

# Network Interface Cards

## NICs

Network Interface Cards (NICs) connect devices to the network. Network adapter or network card are both alternate names for NICs. The NIC serves as an interface between a computer and the network. To connect to a network, a computer must have a NIC installed.

NICs can be built into the motherboard of the computer or can be connected using a port on the device. NICs can connect to either wired or wireless networks.

## Duplex

Historically, NICs had to have their duplex set. The term duplex refers to how the network cards handle two-way communication. There were two settings for duplex: half-duplex or full duplex.

In half-duplex communication, the NIC can both send and receive. But it can't do both at the same time. NICs that are set to half-duplex function like a walkie talkie.

In full duplex, NICs can both send and receive at the same time.

The most important thing about duplex is that both devices need to be using the same setting. Imagine one device is set to half-duplex and the other is set to full duplex. The full duplex NIC can send and receive at the same time. Therefore, it will never stop transmitting. The half-duplex NIC expects that it will either be sending or receiving. Since the full duplex NIC on the other side never stops transmitting, the half-duplex NIC never gets a chance to transmit at all.

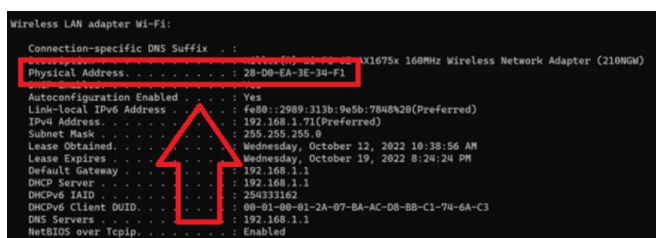
Modern network cards, and the devices they connect to, support auto-sensing. If the device on the other side requires half-duplex, they will select half-duplex. If the device on the other side supports full duplex, they will select full duplex. You should not have to adjust duplex in your career, but it is something you can check if two devices are having trouble communicating.

## MAC Addresses

To deliver something like mail or data, the recipient must have a unique address. Imagine if there were two houses that had the same address. How would the mail system know where to deliver each letter or package?

The same is true for NICs. Each NIC must have a unique address. That address is called a Media Access Control or MAC address. It may also be called a physical address. The MAC address is a unique, hardware address assigned to the NIC by the manufacturer.

MAC addresses are 48 bits long. MAC addresses have six sets of two-digit hexadecimal numbers. The first three sets identify the manufacturer, and the last three sets identify that particular NIC.



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Wireless LAN adapter Wi-Fi:
Connection-specific DNS Suffix . : 
Physical Address. . . . . : 28-D0-EA-3E-34-F1
Autoconfiguration Enabled . . . : Yes
Link-local IPv6 Address . . . . : fe80::2989:313b:9e5b:7848%20(Preferred)
IPv4 Address. . . . . : 192.168.1.71(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : Wednesday, October 12, 2022 10:38:56 AM
Lease Expires . . . . . : Wednesday, October 19, 2022 8:24:24 PM
Default Gateway . . . . . : 192.168.1.1
DHCP Server . . . . . : 192.168.1.1
DHCPv6 IAID . . . . . : 254333162
DHCPv6 Client DUID. . . . . : 00-01-00-01-2A-07-BA-AC-D8-BB-C1-74-6A-C3
DNS Servers . . . . . : 192.168.1.1
NetBIOS over Tcpip. . . . . : Enabled
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