A10

Community Fibre Overcomes IPv4 Exhaustion to Connect Londoners

Community *Fibre*

Industry | ISP

Network Solution

A10 Thunder CGN
A10 Thunder CFW
A10 Harmony Controller

Critical Issues

- Maximize IPv4 addresses to efficiently bring ultra-fast fiber to the residences and businesses of London

Results

- Overcome IPv4 exhaustion using large-scale network address translation

- Deliver an excellent subscriber experience and application availability while maximizing IPv4 resources

- Reclaim 63 IPv4 addresses for each public IPv4 address consumed

- Achieved clear ROI and eliminated need for volume IP address procurement

- Centrally control and manage CGNAT services and IPv4 pools

Digital connectivity is a universal need, and delivering ultra-fast, affordable internet to homes and businesses is the mission at Community Fibre. The privately held provider has connected more than 100,000 homes and businesses with fiber by working with London councils, housing associations, and private landlords. A £400 million investment in 2020 will enable the company to bring fiber to one million London households and businesses by 2023.

> *A10 Networks went the extra mile to help Community Fibre overcome IPv4 exhaustion. A10 Networks understood what we wanted to do, and we felt bought into the solution.*
>
> – Sam Defriez
> Head of Networks, Community Fibre

Challenges

"We consider ourselves cutting-edge and fast-paced to deliver the best speed and quality internet to homes and businesses," says Sam Defriez, head of networks at Community Fibre.

Community Fibre's state-of-the-art network uses IPv6 addressing for scale and security. But the vast majority of destinations on the internet use IPv4 addresses, and rapid subscriber growth meant Community Fibre was exhausting its IPv4 pool. Blocks of public IPv4 addresses can be purchased through a secondary market, but buyers often run into quality issues.

Selection Criteria

Carrier-grade network address translation (CGNAT) allows Community Fibre to preserve its private IPv4 pool, but subscriber experience issues with its incumbent CGNAT solution led the company to explore a new approach to supporting IPv4 devices. It wanted a large-scale NAT solution that would overcome IPv4 exhaustion. The solution needed to scale dynamically to support the company's aggressive growth plans while being operationally efficient.

"We went down a bit of a journey with CGNAT," says Defriez. "We were hoping to use a stateless solution with MAP-T, which wouldn't be CGNAT-based." MAP-T performs translation from IPv4 hosts to the IPv6 domain and vice versa on the customer edge devices and border routers.

"But that didn't happen because our customer premises equipment couldn't support MAP-T in hardware," he says. Changing customers' routers was impractical, both disruptive to customers and costly because of service calls and manual work.

Nevertheless, supporting IPv4 is critical for the customer experience. "Seventy percent of our traffic is IPv4," says Defriez. "We have to maintain our IPv4 address resources, which set us on a journey to CGNAT."

Solution

CGNAT can be implemented in different ways to overcome IPv4 exhaustion and preserve the IPv4 pool. Community Fibre first explored using DS-Lite to tunnel IPv4 traffic through the network, but that network address translation approach also proved unworkable with the company's preferred customer premises equipment (CPE).

IT chose NAT444, which is transparent to the CPE. With NAT444, Community Fibre can replace the public IPv4 address on a subscriber's home router with its own private IPv4 addresses and then, at its internet interconnect, use a public IPv4 address.

Community Fibre deployed A10 Networks Thunder® Carrier Grade Networking (CGN) for high-performance, transparent network address and protocol translation.

With Thunder CGN, Community Fibre can overcome IPv4 address exhaustion to ensure a quality user experience and application availability, while scaling operations efficiently.

"A10 Networks was amazing at helping us through the right architecture, providing tech support, and loaning devices," says Defriez.

Community Fibre transitioned customers to Thunder CGN within three weeks during the early days of the COVID-19 pandemic. "We had done a long proof-of-concept test with several sites, so we had a high level of confidence," he says. "We were supported all the way through by A10 presales and support teams. We did the integration while working from home."

Common Deployment Scenarios

Carrier-Grade NAT/LSN
Scales networks to overcome IPv4 exhaustion with NAT44(4) and ALGs

