

Extend IPv4 Investment and Transition from IPv4 to IPv6 Seamlessly

As digital content and internet traffic are growing exponentially, the growing use of the Internet of Things (IoT) will cause the number of connected devices to cross 25 billion in the next five years, resulting in an increasing demand for even more IP addresses. This growth in connectivity has contributed to the exhaustion of the IPv4 address space, and the depletion of IPv4 addresses from the regional internet registries (RIRs) is now a reality. To sustain current users and prepare for long-term growth, migrating to IPv6 has become inevitable for service providers and other organizations that provide network connectivity services.

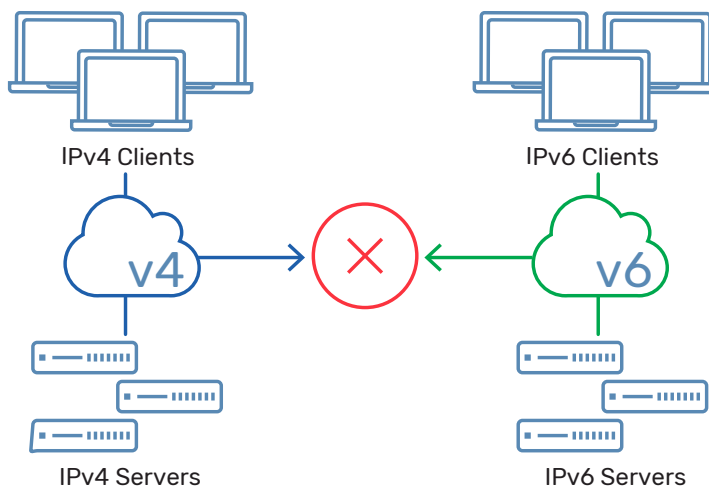


Figure 1. IPv6 - No backward compatibility with IPv4

Challenge

While IPv6 brings forth many advanced capabilities—in addition to a very large address space—it is not backward compatible with IPv4. A successful migration from IPv4 to IPv6 requires careful planning to ensure that all the end-user devices, application servers, and existing network elements continue to operate seamlessly.

Solution

Thunder CGN provides the highest performance and scalability, the most comprehensive carrier-grade NAT (CGNAT) and IPv6 transition options and the broadest range of form factors and capacity to meet the requirements from the largest service provider networks to smaller organizations.

Benefits

- High performance and cost efficiency
- Seamless transition to IPv6
- Integrated DDoS protection
- Ease of use and management

Since IPv6 is not backward compatible with IPv4, organizations will have to plan for the coexistence of IPv4 and IPv6 networks to ensure business continuity and prepare for future growth. A10 Networks Thunder® Carrier Grade Networking (CGN) offers comprehensive carrier-grade NAT (CGNAT) and IPv4 to IPv6 migration solutions, allowing organizations to extend their investments in IPv4 infrastructure while transitioning to newer IPv6 infrastructure, as needed.

The Challenge

Migrating to IPv6 will certainly help pave the foundation for growth but transitioning from IPv4 to IPv6 comes with challenges. IPv6 is not backward compatible with IPv4 and the address translation process tends to break certain applications and protocols. Ensuring compatibility and application reliability are top-of-mind for service providers, as is the requirement to maintain ultra-high levels of network availability.

Any IPv6 transition project needs to provide the following:

- **Preservation of existing investments:** Organizations that have a very large installed base of IPv4 infrastructure need to preserve their existing investments, avoid costly, disruptive replacements, and be able to expand services in future.
- **Support current and future subscriber growth:** Service providers and other organizations are also looking for definitive ways to address the growing demand for IP connectivity. As they prepare to migrate to IPv6 for scalability reasons, they want to ensure a smooth evolution and overcome the compatibility issues with the older IPv4 protocol.
- **Maintain service level agreements:** For most organizations, network or service outages are not acceptable; it leads to immediate revenue loss, customer satisfaction issues and damage to reputation. Organizations need to maintain current applications and meet expectations or SLAs of their customers, subscribers and employees.

The A10 Networks Thunder CGN Solution

The A10 Thunder CGN provides high-performance, highly transparent address and protocol translation, allowing service providers to extend their IPv4 network connectivity while simultaneously making the transition to IPv6.

Thunder CGN products are built upon the A10 Networks Advanced Core Operating System (ACOS®) architecture that delivers high performance, scalability and a wide range of features for enhanced service availability, IPv4 preservation, IPv6 transition and security.

