

# Your Network Uses The Subnet Mask 255.255.255.224. Which Of The Following IPv4 Addresses Are Able To

Your Network Uses The Subnet Mask 255.255.255.224. Which Of The Following IPv4 Addresses Are  
Able To

Understanding subnetting and IP address allocation is fundamental for network administrators, IT professionals, and anyone involved in designing or managing IP networks. The subnet mask 255.255.255.224 plays a significant role in determining the range of IP addresses available within a network. This article explores the implications of using this subnet mask, how to identify valid IPv4 addresses within such a subnet, and practical examples to enhance your networking knowledge.

## Introduction to Subnetting and Subnet Masks

Before diving into the specifics of the subnet mask 255.255.255.224, it's essential to understand what subnetting is and how subnet masks function within an IP network.

### What Is Subnetting?

Subnetting is the process of dividing a larger IP network into smaller, more manageable subnetworks or subnets. It improves network performance, enhances security, and simplifies management by limiting broadcast domains and isolating network segments.

### Role of Subnet Masks

A subnet mask is a 32-bit number that separates the IP address into two parts:

- Network portion: Identifies the specific network.
- Host portion: Identifies individual devices within that network.

The subnet mask 255.255.255.224 is a specific configuration that indicates how many bits are allocated for network and host addresses, directly affecting the size of the subnet and the number of usable IP addresses.

## Understanding the Subnet Mask 255.255.255.224

### Binary Representation

Let's analyze the subnet mask in binary form:

- 255.255.255.224

| Octet | Decimal | Binary   | Explanation                          |
|-------|---------|----------|--------------------------------------|
| 1     | 255     | 11111111 | All bits are network bits            |
| 2     | 255     | 11111111 | All bits are network bits            |
| 3     | 255     | 11111111 | All bits are network bits            |
| 4     | 224     | 11100000 | 3 bits for network, 5 bits for hosts |

### CIDR Notation

The subnet mask 255.255.255.224 corresponds to a CIDR (Classless Inter-Domain Routing) notation of /27 because there are 27 bits set to 1:

- 8 bits (octet 1)
- 8 bits (octet 2)
- 8 bits (octet 3)
- 3 bits (from the last octet)

Total:  $8 + 8 + 8 + 3 = 27$  bits

Number of Addresses

With a /27 subnet:

- Total IP addresses:  $2^{(32 - 27)} = 2^5 = 32$  addresses
- Usable IP addresses: Total addresses minus network and broadcast addresses =  $32 - 2 = 30$

Address Range

If, for example, the network address is 192.168.1.0, then:

- Network address: 192.168.1.0
- Broadcast address: 192.168.1.31
- Usable IP addresses: 192.168.1.1 to 192.168.1.30

Determining Valid IPv4 Addresses in a /27 Subnet

Given the above, the core question is: Which IPv4 addresses are able to be assigned or used within a subnet configured with 255.255.255.224?

Criteria for Valid IPv4 Addresses

An IPv4 address is valid within the subnet if it:

- Falls within the range of the network's IP addresses.
- Is not the network address itself.
- Is not the broadcast address.

Step-by-Step Process

1. Identify the network address: Usually provided or can be calculated from the IP address and subnet mask.
2. Calculate the broadcast address: The highest address in the subnet.
3. Enumerate the usable addresses: The addresses between the network and broadcast addresses.

### Examples

Suppose your network address is 192.168.10.0 with a subnet mask 255.255.255.224 (/27). The subnet details are:

- Network address: 192.168.10.0
- Broadcast address: 192.168.10.31
- Usable IP range: 192.168.10.1 to 192.168.10.30

Any IPv4 address within this range is valid for host assignment.

### Common Questions About IPv4 Addresses and /27 Subnet

Which of the following IPv4 addresses are able to be assigned within the subnet?

- 192.168.10.0
- 192.168.10.15
- 192.168.10.30
- 192.168.10.31
- 192.168.10.32

Answer:

- 192.168.10.0 ☐ No (network address)
- 192.168.10.15 ☐ Yes (within range)
- 192.168.10.30 ☐ Yes (within range, last usable address)

- 192.168.10.31 ☐ No (broadcast address)
- 192.168.10.32 ☐ No (outside range)

How many usable IP addresses are available per subnet with 255.255.255.224?

As calculated earlier, there are 30 usable IP addresses in each /27 subnet.

Why are some addresses reserved and not assignable?

- The network address (first address) identifies the subnet.
- The broadcast address (last address) is used to broadcast messages to all hosts within the subnet.
- Both are reserved and cannot be assigned to individual devices.

## Practical Applications

Understanding which addresses are valid within a subnet helps in:

- Efficient IP address planning.
- Avoiding IP conflicts.
- Configuring network devices correctly.
- Troubleshooting network issues related to IP conflicts or misconfiguration.

