BACKDOORS TO THE KINGDOM:

CHANGING THE WAY YOU THINK ABOUT ORGANIZATIONAL RECONNAISSANCE

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WHOAMI

David Westcott:

- Finder of things
- Attack surface aficionado
- Android RE
- OSINT/ HUMINT
- iDefense THOR TAA Team

AGENDA

- **Why?**
- **Certificate Transparency (CT)**
- **Start of Authority (SOA)**
- **Sender Policy Framework (SPF)**
- **Border Gateway Protocol (BGP)**
- **Q/A**

WHY?

- DNS Enumeration is **LOUD**
- GDPR **COMPLICATED** WHOIS
- The “Cloud” (aka: off-prem) is **MASSIVE**

CERTIFICATE TRANSPARENCY

(CT) CAVEAT?

- Doesn’t capture (most) **self-signed***
- Visibility gap without **scan data**
- Supplementary data is needed to show where the certs are used

(CT) CAVEAT?

32,581,124 (Self-Signed)
26,109,510 (^ & Unexpired)

Source: shodan.io

(CT) CAVEAT?

238,694,349 (Unexpired, not Pre-Cert)
166,355,708 (Unexpired, Pre-cert)

....

13,642,992 not in CT logs, but in scans

Source: censys.io

(CT) TERMS

- **OID:** Object identifier
- **Pre-certificate:** OID 1.3.6.1.4.1.11129.2.4.3
    - AKA Certificate Poison AKA Pre-Cert
- **SCT:** Signed Certificate Timestamp
- **CRL:** Certificate Revocation List
- **AIA Path:** Authority Information Access Path
- **CN:** Common Name
- **SAN:** Subject Alternative Name
- **CA:** Certificate Authority

(CT) RFC & LOGS

Operators:

- **Google**, **Cloudflare**, **DigiCert**, **CNNIC**, **Sectigo (Comodo)**, **Certly, Izenpe, WoSign, Venafi, StartCom,** *Wang Shengnan, GDCA, Beijing PuChuangSiDa Technology Ltd., NORDUnet, SHECA, Akamai, Matt Palmer, Let's Encrypt, Up In The Air Consulting*

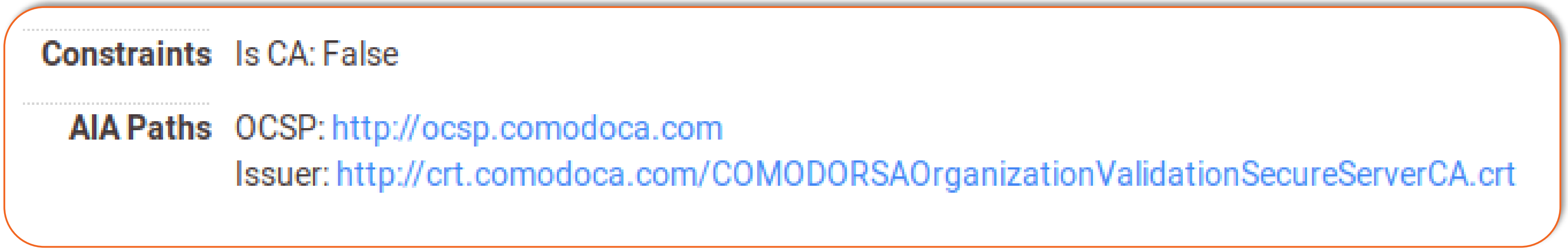
RFC 6962 (Certificate Transparency) | June 2013

- http://www.certificate-transparency.org/known-logs
- https://www.gstatic.com/ct/log_list/log_list.json
- https://github.com/chromium/ct-policy
- https://github.com/chromium/ct-policy/blob/master/log_policy.md
- https://www.gstatic.com/ct/log_list/all_logs_list.json

(CT) CONTENTS

- AIA/CRL Paths!
- IP Addresses
- Email Addresses
- Domains
- SANs
- Certificate Authorities
- Serial Numbers
- Issuers
- Fingerprint
- Pre-Cert!

