Teldat Router

RIP Protocol

Doc. *DM518-I* Rev. *8.00*

July, 1999

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Chapter 1
Introduction

1. Introduction to the RIP

This chapter describes the use of the RIP protocol (Routing Information Protocol) which is an Interior Gateway Protocol. The **Teldat Router** supports two different IGP protocols to build the IP routing table. These protocols are OSPF and RIP.

RIP is a routing protocol based on the Bellman-Ford (or distance vector) algorithm that allows routers to exchange information about destination for computing routes throughout the network. Destinations may be networks or a special destination used to convey a default route. RIP does not alter IP packets and routes them based on destination address only.

Distance vector algorithm makes each router periodically broadcast its routing tables to all its neighbors. Then a router knowing its neighbors' tables can decide which destination neighbor to use for routing a packet.

This information is organized into the following sections:

- Routing Information Protocol.
- RIP configuration.
- RIP configuration commands.
- RIP monitoring commands.

Routers that use a common routing protocol form an Autonomous System (AS). This common routing protocol is called an Interior Router Protocol. IRPs dynamically detect network reachability and routing information within an AS and use this information to build the IP routing table. External routing information can also be imported to an AS by IRPs.

The **Teldat Router** can execute both the OSPF and RIP protocols simultaneously. When this happens, OSPF routes are chosen in preference.

2. Routing Information Protocol

With the advent of OSPF, there are those who believe that RIP is obsolete. While it is true that the newer IGP routing protocols are far superior to RIP, RIP does have some advantages. Primarily, in a small network, RIP-2 has very little overhead in terms of bandwidth used, and configuration and management time. Additionally, there are many, many more RIP implementations in the field than other routing protocols.

The current RIP-1 protocol does not consider autonomous systems, the IGP/EGP interactions, subnetting and authentication. The lack of subnet masks in RIP-1 packets is a particularly serious problem for routers since they need a subnet mask to know how to determine a route. Currently routers with RIP-1 assume that the subnet mask is the same as the interface mask where the RIP-1 packet entered. They also impose the condition that all the subnets of the same network have to be the same length. RIP-2 protocol was introduced to solve this problem.

Note: All bridging router interfaces having RIP enabled as RIP-1 must have the same subnet mask.

RIP-2 is an extension of RIP-1. It uses the same message format but the meaning is extended in some of the fields.

The **Teldat Router** supports the complete implementation of the RIP-2 routing protocol according to the RFC 1723 and RFC 1388 recommendations. This version is compatible with routers executing RIP Version 1. RIP information is exchanged between the routers which execute the different versions although the router must be specifically configured with RIP-2.

RIP-2 is designed to provide services which are not available from the RIP-1 protocol. Its advanced characteristics include:

- *Authentication*, currently is simple password. This gives additional routing security.
- *Route Tag Field*, is an attribute assigned to a route which must be preserved and readvertised with a route. It provide a method of separating “internal” from “external” RIP routes, which may have been imported from an EGP or another IGP.
- *Subnet Mask field*. Contains the subnet mask which is applied to the IP address to yield to non-host portion of the address.
- *Next Hop*, to eliminate packets being routed through extra hops in the system.
- *Multicast* instead of broadcast in order to reduce unnecessary load on those hosts which are not listening RIP-2 packets. The multicast address associated to RIP-2 is 224.0.0.9., The use of multicast is a configurable parameter in order to maintain compatibility with RIP-1.

The RIP-2 supports the following types of physical networks:

- *Leased Lines*. These are networks that use a communication line to join a single pair of routers. An example of this is a serial line at 56 Kbps connecting two routers.
- *Broadcast*. These are networks that support more than two connected routers and are able to address a single physical message to all connected routers. An example of a broadcast network is Token Ring.
- *No Broadcast*. These are networks that support more than two connected routers but are incapable of broadcasting. An X.25 public data network is an example of a non broadcast network. The network needs additional configuration information on the other RIP-2 routers connected to the non broadcast network to ensure the correct operation of the RIP-2.

