



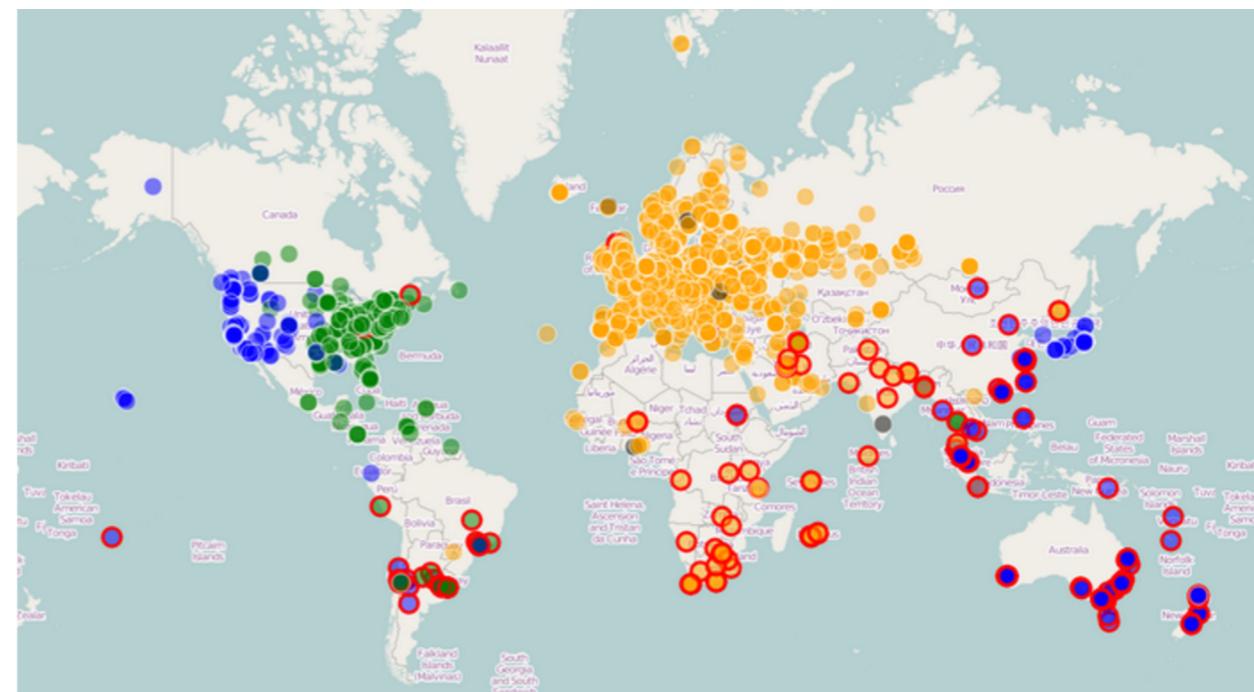
# Measuring Multi-CDNs

(they look like jelly fish)

# Traffic Engineering: BGP vs DNS



- BGP
  - Network operators control/influence
- DNS
  - Content network controls hostname → IP mapping
  - Example: Wikipedia



<https://labs.ripe.net/Members/emileaben/how-ripe-atlas-helped-wikipedia-users>

# CDN vs Multi-CDN



- Content Delivery Network (CDN): puts your content close to users
- By using multiple CDNs you can leverage strengths of each single one
- Big deployments: operating system updates
  - Apple: iOS, Mac OS X
  - Microsoft: Windows
- Do you know where the next big OS update is going to cause traffic spikes?

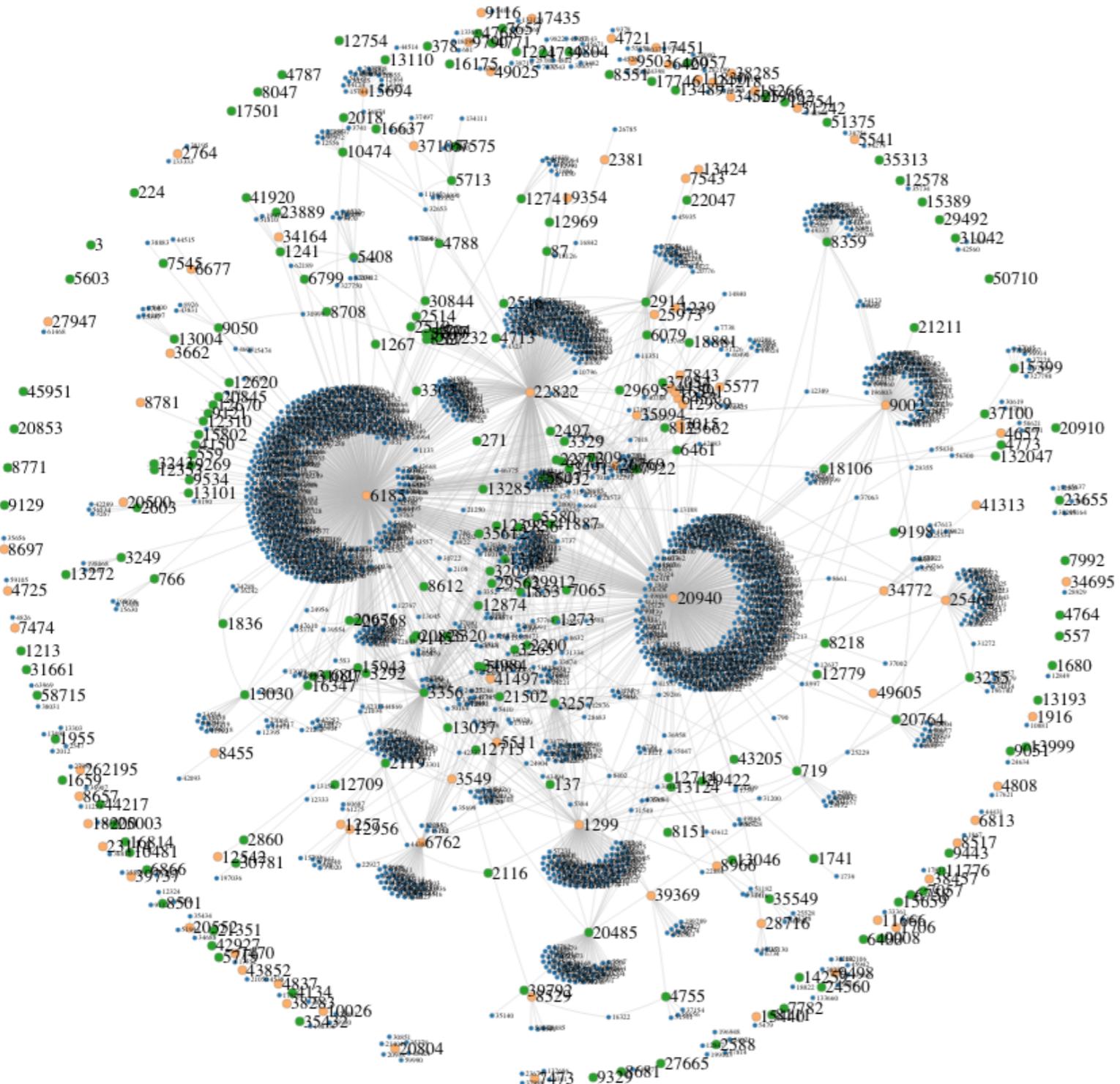
# Can we measure this?



- Yes! With RIPE Atlas
- Input: “steering” hostname (e.g. swcdn.apple.com )
  - Periodically resolve this to IP on RIPE Atlas probes
  - Map IP to ASN
  - Result: pairs of source and destination ASNs

