The State of TLS in httpd 2.4

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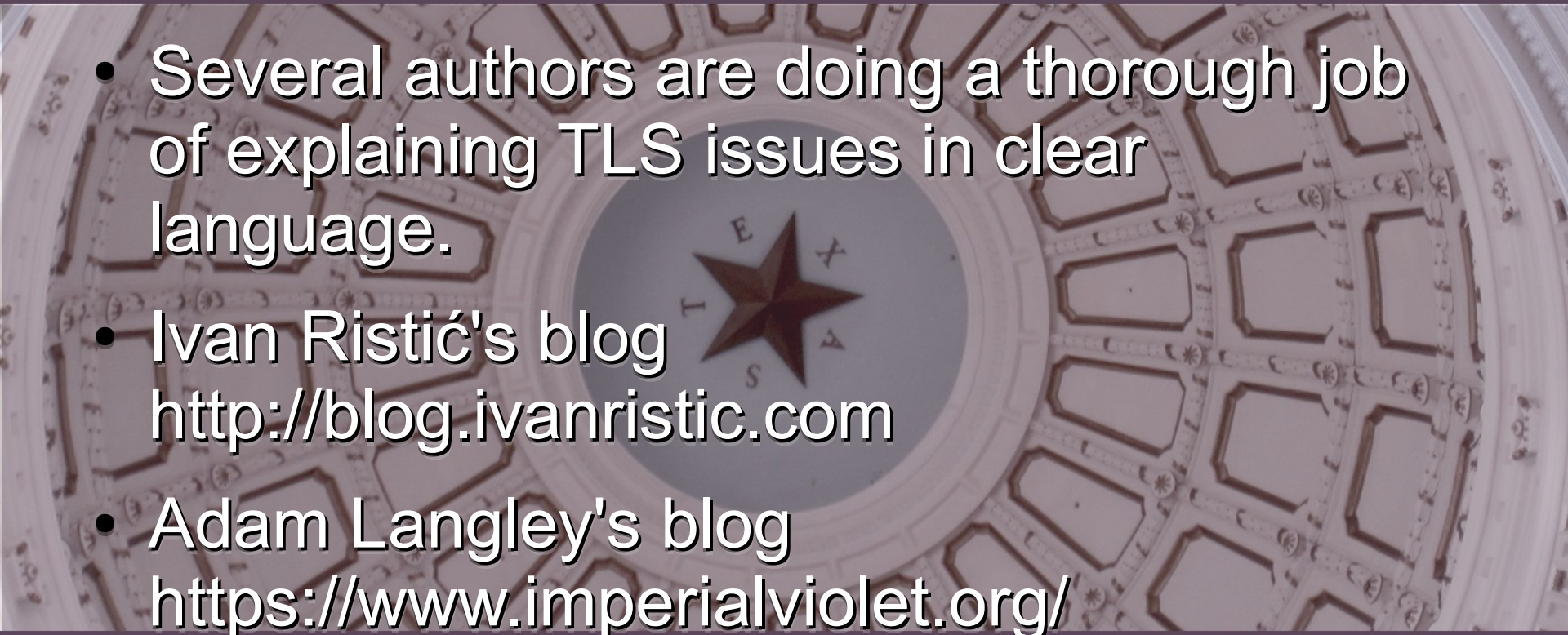
Getting Started

- Guidance is changing annually https://www.ssllabs.com/ssltest/analyze.html?d=svn.apache.org
- Web references have grown stale
- Plain http:// is nearing extinction https://www.eff.org/encrypt-the-web-report

Follow Up-to-date Resources

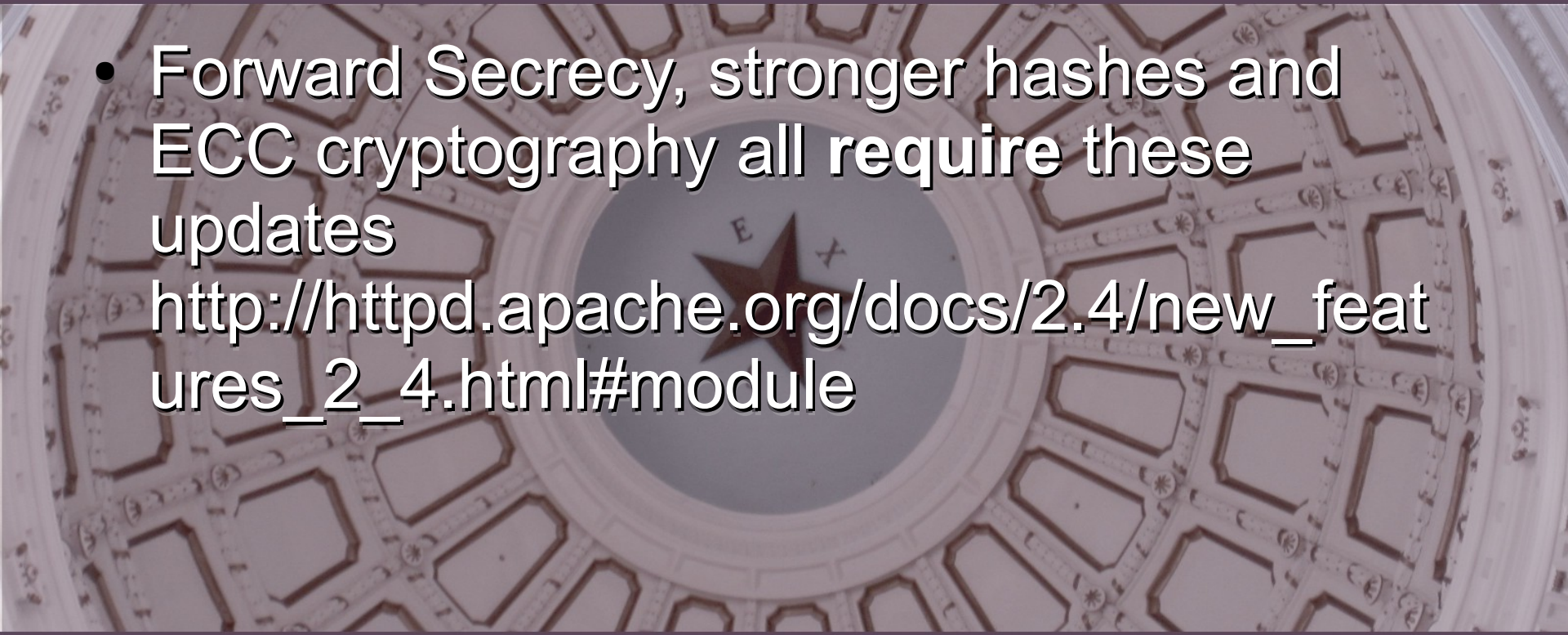


- Several authors are doing a thorough job of explaining TLS issues in clear language.
- Ivan Ristić's blog http://blog.ivanristic.com
- Adam Langley's blog https://www.imperialviolet.org/

