CDNi Request Routing Redirection with Loop Prevention

draft-choi-cdni-req-routing-redir-loop-prevention-00.txt

Taesang Choi (choits@etri.re.kr)
Young-IL Seo (yohan.seo@kt.com)
Dong-Ju Kim (dj.kim@kt.com)
Jongmin Lee (jminlee@sk.com)
Ja-Ryeong Koo (wjbkoo@lguplus.co.kr)
John Dongho Shin (eastsky@solbox.com)
Kyungsoo Park (kspark@kaist.ac.kr)

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Introduction

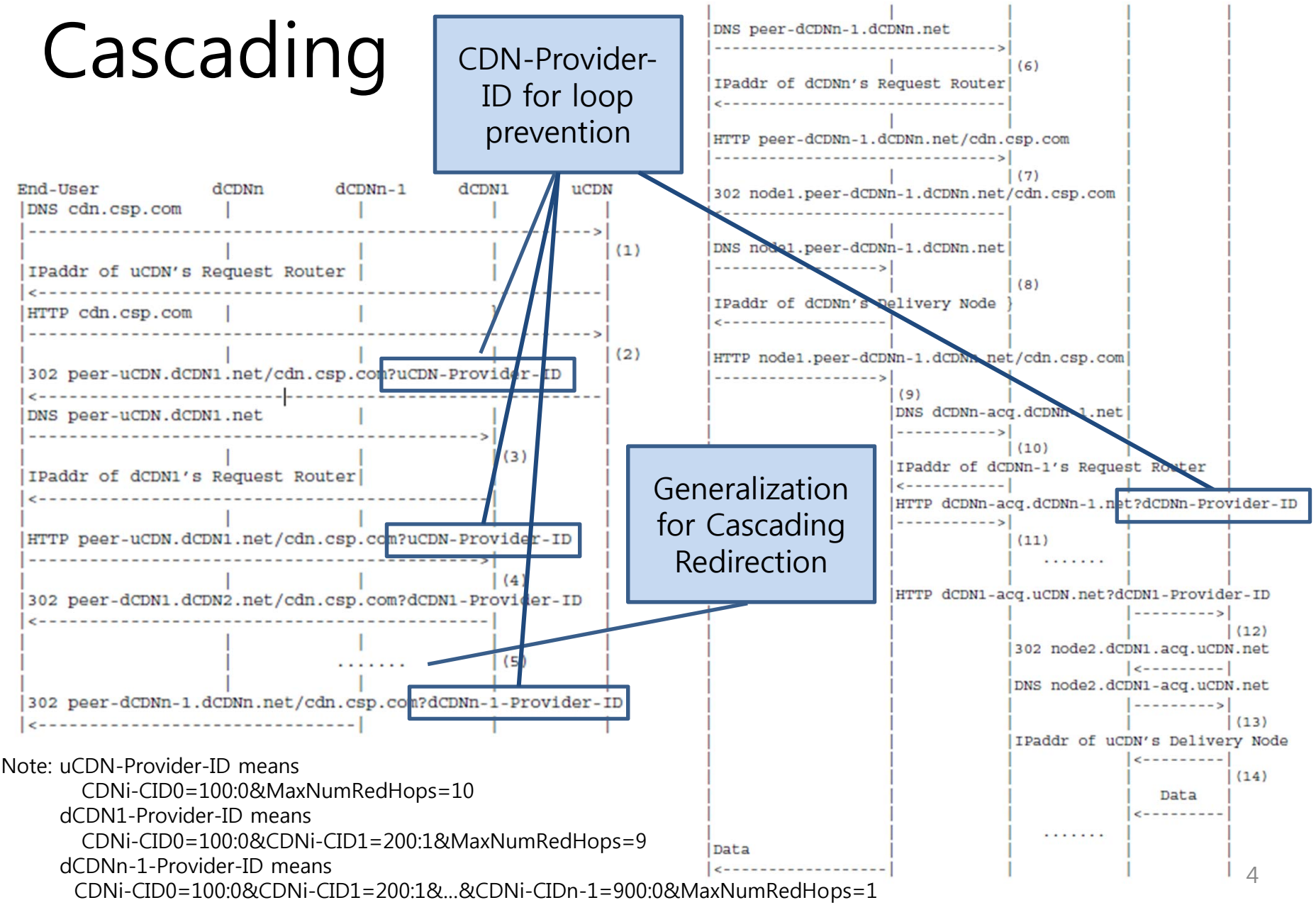
- Related Requirements
  - the CDNi solution shall support iterative and recursive CDNi request routing
  - Efficient request routing for small and large objects
  - arbitrary number of levels of cascaded CDN redirection
  - looping prevention of any CDN request routing redirection, and
    subsequently allowing the request routing redirection