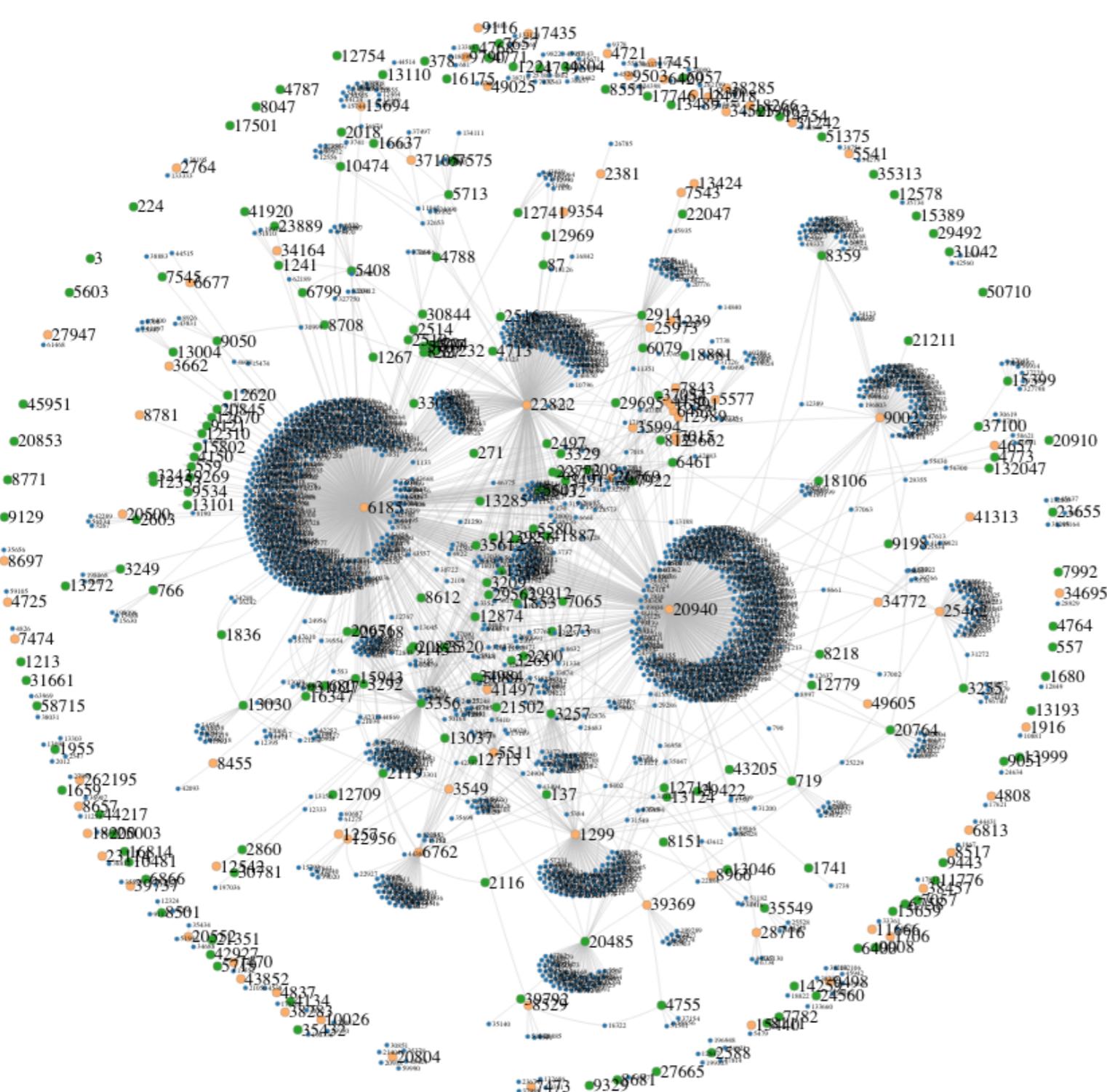


# Apple mCDN (around iOS8)



*Source (blue) - destination (orange) ASN pairs for Apple multiCDN. ASNs can be both (green).*

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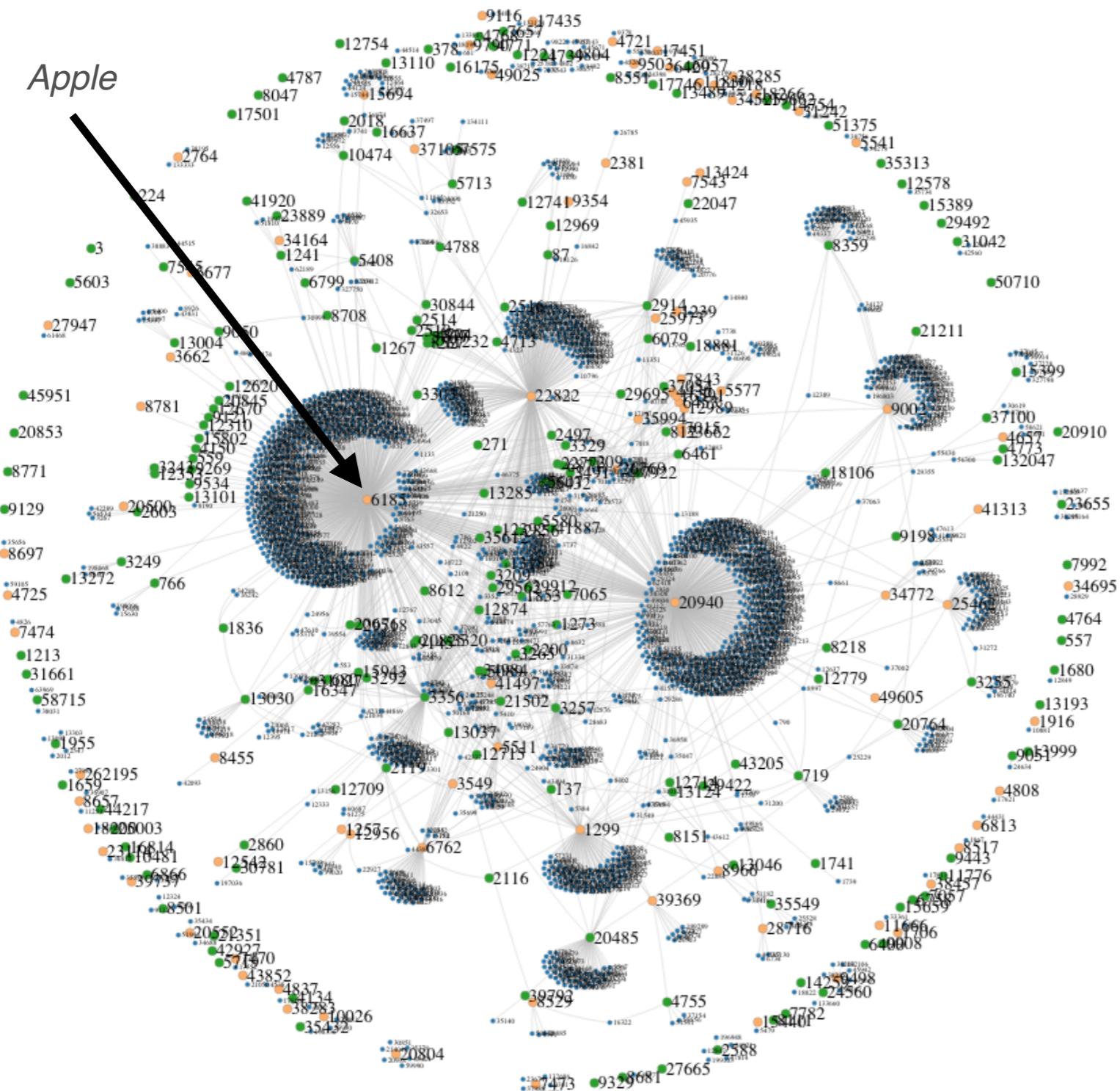


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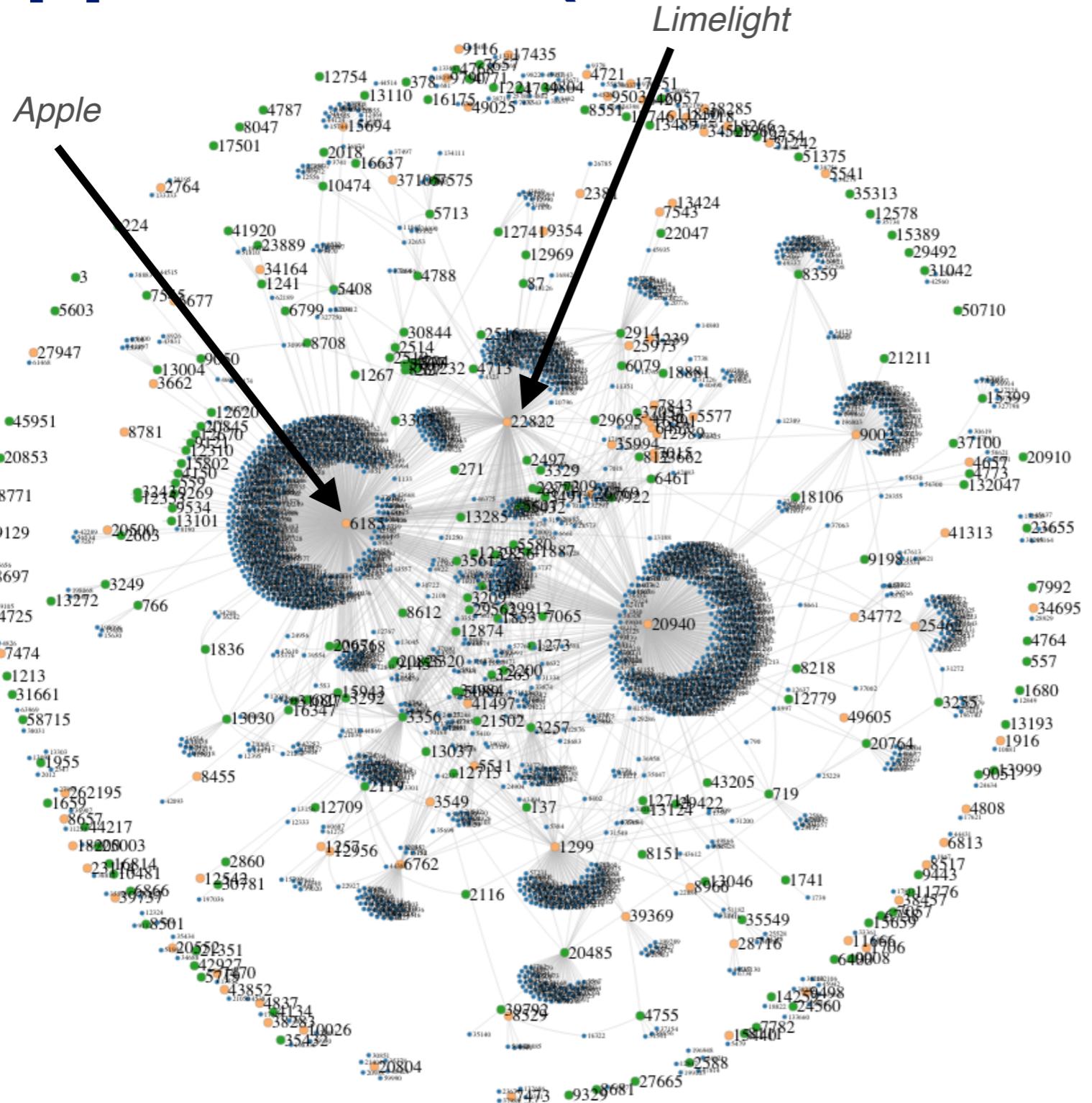


