6CN

Content Networking with IPv6, http://6cn.io

Eric Vyncke
Distinguished Engineer, evyncke@cisco.com
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6CN: Coding Content Description – Example of ipv6 address template

IPV6	Routing prefix + subnet id	Interface identifier
Bits	48 + 16	64

Fields	Stream Type	Service ID	Content Descriptor	Chunk Descriptor		
Bits	2	12	26	24		
				4	4	16
Comments	= 4 types 00 = linear 01 = non-linear 10 = UGC 11 = corp.	= 4096 services per type	= 70+ millions per service	= 16 profiles To combining appropriated AV formats (DASH/HLS most significant bit) and ABR qualities =0 reserved value	= duration From 1 to 15s =0 can be reserved for none, so a single (big) chunk/file	= chunk sequence number Allows by iteration to (pre)-fetch/cache over the network Combined with Duration, it references from 6 hours to 4 days per service/content. It also gives direct time stamps for trick modes =0 can be reserved for the DASH/HLS manifest

Example of recommendation

Fields	Show/Serie ID	Episode ID
Bits	16	10
Comment	= 65000+ per service	= 1000+ per show

Fields	Source ID	Movie ID
Bits	12	14
Comment	= 4000+ per service	= 16000+ per source

Fields	#Day	#Clock
Bits	15	11
Comment	*year/month/day*	*minute in the day*

Flexible Address Format

```
{
    "prefixes": [  "2001:bc8:2543:101::/64" ],
    "id": "Packet_net-origin",
    "name": "Origin at Packet.net Sunnyvale",
    "description": "Cisco Live 2017 CDN",
    "fields": [ {
        "id": "prefix",
        "description": "Video prefix",
        "length": 64 },
      { "id": "stream_type",
        "description": "Stream Type",
        "length": 2,
        "values": {"0":"linear", "1":"non-linear", "2":"UGC",
"3":"corp."}
      },
```

6CN: IPv6-Centric to Cache, Analyze and Route Videos

http://6cn.io *Sunnyvale, California (origin server)*

Home | Introduction to 6CN | Video catalog ▾ | Video via DASH ▾ | Video via HLS ▾ | Analytics ▾ | CDN

Streaming video

Video streaming is usually done by two incompatible systems (DASH and HLS described in other tabs) but share the concept of splitting a long movie in small video sequences. The duration of each sequence is usually small (1 to 5 seconds) in order to allow quick start (once a couple of chunks are preloaded) as well as sliding quickly through the video. As there are usually multiple representation of one movie (language, resolution, required bandwidth, ...), there will be multiple video chunks for the same video segment.

Introduction to 6CN

In the usual system, the video chunks are in the same file and the browser accesses them by fetching a specific byte range or by using URI with some parameters.

In the 6CN (Content Networking for Delivery and Caching), each video chunk has its own IPv6 address (which can vary based on the cache the chunk is located).

All IPv6 addresses are generated in a special way, you can try to decode ⧉, or encode ⧉ them ;-). The encoding scheme is described in a specific format and there is a tool ⧉ to edit this format.

Putting semantics in IPv6 addresses also opens the door for NetFlow-based analytics by the provider even when chunks are encrypted. The addressing scheme used by this demo is described below (and look at the impressive number of videos which can be encoded in a single /64):

