Distributed Delegated Mappings

draft-watson-dinrg-delmap-01

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DINRG - IETF 103

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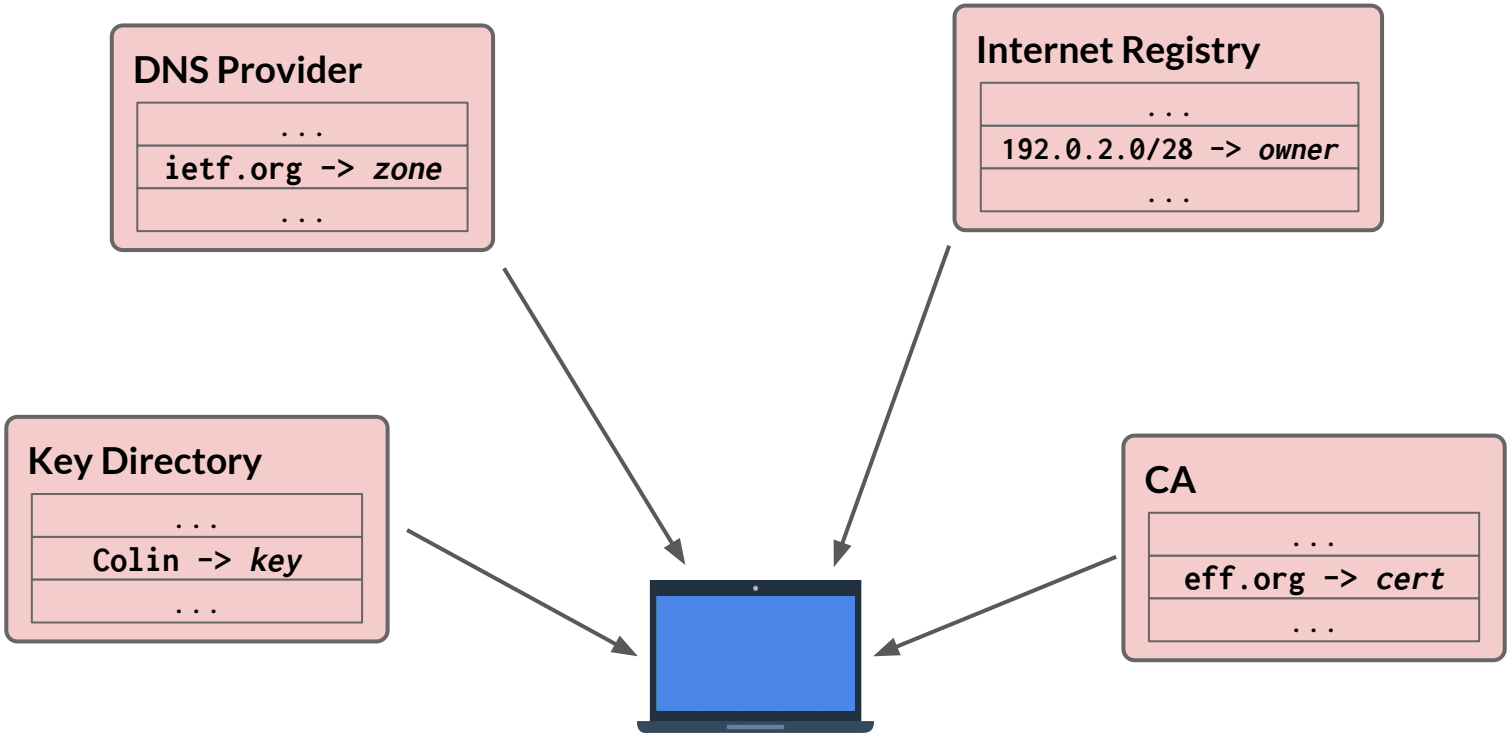
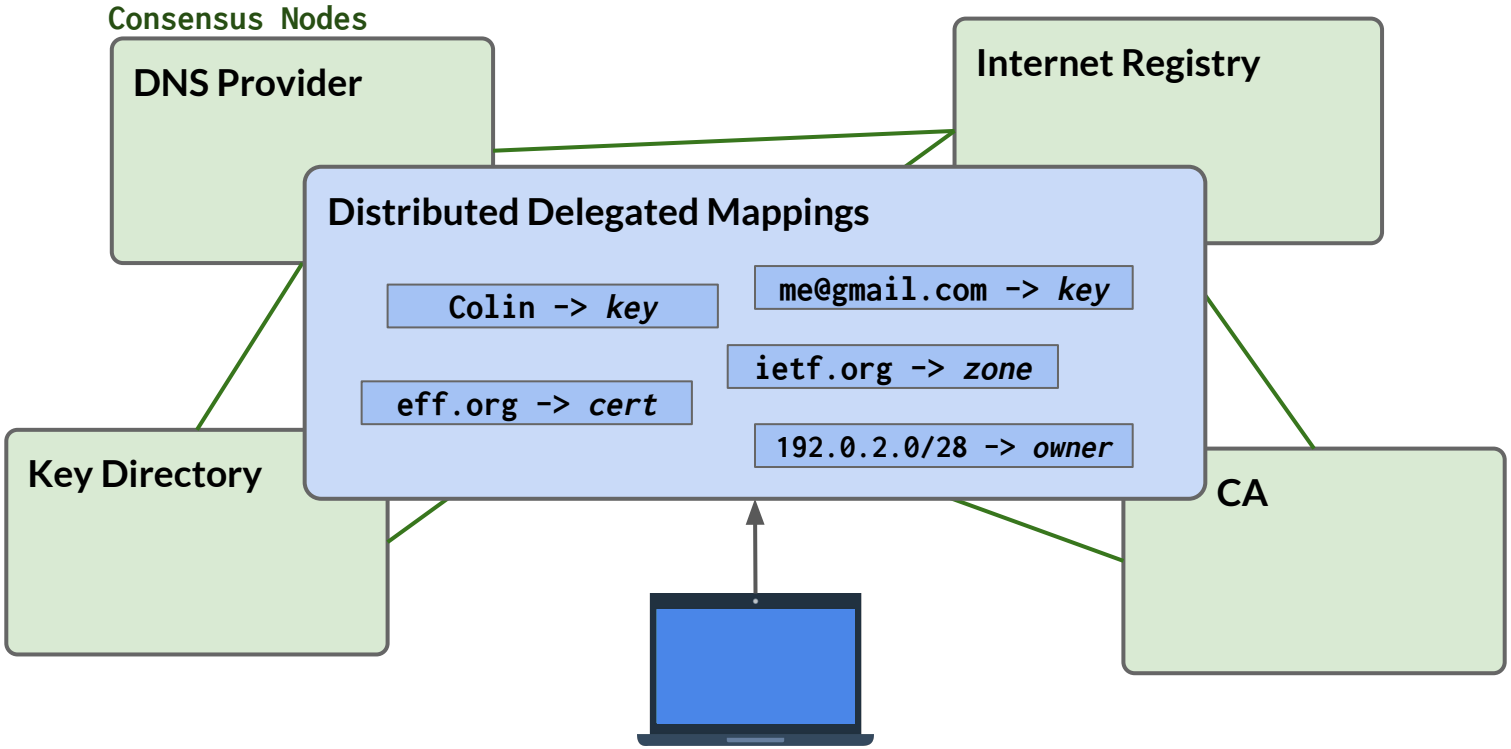
Recap

