Thoughts On Internet Naming Systems

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Topics

- Part I – Chasing the Chimera of the Global Uniform Internet Name Space.
- Part II – Pushing DNS to the Limit, and Beyond.
- Part III – DNS Ain't Broke. So Why Are We Trying to Fix It?

First Law of the Internet

- Every person shall be free to use the Internet in any way that is privately beneficial without being publicly detrimental.
  - The burden of demonstrating public detriment shall be on those who wish to prevent the private use.
    - » Such a demonstration shall require clear and convincing evidence of public detriment.
  - The public detriment must be of such degree and extent as to justify the suppression of the private activity.

PART I

Chasing the Chimera of the Global Uniform Internet Name Space

Questions

- What is a “Global Uniform Internet Name Space” (GUIN)?
- Are there any GUINs?
- Does it really matter?

Characteristics of a GUIN

- Universal validity or universal invalidity
- Invariance:
  - Location invariance
  - Client invariance
  - Temporal invariance

Universal Validity or Universal Invalidity

- Every name that is valid must be valid everywhere.
- Every name that is invalid must be invalid everywhere.

Invariance

- Location Invariance - Every valid name must have the same meaning no matter where it may be uttered.
- Client Invariance - Every valid name must have the same meaning no matter by whom it may be uttered.
- Temporal Invariance - Once a name becomes valid it must have the same meaning no matter when it may subsequently be uttered.

Location Invariance

- Frequently invalidated by “content management” systems.
  - E.g. Localized web content delivered according to location of requestor.

Client Invariance

- Under attack by “personalization” aspects of “content management” systems.
  - E.g. Requestor identity may be used to generate personalized response.
  - Example: amazon.com returns personalized web pages.

Temporal Invariance

- Name rot is a common occurrence.
  - E.g. E-mail addresses and URLs frequently become invalid when users move or content is removed.
- A name may remain the same but the content referred to may change.
  - E.g. E-mail addresses are frequently re-assigned.
  - E.g. Internet Drafts retain same URL but content disappears after a period of time.

What Does "Same Meaning" Mean?

- "the same meaning" is subjective and contextual.
  - Depends what the user is trying to accomplish at the time.
- There is ambiguity between name of the information container and the information contained.
- There is ambiguity caused by new versions replacing old ones.

Impact of Internationalization on GUINS

- Increased presence of synonyms
  - E.g. Same word in multiple scripts.
- In DNS - Unless presentation layer conversions are ubiquitous, human users may see the “ugly” representations.
  - This will erode the expectation of users that DNS names have semantic meanings.
    - » Some of us may consider that to not necessarily be a bad thing.

Are There Any GUINs?

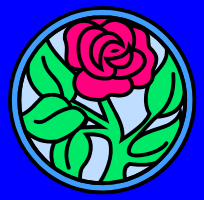
- It's pretty hard to successfully run the gauntlet of requirements to be a GUIN.
- Non-GUINs: DNS, URLs, URIs, e-mail addresses.
- GUINs: OSI object identifiers, ISBN's, UPC codes
  - These tend to be semantic-free name spaces so there is little pressure to create separate spaces.

Do GUINs Really Matter?

- GUINs tend to require either:
  - An extremely strong centralized authority, or
  - A basis in natural, physical laws.
- Perhaps it is best to dispense with the concept of Global Uniform Name Spaces and accept the fluid formation of name spaces around communities of interest.
  - In which case there ought to be reasonably effective inter-community translation mechanisms.

GUINs: A Fact of Life

- Communities often establish their own naming spaces.
  - There are many existence proofs of successful parallel global name spaces.
    - » Consider the rose:



rose
roos
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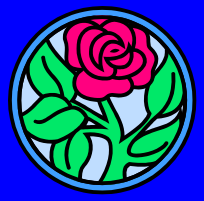
rùže

“What's in a name? That which we call a rose by any other name would smell as sweet”

William Shakespeare



Isn’t it really just a matter of translation?