Update to Modern Tools

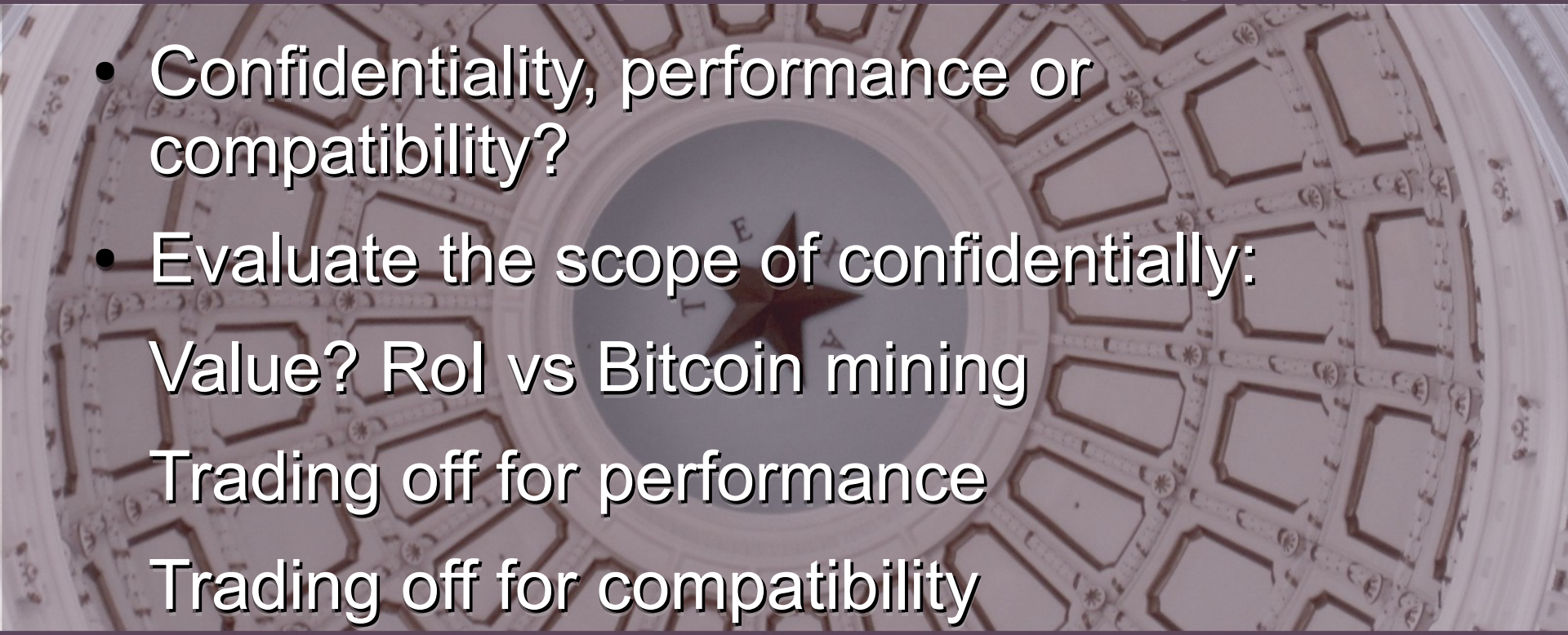
- OpenSSL 1.0.1 provides the necessary TLSv1.2 facilities
- Apache HTTP Server 2.4 connects the dots for OpenSSL 1.0.1 features
- 1.0.2 is now the emergent alternative

More Reasons



- Forward Secrecy, stronger hashes and ECC cryptography all **require** these updates http://httpd.apache.org/docs/2.4/new_features_2_4.html#module

Choose 2? (Or only one?)



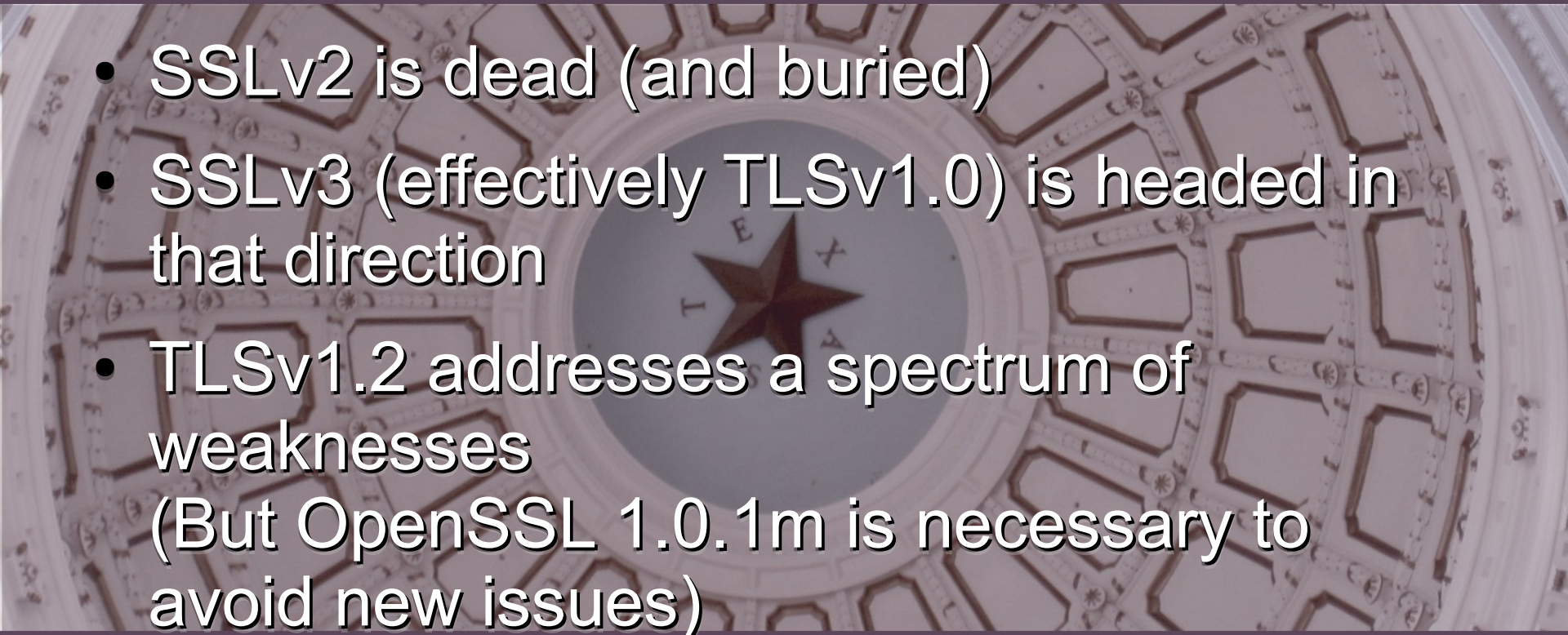
- Confidentiality, performance or compatibility?
- Evaluate the scope of confidentially:

  Value? RoI vs Bitcoin mining

  Trading off for performance

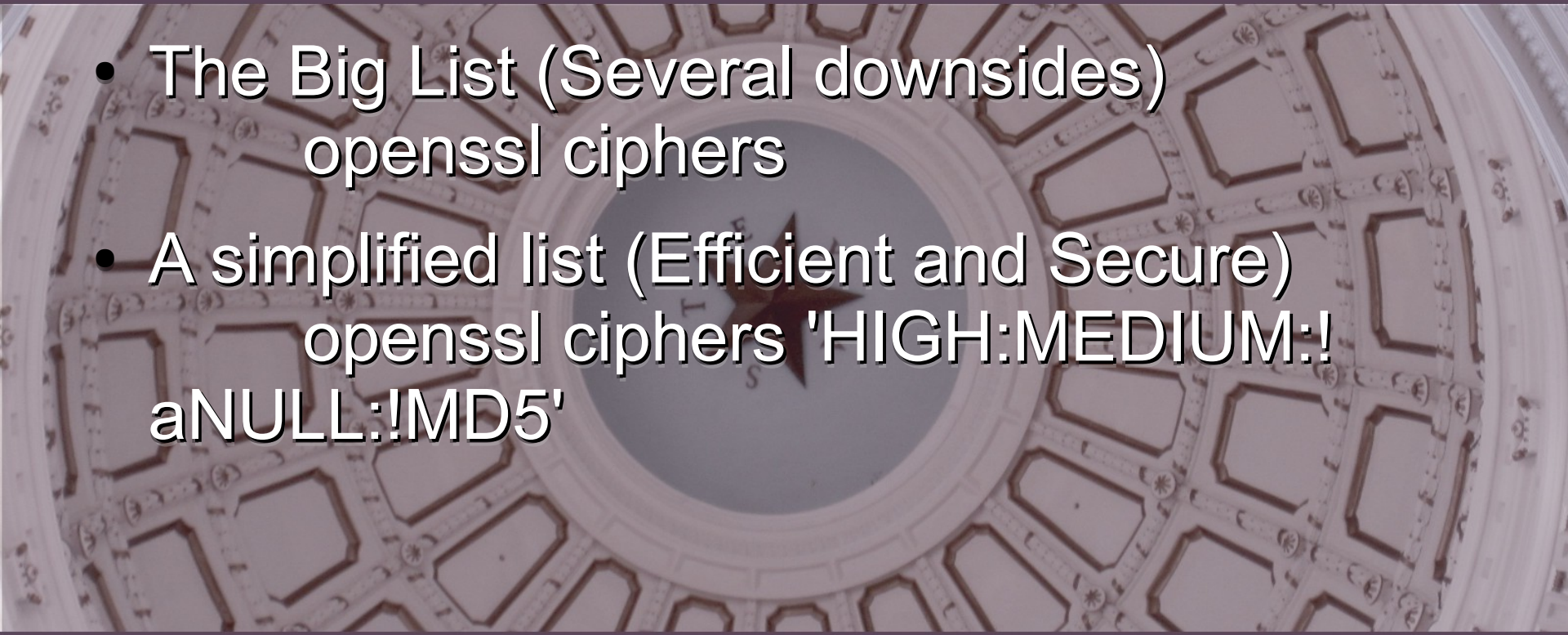
  Trading off for compatibility

Protocols



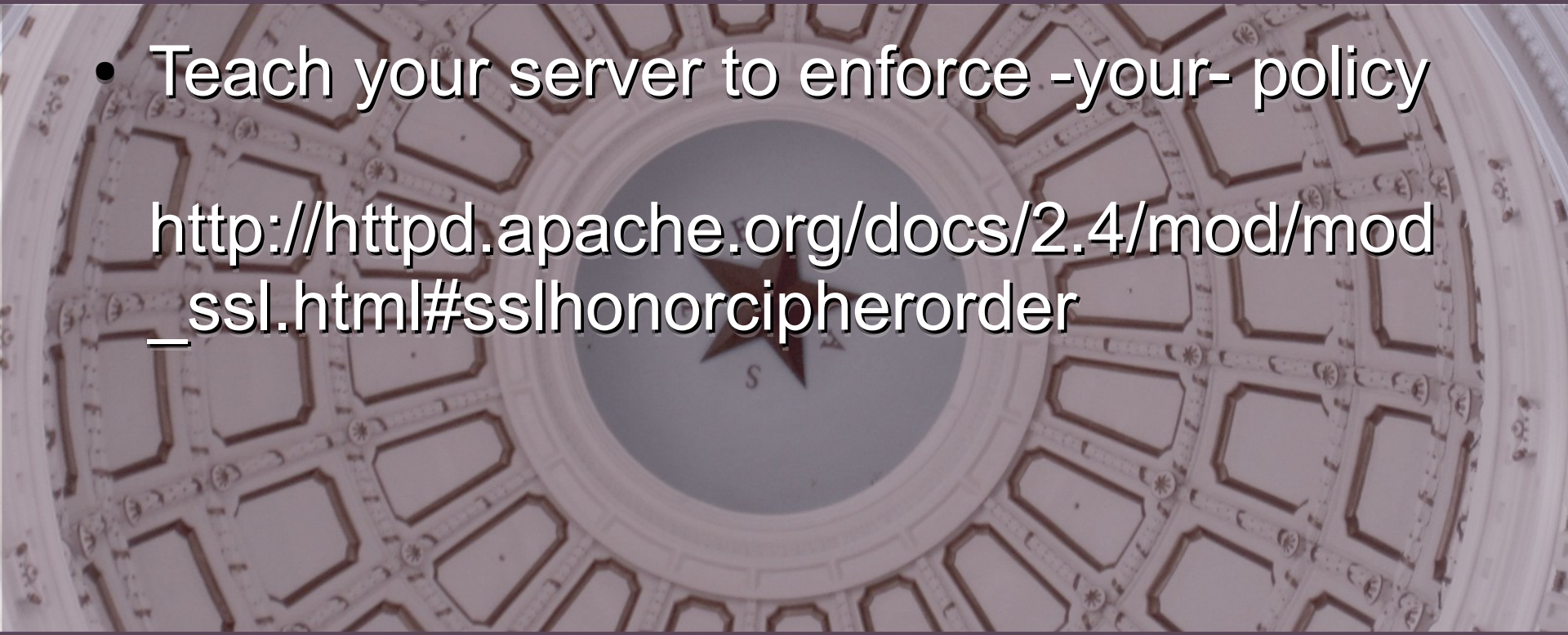
- SSLv2 is dead (and buried)
- SSLv3 (effectively TLSv1.0) is headed in that direction
- TLSv1.2 addresses a spectrum of weaknesses
  (But OpenSSL 1.0.1m is necessary to avoid new issues)
- OpenSSL 1.0.2(a!) adds new API facilities

Ciphers



- The Big List (Several downsides)
  openssl ciphers
- A simplified list (Efficient and Secure)
  openssl ciphers 'HIGH:MEDIUM:!aNULL:!MD5'

