

CDN 2.3

- [Overview](#)
- [Prevention of redundant transcoding of the same stream on two or more transcoders in CDN](#)
 - [Configuration](#)
 - [Redundant stream transcoding checking with REST API](#)
 - [REST queries and responses](#)
 - [Parameters](#)
- [CDN extended information displaying](#)
 - [Using CLI](#)
 - [Using REST API](#)
- [Channel quality control between CDN nodes](#)
 - [Checking channel quality metric and statistics using REST API](#)
 - [REST queries and response states](#)
 - [Parameters](#)
 - [Response formats](#)
- [Node state periodic sending](#)
- [Backward compatibility with CDN 2.2, 2.1, 2.0](#)
 - [Controller node in previous CDN version](#)
 - [CDN versions matching](#)
 - [PASSIVE node version assign](#)
- [Known limits](#)

Overview

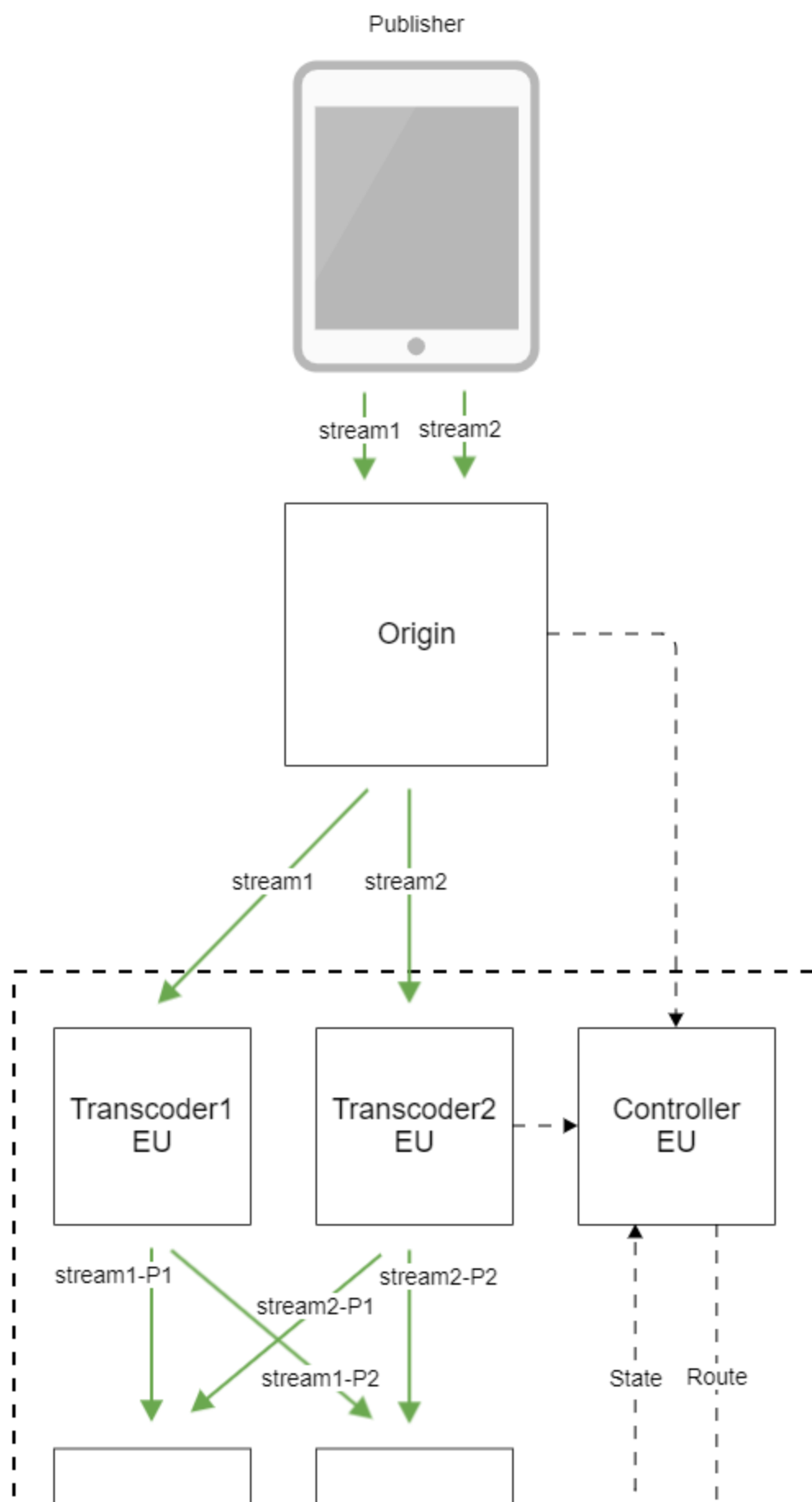
CDN 2.3 implements the following features in addition to [CDN 2.1](#) and [2.2](#):

