



## **ARP and InARP Protocol**

Teldat-Dm 701-I

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## I Related Documents

Teldat-DM703-I Frame Relay

Teldat-DM704-I Configuration and Monitoring

# Chapter 1 Introduction

## 1.1 ARP Protocol

The **ARP Protocol** is a low-level protocol that dynamically maps network layer addresses to physical medium access control (MAC) addresses. When given the network layer address of the destination system, the ARP protocol is able to locate 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 build the data link layer header, a router acquires the physical MAC address of the destination host. Then, the router maps said address to the 32-bit IP address. This function is called *address resolution*.

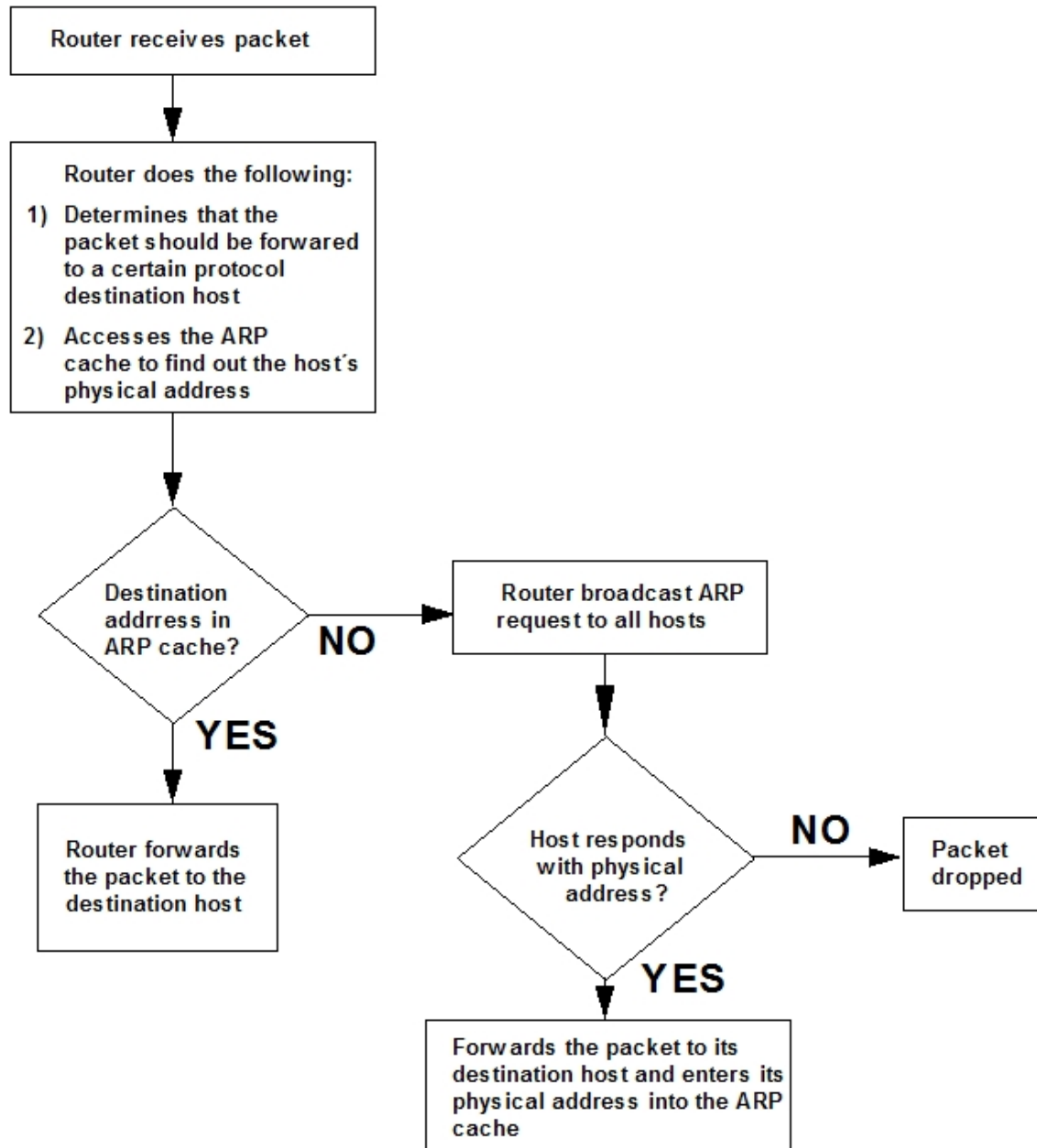


Fig. 1: ARP Protocol

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 broadcasts 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.

## 1.2 InARP Protocol

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

Essentially, the basic **InARP protocol** operates just like the ARP one, except for the fact that InARP does not send broadcast packets because the hardware address of the remote device is known (it is the DLCI). When a circuit is activated for the first time, it sends an InARP packet that contains 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 are added to its ARP cache (as if the packet received was an ARP package).

The difference between an InARP and an ARP packet is that, when a device receives an InARP package, it automatically assumes it has reached its final destination and stops broadcasting it. Moreover, every time an InARP request is received, the device must reply with an answer package. This is sent to the address of the device that made the request and contains the protocol address of the device that is answering.

