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 make public information on its 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 in order for 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 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 convert into an *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 is seconds. If the **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.

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 **Holdtime**. The **Holdtime** should be at least three times longer than the **Hellotime** and must be greater than the **Hellotime**.

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

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

You cannot use a configured time and a learned time (**Holdtime** configured **Hellotime** learned 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 Nº

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).

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 the 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:

Nº of the Standby Group
Virtual MAC address
Priority
Authentication Data
Hellotime
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 premption 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.
- **Destination check time:** Time between checking the destination list.
- **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: The option to configure port 1985 appears by default as this is used for the HSRP protocol. The use of this port is recommended in order to maintain compatibility.***

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 at the moment of 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 to 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. DESTINATION CHECK TIME

A series of destinations is considered for each TVRP group (explained in the next section). The destination check time is the interval to check the destination list. Each time the destination check time lapses, the destinations list is examined verifying that the router has an *active* route available to each one of these.

In situations where a route is not available to a 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. DESTINATIONS

In order to avoid the *active* router losing the links with the rest of the networks, it cannot reach other networks except the LAN, the destination check function is implemented.

Through this function, a list of destinations is configured and periodically checked to make sure the routes are active towards them (in this way, the router knows what to do with the 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 any destinations (i.e. the destinations list is empty), 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
User Configuration
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.
ADD	Adds information to the TVRP configuration.
DELETE	Deletes the TVRP information entered through the **ADD** command.
DISABLE	Disables certain TVRP functions which have been enabled through the **ENABLE** command.
ENABLE	Enables the whole TVRP protocol or a specific group.
LIST	Displays the TVRP configuration.
SET **P**ORT-UDP	Establishes or changes the configuration information concerning the UDP port through which the TVRP protocol functions.
EXIT	Exits the TVRP configuration prompt.

The letters written in **bold**, are the minimum number of characters that have to be entered in order to validate the command.

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>?
ADD
DELETE
DISABLE
ENABLE
LIST
SET
EXIT
TVRP config>
```

2.2. ADD

The **ADD** command is used to add more configuration information to the TVRP protocol. This command permits you to aggregate and/or modify TVRP groups as well as add destination addresses to the destination list monitored by these groups.

Syntax:

```
TVRP config> ADD ?
DESTINATION
GROUP
```

a) *ADD DESTINATION*

Adds a new destination to check to the group destination list. The destination is specified by an IP address that can also be a network or a host address.

Syntax:

```
TVRP config> ADD DESTINATION <TVRP group nº, IP address>
```

Example:

```
TVRP config> ADD DESTINATION 1 192.7.1.0
  Destination 192.7.1.0 added to group 1

TVRP config>
```

WARNING: If no destinations are configured in a specific TVRP group, the router is always participating in the group (although only the LAN interface is functioning). TVRP disable is only produced in the router when the LAN interface stops functioning.

b) ADD GROUP

Adds a new TVRP group to those already configured or modifies the values of an existing group. If the group being added already exists, the previously configured values appear and these can be modified if required. If the group is not already configured, the parameters are displayed by default.

Syntax:

```
TVRP config> ADD GROUP <TVRP group nº>
```

Example:

```
TVRP config> ADD GROUP
  Group Number: [0]?
  Group Virtual IP Address [0.0.0.0]? 172.27.0.6
  Local IP Address [0.0.0.0]? 172.27.0.2
  LAN type: ETH (0), TKR (>0) [0]?
  Group Virtual MAC Address [00-00-0C-07-AC-00]?
  Priority [0]? 100
  Hellotime (in seconds)[3]?
  Holdtime (in seconds)[10]?
  Enable Preemption: NO (0), YES (>0) [0]?
  Authenticate Data [teldat]?
  Destination check time (in seconds)[5]?

