Hardcopy Cable Replacement Profile (HCRP)

Abstract:
This document defines test structures and procedures for the interoperability test of Bluetooth® devices implementing the Hardcopy Cable Replacement Profile (HCRP) Specification Profile.
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<th>Revision Number</th>
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<td>0.1</td>
<td>2001-03-05</td>
<td>First draft</td>
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<td>0.4</td>
<td>2001-03-28</td>
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<td>2001-05-10</td>
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<td>0.6</td>
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<td>Changed Service Discovery to independent test, modified Notification tests, updated Test Case Mapping Table.</td>
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<td>Updated table of contents, Test Case Mapping Table, minor other corrections to text.</td>
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<td>0.90, 0.90a, 0.90b</td>
<td>2001-11-19</td>
<td>Eliminated Sender UI as a determining factor in running selected tests. Loosened some requirements on what the Sender UI presents in Discovery and Connection tests.</td>
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<td>0.90c</td>
<td>2001-02-11</td>
<td>TCMT: item conditions for CR_GetLPTStatus and CR_Get1284ID changed from ORs to ANDs; added ICS features to first two entries in TCMT to account for Discoverability requirements.</td>
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<td>0.90d</td>
<td>2002-02-25</td>
<td>Incorporated changes to TCMT. Renumbered test cases in Data Channel Flow Control section. Removed extraneous text and corrected some formatting.</td>
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<td>0.90e</td>
<td>2002-03-01</td>
<td>Modified references to commands such as GetLPTStatus to include the prefix “CR_”. Changed Service Discovery test identifier. Removed “K:X” notation. Changed Bonding Test procedure to improve determination of Link key exchange</td>
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<td>Section 5.2.4.1: Bonding test redefined to allow for either client or server to initiate authorization request. Section 5.2.1.2: Changed Limited Inquiry test to require Server to be in Limited Discoverable mode.</td>
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<td>Revisions based on BTI feedback: additional references added; use of Bluetooth Protocol Analyzer allowed for TP/SD/BV-01-I; Large &amp; multiple short documents note removed from 5.4; 5.5.1.2.5 fail verdict amended; 5.5.1.4 test description reworded</td>
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## Hardcopy Cable Replacement Profile (HCRP) / Test Specification

### Revision History

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<tr>
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### Contributors

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martin Roter</td>
<td>Nokia Mobile Phones</td>
</tr>
<tr>
<td>Patrick Vine</td>
<td>Microsoft Corp.</td>
</tr>
<tr>
<td>Goro Ishida</td>
<td>Seiko Epson Corporation</td>
</tr>
<tr>
<td>Bill Bregar</td>
<td>Hewlett-Packard Company</td>
</tr>
<tr>
<td>Rod Hofer</td>
<td>Hewlett-Packard Company</td>
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HCRP/CL/CCP/BV

HCRP/CL/CCP/BV

HCRP/SR/CCP/BV

HCRP/SR/CCP/BV

HCRP/CL/CCP/BV

HCRP/SR/CCP/BV

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1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and Test Cases (TC) to test the Hardcopy Cable Replacement Profile (HCRP).

The objective of this document is to provide a basis for the conformance tests for Bluetooth devices giving a high probability of air interface interoperability between different manufacturers' Bluetooth devices.
2 References, Definitions, and Abbreviations

2.1 References
This Bluetooth document incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter.

[1] Specification of the Bluetooth System, Core System, version 2.0 or later
[2] Bluetooth Hardcopy Cable Replacement Profile
[5] ICS proforma for Hardcopy Cable Replacement Profile

2.2 Definitions
For the purpose of this Bluetooth document, the definitions from [1], [2] and [4] apply.

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<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>Idle Mode</td>
<td>As seen from a remote device, a Bluetooth device is idle, or is in Idle mode, when there is no link established between them.</td>
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<tr>
<td>Online Mode</td>
<td>For the purposes of this document Online mode means Public or Private Online mode.</td>
</tr>
<tr>
<td>Ready State</td>
<td>Not in an error state, and device is able to continue receiving and processing commands.</td>
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2.3 Abbreviations
For the purpose of this Bluetooth document, the abbreviations from [1], [2] and [4] apply.
3 Test Suite Structure (TSS)

3.1 Overview

The following section gives an overview on the expected test suite structure indicating the different test groups to cover the Hardcopy Cable Replacement capabilities.

The Hardcopy Cable Replacement profile specifies two typical configurations of devices, or roles, for this profile:

Server

The device that receives print data from the Client and prints it, or scans images and sends scan data to the Client.

Client

The device sending the data to be printed or the device to receive the scanned data.

Figure 3.1 shows the Hardcopy Cable Replacement profile Test Suite Structure (TSS) including its subgroups defined for testing:

- Discovery and Connection Setup
  - Public Online
  - Private On-line
  - Offline
  - Bonding
- Service Discovery
  - Service Discovery
- Data Channel Flow Control
  - Printing Functionality
  - Scanning Functionality
- Control Channel Protocol
  - CR_GetLPTStatus
  - CR_Get1284ID
  - CR_SoftReset
  - CR_HardReset
- Notification Handling
  - Notifications
3.2 Test Groups

The test groups are organized in three levels. The first level defines the profile procedure groups representing the profile procedures. The second level, if the third level exists, separates the profile procedures in functional modules. The last level in each branch contains the standard ISO subgroups BV and BI.

