

**SOLUTION 1:****1. Ipconfig /all**

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Wireless LAN adapter Local Area Connection* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . : 
    Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
    Physical Address. . . . . : 14-F6-D8-F3-85-82
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . : 
    Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
    Physical Address. . . . . : 16-F6-D8-F3-85-81
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter WiFi:

    Connection-specific DNS Suffix . : 
    Description . . . . . : Intel(R) Wireless-AC 9462
    Physical Address. . . . . : 14-F6-D8-F3-85-81
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::ad67:1708:e561:2bf0%7(Preferred)
    IPv4 Address. . . . . : 192.168.128.219(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Lease Obtained. . . . . : 16 November 2021 11:51:39
    Lease Expires . . . . . : 16 November 2021 14:19:02
    Default Gateway . . . . . : 192.168.128.49
    DHCP Server . . . . . : 192.168.128.49
    DHCPv6 IAID . . . . . : 85259992
    DHCPv6 Client DUID. . . . . : 00-01-00-01-27-E0-E8-95-14-F6-D8-F3-85-81
    DNS Servers . . . . . : 192.168.128.49
    NetBIOS over Tcpip. . . . . : Enabled

Ethernet adapter Bluetooth Network Connection:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . : 
    Description . . . . . : Bluetooth Device (Personal Area Network)
    Physical Address. . . . . : 14-F6-D8-F3-85-85
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
```

## 2. Analyzing ARP request

No.	Time	Source	Destination	Protocol	Length	Info
199	1.558111	IntelCor_f3:85:81	Broadcast	ARP	42	Who has 192.168.128.49? Tell 192.168.128.219
200	1.561291	0e:15:27:3b:74:62	IntelCor_f3:85:81	ARP	42	192.168.128.49 is at 0e:15:27:3b:74:62
412	3.169441	192.168.128.219	192.168.128.49	ICMP	74	Echo (ping) request id=0x0001, seq=97/24832, ttl=128 (reply in 415)
415	3.172073	192.168.128.49	192.168.128.219	ICMP	74	Echo (ping) reply id=0x0001, seq=97/24832, ttl=64 (request in 412)
582	4.183248	192.168.128.219	192.168.128.49	ICMP	74	Echo (ping) request id=0x0001, seq=98/25088, ttl=128 (reply in 583)
583	4.185289	192.168.128.49	192.168.128.219	ICMP	74	Echo (ping) reply id=0x0001, seq=98/25088, ttl=64 (request in 582)
734	5.207807	192.168.128.219	192.168.128.49	ICMP	74	Echo (ping) request id=0x0001, seq=99/25344, ttl=128 (reply in 736)
736	5.210875	192.168.128.49	192.168.128.219	ICMP	74	Echo (ping) reply id=0x0001, seq=99/25344, ttl=64 (request in 734)
881	6.226201	192.168.128.219	192.168.128.49	ICMP	74	Echo (ping) request id=0x0001, seq=100/25600, ttl=128 (reply in 882)
882	6.228158	192.168.128.49	192.168.128.219	ICMP	74	Echo (ping) reply id=0x0001, seq=100/25600, ttl=64 (request in 881)

> Frame 199: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface \Device\NPF\_{39A1B60E-E512-42DF-9BC8-F761E15137A8}, id 0  
> Ethernet II, Src: IntelCor\_f3:85:81 (14:f6:d8:f3:85:81), Dst: Broadcast (ff:ff:ff:ff:ff:ff)  
> Destination: Broadcast (ff:ff:ff:ff:ff:ff)  
> Source: IntelCor\_f3:85:81 (14:f6:d8:f3:85:81)  
Type: ARP (0x0806)  
v Address Resolution Protocol (request)  
Hardware type: Ethernet (1)  
Protocol type: IPv4 (0x0800)  
Hardware size: 6  
Protocol size: 4  
Opcode: request (1)  
Sender MAC address: IntelCor\_f3:85:81 (14:f6:d8:f3:85:81)  
Sender IP address: 192.168.128.219  
Target MAC address: 00:00:00:00:00:00 (00:00:00:00:00:00)  
Target IP address: 192.168.128.49

0000 ff ff ff ff ff ff 14 f6 d8 f3 85 81 00 06 00 01 .....  