*Apple*



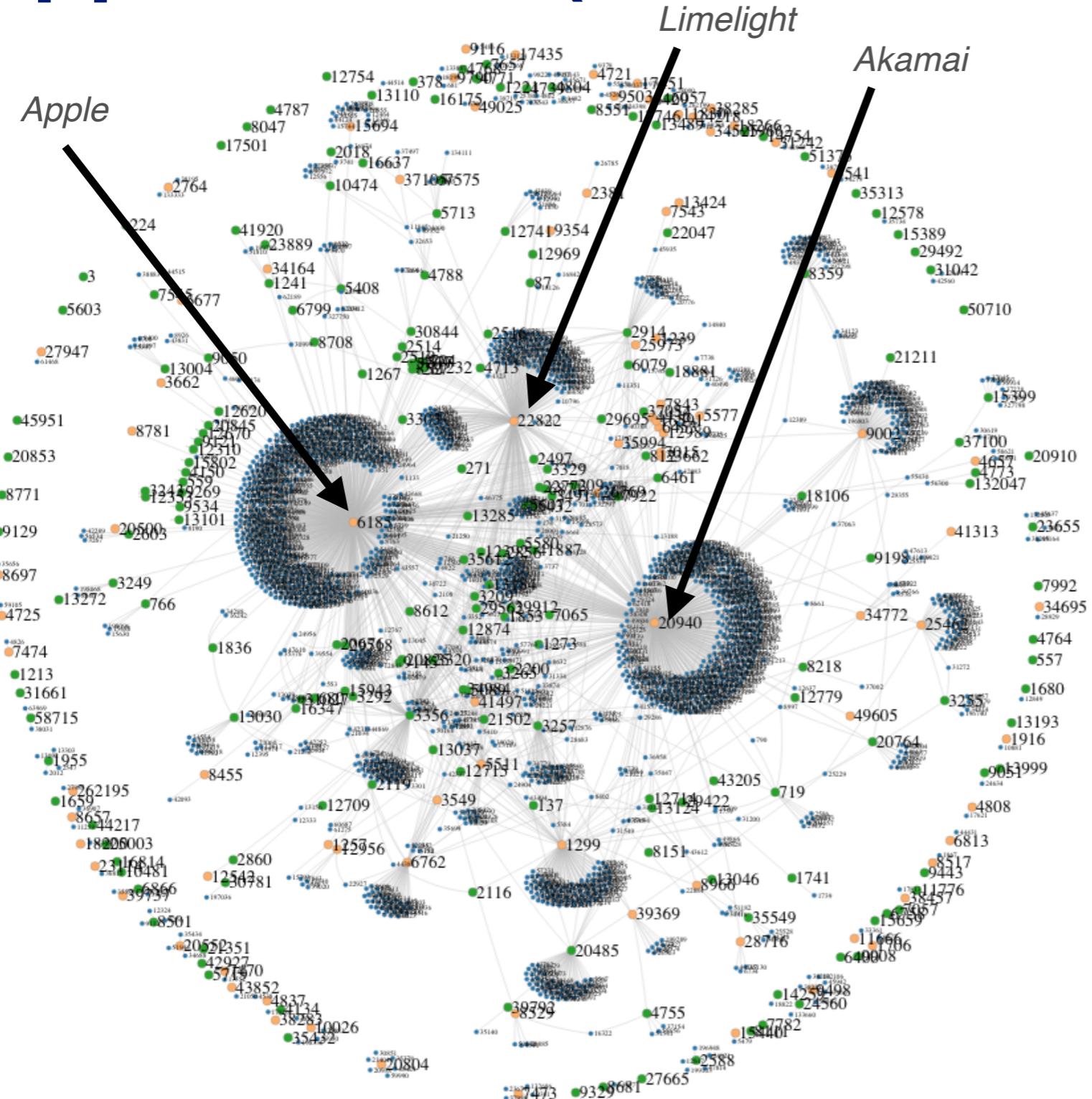
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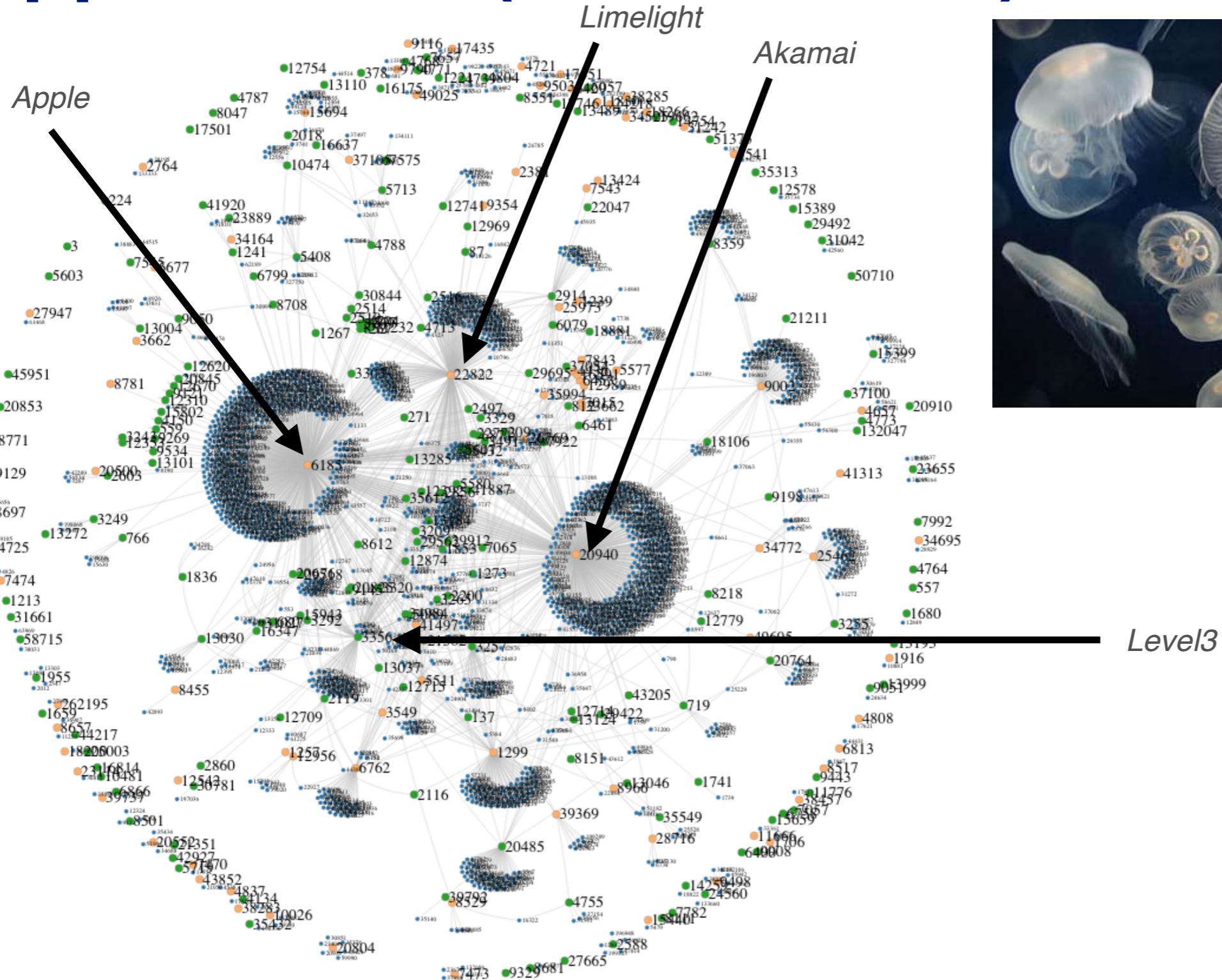
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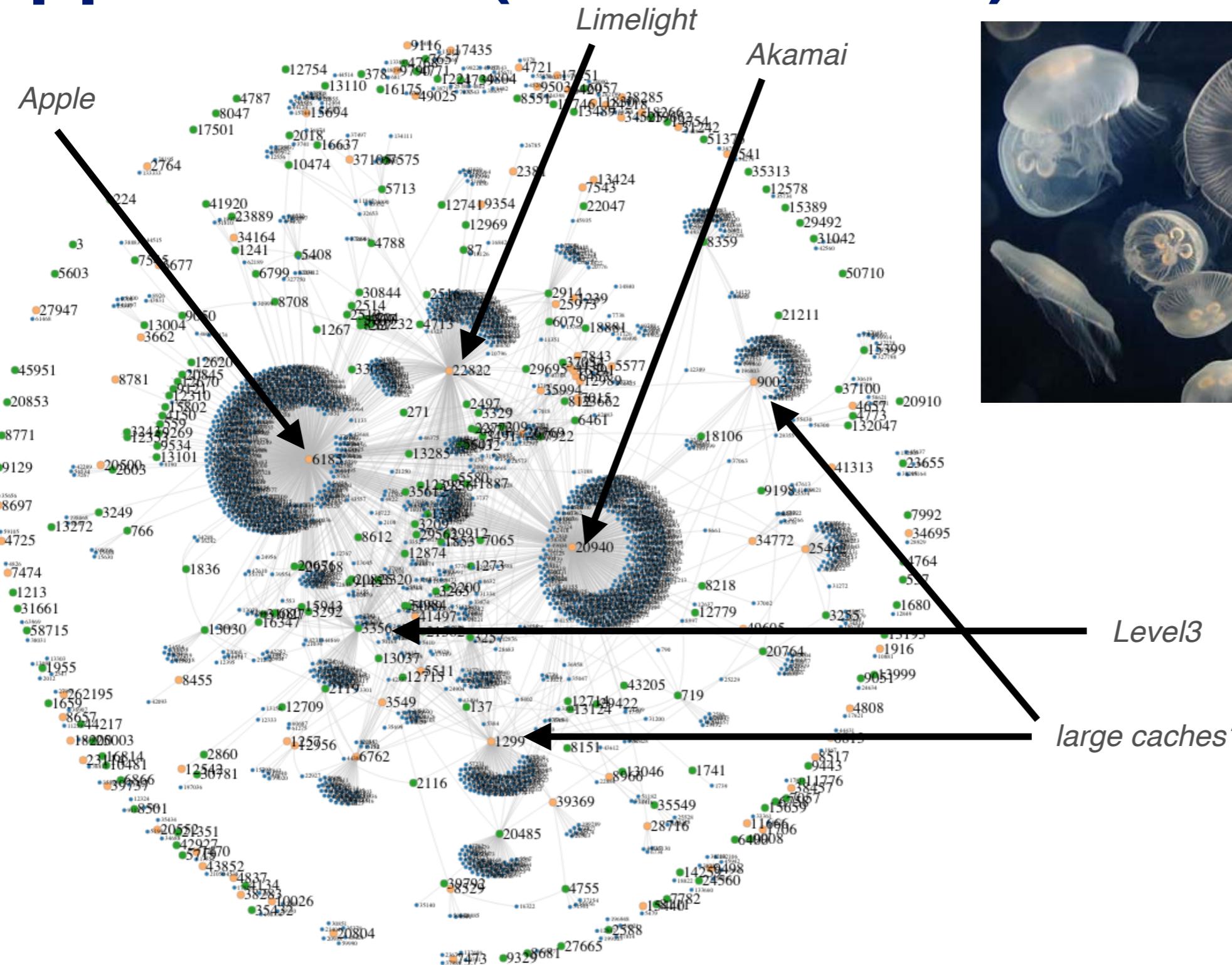


