

New Test Challenges on FCoE

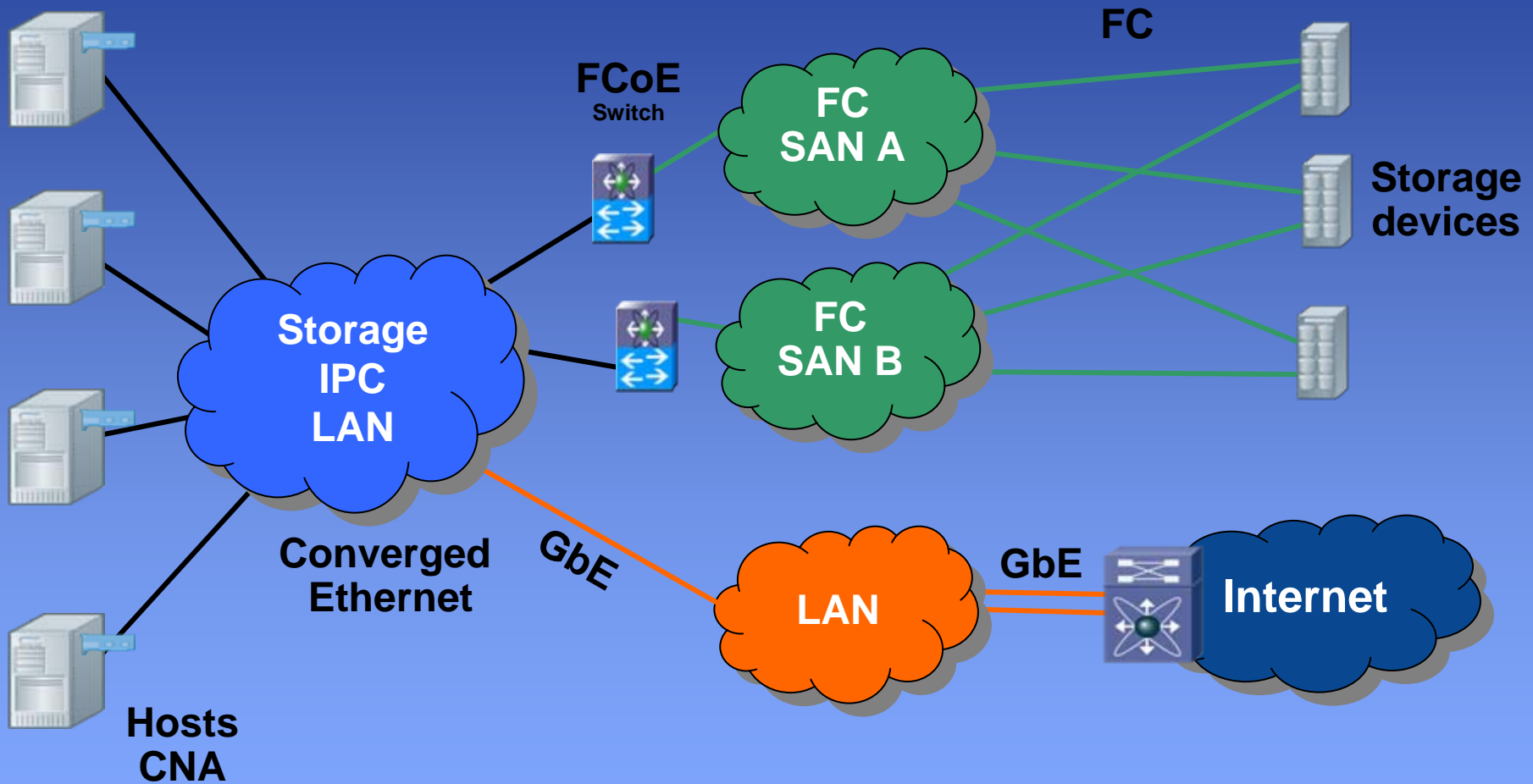
Joy Jiang
Product Manager
Storage Network Test BU
JDSU

