

# Datasheet 4 IP Configuration

This fact sheet provides information on IP configuration options available on internet access services from Globalinternet. It is part of a series of 9 documents that give a full overview of products and services available.

IP configuration Options	DIA	Broadband
IPv4	Standard	Standard
IPv6	Non-standard option	Non-standard option
Dual stack	Yes	N/A
Dynamic IP	N/A	Yes
Public static IP	Yes	Yes
Subnets /30 & above	Yes - min /30, 1 free IP	Yes - min /32, 1 free IP
Subnets /29 & below	Yes	N/A
BGP	Non-standard option - eBGP only	N/A

## IP addressing background

An IP address is a numeric identifier assigned to each machine on an IP network and uniquely designates the specific location of the device on the network. Data sent across the internet gets divided into packets with both the sender's and the receiver's IP addresses enabling routing to be achieved to any connected destination.

There are two version of Internet Protocol in use: IPv4 (Internet Protocol Version 4) and IPv6. The default IP addressing that is used worldwide is IPv4 but this is running out of available addresses and being replaced IPv6 which supports effectively unlimited unique addresses. IPv6 includes the capabilities of IPv4 and any server that can support IPv6 packets can also support IPv4 packets.

### IPv4

IPv4 uses 32-bit addresses which limits the address space to 4.3 billion addresses. They are most often written in the dot-decimal notation. The CIDR (Classless Inter-Domain Routing) notation standard combines the address with its routing prefix in a compact format, in which the address is followed by a slash character (/) and the subnet mask.

### Example:

IPv4 IP address: 195.114.237.66

IPv4 CIDR: 195.114.237.66 / 30

### IPv6

IPv6 addresses have 128 bits & can support  $2^{128}$  unique addresses. (around 340 undecillion). The 128 bits of an IPv6 address are represented in 8 groups of 16 bits each. Each group is written as four hexadecimal digits and the groups are separated by colons.

### Example:

IPv6 IP address: 2607:f0d0:1002:51::4

IPv6 CIDR: 2607:f0d0:1002:51::4 / 64

## Transition from IPv4 to IPv6

Transition from IPv4 to IPv6 will happen over an extended period - both protocols will continue to operate simultaneously for some time. To enable this, IPv6 transition mechanisms are needed to enable IPv6 hosts to reach IPv4 services and to allow isolated IPv6 hosts

and networks to reach each other over IPv4 infrastructure. Many of these transition mechanisms use tunneling to encapsulate IPv6 traffic within IPv4 networks. This is an imperfect solution, which reduces the maximum transmission unit (MTU), reduces the security and increases latency. Tunneling protocols are a temporary solution for networks that do not support dual-stack, where both IPv6 and IPv4 run independently.

## Dual Stack

Dual stack (or native dual-stack) provides complete IPv4 and IPv6 protocols stacks in the same network node, avoiding the complexities of tunnelling. Dual Stack software design is a transitional technique to facilitate the adoption and deployment of IPv6.

Dual Stack solutions are available from Globalinternet for DIA products only.

## Types of IP addresses

**Public IP:** A public IP address is the address which is needed to allow access over the Internet. Public IP addresses are those that allow any two devices to identify each other. When a user connects to the Internet, his/her computer/device is usually assigned an address from a pool that has been set aside for the local Internet Service Provider (ISP) to use for their customers.

**Private IP:** A private IP address is the address assigned to a device on a private Local Area Network (LAN) that is accessible only within the Local Area Network. Private addresses cannot be routed to the Internet, so cannot communicate directly with devices on the Internet. IPv4 reserves special address blocks for private networks: IP addresses in the ranges below are not routable on the public internet, all other ranges are public & routable.

Address range	CIRD block
10.0.0.0 - 10.255.255.255	10.0.0.0/8
172.16.0.0 - 172.31.255.255	172.16.0.0/12
192.168.0.0 - 192.168.255.255	192.168.0.0/16

**Dynamic IP:** This is the standard type of address that is assigned by ISPs. A dynamic IP address is chosen from a pool of available addresses, and changes after a

certain amount of time which the ISP dictates. Sometimes a reboot of the modem can cause the customer's modem to retrieve a new/different IP address from the ISP address pool.