3.2.1 Profile Procedure Groups

The profile procedure groups identify the Bluetooth Hardcopy Cable Replacement Profile services: Discovery and Connection Setup, Service Discovery, Data Channel Flow Control, Control Channel Protocol and Notification Handling.
4 Test Cases (TC)

4.1 Introduction

4.1.1 Test Case Identification Conventions

Test cases shall be assigned unique identifiers per the conventions in [4]. The convention used here is
<spec abbreviation>/<IUT role>/<class>/<feat>/<func>/<subfunc>/<cap>/<xx>-<nn>-<y>.

Bolded ID parts shall appear in the order prescribed. Non-bolded ID parts (if applicable) shall appear between the bolded parts. The order of the non-bolded parts may vary from test specification to test specification, but shall be consistent within each individual test specification.

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<td>Hardcopy Cable Replacement Profile</td>
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<th>Identifier Abbreviation</th>
<th>Role Identifier &lt;IUT role&gt;</th>
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<td>Server</td>
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<td>CL</td>
<td>Client</td>
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<th>Feature Identifier &lt;feat&gt;</th>
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<td>DCS</td>
<td>Discovery and Connection Set-up</td>
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<td>SD</td>
<td>Service Discovery</td>
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<tr>
<td>DFC</td>
<td>Data Channel Flow Control</td>
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<td>CCP</td>
<td>Control Channel Protocol</td>
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<td>NTF</td>
<td>Notification Handling</td>
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Table 4.1: HCRP TC Feature Naming Conventions

4.1.2 Conformance

When conformance is claimed, all capabilities indicated as mandatory for this Specification shall be supported in the specified manner (process-mandatory). This also applies for all optional and conditional capabilities for which support is indicated. All mandatory capabilities, and optional and conditional capabilities for which support is indicated, are subject to verification as part of the Bluetooth Qualification Program.

The Bluetooth Qualification Program may employ tests to verify implementation robustness. The level of implementation robustness that is verified varies from one Specification to another and may be revised for cause based on interoperability issues found in the market.

Such tests may verify:

• That claimed capabilities may be used in any order and any number of repetitions that is not excluded by the Specification, OR
• That capabilities enabled by the implementations are sustained over durations expected by the use case, OR
• That the implementation gracefully handles any quantity of data expected by the use case, OR
• That in cases where more than one valid interpretation of the Specification exist, the implementation complies with at least one interpretation and gracefully handles other interpretations OR
• That the implementation is immune to attempted security exploits.

A single execution of each of the required tests is required in order to constitute a pass verdict. However, it is noted that in order to provide a foundation for interoperability, it is necessary that a qualified implementation consistently and repeatedly pass any of the applicable tests.

In any case, where a member finds an issue with the Test Plan Generator, the Test Case as described in the Test Specification, or with the Test System utilized, the Member is required to notify the responsible party via an errata request such that the issue may be addressed.

4.1.3 Pass/Fail Verdict Conventions

Each test case has an Expected Outcome section, which outlines all the detailed pass criteria conditions that shall be met by the IUT to merit a Pass Verdict.

The convention in this test specification is that, unless there are a specific set of fail conditions outlined in the test case, the IUT fails the test case as soon as one of the pass criteria conditions cannot be met. If this occurs the outcome of the test shall be the Fail Verdict.

4.2 Discovery and Connection Set-up

All hardcopy devices are expected to support Public Online mode, General Inquiry. If other modes and inquiry types are supported by a hardcopy device, the manufacturer shall supply, via the IXIT, instructions and mechanisms for setting their device into the appropriate mode for the following tests.

Other than tests in Section 4.2.1.1 - General Inquiry – Public Online (HCRP/SR/DCS/BV-01-I, HCRP/CL/DCS/BV-01-I), the execution of these test cases is a function of the User Interfaces and the capabilities of the Client and Server.

4.2.1 Public Online Mode

Test Subgroup objectives:

• To verify that the Server supports Public Online mode and can be discovered by and connected to the Client using the General and Limited Inquiry, Name Discovery and Device Discovery procedures and provide information like Bluetooth Device Address, name, etc.

4.2.1.1 General Inquiry – Public Online

• Test Case ID(s)

HCRP/SR/DCS/BV-01-I
HCRP/CL/DCS/BV-01-I

• Test Purpose

Server:
To verify that the Server is in Public Online mode and can be discovered by the Client using the General Inquiry procedure.

Client:

To verify that the Client makes correct use of the General Inquiry procedure and can discover the Server, when the Server is in Public Online mode.

- **Reference**
  
  [2] 3

- **Initial Condition**
  
  **Server:**
  
  Offline mode or Public Online mode.

  **Client:**
  
  Standby mode

- **Test Procedure**
  
  **Server:**
  
  Set the Server to Public Online mode if it is in a different mode.

  **Client:**
  
  After the Server is set to Public Online mode, perform a General Inquiry procedure to get a list of devices in the vicinity.

- **Expected Outcome**
  
  **Pass verdict:**
  
  - It is possible from the Upper Tester on the Client to activate the Bluetooth Device Inquiry function.
  - It is possible to put the Server into Public Online mode
  - A list of discovered devices is presented to the Upper Tester of the Client and the Server is included in the list.

4.2.1.2 **Limited Inquiry – Public Online**

- **Test Case ID(s)**
  
  **HCRP/SR/DCS/BV-02-I**

  **HCRP/CL/DCS/BV-02-I**

- **Test Purpose**
  
  **Server:**
  
  To verify that when the Server is in Public Online mode and in Limited Discoverable mode, it can be discovered by the Client using the Limited Inquiry procedure.
Client:

To verify that the Client makes correct use of the Limited Inquiry procedure and can discover the Server.