joy.jiang@jdsu.com

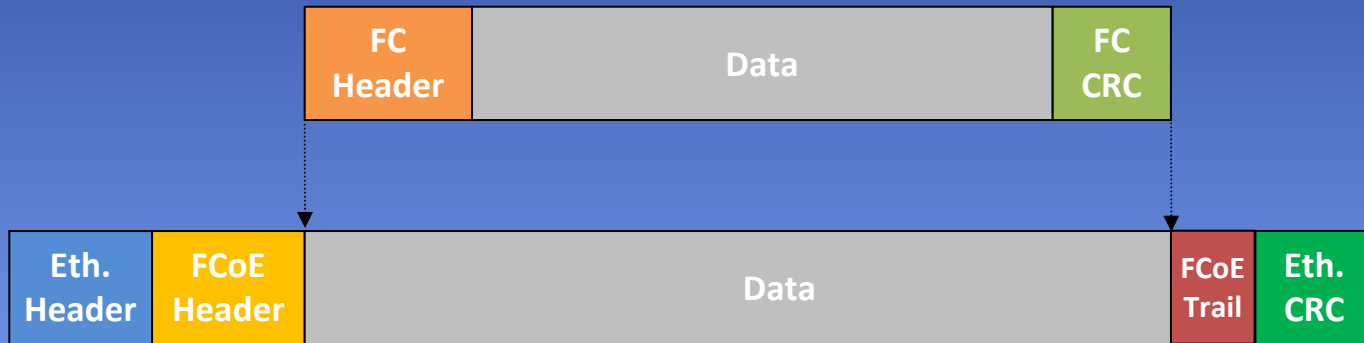
Outline

- Technology overview
 - Fibre Channel over Ethernet (FCoE)
 - Data Center Bridging (DCB)
- New testing challenges on FCoE
- Test case examples
- Summary