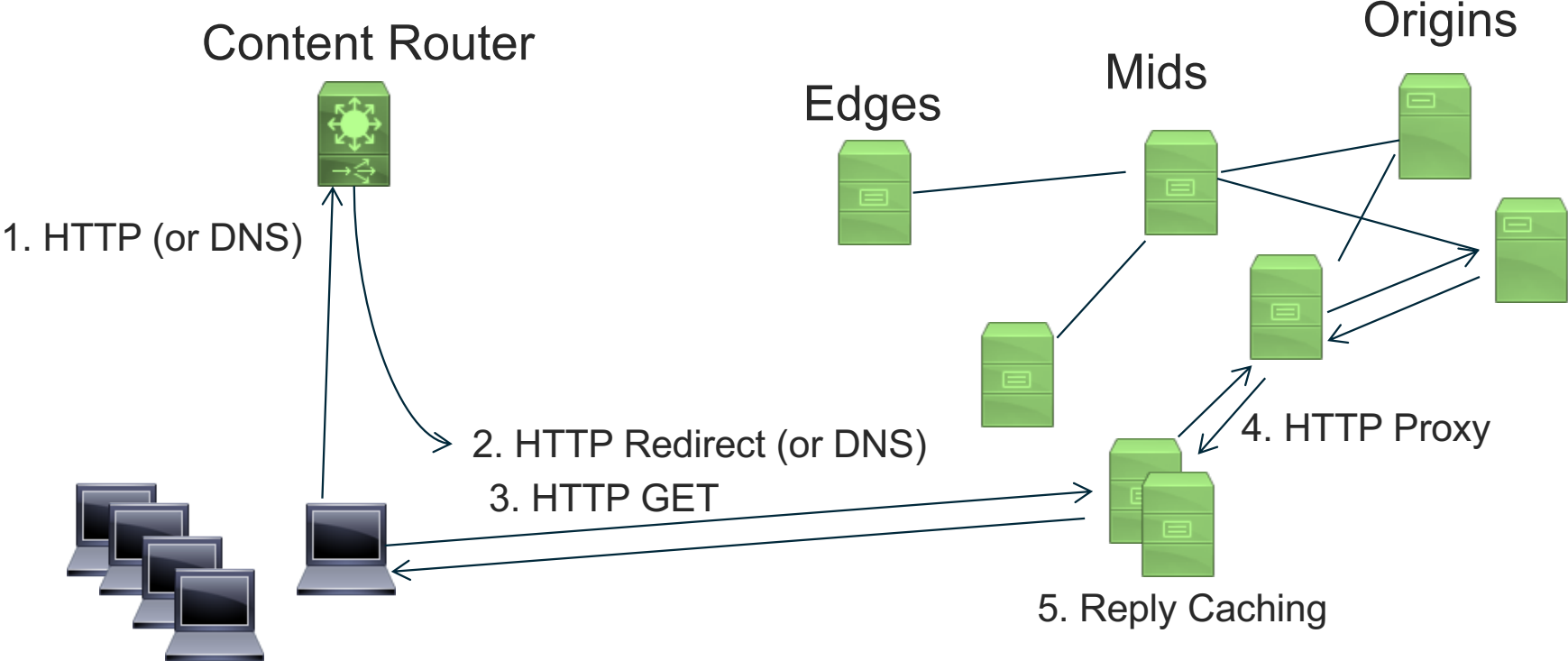6CN: Coding Content Description – Example of ipv6 address template

