

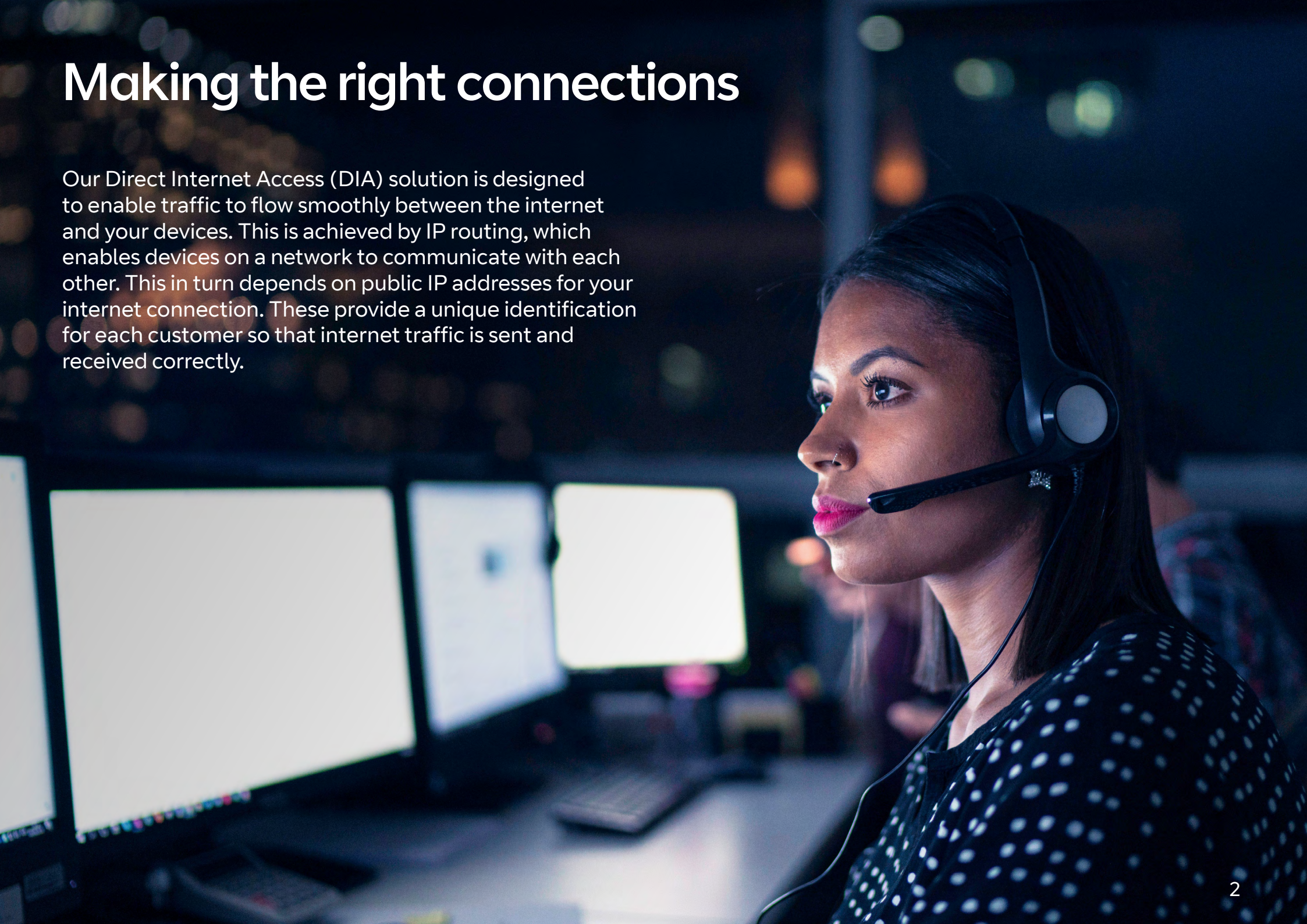


# Direct Internet Access (DIA): IP addressing

Streamlining the flow of internet traffic

# Making the right connections

Our Direct Internet Access (DIA) solution is designed to enable traffic to flow smoothly between the internet and your devices. This is achieved by IP routing, which enables devices on a network to communicate with each other. This in turn depends on public IP addresses for your internet connection. These provide a unique identification for each customer so that internet traffic is sent and received correctly.



# Public and private IP addresses

Confused? Here's a quick explanation of the two types of addresses.

