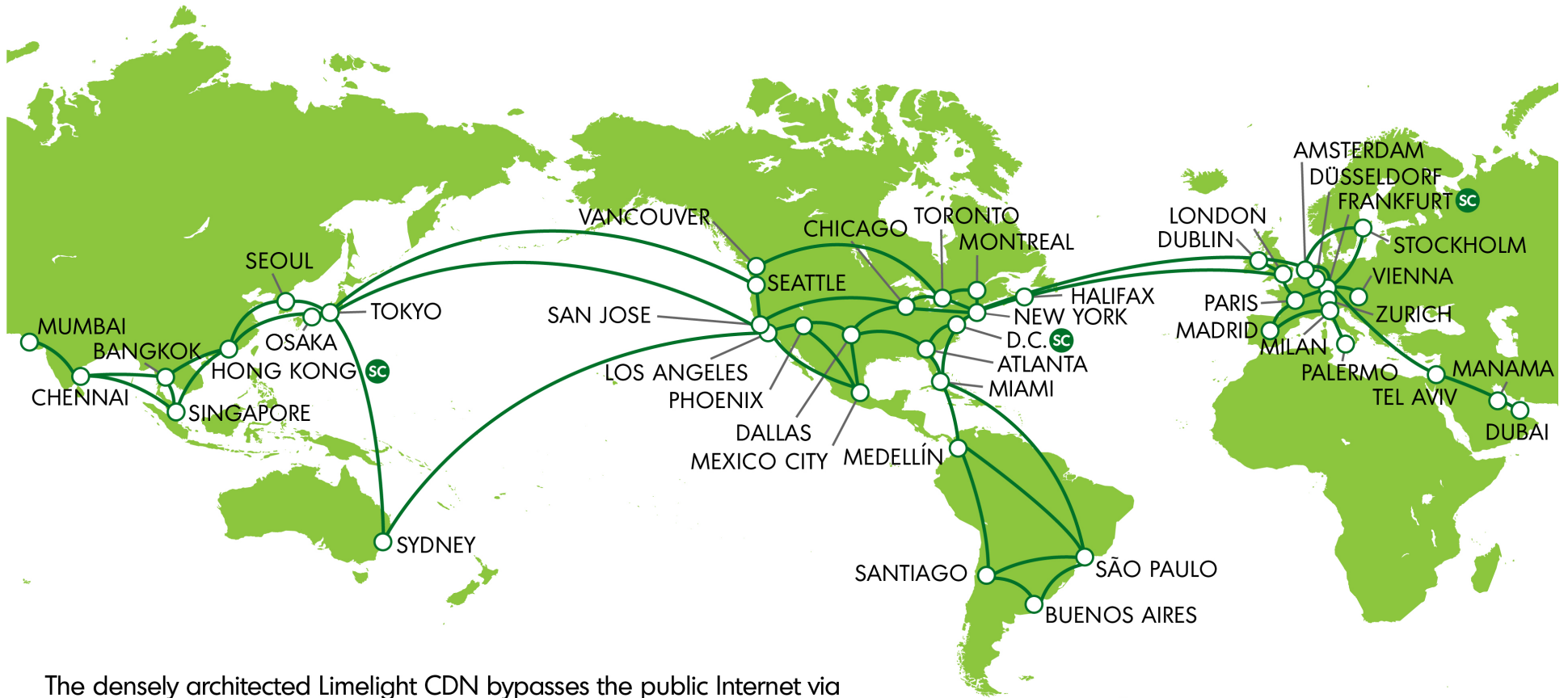


# Interconnection Trends— as seen from **AS22822**

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# AS 22822 Global perspective



The densely architected Limelight CDN bypasses the public Internet via 80+ interconnected locations for truly unlimited global reach.

ASN 22822

 Scrubbing Centers



# Inside AS22822, looking out.

## Global Network

- AS22822 spans the Globe.
- Operate a carrier like backbone for internal use
- AS22822 has selective peering policies
- 60+ Internet Exchanges.

## Other ASNs

Different Reasons – historical, regulatory, architectural

- AS38622, AS45396, AS55429, AS12411, AS23059, AS60261, AS25804
- Non AS22822 ASNs have more open policies



# Observation of Current Trends – 100G

- 100G is the new 10G
  - Major increase in 100G interconnections in 2016
  - IXPs were early movers, but lot more private interconnects moving to 100G
- Drivers
  - Lots of traffic..
  - Cost for port is comparable to 10x10G.
  - High cost of Cross connects in many facilities
  - Reduced overhead, management and running into ECMP limits on nx10G.
- Road Blocks
  - The primary road block currently seems to be the cost of LR4 optics, specially on deployed hardware (CFP2)
  - Cost of Optics is still high, which is probably the only thing slowing it down.
    - 10-13K USD for 100G LR4, vs. ~ 1K USD for 10x10G LR Optics.
  - We are testing LR4 lite from Finisar (2.5KM range) QSFP+ optic