Traditional Traffic Control CDN

Content Router

Origins

Mids

Edges

1. HTTP (or DNS)

2. HTTP Redirect (or DNS)

3. HTTP GET

4. HTTP Proxy

5. Reply Caching

Adding 6CN to Traffic Control

Edges

Mids

Origins

2001:c::CID

Content Router

2001:b::CID

2001:a::CID

Apache Traffic Server

Apache Traffic Server

IP based QoS

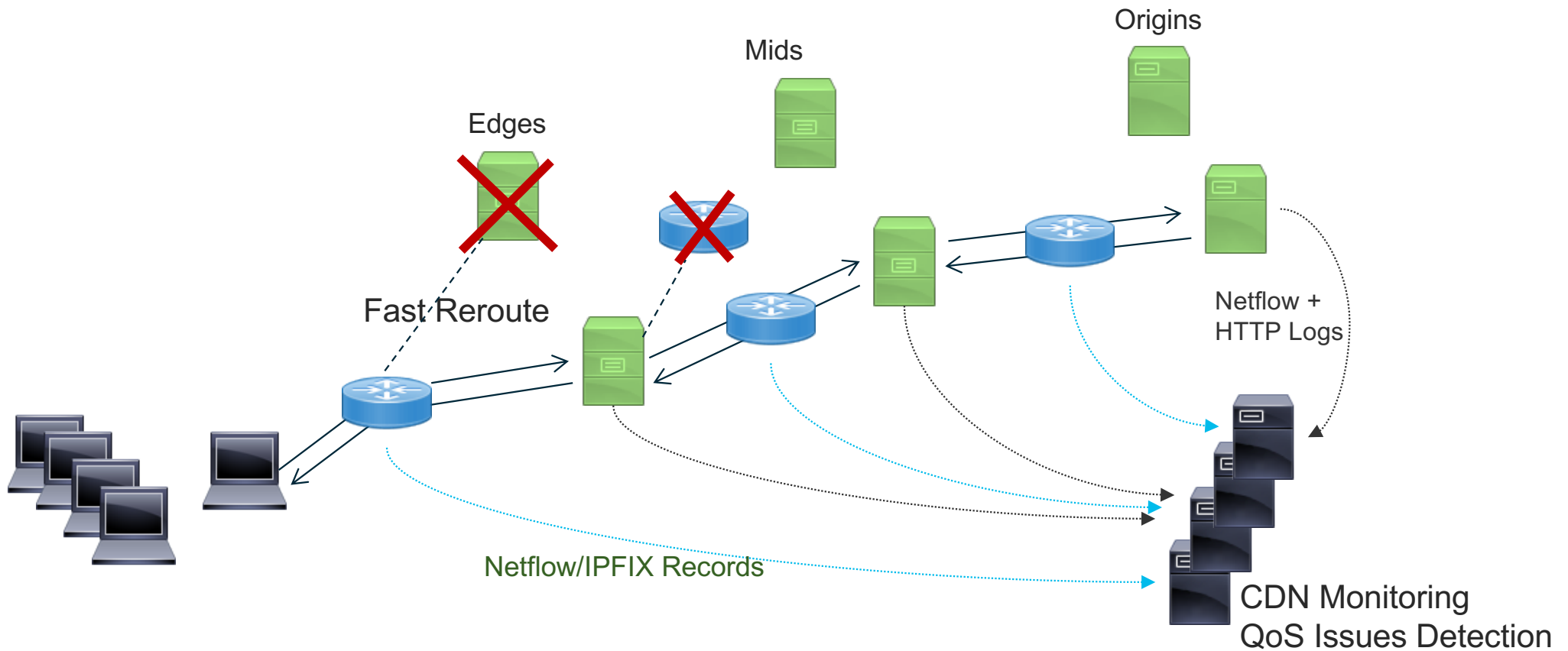[Anycast or Unicast Locator]::[Content ID]

Search:

Profile	Host_Name	Edge Cache Group	Healthy	Admin	Connections	Mbps Out
ALL	ALL	ALL	✓	ALL	2	0
EDGE_CDE250_prs-cdn	tedge1	EDGE-1	✓	REPORTED	1	0
EDGE_CDE250_prs-cdn	tedge2	EDGE-1	✓	REPORTED	1	0
ALL	ALL	EDGE-1	✓	ALL	2	0
ALL	ALL	MID-1	✓	ALL	0	0