Future Data Center Network

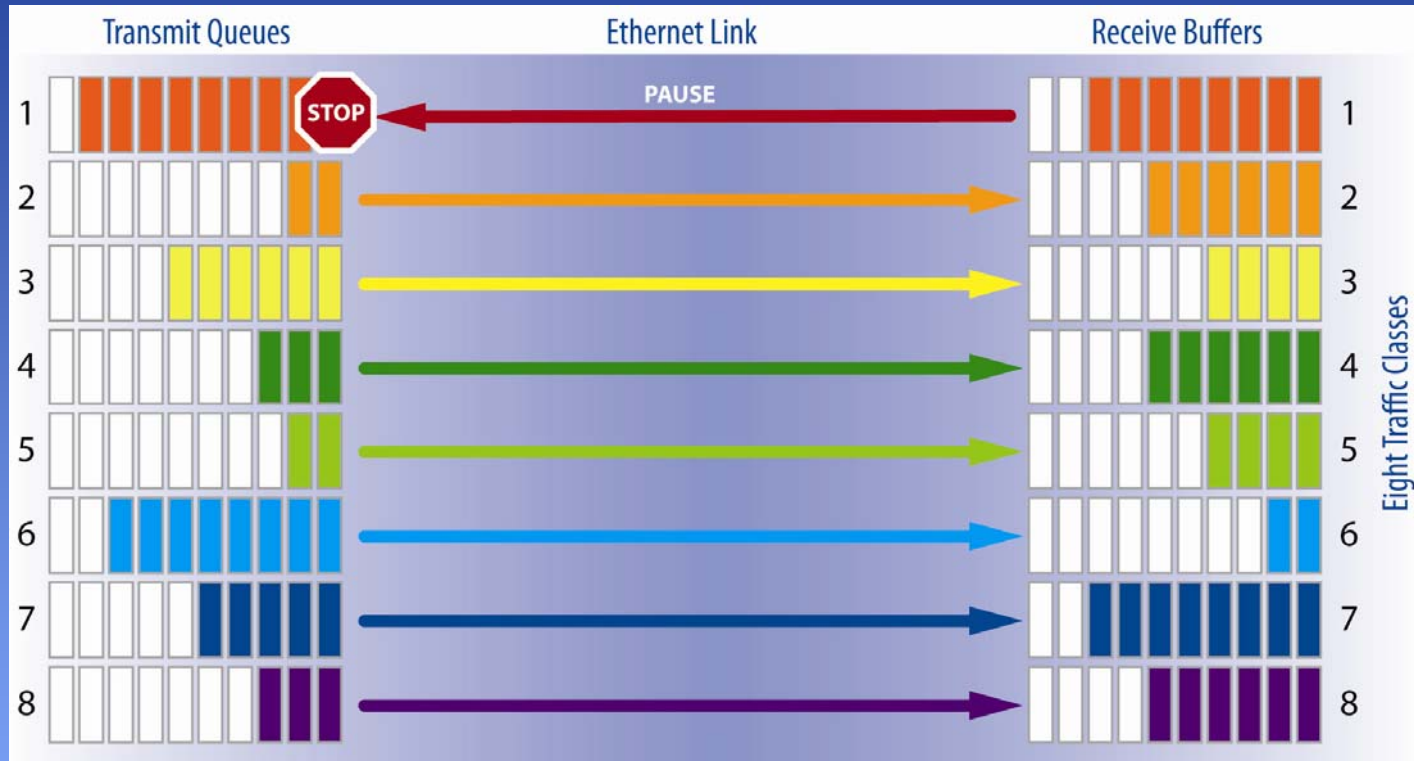


Fibre Channel over Ethernet (FCoE)