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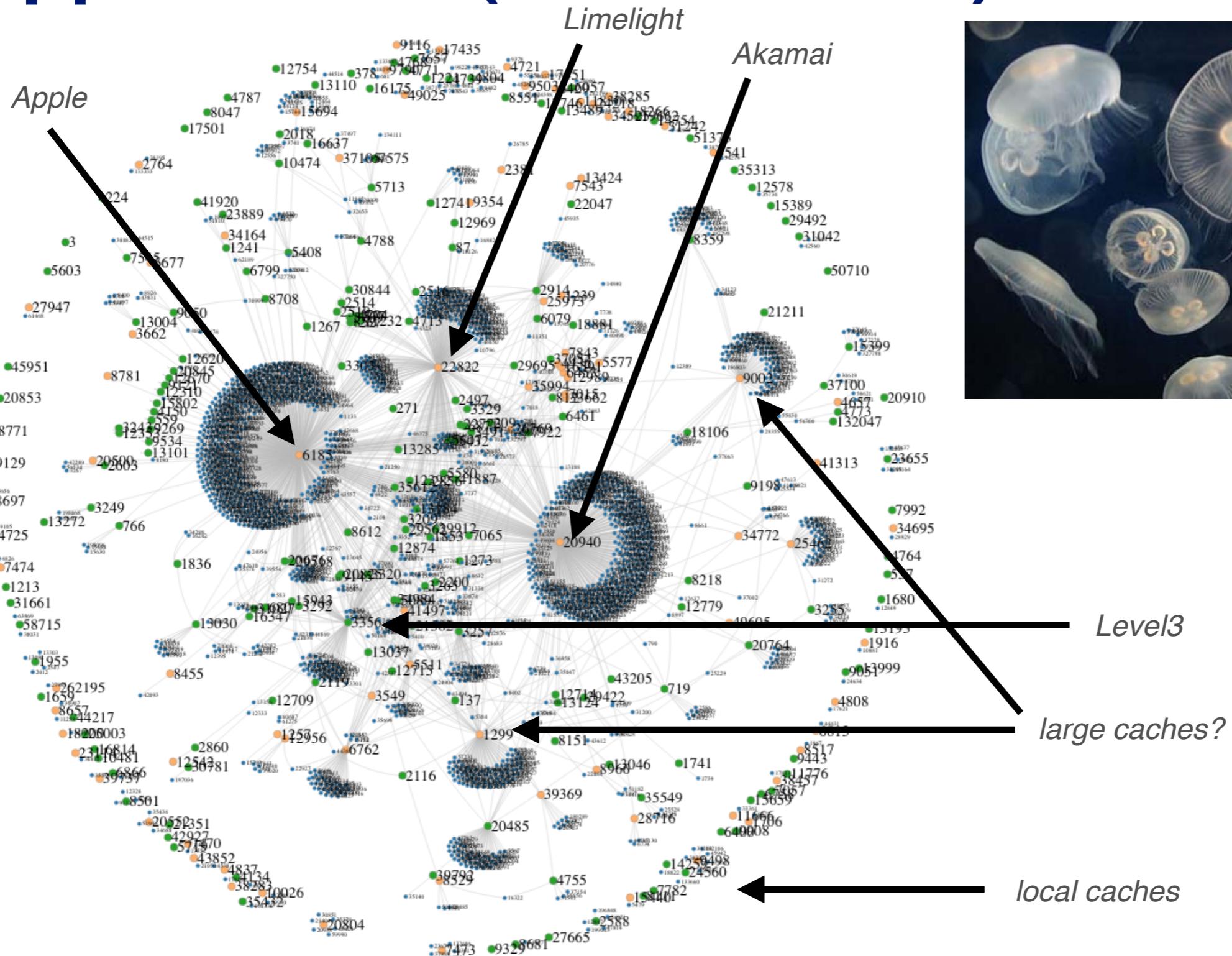


