

Intel® Smart Connect Technology 4.0

Compliance Test Plan

August 2012

Revision 0.5

Intel Confidential

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Revision History

Document Number	Revision Number	Description	Revision Date
485844	1.0	<ul style="list-style-type: none">• Changed to compliancy• Added pnpExcersier tool• Some tests made optional• Added sections on Compliancy/Test Tools	August 2012

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1 Introduction

1.1 Purpose of this Document

The Intel® Smart Connect Technology Compliance Guide is designed to provide original equipment and device manufacturers with the compliancy requirements for 2012/13 platform implementation and the methodology and tools to verify compliance Intel® Smart Connect Technology. This document contains the compliance requirements to meet Intel® Smart Connect Technology quality requirements. This will reduce the number of issues seen in the implementation of this technology.

It also provides the test environment setup information, the procedure for each test, and the expected results for the purpose of validating compliancy. Requirements contained in this document target the system BIOS/EC and other aspects of overall platform implementation.

Any issues found within Intel Smart Connect Technology should be promptly reported to your Intel contact for further assessment.

Note: Intel® Smart Connect Technology is referred to (for brevity) as “iSCT” in various table entries throughout this document.

1.2 Reference Documents

Document	Document No./Location
Intel® Smart Connect Technology 4.0 Platform Design Specification	503702

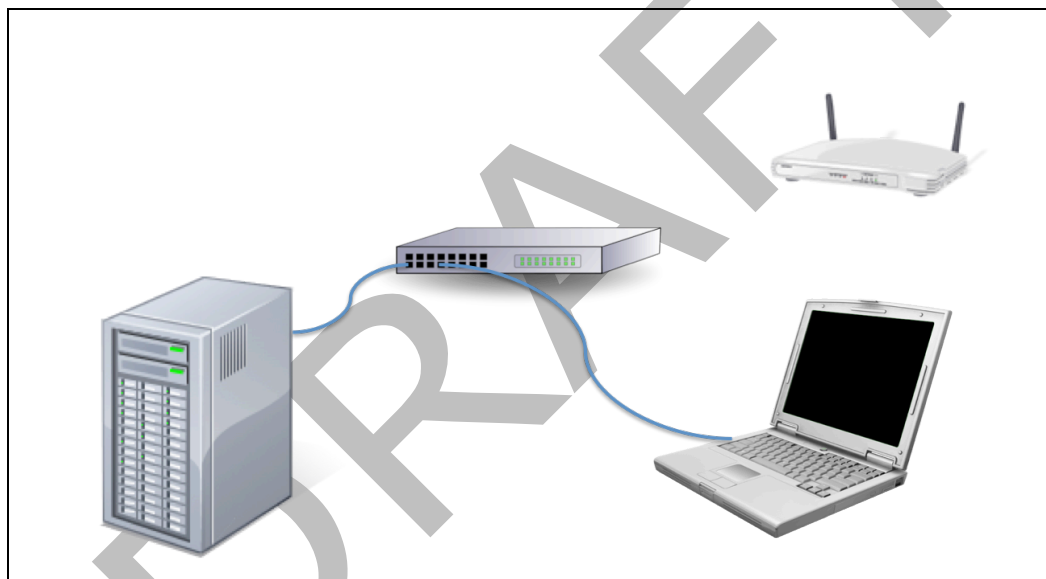
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2 Configuration

Test setup is pictured below. For the tests described in the test plan, the connection from the system under test (SUT) to the content server can be over a wired connection. The content server or router/gateway will need to supply the IP address for the SUT. The Wireless Access Point (AP) is required for the NetDetect testing section. If the AP has security enabled, before conducting these tests ensure the SUT is configured properly and has connectivity.

The configuration values for the Intel Smart Connect Technology should be configured with the settings the customer plans to ship (periodic wake, OS unattended sleep, password required on resume). For battery tests, battery must be fully charged.

Figure 2-1. Test Setup



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3 Installation

Table 3-1. Installation Verification

Test Case	Objective	Test Procedure	Pass/Fail Criteria
INS-001	Verify ISCT virtual device is created	Boot into BIOS menu of the SUT and turn on ISCT (optional if BIOS doesn't support this feature) Locate an "Unknown device" with Hardware ID "ACPI\INT33A0" from windows device manager	Device with Hardware ID "ACPI\INT33A0" should not exist if boot with ISCT disabled
INS-002	Verify that ISCT can be installed on your SUT properly	Un-install previous installation if exists Open windows explorer and navigate to ISCT installation directory Execute "Setup.exe" as Administrator Follow the GUI instructions to complete installation	1. Installation complete without error message. 2. Check Windows Service Manager and verify ISCT agent is started
INS-003	Verify ISCT device is consumed in device manager properly by the driver	Execute Windows* Device Manager Expand "System devices" and try locating "Intel(R) Smart Connect Technology Device"	ISCT device existed and version matched
INS-004	Verify ISCT agent is in background service	Open a Command Prompt with Administrator privilege Execute "Net Stop ISCTAgent" Execute "Net Start ISCTAgent"	Command should complete without error message
INS-005	Verify all drivers resume properly when waking from S3	Open Device Manager and make sure no yellow bang exists on ISCT device Put SUT in S3 state Wake up SUT by power button Verify S3 resume correctly and there is no yellow band devices in Windows Device Manager	S3 cycle complete with error message

