Teldat Router

ARP and InARP Protocol

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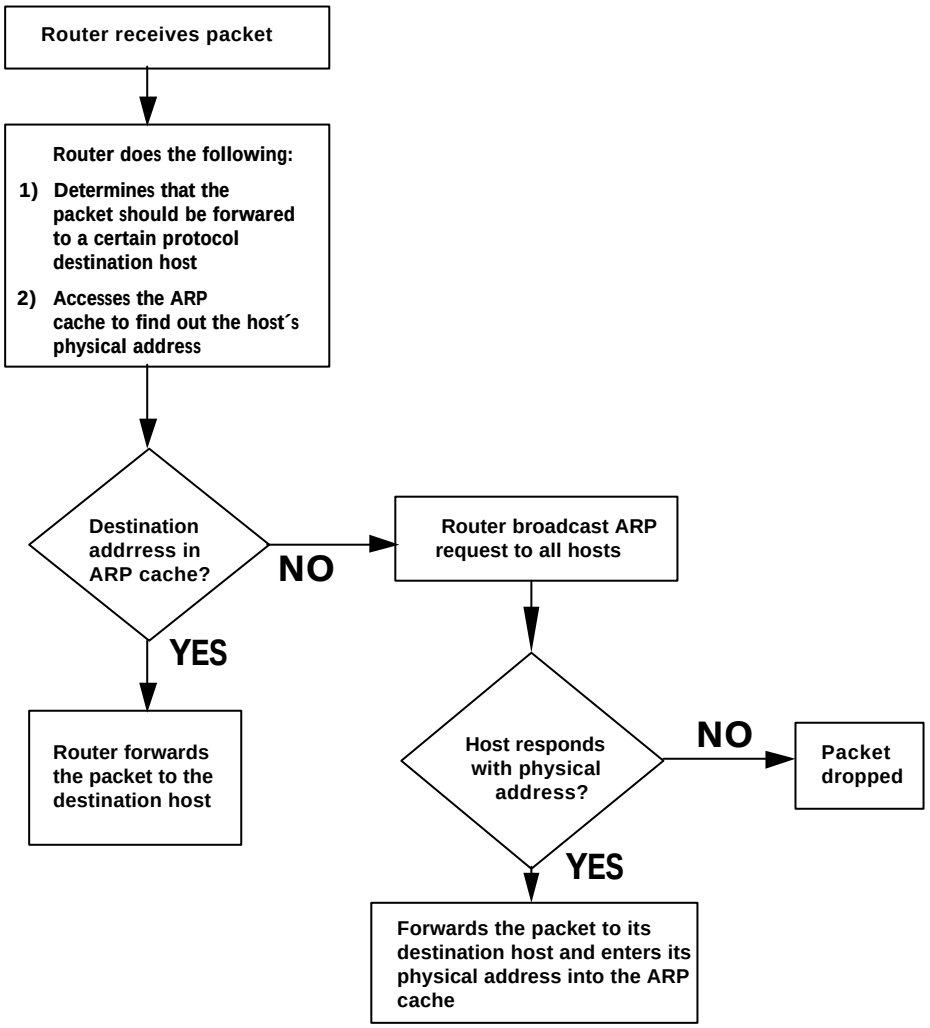
Chapter 1
Introduction

1. ARP Protocol

The ARP Protocol is a low-level protocol that dynamically maps network layer addresses to physical medium access control (MAC) addresses. Given only the network layer address of the destination system, ARP locates the MAC address of the destination host within the same network segment.

For example, a router receives an IP packet destined for a host connected to one of its LANs. The packet only contains a 32-bit IP destination address. To construct the data link layer header, a router acquires the physical MAC address of the destination host. Then, the router maps that address to the 32-bit IP address. This function is called *address resolution*. The following figure illustrates how ARP works.



When a router translates a network layer address to a physical address, the router accesses the ARP (translation) cache. The ARP cache contains the physical MAC address that corresponds to that network layer address. If the address is missing, the router broadcast an ARP request to all hosts to locate the correct physical MAC address. The destination host with the correct physical MAC address responds to the router. The router then sends the packet to the destination host and enters the physical MAC address into the translation cache for future use.