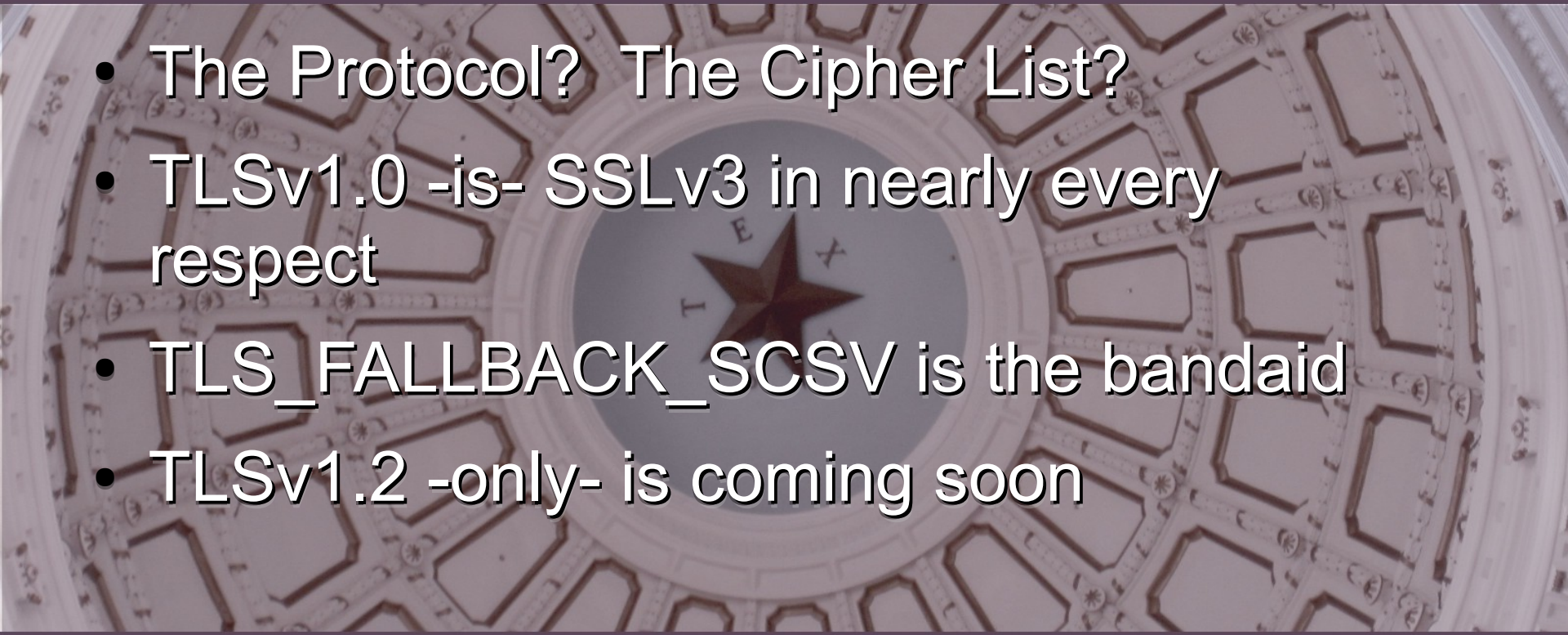
Dictating Priority



- Teach your server to enforce -your- policy

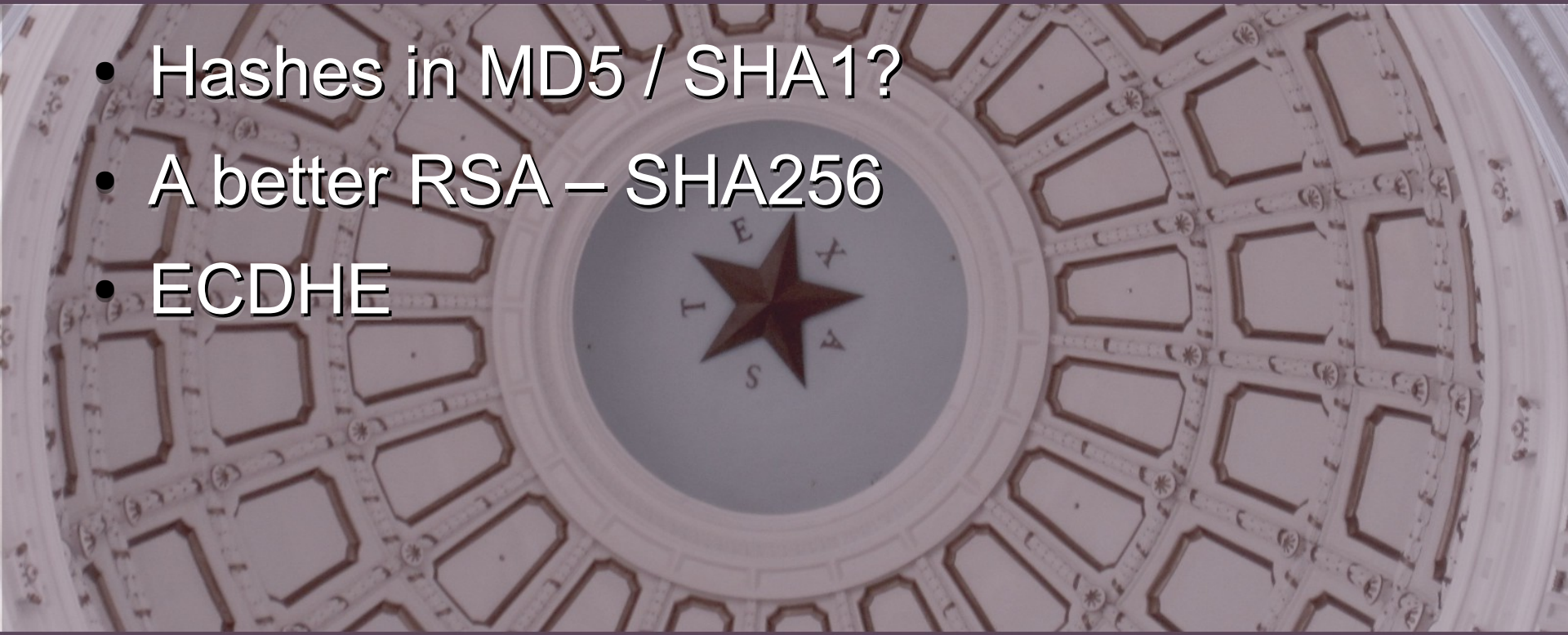
  http://httpd.apache.org/docs/2.4/mod/mod_ssl.html#sslhonorcipherorder

Disable SSLv3?



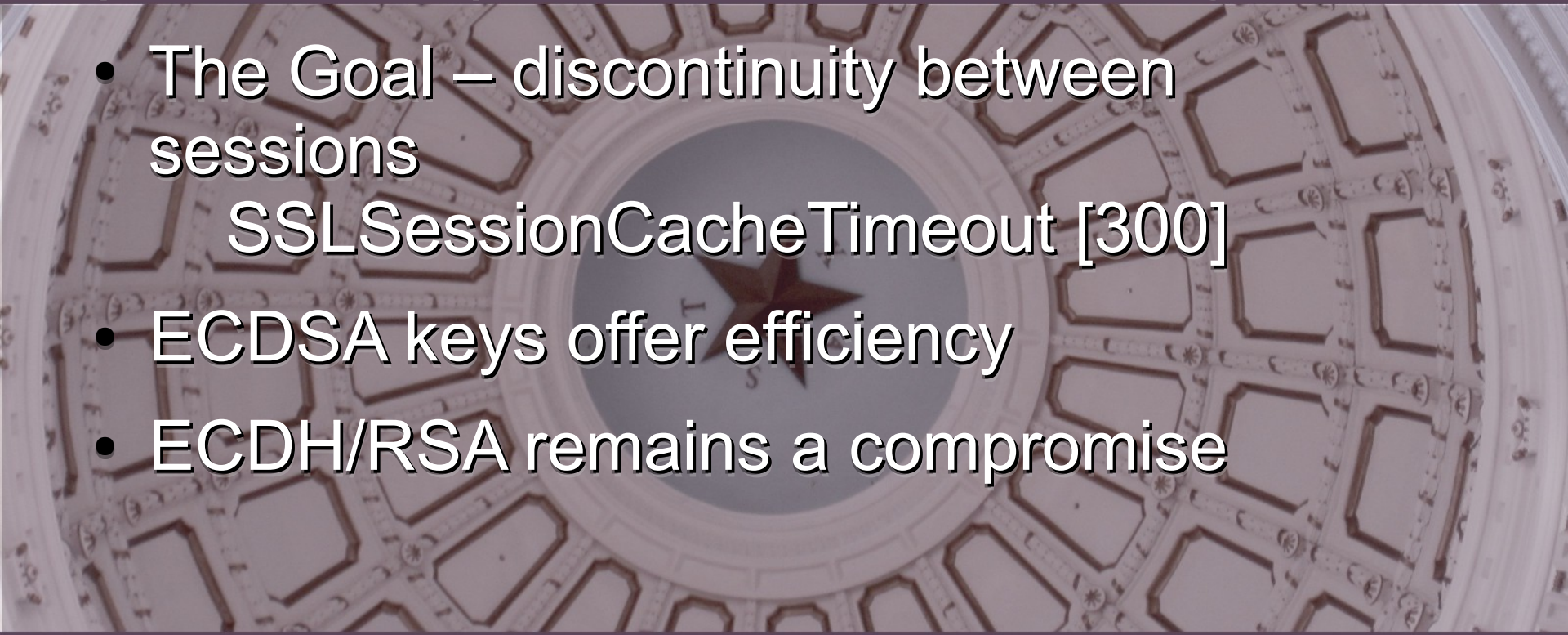
- The Protocol? The Cipher List?
- TLSv1.0 -is- SSLv3 in nearly every respect
- TLS_FALLBACK_SCSV is the bandaid
- TLSv1.2 -only- is coming soon