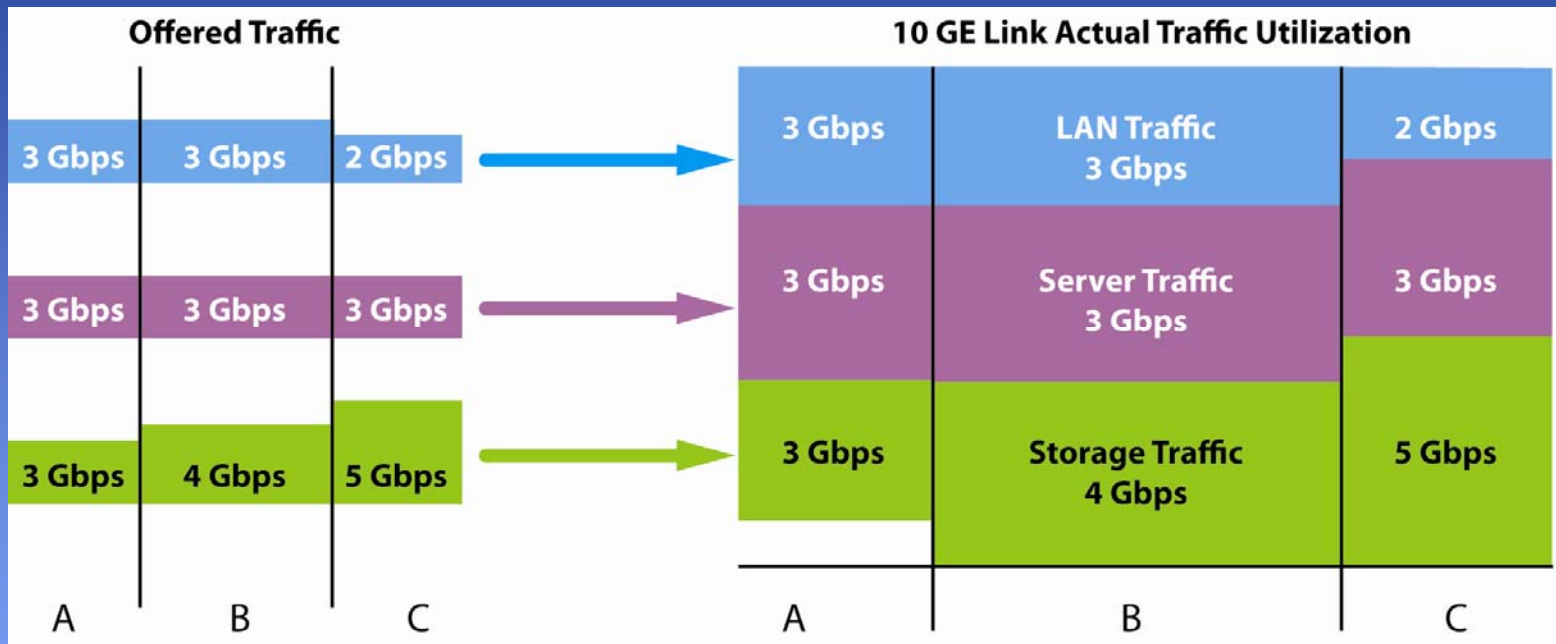
FCoE frame structure

Priority-Based Flow Control (PFC)



- Traffic flow management, providing the same service that Buffer-to-Buffer flow control provides in Fibre Channel, but per Priority
- Based on IEEE802.3x PAUSE, made per-Priority

Enhanced Transmission Selection (ETS)



- Defines the minimum guaranteed bandwidth among different priority groups
- Dynamically optimize bandwidth utilization among virtual links

Key Focus on Testing FCoE and Converged Networks

- Verify new network components
 - Functional verification and protocol compliance
 - Benchmarking tests
- Verify converged networks