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

In brief, the **Inverse ARP protocol** (InARP) allows a Frame Relay device to discover the protocol address of the device that is at the other end of the line.

## Chapter 2 Configuration

### 2.1 ARP Protocol Configuration Commands



#### Note

ARP Inverse protocol configuration is carried out inside the **ARP protocol**.

This section describes the ARP configuration commands. To access the **ARP protocol** configuration environment you must enter the following commands:

```
*process 4
Config> protocol arp

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

The following table summarizes the **ARP protocol** configuration commands.

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

#### 2.1.1 ? (HELP)

Use ? (HELP) to list the available commands at 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
  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>
```



## 2.1.2 AUTO-REFRESH

The auto-refresh function controls the router's capability to send an ARP request based on the table information. This request is sent directly to the MAC address in the current translation, instead of being broadcast to all 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>
```

## 2.1.3 ENTRY

This command allows you to add a static assignment between a MAC address and an IP address in the ARP cache. When using a public entry, the software responds to **ARP protocol** petitions as if it were the proprietor of the specified IP address. If a MAC address is not specified, or if its value is 00-00-00-00-00-00, a public entry is created with the specified interface MAC address.

*Syntax:*

```
ARP config>entry ?
<interface>   Interface name
```

*Example:*

```
ARP config>entry ethernet0/0 172.24.51.4 00-10-B5-F5-26-19 public
ARP config>
```

## 2.1.4 INVERSE-ARP

This option globally enables InARP message sending. Through the commands found in the interfaces that support this protocol, you can enable/disable this option per interface and circuit (see *Teldat-Dm 703-I Frame Relay*).

*Example:*

```
ARP config>inverse-arp
ARP config>
```

## 2.1.5 LIST

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

*Syntax:*

```
ARP config>list ?
  arp           View the ARP protocol configuration parameters
  inverse-arp   view the ARP Inverse protocol configuration
```

### 2.1.5.1 LIST ARP

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

*Syntax:*

```
ARP config>list arp ?
  all          ARP protocol configuration and statically configured entries
  config       Displays the ARP protocol configuration parameters
  entry        Lists the statically configured ARP protocol entries
```

#### 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>
```

### 2.1.5.2 LIST INVERSE-ARP

Use the **LIST INVERSE-ARP** command 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>
```

## 2.1.6 NO

This command allows you to delete 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 InARP message sending
```

### 2.1.6.1 NO AUTO-REFRESH

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

*Example:*

```
ARP config>no auto-refresh
ARP config>
```

### 2.1.6.2 NO ENTRY

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

*Example:*

```
ARP config>no entry ethernet0/0 172.24.51.104
Entry deleted
ARP config>
```

### 2.1.6.3 NO INVERSE-ARP

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

*Example:*

```
ARP config>no inverse-arp
ARP config>
```

## 2.1.7 SET

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

*Syntax:*

```
ARP config>set ?
  arp           Timeout value for the ARP Protocol refresh timer
  inverse-arp   Establish the refresh time values and the time between retries
```

### 2.1.7.1 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 auto refresh.

*Syntax:*

```
ARP config>set arp ?
  refresh-timer Timeout value for the ARP Protocol refresh timer
```

*Example:*

```
ARP config>set arp refresh-timer 01:00
ARP config>
```

### 2.1.7.2 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   Establish the refresh time value
  retry-timer     Establish the time value between retries
```

### SET INVERSE-ARP REFRESH-TIMER

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

If you configure a non-zero value in the refresh timer, the known ARP Inverse entries are requested again. If the response does not arrive within the configured refresh time, they are deleted.

*Example:*

```
ARP config>set inverse-arp refresh-timer 01:00
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 modi-

fy this, simply enter the command followed by a figure in minutes and seconds. Value 0 disables the retries.

If you configure a non-zero value 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 01:00
ARP config>
```

## 2.1.8 EXIT

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

*Syntax:*

```
ARP config>exit
```

*Example:*

```
ARP config>exit
Config>
```

## 2.2 Command Summary

AUTOREFRESH

NO AUTOREFRESH

ENTRY <interface> <ip-address> <mac>

NO ENTRY <interface> <ip-address> <mac>

INVERSE-ARP

NO INVERSE-ARP

LIST ARP

INVERSE-ARP

SET

EXIT

## Chapter 3 Monitoring

### 3.1 ARP Protocol Monitoring Commands

This section focuses on the ARP monitoring commands. To access the **ARP protocol** monitoring environment, you must enter the following commands:

```
*process 3
+protocol arp
ARP+
```

The following table summarizes the **ARP protocol** monitoring commands.

Command	Function
? (AYUDA)	Lists the available commands or options.
CLEAR	Deletes the ARP entries learned by the interface.
DUMP	Displays the configured and learned ARP entries for an interface.
EXIT	Returns to the previous prompt.

#### 3.1.1 ? (HELP)

Use ? (HELP) to list all the available commands.

*Syntax:*

