TVRP Protocol

Teldat Dm725-I

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Chapter 1 Introduction

1.1 Introduction to TVRP Protocol

TVRP provides a tolerance mechanism for IP routing failures under certain circumstances. Specifically it provides protection for the first-hop router when the source host cannot dynamical learn its address. It also provides automatic backup for said router when configured in our routers, executing IP over LAN Ethernet and Token Ring networks.

The objective of TVRP is to make the hosts think they are using a single virtual router, while simultaneously maintaining connectivity with other networks, although the first-hop router being used is down.

TVRP is not being recommended to replace the current mechanisms used to discover the routers dynamically (nothing further, whenever possible we recommend the use of mechanisms such as RIP, OSPF etc.), but simply to provide an alternative protocol when these mechanisms cannot be used.

A set of routers participates in TVRP and creates the illusion of a single virtual router. A set of routers working in common is known as *TVRP GROUP*.

A single router within the group, known as Active Router, manages the IP traffic routing towards the virtual router. Another router (from the TVRP group) is chosen as the Standby Router. If the active router fails, the standby router takes over the routing tasks and becomes the new active router. Another router within the group is then chosen to be the new standby router.

Although various routers can participate in a specific TVRP group, the protocol ensures that only one router, the active router, is routing the IP traffic for the virtual router. Also the active router is in charge of responding to the traffic specifically directed to the virtual IP address such as PING, TELNET, and FTP etc.

To minimize the network traffic, once the process to choose the active and standby routers has terminated, only the active and standby routers send periodic TVRP messages.

In a determined LAN network, various TVRP groups can co-exist (and overlap). Each group 'simulates' a different virtual router. A virtual MAC address and a virtual IP address are established for each TVRP group.

This protocol is also available in Wireless LAN networks where it is used by the access points. In these scenarios, the TVRP groups are made up of a single element, the access point. If the same TVRP configuration is replicated in various access points belonging to the same SSID, the WLAN stations that execute roaming between the said access points can always send their outgoing traffic towards the same virtual router.

1.2 Protocol

Routers, in the TVRP group, periodically publish information on their states by exchanging messages. Authentication is applied to said messages to ensure they are from a router in the same TVRP group. There are two types of authentication: *Authentication with Password in clear* (also known as *Authentication in plain text*). This is where a password is configured in each group and inserted in the packet to be checked at destination. The second is *MD5 Authentication*. This calculates the packet's MD5 authentication algorithm, which is inserted in the packets and checked at destination.

1.2.1 Packet Format

TVRP operates over UDP in one of the ports. Said port is configurable, however please ensure you do not use one assigned for other purposes.

The packets are sent to the multicast address 224.0.0.2 with a TTL = 1.

The routers use their IP address as a source IP address for the TVRP packets (instead of the virtual IP address). This ensures the routers participating in a TVRP group can identify each other.

The following fields appear in the data part of the UDP datagram TVRP messages are sent in:

1.2.1.1 VERSION

Gives the TVRP version.

1.2.1.2 OPERATION CODE

Gives the type of TVRP message contained in the packet.

Hello:

Active or standby router.

Coup:

Coup messages are sent when a router wants to convert into an active router.

Resign:

Resign messages are sent when the router does not want to continue being the active router.

1.2.1.3 STATUS

Describes the current state of the router sending the message.

Initial:

Advises TVRP is not working. This may be due to a configuration change, when the interface starts up for the first time, or when the router cannot route the packets to the given IP addresses.

Learn:

The router does not have the virtual IP address configured and has not received an authenticated Hello message from the active router. The router waits to receive information from said router.

Listen:

The router has a virtual IP address configured, but it is neither the active nor the standby router address. It listens to Hello messages from said routers.

Speak:

The router sends periodic Hello messages and actively participates in choosing the active and/or standby router.

Standby:

The standby router is the candidate chosen to convert into the next active router and sends periodic Hello messages. Excluding transitory conditions, there needs to be a maximum of ONE router in a standby state within the group.

Active:

The router is currently routing the packets towards the TVRP group virtual MAC address. It sends periodic Hello messages. Excluding transitory conditions, there can only ONE active router in within the TVRP group.

1.2.1.4 HELLOTIME

This field is only significant in Hello messages. This indicates the approximate time (in seconds) between Hello messages sent by the router. If Hellotime is not configured, the router must learn it from a Hello message sent by the active router. This must be carried out if there is no Hellotime configured and the Hello message is authenticated.

A router sending a Hello message must insert the Hellotime it is using in the corresponding message field.

If the Hellotime is not learned through a Hello message from the active router, nor manually configured, a default value of 3 seconds is recommended.

1.2.1.5 HOLDTIME

This field is only significant in the Hello messages. This indicates the time (in seconds) the current Hello message is considered valid.

If a router sends a Hello message, the recipients of said message must consider this valid during a time period equal to Holdtime.

If the Holdtime is not configured in the router, it must be learned from a Hello message sent by the active router. Holdtime must be inserted in Hello messages sent by the router. If Holdtime is not learned nor configured, a recommended value of 10 seconds is used.

An active router does not (and shouldn't) learn the new Hellotime and Holdtime values (although these can use the values learned from the previous active router).

You cannot use a configured time and another learned time (configured Holdtime, learned Hellotime and vice versa).

1.2.1.6 PRIORITY

This field is used to choose the active and the standby routers. The router with the greatest priority (highest number) wins. When two routers have the same priority, the one with the 'highest' IP address wins.

1.2.1.7 GROUP Nº

Identifies the TVRP group. For Token Ring, the values are between 0 and 2 (inclusive). Values between 0 and 255 (inclusive) are for the rest of the transmission methods.

1.2.1.8 RESERVED

This is not used.

1.2.1.9 AUTHETICATION DATA

This contains a password in clear, which is used when Authentication with Password in clear (or with plain text) is configured as authentication. This field is not designed to provide security, but to prevent errors in the configuration of the group (to ensure a message effectively belongs to a specific group).

If no password has been configured, the following is used by default:

0x74 0x65 0x6C 0x64 0x61 0x74 0x00 0x00 ("t" "e" "l" "d" "a" "t" NUL NUL)

1.2.1.10 VIRTUAL IP ADDRESS

This is the virtual IP address used by the TVRP group. If it is not configured in the router, it must be learned through an authenticated Hello message from the active router.

If MD5 Authentication is configured, then in addition to the previous fields, the packet contains the following fields:

1.2.1.11 MD5 TLV (Type-length-value)

Made up of one byte with the type of TLV used; in this case "0x04".

1.2.1.12 MD5 TLV LENGTH (Type-length-value)

Made up of one byte with the TLV length, in this case it's 28 bytes: "0x1C"

1.2.1.13 TYPE OF MD5 ALGORITHM

Identifies the type of algorithm used, in this case it's the MD5: "0x01"

1.2.1.14 MD5 FLAGS

Algorithm options.

1.2.1.15 ROUTER IP ADDRESS

IP address of the router sending the packet.

1.2.1.16 KEY IDENTIFIER

Contains the number to identify the KEY used for MD5 authentication.

