Debugging Connectivity w/OpenSSL

← and *this* guy…

Michael Camp Bentley

The Splunk Doctor | Stage 2 Security

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About the Author

He’s not too shabby...

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About the Author

…smells of elderberries

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Common Network Troubleshooting Tools

We all deserve the right to be wrong…

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Common Tools Used

We all deserve the right to be wrong…

"Ping"

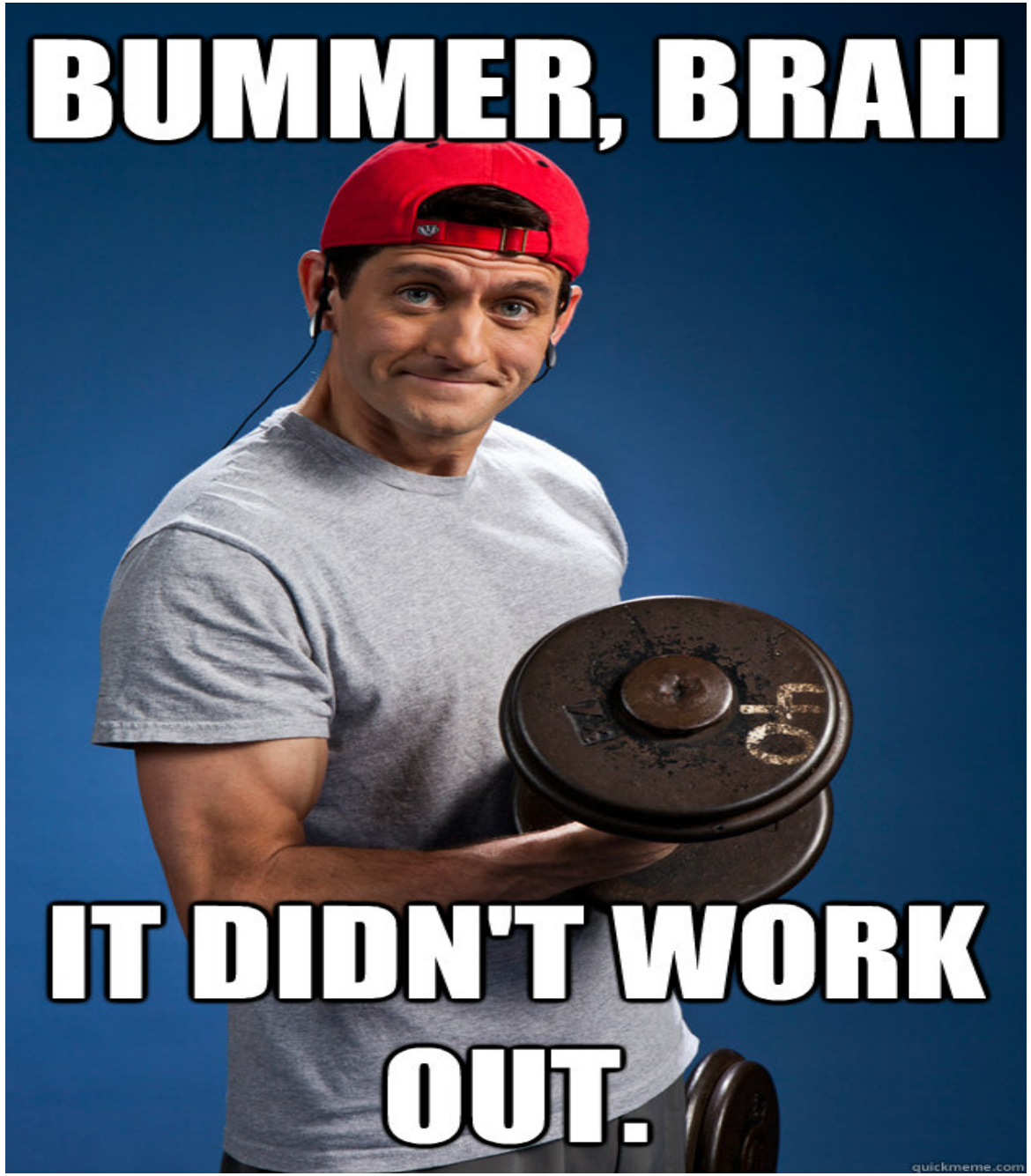
- *Requires ICMP to be enabled*
- *Does not test specific ports*

"Traceroute"

- *Requires ICMP to be enabled*
- *Doesn't test specific ports*
- *Just a bunch of pings*

"Telnet"

- *Is it installed?*
- *Should you install it?*
- *Doesn't work on Secure Connections easily*



Possible Solutions

"Hold my beer…"

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Possible Solutions

"Hold my beer…"

"Netcat"

- *Works for both UDP/TCP!*
- *Is it installed?*
- *Requires some piping to test SSL/TLS*

"Custom Scripts"

- *Beauty is in the eye of the beholder*
- *I can do it in perl, yum install perl?*
- *Not easy to write processes around*

"OpenSSL"

- *Can test most any TCP connection, but not UDP.*
- *Can validate certificates*
- *Comes with every version of Splunk - Even UFs!*

$splunk_home$/bin/openssl

Quick SSL/TLS Primer

"That means Super Splunk Lover, & True Lover of Splunk right?"