• Reference

[2] 3

• Initial Condition

Server:

Offline mode or Public Online mode.

Client:

Standby mode

• Test Procedure

Server:

Set the Server to Public Online mode, if it is in a different mode.

Set the Server to Limited Discoverable mode, if it is in a different mode.

Client:

After the Server is set to Public Online mode, perform a Limited Inquiry procedure to get a list of devices in the vicinity.

• Expected Outcome

Pass verdict:

- It is possible from the Upper Tester on the Client to activate the Bluetooth Device Inquiry function.
- It is possible to put the Server into Public Online mode.
- It is possible to put the Server into Limited Discoverable mode.
- A list of discovered devices is presented to the Upper Tester of the Client and the Server is included in the list.

• Notes

The Server must be in both Public Online mode and in Limited Discoverable mode to be discovered with a Limited Inquiry. The manufacturer shall supply, via the IXIT, instructions for setting the Server to Limited Discoverable mode, if necessary.

4.2.1.3 Device Discovery – Public Online

• Test Case ID(s)
**Test Purpose**

**Server:**
To verify that the Server is in Public Online mode and can be discovered and connected to by the Client using the Name Discovery procedure.

**Client:**
To verify that the Client makes correct use of the Device Discovery procedure and can discover the Server, when the Server is in Public Online mode.

**Reference**
[2] 3

**Initial Condition**

**Server:**
Offline mode or Public Online mode.

**Client:**
Standby mode.

**Test Procedure**

**Server:**
Set the Server to Public Online mode if it is in a different mode.

**Client:**
After the Server is set to Public Online mode perform a Device Discovery to get a list of devices in the vicinity.

**Expected Outcome**

**Pass verdict:**
- It is possible from the Upper Tester on the Client to activate the Bluetooth Device Discovery procedure.
- It is possible to put the Server into Public Online mode.
- A list of discovered devices is presented to the Upper Tester and the Server is included in the list.

4.2.2 **Private Online mode**

Test subgroup objectives:
To verify that the Server supports Private Online mode and cannot be discovered by the Client using General Inquiry or Limited Inquiry.

### 4.2.2.1 Inquiry – Private Online

#### Test Case ID(s)

- **HCRP/SR/DCS/BV-04-I**
- **HCRP/CL/DCS/BV-04-I**

#### Test Purple

**Server:**

To verify that the Server can be placed in Private Online mode (not discoverable) and cannot be discovered by the Client using the General or Limited Inquiry procedure.

**Client:**

To verify that the Client makes correct use of the General or Limited Inquiry procedure and cannot discover the Server, when the Server is in Private Online mode.

#### Reference

[2] 3

#### Initial Condition

**Server:**

- Offline mode or Private Online mode.

**Client:**

- Standby mode.

#### Test Procedure

**Server:**

Set the Server to Private Online mode if it is in a different mode.

**Client:**

After the Server is set to Private Online mode perform a General or Limited Inquiry to get a list of devices in the vicinity. (See Notes, below.)

#### Expected Outcome

**Pass verdict:**

- It is possible from the Upper Tester on the Client to activate the Bluetooth Device Inquiry function.
- It is possible from the Upper Tester on the Server to put the Server into Private Online mode.
- A list of discovered devices is presented to the Upper Tester of the Client and the Server is not included in the list.

• Notes
The types of inquiries executed in this test depend on which types of inquiry the device under test supports.

4.2.3 Offline mode

Test subgroup objectives:

• To verify that the Server supports Offline mode and can neither be discovered by nor connected to the Client using General Inquiry or Service Discovery procedures.

4.2.3.1 Inquiry – Offline

• Test Case ID(s)
  HRCP/SR/DCS/BV-05-I
  HRCP/CL/DCS/BV-05-I

• Test Purpose
  Server:
  To verify that the Server is in Offline mode (not discoverable) and cannot be discovered by the Client using the General Inquiry or Limited Inquiry procedure.

  Client:
  To verify that the Client makes correct use of the General Inquiry or Limited Inquiry procedure and cannot discover the Server, when the Server is in Offline mode.

• Reference
  [2] 3

• Initial Condition
  Server:
  Offline mode
  Client:
  Standby mode

• Test Procedure
  Server:
  Set the Server to Offline mode, if it is in a different mode.

  Client:
After the Server is set to Offline mode, perform a General Inquiry or Limited Inquiry to get a list of devices in the vicinity.

- Expected Outcome
  Pass verdict:
  - It is possible from the Upper Tester on the Client to activate the Bluetooth Device Inquiry function.
  - It is possible to put the Server into Offline mode
  - A list of discovered devices is presented to the Upper Tester of the Client and the Server is not included in the list.

### 4.2.4 Bonding mode

Test subgroup objectives:

- To verify that the Server and Client support Bonding mode and can be paired.

#### 4.2.4.1 Bonding

- Test Case ID(s)
  - HCRP/SR/DCS/BV-06-I
  - HCRP/CL/DCS/BV-06-I

- Test Purpose
  - Server:
    To verify that the Server can be bonded with the Client and the PIN codes are exchanged correctly.
  - Client:
    To verify that the Client can be bonded with the Server and the PIN codes are exchanged correctly.

