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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.

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FOCUS Newsletter

We close out the year by learning about a new public DNS service with a focus on privacy and speed, Option 18 and 37 - DHCPv6 on the DHCPatriot and an interesting look at the future with IoT and Microsoft's HoloLens device.

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In This Issue

Cloudflare Public DNS Service

DNS is essentially the phone book of the internet. It translates the words of a domain into the IP address as traffic moves around the internet based on IP addresses and humans are notoriously horrible at remembering lots of long numbers.

Your company may currently host your very own internal DNS server to provide your customers a safe and fast way to interact with this essential function. However with proliferation of public DNS resources a lot of companies are relying on them for secondary lookup functions or even as the primary reference and hosting a secondary themselves.

Publicly accessible DNS servers are nothing new. Many companies in the past would offer super fast access to these servers that were even faster than reaching the local ISP's servers. Most of the time this was done in conjunction with collecting user data about the interaction, building profile and assisting in targeting ads to the user or tracking the user.

Larger companies such a Google and Cisco have gotten on board thru the years and host their own as well. These have been some of the most popular, but again they are using your data to monetize your interactions.

Then in April 2018, leading Content Delivery Network (CDN) Cloudshare got into the mix with their private and secured publicly available DNS servers.

Primary: 1.1.1.1 (IPv6: 2606:4700:4700::1111)
Secondary: 1.0.0.1 (IPv6: and 2606:4700:4700::1001)

This service is fast, free and as safe as DNS can be. Current response times put it at 14ms verses the next fastest via OpenDNS at 20ms and Google DNS at 34ms. It supports secure connections via DNS-over-TLS and DNS-over-HTTPS. They also do not track or retain any of your data associated with using the service and boasts the fastest response time of around 14ms.

Try it today or learn more info at https://1.1.1.1/

From the Desk of Stephen Walter

If you are a regular reader of my column, you know that I often write about the Internet of Things (IoT) and that those topics usually cover credit card size System on Chip (SoC) computers like the RaspberryPi and range from the Amazon Dash Button that lets you wirelessly reorder detergent with a press of a button to full blown SmartHome builds that include home security features. In this issue, the view of IoT takes a twist, thanks to a cable news feature.

Recently, one of the cable news channels dedicated to financial news ran a tech feature that they considered IoT. The technology at the center of their program was the Microsoft HoloLens, Microsoft's own description is “the first self-contained, holographic computer, enabling you to engage with your digital content and interact with holograms in the world around you.” While the HoloLens looks like a wearable for VR and Gaming, the application that was the focus of the feature was a long established commercial building construction firm. Specifically, an international contractor based in the UK who builds high rises all over the world. To understand why such a company would place IoT at the core of their business model, one need only follow the money.

High Tech might not seem at home with dozers, cranes and jackhammers but the HoloLens has been integrated into their model in several areas - ultimately, all of them to reduce cost.

- **Building Code.** The company strategy is to use the most stringent elements of the code in all of their countries of operation to create a single universal code that streamlines SOP and training, that can be referenced by the HoloLens regardless of location, thus saving money by reducing training costs and reducing delays associated with non compliance.

- **Jobsite Safety.** A company executive gave essentially the same rationale for their approach to jobsite safety as they did building code. The HoloLens allows access to the company’s safety protocols from the work site and increases compliance and reduces downtime - saving the company money. In response to customer needs, Microsoft has already redesigned the lenses of the HoloLens to be certified as safety glasses, so safety glasses need not be worn beneath the HoloLens.

- **Reduce/Eliminate downtime.** The HoloLens 3D capability allows one to view 3D images of the building blueprints. If a door has to be moved, for example, the wearer can see the prints, a 3D representation of the structure - from framing to finish. The company claims that this makes finding and fixing problems and much shorter, hence cheaper process. A similar application is when an outside expert or consultant is needed. By using the HoloLens, the contractor can be virtually on site while coordinating with someone who is actually on site, with both parties seeing the same thing at the same time. The third application mentioned was a similar walk through with the client when changes were needed. Each of these examples illustrates the cost savings of reducing delay.

As a technology customer, the construction company’s biggest concerns were stable power and network uptime - to keep the technology up and running. Given that, I think the take aways are:

- New connected technologies and applications will come faster than we can even imagine them.
- The ISP/NSP’s role in expanding commercial applications will be to provide a stable network with focus on uptime.
- Commercial technology adoption will be about cost not “cool”. Follow the money.

Option 18 and 37 - DHCPv6

When using DHCP for IPv4 (DHCPv4) in the past, it was possible to track sessions using option 82 sub-option 1 (circuit-id) or 2 (remote-id) instead of captive portal authentication. We detailed this in the Q4 2015 newsletter “DHCPatriot and No Authentication”. We recently added authentication to DHCPv6 in DHCPatriot 6.2.0. However, it is possible to avoid using captive portal authentication in DHCPv6, if desired, just as you can in DHCPv4.

The option numbers have changed in DHCPv6. There is now option 18 (interface-id), in DHCPv6, which is analogous to option 82 sub-option 1 (circuit-id). The other option that is analogous to option 82 sub-option 2 (remote-id) is option 37 (remote-id) in DHCPv6. These DHCPv6 options are detailed in RFCs. Specifically option 18 in section 22.18 (https://tools.ietf.org/html/rfc3315#section-22.18) of RFC 3315 and option 37 has its own which is RFC 4649 (https://tools.ietf.org/html/rfc4649).

If your relay agent device sends either of these DHCPv6 options when relaying the packets from the client to the DHCPatriot system, and they are plain text (not binary encoded of some sort), the DHCPatriot system will collect the content of these options and record it with the sessions. Combining this data with some sort of records tying either the contents of the interface-id or remote-id with a user would let you identify the owner of the device without need of using the Captive Portal authentication mechanism.

For example, if DHCPv6 option 18 (interface-id) contains information about where the device is connected (example: SMITHVILLE_SH12_SLT4_9423/Ethernet48-Vlan3) and you have an external plant record of what house that equates to, then you could identify the subscriber household that the session belongs to. This would allow the response to DMCA complaints and subpoenas in the same way a username would. If you are already doing this on DHCPv4, then you already know how easy it is for an end user who doesn’t need to know anything about this and doesn’t need to authenticate at a captive portal.
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“I found a solution to your spam problem. I’ve set up your e-mail to automatically delete any message with a vowel in it.”