NAT explained

NAT stands for network address translation, and this is a service that is used in routers. And

Its purpose is to translate a set of IP addresses to another set of IP addresses. And the reason for having the NAT service, is to help preserve the Limited amount of IP version 4 public IP addresses that we have available around the world.

When the IP version 4 address was created, engineers didn't realize how big the internet will become. Because even though there were over 4 billion IP version 4 addresses available, the engineers thought that would be enough. But obviously they were wrong. So, in order to prevent a shortage of public IP version 4 addresses, engineers developed private IP addresses and network address translation.

Now there are two different types of IP version 4 addresses, there's public and there is private. Public IP addresses are publicly registered on the Internet. You have to have a public IP address if you want to go on the internet, and there are approximately 4 billion public IP addresses available. So, they are limited.

Now, private IP addresses are different. Private IP addresses are not publicly registered. So, you cannot directly access the internet with a private IP. Private IP addresses are only used internally, such as inside a home or business. they are not used out on the public Internet, and your router is what assigns your internal devices a private IP. So, for example, most homes and businesses are not going to have just one device that needs internet access. Chances are that they are going to have multiple devices, that need access to the Internet. So those devices need a public IP address if they want to access the Internet.

Now You could contact your internet service provider, and ask them for these additional public IP addresses for all of your devices. But that's going to be more expensive, Unnecessary, and more importantly: It would also be a waste of public IP addresses. And let's face it if every device in the world had their own public IP address, we would have run out of public IP addresses already. So instead, we can have our router assigned the devices inside our home or business Private IP addresses. And when our devices need to access the Internet, their private IP address will be translated by NAT in the router to the one public IP address that we have been given. So again, this is what NAT does it, translates a set of IP addresses to another set of IP addresses. So not only does it translate private to public, but also translates public to private. Because if a computer out on the internet wants to communicate with a computer on this private network, then the public IP address needs to be translated by NAT to the private IP address for that computer.

now in the future, we won't need NAT or private IP addresses. And this is because of the new generation of an IP address Called IP version 6. With IP version 6, every single device in the world Will have its own public IP address. So, there is no need for IP address translation, and this is because IP version 6 is able to produce over 340 undecillion IP addresses. So that's the number 340 with 36 digits after it. So, with a number that huge we will never run out of IP addresses.