SIE IPv4 Darknet

DUST

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Deck Version 0.2

Space

- There's lots of it

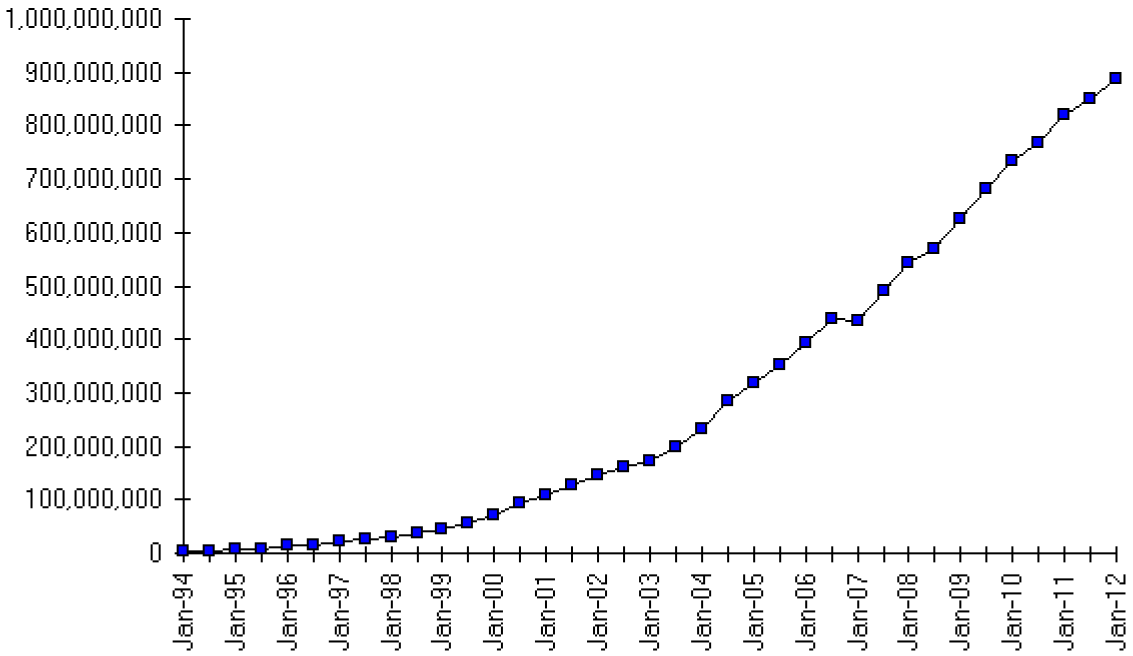
[picture deleted]
[for reference, look for
“darknet hilbert heat map”
on google]

Who has a good recent diagram?

Are we really running out?

- IP counts increasing somewhat linearly - IPv6 emerging

Internet Domain Survey Host Count



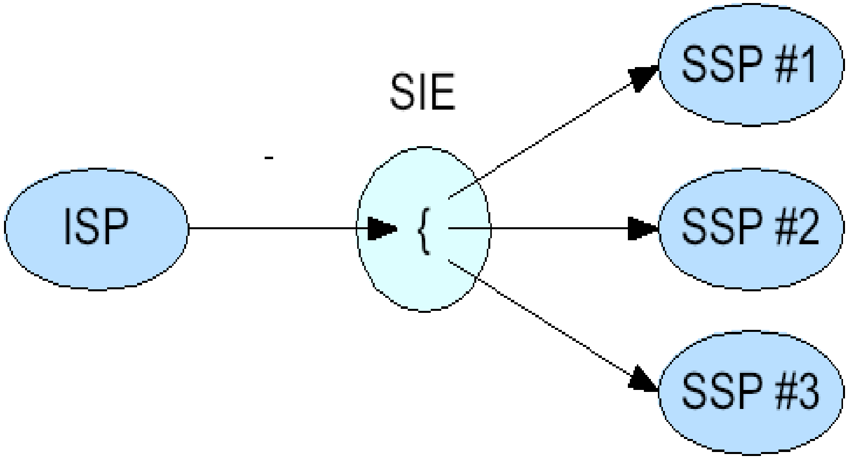
Source: Internet Systems Consortium (www.isc.org)

