Chapter 8
ARP and RARP

- ARP
- ARP Design
- RARP

Figure 8-1
ARP and RARP

Logical address

ARP
Physical address

Logical address

RARP
Physical address
### Figure 8-2: ARP operation

**I am the node you are looking for and my physical address is:**

A46EF45983AB

**I am looking for the physical address of a node whose IP address is:**

141.23.56.23

#### a. ARP request is broadcast

#### b. ARP reply is unicast

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### Figure 8-3: ARP packet

<table>
<thead>
<tr>
<th>Hardware Type</th>
<th>Protocol Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware length</td>
<td>Protocol length</td>
</tr>
<tr>
<td>Request 1, Reply 2</td>
<td></td>
</tr>
</tbody>
</table>

**Sender hardware address**

(For example, 6 bytes for Ethernet)

**Sender protocol address**

(For example, 4 bytes for IP)

**Target hardware address**

(For example, 6 bytes for Ethernet)  
(I is not filled in a request)

**Target protocol address**

(For example, 4 bytes for IP)
Figure 8-4
Encapsulation of ARP packet

Type: 0x0806

ARP request or reply packet

<table>
<thead>
<tr>
<th>Preamble and SFD</th>
<th>Destination address</th>
<th>Source address</th>
<th>Type</th>
<th>Data</th>
<th>CRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 bytes</td>
<td>6 bytes</td>
<td>6 bytes</td>
<td>2 bytes</td>
<td></td>
<td>4 bytes</td>
</tr>
</tbody>
</table>

Type: 0x0806

Figure 8-5 part 1
Four cases using ARP

Case 1. A host has a packet to send to another host on the same network.

Case 2. A host wants to send a packet to another host on another network. It must first be delivered to the default router.
Case 3. A router receives a packet to be sent to a host on another network. It must first be delivered to the appropriate router.

Target IP address: Destination address in the IP datagram

Case 4. A router receives a packet to be sent to a host on the same network.

Target IP address: IP address of the appropriate router found in the routing table

The proxy ARP router replies to any ARP request received for destinations 141.23.56.21, 141.23.56.22, and 141.23.56.23.
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Figure 8-7

ARP components

IP layer

ARP

Output module

Cache table

Input module

Cache-control module

Data link layer

ARP packet (request)

ARP packet (request or reply)

ARP packet (reply)

IP packet

ARP packet with resolved hardware address

Figure 8-8

RARP operation

My physical address is A46EA4578236. I am looking for my IP address.

Request

Host

RARP server

a. RARP request is broadcast

Your IP address is: 141.14.56.21

Reply

Host

RARP server

b. RARP reply is unicast

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Figure 8-9

RARP packet

<table>
<thead>
<tr>
<th>Hardware type</th>
<th>Protocol type</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware length</td>
<td>Protocol length</td>
<td>Request 3, Reply 4</td>
</tr>
</tbody>
</table>

Sender hardware address
(For example, 6 bytes for Ethernet)

Sender protocol address
(For example, 4 bytes for IP)
(It is not filled for request)

Target hardware address
(For example, 6 bytes for Ethernet)
(It is not filled for request)

Target protocol address
(For example, 4 bytes for IP)
(It is not filled for request)

Figure 8-10

Encapsulation of RARP packet

Type: 0x8035

RARP request or reply packet

Preamble and SFD
8 bytes

Destination address
6 bytes

Source address
6 bytes

Type
2 bytes

Data

CRC
4 bytes