CCNAv7:
Intoduction to Network (ITN)

Companion Guide

Networking Academy

Introduction to Networks Companion Guide (CCNAv7)

Cisco Networking Academy

Cisco Press

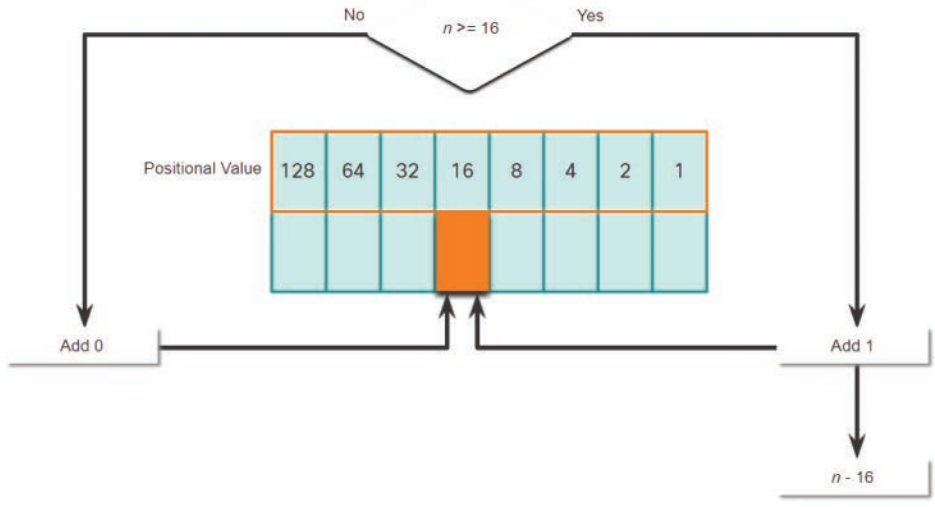

Figure 5-6 16 Positional Value

Step 5. In Figure 5-7, is the decimal number of the octet (*n*) equal to or greater than the next most significant bit (8)?

- If no, then enter binary **0** in the 8 positional value.
- If yes, then add a binary **1** in the 8 positional value and subtract 8 from the decimal number.

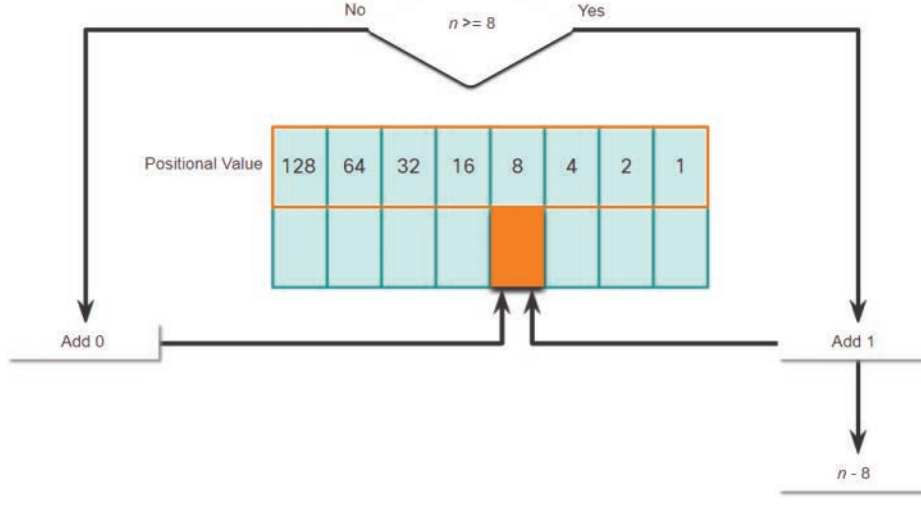

Figure 5-7 8 Positional Value

Step 6. In Figure 5-8, is the decimal number of the octet (*n*) equal to or greater than the next most significant bit (**4**)?

- If no, then enter binary **0** in the **4** positional value.
- If yes, then add a binary **1** in the **4** positional value and subtract **4** from the decimal number.

