

CDNI
Internet-Draft
Intended status: Standards Track
Expires: March 7, 2013

H. Song
Huawei
Y. Zhang
China Mobile
Y. Sun
ICT/CAS
Sep 3, 2012

**A SLR (Service Level Requirements) based footprint for CDNI
draft-song-cdni-slr-based-footprint-02**

Abstract

Footprint advertisement is a very important step for CDN interconnection and generates a lot of discussion. Actually, each CDN can serve the whole world if its surrogates are publicly reachable by IP addresses. But if a CDN does that, it can not satisfy the requirements from the applications. So CDNs deliver contents for applications, and the basic requirements should be from the applications. One CDN can serve different applications well with different footprint. But there is rare discussion on service level requirements based footprint. This document is used to generate the discussion on this aspect.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on March 7, 2013.

Copyright Notice

Copyright (c) 2012 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal

Provisions Relating to IETF Documents

(<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

1.	Terminology	3
2.	Why SLR Based Footprint	3
3.	What are the Parameters for SLR	4
3.1.	Average Response Time	4
3.2.	Throughput	4
3.3.	Startup Delay	4
3.4.	Average downloading rate	5
3.5.	Hit Ratio	5
3.6.	Capability	5
3.7.	Up-time	5
3.8.	Discussion	5
4.	Dynamic Mapping for Footprint	5
5.	Message Flows	6
6.	Security Considerations	6
7.	IANA Considerations	6
8.	Normative References	6
	Authors' Addresses	7

1. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

2. Why SLR Based Footprint

Each CDN's footprint can be worldwide, if its surrogates' IP addresses are publicly reachable. However, not every CDN can serve the applications for worldwide distribution because it can not satisfy the service level required by those applications. So what an application basically needs is a CDN to satisfy its service level, and distribute the contents to certain areas. If a CDN or together with its downstream CDNs, cannot meet the SLR (service level requirements) in an area from an application, then we can say this upstream CDN is not competent for this content distribution task. This document specifies how the parameters of SLR impact a CDN's footprint. There is other draft [[I-D.he-cdni-cap-info-advertising](#)] mentioned capability advertisement, please note that capability advertisement is also very important and footprint is impacted by capability of a CDN. We consider capability as one service requirement factor from applications. While each CDN serve many tasks concurrently, the dynamic resources that it can allocate is also variable at different time.

The physical deployment area of a CDN might be small, but it can have larger footprint area where it can satisfy an application's SLR. The footprint area might be even larger than a CDN that has larger physical deployment area. Choosing SLR as the basis for footprint can avoid some CDN magnifying its service level and service area on purpose, and also make some other "small" but powerful CDN be treated with justness.

We think that applications should participate in the CDN interconnection process implicitly, i.e. its requirements for service level should be transmitted between upstream and downstream CDNs (message protection is required due to the privacy). A downstream CDN should notify its capability information to its upstream CDN as well when notifying its footprint that satisfies certain SLR, which will allow a upstream CDN to choose multiple downstream CDN to fulfill a task even in a same area.

From the application's perspective, a file downloading application may not care about when the user receive the first bit, but more care about the average downloading rate. While a streaming application may have a different opinion. So for a same CDN, it can serve the

file downloading application well with one wider footprint and serve streaming application well with another smaller footprint.

In general, service level is the main driver for the definition of footprint, and applications do not care about the locations where a CDN's surrogates are deployed while it can satisfy its service requirements. And topologically, ALTO [[I-D.ietf-alto-protocol](#)] is used for the appropriate surrogate selection after the footprints are defined. And ALTO network map information can also be used for the footprint description to upstream CDN .

[3.](#) What are the Parameters for SLR

The general principal for service level requirements is fast, scalable, secure and reliable. But it needs detailed measurement metrics for it. Here we put the capability requirements as one parameter for SLR, as one upstream CDN can choose multiple downstream CDNs to satisfy an customer application's requirements. It does not matter that much if with one footprint, one downstream CDN can satisfy the performance requirements but not capability requirements. This section lists the possible parameters for SLR.

