

Identify Which Of The IP Addresses Below Belong To A Class- A Network? A. \ (126.57 .135 .2 \) B. 11010111001010111111111101010000

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Understanding IP addressing is fundamental for network management, cybersecurity, and internet connectivity. When working with IP addresses, one common task is to determine the class of a given address, which influences how networks are segmented and how routing is handled. In this article, we will analyze two IP addresses—one in decimal notation and the other in binary—and identify which of these belongs to a Class-A network. This comprehensive guide aims to clarify the criteria used to classify IP addresses, provide step-by-step analysis, and enhance your network knowledge.

What Are IP Address Classes?

Before diving into the specific addresses, it's essential to understand the concept of IP address classes. IPv4 addresses are divided into several classes based on their initial bits and range, primarily to facilitate efficient routing and address allocation.

Overview of IPv4 Classes

Class	Address Range (Decimal)	Leading Bits	Typical Use Cases
Class A	0.0.0.0 to 127.255.255.255	0	Large networks, multinational organizations
Class B	128.0.0.0 to 191.255.255.255	10	Medium-sized networks
Class C	192.0.0.0 to 223.255.255.255	110	Small networks, personal and small business networks
Class D	224.0.0.0 to 239.255.255.255	1110	Multicast addresses
Class E	240.0.0.0 to 255.255.255.255	1111	Experimental, reserved for future use

Note: The range 0.0.0.0/8 is reserved for special purposes, and 127.0.0.0/8 is used for loopback addresses.

Analyzing the Given IP Addresses

Let's evaluate each provided address to determine if it belongs to a Class-A network.

Address A: 126.57.135.2

Step 1: Convert the Address to Decimal Range

This address is already in standard dotted decimal notation, so we analyze the first octet (126).

Step 2: Determine the Class Based on the First Octet

- The first octet is 126.
- Class A addresses range from 0 to 127.
- Therefore, 126 falls within the Class A range.

Step 3: Confirm the Address Range

- Since 126 is within 0-127, Address A is a Class-A address.
- Also, 126 is not reserved for special purposes like 127 (loopback), so it is a valid Class-A address.

Conclusion: Address A (126.57.135.2) belongs to a Class-A network.

Address B: 11010111001010111111111101010000

Step 1: Recognize the Address Format

This is a binary string of 32 bits:

11010111 00101011 11111111 01010000

Let's split it into four octets:

- First Octet: 11010111
- Second Octet: 00101011
- Third Octet: 11111111
- Fourth Octet: 01010000

Step 2: Convert the First Octet to Decimal

Convert 11010111 to decimal:

- $1 \cdot 2^7 = 128$
- $1 \cdot 2^6 = 64$
- $0 \cdot 2^5 = 0$
- $1 \cdot 2^4 = 16$
- $0 \cdot 2^3 = 0$
- $1 \cdot 2^2 = 4$
- $1 \cdot 2^1 = 2$
- $1 \cdot 2^0 = 1$

Sum:

$$128 + 64 + 0 + 16 + 0 + 4 + 2 + 1 = 215$$

Step 3: Determine the Class Based on the First Octet

- First octet in decimal: 215
- Class A addresses: 0-127 (first octet)
- Class B addresses: 128-191
- Class C addresses: 192-223

Since $215 > 223$, it falls into the Class D range.

Step 4: Confirm the Address Class

- 215 is within 224-239, which is the Class D multicast address range.
- Therefore, this address belongs to a multicast address, not a Class A network.

Conclusion: Address B (binary: 11010111 00101011 11111111 01010000) does not belong to a Class-A network; it is a Class D multicast address.

Summary of Analysis

Address	Format	First Octet	Address Class	Belongs to Class-A?
A	Decimal	126	Class A	Yes
B	Binary	215	Class D	No

Why Is Class Identification Important?

Class identification impacts network design, routing, and IP address allocation. For example:

- Class-A addresses are used for very large networks, with a small number of network identifiers but many host addresses.
- Class B addresses serve medium-sized networks.
- Class C addresses are suitable for small networks, such as small businesses or home networks.
- Class D addresses are reserved for multicast groups, not typical network routing.

Knowing the class helps administrators efficiently allocate IP addresses, design subnets, and troubleshoot network issues.