## How to Calculate Valid IP Addresses in Any Subnet

To determine the valid IP addresses for any network using a specific subnet mask:

1. Identify the network address: Usually given or calculated from IP and mask.
2. Determine the total number of addresses:  $2^{(\text{number of host bits})}$ .
3. Calculate the broadcast address: Network address + total addresses - 1.
4. List the addresses between network address + 1 and broadcast address - 1.

Example: 192.168.5.0/27

- Network address: 192.168.5.0
- Broadcast address: 192.168.5.31
- Usable addresses: 192.168.5.1 to 192.168.5.30

Any address within this range is valid for hosts.

## Summary

Using the subnet mask 255.255.255.224 (or /27), a network provides 32 total IP addresses, with 30 available for hosts. Valid IP addresses are any addresses within the range, excluding the network and broadcast addresses. Correctly identifying these addresses ensures efficient IP management, proper network configuration, and optimal performance.

## Key Takeaways:

- The subnet mask 255.255.255.224 corresponds to a /27 prefix.
- It provides 30 usable IP addresses per subnet.
- Valid host addresses are between the network address + 1 and the broadcast address - 1.
- Always verify whether a specific IP address falls within the usable range to avoid conflicts.

By mastering subnetting concepts and understanding how to interpret subnet masks like 255.255.255.224, network professionals can design scalable, efficient, and secure networks tailored to their organizations' needs.

---

Ready to implement subnetting in your network? Remember to always calculate the exact network, broadcast, and usable addresses before assigning IPs to avoid conflicts and ensure smooth network operation.

## Frequently Asked Questions

**What does the subnet mask 255.255.255.224 indicate about the network's size?**

It indicates that the network uses a /27 prefix, allowing for 32 IP addresses in the subnet, with 30 usable host addresses.

**Which IPv4 addresses are able to be assigned within a subnet using 255.255.255.224?**

Any IPv4 address that falls within the specific range defined by the network address and subnet mask, excluding the network and broadcast addresses.

**How do you determine if an IPv4 address is valid for a subnet with mask 255.255.255.224?**

Check if the address belongs to the subnet range based on the network address and subnet mask, and ensure it is not the network or broadcast address.

**What is the subnet range for a network with subnet mask 255.255.255.224?**

The range depends on the network address, but generally, it covers 32 IP addresses per subnet, with the first being the network address and the last the broadcast address.

**Can an IP address like 192.168.1.33 be assigned in a subnet with mask 255.255.255.224?**

It depends on the network address, but if 192.168.1.33 falls within the subnet range, then yes, it can be assigned.

## **What are the benefits of using a subnet mask 255.255.255.224 in a network?**

It allows for efficient IP address allocation by creating smaller subnets, which improves network management and security.

## **How many usable hosts are available per subnet with the mask 255.255.255.224?**

There are 30 usable host addresses per subnet, since 32 total addresses minus the network and broadcast addresses.

## **Additional Resources**

Your Network Uses The Subnet Mask 255.255.255.224. Which Of The Following IPv4 Addresses Are Able To

In the intricate world of networking, understanding how IP addresses and subnet masks work together is fundamental for designing, managing, and troubleshooting networks. One common subnet mask, 255.255.255.224, often appears in small to medium-sized networks, offering a balance between efficient IP address utilization and network segmentation. This article delves into what this subnet mask signifies, how it influences the range of valid IPv4 addresses, and how to determine which addresses are capable of functioning within such a network. Whether you're a network administrator, student, or tech enthusiast, grasping these concepts will empower you to optimize network design and troubleshoot with confidence.

## **Understanding the Subnet Mask 255.255.255.224**

## What is a Subnet Mask?

A subnet mask is a 32-bit number that divides an IP address into network and host portions. It helps devices identify whether other IP addresses are within the same local network or need to be accessed via a gateway. Essentially, the subnet mask defines the size of the network and the number of available host addresses within that network.

## Decoding 255.255.255.224

The subnet mask 255.255.255.224 is written in dotted-decimal notation, but its binary form reveals its structure:

- 255 in binary: 11111111
- 224 in binary: 11100000

Thus, the complete mask in binary is:

11111111.11111111.11111111.11100000

This indicates:

- The first 27 bits are network bits (all ones in the mask).
- The remaining 5 bits are host bits (zeros in the mask).

Expressed in CIDR notation, this mask is /27.

## Implications of a /27 Subnet Mask

### Number of Subnets and Hosts

- Number of host bits: 5
- Number of possible host addresses:  $2^5 = 32$

- Usable host addresses:  $32 - 2 = 30$

The subtraction of two addresses accounts for the network address (all host bits zero) and broadcast address (all host bits one), which cannot be assigned to individual hosts.

## Network and Broadcast Addresses

- Network address: The first address in the range, representing the subnet itself.
- Broadcast address: The last address in the range, used to broadcast messages to all hosts within the subnet.

## Calculating the Address Range for 255.255.255.224

Let's assume the network's base IP address is 192.168.1.0. How do we determine the range of valid IP addresses within this subnet?

### Step-by-Step Calculation

1. Identify the block size:

The block size for the last octet is derived from the subnet mask's last octet: 224.

