What can only be done with IPv6...

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June 2018

What are the difference between IPv4 and IPv6?

- Extension headers
- Way more addresses
- Multiple addresses per interfaces

Extension Headers

Segment Routing Header (SRH)

- A IETF draft using Routing Header
- Where each segment can be used for network programming
  - **Making Network Function Virtualization easier**
  - **Allowing Load Balancing at layer-3**
- http://www.segment-routing.net/

In-situ Operation, Administration and Management

- Allow routers on the path to mark packets with timing
- Allows for path verification
  - Important for NFV chaining
- Leveraging SRH
- https://datatracker.ietf.org/wg/ioam/about/

Way more addresses

Containers and IPv6

- In IPv4: containers share ’the’ IPv4 address of the host
  - One port per container and usually some ugly NAT
- In IPv6: containers can share a /64 prefix assigned to the host
  - Each container has access to the full range of TCP/UDP port
  - (/64 per host has some security benefits as well)

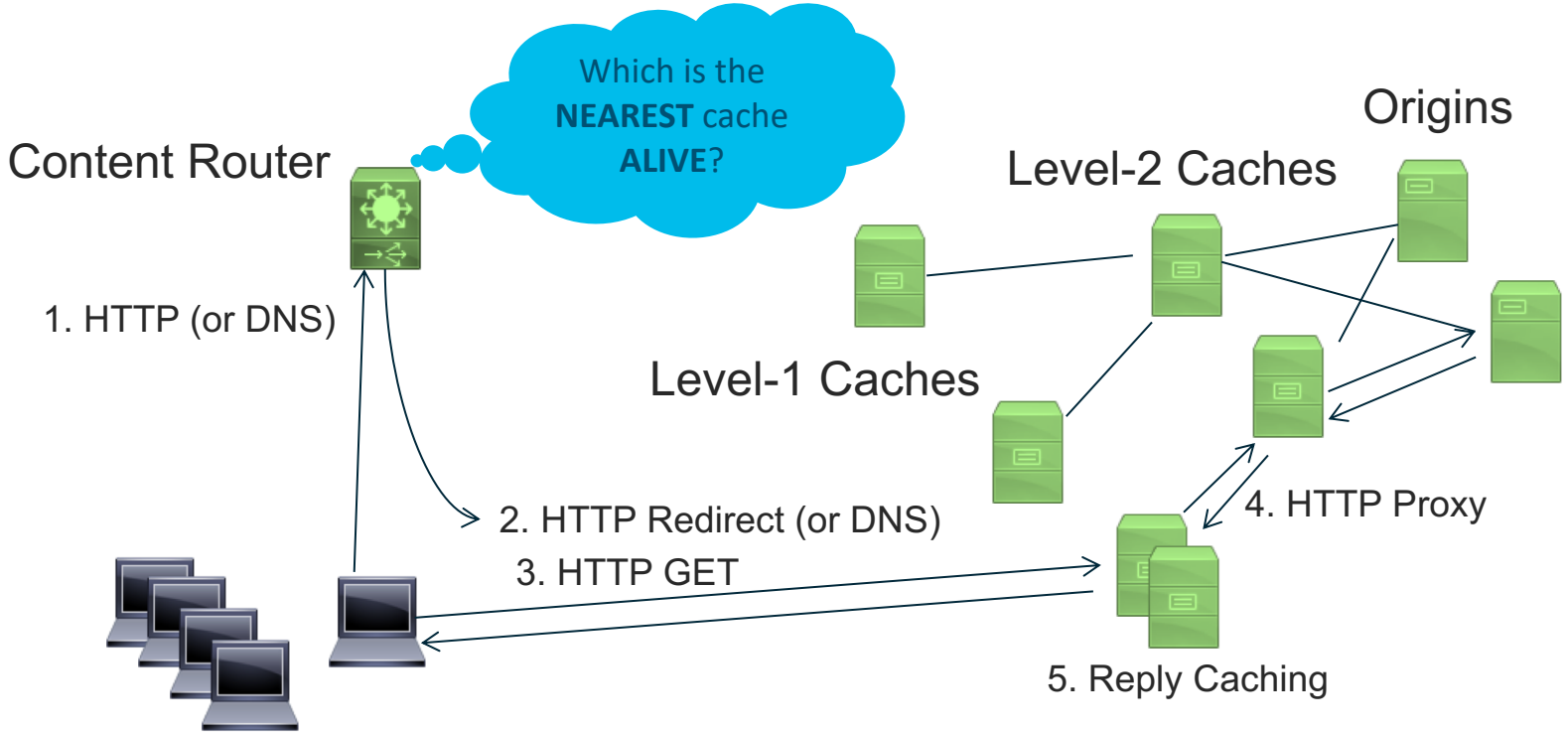
Coding Content Description in IPv6 Addresses – Example of IPv6 address template for movies

