

A Light Reading Webinar

Data Center Migration: Why Testing Matters

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Hosted by

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Sponsored by:



About Spirent Communications

Spirent Communication is a....

- Global test vendor with solutions for the lab and into live networks for Service Provider and Enterprise Networks
- Next Generation Technology coverage from Data Centers, Virtualization, 3G/4G Wireless Technologies, Mobile Backhaul, Satellite/Positioning and 40/100 G Ethernet
- Market leader in enterprise network test and measurement

Spirent TestCenter our flagship platform

- Holistically validate the performance of all data center elements
- Perform line rate layer 2-7 testing
- Benchmark with IETF industry standard logic

Jurrie van den Breekel

- Market Segment Lead for Spirent's Enterprise and Data Center Test Solutions



<http://www.spirent.com>



About Network Test

- An independent test lab
- We test networking equipment and live networks
- Clients include equipment makers, large enterprises, service providers, and trade publications
- Hundreds of tests published
- Network Test president David Newman wrote/cowrote:
 - **RFC 2647** – Benchmarking Terminology for Firewall Performance
 - **RFC 3511** – Benchmarking Methodology for Firewall Performance
 - **RFC 4814** – Hash and Stuffing: Overlooked Factors in Network Device Benchmarking



networktest

<http://networktest.com>



Agenda

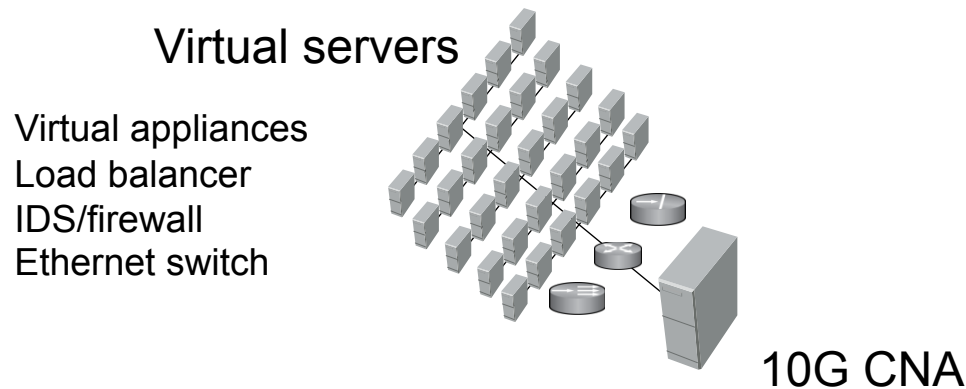
- Introductions and Scope
- Impact of Data Center Virtualization
- Impact of Data Center Convergence
- The need for High Speed Ethernet
- Summary
- Q&A