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4 BIOS/EC/HW

Table 4-1. BIOS/EC/HW Verification

Test Case	Objective	Test Procedure	Pass/Fail Criteria
BES-001	Verify GABS ACPI method	Select "ISCT BIOS Enable Settings (GABS)" in pnpExcerciser tool Click on "Get Value" and verify return values are correct for the platform supported settings	
BES-002	Verify GAOS/SAOS ACPI method	Select "Set ISCT Function Status (GAOS/SAOS)" in pnpExcerciser tool Check "ISCT Mode Enabled" and "ISCT Mode Selection" and click "Set Value" Click "Get Value" and verify the "ISCT Mode Enabled" and "ISCT Mode Selection" check box is selected	
BES-003	Verify GANS/SANS ACPI method	Select "Set ISCT Notification Status (GANS/SANS)" in pnpExcerciser tool Check "ISCT Notification Enabled" and click "Set Value" Click "Get Value" and verify the "ISCT Notification Enabled" check box is selected	
BES-004	Verify GWLS ACPI method	Select "WLAN Module Status (GWLS/SWLS)" in pnpExcerciser tool Click on "Get Value" Verify that "WLAN Wireless Enabled" checked/unchecked matches the state of the Radio On/Off status for the WLAN card Toggle the Radio On/Off status and click on "Get Value" again to verify the status is updated to reflect the current status of the Radio On/Off status	Test not required if no WLAN power control
BES-005	Verify GWWS ACPI method	Select "WWAN Module Status (GWWS/SWWS)" in pnpExcerciser tool Click on "Get Value" Verify that "WWAN Wireless Enabled" checked/unchecked matches the state of the Radio On/Off status for the WLAN card Toggle the Radio On/Off status and click on "Get Value" again to verify the status is updated to reflect the current status of the Radio On/Off status	Test not required if no WWAN support for platform



Test Case	Objective	Test Procedure	Pass/Fail Criteria
BES-006	Verify SASD ACPI method	Select "Sleep Duration (SASD)" in pnpExerciser tool Enter either a non-zero duration in seconds or select a wake-up time Put the platform into S3 and verify the wake occurs within the specified duration or selected time	Platform wakes via EC/RTC timer programmed value
BES-007	Verify GPWR ACPI method	Select "Platform Wake Reason (GPWR)" in pnpExerciser tool Click on "Get Value" and verify that the correct wake reason was returned (should be "EC Timer" or "RTC Timer" selected and "BIOS Programmed Timer" selected) Place platform into S3 and once in S3, resume platform by user method (power button, HID event, ...) Click on "Get Value" and verify it returns "User Pressed Power Button"	Platform Wake Reason is correct for periodic wake timer value and user resumed cases
BES-008 (Mobile Only)	Verify GPCS ACPI Method	Select "Get Platform Component State (GPCS)" in pnpExerciser tool Click on "Get Value" and verify that "Lid State" is checked (lid open). Connect an external monitor to the SUT and close the lid. Click on "Get Value" and verify that "Lid State" is not checked (lid closed).	
WLAN-001	Verify SWLS ACPI method	Select "WLAN Module Status (GWLS/SWLS)" in pnpExerciser tool Check "WLAN Powered in S3 Enabled" Select "Set Value" Put platform into S3 and verify power is applied to WLAN module in S3 Repeat steps 2-4 with S4 sleep state if supported	Test not required if no WLAN power control
WWAN-001	Verify SWWS ACPI method	Select "WWAN Module Status (GWWS/SWWS)" in pnpExerciser tool Check "WWAN Powered in S3 Enabled" Select "Set Value" Put platform into S3 and verify power is applied to WWAN module in S3 Repeat steps 2-4 with S4 sleep state if supported	Test not required if no WWAN power control



5 Basic Functionality

5.1 Objective

Verify platform supports the basic functionality of Intel® Smart Connect Technology.

Table 5-1. Basic Functionality Verification

Test Case	Objective	Test Procedure	Pass/Fail Criteria
BAS-001	Verify SUT will wake up in S0-iSCT state	Clear registry key value of "HKEY_LOCAL_MACHINE\SOFTWARE\...\Intel Smart Connect Technology\Always Updated\WhiteList" if it exist Ensure there is at least one network adapter as connection established (IP assigned) From ISCT Configuration utility, enable updating every 5 minutes Put SUT in S3 state. Verify whether SUT will resume to S0-iSCT state within 10 minutes	SUT should resume to S0-iSCT state within 10 minutes. After a about 30 seconds (give or take) the system will transition back to S3 and continue cycling until interrupted by user
BAS-002	Verify display is off during S0-iSCT state	Following the BAS-001 test case to put SUT in S0-iSCT state Verify screen is off during S0-iSCT state	Screen should be off when in S0-iSCT state
BAS-003	Verify fan is off during S0-iSCT state	Following the BAS-001 test case to put SUT in S0-iSCT state Verify fan is off during S0-iSCT state	Fan should be off when in S0-iSCT state
BAS-004	Verify audio is muted during S0-iSCT state	Following the BAS-001 test case to put SUT in S0-iSCT state Verify audio is muted during S0-iSCT state	Audio should be muted when in S0-iSCT state
BAS-005	Verify S0-iSCT state indicator LED (Optional)	Following the BAS-001 test case to put SUT in S0-iSCT state Verify LED is indicating that system is in S0-iSCT state	LED should indicate SUT is in S0-iSCT state
BAS-006	Verify S0-iSCT state and S3 state have exactly the same system behavior. (Backlights, panel, LED indications, keyboard, etc.)	Following the BAS-001 test case to put SUT in S0-iSCT state Verify LED's do not change state (visual appearance) between S3 and S0-iSCT	All SUT LED's have the same state as when the platform was in S3