- Reference
  - [2] 3

- Initial Condition
  - Server:
    Public Online mode and not currently bonded with the Client device.

- Test Procedure
  - Server:
    The Server shall be put in Bondable mode.
  - Client:
    - After the Server is set to “Bondable” mode issue the “Bluetooth Bonding” function on the Client.
- Enter PIN codes (maximum of 16 digits) on both the Client and the Server, unless a fixed PIN code is used.
- After the bonding procedure executes, disconnect the Bluetooth baseband link (this can be accomplished by powering down, a disconnect function, or walking out of range). Note that some clients may automatically disconnect the link after successful execution of the bonding function.
- Configure at least one of the devices (client or server) to require authentication. (See Notes, below.)
- Re-establish Bluetooth connection.
- Send a job from the Client to the Server and verify that no PIN is requested by either device as part of the transaction.

**Expected Outcome**

*Pass verdict:*

- It is possible to activate the Bluetooth Bonding procedure on the Client.
- It is possible to activate the Bondable mode on the Server.
- It is possible to enter a PIN code on both UIs, unless a fixed PIN code is used.
- Once the second connection is established (following bonding and disconnecting), no request for a PIN code is made from the Upper Tester of either the Client or the Server.

**Notes**

The manufacturer of the device under test is expected to supply via the IXIT, a procedure to configure the device to require authentication, if necessary.

### 4.3 Service Discovery

**Test group objectives:**

- To verify that the Service Discovery Protocol is employed in the determination of device characteristics.

#### 4.3.1 Service Discovery

**Test subgroup objectives:**

- To verify that as a result of the appropriate action, a Client issues a Service Discovery query and properly interprets the SDP record returned by the Server.

#### 4.3.1.1 Service Discovery – HCRP Device

**Test Case ID(s)**

- HCRP/SR/SD/BV-01-I
- HCRP/CL/SD/BV-01-I

**Test Purpose**

*Server:*

To verify that the Server can be recognized as an HCRP compatible device and contains a sufficient SDP record to enable printing/scanning functionality.
Client:

To verify that SDP records can be obtained from the Server and correctly interpreted by the Client to allow printing or scanning.

• Reference

[2] 7

• Initial Condition

Server:

Public Online mode.

Client:

Ready mode and has the Bluetooth Device Address of the device under test.

• Test Procedure

Server:

Set the Server to Public Online mode, if it was in a different mode.

Client:

Activate a printing or scanning application.

• Expected Outcome

Verdicts where the IUT Upper Tester is used to determine pass or fail:

Pass verdict:

- It is possible from the Upper Tester on the Client to activate Service Discovery.
- It is possible, from the Upper Tester, to identify and verify the correctness of specific parameters and their values retrieved via Service Discovery.

Verdicts where the IUT Upper Tester is not used to determine pass or fail:

Pass verdict:

Using the special tool, the mandatory SDP fields for the HCRP specification shall be present and correct indicated.

• Notes

Note that Service Discovery is, generally, transparent to the User. It is invoked as a part of the Device Discovery procedure, and, generally, not directly specified through the UI of the querying device. Without a UI that allows a Service Discovery invocation or that displays specific values obtained during Service Discovery, verification must be done using special tools. In situations where Uls on the devices under test are not available to display Service Discovery information, then a suitable UI Bluetooth Protocol Analyzer (sniffer) shall be used.
4.4 Data Channel Flow Control

Test group objectives:

- To verify that data is transferred reliably between Server and Client.
- In order to verify that the implementation being tested handles credit correctly regardless of relative speed of data flow, it is recommended that the tests in this test group be performed against multiple Clients/Servers, varying in their capacity if possible.

4.4.1 Printing Functionality

Test subgroup objectives:

- To verify that the print data can be transmitted from the Client to the Server on the data channel.

4.4.1.1 Print Data Transmission

- Test Case ID(s)
  
  HCRP/SR/DFC/BV-01-I
  HCRP/CL/DFC/BV-01-I

- Test Purpose

  Server:

  To verify that the Server capable of printing is able to receive the print data from the Client.

  Client:

  To verify that the Client is able to send the print data to the Server that is capable of printing.

- Reference

  [2] 6, 6.5

- Initial Condition

  Server:

  Private or Public Online mode and prepared for printing.

  Client:

  The Client has retrieved the Server’s device information based on one of the inquiry and discovery procedures so that the Server is selectable from a list.

  The printing application is activated.

  The document to be printed is available for printing.

- Test Procedure

  Server:
No user action is required.

Client:

Initiate the print with the Server using the applications procedure.

• Expected Outcome

  Pass verdict

  - The Server prints the document correctly.
  - The Client is able to initiate a subsequent job.
  - The Server is able to accept a subsequent job.

• Notes

  What is being tested is not the quality of the printed output, but only whether the printer delivers printed data similar to what is expected by the user.

4.4.2 Scanning Functionality

Test subgroup objectives:

• To verify that the scanned data can be transmitted from the Server to the Client on the data channel.

4.4.2.1 Scanned Data Transmission

• Test Case ID(s)

  HCRP/SR/DFC/BV-02-I
  HCRP/CL/DFC/BV-02-I

• Test Purpose

  Server:

  To verify that the Server capable of scanning is able to send the scanned data to the Client.

  Client:

  To verify that the Client is able to receive the scanned data from the Server that is capable of scanning.

• Reference

  [2] 6, 6.5

• Initial Condition

  Server:

  Private or Public Online mode and prepared for scanning.

