



Teldat Router

TVRP Protocol

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Chapter 1

Introduction



1. Introduction to TVRP Protocol

The TVRP (Teldat Virtual Router Protocol) is a protocol that provides a tolerance mechanism for IP routing failures under certain circumstances. Specifically the protocol provides protection against failure for the first-hop router when the source host cannot dynamically learn the IP address of this and provides automatic backup for this router when it is configured in the Teldat routers, executing the IP protocol over the LAN Ethernet and Token Ring networks.

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

The 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 due to the circumstances.

A set of routers participates in the TVRP and in the set creates the illusion of a single virtual router. This 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*. In cases where 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 in any particular moment 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.

In order 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** is established for each TVRP group as well as a **virtual IP address**.

2. Protocol

Within the TVRP group, the routers periodically publicize information on the state through the exchange of various messages.

2.1. Packet Format

The TVRP protocol operates over UDP in one of its ports. The user can configure the port although you must be careful not to 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 protocol packets instead of the virtual IP address. This is necessary so the routers participating in a TVRP group can identify each other.

In the UDP datagram data part over which the TVRP messages are sent, the following fields appear:

a) VERSION

This indicates the version of the TVRP protocol.

b) OPERATION CODE

Indicates the type of TVRP message contained in the packet.

Hello:

The **Hello** messages are sent to indicate a router is operating correctly and is in a suitable condition to convert to an *active* or *standby* router.

Coup:

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

Resign:

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

c) STATUS

Describes the current status of the router sending the message.

Initial:

This status indicates the TVRP is not functioning. This status is entered into due to a configuration change, when the interface starts up for the first time or when the router cannot route the packets to the indicated IP addresses.

Learn:

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

Listen:

The router has a virtual IP address configured, but it is neither the *active* nor the *standby* router address. It listens to the **Hello** messages from these 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 be **ONE** *Active* router in within the TVRP group.

d) HELLOTIME

This field is only significant in the **Hello** messages. This indicates the approximate time between **Hello** messages sent by the router. The time is given in seconds. If the **Hello**time 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 **Hello**time configured and the **Hello** message is authenticated.

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

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

e) HOLDTIME

This field is only significant in the **Hello** messages. This indicates the time the current **Hello** message is considered valid. The time is given in seconds.

If a router sends a **Hello** message, the recipients of the message must consider this valid during a time period equal to **Hold**time. The **Hold**time should be at least three times longer than the **Hello**time and must be greater than the **Hello**time.

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

A router in an active state must not learn the new **Hello**time and **Hold**time values (although this can be using the values learned from the previous *active* router).

You cannot use a configured time and another learned time (configured **Hold**time, learned **Hello**time and vice versa).

f) PRIORITY

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

g) GROUP N°

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

h) RESERVED

This is not used.

i) AUTHETICATION DATA

This contains a password in clear. This field is not designed to provide security but to prevent errors in the configuration of the group (to ensure that a message effectively pertains 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)

j) VIRTUAL IP ADDRESS

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

2.2. Operational Parameters

The following information must be known by **ALL** and each of the routers cooperating in the TVRP group in order for the set to function correctly:

N° of the Standby Group

Virtual MAC address

Priority

Authentication Data

Hello time

Holdtime

Within the TVRP group, at least **ONE** router must know the *virtual IP address* (and must be known by all the rest of the routers in the group).

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 the preemption is enabled, this can become the *active* router using a Coup message indicating to the current *active* router that the router with higher priority wishes to convert to an *active* router.

Chapter 2

Configuration



1. TVRP Protocol Configuration

The parameters to be configured within the TVRP protocol are described in this chapter.

Parameters to be configured:

- **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.
- **Group Number:** TVRP group identifier.
- **Priority:** Router priority within the TVRP group.
- **Hello Time:** Time between **Hello** messages.
- **Hold Time:** Period of time that the last received **Hello** message is considered valid.
- **Expropriation:** Expropriation capacity.
- **Authentication Data:** Data to authenticate group messages.
- **Check time:** Time between checking the interfaces and destinations.
- **Interfaces:** Interfaces to be monitored.
- **Destinations:** The IP address of the destinations to check.

1.1. UDP PORT

This deals with the UDP port through which you wish the UDP protocol to function. The TVRP protocol own messages are sent through this port.