Test Case	Objective	Test Procedure	Pass/Fail Criteria
BAS-007	Verify ISCT never wakes from OS Hibernate (S4)	Follow instructions in test case BAS-001 to enable ISCT Put SUT in S4 state in step 4 of BAS-001	ISCT should not wake in hibernate (S4) mode
BAS-008	Verify SUT will not resume to S0-ISCT state as expected when operated in Extended Power Saving mode	From ISCT Configuration utility, modify current SUT time to fall within extended power saving time Follow test case BAS-001 to enable ISCT Verify SUT did not wake to S0-ISCT state in 10 minutes, but instead in 2 hours Restore SUT time to current time	SUT wakes every 2 hours
BAS-009	Verify SUT will not resume to S0-ISCT state if under Battery threshold in DC mode	Power up SUT with DC battery Deplete battery to less than 90% Modify registry key value of "HKEY_LOCAL_MACHINE\SOFTWARE\...\Intel Smart Connect Technology\Always Updated\DCBatteryThresholdHalt" to 95 (5Fh) Follow the instruction in test case BAS-001, verify SUT won't resume to S0-ISCT state Restore "DCBatteryThresholdHalt" value to original settings	Wait 10 minutes and SUT should never resume to S0-ISCT state
BAS-010	Verify power button will trigger SUT state transition from S0-ISCT to S0	Follow the instructions in test case BAS-001 to enable ISCT Press power button while SUT is in S0-ISCT state Verify SUT will resume to S0 state	SUT should resume to S0 state correctly and stay as in S0 per the unattended windows power policy
BAS-011	Verify HID event will trigger SUT state transition from S0-ISCT to S0.	Follow the instructions in test case BAS-001 to put system in S0-ISCT state Trigger every HID event which could invoke S3-resume (keyboard, mouse click, mouse swipe on track pad) Verify SUT will resume to S0 state	SUT should resume to S0 state correctly and stay as in S0 per the unattended windows power policy
BAS-012	Verify after HID event when SUT is in S0-ISCT mode and password is required upon resume, entering a password triggers state transition to S0	Repeat steps from BAS-011 Enter password Verify SUT will resume to S0 state	SUT should resume to S0 state correctly and stay in S0 per the unattended windows power policy



Test Case	Objective	Test Procedure	Pass/Fail Criteria
BAS-013	Verify SUT will not resume to S0-ISCT state if none of applications in whitelist are running (optional)	Examine registry key value of "HKEY_LOCAL_MACHINE\SOFTWARE\...\Intel Smart Connect Technology\Always Updated\WhiteList" If there are no applications in the registry entry, add an application name (can be any application name, e.g. livemail.exe) Ensure none of the application listed are running Follow the instruction in test case BAS-001, verify SUT won't resume to S0-ISCT state	SUT should not resume to S0-ISCT state
BAS-014	Verify HID event will trigger SUT state transition from S3 to S0	Clear registry key value of "HKEY_LOCAL_MACHINE\SOFTWARE\...\Intel Smart Connect Technology\Always Updated\WhiteList" if it exist. Ensure there is at least one network adapter as connection established (IP assigned) From ISCT Configuration utility, enable updating every 5 minutes Manually place system into S3 Once system is in S3, wake system by HID event (power button, keyboard, mouse click, mouse swipe on track pad) Verify SUT will resume to S0 state for each HID event	SUT should resume to S0 state correctly and stay as in S0 per the unattended windows power policy
BAS-015	Verify co-existence with RTC wake event before ISCT wake	Ensure that Microsoft* pwrtest.exe is available on the SUT. From ISCT Configuration utility, enable updating every 5 minutes From administrative command prompt, change directory to where pwrtest.exe resides. Invoke "pwrtest /sleep /p:60" to have the SUT transition to S3 Verify SUT will wake after 60 seconds instead of the ISCT 5 minutes	SUT will wake after 60 seconds instead of 5 minutes
BAS-016	Verify co-existence with RTC wake event after ISCT wake	Ensure that Microsoft* pwrtest.exe is available on the SUT. From ISCT Configuration utility, enable updating every 5 minutes From administrative command prompt, change directory to where pwrtest.exe resides. Invoke "pwrtest /sleep /p:600" to have the SUT transition to S3 Verify SUT will wake after 5 minutes for S0-ISCT and not after 10 minutes for pwrtest wake	SUT will wake after 5 minutes instead of 10 minutes



6 System Thermal Testing

6.1 Objective

This section verifies that the system thermal protection mechanisms work as expected under Intel® Smart Connect Technology on the SUT. To support these tests, you will need access to a thermal chamber.