1.2.1.17 MD5 DIGEST

This contains 16 bytes (the result of applying the MD5 authentication algorithm to the packet). This field is used to check if the MD5 authentication for the received packet is correct or not.

> **Note**
>
> When MD5 authentication has been configured, the field containing the Authentication Data (password in clear) sends everything at 0.

1.2.2 Operational Parameters

The following information must be known by ALL routers cooperating in the TVRP group so the set operates correctly:

N° of the Standby Group

Virtual MAC address

Priority

Type of Authentication (if this is MD5 authentication).

Password

Authentication Data (if the authentication is 'with Password in Clear').

Hellotime

Holdtime

At least one router in the TVRP group must know the virtual IP address (and must be known by all routers in the group). (if this is MD5 authentication)

The following information may be configured (or not) in any router:

Preemption Capability: If a router has a higher priority than the active router and preemption is enabled, the former can become the active router by using a Coup message. This tells the current active router that the router with higher priority wishes to convert to the active router.

Chapter 2 Configuration

2.1 TVRP Protocol Configuration

Parameter to configure in TVRP.

Parameters:

- **UDP Port:** UDP port through which the TVRP protocol operates.
- **Virtual IP Address:** This is the IP address for the TVRP group. This is not associated to any physical interface.
- **Virtual MAC Address:** This is the MAC address associated to the Virtual IP Address.
- **Local IP Address:** The router's LAN interface IP address. This is only configurable in cases of TVRP groups introduced from the global menu; these are not configured through the interface.
- **Type of interface**: Where the router LAN interface where the TVRP is running is Ethernet or Token Ring. Evidently this parameter is only logical where TVRP groups are configured from the global menu and not in the interface itself. This is important because there are certain restriction for Token Ring interfaces: these can only use identifiers from groups 0, 1, and 2. The virtual MAC takes a pre-set value depending on the group identifier (which is not configurable).
- **Group Number:** TVRP group identifier.
- **Priority:** Router priority within the TVRP group.
- **Hello Time:** Time between Hello messages.
- **Hold Time:** Period of time the last received Hello message is considered valid.
- **Expropriation:** Expropriation capacity.
- **Type of Authentication**: Type of authentication to be used in the group. (Authentication with Password in clear or MD5 Authentication.)
- **MD5 Authentication Password**: Password used to execute the MD5 algorithm when MD5 Authentication is configured for the group messages.
- **Authentication Data:** Data to authenticate group messages when authentication with Password in Clear (or Plain Text) has been configured.
- **Check time:** Time between checking the interfaces and destinations.
- **Interfaces:** Interfaces to be monitored.
- **Destinations:** IP address of the destinations to check.
- **Inactivity Condition**: Indicates the condition to be met so the router stops actively participating in the protocol, after checking the configured interfaces and IP destinations for monitoring purposes.
- **ICMP Redirect messages indicating virtual addresses:** Lets you enable ICMP Redirect messages send, indicating a virtual IP address as the next hop address to use.When this option is disabled, the notified address is always a real one and not virtual.

2.1.1 UDP PORT

UDP port the TVRP is going to operate through. Said ports acts as source and destination for messages from the protocol itself.

You can configure any port you wish, nevertheless, avoid *well-known* ports normally used for other protocols or services: port 7 (for *echo*), 13 (for *daytime*) etc., as this can provoke errors in TVRP and the rest of the system.

> **Note**
>
> By default the option to configure port 1985 appears, which is used by the HSRP protocol. This configuration is imperative should you wish to maintain compatibility. We recommend using this port.

2.1.2 VIRTUAL IP ADDRESS

This is one of the most important parameters together with the virtual MAC address.

The virtual IP address is the IP address identifying the TVRP group. The set of routers, which operate together in a TVRP group, simulate the existence of a virtual router whose IP address is said virtual IP address.

This IP address is used by network hosts, which do not have the dynamic learning mechanisms to learn the first hop router's address (default router is the virtual router) to route traffic.

Each TVRP group simulates a distinct virtual router. This means if you configure various groups in the same LAN, then each one needs a different virtual address.

It is ESSENTIAL that the virtual IP address configured for a TVRP group **DOES NOT COINCIDE** with any other address assigned to the router interfaces or the LAN network hosts.

One thing to bear in mind is you must configure a virtual IP address, which belongs to the same subnet used by the LAN.

> **Note**
>
> Not all the routers have to have a virtual IP address configured although AT LEAST ONE must (so the other routers can learn the address). To leave a router without a virtual IP address configured, select the 0.0.0.0 address, which specifically chosen to this effect.

> **Warning**
>
> Leaving the IP address choice up to the user can cause certain problems such as the user selecting addresses used for other purposes (broadcast, multicast etc.), which can cause malfunctions in the system. I.e. you must use unicast IP addresses.

2.1.3 VIRTUAL MAC ADDRESS

The virtual MAC address is closely related with the previous parameter. This is the link layer address that appears associated with the virtual IP address.

The virtual MAC address is configured depending of the type of physical interface that TVRP is executed over.

Said parameter is fully configurable for Ethernet networks and the values can be adjusted as required. The default virtual MAC address should be be retained if you need compatibility with HSRP. This parameter must be carefully specified as it can cause malfunctions in the network.

> **Note**
>
> We recommend using the default virtual MAC address to maintain compatibility with HSRP and to avoid configuring a MAC address already in use in the network.

In Token Ring networks, the virtual MAC addresses correspond to operating addresses. These are pre assigned according to the TVRP group and cannot be chosen by the user.

2.1.4 LOCAL IP ADDRESS

IP address of the router interface directly connected to the LAN where you want TVRP to operate.

To correctly configure this parameter, check the IP addresses associated to the router interfaces and choose the address corresponding to the LAN where the hosts are and whose traffic you wish to route through the virtual router.

> **Important**
>
> If you configure a local IP address that does not correspond to an IP address associated to the router LAN interface, the TVRP group is ignored and does not operate in this router.

This parameter is only configurable for TVRP groups configured at a global level. If you are dealing with groups configured through the interface, the local IP address is the first of the IP addresses assigned to said interface.

2.1.5 INTERFACE TYPE

Specifies if the router's LAN interface where the TVRP is running is Ethernet or Token Ring. When the interfaces are Wireless LAN, Ethernet must be selected. Evidently this parameter is only logical when TVRP groups are configured in the global menu and are not in the interface itself. This is important given that Token Ring interfaces have certain restrictions: these can only use identifiers from groups 0, 1, and 2 and the virtual MAC takes a pre-set value depending on the group identifier (which is not configurable).

2.1.6 GROUP NUMBER

The group number is used to unanimously identify the TVRP group. This means you can have different TVRP groups operating over the same LAN, in different routers and in the same router. TVRP groups can overlap so a 'physical' router can become the active router for various groups i.e. be the virtual router for diverse TVRP groups.

The number of TVRP groups can be configured depending on the type of physical interface the protocol is executing.

2.1.6.1 Ethernet or Wireless LAN

You can configure up to 256 groups. These are numbered from 0 to 255.

2.1.6.2 Token Ring

You can configure a maximum of 3 TVRP groups. The possible groups are 0, 1 and 2.

