Bad guys are everywhere, good guys are somewhere!

NSA/CSS Threat Operations Center (NTOC)

NTOC Technology Development

(U) NTOC

- (U//FOUO) Operates under *both* SIGINT and Information Assurance authorities
  - Leverage SIGINT, IA, OSINT
- (U//FOUO) Coordinates Integrated Cyber Operations
  - V2: Analysis
  - V3: Operations
  - V4: Technology Development Support
    - V45: Technology Development Division

(U) V45 - Projects

- (U//FOUO) TREASUREMAP
  - Massive Internet mapping, exploration, and analysis engine

- (U//FOUO) PACKAGEDGOODS
  - Globally dispersed traceroute generators
- (U) Other Projects

(U) What is TREASUREMAP?

(U//FOUO) Capability for building a near real-time, interactive map of the global internet.

Map the entire Internet – Any device*, anywhere, all the time

(U//FOUO) We enable a wide range of missions:

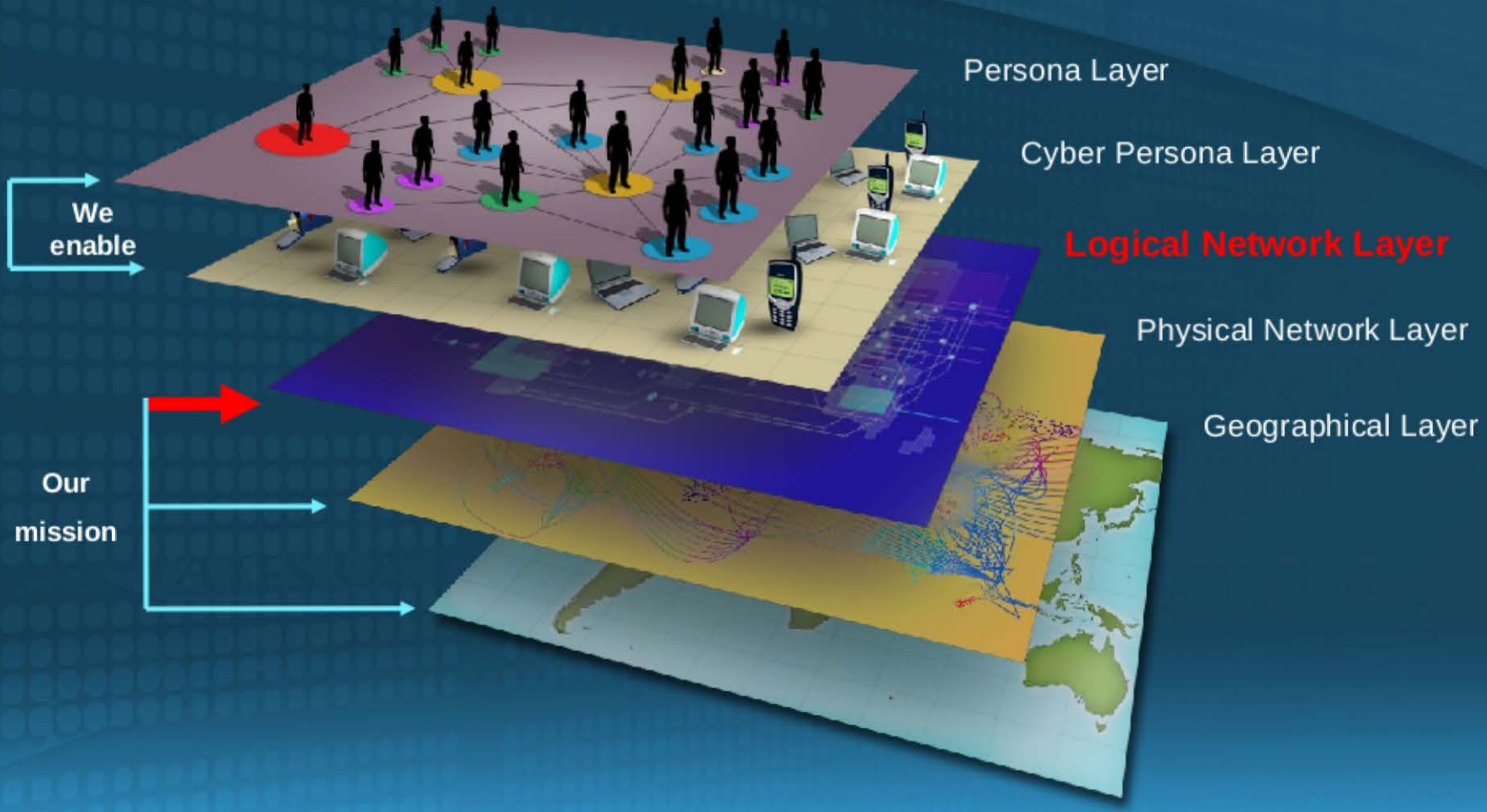
- Cyber Situational Awareness – *your own network plus adversaries'*
- Common Operation Pictures (COP)
- Computer Attack/Exploit Planning / Preparation of the Environment
- Network Reconnaissance
- Measures of Effectiveness (MOE)

(* limited only by available data)

(U) TREASUREMAP

- (U//FOUO) Continual generation of global Internet map, IPv4 and IPv6 (limited)
- (U//FOUO) Focus on logical layers (router and autonomous system), but touches physical, data link, and application layers
- (U) Its Huge.

(U) TREASUREMAP as an Enabler



(U) Current State

- (U//FOUO) Data Sources
  - *Open Source Intelligence (OSINT) * & Academic*
  - *Commercially Acquired*
  - SIGINT
  - Information Assurance
- (U//FOUO) Available on multiple networks to many user groups
  - NSAnet – TREASUREMAP (TM)
    - 5-Eyes partners
    - JWICS users - USG IC
  - SIPRNet – USG IC /DoD – TREASUREMAP-SIPR (TM-S)
- (U) New capabilities delivered every 90 days
- (U) 30+ Gigabytes of additional data added and replaced per day

(* OSINT – Open Source / Publicly available Internet Meta-Data)

(U) Data Sources

Feed the Machine

(U) OSINT, Commercial & Academic

- (U//FOUO) BGP
  - Gives the 300,000 foot view of the Internet
  - Defines routing across Autonomous Systems (AS)
  - Origination of IP address spaces (Prefixes) to AS
  - How the Internet gets knowledge of itself (IP address space)
  - Commericaly purchased Data Sources
    - Akamai, SOCIALSTAMP, SEASIDEFERRY
  - Open Source
    - Public BGP, IXP (RIPE), APNIC, ROUTEVIEWS, CERNET

(U) OSINT, Commercial & Academic

- (U//FOUO) Traceroutes
  - Router –to- router links to targeted IP addresses
  - Creates links between networking devices (routers)
  - TM ingests approx. ~16–18 million traceroutes daily
  - Gives the 300 foot view, router-to-router infrastructure
  - Data Sources
    - ARK – CAIDA's Archipelago Project *
    - PACKAGEDGOODS *
    - SOCIALSTAMP
    - RUSTICBAGGAGE
    - User Input