  The document to be scanned is prepared.

  Client:
The Client has retrieved the Server’s device information based on one of the inquiry and discovery procedures.

The scanning application is activated.

• Test Procedure
  Initiate the scan using the application’s procedure(s) on the Client.

• Expected Outcome
  
  **Pass verdict:**
  - The Client receives the scanned data correctly.
  - The Client is ready to accept a subsequent task.
  - The Server is ready for a subsequent task.

• Notes
  This test does not testing the quality of the scanned input, but only whether the scanner delivers scanned data similar to what is expected by the user.

4.5  **Control Channel Protocol**

Test group objectives:

• To verify the control channel features function correctly

4.5.1  **CR_GetLPTStatus**

Test subgroup objectives:

• To verify that the Client can obtain the IEEE 1284 job status from the Server using the CR_GetLPTStatus request.

4.5.1.1  **Idle – CR_GetLPTStatus**

• Test Case ID(s)
  
  **HCRP/SR/CCP/BV-01-I**
  **HCRP/CL/CCP/BV-01-I**

• Test Purpose
  
  **Server:**
  To verify that the Server can return the IEEE 1284 job status when it is in an idle state.

  **Client:**
  To verify that the Client can obtain the IEEE 1284 job status when the Server is in an idle state.

• Reference
  
  [2] 6, 6.4.12
• Initial Condition
  Server:
  Is in Online mode and is currently idle.

• Test Procedure
  Server:
  No user action is required.

  Client:
  Check the status of the Server.

• Expected Outcome
  Pass verdict:
  - The Server remains idle throughout the test procedure.
  - The Client reports the status of the Server correctly.

4.5.1.2 Successfully processing – CR_GetLPTStatus

• Test Case ID(s)
  HCRP/SR/CCP/BV-02-I
  HCRP/CL/CCP/BV-02-I

• Test Purpose
  Server:
  To verify that the Server can return the IEEE 1284 job status while it is processing a job.

  Client:
  To verify that the Client can obtain the IEEE 1284 job status while the Server is processing a job.

• Reference
  [2] 6, 6.4.12

• Initial Condition
  Server:
  Is in Online mode and prepared to process.

• Test Procedure
  Client:
  Select the Server to use and initiate a job. View the status of the Server.
Server:

No user action is required.

• Expected Outcome

  Pass verdict:
  - The Client reports the status of Server accurately.
  - The Server correctly reports status to the Client or tool.
  - The Server processes the job correctly.

4.5.1.3  Paper empty – CR_GetLPTStatus

• Test Case ID(s)

  HCRP/SR/CCP/BV-03-I
  HCRP/CL/CCP/BV-03-I

• Test Purpose

  Server:

  To verify that the Server can return the IEEE 1284 job status when it is in “Paper empty” state.

  Client:

  To verify that the Client can obtain the IEEE 1284 job status when the Server is in "Paper empty" state.

• Reference

  [2] 6, 6.4.12

• Initial Condition

  Server:

  Is in Online mode and prepared to process.

  Client:

  The Server is available to use.

• Test Procedure

  Client:

  Select the Server to use and initiate a print job. View the status of the Server.

  Server:

  Start processing the print job. Force the Server into a paper empty state.

  Client:
View the status of the Server.

- Expected Outcome

  **Pass verdict:**

  The Client reports the paper out status of Server accurately.

- Notes

  This test case is only valid for Servers that print, not Servers that scan, since the paper-empty state would be undefined in the scanner case.

  Some printers don’t support paper out or error states and always return “paper in” and “no error”.

4.5.1.4 **Not supported by Server – CR_GetLPTStatus**

- Test Case ID(s)

  **HCRP/SR/CCP/BV-04-I**
  **HCRP/CL/CCP/BV-04-I**

- Test Purpose

  Server:

  To verify that the Server is well behaved when it receives, but does not support, the CR_GetLPTStatus PDU.

  Client:

  To verify that the Client can understand that the Server doesn't support the CR_GetLPTStatus request and handle the situation properly.

- Reference

  [2] 6, 6.4.6, 6.4.12

- Initial Condition

  Server:

  Is in Online mode and prepared to process.

  Client:

  The Server is available to use.

- Test Procedure

  Client:

  Select the Server to use and initiate a job.

  Server:
Process the job. Force the Server into a state that should cause the Client to see a change in status.

Client:

View status of the Server.

• **Expected Outcome**
  
  **Pass verdict:**

  Client:

  Retains its connection and can continue to function.

  Server:

  Responds with a reply PDU with the status code parameter containing the not supported error status (0x0000).

4.5.2 **CR_Get1284ID**

Test subgroup objectives:

• To verify that the Client can obtain the IEEE 1284 ID string from the Server using the CR_Get1284ID request.

4.5.2.1 **Supported – CR_Get1284ID**

• Test Case ID(s)

  **HCRP/SR/CCP/BV-05-I**

  **HCRP/CL/CCP/BV-05-I**

• **Test Purpose**

  Server:

  To verify that the Server can return the IEEE 1284 ID string.

  Client:

  To verify that the Client can obtain the IEEE 1284 ID string.

• **Reference**

  [2] 6, 6.4.13

• **Initial Condition**

  Server:

  Is in Online mode and in a Ready state.

  Client:

  The Server is available to use.
• Test Procedure
  Client:
  Initiate a process that causes the Client to obtain the IEEE 1284 ID string.

  Server:
  No user action is required.