2.1.7 PRIORITY

Use this parameter to change the priority for routers in TVRP.

Priority is used when choosing which router is to be converted into the active router. This parameter is sent in the TVRP messages. When routers receive TVRP messages from other routers, they know if they have a higher or lower priority than the router sending the message.

Priority can take values between 0 and 255. The highest value corresponds to the highest number i.e. maximum priority is 255 and minimum 0.

2.1.8 HELLO TIME

To determine if the routers are active, Hello messages are periodically sent. These not only check activity, but also to provide further information on other parameters (virtual IP address etc.).

Hello messages are time configured (Hallo time).

With a longer Hello time, there is a longer interval between one Hello message and the next. However this means less network congestion due to fewer messages being sent.

Hello time can be configured from 1 to 255 seconds. The recommended value is 3 seconds.

2.1.9 HOLD TIME

Establishes the time interval the last received Hello message is considered valid. If Hold time lapses before a new Hallo message is received, the router is probably down. In this case, initiate the corresponding actions depending on whether said router is active or standby.

Hold time can be configured from 1 to 255 seconds. Recommended value is 10 seconds.

> **Note**
>
> Recommended value for Hold time is at least 3 times the Hello time. Said Hold time must be greater than Hello time. If you configure a lower Hold time than Hello time, TVRP malfunction will occur as Hold timers will expire before Hello messages are received.

2.1.10 EXPROPRIATION

Enables or disables the expropriation capacity in a router.

If it is disabled, even though the active router has a lower priority than another router participating in the TVRP group, this will remain as active while it is operative.

If, on the other hand, the expropriation is enabled, the router with the highest priority in the group will become the active. This is recommended if you want to assign higher priorities to those routers you want to router traffic, and lower priorities to routers for standby purposes (backup).

2.1.11 AUTHENTICATION TYPE

Selects the type of authentication the group is going to use. This can be two types: "Authentication with Password in Clear" (or "with plain text") or "MD5 Authentication".

MD5 authentication gives the protocol better security than authentication with Password in clear.

2.1.12 MD5 AUTHENTICATION KEY

The MD5 authentication key is the secret key used to authenticate the message in the MD5 algorithm. This key must be known to all devices belonging to a TVRP group. I.e. when receiving a message the authentication check is found to be correct, this guarantees the message belongs to a device in said group.

> **Note**
>
> If you use a key longer than 64 characters, there may be incompatibility difficulties with other manufacturers.

2.1.13 AUTHENTICATION DATA

Authentication data is used when the authentication configured is "with Password in Clear".

The object of this field is to ensure that a message directed to a determined TVRP group belongs to this group. This avoids problems in the configuration due to messages being received from routers incorrectly configured, other messages directed to the TVRP protocol UDP port, etc.

The authentication data is made up of a character string of up to 8 bytes.

> **Important**
>
> You must configure the same 'MD5 authentication key' or 'authentication data' in all the TVRP group members. If not, incoming packets containing different authentication data are ignored by the protocol. This is due to the fact that routers with a different 'key' or different 'authentication data' function individually (with the undesirable effect of two routers becoming active within the same group and with both routing packets addressed to the virtual router).

2.1.14 CHECK TIME

A series of interfaces and destinations are considered for each TVRP group (this is explained below). Check time is the interval to check the interfaces and destinations. Each time check time lapses, the interfaces and destinations lists are examined (verifying the state of said interfaces) and the active routes towards the destinations.

When *none* of the interfaces being monitored are active (UP), the router stops participating in the TVRP group (if there are various interfaces being monitored, as long as one is active the router will continue to participate in the TVRP group).

Destination behavior is different when route is not available to *some* destination. The router then deactivates within the TVRP group and passes to an initial state until the routes to *all* the configured destinations are available.

Any value between 1 and 255 seconds can be taken. Default is 5 seconds.

2.1.15 INTERFACES

Interface monitoring is carried out to prevent the active router being left without access to other networks (except the LAN) but still participates as active in the TVRP group.

In each TVRP group, you can define a list of interfaces so if none of them is in an active state, the router stops participating in the TVRP group (to ensure that at least one of the monitored interfaces is operating correctly when the

router participates in a determined TVRP group).

2.1.16 DESTINATIONS

IP destination checking is another feature to avoid connectivity loss with other networks while the router is participating in a TVRP group.

This feature is used to configure a list of destinations, which are periodically checked (verify there are active routes towards them) so the router knows how to route traffic addressed to said destinations. All configured destinations must be accessible for the router to remain active in the TVRP group.

The destinations are specified through an IP address; you can configure as many network IP addresses as hosts and routers etc.

> **Note**
>
> If you do not configure either the INTERFACES or the DESTINATIONS, the router permanently participates in the TVRP group except if the LAN interface where the TVRP group is running goes down.

2.1.17 INACTIVITY CONDITION

This option indicates what conditions, once the interfaces and IP destinations have been checked, cause the router to stop participating in the TVRP protocol. There are two possibilities:

> a) The checking in both configured lists must simultaneously fail, i.e. none of the interfaces is active and not all the IP destinations are accessible.
>
> b) Only the checking on one of the lists needs to fail in order for the router to stop participating in the protocol. This is default.

2.1.18 ICMP REDIRECT MESSAGES INDICATING VIRTUAL ADDRESSES

With this option enabled, if the device generates an ICMP Redirect message indicating that a router (currently the active router) must be used as the next hop, the notified IP address is the TVRP group virtual address. When disabled, the IP address is always the real one (i.e. not the virtual).

Default is enabled.

2.2 TVRP Protocol Configuration Commands

The steps to configure TVRP are described in this chapter. Once said protocol is configured, save the configuration and restart the device to activate it.

Enter the following commands to access the TVRP configuration environment:

```
*CONFIG
Config>PROTOCOL IP

-- Internet protocol user configuration --
IP config>TVRP

-- TVRP Configuration --
TVRP config>
```

The following commands are available in the TVRP configuration environment:

Command	Function
? (HELP)	Lists the commands or their available options.
DISABLE	Disables the TVRP.
ENABLE	Enables the TVRP.
GROUP	Configures the parameters for the TVRP groups.

LIST	Displays the TVRP configuration.
NO	Reestablishes default values for the various configuration parameters, disables options or deletes parts of the previously added configuration.
PORT	Configures the UDP port the TVRP operates through.
VIRTUAL-REDIRECTS	Enables the option to send redirects to virtual IPs.
EXIT	Exits the TVRP configuration prompt.

TVRP groups can be configured either from the global menu or the interface (they are associated to) configuration menu. From the global menu, the LAN interface feature is initiated where the specified IP address has been assigned through the local-ip parameter. From the interface config menu, the TVRP group configuration is entered in the interface where you want to enable the protocol (you don't need the local IP address). TVRP can only run over Ethernet, Wireless LAN or Token Ring interfaces. When groups are configured at a global level, the interface-type parameter indicates if the associated interface is Ethernet or Token Ring (you must select Ethernet for Wireless LAN interfaces). Token Ring interfaces have certain restrictions; these can only use identifiers from groups 0, 1 and 2 and the virtual MAC takes a pre-set value depending on the group identifier (not configurable).