2. InARP Protocol

The Inverse ARP protocol (InARP) allows you to check and assign the protocol addresses that correspond to specific hardware addresses. This protocol is usually used in devices with Frame Relay lines that may have DLCIs configured, the equivalent to a hardware address in Frame Relay, and associated to a permanent Virtual Circuit, but the protocol address of the device on the other side of the connection is unknown. This protocol can also be used in other networks in similar circumstances.

The basic InARP protocol operates essentially in the same way as the ARP except for the fact that InARP does not send broadcast packets. This is due to the fact that the hardware address of the remote device is known (it is the DLCI). When a circuit is activated for the first time, this one sends an InARP packet that contain information about its hardware address, protocol address and the hardware address of the remote device. This packet is sent directly to the remote device and, when the latter receives it the protocol address and hardware address must be put in its ARP cache just as it would do with any ARP package that arrives there.

The difference between this and an ARP packet is that when a device receives an InARP package it assumes directly that it is for it and does not continue to broadcast it. Moreover, every time an InARP request is received, the device must reply with an answer package sending it to the address of the device that made the request and in which information on the protocol address of the device that is answering is introduced.

When the device making the request receives the InARP answer, it must update its input in the ARP table with the new protocol address. The addresses learnt via InARP can be updated or invalidated in certain circumstances.

To sum up, the Inverse ARP protocol (InARP) allows a Frame Relay device to discover the protocol address of the device found at the other end of the line.

Chapter 2
Configuration

1. ARP Protocol Configuration Commands

NOTE: ARP Inverse protocol configuration is carried out inside the ARP protocol.

This section explains the ARP configuration commands. To enter in the ARP protocol configuration environment you must introduce the following commands:

```
*PROCESS 4
Config>PROTOCOL ARP

-- ARP user configuration --
ARP config>
```

The following table summarizes the ARP protocol configuration commands. The letters typed in **bold** are the minimum number of characters that need to be keyed in order to activate the command.

Command	Function
? (HELP)	Lists available commands or options.
AUTO-REFRESH	Enables the capacity of the router to send an ARP petition based on the information in the table.
CHANGE	Changes a MAC address translation entry.
ENTRY	Adds a MAC address.
INVERSE-ARP	Globally enables the sending of InARP messages.
LIST	Lists ARP configuration data in SRAM.
NO	Deletes a MAC address, disables inverse ARP and auto-refresh.
SET	Sets the timeout value of the refresh timer.
EXIT	Return to the previous prompt.

1.1. ? (HELP)

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

Syntax:

```
ARP config> ?
```

Example:

```
ARP config> ?
AUTO-REFRESH      Send another ARP request based on the table information
CHANGE            Modify the association between an IP and a MAC
ENTRY             Globally associate an IP address with a MAC address
INVERSE-ARP       Globally enables the InARP message sending
LIST              Display the ARP and the Inverse ARP configuration
NO
SET               Configure the parameters related to the ARP and ARP Inverse
EXIT
ARP config>
```

1.2. AUTO-REFRESH

The auto-refresh function is the router's capability to send another ARP request based on the table information. This request is sent directly to the MAC address in the current translation instead of a broadcast to all the hosts. If auto refresh is enabled, an additional ARP request is sent before the refresh timer is allowed to expire.

Example:

```
ARP config> AUTO-REFRESH
ARP config>
```

1.3. CHANGE

Use this command to modify the global association between an IP address and a MAC address in the ARP cache. The physical address (MAC address) of the example is refereed to the address that we want to modify. `Public entry` specifies that the software respond to ARP requests as if it was the owner of the specified IP address.

Syntax:

```
ARP config> CHANGE ?
ENTRY
```

Example:

```
ARP config> CHANGE ENTRY
Interface Name [ethernet0/0]? ETHERNET0/0
IP Address [0.0.0.0]? 172.24.51.104
Destination MAC address [00-00-00-00-00-00]? 00-10-B5-F5-26-19
Public entry (Y/N) [N]? N
ARP config>
```

1.4. ENTRY

This command permits you to add a static assigment between a MAC addressand an IP address in the ARP cache. `Public entry` specifies that the software responds to ARP protocol petitions as if were the proprietor of the specified IP address.