The Impact of Data Center Virtualization



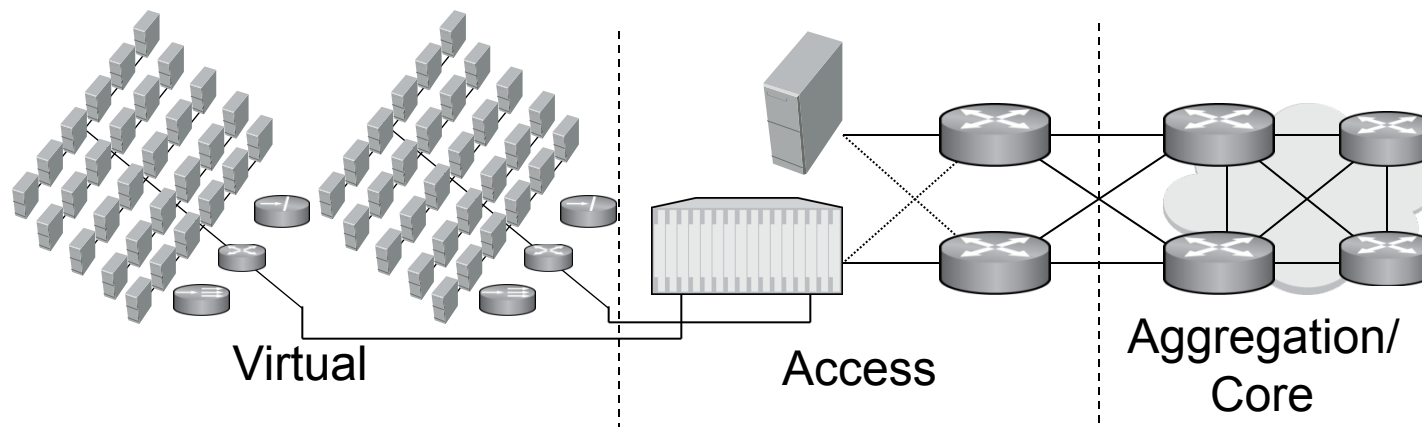
Data Center Virtualization Trends

- Better utilization through virtualization
 - Expanding from 4 to 32 VMs per physical server
 - Processors optimized for virtualization
- Network devices go virtual
 - Blades and virtual switches
 - Virtual appliances
- Virtualization enables cloud computing



Data Center Virtualization Impact

- Virtualized nets are 10x the scale and complexity
 - 100,000-plus virtual servers in a dynamic data centers
 - Exponential growth in application and network traffic
- More pressure on virtual, physical infrastructure
 - Overprovisioning moving from 1:20 to 1:4 or less
- Resource scheduling and live migration
 - The 'killer apps' for dynamic data centers



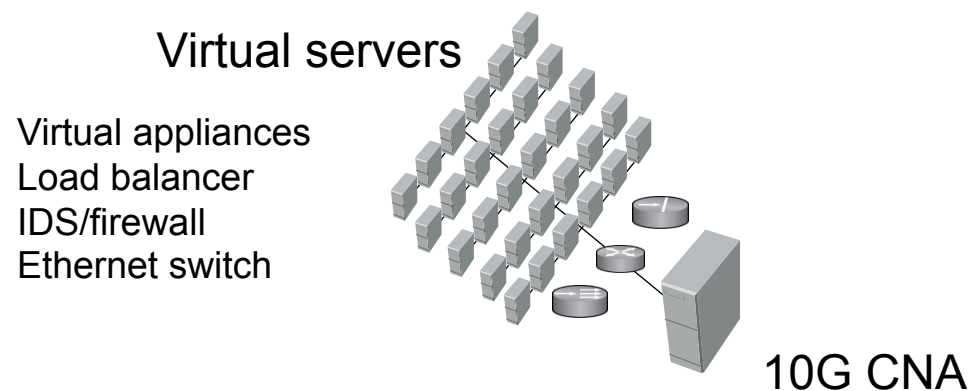
Data Center Virtualization Challenges

- How does virtualization perform?
 - Live migration consumes lots of extra bandwidth
 - Where are the bottlenecks?
 - Not just aggregation and core network infrastructure
 - Also measure vSwitch, vAppliance, CNA, blade switch, application performance
 - How does virtualization scale?
 - How do network and application events correlate?
- How will cloud computing affect performance?



Data Center Virtualization Testing

- Key questions for virtualization testing
 - How do I attach the test instrument?
 - Do I trust the virtual test instrument's numbers?
 - How do virtual and physical device performance compare?
 - What about protocol and feature support?



Poll Question #1

How do you see as the best way to use more virtualization in your data center(s)?

- More VM instances on current hardware
- More VM instances on new higher-capacity hardware
- Outsource to cloud computing service
- No plans to expand

