1)My MAC address is 48-E7-DA-CF-EE-C7

IPv4 address is 192.168.68.105

IPv6 address is fe80::f16c:b8cd:f4ef:72a6%4

Proof:

```
Connection-specific DNS Suffix  . :
Description . . . . . . . . . . . : Realtek RTL8822CE 802.11ac PCIe Adapter
Physical Address. . . . . . . . . : 48-E7-DA-CF-EE-C7
DHCP Enabled. . . . . . . . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::f16c:b8cd:f4ef:72a6%4(Preferred)
IPv4 Address. . . . . . . . . . . : 192.168.68.105(Preferred)
Subnet Mask . . . . . . . . . . . : 255.255.255.0
Lease Obtained. . . . . . . . . . : Sunday, 15 October, 2023 8:39:59 AM
Lease Expires . . . . . . . . . . : Sunday, 15 October, 2023 10:42:02 PM
Default Gateway . . . . . . . . . : fe80::3e84:6aff:fe38:3800%4
                                    192.168.68.1
DHCP Server . . . . . . . . . . . : 192.168.68.1
DHCPv6 IAID . . . . . . . . . . . : 88664026
DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-28-B1-9B-DA-50-81-40-ED-35-FC
DNS Servers . . . . . . . . . . . : 202.188.18.188
                                    1.9.1.9
NetBIOS over Tcpip. . . . . . . . : Enabled
```

2)DHCP (Dynamic Host Configuration Protocol) is a network management protocol used to dynamically assign an IP address to any device, or node, on a network so it can communicate using IP. DHCP automates and centrally manages these configurations rather than requiring network administrators to manually assign IP addresses to all network devices. DHCP can be implemented on small local networks, as well as large enterprise networks.

DHCP assigns new IP addresses in each location when devices are moved from place to place, which means network administrators do not have to manually configure each device with a valid IP address or reconfigure the device with a new IP address if it moves to a new location on the network.

Versions of DHCP are available for use in IP version 4 (IPv4) and IP version 6 (IPv6). IPv6 became an industry standard in 2017 -- nearly 20 years after its specifications were first published. While the adoption rate of IPv6 was slow, more than 29% of Google users were making inquiries using IPv6 by July 2019.

How DHCP works

DHCP runs at the application layer of the TCP/IP stack. It dynamically assigns IP addresses to DHCP clients and allocates TCP/IP configuration information to DHCP clients. This information includes subnet mask information, default gateway IP addresses and domain name system (DNS) addresses.

DHCP is a client-server protocol in which servers manage a pool of unique IP addresses, as well as information about client configuration parameters. The servers then assign addresses out of those address pools. DHCP-enabled clients send a request to the DHCP server whenever they connect to a network.

DHCP uses and functions

DHCP is used to distribute IP addresses within a network and to configure the proper subnet mask, default gateway and DNS server information on the device.

DHCP, including Request for Comments (RFC) 8415 -- the draft version released in November 2018 -- can also be used by ordinary electronic devices whose manufacturers want them to be part of the internet of things (IoT). DHCP is one method of connecting devices -- such as refrigerators and lawn sprinkler systems -- to the internet using a Manufacturer Usage Description (MUD), suggested by the Internet Engineering Task Force (IETF).

DHCP(Dynamic Host Configuration Protocol) server is used to mechanically configure hosts.

The Domain Name System (DNS) is the phonebook of the Internet. Humans access information online through domain names, like nytimes.com or espn.com. Web browsers interact through Internet Protocol (IP) addresses. DNS translates domain names to IP addresses so browsers can load Internet resources.

Each device connected to the Internet has a unique IP address which other machines use to find the device. DNS servers eliminate the need for humans to memorize IP addresses such as 192.168.1.1 (in IPv4), or more complex newer alphanumeric IP addresses such as 2400:cb00:2048:1::c629:d7a2 (in IPv6).

How does DNS work?

