Scalable IP Architectures for Live Production and Playout

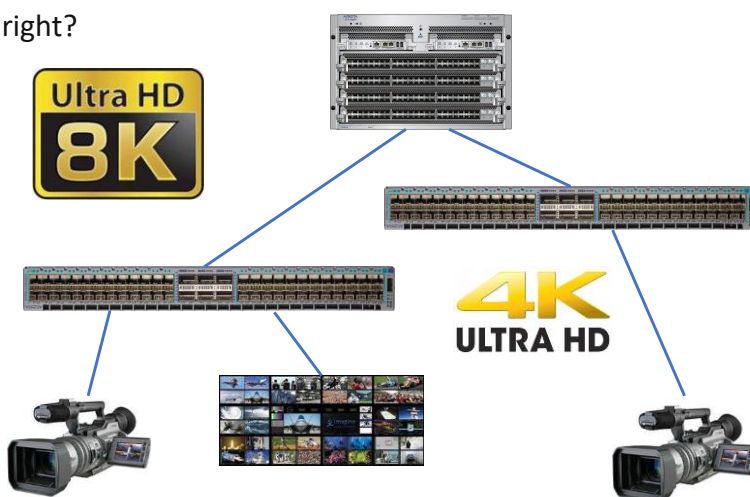Gerard Phillips, Systems Engineer

Arista Networks

IP SHOWCASE THEATRE AT IBC – SEPT. 14-18, 2018


Scalability – Adding more stuff right?

- End points
- Bandwidth
- Geographic sites
- Formats and workflows
- Network functions

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More Formats and workflows

- 4K, 8K, VR, eSports
- What else? We just don't know!!

- Enable scalability by building on cloud principles
  - Vanilla, standardized IP - no vendor lock-in
  - BGP – resilient, scalable, hardened, fast convergence

  - Extensible NOS that allows you to add functionality as you need it
  - Demand a rich API, designed for automation
  - Telemetry + monitoring

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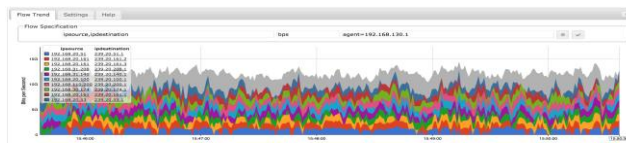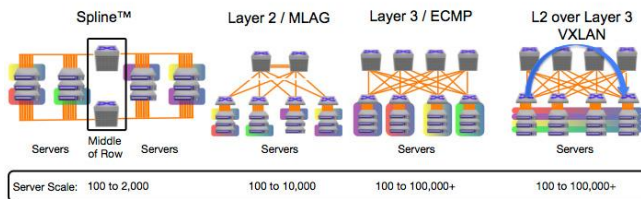
More Bandwidth

- More hosts. Higher resolution, high frame rate ...
- Tomorrow's unknown workflows
- The data heavy immersive viewing experiences of tomorrow

- Fiber is relatively inexpensive, bury more than you think you will need
  - You're bound to use it
  - Digging up the carpark is likely way more expensive than the fiber!

- Moores law for merchant silicon is still running….

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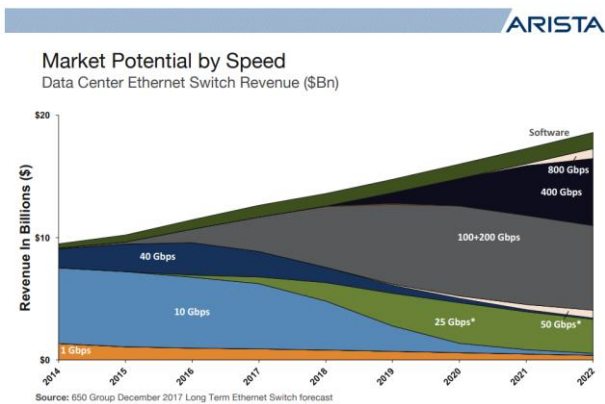
Merchant Silicon Firsts

2008: First ultra-low latency 24-port 10G single chip
2010: First Large Buffer 10G Chip with VOQ Fabric
2011: First 64-port 10G single chip switch
2012: First 32-port 40G single chip
2013: First Large Buffer 40G Chip with VOQ Fabric
2015: First 32-port 100G single chip
2016: First Router 100G Chip with VOQ Fabric
2017: First 64-port 100G single chip
2018: First 32-port 400G single chip (forecast)
2019: ….