PART II

Pushing DNS to the Limit

(When will it go boom?)

Issues and Non-Issues

- Issue: DNS Privacy rights *do* matter.
- Non-Issue: Trademark search of DNS spaces.
  - We ought not to compromise technical excellence to grant preferential rights to one group over another.
- Non-Issue: gTLDs and ccTLDs
  - When it comes to technical considerations, gTLDs are the same as ccTLDs.
  - Issue: Whether it is feasible to police "chartered" TLDs.

Big Zones (particularly Big Root Zones)

- Technical Limits
- Operational Costs and Risks
  - Whose costs do we care about? Whose costs do we ignore?
- Let's not forget the meta-data, the information about the people or entities behind a name (whois).

Technical Limits on DNS Zone Size

- Insanely large zones can and do work:
  - Existence proof : .com (23 million and growing!)
- We are running a real risk of ending up with a flat and wide DNS space with a highly imbalanced hierarchy.
  - Will eventually encounter scaling limitations.
- From the point of view of maximum size, the root zone is pretty much “just another zone” in DNS.
  - So we can expect its technical performance to correlate to our experience with other zones of comparable size with adjustments for query rates.

Technical Limits on DNS Zone Size (continued)

- Large zones can create intense traffic concentrations
  - Query size ≤ Response size, resulting in substantially asymmetrical bit rates.
- Large zones can cause excessively long zone-transfer times
  - Increasing chance of secondaries not having full data.
- Big zones imply frequent updates, this may further imply increased chance of administrative error or of encountering a software flaw.

Competing Root Systems

- Technical Issues
- Uncompensated Costs of Third Parties

Competing Root Systems: Technical Issues

- Pretty much all the problems that have been mentioned in the literature can happen.
  - But will they occur with sufficient frequency or scope as to become something that requires regulatory treatment?
  - Are there non-technical forces that will drive the majority of roots to contain a core of identical data and differ only in relatively rarely used ancillary zones?
    - » I believe that the answer to this is “yes”

Competing Root Systems: Uncompensated Costs

- Network troubleshooters will have another "degree of freedom" to investigate.
  - Time-to-repair may increase.
- Users/customers will manifest any confusion, no matter the cause, as calls to ISP support.

Competing Root Systems: Reality Check

- One can not stop people from establishing their own root systems.
- One can not stop people from using their own root systems.
- Remember the First Law of the Internet:
  - Every person shall be free to use the Internet in any way that is privately beneficial without being publicly detrimental.

PART III

DNS Ain't Broke.

So Why Are We Trying to Fix It?

(What we ought to be doing instead of overloading DNS.)

A Policy Suggestion

- Let's encourage innovations that use DNS, if at all, merely as an internal stable naming layer, isolating whatever lies above from the dynamics of IP address changes and relaxing the demand for consumer-visible semantics in DNS names.

Internationalization of Naming

- Internationalization of DNS is a HUGE undertaking.
  - John Klensin has described this issue very well.
- ACE encodings are great, but…
  - Without widespread "presentation" conversions, users are going to be going "huh?"
    - » Remember those "uncompensated costs" mentioned previously?
- But can we really divert the internationalization juggernaut?

ENUM

- Enum can be viewed as DNS on DNS
- The policy aspects of each layer ought to be considered separately.
  - In other words, let's consider ENUM to be a directory (one built using DNS tools) that just happens to generate DNS names at the bottom.

Chartered/Restricted TLDs

- This is a very popular idea.
  - But most people don't realize that the net is more than merely the world-wide-web.
- But who gets the job of being Solomon?
- Is enforcement really possible?

Internationalization
Synonyms in DNS

- There is a lot of pressure to create DNS labels that are simply synonyms.
  - The country code top level domains want home-language equivalents.
  - We can expect this pressure to also come from multi-national institutions and corporations.

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