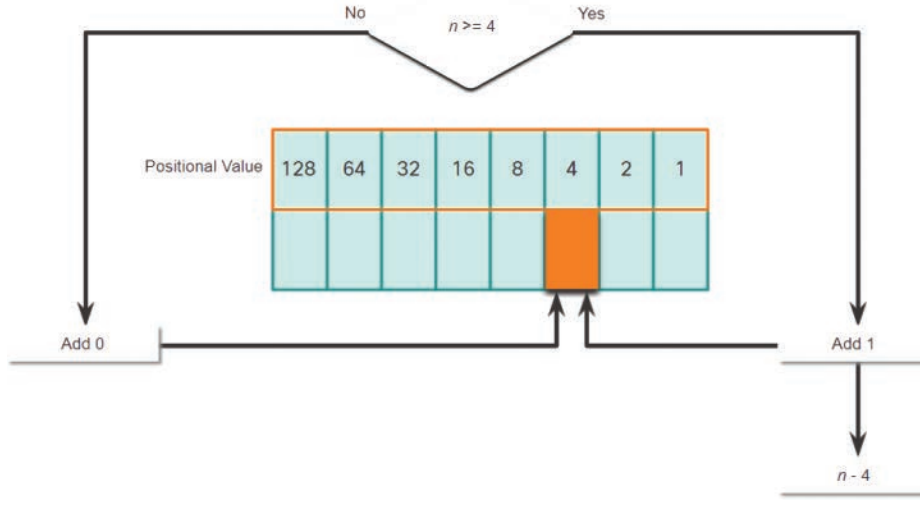

Figure 5-8 4 Positional Value

Step 7. In Figure 5-9, is the decimal number of the octet (*n*) equal to or greater than the next most significant bit (**2**)?

- If no, then enter binary **0** in the **2** positional value.
- If yes, then add a binary **1** in the **2** positional value and subtract **2** from the decimal number.

Step 8. In Figure 5-10, is the decimal number of the octet (*n*) equal to or greater than the last most significant bit (**1**)?

- If no, then enter binary **0** in the **1** positional value.
- If yes, then add a binary **1** in the **1** positional value and subtract **1** from the last decimal number.

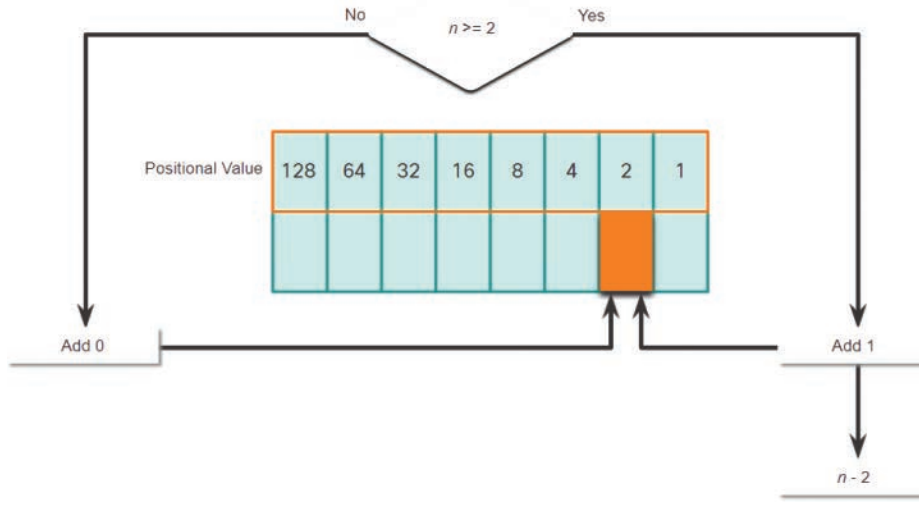

Figure 5-9 2 Positional Value

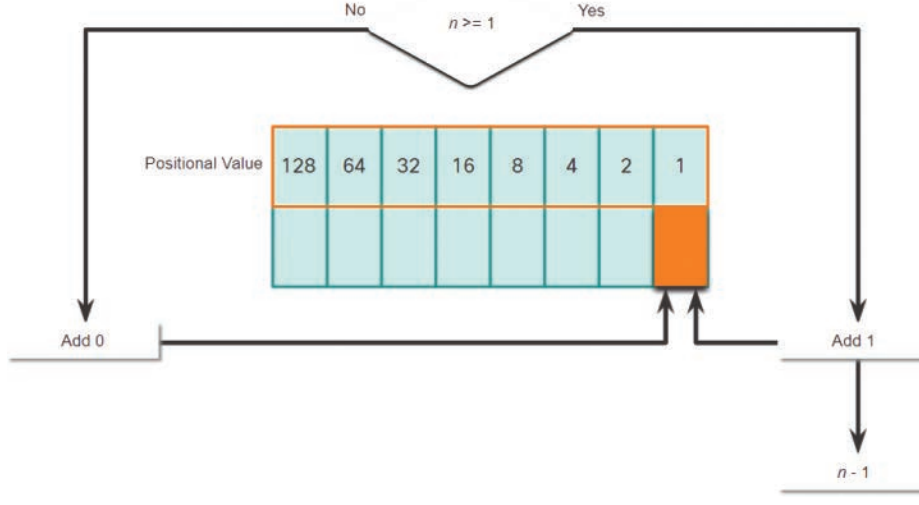

Figure 5-10 1 Positional Value

Decimal to Binary Conversion Example (5.1.8)

To help understand the process of converting from decimal to binary, consider the IP address 192.168.11.10.