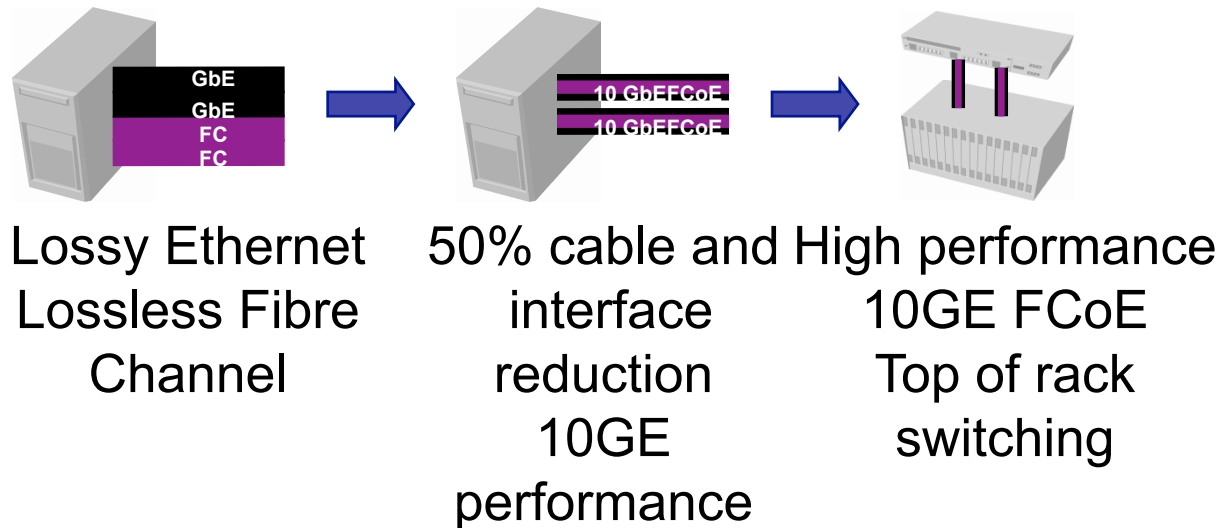


The Impact of Data Center Convergence



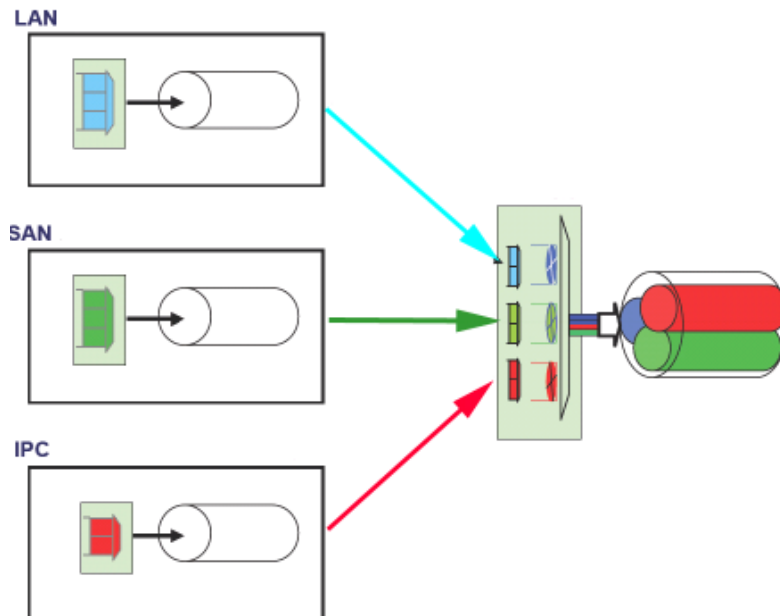
Data Center Convergence Trends

- 10GE on the server enables convergence of Ethernet and Fibre Channel
 - Enough bandwidth for SAN and LAN combined
 - Fibre Channel over Ethernet (FCoE)
- Converging data, storage networks saves money
 - One network, fewer cables, easier cabling, lower power



Data Center Convergence Impact

- Fibre Channel requires lossless connectivity
 - Converged Enhanced Ethernet (CEE)/
Data Center Ethernet (DCE)
- Could double Ethernet traffic
- Network QoS is critically important



Data Center Convergence Challenges

- FCoE is easy
 - Encapsulate Fibre Channel frames in Ethernet
 - Add Fibre Channel Initialization Protocol (FIP)
 - Does fabric discovery and login
- FCoE is hard
 - Ethernet tolerates loss and high jitter
 - FC does not