• Expected Outcome
  Pass verdict:
  - The Client retains its connection and can continue to function.
  - The Client obtains the entire IEEE 1284 ID.

4.5.2.2 Not supported – CR_Get1284ID

• Test Case ID(s)
  HCRP/SR/CCP/BV-06-I
  HCRP/CL/CCP/BV-06-I

• Test Purpose
  Server:
  To verify that the Server behaves well if it does not support the CR_Get1284ID PDU.

  Client:
  To verify that the Client can understand that the Server doesn't support the CR_Get1284ID request and handle the situation properly.

• Reference
  [2] 6, 6.4.6, 6.4.13

• Initial Condition
  Server:
  Is in Online mode and prepared to process.

  Client:
  The Server is available to use.

• Test Procedure
  Client:
  Initiate a process that queries for the IEEE 1284 ID string from the Server.

  Server:
• Expected Outcome

Pass verdict:

Client:

Retains its connection and can continue to function.

Server:

Responds with a reply PDU with the status code parameter containing the not supported error status (0x0000).

4.5.3 CR_SoftReset

Test subgroup objectives:

• To verify that the Client can request the Server to perform a soft reset and that the Server performs a soft reset.

4.5.3.1 Idle – CR_SoftReset

• Test Case ID(s)

HCRP/SR/CCP/BV-07-I

HCRP/CL/CCP/BV-07-I

• Test Purpose

Server:

To verify that the Server can perform a soft reset when it receives the request while in the idle state.

Client:

To verify that the Client can send the CR_SoftReset request to the Server while the Server is idle.

• Reference

[2] 6, 6.4.14

• Initial Condition

Server:

Is in Online mode and prepared to process. (Note: if the Server accepts multiple connections, it shall be connected to by more than one Client.)

Client:

The Server is available to use.

• Test Procedure

Client:
Select the Server. Initiate a soft reset on the Server.
Initiate a new connection with the Server.
Send a new job to the Server

Server:

No user action is required.

• Expected Outcome
  Pass verdict:
  - All of the Client's connections are closed by the Server. Any other Clients connected to the Server are unaffected.
  - Server accepts a new connection from the initiating Client and accepts and correctly processes a subsequent job.

4.5.3.2 Processing a job – CR_SoftReset

• Test Case ID(s)
  HCRP/SR/CCP/BV-08-I
  HCRP/CL/CCP/BV-08-I

• Test Purpose
  Server:
  To verify that the Server can perform a soft reset while processing a job.

  Client:
  To verify that the Client can send the CR_SoftReset request to the Server while the Server is processing a job.

• Reference
  [2] 6, 6.4.14

• Initial Condition
  Server:
  Is in Online mode, has the maximum number of supported clients connected.

  Client:
  Additional client is available.

• Test Procedure
  Client:
  Select the Server. Send a job to the Server to process. Send a soft reset request to the Server.
Server:

Start processing the job. When the soft reset request is received, perform the soft reset.

Additional Client:

Start processing a new job.

• Expected Outcome

Pass verdict:

- All of the connections established by the initial Client under test are closed by the Server. Any other Clients connected to the Server are unaffected.
- The Server aborts the initial Client’s job and returns to a state from which it can process a new job from the additional Client.
- The job initiated by the additional Client is successfully processed by the Server.

4.5.3.3 Not supported – CR_SoftReset

• Test Case ID(s)

HCRP/SR/CCP/BV-09-I
HCRP/CL/CCP/BV-09-I

• Test Purpose

Server:

To verify that the Server behaves well if the CR_SoftReset PDU is not supported.

Client:

To verify that the Client operates properly when it senses that the Server doesn't support the CR_SoftReset request.

• Reference

[2] 6, 6.4.6, 6.4.14

• Initial Condition

Server:

Is in Online mode and prepared to process.

Client:

The Server is available to use.

• Test Procedure

Client:

Select the Server. Send a job to the Server to process. Initiate a soft reset on the Server.
Server:
Start processing the job. When the soft reset request is received, indicate that the request is not supported.

- **Expected Outcome**
  
  **Pass verdict:**

  **Client:**
  Retains its connection and can continue to function.

  **Server:**
  Responds with a reply PDU with the status code parameter containing the not supported error status (0x0000).

### 4.5.4 **CR_HardReset**

**Test subgroup objectives:**

- To verify that the Client can request the Server to perform a hard reset and that the Server performs a hard reset.

#### 4.5.4.1 **Idle – CR_HardReset**

- **Test Case ID(s)**
  
  **HCRP/SR/CCP/BV-10-I**
  
  **HCRP/CL/CCP/BV-10-I**

- **Test Purpose**

  **Server:**
  To verify that the Server can perform a hard reset while idle.

  **Client:**
  To verify that the Client can send the CR_HardReset request to the Server while the Server is idle.

- **Reference**
  
  [2] 6, 6.4.15

- **Initial Condition**

  **Server:**
  Is in Online mode and ready to process.

- **Test Procedure**

  **Client:**
Select the Server. Initiate a hard reset on the Server.

Server:

Remains idle throughout the test procedure.

- Expected Outcome

  Pass verdict:

  - All attached connections between Client and Server are closed.
  - The Server returns to its initial state at time of power on.

### 4.5.4.2 Processing a job – CR_HardReset

- Test Case ID(s)

  - HCRP/SR/CCP/BV-11-I
  - HCRP/CL/CCP/BV-11-I

- Test Purpose

  **Server:**

  To verify that the Server can perform a hard reset while processing a job.