Certs and Keys



- Hashes in MD5 / SHA1?
- A better RSA – SHA256
- ECDHE

(Perfect?) Forward Secrecy

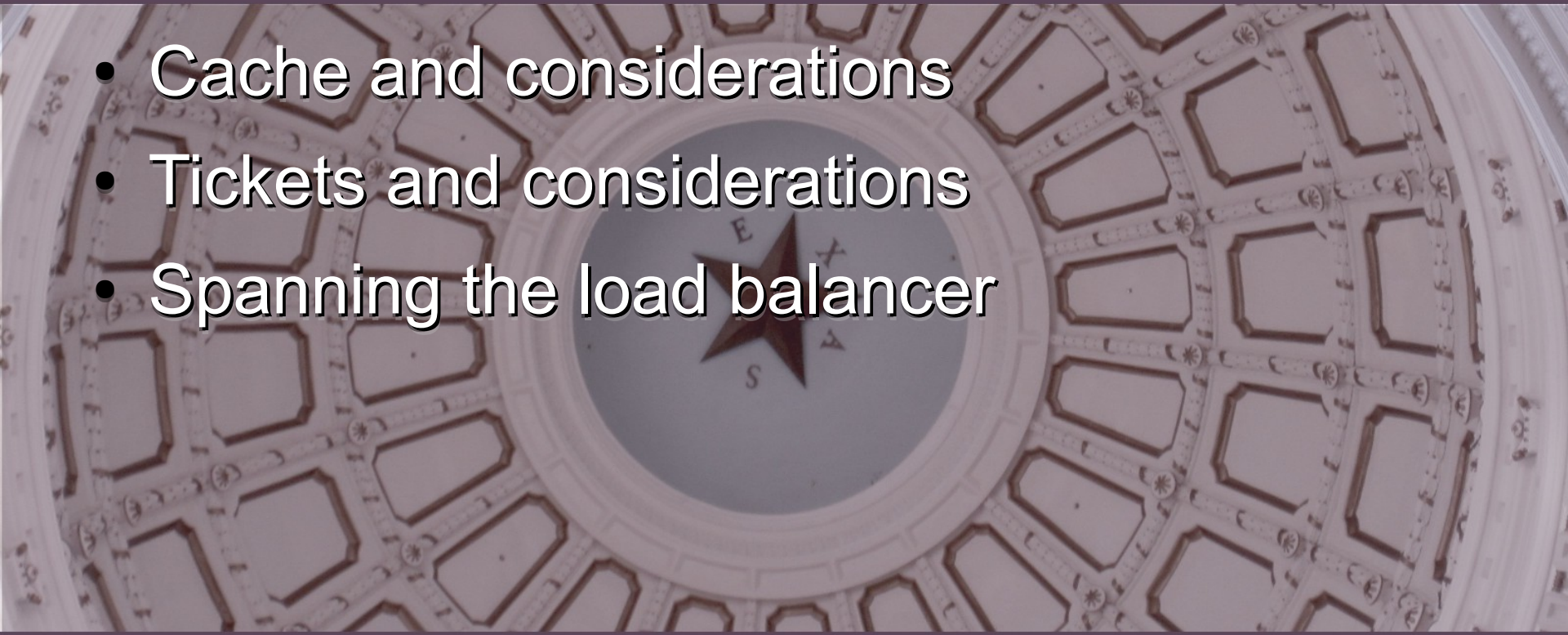


- The Goal – discontinuity between sessions
  SSLSessionCacheTimeout [300]
- ECDSA keys offer efficiency
- ECDH/RSA remains a compromise

OCSP (and Stapling)

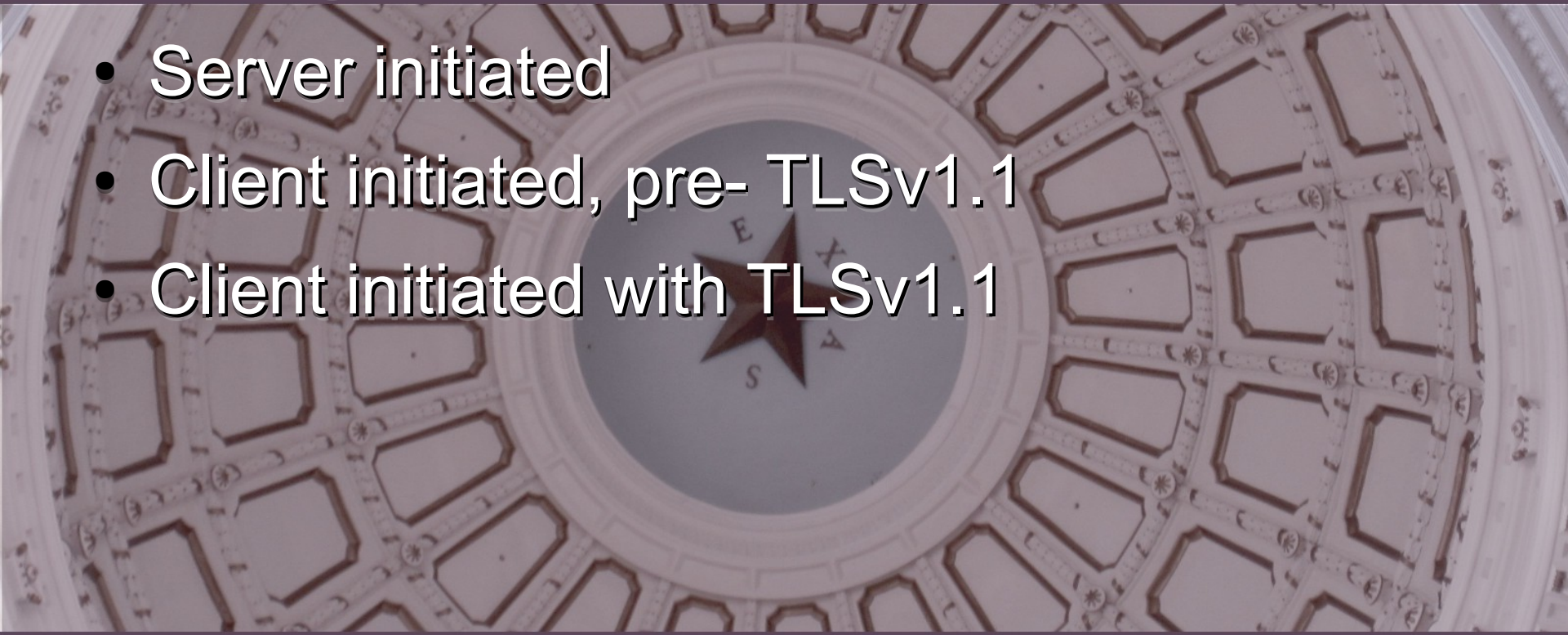
- Confirming continued validity – evolved from revocation lists
- OCSP Failure cases – overloaded providers and unroutable traffic
- Stapling partially solves these issues

