

FIPS 201 Evaluation Program - Transparent Reader Test Procedure

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1 Overview

Homeland Security Presidential Directive-12 (HSPD-12) - "*Policy for a Common Identification Standard for Federal Employees and Contractors*" directed the promulgation of a new Federal standard for a secure and reliable form of identification issued by all Federal Agencies to their employees and contractors.

In addition to derived test requirements developed to test conformance to the NIST standard, GSA has established interoperability and performance metrics to further determine product suitability. Suppliers whose products and services are deemed to be conformant with NIST standards and the GSA interoperability and performance criteria will be eligible to sell their products and services to the Federal Government.

1.1 Identification

This document provides the detailed test procedure that needs to be executed by the Lab in order to evaluate the Transparent Reader (henceforth referred to as the Product) against the subset of applicable requirements that need to be electronically tested for this category.

2 Testing Process

As previously mentioned, this document prescribes detailed test steps that need to be executed in order to test the requirements applicable for this category. Please note that conformance to the tests specified in this document will not result in the Product being compliant to the applicable requirements of FIPS 201. The Product must undergo an evaluation using all the evaluation criteria listed for that category prior to being deemed as compliant. Only products and services that have successfully completed the entire Approval Process will be designated as conformant to the Standard. To this effect, this document only provides details for the evaluation using the Lab Test Data Report approval mechanism.

A Lab Engineer follows the steps outlined below in order to test those requirements that have been identified to be electronically tested. The end result is a compilation of the observed behavior of the Product in the Lab Test Data Report.

For this category, there are two potential Laboratory evaluation paths. If PIV Card Reader submitted for evaluation has a WiegandTM or USB interface, then it will be evaluated as described in Section 3.2.

If the Product submitted for evaluation uses any other Reader-to-Host interface, the manufacturer will be required to provide all required documentation specified by corresponding approval and test procedures, as well as demonstrate in the Lab, the product's ability to meet the Laboratory requirements described in Section 3.1 of this document.

Section 3 provides the test procedures that need to be executed for evaluating the Product as conformant to the requirements of FIPS 201.

3 Test Procedure for Transparent Reader

3.1 Requirements

The following table provides a reference to the requirements that need to be electronically tested within the Lab as outlined in the Approval Procedures document for the Product. Product under evaluation is only required to meet requirements for interfaces it incorporates. The different test cases that are used to check compliance to the requirements is also cross-referenced in the table below.

Identifier #	Interface	Requirement Description	Source	Test Case #
R-TRE.3	Contact	PIV readers shall support the Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.	Card /Card Reader Interoperability Requirements, Section 2.2.2.2	R-TRE-TP.1 R-TRE-TP.7
R-TRE.4	Contact	The contact interface of the reader shall support both the T=0 and T=1 transmission protocols as defined in ISO/IEC 7816-3:1997.	Card /Card Reader Interoperability Requirements, Section 2.2.2.3	R-TRE-TP.2 R-TRE-TP.7
R-TRE.6	Contact Contactless	Data received from logical readers shall be the data that was written by the lab on each “Golden” test card.	Derived Test Requirement	R-TRE-TP.4
R-TRE.7	Contactless	The contactless interface of the reader shall support both the Type A and Type B communication signal interfaces as defined in ISO/IEC 14443-2:2001.	Card /Card Reader Interoperability Requirements, Section 2.2.1.1	R-TRE-TP.3 R-TRE-TP.6
R-TRE.8	Contactless	The contactless interface of the reader shall support both Type A and Type B transmission protocols as defined in ISO/IEC 14443-4:2001.	Card /Card Reader Interoperability Requirements, Section 2.2.1.3	R-TRE-TP.3 R-TRE-TP.6
R-TRE.9	Contactless	Buffers shall not be readable through the contactless interface more than 10 cm from the reader.	Card /Card Reader Interoperability Requirements, Section 4.2.1.1	R-TRE-TP.5 R-TRE-TP.6
R-TRE-CL.13	Contactless Contact	For evaluation purposes, the data format for contactless physical readers (with Wiegand interfaces) shall consist of the two parity bits, Agency Code, System Code and	Transparent Reader Approval Procedure	R-TRE-TP.6 R-TRE-TP.7