- To meet such requirements, this document describes
  - request routing redirection procedures
  - loop prevention mechanisms, and
  - other operational considerations that are associated with redirection

CDN Provider ID for Loop Prevention

- "CDN-Provider-ID" uniquely identifies each CDN provider during the course of request routing redirection
- It consists of "CDN provider Name" and "MaxNumRedHops"
- The CDN provider Name is an uniquely identifiable CDN provider name
  - A pair of an AS number and an additional qualifier is used for CDN provider name
- MaxNumRedHops represents a maximum allowed redirections
- Example: http://cdn.csp.com?CDNI-CID0=100:0 & CDNI-CID1=200:1 & CDNI-CID2=300:0 & MaxNumRedHops=8

HTTP-based Iterative Method with Cascading

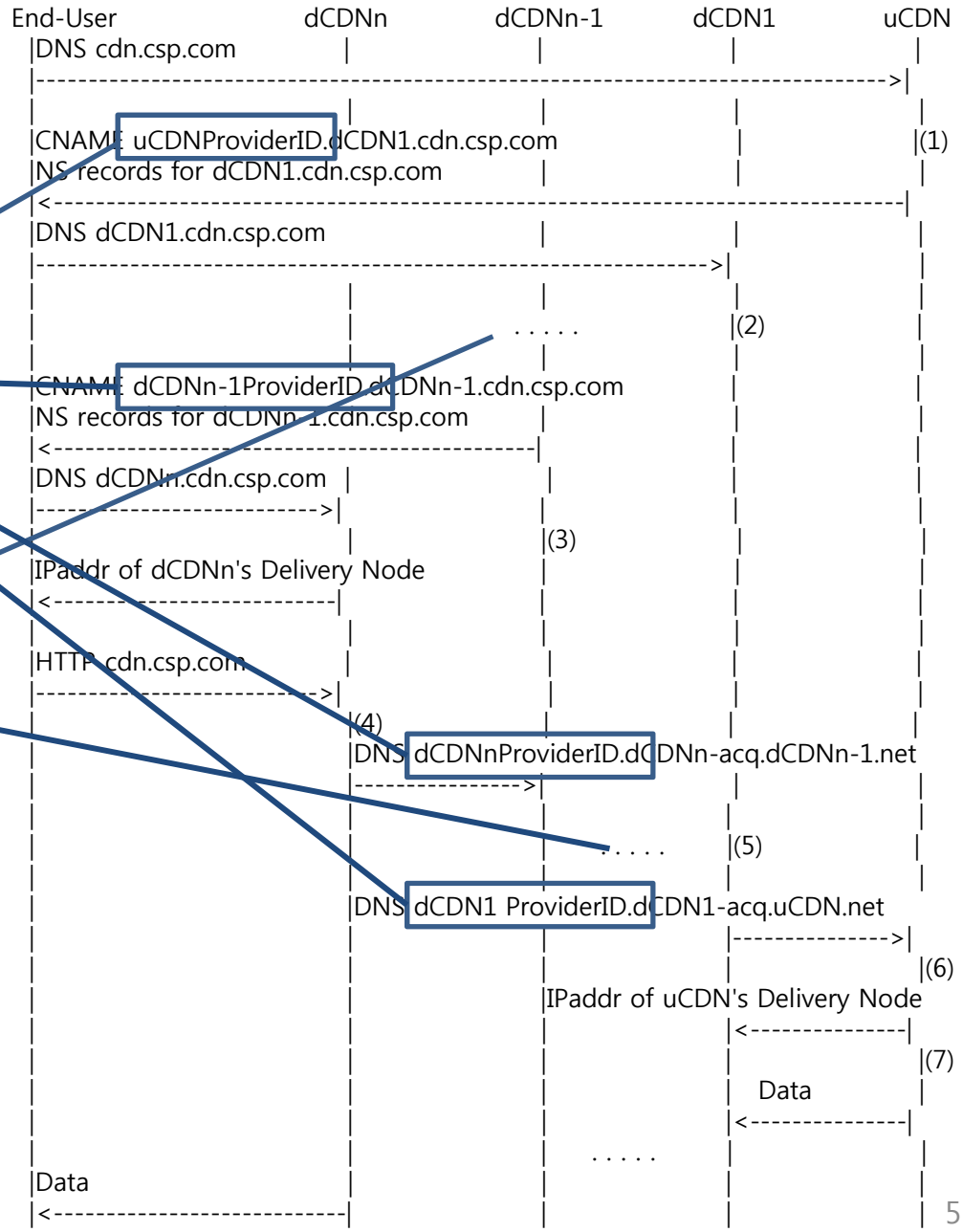


Note: uCDN-Provider-ID means
CDNi-CID0=100:0&MaxNumRedHops=10
dCDN1-Provider-ID means
CDNi-CID0=100:0&CDNi-CID1=200:1&MaxNumRedHops=9
dCDNn-1-Provider-ID means
CDNi-CID0=100:0&CDNi-CID1=200:1&…&CDNi-CIDn-1=900:0&MaxNumRedHops=1

DNS-based Iterative Method with Cascading

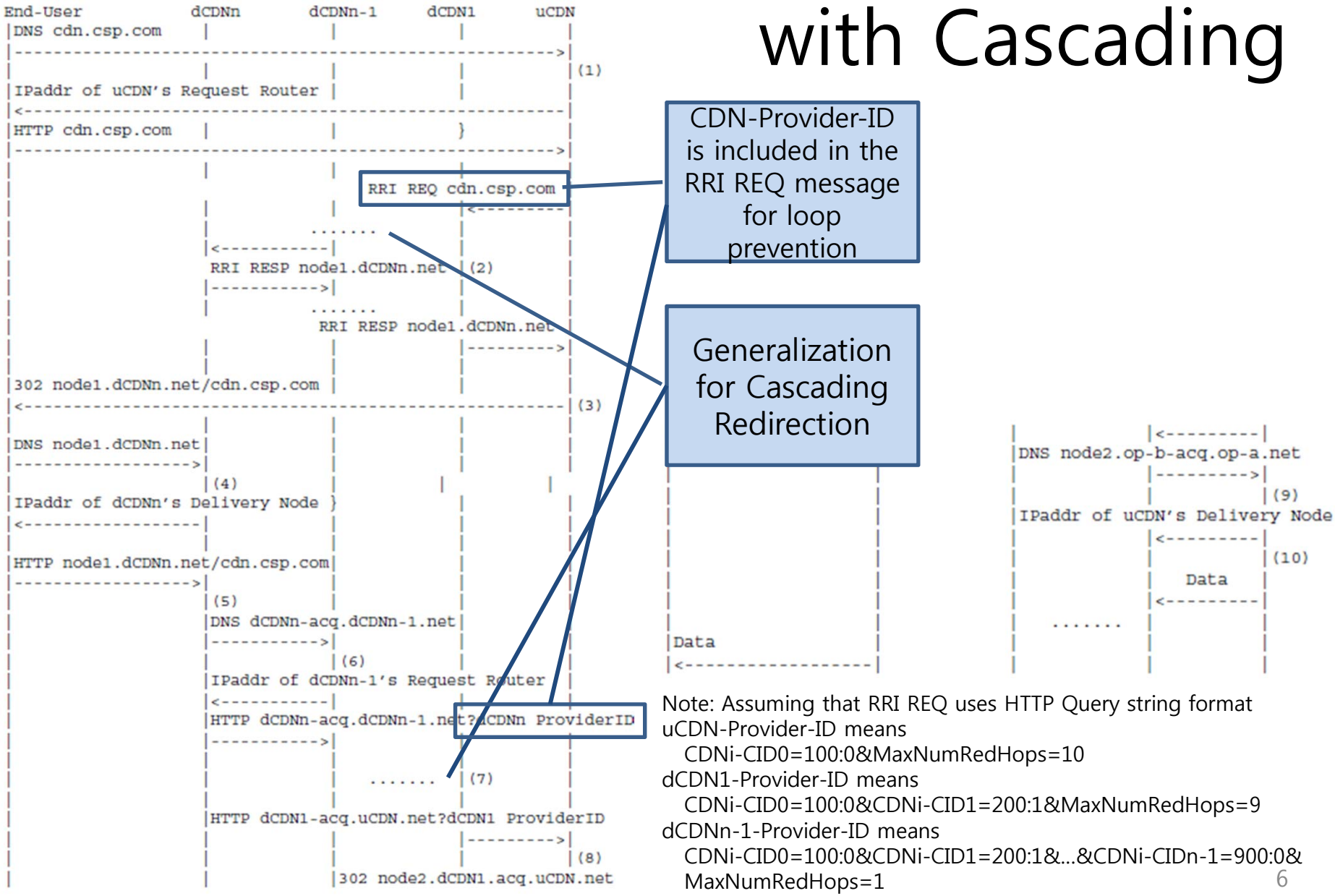
CDN-Provider-ID for loop prevention

Generalization for Cascading Redirection



Note: uCDN-Provider-ID means
100:0:10
dCDN1-Provider-ID means
100:0.200:1.9
dCDNn-1-Provider-ID means
100:0.200:1...900:0.1