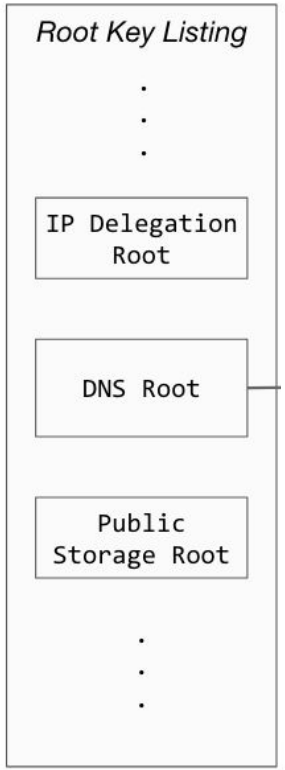
Mappings


DNS Provider
...
ietf.org -> zone
...
Internet Registry
...
192.0.2.0/28 -> owner
...
Key Directory
...
Colin -> key
...
CA
...
eff.org -> cert
...

Mappings


Consensus Nodes
DNS Provider
Internet Registry
Distributed Delegated Mappings
Colin -> key
me@gmail.com -> key
ietf.org -> zone
eff.org -> cert
192.0.2.0/28 -> owner
Key Directory
CA

Structure


Root Key Listing
IP Delegation Root
DNS Root
Public Storage Root

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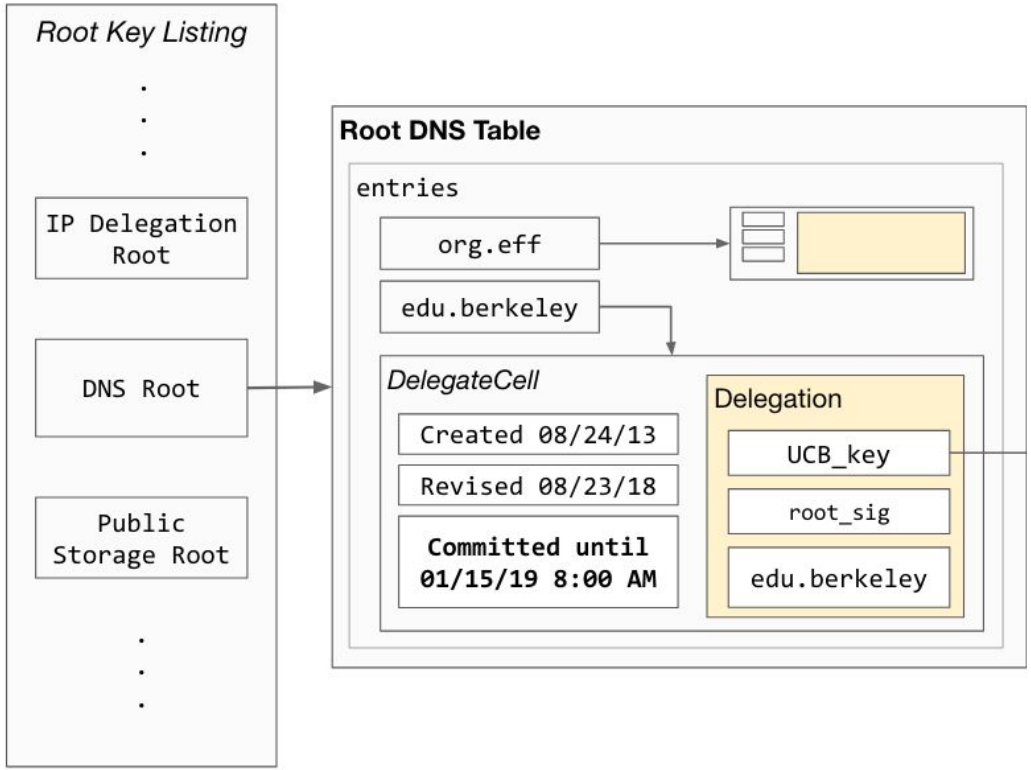
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Root DNS Table
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DelegateCell
Created 08/24/13
Revised 08/23/18
Committed until 01/15/19 8:00 AM
Delegation
UCB_key
root_sig
edu.berkeley