		<p>Credential Code elements of the FASC-N along with the Expiration Date (YYYYMMDD) from the CHUID as defined by appendix A of NIST SP 800-73. Each element shall be individually formatted as binary numbers and combined to form a 75 bit string as shown in the figure below. Section 5 of the SIA standard defines a 26 bit format that does not meet the requirements outlined in FIPS or its supporting documents and shall not be used.</p> <table border="1"> <thead> <tr> <th></th> <th>Position</th> <th>Length</th> </tr> </thead> <tbody> <tr> <td>Parity Bit P1</td> <td>1</td> <td>1</td> </tr> <tr> <td>Agency Code</td> <td>2-15</td> <td>14</td> </tr> <tr> <td>System Code</td> <td>16-29</td> <td>14</td> </tr> <tr> <td>Credential Code</td> <td>30-49</td> <td>20</td> </tr> <tr> <td>Expiration Date</td> <td>50-74</td> <td>25</td> </tr> <tr> <td>Parity Bit P2</td> <td>75</td> <td>1</td> </tr> </tbody> </table> <p>Note: The first parity bit (P1) is even and shall be calculated over the first 37 bits. The second parity bit (P2) is odd and shall be calculated over the last 36 bits.</p>		Position	Length	Parity Bit P1	1	1	Agency Code	2-15	14	System Code	16-29	14	Credential Code	30-49	20	Expiration Date	50-74	25	Parity Bit P2	75	1		
	Position	Length																							
Parity Bit P1	1	1																							
Agency Code	2-15	14																							
System Code	16-29	14																							
Credential Code	30-49	20																							
Expiration Date	50-74	25																							
Parity Bit P2	75	1																							

Table 1 - Applicable Requirements

3.2 Test Components

Table 2 provides the details of all the components required by the Lab to execute this test procedure. Based on the different test cases, different components may be required to execute the test case.

#	Component	Component Details	Identifier
1	The Host System	A Workstation with the Card Reader Test Application installed and operational	HOST
2	Breakout Box	A device that converts Wiegand data output into serial output for input into the Card Reader Test Application, running on the Host System.	BREAKOUT
3	PIV Card Reader under test (Contact/Contactless/Dual Interface)	-	PROD
4	A PIV Card that supports the Contact Class A operating Class only	PIV EP v. 108 Java Card Applet on Oberthur ID-One Cosmo 64 v5 Smart Card	PCARD-CLA
5	A PIV Card that supports the Contact T=0 transmission protocol only	PIV EP v. 108 Java Card Applet on Oberthur ID-One Cosmo 64 v5 Smart Card	PCARD-T0
6	A PIV Card that supports the Contact T=1 transmission protocol only	SafesITe FIPS 201 applet on Gemalto GemCombi'Xpresso R4 E72 K Card	PCARD-T1
7	A PIV Card that supports the Contactless Type-A communication protocol only.	SafesITe FIPS 201 applet on Gemalto GemCombi'Xpresso R4 E72 K Card	PCARD-TA
8	A PIV Card that supports the Contactless Type-B communication protocol only.	StepNexus PIV Application v4.2.1 on Keycorp MULTOS 64K Smart Card	PCARD-TB
9	Data Populator Tool	For randomly generating and loading card container components onto test golden cards.	DPT
10	A metric ruler longer than 10 centimeters	-	RULER

Table 2 - Test Procedure: Components

3.3 Test Cases

This section discusses the various test cases that are needed to test logical and physical, contact and contactless Transparent PIV Card readers. Depending on the type of reader, only certain test cases apply. Suppliers submitting Products that do not have USB or Wiegand interfaces are required to demonstrate in the Lab that the product meets the same requirements mentioned in Section 3.1.

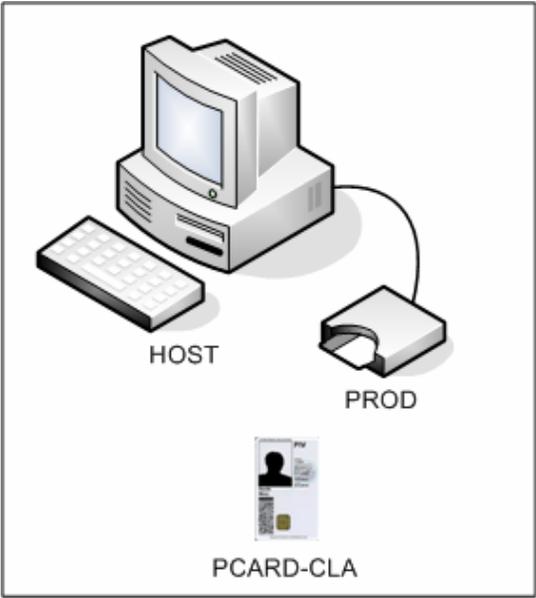
If demonstration of the Product is necessary, Suppliers will be provided with an eight foot (8') table and four (4) 120 volt AC outlets. The Supplier shall be given one (1) Lab workday to demonstrate products ability to meet the said requirements. Upon completion, Supplier is required to print the results of testing for each requirement, which will be incorporated into the Lab Test Data Report.