The process of DNS resolution involves converting a hostname (such as www.example.com) into a computer-friendly IP address (such as 192.168.1.1). An IP address is given to each device on the Internet, and that address is necessary to find the appropriate Internet device - like a street address is used to find a particular home. When a user wants to load a webpage, a translation must occur between what a user types into their web browser (example.com) and the machine-friendly address necessary to locate the example.com webpage.

In order to understand the process behind the DNS resolution, it's important to learn about the different hardware components a DNS query must pass between. For the web browser, the DNS lookup occurs "behind the scenes" and requires no interaction from the user's computer apart from the initial request.

DNS(Domain Name System), the purpose of DNS is to translate the domain names into IP addresses or in revert, convert IP addresses to domain names.

3)In order to obtain the IP address for my machine, I typed (WIN + r) -> CMD -> 'ipconfig /all' enter. Then, this data came out:

```
Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
   Physical Address. . . . . . . . . : 4A-E7-DA-CF-EE-C7
   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. . . . . . . . . : CA-E7-DA-CF-EE-C7
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : simnet.edu.sg
   Description . . . . . . . . . . . : Realtek RTL8822CE 802.11ac PCIe Adapter
   Physical Address. . . . . . . . . : 48-E7-DA-CF-EE-C7
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::f16c:b8cd:f4ef:72a6%4(Preferred)
   IPv4 Address. . . . . . . . . . . : 10.33.171.209(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Lease Obtained. . . . . . . . . . : Tuesday, 17 October, 2023 12:09:08 PM
   Lease Expires . . . . . . . . . . : Tuesday, 17 October, 2023 1:24:41 PM
   Default Gateway . . . . . . . . . : 10.33.64.1
   DHCP Server . . . . . . . . . . . : 10.10.50.74
   DHCPv6 IAID . . . . . . . . . . . : 88664026
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-28-B1-9B-DA-50-81-40-ED-35-FC
   DNS Servers . . . . . . . . . . . : 10.10.50.73
                                       10.10.50.74
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

4)
```
C:\Users\Avis>ping -t localhost

Pinging LAPTOP-0O48JG7L [::1] with 32 bytes of data:
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms

Ping statistics for ::1:
    Packets: Sent = 8, Received = 8, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
Control-C
^C
```

The ping is reported at <1ms, with its minimum, maximum and average time being the same at 0ms. The time values do not vary in any way because all the data is recorded at 0ms.

The ping command is used to test the connectivity and latency between a source and a destination host or IP address. When you exit the ping program, it typically reports the minimum, maximum, and average time taken for the ICMP (Internet Control Message Protocol) packets to travel to the destination host and receive a response.

These time values can vary for a variety of reasons, including network congestion, the distance between the source and destination, and the quality of the network connection. Here's what each value means:

Minimum time: This is the shortest time it took for an ICMP packet to travel from the source to the destination and receive a response during the ping session.

Maximum time: This is the longest time it took for an ICMP packet to travel from the source to the destination and receive a response during the ping session.

Average time: This is the average (mean) round-trip time for the ICMP packets during the ping session. It's the sum of all round-trip times divided by the number of packets sent.

The time values reported by ping can vary depending on network conditions. For example, during periods of high network traffic or congestion, the round-trip times may increase. Similarly, if there are network issues or delays along the route between the source and destination, it can affect these time values. In a well-functioning network, you would generally expect consistent and relatively low round-trip times. However, significant variations may indicate network issues or fluctuations in performance.

Uow.edu.au
Minimum time taken:0ms
Maximum time taken:0ms
Average time taken:0ms

5)The Packet that was sent to my friend's address (172.253.118.104) is 0% lost, with its approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 1ms, Average = 0ms. Hence, it is different because the distance or "step" from my machine to my friend's machine and within the same machine varies. Ping correlates pretty strongly with the physical location of the server initiating the ping vs the server that is hosting your website or service. In addition, the network traffic going through my machine and my friend's machine is also different.

www.google.com pings:

```
C:\Users\Avis>ping -t www.google.com

Pinging www.google.com [172.217.174.164] with 32 bytes of data:
Reply from 172.217.174.164: bytes=32 time=11ms TTL=60
Reply from 172.217.174.164: bytes=32 time=11ms TTL=60
Reply from 172.217.174.164: bytes=32 time=10ms TTL=60
Reply from 172.217.174.164: bytes=32 time=10ms TTL=60
Reply from 172.217.174.164: bytes=32 time=11ms TTL=60
Reply from 172.217.174.164: bytes=32 time=11ms TTL=60
Reply from 172.217.174.164: bytes=32 time=10ms TTL=60
Reply from 172.217.174.164: bytes=32 time=12ms TTL=60

Ping statistics for 172.217.174.164:
    Packets: Sent = 8, Received = 8, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 12ms, Average = 10ms
Control-C
^C
```

www.abc.net.au pings:

```
C:\Users\Avis>ping -t www.abc.net.au

Pinging e3161.b.akamaiedge.net [23.220.240.104] with 32 bytes of data:
Reply from 23.220.240.104: bytes=32 time=10ms TTL=61
Reply from 23.220.240.104: bytes=32 time=10ms TTL=61
Reply from 23.220.240.104: bytes=32 time=16ms TTL=61
Reply from 23.220.240.104: bytes=32 time=10ms TTL=61
Reply from 23.220.240.104: bytes=32 time=11ms TTL=61

Ping statistics for 23.220.240.104:
    Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 16ms, Average = 11ms
Control-C
^C
C:\Users\Avis>
```

[ftp.gnu.org](ftp.gnu.org) pings:

```
C:\Users\Avis>ping -t ftp.gnu.org

Pinging ftp.gnu.org [209.51.188.20] with 32 bytes of data:
Reply from 209.51.188.20: bytes=32 time=308ms TTL=56
Reply from 209.51.188.20: bytes=32 time=320ms TTL=56
Reply from 209.51.188.20: bytes=32 time=297ms TTL=56
Reply from 209.51.188.20: bytes=32 time=300ms TTL=56

Ping statistics for 209.51.188.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 297ms, Maximum = 320ms, Average = 306ms
Control-C
^C
C:\Users\Avis>_
```

6)

My IP Address is:

IPv4: ? **203.217.187.31**

IPv6: ? **Not detected**

My IP Information:

ISP:	Sim Headquarters
Services:	Suspected Network Sharing Device
City:	Singapore
Region:	Singapore
Country:	Singapore