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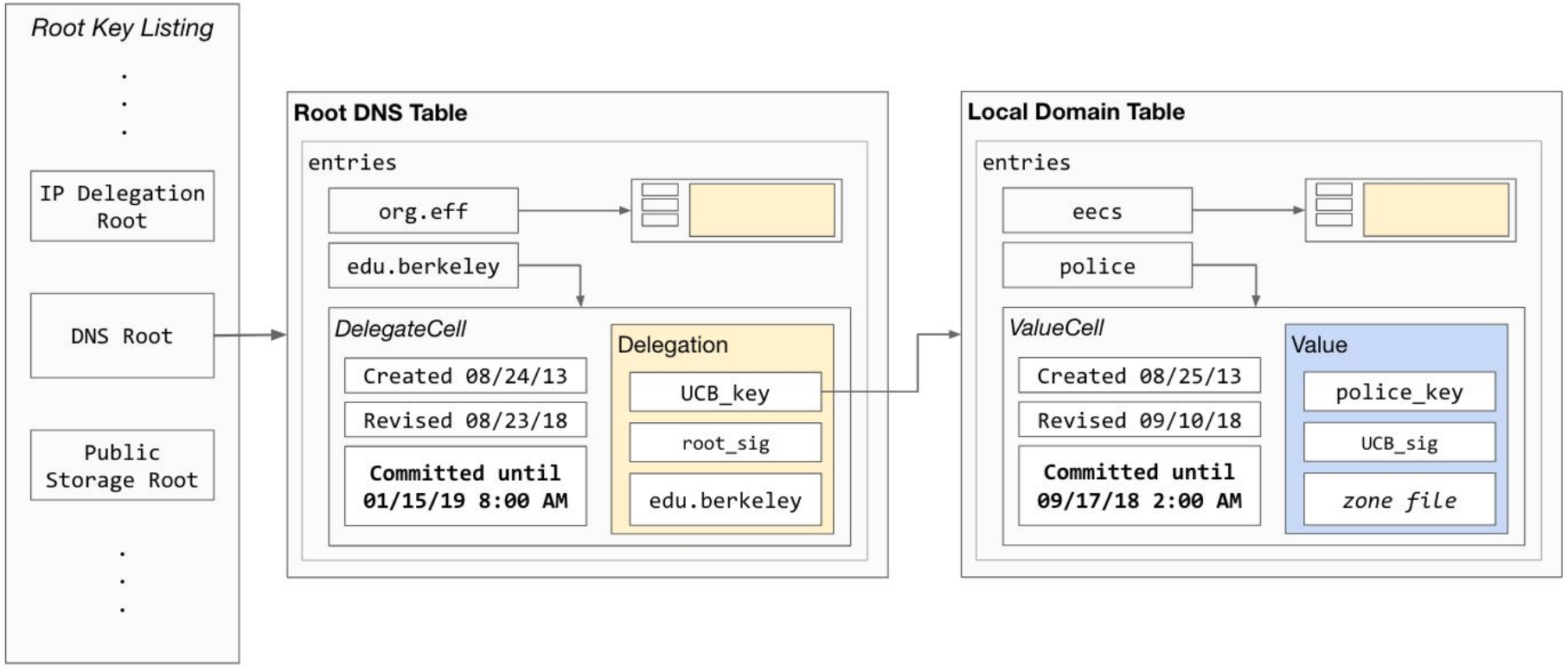
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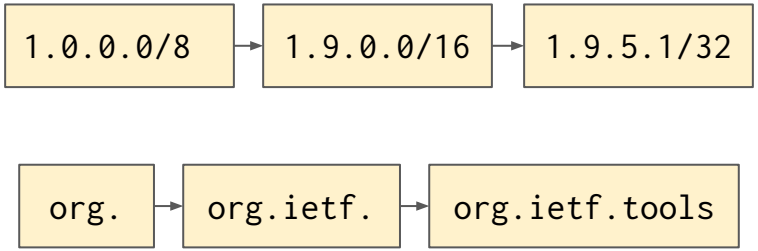
root_sig
edu.berkeley
Local Domain Table
entries
eecs
police
ValueCell
Created 08/25/13
Revised 09/10/18
Committed until 09/17/18 2:00 AM
Value
police_key
UCB_sig
zone file

Updates

1. Prefix-only delegation



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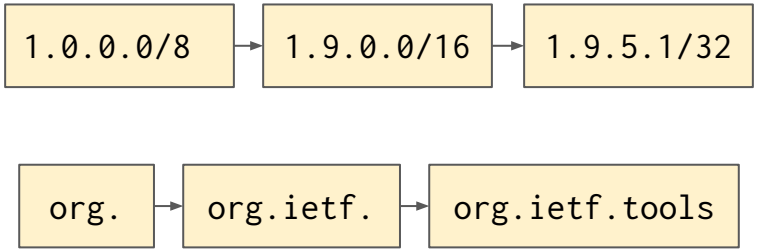

