Bluetooth®
SPECIAL INTEREST GROUP

THE PRODUCT CHANGE CHECKLIST

ABSTRACT: The following document provides Members with a guideline for assessing changes to a Qualified Design. - The guidelines provide the Member with a checklist to consider prior to listing their products or when making changes to existing qualified products.

Revision History

Revision	Date	Description
D09r00	9-Mar, 2006	Original
D10r00	25-Sep, 2006	Revised based on BTAB F2F Basingstoke Review Feedback
D10r01	28-Feb, 2008	Revised and reorganized (SIG)
D10r05	2-May, 2008	BTAB March F2F review comments addressed
D10r06	7-Aug, 2008	BTAB Conference call
D10r07	2-Sep, 2008	Comments from BTAB members during Voting
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CONTENTS

Table of Contents

1 Objective

The Product Change Checklist is designed to help members identify potential *Bluetooth* Qualification and Interoperability issues resulting from the implementation of qualified designs into products and changes to Qualified *Bluetooth* designs. Such changes typically occur when members integrate *Bluetooth* qualified designs into end-products, correct defects, implement UI changes affecting Bluetooth functionality, update the electrical configuration, etc. If left unverified, such changes could result in issues that could lead to Qualification Enforcement Program actions.

This checklist is provided for Members to follow while assessing the impact of any changes to a *Bluetooth* Qualified Design. The goal of this document is to help members identify the issues that impact the *Bluetooth* design as a result of changes. The information in this document will be used to develop an interface on the End Product List (EPL), Test Plan Generator (TPG), and Qualification Listing Interface (QLI) that highlights such potential issues to members so that they can rectify them before completing the final steps in their new *Bluetooth* Qualified Design Listing (QDL), Design Changes or End Product Listing (EPL).

Members can thus identify any *Bluetooth* Qualification impacts and receive guidance on what testing and/or verification is needed based on their changes.

Bluetooth Qualification Program and Qualification Enforcement Program (QEP) [2] are governed by the Program Reference Document (PRD) [1] administered by the Bluetooth SIG. This checklist is not a comprehensive list of all possible scenarios and does not relieve Members from the responsibility to comply with the Bluetooth specifications.

In case of potential conflict, the current PRD supersedes this document.

2 Factors that Result in Design Changes

Each *Bluetooth* product is unique and it is the responsibility of the member to re-assess subsequent changes to the design to ensure that it:

1) continues to comply with the requirements of the *Bluetooth* Specifications

2) continues to comply with the *Bluetooth* Membership Agreements

3) continues to comply with the *Bluetooth* Declaration of Compliance (DoC)

4) continues to comply with the Supplier Declaration of Conformity (SDoC)

5) continues to comply with the *Bluetooth* Qualification Process and Test Case Reference List (TCRL)

6) continues to be interoperable with other *Bluetooth* products as required by the specification

2.1 CHANGES THAT IMPACT A QUALIFIED DESIGN LISTING

The PRD [1] provides Bluetooth SIG Members with the ability to self-declare their product designs as qualified by signing the Declaration of Compliance (DoC) and the Supplier Declaration of Conformity (SDoC). Within these two declarations, the Member agrees to become solely responsible for meeting the requirements and maintaining the qualified status of the design throughout its life-cycle.

The Bluetooth SIG considers a "Design" as a combination of one or more of the following *Bluetooth* related elements:

1) Electronic circuits, components, layout, and printed circuit board

2) Firmware

3) Software

4) Application

5) Supported features

6) Reference Integration Note (RIN)

A "Qualified Design" is a Bluetooth Design that has completed the *Bluetooth* Qualification Process as defined in the PRD [1].

Any change to a Qualified Design requires re-assessment. The outcome of the reassessment will identify if any re-testing is appropriate, the extent of the testing required and whether a new Qualified Design listing is required.

2.2 DEFINITIONS

For the purpose of this document, the following definitions apply:

1) Application: Software that enables the performance using *Bluetooth* wireless technology.