 - Seamless integration with existing infrastructures
 - Congestion management
 - Protocol compliance
 - Performance justification

New Challenges on Testing FCoE

To successfully design and implement a converged Ethernet network with FCoE, you should ...

*think like
a SAN Expert,
not like
a LAN Expert*

Needs for Hardware Protocol Analysis Tools

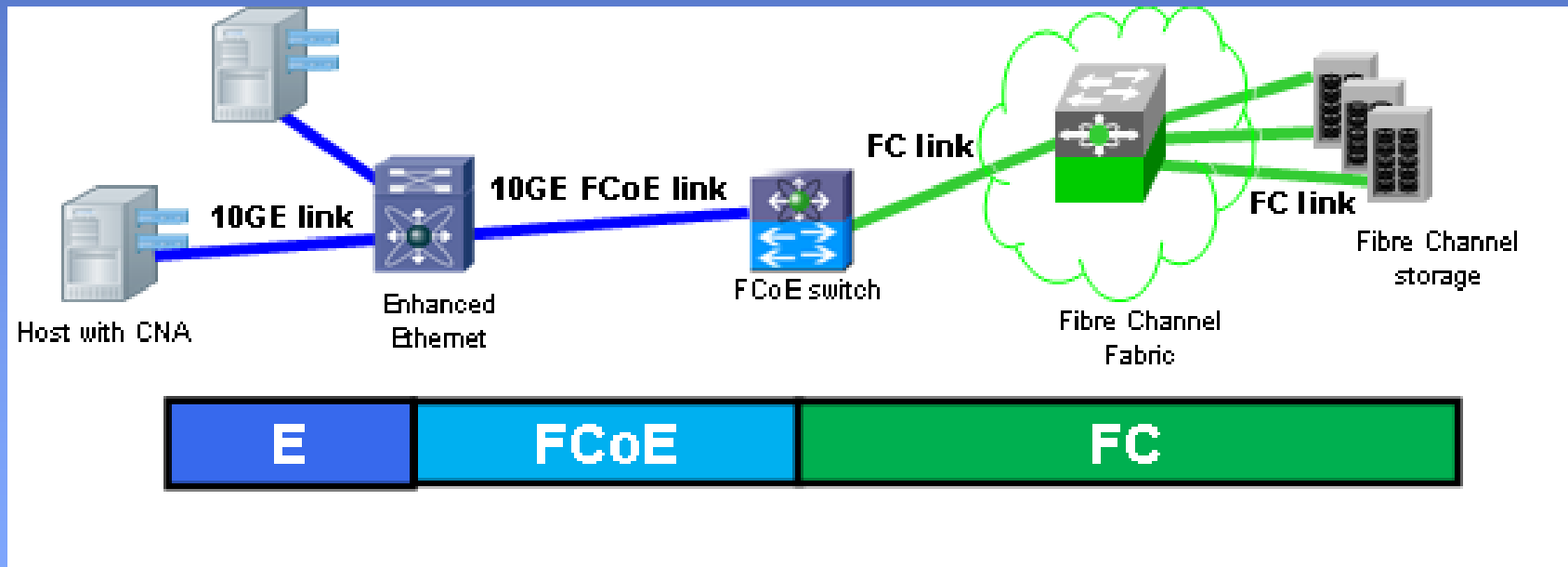
- LAN Ethernet analysis focuses on upper layer testing
 - Software tools satisfy many design and test needs
- FCoE is a transportation protocol
 - Hardware-based protocol analyzer is a must-have tool
 - Requires complete visibility of PFC and ETS behavior
 - Must monitor station-to-station activities