# Trends.. : Interconnect considerations and Drivers

- Content Networks have different drivers compared to carriers
  - Servers getting more and more powerful, so smaller Datacenter footprints.
  - Should they increase Number of servers in one location or increase number of location ?
  - How much burstable capacity to build, how much backup capacity to build ?
- Carriers
  - Diversification and closer co-operation in managing failure domains.
  - Better capacity planning and projection
  - Alleviate pressure on Backhaul
- Unknowns
  - Both have difficulty in predicting consumer behaviour



# Trends.. Diversification from Primary Interconnect Markets

- Big push in the United States
  - Secondary interconnection points in Denver, Phoenix, Minneapolis, Kansas City etc.
  - Driven by both content and carriers, to limit failure domains
  - Some of it is also driven by net neutrality discussion
  - Lots of Open-IX inspired IXPs in Secondary markets, but not sure how much traction they'll get in the near term.
- Similar push in Europe
  - Content pushing to get away from FLAP (Frankfurt, London, Amsterdam and Paris)
  - Stockholm, Milan, Madrid, Vienna, Moscow are already dense
  - Diversity within large countries is being pushed by carriers
    - Manchester (UK), Marseilles (France), Berlin/Dusseldorf (Germany), Rome/Palermo (Italy)
  - Go EAST, young man.. Go EAST – Budapest, Bucharest, Sofia, Warsaw



# APAC Trends

- There is no Continental level trends, due to geography
  - Hong Kong and Singapore continue to dominate as regional Hubs.
- High cost of both national and regional connectivity hinders interconnection.
  - E.g India domestic circuits costs
- Japan trends tracks closely with global trends
  - yet high cost of domestic backhaul doesn't encourage expansion into tertiary markets like Nagoya, Fukuoka etc.
- Localization of content and increased local peering
  - It's still very slow moving but increasingly getting there
  - Not much international market pressures or scaling problems.
    - India, Thailand, Vietnam grows
- Organizations like APIX helping



# In Conclusion

- Internet continues to scale up, growth rate hasn't slowed or any trend towards slowing down
  - For content, only way is to cope deeper and closer to the users
  - Africa, Middle East, Developing Asia are all growing at much higher rate than developed markets.
  - I call them SAAME (South Asia, Africa and Middle East)
- Interconnect Players needs to talk more and strategize more to fit into each other plans
- Let's grow the internet together.





## Limelight Networks

<b>Organization</b>	<a href="#">Limelight Networks</a>
<b>Also Known As</b>	llnw.net
<b>Company Website</b>	<a href="http://www.limelightnetworks.com/">http://www.limelightnetworks.com/</a>
<b>Primary ASN</b>	22822
<b>IRR Record</b>	AS-LLNW
<b>Route Server URL</b>	
<b>Looking Glass URL</b>	
<b>Network Type</b>	Content
<b>IPv4 Prefixes</b>	600
<b>IPv6 Prefixes</b>	30
<b>Traffic Levels</b>	1 Tbps+
<b>Traffic Ratios</b>	Mostly Outbound
<b>Geographic Scope</b>	Global
<b>Protocols Supported</b>	<input checked="" type="radio"/> Unicast IPv4 <input type="radio"/> Multicast <input checked="" type="radio"/> IPv6
<b>Last Updated</b>	2016-04-18T19:39:34Z
<b>Notes</b>	Limelight Networks uses different ASNs in these markets Limelight India - AS 55429 Limelight Korea - AS 45396 Limelight Australia - AS 38622 Limelight UAE - AS 60261 Limelight South Americas - AS 23059

### Peering Policy Information

<b>Peering Policy</b>	<a href="http://www.as22822.net/">http://www.as22822.net/</a>
<b>General Policy</b>	Selective
<b>Multiple Locations</b>	Required - US
<b>Ratio Requirement</b>	No

### Public Peering Exchange Points

Exchange ASN	IPv4 IPv6	Speed RS Peer
<a href="#">JPIX</a> 22822	210.171.224.123 2001:de8:8::2:2822:1	10G <input type="radio"/>
<a href="#">JPIX OSAKA</a> 22822	103.246.232.123 2001:de8:8:6:0:2:2822:1	10G <input type="radio"/>

### Private Peering Facilities

Facility ASN	Country City
<a href="#">Equinix Tokyo (TY1)</a> 22822	Japan Tokyo
<a href="#">Equinix Tokyo (TY2)</a> 22822	Japan Tokyo
<a href="#">KDDI Otemachi (Telehouse Tokyo Otemachi)</a> 22822	Japan Tokyo
<a href="#">KVH Tokyo Data Center 1 (TDC1)</a> 22822	Japan Tokyo
<a href="#">NTT Telepark Dojima Building 3</a> 22822	Japan Osaka