2) Electronic Circuit: An interconnection of electrical components such as resistors, inductors, capacitors, transmission lines, voltage sources, current sources, amplifiers, and switches that forms a closed loop, giving a return path for the current. For the purpose of this document, the circuit must also contain *Bluetooth* wireless electronic components.

3) Electronic Component: A component that provides gain and/or processes a signal.

4) Firmware: A computer program that is embedded in a hardware device, for example a microcontroller. It can also be provided on flash ROMs or as a binary image file that can be uploaded onto existing hardware by a user. For the purpose of this document, Firmware is assumed to affect the *Bluetooth* wireless technology.

5) Hardware Module: A separate electronic circuit that incorporates all of the *Bluetooth* wireless components and provides a consistent interface. For the purpose of this document, a Hardware Module is assumed to have RF behavior that is not impacted by the other components in the Electronic Circuit.

6) Integrated Circuit / Chipset: A miniaturized electronic circuit (consisting mainly of semiconductor devices, as well as passive components) that has been manufactured in the surface of a thin substrate of semiconductor material. For the purpose of this document, Integrated Circuits are assumed to implement some portion of the *Bluetooth* wireless Design.

7) Layout: The placement of electronic circuit and components on a substrate including printed circuit board material, traces, pads, component placement, and design rules. For the purpose of this document, Layouts are assumed to implement some portion of the *Bluetooth* wireless Design.

8) Printed Circuit Board: A non-conductive substrate onto which conductive pathways or traces are laminated and etched from copper sheets to mechanically support and electrically connect electronic components. For the purpose of this document, Printed Circuit Boards are assumed to implement some portion of the *Bluetooth* wireless Design.

9) Re-architecting: Modifying existing Firmware or Software, possibly without impacting the interfaces, in order to improve the Firmware or Software whether for maintainability, performance, or any other purpose.

10) Reference Design: A Bluetooth wireless electrical design consisting of an electronic circuit, layout, and Reference Integration Note. A Reference Design may also specify Printed Circuit Board materials and Firmware.

11) Reference Integration Note (RIN): See Section 5.1 of PRD [1].

12) Software: A general term used to describe a collection of computer programs, procedures and documentation that perform some tasks. For the purpose of this document, Software is assumed to affect the *Bluetooth* wireless technology.

13) Software Module: A separate computer software part that abstracts a portion of the software and provides a logical interface. For the purpose of this document, a Software Module is assumed to affect the *Bluetooth* wireless technology.

14) Supported features: These are the *Bluetooth* wireless technology features that are supported by the Design such as PICS and PIXIT.

15) Re-assessment: Re-assessment is defined as the re-evaluation of a qualified design when changes are made to that original design. The re-assessment should consider any affect that the changes may have on Bluetooth functionality and ensure that the updated design continues to fulfill the current Qualification Testing Requirements. See Section 3.3 of PRD [1] for the definition of Assessment.

16) Derived work: See PRD [1] section 2.2 for details.

2.3 INTEGRATING A QUALIFIED DESIGN

This checklist is purely for changes to existing designs and should not be used to assess new designs.

3 General Product Changes

The following checklist items can be used to assess whether an immediate re-evaluation of the design is required. A YES to any of these questions should result in further evaluation and/or a new listing:

☐ Is the design a new implementation of the same or similar functionality, and not derived work from another design?

IF YES: Then this requires a new Qualified Design listing.

☐ Were any new PICS items added to an existing layer?

IF YES: Then this requires a new Qualified Design listing. (Refer to FAQ 219)

☐ Have any new profiles, protocols, or core layers been added to the design?

IF YES: Then this requires a new Qualified Design listing.

☐ Have any of the integrated *Bluetooth* components, subsystems, or end products used in the original design been updated (with a new QDID) since the initial qualification?

IF YES: Then this requires a new Qualified Design listing.

☐ Do any of the changes result in a new Product Type (i.e. changing from a component to a subsystem, etc.)? Note that adding or removing layers may trigger a change of Product Type.

IF YES: Then this requires a new Qualified Design listing.

