

Thesis Abstract

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Title of Thesis: Client Based Naming			
Summary of Thesis:			
<p>The Domain Name System (DNS) has been described in the literature as the most successful distributed naming system that has ever been designed. However, limitations, imposed by its fundamental design premises are increasingly difficult to work around, particularly the assumption that certain nodes are always reachable. Mobility and transient connectivity are becoming the standard for nodes in the Internet. In general, the DNS as implemented is constructed as a "soft-fail" service, with authoritative node replicas, caching, etc. However, changes to the DNS itself and the changes to the Internet infrastructure are degrading the robustness and "reachability" of parts of the system at the same time that client expectations about resolvability are rising.</p> <p>This work documents how to eliminate the inherent reliance of DNS on fixed third-party servers by using a solution I call Client Based Naming (CBN), which operates optimally in fluid environments, including self-organizing networks such as the Internet. These ideas question key deployment decisions regarding the root context and service discovery. To eliminate reliance on reachability, the re-implemented DNS uses existing technologies in three new ways as follows:</p> <ul style="list-style-type: none"> · Using configuration changes, i.e., placing the node itself at the root of the DNS hierarchy for query purposes, · Using multicast in queries to perform service discovery, and · Using cryptographic techniques for name discrimination in identifying "bad actors." <p>These techniques, plus additional identity credentials, form the basis of a globally persistent name that is usable inside and outside the DNS. Persistent names are critical for service delivery since the nodes' location (based on IP address) changes when the node or network is moved in the Internet. Persistent names can be constructed using the DNS namespace without the need to migrate to Distributed Hash tables (DHT) or crypto-hash based names for resolving ambiguity or to retain a persistent name. CBN is evaluated using simulation. Results indicate that use of multicast transport provides robust service in topologies where node mobility and transient connectivity dominate. Other research has shown that multicast transport for DNS is a commercially viable tactic as long as scoping is restricted to local scope. Concerns still remain about ambiguous naming, resolution and robust crypto key distribution, but this discourse lays out a path for future work.</p>			
Keywords: DNS, Mobility, Multicast, Ad-Hoc, Identity Management			