0010 00 00 06 04 00 01 14 f6 d8 f3 85 81 c0 a8 80 db .....  
0020 00 00 00 00 00 00 c0 a8 80 31 .....:1

- The sender MAC address is same as my Physical Address.
- Sender IP address is same as my IP address.
- Destination is FF:FF:FF:FF:FF:FF which is broadcast address.
- Target IP address is same as default gateway which was pinged.

## 3. Analyzing ARP reply

No.	Time	Source	Destination	Protocol	Length	Info
199	1.558111	IntelCor_f3:85:81	Broadcast	ARP	42	Who has 192.168.128.49? Tell 192.168.128.219
200	1.561291	0e:15:27:3b:74:62	IntelCor_f3:85:81	ARP	42	192.168.128.49 is at 0e:15:27:3b:74:62
412	3.169441	192.168.128.219	192.168.128.49	ICMP	74	Echo (ping) request id=0x0001, seq=97/24832, ttl=128 (reply in 415)
415	3.172073	192.168.128.49	192.168.128.219	ICMP	74	Echo (ping) reply id=0x0001, seq=97/24832, ttl=64 (request in 412)
582	4.183248	192.168.128.219	192.168.128.49	ICMP	74	Echo (ping) request id=0x0001, seq=98/25088, ttl=128 (reply in 583)
583	4.185289	192.168.128.49	192.168.128.219	ICMP	74	Echo (ping) reply id=0x0001, seq=98/25088, ttl=64 (request in 582)
734	5.207807	192.168.128.219	192.168.128.49	ICMP	74	Echo (ping) request id=0x0001, seq=99/25344, ttl=128 (reply in 736)
736	5.210875	192.168.128.49	192.168.128.219	ICMP	74	Echo (ping) reply id=0x0001, seq=99/25344, ttl=64 (request in 734)
881	6.226201	192.168.128.219	192.168.128.49	ICMP	74	Echo (ping) request id=0x0001, seq=100/25600, ttl=128 (reply in 882)
882	6.228158	192.168.128.49	192.168.128.219	ICMP	74	Echo (ping) reply id=0x0001, seq=100/25600, ttl=64 (request in 881)

> Frame 200: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface \Device\NPF\_{39A1B60E-E512-42DF-9BC8-F761E15137A8}, id 0  
> Ethernet II, Src: 0e:15:27:3b:74:62 (0e:15:27:3b:74:62), Dst: IntelCor\_f3:85:81 (14:f6:d8:f3:85:81)  
> Destination: IntelCor\_f3:85:81 (14:f6:d8:f3:85:81)  
> Source: 0e:15:27:3b:74:62 (0e:15:27:3b:74:62)  
Type: ARP (0x0806)  
v Address Resolution Protocol (reply)  
Hardware type: Ethernet (1)  
Protocol type: IPv4 (0x0800)  
Hardware size: 6  
Protocol size: 4  
Opcode: reply (2)  
Sender MAC address: 0e:15:27:3b:74:62 (0e:15:27:3b:74:62)  
Sender IP address: 192.168.128.49  
Target MAC address: IntelCor\_f3:85:81 (14:f6:d8:f3:85:81)  
Target IP address: 192.168.128.219

0000 14 f6 d8 f3 85 81 0e 15 27 3b 74 62 00 06 00 01 .....:tb....  
0010 00 00 06 04 00 02 0e 15 27 3b 74 62 c0 a8 80 31 .....:tb...1  
0020 14 f6 d8 f3 85 81 c0 a8 80 db .....:

- The sender MAC address is physical address of default gateway as a ARP reply.
- Sender IP address is same as default gateway's IP address.
- Target MAC address is same as my MAC address.
- Target IP address is same as my IP address.