The RIP protocol is primary intended for use in networks of moderate size. For this reason the RIP protocol has the following specific limitations:

- The maximum number of hops is 15.
- RIP is slow to find new routes when the network changes.
- This protocol uses fixed "metrics" to compare alternative routes. It is not appropriate for situations where routes need to be chosen based on real-time parameters.

3. RIP Configuration

This section outlines the initial steps required to configure and run RIP protocol appropriately.

1. Enable the RIP protocol.
2. Define the router's RIP network interfaces.
3. Configure the sending parameters by interface, type of route you wish to send and if you want to activate the *poisoned reverse* option of the interface.
4. Configure the reception parameters by interface. Type of route you require to process.
5. Configure the sending and reception compatibility by interface. These are the different compatibility level types defined by the RFC 1723 between RIP-1 and RIP-2 routers.
6. Configure authentication by interface. If you enable authentication, a password must be configured.
7. Configure IGP/EGP interaction. Configures the autonomous system label to which the router belongs, defines the default route to route traffic towards a router which has port functions in non RIP networks.
8. Configure timers. This is to adjust the timers which intervene in RIP-2. We recommend that you do not adjust the default value, or this is carried out by qualified staff.

If you configure RIP to use broadcast messages to update its routes, you must specify the broadcast IP address format.

Chapter 2
RIP Configuration

1. RIP Configuration commands

This section summarizes and then explains all RIP configuration commands. To access to the RIP configuration environment you must enter:

```
*P 4
User Configuration
Config>PROTOCOL RIP
RIP protocol user configuration
RIP config>
```

Command	Function
? (HELP)	List all the RIP commands or associated options.
ADD	Adds to the existing RIP information. You can add any routes that are accepted by the RIP protocol.
DEL	Deletes the RIP routes which are always accepted by the RIP protocol.
DISABLE	Completely disables the RIP protocol.
ENABLE	Completely enables the RIP protocol.
LIST	Shows the RIP configuration.
SET	Establishes or changes the RIP protocol configuration information on sending, reception, authentication, timers etc.
EXIT	Exits the RIP configuration process.

The letters typed in **bold** are the minimum number of characters which need to be keyed in order to activate the command.

1.1. ? (HELP)

Use the **?** (HELP) command to list the commands that are available from the current prompt level. You can also enter a ? after a specific command name to list its options.

Syntax:

```
RIP config> ?
```

Example:

```
RIP config> ?
ADD
DEL
DISABLE
ENABLE
LIST
SET
EXIT
RIP config>
```

1.2. ADD

With the **SET RECEIVING** command the router ignores the information received in the RIP packets referring to routes towards networks or subnets. These filters are individually established for each interface.

However, even though you program these filters, it is possible to accept routes which have determined network or subnet destinations. This can be achieved through the **ADD ACCEPT-RIP-ROUTE** command. The steps to be followed are the following: if you program **ADD ACCEPT-RIP-ROUTE** 10.0.0.0, and the previously mentioned filters are programmed in a determined interface, the router analyzes the RIP packet. If the destination network referred to is 10.0.0.0, it will accept this information.

Syntax:

```
RIP config> ADD ACCEPT-RIP-ROUTE <dir IP-RED/SUBRED>
```

Example:

```
RIP config> ADD ACCEPT-RIP-ROUTE 10.0.0.0
RIP config>
```

1.3. DEL

Use the **DEL** command to delete a route from the network list always accepted by the RIP protocol.

Syntax:

```
RIP config> DEL ACCEPT-RIP-ROUTE <dir IP-RED/SUBRED>
```

Example:

```
RIP config> DEL ACCEPT-RIP-ROUTE 10.0.0.0
RIP config>
```

1.4. DISABLE

Syntax:

```
RIP config> DISABLE ?
RIP
LIMIT-RIP
```

a) *DISABLE RIP*

The **DISABLE RIP** command disables the RIP protocol in the device.