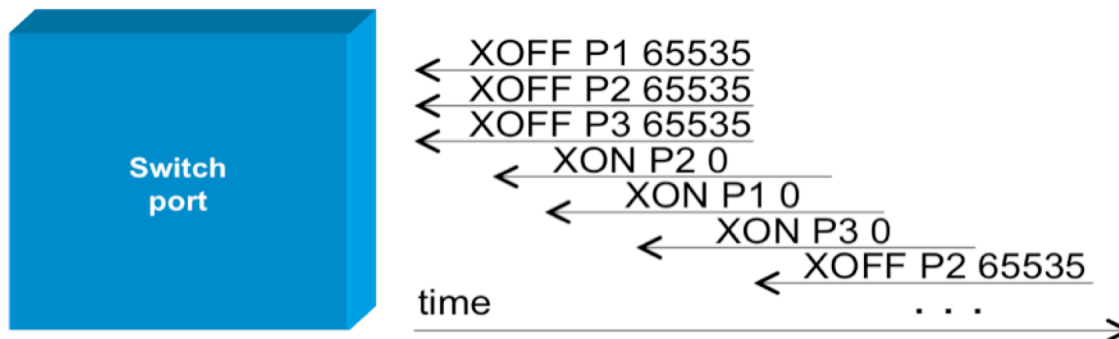
Data Center Convergence Testing

- DCB/DCE/CEE reliable transport mechanisms
 - 802.1Qbb – Priority Flow Control (PFC)
 - Different traffic types can share link without interference
 - 802.1Qaz – Priority Groups (traffic shaping)
 - Scheduling mechanism to ensure QoS/QoE
 - 802.1Qau – Congestion Notification
- Data Center Bridging Exchange Protocol (DCBX)
 - LLDP extension for discovery, capability exchange
- All these present new testing challenges
 - New test tools
 - New test methodologies



Data Center Convergence Testing

- Are you testing the switch or the tester?
 - Will the test instrument obey PFC pause frames?
- What methodology to use?
 - Throughput no longer appropriate
 - Flow control breaks “lock step” traffic patterns
 - Must instead focus on PFC efficiency
 - New metrics: Pause duration, pause response time, maximum latency



Poll Question #2

When are you planning to converge your data and storage networks?

- Already implemented
- 0 – 6 months
- 6 – 12 months
- 12 - 24 months
- More than 24 months
- No plans

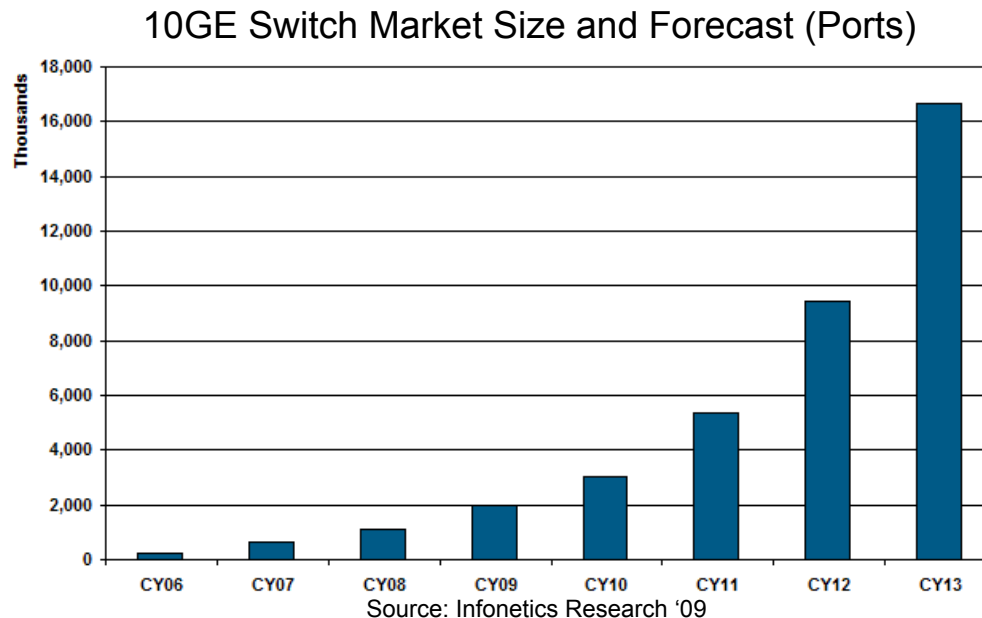


The need for High Speed Ethernet



40G/100G Ethernet Trends

- 10G server connectivity is rapidly increasing
 - 10G on server motherboards coming soon
- 'Top-of-rack' and 'end-of-row' switches increase 10G density in the data center
- 10G servers drive the need for 40G/100G uplinks