TVRP config>
```

2.3. DELETE

The **DELETE** command is used to eliminate TVRP protocol configuration information. This command permits you to delete TVRP groups as well as remove destination addresses from the destination list monitored by these groups.

Syntax:

```
TVRP config> DELETE ?
ALL
DESTINATION
GROUP
```

a) DELETE ALL

This eliminates all information referring to the TVRP protocol. It deletes both the global information and information referent to the TVRP groups that are configured including their destinations.

Syntax:

```
TVRP config> DELETE ALL
```

Example:

```
TVRP config> DELETE ALL
  All TVRP info has been deleted

TVRP config>
```

b) DELETE DESTINATION

This deletes a specific destination from the destination list configured in a TVRP group.
In order to do this, indicate the destination to be eliminated as well as the group it must be removed from (a destination can be configured in distinct groups).

Syntax:

```
TVRP config> DELETE DESTINATION <TVRP group nº, IP-address>
```

Example:

```
TVRP config> DELETE DESTINATION
  Group Number: [0]?15
  IP destination [0.0.0.0]? 192.168.1.0
  Destination 192.168.1.0 deleted from group 15

TVRP config>
```

c) DELETE GROUP

This eliminates a TVRP group from the configured groups.

Syntax:

```
TVRP config> DELETE GROUP <TVRP group nº>
```

Example:

```
TVRP config> DELETE GROUP 1
  TVRP group 1 deleted

TVRP config>
```

2.4. DISABLE

The **DISABLE** command permits you to disable both the general TVRP protocol as well as determined groups.

Syntax:

```
TVRP config> DISABLE ?
GROUP
TVRP
```

a) DISABLE GROUP

Disables a TVRP group from among those configured. You can have various TVRP groups configured but not all of them are necessarily participating. With DISABLE GROUP you leave the TVRP groups disabled. When you add a TVRP group, this is enabled by default, i.e. if you wish to disable it you must execute this command.

Syntax:

```
TVRP config> DISABLE GROUP <TVRP group nº>
```

Example:

```
TVRP config> DISABLE GROUP
  Enter the Group to be disabled [0]? 12
  TVRP group 12 disabled

TVRP config>
```

b) DISABLE TVRP

Disables the TVRP protocol in its set. On disabling all the protocol, the router ignores everything referring to this.

Syntax:

```
TVRP config> DISABLE TVRP
```

Example:

```
TVRP config> DISABLE TVRP
  TVRP disabled

TVRP config>
```

2.5. ENABLE

Through the **ENABLE** command you can enable both the TVRP protocol in general as well as specific groups.

Syntax:

```
TVRP config> ENABLE ?
GROUP
TVRP
```

a) ENABLE GROUP

Enables a TVRP group from those already configured and have been expressly disabled.

Syntax:

```
TVRP config> ENABLE GROUP <TVRP group nº>
```

Example:

```
TVRP config> ENABLE GROUP
  Enter the Group to be enabled [0]? 10
  TVRP group 10 enabled

TVRP config>
```

b) ENABLE TVRP

Enables the TVRP protocol in its group. This permits you to specify the UDP port through which the protocol is going to function.

Syntax:

```
TVRP config> ENABLE TVRP
```

Example:

```
TVRP config> ENABLE TVRP
  UDP port [1985]?
  TVRP enabled on UDP port: 1985

TVRP config>
```

NOTE: If the TVRP protocol has previously been enabled (specifying a determined UDP port) and subsequently disabled, on enabling again it considers the port initially introduced. If you wish to change the port then you must use the* SET PORT-UDP *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 is running on UDP port: 1985


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

 +-------------------------------------------------------------+
 |                      TVRP GROUP:   1                        |
 +-------------------------------------------------------------+
 | Hello:   3  -  Hold:  10  -  Prio:   0  -  Dest.check:   5 |
 | Authen.: teldat    -  Preempt:  NO  -  C.Status:  ENABLED  |
 | Virtual IP : 1.1.1.1                                        |
 | Virtual MAC: 00-00-0c-07-ac-01                              |
 | Local IP   : 192.14.1.3                                     |
 | Destination check list:                                     |
 |                            ---->  172.27.0.0                |
 |                            ---->  192.168.252.0             |
 +-------------------------------------------------------------+
```

```
 +-----------------------------------------------------------+
 |                      TVRP GROUP:   2                      |
 +-----------------------------------------------------------+
 | Hello:   3  -  Hold:  10  -  Prio: 200  -  Dest.check:   7 |
 | Authen.: mygroup   -  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                                   |
 | Destination check list:                                   |
 |                           ---->  145.15.1.0               |
 +-----------------------------------------------------------+

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 is running on UDP port: 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 own operation of the protocol, 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 nº>
```

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  -  Dest.check:   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                                    |
 | Destination check list:                                    |
 |                           ---->  145.15.1.0                |
 +-------------------------------------------------------------+

TVRP config>
```

2.7. SET PORT-UDP

The **SET PORT-UDP** 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.

Syntax:

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

Example:

```
TVRP config> SET PORT-UDP
  UDP port [1985]? 1774
  TVRP enabled on UDP 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 you can reach the function specifications you require.