The following shows how to configure TVRP groups through the interface:

```
*config


Config>network ethernet0/0

-- Ethernet Interface User Configuration --
ethernet0/0 config>ip tvrp ?
  <0..255>    TVRP group number
ethernet0/0 config>ip tvrp 1 ?
  active               Enable this group
  authentication-type  Set authentication type (MD5/plain text)
  authentication-data  Authentication data
  checktime            Time interval to check interfaces and destinations
  destination-ip       IP destination to check
  inactivity-condition Condition to change to inactivity
  ip                   Virtual IP address for the virtual router
  mac                  MAC address for the virtual router
  no                   Negate a command or set its defaults
  preempt              Preempt lower priority routers
  priority             Priority level of this group
  timers               Timers (hello,hold)
  track-interface      Interface to track
ethernet0/0 config>
```

In previous Teldat router application software releases, it was possible to configure TVRP groups associated to a determined interface from the protocol's global configuration menu. This means of configuring groups is still viable, however you will see messages advising the user that this is dealing with old commands that may become obsolete in future releases.

Example:

```
TVRP config>group ethernet0/0 1 ip 172.24.78.1
CLI Warning: This is a superseded command.
CLI Warning: It may become obsolete in future versions.
CLI Warning: Please use per interface ip tvrp config instead.
TVRP config>
```

However, we recommend configuring TRVP groups for the interface from the configuration menu corresponding to the specific interface.

2.2.1 ? (HELP)

Lists the valid commands at the level where the router is programmed. You can also use this command after a specific command to list the available options.

Syntax:

```
TVRP config>?
```

Or:

```
<interface_name> config>ip tvrp ?
```

Example 1:

```
TVRP config>?
  disable             Disable TVRP
  enable              Enable TVRP
  group               Configure a TVRP group
  list                Show TVRP configuration
  no                  Negate a command or set its defaults
  port                Set UDP port for TVRP
  virtual-redirects   Enable ICMP redirects to virtual IP
  exit
TVRP config>
```

Example 2:

```
ethernet0/0 config>ip tvrp ?
  <0..255>    TVRP group number
ethernet0/0 config>ip tvrp 1 ?
  active                Enable this group
  authentication-type   Set authentication type (MD5/plain text)
  authentication-data   Authentication data
  checktime             Time interval to check interfaces and destinations
  destination-ip        IP destination to check
  inactivity-condition  Condition to change to inactivity
  ip                    Virtual IP address for the virtual router
  mac                   MAC address for the virtual router
  no                    Negate a command or set its defaults
  preempt               Preempt lower priority routers
  priority              Priority level of this group
  timers                Timers (hello,hold)
  track-interface       Interface to track
ethernet0/0 config>
```

2.2.2 DISABLE

Run **disable** to disable TVRP. Default is disabled.

Syntax:

```
TVRP config>DISABLE
```

Example:

```
TVRP config>DISABLE
TVRP config>
```

2.2.3 ENABLE

Run **enable** to enable TVRP.

To **disable** TVRP, enter **no enable** (equivalent to **disable**).

Syntax:

```
TVRP config>ENABLE
```

Example:

```
TVRP config>ENABLE
TVRP config>
```

2.2.4 GROUP

Use the **group** command to configure TVRP groups. As mentioned, TVRP groups can be configured from the pro-
tocol global menu or from the specified interface configuration menu where you want to associated said groups.

Syntax (for a globally configured group):

```
TVRP config>GROUP <group n°> [options]
  active                Enable this group
  authentication-type   Set authentication type (MD5/plain text)
  authentication-data   Authentication data
  checktime             Time interval to check interfaces and destinations
  destination-ip        IP destination to check
  inactivity-condition  Condition to change to inactivity
  interface-type        Interface type ethernet/token-ring
  ip                    Virtual IP address for the virtual router
  local-ip              Local interface IP address
  mac                   MAC address for the virtual router
  no                    Negate a command or set its defaults
  preempt               Preempt lower priority routers
  priority              Priority level of this group
  timers                Timers (hello,hold)
  track-interface       Interface to track
```

Syntax (for a group configured through the interface):

```
ethernetX/X config>ip tvrp <group n°> [opciones]
  active                Enable this group
  authentication-type   Set authentication type (MD5/plain text)
  authentication-data   Authentication data
  checktime             Time interval to check interfaces and destinations
  destination-ip        IP destination to check
  inactivity-condition  Condition to change to inactivity
  ip                    Virtual IP address for the virtual router
  mac                   MAC address for the virtual router
  no                    Negate a command or set its defaults
  preempt               Preempt lower priority routers
  priority              Priority level of this group
  timers                Timers (hello,hold)
  track-interface       Interface to track
```

2.2.4.1 active

Activates (enables) the TVRP group. Default is enabled.

Run no **group <group n°> active** or **group <group n°> no active** to disable a globally configured TVRP group.

To disable a TVRP group configured through the interface, run the **no ip tvrp <group n°> active** or **ip tvrp <group n°> no active**.

2.2.4.2 authentication-type

Authentication types for TVRP groups.

There are two available options: MD5 Authentication or Authentication with Password in clear (also known as Plain-
text), the latter being default.

MD5 authentication

To configure MD5 authentication, enter the **authentication-type md5** command followed by the key. Said key can
be directly obtained through the **key-string** command followed by the key in question; or through a Key-Chain that
has been previously configured through the **key-string** command followed by the name of the Key-Chain to be used.

> ⌨ **Note**
>
> If you configure a key that is longer than 64 characters, there may be incompatibility problems with oth-
> er manufacturers.

Plain-Text authentication

To configure Plain-Text authentication, enter the **authentication-type plain-text** command, and optionally enter the value of the data for the authentication going to be used. This also has to be entered through the **authentication-data** command (described below).

Syntax (for a globally configured group):

```
TVRP config>GROUP <group n°> authentication-type ?
  md5          Authentication using MD5
  plain-text   Authentication using plain text
TVRP config>GROUP <group n°> authentication-type md5 ?
  key-chain    Set key-chain name
  key-string   Set key string
TVRP config>GROUP <group n°> authentication-type plain-text ?
  <0..8 chars>    Authentication data
  <cr>
```

Syntax (for a group configured through an interface):

```
ethernetX/X config>ip tvrp <group n°> authentication-type ?
  md5          Authentication using MD5
  plain-text   Authentication using plain text
ethernetX/X config>ip tvrp <group n°> authentication-type md5 ?
  key-chain    Set key-chain name
  key-string   Set key string
ethernetX/X config>ip tvrp <group n°> authentication-type plain-text ?
  <0..8 chars>    Authentication data
  <cr>
```

To reestablish the authentication default value (plain-text), enter **no group <group n°> authentication-type** (for globally configured groups) or **no ip tvrp <group n°> authentication-data** (for groups configured through an interface).

2.2.4.3 authentication-data

TVRP group authentication data.

You can delete previously configured authentication data through **no group <group n°> authentication-data** (for global groups) or **no ip tvrp <group n°> authentication-data** (for groups configured through the interface).