```
Connection-specific DNS Suffix  . :
Description . . . . . . . . . . . : Realtek RTL8822CE 802.11ac PCIe Adapter
Physical Address. . . . . . . . . : 48-E7-DA-CF-EE-C7
DHCP Enabled. . . . . . . . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::f16c:b8cd:f4ef:72a6%4(Preferred)
IPv4 Address. . . . . . . . . . . : 192.168.68.105(Preferred)
Subnet Mask . . . . . . . . . . . : 255.255.255.0
Lease Obtained. . . . . . . . . . : Sunday, 15 October, 2023 8:40:00 AM
Lease Expires . . . . . . . . . . : Sunday, 15 October, 2023 9:41:52 PM
Default Gateway . . . . . . . . . : fe80::3e84:6aff:fe38:3800%4
                                    192.168.68.1
DHCP Server . . . . . . . . . . . : 192.168.68.1
DHCPv6 IAID . . . . . . . . . . . : 88664026
DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-28-B1-9B-DA-50-81-40-ED-35-FC
DNS Servers . . . . . . . . . . . : 202.188.18.188
                                    1.9.1.9
NetBIOS over Tcpip. . . . . . . . : Enabled
```

IP Addresses are initially created, controlled and assigned via an organization called ICANN – This stands for the Internet Corporation for Assigned Names and Numbers and this business is

responsible for a variety of functions relating to namespaces concerning the internet. ICANN distributes IP Addresses to secondary organizations such as government bodies and Internet Service Providers – These organizations will then distribute their allocated IP Addresses to their customers and members of the public.

We receive our designated IP Address from our Internet Service Provider. Your ISP is responsible for distributing and maintaining a block of dynamic IP addresses that are continually circulated throughout their customer base. It stands to reason, therefore, that if you move house and change broadband providers, your IP Address will also change. Even if you keep the same ISP, because you are moving to a new location, and different cables and connection method may be used, it is a very rare instance to keep the same IP Address.

Even if you don't move house or change your physical location, your IP Address may still change over time – This is because dynamic IP addresses are distributed and this type of address can be changed based on your circumstance – For example, if your contract with an ISP expires or your terms change, your IP address may be changed.

The only instance where you may keep the same IP Address is if you have purchased a static IP Address – This type of address does not change and large businesses often make use of static IP addresses to maintain a degree of continuity.

7)

Blacklist Status

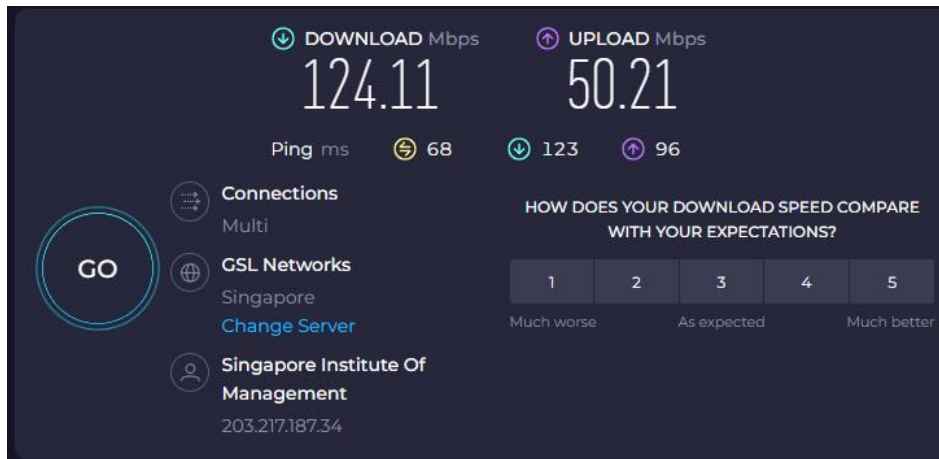☑ IP Not Listed **(Good!)**

🛑 IP Listed **(Bad!)**

❓ Blacklist Timeout Error

❓ Blacklist Offline

- ☑ access.redhawk.org
- ☑ all.s5h.net
- ☑ b.barracudacentral.org
- ☑ bl.spamcop.net
- ☑ bl.tiopan.com
- ☑ blackholes.wirehub.net
- ☑ blacklist.sci.kun.nl
- ☑ block.dnsbl.sorbs.net
- ☑ blocked.hilli.dk
- ☑ bogons.cymru.com
- ☑ cbl.abuseat.org
- ☑ dev.null.dk
- ☑ dialup.blacklist.jippg.org
- ☑ dialups.mail-abuse.org
- ☑ dialups.visi.com
- ☑ dnsbl.abuse.ch
- ☑ dnsbl.anticaptcha.net

8)The crucial difference between a public and private IP address is that the public IP can be seen by other devices on the Internet, while the private IP cannot. Therefore, public IPs are used to interact and communicate online, while private IPs operate within a local network.

https://www.speedtest.net/result/15379803483

Category	Public IP Address	Private IP Address
Scope	Has a global reach.	Only local reach.
Communication	Used to communicate over the Internet.	Used to communicate within a private network.
Uniqueness	A unique address not used by other devices on the Internet.	An address from a smaller range used by other devices in other local networks.
Origin	Assigned by the ISP.	Assigned by the router to a specific device on the local network.
Range	Any IP not in the private IP address ranges.	Any address from the following ranges: 10.0.0.0 - 10.255.255.255; 172.16.0.0 - 172.31.255.255; 192.168.0.0 - 192.168.255.255
Security	Public IPs require additional security measures, they are prone to attacks.	Private IPs are secure.
Example	82.129.73.111	10.0.0.0

Network tools

www.google.com

Start Ping

Results:

Connection successful: http://www.google.com

Round-trip time: 3.39 ms
Round-trip time: 3.44 ms
Round-trip time: 2.30 ms
Round-trip time: 4.98 ms
Round-trip time: 1.97 ms
Round-trip time: 2.43 ms
Round-trip time: 1.93 ms
Round-trip time: 1.69 ms
Round-trip time: 1.88 ms
Round-trip time: 1.53 ms

Testing completed.

Traceroute

www.google.com

Start Traceroute

Results:

Traceroute for www.google.com with a maximum of 15 hops.

Destination: 172.253.63.104

Hop #1	3.236.60.43	4.833 ms
Hop #2	240.3.12.99	0.343 ms
Hop #3	100.66.40.46	3.434 ms
Hop #4	100.100.36.110	1.878 ms
Hop #5	240.0.236.0	0.929 ms
Hop #6	*	*
Hop #7	108.170.240.97	2.002 ms
Hop #8	108.170.246.34	1.968 ms
Hop #9	108.170.235.157	1.828 ms
Hop #10	142.251.237.185	2.897 ms

Hop #11	240.0.236.2	1.000 ms
Hop #12	*	*
Hop #13	99.83.115.173	1.579 ms
Hop #14	*	*
Hop #15	172.253.72.37	3.112 ms

DNS records of www.uow.edu.au

Tool   DNS

☐ Convert Base-10 to IP

www.uow.edu.au

Go!

DNS Records for: **www.uow.edu.au**

DNS servers

Answer Records

www.uow.edu.au	CNAME		600 s

9)