The first octet number, 192, is converted to binary using the previously explained positional notation process.

It is possible to bypass the process of subtraction with easier or smaller decimal numbers. For instance, notice that it is fairly easy to calculate the third octet converted to a binary number without actually going through the subtraction process (8 + 2 = 10). The binary value of the third octet is 00001010.

The fourth octet is 11 (8 + 2 + 1). The binary value of the fourth octet is 00001011.

Converting between binary and decimal may seem challenging at first, but with practice, it should become easier over time.

Figures 5-11 through 5-21 illustrate the steps to convert the IP address 192.168.10.11 into binary:

Step 1. In Figure 5-11, is the first octet number **192** equal to or greater than the high-order bit **128**?

- Yes it is, so add a 1 to the high-order positional value to represent **128**.
- Subtract **128** from **192** to produce a remainder of **64**.

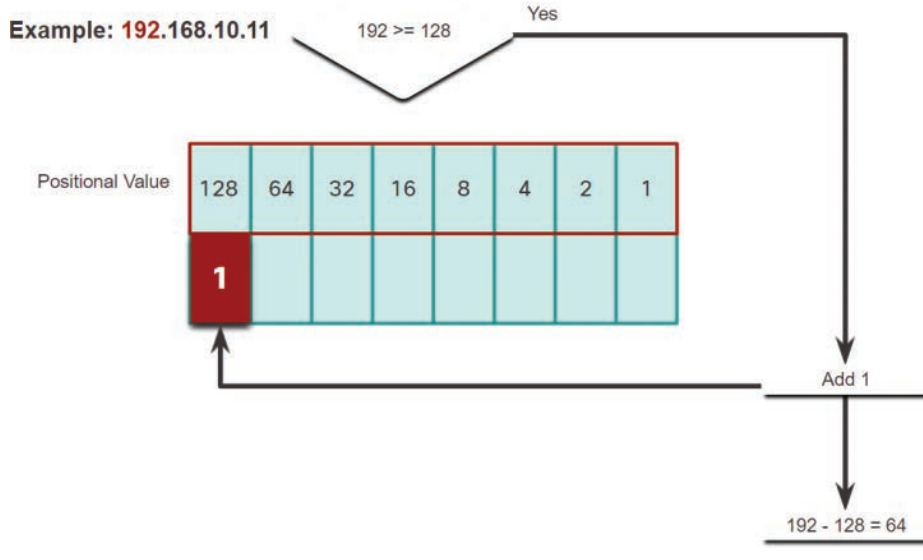

Figure 5-11 Step 1

Step 2. In Figure 5-12, is the remainder **64** equal to or greater than the next high-order bit **64**?

- It is equal, so add a **1** to next high-order positional value.

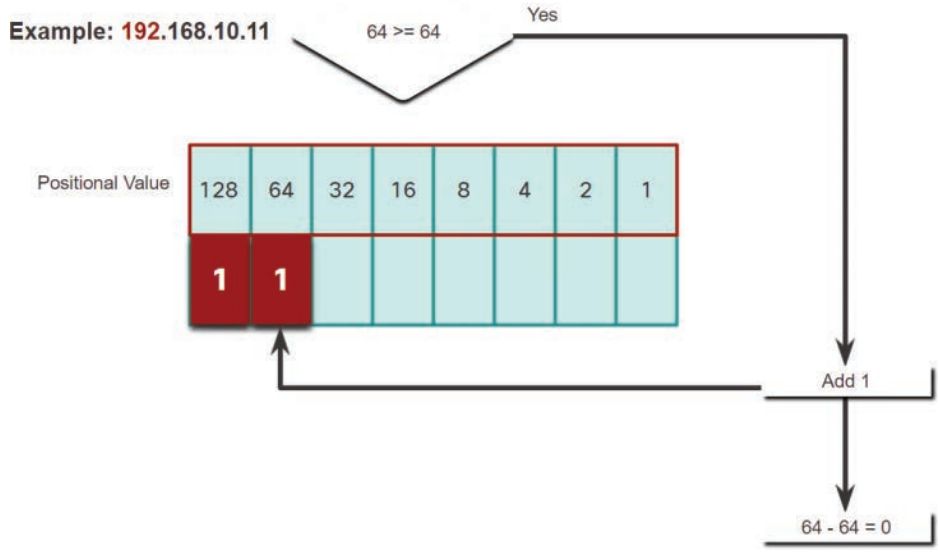

Figure 5-12 Step 2

Step 3. In Figure 5-13, since there is no remainder, enter binary **0** in the remaining positional values.

- The binary value of the first octet is **11000000**.