Syntax:

```
ARP config> ENTRY
```

Example:

```
ARP config>ENTRY
Interface Name [ethernet0/0]? ETHERNET0/0
IP Address [0.0.0.0]? 172.24.51.104
Destination MAC address [00-00-00-00-00-00]? 00-10-B5-F5-26-19
public       public this entry
private      private entry
Type an option [private]? PRIVATE
ARP config>
```

1.5. INVERSE-ARP

This option globally enables the InARP message sending. Subsequently, through the commands situated in the interfaces supporting this protocol, you can enable/disable by interface and circuit (see Frame Relay document number Dm 703-I).

Example:

```
ARP config> INVERSE-ARP
ARP config>
```

1.6. LIST

Use the **LIST** command to display the ARP protocol and the Inverse ARP protocol configuration parameters.

Syntax:

```
ARP config> LIST ?
ARP
INVERSE-ARP
```

a) LIST ARP

Use the **LIST ARP** command in order to view the ARP protocol configuration parameters.

Syntax:

```
ARP config> LIST ARP ?
ALL
CONFIG
ENTRY
```

LIST ARP ALL

Displays the ARP protocol configuration parameters as well as the statically configured entries.

Example:

```
ARP config> LIST ARP ALL
ARP configuration:
Refresh timeout: 5 minutes
Auto refresh: disabled
MAC address translation configuration:
Interface      IP Addr.        MAC Addr
ethernet0/0     172.24.51.104   00-10-B5-F5-26-19
ARP config>
```

LIST ARP CONFIG

Displays the ARP protocol configuration parameters.

Example:

```
ARP config> LIST ARP CONFIG
ARP configuration:
Refresh timeout: 5 minutes
Auto refresh: disabled
ARP config>
```

LIST ARP ENTRY

Lists the statically configured ARP protocol entries.

Example:

```
ARP config> LIST ARP ENTRY
MAC address translation configuration:
Interface      IP Addr.        MAC Addr
ethernet0/0     172.24.51.104   00-10-B5-F5-26-19
ARP config>
```

b) LIST INVERSE-ARP

Use the **LIST INVERSE-ARP** command in order to view the ARP Inverse protocol configuration parameters.

Syntax:

```
ARP config> LIST INVERSE-ARP
```

Example:

```
ARP config> LIST INVERSE-ARP
Inverse ARP configuration:
Inverse ARP is On
Inverse ARP Refresh Timeout  0 minutes
Inverse ARP Retry Timer 0 minutes
ARP config>
```

1.7. NO

This command permits you to eliminate a static assignment between a MAC address and an IP address previously added through configuration.

Syntax:

```
ARP config>NO ?
AUTO-REFRESH      Send another ARP request based on the table information
ENTRY             Globally associate an IP address with a MAC address
INVERSE-ARP       Globally enables the InARP message sending
```

a) NO AUTO-REFRESH

The auto-refresh function is the router's capability to send another ARP request based on the table information. This request is sent directly to the MAC address in the current translation instead of a broadcast to all the hosts.

Example:

```
ARP config> NO AUTO-REFRESH
ARP config>
```

b) NO ENTRY

This command permits you to eliminate a static assignment between a MAC address and an IP address previously added through configuration.

Example:

```
ARP config> NO ENTRY
Interface Name [ethernet0/0]? ETHERNET0/0
IP Address [0.0.0.0]? 172.24.51.104
Entry deleted
ARP config>
```

c) NO INVERSE-ARP

This option globally disables the InARP message sending and ignore the InARP message reception.

Example:

```
ARP config> NO INVERSE-ARP
ARP config>
```

1.8. SET

Use the **SET** command in order to configure the parameters related to the ARP and ARP Inverse protocols.

Syntax:

```
ARP config> SET ?
ARP
INVERSE-ARP
```

a) SET ARP

Use the **SET ARP** command to set the timeout value for the ARP Protocol refresh timer. To change the timeout value for the refresh timer, enter the timeout value in minutes. A setting of 0 disables the refresh timer.

Syntax:

```
ARP config> SET ARP ?
REFRESH-TIMER
```

Example:

```
ARP config> SET REFRESH-TIMER
timeout (in minutes) [5]?
ARP config>
```

b) SET INVERSE-ARP

Use the **SET INVERSE-ARP** to establish the refresh time values and the time between ARP Inverse protocol retries.