Table 6-1. System Thermal Verification

Test Case	Objective	Test Procedure	Pass/Fail Criteria
THRM-001	<p>To verify that iSCT Agent changes wake timer and correctly employs an exponential thermal back-off algorithm when Tj exceeds temperature threshold during iSCT cycling</p> <p>To verify feature's functionality for both daytime and nighttime</p>	<p>In 'regedit' set ThermalThresholdCentigrade = 65. LoggingLevel = 16; LoggingEnabled = 2</p> <p>In iSCT UI select S3 = minimum</p> <p>Run iSCT concurrent WL (email, Twitter etc.)</p> <p>Start 'Debugview.exe' and start logging to a data file</p> <p>Put system to S3 to initiate iSCT cycling of S0→S3→S0→</p> <p>Put system in backpack, put backpack in temp chamber, select chamber temp = 35°C</p> <p>Run iSCT testing over a recommended period of ~6-8hrs</p> <p>Review DebugView output log file to ensure successful network connection and information packet transfer during iSCT cycling</p> <p>Analyze DebugView output log file to ensure wake timer multipliers are correctly applied as per Tj is reached to the target value.</p>	<p>Check CPU temperature reported in log... when CPU temperature reported is numerically lower than 65C... i.e. <64C the sleep duration for the next sleep cycle should double...</p> <p>If you have implemented any other additional thermal protections based on other system thermal sensors, check them according to your platform design specifications.</p>

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7 System Battery Testing

7.1 Objective

This section verifies that the system battery protection mechanisms work as expected under Intel Smart Connect Technology on the SUT.

Table 7-1. System Battery Verification

Test Case	Objective	Test Procedure	Pass/Fail Criteria
BAT-001	To verify that iSCT agent reduces wake frequency as battery charge level depletes, and eventually ISCT operation stops at a low battery setting	<ol style="list-style-type: none"> 1. In 'regedit' set LoggingLevel = 16; LoggingEnabled = 2 2. In iSCT UI select S3 = minimum (5 min) 4. Ensure system is ~100% charged, start iSCT concurrent WL (email, Twitter etc.) 5. Start 'Debugview.exe' and start logging to a data file 6. Put system to s3 to initiate iSCT cycling of S0→S3→S0→ 7. Unplug AC, and run system on battery. 8. Start sending average sized e-mail to the test system at repeat intervals (e.g., ~50kB file every 5 minutes) 9. Run iSCT testing over an extended period of ~4days (till battery runs out) 10. Inspect s3 and s0 durations from debugview output log. Inspect if battery back-off policy is functional and consistent. Ensure wake timer multipliers are correctly applied as per battery charge depletes from >90%, >80%, >70%, ... 11. Inspect debuglog output file to ensure successful network connection and information packet transfer during iSCT cycling 	Inspect if battery back-off policy is functional and consistent. Ensure wake timer multipliers are correctly applied as per battery charge depletes from >90%, >80%, >70%, ...

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8 NetDetect

8.1 Objective

This section verifies NetDetect support on the SUT. To support these tests, you will need to have an Access Point available and the SSID of the Access Point configured to be "Connect Automatically" in the Windows* Wireless Connection Manager.

Table 8-1. NetDetect Verification

Test Case	Objective	Test Procedure	Pass/Fail Criteria
ND-001	Verify NetDetect Functionality with ISCT Agent (AC)	<p>Verify the Access Point can be connected to by the SUT and the SSID of the Access Point is checked for "Connect Automatically".</p> <p>Verify network connectivity exists via WLAN to the Access Point</p> <p>Verify no other network connections exist (LAN/WWAN)</p> <p>From ISCT Configuration utility on the SUT, enable updating every 5 minutes</p> <p>Turn off AP and after a minute, verify no network connections exist (LAN/WLAN/WWAN)</p> <p>Manually place platform into s3</p> <p>After 5-10 minutes platform will wake into S0-ISCT</p> <p>Wait for platform to transition back to S3 by ISCT Agent</p> <p>Wait 10 minutes (the initial NetDetect enabling hold-off period - equal to the current periodic wake setting)</p> <p>Apply power to the AP</p> <p>Platform will wake and transition to S0-ISCT and transition back to S3 (typically within 2-4 minutes).</p>	Platform wakes up shortly after AP turned back on and transitions to S0-ISCT and then backs to s3 again with the SUT is on AC power.
ND-002	Verify NetDetect Functionality with ISCT Agent (Battery)	<p>Repeat test ND-001 with the SUT running on battery only</p>	Platform wakes up shortly after AP turned back on and transitions to S0-ISCT and then backs to s3 again when the SUT is on battery power.



