CDNI Request Routing with ALTO
draft-seedorf-cdni-request-routing-alto-03

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November 8, 2012

Introduction

- **ALTO within CDNI**
  - Part of the CDNI Request Routing Interface
  - In particular, ALTO is considered for the "Footprint & Capabilities Advertisement" part of the CDNi Request Routing Interface (asynchronous advertisement)

- **Goal of draft-seedorf-cdni-request-routing-alto**
  - Show how ALTO can be used for dCDN selection within CDNi request routing
    - Discuss design choices, advantages of ALTO, presented concrete examples

- **Changes since version -01 (current version is -03)**
  - Taking into account discussions in "footprint/capabilities advertisement" design team
    - What is a footprint?, upstream CDN makes the decision, coverage is not enough for dCDN selection, ..
  - More concrete examples of dCDN selection with ALTO maps & discussing design choices on how to use ALTO maps in the context of CDNI
  - Examples of resource capability advertisement with ALTO
  - Adding text on useful ALTO extensions for CDNI
    (previously in `draft-seedorf-i2aex-alto-cdni-perpective-00`)

High-Level Example of Selecting a Downstream CDN
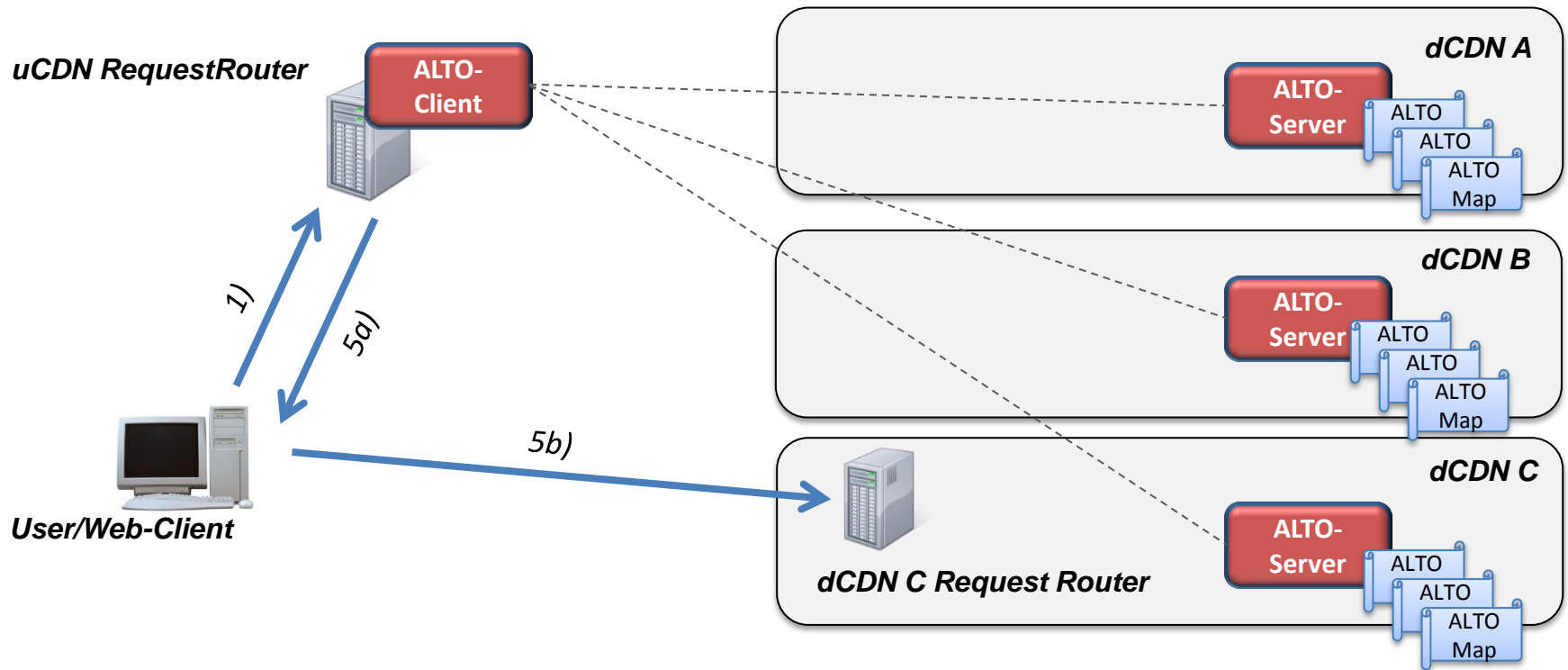
1) uCDN receives end user request from an IP address that indicates CDNI

2) uCDN uses the network map from each candidate dCDN to check if (in principle) the footprint matches the IP-address of the end user request

3) uCDN uses the cost maps provided by the remaining (after step 2) candidate dCDNs to obtain additional information for judging the delivery quality associated with each dCDN for the given request

4) uCDN determines which is the best dCDN (taking into account the cost maps of interest to uCDN and using an uCDN specific algorithm)

5) uCDN redirects end user request to request router of best dCDN

Advantages of using ALTO

- CDN request routing is done at the application layer
  - ALTO is a protocol specifically designed to improve application layer traffic by providing additional information to applications that these applications could not easily retrieve themselves
  - ➤ **Exactly the CDNI dCDN selection use case**

- ALTO network maps are a straightforward way to express a dCDN footprint

- ALTO cost maps are suitable to express various types of delivery "cost" and can hence be used by an upstream to judge the delivery quality associated with a given dCDN for a given end user request
  - ➤ increases flexibility to cover different use cases and business models for CDN interconnection

- Flexible granularity: The concept of the PID and ALTO network/cost maps allows for different degrees of granularity
  - enables a dCDN to differentiate the delivery quality for serving an end user request on a fine granularity depending on the end user location (and not only on an AS-level)

- ALTO maps provide integrity protection

Outlook / Next Steps

- Discussion on design choices for using ALTO maps in CDNI request routing
    - Different possibilities are discussed in the draft
        - E.g. express delivery quality via network map or via cost map
    - Considering ALTO ECS Mode?
        - Would be a more synchronous type of operation …

- Progress is dependent on work of the "footprint/capabilities advertisement" design team
    - Outcome of design team discussions affects concrete ALTO solution

Acknowledgements

- Special thanks to Richard Yang for valuable contributions to this draft

BACKUP SLIDES

Selection of a Downstream CDN with ALTO

- Footprint Advertisement with ALTO network map
  - dCDN provides ALTO network map
    - ALTO network map: group network locations into "PIDs"
    - Network map of dCDN contains footprint of dCDN grouped into PIDs
  - uCDN matches IP-addresses of user requests with network map
    - to see if a given dCDN can provider can in principle serve a given request

- ALTO cost maps for Downstream CDN Selection
  - dCDN provides ALTO cost map
    - ALTO cost map: contains network layer "costs" with a certain "cost type" between PIDs
    - a means for a downstream CDN provider to convey a multitude of dynamically changing information which the upstream CDN provider cannot measure itself
    - Examples for costs are latency, bandwidth, monetary costs, abstract operational costs, …
  - uCDN can select best dCDN based on ALTO cost maps
    - Cost maps enable dCDN to assess the quality associated with the delivery by a given dCDN
    - uCDN can apply its internal algorithms on how to combine/weight different costs for dCDN selection

uCDN

ALTO-
Client

ALTO-
Server

dCDN