



# SuperSpeed USB Developers Conference

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# Compliance & Interoperability

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# Agenda

- Compliance Program Goals
- Compliance Process
- Test Categories
  - Framework Tests
    - USBCV 3.0
  - Cable and Connector Tests
  - Electrical Tests
  - Host and Hub Tests
  - Compliance Devices
  - Interoperability
- Summary

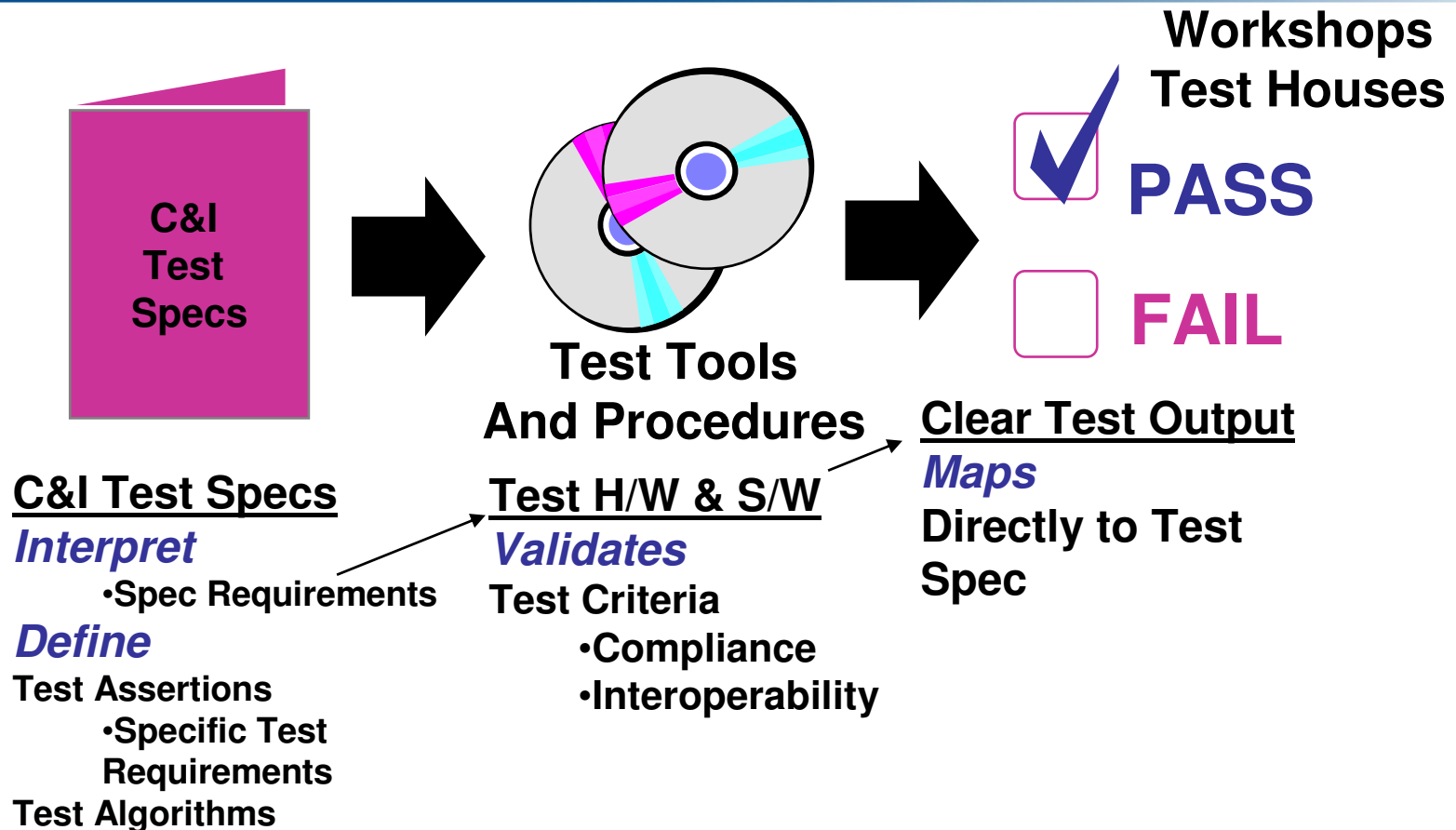


# Compliance Program Goals

- High Quality Certified SuperSpeed Products
- Stable, Repeatable, Well Documented Tests
  - Documented Test Procedures
  - Documented Test Assertions and Descriptions
- Instantly Available Testing (Qualified Test Houses)
- Reuse USB 2.0 Compliance Program Infrastructure
  - Extend and Reuse USBCV
  - Reuse Existing Compliance Devices
    - Testing of USB 2.0 capabilities of Hosts and Hubs
  - Extend Compliance Device Infrastructure
    - Testing of USB 3.0 capabilities of Hosts and Hubs
  - Extend and Reuse Test Services Infrastructure
- Minimize Test Equipment Costs
  - Avoid Expensive Equipment As Possible
- End goal is to provide Full End Product Test Coverage at Workshops

**Repeat Success Of USB 2.0 Compliance Program**

# Compliance Process



**Predictable Path To Compliance**  
**Same Model as USB 2.0 Compliance Program**

# SuperSpeed USB Logo



Passing Compliance Enables Use Of Logo



# Test Spec – Test Assertions

- Test assertions provide specific test requirements with spec references
- Simple set of 'yes/no' questions
- Test specs will be available on the USB-IF website

9.6.1#2	A device must report a value of 0300H in the <i>bcdUSB</i> field of its Device Descriptor	
9.6.1#5	A device must report a value of 09H in the <i>bMaxPacketSize0</i> field of its Device Descriptor	



# Test Spec – Test Descriptions

- Test descriptions provide detailed descriptions of how test suites test specific test assertions
- EXAMPLE:
- Device Descriptor Test
  - Place device in desired starting state
  - Send a Control Transfer Request
    - bRequest set to GetDescriptor
    - wValue set to the Device Descriptor
    - wLength set to 12H
  - Verify Descriptor Type set to DEVICE Descriptor
  - 
  -