**Static IP:** A static IP address does not change, the one assigned by the supplier will be the permanent address on the internet (as long the service stays with the same supplier / server).

*Note: A public IP can be dynamic or static, a dynamic IP can be private or public.*

## Subnets

A subnetwork, or subnet, is a logical subdivision of an IP network into 2 or more networks. Devices that belong to a subnet are addressed with a common bit-group in their IP address. This results in the logical division of an IP address into two fields, a network or routing prefix and the host identifier. It is written as the first address of a network, followed by a slash character (/), and ending with the bit-length of the prefix.

For example: Subnet /30: 195.114.237.0/30

195.114.237.x is the routing prefix (routing prefix never changes)

x.x.x.0 is the host identifier (host identifier is the variable part)

The subnet indicates how many hosts can be identified on the same part of the network:

Subnet /32 total available IPs: 1 (usable IPs 1)

Subnet /31 total available IPs: 2 (usable IPs 1)

Subnet /30 total available IPs: 4 (usable IPs 1)

Subnet /29 total available IPs: 8 (usable IPs 5)

Subnet /28 total available IPs: 16 (usable IPs 13)

Except for /32, 3 of these IP addresses can not be used by the customer because they have a special function within the network.

Following the same example: 195.114.237.0/30 4 IPs available but only 1 is free to use:

195.114.237.0 : not usable - the subnet name

195.114.237.1 : not free to use by the customer - NTE will connect using this IP address

195.114.237.2 : free to use by the customer

195.114.237.3 : not usable - this is the broadcast IP

## Subnet masks

The routing prefix of an address is identified by using another address, called the network mask (netmask) or subnet mask, written in a form identical to that of the address itself. Only used for IPv4 networks. The netmask is a different way to define how many IP addresses/hosts the subnet has.

Example: 195.114.237.0/30 can be wrote as [195.114.237.0, netmask: 255.255.255.252]

More information in the following table:

Shorthand	Netmask	Resulting Subnet	Available IPs	Usable IPs
/32	255.255.255.255	No host, no broadcast	1	1
/31	255.255.255.254	No host, 1 broadcast	1	1
/30	255.255.255.252	2 hosts, 1 net base, 1 broadcast	4	1
/29	255.255.255.248	6hosts, 1 net base, 1 broadcast	8	5
/28	255.255.255.240	14 hosts, 1 net base, 1 broadcast	16	13

## Configuration

Below table shows the different supported configurations by Globalinternet.

IP configura-	Definition
Routed subnet on LAN	Globalinternet assigns the free public IPs from the subnet towards the LAN
Bridged IP	Customer gets a single fixed public IP from a block assigned to many customers. Applicable for subnets /32 or /31
Bridged IP (PPPoE)	Customer gets a username and password which has a fixed static public IP assigned to it. Applicable for subnets /32 or /31

## Monitoring of ISP Service

**Routed subnet on LAN:** Globalinternet can monitor the line and check status. LAN Subnet must be public, static and routed - Private IPs cannot be accepted

**Bridged IP:** With the NTE in bridge mode, Globalinternet cannot monitor the line. The service support team are only able to see if the line is up or down but cannot check IP connectivity.

## BGP

BGP (Border Gateway Protocol) is a protocol that manages how packets are routed across the internet through the exchange of routing and reachability information between edge routers. BGP directs packets between autonomous systems (AS) - networks managed by a single enterprise or service provider. Normally BGP is used to connect from one AS to another, and it is referenced as an external BGP, or eBGP.

BGP offers network stability that guarantees routers can quickly adapt to send packets through alternative connections if one internet path goes down. BGP makes routing decisions based on paths, rules or network policies configured by a network administrator. Each BGP router maintains a standard routing table used to direct packets in transit. This table is used in conjunction with a separate routing table, known as the routing information base (RIB) - the RIB contains route information from internal peers and directly connected external peers - and continually updates the routing table as changes occur.

BGP is available on DIA services only and incurs additional charges over the base internet service.

**Let's Talk!** At Globalinternet, we want to help you to take full control over your internet without having to deal with the complexity of sourcing multiple Internet Service Providers.

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