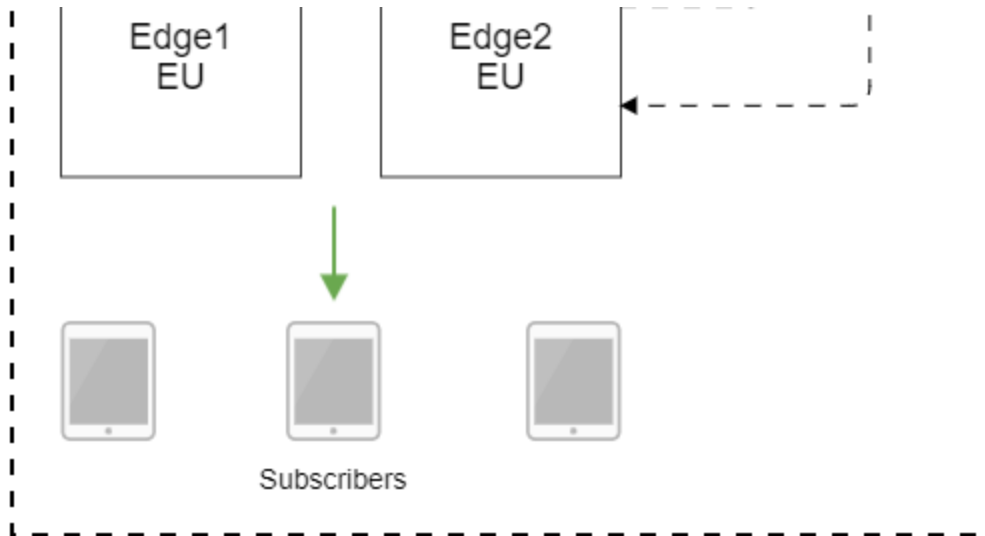
- prevention of redundant transcoding of the same stream on two or more transcoders in CDN
- CDN extended information displaying
- channel quality control between CDN nodes
- node state periodic sending

Prevention of redundant transcoding of the same stream on two or more transcoders in CDN

CDN 2.3 allows to prevent redundant transcoding of the same stream published to CDN on two or more transcoders in the same group. This can occur in large CDNs with big amount of incoming and outgoing media traffic, when a many subscribers connecting simultaneously to the CDN servers. It creates excessive load on transcoders which may lead to servers out of work..

To solve the problem, in every CDN group the special node with Controller role should be allocated which receives stream information from all the CDN nodes and collects current CDN state. The nodes with Edge role should request Controller node if it is available to choose a route for a stream playback. If the stream is already transcoded on any Transcoder node, Controller node does not allow to build the route for the stream playback through another Transcoder. If Controller node is not available, Edge node should choose a route for a stream playback according to [CDN 2.1](#) method.





Controller node should not be used to publish or play any streams.

Configuration

Controller role should be set to node with the following parameter

```
cdn_role=controller
```

Controller request timeout can be defined on Edge node with the following parameter

```
cdn_controller_request_timeout=5000
```

The timeout is set in milliseconds, 5000 ms by default.

Controller response caching duration can be defined on Edge node with the following parameter

```
cdn_controller_response_cache_expire=10000
```

The cache duration is set in milliseconds, 10000 ms by default.

Controller response timeout and caching parameters should be set only on Edge nodes.

Redundant stream transcoding checking with REST API

Redundant stream transcoding can be checked with REST query to Edge server.