Test Case	Objective	Test Procedure	Pass/Fail Criteria
ND-003	Verify NetDetect does not wake platform when Radio is turned off in S0	<p>Verify the Access Point can be connected to by the SUT and the SSID of the Access Point is checked for "Connect Automatically".</p> <p>Verify network connectivity exists via WLAN to the Access Point</p> <p>Verify no other network connections exist (LAN/WWAN)</p> <p>From ISCT Configuration utility on the SUT, enable updating every 5 minutes</p> <p>Turn Radio off using either HW switch or Function Key</p> <p>Turn off AP and after a minute, verify no network connections exist (LAN/WLAN/WWAN)</p> <p>Manually place platform into s3</p> <p>After 5-10 minutes platform will wake into S0-ISCT</p> <p>Wait for platform to transition back to S3 by ISCT Agent</p> <p>Wait 10 minutes (the initial NetDetect enabling hold-off period - equal to the current periodic wake setting)</p> <p>Apply power to the AP</p> <p>Platform will not wake as Radio is turned off</p> <p>Restore platform to normal S0 state</p> <p>Turn Radio on via either HW switch or Function key</p> <p>Repeat steps 2-11.</p> <p>Platform will wake and transition to S0-ISCT and transition back to S3 (typically within 2-4 minutes).</p>	Platform does not wake after AP turned back on when Radio is turned off and wakes after Radio turned back on and AP turned on



Test Case	Objective	Test Procedure	Pass/Fail Criteria
ND-004	Verify NetDetect does not wake platform with Radio is turned off in S3 (via HW Radio Switch) – optional if no HW Radio Switch	<p>Verify the Access Point can be connected to by the SUT and the SSID of the Access Point is checked for "Connect Automatically".</p> <p>Verify network connectivity exists via WLAN to the Access Point</p> <p>Verify no other network connections exist (LAN/WWAN)</p> <p>From ISCT Configuration utility on the SUT, enable updating every 5 minutes</p> <p>Turn off AP and after a minute, verify no network connections exist (LAN/WLAN/WWAN)</p> <p>Manually place platform into s3</p> <p>After 5-10 minutes platform will wake into S0-ISCT</p> <p>Wait for platform to transition back to S3 by ISCT Agent</p> <p>Wait 10 minutes (the initial NetDetect enabling hold-off period - equal to the current periodic wake setting)</p> <p>Turn off Radio via HW Radio Switch</p> <p>Apply power to the AP</p> <p>Platform will not wake as Radio is turned off</p> <p>Restore platform to normal S0 state</p> <p>Turn Radio on via HW Radio Switch</p> <p>Repeat steps 2-11.</p> <p>Platform will wake and transition to S0-ISCT and transition back to S3 (typically within 2-4 minutes).</p>	Platform does not wake after AP turned back on when Radio is turned off and wakes after Radio turned back on and AP turned on

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9 Intel® Rapid Start Technology

9.1 Objective

This section verifies Intel Rapid Start Technology co-existence with Intel Smart Connect Technology on the SUT. To support these tests, you will need to have the Intel Rapid Start Technology configured and running on the SUT.

Many of these tests may not be supported by the Rapid Start Technology policies of the platform.

Table 9-1. Intel® Rapid Start Technology Verification

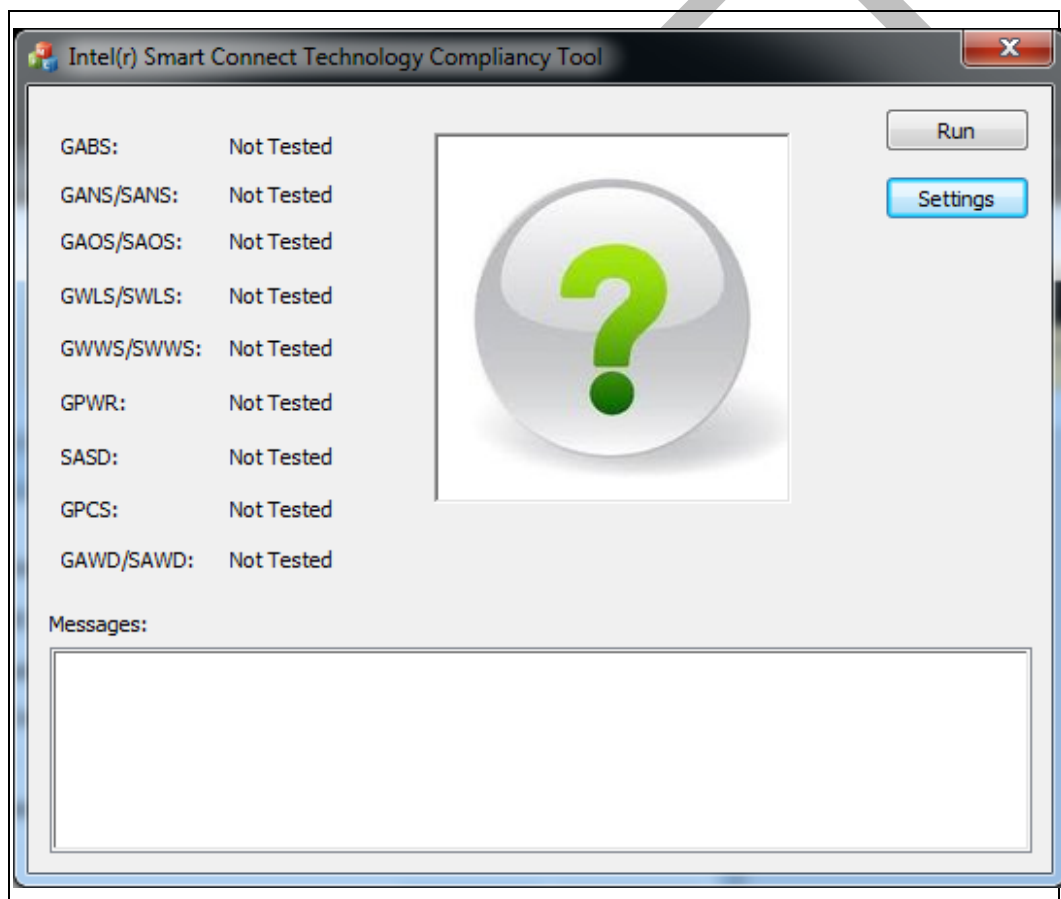
Test Case	Objective	Test Procedure	Pass/Fail Criteria
BAT-001	Verify Rapid Start S4 is entered immediately upon transition from S0 to S3 when the current time of the SUT is between the iSCT Extended Hours setting	<p>Ensure there is at least one network adapter as connection established (IP assigned)</p> <p>From ISCT Configuration utility, enable updating every 5 minutes</p> <p>Verify and/or set the current time of the system to fall within the iSCT Extended Hours time period setting on the Advanced tab of the iSCT Configuration Utility</p> <p>Manually place the SUT into S3</p> <p>Upon entry to S3, the BIOS will save the contents of Active Memory to the SSD device and transition the platform to Rapid Start S4</p> <p>After approximately 2 hours, the platform will wake from Rapid Start S4 and enter S0-ISCT and then transition back to S3 and immediately to Rapid Start S4</p>	<p>Platform enters Rapid Start S4 shortly after the transition to S3</p> <p>Platform wakes from Rapid Start S3 after 2 hours and then transitions back to S3 and subsequently Rapid Start S4</p>