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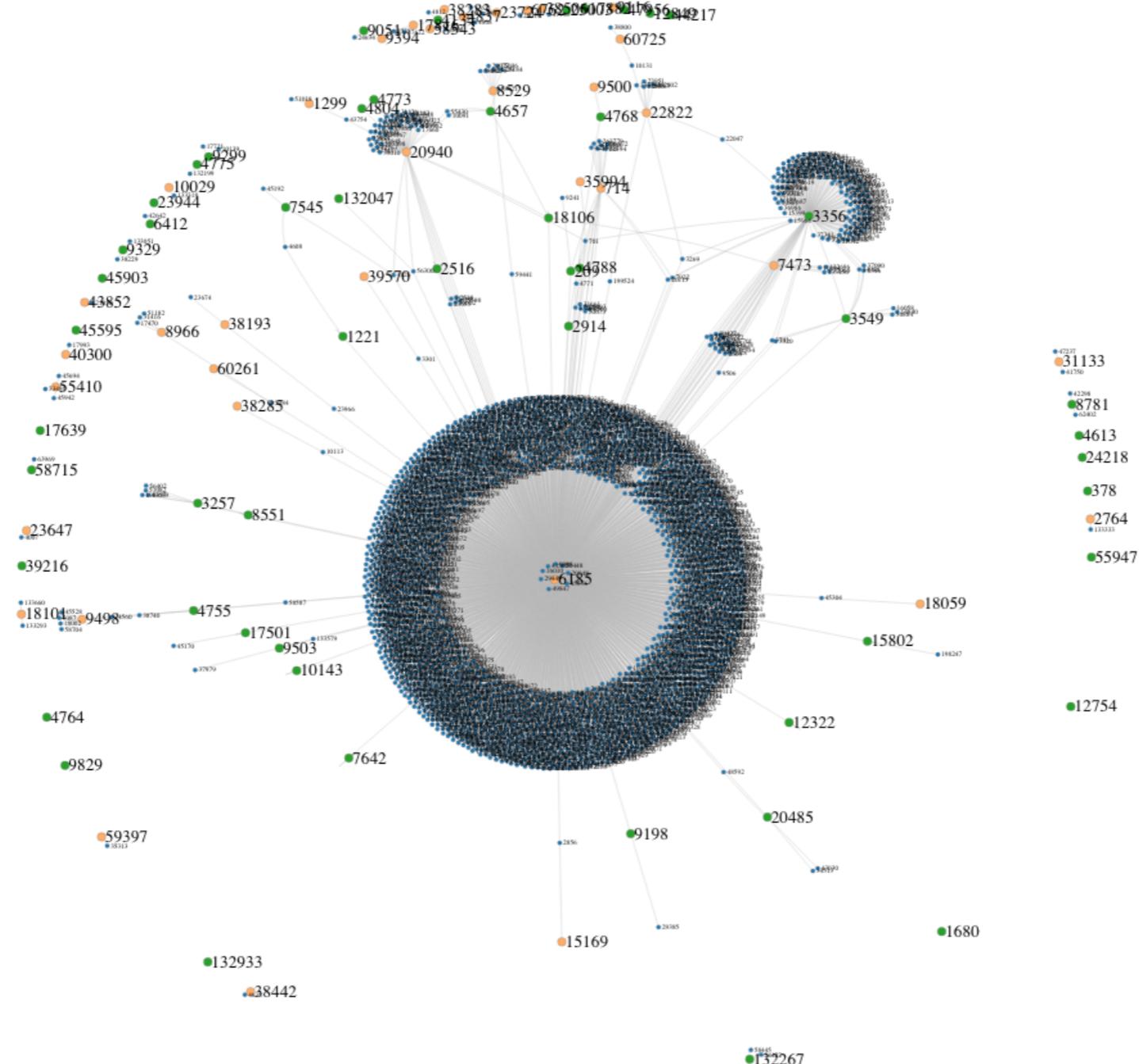
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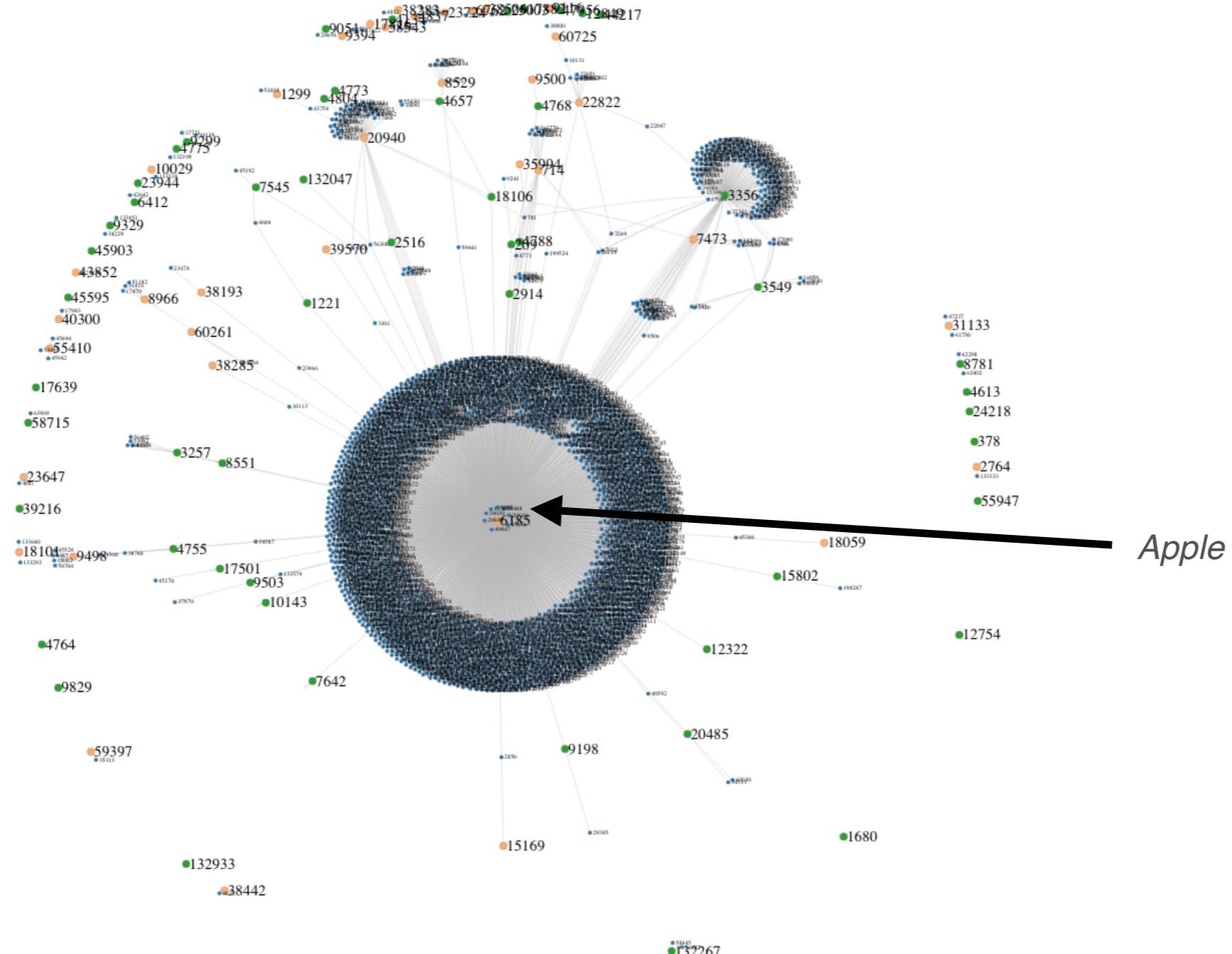
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# Apple mCDN (around iOS9)



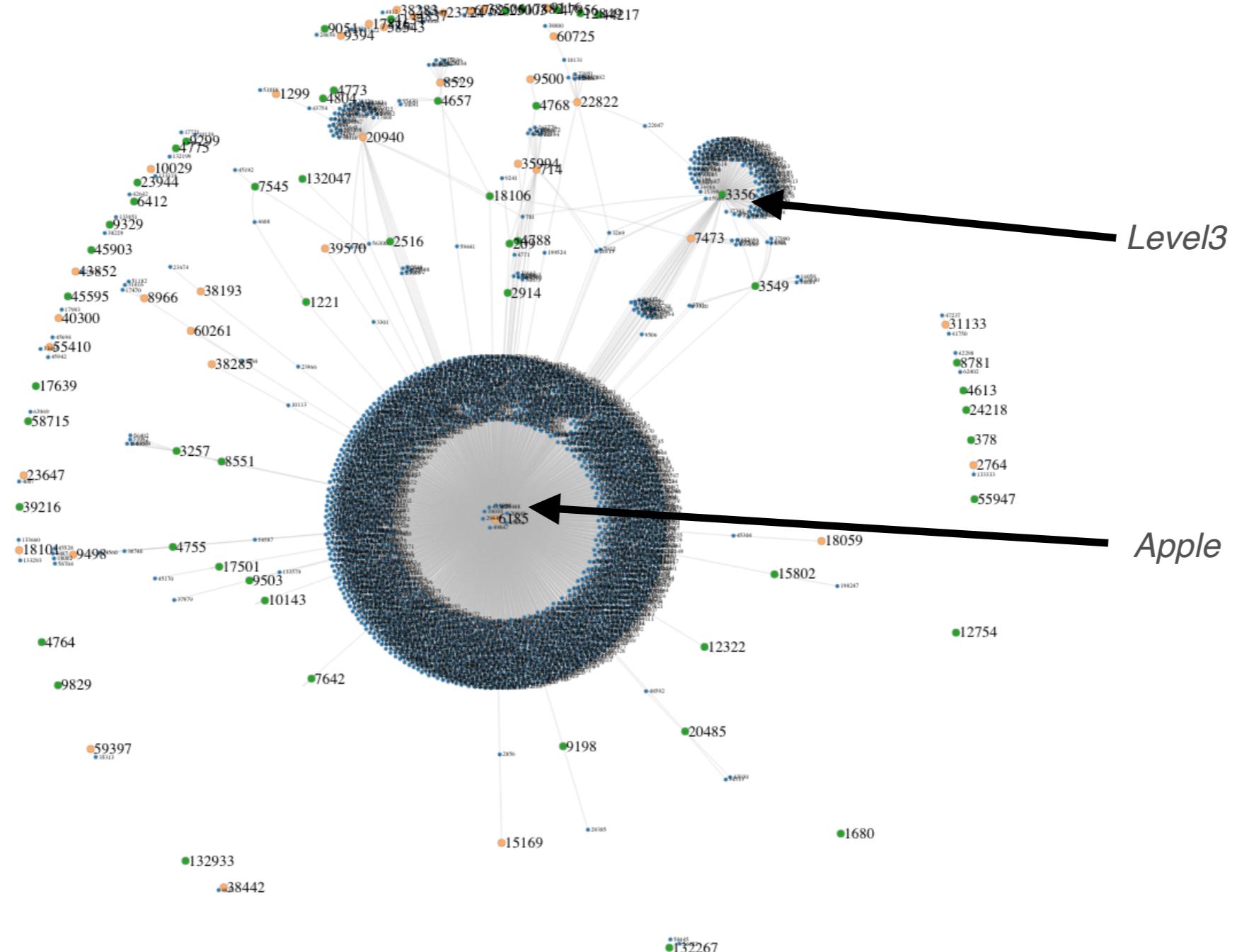
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# Apple mCDN (around iOS9)



