## IPv6 – Bridging the Gap to Tomorrow

Overview   Increasingly, especially in international and governmental markets, organizations of all types are finally feeling the pressure to migrate from the well known and universal IPv4 standard towards the newer IPv6 standard. There are many reasons, not the least of which is the limited number of addresses available in the IPv4 system and the increasing number of devices requiring access to the "new" Internet: your coffee pot, TV, alarm clock and car, to mention a few. There are also many additional features of the IPv6 standard such as increased security and reliability. The problem is that the world at large runs on IPv4. With the exception of Internet II, which is not open to commercial access, the Internet we are all familiar with is currently only available as IPv4. In order to achieve IPv6 compliance, many governmental organizations have received mandates to migrate their systems and help drive the world-wide adoption of IPv6.

Challenge   The problem is that the entire world will not switch to IPv6 at the same time, nor will many organizations be able to simply flip a switch and decide that all applications and all equipment will now be IPv6 instead of IPv4. What is needed is a smart migration plan and the tools to help provide the orderly transition between the two standards. This tool should be able to seamlessly operate in both the IPv4 network as well as the IPv6 network with impunity and give the organization the freedom to test, move and migrate their existing infrastructure at a controlled and manageable pace. That tool is the BIG-IP Local Traffic Manager (LTM) from F5 Networks.

Solution   The BIG-IP LTM from F5 Networks is most known for load-balancing, high-availability and even its SSL-processing capabilities. Lesser known are its capabilities for compression, caching, rate-shaping and, relevant here, the fact that it can operate as an IPv4 to IPv6 gateway—operating identically in either environment, and within mixed environments. This capability is ideal for organizations which are either actively planning for or anticipating an IPv4 to IPv6 transition.
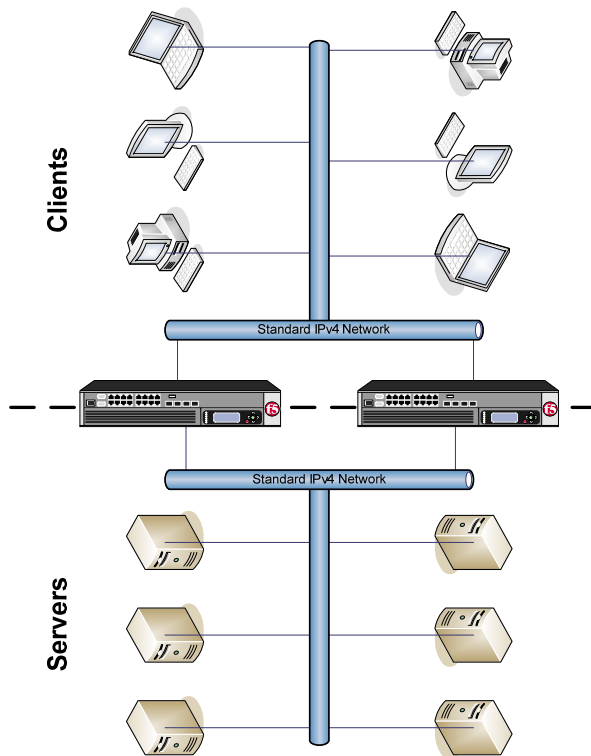
The typical BIG-IP LTM deployment has the LTM device between the clients and the servers to provide the applications the clients use. In this way, the LTM device can provide virtualization and high-availability functions, making several physical servers look like a single entity. However, even if you don't have multiple servers providing applications, the LTM device can still provide services for the servers behind it. In this case, the virtualization capability can provide an opportunity to start migrating either clients or servers to IPv6 networks without having to change everything all at once.