3.3.1 Test Case R-TRE-TP.1

3.3.1.1 Purpose

The purpose of this test is to verify that the PIV reader supports the Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.

3.3.1.2 Test Setup

<p>Equipment :</p>	<p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ HOST ▪ PCARD-CLA ▪ PROD <p>Note: This test case applies to only logical contact readers</p>
<p>Configuration Diagram :</p>	<div style="text-align: center;">  <p>The diagram shows a desktop computer system labeled 'HOST' connected via a cable to a device labeled 'PROD'. Below the 'PROD' device is a PIV card labeled 'PCARD-CLA'.</p> </div> <p style="text-align: center;">Figure 1 - Configuration Diagram for Test Case R-TRE-TP.1</p>

Preparation	<ul style="list-style-type: none"> ▪ Install the drivers for the PROD in accordance with the manufacturer provided documentation. ▪ Connect the PROD into the appropriate port on the HOST. ▪ Verify that the PROD is correctly installed by reviewing its presence in list of hardware using the windows hardware device manager on the HOST.
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3.3.1.3 Test Process

Test Steps:	<ol style="list-style-type: none"> 1. Execute the Test Application on the HOST. 2. Make sure that the details of PCARD-CLA are entered into the Test Application by clicking File → Edit Reference Contact Card Implementation Info. Ensure that the Class A Compliant box is checked. 3. Select the “Transparent Reader (Contact)” tab in the Test Application. This selects the test for the Transparent Reader. 4. Fill in all the Transparent Reader Product Information as required in the screen. 5. Select the Test Case radio button corresponding to R-TRE-TP.1 6. Click on the “Execute Selected Test” button. Follow the steps on the screen. 7. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	<ol style="list-style-type: none"> 1. The test completes successfully showing that the Product supports Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.

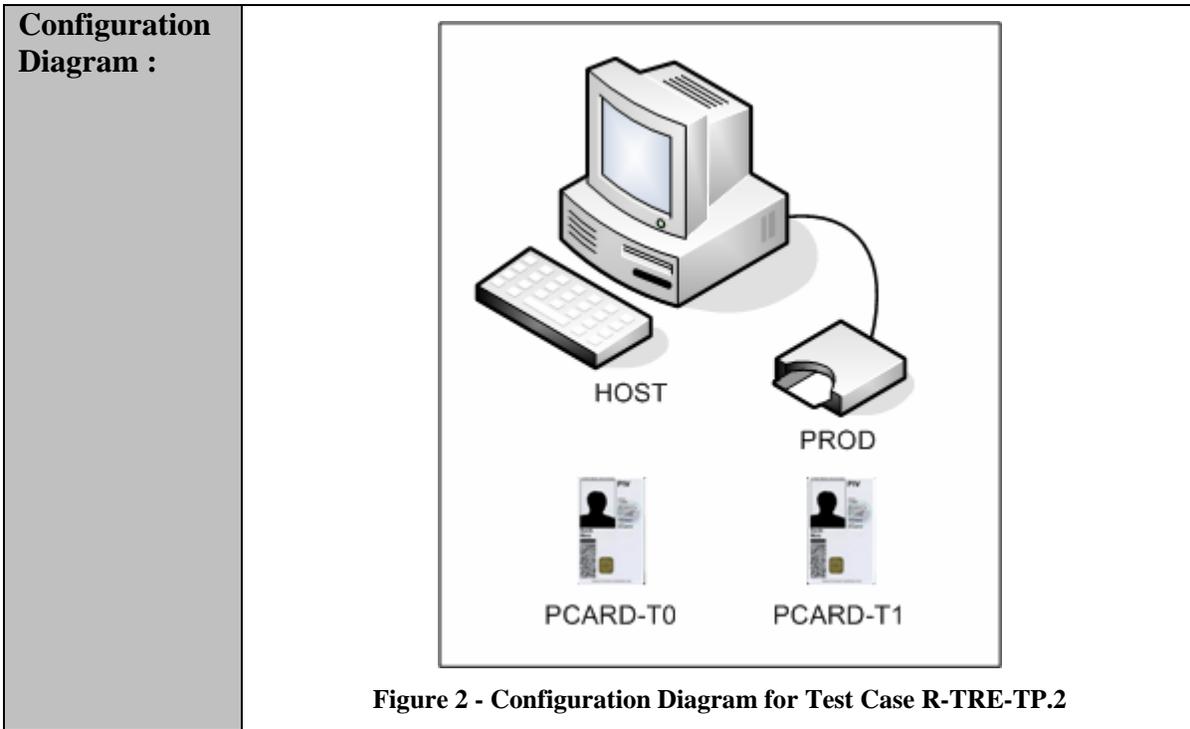
3.3.2 Test Case R-TRE-TP.2

3.3.2.1 Purpose

The purpose of this test is to verify that the contact interface of the reader supports both the T=0 and T=1 transmission protocols as defined in ISO/IEC 7816-3:1997.