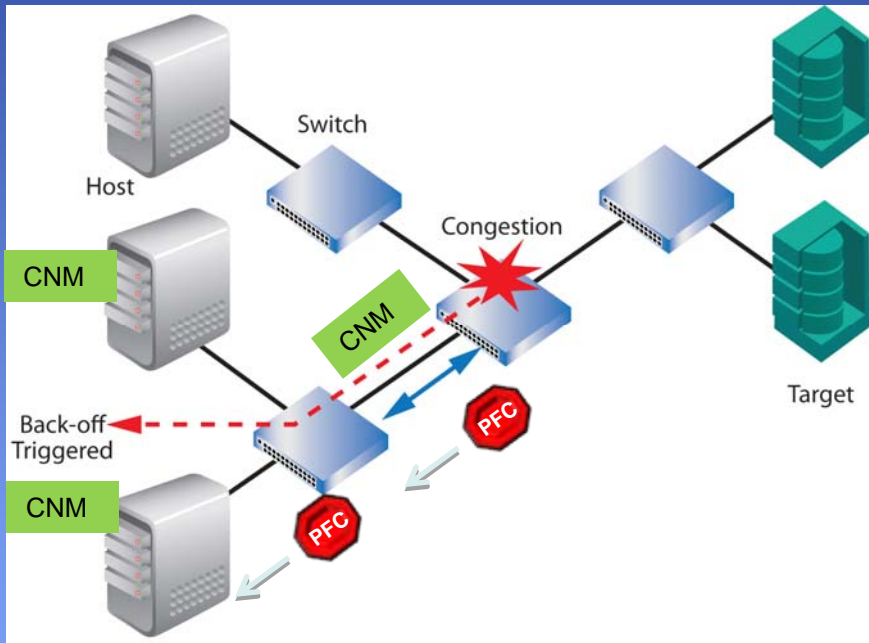
JDSU Xgig Protocol Test Platform

Time Correlated Tests with Mixed Interfaces

- Mixed physical links and transport protocols in one network
 - FCoE maps native FC SAN to Ethernet