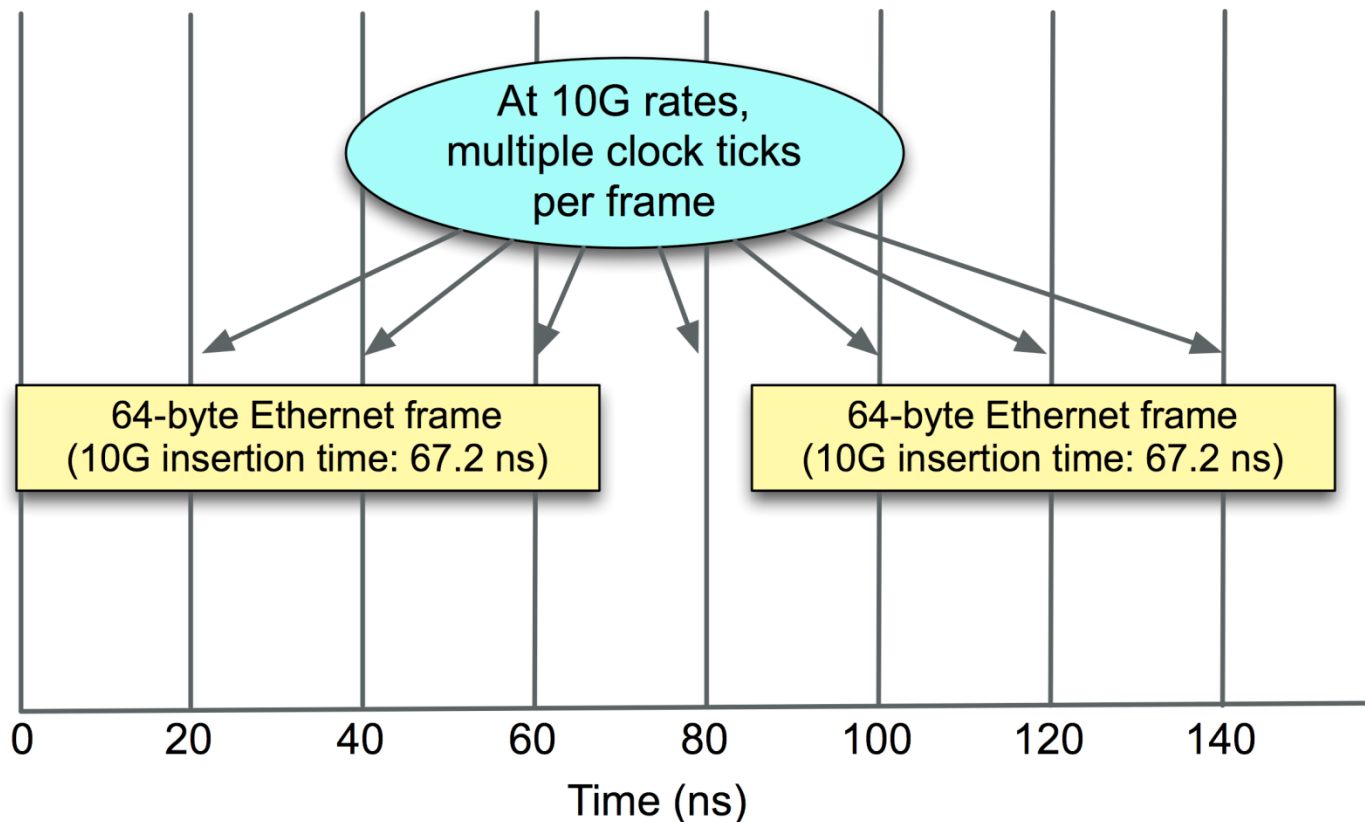
40G/100G Ethernet Impact

- 4-10x faster than 10G
- 40-100x faster than gigabit
 - 100G Ethernet is 148.8 million 64-byte frames/second
- 40G/100G Ethernet are multi-lane
 - Involves multiplexing/demultiplexing
 - Some early solutions will use parallel implementations of lower-speed circuits
 - Out-of-order frames harmful for FCoE and video quality