Extend IPv4

The Thunder CGN product line supports standards-based carrier-grade NAT (CGNAT). CGNAT mitigates IPv4 address exhaustion by using address and port translation in large scale to extend the life of an IPv4 network infrastructure.

Typically, the ratio of private to public addresses can be very high and it is resource intensive to perform address translations simultaneously for many users in a service provider environment. A10 Thunder CGN is designed to deliver a high-performance, scalable carrier-grade NAT solution in efficient form factors. In addition, Thunder CGN supports advanced logging features to trace user connection details to maintain compliance and regulatory requirements.

As described in Figure 2, Thunder CGN allows service providers to extend the lifetime of their current IPv4 infrastructure, save costs and gain time to plan their IPv6 transition strategy.

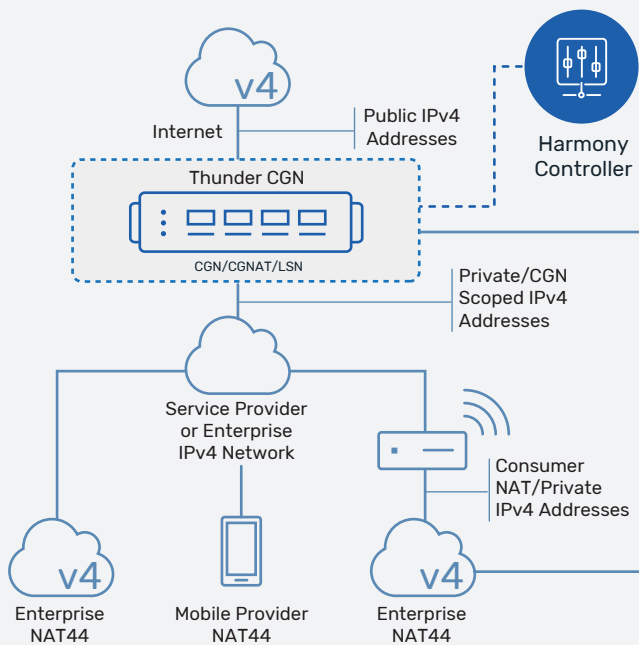


Figure 2: Carrier Grade NAT (CGNAT) deployment options

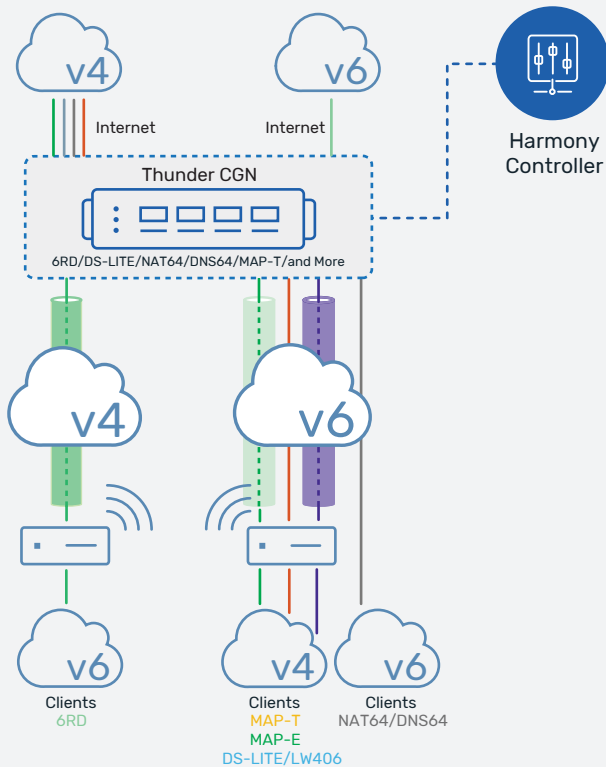


Figure 3: IPv6 transition options

Application Reliability

A10 Thunder CGN provides application availability and connection reliability so that applications will remain addressable and operate transparently through the address translation process.

Many applications still rely on network transport information to operate. Applications that embed network and other information in the IP packet payload tend to break with address translation. A10 provides a comprehensive list of application layer gateways (ALGs) to ensure that protocols like FTP, TFTP, RSTP, PPTP, SIP, ICMP, DNS and H.323 remain functional even when subject to NAT. In addition, advanced features such as Endpoint Independent Mapping (EIM) and hairpinning ensure predictable NAT behavior to provide a transparent end-user experience.