Sessions



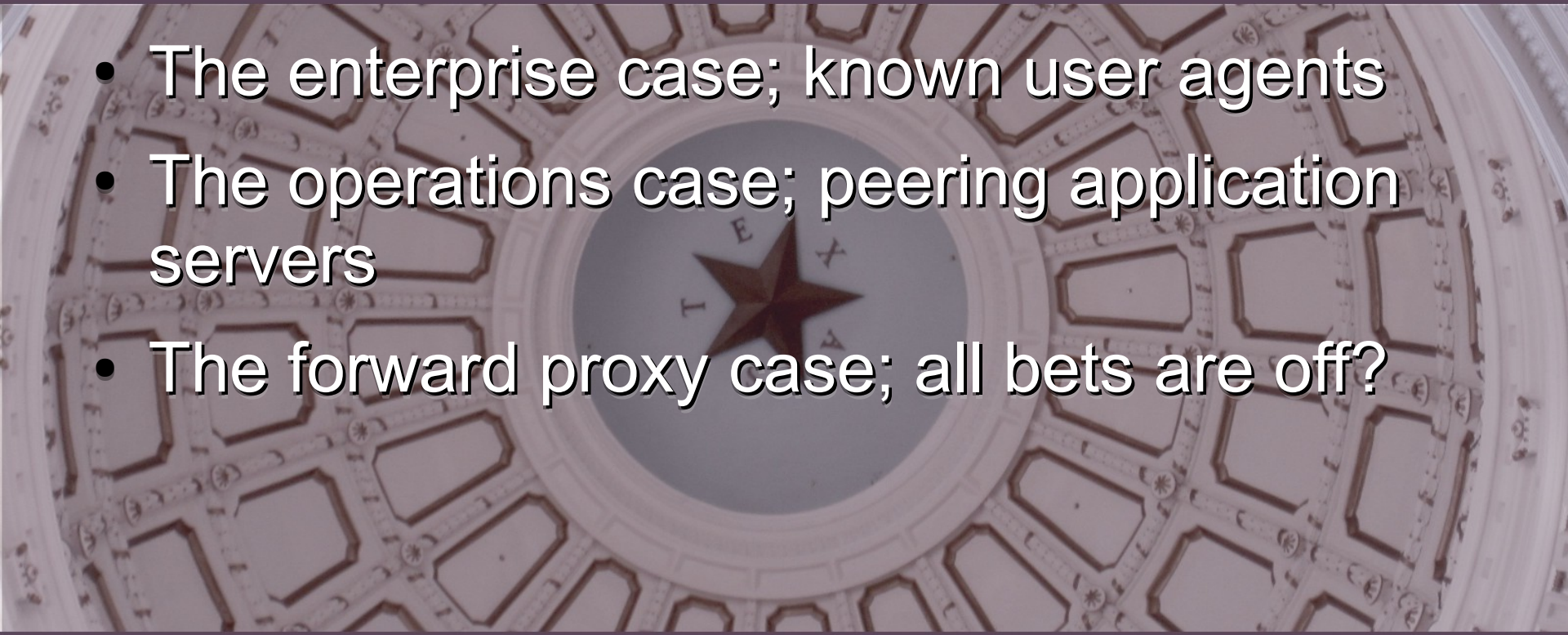
- Cache and considerations
- Tickets and considerations
- Spanning the load balancer

Renegotiation



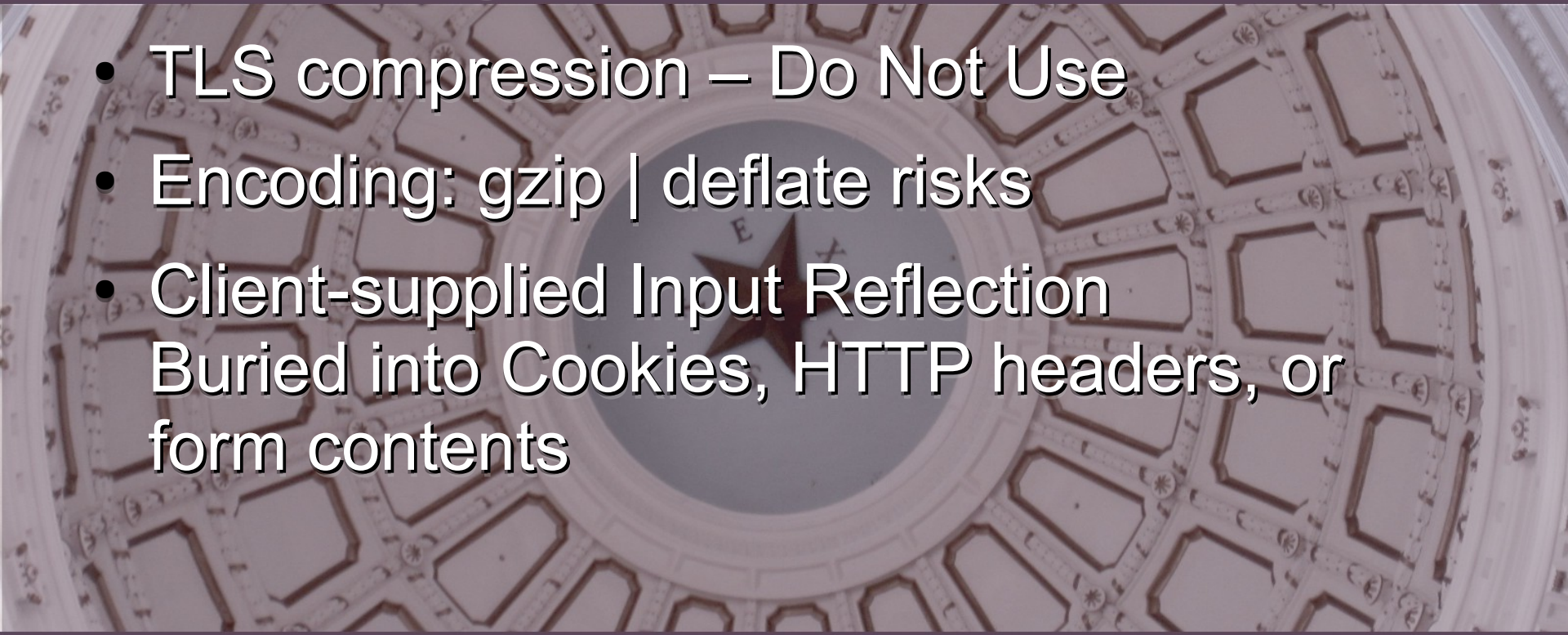
- Server initiated
- Client initiated, pre- TLSv1.1
- Client initiated with TLSv1.1

Under Control



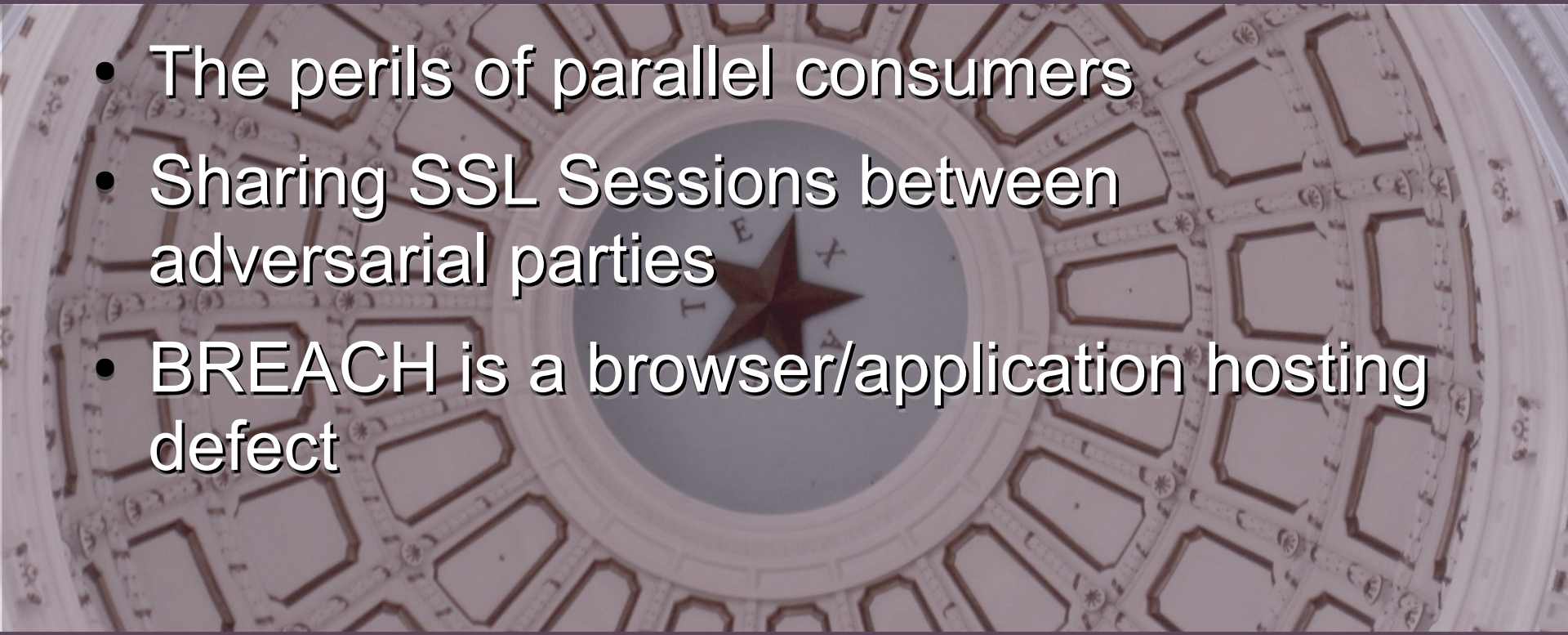
- The enterprise case; known user agents
- The operations case; peering application servers
- The forward proxy case; all bets are off?