2.2.4.4 checktime

Time period between interface and destination checks.

Run **no group <group n°> checktime** (for global groups) or **no ip tvrp <group n°> checktime** (for groups configured through the interface) to reestablish the default value for this parameter.

2.2.4.5 destination-ip

Adds a new destination to be checked to the TVRP group destinations list. Said destination is specified by an IP address, which can be a network address or a host address.

To delete a destination configured in a global TVRP group, run **no group <group n°> destination-ip <IP address>** or **group <group n°> no destination-ip <IP address>**.

To eliminate a destination configured in a TVRP group associated to an interface run **no ip tvrp <group n°> destination-ip <IP address>** or **ip tvrp <group n°> no destination-ip <IP address>**.

2.2.4.6 inactivity-condition

Condition to be met once the interfaces and IP destinations are checked so the router stops actively participating in the protocol and passes to inactive.

The options are *any-list* (the router passes to inactive when checking on one of the lists fails) and *both-lists* (for the router to pass to inactive, checking on both lists has to fail).

To return to the default condition (*any-list*), run **no group <group n°> inactivity-condition** (for global groups) or **no ip tvrp <group n°> authentication-data** (for groups configured through an interface).

2.2.4.7 interface-type

Type of local interface over which the TVRP group is going to operate. The possible values are *ethernet* and *token-ring*.

This parameter is only logical for global groups, which are not configured in the interface itself.

To re-establish default for this parameter (*ethernet*), run **no group <group n°> interface-type**.

2.2.4.8 ip

TVRP group virtual IP address.

This address must always be configured. It can, however, be deleted by running **no group <group n°> ip** (global groups) or **no ip tvrp <group n°> ip** (for groups configured through the interface).

2.2.4.9 local-ip

IP address for the TVRP router's local interface. This parameter is only logical for globally configured groups. In this case it is essential this is configured. Said value must coincide with the IP address value configured in the LAN interface where you want the protocol to run. To delete the previously assigned value, run **no group <group n°> ip.**

2.2.4.10 mac

TVRP group virtual MAC address (this parameter cannot be configured for token-ring interfaces).

To reestablish default for the virtual MAC, run **no group <group n°> mac** for globally configured groups or **no ip tvrp <group n°> mac** for groups configured through the interface.

2.2.4.11 preempt

Enables the preempt capacity (default is enabled). To disable this, run **no group <group n°> preempt** or **group <group n°> no preempt** (for global groups). Run **no ip tvrp <group n°> preempt** or **ip tvrp <group n°> no preempt for groups configured through the interface.**

2.2.4.12 priority

TVRP group priority. The higher the value of this parameter the higher the priority.

Reestablish default (0) by running **no group <group n°> priority** (globally configured groups) or **no ip tvrp <group n°> priority** (for groups configured through the interface).

2.2.4.13 timers

Hellotime and *Holdtime* timers.

To reestablish default for these timers, run **no group <group n°> timers** (global groups) or **no ip tvrp <group n°> timers** (groups through the interface).

2.2.4.14 track-interface

Monitoring the state of a specified interface.

To deactivate monitoring for an interface in a TVRP group, enter **no group <group n°> track-interface <interface>** or **group <group n°> no track-interface <interface>** for globally configured groups. Run **no ip tvrp <group n°> track-interface <interface>** or **ip tvrp <group n°> no track-interface <interface>** for groups configured through the interface.

Example 1:

```
TVRP config>group 10 ip 192.168.1.1
TVRP config>group 10 local-ip 192.168.1.254
TVRP config>group 10 checktime 10
TVRP config>group 10 authentication-data mytest
TVRP config>group 10 timers 5 15
TVRP config>group 10 inactivity-condition both-lists
TVRP config>group 10 track-interface ppp1
TVRP config>group 10 destination-ip 10.0.0.0
TVRP config>list group
```

```
                ===== List of TVRP groups =====


 +----------------------------------------------------------+
 |                       TVRP GROUP:  10                    |
 +----------------------------------------------------------+
   Hello:   5  -  Hold:  15  -  Prio:   0  -  Checktime:  10
   Authentication type: PLAIN-TEXT  -  Auth. Data: mytest
   Preempt: YES  -  C.Status:  ENABLED
   Virtual IP:   192.168.1.1
   Virtual MAC:  00-00-0c-07-ac-0a
   Local IP:     192.168.1.254
   Interface track list: ppp1
   Destination check list: 10.0.0.0
   Change to inactivity when fail: BOTH LISTS



TVRP config>show config
; Showing Menu and Submenus Configuration for access-level 15 ...

      group 10 ip 192.168.1.1
      group 10 local-ip 192.168.1.254
      group 10 checktime 10
      group 10 authentication-data "mytest"
      group 10 timers 5 15
      group 10 inactivity-condition both-lists
      group 10 track-interface ppp1
      group 10 destination-ip 10.0.0.0
;
TVRP config>
```

Example 2:

```
Config>network ethernet0/0

-- Ethernet Interface User Configuration --
ethernet0/0 config>ip address 172.24.78.57 255.255.0.0
ethernet0/0 config>ip tvrp 5 ip 172.24.78.1
ethernet0/0 config>ip tvrp 5 checktime 10
ethernet0/0 config>ip tvrp 5 authentication-data tvrp
ethernet0/0 config>ip tvrp 5 timers 5 15
ethernet0/0 config>ip tvrp 5 inactivity-condition both-lists
ethernet0/0 config>ip tvrp 5 track-interface ppp1
ethernet0/0 config>ip tvrp 5 destination-ip 10.0.0.0
ethernet0/0 config>show config
; Showing Menu and Submenus Configuration

;
   ip address 172.24.78.57 255.255.0.0
;
;
;
;
   ip tvrp 5 ip 172.24.78.1
   ip tvrp 5 checktime 10
   ip tvrp 5 authentication-data "tvrp"
   ip tvrp 5 timers 5 15
   ip tvrp 5 inactivity-condition both-lists
   ip tvrp 5 track-interface ppp1
   ip tvrp 5 destination-ip 10.0.0.0
;
ethernet0/0 config>exit
Config>protocol ip

-- Internet protocol user configuration --
IP config>tvrp

-- TVRP Configuration --
```

```
TVRP config>list group


                ===== List of TVRP groups =====


 +------------------------------------------------------------+
 |                      TVRP GROUP:   5                        |
 +------------------------------------------------------------+
   Hello:   5  -  Hold:  15  -  Prio:   0  -  Checktime:  10
   Authentication type: PLAIN-TEXT  -  Auth. Data: tvrp
   Preempt: YES  -  C.Status:  ENABLED
   Virtual IP:   172.24.78.1
   Virtual MAC: 00-00-0c-07-ac-05
   Interface:   ethernet0/0
   Interface track list: ppp1
   Destination check list: 10.0.0.0
   Change to inactivity when fail: BOTH LISTS


TVRP config>
```

To eliminate a globally configured TVRP group, run **no group <group nº>**. For a group configured through the interface, run **no ip tvrp <group nº>.**

2.2.5 LIST

Use the **list** command to view the different parameters for the TVRP protocol configuration, depending on what option you've selected.