IPv6 Translation
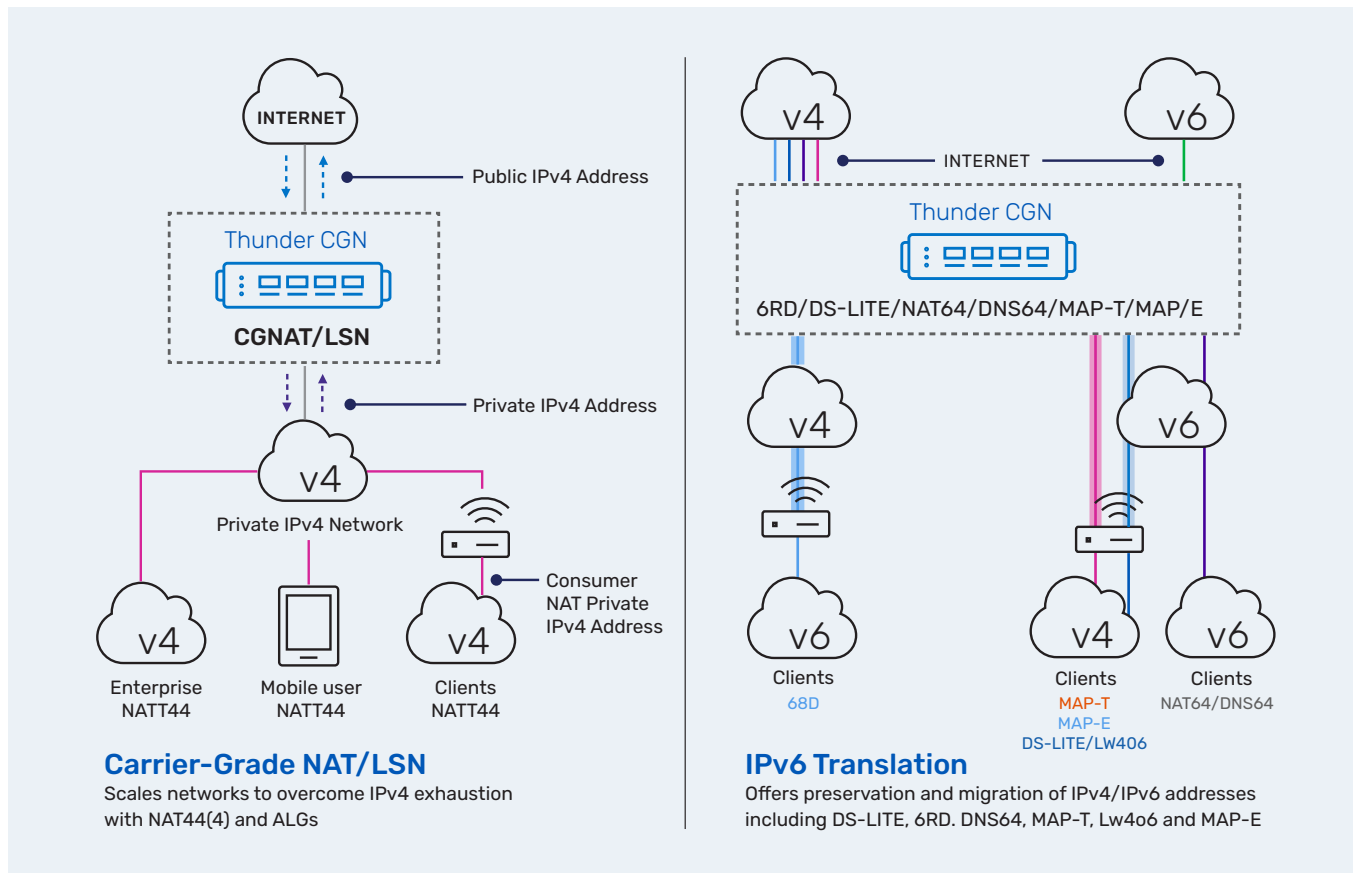Offers preservation and migration of IPv4/IPv6 addresses including DS-LITE, 6RD. DNS64, MAP-T, Lw4o6 and MAP-E

Figure 1: Common Thunder CGN deployment scenarios for carrier-grade NAT and IPv6 translation

Results

Using Thunder CGN to overcome IPv4 exhaustion, Community Fibre can deliver an excellent subscriber experience, ensure application availability, and continue its growth trajectory.

The transition to Thunder CGN was barely noted by customers. Subscribers work, stream media, or catch up with friends and family from their favorite devices. Applications run flawlessly. Gamers, once quite vocal about their dissatisfaction with shared IP addresses, have become silent. Application availability problems with the UK's most popular streaming media service are a thing of the past.

Behind the scenes, the dynamic network address translation from Thunder CGN ensures application availability and efficient use of ports. Fixed IPv4 addresses are reserved for serious gamers or game hosters who cannot share a pool of IP addresses.

Community Fibre maximized its finite IPv4 pool and avoided the cost of purchasing new IP addresses on the secondary market. With its current 1/64 plan, it reclaims 63 IPv4 addresses for each IPv4 address consumed. That adds up to 12,000 to 15,000 per A10 Networks Thunder® Convergent Firewall (CFW) physical appliance.

"The business case and ROI for deployment was very clear and easily justified based on the difference in cost between volume IP address procurement versus investment in the A10 Thunder CFW," says Defriez.