Example:

```
RIP config> DISABLE RIP
RIP config>
```

b) *DISABLE LIMIT-RIP*

The **DISABLE LIMIT-RIP** command activates the RIP protocol in Frame Relay interfaces. You should use this command if you do not wish to restrict the RIP protocol in the device.

Example:

```
RIP config> DISABLE LIMIT-RIP
RIP config>
```

1.5. ENABLE

Syntax:

```
RIP config> ENABLE ?
RIP
LIMIT-RIP
```

a) *ENABLE RIP*

The **ENABLE RIP** command enables the RIP protocol in the device.

Example:

```
RIP config> ENABLE RIP
RIP config>
```

b) ENABLE LIMIT-RIP

The **ENABLE LIMIT-RIP** command deactivates the RIP protocol in Frame Relay interfaces. When LIMIT-RIP is enabled, the RIP packets are not sent via the Frame Relay interfaces unless they are in ISDN backup. The LIMIT-RIP option is by default disabled.

This command exists for when the **Teldat Router** operates with the **CENTRIX-P** backup device in certain Frame Relay virtual circuits backup scenarios over ISDN. This command affects all the device's Frame Relay interfaces.

Note: This command should not be enabled under other circumstances and always must be used by qualified staff.

Example:

```
RIP config> ENABLE LIMIT-RIP
RIP config>
```

1.6. SET

Sometimes it is necessary to personalize the RIP behavior. You can personalize RIP through the **SET** command in IP protocol. The majority of these options are for a specified IP address. E.g. those that control the sending and reception of the RIP information for each interface.

Syntax:

```
RIP config> SET ?
AGGREGATION
AS-LABEL
AUTHENTICATION
COMPATIBILITY
COST-ADDITIONAL
ORIGINATE-RIP-DEFAULT
RECEIVING
SENDING
TIMERS
```

a) SET AGGREGATION

If you use the **SET AGGREGATION** command to configure the RIP aggregation parameters of the router network interfaces. The type of routes to send via a determined interface depends on the status of the sending flags previously described and the aggregation parameters which will be described further on.

On executing this command a list of the logical interfaces appears (IP addresses) where the RIP aggregation parameters can be configured. You enter an existing address and then proceed to respond positively or negatively to the following questions:

Example:

```
RIP config> SET AGGREGATION
IP addresses for each interface:
   intf  0   192.7.1.253      255.255.255.0    NETWORK broadcast,    fill 0
   intf  1   10.0.0.3         255.0.0.0        NETWORK broadcast,    fill 0
             192.3.1.2        255.255.255.0    NETWORK broadcast,    fill 0
   intf  2                                     IP disabled on this interface
Set for which interface address [0.0.0.0]? 192.7.1.253
Aggregation type:
   1.- Do not aggregate
   2.- Aggregate subnets
   3.- Use aggregation routes
   4.- Aggregate subnets and use aggregation routes
Enter option: [1]?
Do you wish to allow disconnected subnetted networks? (Yes/No)(Y)?
RIP config>
```

The meaning of the types of aggregation are the following:

Do not aggregate — No type of aggregation is carried out. This means that the neither aggregation routes nor the subnet aggregation routes are sent. This is the default option.

Aggregate subnets — In the routing table when a subnet route is learnt or configured, a "Sbnt" route or a subnet aggregation route with the destination "the subnet network" and the following hop "none" automatically appears. In activating this type of aggregation, the subnet aggregation routes are sent whenever one of the subnets has the sending flags properly configured.

Use aggregation routes — The aggregation routes are not routes as such, but marks that appear on the active route table indicating that a series of aggregated routes exist. On activating this type of aggregation, only the aggregation routes and the routes which do not belong to any aggregation are sent. This means that the aggregated routes are not sent. So that an aggregation route is announced, one of the routes it is composed of (aggregated route) must be of a certain type so the sending flags permit it to be sent.

The following indicates the significance of the aggregation flag:

Do you wish to allow disconnected subnetted networks — If a subnet route is disabled, it is not broadcast outside the network area it belongs to. In the same way, an interface does not accept routes for subnets which don't belong to the interface's network.