```
Domain Name: UOW.EDU.AU
Registry Domain ID: D407400000000599159-AU
Registrar WHOIS Server: https://whois.auda.org.
Registrar URL: https://www.domainname.edu.au
Last Modified: 2022-12-15T05:38:14Z
Registrar Name: EDUCATION SERVICES AUSTRALIA LI
Registrar Abuse Contact Email: registrar@esa.edu
Registrar Abuse Contact Phone: +61.399109829
Reseller Name:
Status: serverRenewProhibited https://identityc
Status Reason: Not Currently Eligible For Renew
Registrant Contact ID: EDU12470-R
Registrant Contact Name: DNS Administrators
Tech Contact ID: EDU12471-C
Tech Contact Name: DNS Administrators
Name Server: NS2.AARNET.NET.AU
Name Server IP: 202.158.195.8
Name Server: NS1.AARNET.NET.AU
Name Server IP: 202.158.196.136
Name Server: DNS2.UOW.EDU.AU
Name Server IP: 130.130.130.130
Name Server: DNS1.UOW.EDU.AU
Name Server IP: 130.130.213.213
Name Server: NS3.AARNET.NET.AU
Name Server IP: 202.158.196.69
DNSSEC: unsigned
Registrant: University of Wollongong
Eligibility Type: Higher Education Institution
```

Result:

- Domain name: UOW.EDU.AU
- Name Server:NS2.AARNET.NET.AU
- Name Server IP:202.158.195.8
- Name Server:NS1.AARNET.NET.AU
- Name Server IP:202.158.196.136
- Name Server:DNS2.UOW.EDU.AU
- Name Server IP:130.130.130.130
- Name Server:DNS1.UOW.EDU.AU
- Name Server IP:130.130.213.213
- Name Server:NS3.AARNET.NET.AU
- Name Server IP:202.158.196.69

10)

o "Whois" Search tool:

This tool is to know who the responsible party (or parties) is behind a domain name, the WHOIS query will allow you to query multiple domain registrars' databases. If the owner has chosen to hide their information, you can nevertheless return forwarding information.

