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Open Standards Everywhere

ICANN 68 DNSSEC/Security Workshop



Dan York
Project Lead, Open Standards Everywhere
york@isoc.org

Once upon a time... (in March 2019)

Site	IPv6	DNSSEC	HTTPS	HSTS	Internet.nl	TLS 1.3	HTTP/2	Audit date
www.internetsociety.org	Y	Y	Y	Y	100%	N	Y	3/25/19
future.internetsociety.org	N	Y	Y	N	78%	N	N	3/25/19
assets.internetsociety.org	N	N	Y	Y	55%	N	Y	3/25/19
apps.internetsociety.org	Y	Y	Y	N	94%	N	N	3/25/19
inforum.internetsociety.org	N	Y	Y	Y	81%	Y	N	4/8/19
www.isocfoundation.org	N	N	Y	N	52%	N	Y	3/25/19
www.manrs.org	Y	N	Y	N	70%	N	Y	3/25/19
observatory.manrs.org	N	Y	Y	N	94%	N	N	3/26/19
www.internethalloffame.org	Y	Y	Y	Y	100%	N	N	3/26/19
www.afpif.org	Y	N	Y	N	70%	N	N	3/26/19
www.ndss-symposium.org	Y	N	Y	N	71%	N	Y	3/26/19
www.ietfjournal.org	Y	N	Y	N	70%	N	N	3/26/19
www.dnssec-deployment.org	Y	Y	Y	N	94%	N	N	3/26/19
www.internetac.org	Y	N	Y	N	70%	N	Y	3/26/19
www.ixptoolkit.org	Y	Y	Y	N	91%	N	N	3/26/19
www.iotsecurity2018.ca	N	N	Y	N	37%	N	N	3/26/19
www.iotsecurity.sn	Y	N	Y	N	70%	N	Y	3/26/19
www.worldipv6launch.org	Y	N	Y	N	68%	N	Y	3/25/19
Percentage compliant	67%	44%	100%	22%	76%	6%	44%	
The sites below are additional websites where changes may be made in the future.								
www.connect-smart.org	N	N	Y	N	52%	N	N	3/26/19
www.openwsis2015.org	Y	Y	Y	N	94%	N	N	4/8/19
www.otalliance.org	N	Y	Y	N	79%	N	N	4/8/19
Percentage compliant	33%	67%	100%	0%	76%	0%	0%	



“Oh, sure, we can fix those up!”



The Problem

Many website operators WANT their sites to use the latest standards for security...

The image displays three overlapping screenshots of web security tools. The leftmost screenshot shows a dark interface with a large yellow 'X' in a circle and the text 'No HTTP/2 support'. The middle screenshot is a website test report from Internet.nl, showing a 55% score and a list of issues: 'Not reachable via modern internet address, or improvement possible (IPv6)', 'Domain name not signed (DNSSEC)', 'Connection sufficiently secured (HTTPS)', and 'All application security options set (Security options)'. The rightmost screenshot is a 'TLS Checker' tool showing a 'Moderate' score on a rainbow scale and a message that the tested resource isn't running TLS 1.3.

... but they do not know HOW to do so!



The Problem

And many website operators...


do not understand WHY they should care...

about the latest open standards!



Examples: HTTP/2, HSTS

The Challenge

- **MANY** sources of information about *individual* standards.
- But...
 - not any **single source** of “best practices” for standards for websites
 - many sources can be **very technical** and **NOT easy to understand**
 - sources may **not** be **up-to-date** with the latest standards and tools
 - **no agreement** within Internet community on what exactly makes a “secure server” based on open Internet standards
 - **no example / reference systems** that can **show** how all of these standards and protocols can work together successfully
-  It is **difficult** to figure out how to set up your webserver!

“We need to make this easier for system administrators like me!”



Our Contribution – the **Open Standards Everywhere (OSE)** project

1. **BUILD** a set of public demonstration web servers available to all.
2. Provide **step-by-step DOCUMENTATION** and links to resources so that a website administrator can set up their own systems in a similar way.
3. **PROMOTE** this server ecosystem and documentation widely throughout the web, developer, and open source communities.
4. **LEAD BY EXAMPLE**, and ensure Internet Society websites follow our recommendations.



