

Lab – Researching Subnet Calculators (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Objectives

Part 1: Review Available Subnet Calculators

Part 2: Perform Network Calculations Using a Subnet Calculator

Background / Scenario

While it is important to understand how to convert a decimal IP address to its binary format and apply the bitwise ANDing operation to determine the network address, it is also a tedious and mistake-prone process. To assist with these calculations, many network administrators make use of an IP subnet calculator utility program. A number of these types of programs have been developed that can be downloaded or run directly from the Internet.

In this lab, you will be introduced to a few of the free IP subnet calculators that are available. You will use a web-based IP subnet calculator to perform the network operations in this lab.

Required Resources

Device with Internet access

Part 1: Review Available Subnet Calculators

In Part 1, you are introduced to two types of subnet calculators: client-based (programs that are downloaded and installed) and web-based (utilities that are run from a browser).

Step 1: Review client-based subnet calculators.

Solarwinds provides a free subnet calculator that can be downloaded and installed on a PC running a Windows operating system. You will be required to provide personal information (Name, Company, Location, Email Address, and Phone number) to be able to download this program. You can download and install the Solarwinds Subnet Calculator at www.solarwinds.com.

If you have a PC running Linux, it is recommended that you use the **ipcalc** utility (available with most Linux distributions). Use the **apt-get install ipcalc** command to install ipcalc on a PC running Linux.

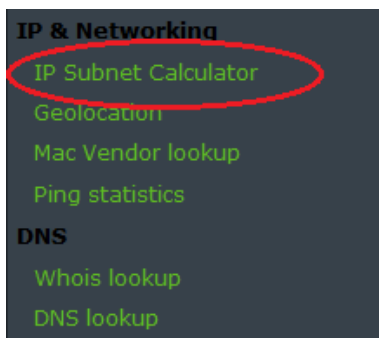
Step 2: Use a web-based subnet calculator.

Web-based subnet calculators do not require installation, but you do need Internet access to use them. The following web-based subnet calculator is accessible from any device that has Internet access, including smartphones and tablets.

a. From your browser, go to www.ipcalc.org and click the **IP Subnet Calculator** link.

Note: Several other useful utilities are also listed on the menu, such as MAC vendor lookup, whois lookup, and DNS lookup.

Note: At the time of this writing, a page formatting issue was encountered when viewing the www.ipcalc.org website using Internet Explorer (Version 9). While the site functioned correctly, you may want to consider using another browser (Firefox or Chrome) when accessing this site.



- b. On the IP Subnet Calculator screen, enter an IP address and subnet mask or an IP address and CIDR prefix notation. Examples of how to enter each of these are shown in the Introduction area.

:: IP Subnet Calculator ::

Introduction:

A subnet is a logically visible subdivision of an IP network. The practice of dividing a network into subnetworks is called subnetting.

This application will help you to compute information about IP subnetting. It's easy to use.

In the following form you can enter differents address format:

Description	Format
IP & CIDR Netmask	10.0.0.1/22
IP & Netmask	10.0.0.1 255.255.252.0
IP & Wildcard Mask	10.0.0.1 0.0.3.255

The behavior of this application is the same that the *ipcalc* binary of GNU/Linux system's !

Application:

- c. In the Application field, enter **192.168.50.50/27** and click **Calc!**. The next screen displays a table with network information in both decimal and binary formats.

Application:

Description	Value	Extra
Address	192.168.50.50	11000000.10101000.00110010.00110010
Netmask	255.255.255.224	11111111.11111111.11111111.11100000 /27
Network	192.168.50.32	11000000.10101000.00110010.00100000
Broadcast	192.168.50.63	
Host min	192.168.50.33	11000000.10101000.00110010.00100001
Host max	192.168.50.62	11000000.10101000.00110010.00111110
Host/net	30	Class C, Private Internet

- d. Using the information provided in the example above, answer the following questions.