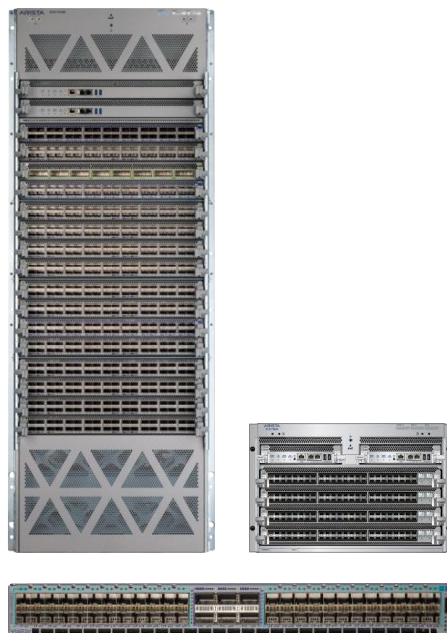## Bandwidth Improvement
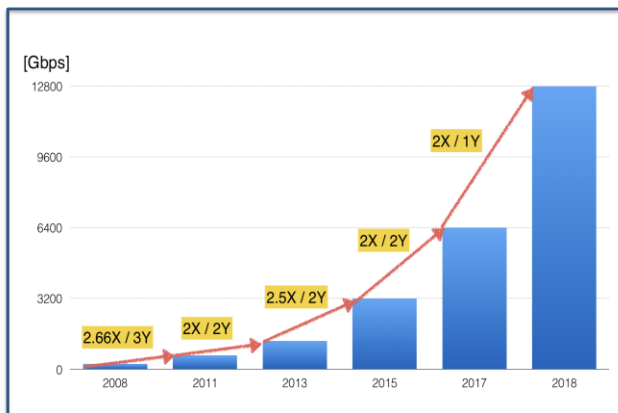
Architectures for host scale

- One BIG switch
- Hub and spoke
- Leaf and spine

- What might we want to consider?
  - How many hosts can be accommodated?
  - Blocking or non-blocking infrastructure?
  - PTP distribution
  - Resilience options
  - Failure domain size - Physical, L2, PTP…

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One BIG switch

- Non-blocking
- Simple IGMP works fine

- > 2k hosts @ 25Gbe

- Fixed or Modular chassis
- Modular – populate as you grow

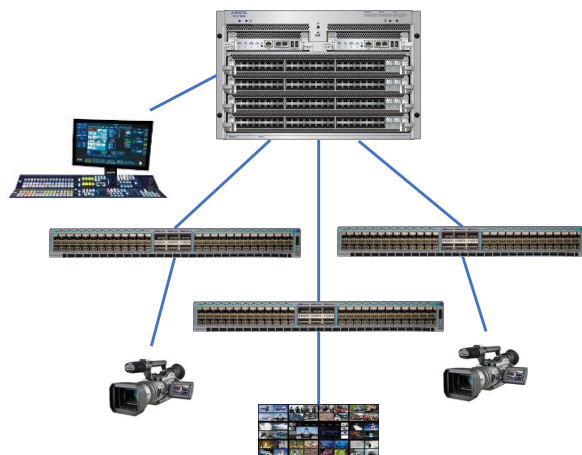- Maybe 100% non-blocking is not needed??

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Hub and spoke

- >16k hosts @ 25Gbe, 1:10 provisioning

- 400Gbe around the corner….

- Scale at the rate you want to

- Just like traditional broadcast Tie-lines ☺

- Non-blocking no longer makes sense
  - Does that fit your workflow?