Syntax:

```
TVRP config>LIST ?
  all      Show all TVRP configuration
  global   Show status/UDP port
  group    Show TVRP groups
```

2.2.5.1 LIST ALL

Displays all the TVRP configuration.

Syntax:

```
TVRP config>LIST ALL
```

Example 1:

```
TVRP config>LIST ALL


             ===== Global TVRP Parameters =====


 TVRP is currently: ENABLED
 TVRP port (UDP):   1985
 Virtual redirects: ENABLED



                ===== List of TVRP groups =====


 +------------------------------------------------------------+
 |                      TVRP GROUP:   1                        |
 +------------------------------------------------------------+
   Hello:   3  -  Hold:  10  -  Prio:   0  -  Checktime:   5
   Authentication type: PLAIN-TEXT  -  Auth. Data: teldat
   Preempt: YES  -  C.Status:  ENABLED
   Virtual IP:   192.168.1.1
   Virtual MAC: 00-00-0c-07-ac-01
   Local IP:     192.168.1.2
   No interfaces to track
   Destination check list: 172.27.0.0
                           192.168.252.0
   Change to inactivity when fail: ANY LIST
```

2 Configuration

Teldat SA

```
+-------------------------------------------------------------+
|                        TVRP GROUP:   2                      |
+-------------------------------------------------------------+
   Hello:   3  -  Hold:  10  -  Prio:   0  -  Checktime:   5
   Authentication type: PLAIN-TEXT  -  Auth. Data: teldat
   Preempt: YES  -  C.Status:  ENABLED
   Virtual IP:  192.168.2.1
   Virtual MAC: 00-00-0c-07-ac-0
   Local IP:    192.168.2.77
   Interface track list: ppp1
   No destinations to check
   Change to inactivity when fail: ANY LIST


TVRP config>
```

The previous example corresponds to the following configuration:

```
TVRP config>show config
; Showing Menu and Submenus Configuration

      enable
;
      group 1 ip 192.168.1.1
      group 1 local-ip 192.168.1.2
      group 1 no preempt
      group 1 destination-ip 172.27.0.0
      group 1 destination-ip 192.168.252.0
;
      group 2 ip 192.168.2.1
      group 2 local-ip 192.168.2.77
      group 2 track-interface ppp1
;
TVRP config>
```

Example 2:

```
TVRP config>list all

              ===== Global TVRP Parameters =====

  TVRP is currently: ENABLED
  TVRP port (UDP):   1985
  Virtual redirects: ENABLED



              ===== List of TVRP groups =====

+-------------------------------------------------------------+
|                        TVRP GROUP:   1                      |
+-------------------------------------------------------------+
   Hello:   5  -  Hold:  15  -  Prio:   0  -  Checktime:  10
   Authentication type: MD5  -  Key-string: tvrp
   Preempt: YES  -  C.Status:  ENABLED
   Virtual IP:  172.24.78.1
   Virtual MAC: 00-00-0c-07-ac-01
   Interface:   ethernet0/0
   Interface track list: ppp1
   Destination check list: 10.0.0.0
   Change to inactivity when fail: BOTH LISTS



+-------------------------------------------------------------+
|                        TVRP GROUP:   5                      |
+-------------------------------------------------------------+
   Hello:   3  -  Hold:  12  -  Prio:   0  -  Checktime:  15
```

```
   Authentication type: PLAIN-TEXT  -  Auth. Data: first
   Preempt: YES  -  C.Status:  ENABLED
   Virtual IP:  192.168.1.1
   Virtual MAC: 00-00-0c-07-ac-05
   Interface:   ethernet0/0
  No interfaces to track
  No destinations to check
  Change to inactivity when fail: ANY LIST


TVRP config>
```

The above example corresponds to the configuration shown below:

```
TVRP config>show config
; Showing Menu and Submenus Configuration for access-level 15 ...
; ATLAS Router 2 156 Version 10.7.0

      enable
;
TVRP config>exit
IP config>exit
Config>network ethernet0/0

-- Ethernet Interface User Configuration --
ethernet0/0 config>show config
; Showing Menu and Submenus Configuration

;
   ip address 172.24.78.57 255.255.0.0
   ip address 192.168.1.57 255.255.255.0 secondary
;
;
;
;
   ip tvrp 1 ip 172.24.78.1
   ip tvrp 1 checktime 10
   ip tvrp 1 authentication-type md5 key-string "tvrp"
   ip tvrp 1 timers 5 15
   ip tvrp 1 inactivity-condition both-lists
   ip tvrp 1 track-interface ppp1
   ip tvrp 1 destination-ip 10.0.0.0
;
   ip tvrp 5 ip 192.168.1.1
   ip tvrp 5 checktime 15
   ip tvrp 5 authentication-data "first"
   ip tvrp 5 timers 3 12
;
ethernet0/0 config>
```

2.2.5.2 LIST GLOBAL

Displays the TVRP protocol global configuration parameters.

Syntax:

```
TVRP config>LIST GLOBAL
```

Example:

```
TVRP config>LIST GLOBAL


             ===== Global TVRP Parameters =====

  TVRP is currently: ENABLED
  TVRP port (UDP):   1985
  Virtual redirects: ENABLED

TVRP config>
```

2.2.5.3 LIST GROUP

Displays all information relevant to all TVRP groups.

This shows parameters relevant to the protocol performance and the interfaces and destinations configured in each monitored group.

Syntax:

```
TVRP config>LIST GROUP
```

Example:

```
TVRP config>LIST GROUP


            ===== List of TVRP groups =====


 +------------------------------------------------------------+
 |                      TVRP GROUP:   1                       |
 +------------------------------------------------------------+
   Hello:   3  -  Hold:  10  -  Prio:   0  -  Checktime:    5
   Authentication type: PLAIN-TEXT  -  Auth. Data: teldat
   Preempt: YES  -  C.Status:  ENABLED
   Virtual IP:   192.168.1.1
   Virtual MAC: 00-00-0c-07-ac-01
   Local IP:    192.168.1.2
   No interfaces to track
   Destination check list: 172.27.0.0
                           192.168.252.0
   Change to inactivity when fail: ANY LIST



 +------------------------------------------------------------+
 |                      TVRP GROUP:   2                       |
 +------------------------------------------------------------+
   Hello:   3  -  Hold:  10  -  Prio:   0  -  Checktime:    5
   Authentication type: PLAIN-TEXT  -  Auth. Data: teldat
   Preempt: YES  -  C.Status:  ENABLED
   Virtual IP:   192.168.2.1
   Virtual MAC: 00-00-0c-07-ac-02
   Local IP:    192.168.2.77
   Interface track list: ppp1
   No destinations to check
   Change to inactivity when fail: ANY LIST



TVRP config>
```

2.2.6 PORT

Use the **port** command to configure the UDP port used by TVRP. Use this to modify the previously configured port. Default UDP port is 1985.

