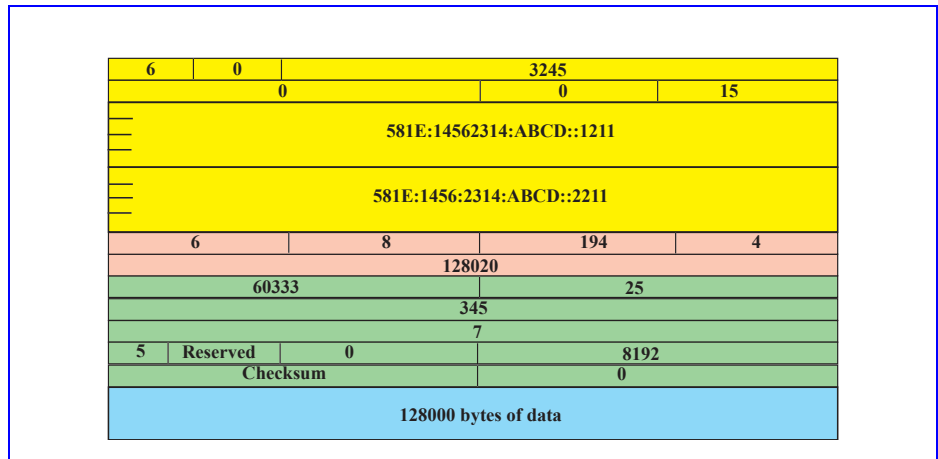# CHAPTER 27

Next Generation: IPv6 and ICMPv6

Exercises

1.
   - **a.** **2340:1ABC:119A:A000::0**
   - **b.** **0:AA::119A:A231**
   - **c.** **2340::119A:A001:0**
   - **d.** **0:0:0:2340::0**

3.

   - a. Link local address
   - b. Site local address
   - c. Multicast address (permanent, link local)
   - d. Loopback address

5. **58ABC1**

7. **0000:0000:0000:0000:0000:FFFF:8106:0C22 or 0::FFFF:8106:C22**

9. **FE80:0000:0000:0000:0000:0000:0000:0123 or FE80::123**

11. **FF02**: < Group ID >

13. The node identifier is **0000:0000:1211**. Assuming a 32-bit subnet identifier, the subnet address is **581E:1456:2314:ABCD:0000** where **ABCD:0000** is the subnet identifier.

15. **581E:1456:2314:0000:ABCD:0000:0001:XXXX**
through **581E:1456:2314:0000:ABCD:0000:00C8:XXXX**
where **XXXX** is the node identifier.

17. See Figure 27.1.

Figure 27.1 *Exercise 17*

6	0	3245		
0		0		15
581E:14562314:ABCD::1211				
581E:1456:2314:ABCD::2211				
6	8	194		4
128020				
60333		25		
345				
7				
5	Reserved	0	8192	
Checksum		0		
128000 bytes of data				

19. The destination unreachable message for IPv6 is almost identical to that of IPv4 with 2 exceptions: the type is type 3 in IPv4 and type 1 in IPv6 and there are far fewer possible codes in IPv6 than there were in IPv4 (5 as opposed to 16 in IPv4).

21. In the parameter problem message, the type is type 4 in IPv6 and type 12 in IPv4. In IPv4, the code could be either 0 for an error or ambiguity in one of the header fields or 1 if a required part of an option is missing. In IPv6, code 0 means the same thing as in IPv4, code 1 now means that there is an unrecognizable extension header, and code 2 means there was an unrecognizable option. The pointer field still points to where the problem was but was extended to 4 bytes in IPv6.

23. The echo request and reply messages are almost identical in both versions, except the type field contains either 8 for a request or 0 for a reply in IPv4, while the type field contains either 128 for a request or 129 for a reply in IPv6.

25. The format for the neighbor solicitation and advertisement messages are completely different in IPv6 than they are in ARP. The ARP packet included hardware type, protocol type, hardware length, protocol length, operation (request or reply) fields and fields for the source and target hardware and protocol addresses. In ICMPv6, the messages include a type field (135 for solicitation and 136 for advertisement), a code of 0, a checksum, and a field to specify the sender's IP address. An option may also be used to indicate the physical address of the sender for the convenience of the receiver.

27. The IPv4 compatible address is used when one host using IPv6 wants to send a message to another host using IPv6, but the message must travel through a region where the networks still use IPv4. The IPv4 mapped address is used when one host using IPv6 wants to send a message to a host that is still using IPv4 and the message must travel through mostly IPv6 networks.

29. **0000:0000:0000:0000:0000:FFFF:77FE:FEFE or 0::FFFF:77FE:FEFE**

31. This is because any IPv6 address starting with *11111111* is a multicast address.