NAT444 Impacts

Chris Donley (CableLabs)

Lee Howard (Time Warner Cable)

Victor Kuarsingh (Rogers Communications)

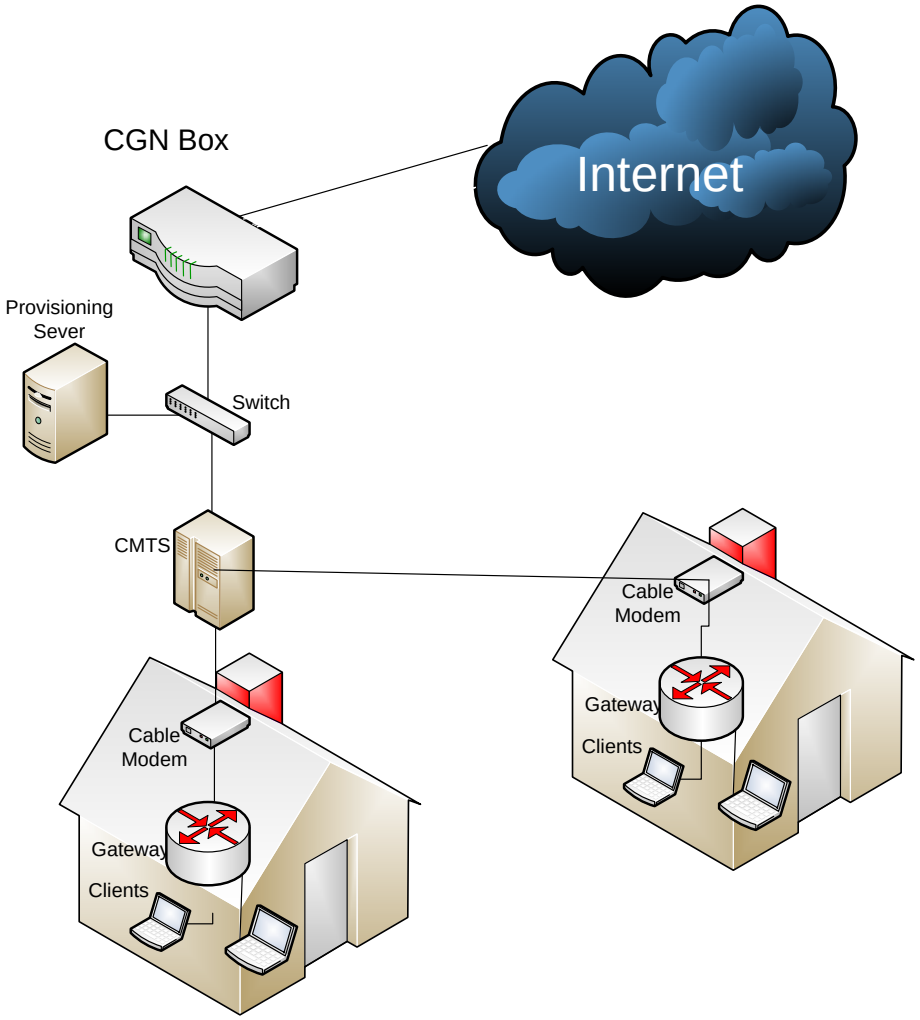
Abishek Chandrasekaran and Vivek Ganti
(University of Colorado)

Paul Eldridge (George Mason University)

Test Goals

- NAT444 was tested in three labs with two LSN products, four ISPs, and multiple home gateways/CPE equipment
  - Results were combined so as not to single out vendor implementations
- The goals of the testing were as follows
  - Characterize NAT444 operation on broadband technology
  - Understand impacts of the technology on ***average*** users, operators, and content providers
  - Understand limitations
- Did not attempt to enable NAT traversal/develop workarounds
- Did not attempt to test DS-Lite or other service multiplexing architectures
  - We expect that many share similar issues

Sample Topology



NAT444 Findings

- NAT444 provides basic IPv4 connectivity
- Several areas of concern (not necessarily unique to NAT444)
  - Performance often differs from vendor to vendor and from environment to environment (your mileage will vary; difficult to predict)
  - Many more advanced tasks will fail outright or be subject to severe service degradation (e.g. Online Gaming, Internet Video, Peer to Peer Operations, FTP, 6to4/transition technologies)
  - Source addresses/ports will change, impacting geolocation, lawful intercept, abuse response
  - Challenging to troubleshoot

NAT444 Conclusion

- Operators will be forced to enable NAT444 or other address sharing mechanisms for IPv4 after exhaustion
  - Breaking IPv4 is not an option
- Address sharing will subject the customer to new failure modes, decrease performance and will deliver an inconsistent experience to the end user
  - Issues we identified not necessarily unique to NAT444
  - Other address sharing mechanisms not tested
- Issues related to NAT444 will be somewhat uncontrollable from the operator and/or content provider point of view
- The optimal solution to IPv4 exhaustion is migration to IPv6