Showing 1 to 5 of 5 entries

6CN Advantages – High Availability, Monitoring

Origins

Mids

Edges

Fast Reroute

Netflow +
HTTP Logs

Netflow/IPFIX Records

CDN Monitoring
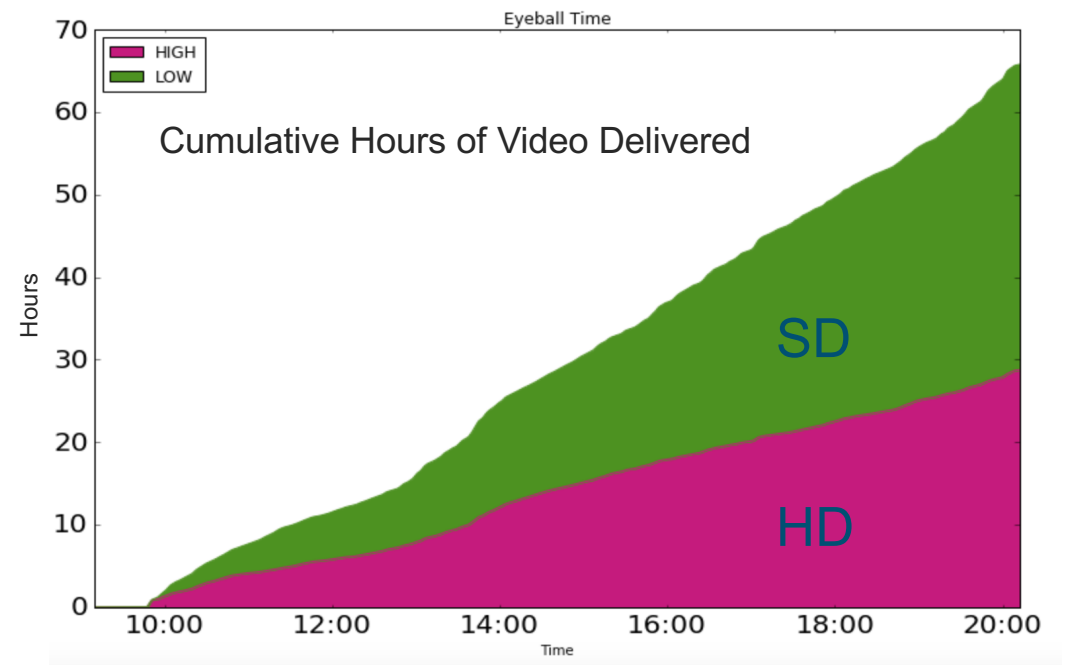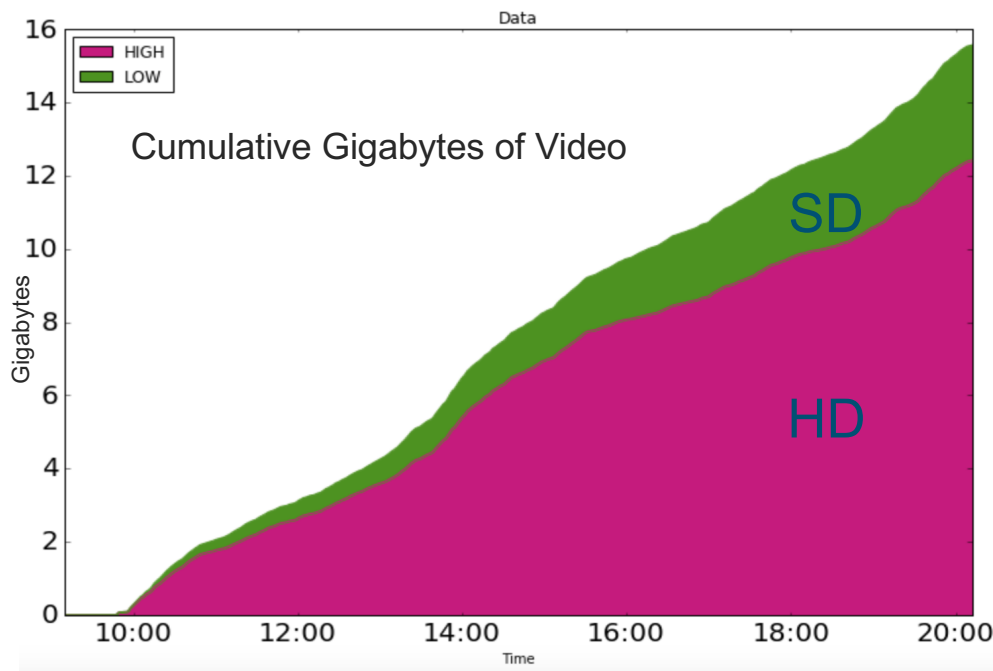QoS Issues Detection

Leverage decades of IP layer optimizations

Bytes vs. Hours for a given video (in HD or SD)