  **Client:**

  To verify that the Client can send the CR_HardReset request to the Server while the Server is processing a job.

- Reference

  [2] 6, 6.4.15

- Initial Condition

  **Server:**

  Is in Online mode and prepared to process.

  **Client:**

  The Server is available to use.

- Test Procedure

  **Client:**

  Select the Server. Send a job to the Server to process. Initiate a hard reset on the Server.

  **Server:**

  The Server starts to process the job. When it receives the hard reset request, it initiates the hard reset.
• Expected Outcome

Pass verdict:

- All the connections between Client and Server are closed.
- The Server stops processing all jobs and returns to its initial state at time of power on.

4.5.4.3 Error status – CR_HardReset

• Test Case ID(s)

HCRP/SR/CCP/BV-12-I
HCRP/CL/CCP/BV-12-I

• Test Purpose

Server:

To verify that the Server can perform a hard reset when it is in an error state and returns to the Ready state after the hard reset.

Client:

To verify that the Client can send the CR_HardReset request when the Server is in an error state.

• Reference

[2] 6, 6.4.15

• Initial Condition

Server:

Is in Online mode and prepared to process.

Client:

The Server is available to use.

• Test Procedure

Client:

Select the Server. Send a job to the Server to process. Initiate a hard reset on the Server when it is in an error state.

Server:

After Server starts to process the job, force the Server into an error state. When it receives the hard reset request, it executes the hard reset.

• Expected Outcome

Pass verdict:

- All connections between Client and Server are closed.
- The Server stops processing all jobs and returns to its initial state at time of power on. Note: recovery from some error states may require user intervention.

### 4.5.4.4 Not supported – CR_HardReset

**Test Case ID(s)**

- HCRP/SR/CCP/BV-13-I
- HCRP/CL/CCP/BV-13-I

**Test Purpose**

**Server:**

To verify that the Server behaves properly when it does not support the CR_HardReset request.

**Client:**

To verify that the Client can understand that the Server doesn't support the CR_HardReset request and handle the situation properly.

**Reference**

[2] 6, 6.4.6, 6.4.15

**Initial Condition**

**Server:**

Is in Online mode and prepared to process.

**Test Procedure**

**Client:**

Select the Server. Send a job to the Server to process. Initiate a hard reset on the Server.

**Server:**

The Server starts to process the job. When it receives the hard reset request, it continues to process and ignores the request.

**Expected Outcome**

**Pass verdict:**

**Client:**

Retains its connection and can continue to function.

**Server:**

Responds with a reply PDU with the status code parameter containing the not supported error status (0x0000).
4.6 Notification Handling

Test group objectives:

• To verify notification handling capabilities

4.6.1 Notifications

Test subgroup objectives:

• To verify that the Client can register to receive notifications from the Server and that the Server can provide notifications to the Client.

4.6.1.1 Notifications - Supported

• Test Case ID(s)
  
  HCRP/SR/NTF/BV-01-I
  HCRP/CL/NTF/BV-01-I

• Test Purpose

Server:

To verify that the Server is able to accept and reply to a CR_RegisterNotification request and to verify that the Server will connect back to the Client and notify it, appropriately.

Client:

To verify that the Client is able to send the CR_RegisterNotification request and to accept a notification from the Server.

• Reference
  [2] 6, 6.6, 6.4.16

• Initial Condition

Server:

In Online mode and currently idle.

Client:

In normal on state.

• Test Procedure

Client:

Send a notification registration to the Server.

Server:

Once a notification registration has been received, generate an event on the Server that will cause the Server to connect back to the Client to notify it of the event.
• Expected Outcome
  Pass verdict
  - Client indicates to the User that the event has occurred.
  - Client continues processing or initiates a subsequent task, appropriately.
  - Server continues processing or initiates a subsequent task, appropriately.

• Notes
  The Server manufacturer is expected to specify, in the IXIT, what events will generate notifications to
  the client and how to invoke those events. The Client manufacturer is expected to specify, in the IXIT,
  how notifications will be received and made known to the User.

4.6.1.2 Notifications – Unsupported
• Test Case ID(s)
  HCRP/SR/NTF/BV-02-I
  HCRP/CL/NTF/BV-02-I

• Test Purpose
  Server:
  To verify that the Server is able to accept the CR_RegisterNotification request when it doesn’t support
  it and ignore it.

  Client:
  To verify that the Client is able to send the CR_RegisterNotification request and to act properly when
  the Server does not support it.

• Reference
  [2] 6, 6.6, 6.4.16

• Initial Condition
  Server:
  In Online mode and currently idle.

  Client:
  In normal on state.

• Test Procedure
  Client:
  Send a notification registration to the Server.

  Server:
No user action is required.

- **Expected Outcome**

  **Pass verdict:**

  **Client:**

  Retains its connection and can continue to function.

  **Server:**

  Responds with a reply PDU with the status code parameter containing the not supported error status (0x0000).

### 4.6.1.3 Notifications – Timeout Elapsed

- **Test Case ID(s)**

  HCRP/SR/NTF/BV-03-I

  HCRP/CL/NTF/BV-03-I

- **Test Purpose**

  **Server:**

  To verify that the Server does not generate notifications after the registration timeout period has expired.

- **Reference**

  [2] 6, 6.6

- **Initial Condition**

  **Server:**

  In Online mode and currently idle, but has registered notifications from the Client.