What is the network address? _____ 192.168.50.32

What is the subnet mask? _____ 255.255.255.224

How many hosts will this network support? _____ 30

What is the lowest host address? _____ 192.168.50.33

What is the highest host address? _____ 192.168.50.62

What is the broadcast address? _____ 192.168.50.63

Part 2: Perform Network Calculations Using a Subnet Calculator

In Part 2, use the www.ipcalc.org web-based subnet calculator to fill in the tables provided.

Step 1: Fill in the following table for address 10.223.23.136/10:

Description	Decimal	Binary
Address	10.223.23.136	00001010.11011111.00010111.10001000
Subnet mask	255.192.0.0	11111111.11000000.00000000.00000000
Network address	10.192.0.0	00001010.11000000.00000000.00000000
Broadcast address	10.255.255.255	00001010.11111111.11111111.11111111
First host address	10.192.0.1	00001010.11000000.00000000.00000001
Last host address	10.255.255.254	00001010.11111111.11111111.11111110
Number of hosts available	4,194,302	N/A

What type of address, public, or private? _____ Private

Step 2: Fill in the following table for the 172.18.255.92 address with a subnet mask of 255.255.224.0:

Description	Decimal	Binary
Address	172.18.255.92	10101100.00010010.11111111.01011100
Subnet mask	255.255.224.0	11111111.11111111.11100000.00000000
Network address	172.18.224.0	10101100.00010010.11100000.00000000
Broadcast address	172.18.255.255	10101100.00010010.11111111.11111111
First host address	172.18.224.1	10101100.00010010.11100000.00000001
Last host address	172.18.255.254	10101100.00010010.11111111.11111110
Number of hosts available	8,190	N/A

What is the CIDR prefix notation for this network? _____ /19

What type of address, public, or private? _____ Private

Step 3: Fill in the following table using the 192.168.184.78 address with a subnet mask of 255.255.255.252:

Description	Decimal	Binary
Address	192.168.184.78	11000000.10101000.10111000.01001110
Subnet mask	255.255.255.252	11111111.11111111.11111111.11111100
Network address	192.168.184.76	11000000.10101000.10111000.01001100
Broadcast address	192.168.184.79	11000000.10101000.10111000.01001111
First host address	192.168.184.77	11000000.10101000.10111000.01001101
Last host address	192.168.184.78	11000000.10101000.10111000.01001110
Number of hosts available	2	N/A

What is the CIDR prefix notation for this network? _____ /30

What type of address, public, or private? _____ Private

Where would you most likely find a network like this being used?

Answers may vary, but a good use for a /30 network is on serial link between two routers. Only two host addresses are needed for this type of link.

Step 4: Fill in the following table for the 209.165.200.225/27 address:

Description	Decimal	Binary
Address	209.165.200.225	11010001.10100101.11001000.11100001
Subnet mask	255.255.255.224	11111111.11111111.11111111.11100000
Network address	209.165.200.224	11010001.10100101.11001000.11100000
Broadcast address	209.165.200.255	11010001.10100101.11001000.11111111
First host address	209.165.200.225	11010001.10100101.11001000.11100001
Last host address	209.165.200.254	11010001.10100101.11001000.11111110
Number of hosts available	30	N/A

What type of address, public, or private? _____ Public

Step 5: Fill in the following table for address 64.104.110.7/20:

Description	Decimal	Binary
Address	64.104.110.7	01000000.01101000.01101110.00000111
Subnet mask	255.255.240.0	11111111.11111111.11110000.00000000
Network address	64.104.96.0	01000000.01101000.01100000.00000000
Broadcast address	64.104.111.255	01000000.01101000.01101111.11111111
First host address	64.104.96.1	01000000.01101000.01100000.00000001
Last host address	64.104.111.254	01000000.01101000.01101111.11111110
Number of hosts available	4094	N/A

What type of address, public, or private? _____ Public

Reflection

1. What is an advantage of using a client-based subnet calculator?

Answers may vary. Client-based subnet calculators do not require Internet access.

2. What is an advantage of using a web-based subnet calculator?

Answers may vary, but web-based subnet calculators do not require download and installation. They can be accessed by any device with Internet access, including mobile devices such as a smart phones and tablets.