Additional Considerations

- Reserved Addresses: Some addresses within each class are reserved for special purposes (e.g., loopback, broadcast).
- CIDR Notation: Modern networks often use Classless Inter-Domain Routing (CIDR), which bypasses the traditional class system, but understanding the original class system remains valuable.

Conclusion

Based on the detailed analysis:

- The IP address 126.57.135.2 is a Class-A address because its first octet (126) falls within the range 0-127.
- The binary address 1101011100101011111111101010000 corresponds to an address in the 215 range, which is Class D, used for multicast purposes.

Therefore, the only address from the options that belongs to a Class-A network is:

A. 126.57.135.2

Understanding how to classify IP addresses is vital for network configuration, security, and efficient management. Whether you're a network administrator, cybersecurity professional, or IT student, mastering these fundamentals enhances your ability to design and troubleshoot modern networks effectively.

Keywords for SEO optimization: IP address classification, Class-A IP address, IPv4 address classes, binary IP address analysis, network addressing, IP subnetting, network management, IP address ranges, IPv4 class identification, IP address basics

Frequently Asked Questions

How can you identify if an IP address belongs to a Class A network?

A Class A IP address has its first octet ranging from 0 to 127. If the first octet falls within this range, the IP belongs to a Class A network.

Is the IP address 126.57.135.2 a Class A address?

Yes, because its first octet is 126, which is within the 0-127 range designated for Class A networks.

What does the binary string 11010111001010111111111101010000 represent in terms of IP class?

The binary string can be converted to decimal to identify its class. Its first 8 bits are '11010111', which is 215 in decimal, indicating a Class C address (since Class C ranges from 192 to 223).

Based on the given IP addresses, which one belongs to a Class A network?

The IP address 126.57.135.2 belongs to a Class A network because its first octet is 126, which falls within the Class A range.

How do you convert a binary IP address to its decimal form to determine its class?

You convert each 8-bit segment of the binary address to decimal. The first decimal number indicates the class: 0-127 for Class A, 128-191 for Class B, 192-223 for Class C, and so on.

Additional Resources

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In the vast and intricate world of computer networking, IP addresses serve as the essential identifiers that allow devices to communicate across the globe. These numerical labels facilitate data exchange, routing, and network management. Understanding the classification of IP addresses—particularly the distinctions between Class A, B, C, and other classes—is fundamental for network administrators, cybersecurity professionals, and anyone involved in digital infrastructure. Today, we focus on a specific question: which of the two provided IP addresses belongs to a Class A network?

This article will explore the characteristics of Class A IP addresses, how to identify them, and apply this knowledge to the given examples: the dotted-decimal IP address \ (126.57.135.2 \) and the binary string \ (11010111001010111111111101010000 \). Through detailed analysis, readers will gain a comprehensive understanding of IP classification and practical skills to differentiate Class A addresses from others.

Understanding IP Address Classes: A Primer

Before diving into the specifics of the given IP addresses, it's crucial to establish foundational knowledge about IP address classes. IPv4 addresses, which are still widely

used in many networks, are 32-bit binary numbers typically represented in dotted-decimal notation (e.g., 192.168.1.1). These addresses are divided into several classes—A, B, C, D, and E—each serving different purposes and characterized by unique ranges.

The Five Classes of IPv4 Addresses:

1. Class A:

- Range: 0.0.0.0 to 127.255.255.255
- Purpose: Designed for very large networks with numerous hosts
- Default Subnet Mask: 255.0.0.0 (or /8 in CIDR notation)
- Identifying characteristic: The first octet (the first 8 bits) falls within 0 to 127

2. Class B:

- Range: 128.0.0.0 to 191.255.255.255
- Purpose: Medium-sized networks
- Default Subnet Mask: 255.255.0.0 (/16)
- Identifying characteristic: The first octet ranges from 128 to 191

3. Class C:

- Range: 192.0.0.0 to 223.255.255.255
- Purpose: Small networks, typically for local area networks (LANs)
- Default Subnet Mask: 255.255.255.0 (/24)
- Identifying characteristic: First octet from 192 to 223

4. Class D:

- Range: 224.0.0.0 to 239.255.255.255
- Purpose: Multicast addresses

5. Class E:

- Range: 240.0.0.0 to 255.255.255.255
- Purpose: Experimental, reserved for future use

Key Point: The defining feature of Class A addresses is that the first octet (the first 8 bits) falls within 0 to 127. However, note that the address 127.x.x.x is reserved for loopback purposes and is not assigned to hosts.