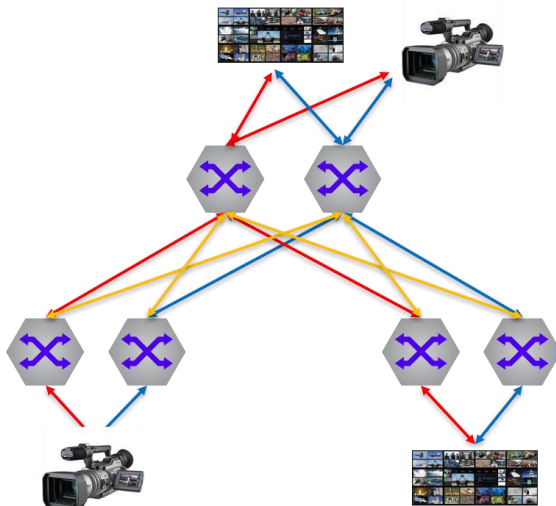- Flow orchestration (SDN) is now required

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Leaf and Spine

- A great architecture for future thinking converged network
- ...think Virtual Network Functionality

But….

- Multicast does NOT scale like unicast…
- Flow orchestration (SDN) is required

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Expansion – if you want to start with a single switch (pair -7) and grow

- Start with a leaf

- Either add a sp(l)ine…

- Or promote the leaf pair to "spline"

- Your decision

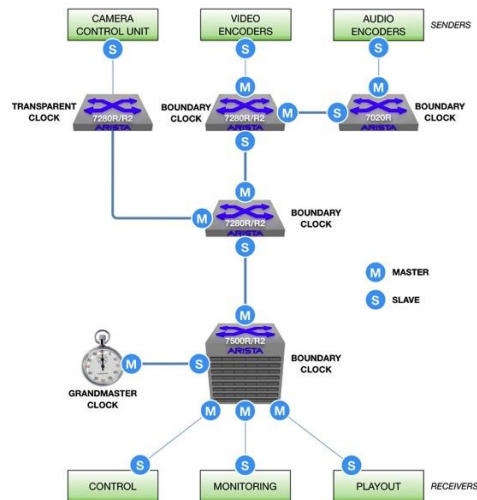**ARISTA**

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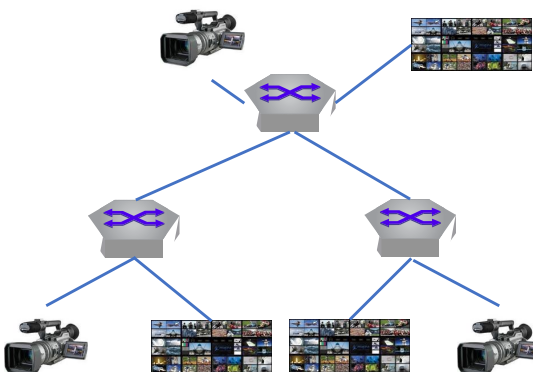
PTP Scaling

BC and TC provide useful ways to scale and protect the performance of your PTP distribution:

- A single switch may not need BC/TC
- Multiple switches – use BC/TC
- GM capability needs to be understood

- Unicast delay-request is preferred
- Slaves often have different requirements

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Don't forget the Dev/Net Ops guys….

- Whether the network starts big, or grows, the effort to manage and sustain grows exponentially

- The key to being able to scale the management function is:
    - Automation, enabled by multiple flexible API's
    - Integration and support for the tools the server guys use - Puppet / Ansible / Chef / bash / python
    - Real-time, comprehensive telemetry
    - Powerful on switch scripting / programmability

- More on this subject, back here, Monday 4:30

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OPENCONFIG

CHEF

puppet

ANSIBLE

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Summary

- The cloud is all about increasing scale, and reducing OPEX

- Their principles are very applicable to our industry
  - Vanilla, standardized IP - no vendor lock-in
  - Extensible NOS that can allow you to add functionality as you need it
  - Multi-switch architectures that allow for growth, and add resilience
  - Rich API's designed for automation, reducing errors and cost
  - Telemetry + monitoring give forward notice of trends before they become issues

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Thank You

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