Open

- Based on agreed-upon, voluntary standards that anyone can use to connect with other systems

Globally-connected

- IPv6 – Native connections for new networks (especially mobile)
- HTTP/2 – Faster connections work better for low bandwidth, mobile

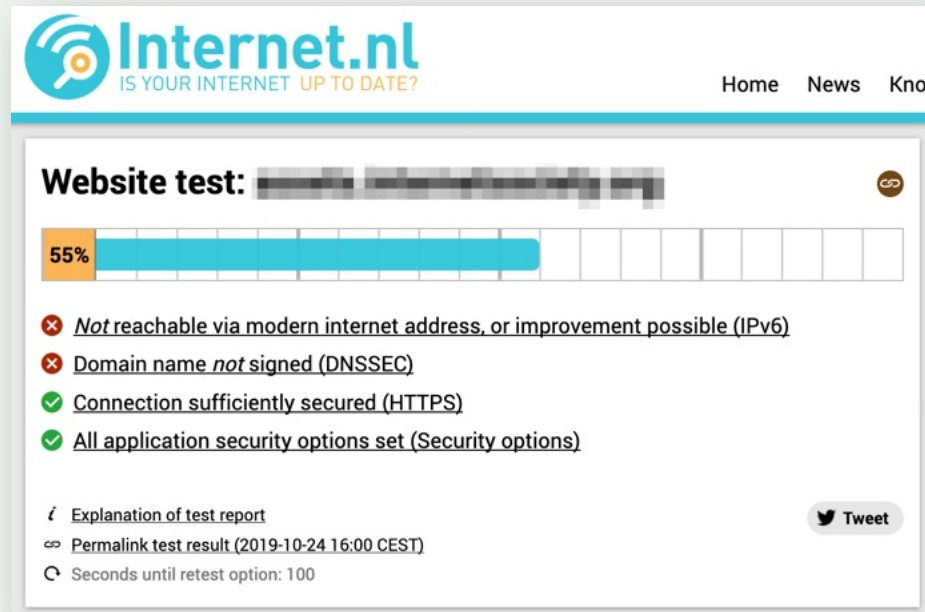
Secure and trustworthy

- DNSSEC
- TLS 1.3, HSTS, and more

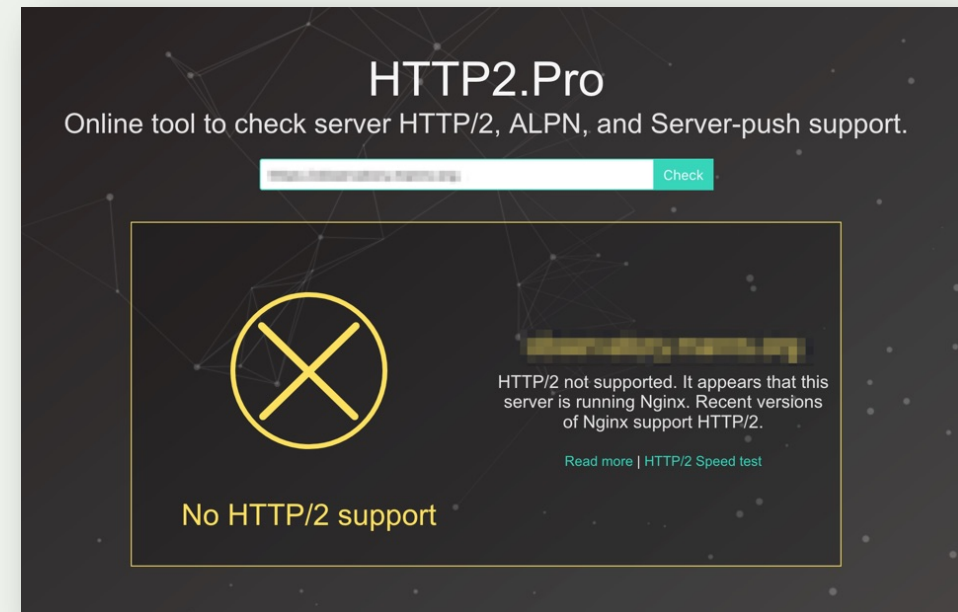


Test framework – Internet.nl and http2.pro

- <https://internet.nl/>
 - IPv6, DNSSEC, HTTPS/TLS, including TLS 1.3, HSTS, more
 - Developed by NLNet Labs with support from many orgs, including ISOC and ISOC NL Chapter
- <https://http2.pro/>
 - HTTP/2



The screenshot shows the Internet.nl website test results page. The header includes the logo "Internet.nl IS YOUR INTERNET UP TO DATE?" and navigation links "Home News Know". The main content area displays "Website test:" followed by a blurred domain name. A progress bar indicates 55% completion. Below the bar, there are four items with status icons: a red 'x' for "Not reachable via modern internet address, or improvement possible (IPv6)", a red 'x' for "Domain name not signed (DNSSEC)", a green checkmark for "Connection sufficiently secured (HTTPS)", and a green checkmark for "All application security options set (Security options)". At the bottom, there are links for "Explanation of test report", "Permalink test result (2019-10-24 16:00 CEST)", and "Seconds until retest option: 100", along with a "Tweet" button.