3.3.2.2 Test Setup

Equipment :	<p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ HOST ▪ PCARD-T0 ▪ PCARD-T1 ▪ PROD <p>Note: This test case applies to only logical contact readers</p>
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Preparation	<ul style="list-style-type: none"> ▪ Install the drivers for the PROD in accordance with the manufacturer provided documentation. ▪ Connect the PROD into the appropriate port on the HOST. ▪ Verify that the PROD is correctly installed by reviewing its presence in list of hardware using the windows hardware device manager on the HOST.
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3.3.2.3 Test Process

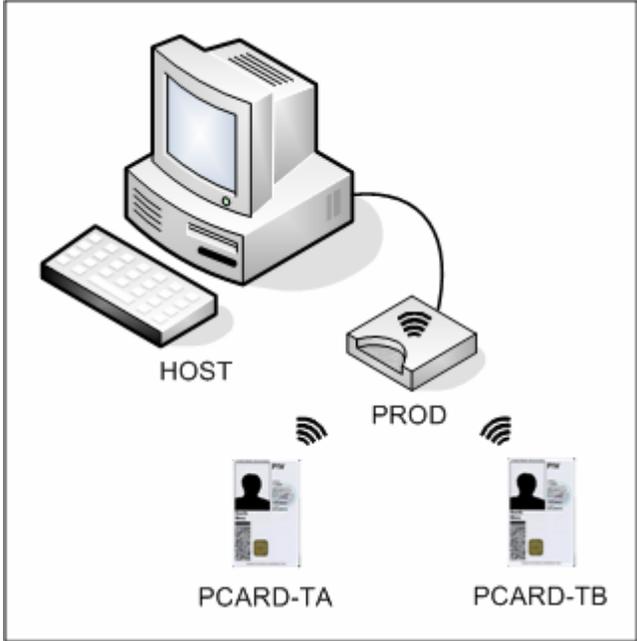
Test Steps:	<ol style="list-style-type: none"> 1. Make sure that the details of PCARD-T0 and PCARD-T1 are entered into the Test Application by clicking File → Edit Reference Contact Card Implementation Info. 2. Select the Test Case radio button corresponding to R-TRE-TP.2 3. Click on the “Execute Selected Test” button. Follow the steps on the screen. 4. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	<ol style="list-style-type: none"> 1. The test completes successfully showing that the Product supports both the T=0 and T=1 transmission protocols as defined in ISO/IEC 7816-3:1997.

3.3.3 Test Case R-TRE-TP.3

3.3.3.1 Purpose

The purpose of this test is to verify that the contactless interface of the reader supports both the Type A and Type B communication signal interfaces and transmission protocols as defined in ISO/IEC 14443-2:2001.

3.3.3.2 Test Setup

<p>Equipment :</p>	<p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ HOST ▪ PCARD-TA ▪ PCARD-TB ▪ PROD <p>Note: This test applies to logical contactless readers.</p>
<p>Configuration Diagram:</p>	 <p style="text-align: center;">Figure 3 - Configuration Diagram for Test Case R-TRE-TP.3</p>
<p>Preparation</p>	<ul style="list-style-type: none"> ▪ Generate data for the CHUID data container. ▪ Enter the hexadecimal representation of the binary data into the <code>expectedValues.TypeA.properties</code> and <code>expectedValues.TypeB.properties</code> files for PCARD-TA and PCARD-TB, respectively. These files are located in the same directory as the TFS executable file. ▪ Install the drivers for the PROD in accordance with the manufacturer provided documentation. ▪ Connect the PROD into the appropriate port on the Host System.

	<ul style="list-style-type: none"> ▪ Verify that the PROD is correctly installed by reviewing its presence in list of hardware using the device manager of the host system.
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3.3.3.3 Test Process

Test Steps:	<ol style="list-style-type: none"> 1. Make sure that the details of PCARD-TA and PCARD-TB are entered into the Test Application by clicking File → Edit Reference Contact Card Implementation Info. 2. Select the “Transparent Reader (Contactless) tab in the Test Application. This selects the appropriate test screen for the Transparent Reader in the test application. 3. Select the Test Case radio button corresponding to R-TRE-TP.3 4. Click on the “Execute Selected Test” button. Follow the steps on the screen. 5. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	<ol style="list-style-type: none"> 1. The test completes successfully for showing that the Product supports both the Type A and Type B communication signal interfaces and transmission protocols.

3.3.4 Test Case R-TRE-TP.4

3.3.4.1 Purpose

The purpose of this test is to verify that the data received through the USB interface of the reader is the data that was expected, and not corrupted during transmission. This test case only applies to Products with USB interfaces.