Syntax:

```
TVRP config>PORT <UDP port>
```

Example:

```
TVRP config>PORT 1774
TVRP config>
```

To reestablish default for the UDP port used by the TVRP (1985), run **no port.**

2.2.7 VIRTUAL-REDIRECTS

virtual-redirects enables ICMP Redirect messages, which provide a virtual IP address as the next hop address. When this feature is enabled, the router checks that said identified next hop router is the active router in a TVRP group. It then sends the ICMP Redirect to notify the gateway IP address (or next hop) is the virtual IP address for said group. If the router is not the active router for a group or, ICPM Redirect message sending is disabled, the IP address given in said ICMP Redirect is the physical IP address for the next hop router to be used.

Run **no virtual-redirects** to disable this feature.

Default is enabled.

Syntax:

```
TVRP config>VIRTUAL-REDIRECTS
```

Example:

```
TVRP config>VIRTUAL-REDIRECTS
TVRP config>
```

2.2.8 EXIT

Use the **exit** command to return you to the previous prompt (IP configuration prompt).

Syntax:

```
TVRP config>EXIT
```

Example:

```
TVRP config>EXIT
IP config>
```

2.3 TVRP Protocol Commands Summary

The following is a summary of all the commands applied to TVRP.

At the global level (from the protocol's main configuration menu):

DISABLE

ENABLE

NO ENABLE

GROUP <group> ACTIVE

GROUP <group> AUTHENTICATION-TYPE {MD5 | PLAIN-TEXT}

GROUP <group> AUTHENTICATION-DATA <plain-text>

GROUP <group> CHECKTIME <seconds>

GROUP <group> DESTINATION-IP <ip-address>

GROUP <group> INACTIVITY-CONDITION {ANY-LIST | BOTH-LISTS}

GROUP <group> INTERFACE-TYPE {<ETHERNET | TOKEN-RING}

GROUP <group> IP <virtual-ip-address>

GROUP <group> LOCAL-IP <local-ip-address>

GROUP <group> MAC <MAC-address>

GROUP <group> NO ACTIVE

GROUP <group> NO DESTINATION-IP <ip-address>

GROUP <group> NO PREEMPT

GROUP <group> NO TRACK-INTERFACE <interface>

GROUP <group> PREEMPT

GROUP <group> PRIORITY <priority>

GROUP <group> TIMERS <hello> <hold>

GROUP <group> TRACK-INTERFACE <interface>

NO GROUP <group>

NO GROUP <group> ACTIVE

NO GROUP <group> AUTHENTICATION-TYPE

NO GROUP <group> AUTHENTICATION-DATA

NO GROUP <group> CHECKTIME

NO GROUP <group> DESTINATION-IP <ip-address>

NO GROUP <group> INACTIVITY-CONDITION

NO GROUP <group> INTERFACE-TYPE

NO GROUP <group> IP

NO GROUP <group> LOCAL-IP

NO GROUP <group> MAC

NO GROUP <group> NO ACTIVE

NO GROUP <group> NO PREEMPT

NO GROUP <group> PREEMPT

NO GROUP <group> PRIORITY

NO GROUP <group> TIMERS

NO GROUP <group> TRACK-INTERFACE <interface>

LIST {ALL | GLOBAL | GROUP}

PORT <UDP-port>

NO PORT

VIRTUAL-REDIRECTS

NO VIRTUAL-REDIRECTS

Through the interface (configuration of TVRP groups from the configuration menu of the associated interface itself):

IP TVRP <group> ACTIVE

IP TVRP <group> AUTHENTICATION-TYPE {MD5 | PLAIN-TEXT}

IP TVRP <group> AUTHENTICATION-DATA <plain-text>

IP TVRP <group> CHECKTIME <seconds>

IP TVRP <group> DESTINATION-IP <ip-address>

IP TVRP <group> INACTIVITY-CONDITION {ANY-LIST | BOTH-LISTS}

IP TVRP <group> IP <virtual-ip-address>

IP TVRP <group> MAC <MAC-address>

IP TVRP <group> NO ACTIVE

IP TVRP <group> NO DESTINATION-IP <ip-address>

IP TVRP <group> NO PREEMPT

IP TVRP <group> NO TRACK-INTERFACE <interface>

IP TVRP <group> PREEMPT

IP TVRP <group> PRIORITY <priority>

IP TVRP <group> TIMERS <hello> <hold>

IP TVRP <group> TRACK-INTERFACE <interface>

NO IP TVRP <group>

NO IP TVRP <group> ACTIVE

NO IP TVRP <group> AUTHENTICATION-TYPE

NO IP TVRP <group> AUTHENTICATION-DATA

NO IP TVRP <group> CHECKTIME

NO IP TVRP <group> DESTINATION-IP <ip-address>

NO IP TVRP <group> INACTIVITY-CONDITION

NO IP TVRP <group> IP

NO IP TVRP <group> MAC

NO IP TVRP <group> NO ACTIVE

NO IP TVRP <group> NO PREEMPT

NO IP TVRP <group> PREEMPT

NO IP TVRP <group> PRIORITY

NO IP TVRP <group> TIMERS

NO IP TVRP <group> TRACK-INTERFACE <interface>

Chapter 3 Monitoring

3.1 TVRP Protocol Monitoring

This section summarizes and explains all the TVRP protocol monitoring commands. Said commands allow you to monitor the TVRP behavior and reach the feature specifications you require.

Run the TVRP monitoring commands at the **TVRP+** prompt. To access said prompt, enter:

```
*MONITOR
Console Operator
+PROTOCOL IP
IP+TVRP

-- TVRP Console --
TVRP+
```

Command	Function
? (HELP)	Lists the commands or options.
CLEAR	Deletes the TVRP groups' statistics.
LIST	Lists the distinct information on the current state of TVRP and its groups, including their statistics.
EXIT	Exits TVRP monitoring.

3.1.1 ? (HELP)

The **?** (HELP) command is used to list the valid commands at the level where the router is being monitored. You can also use this command after a specific command to list the available options.

Syntax:

```
TVRP+?
```

Example:

```
TVRP+?
  clear    Delete TVRP statistics
  list     Show TVRP configuration
  exit     Exit to parent menu
TVRP+
```

3.1.2 CLEAR

Use the **clear** command to initialize the TVRP group statistics.

This resets the number of packets received for each type and returns all the status counters to zero (with the exception of the current status counter for the router within the group, this is set to "1").

Syntax:

```
TVRP+clear?
  all      Delete both TVRP groups and global statistics
  global   Delete global TVRP statistics
  group    Delete specific TVRP group statistics
```

3.1.2.1 CLEAR ALL

Clears the statistics for ALL the TVRP groups, which are configured in the router, and the global statistics.

Syntax:

```
TVRP+clear all
```

Example:

```
TVRP+clear all
  All TVRP statistics have been cleared

TVRP+
```

3.1.2.2 CLEAR GLOBAL

Clears all the TVRP global statistics.

Syntax:

```
TVRP+clear global
```

Example:

```
TVRP+clear global
  Global TVRP statistics cleared

TVRP+
```

3.1.2.3 CLEAR GROUP

Clears the specified TVRP group statistics.

