CGN Logging

• Horror Stories
  o CGN logs required
  o Testing results

• Happy Endings
  o Current options
  o Deterministic reservation
Identity Traceback Illustration

DHCP Log
- A: 10.0.0.1
- B: 10.0.0.2
- C: 10.0.0.3

Webserver log
"GET /illegal.html HTTP/1.0" 200 2326

CGN Log
CGN Testing Background

• CableLabs first conducted CGN testing in 2010
• Second round June – Sep, 2011
  o Both NAT444 and DS-Lite
• Additional CGN testing in IPv6 interop events
• Logging has been *one* aspect of testing
CGN Logging Feature Highlights

• Remote reporting supports Syslog only
• Template for logging is currently not configurable
• Syslog facility is configurable
• Data fields include: Time Stamp, Source IP/Port, NAT IP/Port, Destination IP/Port, Host Name
  o 173 – 542 bytes (DS-Lite)
  o 150 – 450 bytes (NAT444)
## CGN Logging (DS-Lite)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Priority</th>
<th>Hostname</th>
<th>Message</th>
</tr>
</thead>
</table>
## CGN Logging (NAT444)

<table>
<thead>
<tr>
<th>Date</th>
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<th>Priority</th>
<th>Hostname</th>
<th>Message</th>
</tr>
</thead>
</table>
The Horror (log volumes)

150 - 450 bytes/connection
+ 33k - 216k connections per sub per day

5 - 96 MB / user / day

That’s potentially over 1 PB per 1M subs per month

It’s also over 20Mbps for just the log stream…
Log Reduction Strategies

• Port block reservations
  o Reduce logging up to 100x

• Log compression
  o Reduces volume, but not search time

• Deterministic reservation
  o See next slide…
Proposal: Deterministic Port Reservation

• **draft-donley-behave-deterministic-cgn**
• Collect inside range, outside range, compression ratio
  o Compression ratio $\geq$ inside/outside
  o Inside range/compression ratio = ports/user
  o Set aside well-known ports (<1024) & dynamic overflow range
  o Pre-reserve port ranges for each internal IP address
  o Allow dynamic reservation above that threshold
    • Remote logging only required for dynamic reservations
    • Still need state logging locally for every active connection

• Limitation: Requires low compression ratios
The Happy Ending…

DHCP

Reserved Port (e.g. 80)

CGN Device

CGN Mapping Table

Subscriber 1 (DHCP STP Address 1)

Subscriber 2 (DHCP STP Address 2)

Subscriber 3 (DHCP STP Address 3)

Subscriber 4 (DHCP STP Address 4)

IP 1, Port Pool 1

IP 1, Port Pool 2

IP 1, Port Pool 4

IP 1 Bulk Pool

IP 1 Reserved Pool

IP 1

Reserved Port (e.g. 80)

Static, PCP, portal, etc.

Pool exhausted

Logging Required
Questions?

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