(U) OSINT, Commercial & Academic

- (U) Registries - Information on netblock and AS ownership
- (U) DNS - IP address to domain name matching
- (U) Operating System (OS) Fingerprints
  - Software and Operating System characteristics of networked devices
  - ~30-50 million unique IP addresses represented per day

(U//FOUO) Traceroutes: PACKEGEDGOODS

- (U//FOUO) Collects "network measurement" data, on public internet
- (U) Random traceroutes and user requested
- (U//FOUO) **PG-GTR**
  - Currently using ~700 public traceroute sites to perform operations
  - High target (full IP addresses)
  - Capable of ~4K IPv4 and IPv6 traceroutes daily
- (U//FOUO) **PG-Server**
  - High volume: ~6.5 million traceroutes per day
  - Low targeting: IPv4 /24 netblocks or higher
  - Can do whole ASes, Country, Netblocks
  - 13 covered servers in unwitting data centers around the globe
    - **Asia**: Malaysia, Singapore, Taiwan, China (2), Indonesia, Thailand, India
    - **Europe & Russia**: Poland, Russia, Germany, Ukraine, Latvia, Denmark
    - **Africa**: South Africa
    - **South America**: Argentina, Brazil

(U) Coming Soon!

- (U//FOUO) **PG-Server 2.0**
  - Tasking of full IP address
  - Choice of traceroute types:
    - ICMP
    - ICMP Paris
    - TCP
    - UDP
  - Choice of PG-SVR (for source of traceroute)
  - Auto-refresh

(U) Traceroutes - CAIDA

- (U) University of California, San Diego
  - Cooperative Association for Internet Data Analysis
  - Archipelago measurement platform
- (U//FOUO) TM data source: ARK
- (U) High volume: ~10 million traceroutes per day
- (U) Random targeting (/24 netblock, BGP advertised)
- (U) 44 Locations: Asia (5), Europe (15), Africa (2), North America (18), South America (2), Oceania (2)

(U) Internal Sources (Protected Sources)

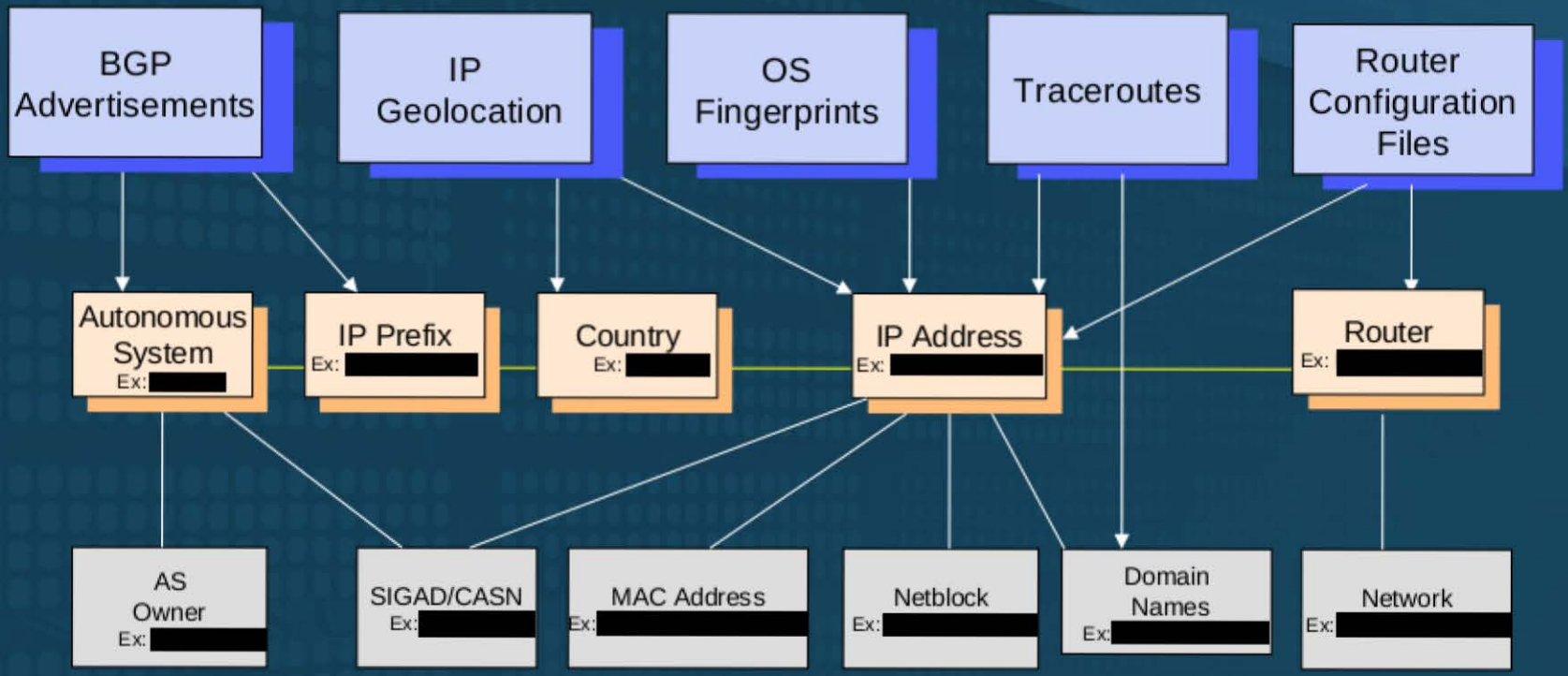
- (U//FOUO) PACKAGEDGOODS - NTOC
  - (S) Clandestine traceroute and DNS processor
- (S//SI//REL) BLACKPEARL – NAC
  - SIGINT session 5-tupel, identified routers, routing protocols, SIGINT access points, (inferred SIGINT access points)
- (S//SI//REL) LEAKYFAUCET – NAC
  - Flow repository of 802.11 WiFi IP addresses and clients via STUN data
- (S//SI//REL) HYDROCASTLE – NAC/INSCOM
  - 802.11 configuration data extracted from CNE activity in specific locations
  - (Requires HYDROCASTLE account)
- (S//SI//REL) MASTERSHAKE – NAC
  - FORNSAT and WiFi collection data
- (S//SI//REL) S-TRICKLER - NTOC
  - IP address fingerprints and potential vulnerabilities from FORNSAT collection

(U) Internal Sources (Protected Sources)

- (S//SI//REL) TOYGRIPPE - NAC
  - Repository of VPN endpoints
- (S//SI//REL) DISCOROUTE– NAC/GCHQ
  - Router configuration files from CNE and passive SIGINT
  - NAC's DISCOROUTE repository
- (TS//SI//REL) VITALAIR2 – TAO
  - Automated scaned IP addresses for TAO known vulnerabilities
- (U//FOUO) IPGeoTrap - NAC
  - Provides geolocation services for IP addresses/ranges
- (TS//SI//REL) JOLLYROGER – SSG/TAO
  - Provides metadata that describes the networking environment of TAO-implanted Windows PCs
  - (Requires JOLLYROGER account)
- (U//FOUO) TUTELAGE – NTOC
  - Specific alerts from intrusion detection sensors
  - (not currently active)