10 Intel® Smart Connect Technology Compliancy Tool

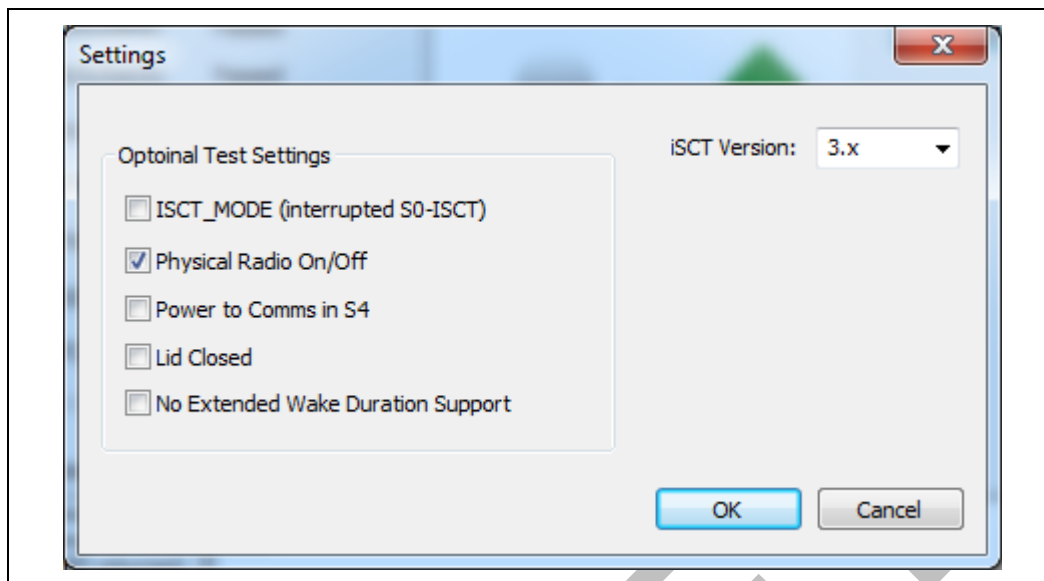
This tool provides a method for the BIOS developer and Validation team to verify their platform correctly supports the Intel® Smart Connect Technology. The tool does not cycle the platform from S0 -> S3 -> S0-ISCT. The tool calls the required ACPI methods to check if the interfaces are implemented and accept the data and return correct values.

Upon invocation of iSCTChecker.exe the following GUI is displayed:



The left side of the GUI displays the ACPI messages to be tested. The **Messages** window displays the output of the tests on each of the ACPI messages. Failure indicators are reported.