# Sample Test Output

## InitializeTestSuite

```
INFO Microsoft Windows XP (Build 2600)
INFO Service Pack 2.0
INFO USBCommandVerifier.dll ver 1.3.3.0
INFO TestServices.dll ver 1.3.3.0
INFO StackSwitcher.dll ver 1.3.3.0
INFO Super Speed Device
```

## BOSDescriptorTest\_DeviceAddressed

Passed

```
INFO Now Starting Test:BOS Descriptor Test (Configuration Index 0)
INFO BOS descriptor bLength : 0x5
INFO BOS descriptor bDescriptorType : 0xf
INFO BOS descriptor bTotalLength : 0x25
INFO BOS descriptor bNumDeviceCaps : 0x2
INFO Descriptor Type : 0xf
INFO Number of Device Capability Descriptors found : 0x2
INFO This is a Super Speed device. Checking Super Speed Device Capability
INFO Checking BOS Super Speed Descriptor
INFO Device Supports 5Gbs
INFO Device Supports High Speed
INFO BOS Super Speed Capability Descriptor wSpeedsSupported reports High as lowest supported speed
INFO BOS Super Speed Capability Descriptor bFunctionality Support = High
INFO BOS Super Speed Capability Descriptor LTM Capable = 0
INFO BOS Super Speed Capability Descriptor bU1DevExitLat = 10
INFO BOS Super Speed Capability Descriptor wU2DevExitLat = 2047
INFO Checking BOS USB 2.0 Extension Descriptor
INFO LPM Capable = 1
INFO Stopping Test [ BOS Descriptor Test (Configuration Index 0):
Number of: Fails (0); Aborts (0); Warnings (0) ]
```

## Summary

```
INFO Summary Log Counts [ Fails (0); Aborts (0); Warnings (0) ]
```



# Test Categories

- SuperSpeed USB Device Tests
  - USBCV – Device tests that can be performed with a standard host
  - Electrical tests – including all USB 2.0 tests
  - Link Level Tests
  - Interoperability
- SuperSpeed USB Hubs
  - All Device tests
  - Hub descriptor tests – Tests of SuperSpeed specific descriptor features (part of USBCV)
  - Hub functional tests – Tests that use a SuperSpeed USB Compliance Test Device to exercise various protocol boundary conditions. Most tests will be silicon only
  - Interoperability
- SuperSpeed USB Hosts
  - Perform all Device and Hub tests (Using known good hubs and devices)
  - Host functional tests – Tests that use a Compliance Test Device to of SuperSpeed USB specific functionality. Most tests will be silicon only
  - Electrical, Link and Interoperability