(U) The Whole is Greater than the Sum of the Parts

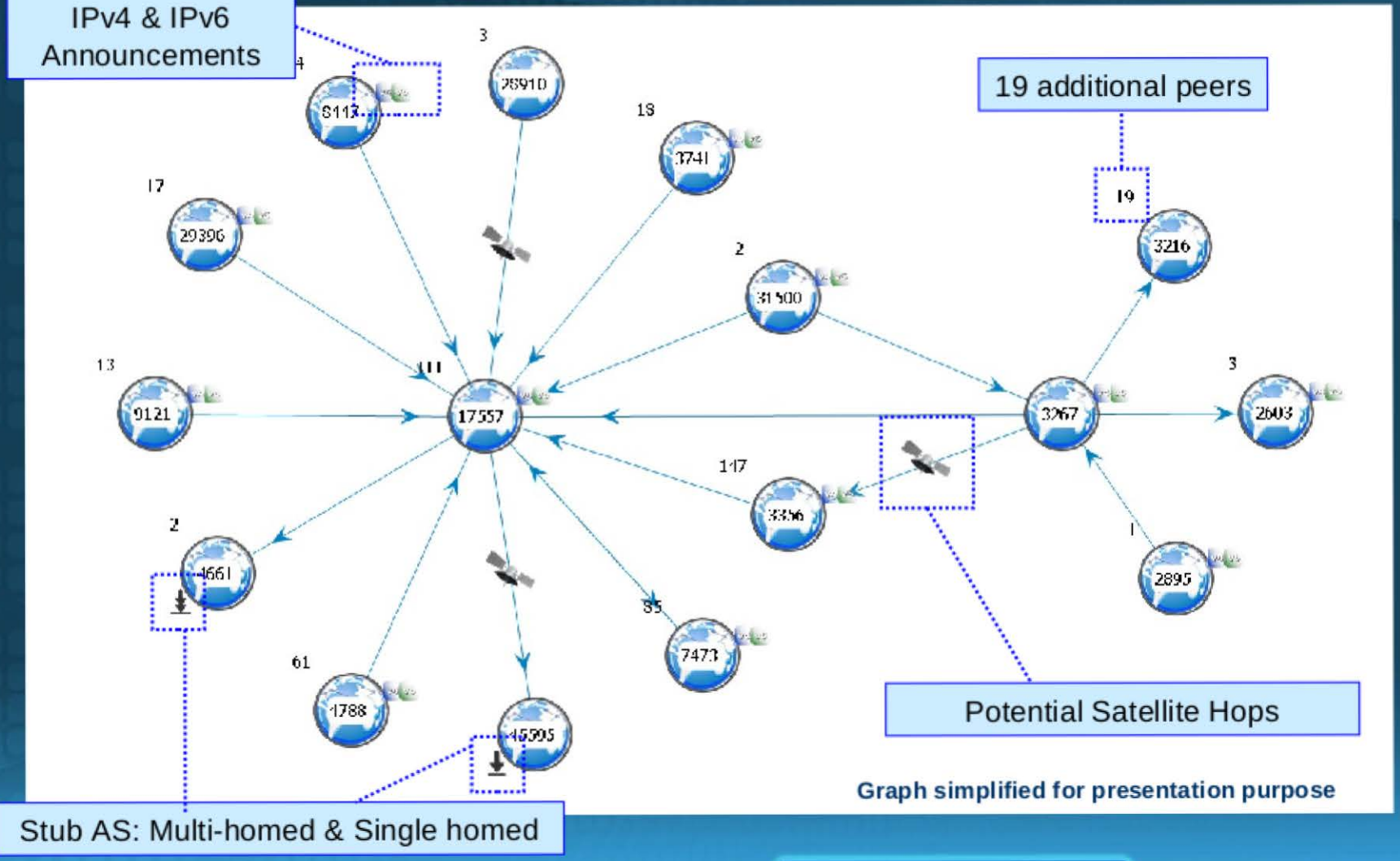
(U) Data Relationships



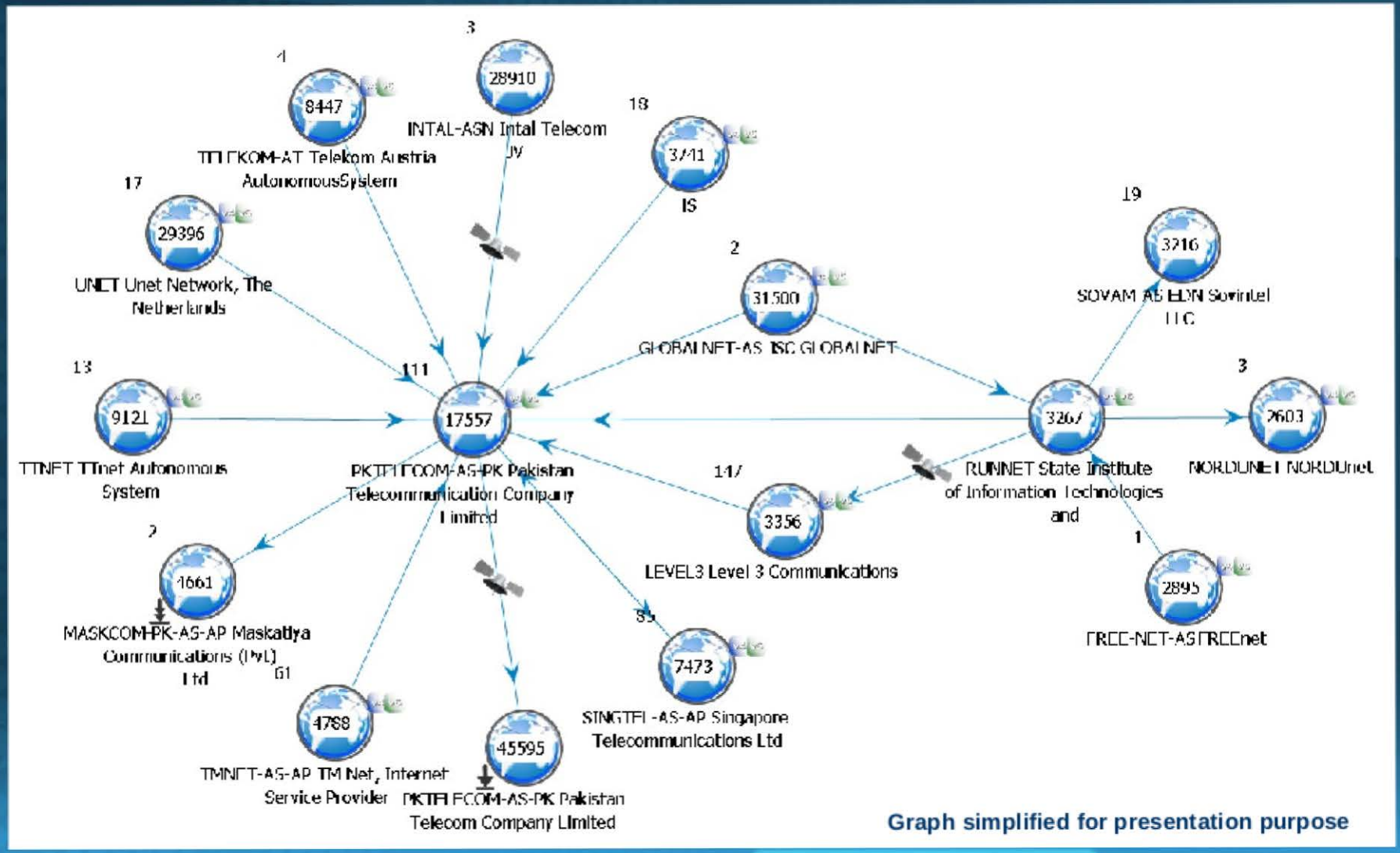
Yellow links denotes direct relationships between data types.