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- Valid (commitment) timestamps
- Signed by party authorized to update specified fields
- Does not violate prefix property
  - No overlapping delegations
  - No duplicate values

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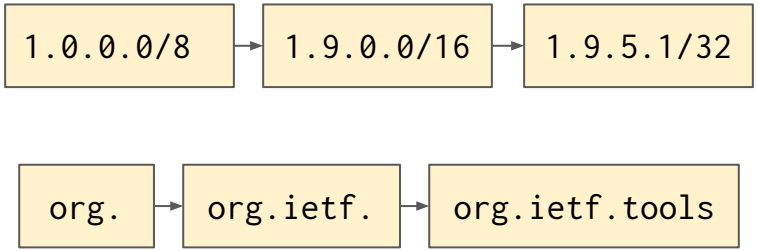

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Discussion on how the system behaves in the face of attacks from:

- DoS/resource exhaustion
- Consensus node compromise
- Upstream compromise

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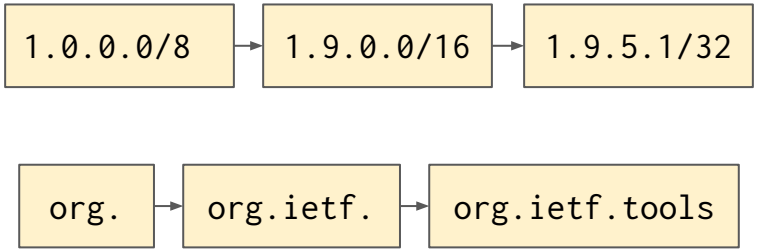

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New delegation field to recursively limit size of tables:

valuecells + delegatecell allowances <= table allowance

In certain cases, may be unlimited.

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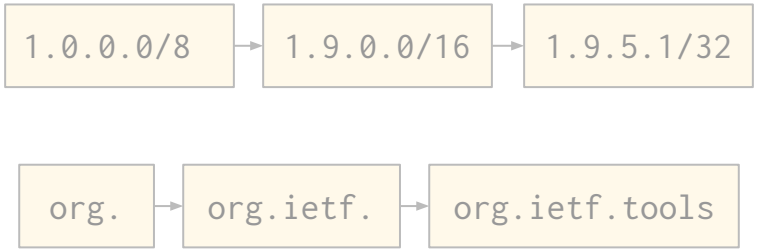