3.3.4.2 Test Setup

Equipment:	<p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ HOST ▪ PCARD-T0 (for contact reader testing) ▪ PCARD-T1 (for contact reader testing) ▪ PCARD-TA (for contactless reader testing) ▪ PCARD-TB (for contactless reader testing) ▪ PROD <p>Note: This test case applies to both logical contact and contactless readers</p>
Configuration Diagrams:	<p>*Note: Refer to the appropriate diagram when testing contact vs. contactless interface readers.</p>

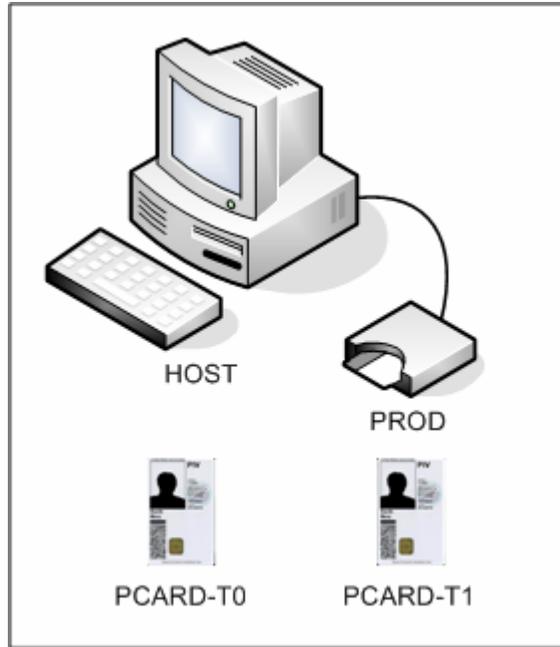


Figure 4 - Configuration Diagram #1 for Test Case R-TRE-TP.4

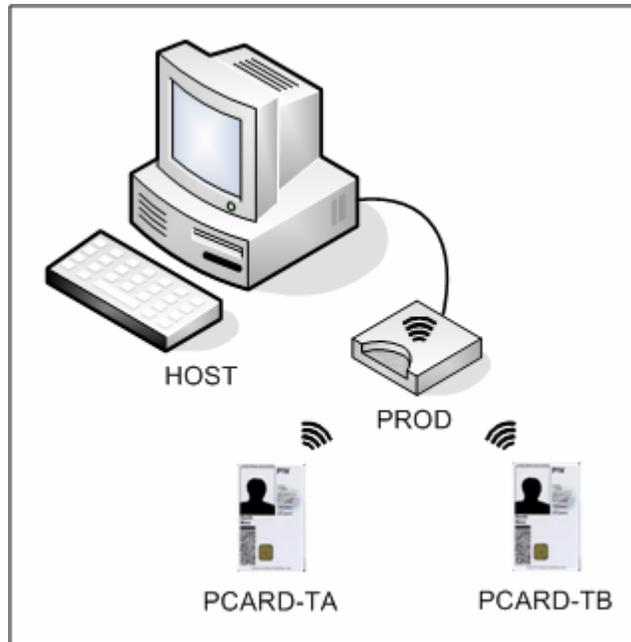


Figure 5 - Configuration Diagram #2 for Test Case R-TRE-TP.4

Preparation:

- Install the drivers for the PROD in accordance with the manufacturer provided documentation.
- Connect the PROD into the appropriate port on the HOST.
- Verify that the PROD is correctly installed by reviewing its presence in list of hardware using the windows hardware device manager on the HOST.

	<ul style="list-style-type: none"> ▪ Generate data for all five mandatory data containers. ▪ Enter the hexadecimal representation of the binary data into the <code>expectedValues.T=0.properties</code> file for PCARD-T0 and <code>expectedValues.T=1.properties</code> file for PCARD-T1 for contact readers, or <code>expectedValues.TypeA.properties</code> file for PCARD-TA and <code>expectedValues.TypeB.properties</code> file for PCARD-TB for contactless readers. These files are located in the same directory as the TFS executable file. <p>*Note: The data entered for <code>finger1</code> and <code>finger2</code> in the <code>expectedValues</code> file are identical.</p>
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3.3.4.3 Test Process

Test Steps:	<ol style="list-style-type: none"> 1. Make sure that the details of PCARD-T0, PCARD-T1, PCARD-TA, and PCARD-TB are entered into the Test Application by clicking File → Edit Reference Contact Card Implementation Info. 2. Select the Test Case radio button corresponding to R-TRE-TP.4 3. Click on the “Execute Selected Test” button. Follow the steps on the screen. 4. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	<ol style="list-style-type: none"> 1. The test completes successfully showing that the data received through the USB interface of the Product is the data that was expected, and not corrupted during transmission.