HTTP-based Recursive Method with Cascading



CDN-Provider-ID is included in the RRI REQ message for loop prevention

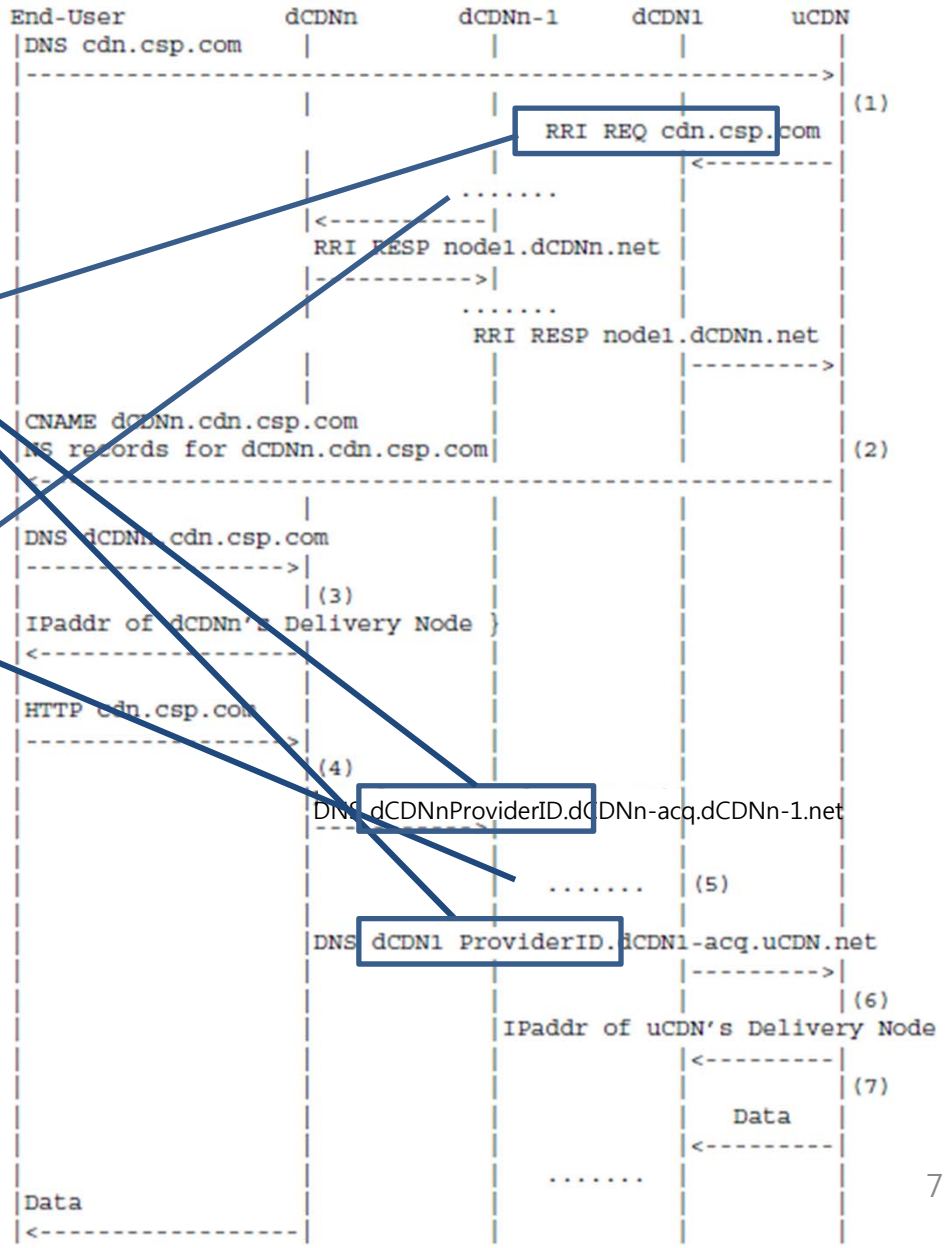
Generalization for Cascading Redirection

