**MAC Address**

In computer networking, the Media Access Control (MAC) address is every bit as important as an [IP](http://compnetworking.about.com/library/glossary/bldef-ip.htm) address. Learn in this article how MAC addresses work and how to find the MAC addresses being used by a computer.

**What Is a MAC Address?**

The Media Access Control (MAC) address is a unique value associated with a network adapter. MAC addresses are also known as **hardware** addresses or **physical** addresses. They uniquely identify an adapter on a LAN.

MAC addresses are 12-digit hexadecimal numbers (48 bits in length). By convention, MAC addresses are usually written in one of the following formats:

MM:MM:MM:SS:SS:SS

MMMM-MMSS-SSSS

The first half (24 BITS) of a MAC address contains the ID number of the adapter manufacturer. These IDs are regulated by an Internet standards body (see sidebar). The second half (24 MORE BITS) of a MAC address represents the serial number assigned to the adapter by the manufacturer. In the example,

00:A0:C9:14:C8:29

The prefix

00A0C9

indicates the manufacturer is Intel Corporation.

**Why MAC Addresses?**

Recall that TCP/IP and other mainstream networking architectures generally adopt the OSI model. In this model, network functionality is subdivided into layers. MAC addresses function at the data link layer (layer 2 in the OSI model). They allow computers to uniquely identify themselves on a network at this relatively low level.

**MAC vs. IP Addressing**

Whereas MAC addressing works at the data link layer, IP addressing functions at the network layer (layer 3). It's a slight oversimplification, but one can think of IP addressing as supporting the software implementation and MAC addresses as supporting the hardware implementation of the network stack. The MAC address generally remains fixed and follows the network device, but the IP address changes as the network device moves from one network to another.

IP networks maintain a mapping (association) between the IP address of a device and its MAC address. This mapping is known as the **ARP cache** or **ARP table**. ARP, the Address Resolution Protocol, supports the logic for obtaining this mapping and keeping the cache up to date.

DHCP also usually relies on MAC addresses to manage the unique assignment of IP addresses to devices.

The method used to find a MAC address depends on the type of network device involved. All popular network operating systems contain utility programs that allow one to find (and sometimes change) MAC address settings.

**Find a MAC Address in Windows**

In Windows 95, Windows 98 and Windows ME, the **winipcfg** utility displays MAC addresses. In Windows NT and any newer versions of Windows, the **ipconfig** utility (using the /all option) can also be used.

Both **winipcfg** and **ipconfig** can display multiple MAC addresses. First, one MAC address is shown for each network adapter. Then, one or more additional MAC addresses are shown for other network adapters.

Windows, for example, utilizes built-in MAC addressing to support Windows dial-up connections. Some Windows VPN clients likewise use their own MAC address. Because these other adapters are really software constructs that do not involve unique hardware, these are often referred to as **virtual adapters**.

**Find a MAC Address in Unix or Linux**

The specific command used in Unix to find a MAC address varies depending on the "flavor" of the operating system. In Linux and in some forms of Unix, the command **ifconfig -a** returns MAC addresses.

It's also possible to find MAC addresses in Unix and Linux by reading the boot message sequence, either on-screen as the system boots or from the startup message file. The log file for boot messages is usually /var/log/messages or /var/adm/messages.

**Find a MAC Address on the Macintosh**

MAC addresses on the Macintosh are generally found on the **TCP/IP Control Panel**. If the system is running Open Transport, the MAC address can be found under the **Info** or **User Mode/Advanced** screens. If the system is running MacTCP, the MAC address can be found under the **Ethernet** icon.

**Finding a MAC Address Summary**

The table below summarizes options for finding a computer's MAC address.

| **Operating system** | **Method** |
| --- | --- |
| Windows 95 and newer | winipcfg |
| Windows NT and newer | ipconfig /all |
| Linux and some Unix | ifconfig -a |
| Macintosh with Open Transport | TCP/IP Control Panel - Info or User Mode/Advanced |
| Macintosh with MacTCP | TCP/IP Control Panel - Ethernet icon |

MAC addresses were designed to be fixed numbers that cannot be changed. However, there are some valid reasons to want to change your MAC address.

