   CDNI Logging Formats for HTTP and HTTP Adaptive Streaming Deliveries
            draft-lefaucheur-cdni-logging-delivery-01

Abstract

   The interconnection of Content Distribution Networks (CDNs) is
   motivated by several use cases. CDN Interconnection can be achieved
   through four CDNI interfaces, one of which is the CDNI Logging
   interface. This document discusses CDNI logging formats for content
   deliveries performed using HTTP or HTTP adaptive streaming.

Requirements Language

   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 RFC 2119 [RFC2119].

Status of this Memo

   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

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   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 January 14, 2013.

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[1](#). **Introduction**

   The interconnection of Content Distribution Networks (CDNs) is
   motivated by several use cases, such as those described in
   [I-D.ietf-cdni-use-cases]. The overall problem space for CDN
   Interconnection (CDNI) is described in
   [I-D.ietf-cdni-problem-statement]. The CDN Interconnection framework
   is defined in [I-D.ietf-cdni-framework] and the requirements for the
   CDN Interconnection solution are specified in
   [I-D.ietf-cdni-requirements].

   One of the CDNI interfaces defined in these documents is the CDNI
   Logging interface whose description is quoted here:

   "o CDNI Logging interface: This interface allows the Logging system
   in interconnected CDNs to communicate the relevant activity logs in
   order to allow log consuming applications to operate in a multi-CDN
   environments. For example, an upstream CDN may collect delivery logs
   from a downstream CDN in order to perform consolidated charging of
   the CSP or for settlement purposes across CDNs. Similarly, an
   upstream CDN may collect delivery logs from a downstream CDN in order
   to provide consolidated reporting and monitoring to the CSP."

   The logging interface is discussed in details in
   [I-D.bertrand-cdni-logging]. The present document identifies a
   number of additional considerations regarding logging for content
   delivery performed using HTTP.

   [I-D.brandenburg-cdni-has] discusses the interactions of HTTP
   Adaptive Streaming with CDNI Logging and provides recommendations on
   how to specifically perform CDNI Logging for delievry performed using
   HTTP Adaptive Streaming. The present document discusses in more
   details how these recommendations woudl impact the CDNI Logging
   interface.

   Section 2 discusses the aspect of CDNI Logging that are specific to
   content delivery performed via regular HTTP. Section 3 discusses the
   aspect of CDNI Logging that are specific to content delivery
   performed via HTTP adaptive streaming. Section 5 discusses the
   aspect of CDNI Logging that are generic to all the CDNI Logs for
   delivery.

   CDNI Logging for other events than content delivery (e.g. failures,
   request routing, service monitoring,...) are not discussed in the
   present document.

1.1. Terminology

   This document uses all terminology defined in
   [I-D.brandenburg-cdni-has].

2. CDNI Logging for regular HTTP Delivery

   This section discusses the triggers on which a CDNI log is generated
   for delivery of content using regular HTTP delivery, as well as the
   fields contained in the corresponding log.

2.1. Regular HTTP Log Triggers

   A CDNI Log is generated for a regular HTTP delivery on the following
   triggers:

```
+-----------------+-------------------------------------------------+
| Event           | Description                                     |
+-----------------+-------------------------------------------------+
| content Request | Reception and processing of a request for a     |
|                 | content                                         |
+-----------------+-------------------------------------------------+
```

2.2. Regular HTTP Log Fields

   A CDNI Log for regular HTTP delivery contains the following fields
   (or a subset therefof as discused in Section 5.4):

```
+------------------+-----------+----------------------------------+
| Field            | Descriptio | Examples                        |
|                  | n          |                                  |
+------------------+-----------+----------------------------------+
| Current-Time     | Time, in  | [20/Feb/2012:00:29.510+0200]    |
|                  | millisecon |                                  |
|                  | ds, at    |                                  |
|                  |  which the |                                  |
|                  |  request  |                                  |
|                  |  was      |                                  |
|                  |  received. |                                  |
| Time-to-Serve    | Time, in  | 952195                          |
|                  | microsecon |                                  |
|                  | ds, taken |                                  |
|                  |  to       |                                  |
|                  |  complete |                                  |
|                  |  the      |                                  |
|                  |  request. |                                  |
```

Client-IP	IP address of the requesting client.	203.0.113.2
Action	Squid action describing how the request was treated locally description(e.g., cache hit/miss).	TCP_HIT, TCP_MISS, ...
Status-Returned	HTTP response code.	200, 404, ...
Bytes-Transferred	Bytes sent to the client, including the headers.	23567992
Method	HTTP request method.	GET
URI	URI of requested content.	http://cache3.cdn1.com/movie/ice/icemovie.mpg
Content-Type	MIME-Type from the reply header.	video/mpeg
User-Agent (and possibly some other HTTP headers)	content of the User-Agent HTTP Header	Mozilla/5.0 (X11; Linux x86_64; rv:12.0) Gecko/20100101 Firefox/12.0

```
| URI-Signing-Vali | Flag       | 0/1                              |
| dation           | indicating |                                  |
|                  | whether    |                                  |
|                  | URI        |                                  |
|                  | signature  |                                  |
|                  | validation |                                  |
|                  | was        |                                  |
|                  | perfomed   |                                  |
+------------------+------------+----------------------------------+
```

3. CDNI Logging for HTTP Adaptive Streaming

This section discusses the CDNI logs for delivery of content using
HTTP adaptive streaming. In line with the recommendations of
[I-D.brandenburg-cdni-has], this document proposes that a log record
be generated for delivery of each chunk or manifest file.

