACK [req-sent] id 1 len 10
01/18/02 10:20:06 PPP.073 ppp1:serial0/0 IPCP Address 150.214.1.2
(0x030696d60102)
01/18/02 10:20:06 PPP.011 ppp1:serial0/0 In frame, type 0x8021, size 12
01/18/02 10:20:06 PPP.072 ppp1:serial0/0 IPCP In CONF-NAK [ack-sent] id 1 len 10
01/18/02 10:20:06 PPP.073 ppp1:serial0/0 IPCP Address 150.214.1.1
(0x030696d60101)
01/18/02 10:20:06 PPP.072 ppp1:serial0/0 IPCP Out CONF-REQ [ack-sent] id 2 len 16
01/18/02 10:20:06 PPP.073 ppp1:serial0/0 IPCP Address 150.214.1.1
(0x030696d60101)
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01/18/02 10:20:06 PPP.074 ppp1:serial0/0 IPCP Van-Jacobson, 15 slots, comp.  
enabled (0x0206002d0f01)  
01/18/02 10:20:06 PPP.011 ppp1:serial0/0 In frame, type 0x8021, size 18  
01/18/02 10:20:06 PPP.072 ppp1:serial0/0 IPCP In CONF-ACK [ack-sent] id 2 len 16  
01/18/02 10:20:06 PPP.073 ppp1:serial0/0 IPCP Address 150.214.1.1  
(0x030696d60101)  
01/18/02 10:20:06 PPP.074 ppp1:serial0/0 IPCP Van-Jacobson, 15 slots, comp.  
enabled (0x0206002d0f01)  
01/18/02 10:20:06 PPP.088 ppp1:serial0/0 IPCP Negotiation successful  
01/18/02 10:20:08 PPP.001 Interface ppp1 ready  
<CTRL-P>  
*
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