How does IP address and MAC address work in parallel?

The Internet works in the same way as postal services. Instead of sending mail, the device sends 'data packets', and the IP address or MAC address determines where the packets will come.

If you want to send a letter, you need the recipient's address. The address is the identity feature that helps the postman know where the letter needs to be sent, so the address must be unique. Two houses cannot have the same address, otherwise there will be confusion.

The Internet works in the same way as postal services. Instead of sending mail, the device sends 'data packets', and the IP address or MAC address determines where the packets will come. Today's article will talk about how these two addresses work in tandem.

How does IP address and MAC address work in parallel?

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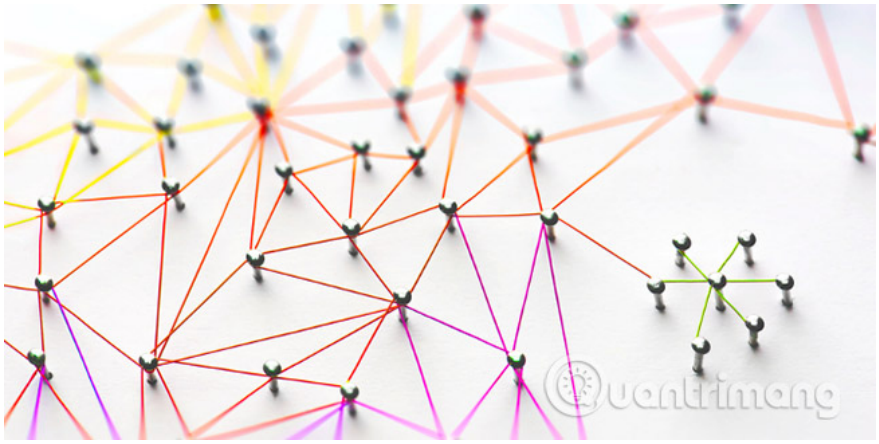
What is an IP address?

For more information, please read the article: What is an IP address?



What is MAC address?

A MAC address identifies a unique "network interface" in a device. While the IP address is assigned by the ISP and can be reassigned when the device is connected or disconnected, the MAC address is attached to the physical adapter (adapter) and specified by the manufacturer.

The MAC address is a 12-digit string, where each digit can be any number from 0 to 9 or letters A to F. For easy reading, the string is divided into blocks. There are three popular formats, the first is the most popular and preferred:

1. 68: 7F: 74: 12: 34: 56
2. 68-7F-74-12-34-56
3. 687.F74.123.456

The first 6 digits (called the 'prefix') represent the adapter manufacturer, while the last 6 digits represent the unique identifier for that particular adapter. The MAC address does not contain information about which network the device is connected to.

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IP addresses are used to transfer data from one network to another using TCP / IP. The MAC address is used to distribute data to the correct device on the network.

Suppose your name is 'John Smith'. Not enough to identify correctly because there are so many people with the same name. But what if we combine with your ancestors (ie 'producers')? You will be "John Smith, Edward's son, Edward is George's son, George is the son of ." All this information is enough to make the name 'John Smith' become unique. That is your MAC address.

If someone wants to send a package to you, he or she can't tell the post office to send it to "John Smith, Edward's son, Edward is George's son, George is the son of . " OK. Although it identifies the exact recipient as a friend, it will drive the post office crazy if it has to find you. That's why it is necessary to have a home address.

But the home address itself is not enough. Need both your home address and your name, otherwise you will receive the package but do not know if it is for you, your spouse, etc. The IP address is where you are, and the MAC address indicates Who are you.

How will this be in practice?

Your router / modem has a unique IP address (home address) specified by your ISP (postal service). The device connects to that router / modem (the person living in the house) has a unique MAC address (personal name). IP address receives data to the router / modem (mailbox), then the router / modem will forward to the appropriate device (recipient).

Benefits of MAC address

Here's how MAC filtering works on modern routers: You can ask the router to deny access to specific MAC addresses (for example, specific physical devices) or allow only a few. Certain MAC addresses connect.

You cannot do the same with IP addresses because routers assign internal IP addresses to devices when they connect and 'recycle' them when the device disconnects. That's why your smartphone may have an internal IP address of 192.168.0.1 in the morning but it becomes 192.168.0.3 when you get home from work. Blocking '192.168.0.1' will not make any sense.

Another convenient use for MAC addresses is to activate Wake-on-LAN. Ethernet adapters can accept a 'magic package' that makes the device 'awake', even if it is turned off. This magic package can be sent from anywhere on the same network, and the MAC address of the Ethernet receiver adapter is the way magic packages know where to go.

Weakness of IP address and MAC address

Do you remember how an IP address denotes a device's connection to an ISP? What if the second device connects to the device and the main channel in all web activity through that device? For the rest of the web, the operation of the second device seems to be the main device.

That's how you hide your IP address from others. Although there is nothing wrong with doing this, it can lead to security issues. For example, a malicious hacker hidden behind some proxies can make it difficult for authorities to track him.

Another risk is that IP addresses can be traced. You will be amazed at what someone can do only with your IP address.

And that is the potential problem of IP conflict, in which two or more devices share the same IP address. This mostly happens on an intranet, but with the growing shortage of IPv4 addresses, it may soon spread across the entire Internet.

For MAC addresses, there is really only one problem you need to know: It's easy to change the device's MAC address. This loses the purpose of the unique identifier specified by the manufacturer, because anyone can 'fake' another person's MAC address. It also makes features like MAC filters almost useless.

Any IP address and MAC address are useful and important, so they won't disappear anytime soon. Hopefully now that you understand what they are, how they work and why you need them.

If you have any questions or if you have any other tips or explanations, please share with us in the comment section below!

See more:

1. How to find the IP address of another computer on the LAN
2. How to change MAC addresses on Windows, Linux and MAC OS X
3. Find IP address and MAC address
4. About IPv6 address