The Design Conundrums



- TLS compression – Do Not Use
- Encoding: gzip | deflate risks
- Client-supplied Input Reflection
  Buried into Cookies, HTTP headers, or form contents

Broken Clients

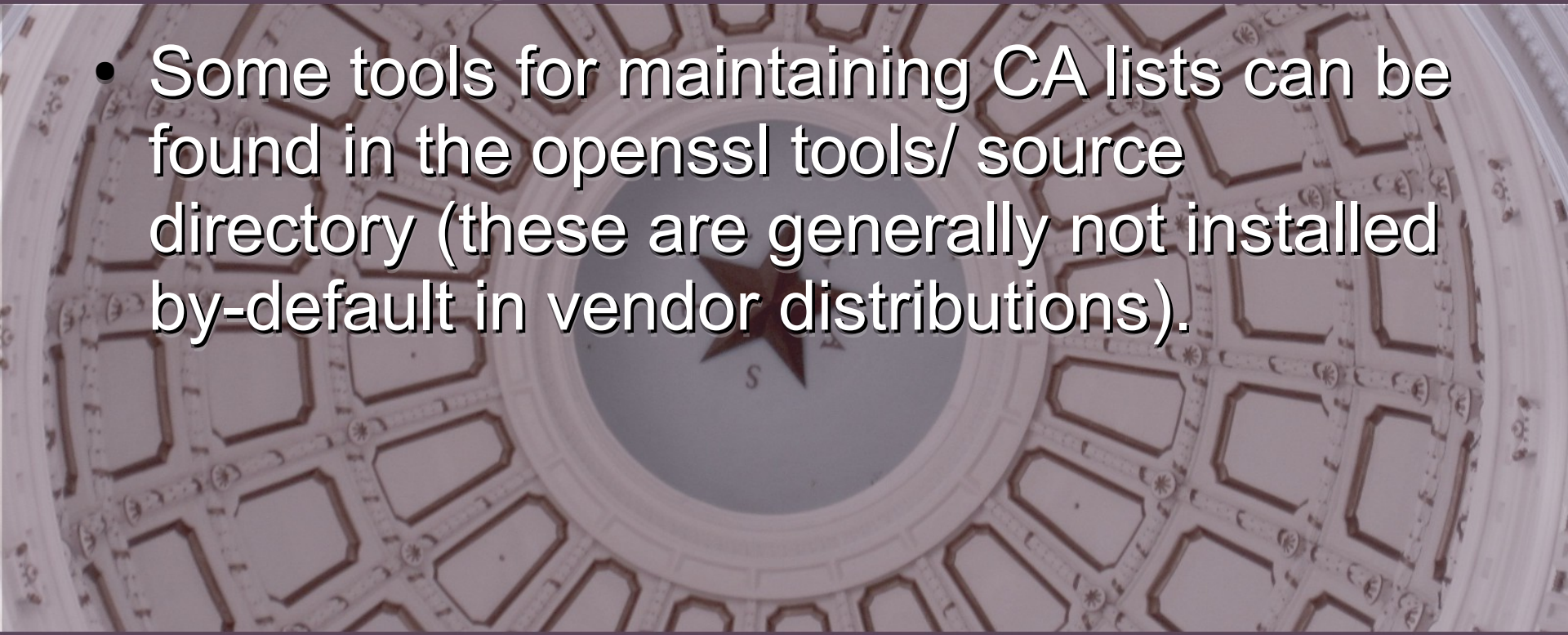


- The perils of parallel consumers
- Sharing SSL Sessions between adversarial parties
- BREACH is a browser/application hosting defect

Virtual Hosting

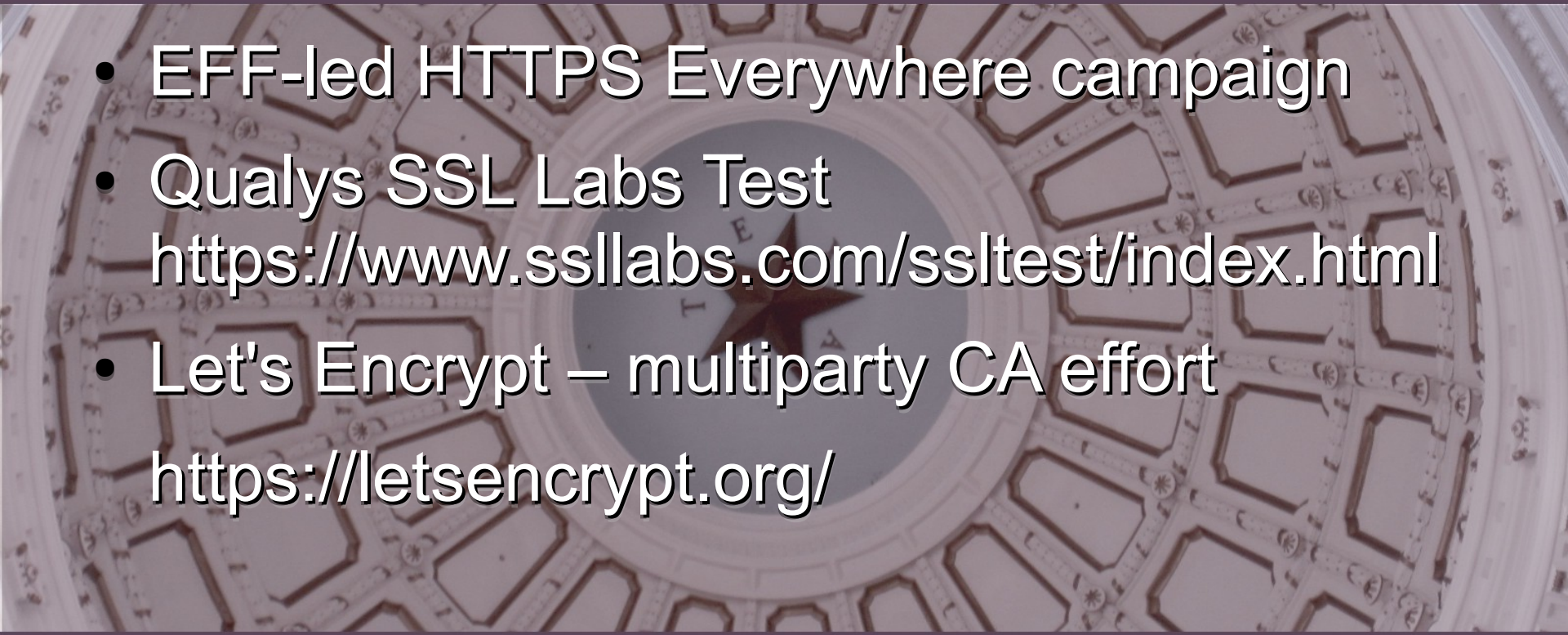
- SNI (Server Name Indication) in httpd 2.4 allows modern clients to share a single IP address for multiple certificates
- Presented based on the TLS SNI hostname indicated by the client.
- Old clients still need a wildcard certificate, or a list of AltSubjectNames

CA Management



- Some tools for maintaining CA lists can be found in the openssl tools/ source directory (these are generally not installed by-default in vendor distributions).