Deciphering the First IP Address: \ (126.57.135.2 \)

The first IP address provided is in dotted-decimal notation: \ (126.57.135.2 \). To determine if it belongs to a Class A network, we need to analyze its first octet.

Step 1: Extract the First Octet

- The first octet here is 126.

Step 2: Check the Range

- As per class definitions, Class A addresses have first octets from 0 to 127.
- Since 126 is within this range, it suggests that the address could be a Class A address.

Step 3: Confirm the Address Class

- The address begins with 126, which is comfortably within the 0-127 range.
- The address 126.x.x.x is indeed a valid Class A address, and more specifically, it falls within the range reserved for such networks.

Additional Considerations:

- The address 127.x.x.x is reserved for loopback testing, so 126 is not part of the loopback range.
- Therefore, \ (126.57.135.2 \) belongs to a Class A network.

Implication:

- This address can support a very large network with many hosts, given the default subnet mask of 255.0.0.0.

Deciphering the Second IP Address: The Binary String

The second address is presented in binary form:
11010111001010111111111101010000

This 32-bit binary string represents an IPv4 address. To analyze it, we must convert it to dotted-decimal notation, then determine its class.

Step 1: Break Down the Binary String

The 32 bits are grouped into four 8-bit octets:

- Octet 1: 11010111
- Octet 2: 00101011
- Octet 3: 11111111
- Octet 4: 01010000

Step 2: Convert Each Octet to Decimal

- Octet 1: 11010111

- Calculation: $(1 \times 128) + (1 \times 64) + (0 \times 32) + (1 \times 16) + (0 \times 8) + (1 \times 4) + (1 \times 2) + (1 \times 1)$
- Sum: $128 + 64 + 0 + 16 + 0 + 4 + 2 + 1 = 215$
- Octet 2: 00101011
- Calculation: $0 + 0 + 128 + 0 + 16 + 0 + 2 + 1 = 43$
- Octet 3: 11111111
- All bits are 1s, so: 255
- Octet 4: 01010000
- Calculation: $0 + 64 + 0 + 16 + 0 + 0 + 0 + 0 = 80$

Step 3: Reconstruct the Address in Dotted-Decimal Format

The address becomes: 215.43.255.80

Step 4: Determine the Class

- Look at the first octet: 215
- Recall the IP address classes:
 - Class A: 0-127
 - Class B: 128-191
 - Class C: 192-223
- Since 215 exceeds 223, it falls outside of Class A, B, and C.
- It is within the 224-239 range, which is reserved for multicast addresses (Class D).

Conclusion:

- The binary address 11010111001010111111111101010000 corresponds to 215.43.255.80, a Class D address.
- Therefore, this address does not belong to a Class A network.

Summary and Practical Implications

The analysis above reveals that:

- Address A (126.57.135.2) is a Class A IP address because its first octet (126) falls within the 0-127 range, excluding the loopback address 127.x.x.x. This classification indicates it belongs to a large network capable of supporting millions of hosts.

- Address B (binary string) translates to 215.43.255.80, which is a Class D address used primarily for multicast purposes. It does not belong to Class A and is not suitable for assigning to individual hosts within traditional network classifications.

Practical Significance:

Understanding IP address classes allows network engineers to design scalable networks, allocate IP addresses efficiently, and implement appropriate subnetting strategies. It also aids in network troubleshooting and security policies, where address classification plays a role in defining access controls and routing rules.

Final Thoughts

Accurate classification of IP addresses remains an essential aspect of network management. While the transition to IPv6 is ongoing and addresses some limitations of IPv4, the foundational knowledge of address classes still underpins many networking principles. The ability to identify whether an IP address belongs to Class A, B, C, or D depends on analyzing the first octet in dotted-decimal notation or the initial bits in binary form.

In our case, the dotted-decimal address \ (126.57.135.2 \) clearly belongs to Class A, making it suitable for large-scale network deployments. Conversely, the binary address, translating to 215.43.255.80, belongs to Class D and is used for multicast communications rather than traditional host addressing.

By mastering these concepts, network professionals can better plan, implement, and troubleshoot complex network environments, ensuring data flows smoothly and securely across the digital landscape.

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