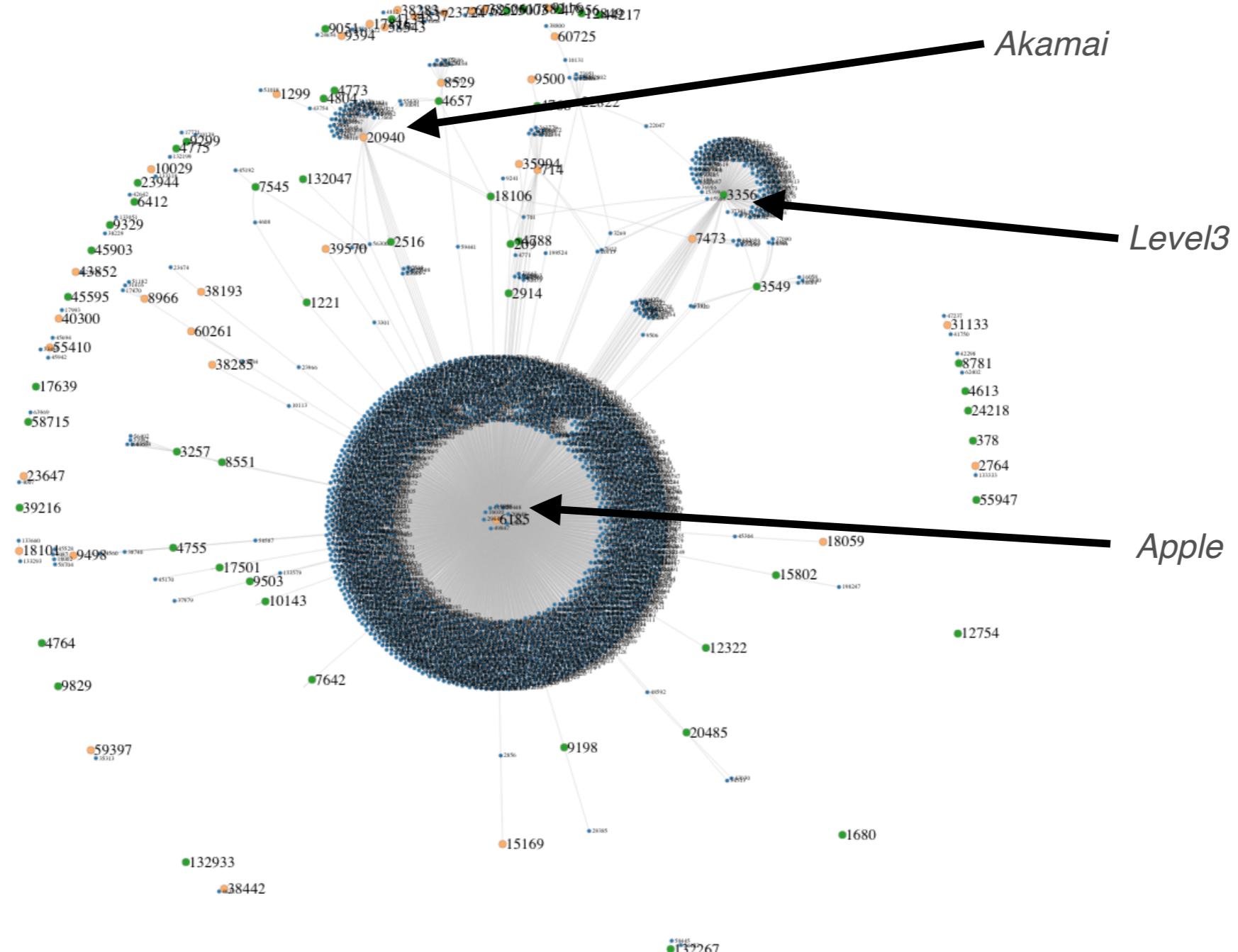
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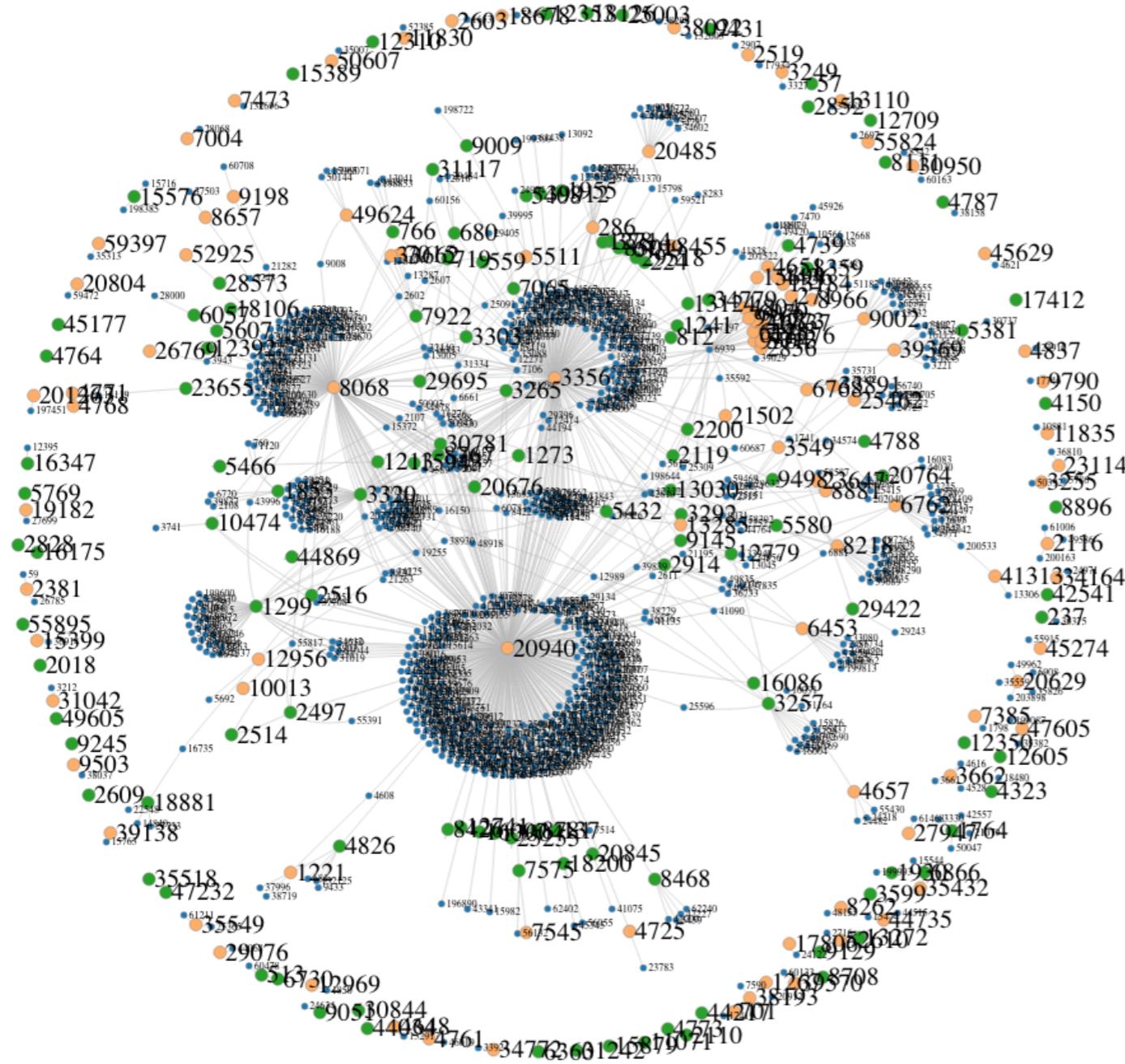
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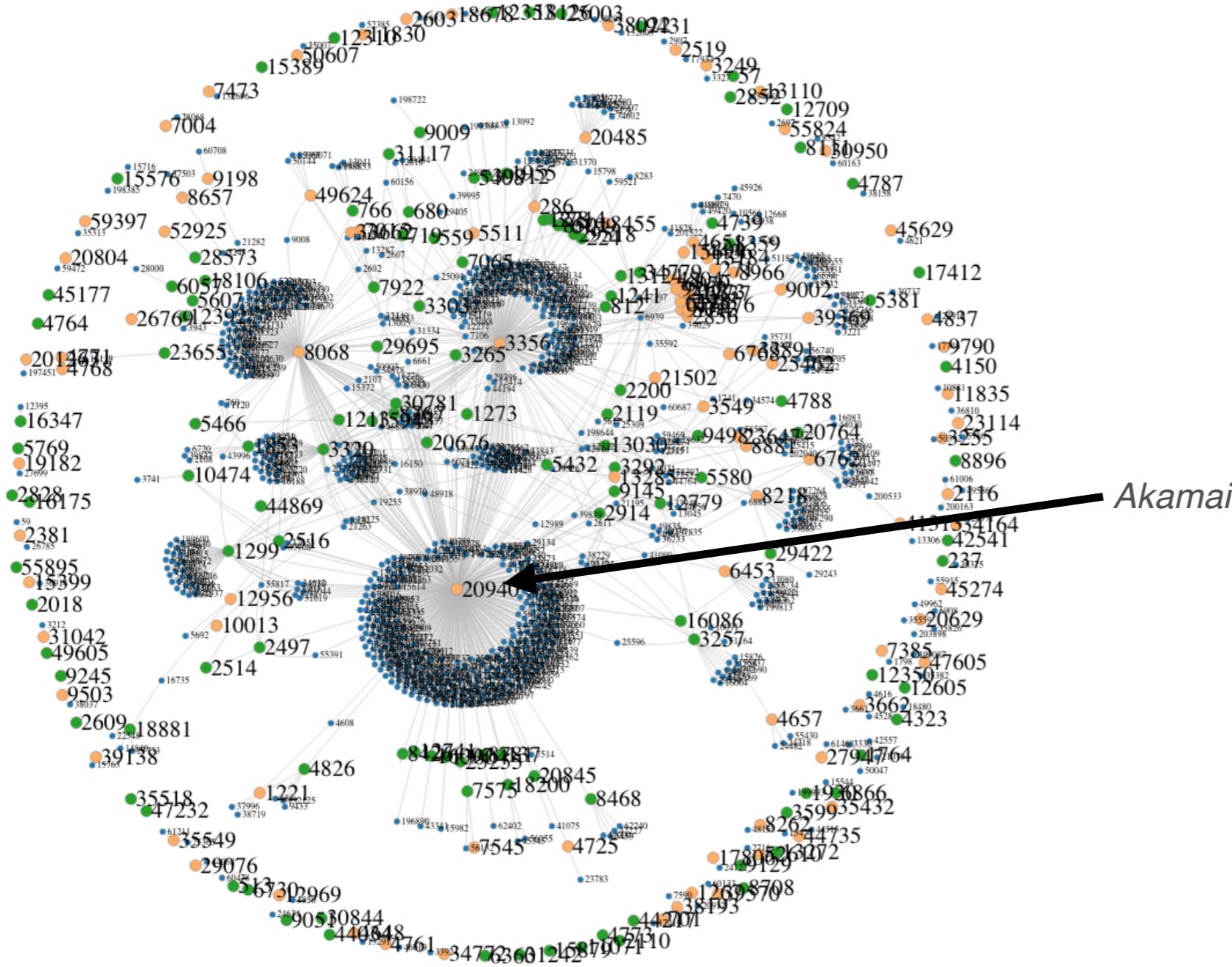
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# Microsoft mCDN IPv4 (Windows 10)