There are probably two equally possible scenarios in a smooth, controlled migration strategy. You can either attempt to migrate the clients to IPv6 while keeping the servers on IPv4, or you can attempt to migrate the servers to IPv6 while leaving the clients in an IPV4 environment. On the one hand, moving the clients to IPv6 involves potentially touching every single client device and incorporating new DHCP services, DNS services and ensuring that the clients are all capable of attaching to the network via IPv6-enabled pathways. On the other hand, it is more likely that moving the servers to IPv6 will encounter application dependencies and potentially impact every user simultaneously if something goes wrong. Most organizations will find it much easier to migrate their applications first as the clients will continue, for some time, to exhibit a need for utilizing IPv4 communication for public resources.
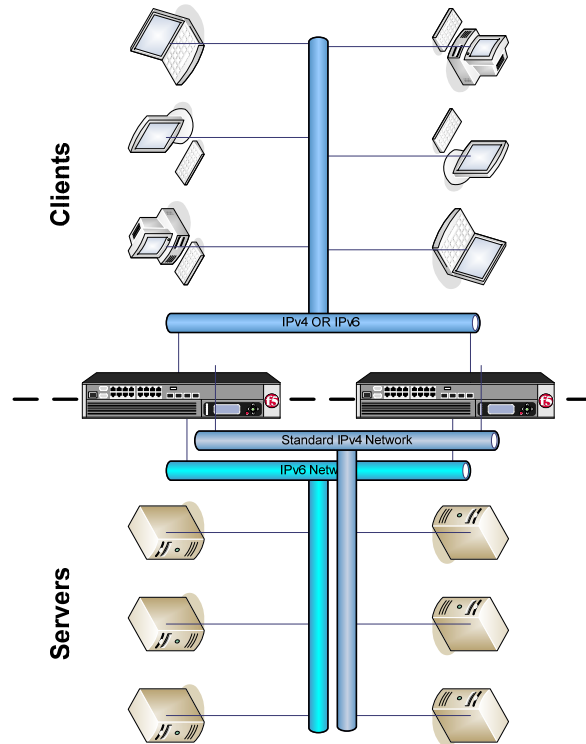
The BIG-IP LTM provides flexibility regardless of how you proceed, but let's assume that the choice has been made to migrate servers first. Assuming you already have a BIG-IP LTM appliance between your servers and your clients, all you have to do is add a new "server" network to the BIG-IP LTM, one that is an IPv6-capable network. The result is that now your network will have IPv4 on the front side of the BIG-IP LTM, and both IPv4 and IPv6 behind it.
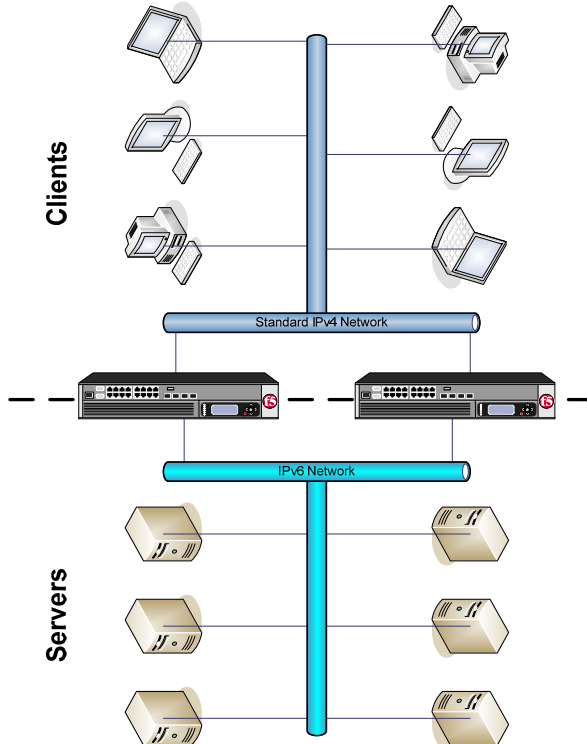
Next, all you have to do is start moving your servers from their IPv4 network to the IPv6 network. Since BIG-IP LTM will continue to provide an IPv4 virtual address to the clients, they will never even know the difference. This is especially true if the LTM is providing load balancing between multiple servers. For example, if you have two back-end servers providing service for an application, simply bring one server down (while the users still access the remaining one), reconfigure the server for IPv6, move it to the IPv6 network and then re-add the server to the original load balancing pool, this time with its IPv6 address instead of the old IPv4 address. Your clients now have their requests load balanced across one IPv4 server and one IPv6 server. To complete the process, simply bring down the remaining IPv4 server (while the clients continue to use the IPv6 server) and move it to a new IPv6 address. Once you are done, your IPv4 clients will be using IPv6 servers—and you have completed the entire server migration without a single second of downtime.