**External, public IP addresses** are visible across the internet. They route traffic to and from your internet connection and the devices connected to it. For instance, if you wanted to access a server at your office from home, you'd need to access it via the external, public IP address. This would allow you to connect to that device via the internet.

**Internal, private IP addresses** are assigned by your router or customer premises equipment (CPE) to the connected devices on your local area network. There's often only a single external, public IP address for your internet connection. However, your equipment will allocate internal, private IP addresses to your connected devices (such as phones, tablets and PCs) so they can work properly and can communicate with each other.

The private IP addresses are assigned by Dynamic Host Configuration Protocol (DHCP), which is usually controlled by the router or CPE. The IP addresses normally start with 192.168.x.x or 10.0.x.x. They're converted and routed to and from the public internet IP address by Network Address Translation (NAT) - another feature of the connected router or CPE.

If you need to access a device while working remotely, you can still send your traffic to the single external public address and let your router or CPE handle routing via NAT onto the local private network and then to the device.

The rest of this document will deal mainly with external, public IP addresses allocated to a DIA service.



# Getting the right addresses

You'll require registered public IP addresses for your DIA service. Most customer orders will take IP addresses issued by BT. These are owned by BT and are not transferable to another ISP if the service is ever ceased. This is known as **Provider Aggregatable (PA) addressing**. It's also possible to use **Provider Independent (PI) addressing** if you already have an existing range which you've previously applied for elsewhere and which you own.

## IPv4 and IPv6 ready

The DIA service supports both IPv4 (traditional) and IPv6 (newer) standards. This future-proofs your service as it enables you to move to IPv6 addressing and routing when you and your customer are ready, without needing changes to the internet service.



# WAN IP addresses



The WAN IP addresses are externally-facing from the internet but aren't generally used by the end customer except for allowing the service to work. They're called WAN addresses as they create the connection back to our internet platform and are linked to the WAN side of the router or CPE you attach to the service.

A typical DIA service, which we provide as 'wires only', would be used with a traditional layer 3 router device, connected and supplied by the service provider. In this case, the WAN addresses are simply used to allow the router to talk to our network and to create the point-to-point internet service.

## The standard allocation is:

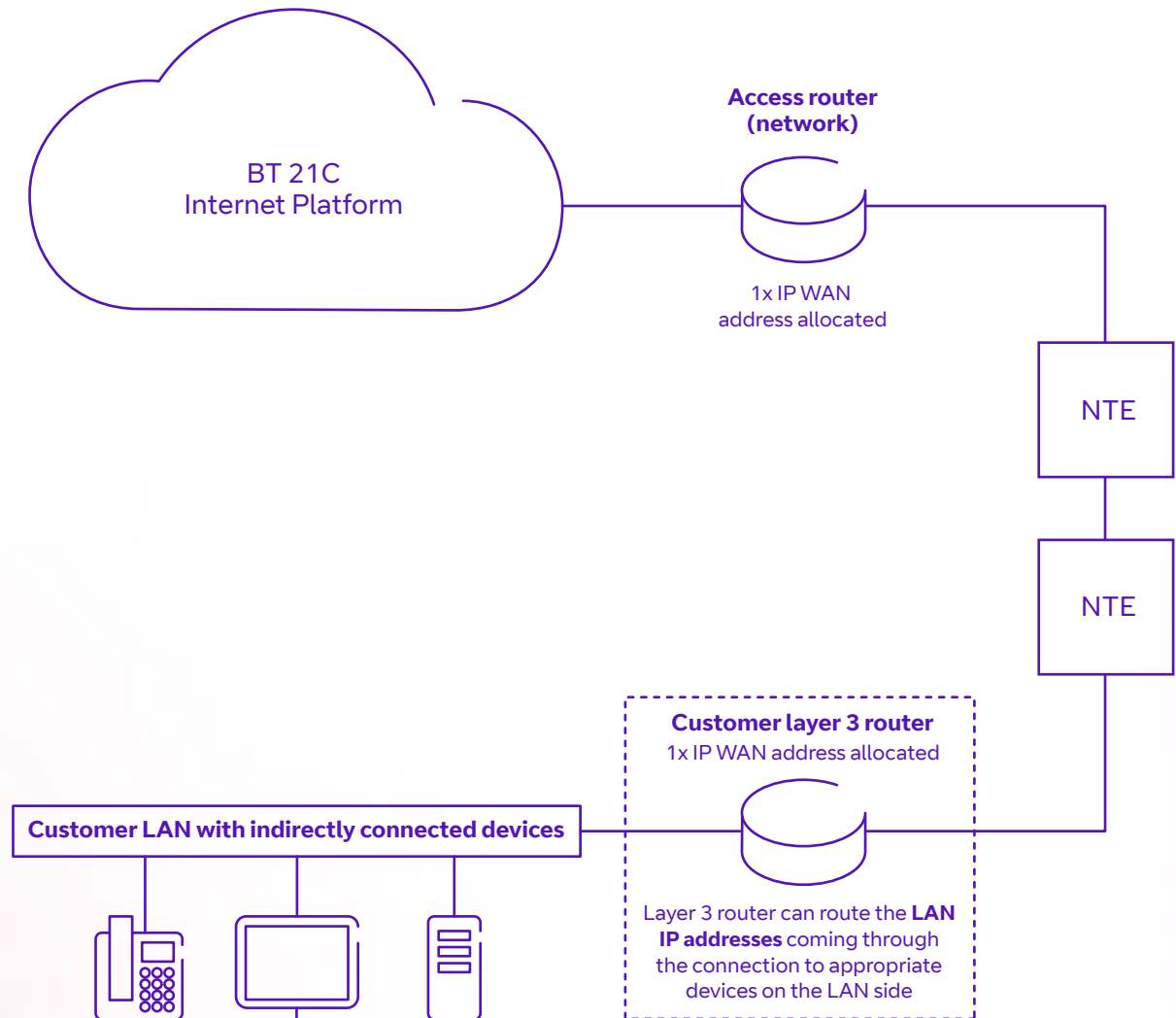
- /31 IPv4 WAN range (two addresses used for the service to work)
- /127 IPv6 WAN range (two addresses used for the service to work)