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Governance

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Separation of Concerns

Mapping Safety

- Delegation rules
- Valid updates
- Verifying permissions
- Global consistency

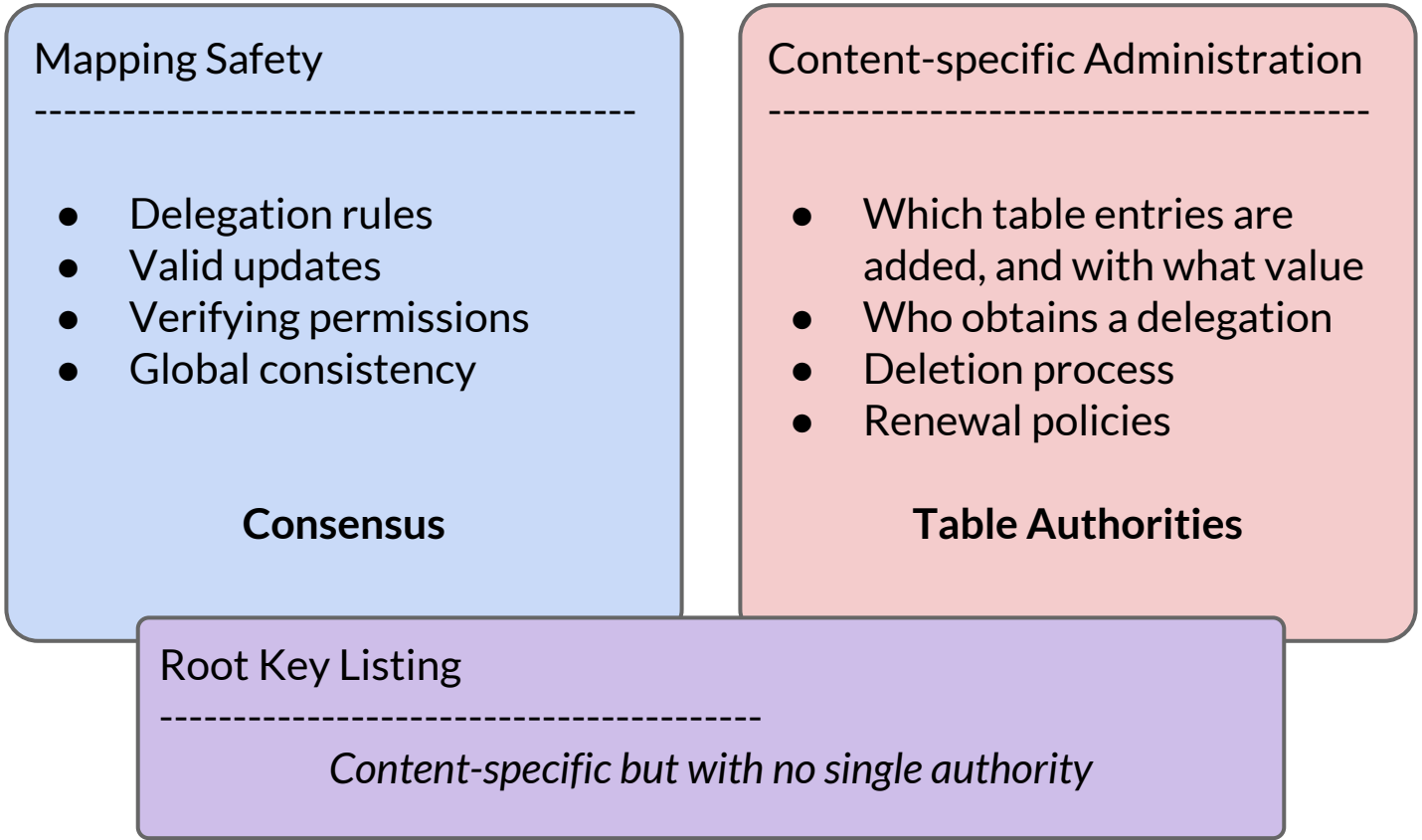
Consensus

Content-specific Administration

- Which table entries are added, and with what value
- Who obtains a delegation
- Deletion process
- Renewal policies

Table Authorities

Separation of Concerns



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Consensus & **Voting**

Content-specific Administration

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Table Authorities

Root Key Listing

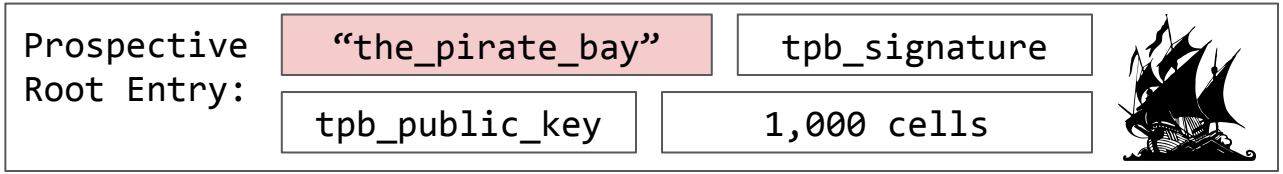
Content-specific but with no single authority

Voting

- Give consensus nodes agency to vote **for** or **against** significant, valid changes
- Explicit additional requirement for the underlying consensus scheme that is already common for protocol updates:
  - Quorums in slice infrastructures like SCP
  - Bitcoin-style percentage of agreeing blocks over a time window
  - Hard forks

Addressing governance through voting

Example:

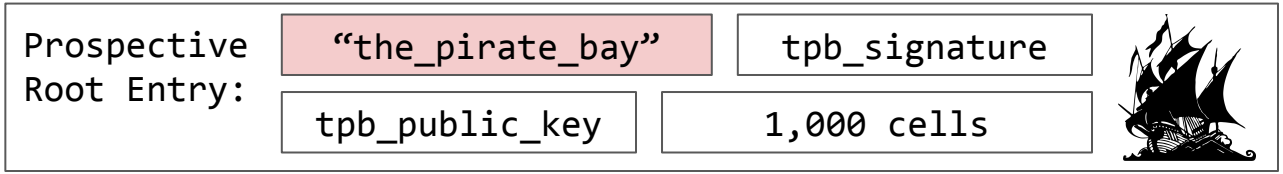


Two primary concerns from a consensus layer perspective:

① Some nodes may not want to support a root that is likely anti-copyright

②

① Root Application



Nodes that disagree with *The Pirate Bay* can vote against the new root.

Potential outcomes:

- Vote on change succeeds → every node accepts that the root listing is updated even if they disagree with the new root’s application
- Vote fails → every node maintains the current listing
- Fundamental disagreement between significant node groups → realistically should not trust consensus relationships moving forward

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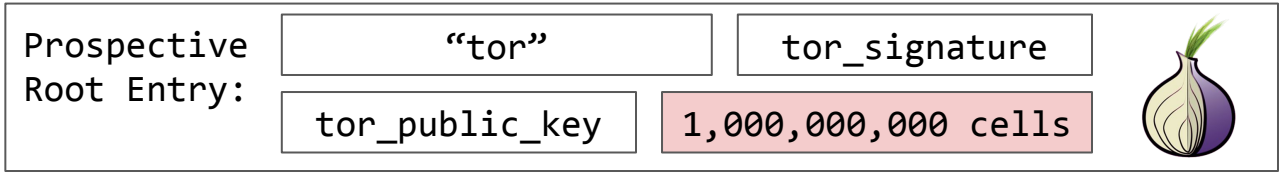
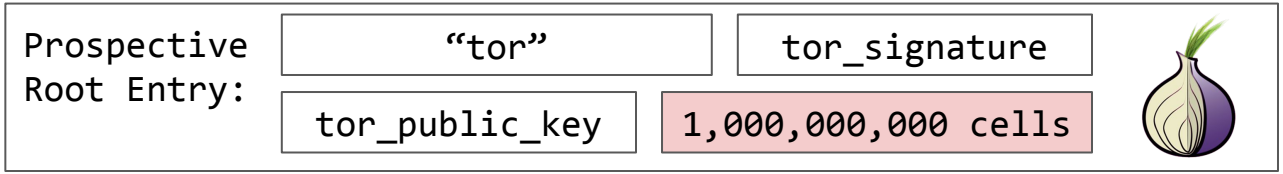


Two primary concerns from a consensus layer perspective:

① Some nodes may not want to support a root that is likely anti-copyright

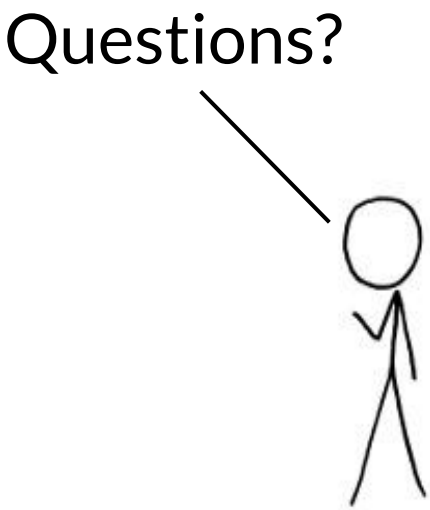
② Maintaining up to a billion mappings and their resulting requests would overburden some nodes’ infrastructure.

② Resource Consumption



Nodes evaluate resource usage by including explicit structural limits.

- Every node observes the same `allowance` value, enabling informed votes against new entries that may pose an unreasonable burden
- *Tor* must find large enough set of nodes willing to support 1 billion new cells OR change its request to a smaller, more reasonable value



https://tools.ietf.org/id/draft-watson-dinrg-delmap-01.txt