REST query should be HTTP/HTTPS POST request as follows:

- HTTP:http://test.flashphoner.com:8081/rest-api/cdn/show_redundant_transcodings
- HTTPS:https://test.flashphoner.com:8444/rest-api/cdn/show_redundant_transcodings

Where:

- test.flashphoner.com - WCS server address
- 8081 - a standard WCS REST / HTTP port
- 8444 - a standard WCSHTTPS port
- rest-api - mandatory part of URL
- /cdn/show_redundant_transcodings- REST query used

REST queries should be sent to Edge server.

REST queries and responses

REST query	REST query body example	REST response body example	Response states	Description
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/cdn/show_redundant_transcodings		<pre>{ "test6": "192.168.1.17,192.168.1.18" }</pre>	200 – Redundant transcoding found 404 - No redundant transcoding	Check redundant transcoding
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Parameters

Description	Example
Stream name	test6
Transcoding nodes list	192.168.1.17, 192.168.1.18

CDN extended information displaying

Since build [5.2.471](#) CDN information output was added or extended to [statistics page](#), to CLI and to REST API

Using CLI

WCSCLI command

```
show cdn-nodes
```

displays CDN version supported by node and group which node belongs to

Ip	State	Processing state	Role	Version	Group
-----	-----	-----	-----	-----	-----
192.168.0.102	ACTIVE	NEW_STREAMS_ALLOWED	TRANSCODER	2.3	null
192.168.0.187	ACTIVE	NEW_STREAMS_ALLOWED	EDGE	2.3	null

In this case, CDN version matching result will be displayed for ACTIVE node and CDN version explicitly set will be displayed for PASSIVE node (see below)

Using REST API

[REST API](#) query /cdn/show_nodes returns CDN version supported by node

```
[
  {
    "version": "2.3",
    "role": "TRANSCODER",
    "globalState": "ACTIVE",
    "processingState": "NEW_STREAMS_ALLOWED",
    "id": "192.168.0.102"
  },
  {
    "version": "2.3",
    "role": "EDGE",
    "globalState": "ACTIVE",
    "processingState": "NEW_STREAMS_ALLOWED",
    "id": "192.168.0.187"
  }
]
```

In this case, CDN version matching result will be displayed for ACTIVE node and CDN version explicitly set will be displayed for PASSIVE node (see below)

Channel quality control between CDN nodes

Since build [5.2.483](#) [channel quality control](#) ability in Origin -> Transcoder -> Edge direction is added. To enable this feature, set the outbound bitrate sending interval value in seconds

```
outbound_video_rate_stat_send_interval=1
```

on Origin and Transcoder nodes.

In this case, the outbound and inbound bitrate values on subscriber node side are periodically comparing with publisher side one. The steady divergence of those values means channel bandwidth decrease. The peaks and sudden changes are smoothed by [Kalman filter](#). Channel quality metric and statistics for the stream can be checked by REST API query.

Checking channel quality metric and statistics using REST API

- HTTP: <http://test.flashphoner.com:8081/rest-api/cdn/stats/print>
- HTTPS: <https://test.flashphoner.com:8444/rest-api/cdn/stats/print>

Where:

- test.flashphoner.com - WCS server address
- 8081 - REST / HTTP port
- 8444 - HTTPS port
- rest-api - mandatory URL part
- /cdn/stats/print - REST method used

REST queries should be sent to node from which statistics should be get. For example, on Edge node statistics can be checked for the stream received from Origin or Transcoder, and on Transcoder node for the stream received from Origin

REST queries and response states

REST query	Body example	Response example	Response states	Description
/cdn/stats/print	<pre>{ "name": "test", "host": "192.168.0.111", "format": "json" }</pre>	<pre>{ "192.168.0.111": [{ "fps": 30, "inboundBitrate": 1658292, "nack": 0, "name": "test", "outboundBitrate": 1692676, "quality": "PERFECT" }] }</pre>	200 – OK 404 - Stream not found	Get the stream statistics

Parameters

Parameter	Description	Example
name	Stream name	test
host	Node IP address from which stream is receiving	192.168.0.111
format	Response format	json
inboundBitrate	Inbound (received) bitrate	1658292
outboundBitrate	Outbound (sent) bitrate	1692676
nack	NACK count	0
fps	FPS	30
quality	Channel quality metric	PERFECT