You can configure any port you wish although you must bear in mind that you cannot use the *well-known* ports normally used by the other protocols or services e.g. port 7 (for *echo*), 13 (for *daytime*) etc., as this can provoke errors in the function of both the TVRP and the rest of the system.

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

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 that work together in a TVRP group simulate the existence of a virtual router whose IP address is this virtual IP address.

This is the IP address to which network hosts without dynamic learning mechanisms to learn the first hop router's IP address (the virtual router is the default router) route the traffic.

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

It is absolutely **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 that pertains 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 have, so the other routers can learn the address. In order to leave a router without a virtual IP address configured, you need to select the 0.0.0.0 address 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.

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 should be configured depending of the type of physical interface through which the TVRP protocol is executed.

In the case of Ethernet networks, the parameter is completely configurable and the values can be adjusted as required. The virtual MAC address that appears by default must be entered if you wish to maintain the compatibility with the HSRP. This parameter must be carefully specified as it can cause malfunctions in the network.

NOTE: In the case of Ethernet, we recommend that you use the virtual MAC address given by default in order to maintain the compatibility with the HSRP protocol and to avoid the possibility of configuring a MAC address already existing in the network.

In cases of 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.

1.4. LOCAL IP ADDRESS

This is the IP address of the router interface directly connected to the LAN through which you wish the TVRP protocol to function.

In order to correctly configure this parameter, you need to 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 which 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.

1.5. GROUP NUMBER

The group number is used to unanimously identify the TVRP group. In this way you can have distinct TVRP groups functioning over the same LAN both in different routers and the same router. The

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 through which the protocol is executed:

a) Ethernet

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

b) Token Ring

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

1.6. PRIORITY

Through this parameter, you can change the priority for the routers within the TVRP protocol.

Priority is used when choosing which router is to be converted into the *active* router. This parameter is sent in the TVRP messages so 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.

1.7. HELLO TIME

In order to determine if the routers are running, **Hello** messages are periodically sent. These not only check the routers are functioning, but also provide further information on other parameters (virtual IP address etc.).

The **Hello** messages are time configured and known as *Hello 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.

1.8. HOLD TIME

This parameter is used to establish the time interval the last received **Hello** message is considered valid. If the *Hold time* lapses before a new **Hello** message is received, it is presumed that the router is down. In this case, you must initiate the corresponding actions depending on whether the router in question is active or standby.

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

NOTE: The recommended value for Hold time is at least 3 times the Hello time. It is essential however that it is greater than the Hello time. By configuring a lower Hold time than Hello time will provoke TVRP malfunctions, as the Hold timers will expire before the Hello messages are received.

1.9. EXPROPRIATION

Through this option you establish if the expropriation capacity in a router is enabled or disabled.

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

If on the other hand the expropriation is enabled, the router with the highest priority in the group will be active. We recommend this option so you can assign higher priority to those routers you wish in principal to route the traffic and lower priorities to those routers to be on standby (acting as backup).

1.10. AUTHENTICATION DATA

The object of this field is to ensure that a message directed to a determined TVRP group pertains 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.

Authentication data consists of 8 bytes, where you can introduce any value bearing in mind that only the first 8 bytes are considered.

IMPORTANT: You must configure the same '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 distinct 'key' function individually (with the undesirable effect of two routers becoming active within the same group).

1.11. CHECK TIME

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

In cases where **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).

In cases of destination, the behavior is different: in situations where a route is not available to **some** destination, the router 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. The default value is 5 seconds.

1.12. INTERFACES

In order to avoid the situation where the *active* router is left without access to other networks except the LAN and still participates as such in the TVRP group, interface monitoring is carried out.

In each TVRP group, you can define a list of interfaces so that in cases where none of them is in an active state, the router stops participating in the TVRP group (in this way you can ensure that **at least one of the monitored interfaces** is operating correctly when the router participates in a determined TVRP group).

1.13. DESTINATIONS

The checking of IP destinations is another functionality to avoid connectivity loss with other networks while the router is participating in a TVRP group.

Through this function, a list of destinations is configured and periodically checked (to verify that there are active routes towards them); in this way, the router knows how to deal with traffic directed towards these destinations.

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. TVRP Protocol Configuration Commands

The steps required to configure the TVRP protocol are described in this chapter. Once you have configured the TVRP protocol, you must save the configuration and restart the device in order for this to take effect.