However, disconnected subnets are permitted. The routes for subnets are sent and received by the interface independently of the its network. Disconnected subnets are permitted by default.

b) SET AS-LABEL

For IGP/EGP interaction. This is configurable in the logical interface (IP address). In order to configure this, use the **SET AS-LABEL** command**.** On executing this command, a list of all the logical interfaces

that you can configure appear. Introduce an existing address and then introduce the Autonomous System number required.

Example:

```
RIP config> SET AS-LABEL
IP addresses for each interface:
   intf  0   192.7.1.253      255.255.255.0    NETWORK broadcast,    fill 0
   intf  1   10.0.0.3         255.0.0.0        NETWORK broadcast,    fill 0
             192.3.1.2        255.255.255.0    NETWORK broadcast,    fill 0
   intf  2                                     IP disabled on this interface
Set for which interface address [0.0.0.0]? 192.7.1.253
Interface AS label[0]?
RIP config>
```

c) SET AUTHENTICATION

Authentication is sent with each packet and checked for each received packet. It is also configurable in logical interface (IP address). To configure you use the **SET AUTHENTICATION** command. On executing this, a list of all logical interfaces appear where you can configure the RIP authentication. Introduce an existing address and then choose the required option.

Example:

```
RIP config> SET AUTHENTICATION
IP addresses for each interface:
   intf  0   192.7.1.253      255.255.255.0    NETWORK broadcast,    fill 0
   intf  1   10.0.0.3         255.0.0.0        NETWORK broadcast,    fill 0
             192.3.1.2        255.255.255.0    NETWORK broadcast,    fill 0
   intf  2                                     IP disabled on this interface
Set for which interface address [0.0.0.0]? 192.7.1.253
Available:
 1.- No authentication
 2.- Clear password
What kind of authentication do you wish? [1]? 2
Enter password: []? Cualquiera
RIP config>
```

The meaning of each field is:

No authentication	No authentication.
Clear password	Authentication with a clear password. If you choose this option you have to configure the password.

The following algorithm is used when authenticating:

- The router is not configured to authenticate. The non authenticated RIP-1 and RIP-2 packets are accepted. The authenticated RIP-2 packets are discarded.
- The router is configured to authenticate. All the RIP-1 and RIP-2 packets which do not pass the authentication are discarded. All sent packets are authenticated.

d) SET COMPATIBILITY

The RFC 1058 recommendation specifies version 0 RIP messages should be discarded. Version 1 messages should be discarded if any of the MBZ 'must be zero' fields are not zero. All messages in versions superior to 1 should be accepted.

However, sometimes it is necessary to implement a compatibility selector for two reasons. Firstly there are RIP-1 implementations that do not follow the previously described recommendation. Secondly, the use of multicast can prevent systems with RIP-1 receiving RIP-2 packets. This compatibility selector is configured in the interface.

To configure the compatibility selectors, use the **SET COMPATIBILITY** command.

On executing this command, a list of all the logical interfaces (IP addresses), where you can configure the RIP compatibility, appears. Introduce an existing address and then choose the option required.

Example:

```
RIP config> SET COMPATIBILITY
IP addresses for each interface:
   intf  0   192.7.1.253      255.255.255.0    NETWORK broadcast,    fill 0
   intf  1   10.0.0.3         255.0.0.0        NETWORK broadcast,    fill 0
             192.3.1.2        255.255.255.0    NETWORK broadcast,    fill 0
   intf  2                                     IP disabled on this interface
Set for which interface address [0.0.0.0]? 192.7.1.253
Available:
 1.- Do not send
 2.- RIP1
 3.- RIP2 Broadcast
 4.- RIP2 Multicast
What kind of sending compatibility do you wish? [3]? 4
Available:
 1.- RIP1
 2.- RIP2
 3.- RIP1 or RIP2
 4.- Do no receive
What kind of receiving compatibility do you wish? [3]? 2
RIP config>
```

The send selector has four positions:

Do not send: disables the send RIP packets in this interface.