```
ARP+?
```

*Example:*

```
ARP+?
  clear   Deletes the ARP entries learned by an interface
  dump    Displays the configured and learned ARP entries for an interface
  exit    Exit to parent menu
ARP+
```

#### 3.1.2 CLEAR

This command allows you to delete the ARP entries learned through an interface. This is useful when, due to changes in the device configuration of a network, you already know the ARP associations are invalid. In this case, the **CLEAR** command accelerates the process allowing the correct entries to be learned.

Additionally, you can type a text string to delete only the entries that match that string. When this command completes, it will print the entries that were deleted.

This command does not delete the entries as such, but it reduces their lives to a minimum.

*Syntax:*

```
ARP+clear <interface> [match <string>]
```

*Example 1:*

```
ARP+clear ethernet0/0
OK
ARP+
```

*Example 2:*

```
ARP+clear ethernet0/0 match 20
```

```

Deleting matching entries...

MAC address      IP address      Timeout (min)
00-1b-53-48-a5-64  192.168.214.20  210
00-23-54-31-a6-47  192.168.212.20  232

  2 matching entries deleted

OK
ARP+

```

In this example, the command deletes all entries that match the "20" string.

#### Example 3:

```

ARP+clear ethernet0/0 match 212.223

Deleting matching entries...

MAC address      IP address      Timeout (min)
6c-62-6d-82-40-a3  192.168.212.223  204

  1 matching entry deleted

OK
ARP+

```

By using a dot in the match string, only IP addresses will be searched.

#### Example 4:

```

ARP+clear ethernet0/0 match 5b-4c

Deleting matching entries...

MAC address      IP address      Timeout (min)
e4-11-5b-4c-54-c9  192.168.212.29  240

  1 matching entry deleted

OK
ARP+

```

Using - or : in the string will search only MAC addresses.

#### Command history:

Release	Modification
11.00.05	The <b>match</b> option was introduced as of version 11.00.05.
11.01.01	The <b>match</b> option was introduced as of version 11.01.01

### 3.1.3 DUMP

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

Additionally, you can type a text string to show only the matching entries.

#### Syntax:

```
ARP+dump <interface> [match <string>]
```

Examples of an interface with ARP.

#### Example 1:

```
ARP+dump 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 2:**

```

ARP+dump ethernet0/0 match 29

ARP entries for IP protocol
MAC address      IP address      Timeout (min)
00-0c-29-c4-0c-d7  192.168.212.189  214
e4-11-5b-4c-54-c9  192.168.212.29   240
ARP+

```

In this example, string "29" is set as the match string. Therefore, only the entries that match the string in some field are shown.

**Example 3:**

```

ARP+dump ethernet0/0 match 168.213

ARP entries for IP protocol
MAC address      IP address      Timeout (min)
00-1a-92-9b-67-d2  192.168.213.140  240
00-17-31-de-b4-15  192.168.213.16   240
00-13-d3-c9-94-cf  192.168.213.81   234
50-7b-9d-53-2c-71  192.168.213.148  220
00-a0-26-ae-02-59  192.168.213.245  234
00-a0-26-92-00-08  192.168.213.151  161
00-a0-26-92-00-08  192.168.213.152  164
00-0c-76-5c-73-27  192.168.213.57   236
40-40-22-00-dd-39  192.168.213.157  162
ARP+

```

In this example, and since a dot has been added to the string, only the IP address field is searched when looking for a match.

**Example 4:**

```

ARP+dump ethernet0/0 match 00-0c

ARP entries for IP protocol
MAC address      IP address      Timeout (min)
00-0c-76-5c-73-27  192.168.213.57   239
00-0c-29-c4-0c-d7  192.168.212.189  218
00-0c-76-5c-73-2d  192.168.212.222  236
ARP+

```

By using - or : in the string, only the MAC address field will be searched for when looking for a match.

Example of an interface with ARP-Inverse.

**Example:**

```

ARP+dump 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+
```

#### Command history:

Release	Modification
11.00.05	The <b>match</b> option was introduced as of version 11.00.05.
11.01.01	The <b>match</b> option was introduced as of version 11.01.01

### 3.1.4 EXIT

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

#### Syntax:

```
ARP+exit
```

#### Example:

```
ARP+exit
+
```



## Appendix A Custom Parameters

### A.1 Custom Parameters Supported

Teldat devices have parameters that can be personalized to modify device behavior *under special circumstances* (customized versions). For further information on the activation, deactivation and listing of these parameters, please see the help section for the **enable patch**, **disable patch** and **list patch** commands respectively. They can be found in manual *Teldat-DM704-I*, under *Configuration and Monitoring, Chapter 2*.

The **ARP protocol** in the Teldat router is equipped with the following custom parameters:

#### **ARPI\_SND\_LCL**

Using this patch, you can modify the Inverse **ARP protocol** behavior.

Value: 0                                      The Inverse ARP protocol does not send the configured internal IP address.

Value: 1                                      The Inverse ARP protocol sends the configured internal IP address.

This value takes immediate (dynamic) effect without having to reboot the device.