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SSL/TLS Primer

"That means Super Splunk Lover, & True Lover of Splunk right?"

Secure Sockets Layer - SSL was one of the first encryption methods used on the interwebs

Transport Layer Security - TLS is one of the latest encryption methods used on the interwebs

History of both:

SSL 1.0 -> SSL 2.0 -> SSL 3.0 -> TLS 1.0 -> TLS 1.1 -> TLS 1.2 (Most of us are here now) -> TLS 1.3

[reference]
https://en.wikipedia.org/wiki/Transport_Layer_Security#SSL_1.0,_2.0,_and_3.0

SSL/TLS Options Splunk Supports

"That means Super Splunk Lover, & True Lover of Splunk right?"

- Most versions of SSL/TLS are available, old versions are deprecated and/or unsupported
- Forwarders can use certs for sending / receiving from Peers and Deployment Servers
- Search Heads, Cluster Masters, and Peers can use certs for replicating search artifacts.
- Indexers can use certs for replicating data between Indexers
- KVStore requires a cert for all communications
- For each encrypted connection in splunk you can require valid certificates, check common names of certificates against a list of known common names, and more
- By default $splunk_home$/etc/auth/server.pem is used for web (if https enabled), search, replication, kvstore, and deployment servers. The password for this cert is 'password'.
- **It is very important that you encrypt your splunk traffic with your own certificates!**

Demonstrations

Repeat after me – “Dearest, most gracious and forgiving demo-gods, please let this work…”

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Simple Connectivity Test

…this is easy!

Test if TCP Port 9997 is open to idx1.mycompany.com

openssl s_client -connect idx1.mycompany.com:9997

[“-connect {SERVER}:{PORT}” can be FQDNs if DNS is enabled on your client, or it can be IP addresses as well.]

Simple TCP w/TLS 1.2 Test

…this is an easy 1 too!

Test if TCP Port 9996 is open and accepting TLS1.2 connections on idx1.mycompany.com

openssl s_client -connect idx1.mycompany.com:9996 -tls1_2

Other SSL/TLS Options:

-ssl2, -ssl3, -tls1, -tls1_1, -tls1_2, -no_ssl2, -no_ssl3, -no_tls1, -no_tls1_1, -no_tls1_2
These options require or disable the use of the specified SSL or TLS protocols. By default the initial handshake uses a version-flexible method which will negotiate the highest mutually supported protocol version.

Advanced TCP w/TLS1.2 & Client Cert Test

…getting to the cool stuff

Test if TCP Port 9995 is open and accepting TLS1.2 connections on idx1.mycompany.com using/Splunk default server.pem certificate:

openssl s_client -connect idx1.mycompany.com:9995 -tls1_2 -cert /opt/splunk/etc/auth/server.pem

Advanced SMTP Test w/STARTTLS

…ever wanted to script your email?

Test if SMTP port 25 is open and accepting STARTTLS connections on mail.mycompany.com using an interactive prompt:

openssl s_client -connect smtp.gmail.com:25 -tls1_2 -starttls smtp -crlf

[“-starttls smtp” enables STARTTLS support with SMTP]

[“-crlf” enables interactive input from user]

250 XRDST
ehlo
250-mail_gateway Hello [your ip]
250-SIZE 73400320
250-PIPELINING
250-DSN
250-ENHANCEDSTATUSCODES
250-AUTH NTLM LOGIN
250-X-EXPS GSSAPI NTLM
250-8BITMIME
250-BINARYMIME
250-CHUNKING
250 XRDST
AUTH LOGIN dGVzdA==
334 UGFzc3dvcmQ6
cGFzc3dvcmQ=
235 2.7.0 Authentication successful

Links

…getting to the cool stuff

Manual on OpenSSL S_Client:
https://www.openssl.org/docs/man1.0.2/man1/openssl-s_client.html

TLS/SSL Wikipedia:
https://en.wikipedia.org/wiki/Transport_Layer_Security#SSL_1.0,_2.0,_and_3.0

Test Ports w/TA-WebTools and it's testport SPL command:
https://splunkbase.splunk.com/app/4146/#/details

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Thank You!

…you're awesome

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Thank You!

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