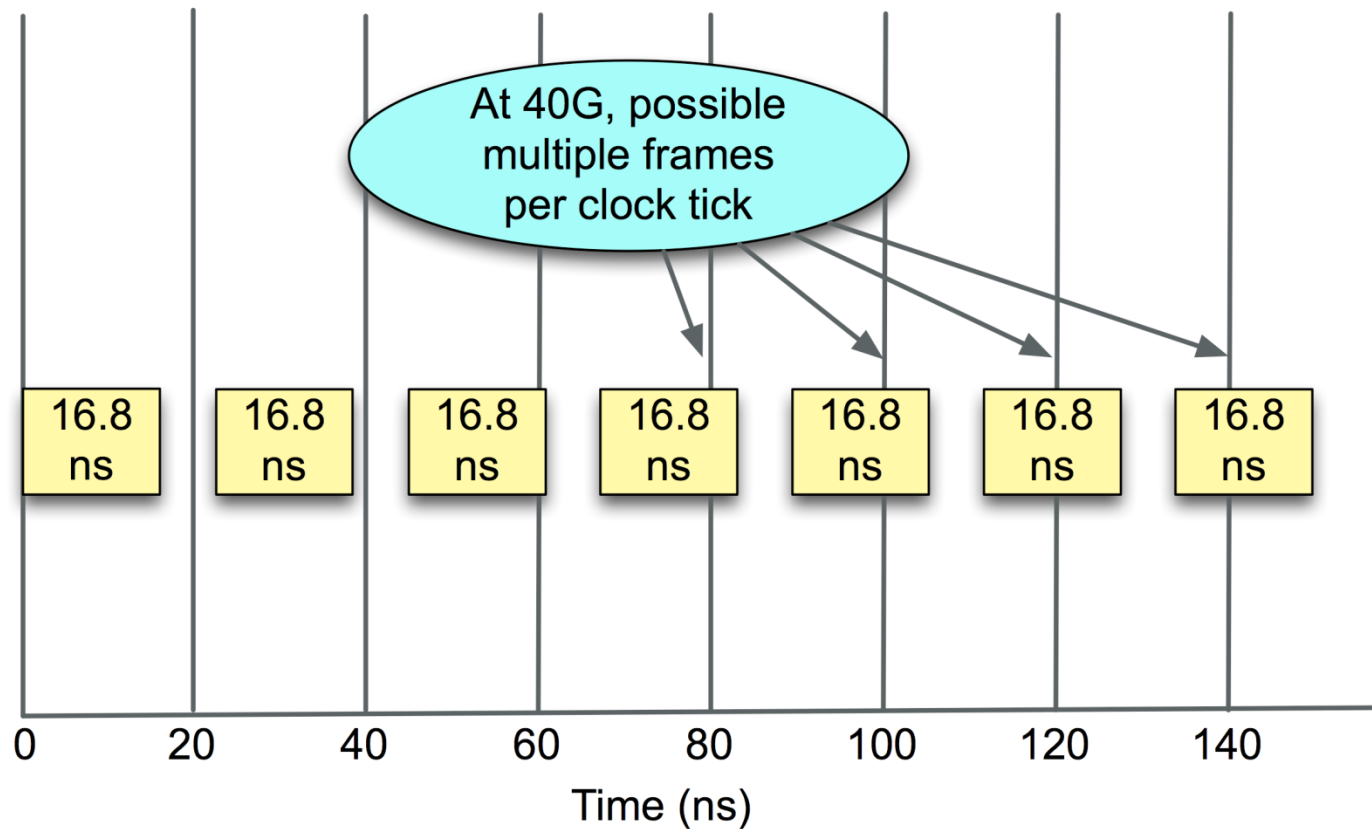
40G/100G Ethernet Challenges

- Key concept is **timestamp resolution**
- At **10G** rates, everything is good with 20-ns resolution
Key number here is **67.2 ns**