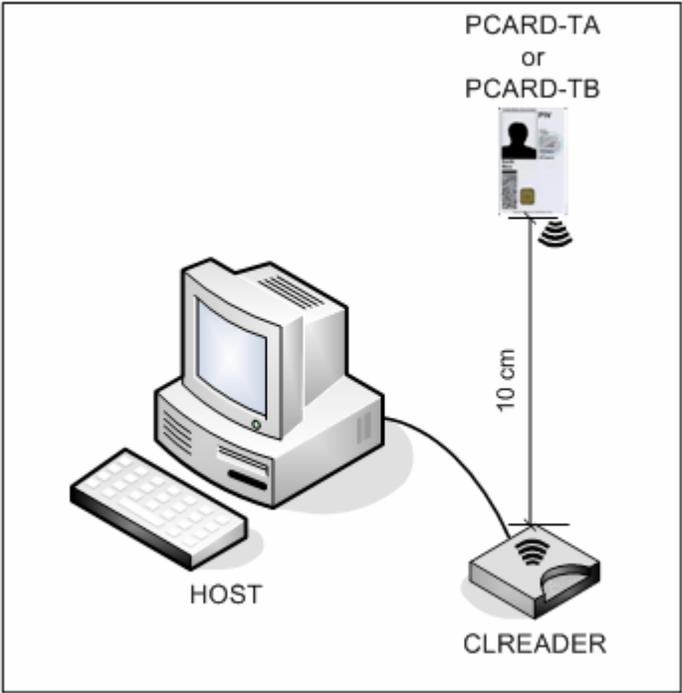
3.3.5 Test Case R-TRE-TP.5

3.3.5.1 Purpose

The purpose of this test is to verify that the PIV Card buffers shall not be readable through the contactless interface more than 10 cm from the Product.

3.3.5.2 Test Setup

Equipment :	<p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ HOST ▪ PCARD-TA ▪ PROD ▪ RULER <p>Note: This test case applies only to logical contactless readers</p>
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<p>Configuration Diagram :</p>	 <p style="text-align: center;">Figure 6 - Configuration Diagram for Test Case R-TRE-TP.5</p>
<p>Preparation</p>	<ul style="list-style-type: none"> ▪ Install the drivers for the PROD in accordance with the manufacturer provided documentation. ▪ Connect the PROD into the appropriate port on the Host System. ▪ Verify that the PROD is correctly installed by reviewing its presence in list of hardware using the device manager of the host system.

3.3.5.3 Test Process

<p>Test Steps:</p>	<ol style="list-style-type: none"> 1. Make sure that the details of PCARD-TA are entered into the Test Application by clicking File → Edit Reference Contact Card Implementation Info. 2. Select the Test Case radio button corresponding to R-TRE-TP.4 3. Click on the “Execute Selected Test” button. Follow the steps on the screen. 4. Click the “OK” button to proceed. 5. Verify that the test was completed by reviewing the result on the screen.
<p>Expected Result(s):</p>	<ol style="list-style-type: none"> 1. The test completes successfully showing that the Product does not read the PIV Card buffers through the contactless interface more than 10 cm away from the Product.