For example, we know which AS contains a router because we can relate a router to IP Addresses, IP Addresses to IP Prefixes, then IP Prefixes to an AS.

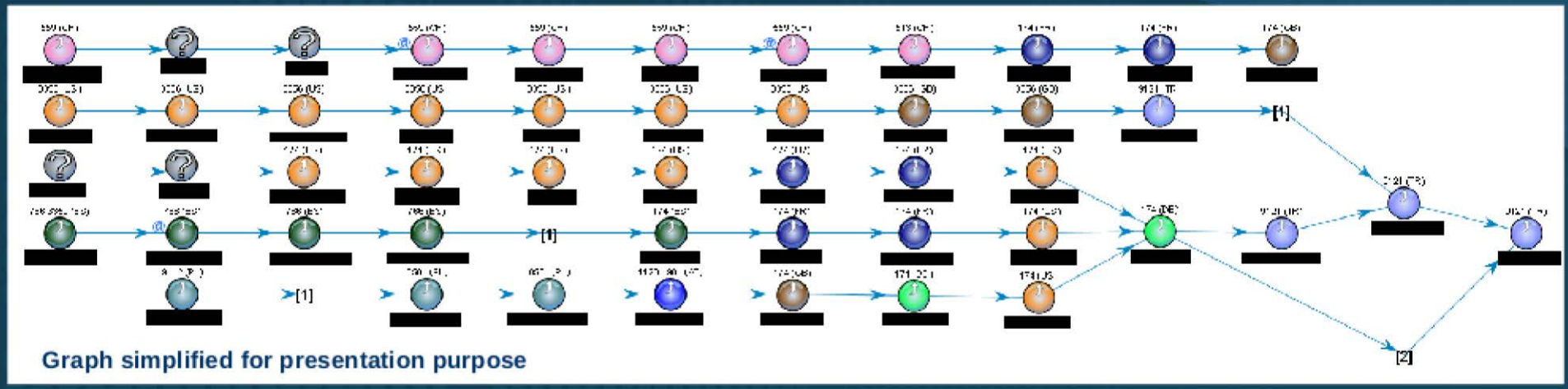
(U) Autonomous System Peering - BGP



(U) … and Registries

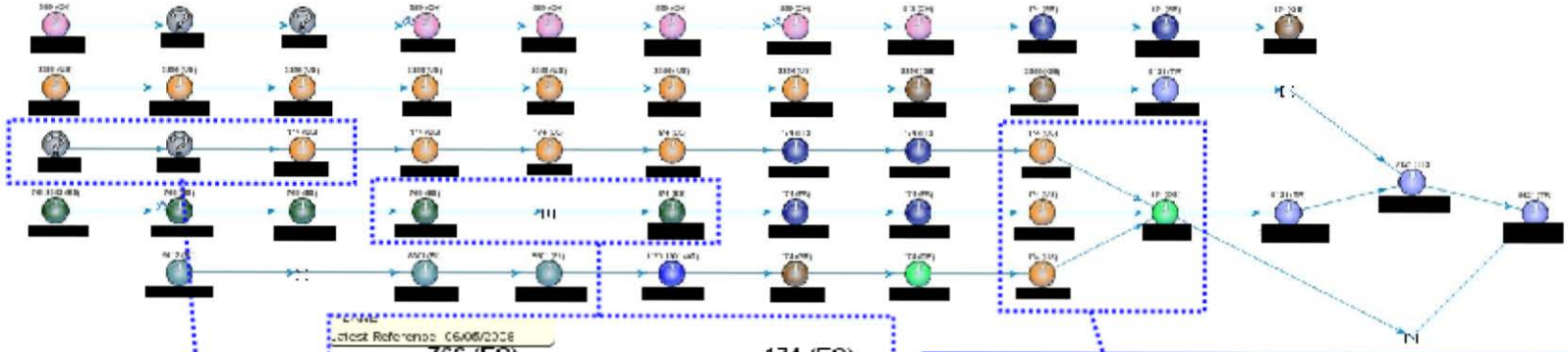


(U) Internet “flow” to a “Network”



They’re color-coded by country. Big deal.

(U) With Traceroute…



766 (ES)

[1]

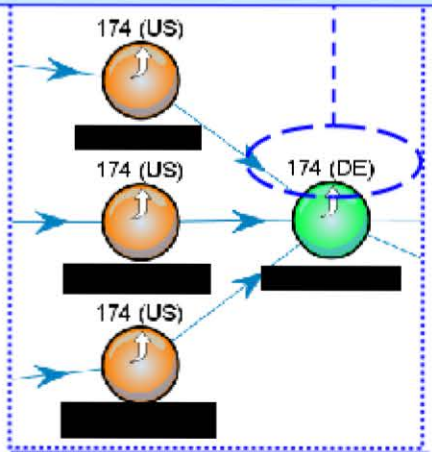
174 (ES)

Missing Hops

Correlation of IP Address with AS & Country

RFC1918 Addresses

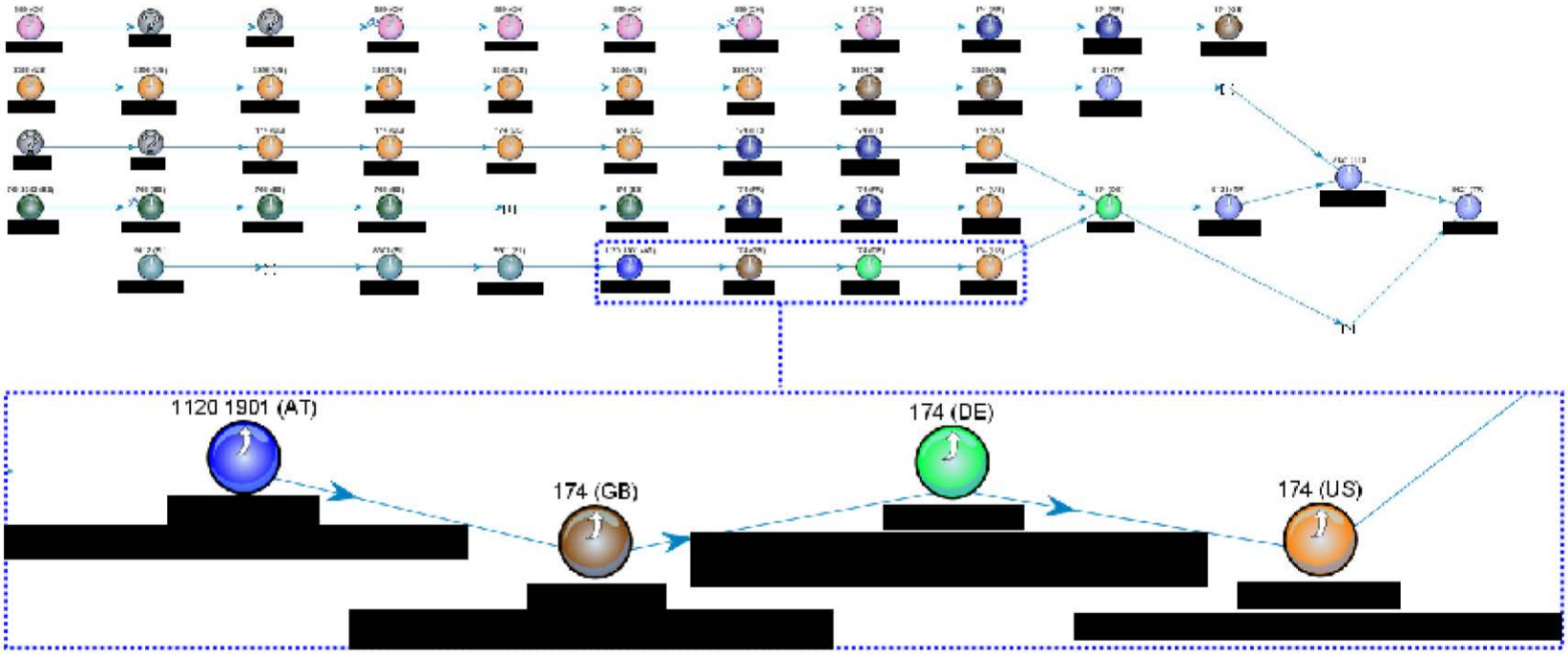
(private IP address space)