The high-performance, compact Thunder CGN is operationally efficient through the use of minimal data center rack space, lower power consumption, and reduced cooling requirements. As a compact physical appliance, Thunder CGN enables Community Fibre to break out connections to different residential sites in a cost-effective and scalable way.

"We didn't want to get more rack space or increase complexity, so we needed a solution that was small," he says. "The Thunder CGN 1U device fit that profile."

With internet customers all over London, centralized control of network services is critical. Community Fibre uses A10 Networks Harmony® Controller to configure and manage the pool of IPv4 addresses and network address translation policies. Data from Harmony Controller flows into Community Fibre's operations

portal via A10 Networks' aXAPI® Restful API for control and automation. With Harmony Controller, data is logged to the cloud, so the infrastructure team doesn't need to worry about running out of storage.

"We easily integrated Harmony Controller into our solution," he says. "Harmony Controller has a well-built API, which makes it easy to get information into our operations portal."

The versatility of Thunder CGN is an advantage as Community Fibre grows. Thunder CGN is built on A10 Networks' proven Advanced Core Operating System (ACOS®), which allows multiple network functions to be consolidated on a single appliance. Community Fibre is exploring Thunder Convergent Firewall (CFW) functionality for analytics and insight into customer traffic patterns.

"Thunder CFW provides some degree of investment protection," he says. "We have the ability to extend the capabilities of the platform from multiple CGNAT use cases (such as NAT444, NAT64, MAP-T, and MAP-E) into firewall and application delivery controller use cases in the future as well if required."

Community Fibre has trusted partners as it brings ultra-fast broadband to one million homes and businesses.

> *"A10 Networks went the extra mile to help Community Fibre overcome IPv4 exhaustion," he says. "A10 Networks understood what we wanted to do, and we felt bought into the solution."*

Community Fibre also partnered with Horsebridge Networks, which has deep expertise in designing, building, and operating large-scale networks. "We really liked the collaboration with Horsebridge," says Defriez. "Horsebridge was closely related to our business and had expertise in CGN. Having that level of real-life expertise was really helpful for us."

"We, like Community Fibre, are passionate about shrinking the digital divide in the United Kingdom," says Adam Baxter, CTO at Horsebridge Networks. "We are proud to partner with Community Fibre, delight their end users and grow their business through our network engineering services."

Success and Next Steps

An experienced network architect, Defriez advises peers exploring how to maximize IP address resources through large-scale NAT. "There's more than one technology for CGNAT, and choosing the best one depends on your CPE," he says.

"It's important to understand the level of enforcement you want to take," says Defriez. "It's a complex decision to determine the best technology in terms of cost and what works for your business. The key was to experiment and work through the different steps to make sure it was the right CGNAT solution for us."

Backed by a flexible CGNAT platform from A10 Networks and Horsebridge, Community Fibre can continue to innovate as it brings ultra-fast fiber broadband to homes and businesses.

About Community Fibre

We're a London broadband company exclusively serving the residents and businesses of London. Community is at the very heart of what we do, bringing faster, more affordable broadband to the communities we serve.

We are leading the way in bringing faster broadband at a fairer price to more Londoners, with over 100,000 homes able to connect to us in just a few years.

Unlike most other providers, we roll out and operate our own dedicated full fibre network. We run fibre optic cable all the way into the home or business (FTTH), for maximum speed, reliability and efficiency.

Our pricing is designed to ensure that everyone in London can afford really fast and reliable broadband.

About Horsebridge Networks

Horsebridge Networks is a managed service provider to the UK alternative network, or altnet, marketspace. Specializing in the design, build, and operation of altnet service provider networks, Horsebridge provides a complete portfolio of services to altnets, from fiber design and planning, through to network operations, analytics, and optimization.

Horsebridge Networks portfolio provides solutions that can help support altnets throughout their entire business lifecycle, including a comprehensive portfolio of advanced professional engineering services, OSS, BSS, multi-channel contact-center, and customer services. Horsebridge's mission is primarily to provide the altnet community with the products and services they need to deliver gigabit services to their customers.

Find out how to manage
IPv4 exhaustion using CGNAT

IPv6 – Are We There Yet?

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and experience the

A10 Networks Difference

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About A10 Networks

A10 Networks (NYSE: ATEN) provides secure application services for on-premises, multi-cloud and edge-cloud environments at hyperscale. Our mission is to enable service providers and enterprises to deliver business-critical applications that are secure, available and efficient for multi-cloud transformation and 5G readiness. We deliver better business outcomes that support investment protection, new business models and help future-proof infrastructures, empowering our customers to provide the most secure and available digital experience. Founded in 2004, A10 Networks is based in San Jose, Calif. and serves customers globally.

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