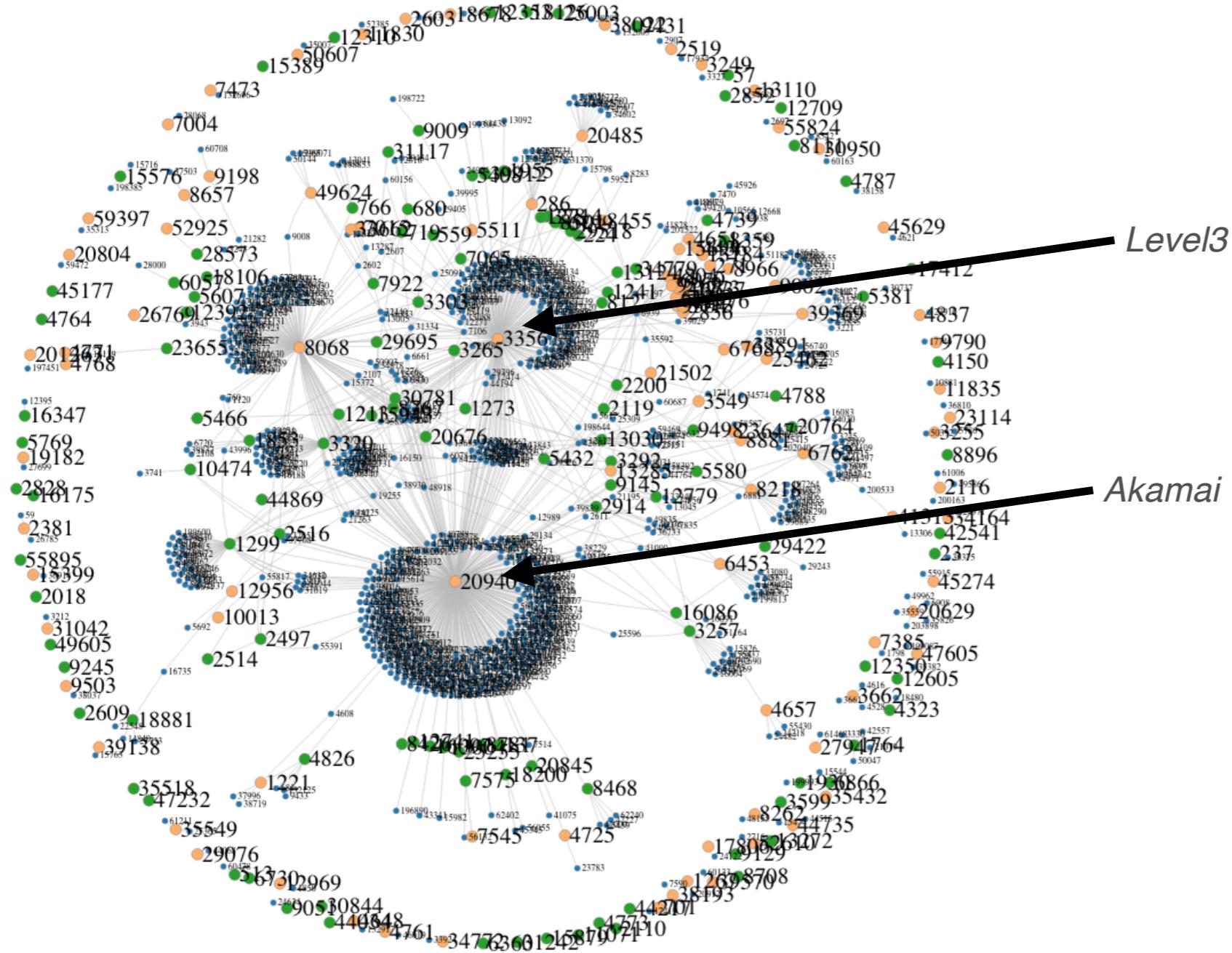
*Source (blue) - destination (orange) ASN pairs for Microsoft multiCDN use. ASNs can be both (green).*

# Microsoft mCDN IPv4 (Windows 10)



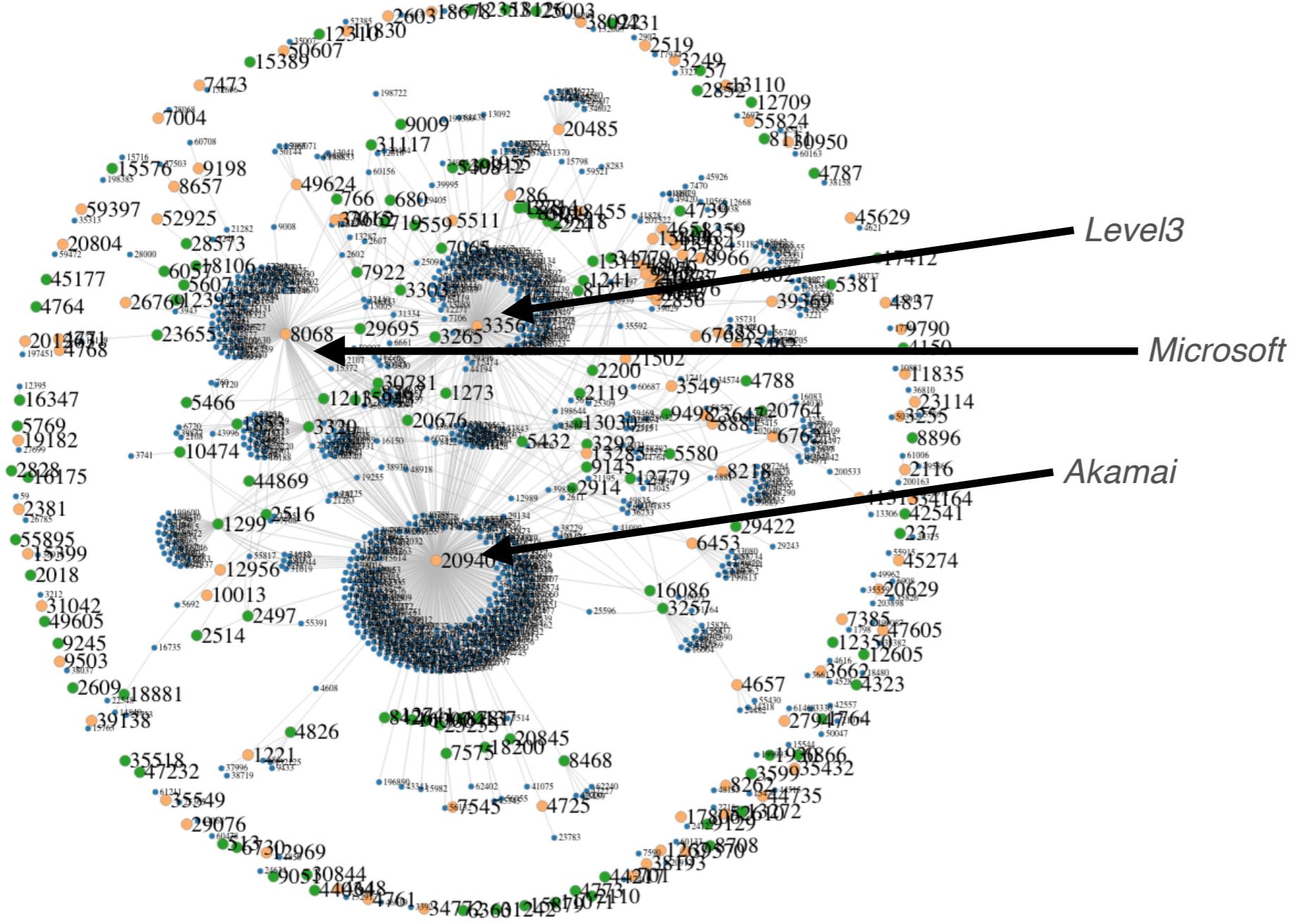
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# Microsoft mCDN IPv4 (Windows 10)