A small WAN IP address range is allocated to the service as standard, with two IP addresses (for both IPv4 and IPv6). One is allocated to our network's access router, and the other to the WAN port of the connected router at your site. This is so the service can work.

# LAN IP addresses

LAN IP addresses are the internet-facing addresses you'd usually use for the service. Importantly, these aren't private, internal IP addresses but external addresses.

They're routed across the connection, via the onsite router or CPE, and then to your LAN. These devices are described as indirectly connected, behind the layer 3 router.



## IPv4 LAN addresses

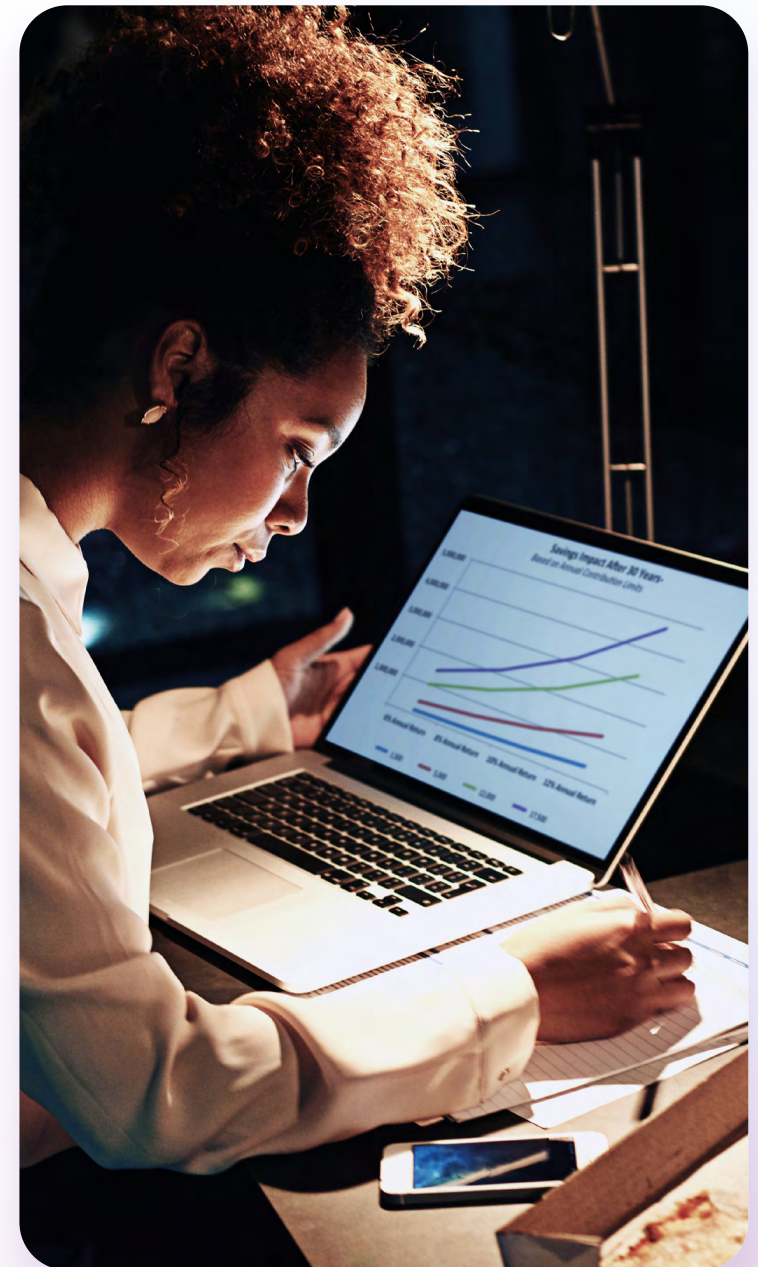
With DIA, you can have as many IPv4 LAN addresses as you can justify, although anything above our standard allocation is chargeable, and must also be justified. As the number of IPv4 addresses is gradually diminishing, larger allocations must be justified to RIPE, the IP address governing body.