RIP-1: only RIP version 1 packets are sent.

RIP-2 broadcast: where the RIP version 2 packets are sent by broadcast.

RIP-2 multicast: where the RIP version 2 packets are sent by multicast.

We recommend that the chosen value should be *RIP-1* or *RIP-2 multicast* and not *RIP-2 broadcast* in order to avoid comprehension problems with *RIP-1* devices. *RIP-2 broadcast* should only be used when the network manager knows and understands all the possible consequences.

The reception selector has four positions:

RIP-1: only accepts version 1 RIP packets.

RIP-2: only accepts version 2 RIP packets.

RIP-1 or RIP-2: both versions are accepted.

Do not receive: RIP listening disabled in this interface.

e) SET COST-ADDITIONAL

This command is used to associated a cost to an interface. This means that all the RIP routes learnt from this interface increase their costs in however many units configured in the parameter + 1 (if the cost is zero, the RIP protocol will only increase it by 1 unit). The value range is between 0 and 15. The default value is zero.

Example:

```
RIP config> SET COST-ADDITIONAL
IP addresses for each interface:
   intf  0   192.7.1.253      255.255.255.0    NETWORK broadcast,    fill 0
   intf  1   10.0.0.3         255.0.0.0        NETWORK broadcast,    fill 0
             192.3.1.2        255.255.255.0    NETWORK broadcast,    fill 0
   intf  2                                     IP disabled on this interface
Set for which interface address [0.0.0.0]? 192.7.1.253
Per interface additional cost? [0]? 5
RIP config>
```

If a value outside of the range permitted is introduced:

Example:

```
RIP config> SET COST-ADDITIONAL
IP addresses for each interface:
   intf  0   192.7.1.253      255.255.255.0    NETWORK broadcast,    fill 0
   intf  1   10.0.0.3         255.0.0.0        NETWORK broadcast,    fill 0
             192.3.1.2        255.255.255.0    NETWORK broadcast,    fill 0
   intf  2                                     IP disabled on this interface
Set for which interface address [0.0.0.0]? 192.7.1.253
Per interface additional cost? [5]? 16
Must be less than 16. Using default value.
RIP config>
```

f) SET ORIGINATE-RIP-DEFAULT

You should use the **SET ORIGINATE-RIP-DEFAULT** command if your network is using RIP, and a network you have connected to is using another routing protocol (such as OSPF) to establish (originate) a single default route to that network.

This default route will direct traffic bound for a non RIP network to a boundary router which will function as a portal. The **Router Teldat** only accept OSPF.

Example:

```
RIP config> SET ORIGINATE-RIP-DEFAULT
Originate default if OSPF routes available(Yes/No)(Y)?
Originate default of cost[1]?
RIP config>
```

g) SET RECEIVING

Use the **SET RECEIVING** command to configure the RIP reception parameter of the route network interfaces. The routes set which are processed via a logical interface (IP address), is the union of the selected routes activating some of the flags (described below). These flags control the information received in the RIP frames to be incorporated in the router's routing tables. By activating certain flags the router will not take static routing information into account in cases where the RIP finds a better route than that already arranged.

On executing this command, a list of all the logical interfaces (IP addresses) appear where you can configure the RIP reception. Enter an existing address and subsequently respond yes or no to the following questions:

Example:

```
RIP config> SET  RECEIVING
IP addresses for each interface:
   intf  0   192.7.1.253      255.255.255.0    NETWORK broadcast,    fill 0
   intf  1   10.0.0.3         255.0.0.0        NETWORK broadcast,    fill 0
             192.3.1.2        255.255.255.0    NETWORK broadcast,    fill 0
   intf  2                                     IP disabled on this interface
Set for which interface address [0.0.0.0]? 192.7.1.253
Do you wish to process received network routes? (Yes/No)(Y)? y
Do you wish to process received subnetwork routes? (Yes/No)(Y)? y
Do you wish to overwrite default routes? (Yes/No)(N)? n
Do you wish to overwrite static routes? (Yes/No)(N)? n
RIP config>
```