The Settings button displays the test configuration dialog box:

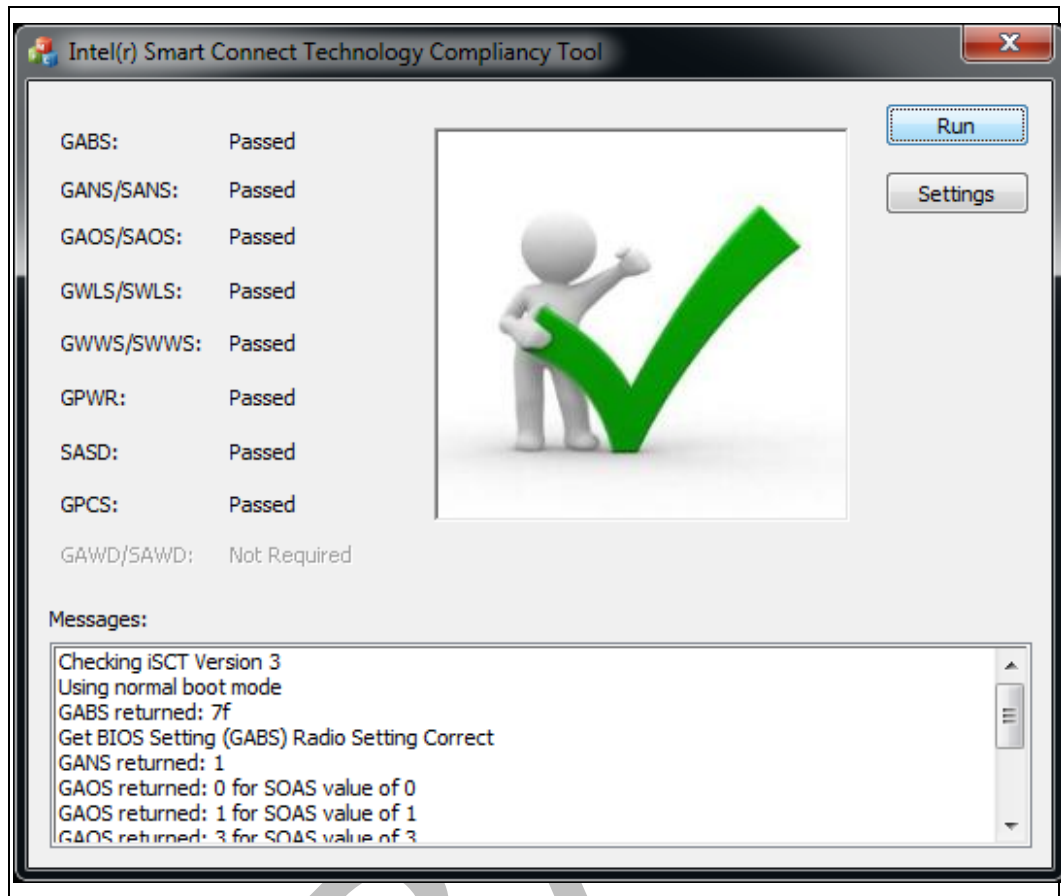


In this example, the following settings are used:

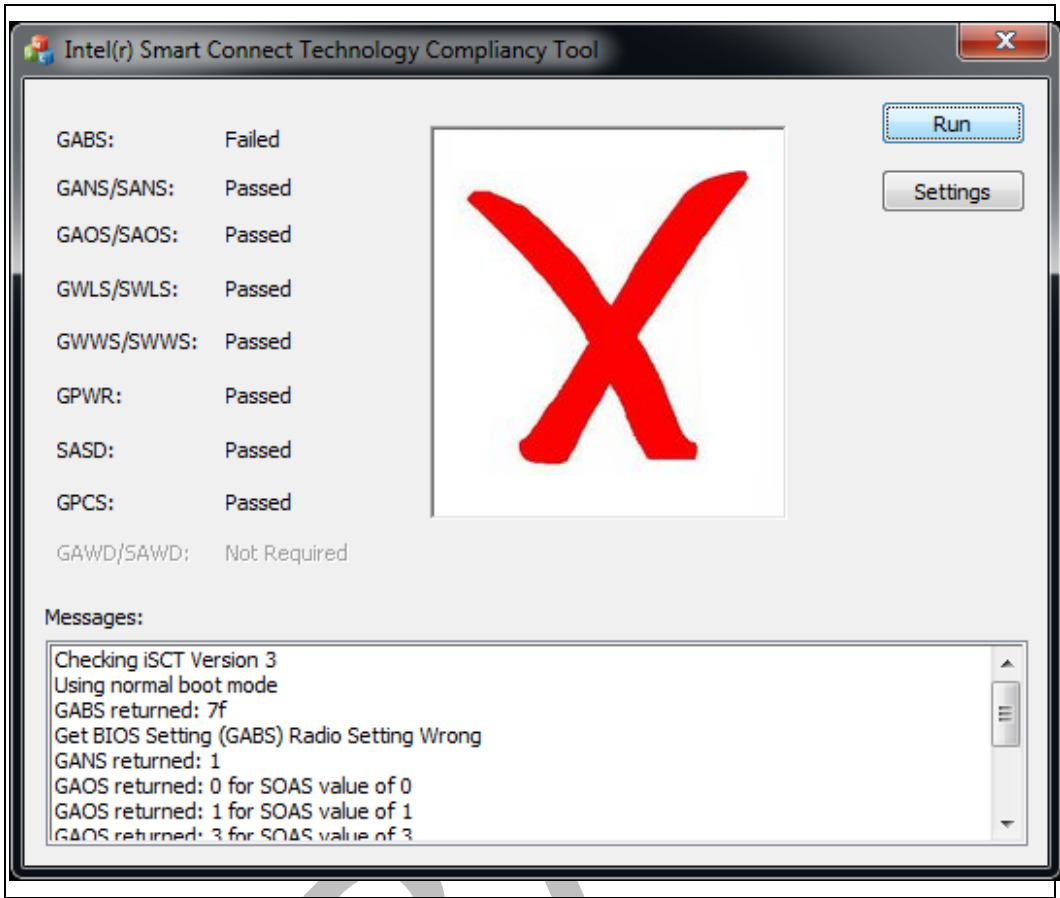
- 1) Platform is booted normally (not by periodic/NetDetect wake)
- 2) The platform has a physical Radio On/Off switch
- 3) Power is not supplied to the Comms devices in S4
- 4) Lid is open
- 5) Extended Wake Duration supported
- 6) BIOS supports Smart Connect Technology 4.0