☐ Are any *Bluetooth* profiles features, profiles, protocols, and/or core features implemented and exposed in the product but not declared in the PICS?

IF YES: All PICS shall match the implemented and exposed profile features, profiles, protocols, and/or core features implemented in the design. This requires a new Qualified Design listing.

☐ Have any profiles, protocols, or core layers been removed from the design?

IF YES: Then this design must be reassessed for impacts to the Qualified Design listing. Members should use the questions that follow to determine which part of the design requires further evaluation.

☐ Do any of the changes alter the core or the profile specification versions?

IF YES: Then this requires a new Qualified Design Listing.

☐ Does this design alter the *Bluetooth* wireless radio implementation?

IF YES: Complete the Checklist for Electrical Design Changes.

☐ Does this design alter the *Bluetooth* Core Stack implementation?

IF YES: Complete the Checklist for Changes to the Core Stack.

☐ Does this design alter the *Bluetooth* Profile Stack implementation?

IF YES: Complete the Checklist for Changes to the Profile Stack.

☐ Does this design alter an application or UI that interfaces with the *Bluetooth* wireless technology?

IF YES: Complete the Checklist for Changes to the UI or Application.

4 Checklist for Electrical Design Changes

If any changes have been made to a product's electrical implementation, then the member is responsible for verifying that none of the changes impact qualified status of the electrical design.

Any hardware change (such as a change to the PCB layout, or integration of an antenna on a new PCBA material) of a circuit as defined in the respective Reference Integration Note (refer to the RIN within the QDL listing for the integrated circuit) requires re-assessment.

Changing passive components such as capacitors of the oscillator circuit, for example, will require RF retesting even if the replacement capacitors are of the same values. This is due to the fact that the capacitors used may demonstrate completely different behaviors across the temperature range and may have different tolerances.

Electrical changes to existing designs require considerable expertise and the Bluetooth SIG recommends that all electrical changes be reassessed by experts in this field (e.g. a Bluetooth Qualification Expert) to assess any impacts to the RF performance.

As such, members must answer each question in the following checklist. A YES to any of these questions should result in further evaluation and/or a new listing:

☐ Does the change alter a *Bluetooth* Hardware Module power supply, RF circuit, or integrated antenna?

   IF YES: The *Bluetooth* design requires re-assessment.

☐ Does the change alter a *Bluetooth* Integrated Circuit (E.g. RF / Baseband chip) ?

   IF YES: The *Bluetooth* design requires re-assessment. Refer to Product Change Checklist Spreadsheet [4].

☐ Does the change alter a *Bluetooth* Reference Design?

   IF YES: The *Bluetooth* hardware module requires re-assessment.

☐ Does the change utilize a hardware module from a different design (QDID)?

   IF YES: This requires a new Qualified Design Listing, even if manufacturer of the module is the same.

☐ Does the change alter a *Bluetooth* RF Layout or electrical components?

   IF YES: The *Bluetooth* design requires re-assessment.

☐ Has the process technology used in the Integrated Circuit (IC) or *Bluetooth* module changed since it was qualified (i.e. technology migration from a 0.3μm process to a 0.18μm process or from one IC fabrication process to another)?

   IF YES: The IC process change may have impacted the power supply and/or RF design and requires re-assessment.

☐ Was the external antenna or the antenna port replaced?

   IF YES: The antenna configuration change may have impacted the RF design and requires re-assessment.

☐ Was an RF power amplifier added to increase the RF output power or RF power amplifier changed?

   IF YES: Complete RF testing is required , and if the change results in change in Power Class (E.g. Class 2/3 to Class 1, or vice versa) a new Qualified Design Listing is required.

☐ Was the crystal oscillator changed?

   IF YES: Such a change requires re-assessment. The frequency related RF test cases, sensitivity and receiver immunity performance test cases need to be re-tested under normal and extreme conditions. Crystal oscillator is a critical component that affects RF characteristics.

☐ Has the supply voltage range of integrated Hardware Module or Integrated Circuit changed with respect to the range indicated in the existing design's qualification (refer to the RIN document for the QDL listing for the module or integrated circuit)?