The meaning of each field is:

Do you wish to process received network routes?	If set it accepts network routes, if it is deactivated it only accepts those network routes introduced with the **ADD ACCEPT-RIP-ROUTE** command.
Do you wish to process received subnetwork routes?	If set it accepts the subnetwork routes, if deactivated it only accepts those subnetwork routes introduced with the **ADD ACCEPT-RIP-ROUTE** command.
Do you wish to overwrite default routes?	If set it prevents a default RIP route received from the IP interface address, from being stored as the default route.
Do you wish to overwrite static routes?	This command prevents the RIP routes received in the IP interface address overwriting the static routes.

If the "Do you wish to allow disconnected subnetted networks" flag is disabled: for a given interface it will only accept those subnet routes which belong to the same IP network as the interface. E.g. destination subnet route: 192.6.1.144, mask: 255.255.255.248, if the incoming interface address is 192.6.1.x, the route is accepted . But if the incoming interface belongs to a different IP network e.g. 193.5.1.x, the route received is rejected,. If however, the "Subnet disconnected" is enabled, then reception of subnets via interfaces which do not belong to the subnet is permitted.

h) SET SENDING

Use the **SET SENDING** command to configure the RIP sending parameters of the router network interfaces. The type of routes to send for a determined interface depends on the status of the flags (described below). The subnet level routes are only sent when the destination subnet belongs to the same IP network as the sending address.

On executing this command, a list of all the logical interfaces (IP addresses) appear where you can configure the RIP sending. Enter an existing address and subsequently respond yes or no to the following questions:

Example:

```
RIP config> SET SENDING
IP addresses for each interface:
   intf  0   192.7.1.253      255.255.255.0    NETWORK broadcast,    fill 0
   intf  1   10.0.0.3         255.0.0.0        NETWORK broadcast,    fill 0
             192.3.1.2        255.255.255.0    NETWORK broadcast,    fill 0
   intf  2                                     IP disabled on this interface
Set for which interface address [0.0.0.0]? 192.7.1.253
Do you wish to send network routes? (Yes/No)(Y)? y
Do you wish to send subnetwork routes? (Yes/No)(Y)? y
Do you wish to send static routes? (Yes/No)(N)? n
Do you wish to send direct routes? (Yes/No)(Y)? y
Do you wish to send default routes? (Yes/No)(N)? n
Do you wish poisoned reverse ? (Yes/No)(Y)? y
RIP config>
```

The meaning of each field is:

Do you wish to send network routes? — If set , the router sends all network level routes in RIP responses sent from this IP address.

Do you wish to send subnetwork routes? — If set, the router sends appropriate subnet level routes in RIP responses sent from this IP address. Sending a subnet route depends on the configuration and the "Do you wish to allow disconnected subnetted networks" flag. If the type of aggregation is "Use aggregation routes" and the route is aggregated by the aggregation route (Aggr), only that route is sent (Aggr). If the aggregation is configured as "Aggregate subnets" then both are sent i.e. the subnet routes as well as the subnet aggregation (Sbnt). If the "Do you wish to allow disconnected subnetted networks" flag is disabled: for a given interface only those subnet routes which belong to the same IP network as the interface are included.

For the other interfaces the network route is included. E.g. destination subnet route: 192.6.1.144, mask: 255.255.255.248, if the outgoing interface address is 192.6.1.x, the route will send as is. But if the outgoing interface belongs to a different IP network e.g. 193.5.1.x, the route sent is the added destination network: 192.6.1.0 mask: 255.255.255.0. If the "Do you wish to allow disconnected subnetted networks" flag is enabled, then you can also send subnets via interfaces which do not pertain to the subnet.

Do you wish to send static routes? — If set, the router advertises all statically configured routes in RIP responses sent from this IP address.