Note: Assuming that RRI REQ uses HTTP Query string format
uCDN-Provider-ID means
CDNi-CID0=100:0&MaxNumRedHops=10
dCDN1-Provider-ID means
CDNi-CID0=100:0&CDNi-CID1=200:1&MaxNumRedHops=9
dCDNn-1-Provider-ID means
CDNi-CID0=100:0&CDNi-CID1=200:1&…&CDNi-CIDn-1=900:0&
MaxNumRedHops=1

DNS-based Recursive Method with Cascading

CDN-Provider-ID is included in the RRI REQ message for loop prevention

Generalization for Cascading Redirection



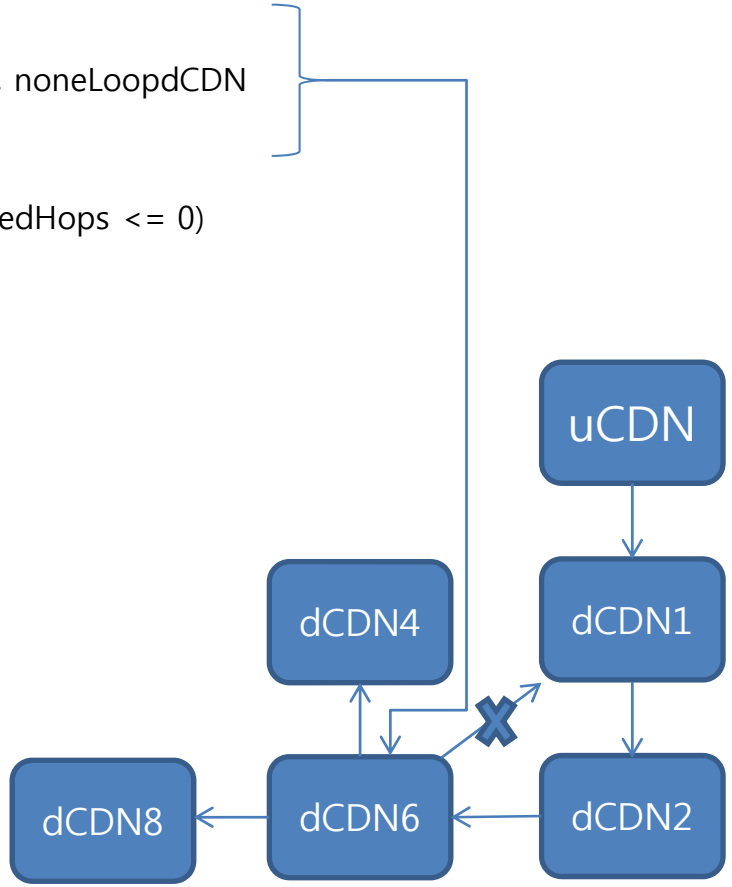
Note: Assuming RRI REQ uses same format as HTTP-based recursive method

For loop detection during content acquisition,
- dCDN-Provider-ID means
  - 100:0:10
- dCDNn-1-Provider-ID means
  - 100:0.200:1.9
- dCDN1-Provider-ID means
  - 100:0.200:1…900:0.1

Proposed Loop Prevention Mechanism

```
if (CDN-Provider-ID list contains nextProviderName)
{ //next CDN Provider will encounter loop thus choose another dCDN, noneLoopdCDN
  1) requestRedirect(nonLoopdCDN)

} else if (CDN-Provider-ID list contains my.ProviderName or MaxNumRedHops <= 0)
{ //loop detected
   2) request.deny(); //most strict option
   3)
      if (my.Avail == true) {
        request.DoService (mine);
      } elseif (parent.Avail == true) { //if parent CDN is available
         request.Redirect (parent);
      } elseif (uCDN.Avail == true) { //if uCDN is available
         request.Redirect (uCDN);
      } elseif (dCDNAvail == true) { //if other dCDN is available
         requestRedirect(dCDN);
      } else { //no CDN is available to serve the request
         request.deny(); }
```



Other Operational Considerations

- This draft identifies additional requirements from operational perspectives:
  - service availability, QoS requirements, resource faults, etc. besides end-user proximity
  - Performance feasibility of request routing redirection
    and loop prevention
    - The requirements may vary depending on the CDN service types (e.g., CDN for small and/or large object).
  - Also granularity of redirection within or between contents

Summary

- This draft proposed
  - generalization of request routing redirection procedures that considers arbitrary level of cascaded redirections
  - loop prevention mechanisms, and
  - other operational considerations that are associated with redirection
- Any comments or suggestions for improvements are invited