Applications can also break when network connections switch over between devices due to failures. Thunder CGN devices, when deployed in high availability (HA) mode, allow established sessions to be maintained during any failover, and this is completely unnoticeable to end users. The high connection reliability of Thunder CGN provides service providers a cost-effective solution to meet SLAs and user satisfaction goals.

Broad IPv6 Transition Options

Service provider networks are very diverse and often require different transition technologies to be deployed simultaneously. The Thunder CGN product line provides a wide choice of technologies that enable a smooth transition to IPv6 networks as shown in Figure 3.

IPv6-only core networks can use technologies like Dual-Stack Lite (DS-Lite) allowing IPv4-only devices to access the internet using softwires (or tunnels) through the IPv6-only infrastructure. Light Weight 4 over 6 (Lw4o6) or IPv6 Rapid Deployment (6rd) provide similar behavior, allowing alternate IP versions access through the network. For example, they allow IPv6 devices access over an IPv4-only core. MAP-T is a translation technique that builds on the address plus port method of stateless NAT to translate packets between IPv4 and IPv6 networks.

IPv6-only devices need a way to access IPv4 content and NAT64/DNS64 features solve the problem by interfacing between the IPv4-only content and native IPv6 clients.

Thunder CGN also ensures that customers can deploy any transition technology as well as provide the seamless interplay between these technologies. For example, users can start with CGNAT to immediately mitigate IPv4 address exhaustion and then phase in NAT64/DNS64 to enable IPv6 clients to access the IPv4-based internet.

To summarize, A10 Thunder CGN products offer a comprehensive feature set consisting of CGNAT functions, ALGs and many techniques for migrating to IPv6 in a single device. Figure 4 provides a summary of all IPv4 extension and features for migrating to IPv6 that are supported by A10 Thunder CGN.

Features and Benefits

Thunder CGN with ACOS offers the industry's highest performance and broadest range of physical, virtual, container, and bare metal options.

Clear Advantages

CGNAT and IPv4 to IPv6 translations need to analyze deeply into the data packets. This process is very resource intensive and requires an array of high-performance engines as part of the basic CGN architecture. Standard networking equipment is simply not designed for this level of inspection.

Payload inspection, protocol-aware gateways and IPv4 to IPv6 transition techniques strain CPU and memory resources on traditional router products, which are not cost-effective for providing high performance and scalability. ACOS leverages a high-speed shared memory architecture and flexible traffic accelerator technology to efficiently utilize multi-core processors and hardware-accelerated network functions to efficiently process network traffic.

As a result, A10 Thunder CGN appliances are significantly more efficient, consume less power and cooling when compared to other CGN solutions, all of which result in unmatched price/performance.