Do you wish to send direct routes? — If set, the router advertises all directly connected networks in RIP responses sent from this IP address. If this is not activated it will only send to directly connected networks participating in RIP protocol (i.e. that have RIP enabled for sending or reception). This is active by default.

Do you wish to send default routes? — If set, the router advertises a default route in RIP responses from this IP address if the router itself has a default router in operation. The route to the default router is advertised as a route to destination 0.0.0.0.

Do you wish poisoned reverse? This option is set by default. Enable or disable the poisoned reverse in the split-horizon process. When the routes learnt from a gateway are enabled, they are broadcast with infinite metrics (16). If this is disabled these routes are not broadcast. The protocol convergence is quicker when this is enabled.

The set of routes to send through a specific interface also depends on the type of aggregation configured.

i) SET TIMERS

There exist three timers which control the algorithm function (as defined in the RIP RFC). These values should only be changed in certain exceptional cases and the network manager should be aware of the possible consequences.

Example:

```
RIP config> SET TIMERS
Enter periodic sending timer [30]? 30
Enter route expire timer [180]? 180
Enter route garbage timer [120]? 120
RIP config>
```

The meaning of each field is:

Periodic sending timer the default value is 30 seconds and is the time between sending the periodic responses.

Route expire timer the default value is 180 seconds. If this time should elapse without a response refreshing the route, this route is considered invalid.

Route garbage timer the default value is 120 seconds. Once the route is considered invalid, it is maintained in the routing tables for 120 seconds with metric value 16 (indefinite) so the neighboring RIP routers realize that it is going to be deleted.

1.7. LIST

Syntax:

```
RIP config> LIST
ADDRESS-OPTIONS
ALL
AS-LABELS
LIMIT-RIP
TIMERS
```

a) LIST ADDRESS-OPTIONS

Use the **LIST ADDRESS-OPTIONS** command to see all the options for a determined interface.

Example:

```
RIP config> LIST ADDRESS-OPTIONS
Enter address [0.0.0.0]? 192.7.1.253
    Address: 192.7.1.253
        Send network routes:.............Yes
        Send subnetwork routes:..........Yes
        Send static routes:..............No
        Send direct routes:..............Yes
        Send default routes:.............No
        Poison reverse enabled:..........Yes
        Autonomous system label:.........0
        Sending compatibility:...........RIP2 Multicast.
        Receive network routes:..........Yes
        Receive subnetwork routes:.......Yes
        Overwrite default routes:........No
        Overwrite static routes:.........No
        Receiving compatibility:.........RIP2.
        Authentication:..................Clear password.
        Aggregation type:................Do not aggregate.
        Allow disconnected subnetted networks:..Yes
        Per interface additional cost: 0
RIP config>
```

b) LIST ALL

Use the **LIST ALL** command to obtain a list of all configured parameters.

Example:

```
RIP config> LIST ALL
RIP: enabled
RIP default origination: OSPF, cost = 1
Options per interface address:
Interface:  0
    Address: 192.7.1.253
        Send network routes:.............Yes
        Send subnetwork routes:..........Yes
        Send static routes:..............No
        Send direct routes:..............Yes
        Send default routes:.............No
        Poison reverse enabled:..........Yes
        Autonomous system label:.........0
        Sending compatibility:...........RIP2 Multicast.
        Receive network routes:..........Yes
        Receive subnetwork routes:.......Yes
        Overwrite default routes:........No
        Overwrite static routes:.........No
        Receiving compatibility:.........RIP2.
        Authentication:..................Clear password.
        Aggregation type:................Do not aggregate.
        Allow disconnected subnetted networks:..Yes
        Per interface additional cost: 0
more ?
Interface:  1
    Address: 10.0.0.3
        Send network routes:.............Yes
        Send subnetwork routes:..........Yes
        Send static routes:..............No
        Send direct routes:..............Yes
        Send default routes:.............No
        Poison reverse enabled:..........Yes
        Autonomous system label:.........0
        Sending compatibility:...........RIP2 Broadcast.
        Receive network routes:..........Yes
        Receive subnetwork routes:.......Yes
        Overwrite default routes:........No
        Overwrite static routes:.........No
        Receiving compatibility:.........RIP1 or RIP2.
        Authentication:..................No.
        Aggregation type:................Do not aggregate.
        Allow disconnected subnetted networks:..Yes
        Per interface additional cost: 0
more ?
Address: 192.3.1.2
        Send network routes:.............Yes
        Send subnetwork routes:..........Yes
        Send static routes:..............No
        Send direct routes:..............Yes
        Send default routes:.............No
        Poison reverse enabled:..........Yes
        Autonomous system label:.........0
        Sending compatibility:...........RIP2 Broadcast.
        Receive network routes:..........Yes
        Receive subnetwork routes:.......Yes
        Overwrite default routes:........No
        Overwrite static routes:.........No
        Receiving compatibility:.........RIP1 or RIP2.
        Authentication:..................No.
        Aggregation type:................Do not aggregate.
        Allow disconnected subnetted networks:..Yes
        Per interface additional cost: 0
more ?
Accept RIP updates always for:
[NONE]
```

```
RIP timers:
Periodic sending timer: 30
Route expire timer: 180
Route garbage timer: 120
Limit RIP: disabled.
RIP config>
```