The standard free allocation is /29 IPv4 LAN range. This will meet most customer needs, especially as common CPE devices take care of internal private IP addressing on their network and NAT can be used for routing traffic. The /29 IPv4 range provides six useable IPv4 addresses from a block of eight (as one is reserved for the network address at the start of the range, and one is reserved as the broadcast address for signalling). You'll also need to use one of these addresses for the connected router device. Larger ranges can be requested when ordering but will attract additional rental charges and require justification.

## IPv6 LAN addresses

A huge range of IPv6 addresses is provided as standard. This should provide more than you could ever need, as and when you make the move to IPv6.

The standard allocation is /56 IPv6 LAN range (over 4.7 sextillion addresses).



## Summary of standard WAN IP and LAN IP allocations

A DIA service is allocated the following IPv4 addresses by default. These will meet the vast majority of customer demands:

### IPv4 addresses

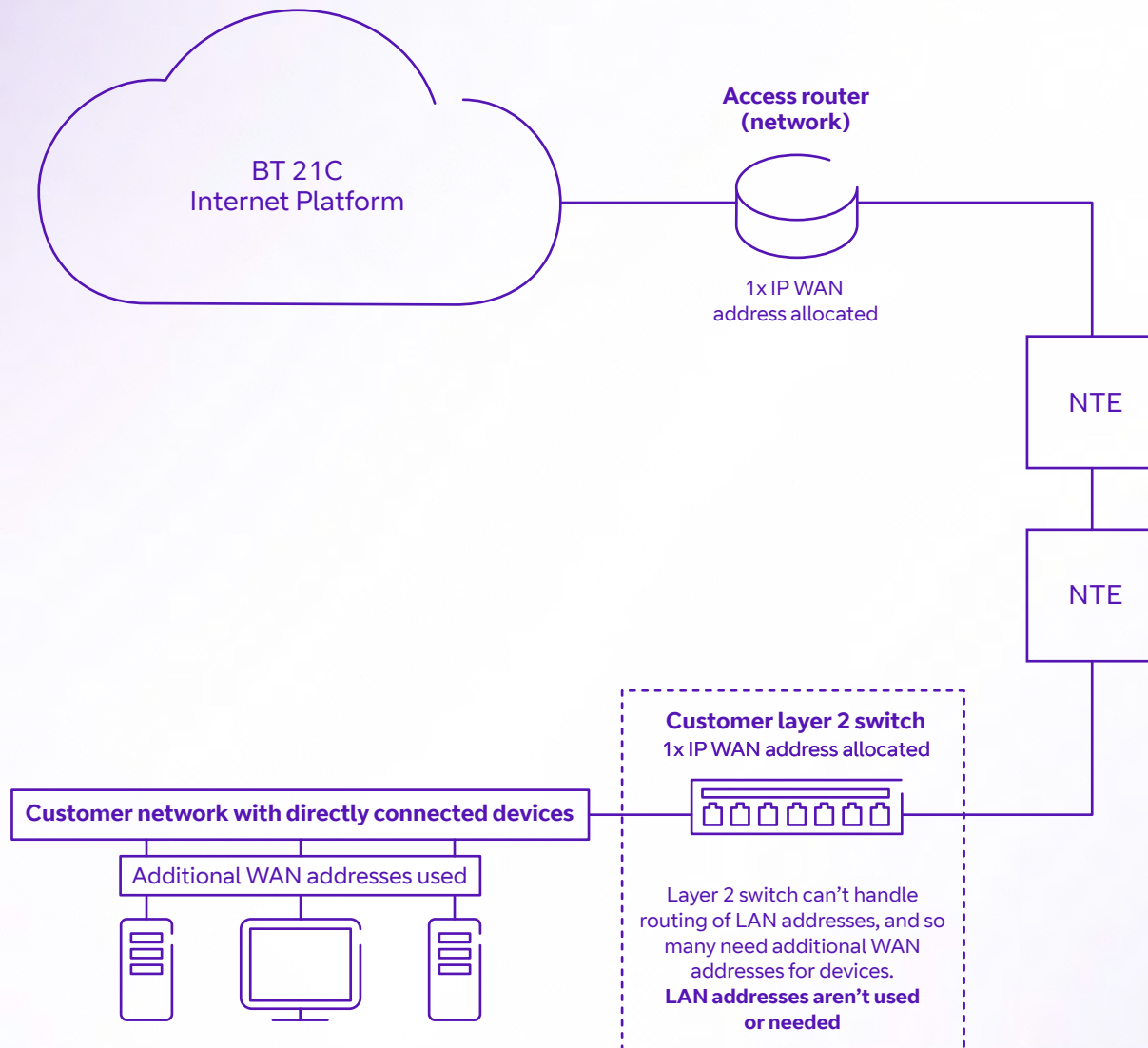
<b>/31 WAN address range</b>	Two IP addresses	One is used by us and assigned to our network access router equipment, the other by you to assign to equipment you connect to the service (the CPE). These enable the service to work.
<b>/29 LAN address range</b>	A block of eight IP addresses: six are useable	Your useable addresses on the service, provided as standard, without the need to justify their usage. Two are reserved for the network address and broadcast address, leaving six for your use. One is then needed for the connected router.

### IPv6 addresses

<b>/127 WAN address range</b>	Two IP addresses	As with IPv4 addresses, these allow the network access router to communicate with your CPE.
<b>/56 LAN address range</b>	>4.7 sextillion addresses	A huge range is provided as standard.