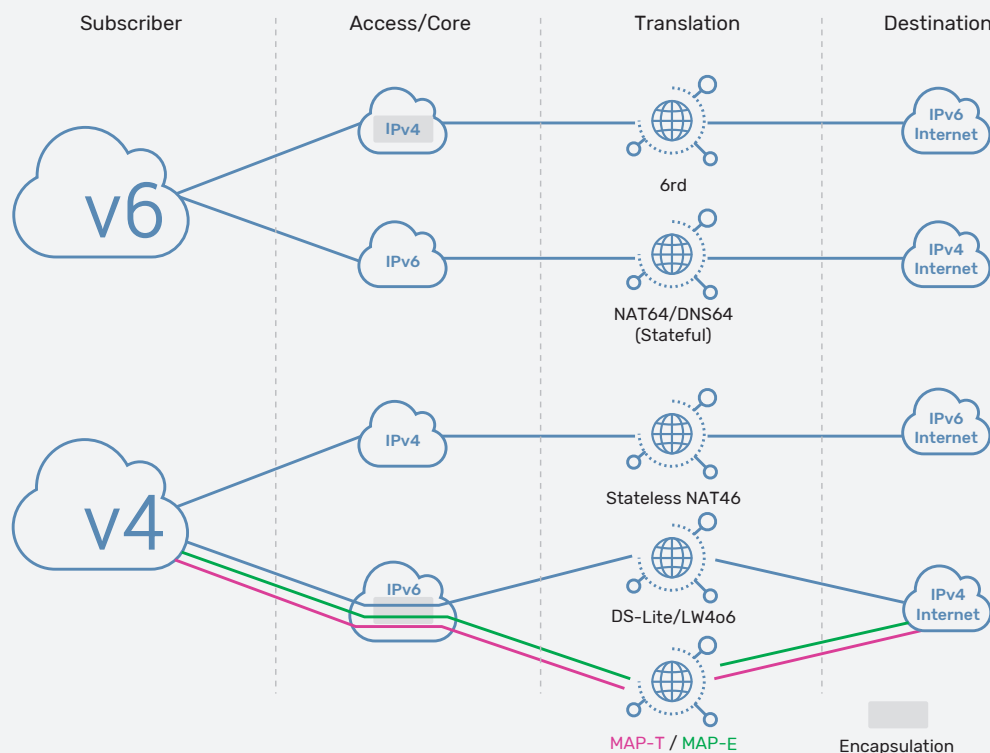


Figure 4: IPv4-IPv6 migration options

Integrated DDoS Protection

A10 Thunder CGN appliances also come with integrated distributed denial of service (DDoS) protection. This provides specialized DDoS protection for CGN devices with public-facing services by eliminating large traffic volumes containing multi-vector attacks.

Ease of Use and Management

Thunder CGN also offers comprehensive management options for operational simplicity and reduced management cost. This includes the choice of an easy-to-use, intuitive graphical user interface (GUI) and a command line interface (CLI) similar to the industry standard. Extensive SNMP MIBs support, Netflow, Sflow and a variety of built-in logging capabilities are also supported.

The software-based ACOS architecture provides flexibility and supports A10 Networks' aXAPI® REST-based API, enabling remote interaction from third-party applications to control the appliance. The programmability and application programming interface approach in ACOS enables A10 Thunder CGN products to integrate with software-defined networking (SDN) and network functions virtualization (NFV) fabrics and cloud orchestration appliances like OpenStack, dynamically delivering network and security services.

Visibility and Analytics with Harmony Controller

A10 Harmony® Controller adds application and network services visibility. A10 Harmony Controller with Thunder CGN provides real-time actionable insights on critical CGN services such as mapping distribution, NAT IP pool utilization, and more, as well as subscriber session insights for analysis and faster troubleshooting. Traffic and security analytics are leveraged to detect anomalous trends and provide customizable alerts based on configurable metrics. This simplifies capacity planning, improves service reliability and increases operational efficiency to reduce TCO of the overall solution.

Thunder CFW for Maximum Flexibility and Simpler Operations

Thunder CGN is also available as a feature with the A10 Thunder Convergent Firewall (CFW). A high-performance, all-inclusive security product, A10 Thunder® CFW is a cost-effective approach for strengthening security postures and protecting network perimeters without the need for disparate point products. A10 Thunder CFW features a data center firewall, IPsec VPN, carrier-class firewall for mobile infrastructure security, and secure application delivery, carrier grade networking, web gateway for enterprise, mobile network operators and other service providers. Thunder CFW includes all Thunder ADC, CGN and SSL Insight® (SSLi®) features. Thunder CFW provides maximum functional flexibility for evolving networks and changing traffic.

Performance, Scalability Simpler Operations for CGNAT and IPv6 Transitions

Because network addressing and IPv6 transition architectures can vary greatly across an organization, service providers, enterprise and higher education institutions need a solution that provides the broadest support for standards-based address and protocol translations. A10 Thunder CGN solution extends the service life of current IPv4 infrastructure, reduces costs and gains time to plan an IPv6 transition strategy. It also provides many advanced features with the all-inclusive licensing model and broad choice of Thunder CGN VNFs, containers, bare metal and appliances to meet the unique requirements of different networks.

Transitioning from IPv4 to IPv6 is a long process that requires a continued assurance of compatibility along the way because of the interactions among a large number of end-user devices, other network elements and application servers.

A10 leads the industry with proven deployments, in-depth support experience, efficiency and performance. Every A10 Thunder CGN appliance, hardware or software, sets a new performance and session scalability benchmark in its class that effectively reduce the overall TCO.

Next Steps

For more information, please contact your A10 representative and visit: a10networks.com/cgn

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, higher education institutions 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.

For more information, visit: a10networks.com or tweet [@a10Networks](https://twitter.com/a10Networks)

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