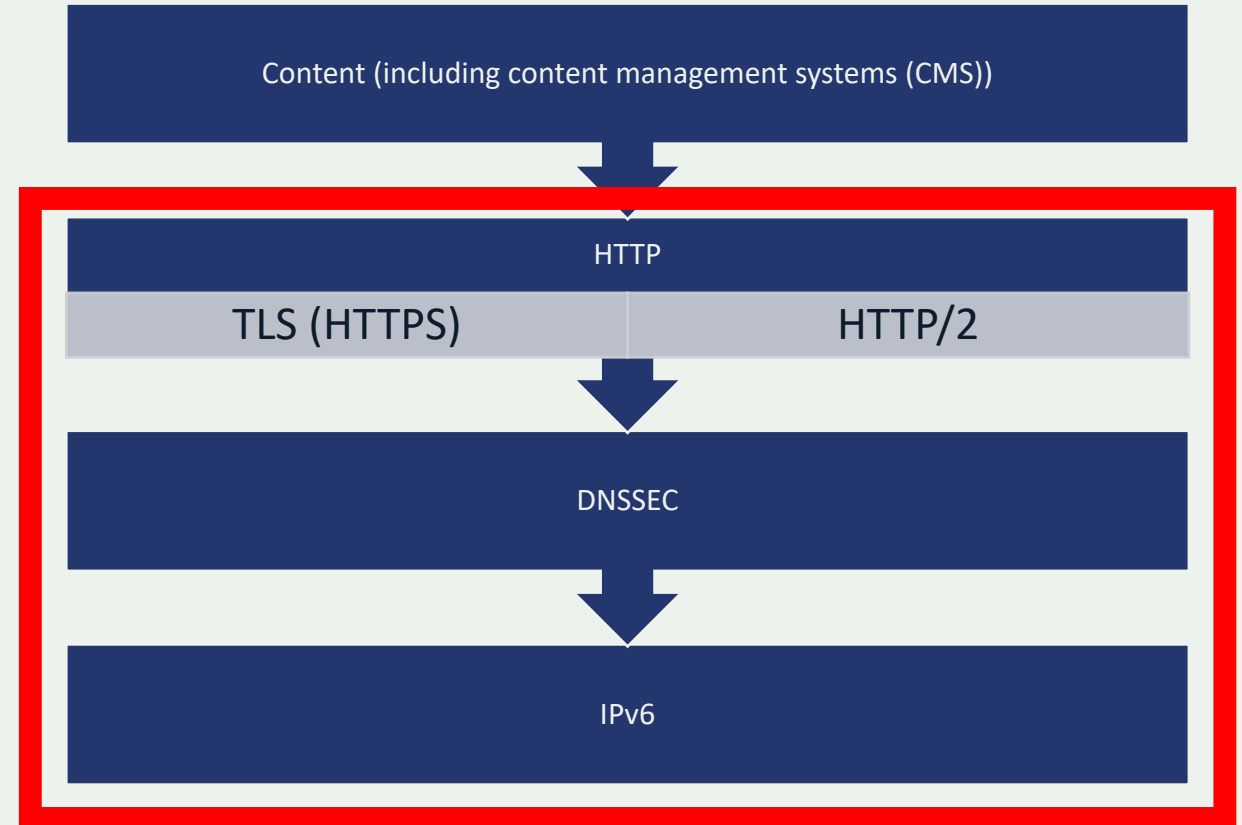


The screenshot shows the HTTP2.Pro website, which is an online tool to check server HTTP/2, ALPN, and Server-push support. The header includes the title "HTTP2.Pro" and the subtitle "Online tool to check server HTTP/2, ALPN, and Server-push support." Below the subtitle is a search bar with a "Check" button. The main content area features a large yellow "X" icon in a circle, indicating a test failure. Below the icon, the text reads "No HTTP/2 support". To the right of the icon, there is a message: "HTTP/2 not supported. It appears that this server is running Nginx. Recent versions of Nginx support HTTP/2." Below this message is a link "Read more | HTTP/2 Speed test".



Scope – Web servers

- OSE project is focusing on security and standards of **the connections to a web server**
- **NOT** focused on **content** of web sites.
- Out of scope:
 - Web site design, presentation
 - Content management systems
 - Accessibility
 - Mobile usability
 - Page speed performance



Three types of web servers

"Self-hosted" on a server or virtual machine

- You have command-line access and can configure files.

Hosted with a website hosting provider

- You do NOT have command-line access. You typically use web administration forms and are limited in what you can do.

Content delivery networks (CDNs)

- You use a CDN in front of your self-hosted or hosted website.