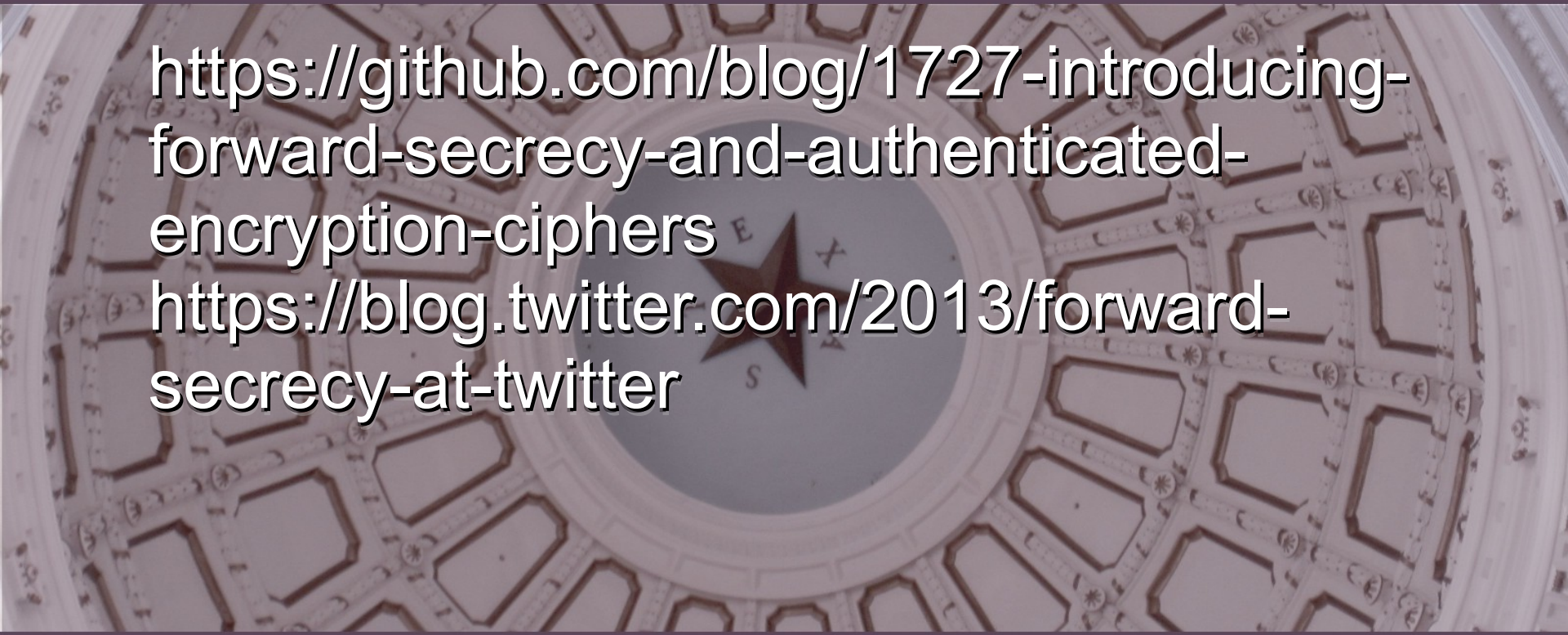
External Efforts



- EFF-led HTTPS Everywhere campaign
- Qualys SSL Labs Test
  https://www.ssllabs.com/ssltest/index.html
- Let's Encrypt – multiparty CA effort

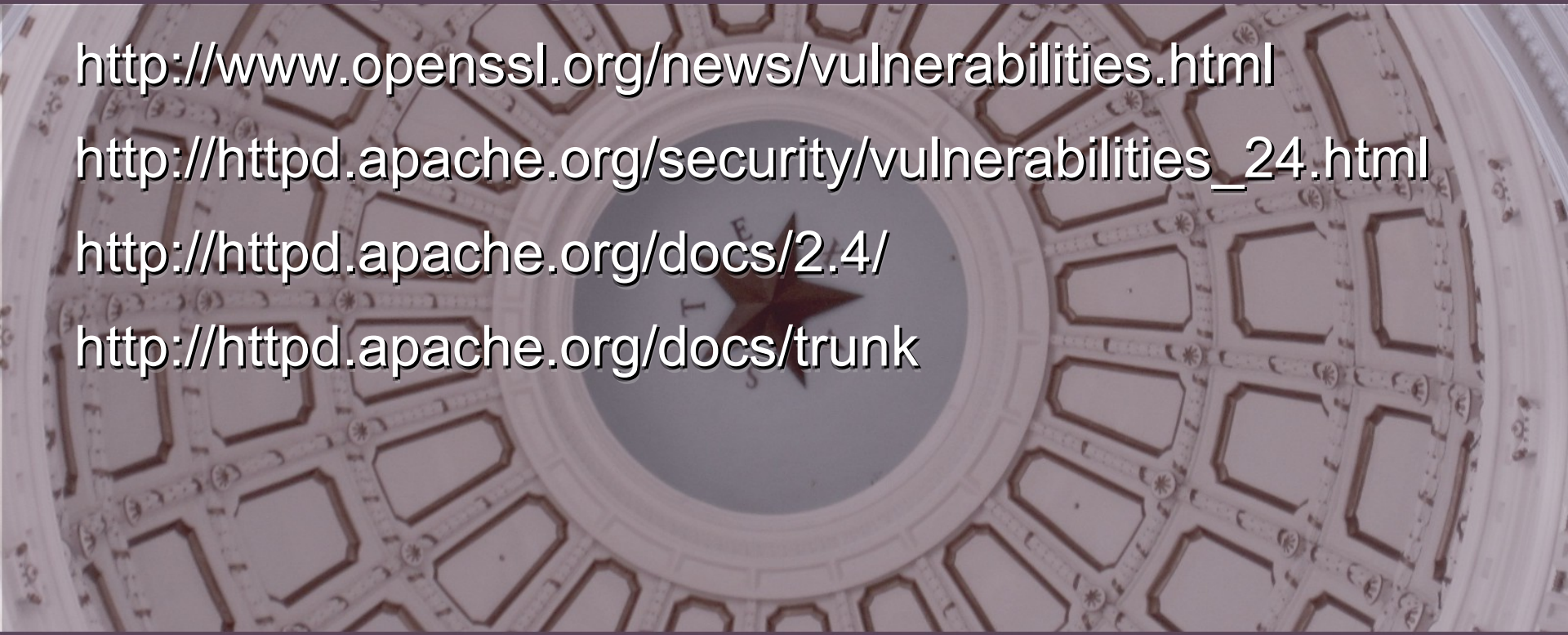
  https://letsencrypt.org/

Success stories



https://github.com/blog/1727-introducing-forward-secrecy-and-authenticated-encryption-ciphers
https://blog.twitter.com/2013/forward-secrecy-at-twitter

An Ongoing Process



http://www.openssl.org/news/vulnerabilities.html

http://httpd.apache.org/security/vulnerabilities_24.html

http://httpd.apache.org/docs/2.4/

http://httpd.apache.org/docs/trunk

Questions?

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