Network Bottlenecks

Graph simplified for presentation purpose

(U) ... and DNS



Graph simplified for presentation purpose

(U) IP Geolocation Data

- Correlate IP addresses with country, latitude and longitude (via IPGeoTrap)

(U) Seeing Red

SIGINT in the Water

(S//SI//REL) Bring the SIGINT (AS Level)

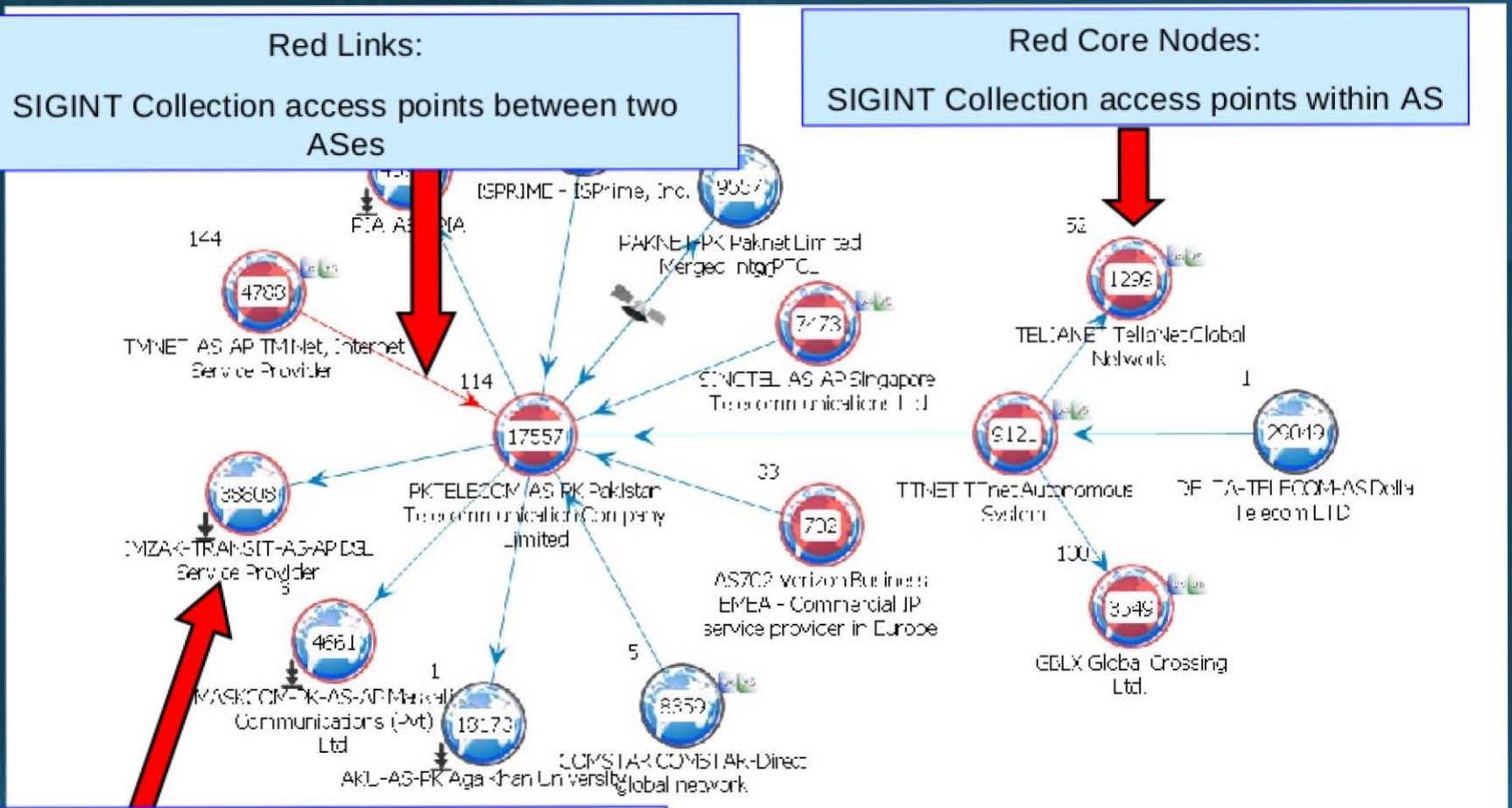
TREASURE MAP

Red Links:

SIGINT Collection access points between two ASes

Red Core Nodes:

SIGINT Collection access points within AS



Red Ringed Node:

Nodes within AS are SIGINT Referenced

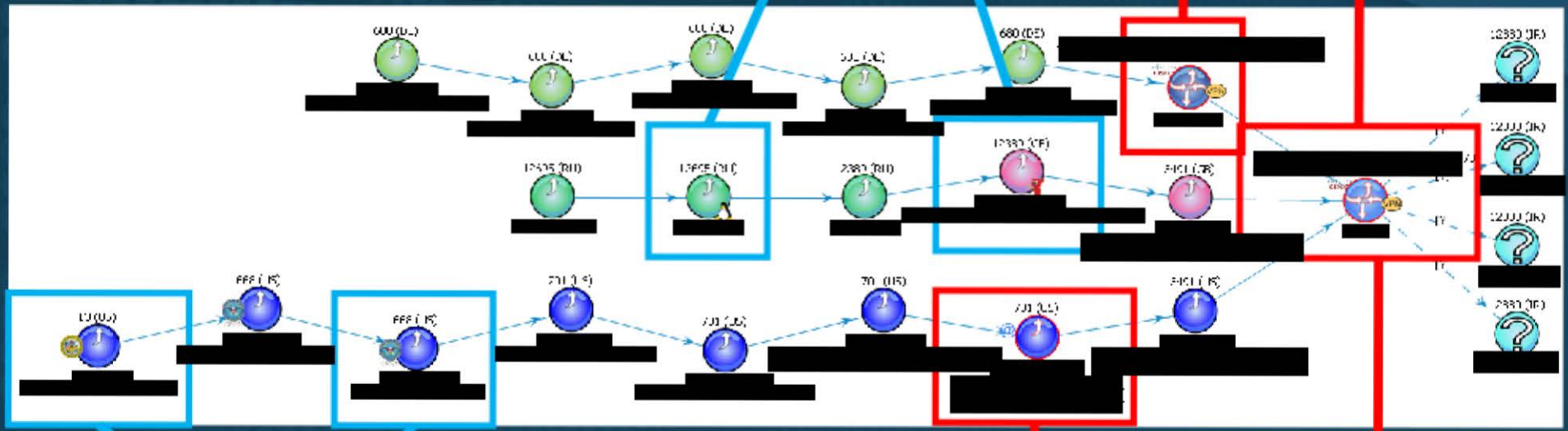
Graph simplified for presentation purpose

(S//SI//REL) Traceroute – overlaid with SIGINT and other

TOYGRIPPE (VPN)

Router Configuration
Router Vendor:Cisco

OS Fingerprints



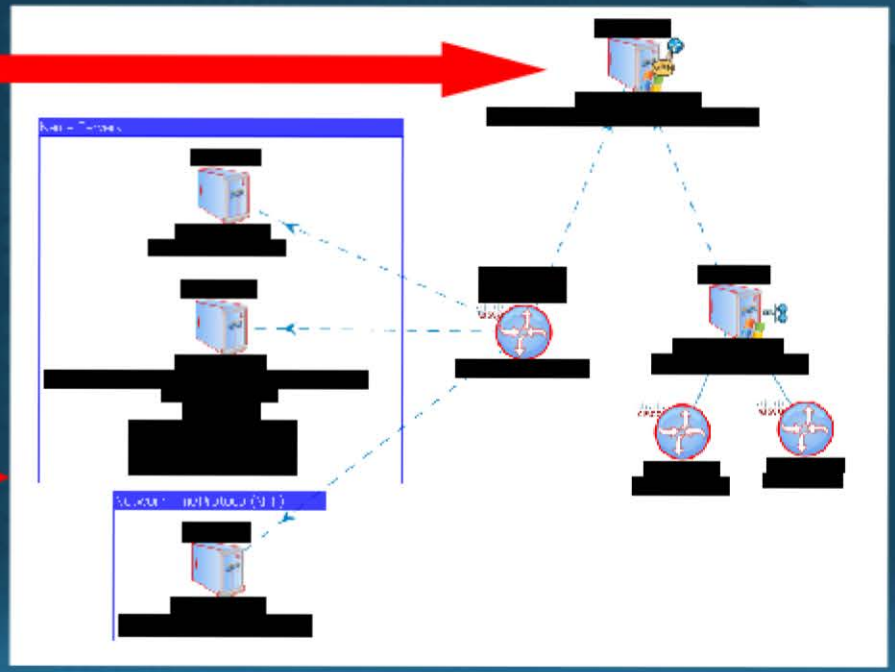
DoD Shields: DoD IP Addresses

Node Referenced in SIGINT

Underscore AS: “Operational” AS = 12880

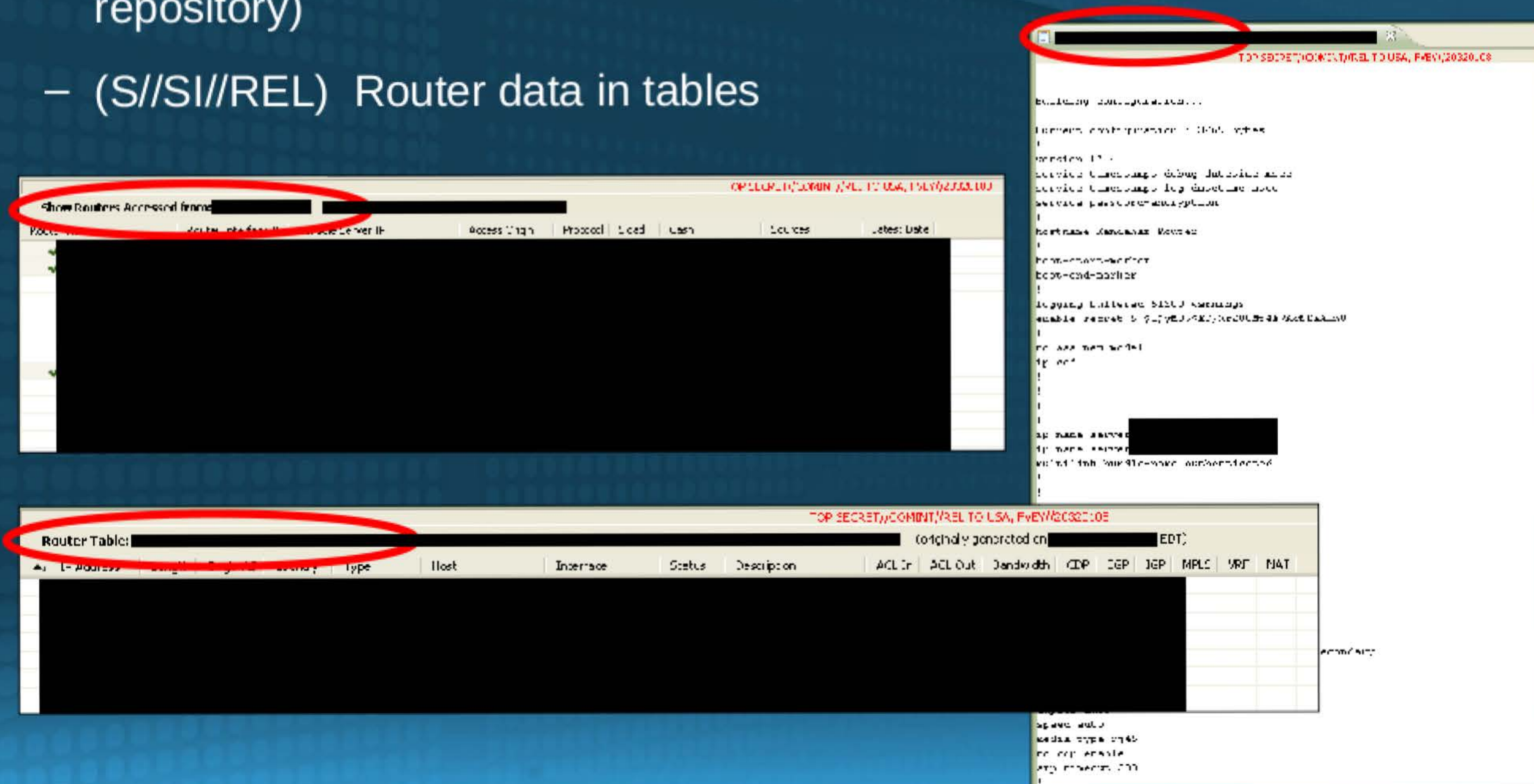
(S//SI//REL) Known Devices

- (S//SI//REL) Sources: DISCOROUTE (NAC router configuration repository)
- (S//SI//REL) Display supporting infrastructure, as configured in router configuration files
  - Where router accessed from (possible NOC?)
  - servers configured for router (NTP, DNS, Radius, TACACS)



