

Chapter 15: Address Resolution Protocol

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- ❑ Address resolution problem
- ❑ Address resolution techniques
- ❑ ARP protocol
- ❑ Proxy ARP, Reverse ARP, and Inverse ARP

Address Resolution Protocol (ARP)



- ❑ Problem: Given an IP address find the MAC address
- ❑ Solution 1. Table Lookup:
Searching or indexing to get MAC addresses

IP Address	MAC Address
197.15.3.1	0A:4B:00:00:07:08
197.15.3.2	0B:4B:00:00:07:00
197.15.3.3	0A:5B:00:01:01:03
197.15.3.4	04:06:07:08:09:10
197.15.3.5	06:07:09:08:03:01

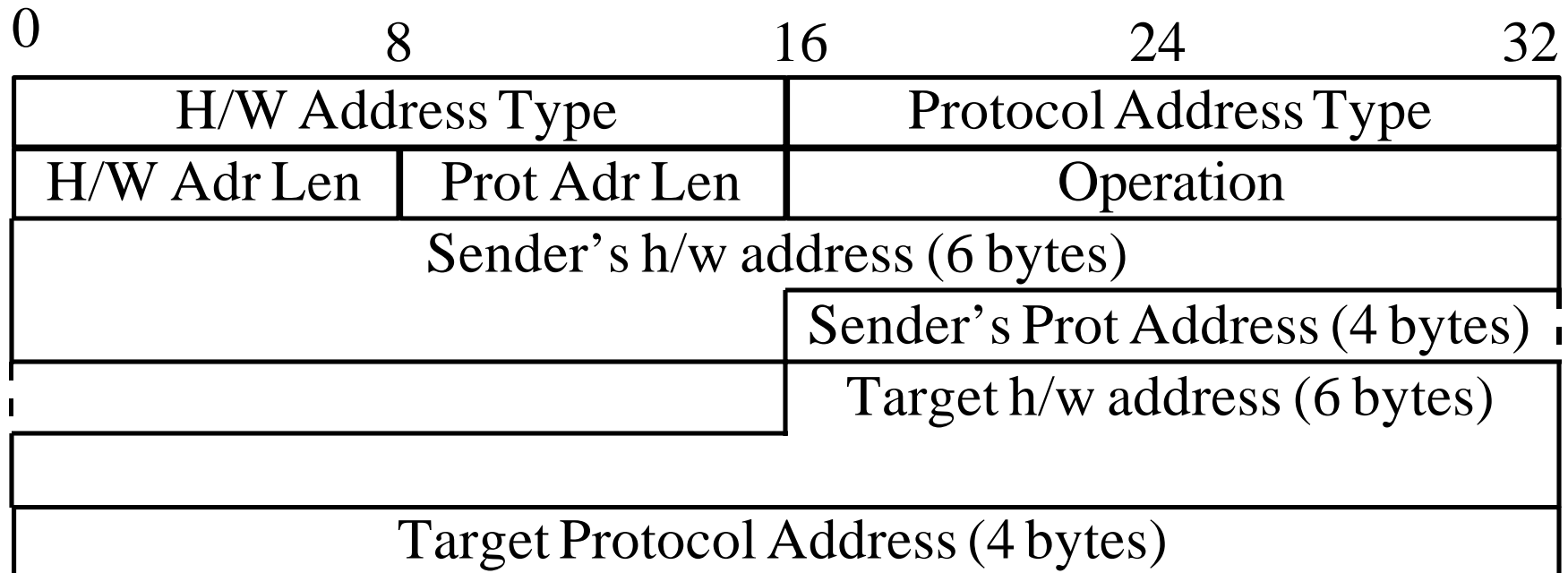
ARP (Cont)

- ❑ 2. Closed-Form Computation: Using local IEEE 802 addresses, e.g., Hardware Address
= (IP_address & 0xFF)!40:00:00:00:00:00
- ❑ 3. Message Exchange: ARP
 - ❑ The host broadcasts a request:
“What is the MAC address of 127.123.115.08?”
 - ❑ The host whose IP address is 127.123.115.08 replies back: “The MAC address for 127.123.115.08 is 8A-5F-3C-23-45-56₁₆”
- ❑ All three methods are allowed in TCP/IP networks.