Closing the dialog returns back to the main (opening) window.

When the Run button is pressed, the tests are run using the settings and the following window displayed if all tests pass.



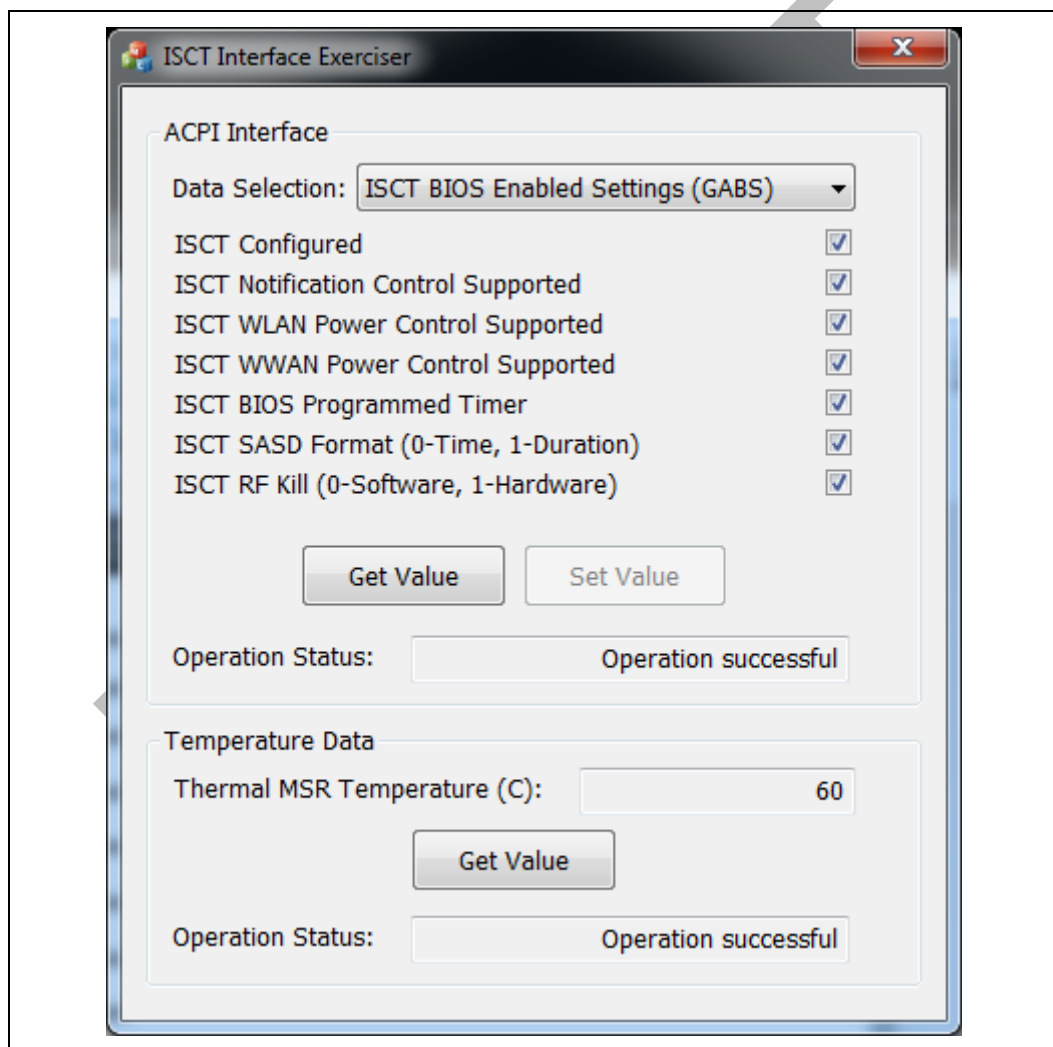
If any of the tests fail, instead of the checkmark icon being displayed, an icon with a "X" is displayed. In this example, the Physical Radio On/Off GABS ACPI Control Method setting was set not correctly as indicated in the Messages window.



11 ISCT Interface Exerciser

For manual testing of the BIOS ACPI methods, the ISCT Interface Exerciser allows invocation of each required BIOS ACPI interface interactively.

Upon invoking pnpExerciser.exe the following window is displayed:



To check additional functions, click on the Data Selection drop down.