In order to access the TVRP configuration environment, enter the following commands:

```
*PROCESS 4
Config>PROTOCOL IP

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

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

The following commands are available within the TVRP configuration environment:

Command	Function
? (HELP)	Lists the commands or their available options.
CLEAR	Deletes all the TVRP information.
DISABLE	Disables the TVRP protocol.
ENABLE	Enables the TVRP protocol.
GROUP	Configures the parameters for the TVRP groups.
LIST	Displays the TVRP configuration.
PORT	Configures the UDP port through which the TVRP protocol functions.
EXIT	Exits the TVRP configuration prompt.

Normally, if you do not enter all the necessary parameters in the command line to complete a command, the device will request them.

2.1. ? (HELP)

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

Syntax:

```
TVRP config>?
```

Example:

```
TVRP config>?
CLEAR
DISABLE
ENABLE
GROUP
LIST
NO
SET
```

```
EXIT
TVRP config>
```

2.2. CLEAR

The **CLEAR** command deletes all information referent to the TVRP protocol. This command deletes both the global information as well as information referent to the configured TVRP groups including their interfaces and destinations.

Syntax:

```
TVRP config>CLEAR
```

Example:

```
TVRP config>CLEAR
  All TVRP info has been deleted
TVRP config>
```

2.3. DISABLE

The **DISABLE** command permits you to disable the TVRP protocol. The TVRP is disabled by default.

Syntax:

```
TVRP config>DISABLE
```

Example:

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

2.4. ENABLE

Through the **ENABLE** command you enable the TVRP protocol.

Syntax:

```
TVRP config>ENABLE
```

Example:

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

2.5. GROUP

The **GROUP** command is used to configure TVRP groups.

Syntax:

```
TVRP config>GROUP <group n°> [options]
  active                Enable this group
  authentication-data   Authentication data
  checktime             Time interval to check interfaces and destinations
  destination-ip        IP destination to check
  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

a) active

Activates (enables) the TVRP group. By default the groups are enabled.
In order to disable a TVRP group, use the **GROUP <group n°> no active**.

b) authentication-data

TVRP group authentication data.

c) checktime

Time period between interface and destination checks.

d) destination-ip

Adds a new destination to be checked to the TVRP group destinations list. The destination is specified by an IP address, which can be either a network address or a host address.
In order to delete a destination configured in a TVRP group, use the following: **GROUP <group n°> no destination-ip <IP address>**.

e) interface-type

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

f) ip

TVRP group virtual IP address.

g) local-ip

IP address of the TVRP router's local interface

h) mac

TVRP group virtual MAC address. In cases of *token-ring* interfaces, this parameter cannot be configured.

i) preempt

Enables the preempt capacity. In order to disable this parameter use the following: **GROUP <group n°> no preempt**.

j) priority

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

k) timers

Helotime and *Holdtime* timers.

l) track-interface

Monitoring the state of the specified interface.

In order to eliminate monitoring of an interface in a TVRP group, use the **GROUP <group n°> no track-interface <interface>**.

Example:

```
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 track-interface ppp1
TVRP config>GROUP 10 destination-ip 10.0.0.0
TVRP config>LIST GROUP 10
+-----+
|                                     TVRP GROUP: 10                                     |
+-----+
Hello: 5 - Hold: 15 - Prio: 0 - Checktime: 10
Authen.: 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

TVRP config>SHOW CONFIG
; Showing Menu and Submenus Configuration ...

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 track-interface ppp1
group 10 destination-ip 10.0.0.0
;
TVRP config>
```

In order to eliminate a TVRP group, you can use the **NO GROUP <group n>** command.

2.6. LIST

The **LIST** command permits you to view the distinct parameters for the TVRP protocol configuration according to the option chosen.

Syntax:

```
TVRP config>LIST ?
ALL
GLOBAL
GROUP
```

a) LIST ALL

Displays ALL the TVRP configuration.