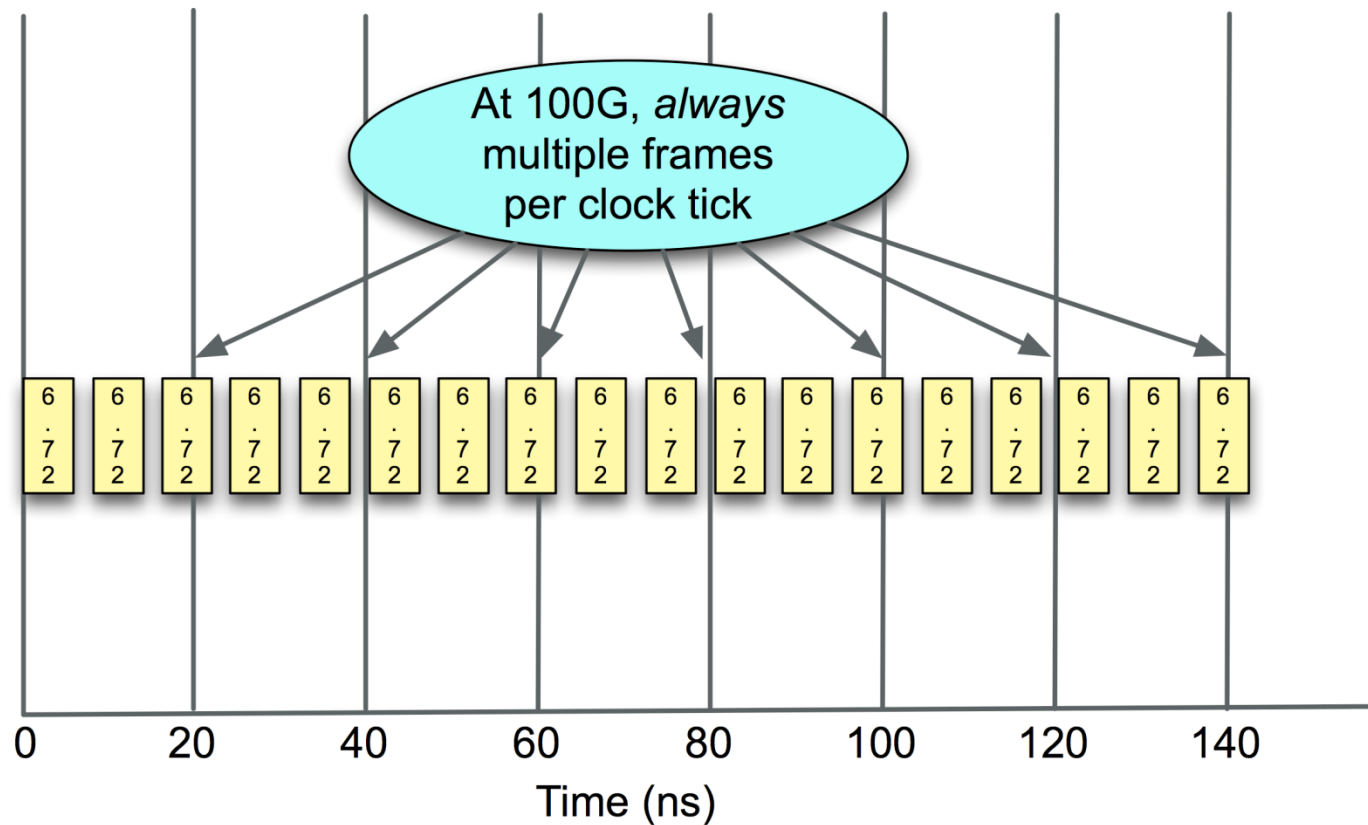
40G/100G Ethernet Challenges

- At **40G** rates, we may run into a problem rather fast



40G/100G Ethernet Challenges

- At **100G** rates, 20-ns resolution will not work



40G/100G Ethernet Challenges

- If more than 1 frame is transmitted per clock tick, the test instrument is blind
 - Accurate throughput, latency, jitter, even packet counts not possible
- All measurements require accurate packet counts
- Video, IPDV (jitter) depend heavily on precise timing
- Key question for 40G/100G test tools:
 - What's the timestamp resolution?



40G/100G Ethernet Testing

- Key questions for high-speed testing :
 - Single stream measurement at 40G/100G rates
 - Must be able to count
 - Accurate latency, jitter, inter-arrival times
 - Must be able to determine sequencing
 - Same latency port2port, slot2slot, chassis2chassis



Poll Question #3

What is your preferred option for higher speed Ethernet?

- 40G
- 100G
- Combination of 40G and 100G
- No plans to adopt 40G or 100G

Summary

- Virtualization increases network utilization
- Convergence demands FC quality over Ethernet
- High-speed Ethernet will enable virtualization, convergence
- Testing is a must
 - Take holistic approach to data center testing
 - Validate any-to-any connectivity, virtual/physical/combined
 - Measure customer cost savings and satisfaction targets



Q&A



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