IF YES: The supply voltage range, at the point of connection, should remain within the range of the existing qualified design's listing (refer to the RIN document within the QDL listing). If not, all extreme condition test cases need to be retested for the End Product under extreme voltage conditions under high and low temperature conditions. In addition the RIN document has to be updated with new voltage range if it existed for the original design.

☐ Has the temperature range claimed within the RF module or integrated circuit changed with respect to the Qualified Design?

IF YES: The temperature range claimed for the product integrating the Hardware Module or integrated circuit should be within the range of the existing qualified design listing. Otherwise, all test cases need to be retested at the relevant extreme test conditions. In addition the RIN document has to be updated with new temperature range if a RIN document existed for the original design.

5 Checklist for Changes to the Core Layers (Controller and Host Stack)

Please go through the checklist below and answer each question. If an answer is found to be 'yes' to any of the questions below, additional testing and a new Qualification Listing may be required.

The list checks the impact of changes made to a design that uses a tested *Bluetooth* controller (BB, LM, HCI) and host stack (HCI, L2CAP, GAP, SDP) implementation:

☐ Does the change utilize a host stack from a different design (QDID)?

IF YES: This requires a new Qualified Design listing, even if manufacturer of the stack is the same.

☐ Has the *Bluetooth* core stack implementation been changed since it was last integrated into the design?

IF YES: Then integrating the updated Core Stack requires re-assessment.

Changes to the Core Stack may include changes to software modules, features, or a transition from one specification version to another (i.e. *Bluetooth* v1.2->v2.0+EDR or v2.0+EDR->v2.1+EDR) and generally require a new Qualified Design Listing, (mandatory for a Core Spec Version change on the end design). Even if no such new Qualified Design Listing has been obtained, the integrator is still responsible for ensuring that their design is re-assessed and that a new Qualified Design Listing is obtained based-on the changes to the Core Stack.

☐ Has the *Bluetooth* host stack implementation changed to a new version (i.e. v2.1+EDR) that includes additional mandatory features, since it was last integrated into the design?

IF YES: Then integrating the updated Host Stack requires a new Qualified Design Listing.

Please note that v2.1+EDR necessitates changes to Core, Host, Profile and Application (User Interface) parts of a Design. All of the portions contained in the Design shall meet the requirements of supported v2.1+EDR features including the mandatory Secure Simple Pairing feature. Please refer to FAQ 258 for mixing policy for all Bluetooth core versions.

☐ Have any of the design's functions or features been re-architected since the design was qualified?

IF YES: Then these re-architected features or functions need to be treated as "new" features or functions. Such changes require re-assessment of the design.

☐ Has any new *Bluetooth* functionality (PICS supported features) within a stack layer or have any new *Bluetooth* stack layers been added since the design was qualified?

IF YES: Adding new functionality or *Bluetooth* stack layers requires a new Qualified Design Listing (i.e. LM changes affect the LM and the HCI layers).

☐ Have any *Bluetooth* ESR changes been integrated into the core or host stack since the design was qualified?

IF YES: Updating the *Bluetooth* stack for ESR changes require re-assessment of the design and a new Qualified Design Listing if any new PICS items were added.

6 Checklist for Changes to the Profile and Protocol layers (Outside the Core)

Please go through the checklist below and answer each question. If an answer is found to be 'yes' to any of the questions below, additional testing and a new Qualification Listing may be required.

The list checks the impact of changes made to a design that uses one or more tested *Bluetooth* profiles and/or protocols (i.e. HFP 1.5, A2DP, AVRCP, AVDTP, AVCTP, HID, etc.):

☐ Has the *Bluetooth* profile and/or protocol stack implementation been changed since it was last integrated into the design?

IF YES: Then integrating the updated profile and/or protocol stack requires re-assessment.