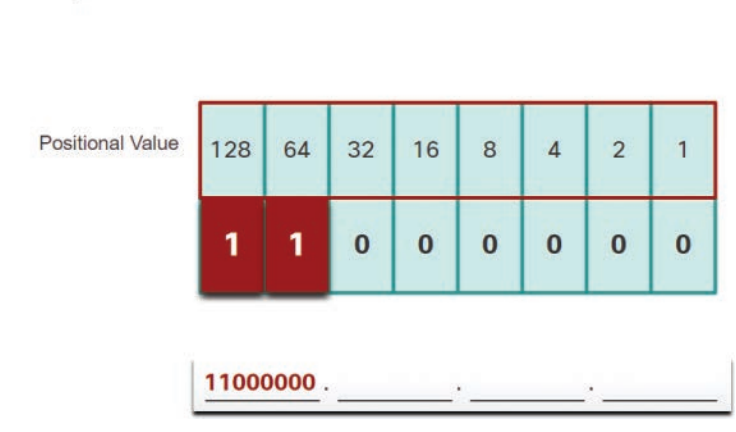

Figure 5-13 Step 3

Step 4. In Figure 5-14, is the second octet number **168** equal to or greater than the high-order bit **128**?

- Yes it is, so add a **1** to the high-order positional value to represent **128**.
- Subtract **128** from **168** to produce a remainder of **40**.

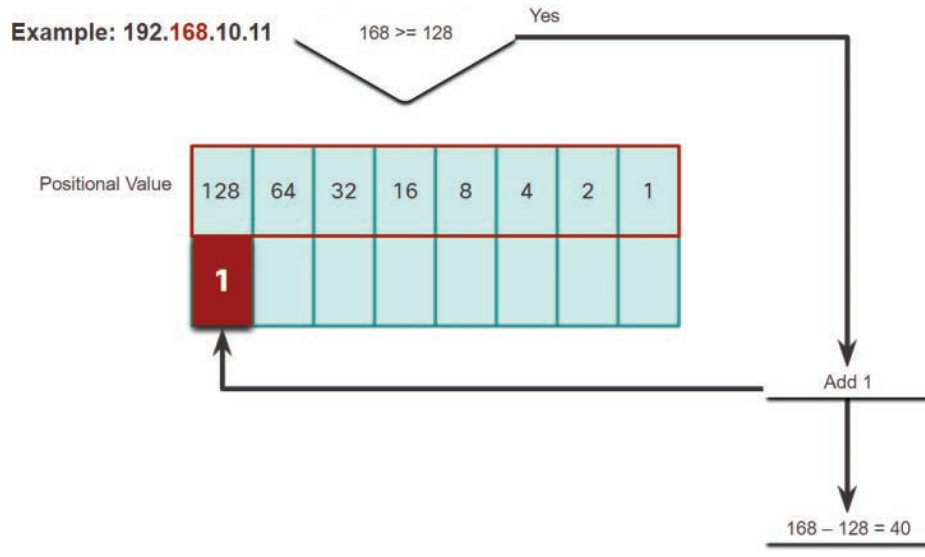

Figure 5-14 Step 4

Step 5. In Figure 5-15, is the remainder **40** equal to or greater than the next high-order bit **64**?

- No it is not, so enter a binary **0** in the positional value.

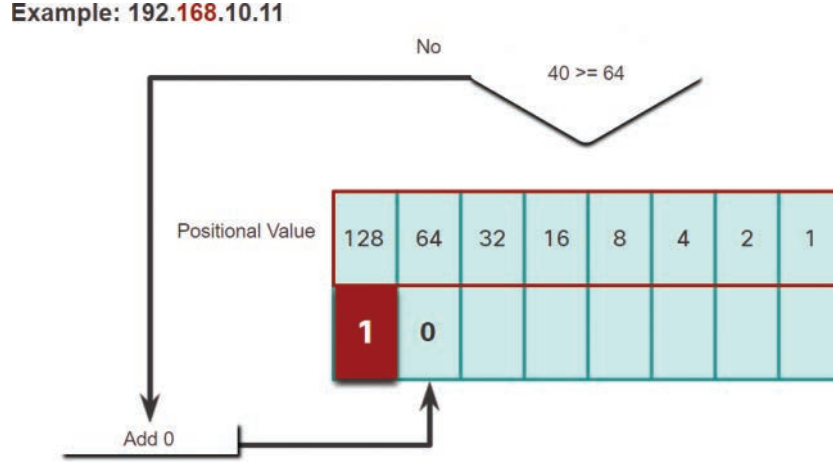

Figure 5-15 Step 5

Step 6. In Figure 5-16, is the remainder **40** equal to or greater than the next high-order bit **32**?

- Yes it is, so add a **1** to the high-order positional value to represent **32**.
- Subtract **32** from **40** to produce a remainder of **8**.