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

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

TVRP monit>
```

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.

The letters written in **bold** are the minimum number of characters required to validate the command.

1.1. ? (HELP)

This 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 monit> ?
```

Example:

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

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 monit> ACTIVATE ?
ALL
GROUP
```

a) ACTIVATE ALL

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

Syntax:

```
TVRP monit> ACTIVATE ALL
```

Example:

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

TVRP monit>
```

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 monit> ACTIVATE GROUP <TVRP group nº>
```

Example:

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

TVRP monit>
```

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 monit> 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 monit> CLEAR ALL
```

Example:

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

TVRP monit>
```

b) CLEAR GLOBAL

Clears all the TVRP global statistics.

Syntax:

```
TVRP monit> CLEAR GLOBAL
```

Example:

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

TVRP monit>
```

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 monit> CLEAR GROUP <TVRP group nº>
```

Example:

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

TVRP monit>
```

1.4. DEACTIVATE

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

Syntax:

```
TVRP monit> 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 monit> DEACTIVATE ALL
```

Example:

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

TVRP monit>
```

b) *DEACTIVATE GROUP*

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

Syntax:

```
TVRP monit> DEACTIVATE GROUP <TVRP group nº>
```

Example:

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

TVRP monit>
```

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 monit> LIST ?
ALL
GLOBAL
GROUP
```

a) *LIST ALL*

View ALL the information on the current TVRP protocol state.

Syntax:

```
TVRP monit> LIST ALL
```

Example:

```
TVRP monit> LIST ALL

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

  TVRP is currently:  ENABLED
  Unknown rcvd:       0
  vMAC captured:      00000C07AC01
  TVRP is running on UDP port: 1985


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

 +-------------------------------------------------------------+
 |                      TVRP GROUP:   1                        |
 +-------------------------------------------------------------+
 | Hello:   3  -  Hold:  10  -  Prio:   0  -  Dest.check:   5 |
 | Virtual IP : 175.27.1.2                                     |
 | Virtual MAC: 00-00-0c-07-ac-01                              |
 | 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:     112,   received:      77    |
 |   Coup messages --->  sent:       1,   received:       0    |
 |   Resign messages ->  sent:       1,   received:       0    |
 +-------------------------------------------------------------+
```

```
 +------------------------------------------------------------+
 |                      TVRP GROUP:   0                       |
 +------------------------------------------------------------+
 | Hello:   3  -  Hold:  10  -  Prio:   0  -  Dest.check:   5 |
 | Virtual IP : 192.14.1.2                                    |
 | Virtual MAC: 00-00-0c-07-ac-00                             |
 | TVRP state:  INITIAL       Previous state:  INITIAL        |
 | Currently STOPPED          Last event: NULL                |
 | Initial: 1           Learn: 0           Listen: 0          |
 | Speak: 0           Standby: 0           Active: 0          |
 |   Hello messages -->  sent:       0,   received:       0   |
 |   Coup messages --->  sent:       0,   received:       0   |
 |   Resign messages ->  sent:       0,   received:       0   |
 +------------------------------------------------------------+

TVRP monit>
```

b) 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: **Hello** messages, **Coup** messages, and **Resign** 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 config> LIST GROUP <TVRP group nº>
```

Example:

```
TVRP monit> 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                       |
 +------------------------------------------------------------+
 | Hello:   3  -  Hold:  10  -  Prio:   0  -  Dest.check:   5 |
 | Virtual IP : 1.1.1.1                                       |
 | Virtual MAC: 00-00-0c-07-ac-01                             |
 | 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:     219,   received:     177   |
 |   Coup messages --->  sent:       0,   received:       0   |
 |   Resign messages ->  sent:       1,   received:       0   |
 +------------------------------------------------------------+

TVRP monit>
```

The meaning of the fields that appear is as follows:

Hello: *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).

Hold: Current *Hold time* (configured or learned).

Prio: Router priority within the TVRP group (coincides with that configured).

Dest.check: Destination check time (coincides with that configured).

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 even: 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 monit> EXIT
```

Example:

```
TVRP monit> EXIT
IP>
```