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Located in historic downtown Wapakoneta, Ohio, FNGi has been instrumental in developing and supporting Internet Networks across the U.S. since 1993. The FNGi team can assist you with all phases of your Internet Network from initial planning through long-term support.

### www.network1.net 800.578.6381



Spring is upon us. As a time for new beginnings we present the newest version of our bestselling, best in class, DHCPatriot. And with IPv6 growing more everyday we break down the new address scheme and we learn an amazing fact about the size of IPv6's address capacity!



#### YOUR CONNECTION TO FIRST NETWORK GROUP NEWS

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The completion and deployment of DHCPatriot version 6.0.0 continues on and we are excited to share some of the new features and updates you can expect.

This release features a new underlying 64-bit custom Linux-based operating system. This greatly speeds up system access to RAM, which allows for larger file sizes and improves system stability.

The single biggest change to the DHCPatriot software is the addition of the configuration boxes for open DHCP configs to the authenticated subnets. These boxes can be used to configure various custom settings that otherwise would not be possible without unwieldy and overly-complex additions to the GUI.

Shared Network Name Display that was added to the Sticky IP configuration in version 5.0.0 has been added additionally to Exclude IP, Users using multiple IPs and Hijacked IP reports. Some customers with a large amount of Sticky IPs reported performance problems with the addition of the shared network name to that report. In response to this problem, we have added a configuration option under in the General Setup that allows you to hide the Shared Network name display on these reports.

We have also added the ability to perform remote syslogging. An IP address can now be added in the General Setup of a remote syslog server. This server will receive all logs from both DHCPatriot devices that are viewable under either the Search DHCP Logs report or the System Logs report. Enabling this option provides additional logging services. These logs will, as always, remain available on the DHCPatriot system as well. Several customers have requested this option so that they may better integrate the DHCPatriot system into their logging strategy.

If you have not received the 6.0.0 update yet on your DHCPatriot, we will be in touch with you to schedule it very soon.

#### April – June 2016



## **DHCPatriot Version 6!**

If you have a suggestion about a new function or an improvement, we are all ears. Our goal is to continue to refine and improve the DHCPatriot to make it the most impressive and capable piece of gear you own.



## How to Make Sense of an IPv6 Address: The Basics

As we the world makes its transition from IPv4 to IPv6, there will be a lot of new concepts to understand. The standards groups behind IPv6 have made some very intelligent changes to the new addressing schema. So not only is it going to provide an absolutely enormous amount  $(2^{128})$  of available IP addresses compared to IPv4, the address itself can contain more information.

Let's look at the basics of an IPv6 Address:

As you know a computer operates on binary notation, 1's and 0's. So to a computer an IPv6 address looks like this:

#### 

That's 128 bits long and in human terms, very complicated. Imagine trying to reference that as you are troubleshooting. Thankfully we can convert that string into hexadecimal notation (hex) to make it more human-friendly.

The first step is to break it apart into 8 sections of 16-bits.

#### 

Then break each of those sections down into 4, 4-bit parts. Let's look at the first section in four parts:

00100000000001 becomes 0010 0000 0000 0001

Now we can convert those segments into a hex value.

0010 = 2, 0000 = 0, 0000 = 0, 0001 = 1

So the first group can be expressed as "2001" in hex. That's a bit more human. If we apply the same process to the rest of the digits we get the full "human" version of the IPv6 address.

#### 2001:0db8:abcd:1234:0000:0000:0000:0abc

That's much easier for human use. IPv6 allows us to shorten it even further by two methods, Zero Suppression and Zero Compression. Since IPv6 compatible systems know that each section of the address will always be four digits long, with Zero Suppression we can drop any leading zeros. The system will assume any 3 digit section starts with a zero.

#### 2001:db8:abcd:1234:0000:0000:0000:abc

That took care of two digits, but what about all those huge groups of just zeros? That's where Zero Compression comes in. IPv6 systems allow you to compress or collapse groups of zeros by removing them completely and replacing them with a double colon (::). But this can only be done once in a single address.

#### 2001:db8:abcd:1234::abc

That's MUCH easier to work with than the very long version of that we started with. Most systems will express IPv6 addresses in this way.

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## **FNGi-branded Optics**

First Network Group, Inc. now offers our own line of FNGi-branded optics. This includes the common SFP optical transceivers, as well as SFP+, XFP, CFP, and more. These are sourced from major manufacturers (the same ones that make the OEM-labeled products) and programmed and tested by one of the leading suppliers in the industry.

Custom programming allows these modules to appear the same as OEM models to switches and routers. No more having to issue special commands to get non-original SFPs to function.

We can provide direct replacements for existing OEM models. In some cases, we can offer similar models that exceed the distance specifications, or use different wavelengths. Examples include 100+km distance support, Bi-directional optics that use only 1 fiber, and DWDM models. Our optical transceivers have a lifetime warranty.

We also provide a full catalog of optical cabling, as well. A variety of lengths, fiber types, and connectors are available.

Contact Randy Carpenter for more details and for a custom quote. rcarpen@network1.net or 1-800-578-6381, option 2

# IPv6: Just a drop in the bucket?



The amount of available IPv6 addresses far surpasses the total available IPv4 addresses, so much in fact that it can be difficult to fathom.

Here's an example to help put this ratio into perspective:

If one IPv4 address equals one drop of water, you could fill approximately five 30 foot wide above ground swimming pools. By comparison, an IPv6 address being one drop of water would be enough water to fill all of Earth's oceans almost 13 TRILLION times!

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## **Binary to Hex Cheat Sheet**

Dec	Hex	Oct	BIN
0	0	000	0000000
1	1	001	00000001
2	2	002	00000010
3	3	003	00000011
4	4	004	00000100
5	5	005	00000101
6	6	006	00000110
7	7	007	00000111
8	8	010	00001000
9	9	011	00001001
10	А	012	00001010
11	В	013	00001011
12	С	014	00001100
13	D	015	00001101
14	E	016	00001110
15	F	017	00001111

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