## SOLUTION 2:

*Class-full addressing Table:*

CLASS	LEADING BITS	NET ID BITS	HOST ID BITS	NO. OF NETWORKS	ADDRESSES PER NETWORK	START ADDRESS	END ADDRESS
CLASS A	0	8	24	$2^7$ (128)	$2^{24}$ (16,777,216)	0.0.0.0	127.255.255.255
CLASS B	10	16	16	$2^{14}$ (16,384)	$2^{16}$ (65,536)	128.0.0.0	191.255.255.255
CLASS C	110	24	8	$2^{21}$ (2,097,152)	$2^8$ (256)	192.0.0.0	223.255.255.255
CLASS D	1110	NOT DEFINED	NOT DEFINED	NOT DEFINED	NOT DEFINED	224.0.0.0	239.255.255.255
CLASS E	1111	NOT DEFINED	NOT DEFINED	NOT DEFINED	NOT DEFINED	240.0.0.0	255.255.255.255

Pinging different sites and classifying the classes of IP

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PS C:\Users\Sceke> ping instagram.com

Pinging instagram.com [31.13.79.174] with 32 bytes of data: Class A
Reply from 31.13.79.174: bytes=32 time=82ms TTL=51
Reply from 31.13.79.174: bytes=32 time=68ms TTL=51
Reply from 31.13.79.174: bytes=32 time=61ms TTL=51
Reply from 31.13.79.174: bytes=32 time=59ms TTL=51

Ping statistics for 31.13.79.174:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 59ms, Maximum = 82ms, Average = 67ms
PS C:\Users\Sceke> ping youtube.com

Pinging youtube.com [142.250.67.142] with 32 bytes of data: Class B
Reply from 142.250.67.142: bytes=32 time=65ms TTL=112
Reply from 142.250.67.142: bytes=32 time=70ms TTL=112
Reply from 142.250.67.142: bytes=32 time=97ms TTL=112
Reply from 142.250.67.142: bytes=32 time=63ms TTL=112

Ping statistics for 142.250.67.142:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 63ms, Maximum = 97ms, Average = 73ms
PS C:\Users\Sceke> ping drive.google.com

Pinging drive.google.com [142.250.67.238] with 32 bytes of data: Class B
Reply from 142.250.67.238: bytes=32 time=104ms TTL=112
Reply from 142.250.67.238: bytes=32 time=64ms TTL=112
Reply from 142.250.67.238: bytes=32 time=66ms TTL=112
Reply from 142.250.67.238: bytes=32 time=61ms TTL=112

Ping statistics for 142.250.67.238:
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```
PS C:\Users\Sceke> ping google.com

Pinging google.com [142.250.183.174] with 32 bytes of data: Class B (127-191)
Reply from 142.250.183.174: bytes=32 time=67ms TTL=112
Reply from 142.250.183.174: bytes=32 time=87ms TTL=112
Reply from 142.250.183.174: bytes=32 time=62ms TTL=112
Reply from 142.250.183.174: bytes=32 time=78ms TTL=112

Ping statistics for 142.250.183.174:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 62ms, Maximum = 87ms, Average = 73ms
PS C:\Users\Sceke> arp -d
PS C:\Users\Sceke> ping bing.com

Pinging bing.com [13.107.21.200] with 32 bytes of data: Class A (0-127)
Reply from 13.107.21.200: bytes=32 time=59ms TTL=114
Reply from 13.107.21.200: bytes=32 time=73ms TTL=114
Reply from 13.107.21.200: bytes=32 time=83ms TTL=114
Reply from 13.107.21.200: bytes=32 time=63ms TTL=114

Ping statistics for 13.107.21.200:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 59ms, Maximum = 83ms, Average = 69ms
PS C:\Users\Sceke> ping facebook.com

Pinging facebook.com [31.13.79.35] with 32 bytes of data: Class A (0-)127
Reply from 31.13.79.35: bytes=32 time=59ms TTL=51
Reply from 31.13.79.35: bytes=32 time=59ms TTL=51
Reply from 31.13.79.35: bytes=32 time=58ms TTL=51
Reply from 31.13.79.35: bytes=32 time=96ms TTL=51
```