(S//SI//REL) Known Devices

- (S//SI//REL) Sources: DISCOROUTE (NAC router configuration repository)
- (S//SI//REL) Router data in tables



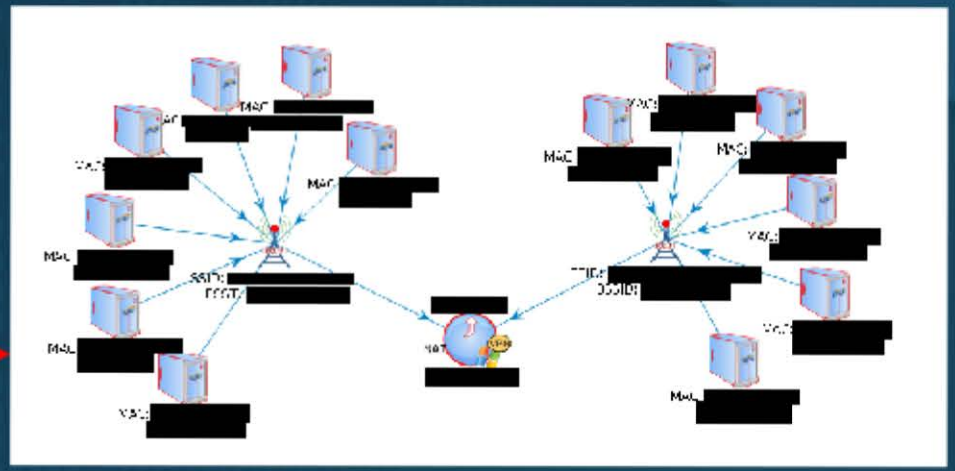
(S//SI//REL) Cisco Discovery Protocol (CDP)

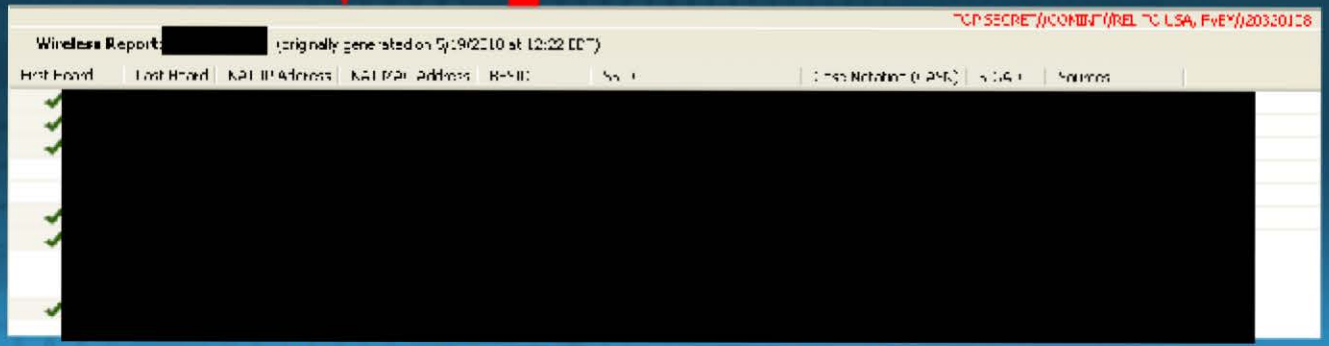
TREASURE MAP


```
CDP Router Report: SLB-SIN-SW01


---
Date:               05/04/2011
Device Name:        SLB-SIN-SW01
Model:              cisco WS-C2960-24TC-L
Capabilities:       Performs Level2 Switching
                    IGMP Flag Set
Software Version:   12.2(25)SEE2
Network Prefixes:   -
Duplicate Ports:    -


Physical Port     Address        Protocol  AS    Country  Data Sources
FastEthernet0/6   89.254.60[redacted]  IP        N/A   NORWAY   BD_REL [05/03/2010 20:00:00]
```

(U//FOUO) 802.11 WiFi Data

- (U//FOUO) Display and correlation of 802.11 wireless networks and RFC1918 clients
- (S//SI//REL) Sources
  - HYDROCASTLE *
  - LEAKYFAUCET