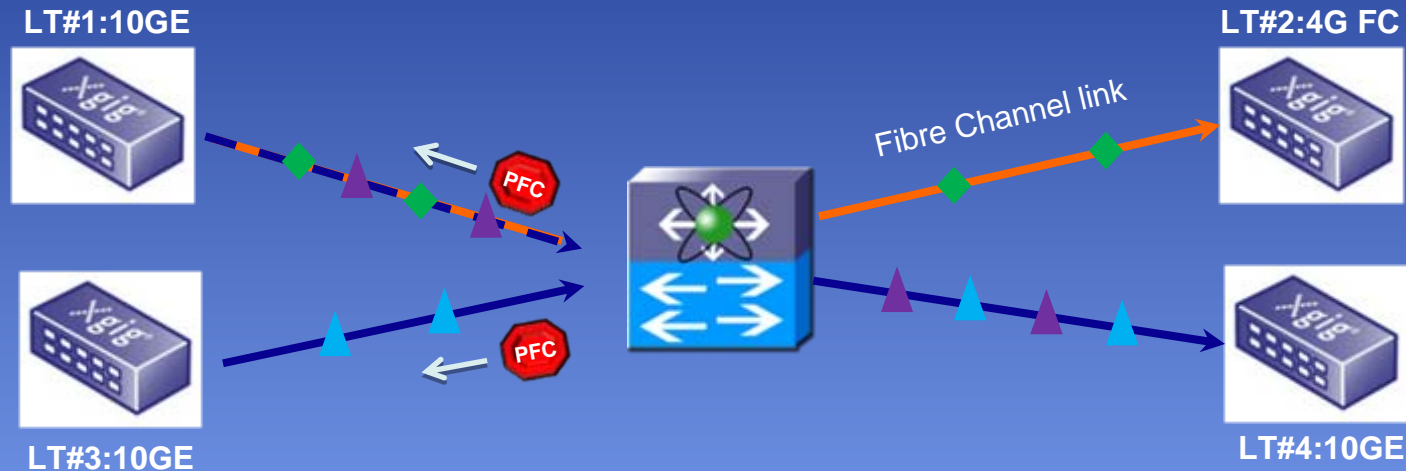


Congestion Management (CN) Test in Converged Networks



- Need for in-line and large scale cross-port analysis
 - Managing PFC in a large size network
 - CN rate limiting involving end to end stations

Test Flow Management with PFC



- Flow control correlation
 - Buffer-to-Buffer credits at FC versus PFC at FCoE
- Verify PFC and ETS load balancing
 - Over-subscribe LT#4 to cause load limiting at both LT#1 and LT#3

PFC Verification and Metrics



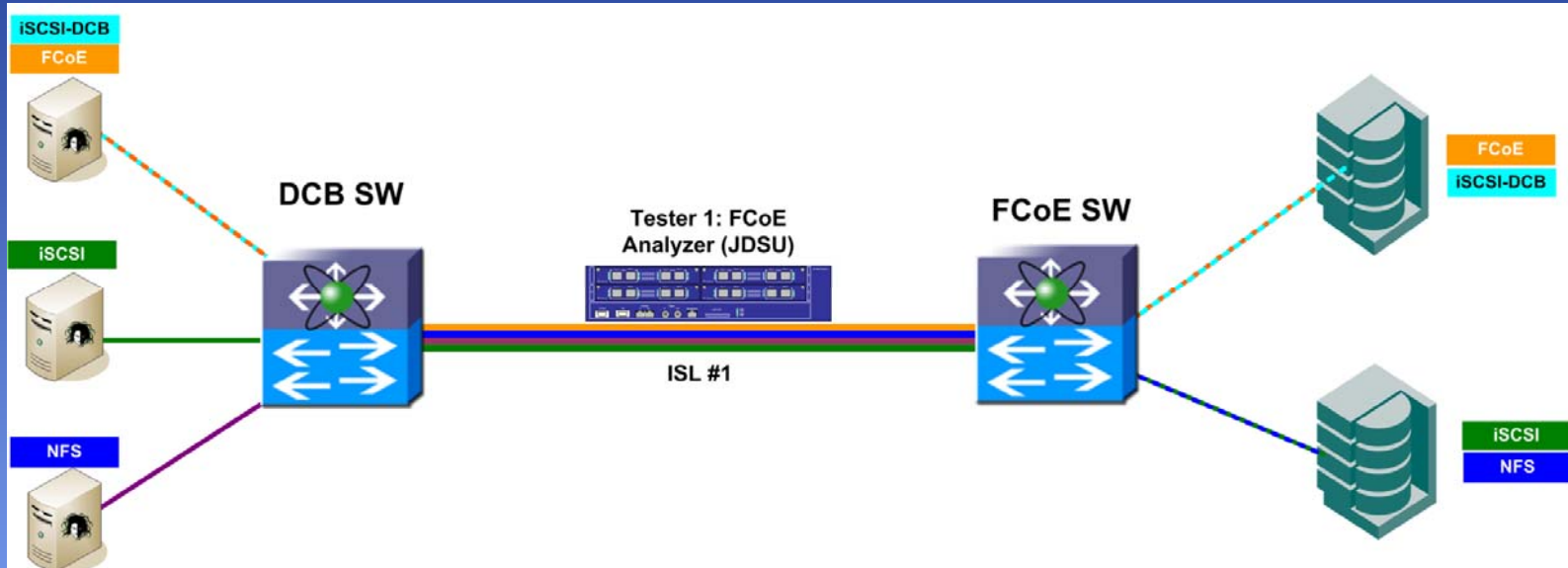
Analyzer shows how PFC interacts with I/O