The query without stream name returns all the streams statistics received from the CDN node defined. The query without node returns all the streams statistics received from other CDN nodes if the stream name is not set

Response formats

By default, statistics is returned in JSON format:

```
POST /rest-api/cdn/stats/print HTTP/1.1
Content-Length: 19
Content-Type: application/json
Host: test.flashphoner.com:8081
{
  "name": "test"
}

HTTP/1.1 200 OK
Access-Control-Allow-Origin: *
Content-Length: 125
Content-Type: application/json
{
  "192.168.0.111": [
    {
      "fps": 31,
      "inboundBitrate": 1052794,
      "nack": 81,
      "name": "test",
      "outboundBitrate": 1048518,
      "quality": "PERFECT"
    }
  ]
}
```

Prometheus format is also supported:

```
POST /rest-api/cdn/stats/print HTTP/1.1
Content-Length: 43
Content-Type: application/json
Host: test.flashphoner.com:8081
{
  "format": "prometheus",
  "name": "test"
}

HTTP/1.1 200 OK
Access-Control-Allow-Origin: *
Content-Length: 397
Content-Type: plain/text

cdn_connection_quality{param="inboundBitrate",node="192.168.0.111",name="test"} 1249049
cdn_connection_quality{param="outboundBitrate",node="192.168.0.111",name="test"} 1240717
cdn_connection_quality{param="quality",node="192.168.0.111",name="test"} 3
cdn_connection_quality{param="fps",node="192.168.0.111",name="test"} 30
cdn_connection_quality{param="nack",node="192.168.0.111",name="test"} 81
```

Channel quality metric is shown as follows

JSON	Prometheus	Description
UNKNOWN	0	Quality is unknown, media packets are not received
BAD	1	Quality is bad
GOOD	2	Quality is good
PERFECT	3	Quality is perfect

Node state periodic sending

To reduce impact of channels quality between CDN nodes to CDN current state collection on each node, there was a couple of parameters added to control the period of CDN node state components sending to another nodes

Parameter	Default value	Description
cdn_nodes_acl_refresh_interval	60000	Interval to send ACL keys list, ms
cdn_nodes_group_refresh_interval	60000	Interval to send node groups, ms
cdn_nodes_role_refresh_interval	60000	Interval to send node role, ms
cdn_nodes_route_refresh_interval	60000	Interval to send node routes, ms
cdn_nodes_state_refresh_interval	60000	Interval to send node state, ms
cdn_nodes_version_refresh_interval	90000	Interval to send CDN version supported, ms

Backward compatibility with CDN 2.2, 2.1, 2.0

Controller node in previous CDN version

For previous CDN versions node, Controller node is Origin.

CDN 2.1 nodes will choose a route to stream playback without Controller node even if this node is in the group.

CDN versions matching

Since build [5.2.471](#), CDN versions matching works as follows: when CDN signaling connection is established, nodes send version supported to each other. If versions are differ, node with later version will fall it to earlier one. For example if Edge 2.3 is connecting to CDN 2.2, it will send CDN 2.2 compatible messages only to another nodes. At all the CDN point this Edge server will look like CDN 2.2 supporting node.

Every node periodically sends its version to another nodes to escape versions mismatch after losing the connection. The version refresh period is set in milliseconds with the following parameter

```
cdn_nodes_version_refresh_interval=90000
```

By default, version refresh period is 90 seconds.

PASSIVE node version assign

When node goes to PASSIVE state after losing the connection or by setting with `/cdn/enforce_state` REST query, the message exchange with this node will stop. Another nodes will suppose PASSIVE node to support CDN version set by the following parameter

```
cdn_force_version=2.0
```

By default, CDN 2.0 is assignade to PASSIVE node.

For eaxmple, if one Edge in CDN 2.3 loses the connection with another servers, CDN nodes will suppose this Edge to be CDN 2.0 until it restores CDN connection and passes CDN versions matching.

Known limits

To choose a stream playback route using Controller node, Edge node should be in the same group, and this group must be set in CDN node settings:

```
cdn_groups=g1
```

Controller node choose all the routes through Transcoder nodes in the same group only.

Controller node without any group set cannot be used to choose a route.