3.1. HAS Chunk-Based Log Triggers

A chunk-based Log record is generated for HAS delivery on the
following triggers:

```
+--------------------+---------------------------------------------+
| Event              | Description                                 |
+--------------------+---------------------------------------------+
| Chunk/Manifest     | Reception of a request for a Segment (or    |
| Request            | Manifest File)                              |
+--------------------+---------------------------------------------+
```

3.2. HAS Chunk-Based Log fields

A chunk-based Log record for HTTP adaptive streaming may contain all
the same fields as a CDNI Log for a regular HTTP request, as well as
the following additional fields:

```
+------------+------------------+--------------------------------+
| Field      | Description      | Examples                       |
+------------+------------------+--------------------------------+
| Content    | Identifier for   | format and scope of unicity are|
| Collection | Content          | TBD                            |
| ID         | Collection       |                                |
```

```
    | Session-id | a string         | 6141F5795BE774691D234A0465B9667A |
    |            | generated by the |                                  |
    |            | delivering CDN   |                                  |
    |            | and unique (to   |                                  |
    |            | the delivering   |                                  |
    |            | CDN) to identify |                                  |
    |            | the Session. (*) |                                  |
    +------------+------------------+----------------------------------+
```

   (*) The Session-ID value to be included in a log record by the
   delivering CDN is such that:

   o different per-chunk log records with the same Session-ID value
      must correspond to the same user session (.i.e delivery of same
      content to same enduser at a given point in time)

   o log records for different chunks of the same user session (.i.e
      delivery of same content to same enduser at a given point in time)
      should be provided with the same session-ID value. While
      undesirable, there may be situations where the delivering CDN uses
      more than one session-ID value for different per-chunk log records
      of a given session, for example in scenarios of fail-over or load-
      balancing across multiple Surrogates and where the delivering CDN
      does not implement mechanism to synchronize session-IDs across
      Surrogates.

4. Performance Monitoring

   The CDNI Log fields listed in the previous sections allow monitoring
   of essential delivery performance indicators across the CDN Mesh.
   For example, for a regular HTTP delivery, these fields allow tracking
   of the time taken to serve the requested content, tracking of content
   delivery failures, tracking of partial deliveries and tracking of
   cache hit ratios. As another example, for HTTP adaptive streaming,
   these fields allow tracking of the presentation (and its fluctuation
   over time) served to the End-User as well as the End-User random
   content access (e.g. Play/Stop/Seek).

   Subsequent versions of this document may discuss potential additional
   log fields for enhanced performance monitoring.

5. CDNI Log Encoding and Transport

   Details for CDNI Log encoding and transport will be specified in
   subsequent versions. WE observe that this is expected to allow
   optional use of common compression techniques (e.g. gzip). However,

Section 5.1 identifies the information that is to be included in the
header of CDNI Logs, Section 5.2 identifies information that is to be
attached to every CDNI Log record and Section 5.3 identifies the
information that is to be included in the footer of CDNI Logs.
Finally, Section 5.4 discusses the notion of customized Logging.

5.1. CDNI Log Header Information

The header of CDNI Logs contains the following fields:

Field	Description	Examples
Format-Version	Version of the CDNI Log format.	v1.0
Log-Field-List	The list of the fields provided in the log records	time cs-method cs-uri
Log-ID	Unique identifier for the CDNI Log (facilitates detection of duplicate Logs and tracking in case of aggregation).	
Log-Timestamp	Time, in milliseconds, the CDNI Log was generated.	[20/Feb/2012:00:29.510+0200]

5.2. CDNI per-Log-Record Information

In addition to the log fields discussed in previous sections, each
CDNI log record contains the following fields:

Field	Description	Examples
Log Record Digest	Digest of the Log records (facilitates recovery of uncorrupted Log records inside a corrupted CDNI Log)	

5.3. CDNI Log Footer Information

The footer of CDNI Logs contains the following fields:

```
+---------+---------------------------------------------+----------+
| Field   | Description                                 | Examples |
+---------+---------------------------------------------+----------+
| Log     | Digest of the complete Log (facilitates     |          |
| Digest  | detection of Log corruption)                |          |
+---------+---------------------------------------------+----------+
```

5.4. CDNI Customized Log Format

This document proposes that customized logs be supported by CDNI in
the following manner:

o the uCDN uses the CDNI Metadata interface to indicate to the dCDN
   which subset of the CDNI logging fields are to be provided in a
   log record for corresponding to a request for a given content

o the dCDN provides, via the CDNI Logging interface, log records
   containing the subset of CDNI logging fields requested by the
   uCDN.

o The dCDN explicitly lists in the CDNI Log Header the fields
   actually provided (as discussed in Section 5.1).