Changes to the profile and/or protocol stack may include changes to software modules, features, or a transition from one profile or protocol specification version to another (i.e. HFP 1.0 -> HFP 1.5) and generally require a new Qualified Design Listing. Even if no such new Qualified Design Listing has been obtained, the integrator is still responsible for ensuring that their design is re-assessed and that a new Qualified Design Listing is obtained based-on the changes to the profile or protocol stack.

☐ Has the *Bluetooth* profile and/or protocol stack implementation changed to support higher version of Bluetooth (i.e. v2.1+EDR) since it was last integrated into the design?

IF YES: Then integrating the updated profile and/or protocol stack requires a new Qualified Design Listing.

☐ Have any of the design's functions or features been re-architected since the design was qualified?

IF YES: Then these re-architected features or functions need to be treated as "new" features or functions. Such changes require re-assessment of the design and a new Qualified Design Listing if it resulted in addition of PICS items.

☐ Has any new *Bluetooth* functionality within a profile and/or protocol stack layer or have any new *Bluetooth* profile and/or protocol stack layers been added since the design was qualified?

IF YES: Adding new functionality or *Bluetooth* profile and/or protocol stack layers requires re-assessment of the entire design to the latest Bluetooth Qualification requirements and a new Qualified Design Listing.

☐ Have any *Bluetooth* ESR changes been integrated into the profile and/or protocol stack since the design was qualified?

IF YES: Updating the *Bluetooth* profile and/or protocol stack for ESR changes require re-assessment of the design and a new Qualified Design Listing if any new PICS items were added.

7 Checklist for Changes to the UI or Application

Please go through the checklist below and answer each question. If an answer is found to be 'yes' to any of the questions below, additional testing and/or listing may be required.

The list checks the impact of changes made to the End Product or Subsystem as a result of Application and/or UI changes:

☐ Has the *Bluetooth* core or profile stack implementation been updated since it was last integrated into the tested design?

IF YES: Then the integrator should assess whether the changes to the core or profile stack require adjustments to the application and/or UI in order to expose supported features and to properly remove access to any unsupported features.

Any change to the UI and/or application as a result of changes to the integrated core or profile stack requires re-assessment.

☐ Has the application or UI changed since it was used to qualify the design?

IF YES: Then the implementer must determine if the implemented features are still fully functional and properly exposed by the application at the UI.

Any application or UI changes to the *Bluetooth* wireless technology features require re-assessment.

Subsetted design implementations must expose all implemented Bluetooth profile features, profiles, and applicable core features at the application and at the *Bluetooth* wireless interface and may expose only those subsetted features both at the UI and at the *Bluetooth* interface that are also present in the Qualified Listing.

All mandatory *Bluetooth* features must be implemented, qualified, and exposed at both the Bluetooth wireless interface and the UI.

☐ Has the *Bluetooth* core or host stack been updated for newer version of Bluetooth (i.e. v2.1+EDR)?

IF YES: Then the UI must be updated to implement the mandatory features of the newer version (i.e. v2.1+EDR Secure Simple Pairing feature enhancements) and therefore this requires a new Qualified Design Listing.

The Bluetooth Secure Simple Pairing feature enables extensive enhancements to the Bluetooth pairing user experience and should be carefully reassessed with the help of the *Bluetooth* Secure Simple Pairing User Interface Flow Whitepaper [3]. The *Bluetooth* GAP host features and profile application's pairing user interface are also impacted and therefore require retesting to ensure that the device remains interoperable with both v2.1+EDR and legacy *Bluetooth* wireless devices.

☐ Has the MMI (Man Machine Interface) of the UI been mapped differently in the end design?

IF YES: Changing the way the application is mapped to the MMI may affect the Bluetooth functionality of the supported features therefore this requires re-assessment of all affected test cases based on functionality. (E.g. the design changes from a three button to a two button MMI).

8 References

[1] *Bluetooth* Qualification Program Reference Document (PRD) (current version)
https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=40972

[2] *Bluetooth* Qualification Enforcement Process Document (QEP)
https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=40972

[3] *Bluetooth* Secure Simple Pairing User Interface Flow Whitepaper
https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=86173

[4] PCC Spreadsheet