14 hour test period, using IPFIX records sent to PNDA (logstash & Kafka)
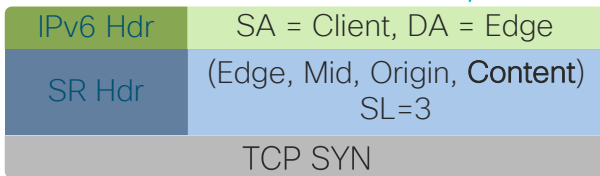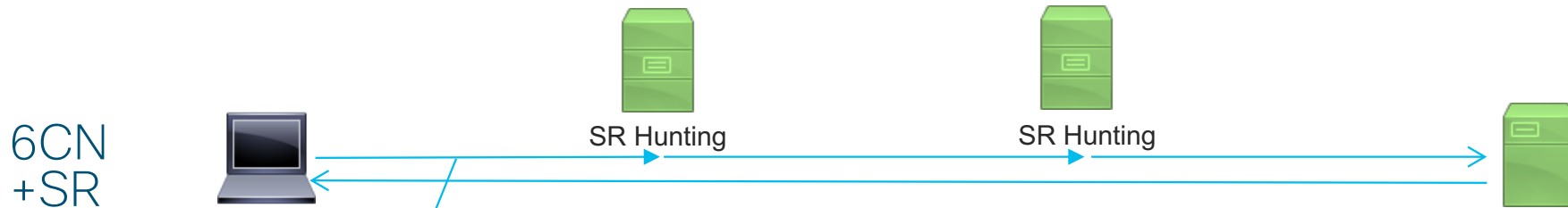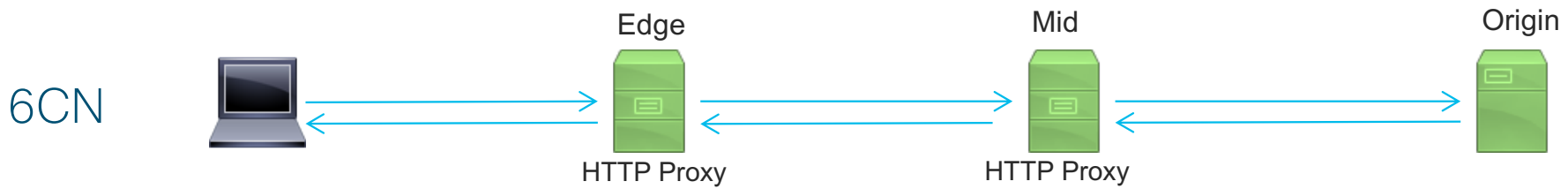
6CN Address Decoder

2001:bc8:2543:10a:4000:100:433:1d

Movie/chunk address	2001:0bc8:2543:010a:4000:0100:0433:001d	
Stream type	0000:0000:0000:0000:4000:0000:0000:0000	1
Service ID	0000:0000:0000:0000:0000:0000:0000:0000	0
Content descriptor	0000:0000:0000:0000:0000:0100:0400:0000	65540
Profile	0000:0000:0000:0000:0000:0000:0003:0000	3
Duration	0000:0000:0000:0000:0000:0000:0003:0000	3
Sequence	0000:0000:0000:0000:0000:0000:0000:001D	29

Address to decode: [   ] [Decode!]

Work In Progress: Segment Routing Content Hunting

6CN

Edge
Mid
Origin

HTTP Proxy
HTTP Proxy

6CN +SR

SR Hunting
SR Hunting

IPv6 Hdr	SA = Client, DA = Edge
SR Hdr	(Edge, Mid, Origin, **Content**) SL=3
	TCP SYN

SR Hunting Function:
Do a lookup on the last segment and act upon the lookup result.
In 6CN Context: Reply if content is in cache.

No HTTP Proxying

Upload your own 6CN Video

http://6cn.io/users/

Home Introduction to 6CN Video catalog ▾ Video via DASH ▾ Video via HLS ▾ Analytics ▾ CDN

Users videos

6CN community videos

Mark Townsley uses 6CN Videos.

Welcome back Mark Townsley

On this page you can find a couple of videos uploaded by the 6CN community.

You can also upload your own videos.

There are 9 videos in our 6CN video store. Feel free to click on any randomly selected video below to play it with some IPv6 information being displayed.

Happy 2017 !
2017-01-23 (7 view(s))
101 IPv6 addresses
Uploaded by: Eric Vyncke

Drone Racing in Alsace
2017-02-17 (7 view(s))
231 IPv6 addresses
Uploaded by: Pierre Pfister

Freeride in the Alps
2017-02-20 (5 view(s))
601 IPv6 addresses
Uploaded by: Pierre Pfister

Flying over the San Francisco Bay (fast forward)
2017-01-23 (14 view(s))
85 IPv6 addresses
Uploaded by: Eric Vyncke

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For more information:
http://6cn.io/6cn-doc.pdf
http://6cn.io (demo)