We consider the parameters that are not high dynamic. Those parameters that are dynamic at a very brief time frame, but statistically rather static at a reasonable time frame (like one month) can be considered for footprint determination.

However, this document is not going to define the specifics for the measurement methods.

[3.1.](#) Average Response Time

This value is to reflect the average response time in normal network condition. This value impacts the footprint a lot.

[3.2.](#) Throughput

This parameter will also impact the footprint. If a CDN's available throughput is very big then it can serve more than its deployment area.

[3.3.](#) Startup Delay

This parameter is a very important metric for the streaming media delivery. As a TCP connection throughput close to MTU/RTT. Long distance transport maybe mean smaller MTU and longer RTT, as well as more packet lost rate, which will result in a low rate data

transport, and in consequence long startup delay.

3.4. Average downloading rate

Application usually needs the CDN to guarantee a certain downloading rate for a certain service. More discussion is needed on this parameter and how it impacts footprint.

3.5. Hit Ratio

This parameter is about the content availability. High hit ratio means more local service and low burden on original servers. This parameter is more related to the CDN's optimization policies than to the footprint.

3.6. Capability

For the capability, we consider the processing power of the CDN and its features that can support certain kinds of applications.

3.7. Up-time

Uptime is a measure of the time a machine has been up without any downtime. For a CDN system, it usually needs to guarantee a 100% up-time for system (not for each host).

3.8. Discussion

Not all parameters required for a certain service level are listed. More discussion is needed. Some parameters might impact a CDN's footprint, and some will not. Should all of them or just a portion that affect the footprint be conveyed in the same way among CDNs?

4. Dynamic Mapping for Footprint

Each CDN participate in the CDN interconnection network should maintain a map between the SLR parameters and its footprint. There are choices to exchange the map information.

(1) An application's SLR is directly sent from upstream CDN to the downstream CDN. So that downstream CDN can report its footprint to upstream CDN accordingly. The downstream CDN should guarantee it satisfies the SLR for users in its reported footprint. Although this method requires message exchange for each application, but it is simple to implement.

(2) Each CDN report its mapping between SLR parameters and footprint

to upstream CDN. And the upstream CDN will make the final decision on the downstream CDN's footprint according to a specific application's SLR. This method reduces the message exchanges but the map itself might be very complicated, due to various combination of these parameter values exist.

5. Message Flows

TBD.

6. Security Considerations

These security issues are open for discussion:

(1) Applications might take its service level requirements as a confidential? Although it can be a confidential to users, but it can be protected without leaking to any third party that is not involved in the CDN interconnection?

(2) CDNs might take its footprint according to SLR as confidential?

(3) Footprint cheating. A CDN may cheat with its footprint. If the behavior is discovered, the application cannot get the service level in that announced footprint, punishment policies should be applied to the CDN provider.

7. IANA Considerations

There is no IANA consideration for this document.

8. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

[I-D.he-cdni-cap-info-advertising]
He, X., Dawkins, S., Chen, G., Zhang, Y., and W. Ni,
"Capability Information Advertising for CDN
Interconnection", [draft-he-cdni-cap-info-advertising-01](#)
(work in progress), March 2012.

[I-D.seedorf-cdni-request-routing-alto]
Seedorf, J., "CDNI Request Routing with ALTO",
[draft-seedorf-cdni-request-routing-alto-02](#) (work in

progress), July 2012.

[I-D.ietf-alto-protocol]

Alimi, R., Penno, R., and Y. Yang, "ALTO Protocol",
[draft-ietf-alto-protocol-12](#) (work in progress), July 2012.

Authors' Addresses

Haibin Song
Huawei

Email: haibin.song@huawei.com

Yunfei Zhang
China Mobile

Email: zhangyunfei@chinamobile.com

Yi Sun
ICT/CAS

Email: sunyi@ict.ac.cn