Gigabit Ethernet - PFC Flow Control Timings

GE LT1 RX (SW)(1,1,1) / GE LT1 TX(1,1,2)	<u>% PFC Pause Time</u>	<u>PFC Pause Time (Avg. - us)</u>	<u>PFC Pause Time (Min - us)</u>	<u>PFC Pause Time (Max - us)</u>	<u>Frame overlap time (Avg. - us)</u>
Cisco Systems:B1:19:10 -> IEEE Std 802.3x Full Duplex PAUSE operation	66.440	54.141	45.113	58.588	0.000
VLAN 100 ; Cisco Systems:B1:19:00 -> VLAN 100 ; 0e:fc:00:94:00:52	0.000	0.000	0.000	0.000	0.000

PFC metrics from Analyzer

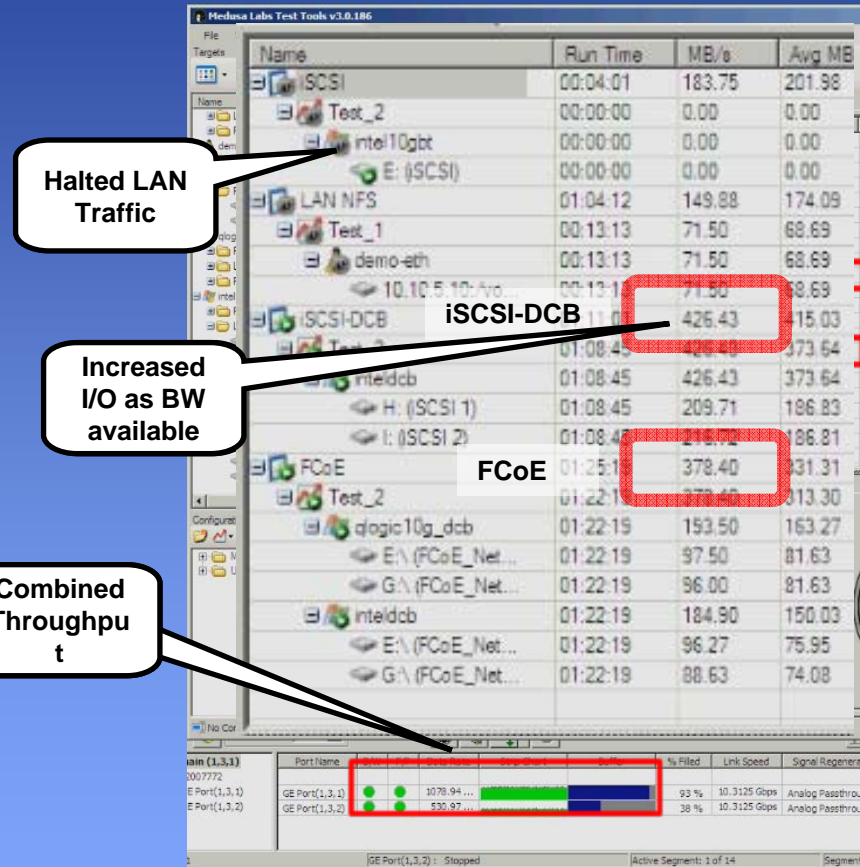
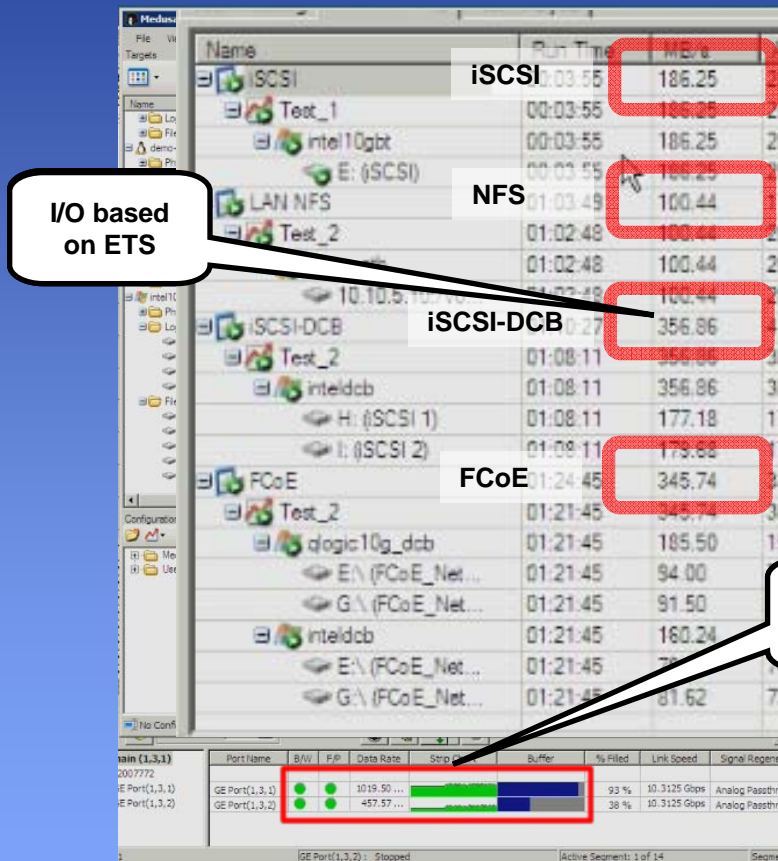
Dynamic Load Balancing with ETS



ETS Parameters

Traffic	PCP	%Band Width
FCoE	3	35%
iSCSI-DCB	5	35%
LAN (iSCSI/NFS)	0	30%

Dynamic Load Balancing with ETS



Summary

- New challenges on Ethernet testing by FCoE
 - Change LAN test focus to SAN!
 - Need hardware-based tools for high speed testing
 - Need time-synced testing among FC and FCoE links
 - Need in-line tools for comprehensive congestion management testing

THANK YOU!

About JDSU

- JDSU (NASDAQ: JDSU; and TSX: JDU) enables broadband and optical innovation in the communications, commercial and consumer markets. JDSU is the leading provider of communications test and measurement solutions and optical products for telecommunications service providers, cable operators, and network equipment manufacturers. JDSU is also a leading provider of innovative optical solutions for medical/environmental instrumentation, semiconductor processing, display, brand authentication, aerospace and defense, and decorative applications.

QUESTIONS?