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

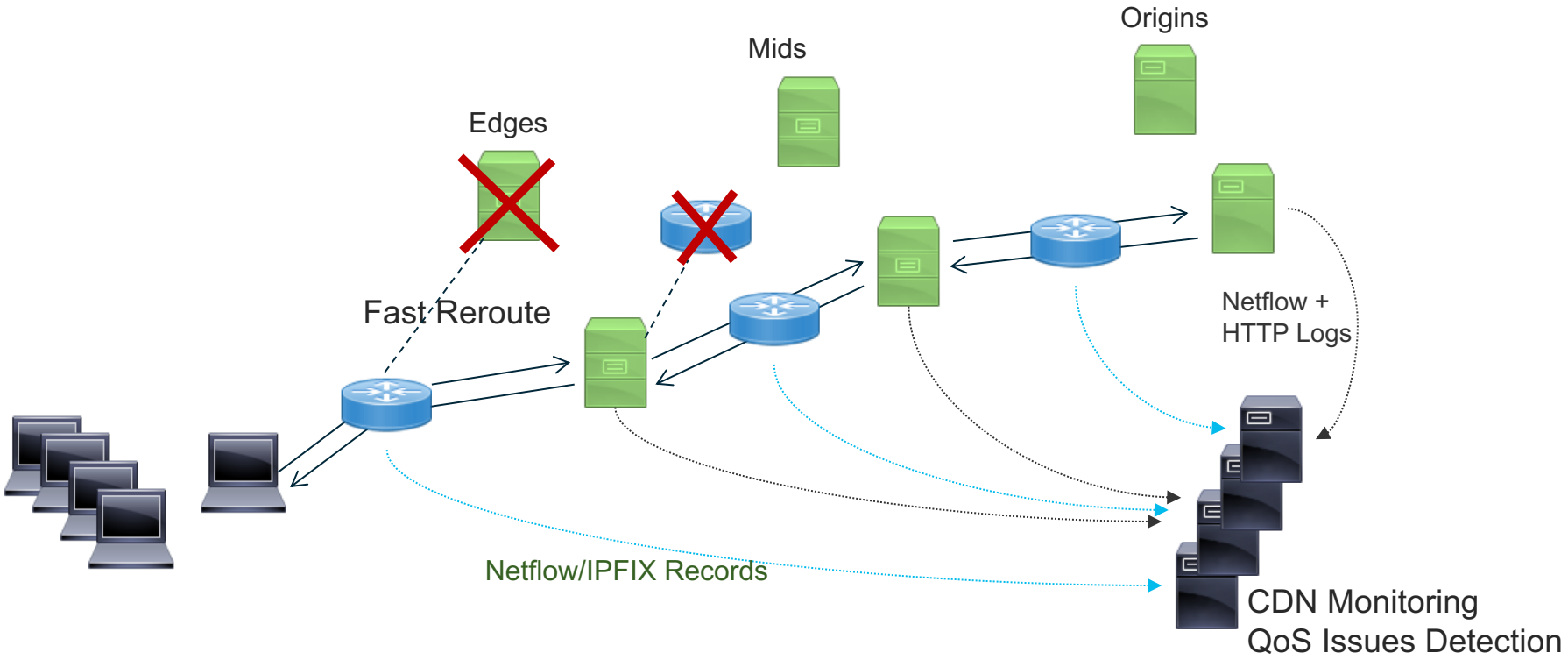
Fields	Stream Type	Service ID	Content Descriptor	Chunk Descriptor		
Bits	2	12	26	24		
				4	4	16
Comments	= 4 types 00 = linear 01 = non-linear 10 = UGC 11 = corp.	= 4096 services per type	= 70+ millions per service	= 16 profiles To combining appropriated AV formats (DASH/HLS most significant bit) and 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