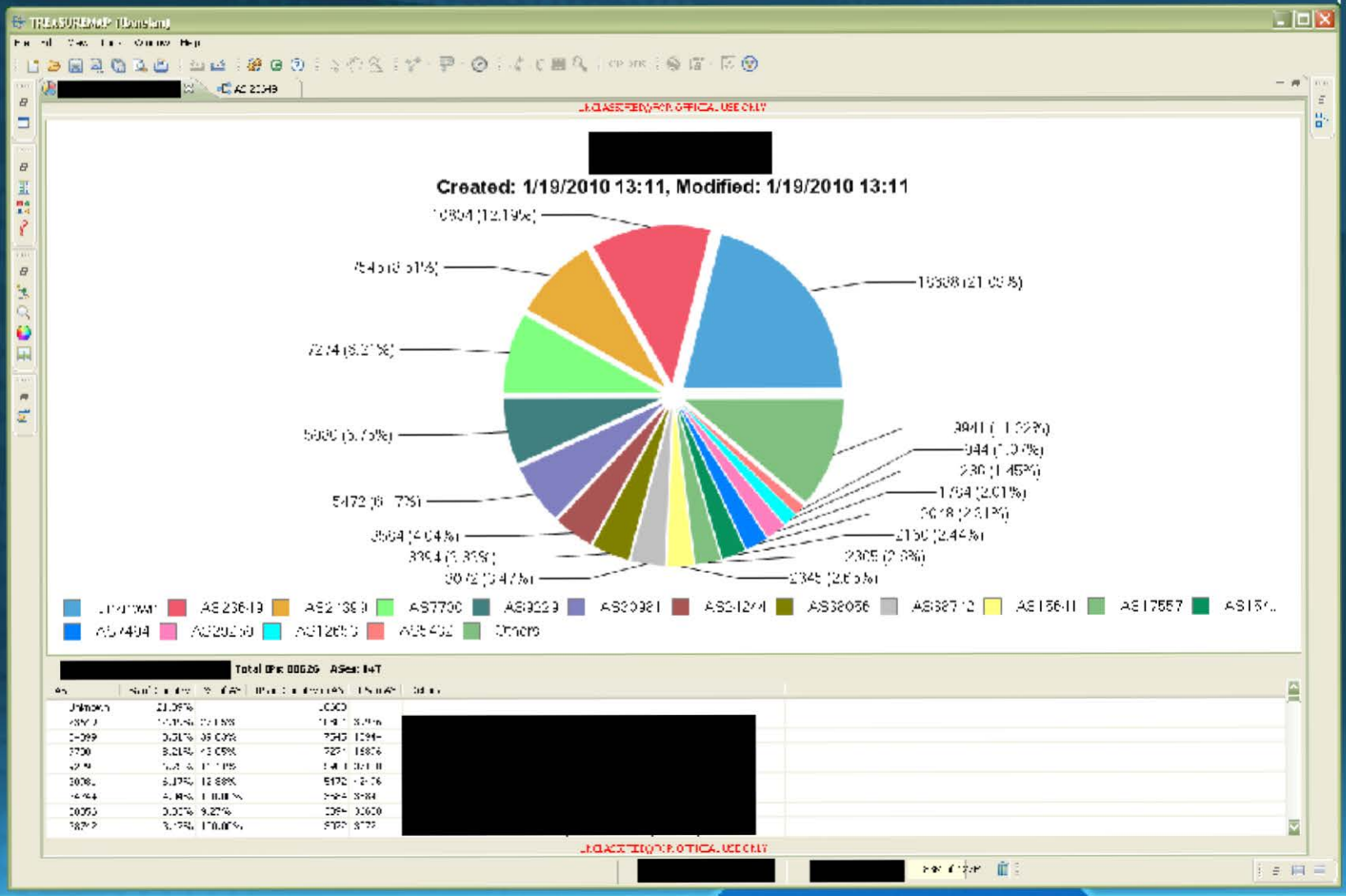


(* HYDROCASTLE account required)

(U) Communities

- (S//SI//REL) Individual IP addresses related by a common attribute
  - TOR router
  - Servers (DNS, NTP, SNMP, TACACS, RADIUS)
  - Hide IP NG Proxy Servers
  - BYZANTINE HADES Infrastructure hosts/infected hosts
- (S//SI//REL) Sources: (Varies)
  - Currently TOR router advertisements
  - router configurations
  - XKEYSCORE

(U) Country (AS Presence)



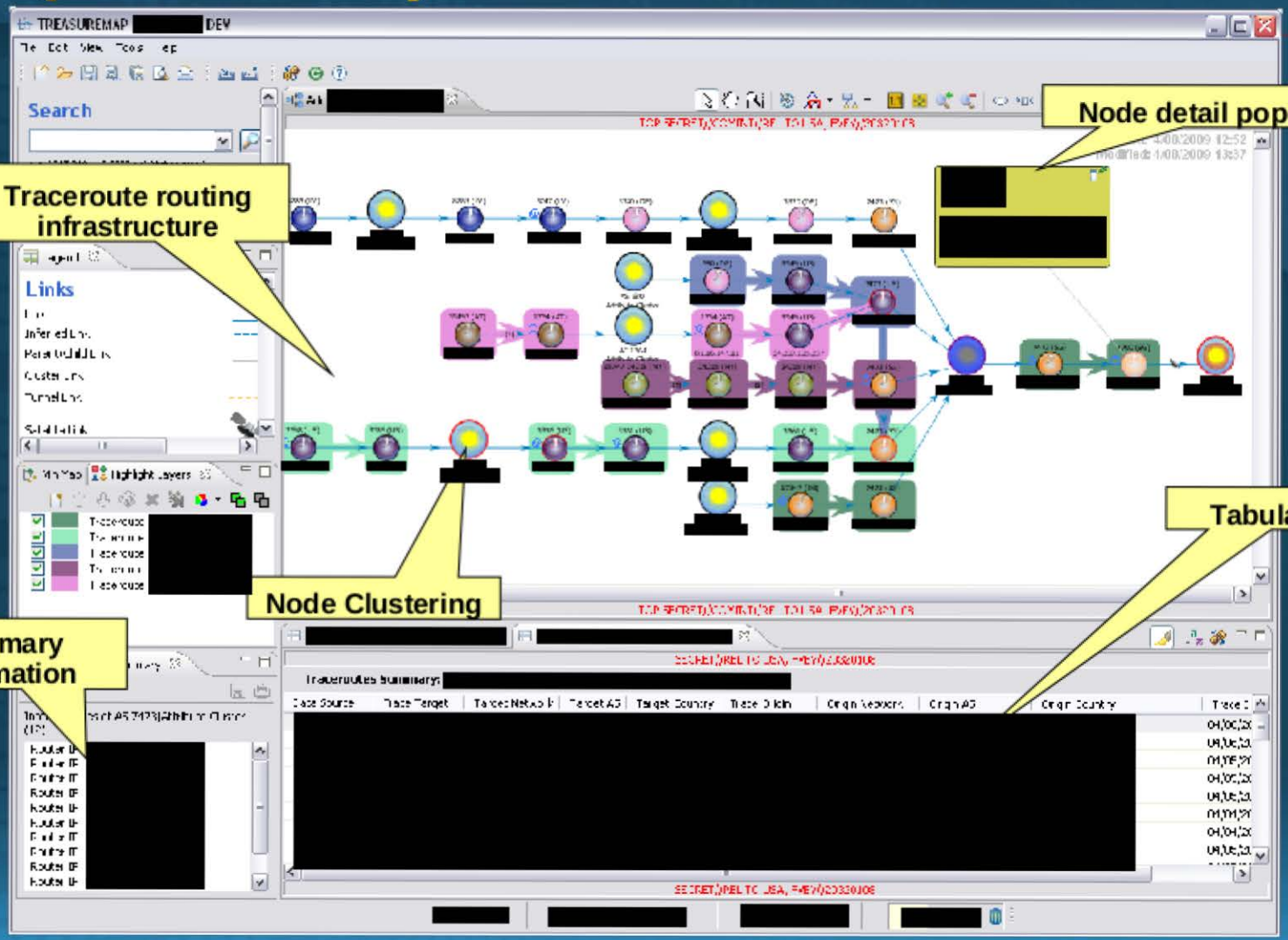
(U//FOUO) TREASUREMAP Workspace

- (U//FOUO) **Toolbar**: Offers access to a variety of commonly used functions
- (U//FOUO) **Search Pane**: Input search parameters
- (U//FOUO) **Advanced Search Options**: Preferences for searches
- (U//FOUO) **Release my search to PG**: Requesting traceroutes for target IP addresses
- (U//FOUO) **Other Searches**: Includes Router, DNS, Batch IP/MAC and JOLLYROGER
- (U//FOUO) **Legend**: Contains all of the icons and decorations as seen in an active graph
- (U//FOUO) **Send Feedback**: Provides a way to communicate questions, comments or problems to the TREASUREMAP team.

(U//FOUO) TREASUREMAP Search Items

1. (U//FOUO) IP Address
2. (U//FOUO) Routers
3. (U//FOUO) DNS (FQN)
4. (U//FOUO) MAC address / 802.11 BSSID / 802.11 SSID
5. (U//FOUO) IP Prefix / Range (CIDR Notation)
6. (U//FOUO) Registry Netblock
7. (U//FOUO) SIGAD and/or Case Notation
8. (U//FOUO) Country / IP Country Code
9. (U//FOUO) Autonomous System (AS) Number
10. (U//FOUO) Free Text

(S//SI//REL) User Interface: NAVS



(UFOUO) User Interface: Website

(U//FOUO) TREASUREMAP Contact Info

- [redacted]
  - Government Lead
  - [redacted]
- Customer Support Team
  - [redacted]
- Email: DL
  - [redacted]