

OSI Model

What is OSI (Open Systems Interconnect)?

It is the model (set of rules) used to enable two computers can talk to each other. It allows you to see the underlying data and edit it (for example Wikipedia is an open system as you can add to it, however Windows is a Closed System as you can use it but not change the underlying code).

The Layers of OSI

It is comprised of seven layers. Remember: *All People Seem To Need Data Processing*

Layer 7 - Physical – Transmission medium, raw data, Nic's, Cables Hub's

Layer 6 – Data Link – MAC addressing, LAN environments.

Layer 5 – Network – Routing, IP addressing, routers working, WAN environment.

Layer 4 – Transport – Error detection/recovery, connection orientated, and formal handshake.

Layer 3 - Session – Makes/maintains/breaks connections.

Layer 2 – Presentation – Translates between the network and the computer.

Layer 1 - Application – Sorts data from network to correct application using the correct ports.

Router Protocols

IPX/SPX – Internetwork Package Exchange / Sequenced Pack Exchange

XXXX XXXX



Network Address User address

TCP/IP – Transport Control Protocol / Internet protocol

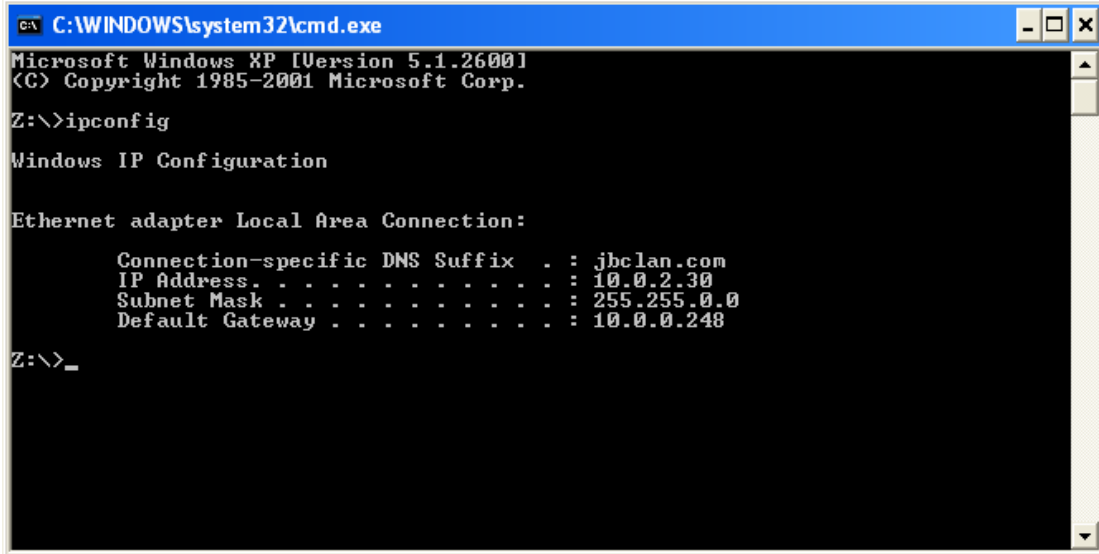
XXXX XXXX XXXX XXXX



Any Number between 0 and 255

Default Gateway – IP address of router.

An Example Of TCP/IP's and Gateway address



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

Z:\>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : jbclan.com
    IP Address . . . . . : 10.0.2.30
    Subnet Mask . . . . . : 255.255.0.0
    Default Gateway . . . . . : 10.0.0.248

Z:\>_
```

Classes Of IP Addresses (Class full System)

Use the first part of the IP address to work out the class:

Class A – 1 to 126 (127 is the loopback address). First Octet = network address

Class B – 128 to 191. First 2 Octets = network address

Class C – 192 to 223 first 3 Octets = network address.

Class D – 224 to 239 uses all 4 Octets = network address.

Class E – 240 to 254 use's all 4 Octets = network address (255 - MOD & Testing only! Class D&E)

For example

10.3.200.159

So the first number is ten making it Class A

10.0.0.0 is the network address.

0.3.200.159 is the Host address

And another

201.25.67.5

So the first number is 201 making it class C

201.25.67.0 is the network address.

0.0.0.5 is the Host address.

Class less System

This concept use's a subnet mask (see top image).

Class A – 255.0.0.0

Class B – 255.255.0.0

Class C – 255.255.255.0

You use the 255 to acknowledge to Octets.

For Example

10.3.1.45 is the IP

Making it a class A.

10.0.0.0 is the network address

0.3.1.45 is the host address

And another

130.2.5.23 is the IP

Making it a Class C

130.2.5.0 is the Network address

0.0.0.23 is the host address.

As you can see it is very much the same as Class full it just use's the Subnet Mask.

| IP | Subnet Mask | Result |
|----|-------------|--------|
| 0 | 0 | 0 |
| 1 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 1 | 1 |

This table shows that if you have a number in both fields it will show the number from the IP address.

Addresses that Can Not be Used.

127.0.0.1 – Local Loopback, used for detecting NIC faults (all 127 address).

10.X.X.X – IP reserved for business.

192.168.X.X - SOHO (small office/home office)

169.254.X.X – APIPA (Automatic Private IP Addressing) Shows that host cannot connect with server.

Domain Name Service/Server

The DNS is a large database referencing IP – domain names. It use's it database to query the network.

I.e. www.bbc.co.uk will be queried and the result may be returned to .uk addresses. Then it will query again in the .uk and may get the results of .co.uk, followed by another query in the co.uk for any bbc.co.uk and finally turning up a www.bbc.co.uk.

NAT's (Network Address Translations)

Static NAT – Each private IP maps to a public IP

Dynamic NAT – Many private IP's map too many public IP's

Overloaded NAT (used @ JBC) – Many private IP's map to a public IP's