6. Impact on CDNI Metadata Requirements

We request that the following requirements be added in section 6 of
[I-D.ietf-cdni-requirements]:

"

META-X [HIGH] The CDNI Metadata Distribution interface shall support
an OPTIONAL mechanism allowing the Upstream CDN to indicate to the
Downstream CDN which CDNI Log fields are to be provided for all, for
specific sets of, or for specific content items delivered using HTTP.
A CDNI implementation that does not support this optional CDNI
Metadata Distribution Interface mechanism MUST ignore this log format
indication and generate CDNI logging format for adaptive streaming
using the default set of CDNI Logging fields. [Editor's note: A
default set of logging fields need to be defined]

META-X [MID] The CDNI Metadata Distribution interface shall allow the
uCDN to signal to the dCDN the Content Collection ID value for all,
for specific sets of, or for specific content items delivered using

HTTP. Whenever the dCDN is instructed by the uCDN (using the customized logging mechanism described in Section 5.4) to report the Content Collection ID field in the log records, the dCDN is to use the value provided through the CDNI Metadata interface for the corresponding content.

"

7. Impact on CDNI Footprint and Capabilities Advertisement

We request that the following requirement be added in section 5 of [I-D.ietf-cdni-requirements]:

"

REQ-X [MID] The CDNI Request Routing/Footprint and Advertisement Interface shall support advertisement of the following capabilities:

o support for customized CDNI Logging

o support of Content Collection ID logging

o support for Session-ID logging

"

8. Generation of CDNI Logs

Like other CDNI interfaces, the CDNI Logging interface specifies operations across CDNs and not inside a CDN. Therefore, the log formats specified in this document apply to CDNI logging information exchanged across CDNs and does not constrain the process for generating such inter-CDN logs within a given CDN. The format of the logs generated by a given CDN Surrogate is beyond the scope of the present document. We observe that a given CDN could elect to have its Surrogates natively generate logs in the same format as the one to be used for exchange with another CDN, or that the CDN could elect to have its Surrogates generate logs in any other format (as long as they include the necessary information) and have these logs then reformatted prior to exchange with another CDN.

9. IANA Considerations

[This will be specified in subsequent versions].

10. Security Considerations

   CDNI Logs exchanged over the CDNI Logging interface can be consumed
   by very sensitive applications including inter-CDN accounting and
   billing. The associated security concerns are discussed in
   [I-D.ietf-cdni-framework]. At this stage, we observe that the CDNI
   Logging interface can leverage the existing security mechanisms
   supported by the underlying transport protocol that will be selected
   for transport of CDNI Logs (e.g. to support authentication of the
   entities exchanging CDNI Logs through the CDNI Logging interface, to
   support privacy and protection against spoofing). This will be
   further discussed in subsequent versions of this document.

11. Acknowledgements

   The authors want to thank Gene Halbrooks for his input into this
   document.

12. References

12.1. Normative References

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

12.2. Informative References

   [I-D.bertrand-cdni-logging]
               Bertrand, G. and S. Emile, "CDNI Logging Interface",
               draft-bertrand-cdni-logging-00 (work in progress),
               February 2012.

   [I-D.brandenburg-cdni-has]
               Brandenburg, R., Deventer, O., Faucheur, F., and K. Leung,
               "Models for adaptive-streaming-aware CDN Interconnection",
               draft-brandenburg-cdni-has-03 (work in progress),
               July 2012.

   [I-D.ietf-cdni-framework]
               Peterson, L. and B. Davie, "Framework for CDN
               Interconnection", draft-ietf-cdni-framework-00 (work in
               progress), April 2012.

   [I-D.ietf-cdni-problem-statement]
               Niven-Jenkins, B., Faucheur, F., and N. Bitar, "Content
               Distribution Network Interconnection (CDNI) Problem

              Statement", draft-ietf-cdni-problem-statement-08 (work in
              progress), June 2012.

   [I-D.ietf-cdni-requirements]
              Leung, K. and Y. Lee, "Content Distribution Network
              Interconnection (CDNI) Requirements",
              draft-ietf-cdni-requirements-03 (work in progress),
              June 2012.

   [I-D.ietf-cdni-use-cases]
              Bertrand, G., Emile, S., Burbridge, T., Eardley, P., Ma,
              K., and G. Watson, "Use Cases for Content Delivery Network
              Interconnection", draft-ietf-cdni-use-cases-09 (work in
              progress), July 2012.

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