```
Domain Name: UOW.EDU.AU
Registry Domain ID: D4074000000000599159-AU
Registrar WHOIS Server: https://whois.auda.org.
Registrar URL: https://www.domainname.edu.au
Last Modified: 2022-12-15T05:38:14Z
Registrar Name: EDUCATION SERVICES AUSTRALIA L1
Registrar Abuse Contact Email: registrar@esa.edu
Registrar Abuse Contact Phone: +61.399109829
Reseller Name:
Status: serverRenewProhibited https://identity
Status Reason: Not Currently Eligible For Renew
Registrant Contact ID: EDU12470-R
Registrant Contact Name: DNS Administrators
Tech Contact ID: EDU12471-C
Tech Contact Name: DNS Administrators
Name Server: NS2.AARNET.NET.AU
Name Server IP: 202.158.195.8
Name Server: NS1.AARNET.NET.AU
Name Server IP: 202.158.196.136
Name Server: DNS2.UOW.EDU.AU
Name Server IP: 130.130.130.130
Name Server: DNS1.UOW.EDU.AU
Name Server IP: 130.130.213.213
Name Server: NS3.AARNET.NET.AU
Name Server IP: 202.158.196.69
DNSSEC: unsigned
Registrant: University of Wollongong
Eligibility Type: Higher Education Institution
```

URL Encode and Decode

If you need to include special characters in your URL, you'll need to encode them so that the URL remains valid. You can do this with URL Encode. Conversely, if a URL contains special characters and has been encoded, yet you want to see it in a more human-readable form, use URL Decode to standardize the URL.

Encode:

Result

Original Text/URL	Encoded Text/URL
www.uow.edu.au	www.uow.edu.au

Decode:

Result

Original Text/URL	Encoded Text/URL
www.uow.edu.au	www.uow.edu.au

HTTP reader:

The HTTP Headers tool allows us to see what headers are returned by a web server for a specific domain name or IP Address. If you notice odd behaviour with your HTTP connections, you can use this tool to troubleshoot the top-level domain. Alternatively, you can use it to check for redirection — minimizing these optimizes any links you might be using

```
Server: Apache
Location: https://www.uow.edu.au/

HTTP/1.1 200 OK
Date: Sun, 15 Oct 2023 14:20:05 GMT
Content-Type: text/html; charset=UTF-8
Content-Length: 10657
Connection: keep-alive
Set-Cookie:
AWSALB=NAi8BUSjYP5KrPnhq0j/llKTAAZpjnUkUw4vo1Qto7FjfL5djkezAJXszVQOiZ4GLzbG4wiHl02krtwsU2Gf2nwH/Zq1VjFd9LVXiE23VM15bK3R5VCTzZY4O5Tdsz6tudLlcn/PZ+4LJ6Mi5d7DYaQs90i
E0LCVKo9id+N512MA4Lon44JfFM+FlBATPQ==; Expires=Sun, 22 Oct 2023 14:20:05 GMT; Path=/,
AWSALBCORS=NAi8BUSjYP5KrPnhq0j/llKTAAZpjnUkUw4vo1Qto7FjfL5djkezAJXszVQOiZ4GLzbG4wiHl02krtwsU2Gf2nwH/Zq1VjFd9LVXiE23VM15bK3R5VCTzZY4O5Tdsz6tudLlcn/PZ+4LJ6Mi5d7DYaQ
s90iE0LCVKo9id+N512MA4Lon44JfFM+FlBATPQ==; Expires=Sun, 22 Oct 2023 14:20:05 GMT; Path=/; SameSite=None; Secure
Server: Apache
Strict-Transport-Security: max-age=31536000; includeSubDomains
X-Powered-By: PHP/7.2.34
Vary: Accept-Encoding,User-Agent
Content-Encoding: gzip
```