If you do not indicate the group, the router will ask which group you want the statistics deleted from.

Syntax:

```
TVRP+clear group <TVRP group n°>
```

Example:

```
TVRP+clear group 0
  TVRP group 0 cleared

TVRP+
```

3.1.3 LIST

Use the **list** command to view the various TVRP protocol dynamic parameters, such as global and own statistics for each specific TVRP group.

Syntax:

```
TVRP+list ?
  all       Show all TVRP configuration
  global    Show status/UDP port
  group     Show TVRP groups
```

3.1.3.1 LIST ALL

Displays all information on the current state of TVRP.

Syntax:

```
TVRP+list all
```

Example:

```
TVRP+list all


             ===== Global TVRP Parameters =====

  TVRP is currently: ENABLED
  TVRP port (UDP):   1985
  Virtual redirects: ENABLED
  Unknown packets:   13
  Authentication Failed packets: 0
```

```
                ===== List of TVRP groups =====

 +----------------------------------------------------------+
 |                          TVRP GROUP:  77                 |
 +----------------------------------------------------------+
   Virtual IP:  192.14.1.77
   Virtual MAC: 00-00-0c-07-ac-4d
   Current local IP/Interface: 192.14.1.1 ethernet0/0
   ACTIVE Router:  192.14.1.1
   STANDBY Router: 0.0.0.0
   Hellotime: 3              Holdtime: 10
   TVRP state:   ACTIVE       Previous state: STANDBY
   Currently  RUNNING         Last event: HELO_EXP
   Initial: 1          Learn: 0            Listen: 1
   Speak: 1            Standby: 1            Active: 1
     Hello messages --> sent:   2546,   received:      17
     Coup messages ---> sent:      0,   received:       0
     Resign messages -> sent:      0,   received:       0


 +------------------------------------------------------------+
 |                          TVRP GROUP:  55                   |
 +------------------------------------------------------------+
   Virtual IP:  192.14.2.7
   Virtual MAC: 00-00-0c-07-ac-00
   Current local IP/Interface: 192.14.2.1 ethernet0/0
   ACTIVE Router:  192.14.2.1
   STANDBY Router: 192.14.2.147
   Hellotime: 4              Holdtime: 12
   TVRP state:   ACTIVE       Previous state:  LISTEN
   Currently  RUNNING         Last event: HI_L_STB
   Initial: 0          Learn: 0            Listen: 0
   Speak: 0            Standby: 0            Active: 1
     Hello messages --> sent:    148,   received:      15
     Coup messages ---> sent:      1,   received:       0
     Resign messages -> sent:      0,   received:       1


TVRP+
```

3.1.3.2 LIST GLOBAL

Displays general information and global statistics on TVRP.

Syntax:

```
TVRP+list global
```

Example:

```
TVRP+LIST GLOBAL


            ===== Global TVRP Parameters =====

 TVRP is currently: ENABLED
 TVRP port (UDP):   1985
 Virtual redirects: ENABLED
 Unknown packets:   109
 Authentication Failed packets: 0


TVRP+
```

The meaning of the fields that appear is as follows:

TVRP is currently: Current status of TVRP: enabled or disabled.

TVRP port (UDP):   Port where TVRP is running.

Virtual redirects:	Reports the current status of this feature.
Unknown packets:	Number of unknown packets received.
Authentication failed packets:	Number of packets received with erroneous authentication.

3.1.3.3 LIST GROUP

Displays the relevant information for the status of a determined TVRP group.

Parameters referring to the protocol's own operations and own statistics for this TVRP group are displayed: Hello messages, Coup messages and Resign messages.

Where the number of a group you want to view is not given, a list is displayed containing a summary on the active groups you can consult.

Syntax:

```
TVRP+list group <TVRP group n°>
```

Example:

```
TVRP+list group
  Group   Local Address      Virtual IP        Virtual MAC
     1    192.14.1.3         1.1.1.1           00-00-0c-07-ac-01
     0    192.14.1.3         192.14.1.2        00-00-0c-07-ac-00


TVRP+list group 1
 +-----------------------------------------------------------+
 |                     TVRP GROUP:   1                       |
 +-----------------------------------------------------------+
   Virtual IP:  1.1.1.1
   Virtual MAC: 00-00-0c-07-ac-01
   Current local IP/Interface: 192.14.1.3 ethernet0/0
   ACTIVE Router:  1.1.1.254
   STANDBY Router: 0.0.0.0
   Hellotime: 3              Holdtime: 10
   TVRP state:   ACTIVE       Previous state:  STANDBY
   Currently  RUNNING        Last event: HELO_EXP
   Initial: 2          Learn: 0          Listen: 2
   Speak: 1          Standby: 1          Active: 2
     Hello messages --> sent:    1021,   received:     179
     Coup messages ---> sent:       0,   received:       0
     Resign messages -> sent:       1,   received:       0


TVRP+
```

The meaning of the fields that appear is as follows:

VIRTUAL IP:	Virtual IP address of the TVRP group. Address 0.0.0.0 indicates the virtual IP address for the group is unknown.
VIRTUAL MAC:	Virtual MAC address of the TVRP group.
Current local IP/Interface:	Local IP address and interface the TVRP group is associated to.
ACTIVE Router:	IP address of the active router. Address 0.0.0.0 indicates the active router is unknown.
STANDBY Router:	IP address of the standby router. Address 0.0.0.0 indicates the standby router is unknown.
Hellotime:	Hello time currently used for this TVRP group (this can be the time set through configuration or, learned through an authenticated message from another router participating in the same group).
Holdtime:	Current Hold time (configured or learned).

TVRP state:	Current state of the router within the TVRP group.
Previous state:	Previous state to current.
Currently…:	Indicates if the router is operating or not within the TVRP group: *RUNNING* if it is active or *STOPPED* if it is not.
Last event:	Last event occurred relevant to TVRP. The events can be:

"*NULL* ", void event.

"*ENABLED* ", enabled TVRP.

"*DISABLED*", disabled TVRP or disabled interface.

"*ACT_EXP* ", Active timeout.

"*STND_EXP*", Standby timeout.

"*HELO_EXP*", Hello timeout.

"*HI_H_SPK*", Reception of Hello message from a router in Speak state with higher priority.

"*HI_H_ACT*", Reception of Hello message with higher priority from the active router.

"*HI_L_ACT*", Reception of Hello message with lower priority from the active router.

"*RESIGN* ", Reception of Resign message from active router.

"*COUP_HIG*", Reception of Coup message with higher priority.

"*HI_H_STB*", Reception of Hello message with higher priority from the standby router.

"*HI_L_STB*", Reception of Hello message with lower priority from the standby router.

Initial, Learn, Listen, Speak, Standby, Active:	Number of times the router has passed through each of the corresponding states in the TVRP group.
Hello messages:	Number of Hello messages sent and received.
Coup messages:	Number of Coup messages sent and received.
Resign messages:	Number of Resign messages sent and received.

3.1.4 EXIT

Use this command to return to the previous prompt level (here the monitoring prompt).

Syntax:

```
TVRP+exit
```

Example:

```
TVRP+exit
IP+
```