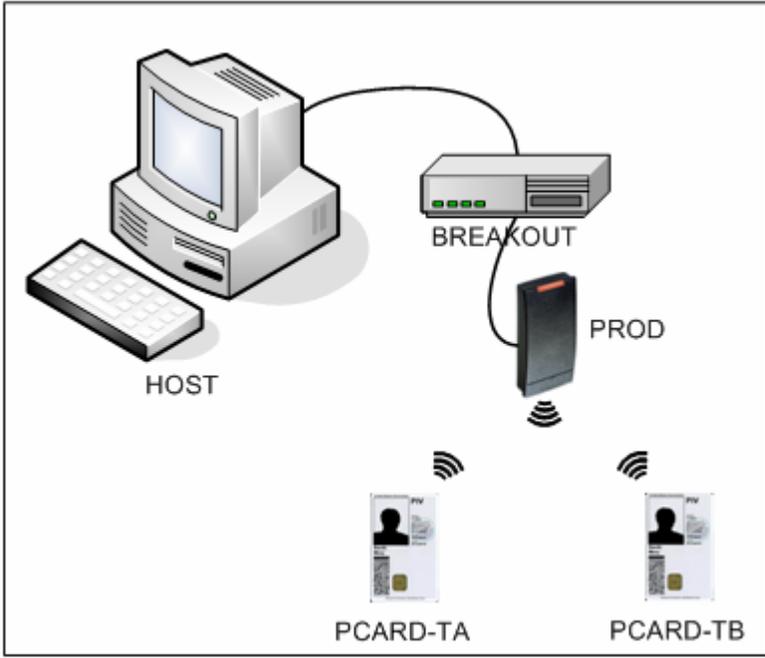
3.3.6 Test Case R-TRE-TP.6

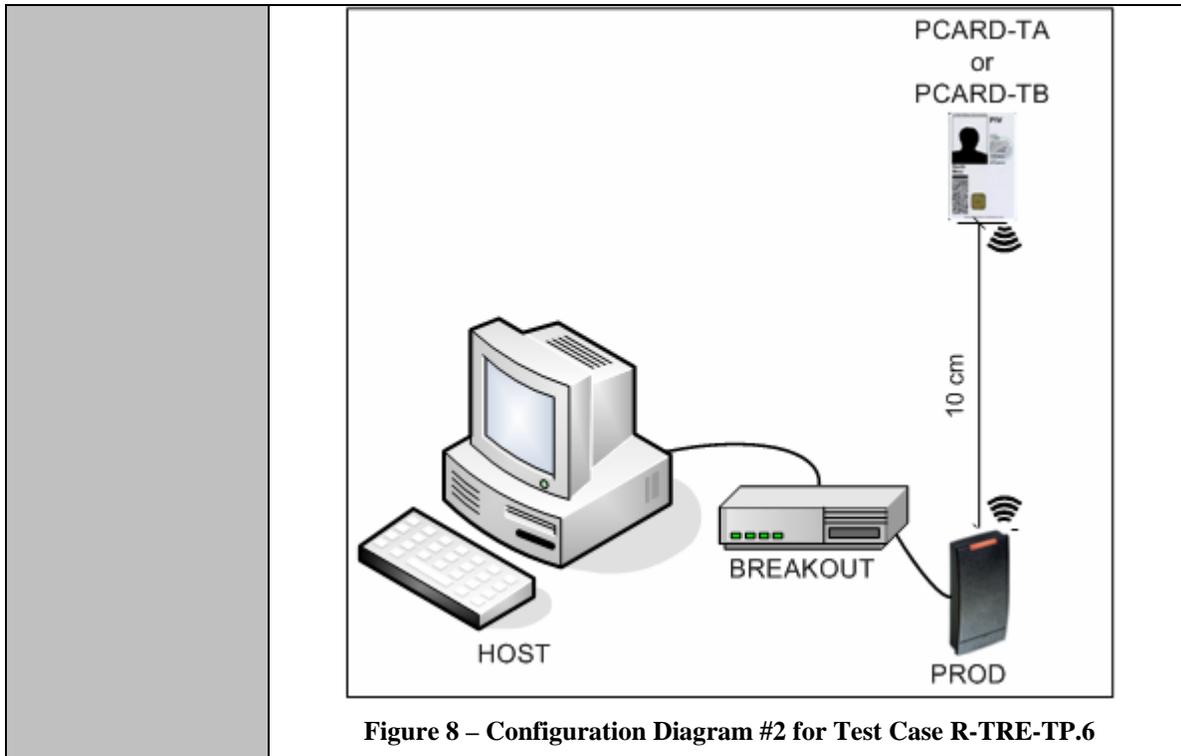
3.3.6.1 Purpose

The purpose of this test is to verify the following requirements for Wiegand-based (physical) contactless readers:

- i. PIV Card buffers are not readable through the contactless interface more than 10 cm from the Product.
- ii. The contactless interface of the reader supports both the Type A and Type B communication signal interfaces and transmission protocols as defined in ISO/IEC 14443-2:2001 and ISO/IEC 14443-4:2001, respectively.
- iii. Data retrieved from the PIV Card has been parsed into the proper data elements and passed to the host interface as the required string of bytes.

3.3.6.2 Test Setup

<p>Equipment :</p>	<p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ HOST ▪ PCARD-TA ▪ PCARD-TB ▪ PROD ▪ RULER <p>Note: This test case applies to only physical contactless readers</p>
<p>Configuration Diagram:</p>	 <p style="text-align: center;">Figure 7 – Configuration Diagram #1 for Test Case R-TRE-TP.6</p>



Preparation	<ul style="list-style-type: none"> ▪ Connect the PROD into the appropriate port on the breakout box. ▪ Ensure that the breakout box is connected to the appropriate port on the host system. ▪ Ensure that the 12v power supply to the breakout box is connected to a power source.
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3.3.6.3 Test Process

Test Steps:	<ol style="list-style-type: none"> 1. Make sure that the details of PCARD-TA and PCARD-B are entered into the Test Application by clicking File → Edit Reference Contact Card Implementation Info. 2. Select the “Transparent Reader (Contactless) tab in the Test Application. This selects the appropriate test screen for the Transparent Reader in the test application. 3. Select the “Physical Reader” checkbox in the Test Application 4. Click on the “Execute Test” button. Follow the steps on the screen. 5. Follow the instructions on the screen. 6. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	<ol style="list-style-type: none"> 1. The test completes successfully showing that the Product has: <ol style="list-style-type: none"> a. Communicated with the Type A and Type B PIV Cards. b. Not read PIV Card buffers from a distance of more than 10 cm from the Product.