See by your own: http://6cn.io

Traditional Traffic Control CDN



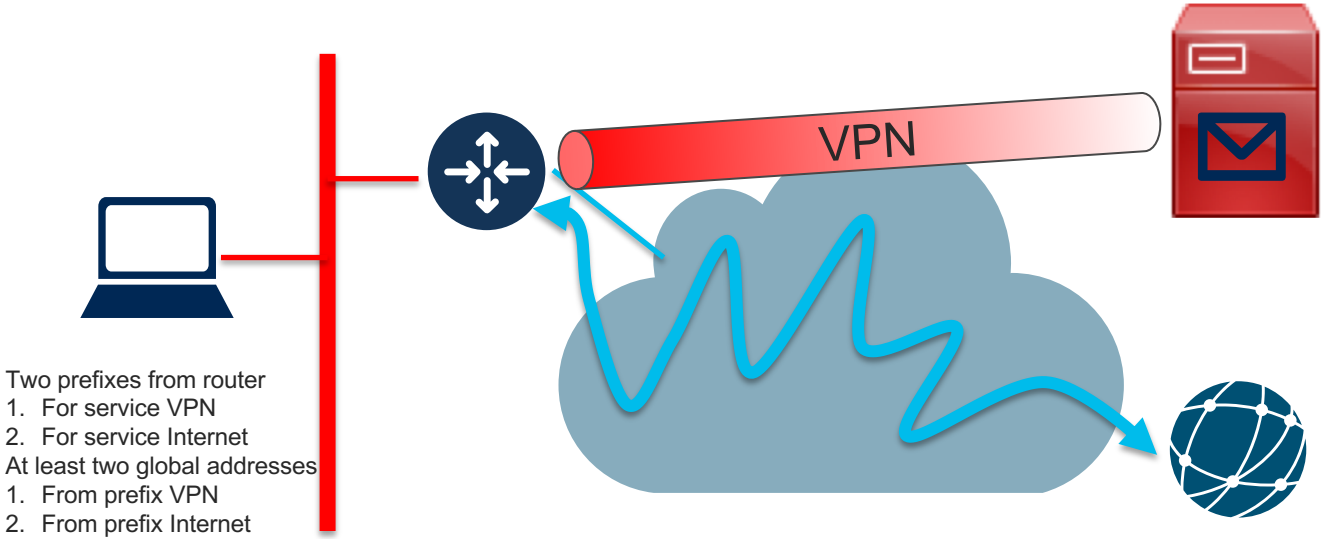
6CN Advantages – High Availability, Monitoring



Leverage decades of IP layer optimizations

Multiple IPv6 Addresses per Interface

Selecting the Service by Source Address



Traffic engineering
Different QoS
Different path

Network signals the services to the hosts

- draft-ietf-intarea-provisioning-domains
- Identify Provisioning Domains (PvDs)
  - *[RFC7556] Provisioning Domains (PvDs) are consistent sets of network properties that can be implicit, or advertised explicitly.*
- Extend PvD with additional information
  - For the applications: name, captive portal, etc…

IPv6 can do more than IPv4...

... And we are only scratching the surface...

- Extension headers prevent ossification of the IP stack
- Many addresses allow for micro-services addressing
- Multiple addresses per interface to allow the source to select the network service