# Larger WAN ranges



Occasionally, some customers might not be connecting traditional layer 3 router devices, but may want to use layer 2 switches or SDWAN-type equipment instead. This is considered a niche requirement. However, it's possible to request a larger IPv4 WAN range to accommodate these directly connected devices if a layer 3 router isn't being used. In such cases, the connected CPE can't use the LAN addresses in the usual way, and may need more WAN addresses for those devices.

The following IPv4 WAN ranges are available, but we wouldn't allocate any LAN addresses, as they wouldn't be used or needed.

- **The /30 IPv4 WAN range.** This gives you four addresses. One is for our access router; one for the connected CPE; one as the network address; and one for the broadcast address. This therefore wouldn't support any additional directly connected devices apart from the CPE.
- **The /29 IPv4 WAN range.** This is used where additional directly connected devices are being used via a layer 2 device or switch. This would give you eight addresses. One is for our access router; one for the connected CPE; one as the network address; and one for the broadcast address. This would leave you with four useable addresses for the additional directly connected devices, not including the layer 2 switch/CPE.
- **The /127 IPv6 WAN range** is used for IPv6 addressing. It's assigned as standard (two addresses) and can't be changed, so it isn't currently possible to use IPv6 addressing for more directly connected devices.



Importantly, for a more common scenario where you'll be using the normal LAN addresses for the service alongside a layer 3 router, it isn't necessary to have any more WAN addresses than the standard /31 IPv4 allocation, as they wouldn't be used. Please note that we might not allocate any IPv4 LAN addresses if a larger WAN range is selected.

# Delve a little deeper

Visit our [Direct Internet Access page](#) for more details about DIA.

For further information, talk to your account manager or specialist.



#### Offices Worldwide

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