If you continue in this fashion, you should easily be able to create a network where your client systems continue to use IPv4, but all of your servers are running on their new IPv6 network. The clients will not realize that there is anything different as they are still contacting and utilizing the IPv4 virtual server being serviced by the BIG-IP LTM to access the applications.

It is important to note that this same technique can be used to enable moving your clients to IPv6 without changing the servers. In this case, you create a client-facing IPv6 interface with a new IPv6 virtual server that points to the exact same IPv4 servers as the original IPv4 virtual. Then, as you move clients to the new IPv6 client network, the new IPv6 DNS processes can "hand out" the new IPv6 IP address of the virtual server, utilizing the same DNS name that used to point to the IPv4 one. Again, by using the same host name and same back-end servers, in most cases the clients will be able to start using their old applications like nothing ever changed.

Of course, it is never that simple, but the BIG-IP LTM gives you the flexibility to migrate services and clients at your organizations' own pace. If some applications can't be moved or don't support IPv6, you can leave them as IPv4 until they are replaced (assuming your organization must use all IPv6) or retired. In the same manner, clients that still need to maintain their IPv4 identity can either be dual-homed (IPv4 and IPv6) or can simply access your company's IPv6 network via the BIG-IP LTM's IPv4 interface. The virtualization capabilities of the BIG-IP LTM make this possible.

Clients

IPv6 Network
Standard IPv4 Network
Standard IPv4 Network
IPv6 Network

Servers
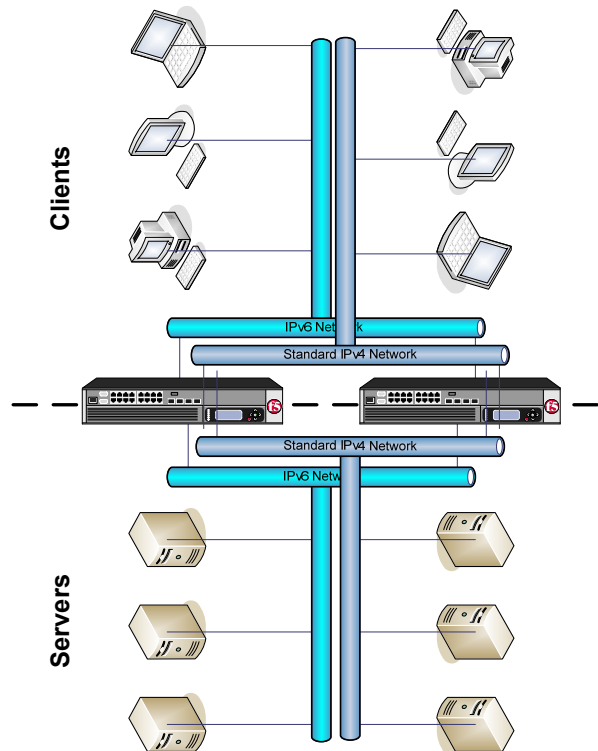
About F5 F5 Networks is the global leader in Application Delivery Networking. F5 provides solutions that make applications secure, fast and available for everyone, helping organizations get the most out of their investment. By adding intelligence and manageability into the network to offload applications, F5 optimizes applications and allows them to work faster and consume fewer resources. F5's extensible architecture intelligently integrates application optimization, protects the application and the network, and delivers application reliability—all on one universal platform. Over 10,000 organizations and service providers worldwide trust F5 to keep their applications running. The company is headquartered in Seattle, Washington with offices worldwide. For more information, go to www.f5.com.