(CT) AIA/CRL PATH



Constraints	Is CA: False
AIA Paths	OCSP: http://ocsp.comodoca.com Issuer: http://crt.comodoca.com/COMODORSAOrganizationValidationSecureServerCA.crt

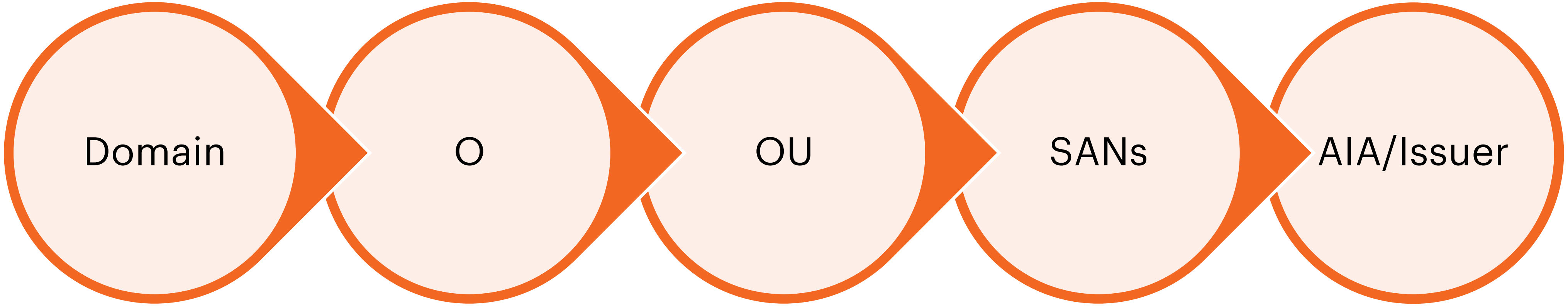
- **Issuer AIA: CN, DC, LDAP String**
- **Issuer AIA ~= “ldap”, Not Expired, Not Pre-Cert == ~444,000+**
  - **Source: Censys**

(CT) DATA

- **Current CT entry count:** **~2,924,366,030 (as of Feb. 12, 19)**
  - **Google:**
  - Argon2018, 2019, 2020, 2021, Aviator, Icarus, Pilot, Rocketeer, Skydiver
  - **Cloudflare:**
  - Nimbus2018, 2019, 2020, 2021

~571 GB*

(CT) MAPPING



++: Email Addresses, Names, CAs, Internal Naming Syntax, IPs

(CT)
AND....ACTION!

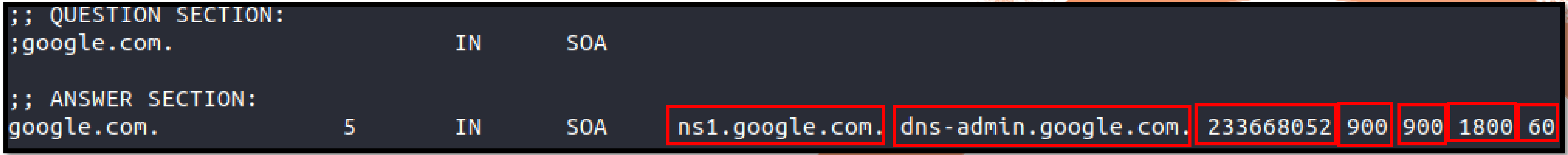
(CT) GETTING STARTED

- **Censys**
- **Binaryedge**
- **Shodan**
- **crt.sh (Sectigo)**
- **Google Transparency Report**
- **Facebook CT**
- **Axeman (Cali Dog Security; Ryan Sears)**
- **CertStream (Cali Dog Security; Ryan Sears)**
- **Rapid7 Open Data**
- **scans.io (Censys)**

START OF AUTHORITY

(SOA)

- MNAME (Primary Master NS)
- RNAME (Email Address)
- SERIAL
- REFRESH
- RETRY
- EXPIRE
- MINIMUM
- $TTL



```
;; QUESTION SECTION:
;google.com.                    IN      SOA

;; ANSWER SECTION:
google.com.             5       IN      SOA     ns1.google.com. dns-admin.google.com. 233668052 900 900 1800 60
```

(SOA) AND…ACTION!

SENDER POLICY FRAMEWORK

(SPF)

- ALL
- A
- IP4 -> ASN/pDNS/Certs -> Off-Prem, Friends, Providers
- IP6 -> ASN/pDNS/Certs -> Off-Prem, Friends, Providers
- MX -> ReverseMX -> Sibling Domain(s)
- PTR
- EXISTS
- INCLUDE -> Off-Prem, Friends, Providers

(SPF) AND...ACTION!

BORDER GATEWAY PROTOCOL

(BGP) ASN/RANGES

bgpview.io (indexed by Google, has API)

rdap.arin.net/registry/entity/ID-ARIN (not indexed)

- Name, Email, Address, Phone # (vcard)
- Status of PoC (w/ dates)

(BGP) CLIENTS

- RDAP (Registration Data Access Protocol)
  - nicinfo (client | Ruby)
  - DNSBelgium (client | Java)
  - CNNIC (client | Java)
  - CentralNIC “rdapper” (client | Perl)

(BGP) AND...ACTION!

[REDACTED]

Questions?

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