c) LIST AS-LABELS

Use the **LIST AS-LABELS** command to obtain a list of all the address labels identifying the Autonomous Systems (AS) configured in this address.

Example:

```
RIP config> LIST AS-LABELS
AS labels per interface
10.0.0.3        0
192.3.1.2       0
192.7.1.253     0
RIP config>
```

d) LIST LIMIT-RIP

Use the **LIST LIMIT-RIP** command to see the LIMIT-RIP option.

Example:

```
RIP config> LIST LIMIT-RIP
Limit RIP: disabled.
RIP config>
```

e) LIST TIMERS

Use the **LIST TIMERS** command to obtain a list of the values configured in the timers.

Example:

```
RIP config> LIST TIMERS
RIP timers:
Periodic sending timer: 30
Route expire timer: 180
Route garbage timer: 120
RIP config>
```

1.8. EXIT

Use the **EXIT** command to return to the previous prompt level.

Syntax:

```
RIP config> EXIT
```

Example:

```
RIP config> EXIT
Config>
```

Chapter 3
RIP Monitoring

1. RIP Monitoring commands

This section summarizes and then explains all RIP monitoring commands. To access the RIP monitoring commands you must enter:

```
*P 3
Console Operator
+PROTOCOL RIP
RIP protocol monitor
RIP>
```

Command	Function
? (HELP)	List the commands or associated options.
LIST	Shows the RIP statistics.
EXIT	Exits the RIP monitoring process.

The letters typed in **bold** are the minimum number of characters which need to be keyed in order to activate the command.

1.1. ? (HELP)

Use the **?** (HELP) command to list the commands that are available from the current prompt. You can also enter a ? after a specific command name to list its options.

Syntax:

```
RIP> ?
```

Example:

```
RIP> ?
LIST
EXIT
RIP>
```

1.2. LIST

Use the **LIST** command to show RIP statistics. This also shows the detailed statistics for each interface.

Syntax:

```
RIP> LIST
```

Example:

```
RIP> LIST
RIP globals:
Route changes due to RIP:.....................0
Responses sent due to received requests:........0

RIP per interface:
                Pack. rx errors    Ruotes rx errors    Triggered updates tx
Interface:  0
192.7.1.253                   0                   0                          0
Interface:  1
192.3.1.2                     0                   0                          5
10.0.0.3                      0                   0                          5
Interface:  2
RIP>
```

The meaning of each field is:

Pack rx errors	Counts the number of packets received with errors.
Routes rx errors	Counts the number or routes received with errors.
Triggered updates tx	Counts the updating for sent route changes.

1.3. EXIT

Use the **EXIT** command to return to the previous prompt level.

Syntax:

```
RIP> EXIT
```

Example:

```
RIP> EXIT
```