Syntax:

```
ARP config> SET INVERSE-ARP ?
REFRESH-TIMER
RETRY-TIMER
```

SET INVERSE-ARP REFRESH-TIMER

Use the **SET INVERSE-ARP REFRESH-TIMER** commands in order to establish the refresh time value. In order to modify this, simply enter the command followed by a figure in minutes. Value 0 disables refresh.

If you configure a value distinct to zero in the refresh timer, the learnt ARP Inverse entries are requested again, and in cases where the response does not arrive within the configured refresh time, they are deleted.

Example:

```
ARP config> SET INVERSE-ARP REFRESH-TIMER
Inverse ARP Refresh Timeout (in minutes) [0]? 5
ARP config>
```

SET INVERSE-ARP RETRY-TIMER

Use the **SET INVERSE-ARP RETRY-TIMER** command to establish the time value between retries. In order to modify this, simply enter the command followed by a figure in minutes. Value 0 disables the retries.

If you configure a value distinct to zero for retries in the timer, each interface circuit periodically sends a petition until a response is obtained.

Example:

```
ARP config> SET INVERSE-ARP RETRY-TIMER
Inverse ARP Retry Timer (in minutes) [0]? 1
ARP config>
```

1.9. EXIT

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

Syntax:

```
ARP config> EXIT
```

Example:

```
ARP config> EXIT
Config>
```

Chapter 3
Monitoring

1. ARP Protocol Monitoring Commands

This section explains the ARP monitoring commands. To enter in the ARP protocol monitoring environment you must introduce the following commands:

```
*PROCESS 3

+PROTOCOL ARP
ARP>
```

The following table summarizes the ARP protocol monitoring commands. The letters typed in **bold** are the minimum number of characters that need to be keyed in order to activate the command.

Command	Function
? (HELP)	Lists available commands or options.
DELETE	Deletes a MAC address translation entry.
DUMP	Displays the configured and learnt ARP inputs for an interface.
EXIT	Return to the previous prompt.

1.1. ? (HELP)

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

Syntax:

```
ARP> ?
```

Example:

```
ARP> ?
DELETE
DUMP
EXIT
ARP>
```

1.2. DELETE

This command allows you to delete the learnt ARP inputs. This is useful when, due to changes in device configurations of a network, you already know the ARP associations are invalid . In this case the **DELETE** command accelerates the process allowing the correct inputs to be learnt.

This command does not actually delete the inputs, it reduces the life of each to a minimum.

Syntax:

```
ARP>DELETE
```

Example:

```
ARP>DELETE
Enter interface:  [ethernet0/0]? ETHERNET0/0
OK
ARP>
```

1.3. DUMP

This command allows you to see all the MAC addresses associated with protocol addresses for a specific interface. Both the configured and the learnt inputs are displayed. In the Refresh column the time given for the configured inputs is zero. The time given for the learnt inputs is the number of minutes after which the input is deleted or automatically refreshed.

Syntax:

```
ARP>DUMP
```

Example of an interface with ARP.

Example:

```
ARP> DUMP
Enter interface:  [ethernet0/0]? ETHERNET0/0

ARP entries for IP protocol
MAC address           IP address       Refresh
00-00-E8-3D-25-7F     192.6.5.1        2
08-00-09-A3-04-21     192.6.1.1        3
00-C0-4F-71-5C-56     192.6.1.33       2
02-00-00-00-00-00     198.198.198.1    4
00-60-97-3E-4E-F5     192.6.1.162      2
00-60-97-83-1C-72     192.6.1.195      3
08-00-20-78-14-DC     192.6.1.3        3
00-A0-26-40-8F-30     192.6.1.131      1
00-60-08-79-32-DE     192.6.1.163      3
00-20-AF-44-2B-08     192.6.5.3        3
00-C0-4F-95-C4-F9     192.6.1.36       1
00-A0-24-7C-EC-FD     192.6.1.164      5
ARP>
```

Example of an interface with ARP-Inverse.

Example:

```
ARP> DUMP
Enter interface:  [ethernet0/0]? SERIAL0/0

ARP entries for IP protocol
DLCI  IP address      Refresh
17    ???.???.???.??? 1 ----> Indicates this is pending a petition with retries.
18    10.10.10.10     5
19    10.10.10.9      3
ARP>
```

1.4. EXIT

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

Syntax:

```
ARP> EXIT
```

Example:

```
ARP> EXIT
+
```