GGIE: the Glass to Glass Internet Ecosystem

GGIE::Leveraging IPv6 Glass to Glass

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What is GGIE::Glass to Glass?

Scope: Internet video from the camera lens to the viewer’s screen

Primary Goal: Enable video streaming to scale on the Network

Secondary Goal: Be backwards compatible with existing video streaming

This Talk’s Focus: Content Distribution
Film’s Evolution to File to Packaged Media

- Film
- File
- Segments
- Packaged Segments

CMAF
Evolution: Name to URL to Manifests

- **Title** “Minions”
- **URL** [http://s1.example.com/Minions.mov](http://s1.example.com/Minions.mov) & byte offset
- **DASH Manifest & URLs** [http://s1.example.com/minions_199](http://s1.example.com/minions_199)
- **Multi-modal**: DASH Manifest or HLS MU8 Playlist or ....
Referencing Media Segments by IPv6

http://s1.example.com/minions_1Mbps_xxx

http://s1.example.com/minions_4Mbps_xxx

http://s1.example.com/minions_8Mbps_xxx

Current DASH Manifest Elements

DASH Manifest Elements with GGIE
  http://2001:db8::0001:xxxx
  http://2001:db8::0004:xxxx
  http://2001:db8::0008:xxxx

Segments

2~15 sec fragments

2001:db8::0001:xxxx
2001:db8::0004:xxxx
2001:db8::0008:xxxx
A little Inspiration from the past

The network is the computer

John Gage, Sun Microsystems
...Employee 21
Packaging IPv6 Segment References

Prefix 2001:db8::

Segments

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Segments</th>
<th>Packaged Media</th>
<th>Packaged Media Address References</th>
</tr>
</thead>
<tbody>
<tr>
<td>0010:0001</td>
<td>0010::FFFF</td>
<td>0010:FFFF</td>
<td></td>
</tr>
<tr>
<td>0020:0001</td>
<td>0020::FFFF</td>
<td>0020:FFFF</td>
<td></td>
</tr>
<tr>
<td>0030:0001</td>
<td>0030::FFFF</td>
<td>0030:FFFF</td>
<td></td>
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</tbody>
</table>

This a Media Encoding Network or MEN – A structured arrangement of references to segments
GGIE::Core Elements

**Media Identifier**
Identifies the Work
Generically holds IDs from content systems
EIDR, AD-ID, YouTube, Facebook etc.

**Media Encoding Network (MEN)**
References each Encode of the Work
IPv6 Address to Packaged Media assignment scheme


2001:db8::/64

**MARS**
Maps Media Identifiers to/from Media Encoding Networks
Connecting Assets & Resources

Assets
Access via Names:
- Media Assets
- Works/Titles
- Metadata
- Sources/Edits

Mapping & Connecting
- MARS
- Network
- App/API

Resources
Access via IPv6 Address:
- Packaged Assets
- Distributions
- Encodings
- Media Containers
- Packaged Metadata
GGIE Video Media Model

Apps
- CTA WAVE
- W3C Media
- DASH player
- HLS player

Devices
- Tablet
- Smart TV
- Smart Phone
- PC
- STB

Content Identification
- EIDR
- Unique Service IDs
- AD-ID
- GGIE URI

Media Encoding
- MPEG
- HEVC

Streaming Media Packaging
- DASH
- HLS
- CMAF

Packaged Media Addressing
- GGIE Media Encoding Networks (MEN)

Caching
- CDNs
- FOG Cache
- Local Cache
- GGIE Cache (optional)

Transport
- HTTP/HTTPS

Network Layer 4
- DNS
- GGIE MARS

Network Layer 3
- IPv6
- GGIE Direct Addressing

Segment Routing

Network Layer 3

GLASS
How about some running code?

*Developed under a Comcast Innovation Fund partnership with Prof. Gaurav Naik of Drexel University

NBCUniversal
drexel university
GLASS
GLASS
More about GGIE

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IETF 98 in Chicago March 26-31 (that’s next week)
  Monday 3/27  – Bar BoF on Internet Streaming
  Thursday 3/30 – Bits-n-Bytes live Glass-Glass demo in the Comcast-NBCUniversal booth

Glass to Glass Internet Ecosystem Introduction
  draft-deen-daigle-ggie
  by: G.Deen, L.Daigle

Using Media Encoding Networks to address MPEG-DASH video
  draft-deen-naik-ggie-men-mpeg-dash
  by: G.Deen, G.Naik, J.Brzozowski, L.Daigle, W.Rose, M.Townsley

GGIE Internet Video Use Cases
  draft-rose-deen-ggie-use-cases
  by: G.Deen, W.Rose

Glass to Glass Internet Ecosystem URI and S-NAPTR Use
  draft-daigle-deen-ggie-uri-snaptr
  by: L.Daigle, G.Deen,