Container Assisted Naming, Routing, and Resolution

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Motivation

**Routing Scalability:** The size of content name space is much larger than that of IP address, imposes challenge to the content router implementation. Need an aggregated naming solution.

**Name persistency:** Location independent names are preferred in order to better support content mobility and multi-homing.

**Routing Simplicity:** Routing based on one name space is simpler than additional routing labels which require a translation system. Using LPM instead of exact match.
Container-The Way of Aggregation

A **container** is an identifier of the “space” (logical or physical) in which data is stored or can be accessed. A container can be the identifier of the followings:

- A content name prefix, e.g., huawei.com/products;
- A company or organization, e.g., huawei.com, tsinghua.edu;
- A host, a mobile phone or any content storage device, e.g., chinamobile/joe/iphone;
- A mobile network in a moving object such as a plane, a train or a ship, e.g., airchina/ca1314;
- A network domain, e.g., cn, cn/gd, cn/gd/sz.
Container assisted naming format

\[ \text{Name} = \text{object name} [ \mid \text{container(s) name} ]_{0..n} \]

e.g., Name = \{object name [|container A ||container D |container B ||container D ||container E |container C]\}

- “|” is container separator.
- Depth-first traversal, separated by a separator “|”, as the depth increases, the separator also increases.
- A container at deeper layer provides access service for the ones at upper layer.
- The depth of a Tree has no theoretical limitation.

**Access container:** Container D as the access container of A, if container A is contained in container D, and container D has a routing entry leading to A.
Container assisted forwarding

1. Match Object Name with cache
2. Match Object Name with FIB entries.
3. Obtain the resolvable access containers. [optional]
   By end-users /on-path routers..
   Match the Containers Name with FIB entries.
   Containers can be matched one by one in the sequence until there is a match.
   Based on forwarding strategy.
Routing Scalability

- Topology dependent
- Popular topology independent
- Unpopular topology independent

FIB size = \( N(\text{top-level containers}) \) + \( N(\text{popular containers}) \)

(core router) \hspace{1cm} \text{(topology dependent)} \hspace{1cm} \text{(topology independent)}
Example. Mobility-with resolution

```plaintext
{joe.com/main.html
| att/joe.com; resolvable=yes}
```

Level-1 resolution

```
{joe.com/main.html
| att/joe.com; resolvable=yes
|| united/1314 ; resolvable=yes}
```

Level-2 resolution

```
{joe.com/main.html
| att/joe.com; resolvable=yes
|| united/1314 ; resolvable=yes
||| us/hi}
```

Resolution

```
Us/hi
```

```
Us/ca
```

```
Us/ca/la
```

```
United/1314
```

CNS

United/1314
Thank you

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