Comparison of ARP Techniques

Issue	Method
Address change does not affect other hosts	Message, Computation
Protocol address independent of h/w address	Table , Message
H/w address independent of protocol address	Table, Message
Uses broadcast	Message
Adds traffic to a network	Message
Resolves with min delay	Table, Computation
Easy to implement	Computation, Table, Message

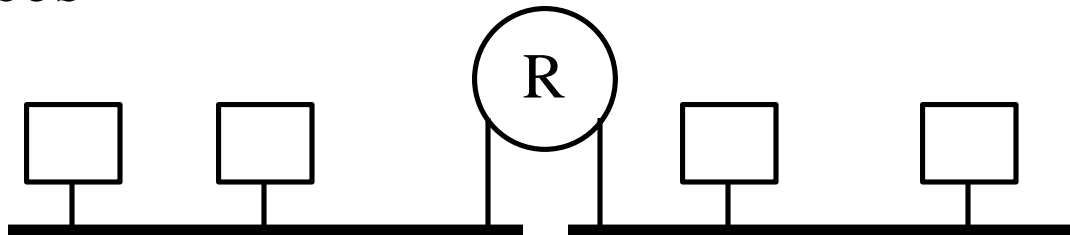
ARP Message Format



- ❑ H/W Address type:
- ❑ Protocol Address type: 0x0800 = IP
- ❑ Operation: 1=Request, 2=Response
- ❑ ARP messages are sent directly to MAC layer

ARP Processing

- ❑ ARP responses are cached.
- ❑ Entry replaced when
 - ❑ Cache table fills up (oldest removed)
 - ❑ After some time, e.g., 20 minutes
- ❑ Sender's address binding is stored in the cache of the target
- ❑ Proxy ARP: A router may act as a proxy for many IP addresses

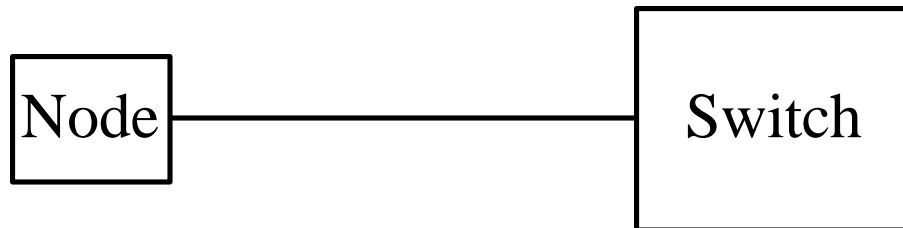


Reverse ARP (RARP)

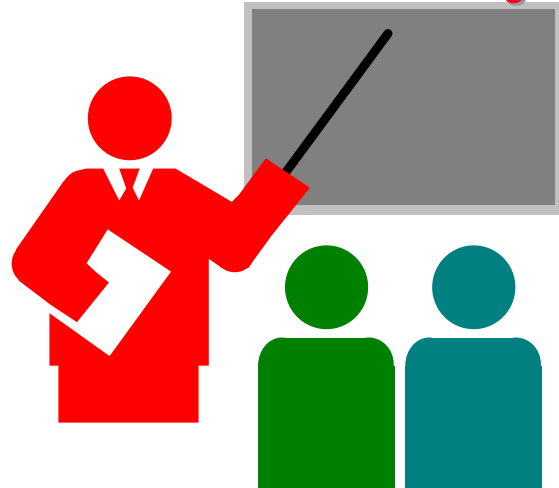
- ❑ What is the IP address of a given hardware address?
- ❑ Used by diskless systems to find their own IP address.
- ❑ Need RARP server to respond.
- ❑ Ref: RFC 903 and Comer's "Internetworking with TCP/IP, Vol 1, 3rd Ed

Inverse ARP

- ❑ Used on point to point links
- ❑ Find IP address of the host on the other end
- ❑ Used in frame relay and ATM
- ❑ Ref: RFC 1293



Summary



- ❑ ARP allows converting IP address to MAC addresses
- ❑ Proxy ARP, RARP, Inverse ARP

Homework

- ❑ Read Chapter 15, RFC 826
- ❑ Submit answers to 15.6

References

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- ❑ [RFC0903] R. Finlayson, T. Mann, J. Mogul, M. Theimer, "Reverse Address Resolution Protocol", 06/01/1984, 4 pages.
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