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## CHAPTER 28

# ICMPv6

### Exercises

1. Error-reporting messages contain part of the IP datagram for which the error message has been created. This is needed to let the sender of the datagram to identify which datagram has been discarded due to the error. See Chapter 9 for more information.
3. Two informational messages in ICMPv4 are kept in ICMPv6, but the other two have been deleted. Table 28.E3 shows a comparison.

**Table 28.E3** Solution to Exercise 3

Message	v4	v6	Explanation
Echo Request/Response	✓	✓	
Timestamp request/response	✓		Deleted from ICMPv6; rarely used

5. These messages are new in Version 6. Version 4 was using RARP protocol, but it is now deprecated. Table 28.E5 shows a comparison.

**Table 28.E5** Solution to Exercise 5

Message	v4	v6	Explanation
Inverse neighbor solicitation		✓	Version 4 used RARP request message
Inverse neighbor advertisement		✓	Version 4 used RARP reply message

7.
  - a. Since Max Response Code (MRC) is less than 32768, we simply find the value of Maximum Response Delay (MRD) as

$$\text{MRD} = (1/10) \text{ MRC} = (1/10) \times 22,000 = 2200 \text{ seconds}$$

Note that we don't have to worry about the most significant bit because it is 0 and has no effect in calculation. Calculation can be done using decimal values.

- b. Since  $MRC \geq 32768$ , we need to find the exponent and the mantissa.

$$\begin{aligned}MRD &= (43,000)_{10} = (AF78)_{16} = (1010\ 1111\ 0111\ 1000)_2 \\Ex &= (010)_2 = 2 \quad \quad \quad \text{Mantissa} = (1111\ 0111\ 1000)_2 = (F78)_{16}\end{aligned}$$

This means that we need to shift  $(10000)_{16}$  five bits,  $(Exp + 3)$ , to the left and OR it with the mantissa.

$$\begin{aligned}\text{Shifting: } (10000)_{16} &<< 5 = (20000)_{16} \\ \text{Bit-Wise ORing: } (F78)_{16} &| (200000)_{16} = (200F78)_{16} = 2,101,112 \\ MRD &= (1/10) \times 2,101,112 \approx 210,111 \text{ seconds}\end{aligned}$$