Syntax:

```
TVRP config>LIST ALL
```

Example:

```
TVRP config>LIST ALL

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

TVRP is currently: ENABLED
TVRP port (UDP): 1985
```

```

===== List of TVRP groups =====
+-----+
|                                     |
|                               TVRP GROUP: 1 |
+-----+
Hello: 3 - Hold: 10 - Prio: 0 - Checktime: 5
Authen.: teldat - Preempt: NO - 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

+-----+
|                                     |
|                               TVRP GROUP: 2 |
+-----+
Hello: 3 - Hold: 10 - Prio: 0 - Checktime: 5
Authen.: 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: pppl
No destinations to check

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 pppl
;
TVRP config>

```

b) 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

TVRP config>

```

c) LIST GROUP

Displays all the information relating to the configuration of a specific TVRP group.

As well as the parameters referring to the protocol's own functions, the destinations configured for the group are also displayed.

In cases where you do not indicate the number of the group you wish to view, a list is displayed summarizing the configured groups. From here you can select the number of the group you wish to view.

Syntax:

```
TVRP config>LIST GROUP <TVRP group n°>
```

Example:

```
TVRP config>LIST GROUP
  Group   Local Address   Virtual IP   Virtual MAC
  0       192.14.1.3           192.14.1.1   00-00-0c-07-ac-00
  2       177.15.2.6           177.15.2.8   c0-00-00-04-00-00

Group Number: 2
+-----+
|                   TVRP GROUP: 2                   |
+-----+
Hello: 3 - Hold: 10 - Prio: 200 - Checktime: 7
Authen.: tokenrin - Preempt: YES - C.Status: ENABLED
Virtual IP: 177.15.2.8
Virtual MAC: c0-00-00-04-00-00
Local IP: 177.15.2.6
Interface track list: pppl
No destinations to check

apu TVRP config>
```

2.7. PORT

The **PORT** command permits you to configure the UDP port used by the TVRP protocol. This is used when you wish to modify the previously configured port. By default the UDP port is 1985.

Syntax:

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

Example:

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

2.8. EXIT

The **EXIT** command returns you to the previous prompt (IP configuration prompt).

Syntax:

```
TVRP config>EXIT
```

Example:

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

Chapter 3 Monitoring



1. TVRP Protocol Monitoring

This section summarizes and explains all the TVRP protocol monitoring commands. These commands permit you to monitor the TVRP behavior and this way reach the function specifications you require.

Introduce the TVRP monitoring commands at the **TVRP>** prompt; in order to access this prompt enter the following:

```
*PROCESS 3
Console Operator
+PROTOCOL IP
IP>TVRP
TVRP Monitoring

TVRP>
```

Command	Function
? (HELP)	Lists the commands or options.
ACTIVATE	Initiates the router function the configured TVRP groups although these are not active.
CLEAR	Deletes the TVRP groups' statistics.
DEACTIVATE	Finalizes router participation in the TVRP groups that are active and working in the protocol.
LIST	Lists the distinct information referent to the current state of the TVRP protocol and its groups including the statistics for these.
EXIT	Exits the TVRP monitoring.

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 in order to list the available options.

Syntax:

```
TVRP>?
```

Example:

```
TVRP>?
ACTIVATE
CLEAR
DEACTIVATE
LIST
EXIT
TVRP>
```

1.2. ACTIVATE

Activates the TVRP protocol function in all those configured groups that are not active yet and participating in the group. If the conditions necessary for protocol function are not fulfilled (LAN interface is not operative, destinations cannot be reached etc.), the router cannot participate in this TVRP group.

NOTE: This command has no effect if the TVRP protocol is not active i.e. if it is not enabled.

Syntax:

```
TVRP> ACTIVATE ?  
ALL  
GROUP
```

a) ACTIVATE ALL

Activates the functioning of all the configured groups that are not already active.

Syntax:

```
TVRP>ACTIVATE ALL
```

Example:

```
TVRP>ACTIVATE ALL  
TVRP group 0 running  
TVRP group 13 running  
  
TVRP>
```

b) ACTIVATE GROUP

Activates the router participation in a specified TVRP group that is configured. If you do not indicate the group, the device will ask the user which group he wishes to activate.

Syntax:

```
TVRP>ACTIVATE GROUP <TVRP group n°>
```

Example:

```
TVRP >ACTIVATE GROUP  
Group Number: [0]? 1  
TVRP group 1 running  
  
TVRP>
```

1.3. CLEAR

You initialize the TVRP group statistics through the **CLEAR** command.

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  
GLOBAL  
GROUP
```

a) CLEAR ALL

Clears the statistics of **ALL** the TVRP groups that are configured in the router as well as the global statistics.

Syntax:

```
TVRP>CLEAR ALL
```

Example:

```
TVRP>CLEAR ALL
All TVRP statistics have been cleared
TVRP>
```

b) CLEAR GLOBAL

Clears all the TVRP global statistics.