*Source (blue) - destination (orange) ASN pairs for Microsoft multiCDN use. ASNs can be both (green).*

# Microsoft mCDN IPv4 (Windows 10)



*Source (blue) - destination (orange) ASN pairs for Microsoft multiCDN use. ASNs can be both (green).*

# Microsoft mCDN IPv6 (Windows 10)



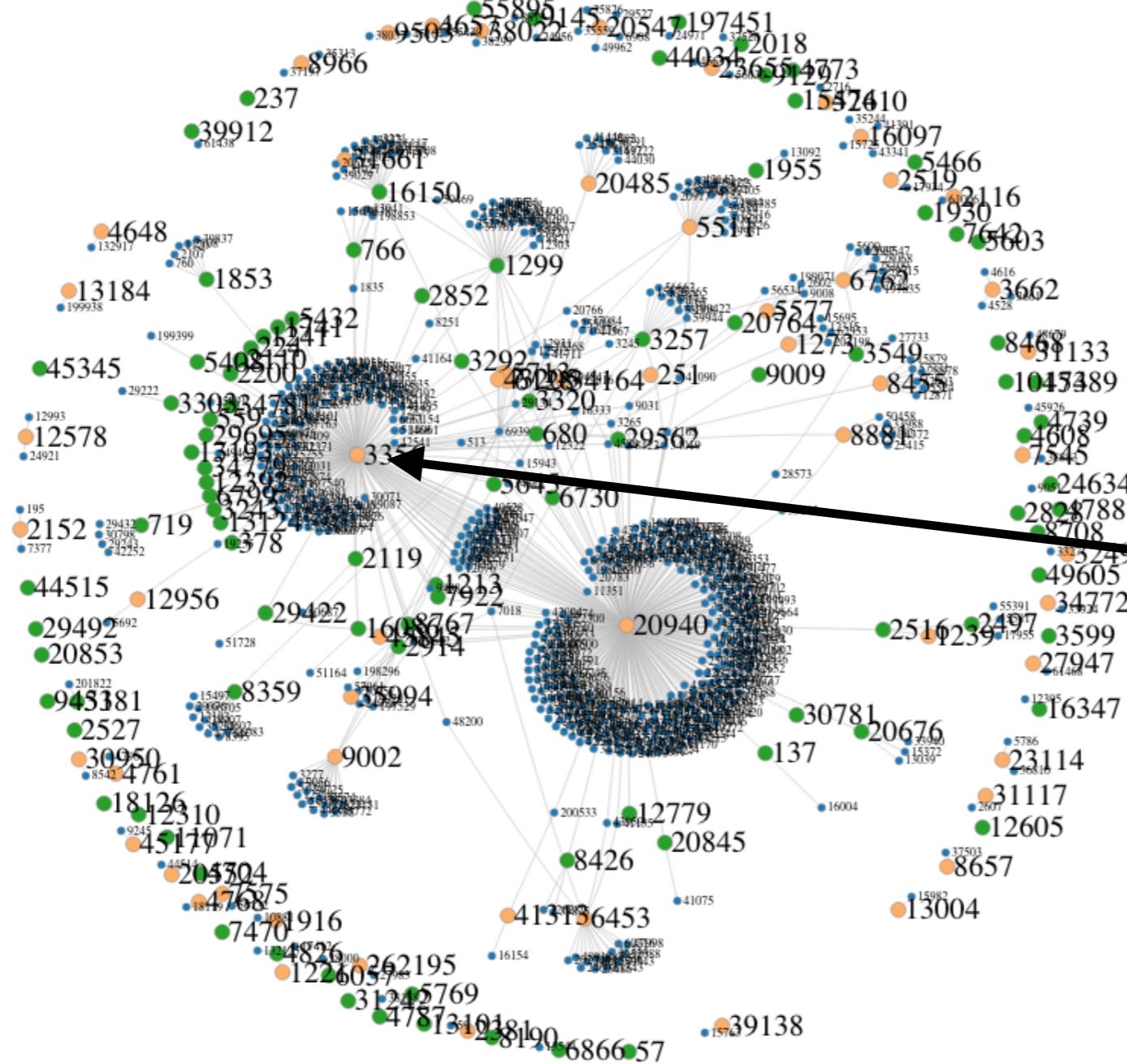
- Yes! IPv6  
enabled  
multi-CDN

*Source (blue) - destination (orange) ASN pairs for Microsoft multiCDN use. ASNs can be both (green).*

# Microsoft mCDN IPv6 (Windows 10)



- Yes! IPv6 enabled multi-CDN

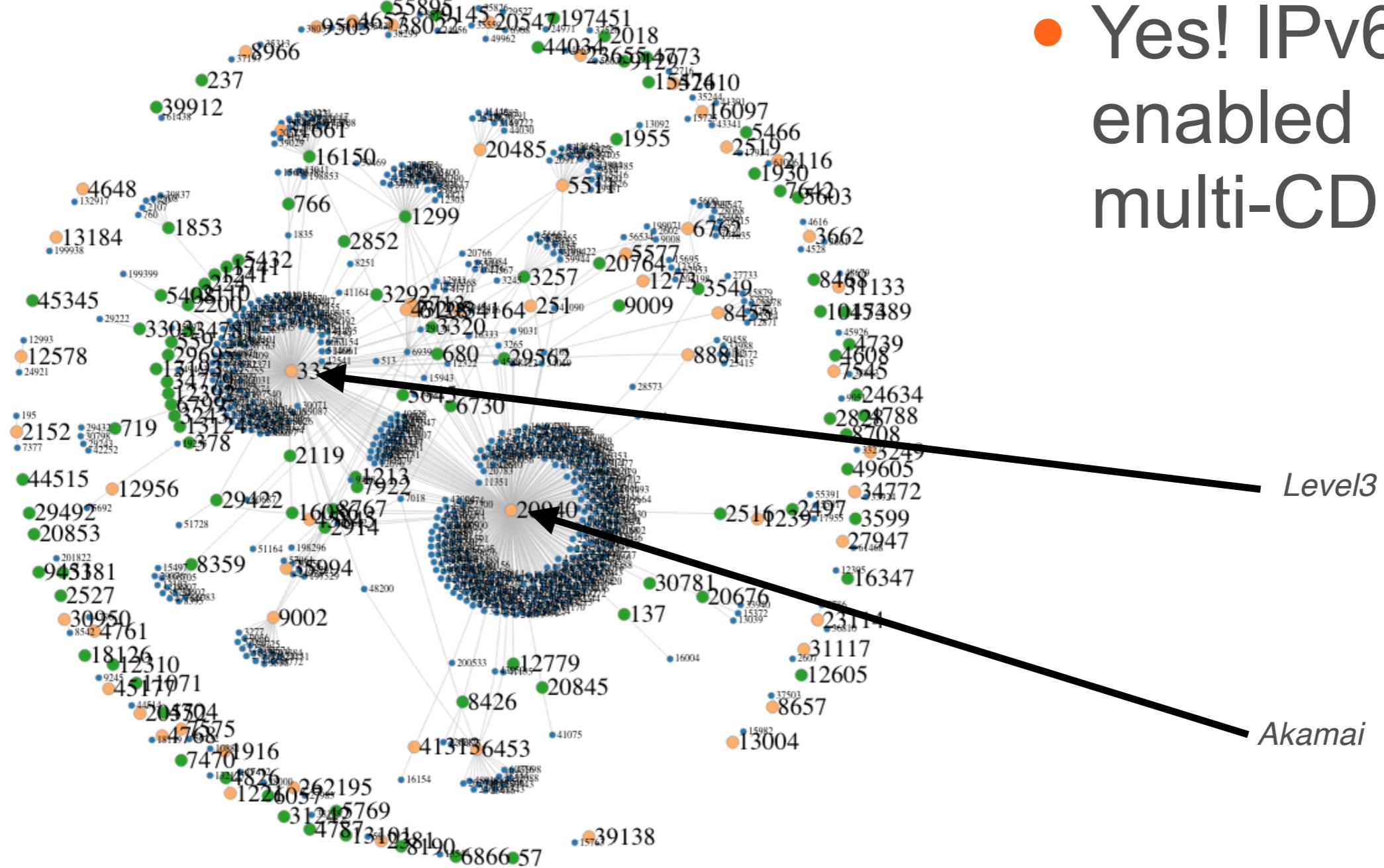


Source (blue) - destination (orange) ASN pairs for Microsoft multiCDN use. ASNs can be both (green).

# Microsoft mCDN IPv6 (Windows 10)



- Yes! IPv6 enabled multi-CDN



*Source (blue) - destination (orange) ASN pairs for Microsoft multiCDN use. ASNs can be both (green).*

# Your Input Please!



- How can we make this most useful to you?
- Awareness?

```
e1000$ ./multicdn 3265 apple 2015-11-15 2015-11-16
```

AS6185 85.46% (APPLE-AUSTIN - Apple Inc.,US)

AS286 13.35% (KPN KPN International / KPN Eurorings,NL)

AS3356 1.19% (LEVEL3 - Level 3 Communications, Inc.,US)

- Alerts?
- Which multiCDNs/hostnames to follow?
- <your idea here>
  - Plan: Follow up on <https://labs.ripe.net/>



# Questions

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@meileaben