	<p>c. Read data from both Type A and Type B PIV Cards and parsed the required data elements into the appropriate string of bytes and sent to the host interface.</p>
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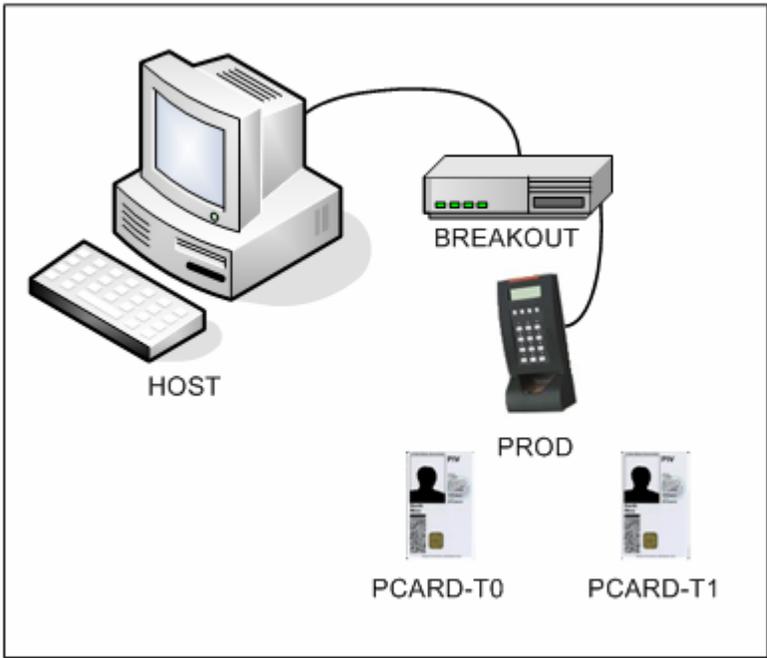
3.3.7 Test Case R-TRE-TP.7

3.3.7.1 Purpose

The purpose of this test is to verify the following requirements for Wiegand-based (physical) contact readers:

- i. The PIV reader supports the Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.
- ii. The contact interface of the reader supports both the T=0 and T=1 transmission protocols as defined in ISO/IEC 7816-3:1997.
- iii. Data retrieved from the PIV Card has been parsed into the proper data elements and passed to the host interface as the required string of bytes. This test case applies to readers with a Wiegand interface to the host system.

3.3.7.2 Test Setup

Equipment :	<p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ HOST ▪ PCARD-T0 ▪ PCARD-T1 ▪ PROD <p>Note: This test case applies to only physical contact readers</p>
Configuration Diagrams:	 <p>The diagram illustrates the test setup. On the left, a host computer system (monitor, tower, and keyboard) is labeled 'HOST'. A cable connects the host to a 'BREAKOUT' box. From the breakout box, another cable connects to a physical contact reader labeled 'PROD'. Below the reader, two PIV cards are shown, labeled 'PCARD-T0' and 'PCARD-T1'.</p>
<p>Figure 9 – Configuration Diagram for Test Case R-TRE-TP.7</p>	

Preparation	<ul style="list-style-type: none"> ▪ Connect the PROD into the appropriate port on the breakout box. ▪ Ensure that the breakout box is connected to the appropriate port on the host system. ▪ Ensure that the 12v power supply to the breakout box is connected to a power source.
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3.3.7.3 Test Process

Test Steps:	<ol style="list-style-type: none"> 1. Make sure that the details of PCARD-T0 and PCARD-T1 are entered into the Test Application by clicking File → Edit Reference Contact Card Implementation Info. 2. Select the “Transparent Reader (Contact) tab in the Test Application. This selects the appropriate test screen for the Transparent Reader in the test application. 3. Select the “Physical Reader” checkbox in the Test Application 4. Click on the “Execute Test” button. Follow the steps on the screen. 5. Follow the instructions on the screen. 6. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	<ol style="list-style-type: none"> 1. The test completes successfully showing that the Product: <ol style="list-style-type: none"> a. Supports the Class A operating class. b. Supports the T=0 and T=1 transmission protocols. c. Reads data from both T=0 and T=1 PIV Cards, parsed the required data elements into the appropriate string of bytes, and sent the string to the host interface.