Syntax:

```
TVRP>CLEAR GLOBAL
```

Example:

```
TVRP>CLEAR GLOBAL
Global TVRP statistics cleared
TVRP>
```

c) CLEAR GROUP

Clears the specified TVRP group statistics. If you do not indicate the group, the device asks the user which group the statistics should be deleted from.

Syntax:

```
TVRP>CLEAR GROUP <TVRP group n°>
```

Example:

```
TVRP>CLEAR GROUP
Group Number: [0]?
TVRP group 0 cleared
TVRP>
```

1.4. DEACTIVATE

Through the **DEACTIVATE** command, the router participation is interrupted in the TVRP group participating in the protocol.

Syntax:

```
TVRP>DEACTIVATE ?
ALL
GROUP
```

a) DEACTIVATE ALL

Deactivates the function of all the non-active groups configured. From this point onwards the router does not intervene in any TVRP group and therefore does not collaborate with the other routers simulating virtual routers.

Syntax:

```
TVRP>DEACTIVATE ALL
```

Example:

```
TVRP>DEACTIVATE ALL
TVRP group 0 stopped
TVRP group 13 stopped
TVRP>
```


b) DEACTIVATE GROUP

Deactivates the participation of a router within a specified TVRP group.

Syntax:

```
TVRP>DEACTIVATE GROUP <TVRP group n°>
```

Example:

```
TVRP>DEACTIVATE GROUP
Group Number [0]? 1
TVRP group 1 stopped
TVRP>
```

NOTE: *On manually deactivating a TVRP group we are interfering with the normal protocol operation and provoking an abnormal change of state. This means that there is no guarantee that the router can reactivate the TVRP group in an orthodox form, according to the normal channels where the protocol is executed. However the command **ACTIVATE** is always available in order to restore TVRP group participation.*

1.5. 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
GLOBAL
GROUP
```

a) LIST ALL

View ALL the information on the current TVRP protocol state.

Syntax:

```
TVRP>LIST ALL
```

Example:

```
TVRP>LIST ALL

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

TVRP is currently: ENABLED
TVRP port (UDP): 1985
Unknown packets: 13
Captured vMAC: 00000C07AC4D
Captured vMAC: 00000C07AC00

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

+-----+
|                                     TVRP GROUP: 77                                     |
+-----+
Virtual IP: 192.14.1.77
Virtual MAC: 00-00-0c-07-ac-4d
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
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>

```

b) LIST GLOBAL

Displays the general information and the global statistics of the TVRP protocol.

Syntax:

```
TVRP>LIST GLOBAL
```

Example:

```

TVRP>LIST GLOBAL

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

TVRP is currently:  ENABLED
TVRP port (UDP):    1985
Unknown packets:    109
Captured vMAC:     00000C07AC4D
Captured vMAC:     00000C07AC00

TVRP>

```

The meaning of the fields that appear is as follows:

TVRP is currently: Indicates the current status of the TVRP protocol: *ENABLED* or *DISABLED*.

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

Unknown packets: Number of unknown packets received.

Captured vMAC: Indicates that a virtual MAC is being captured and routed by the router.

c) LIST GROUP

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

As well as the parameters referring to the protocol's own operations, the own statistics for this TVRP group is also displayed: **H**ello messages, **C**oup messages, and **R**esign messages.

Where a group number is not indicated, a list summarizing the configured groups is displayed which you can check for the group number you wish to view.

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

  Group Number: 1
+-----+
|                                     TVRP GROUP: 1                             |
+-----+
Virtual IP: 1.1.1.1
Virtual MAC: 00-00-0c-07-ac-01
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.

ACTIVE Router: IP address of the *active* router. Address 0.0.0.0 indicates that the *active* router is unknown.

STANDBY Router: IP address of the *standby* router. Address 0.0.0.0 indicates that the *standby* router is unknown.

Hellotime: *Hello time* currently used for this TVRP group (this can be the time introduced 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 functioning or not within the TVRP group: *RUNNING* if it is active or *STOPPED* if it is not.

Last event: Last event occurred in relation to the TVRP protocol. The events can be the following:

"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 for each of the corresponding states within 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.

1.6. EXIT

Use this command to return to the previous prompt level. In this case you return to the IP monitoring prompt.

Syntax:

```
TVRP>EXIT
```

Example:

```
TVRP>EXIT  
IP>
```