# Test Coverage

- Compliance is not a replacement for validation
- Tests attempt to approximate variations that could occur across all hosts
  - Full coverage not possible with standard host
- For example - It is unlikely we will design a test to check that a device accepts all possible permutations of ACKs with varying NumP and Sequence numbers

# Interop Lab



- Provides early debug and interop help
  - Access to tools, other products, and experts
- Available to early developers
  - By appointment
  - For multiple days, if needed
- Hosted at Intel in Oregon
  - Open for business EOY 08'/early Q1 09'

# Peripheral Developers Kit (PDK)



- Provides a host controller and SW solution to enable early peripheral development
  - PCIe add-in card
  - Prototype software stacks from Microsoft and Intel
- Will be available for purchase through the USB-IF e-Store
  - June 2009



# Analysis Tools

- SuperSpeed USB protocol analyzers
  - Ellisys
  - LeCroy
- Physical layer analysis tools
  - Agilent
  - LeCroy
  - Tektronix
- See demos at the showcase

Transfer	S	Control	ADDR	ENDP	bRequest	wValue	wIndex	Descriptors	Time Stamp				
0	S	GET	0	0	GET_DESCRIPTOR	DEVICE type	0x0000	DEVICE Descriptor	0.000000010				
Transaction	S	SETUP	ADDR	ENDP	D	TP	R	bRequest	wValue	wIndex	wLength	ACK	Time Stamp
0	S	S	0	0	D->H	S	D	0x06	0x0100	0x0000	64	0	0.000000010
SS Tx	Packet	Dir	S	DPH	Data Len	ADDR	ENDP	SeqN	EoB	LCW	Time Stamp		
0	-->	S	DPH	8	0	0	0	N	Hseq:0	0.000000010			
SS Tx	Packet	Dir	S	DPP	Data	Time	Time Stamp						
1	-->	S	DPP	8 bytes	50.000 ns	0.000000050							
SS Rx	Packet	Dir	S	TP	ACK	ADDR	ENDP	SeqN	NumP	LCW	Time	Time Stamp	
2	--<	S	TP	1	0	0	0	1	1	Hseq:0	50.000 ns	0.000000100	
Transaction	S	IN	ADDR	ENDP	Data	ACK	Time Stamp						
1	S	S	0	0	18 bytes	0	0.000000150						
SS Tx	Packet	Dir	S	TP	ACK	ADDR	ENDP	SeqN	NumP	LCW	Time	Time Stamp	
3	-->	S	TP	1	0	0	0	1	1	Hseq:0	50.000 ns	0.000000150	
SS Rx	Packet	Dir	S	DPH	Data Len	ADDR	ENDP	SeqN	EoB	LCW	Time Stamp		
4	--<	S	DPH	18	0	0	0	N	Hseq:0	0.000000200			
SS Rx	Packet	Dir	S	DPP	Data	Time	Time Stamp						
5	--<	S	DPP	18 bytes	70.000 ns	0.000000240							
SS Tx	Packet	Dir	S	TP	ACK	ADDR	ENDP	SeqN	NumP	LCW	Time	Time Stamp	
6	-->	S	TP	1	0	0	0	1	0	Hseq:0	50.000 ns	0.000000310	
Transaction	S	STAT	ADDR	ENDP	Data	ACK	Time Stamp						
2	S	S	0	0	0 bytes	0	0.000000360						
SS Tx	Packet	Dir	S	TP	Status	ADDR	ENDP	LCW	Time	Time Stamp			
7	-->	S	TP	4	0	0	0	Hseq:0	50.000 ns	0.000000360			
SS Rx	Packet	Dir	S	TP	ACK	ADDR	ENDP	SeqN	NumP	LCW	Time	Time Stamp	
8	--<	S	TP	1	0	0	0	1	0	Hseq:0	50.000 ns	0.000000410	



# Summary and Call to Action

- SuperSpeed Compliance Program will follow USB 2.0 Model
  - Trademarked Logo For Compliance
  - High level of testing with initial product rollout
  - Repeatable tests and procedures
- USB-IF will provide all required testing at USB-IF workshops
- Review test specs when available and provide feedback
  - Currently on track for Q1 2009
- Review Interoperability Procedures
  - Perform in your own lab



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