BUILD reference servers

- <https://ose-apache.internetsociety.org/>
- <https://ose-apache-cdn.internetsociety.org/>
- <https://ose-nginx.internetsociety.org/>
- <https://ose-nginx-cdn.internetsociety.org/>

Apache

Apache
with CDN

NGINX

NGINX
with CDN



DOCUMENT how we set up the servers

- Easy-to-understand (and easy-to-find) documentation will be key.
- Current plans include:
 - Web pages with step-by-step tutorials
 - Videos / "screencasts" showing the precise configuration steps
 - Links to testing tools and environments
 - Links to more details on specific standards, protocols, and practices
 - Materials about why this is important, including business cases



DOCUMENTATION – an experiment using GitHub

- We are developing the documentation on GitHub:
- **<https://github.com/internetsociety/ose-documentation>**
- Once complete, documentation will be moved to main ISOC website
- Will be published in English, French, and Spanish



LEAD BY EXAMPLE – our Internet Society sites

- We will “practice what we promote”
- Audit of all of our corporate sites
- Working on changes
- Working with our Chapters and Special Interest Groups (SIGs)

Site	IPv6	DNSSEC	HTTPS	HSTS	NOT TLS 1.0/1.1	Cipher Order	Internet.nl	TLS 1.3	HTTP/2
www.internetsociety.org	Y	Y	Y	Y	Y	N	97%	N	Y
future.internetsociety.org	Y	Y	Y	Y	Y	N	97%	N	Y
apps.internetsociety.org	Y	Y	Y	Y	N	N	97%	N	N
www.isocfoundation.org	Y	N	Y	Y	Y	N	70%	N	Y
news.internetsociety.org	Y	Y	Y	Y	Y	N	97%	N	Y
www.manrs.org	Y	Y	Y	Y	Y	N	97%	N	Y
observatory.manrs.org	Y	Y	Y	Y	N	N	92%	N	N
ose-apache.internetsociety.org	Y	Y	Y	Y	Y	Y	100%	Y	Y
ose-apache-cdn.internetsociety.org	Y	Y	Y	Y	Y	N	97%	Y	Y
ose-nginx.internetsociety.org	Y	Y	Y	Y	Y	Y	100%	Y	Y
ose-nginx-cdn.internetsociety.org	Y	Y	Y	Y	Y	N	97%	Y	Y
www.internethalloffame.org	Y	Y	Y	Y	N	N	97%	N	N
www.afpif.org	Y	N	Y	Y	Y	N	70%	N	Y
www.ndss-symposium.org	Y	N	Y	N	Y	N	69%	N	Y
www.ietfjournal.org	Y	N	Y	N	N	N	68%	N	Y
www.dnssec-deployment.org	Y	Y	Y	N	N	N	95%	N	Y
www.internetac.org	Y	Y	Y	Y	Y	N	97%	N	Y
www.internetcollaboration.org	Y	Y	Y	Y	Y	N	97%	N	Y
www.iotsecurity.sn	Y	N	Y	Y	Y	N	70%	N	Y
www.ixptoolkit.org	Y	N	Y	N	N	N	68%	N	Y
www.worldipv6launch.org	Y	N	Y	Y	Y	N	68%	Y	Y
Percentage compliant	100%	67%	100%	81%	71%	10%	88%	24%	86%



Future

- Expanding web server documentation as standards evolve:
 - **HTTP/3** (also known as QUIC)
 - **Website packaging standards**
- In the next years, possible ideas include:
 - **Mail servers**, embracing security standards such as DMARC, DKIM
 - **DNS servers**, promoting DNSSEC validation, DNS-over-HTTPS (DoH), and DNS-over-TLS (DoT)
 - **Time servers**, adding support for Network Time Security (NTS) to complement our Time Security project
 - **Communication servers**, embracing WebRTC and similar standards



How You Can Help

- **Test your site with Internet.nl** – and help spread the word about site
- **Review / comment on the documentation on GitHub:**
 - <https://github.com/internetsociety/ose-documentation>
- **Share** this info and encourage others to join in
 - <https://www.internetsociety.org/ose/>



We want **open standards** to be **everywhere!**

(Including our own sites and services)



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Thank you.

Dan York
Project Lead, Open Standards Everywhere
york@isoc.org

Rue Vallin 2
CH-1204 Geneva
Switzerland

Rambla Republica de Mexico 6125
11000 Montevideo,
Uruguay

Science Park 400
1098 XH Amsterdam
Netherlands

11710 Plaza America Drive
Suite 400
Reston, VA 20190, USA

66 Centrepont Drive
Nepean, Ontario, K2G 6J5
Canada

3 Temasek Avenue, Level 21
Centennial Tower
Singapore 039190

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[@internetsociety](https://twitter.com/internetsociety)