Typical research

- tcpdump > dataset
- analysis < dataset > results
- cp results presentation

What we do

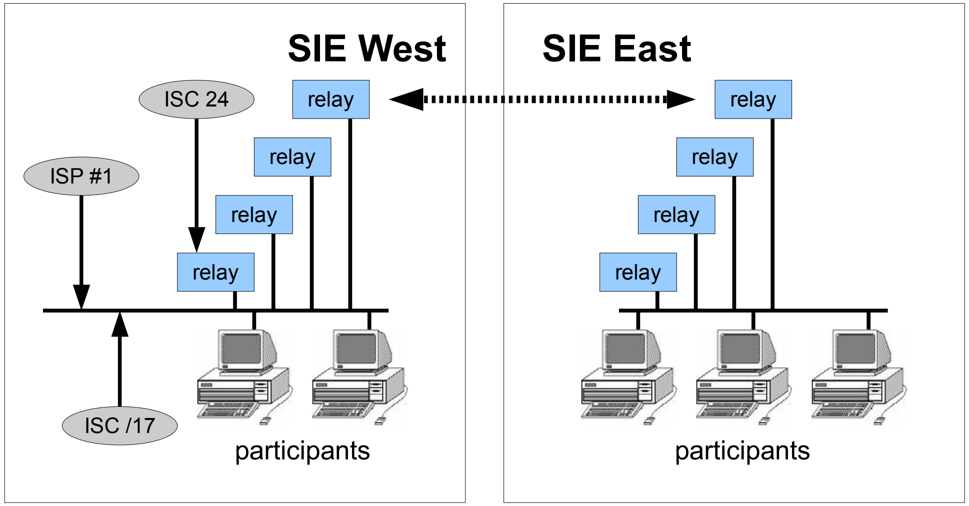
- How to efficiently distribute data?
- We efficiently encapsulate and redistribute
- ... in real time.



What's there

- 500k+ addresses, 10 networks
- >1000 pps

Darknet flow



One way we get it

- ISP router cross-connects to SIE switch
- Router ends up broadcasting on SIE VLAN
- Cisco config-fu:

```
router static
address-family ipv4 unicast
  XX.XX.0.0/16 10.255.10.254
 arp vrf default 10.255.10.254 0202.0404.0606 ARPA
 interface GigabitEthernet0/2/0/3.14
  description SIE Dark Net
  ipv4 address 10.255.10.1 255.255.255.0
  dot1q vlan 14
```

How to redistribute

- NMSG
  - Google protocol buffers
  - Encapsulation
  - Source Identifiers
  - Broadcast network plumbing
  - Net->File->Replay capability

Sender:

```
  nmsgtool -dddd -V ISC -T pkt -i sie.14+ -m 1280 -s DESTIP/50140
```

Receiver:

```
  nmsg-pkt-inject -l DESTIP/DESTPORT -o sie.14
```

More capture

```
ip route add blackhole X.Y.Z.0/24

nmsgtool -D -V ISC -T pkt -i eth0 -m 1280 –unbuffered \
      -s DESTIP/50140 -z -b 'net X.Y.Z.0/24'
```

```
nmsgtool -D -V ISC -T pkt -i eth0 -z -w FILE.nmsg -t 3600 -k kick.sh
```

Would love to get flow or Null0 traffic.

Uses

- Commercial:
  - Backscatter analysis – target watch
  - Probe sources mapping to botnets or “sources of interest” for IDS people.
- Research:
  - Test theories/predictions on live data
  - Combine with other data (netflow, bgp, passiveDNS?, others)
  - Loosely-coupled multi-processor approach

Levels of darkness

- V1 – black – no response
- V2 – dark-gray – limited response
  - Think sinkhole: reset after TCP handshake
- V3 – blue - Honeypot VPN
  - Darknet offers NAT transport to remote honeypot server(s) to get infected.
  - Infected server uses remote IP resources for study after initial infection session closed.

Challenges

- Anonymizing? (PII)
  - Not yet, we rely on privacy agreement
  - Can make your own anon wrapper
  - Can make 3rd-party summary tools
    - Standardized 5060/445/80/53/ICMP triggers and event correlation.- encouraged by Alberto
    - Real-time feedback of event reports from ISPs
- Timing
  - We can preserve timing at capture, but replay and distribution in PCAP has timers set to current when regenerated.

Challenges

- Some ISPs have only flow data available – perhaps we should make another type?
- Getting more data
- How do you collect data?
- What formats do you use?

Email: sie @ isc.org

Future

- Let's take some common methods and tools and publish them so that anyone can apply them to their darknets and share classification results.
- Let's show ISPs what good can come from their contributing data in real time to make available to researchers. Possible feedback loop for them.