**Changing MAC Addresses to Support Your ISP**

Some ISPs, typically cable modem providers, sell Internet subscriptions on a per-address basis. Occasionally the ISP manages these subscriptions by assigning a static (fixed) IP address to the customer. However, this approach is an inefficient use of IP addresses that are currently in short supply.

More typically, ISPs manage single-address subscriptions by registering the MAC address of the device that connects to the ISP. This device could be a broadband modem, for example. The customer is free to build a home or small business network behind this modem, but the ISP expects the MAC address to match the registered value at all times.

Whenever a customer replaces their modem or adds a broadband router, the MAC address will no longer match that registered at the ISP, and the ISP will disable the customer's Internet connection.

**Cloning MAC Addresses**

One way to solve this problem is to call the ISP and ask them to update the registered MAC address to match the new hardware. A more efficient way to solve this problem is to configure the device so that it advertises the original MAC address, even though it's hardware is built to utilize a different MAC address. This process is called **cloning**.

Many broadband routers today support MAC address cloning as an advanced configuration option. The exact procedure varies depending on the type of router.

**MAC Addresses and Cable Modems**

Note that in addition to MAC addresses stored at the ISP, some broadband modems also store the MAC address of the host computer's network adapter. However, in this case, cloning is not required. It's true that changing network adapters usually causes the cable modem connection to fail. To remedy this problem, though, requires only that the cable modem and computer be reset (and perhaps a waiting period for the ISP to release the old IP address).

**Changing MAC Addresses through the Operating System**

Starting with Windows 2000, users can change their MAC address through the Windows **My Network Places** interface. This feature relies on software support built into the adapter driver program and thus does not work for all adapters.

Likewise, the ifconfig command available in Linux and other flavors of Unix supports changing MAC addresses with the necessary network card and driver support.

**In Conclusion**

The MAC address is an important element of computer networking. MAC addresses uniquely identify a computer on the LAN. MAC is an essential component required for network protocols like TCP/IP to function.

Computer operating systems and broadband routers support viewing and sometimes changing MAC addresses. Some ISPs track their customers by MAC address. Changing a MAC address can be necessary in some cases to keep an Internet connection working.

Changing MAC addresses may also increase privacy in some situations, though MAC addresses do not reveal any geographic or ISP location information like IP addresses do.

## Windows 7

1. Click 'Start'
2. In the Search box, type "cmd" (no quotes) and hit Enter
3. A command prompt will open. Type "getmac /v" (no quotes) and hit Enter
4. Among the information will be one or more listings:
   * Ethernet Adapter Local Area Connection is a wired adapter.
   * Ethernet Adapter Wireless Network Connection is a wireless adapter.

Look for "Physical Address" for the adapter you wish to register. That is its MAC address.

## Windows XP

1. Click the 'Start'
2. Select 'Run' and type "cmd" (no quotes) and hit Enter
3. A command prompt will open. Type "ipconfig /all" (no quotes) and hit Enter
4. Among the information will be one or more listings:
   * Ethernet Adapter Local Area is a wired adapter.
   * The wireless adapter will be named for the brand or type (or labeled 'Ethernet Adapter Wireless Network Connection'.

Look for "Physical Address" for the adapter you wish to register. That is its MAC address.

## MacOS X 10.5 - 10.7

1. Open 'System Preferences'
2. Select 'Network'
3. Choose the interface you want to register: Built-In Ethernet or Airport
4. Click' Advanced'
5. Select the 'Ethernet' tab ('Hardware' on 10.7)
6. 10.5-10.6 - "Ethernet ID" shows the MAC Address for this interface
7. 10.7 - "MAC Address" shows the MAC Address for this interface

## Linux

1. Open a shell/terminal window
2. Type "ifconfig -a" (no quotes)
3. Determine which interface you need.
4. "Ethernet HWaddr" shows the MAC Address for this interface

## iPhone/iPad/iPod Touch

1. Open 'Settings'
2. Select 'General'
3. Select 'About'
4. Look for 'Wi-Fi Address'

## Android

1. Open 'Settings'
2. Select 'About phone'
3. Select 'Hardware information'
4. Look for 'Wi-Fi MAC Address'

For example have a look

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