  **Client:**

  No active connection to Server but has registered for notification with the Server.

- **Test Procedure**

  **Client:**

  Register notifications with the server (see Notes, below).

  **Server:**

  After the timeout period has expired, create a condition that would have generated a notification connection to the Client if it had occurred prior to the timeout.

- **Expected Outcome**
Pass verdict:

No notification is sent to the Client from the Server.

• Notes

The manufacturer is expected to provide, via the IXIT, information pertaining to the registration timeout period. In particular, information is required as to the either the default timeout period or how a User can specify the duration of the timeout.

4.6.1.4 Notifications - Retries

• Test Case ID(s)
  HCRP/SR/NTF/BV-04-I
  HCRP/CL/NTF/BV-04-I

• Test Purpose

  Server:

  To verify that if the Server fails to open the Notification channel, it retries properly.

  Client:

  To verify that if the Client is made unconnectable, e.g., goes out of range, that the Server can successfully open the Notification channel once the Client is connectable.

• Reference

  [2] 6, 6.6

• Initial Condition

  Server:

  In Online mode and currently idle.

  Client:

  No active connection to Server, but has registered for notification.

• Test Procedure

  Client:

  Make Client unconnectable.

  Server:

  Create a condition that generates a notification to the Client (e.g., press scan button).

  Client:

  After a period of time greater than the Server’s time to make a single connection, make the Client connectable again.
• Test Condition
The Client can be made unconnectable by taking the Client out of range.

• Expected Outcome

**Pass verdict:**

When the Client is made connectable again in the given time period, the Server successfully connects to the Client and provides the requested notification.

• Notes
Although the appropriate amount of time during which the Client should be made unconnectable will vary, depending on implementations and the mechanism by which the Client is made unconnectable, the following guideline should suffice for most circumstances: The Client should be made unconnectable for more than 15 seconds and less than 60 seconds.

4.6.1.5 HCRP/SR/NTF/BV-05-I [Notifications – Client Unavailable]

• Test Purpose

**Server:**

To verify that if the Server fails to open the Notification channel, it ceases to retry, returns to the Ready state, and is able to perform a subsequent task.

• Reference

[2] 6, 6.6

• Initial Condition

**Server:**

In Online mode and currently idle.

**Client:**

No active connection to Server but has registered for notification.

• Test Procedure

**Client:**

Make Client unconnectable.

**Server:**

Create a condition that generates a notification to the Client (e.g., press scan button).

• Test Condition

The Client can be made unconnectable by taking the Client out of range.

• Expected Outcome
Pass verdict:

The Server functions correctly after failing to send the notification to the Client.
5 Test Case Mapping

The Test Case Mapping Table (TCMT) maps test cases to specific requirements in the ICS. The product shall be tested in all roles for which support is declared in the ICS document.

The columns for the TCMT are defined as follows:

**Item:** Contains a y/x reference, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS Proforma for Hardcopy Cable Replacement Profile (HCRP) [5]. If the item is defined with Protocol, Profile or Service abbreviation before y/x, the table and feature number referenced are defined in the abbreviated ICS Proforma document.

**Feature:** Recommended to be the primary feature defined in the ICS being tested or may be the test case name.

**Test Case(s):** The applicable test case identifiers required for Bluetooth Qualification if the corresponding y/x references defined in the Item column are supported.

**Test Case Applicable:** May be used to note if a test is required based on the supported features.

For purpose and structure of the ICS/IXIT Proforma and instructions for completing the ICS/IXIT Proforma refer to the Bluetooth ICS and IXIT Proforma document.

<table>
<thead>
<tr>
<th>Item</th>
<th>Feature</th>
<th>Test Case(s)</th>
<th>Test Case Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCRP (2/1 AND 2/2a)</td>
<td>General Inquiry and Public Online mode</td>
<td>HCRP/SR/DCS/BV-01-I</td>
<td></td>
</tr>
<tr>
<td>HCRP (2/1 AND 2/2b )</td>
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<td>HCRP/SR/DCS/BV-02-I</td>
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<td>HCRP 3/2</td>
<td>Limited Inquiry – Public Online</td>
<td>HCRP/CL/DCS/BV-02-I</td>
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<td>HCRP 2/1</td>
<td>Device Discovery – Public Online</td>
<td>HCRP/SR/DCS/BV-03-I</td>
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<tr>
<td>HCRP 3/3</td>
<td>Device Discovery – Public Online</td>
<td>HCRP/CL/DCS/BV-03-I</td>
<td></td>
</tr>
<tr>
<td>HCRP 2/2</td>
<td>General Inquiry – Private Online</td>
<td>HCRP/SR/DCS/BV-04-I</td>
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<tr>
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<tr>
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<td>HCRP/SR/DCS/BV-06-I</td>
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<td>HCRP/CL/DCS/BV-06-I</td>
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<td>Service Discovery</td>
<td>HCRP/CL/SD/BV-01-I</td>
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<td>HCRP 2/7</td>
<td>Print Data Transmission</td>
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<td>Print Data Transmission</td>
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<td>Scanned Data Transmission</td>
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<tr>
<td>HCRP 2/9</td>
<td>Idle - CR_GetLPTStatus</td>
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<tr>
<td>HCRP 2/9</td>
<td>Successfully processing - CR_GetLPTStatus</td>
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<td>Supported - CR_Get1284ID</td>
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<td>Idle – CR_SoftReset</td>
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*Table 5.1: Test Case Mapping*