- 224 in decimal corresponds to 32 (total addresses per subnet) minus the number of network addresses that can be used for hosts.

Alternatively, the block size is the value of the last octet's increment:

$$256 - 224 = 32$$

2. Determine the subnet ranges:

- The subnets increment every 32 addresses in the last octet.

3. Calculate specific subnet addresses:

For 192.168.1.0/27:

- Network address: 192.168.1.0
- Broadcast address: 192.168.1.31
- Usable addresses: 192.168.1.1 to 192.168.1.30

Next subnet: 192.168.1.32/27

- Network address: 192.168.1.32
- Broadcast address: 192.168.1.63
- Usable addresses: 192.168.1.33 to 192.168.1.62

And so on for subsequent subnets.

## General Range Formula

For any network with IP address N.x.y.z and subnet mask 255.255.255.224:

- The network address is the base address aligned to the block size (multiples of 32).
- The range of valid host addresses is from network address + 1 to broadcast address - 1.

## Which IPv4 Addresses Are Able To Function in a 255.255.255.224 Subnet?

Knowing the range, it's crucial to understand which addresses are valid for hosts and which are reserved for network functions.

## Valid Host Addresses

Any IP address that falls within the calculated range, excluding the network and broadcast addresses, can be assigned to a device within this subnet.

For example:

- 192.168.1.1 (within 192.168.1.0/27) – Valid
- 192.168.1.30 (within 192.168.1.0/27) – Valid

Invalid addresses include:

- 192.168.1.0 (Network address)
- 192.168.1.31 (Broadcast address)

## Invalid or Reserved Addresses

- Network address: The first address of the subnet, used to identify the subnet itself. Cannot be assigned to hosts.
- Broadcast address: The last address of the subnet, used to send messages to all hosts within the subnet. Cannot be assigned to individual devices.

## Practical Examples of Address Allocation

Suppose your network is 10.0.0.0 with a subnet mask of 255.255.255.224 (/27). The address ranges would be:

| Subnet       | Network Address | Usable Host Range     | Broadcast Address |
|--------------|-----------------|-----------------------|-------------------|
| -----        | -----           | -----                 | -----             |
| 10.0.0.0/27  | 10.0.0.0        | 10.0.0.1 – 10.0.0.30  | 10.0.0.31         |
| 10.0.0.32/27 | 10.0.0.32       | 10.0.0.33 – 10.0.0.62 | 10.0.0.63         |
| 10.0.0.64/27 | 10.0.0.64       | 10.0.0.65 – 10.0.0.94 | 10.0.0.95         |

In each case, only addresses within the "Usable Host Range" are suitable for device assignment.

## Implications for Network Design and Management

### Efficient IP Address Utilization

Using a /27 subnet mask allows for 30 hosts per subnet, which is ideal for small networks, branch offices, or specific device groups where IP space conservation is necessary.

### Network Segmentation and Security

Subnetting with /27 provides segmentation, reducing broadcast domains, and potentially improving network security by isolating groups of devices.

### Scalability Considerations

While /27 is suitable for small segments, larger networks may require larger subnets (/24, /23) to accommodate more hosts or multiple subnets.

## Summary: Recognizing Valid IPv4 Addresses in a 255.255.255.224 Subnet

- Subnet mask overview: 255.255.255.224 (/27) divides the network into subnets of 32 addresses each.
- Address range: For a network starting at a base IP, the usable addresses are those between the network address + 1 and the broadcast address - 1.
- Valid addresses: Any IP that falls within the range, excluding network and broadcast addresses, can

be assigned to hosts.

- Invalid addresses: Network address and broadcast address of each subnet are reserved and cannot be assigned to devices.

## Final Thoughts

Understanding the relationship between subnet masks and IP address ranges is essential for effective network management. The subnet mask 255.255.255.224 provides a practical means to segment networks, optimize address space, and improve security. By mastering how to calculate address ranges and identify valid host addresses, network professionals can design scalable, efficient, and secure networks tailored to their organizational needs. Whether deploying new devices, troubleshooting connectivity issues, or planning future expansions, a solid grasp of subnetting principles ensures smoother network operations and better resource utilization.

---

Remember: Always verify the specific address ranges for your subnet based on your network's IP address and subnet mask configuration to avoid address conflicts and ensure proper network functioning.

## **Your Network Uses The Subnet Mask 255 255 255 224 Which Of The Following Ipv4 Addresses Are Able To**

Your Network Uses The Subnet Mask 255 255 255 224 Which Of The Following Ipv4 Addresses Are Able To

## Related Articles

- [4\) According To Adams In The Fourth Paragraph, Besides Virtue, What Does A Republican Government Need](#)
- [3. Given Utility Function  \$U =\$  Where  \$P\_x = 12\$  Birr, Birr,  \$P\_y = 4\$  Birr And The Income Of The Consumer Is,](#)

- [What Was A Major Provision Of The Civil Rights Act Of 1964? Responses It Ended Segregation In Public](#)

[Back to Home](#)